



DEPARTMENT OF THE AIR FORCE
27TH SPECIAL OPERATIONS CIVIL ENGINEER SQUADRON (AFSOC)
CANNON AIR FORCE BASE NEW MEXICO

 **ENTERED**

FEB 03 2011

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Ms Patricia Stewart
Hazardous Waste Bureau
New Mexico Environment Department
2905 Rodeo Park Drive East Bldg 1
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Dear Ms Stewart

Attached are the revised replacement pages to the Comprehensive Site Evaluation Phase II Work Plan, Version 2.0, Military Munitions Response Program (MMRP), Cannon Air Force Base, New Mexico, September 2010. This is the response to the Approval with Modification presented in a letter from Mr. John Kieling, Program Manager, Permits Management Program, New Mexico Environment Department, dated January 13, 2011.

If you have any questions regarding this submittal, please contact Mr. Ronald Lancaster, Chief, Asset Management Flight, at (575) 784-1146.

Sincerely

RONALD A. LANCASTER, GS-13

Attachment:
Revised Replacement Pages to the Comprehensive Site Evaluation Phase II Work Plan, Version 2.0 (September 2010) (2)

cc:
New Mexico Environment Department, Mr. David Cobrain (w/o Attachment)
Environmental Protection Agency, Region VI, Ms Wendy Jacques (w/o Attachment)

7.0 DATA SCREENING VALUES

Inputs to the decision-making process for the CSE Phase II will include the collection and chemical analysis of surface and subsurface soil at the 1940s Skeet Range at Cannon AFB. All analytical data will be compared to regulatory screening levels to determine if releases have occurred at concentrations exceeding levels of potential concern. The following sections describe the assessment of the investigative data based on the regulatory screening values.

7.1 Comparison of Metals and PAH Data to Background Data

Cannon AFB has established background levels for naturally occurring metals and these levels will be used for comparison to the CSE Phase II analytical data. There are no known background data for PAHs at Cannon AFB; therefore, 7 to 10 background samples will be collected from similar areas outside the MRA and used for comparison to the MRA PAH analytical data.

7.2 Screening Values for Soil

Analytical results for the soil will be compared with applicable primary and secondary soil screening values, including the NMED SSLs (NMED, 2009) and the EPA RSLs (EPA, 2010) respectively. The NMED SSLs are derived using default exposure parameter values and chemical- and State of New Mexico-specific physical parameters. These default SSL values are assumed to be appropriately conservative and likely protective for the majority of site conditions relevant to soil exposures within New Mexico. The EPA RSLs are defined as chemical-specific concentrations for individual contaminants in soil that may warrant further investigation or cleanup. The RSLs address exposures to soil due to direct contact via ingestion, dermal absorption, and inhalation.

No ecological risk assessment will be completed for this site, as discussed in Section 4.5; therefore, no ecological screening values are presented. In addition, no soil screening values for protection of groundwater are presented because of the depth to groundwater, which is approximately 250 ft, compared to the expected shallow impacts from munitions-related activities.

Detected concentrations of lead and individual PAHs will be compared to primary NMED and secondary EPA screening values for soil presented in Table 7-1. The current and assumed future use of the site is residential and therefore Residential SSLs and RSLs are proposed for use although Industrial SSLs and RSLs are presented for comparison.

Table 7-1 – Soil Screening Levels

Analyte	Limit of Detection (mg/kg)	Reporting Limit (mg/kg)	NMED SSLs/EPA RSLs (mg/kg)	
			Residential ^a	Industrial ^a
Lead	0.5 – 20 ^b	5 - 20 ^b	400/400	800/800
Polynuclear Aromatic Hydrocarbons (PAHs)				
Acenaphthene	0.00125	0.0025	3,440/3,400	36,700/33,000
Acenaphthylene	0.00125	0.0025	None	None
Anthracene	0.00125	0.0025	17,200/17,000	183,000/170,000
Benzo(a)anthracene	0.00125	0.0025	6.21/0.15	23.4/2.1
Benzo(a)pyrene	0.00125	0.0025	0.621/0.015	2.34/0.21
Benzo(b)fluoranthene	0.00125	0.0025	6.21/0.15	23.4/2.1
Benzo(k)fluoranthene	0.00125	0.0025	62.1/1.5	234/21
Benzo(g,h,i)perylene	0.00125	0.0025	None	None
Chrysene	0.00125	0.0025	621/15	2,340/210
Dibenz(a,h)anthracene	0.00125	0.0025	0.621/0.015	2.34/0.21
Fluoranthene	0.00125	0.0025	2,290/2,300	24,400/22,000
Fluorene	0.00125	0.0025	2,290/2,300	24,400/22,000
Indeno(1,2,3-cd)pyrene	0.00125	0.0025	6.21/0.15	23.4/2.1
1-Methylnaphthalene	0.00125	0.0025	None/22	None/99
2-Methylnaphthalene	0.00125	0.0025	None/310	None/4,100
Naphthalene	0.00125	0.0025	45/3.6	252/18
Phenanthrene	0.00125	0.0025	1,830/None	20,500/None
Pyrene	0.00125	0.0025	1,720/1,700	18,300/17,000

^aThe first number is the primary NMED Soil Screening Level (SSL) and the second number is the secondary EPA Regional Screening Level (RSL) for soil.

^bThe first (lower) number in the range is for ICP analysis (limited number of samples), and the second (approximate) number in the range is for XRF analysis.

Table 9-1 – Cannon AFB Data Quality Objectives for 1940s Skeet Range MRA

DQO Elements		DQO Output	
		XRF Site Survey	Laboratory Analytical Samples
Step 1: State the Problem	Problem Statement	1940s Skeet Range was a skeet range. Activities at the range may have caused lead to be present in soil above the screening or action level criteria.	Due to historical activities at typical skeet ranges, lead and PAHs may be present in soil above the screening or action level criteria.
Step 2: Identify the Goal of the Study	Decision Statement	Determine the locations and horizontal and vertical impacts of range activities on the soil, including whether lead is above the 400 mg/kg threshold based on residential human health land use. Lead concentrations will be evaluated on-site using FPXRF for lead and correlated to off-site laboratory analyses.	Confirm the FPXRF method is appropriate for identifying soil with lead above the action level criteria, and establishing the boundaries of soil contamination. Determine the impacts of range activities on PAH concentrations in the soil, including whether PAHs are above background concentrations. PAH concentrations will be evaluated by off-site laboratory analyses; the extent of the impact will be determined visually by the presence or absence of clay target fragments.
	Alternative Actions	If lead is detected above the action level, the results will be used to evaluate the volume of contaminated soil. If lead is not detected above the screening or action level criteria and confirmed by laboratory analysis, NFA will be recommended.	If lead and PAHs are not detected above the screening or action level criteria, NFA will be recommended. If lead and/or PAHs are detected above the screening or action level criteria, future military munitions response actions may be recommended.
Step 3: Identify Information Inputs	Chemicals Of Interest	Surface and subsurface soil will be sampled at the range and analyzed for lead using FPXRF. Replicate samples will be collected at a 10% frequency and analyzed for QA/QC samples. Correlation samples will be collected and sent to the offsite laboratory for lead analysis by SW6010B. Samples will be selected from the range of observed XRF values, with samples typically ranging from less than 100 ppm, 100 – 250 ppm and greater than 250 ppm (up to 600 ppm).	Munitions fired at skeet ranges contain shot, which is composed primarily of lead. Although other metals can be associated with range activities (e.g., primarily antimony, arsenic, and barium), lead is typically the risk driver and found at the same locations as the other metals. Clay pigeon targets contain PAHs from the typical coal tar binder. PAHs are chemicals of interest where target fragments are present; only these locations will be sampled for PAHs.
	Physical Data	Map locations indicating locations and areas to be sampled, and coordinates for actual sampling locations.	Map locations indicating locations and areas to be sampled, and coordinates for actual sampling locations.
	Sampling Method	Stainless steel or disposable hand tools.	Stainless steel or disposable hand tools.

Table 9-1 – Cannon AFB Data Quality Objectives for 1940s Skeet Range MRA

DQO Elements		DQO Output	
		XRF Site Survey	Laboratory Analytical Samples
Analytical Methods	Field Data: (Solid - soil) Lead: FPXRF per SOP, SW-846 Method 6200	Lab Data: (Solid - soil) Lead: SW-846 Method 6010B PAHs: SW-846 Method 8270C	
Method Quantitation Limits	Refer to Table 9-2.	Refer to Table 9-2.	
Field Quality Control Samples	Field Duplicates (1 per 10 samples)	Field Duplicate (1 per 10 samples). MS/MSD (1 pair per 20 samples) Field blank (1 per day per analyte group, when using non-dedicated or reusable sampling devices)	
Data Use	Site Delineation	CSE Phase II Report and DMT	
Action Level Criteria	For determination of lead hazards in soil the NMED Soil Screening Level - Residential value of 400 mg/kg will be the primary evaluation criteria; the secondary source evaluation criteria (EPA Regional Screening Level - Residential) value is also 400 mg/kg.	For determination of lead and PAH hazards in soil, applicable NMED Soil Screening Level - Residential values will be used as primary evaluation criteria; applicable EPA Regional Screening Level - Residential values will be used as secondary evaluation criteria (see Table 7-1). No ecological risk-based soil screening levels or action levels will be applied to the site data.	
Step 4: Define the Boundaries of the Study	Media To Sample	Surface soil (0.0 to 0.5 foot bgs) & subsurface soil (0.5 foot intervals to 3 feet bgs), or as necessary to define the depth of contamination) at the MRA.	Surface soil (0.0 to 0.5 foot bgs) & subsurface soil (0.5 foot intervals to 3 feet bgs), or as necessary to define the depth of contamination at the MRA.
	Spatial Boundaries	See Figure 1-2 and Figure 3-1.	See Figure 1-2 and Figure 3-1.
	Time Frame	Analyses completed before demobilization.	Standard analysis (30 days) of lead correlation samples. Standard analysis of PAH samples.
	Practical Constraints	Portions of the MRA are currently off-base. Private property ROE access may be required.	Portions of the MRA are currently off-base. Private property ROE access may be required.
	Scale	See Figure 1-2 and Figure 3-1.	See Figure 1-2 and Figure 3-1.

Table 9-1 – Cannon AFB Data Quality Objectives for 1940s Skeet Range MRA

DQO Elements		DQO Output	
		XRF Site Survey	Laboratory Analytical Samples
Step 5: Develop the Analytic Approach	Decision Rule	If concentrations of lead are below the screening or action level criteria, NFA is recommended. If concentrations are above the screening or action level criteria, a military munitions response action may be recommended.	Based on historic operations, and refined by field operations, or where clay target fragments are observed, range samples will be analyzed for PAHs. If concentrations of lead and PAHs are below screening or action level criteria, NFA is recommended. If concentrations are above the screening or action level criteria, a military munitions response action may be recommended.
Step 6: Specify Performance or Acceptance Criteria	Tolerance Limits	Data Completeness	Data Usability/Completeness
Step 7: Develop the Detailed Plan for Obtaining Data	Sampling Design	<p>Proposed sample locations are approximately 160 feet apart within or near the likely maximum shot fall zone (300 to 680 feet down range) and approximately 160 feet apart outside the maximum shot fall zone. Samples will be collected from the upper six inches of the soil if the site appears undisturbed. Any clay or shot fragments will be removed from the sample. If the lead result in the surface soil sample exceeds 400 mg/kg, samples will be collected at 6 to 12 inches and in 6-inch increments to maximum depth of 36 inches, or refusal, if the results for lead continue to exceed 400 mg/kg in each subsequent sample.</p> <p>If the ground has been significantly disturbed, samples will be collected to a maximum depth of about three feet bgs, at the rate of one subsurface sample per two acres. Lithology of the samples will be documented.</p>	<p>Lead correlation sample locations will be collected at the rate of one per acre of range, and be split from soil samples analyzed by XRF, and selected based on the results from the XRF analysis. Results will be statistically assessed to determine the correlation between the XRF results and analytical results and to verify XRF field screening results.</p> <p>General areas for PAH sampling will be identified based on historic operations and expected region of fall-out. Final sample locations will be refined in the field based on visual observation. Approximately one PAH sample will be collected per acre of range (not including QC samples).</p>

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APPENDIX D. REFERENCES

Black & Veatch. 2008. *General Plan, Cannon AFB, New Mexico*. February.

CH2M Hill. 1983. *Installation Restoration Program Records Search for Cannon AFB, New Mexico*. August.

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Cannon AFB has established background levels for naturally occurring metals and these levels will be used for comparison to the CSE Phase II analytical data. There are no known background data for PAHs at Cannon AFB; therefore, 7 to 10 background samples will be collected from similar areas outside the MRA and used for comparison to the MRA PAH analytical data.

7.2 Screening Values for Soil

Analytical results for the soil will be compared with applicable primary and secondary soil screening values, including the NMED SSLs (NMED, 2009) and the EPA Human Health Medium-Specific Regional Screening Levels (RSLs) (EPA, 2010), for the evaluation of human health based on the CSE Phase II analytical data respectively. The NMED SSLs are derived using default exposure parameter values and chemical- and State of New Mexico-specific physical parameters. These default SSL values are assumed to be appropriately conservative and likely protective for the majority of site conditions relevant to soil exposures within New Mexico are either equivalent or higher values for the chemicals of concern. The EPA RSLs are defined as chemical-specific concentrations for individual contaminants in soil that may warrant further investigation or cleanup. These values are based on an incremental lifetime cancer risk of 1×10^{-6} and noncancer hazard quotient of 1. RSLs have been developed for residential and industrial/commercial scenarios. The residential soil RSLs are based on exposures to child and adult residents during typical daily activities. For carcinogens, residential RSLs are based on combined childhood and adult exposure over a 30-year period. For noncarcinogens, residential RSLs are based on childhood exposure from 1 to 6 years of age. The industrial RSLs are based on exposures to outdoor workers in a typical industrial/commercial workplace for 25 years. The RSLs address exposures to soil due to direct contact via ingestion, dermal absorption, and inhalation.

No ecological risk assessment will be completed for this site, as discussed in Section 4.5; therefore, no ecological screening values are presented. In addition, no soil screening values for protection of groundwater are presented because of the depth to groundwater, which is approximately 250 ft, compared to the expected shallow impacts from munitions-related activities.

Detected concentrations of lead and individual PAHs will be compared to the primary NMED and secondary EPA screening values for soil presented in Table 7-1. The current and assumed future use of the site is residential and therefore Residential SSLs and EPA-RSLs are proposed for use although Industrial SSLs industrial land use and RSLs are presented for comparison.

Table 7-1 – Soil Screening Levels

Analyte	Limit of Detection (mg/kg)	Reporting Limit (mg/kg)	NMED SSLs/EPA RSLs ^a (mg/kg)	
			Residential ^a	Industrial ^a
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Acenaphthene	0.00125	0.0025	<u>3,440</u> /3,400	<u>36,700</u> /33,000
Acenaphthylene	0.00125	0.0025	None	None
Anthracene	0.00125	0.0025	<u>17,200</u> /17,000	<u>183,000</u> /170,000
Benzo(a)anthracene	0.00125	0.0025	<u>6.21</u> /0.15	<u>23.4</u> /2.1
Benzo(a)pyrene	0.00125	0.0025	<u>0.621</u> /0.015	<u>2.34</u> /0.21
Benzo(b)fluoranthene	0.00125	0.0025	<u>6.21</u> /0.15	<u>23.4</u> /2.1
Benzo(k)fluoranthene	0.00125	0.0025	<u>62.1</u> /1.5	<u>234</u> /21
Benzo(g,h,i)perylene	0.00125	0.0025	None	None
Chrysene	0.00125	0.0025	<u>621</u> /15	<u>2,340</u> /210
Dibenz(a,h)anthracene	0.00125	0.0025	<u>0.621</u> /0.015	<u>2.34</u> /0.21
Fluoranthene	0.00125	0.0025	<u>2,290</u> /2,300	<u>24,400</u> /22,000
Fluorene	0.00125	0.0025	<u>2,290</u> /2,300	<u>24,400</u> /22,000
Indeno(1,2,3-cd)pyrene	0.00125	0.0025	<u>6.21</u> /0.15	<u>23.4</u> /2.1
1-Methylnaphthalene	0.00125	0.0025	<u>None</u> /22	<u>None</u> /99
2-Methylnaphthalene	0.00125	0.0025	<u>None</u> /310	<u>None</u> /4,100
Naphthalene	0.00125	0.0025	<u>45</u> /3.6	<u>252</u> /18
Phenanthrene	0.00125	0.0025	1,830/ <u>None</u> ^e	20,500/ <u>None</u> ^e
Pyrene	0.00125	0.0025	<u>1,720</u> /1,700	<u>18,300</u> /17,000

^aThe first number is the primary NMED Soil Screening Level (SSL) and the second number is the secondary EPA Regional Screening Levels (RSLs) for soil. ~~(May 2010) unless otherwise noted (see Footnote c)~~

^bThe first (lower) number in the range is for ICP analysis (limited number of samples), and the second (approximate) number in the range is for XRF analysis.

^eNo EPA RSL is available, so the NMED SSL (December 2009) is substituted.

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Table 9-1 – Cannon AFB Data Quality Objectives for 1940s Skeet Range MRA

DQO Elements		DQO Output	
		XRF Site Survey	Laboratory Analytical Samples
Step 1: State the Problem	Problem Statement	1940s Skeet Range was a skeet range. Activities at the range may have caused lead to be present in soil above the screening or action level criteria.	Due to historical activities at typical skeet ranges, lead and PAHs may be present in soil above the screening or action level criteria.
Step 2: Identify the Goal of the Study	Decision Statement	Determine the locations and horizontal and vertical impacts of range activities on the soil, including whether lead is above the 400 mg/kg threshold based on residential human health land use. Lead concentrations will be evaluated on-site using FPXRF for lead and correlated to off-site laboratory analyses.	Confirm the FPXRF method is appropriate for identifying soil with lead above the action level criteria, and establishing the boundaries of soil contamination. Determine the impacts of range activities on PAH concentrations in the soil, including whether PAHs are above background concentrations. PAH concentrations will be evaluated by off-site laboratory analyses; the extent of the impact will be determined visually by the presence or absence of clay target fragments.
	Alternative Actions	If lead is detected above the action level, the results will be used to evaluate the volume of contaminated soil. If lead is not detected above the screening or action level criteria and confirmed by laboratory analysis, NFA will be recommended.	If lead and PAHs are not detected above the screening or action level criteria, NFA will be recommended. If lead and/or PAHs are detected above the screening or action level criteria, future military munitions response actions may be recommended.
Step 3: Identify Information Inputs	Chemicals Of Interest	Surface and subsurface soil will be sampled at the range and analyzed for lead using FPXRF. Replicate samples will be collected at a 10% frequency and analyzed for QA/QC samples. Correlation samples will be collected and sent to the offsite laboratory for lead analysis by SW6010B. Samples will be selected from the range of observed XRF values, with samples typically ranging from less than 100 ppm, 100 – 250 ppm and greater than 250 ppm (up to 600 ppm).	Munitions fired at skeet ranges contain shot, which is composed primarily of lead. Although other metals can be associated with range activities (e.g., primarily antimony, arsenic, and barium), lead is typically the risk driver and found at the same locations as the other metals. Clay pigeon targets contain PAHs from the typical coal tar binder. PAHs are chemicals of interest where target fragments are present; only these locations will be sampled for PAHs.
	Physical Data	Map locations indicating locations and areas to be sampled, and coordinates for actual sampling locations.	Map locations indicating locations and areas to be sampled, and coordinates for actual sampling locations.
	Sampling Method	Stainless steel or disposable hand tools.	Stainless steel or disposable hand tools.

Table 9-1 – Cannon AFB Data Quality Objectives for 1940s Skeet Range MRA

DQO Elements		DQO Output	
		XRF Site Survey	Laboratory Analytical Samples
	Analytical Methods	Field Data: (Solid - soil) Lead: FPXRF per SOP, SW-846 Method 6200	Lab Data: (Solid - soil) Lead: SW-846 Method 6010B PAHs: SW-846 Method 8270C
	Method Quantitation Limits	Refer to Table 9-2.	Refer to Table 9-2.
	Field Quality Control Samples	Field Duplicates (1 per 10 samples)	Field Duplicate (1 per 10 samples). MS/MSD (1 pair per 20 samples) Field blank (1 per day per analyte group, when using non-dedicated or reusable sampling devices)
	Data Use	Site Delineation	CSE Phase II Report and DMT
	Action Level Criteria	For determination of lead hazards in soil; the <u>NMED Soil Screening Level - Residential value of 400 mg/kg will be the primary evaluation criteria; the secondary source evaluation criteria (EPA Regional Screening Level - (2010) for residential use/Residential) value of is also 400 -mg/kg will be used.</u> [†]	For determination of lead and PAH hazards in soil, the applicable NMED Soil Screening Level - Residential values will be used as primary evaluation criteria; applicable EPA Regional Screening Level - (2010) for residential-Residential values use will be used <u>as secondary evaluation criteria</u> (see Table 7-1). No ecological risk-based soil screening levels or action levels will be applied to the site data.
Step 4: Define the Boundaries of the Study	Media To Sample	Surface soil (0.0 to 0.5 foot bgs) & subsurface soil (0.5 foot intervals to 3 feet bgs), or as necessary to define the depth of contamination) at the MRA.	Surface soil (0.0 to 0.5 foot bgs) & subsurface soil (0.5 foot intervals to 3 feet bgs), or as necessary to define the depth of contamination at the MRA.
	Spatial Boundaries	See Figure 1-2 and Figure 3-1.	See Figure 1-2 and Figure 3-1.
	Time Frame	Analyses completed before demobilization.	Standard analysis (30 days) of lead correlation samples. Standard analysis of PAH samples.
	Practical Constraints	Portions of the MRA are currently off-base. Private property ROE access may be required.	Portions of the MRA are currently off-base. Private property ROE access may be required.
	Scale	See Figure 1-2 and Figure 3-1.	See Figure 1-2 and Figure 3-1.

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DQO Elements		DQO Output	
		XRF Site Survey	Laboratory Analytical Samples
Step 5: Develop the Analytic Approach	Decision Rule	If concentrations of lead are below the screening or action level criteria, NFA is recommended. If concentrations are above the screening or action level criteria, a military munitions response action may be recommended.	Based on historic operations, and refined by field operations, or where clay target fragments are observed, range samples will be analyzed for PAHs. If concentrations of lead and PAHs are below screening or action level criteria, NFA is recommended. If concentrations are above the screening or action level criteria, a military munitions response action may be recommended.
Step 6: Specify Performance or Acceptance Criteria	Tolerance Limits	Data Completeness	Data Usability/Completeness
Step 7: Develop the Detailed Plan for Obtaining Data	Sampling Design	<p>Proposed sample locations are approximately 160 feet apart within or near the likely maximum shot fall zone (300 to 680 feet down range) and approximately 160 feet apart outside the maximum shot fall zone. Samples will be collected from the upper six inches of the soil if the site appears undisturbed. Any clay or shot fragments will be removed from the sample. If the lead result in the surface soil sample exceeds 400 mg/kg, samples will be collected at 6 to 12 inches and in 6-inch increments to maximum depth of 36 inches, or refusal, if the results for lead continue to exceed 400 mg/kg in each subsequent sample.</p> <p>If the ground has been significantly disturbed, samples will be collected to a maximum depth of about three feet bgs, at the rate of one subsurface sample per two acres. Lithology of the samples will be documented.</p>	<p>Lead correlation sample locations will be collected at the rate of one per acre of range, and be split from soil samples analyzed by XRF, and selected based on the results from the XRF analysis. Results will be statistically assessed to determine the correlation between the XRF results and analytical results and to verify XRF field screening results.</p> <p>General areas for PAH sampling will be identified based on historic operations and expected region of fall-out. Final sample locations will be refined in the field based on visual observation. Approximately one PAH sample will be collected per acre of range (not including QC samples).</p>

[†]EPA, 4010

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APPENDIX D. REFERENCES

Black & Veatch. 2008. *General Plan, Cannon AFB, New Mexico*. February.

CH2M Hill. 1983. *Installation Restoration Program Records Search for Cannon AFB, New Mexico*. August.

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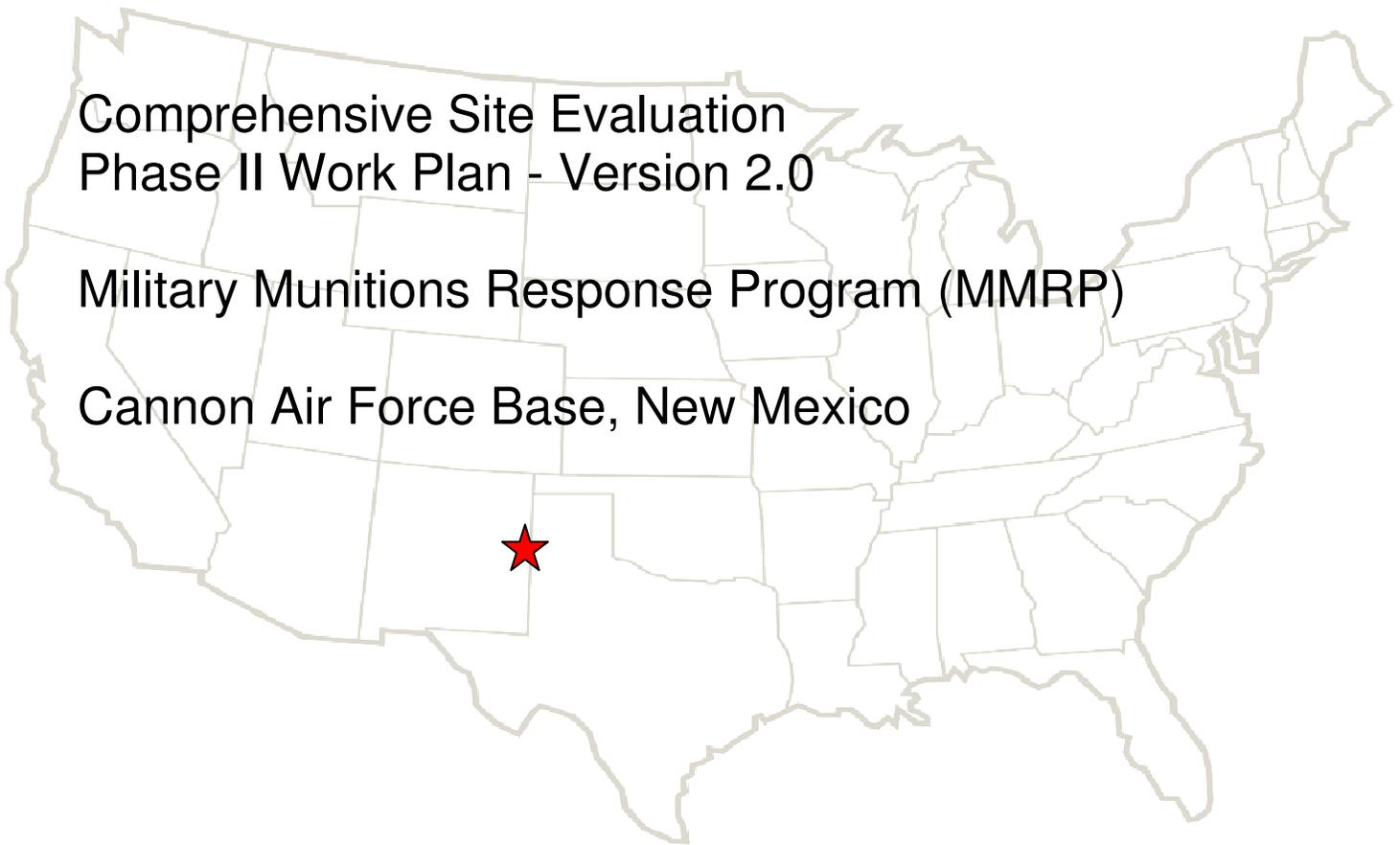


US Air Force

Prepared by:



US Army Corps of Engineers®
Omaha District



Comprehensive Site Evaluation
Phase II Work Plan - Version 2.0

Military Munitions Response Program (MMRP)

Cannon Air Force Base, New Mexico

September 2010



Comprehensive Site Evaluation Phase II Work Plan

Version 2.0

Military Munitions Response Program

Cannon Air Force Base, New Mexico



Prepared for:

Headquarters, Air Force Special Operations Command

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1.0 INTRODUCTION

1.1 Project Authorization

This project consists of performing Comprehensive Site Evaluation (CSE) Phase II activities for one munitions response area (MRA) previously identified as the 1940s Skeet Range at Cannon Air Force Base (AFB), New Mexico, under the Air Force (AF) Military Munitions Response Program (MMRP). Cannon AFB is located in Curry County, New Mexico, approximately eight miles west of the City of Clovis (Figure 1-1). The MRA identified at Cannon AFB, based on the Modified CSE Phase I findings, is depicted on Figure 1-2.

The goal of the AF MMRP is to make MRA safe for reuse and to protect human health and the environment in the process. The MMRP addresses issues related to munitions and explosives of concern (MEC) and munitions constituents (MC) associated with MRA, as well as related contaminants of potential concern (COPCs) on range areas that are no longer active.

The CSE Phase I and II are essentially analogous to a Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) Preliminary Assessment (PA) and Site Inspection (SI), respectively; with greater data requirements. In support of the MMRP at Cannon AFB, a Final Modified CSE Phase I investigation was completed in December 2009 (United States Army Corps of Engineers [USACE], 2009) (Appendix A). As cited in the Modified CSE Phase I Report, the Modified CSE Phase I effort was conducted in accordance with the AF's CSE Guidance (*Draft Air Force Guide for Conducting the Comprehensive Site Evaluation Phase I at Air Force Munitions Response Areas, Version 8.3 REV; 2005*) (United States Air Force [USAF], 2005). The purpose of the Modified CSE Phase I was to identify and locate all potential MRA across the installation by performing historical records review (HRR) interviews and site reconnaissance. This information was used to evaluate the extent of MEC and/or potential for MC exposure at the site.

This CSE Phase II Work Plan has been prepared in accordance with the format and guidelines of the AF MMRP. The CSE Phase II will be performed in accordance with the AF's CSE Phase II Guidance (*Air Force Guide for Conducting the Comprehensive Site Evaluation Phase II at Air Force Munitions Response Areas, Version 4.0, October*) (USAF, 2006). The CSE Phase II effort at the MRA identified during the Modified CSE Phase I will include MEC and MC investigation activities in accordance with the CERCLA, and its implementing regulation, the National Contingency Plan (NCP). Activities in locations that may present MEC hazards are required to be in compliance with the Department of Defense (DoD), AF, Army, and USACE requirements regarding personnel, equipment, and procedures. Under the Modified CSE Phase I for Cannon AFB, no MEC hazards were identified at the MRA.

1.2 Purpose and Scope

The objective of this Work Plan is to present the management, operational, safety, and environmental protection procedures necessary to conduct the CSE Phase II investigations. The field investigation for the MRA will comprise three main tasks: 1) visual survey; 2) soil sampling for on-site X-ray fluorescence (XRF) analysis; and 3) soil sampling and off-site laboratory analysis. The approaches for these efforts have been included in this Work Plan to facilitate project review and scope comprehension. These activities will be performed to

characterize the Cannon AFB MRA to determine impacts associated with historical military munitions related activities.

1.3 Overview of Cannon AFB CSE Phase II

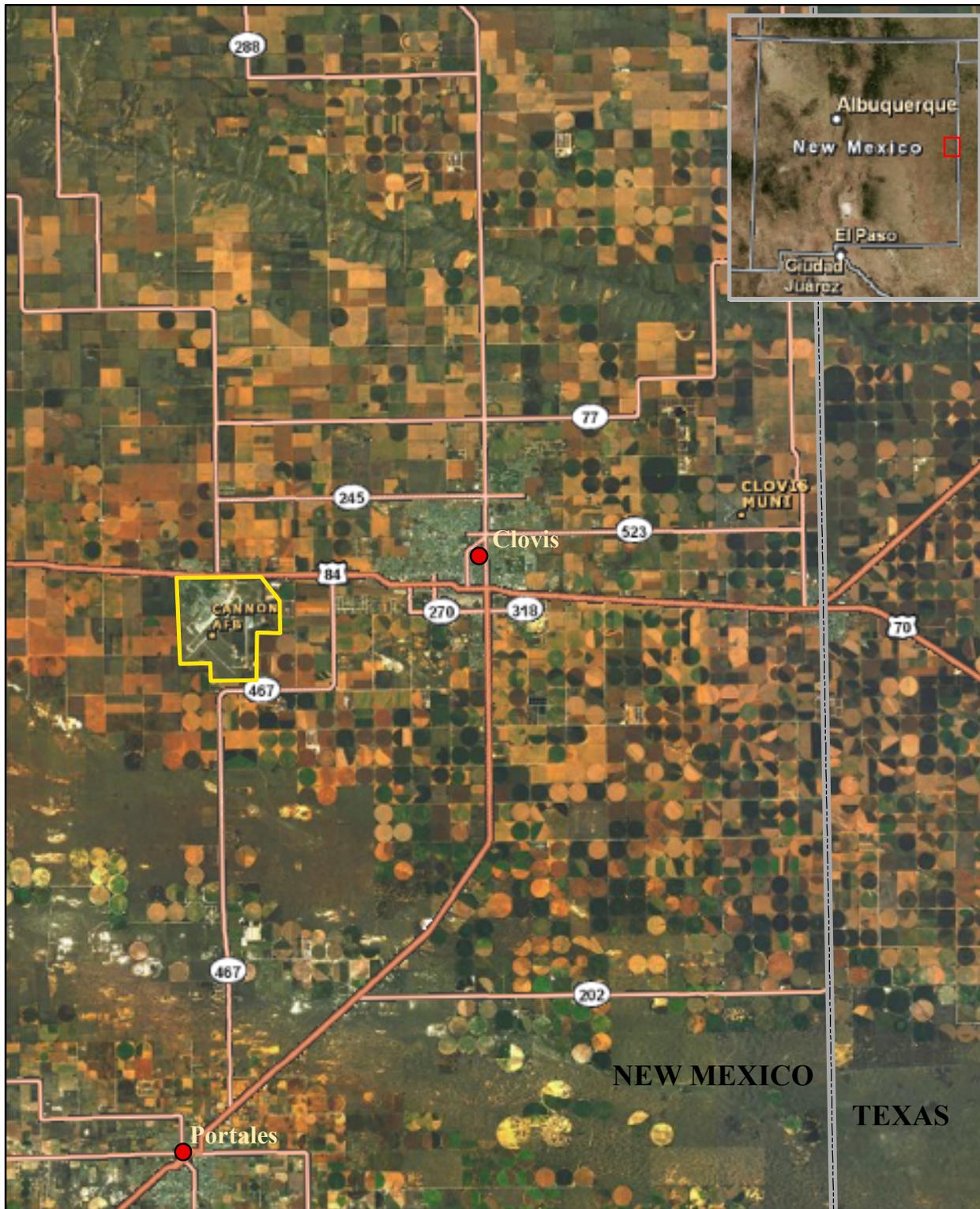
The goals of the CSE Phase II are to determine whether the MRA identified at Cannon AFB requires additional munitions response actions, and if so, provide recommendations for those actions; or provide documentation for No Further Action (NFA). While a CSE Phase II is similar to a CERCLA SI, the CSE Phase II investigation differs from the traditional SI with respect to the data requirements. The SI is primarily focused on obtaining data required for Hazard Ranking System (HRS) scoring. The CSE Phase II utilizes an expanded array of analytical, tracking, and reporting tools to support decision-making, and therefore has greater data requirements. Tools used as part of the CSE include:

- Conceptual Site Model (CSM) for planning, modeling, and data interpretation of source/receptor interaction and communication among the project team;
- Munitions Response Site Prioritization Protocol (MRSP) to prioritize sites for further munitions response actions;
- HRS data to allow screening and ranking by the United States Environmental Protection Agency (EPA) using EPA standard protocol for determining relative risk;
- AF Restoration Information Management System (AFRIMS) for a range of program management functions, including data calls and audits; and
- Remedial Action Cost Engineering Requirements (RACER) MMRP module for estimating the costs of future munitions response actions.

Components of the typical CSE Phase I for Cannon AFB were deferred to the CSE Phase II, including the HRS, the CSM, and the MRSP. MRA identified in this CSE Phase II will employ these tools.

The primary goals and performance objectives of the CSE Phase II investigations under the AF MMRP are to:

- Determine if further munitions response actions are required at the MRA investigated and provide a recommendation for what this action should be;
- Determine if there is a need for an emergency response and/or other removal action at any MRA on the installation;
- Determine the approximate extent and density of anomalies across the MRA investigated, and where appropriate, make recommendations to subdivide the MRA into discrete Munitions Response Sites (MRSs);



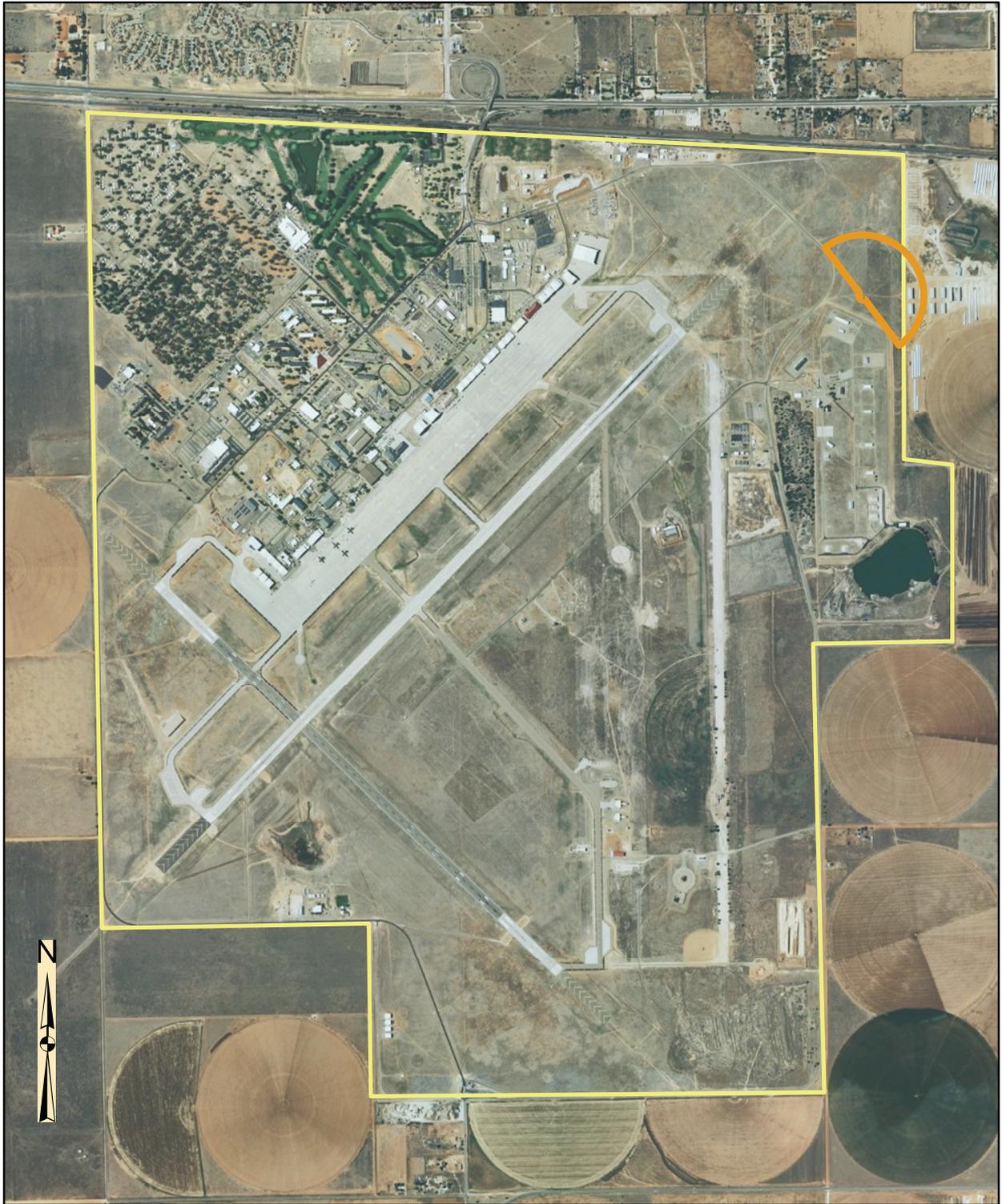
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-  State Border
-  Cannon AFB



 <p>U.S. ARMY CORPS OF ENGINEERS OMAHA DISTRICT</p>	
<p>MILITARY MUNITIONS RESPONSE PROGRAM</p>	
<p>FIGURE 1-1</p>	<p>SITE LOCATION CANNON AFB</p>
	

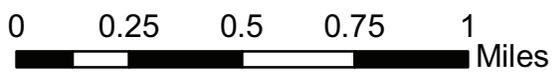
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Legend

— Skeet Range

□ Cannon AFB



**U.S. ARMY
CORPS OF ENGINEERS
OMAHA DISTRICT**

MILITARY MUNITIONS RESPONSE PROGRAM

**FIGURE
1-2**

**Figure 1-2
MRA Location
Cannon AFB, New Mexico**



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- Determine the likelihood that known or suspected MEC can affect specific receptors;
- Determine whether releases of MC to the environment have occurred as a result of past military munitions activities within the MRA;
- Determine the vertical and horizontal extent of MC contamination, if MCs are identified;
- Determine whether MCs, hazardous substances, pollutants and contaminants, or other constituents have affected specific receptors;
- Collect sufficient data for evaluation pursuant to the DoD's MRSPP;
- Collect sufficient data to facilitate evaluation pursuant to the EPA HRS;
- Collect sufficient data to support the development of an accurate CSM;
- Collect sufficient data to support cost estimating for further munitions response actions, using RACER; and
- Collect sufficient data to support updating program management information in AFRIMS.

As further described in Section 5.0, the CSE Phase II for Cannon AFB will consist of a visual survey, sampling and on-site analysis by XRF for lead in soil, and sampling and off-site laboratory analysis for lead and polynuclear aromatic hydrocarbons (PAHs) in soil. Data will be obtained on a site-specific (i.e., MRA) basis. This Work Plan has been prepared as an adaptive work plan, following the Triad concepts of systematic planning, dynamic work strategies (DWS), and real-time measurement systems (EPA, 2003, 2004, and 2005; Interstate Technology & Regulatory Council [ITRC], 2003a). Ultimately, this strategy is intended to reduce repetitive tasks, limit redundant information, and minimize the number of mobilizations.

1.4 Data Needs Analysis

Per the *Air Force Guide for Conducting the Comprehensive Site Evaluation Phase II at Air Force Munitions Response Areas (Version 4.0)* (USAF, 2006), the Modified CSE Phase I Report for Cannon AFB (USACE, 2009) and other relevant and available information were reviewed to identify potential data gaps. Data requirements for the MRA as presented in the Modified CSE Phase I Report are summarized in Table 1-1.

1.5 Work Plan Content

This Work Plan is composed of ten sections as follows:

- **Section 1.0 - Introduction:** This section presents the introduction, CSE Phase II project objectives, and organization of this Work Plan.
- **Section 2.0 - Project Management:** This section presents the organizational structure, identifies the primary project staff and their respective roles and responsibilities for the CSE Phase II activities, as well as the deliverables and schedule for the work to be completed.

Table 1-1 – Data Requirements for Cannon AFB CSE Phase II Activities

MRA	Scope	Proposed CSE Phase II Activities	Potential Results and Proposed Path Forward
1940s Skeet Range	Evaluate whether lead and/or PAHs are present above applicable screening or regulatory levels.	<p>Perform a visual survey of the MRA to evaluate the location and features of the site.</p> <p>Conduct on-site XRF analysis of surface and subsurface soil to evaluate if lead is present above the 400 milligrams per kilogram (mg/kg) screening level (Table 7-1). If lead is present above this level, delineate the lateral and vertical extent of these elevated lead concentrations. Confirm the XRF analysis by off-site laboratory analysis.</p> <p>Where there is evidence of clay target debris, conduct off-site laboratory analysis of soil to evaluate if PAHs are present above the screening levels (Table 7-1). If PAHs are present above these levels, delineate the lateral and vertical extent of the clay target fragments. In areas of site where no clay targets are present, no PAH sampling will be conducted.</p>	<p>If lead or PAHs are present above screening levels, recommend appropriate response actions.</p> <p>If lead and PAHs are not present above screening levels, propose NFA.</p>

- Section 3.0 - Site Description:** This section describes the history of Cannon AFB and its military munitions-related activities; a physical description of the installation; a summary of previous investigations relevant to the CSE Phase II efforts; and a summary of the specific types of MEC and hazards that are anticipated.

- **Section 4.0 - Interim Conceptual Site Model and Exposure Pathway Analysis:** This section describes the ICSM developed for the Cannon AFB MRA and evaluates the media and transport mechanisms associated with potential MEC/MC.
- **Section 5.0 – CSE Phase II Field Work:** This section describes the project mobilization, equipment, and proposed investigation activities to be performed at the installation. Specifically, the visual surveying, sampling and on-site XRF analysis, and other sampling and off-site laboratory analysis procedures are discussed.
- **Section 6.0 - MEC Planning and Operations:** This section describes the precautions associated with working in areas potentially containing MEC. Additionally, the identification and management of potential MEC as well as the personnel qualifications for this project are discussed.
- **Section 7.0 - Data Screening Values:** This section discusses the screening values to be used to conduct a human health risk screening for environmental media.
- **Section 8.0 - Data Management:** This section discusses how data will be managed for the duration of the project. Specifically, data generation, reporting, review, and evaluation are discussed, as well as the final data presentation.
- **Section 9.0 - Quality Assurance Project Plan:** This section describes the quality assurance (QA) requirements and procedures to be implemented for this project.
- **Section 10.0 – Accident Prevention Plan and Site Safety and Health Plan (APP/SSHP):** This section describes the safety procedures that will be used to execute all facets of the CSE Phase II field work.

Tables and figures are embedded in the text where first referenced. The Final Modified CSE Phase I Report is included in Appendix A. Definitions are presented in Appendix B, acronyms and abbreviations are included in Appendix C, and references are contained in Appendix D. Appendix E contains the standard table of contents for CSE Phase II reports. The APP/SSHP is presented as Appendix F. Appendix G contains Standard Operating Procedures (SOPs). Appendix H contains off-site laboratory accreditation.

1.6 Changes to the Work Plan

The activities proposed in this Work Plan, as well as the supporting rationale, are based on careful evaluation of the best information available to the authors. However, during execution of the work, unforeseen circumstances or events may arise that require modification to the procedures discussed herein. All significant procedure modifications will be coordinated with the stakeholders, as warranted, prior to the implementation of the change(s). These changes will be documented by “change pages” and also noted in the CSE Phase II Report.

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2.0 PROJECT MANAGEMENT

2.1 *Project Objectives*

The objective of this Work Plan is to present the procedures necessary to conduct an investigation that characterizes the MRA on the installation. The investigation will recommend and provide sufficient documentation for whether the MRA warrants additional munitions response activities or NFA determination. The CSE Phase II Report will summarize the results of each visual survey, results of sampling for on-site XRF analysis and off-site laboratory analysis, and present all project findings. In addition, the CSE Phase II Report will provide, if necessary, a recommendation for the MRA for future munitions response activities.

The specific goals and performance objectives for collecting information to meet these data requirements are outlined in Section 1.3.

2.2 *Project Organization*

The project organizational structure is presented in Figure 2-1. The following organizations have major roles in this investigation:

Air Force Major Command (MAJCOM): Air Force Special Operations Command (AFSOC) – AFSOC is the MAJCOM responsible for Cannon AFB. John Steele (AFSOC/A7AV) is the AFSOC representative for the work being performed at Cannon AFB.

Installation: Cannon AFB – Mr. Hugh Hanson (27 SOCES/CEAN) is the on-site environmental point of contact (POC) for completion of the CSE Phase II at Cannon AFB. All on-site activities will be coordinated through him.

USACE, Project Manager (PM) – the Omaha District is the AF Contract Service Center (CSC) for this work. Mr. Glenn Marks, PMP, is the USACE project manager and is responsible for overall project management, contract administration, QA, and acceptance/approval of milestones with input from the installation.

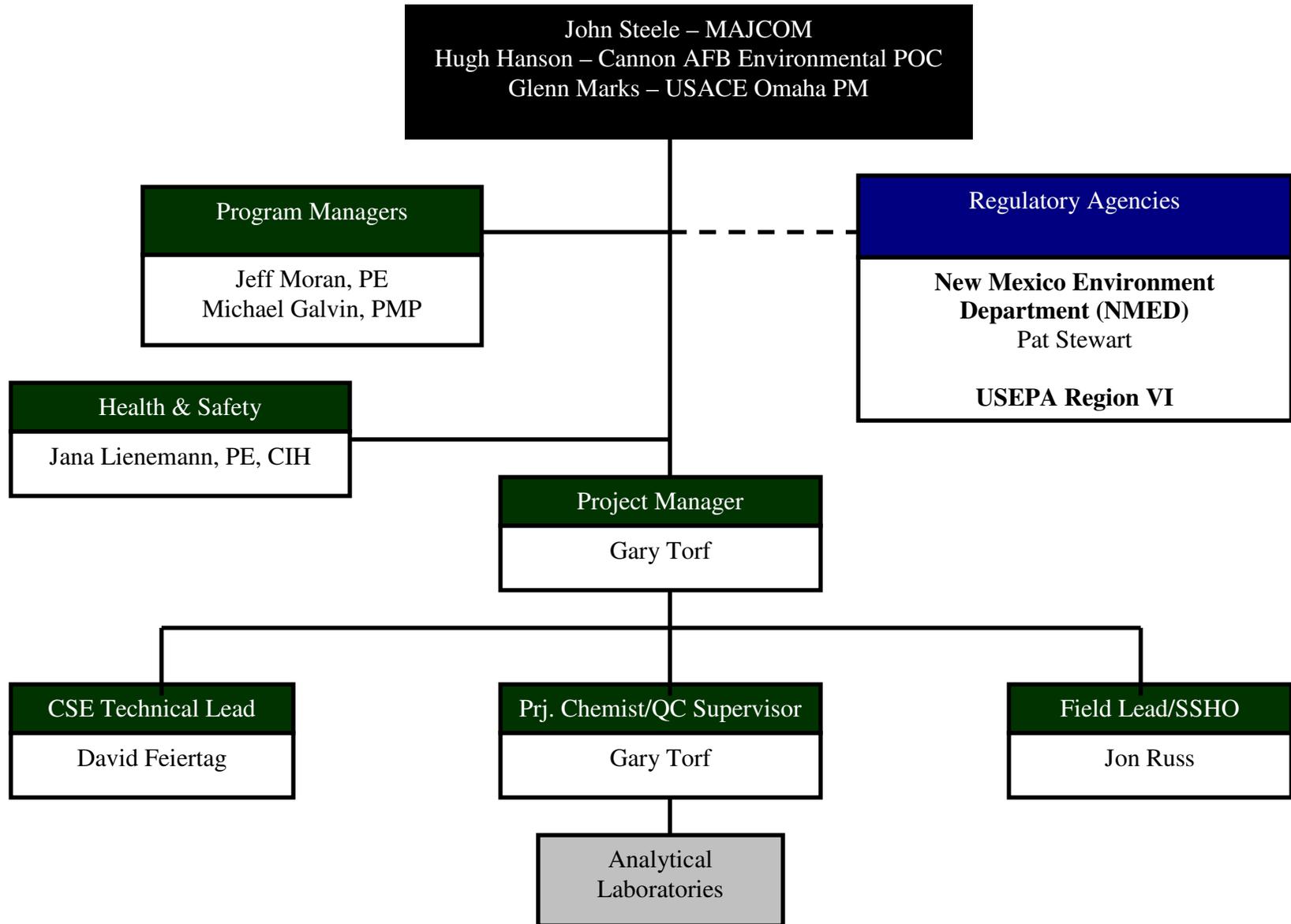
Regulator: US Environmental Protection Agency (EPA) Region VI – EPA Region VI is the federal regulatory authority for Cannon AFB. EPA Region VI will be provided the opportunity to review and comment on all work plans and reports completed for the installation.

Regulator: State of New Mexico Environment Department (NMED) – The State of New Mexico Environment Department is the state regulatory authority and a stakeholder for Cannon AFB. Ms. Pat Stewart is the NMED representative responsible for Cannon AFB. Ms. Stewart will be provided the opportunity to review and comment on all work plans and reports completed for the installation.

Prime Contractor: Versar, Inc. (Versar) – Versar is the prime contractor, performing this project under Contract W9128F-08-D0027, Task Order 0006. The Versar Project Manager is Gary Torf. Team Member Jacobs Engineering Group Inc. (Jacobs) will provide technical support and Health and Safety oversight as needed. Jonathan Russ is the Jacobs Technical Lead.

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Figure 2-1 – Organizational Chart for AF MMRP CSE Phase II at Cannon AFB, NM



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2.3 Contractor Project Personnel

The CSE Phase II investigation work at Cannon AFB will be led by Versar. Versar's organization for this project is presented on Figure 2-1. The following subsections describe the responsibilities of the Versar Team.

2.3.1 Management and Operations

2.3.1.1 Versar Program and Deputy Program Managers

Versar's acting Program Manager is Mr. Jeff Moran, PE, and Mr. Michael Galvin, PMP, is Versar's Deputy Program Manager. Mr. Moran has overall responsibility for the activities conducted for this program, and Mr. Galvin has the day-to-day responsibilities for the activities conducted for this project. Mr. Galvin is responsible for supporting Versar's PM with personnel and other resources, for providing performance oversight, and for quality control (QC) and safety. Additional responsibilities include maintaining formal communications with the Contracting Officer and Contracting Officer's Representative (COR); contract changes; guidance on particularly difficult problems which may arise during the execution; communication of program status and problems encountered to the COR; and overall client satisfaction.

2.3.1.2 Versar Project Manager

Versar's PM is Mr. Gary Torf. Mr. Torf has the primary responsibility for completion of CSE Phase II activities. He is responsible to and reports to Versar's Deputy Program Manager and the USACE Project Manager. Versar's PM has day-to-day control and responsibility for planning, scheduling, cost control, implementation of project tasks, technical reports, and managing documents. He will monitor project personnel during performance, and direct technical resources. Versar's PM has overall responsibility for safety, quality, schedule, approval of project deliverables, and, lastly, achieving the performance-based milestones.

2.3.1.3 CSE Technical Lead

The CSE Technical Lead is Mr. David Feiertag. Mr. Feiertag's responsibilities will include establishing technical standards associated with environmental sampling for this task order (TO), instructing project personnel in those standards, and monitoring technical task performance against the standards. He is responsible for coordination with the Versar Project Chemist for technical decisions made during the project planning, execution, and reporting phases of the work. He will assure that the project deliverables are technically sound, high quality, and consistent with the Statement of Objectives (SOO), CSE Guidance, and Versar's technical standards.

2.3.1.4 Project Chemist/Data Validation Manager

The Project Chemist/Data Validation Manager is Mr. Gary Torf. Mr. Torf will ensure that the work performed is in accordance with the Quality Assurance Project Plan (QAPP), this Work Plan, Standard Operating Procedures (SOPs), and other pertinent analytical and other laboratory procedures. He will be responsible for sample tracking, data management, laboratory coordination, data interpretation, analytical electronic data deliverables (EDDs), and report

writing. He will be responsible for the review, evaluation, and validation of all analytical data for the project and will participate in interpreting and presenting the analytical data. This includes reviewing selected field and analytical data to ensure adherence to QA/QC procedures, and approving the quality of data before they are included in the CSE report. He will be responsible for the validation of the analytical data from the contract laboratory according to the QAPP, DoD requirements, EPA analytical methods performed, and laboratory SOPs. Mr. Torf is also responsible for the production of a final validation report for the project with a justification for data qualifiers applied (if any), while maintaining strict adherence to project schedules. He will work with field sampling personnel and the contract laboratories to ensure that the work performed is in accordance with the QAPP, Section 9.0. He is responsible for coordination with USACE Project Chemists for technical decisions made during the project planning, execution, and reporting phases of the work. Mr. Torf is also the Versar PM.

2.3.1.5 Field Lead/Site Safety and Health Officer

The Field Lead is Mr. Jon Russ. Mr. Russ is responsible for providing on-site management of CSE Phase II activities, for coordinating field team activities, conducting the visual survey and sampling, and meeting schedule deadlines. He will ensure that the work is being conducted in accordance with the Work Plan. He will coordinate the initial orientation and safety meeting prior to additional field activities, as well as the daily safety meeting prior to the start of work each day of the additional activities. Mr. Russ reports to the Versar PM and will coordinate the on-site efforts. Mr. Russ will coordinate with the Project Chemist, and the appropriate installation personnel to ensure compliance of project activities with technical and health and safety requirements as outlined in the Work Plan and APP/SSHP. Additional details on the responsibilities of the Site Safety and Health Officer (SSHO) are provided in the APP/SSHP (Appendix F).

2.3.2 Quality Control

The QC Supervisor is Mr. Gary Torf. Mr. Torf will be responsible for evaluating the quality of the work during CSE Phase II activities. The QC Supervisor is responsible for assuring that the QAPP procedures (Section 9.0) are implemented during the on-site field activities. He will make these evaluations referencing the SOO and this Work Plan, and be in communication with the CSE Field/Technical Lead and PM. He will confirm that the final project deliverables are based on defensible and documented data, manage the control of records during project performance, and address foreseeable data management and QC problems in updates to the QAPP.

2.3.3 Health and Safety

2.3.3.1 Health and Safety Manager

The Program H&S Manager is Ms. Jana Lienemann, CIH. Ms. Lienemann has the overall responsibility for assuring that the Versar Team's work is performed consistent with internal standards and the requirements of its Contract with the USACE. Ms. Lienemann reports to the Deputy Program Manager.

2.3.3.2 Unexploded Ordnance (UXO) Safety Officer

No explosive MEC are known or anticipated to be present on the MRA. The Program UXO Safety Officer, Sylvester (J.R.) Willis, will be notified immediately (865-621-1632) if any suspect munitions or debris that is not consistent with small arms is observed. The Installation Environmental POC and the Omaha USACE District PM will be contacted and a decision made regarding the need to activate explosive ordnance disposal (EOD) personnel.

2.4 Project Communication and Reporting

Communications between Versar/Jacobs project personnel, primarily the PM, and the USACE PM will occur as necessary. Upon receiving approval from the USACE PM, the Versar PM and/or designated technical representatives will routinely communicate with the Installation POC regarding data requests or questions to/from the installation. Any irresolvable technical or regulatory problems or issues will be immediately reported to the USACE PM.

2.4.1 Administration and Scheduling Meetings

Administration and scheduling meetings will be held, including via teleconference, as necessary. The purposes of the meetings are to:

- Review previous activities,
- Identify and resolve any QC or safety issues, and
- Discuss future field activities, or other logistical issues.

These meetings will likely be held as needed during project execution. Possible attendees include:

- MAJCOM POC;
- Installation POC;
- USACE PM;
- Versar's PM;
- Versar Team Technical Lead; and
- Other Versar Team members as needed.

2.4.2 Stakeholder Meetings

Meetings with the stakeholders will be held as necessary during project execution. Two types of stakeholder meetings are anticipated: meetings with regulators and meetings with the public/community. Likely attendees include:

- MAJCOM POC;
- Installation POC;
- USACE PM;

- Regulators, including NMED and EPA Region 6, as appropriate;
- Technical Review Committee (TRC) members, if applicable, or other members from the community as appropriate;
- Versar's PM; and
- Other Versar Team members as needed.

2.5 Project Deliverables/Milestones

2.5.1 CSE Phase II Planning Documents

This deliverable includes this Work Plan, with the CSE Phase II Field Work approach presented in Section 5.0, the QAPP presented as Section 9.0, and the APP/SSHP presented in Section 10.0. In addition, the presentation materials and minutes for the MAJCOM Kickoff Meeting and Stakeholder Meeting are deliverables in support of the planning documents.

2.5.2 CSE Phase II Field Activities

The field activities deliverables will be the approach, findings, presentation maps, and exit briefing materials that will be presented to the Project Team before site departure. Data Quality Control Reports (DQCR) will be generated daily summarizing site activities and will be submitted no later than 0900 the following day.

2.5.3 Fact Sheet Issuance

The Versar Team will issue a Community Relations Fact Sheet (and requested copies) to the Installation POC before the CSE Phase II field work begins. Another fact sheet will be issued when the CSE Phase II Report is issued.

2.5.4 CSE Phase II Report

Following the completion of the CSE Phase II investigation work, a CSE Phase II Report will be completed. The CSE Phase II Report will fully document all project activities and provide recommendations for future munitions response actions or recommend NFA if appropriate. The CSE Phase II Report will be prepared in accordance with the SOO and the guidance contained in the *Air Force Guide for Conducting the Comprehensive Site Evaluation Phase II at Air Force Munitions Response Areas* (USAF, 2006). The CSE Phase II Report Table of Contents is included in Appendix E. If NFA is warranted, a draft NFA document will also be prepared.

2.5.5 Update the Data Management Tool Database

On completion of the CSE Phase II investigation and assessment, the Versar Team will upload the information collected into the data management tool (DMT), which is an Access database, for the Air Force MMRP.

2.5.6 Update Administrative Record/Information Repository

On finalization of fact sheets and other final CSE Phase II documents, the Versar Team will verify the installation has the appropriate format and sufficient quantities of documents for items that need to be placed in the Administrative Record (AR) or other installation-specific Information Repository (IR).

2.6 Project Schedule

The schedule for the Cannon AFB CSE Phase II is provided as Table 2-1. The schedule provides the proposed start date and sequence for the primary activities in this scope of work. The project schedule will be used as a guide for the completion of project tasks. Constraints specific to this site (e.g., weather, access) are being considered in developing the schedule for specific activities. It is anticipated that mobilization and field work tasks will be completed in less than 2 weeks.

2.7 Project Community Relations

Community relations during the implementation of field activities will be conducted by the installation, with the Versar Team providing technical support as requested.

2.8 Coordination of Rights of Entry

Private property Rights of Entry (ROE) may be required during execution of this project. The USACE PM will coordinate ROE from the adjacent landowner (Rajen Dairy) with the Air Force MAJCOM and Installation POC, as necessary.

2.9 Management of Field Operations

2.9.1 Communications

This section describes the on- and off-site communications required during field operations at Cannon AFB. Due to hazards inherently associated with field operations, reliable communications both on- and off-site are required and will be maintained. At Cannon AFB, prior to the field efforts, the Versar Team's PM will coordinate with the Cannon AFB Environmental POC and USACE PM to ensure that communications can occur with the appropriate installation personnel during these activities. The Versar Team will also have cellular telephones for off-site transmissions, on-site back-up communications between the installation and field teams, and emergency situations.

Table 2-1 – Cannon AFB Project Schedule

Key Scheduling Item	Actual or Approximate Date
MAJCOM Kick Off Teleconference	24 February 2010
Stakeholder Kick Off Meeting	10 March 2010
Work Plan	October 2010
Field Activities	November 2010
Final CSE Phase II Report	February 2011

2.9.2 Installation Access

2.9.2.1 Versar Project Team

The Versar PM or Field Lead will submit access requests to the Cannon AFB Environmental POC to ensure that appropriate information is provided in a timely manner for access authorization. Prior to beginning field work at the installation, the Field Lead will have the Versar Team personnel read and sign the APP/SSHP for the installation. In addition, he/she will ensure that team members receive a project-specific (including MEC hazard awareness) briefing, an installation-specific safety briefing, and are in full compliance with the installation-specific requirements.

2.9.2.2 Unauthorized Visitors

The portion of the MRA on Cannon AFB is restricted to authorized personnel only. Any Versar Team member discovering an unauthorized visitor in an investigation area will contact the Cannon AFB Environmental POC or other assigned point of contact immediately. Work will be stopped until the individual is escorted out of the area. Unauthorized visitor events will be logged in the daily field log by the Field Lead or his/her designee. The field team will manage any potential site visitors in these areas to ensure their safety.

2.9.3 Cultural and Natural Resources Management

No coordination with cultural or natural resources personnel is needed based on the proposed areas of field work. According to the Modified CSE Phase I Report, there are no sensitive cultural/natural resource areas that are expected to be affected by the Phase II investigation. Brief summaries of the cultural and natural resources at Cannon AFB are provided in the following sections.

2.9.3.1 Cultural Resources

According to the findings of the Modified CSE Phase I Report, there are no cultural or archaeological sites present on Cannon AFB.

2.9.3.2 Natural Resources

According to the findings of the Modified CSE Phase I Report, one endangered species act candidate is found in the vicinity of Cannon AFB, the black-tailed prairie dog. This species is not expected to be found at the MRA.

There are no surface water or wetlands areas adjacent to the 1940s Skeet Range MRA.

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3.0 SITE DESCRIPTION

The following descriptions of the physical and environmental settings of the site are primarily from the Modified CSE Phase I Report (USACE, 2009), which references various historical documents and specifically identifies two documents as the primary sources of information presented: *Installation Restoration Program (IRP) Records Search for Cannon AFB, New Mexico* (CH2M Hill, 1983) and the *General Plan, Cannon AFB, New Mexico* (Black & Veatch, 2008).

3.1 Installation Location

Cannon AFB is located in Curry County, New Mexico, about 8 miles west of the City of Clovis, 12 miles north of the City of Portales, and 190 miles east-southeast of the City of Albuquerque. It is situated in New Mexico's high plains, near the Texas Panhandle. US Route 60/84 runs east-west and passes through the north end of the Base. Curry Road 7/Route 467 runs east-west just south of the Base. Cannon AFB is bordered to the east by Curry Road P and to the west by Curry Road R.

The Base is situated on 3,789 acres (5.9 square miles) of federally-owned land. Buildings and administrative areas are generally found in the northern portion of the Base, while the southern portion is comprised mainly of access roads and the flight line. Whispering Winds Golf Club is located in the northern portion of the Base. Off-base facilities include the Melrose Air Force Range (formerly Melrose Bombing Range), about 24 miles west-southwest of the Base, and the Conchas Lake Recreation Annex, about 80 miles northwest of the Base. The Melrose Range is the primary training range for Cannon AFB. It is located on approximately 60,010 acres and is currently active.

3.2 Installation Mission and Operational History

The history of Cannon AFB began in 1929 with the establishment of Portair Field (later Clovis Municipal Airport), a civilian passenger terminal for early commercial transcontinental flights. The Army Air Corps took control of the site in 1942, and it became known as Clovis Army Air Base (renamed Clovis Army Air Field in 1945, and later Clovis AFB). Through the end of World War II, the Base was used for flying, bombing, and gunnery classes. It was placed on reduced operational status in mid-1946 and flying activity decreased. The installation was deactivated in 1947. Up until that point, aircraft at Cannon AFB included B-17, B-24, and B-29 heavy bombers.

The Base was reassigned to the Tactical Air Command in mid-1951 and was reactivated later that year. Between 1951 and 1957, aircraft at the Base included the P-51 "Mustang" and F-86 "Sabre" fighter jets. The Base became a permanent installation in June 1957 and renamed Cannon AFB in honor of the late General John K. Cannon, a former commander of the Tactical Air Command. In 1959, the 312th Tactical Fighter Wing (TFW) was deactivated and replaced by the 27th TFW (which, by the mid-1970s, had become the principle USAF unit at Cannon AFB). In 1965, the Base's mission changed to that of a replacement training unit. Until recently, the function and operations of Cannon AFB has remained relatively unchanged.

In May 2005, the Secretary of Defense (SECDEF) recommended the closure of Cannon AFB to the Base Realignment and Closure Commission. The Commission's subsequent September 2005 final report to the President recommended that the Base remain open as an enclave until at least 31 December 2009 (or until a new mission was found) and that the 27th TFW be disestablished. The SECDEF designated Special Operations as the new mission at Cannon AFB on 19 June 2006, and the 27th SOW was activated under the control of AFSOC.

The AFSOC mission provides USAF Special Operations Forces (SOF) for worldwide deployment and assignment to regional unified commands. The AFSOC's core tasks have been grouped into four mission areas: forward presence and engagement, information operations, precision employment and strike, and SOF mobility. The 27th SOW is the host unit at Cannon AFB. It supports the USAF component of unified command, conducting sensitive special operations missions in response to SECDEF taskings.

3.2.1 History of MRA Activities

Nineteen potential MRAs were identified during completion of the off-site HRR and onsite records review for the Modified CSE Phase I at Cannon AFB; during the CSE Phase I field effort, one additional potential MRA was identified. Based on an evaluation of the site conditions and historical information for these sites, only two sites were further evaluated during the CSE Phase I field effort: the Former Chemical Warfare Area and the 1940s Skeet Range.

- The Former Chemical Warfare Area was not retained for further evaluation under the MMRP, as no evidence of MEC or CWM was observed and the site has been redeveloped as a parking lot. No further action (NFA) was recommended for this area.
- The 1940s Skeet Range was retained for further evaluation under the MMRP as it was determined there is a potential for environmental impacts from MC to have occurred at this MRA. Recommended actions included sampling surface and subsurface soil to assess if MC has been released to the environment.

A summary of the 1940s Skeet Range MRA, as presented in the Modified CSE Phase I Report (USACE 2009), is detailed below in the following subsection.

3.2.1.1 1940s Skeet Range

A 1940s Skeet Range was discovered during the on-site records review. According to an August 1943 Building Index for Clovis Airfield, Clovis, New Mexico, Building T-2150 was a skeet range. The location of Building T-2150 was identified on an April 1944 Water Distribution map for Clovis Airfield. This map depicts Building T-2150 as being located just north of the Ordnance Storage Area, which is still used as an active Munitions Storage Area. The 1944 map appears to show a firing arc for a skeet range although it is oriented firing to the south towards the ordnance storage area. Because both the skeet range and ordnance storage area were active during the same time period, the direction of fire from the skeet range was most likely not toward the south. Review of a 1946 aerial photograph appears to show the firing direction to the north. The location of the former range is in the northeast portion of the Base, just north of the active ordnance area.

3.3 Climate

The climate at Cannon AFB is mainly hot and dry. Monthly mean high temperatures range from 51 degrees Fahrenheit (°F) in January to 93°F in July. Monthly mean low temperatures range from 23°F in January to 64°F in July. Average annual precipitation is approximately 18 inches. Annual mean snowfall is approximately 12 inches. Table 3-1 reflects the average annual climate for nearby Clovis, NM (<http://www.weatherbase.com/>).

Table 3-1: Cannon AFB Climatological Data		
Month	Average Temperature (°F)	Average Precipitation (inches)
January	38	0.4
February	42	0.4
March	48	0.6
April	57	1.2
May	66	2.3
June	75	2.5
July	77	2.7
August	76	2.8
September	69	2.1
October	59	1.9
November	47	0.5
December	39	0.6
Annual Average or Total	58 (average)	17.9 (total)

3.4 Topography

Cannon AFB is located in the Southern High Plains section of the Great Plains Region. The section is a plateau, bordered to the north by the Canadian River (approximately 60 miles north of the Base), to the east and west by escarpments rising up to 300 feet (ft), and to the south by the Edwards Plateau in western Texas. Elevations at Cannon AFB range from 4,260 ft above mean sea level (msl) in the southern portion of the Base to 4,330 ft above msl in the northwest portion (CH2M Hill, 1983). The Base slopes slightly downward toward the southeast.

3.5 Hydrology

Cannon AFB is situated near the headwaters of the Brazos River. However, due to low precipitation, high evapotranspiration, and gently-sloping terrain, little if any water ever reaches the river (CH2M Hill, 1983). Surface water streams are non-existent in the vicinity of the Base. Running Water Draw, the nearest drainage feature, is located about 10 miles north of the Base and is dry most of the time. Drainage in the vicinity of the Base is poorly developed due to low annual rainfall and lack of relief (CH2M Hill, 1983). The only significant surface water features at the Base are several playas and ponds, located in the northern, eastern, and southern portions of the Base.

3.6 Soil and Vegetation Types

Soil and vegetation characteristics surrounding Cannon AFB were determined as part of the Modified CSE Phase I (USACE, 2009). The majority of the Base contains Amarillo fine sandy loam. This soil is well-drained, and the depth to the underlying water table is about 250 ft (CH2M Hill, 1983).

The vegetation on Cannon AFB is typical of semiarid short grass prairies and is limited by water availability (CH2M Hill, 1983). The prairie grasslands are utilized by a variety of birds and mammals – several species of larks, hawks, waterfowl, rabbits, squirrels, and mice are found in the area. Two communities of black-tailed prairie dogs have been found on Base, one near the active munitions storage area and one near the runways (CH2M Hill, 1983). The black-tailed prairie dog is a Federal Endangered Species Act candidate animal. According to the Phase I Report, the black-tailed prairie dog is not found at any of the potential MRAs. There are no other known threatened or endangered species at Cannon AFB.

3.7 Geology and Hydrogeology

The geology beneath Cannon AFB mainly consists of a thick, 200 to 400 ft layer of unconsolidated sediments deposited over Triassic sandstone. The sandstone forms the base of the High Plains aquifer (regionally called the Ogallala aquifer), which is situated within the overlying gravel, sand, silt, and clay sediments (Black & Veatch, 2008). The unconfined aquifer beneath Cannon AFB is the sole source of water supply for the Base. Groundwater flow is typically east to southeast, and water table slope is approximately 7 to 15 ft per mile (Black & Veatch, 2008).

3.8 Previous Investigations

Under the 2009 Modified CSE Phase I, information about Cannon AFB relating to past military munitions activities and physical site conditions was compiled and evaluated. Information sources included archival records from Cannon AFB, interviews with Cannon AFB personnel, additional archival information collected from public sources, and observations made during the field reconnaissance. This information was reviewed and used to evaluate the extent of MEC and/or potential for MC exposure at the site. No sampling was conducted under the Modified CSE Phase I for Cannon AFB. The Modified CSE Phase I identified one MRA for further investigation and/or action: the 1940s Skeet Range. According to the Modified CSE Phase I, no

past environmental or munitions related investigations have been performed at this MRA. Details of the MRA reported in the Modified CSE Phase I are summarized below.

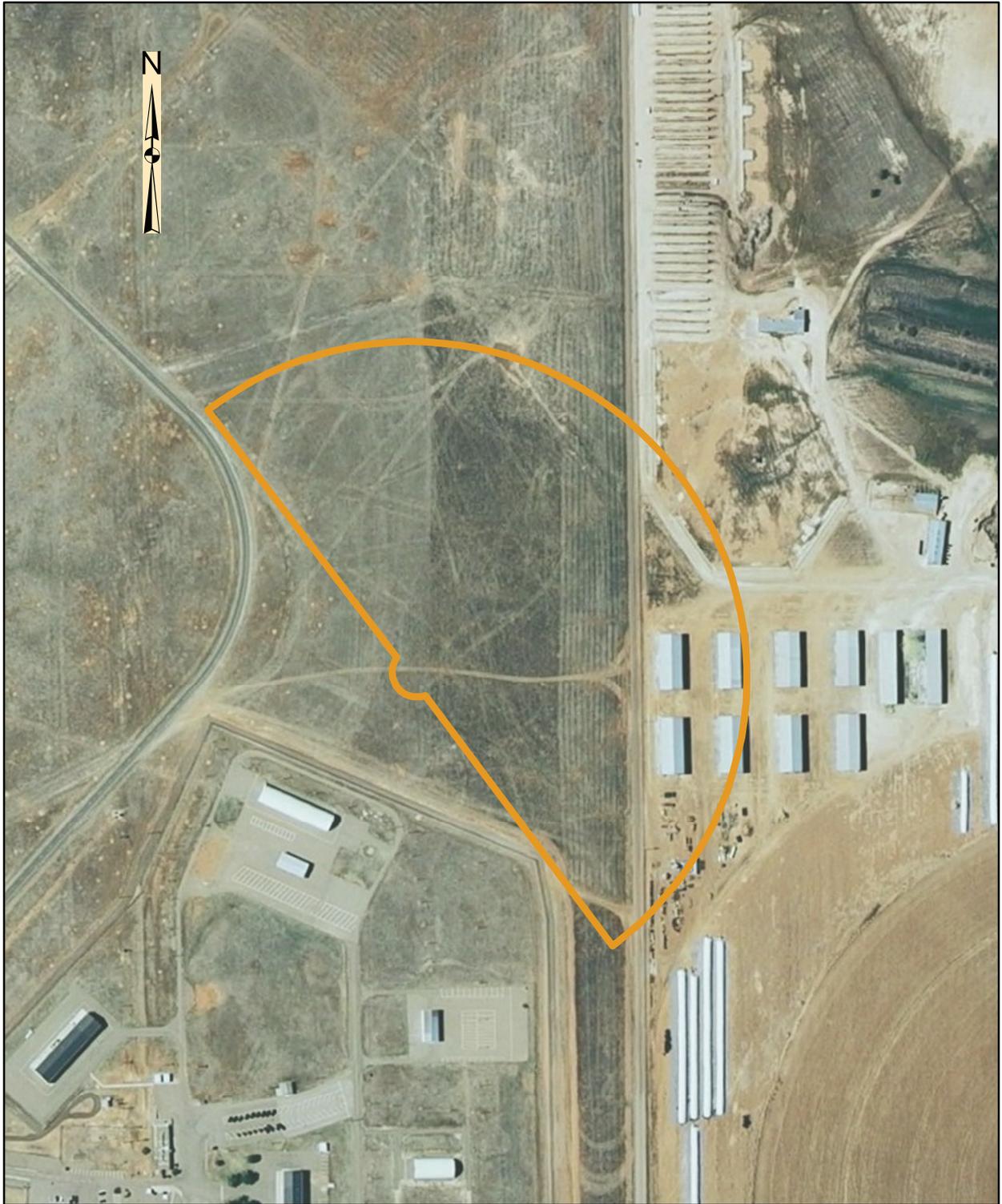
1940s Skeet Range

The 1940s Skeet Range is described as 29.4 acres, measuring approximately 1,800 ft in length, 960 ft wide, and with a perimeter of approximately 4,700 ft. Figure 3-1 shows the approximate location of the MRA as depicted in the CSE Phase I report. The area is located in the northeast portion of the Base, just north of the Munitions/Ordnance Storage Area, and extends beyond the installation boundary to the east onto the Rajen Dairy Property. The off-base portion of the area contains two buildings; the on-base portion of the area does not contain any structures. The area generally consists of an open field with a sparse vegetative cover of low grasses.

The 1940s Skeet Range is estimated to have been in use from at least 1943 to at least 1946, though the history of the range is not known. A 1944 map places the range, identified in a 1943 building index as Building T-2150, to the north of the Ordnance Storage Area, which is currently active as a Munitions Storage Area. A 1966 aerial photograph indicates the firing arc of the range based on the observable firing positions.

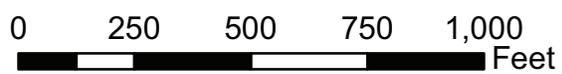
Access to the on-base portion of the area is restricted to the general public but accessible to authorized personnel. The off-base portion of the area is located on private property, and would require right of entry approval by the land owner.

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Legend

 Skeet Range



U.S. ARMY
CORPS OF ENGINEERS
OMAHA DISTRICT

MILITARY MUNITIONS RESPONSE PROGRAM

FIGURE
3-1

Figure 3-1
1940's Skeet Range
Cannon AFB, New Mexico



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3.9 *Deviations from Modified CSE Phase I Conclusions and Recommendations*

The CSE Phase II activities presented in this Work Plan deviate from the conclusions and recommendations in the Modified CSE Phase I Report in that the scope of the proposed CSE Phase II investigation includes a visual survey and completion of on-site analysis using X-Ray Fluorescence (XRF). The Modified CSE Phase I recommended surface and subsurface soil sampling only at the subject MRA to assess if MC has been released to the environment. The following describes and presents the rationale for deviations from the modified Phase I conclusions and recommendations.

3.9.1 Visual Survey

The Modified CSE Phase I Report did not include a recommendation for a visual survey at the MRA to be evaluated during CSE Phase II efforts. Extensive experience by the Omaha District Corps of Engineers Military Munitions Design Center personnel, as well as the results of other programmatic investigations for numerous sites throughout the AF MMRP, have shown that areas used for military munitions activities frequently have visual evidence of their existence. Evidence includes residual MEC, disturbed soils and vegetation, soil discoloration, and features such as berms. As such, the visual survey is the most critical step in determining the potential for subsurface impacts. For Cannon AFB, if evidence of military munitions activities is observed, the proposed MC sampling will be focused in these areas to help characterize the site.

3.9.2 Sampling and Analysis

The Modified CSE Phase I Report recommended sampling of surface and subsurface soil for analysis of MCs. The Modified CSE Phase I did not specifically include recommendations for XRF analysis and correlation sample analysis. However, these tasks are included in this Work Plan. The intent of the XRF analysis, in combination with fixed-based laboratory analysis, is to evaluate the nature and extent of contamination, and to assist in finding lead concentrations greater than the screening or action levels. Extensive experience by the Omaha District Corps of Engineers Military Munitions Design Center personnel, as well as the results of other programmatic investigations for numerous sites throughout the AF MMRP, have shown that on-site XRF analysis is an effective tool to help characterize the nature and extent of contamination.

Under the Modified CSE Phase II Checklist, the report must contain identification of background levels of hazardous substances. Based on review of the Modified CSE Phase I historical records search and available documents, background levels of PAHs do not appear to have been established for the site. Background values for naturally occurring metals have been established, however, and will be used for comparison of CSE Phase II analytical results.

3.10 *Summary of MEC Risk*

Based on the results of the Modified CSE Phase I efforts, potential MEC, including both conventional and special consideration, are not present on the closed range areas or any other areas of Cannon AFB, as described below.

3.10.1 Conventional MEC

Based on the results of the Modified CSE Phase I efforts, no MEC are present at the MRA. In addition, no information identified during the Modified CSE Phase I indicates there has been a release of MEC at Cannon AFB. Additionally, no evidence of small arms was found at the 1940s Skeet Range (other than clay pigeon debris), based on historical and physical information. Munitions used at the 1940s Skeet Range were likely shotgun pellets (e.g., shot contained in shotgun shells/cartridges).

3.10.2 Special Consideration MEC

In addition to conventional ordnance contamination, the Modified CSE Phase I also examined Cannon AFB for the presence of special consideration MEC (e.g., Chemical Warfare Materiel [CWM], depleted uranium [DU]). CWM was likely used at the Former Chemical Warfare Area situated across the Base to the west of the 1940s Skeet Range; however, no indications of special consideration MEC were discovered during the Phase I site visits, and the area has been completely renovated and paved over with a parking lot and several adjacent buildings. This area was the only other potential MRA site, in addition to the 1940s Skeet Range, evaluated further during the CSE Phase I field effort at Cannon AFB. Therefore, it has been determined that no CWM or DU is associated with the 1940s Skeet Range.

4.0 INTERIM CONCEPTUAL SITE MODEL AND EXPOSURE PATHWAY ANALYSIS

The Interim Conceptual Site Model (ICSM) was developed to evaluate potential MEC and/or MC environmental impacts. The ICSM is a description of the site and its environment based on existing knowledge. It describes MC sources and possible receptors, and the interactions between them. It is intended to assist in planning, data interpretation, and communication. The ICSM is used as a planning tool to integrate information from a variety of resources and to evaluate the information with respect to project objectives and data needs. It is intended to evolve through an iterative process of further data collection or action. The information provided in this section will be refined through the CSE Phase II process.

4.1 *Interim Conceptual Site Model*

4.1.1 MEC

Based on the Modified CSE Phase I evaluations, the identified MRA is associated with small arms munitions use. MEC was not observed and is not expected to be associated with the 1940s Skeet Range. Consequently, there are no known or suspected explosive hazards associated with this MRA, and there are no complete or potential receptor pathways for MEC; therefore, no ICSM for MEC exposure from this MRA is included in this work plan.

Table 4-1 summarizes the munitions activities at the Cannon AFB 1940s Skeet Range.

Table 4-1 – Summary of Munitions Used at Cannon AFB 1940s Skeet Range

Range	Dates of Operations	Known or Suspected Munitions Use
1940s Skeet Range	At least 1943 to at least 1946	Known = none identified Suspected = 12-, 16-, or 20-gauge shotgun with shells containing lead shot

4.1.2 MCs, Hazardous Substance, Pollutants, and PCOCs

The potential sources of MC at Cannon AFB, as described in Section 3.0, are the munitions-related activities that occurred at the 1940s Skeet Range MRA.

No specific information regarding the types of munitions or ammunition used at this former range is available. However, typically at skeet ranges, MCs are associated with shot, primer, and clay pigeon target fragments. Shot was typically 94 percent lead and 6 percent antimony; and primer could contain significant amounts of metals, including lead and barium compounds (e.g., 40 and 30 percent, respectively, in Primer #955) (United States Army Defense Ammunition Center, MIDAS database, 2008). However, the risk-driving metal is typically lead. Clay pigeon targets are composed of a mineral powder held together with an asphalt-like petroleum pitch binder, which contains polynuclear aromatic hydrocarbon (PAH) compounds.

Through detonation, corrosion, or leakage, MEC in the surface and subsurface soil may release MC into the site soils. Therefore, the primary MCs potentially associated with the use of the MRA, lead and PAHs, will be investigated. Based on the site description (Section 3.0), only terrestrial exposures are expected to occur. The ICSM for potential MC exposure at Cannon AFB is presented in Figure 4-1.

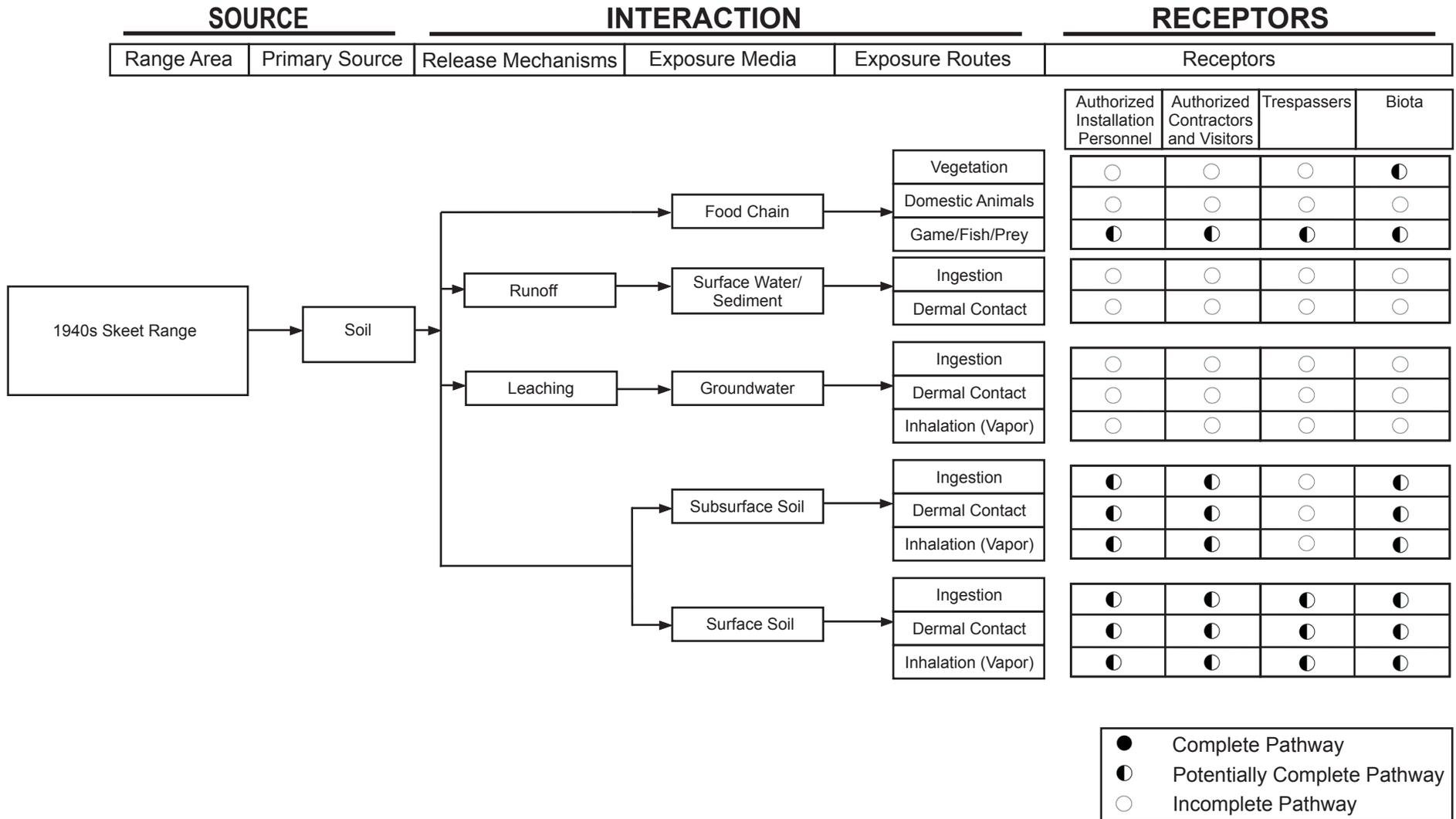
4.2 MC Exposure Pathway Analysis

The information presented in the ICSM was used to identify all actual, potentially complete, or incomplete source-receptor interactions for the site, for both current and reasonably anticipated future land uses. An exposure pathway is the course a chemical or physical agent takes from a source to a receptor. As described in Section 4.1.1, there are no complete or potential receptor pathways for MEC; therefore, no further analysis is provided. Each MC pathway includes a source, an exposure medium, an exposure route, and a receptor. The MC pathways may also include a release mechanism and a transport medium if the point of exposure is not at the same location as the source.

4.2.1 Transport Process

A combination of naturally-occurring and human activities increases the risk of exposure to MC. Natural occurrences, such as soil erosion due to high winds or water action, can loosen and displace soils, causing MC located on or beneath the ground surface to be moved or exposed. At the time of the MC release into the environment, the medium receiving the item is soil.

Figure 4-1 - MC Exposure Pathway Analysis - Cannon AFB



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The fate and transport of the MC are dependent on a wide variety of factors. Contaminant fate refers to the expected final state that an element, compound, or group of compounds will achieve following release to the environment. Contaminant transport refers to the mechanisms and rates of migration of contaminants away from the source area. Migration pathways often include air, water, soil, and the interfaces between the phases of the contaminant (i.e., solid, liquid, or gas). Due to the environment at Cannon AFB, the fate and transport of contaminants occur in only one of the three potential environmental media: terrestrial (i.e., not aquatic or atmospheric).

The fate and transport of contaminants at Cannon AFB are strongly influenced by physical and chemical properties, as well as by environmental factors such as soil characteristics. For example, according to the Henry's Law Constants, a measure of the volatility of a compound is related to other physical properties of the compound, the most important of which are vapor pressure and water solubility. Compounds exhibiting high vapor pressures and low water solubility tend to have high volatilization rates (and therefore, high Henry's Law Constants). The organic carbon/water partition coefficient (K_{oc}) value is a measure of the tendency of a chemical to be sorbed to the organic fraction of soil. The higher the value, the greater the sorption potential of the compound will be. The octanol/water partition coefficient (K_{ow}) value is an indication of whether a compound will dissolve in a solvent (i.e., n-octanol) or water. The properties of the primary compounds of interest at Cannon AFB (metals and PAHs) are as follows:

Metals: Since most metals are indigenous to the earth, they are usually found at varying concentrations in most environmental media. In soil, metal contaminants are dissolved in the soil solution; adsorbed or ion-exchanged in inorganic soil constituents; complexed with soluble soil organic matter; and precipitated as pure or mixed solids. Metals in the soil solution are subject to movement with water particles and may be transported through the vadose zone to groundwater, and then either volatilized or consumed by plants and aquatic organisms. Unlike organic constituents, metals cannot be degraded; however, the mobility and toxicity of some metals can be altered due to changes in oxidation states. The solubility of lead is strongly influenced by pH. Under natural pH conditions, lead is relatively insoluble. Lead has a high affinity to be sorbed to surfaces on clay and iron and manganese oxide particles. The net effect is for lead to be primarily bound to the solid state. Lead is nonvolatile, but can become airborne via dust.

PAHs: PAH compounds tend to associate with the soil phase because they have a strong affinity for organic matter (K_{ow} range from 10^4 to 10^7). This tendency is even greater when soil organic matter concentrations are large. Very little of the PAHs dissolve directly into water, but where water contains dissolved or particulate organic matter, there is a competition for association of the PAH between the aqueous organic matter and solid phase organic matter. Limited transport of PAHs in soil may occur if there is a high organic content in the soil pore water. PAHs are nonvolatile, but can become airborne via dust.

4.2.2 Exposure Media and Accessibility

Interaction describes ways that receptors come into contact with a source. Environmental contaminants, such as MC, often undergo various processes (e.g., migration) such that media other than the source area can become contaminated. Therefore, all potentially contaminated

media (exposure media) were initially considered for the site, as shown on Figure 4-1. However, the primary potentially impacted and accessible media for Cannon AFB are surface and subsurface soil.

4.2.3 MC Exposure Receptors

A receptor is an organism (human or ecological) that contacts a chemical or physical agent. Identification of the receptors that may be exposed to site contaminants considers both current and reasonably-anticipated future land uses. The receptors considered for exposure to MC at the Cannon AFB MRA is: authorized installation personnel and Rajen Dairy property personnel (including current and future residents), authorized contractors and visitors, and trespassers.

Ecological habitat is not considered significant at the MRA. The portion of the site on Cannon AFB property is an open field with no wetlands. The portion on private property is agricultural land with a few buildings.

4.2.4 MC Exposure Conclusions

If MC is present, a potentially complete exposure pathway exists for current and future receptors. The 1940s Skeet Range area is accessible to anyone with access to Cannon AFB or the adjacent Rajen Dairy property. During a visual reconnaissance completed in the vicinity of the MRA during the Modified CSE Phase I fieldwork, the only remnants of the range on-base include some clay target debris and several slabs of concrete at the MRA. A site survey of the off-base portion of the range was not performed during the Modified CSE Phase I fieldwork.

4.3 Groundwater Migration Pathway Analysis

4.3.1 Groundwater Receptors

The Modified CSE Phase I found that there are no wetlands in the vicinity of the MRA, and the depth to groundwater is approximately 250 ft (CH2M Hill, 1983).

4.3.2 Groundwater Conclusions

The physical properties of the MC (i.e., metals and PAHs) associated with the munitions activities at the MRA indicate MC transport to groundwater is unlikely. The potential MCs associated with the MRA generally have limited mobility in soil, due to their tendency to bind to organic matter. As a result, migration to groundwater is considered only marginally viable, particularly considering the reported depth to groundwater. While a complete assessment has not been performed, the probability of appreciable groundwater impact from past munitions-related activities is low. Consequently, a groundwater assessment for impact from past munitions-related activities is not warranted.

4.4 Surface Water Migration Pathways Analysis

4.4.1 Surface Water Receptors

There is no significant surface water in the vicinity of the MRA at Cannon AFB. Therefore, MC exposure to surface water receptors is considered an incomplete exposure pathway.

4.4.2 **Surface Water Conclusions**

There is no significant surface water in the vicinity of the MRA. Therefore, it is unlikely any current or future receptor would be exposed to possible MC via a surface water exposure pathway. As such, surface water is considered an incomplete exposure route.

4.5 ***Soil Migration Pathway Analysis***

MC may be released directly to soil during the initial deposition activity or they may be released to soil through weathering of munitions related debris (e.g., lead shot, lead bullets, or clay target fragments).

4.5.1 **Soil Exposure Receptors**

Potential soil receptors that are typically evaluated include both human and ecological receptors. Potential human soil receptors at the Cannon AFB MRA include authorized installation personnel and Rajen Dairy property personnel (including current and future residents), authorized contractors and visitors, and trespassers. As reported in the Modified CSE Phase I, no ecological receptors were identified, and no sensitive ecological populations, habitat, or natural resources are at or adjacent to the MRA. It should be noted that the portion of the MRA that extends onto the Rajen Dairy property appears to be used primarily for equipment storage, and it does not appear that dairy cattle are grazed or fed in that area.

4.5.2 **Soil Exposure Conclusions**

A potentially complete pathway exists for current and future receptors (current and future installation and private property personnel, installation -escorted and private property -escorted visitors [including contractors], and trespassers) to be exposed to possible MC-impacted soil at the MRA. However, ecological exposure to MC in soil is considered only marginally viable. While a complete assessment has not been performed, the probability of appreciable biota impact from past munitions-related activities is low. Consequently, a biological assessment for impact from past munitions-related activities is not warranted.

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5.0 CSE PHASE II FIELD WORK

This section presents a summary of the various tasks involved in this investigation, from mobilization and field work preparation, to development of the CSE Phase II Report. In addition, specific details of how tasks will be carried out safely in the field are provided. Details concerning MEC-related procedures are presented in Section 6.0.

5.1 Pre-Mobilization Activities

5.1.1 Stakeholder Kick-off Meeting

A Stakeholder kick-off meeting for the proposed CSE Phase II activities was held at Cannon AFB on 10 March 2010. The organizations listed in Section 2.2 were invited to attend the kick-off meeting. The purpose of the meeting was to brief appropriate entities/personnel concerning: 1) scope of activities, 2) expected schedule, 3) operational procedures, 4) safety issues, 5) support requirements, and 6) emergency planning. In addition, a site inspection of the 1940s Skeet Range was conducted to provide a preliminary assessment of the conditions and help finalize this Work Plan. Information obtained during this meeting is incorporated into this Work Plan.

5.1.2 Notification and Coordination

As this Work Plan is finalized, the Versar Team will coordinate with USACE – Omaha District; MAJCOM (AFSOC); and Cannon AFB to reconfirm the schedule and identify any modified requirements or changes, and as requested, notify the other project stakeholders concerning the start date for the field effort. It is tentatively scheduled to begin in September 2010. Private property Rights of Entry (ROE) may be required on this project. The USACE PM will coordinate ROE from the adjacent landowner (Rajen Dairy) with the Air Force MAJCOM and Installation POC, as necessary. In addition, the Versar Team will coordinate with vendors and suppliers as required to coordinate goods and services that may be required to support the Cannon AFB CSE Phase II operations.

5.2 Mobilization

The goal of the mobilization phase is to ensure that proper attention is dedicated to preparing and training for the pending CSE Phase II field investigations. Actions performed during this phase include:

- Identify, procure, package, ship, and inventory project equipment;
- Coordinate with local agencies, as needed;
- Organize support facilities, as needed, including potential warehouse or storage space;
- Arrange for travel and lodging, as needed;
- Finalize subcontractor(s) and operating schedules;
- Coordinate with the Base to access the Rajen Dairy private property (if necessary) for sampling;

- Verify required work and safety qualifications are in place for the personnel that will be mobilized to the site;
- Submit forms for access and utility clearance. Access forms are typically required to be submitted 3 to 4 weeks before arrival to allow completion of a background check. A work/dig permit from Civil Engineering (CE), submitted with a map indicating the outline of the area and the depths to be sampled is typically required 2 weeks before arrival. Access forms and dig permits need to be arranged through Hugh Hanson, the Installation Environmental POC;
- Photographs can be taken at the MRA only with prior approval, to be arranged through Hugh Hanson, the Installation Environmental POC;
- Transport and assemble the contractor work force at Cannon AFB; and
- Conduct site-specific training, as required.

The following subsections describe activities related to mobilization of personnel and equipment to Cannon AFB, as well as subsequent setup and site-specific training for the CSE Phase II activities.

5.2.1 **Personnel**

The Versar Team expects to deploy four personnel to the site to conduct the visual surveys and sampling and analysis in support of CSE Phase II field activities. The Versar PM and Technical Lead will attend the Entrance and Exit Briefings. Once all project personnel are on-site but prior to the start of any field work, field personnel must attend a site-specific safety briefing. In addition, the Versar PM or Field Lead and SSHO will give an overview presentation of the Work Plan and a Site-Specific Safety Briefing. The purpose of this training is for all involved personnel to fully understand the procedures and methods to be used during the investigation activities, individual duties and responsibilities, and safety and environmental practices and procedures associated with the CSE Phase II operations. The APP/SSHP will have been read and signed by all personnel, confirming that they have read and understand the provisions laid out in the APP/SSHP, prior to performing any field work. Personnel conducting invasive work will have received Hazardous Waste Operations and Emergency Response (HAZWOPER) 40-hour (and 8-hour supervisor or 8-hour refresher) training, as required.

5.2.2 **Project Equipment**

The following sections list typical equipment and supplies likely to be needed for field activities associated with this CSE Phase II investigation.

5.2.2.1 On-Site Sample Processing and Analytical Equipment

The primary on-site sample processing and analytical equipment that will be used for this project is listed below. Complete lists can be found in the SOPs (Appendix G).

- Innov-X Model XT-440L portable XRF
- HP iPAQ Pocket PC data system

5.2.2.2 *Visual Inspection and Sampling Tools and Equipment*

The primary visual inspection and sampling tools and miscellaneous equipment anticipated for this project are listed below. A complete list can be found in the SOPs (Appendix G).

- Camera(s), digital;
- 2 GPS unit(s);
- Measuring tape or wheel, minimum of 100 feet;
- Flags, pin assorted colors, red, white, blue; and surveyor's tape, flagging;
- Disposable trowels/scoops;
- Stainless steel trowels, spoons;
- Stainless steel hand auger, drive sampler (with or without liners);
- Shovels, preferably stainless steel;
- Soil moisture probe;
- Personal protective equipment (PPE), as per APP/SSHP; including leather work gloves, disposable nitrile or latex gloves, safety glasses, and sunscreen;
- Fire Extinguisher (10-pound ABC);
- Vehicle first aid kits;
- Water (potable);
- Spray bottles, buckets/tubs, nylon brushes, and wire brushes for decontamination;
- Alconox[®] or equivalent phosphate-free detergent;
- Aluminum foil, polyethylene/plastic sheeting;
- Resealable bags (e.g., Ziploc[®]);
- Laboratory-provided sample bottles;
- Sample shipping coolers;
- Wet ice for sample shipment;
- 2-inch, clear plastic tape, strapping tape, packing materials;
- Sample labels and custody seals;
- Federal Express air bills;
- Paper towels, wipes, and trash bags; and
- Notebook, field forms, and indelible ink pens.

5.2.3 Support Facilities

Limited support facilities will be required for this project, based on the limited number of field personnel and short duration of field work (about 2 weeks). Project documentation, sample management, XRF analysis, and all other project tasks will take place on-site or at a common meeting area (e.g., hotel). The Versar project team will coordinate with the Cannon AFB POC if it is determined that indoor storage space is required.

A FedEx Express Shipping Center is available approximately 10 miles from Cannon AFB in Clovis, NM for shipment of equipment, materials, and off-site laboratory samples.

FedEx Express Ship Center
700 Town Gate Plaza
Clovis, NM 88101

Facility hours
Mon-Fri: 0900 – 1730
Sat/Sun: Closed

5.3 Field Investigation

5.3.1 UXO Avoidance

No MEC are expected to be encountered. However, if encountered, MEC items are not to be handled as part of the CSE Phase II activities. The location of MEC will be recorded in site logbook, and the area will be flagged for avoidance. The Program UXO Safety Officer (Mr. Sylvester (J.R.) Willis), the Installation POC (Mr. Hugh Hanson), and the USACE (Mr. Glenn Marks) will be notified immediately of the presence of MEC. After discussion with USACE, a recommendation will be given to the installation POC if EOD should be notified. If possible a picture will be sent to the USACE PM's for evaluation.

5.3.2 Technical Approach for MRA at Cannon AFB

Table 5-1 and the subsequent sections present the proposed technical approach for the CSE Phase II at the 1940s Skeet Range MRA. The approach for the visual survey is described in Section 5.3.2.1, sampling is described in Section 5.3.2.2, and correlation sampling is described in Section 5.3.2.3. The technical approach will use dynamic work strategies (DWS) as the basis for all field activities. DWS requires flexibility and adaptability during field sampling and data collection, as well as timely communication between all members of the project team.

Table 5-1 – Technical Approach for 1940s Skeet Range MRA at Cannon AFB

Site Name	Visual Survey	On-site XRF Analysis for Lead	Off-site Laboratory Analysis for MCs	Munitions	Notes
1940s Skeet Range	Yes	Yes	Yes	Shotgun shells (cartridges) that contained shot	MCs include lead and PAHs

5.3.2.1 Visual Survey

A visual survey will be performed at the MRA with the goal to cover the entire MRA (100%) to the extent practical (depending on vegetation, land features, access to off-base private property, etc.). Figure 3-1 shows the extent of the MRA and initial area planned for visual survey. During the Stakeholder kickoff meeting, the extent of the MRA was generally located based on the coordinates made available in the Modified CSE Phase I Report. The visual survey will be performed to cover the theoretical shotfall zone for the skeet range (radius from the firing point of about 680 feet), as shown on Figure 3-1. These areas or the approach may be modified as warranted by field observations. If modified, the reasons for the changes will be documented.

It is expected that a team of four people will conduct the survey at the MRA. Spacing of team members will be site dependent (i.e., open non-vegetated areas allow for wider spacing), but sufficient to assure visual coverage of the entire MRA, with the limitations described above. At the 1940s Skeet Range, because the area is open field, transects spaced approximately 20-feet apart will be used in support of the visual survey. Field team members will search for visual evidence of MEC, and other debris or cultural items present on the surface. These items may be most obvious where vegetation is minimal. Clay bird target fragments may be definitively identified based on angular, curved ridges and are typically black, yellow or orange in color.

The survey will be recorded using a GPS (Trimble GeoXH GPS unit). The Trimble GeoXH handheld GPS unit is a high performance, Wide Area Augmentation System-enabled, sub-foot GPS receiver combined with a rugged handheld computer. The computer runs Microsoft Windows Mobile Version 5.0 software powered by a 416 megahertz processor. The GeoXH is weatherproof and is powered by an all-day, rechargeable battery. It comes equipped with a color display designed for outdoor viewing.

Prior to mobilizing to the field, each GeoXH will be uploaded with any known coordinates and example transects, if applicable. At the start of each field day, the visual survey teams will test the GPS unit at an established control point, either provided by the installation or based on another known point, to ensure the unit is functioning properly and returning correct positional information. The GeoXH's screen will display any transects against an area map background. The GeoXH's GPS capability will guide the team to each transect and help the field personnel

stay on course. It will also record the path actually followed by the team for later compilation and illustration purposes. As the team traverses the area, they will collect digital photographs and GPS coordinates of pertinent items. All data will be downloaded to the project database. Following the field portion of the survey, field notes, site photographs, and GPS data will be consolidated for all survey groups and the information will be used in the CSE Phase II Report.

5.3.2.2 MRA Sampling

Sampling will be conducted at the 1940s Skeet Range to assess whether lead is present in soil above the screening level, and, if so, delineate the vertical and lateral extent of lead above this level. The samples will be analyzed on-site using a field portable XRF (FPXRF) to complete the delineation before demobilization. Selected samples will be sent to an off-site laboratory for lead analysis to correlate the XRF results (correlation samples), as described in Section 5.3.2.3. In addition, sampling will be conducted at the 1940s Skeet Range where clay target fragments are present to assess if these fragments have resulted in PAHs in soil above the screening levels. It is assumed that elevated levels of PAHs would only be present in association with clay target fragments; therefore, in general, the presence or absence of these fragments will be used to define the extent of PAH contamination, if present. Samples collected in areas of clay target debris will be sent to an off-site laboratory for PAH analysis. Some clay target fragments were observed during the March 10, 2010, site visit.

The specific initial sampling locations and depths for the skeet range will be selected based on site observation, information on changes to the site after range activities ceased, and access restrictions as described in the following paragraphs. All sample locations will be determined in the field based on professional judgment. Under the Triad approach, a DWS is implemented, which includes a flexible and adaptable approach to sampling and data collection that can continually be adjusted and refined in the field as new data are generated and data gaps are identified. Therefore, additional modifications may be made based on information obtained from the visual survey and observations during sampling. At the 1940s Skeet Range, the initial sampling locations will be based on the theoretical shotfall zone for a typical skeet range, spaced about 160 feet apart within the expected maximum shotfall zone and along transects outside of the expected maximum shotfall zone. If warranted, horizontal spacing may be increased or decreased depending on data needs and findings.

A grid layout will be used to encompass the firing point and safety fans in order to fully characterize the nature and extent of contamination. If MD, or other metallic debris or cultural items are observed on the ground surface during the visual survey outside of the proposed sampling grid, the sampling locations will be adjusted to include these locations.

The types and rationale for samples to be collected for the Cannon AFB CSE Phase II effort are summarized in Table 5-2. Both surface (0- to 0.5 foot below ground surface [bgs]) and subsurface (deeper than 0.5 foot bgs) soil samples will be collected to vertically and horizontally delineate the extent of lead and/or PAH contamination at the MRA and to accurately scope future remedial/removal actions, if warranted. At locations where fill material may be placed on the surface, such as at the off-base area, samples will be collected at sufficient depth to sample the previous ground surface. If XRF results indicate that lead contamination exists above residential screening levels, subsurface soil samples will be collected at 0.5-foot interval

increments until the XRF results indicate that lead concentrations are sufficiently below residential screening levels, down to an estimated maximum depth of 3 feet bgs.

To delineate the areal extent of lead contamination, samples for XRF analysis will first be collected at the proposed locations of known or suspected range features, including the firing area and shotfall zone. If necessary, additional samples will be collected working away from these features, including off-base once right of entry has been obtained. Samples will be collected and analyzed until the observed lead values are below the screening level and the entire proposed initial sampling area has been covered.

As described above, samples for PAH analysis will be collected only where clay target fragments are observed. The extent of the fragments (vertical and lateral) will be noted and recorded on a sample collection sheet.

Table 5-2 – Summary of Proposed Cannon AFB Sampling

Site Name	On-site XRF Analysis ^a	Off-site Laboratory Analysis ^a
1940s Skeet Range	<p>Samples will be collected from the MRA at locations to-be-determined in the field, beginning from the firing line and extending to the outer extent of the theoretical shotfall area. Spacing of sample locations will be approximately 160 ft in a radial grid.</p> <p>If lead is detected above the screening level, it will be delineated vertically (0.5 foot) and horizontally (about 50 feet).</p> <p>If lead is not detected or is below the screening level at the initial sample locations, no additional locations will be sampled for lead analysis.</p>	<p>Lead to correlate the results from the XRF for about 12 samples (Section 5.3.2.3)</p> <p>PAHs at location where target fragments are present</p>

^aOn-site and off-site analytical methods are described in Sections 5.5 and 9.

To delineate the vertical extent of lead contamination, samples will be collected in 0.5-foot intervals. If the 0.0-0.5 foot bgs XRF instrument reading exceeds the lead screening level, additional subsurface samples will be collected and analyzed. Subsurface soil will be collected in 0.5-foot intervals (e.g., 0.5-1 foot, 1-1.5 feet, 1.5-2 feet, etc.), until the lead concentration is below the screening level. If the 0.0-0.5 foot bgs XRF instrument reading is below the lead screening level and the location is within an area where fill has been placed, subsurface soil samples will be collected to a sufficient depth (maximum 3 ft bgs) to sample the previous ground

surface. In these areas, surface soil samples may not be collected at every location if it is apparent the surface material (e.g., topsoil or road base) was placed after range activities ceased.

As described in detail in the Soil Sampling SOP (SOP 1, Appendix G), samples will be collected using a disposable or decontaminated trowel or scoop, a decontaminated stainless steel hand auger or drive sampler with or without a liner, or shovel, and placed into a resealable bag (e.g., Ziploc[®]). The borehole will be backfilled using any residual sampling material. If residual sample material is insufficient for backfilling, additional clean material (e.g., potting soil or sand) will be used to finish backfilling the borehole. Before analysis, the sample will be processed, as described in the Soil Sample Preparation SOP (SOP 4, Appendix G), by removing any vegetative matter and rocks. If any shot, clay target fragments, shell/bullet/ cartridge fragments are observed, they will also be manually removed, described on a sample collection sheet (including the amount), and photographed. All samples will be temporarily archived in the original sample bag in a cooler until final off-site laboratory samples (e.g., for PAH analysis, lead correlation, and background) have been selected. If a sample requires off-site laboratory analysis, a portion of the processed material will be transferred to the appropriate sample bottle(s) (QAPP, Table 9-3) and placed in a cooler on ice.

5.3.2.2.1 Surface Soil Disturbance

Surface soil disturbances to the MRA may have occurred in the years since this MRA was last operational. Proposed sample locations that are on top of or immediately adjacent to a road, structure, or any other disturbed area will be off-set in the field to the nearest visually undisturbed location. Detailed notes will be collected to include location and reason for off-set.

5.3.2.2.2 High Moisture Content

XRF analysis of surface and subsurface soils with high moisture content can lead to screening values with an elevated degree of error. To effectively and efficiently identify soils with high moisture content, visual observation will be performed in accordance with SOP 4 (Appendix G) to identify soils with high moisture content prior to sample collection. If visual inspection indicates that the soil has excessive moisture, such as visible water or soil clumps holding together, XRF analysis will be abandoned and soil samples will be collected for off-site laboratory analysis only.

5.3.2.3 Correlation Sampling

Near the end of, or at the conclusion of, the XRF analysis, lead concentrations will be evaluated by comparing the lead results to the EPA Residential Regional Screening Level (RSL) and NMED Residential Soil Screening Levels (SSL) of 400 mg/kg. Following this evaluation, representative locations will be selected for off-site laboratory analysis to correlate the XRF results. All samples collected for off-site analysis will be collected from the same material that has been analyzed by XRF. Samples for off-site analysis will be selected to bracket the decision point (i.e., 400 mg/kg) and low concentrations will be given preference to samples that exceed the screening criteria by magnitudes. In addition, these samples will be horizontally and vertically distributed. 12 correlation samples will be collected: 4 high, 4 medium, and 4 low,

bracketing the decision point (screening level). Evaluation of these data is described in Section 9.6.3.

5.3.2.4 Background Comparison

Cannon AFB has established background levels for naturally occurring metals and these levels will be used for comparison to the CSE Phase II analytical data. There are no known background data for PAHs; therefore, approximately 10 background samples will be collected from a nearby area (discussed during the on-site Stakeholder Kickoff Meeting) and used for comparison to the MRA PAH analytical data.

5.3.3 Decontamination Requirements

Decontamination will be performed on reusable sampling and sample preparation equipment to prevent cross-contamination between sampling locations. Disposable equipment will be used whenever possible, and will not require decontamination. The Sampling Equipment Decontamination procedure is presented in Appendix G (SOP 3).

5.3.4 Surveying of Sample Locations

Prior to field mobilization, the GIS Specialist will upload the visual survey transects and all of the potential sample locations and identified range impact areas into the GPS unit to assist the field team in navigating to the MRA. At the time of sampling, sampling locations will be marked with pin flags, stakes, and/or surveyor's flagging tape coincident with the sampling activities. When the field team collects the actual sample, the sample point will be recorded using a mapping grade GPS unit. State Plane or Universal Transverse Mercator (UTM) coordinates will be used as designated by the GIS Specialist. Raw data from the GPS units will be downloaded and transferred to the designated GIS Specialist for data processing and mapping.

5.4 Quality Control Sampling

The QAPP for the CSE Phase II field activities (Section 9.0) describes the types and frequency requirements of samples collected for QC purposes. Field QC samples will include field duplicate samples and matrix spike (MS)/matrix spike duplicate (MSD) samples. In addition, if non-dedicated or reusable sampling equipment is used, equipment rinsate blanks will also be collected.

5.5 Analytical Program

Samples collected under this Work Plan will be analyzed for the expected MCs of potential concern, identified based on the history of the range. Analyses will consist of the following analytes, analytical suites, and analytical methods:

- Lead - EPA SW-846 Method 6200 (FPXRF)
- Lead – EPA SW-846 Methods 6010B (Inductively Coupled Plasma [ICP] - Atomic Emission Spectrometry [AES])
- PAHs – EPA SW-846 Method 8270C (Gas Chromatography/Mass Spectrometry [GC/MS] - Selected Ion Monitoring [SIM])

Sample analysis is described in detail in the Cannon AFB CSE Phase II QAPP (Section 9.0). The data will be reported and managed as specified in the Cannon AFB CSE Phase II data management plan (Section 8.0). Data quality indicators will be reported and evaluated against the criteria specified in the QAPP (Section 9.9).

5.6 Sample Management

This section describes the procedures for sample handling, custody, and preservation of all samples collected for analysis under the CSE Phase II. Additional detail regarding packaging and chain-of-custody (COC) requirements are detailed in Section 9.5.7 of the QAPP and SOP 2 – Sample Identification, Labeling, and Shipment (Appendix G).

5.6.1 Samples for On-site Analysis

Soil samples will initially be collected into new, plastic Ziploc® bags. Sample preparation procedures prior to analysis are detailed in SOP 4 (Appendix G). If the sample requires off-site analysis (e.g., correlation sample, PAH analysis) in addition to on-site analysis by XRF, a portion of the processed soil will be used to fill sample jars for shipment off site.

5.6.2 Samples for Off-site Analysis

Samples for off-site laboratory analysis will be collected from the sample material that has been prepared for analysis as described above. These samples will be collected in new, clean, sample containers provided by the laboratory. Unopened containers will be stored in a designated clean area onsite until used.

Each sample will be assigned a unique identifier that references the location where the sample has been collected. This field sample number, in coordination with the location identified, the sample depth (if applicable), the sampling date/time, the sample matrix, and the sample-type code will provide a unique identification of each sample. These identifiers will be compatible with the Environmental Restoration Program Information Management System (ERPIMS) database.

The sample containers will be labeled with these unique identifiers, and placed in coolers with wet ice for transport to the off-site laboratory. Sufficient wet ice will be used to keep the samples cool during collection and shipment, maintaining an internal temperature between 0 and 6 degrees Celsius (°C). A temperature blank will be included in each shipping cooler and may be used to determine the internal temperature of the shipment upon receipt at the laboratory. No chemical preservatives will be added to the samples. Samples will be shipped from the field to the laboratory on the day of collection if at all possible. Sample holding times are described in Section 9.5.4 (Table 9-3).

Sample custody procedures will be followed, including the use of a COC record to provide the analytical request and inventory of all samples in the shipment. A sample COC form is included in Appendix G (SOP 2) (this is a three-part form). The field team shipper will prepare the form and sign and date the form to transfer the sample custody to the laboratory, retaining the last page of the form (pink copy). The original COC form will be enclosed in a Ziploc® bag and

placed inside one of the sample coolers. Custody seals will be signed and dated by the field shipper and applied to each individual cooler and secured to the cooler with clear tape.

The field team sample shipper will make arrangements with an overnight delivery service for package pickup or will drop off sample coolers at an appropriate location (see Section 5.2.3), and retain the shipping paperwork and tracking number. All samples will be sent to the laboratory via priority overnight service. If the shipment of samples will be received by the laboratory on Saturday, the field shipper will make prior arrangements with the laboratory, and verify all shipping airbills and labels, if available, indicating "SATURDAY DELIVERY."

5.7 Investigation-Derived Waste Management

Management and disposal of investigation-derived waste (IDW) will follow Air Force, federal, state, and local laws and regulations. For the Canon AFB site, excess soil will be returned to the locations from which it was collected. Decontamination water will not be generated because only dedicated sampling equipment is being used. Nonhazardous solid IDW is anticipated to consist of used PPE (e.g., nitrile gloves), paper towels, disposable sampling equipment, and other quantities of solid debris. This small quantity of nonhazardous IDW will be containerized in plastic trash bags and disposed in a dumpster approved by the installation or appropriate local jurisdiction.

5.8 UXO Disposal

If a live or potentially live item is identified during field activities, the response procedures outlined in Section 6.0 and the APP/SSHP (Appendix F) will be followed.

5.9 Demobilization

The Versar Team will demobilize from Cannon AFB upon completion of the Exit Briefing, following the CSE Phase II field work. All exclusion areas will be shut down and equipment will be cleaned and removed from the site.

5.10 Develop CSE Phase II Report

Following completion of the CSE Phase II investigation work, a CSE Phase II report will be completed. The CSE Phase II report will fully document all CSE Phase II activities and results and provide recommendations for future munitions response actions or recommend NFA where appropriate. The CSE Phase II report will be prepared in accordance with the SOO and the guidance contained within the *Air Force Guide for Conducting the Comprehensive Site Evaluation Phase II at Air Force Munitions Response Areas, Version 4.0* (USAF, 2006). A copy of the CSE Phase II Report Table of Contents is included in Appendix E.

If NFA is warranted, the Versar Team will prepare an NFA decision memorandum using a format provided by USACE.

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6.0 MEC PLANNING AND OPERATIONS

According to the Cannon AFB Modified CSE Phase I Report, no information indicated that any release of MEC occurred at Cannon AFB; therefore, MEC is not anticipated to be found during the CSE Phase II investigation. However, in the event that potential MEC is encountered, this section discusses the MEC-specific procedures to be used during the CSE Phase II investigation activities. If needed, the nearest explosive ordnance disposal (EOD) personnel, identified by the Installation RPM, will be notified and plans and procedures will be followed in accordance with this section.

6.1 MEC Accountability and Records Management

In the event that potential MEC is encountered, the USACE PM and the Versar Team Program UXO Safety Officer, Sylvester (J.R.) Willis, will be consulted. If this occurs, all MEC-related records, including maps, journals, and logs will be signed and dated. Records will be completely filled out at the time of investigation. The field records will be reviewed daily by the Field Lead (or designee), and a summary of the data presented to the Versar PM. A copy of all records will be maintained by Versar in its Westminster, Colorado office.

6.2 MEC Identification

MEC will not be moved or handled during this investigation. MEC will be evaluated only using visual examination. When possible, any color coding that might be present and visible without handling the item will be noted. However, the color coding system cannot always be relied upon to be accurate because some munitions may have incomplete or improper coding.

6.3 MEC Personnel and Qualifications

In the event Versar Team UXO personnel are used during this CSE Phase II investigation, they will have the documented training and experience, in accordance with the Department of Defense Explosive Safety Board (DDESB) *Technical Paper 18, Minimum Qualifications for Unexploded Ordnance Technicians and Personnel* (DDESB, 2004).

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7.0 DATA SCREENING VALUES

Inputs to the decision-making process for the CSE Phase II will include the collection and chemical analysis of surface and subsurface soil at the 1940s Skeet Range at Cannon AFB. All analytical data will be compared to regulatory screening levels to determine if releases have occurred at concentrations exceeding levels of potential concern. The following sections describe the assessment of the investigative data based on the regulatory screening values.

7.1 Comparison of Metals and PAH Data to Background Data

Cannon AFB has established background levels for naturally occurring metals and these levels will be used for comparison to the CSE Phase II analytical data. There are no known background data for PAHs at Cannon AFB; therefore, 7 to 10 background samples will be collected from similar areas outside the MRA and used for comparison to the MRA PAH analytical data.

7.2 Screening Values for Soil

Analytical results for the soil will be compared with applicable primary and secondary soil screening values, including the NMED SSLs (NMED, 2009) and the EPA Human Health Medium-Specific Regional Screening Levels (RSLs) (EPA, 2010), for the evaluation of human health based on the CSE Phase II analytical data respectively. The NMED SSLs are derived using default exposure parameter values and chemical- and State of New Mexico-specific physical parameters. These default SSL values are assumed to be appropriately conservative and likely protective for the majority of site conditions relevant to soil exposures within New Mexico are either equivalent or higher values for the chemicals of concern. The EPA RSLs are defined as chemical-specific concentrations for individual contaminants in soil that may warrant further investigation or cleanup. These values are based on an incremental lifetime cancer risk of 1×10^{-6} and noncancer hazard quotient of 1. RSLs have been developed for residential and industrial/commercial scenarios. The residential soil RSLs are based on exposures to child and adult residents during typical daily activities. For carcinogens, residential RSLs are based on combined childhood and adult exposure over a 30-year period. For noncarcinogens, residential RSLs are based on childhood exposure from 1 to 6 years of age. The industrial RSLs are based on exposures to outdoor workers in a typical industrial/commercial workplace for 25 years. The RSLs address exposures to soil due to direct contact via ingestion, dermal absorption, and inhalation.

No ecological risk assessment will be completed for this site, as discussed in Section 4.5; therefore, no ecological screening values are presented. In addition, no soil screening values for protection of groundwater are presented because of the depth to groundwater, which is approximately 250 ft, compared to the expected shallow impacts from munitions-related activities.

Detected concentrations of lead and individual PAHs will be compared to the primary NMED and secondary EPA screening values for soil presented in Table 7-1. The current and assumed future use of the site is residential and therefore Residential SSLs and EPA-RSLs are proposed for use although Industrial SSLs industrial land use and RSLs are presented for comparison.

Table 7-1 – Soil Screening Levels

Analyte	Limit of Detection (mg/kg)	Reporting Limit (mg/kg)	NMED SSLs/EPA RSLs ^a (mg/kg)	
			Residential ^a	Industrial ^a
Lead	0.5 – 20 ^b	5 - 20 ^b	<u>400</u> /400	<u>800</u> /800
Polynuclear Aromatic Hydrocarbons (PAHs)				
Acenaphthene	0.00125	0.0025	<u>3,440</u> /3,400	<u>36,700</u> /33,000
Acenaphthylene	0.00125	0.0025	None	None
Anthracene	0.00125	0.0025	<u>17,200</u> /17,000	<u>183,000</u> /170,000
Benzo(a)anthracene	0.00125	0.0025	<u>6.21</u> /0.15	<u>23.4</u> /2.1
Benzo(a)pyrene	0.00125	0.0025	<u>0.621</u> /0.015	<u>2.34</u> /0.21
Benzo(b)fluoranthene	0.00125	0.0025	<u>6.21</u> /0.15	<u>23.4</u> /2.1
Benzo(k)fluoranthene	0.00125	0.0025	<u>62.1</u> /1.5	<u>234</u> /21
Benzo(g,h,i)perylene	0.00125	0.0025	None	None
Chrysene	0.00125	0.0025	<u>621</u> /15	<u>2,340</u> /210
Dibenz(a,h)anthracene	0.00125	0.0025	<u>0.621</u> /0.015	<u>2.34</u> /0.21
Fluoranthene	0.00125	0.0025	<u>2,290</u> /2,300	<u>24,400</u> /22,000
Fluorene	0.00125	0.0025	<u>2,290</u> /2,300	<u>24,400</u> /22,000
Indeno(1,2,3-cd)pyrene	0.00125	0.0025	<u>6.21</u> /0.15	<u>23.4</u> /2.1
1-Methylnaphthalene	0.00125	0.0025	<u>None</u> /22	<u>None</u> /99
2-Methylnaphthalene	0.00125	0.0025	<u>None</u> /310	<u>None</u> /4,100
Naphthalene	0.00125	0.0025	<u>45</u> /3.6	<u>252</u> /18
Phenanthrene	0.00125	0.0025	1,830/ <u>None</u> ^e	20,500/ <u>None</u> ^e
Pyrene	0.00125	0.0025	<u>1,720</u> /1,700	<u>18,300</u> /17,000

^aThe first number is the primary NMED Soil Screening Level (SSL) and the second number is the secondary EPA Regional Screening Levels (RSLs) for soil. ~~(May 2010) unless otherwise noted (see Footnote c)~~

^bThe first (lower) number in the range is for ICP analysis (limited number of samples), and the second (approximate) number in the range is for XRF analysis.

^eNo EPA RSL is available, so the NMED SSL (December 2009) is substituted.

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8.0 DATA MANAGEMENT

8.1 Data Management Plan

The purpose of this plan is to outline the management of data generated during the CSE Phase II investigation including initial generation of data, data reporting/review/evaluation, and final presentation of data. The types of data that will be generated during this investigation will include a field visual survey, GIS, XRF analytical data generated on site, and off-site laboratory sample data.

8.2 Generation of Data

The visual survey data, GIS data, on-site XRF data, and off-site laboratory sample data will be generated at different stages of the investigation and by different parties – both by Versar and the subcontract laboratories. However, each data type will have a specific person who has been identified in this work plan as the responsible person for generation of the data stream:

- The visual survey and field sampling data will be generated by the field sampling team and supported by all members of the field sampling team and the GIS Specialist. GPS coordinates for site reconnaissance data and sampling locations will be recorded and provided in the electronic data deliverables for the CSE Phase II investigation.
- The on-site XRF analysis data set will be generated primarily by the on-site XRF technician, with input from the Versar Team Project Chemist.
- The XRF correlation sampling analysis data set will be generated primarily by the Versar Team Project Chemist, as arranged through the off-site laboratory.
- The off-site laboratory analysis data stream will be generated by the laboratory and overseen by the Versar Team Project Chemist.

8.3 Data Reporting/Review/Evaluation

All sample collection/field survey data generated during the investigation will be reviewed for accuracy and completeness. Laboratory data will be validated by the Versar Team chemist(s) according to the QAPP (Section 9.0), the DoD Quality Systems Manual (QSM) 4.1 (DoD, 2009), and the analytical method. The validated laboratory data along with the field data will be compiled into the CSE Phase II Report. An electronic ERPIMS data submission will also be delivered directly to AFCEE using the EPRIMS Web Service and ERPToolsX software application.

Each person who generated data will be responsible for completing an initial data review. The CSE Technical Lead, who will prepare the CSE Phase II Report along with input from the other scientist/engineering staff, will provide a second level of review as the material is sorted and organized for the report.

8.4 Final Data Presentation

In the CSE Phase II Report, The Versar Team will summarize the field investigation and display collected data in a series of maps, figures, and data tables. In the report appendices, copies of all the required field documentation, data validation, and raw data backup will be included to support the information presented in the data tables.

The Versar Team will maintain the originals of all completed field paperwork and logbooks, laboratory EDDs, electronically stored field data files, laboratory data packages, and other forms of completed documentation in Versar's Westminster, Colorado office. These documents will be stored and maintained by Versar for transfer to the USACE representative, if requested, at the end of the contract.

8.5 USAF Data Management Deliverables

The DMT input data sheets will be completed using the information gathered during the CSE Phase II Investigation. The DMT is a Microsoft Access database that houses all of the data required for each of the information systems: AFRIMS, RACER–MMRP Module, and MRSPP. The database specifies the type of data required, the specific entries required or allowed (using pick lists), and requires a reference to the location in the report where the information is obtained. All information collected will be uploaded into the DMT for the AF MMRP.

9.0 QUALITY ASSURANCE PROJECT PLAN

This QAPP establishes function-specific responsibilities and authorities for data quality and defines procedures that will ensure that Cannon AFB Comprehensive Site Evaluation CSE Phase II activities will result in the generation of reliable data and follows the DoD QSM 4.1 requirements. Inherent in the QA program is the implementation of QC measures. These measures provide assurance that the monitoring of quality-related events has occurred, and that the data gathered in support of the project are complete, accurate, and precise. Implementation of this QAPP will help ensure the validity of the data collected and will establish a firm foundation for estimates of contamination and decisions regarding the CSE. This document was developed in accordance with guidance contained in the USACE, EM 200-1-3, *Requirements for the Preparation of Sampling and Analysis Plans* (USACE, 2001); the DoD QSM 4.1 (DoD, 2009); and the EPA *Guidance on Systematic Planning Using the Data Quality Objective Process* (EPA QA/G-4) (EPA, 2006).

Sample collection will be performed in accordance with established procedures designed to ensure the collection of representative samples. An off-site laboratory that is either accredited in accordance with the DoD Environmental Laboratory Accreditation Program (ELAP) or holds an unexpired DoD Component (Army, Navy, or Air Force) approval, and is accredited under the National Environmental Laboratory Approval Program (NELAP) will perform the analytical sample analysis. Versar will validate the laboratory data according to this QAPP and DoD QSM 4.1 requirements, and the analytical method. Data validation qualifiers will be consistent with the DoD QSM 4.1.

9.1 Project Sample Analysis Organization and Responsibilities

Qualifications and capabilities of potential analytical subcontractors were assessed by Versar in selecting companies to perform analyses under the CSE Phase II for Cannon AFB. Based on this assessment, Versar has selected the following laboratory to perform analysis of confirmatory samples:

Microbac Laboratories, Inc.
158 Starlite Drive
Marietta, OH 45750
Telephone: 740.373.4071
Contact: Ms. Stephanie Mossburg

The Microbac Laboratories, Inc.'s current DoD ELAP certification and the Primary NELAP Florida Department of Health (DOH) certificate is included as Appendix H. NMED does not have their own approval program. Versar has previously contracted with this laboratory.

The Versar Team will be performing the onsite analysis for metals using a Field Portable XRF detector.

9.2 Data Assessment Organization and Responsibilities

The key points of contact and responsibilities are outlined in Section 2.0 of this document. Versar's Chemistry QC Supervisor, Gary Torf, will be the key point of contact for the data

analysis subcontractor representatives. He will work closely with the CSE Technical Lead and other project personnel in ensuring the procedures in this QAPP are followed.

9.3 Quality Assurance Objectives

QA is defined as the overall system of activities for assuring the reliability of data produced. The system integrates the quality planning, assessment, and corrective actions of various groups in the organization to provide the independent QA program necessary to establish and maintain an effective system for collection and analysis of environmental samples and related activities. The QA program encompasses the generation of complete data with its subsequent review, validation, and documentation.

9.3.1 Data Quality Objectives

Systematic planning using the data quality objectives (DQO) process provides the performance and acceptance criteria for collecting environmental data for this project (EPA, 2006). The DQO process consists of the seven steps identified in Table 9-1. The identified project-specific DQOs for each site are described in these tables.

The overall QA objective is to develop and implement procedures for sample and data collection, sample shipment, and reporting that will allow QA reviewers to determine whether the field and laboratory data collected during the CSE at Cannon AFB meet the criteria and endpoints established in the DQOs. The QA objective will be achieved through the implementation of specific procedures for sampling, field data collection, COC, calibration, internal QC, audits, preventive maintenance, and corrective actions as described in this document.

9.3.2 Measurement Quality Objectives

On-site sample measurements obtained in the field and off-site sample analyses performed in a laboratory include both semi-quantitative and semi-qualitative screening-level data, as well as more qualitative and quantitative definitive-level data. The difference in level is not a function of where a measurement takes place; a field method, an on-site laboratory, or an off-site laboratory can generate definitive data. The difference in level is a function of the analytical method protocol's specificity, as demonstrated by an acceptable level of measurement uncertainty from the number and type of analytical QC samples employed and the performance criteria specified. Screening-level data generally support intermediate decisions, while definitive-level data generally support final decisions. The data level anticipated from the sample analyses described in this plan have been defined by the DQOs - a final determination of the level of analytical data actually obtained is made during the data usability review described in Section 9.9.

Table 9-1 – Cannon AFB Data Quality Objectives for 1940s Skeet Range MRA

DQO Elements		DQO Output	
		XRF Site Survey	Laboratory Analytical Samples
Step 1: State the Problem	Problem Statement	1940s Skeet Range was a skeet range. Activities at the range may have caused lead to be present in soil above the screening or action level criteria.	Due to historical activities at typical skeet ranges, lead and PAHs may be present in soil above the screening or action level criteria.
Step 2: Identify the Goal of the Study	Decision Statement	Determine the locations and horizontal and vertical impacts of range activities on the soil, including whether lead is above the 400 mg/kg threshold based on residential human health land use. Lead concentrations will be evaluated on-site using FPXRF for lead and correlated to off-site laboratory analyses.	Confirm the FPXRF method is appropriate for identifying soil with lead above the action level criteria, and establishing the boundaries of soil contamination. Determine the impacts of range activities on PAH concentrations in the soil, including whether PAHs are above background concentrations. PAH concentrations will be evaluated by off-site laboratory analyses; the extent of the impact will be determined visually by the presence or absence of clay target fragments.
	Alternative Actions	If lead is detected above the action level, the results will be used to evaluate the volume of contaminated soil. If lead is not detected above the screening or action level criteria and confirmed by laboratory analysis, NFA will be recommended.	If lead and PAHs are not detected above the screening or action level criteria, NFA will be recommended. If lead and/or PAHs are detected above the screening or action level criteria, future military munitions response actions may be recommended.
Step 3: Identify Information Inputs	Chemicals Of Interest	Surface and subsurface soil will be sampled at the range and analyzed for lead using FPXRF. Replicate samples will be collected at a 10% frequency and analyzed for QA/QC samples. Correlation samples will be collected and sent to the offsite laboratory for lead analysis by SW6010B. Samples will be selected from the range of observed XRF values, with samples typically ranging from less than 100 ppm, 100 – 250 ppm and greater than 250 ppm (up to 600 ppm).	Munitions fired at skeet ranges contain shot, which is composed primarily of lead. Although other metals can be associated with range activities (e.g., primarily antimony, arsenic, and barium), lead is typically the risk driver and found at the same locations as the other metals. Clay pigeon targets contain PAHs from the typical coal tar binder. PAHs are chemicals of interest where target fragments are present; only these locations will be sampled for PAHs.
	Physical Data	Map locations indicating locations and areas to be sampled, and coordinates for actual sampling locations.	Map locations indicating locations and areas to be sampled, and coordinates for actual sampling locations.
	Sampling Method	Stainless steel or disposable hand tools.	Stainless steel or disposable hand tools.

Table 9-1 – Cannon AFB Data Quality Objectives for 1940s Skeet Range MRA

DQO Elements		DQO Output	
		XRF Site Survey	Laboratory Analytical Samples
	Analytical Methods	Field Data: (Solid - soil) Lead: FPXRF per SOP, SW-846 Method 6200	Lab Data: (Solid - soil) Lead: SW-846 Method 6010B PAHs: SW-846 Method 8270C
	Method Quantitation Limits	Refer to Table 9-2.	Refer to Table 9-2.
	Field Quality Control Samples	Field Duplicates (1 per 10 samples)	Field Duplicate (1 per 10 samples). MS/MSD (1 pair per 20 samples) Field blank (1 per day per analyte group, when using non-dedicated or reusable sampling devices)
	Data Use	Site Delineation	CSE Phase II Report and DMT
	Action Level Criteria	For determination of lead hazards in soil; the <u>NMED Soil Screening Level - Residential value of 400 mg/kg will be the primary evaluation criteria; the secondary source evaluation criteria (EPA Regional Screening Level - (2010) for residential use/Residential) value of is also 400 -mg/kg will be used.</u> [†]	For determination of lead and PAH hazards in soil, the applicable NMED Soil Screening Level - Residential values will be used as primary evaluation criteria; applicable EPA Regional Screening Level - (2010) for residential-Residential values use will be used <u>as secondary evaluation criteria</u> (see Table 7-1). No ecological risk-based soil screening levels or action levels will be applied to the site data.
Step 4: Define the Boundaries of the Study	Media To Sample	Surface soil (0.0 to 0.5 foot bgs) & subsurface soil (0.5 foot intervals to 3 feet bgs), or as necessary to define the depth of contamination) at the MRA.	Surface soil (0.0 to 0.5 foot bgs) & subsurface soil (0.5 foot intervals to 3 feet bgs), or as necessary to define the depth of contamination at the MRA.
	Spatial Boundaries	See Figure 1-2 and Figure 3-1.	See Figure 1-2 and Figure 3-1.
	Time Frame	Analyses completed before demobilization.	Standard analysis (30 days) of lead correlation samples. Standard analysis of PAH samples.
	Practical Constraints	Portions of the MRA are currently off-base. Private property ROE access may be required.	Portions of the MRA are currently off-base. Private property ROE access may be required.
	Scale	See Figure 1-2 and Figure 3-1.	See Figure 1-2 and Figure 3-1.

Table 9-1 – Cannon AFB Data Quality Objectives for 1940s Skeet Range MRA

DQO Elements		DQO Output	
		XRF Site Survey	Laboratory Analytical Samples
Step 5: Develop the Analytic Approach	Decision Rule	If concentrations of lead are below the screening or action level criteria, NFA is recommended. If concentrations are above the screening or action level criteria, a military munitions response action may be recommended.	Based on historic operations, and refined by field operations, or where clay target fragments are observed, range samples will be analyzed for PAHs. If concentrations of lead and PAHs are below screening or action level criteria, NFA is recommended. If concentrations are above the screening or action level criteria, a military munitions response action may be recommended.
Step 6: Specify Performance or Acceptance Criteria	Tolerance Limits	Data Completeness	Data Usability/Completeness
Step 7: Develop the Detailed Plan for Obtaining Data	Sampling Design	<p>Proposed sample locations are approximately 160 feet apart within or near the likely maximum shot fall zone (300 to 680 feet down range) and approximately 160 feet apart outside the maximum shot fall zone. Samples will be collected from the upper six inches of the soil if the site appears undisturbed. Any clay or shot fragments will be removed from the sample. If the lead result in the surface soil sample exceeds 400 mg/kg, samples will be collected at 6 to 12 inches and in 6-inch increments to maximum depth of 36 inches, or refusal, if the results for lead continue to exceed 400 mg/kg in each subsequent sample.</p> <p>If the ground has been significantly disturbed, samples will be collected to a maximum depth of about three feet bgs, at the rate of one subsurface sample per two acres. Lithology of the samples will be documented.</p>	<p>Lead correlation sample locations will be collected at the rate of one per acre of range, and be split from soil samples analyzed by XRF, and selected based on the results from the XRF analysis. Results will be statistically assessed to determine the correlation between the XRF results and analytical results and to verify XRF field screening results.</p> <p>General areas for PAH sampling will be identified based on historic operations and expected region of fall-out. Final sample locations will be refined in the field based on visual observation. Approximately one PAH sample will be collected per acre of range (not including QC samples).</p>

[†]EPA, 4010

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9.3.2.1 Precision

Precision is the degree to which a set of measurements, obtained under similar conditions, conforms to itself. Precision data indicate the consistency and reproducibility of field sampling and/or analytical processes. Chemical measurement precision is usually expressed as a percent difference or standard deviation, in either absolute or relative terms. Overall project precision is measured by the sampling and analysis of field sample duplicates and MSDs. Precision specific to the analytical process is measured by preparing and analyzing duplicate aliquots of the same field sample or laboratory QC sample in the laboratory; these aliquots are called laboratory duplicates. Duplicate precision is evaluated by calculating a relative percent difference (RPD) using the following equation:

$$\text{RPD} = \frac{|x_1 - x_2|}{(x_1 + x_2)/2} \times 100\%$$

where:

x_1 = original sample concentration

x_2 = duplicate sample concentration

The RPD of field duplicates, laboratory duplicates, and MSDs will be calculated and evaluated against the criteria listed in Table 9-2.

9.3.2.2 Accuracy and Bias

Accuracy is the degree of agreement between a sample result and a reference value. Bias refers to the systematic inaccuracy associated with a sample result based on a reference value. Analytical accuracy is determined by adding a known concentration of target analyte(s) or surrogate (those with properties that mimic analytes of interest, but unlikely to be found in environmental samples) analyte(s) to a standard reference material or a laboratory control sample (LCS) consisting of an analyte-free matrix, and performing the prescribed method on the reference material or LCS. Analytical method accuracy is measured as a percentage, by calculating the amount of material recovered from the reference material or LCS by the analytical procedure, using the following equation:

$$\frac{\text{Measured Value}}{\text{Expected Value}} \times 100\%$$

Bias introduced by the sample matrix is determined by adding a known concentration of target analyte(s) or surrogate analyte(s) to an aliquot of field sample, referred to as a MS sample, and performing the prescribed method on the spiked sample aliquot. Analytical method bias is

measured as a percentage, by performing the prescribed method on the MS sample after the addition of a known concentration of analyte(s) and taking into account the concentration of analyte(s) determined to be present in a non-spiked aliquot of the field sample, using the following equation:

$$\frac{\text{Matrix Spike Value}_{\text{(after known addition)}} - \text{Non-spiked Value}_{\text{(before known addition)}}}{\text{Spike Value}_{\text{(concentration of spike addition)}}} \times 100\%$$

The percent recovery of LCSs and MS samples will be calculated and evaluated against the criteria listed in Table 9-2.

9.3.2.3 Representativeness

Representativeness is a qualitative measure of the degree to which a sampling and analysis program reflects the conditions of a site. Representativeness describes the adequacy of the sample collection process and the analysis process, as determined by sample matrix homogeneity and the consistency with which analytical procedures are performed. The documentation and use of statistical sampling designs and standardized operating procedures in the field and laboratory will help assure that sample results are representative of site conditions.

9.3.2.4 Completeness

Completeness is a measure of the amount of valid data collected compared to the expected amount of total data. Overall completeness will be inferred from a records review and documented data validation. Sampling completeness is assessed through an evaluation of the total number of samples proposed for collection compared to the actual number of samples collected and analyzed. Analytical completeness is evaluated by comparing the number of useable data points collected compared to the total number of data points generated for each analyte and sample. Completeness is calculated as a percentage using the following equations:

$$\% \text{ Sampling Completeness} = \frac{\text{Number of Samples Collected}}{\text{Number of Proposed Samples}} \times 100\%$$

$$\% \text{ Analytical Completeness} = \frac{\text{Useable Data}}{\text{Total Data Collected}} \times 100\%$$

Table 9-2 – Field & Laboratory Analysis: Analytes, Methods, and Quality Control Limits

Analyte/Method	Limit of Detection (mg/kg)	Reporting Limit (mg/kg)	Control Limits ^a	
			Accuracy/Bias (%)	Precision (% RPD)
Lead – FPXRF SW6200	20	20	NA	20
Lead – ICP SW6010B	0.50	5.0	80-120	20
PAHs – GC/MS SW8270C-SIM				
Acenaphthene	0.00125	0.0025	45-110	30
Acenaphthylene	0.00125	0.0025	45-105	30
Anthracene	0.00125	0.0025	55-105	30
Benzo(a)anthracene	0.00125	0.0025	50-110	30
Benzo(a)pyrene	0.00125	0.0025	50-110	30
Benzo(b)fluoranthene	0.00125	0.0025	45-115	30
Benzo(k)fluoranthene	0.00125	0.0025	45-125	30
Benzo(g,h,i)perylene	0.00125	0.0025	40-125	30
Chrysene	0.00125	0.0025	55-110	30
Dibenz(a,h)anthracene	0.00125	0.0025	40-125	30
Fluoranthene	0.00125	0.0025	55-115	30
Fluorene	0.00125	0.0025	50-110	30
Indeno(1,2,3-cd)pyrene	0.00125	0.0025	40-120	30
1-Methylnaphthalene	0.00125	0.0025	35-100	30
2-Methylnaphthalene	0.00125	0.0025	45-105	30
Naphthalene	0.00125	0.0025	40-105	30
Phenanthrene	0.00125	0.0025	50-110	30
Pyrene	0.00125	0.0025	45-125	30
2-Fluorobiphenyl ^b	NA	NA	45-105	NA
Nitrobenzene-d5 ^b	NA	NA	35-100	NA
Terphenyl-d14 ^b	NA	NA	30-125	NA

^aDoD QSM 4.1 Appendix G

^bSurrogate standard

DoD – Department of Defense

FPXRF – field portable XRF

GC/MS – gas chromatography/mass spectrometry

ICP – inductively coupled plasma

mg/kg – milligrams per kilogram

NA – not applicable

PAH – polynuclear aromatic hydrocarbon

QSM – Quality Systems Manual 4.1

RPD – relative percent difference

SIM – selected ion monitoring

SW – solid waste

The importance of any missing or unusable (i.e., rejected) records or data will be evaluated in terms of the sample location, analyte, decision to be made, and the consequences of an erroneous decision. If an information gap affecting project goals is created when expected data are missing or judged to be unusable for project decisions, the PM will be notified. Critical samples or analytes for which data is missing or unusable will be re-collected and or reanalyzed.

A completeness goal of 90% has been set for sampling and analysis efforts for the Cannon AFB CSE Phase II.

9.3.2.5 Comparability

Comparability is the degree to which separate data sets can be represented as similar. The documentation and use of statistical sampling designs and standardized operating procedures in the field and laboratory will help assure the comparability of measurements. Inconsistent data results will be addressed during the data validation and data usability review outlined in Section 9.9.

9.3.2.6 Sensitivity, Detection and Quantitation Limits, and Reporting Limits

Sensitivity refers to the ability of an analytical method or instrument to detect target analytes at a specified concentration. The detection limit is generally defined as the lowest amount of a substance that can be measured with a specified degree of confidence. Analytical sensitivity is quantified by instrument detection limits and laboratory reporting limits and is compared to project-specific screening or action levels to ensure that prospective analytical data are adequate for project decisions. The DoD QSM 4.1 has defined the following terms associated with the analysis and reporting of environmental data:

- Limit of Detection (LOD) - *The smallest amount or concentration of a substance that must be present in a sample in order to be detected at a high level of confidence (99%). At the LOD, the false negative rate (Type II error) is 1%.*
- Limit of Quantitation (LOQ) - *The lowest concentration that produces a quantitative result within specified limits of precision and bias. For DoD projects, the LOQ shall be set at or above the concentration of the lowest initial calibration standard.*
- Reporting Limit (RL) - *A client-specified lowest concentration value that meets project requirements for quantitative data with known precision and bias for a specific analyte in a specific matrix.*

The off-site laboratory will maintain a list of verified detection limits (LOD) that are less than the concentration of the lowest initial calibration standard (LOQ) set for each analyte and test method. The laboratory's established LOQ must be less than or equal to the project RL specified for the method and analyte in Table 9-2. The verified LOD and RL will be adjusted as appropriate (e.g., analytical dilutions, percent moisture) for listing with each sample analyte result reported. Analytes not identified at concentrations equal to or greater than the LOD will be reported as not-detected and analyte concentrations equal to or greater than the LOD but less than the RL will be qualified as estimated values.

9.4 Sample Location and Rationale

A summary of the proposed sampling is provided in Section 5.0 of this document. Samples at the MRA will be collected for on-site analysis of lead by XRF, and for off-site lead analysis by ICP to correlate the results of the XRF. Samples for off-site analysis of PAHs will be collected only at the 1940s Skeet Range where clay target debris is observed. Actual sample locations may change based on field observations and conditions and, where applicable, XRF results. Specific information on sampling locations and procedures is contained in Section 9.5.

9.5 Sample Management

9.5.1 Sample Number and Type

The parameters, media, and estimated laboratory samples to be collected during this scope of work for Cannon AFB CSE Phase II are anticipated to include approximately 12 lead correlation samples, approximately 10 background PAH samples, and up to 12 PAH samples at the 1940s Skeet Range MRA.

Sample collection, preservation, handling, storage, packaging, and shipping will be performed in a manner that minimizes damage, loss, deterioration, and artifacts. Procedures described are designed to eliminate external contamination and to ensure data quality through the use of standardized sampling procedures.

9.5.2 Sample Containers

The integrity of containers for soil/solid samples is ensured by the use of appropriate cleaning techniques as specified by the EPA and DoD guidance. The contract laboratory will purchase pre-cleaned sample bottles for chemical analyses according to requirements set forth in EPA and USACE Guidelines. Sample container requirements for analyses to be performed for the site investigation are provided in Table 9-3.

9.5.3 Sample Preservatives

Sample preservation requirements for analyses to be performed are provided in Table 9-3. Chemical preservation is not applicable to the parameters to be analyzed in the matrices to be collected. All samples will be cooled upon collection and until analysis.

Table 9-3 – Analysis Container, Preservation, and Holding Time Requirements

Parameter	Soil/Solid Matrix		
	Container	Preservation	Holding Time (from collection date)
Lead	4-oz. glass, Teflon Lined Lid	Cool: 0 to 6 °C	180 days to analysis
PAHs	4-oz. glass, Teflon Lined Lid	Cool: 0 to 6 °C	14 days to extract/40 days from extraction to analysis

9.5.4 Holding Times

Sample holding time is defined as the interval between sample collection to sample extraction and analysis such that a sample result may be considered valid and representative of the sample matrix. Sample holding time requirements for analyses to be performed are provided in Table 9-3.

The laboratory QA program will be responsible for ensuring the adequacy of the sample tracking system in precluding holding time deficiencies.

9.5.5 Sample Identification

Each sample will be assigned a unique sequential number at the time of sampling, to be written on a sample label, which will be permanently affixed to the sample container. The sample identification number consists of an alphanumeric designation related to the MRA, location, soil depth, and QC sample (as appropriate), according to the following convention:

MRA Designation: **Skeet Range (SR)**

Location Designation: Three (3) -digit numeric designator (**001** through 999) for non-QC field samples with assignable geographic coordinates (x-value east/west, and y-value north/south).

The character designator FIELDQC will apply to field QC samples

Location ID: SR001A

Field Sample Designation: Reference to the soil depth range collected, and field QC sample type if applicable, where:

A = 0.0 ft to 0.5 ft	D = 1.5 ft to 2.0 ft
B = 0.5 ft to 1.0 ft	E = 2.0 ft to 2.5 ft
C = 1.0 ft to 1.5 ft	F = 2.5 ft to 3.0 ft

DUP = field duplicate	EB = equipment blank
MS = matrix spike	MSD = matrix spike duplicate

Field Sample ID: SR001ADUP

9.5.6 **Documentation Requirements**

Information pertinent to the sampling effort will be recorded in a field logbook and COC forms will be used to trace samples. All entries will be made in indelible ink on consecutively numbered pages, and corrections will consist of lineout deletions that are initialed and dated. At a minimum, required field logbook entries include:

- Time and date of sample collection;
- Sampler identification;
- Sample identification number;
- Sample type;
- Analytical request;
- Sampling methodology (grab or composite sample);
- Preservation used, as applicable;
- Associated QA/QC samples;
- Physical field measurements; and
- Signature and date of personnel responsible for observations.

A sample label will be filled out using indelible ink and will include the following information:

- Project name and number;
- Sample location/Site ID;
- Sample date and time;
- Analyses to be performed; and
- Preservative, as applicable.

9.5.7 **Packaging and COC Requirements**

Environmental samples to be shipped must be packaged appropriately in leak-proof coolers. Custody procedures must be performed and documented appropriately to ensure sample integrity. The following sections discuss sample packaging, shipment, and custody requirements.

9.5.7.1 Shipping Coolers

If possible, sample coolers will be shipped to arrive at the laboratory the morning after samples are collected (priority overnight). The laboratory will be notified of the sample shipment and the estimated date of sample arrival. Coolers used to transport environmental samples to the laboratory are required to be clean, leak proof, contamination-free, and in suitable condition to handle sample containers packed with wet ice.

9.5.7.2 *Temperature Blanks*

Temperature blanks will be included in each sample shipment cooler in order to document sample storage temperatures between 0°C and 6°C during shipment. Temperature blanks will be used by the laboratory to measure the shipping container internal temperatures at receipt.

9.5.7.3 *Sample Packaging and Shipment*

Samples will be transferred to an off-site laboratory for analysis via waterproof plastic coolers. Before samples can be put in the cooler, any drains will be sealed with tape to prevent leaking. Each cooler will be packed in the following manner:

- Ensure sample lids are tight.
- Fill the cooler with enough packing material to prevent breakage of glass bottles.
- Place sufficient wet ice in the cooler to maintain the internal temperature between 0°C and 6°C during transport.
- Place a temperature blank in the cooler.
- Place associated COCs in a Ziploc[®] bag, and tape it to the inside lid of the cooler.
- Seal coolers at a minimum of two locations with signed custody seals or evidence tape before being transferred off site. Attach a completed shipping label, “up” arrow stickers, fragile stickers, and a “SATURDAY DELIVERY” label (if applicable) to the cooler. Cover custody seals with wide, clear packing tape, and continue around the cooler to seal the lid. If the cooler has a drain spout, it is also to be sealed with clear packing tape or duct tape.

9.5.7.4 *Chain-of-Custody*

Sampling will be evidenced through the completion of a COC form, which accompanies the sample containers in the field, during transit to the laboratory, and upon receipt by the laboratory. The COC will be annotated to indicate time and date that samples are relinquished. In addition, shipping containers will be affixed with custody seals. The COC will be filled out using indelible ink and will include the following information:

- Project name and number;
- The signatures of the sampling personnel;
- Sampling dates, locations, and times (military format);
- List of the chemical analysis, volume, and preservatives used;
- Type of sample, whether “grab” or “composite”;
- The total number of containers per sample location;
- The custody seal number;
- Sample relinquisher, date and time;
- Any special remarks (i.e., MS/MSD);

- Courier, or carrier airbill number; and
- Analytical Laboratory name.

9.6 Analytical Procedures

The essential tasks and procedures for the generation of analytical data are derived from the guidance provided in DoD QSM 4.1 (2009). The analytical methods chosen and the analytical QC criteria and procedures to be implemented conform where applicable to the specifications listed in the DoD QSM 4.1, particularly where clarified for DoD installations and as noted in the DoD appendices. Specific analytical methods applicable to the project are briefly described in this section.

9.6.1 On-Site Field Analyses

Soil analyses using FPXRF technology will be performed on site. The XRF analyte list and QC limits are provided in Table 9-2. Soil samples will be analyzed for lead consistent with *EPA SW-846 Method 6200 – Field Portable X-Ray Fluorescence Spectrometry for the Determination of Elemental Concentrations in Soil and Sediment*, and the USACE-Omaha District Military Munitions Design Center guidance document: *Small Arms Range Characterization of Lead Using X-Ray Fluorescence (XRF)*. Two SOPs included in Appendix G, *Soil Sample Preparation Prior to the Analysis of Metals by FPXRF* and *Analysis of Soil/Sediment Samples for Elemental Analysis by X-Ray Fluorescence (XRF)*, detail the field sample preparation and on-site analytical procedures to be followed.

9.6.2 Off-Site Laboratory Analyses

Soil analyses to be performed at an off-site laboratory include lead and PAHs. The analyte lists and QC limits are provided in Table 9-2. Soil samples will be analyzed for metals (lead) and PAHs using EPA SW-846 Methods 6010B – *Inductively Coupled Plasma-Atomic Emission Spectrometry (ICP-AES)* and 8270C – *Semivolatile Organic Compounds by Gas Chromatography/Mass Spectrometry (GC/MS)*, respectively. All sample analyses will be performed following the procedures outlined in the applicable method (the GC/MS will be operated in the SIM mode) and the requirements listed in the DoD QSM 4.1 (2009).

9.6.3 Correlation of FPXRF Data to ICP-AES Data

Collaborative data sets consisting of soil lead results obtained from on-site FPXRF sample analyses and off-site ICP-AES sample analyses will be compared using linear regression. Twelve (12) collaborative samples will be selected for off-site analysis by ICP from the Former Skeet Ranges MRA. These samples will be selected within the range of XRF-determined soil concentrations bracketing the screening or action level of 400 mg/kg as follows:

- concentrations less than 75 mg/kg
- concentrations between 75 mg/kg and 400 mg/kg, and
- concentrations between 400 mg/kg and 1000 mg/kg

A correlation coefficient will be determined from the collaborative data set using the least squares method, with the objective of having a correlation coefficient of at least 0.70, and optimally 0.90 or greater, indicating a direct positive relationship between the values obtained from the XRF and ICP analyses using the following equation:

$$r = \frac{n \sum xy - \sum x \sum y}{\sqrt{n \sum x^2 - (\sum x)^2} \sqrt{n \sum y^2 - (\sum y)^2}}$$

where,

r = correlation coefficient

n = number of data pairs

y = XRF lead result for a collaborative sample

x = ICP lead result for a collaborative sample

The collaborative lead concentration values and calculated line factors of y-intercept and slope of the line (obtained by the equation: $y = mx + b$; where, b = y-intercept, m = slope of the line) will be reported, along with a graphical plot of the regression line and lead data.

If the correlation coefficient is less than 0.70, the collaborative data will be further reviewed and assessed to determine data usability.

9.6.4 Reporting and Detection Limits

The detection and reporting limits for the CSE Phase II sampling activities are provided in Table 9-2. Section 9.3.2.6 provides a discussion of project-related detection and reporting limit objectives.

9.7 Instrument Calibration Procedures

Calibration procedures for field and laboratory instruments are designed to ensure that the equipment is functioning optimally and produce results of known quality. Equipment and field logbooks will record usage, maintenance, calibration, and repair histories.

9.7.1 On-Site Field Instrument Calibration

The XRF will be pre-calibrated using an internal-instrument procedure, and further calibrated on a daily basis according to SOP “*Analysis of Soil/Sediment Samples for Elemental Analysis by X-ray Fluorescence (XRF)*” (Appendix G).

9.7.2 Off-Site Laboratory Instrument Calibration

Laboratory instrument calibration procedures include the initial calibration, daily calibration, and continuing calibration steps detailed in the applicable method and outlined in the DoD QSM 4.1 for the specific instrument type.

9.8 *Field Quality Control Samples*

Field QC samples provide information used to evaluate the quality of the sample collection component of project plan activities. The required types and collection frequencies for field QC samples to be collected for off-site laboratory analyses during the Cannon AFB CSE Phase II are detailed in this section and summarized in Table 9-4. For the on-site XRF analyses, only field duplicate samples will be collected, at the frequency of 1 per 10 soil samples. The acceptance criteria (accuracy, bias, and precision) for field QC sample results are listed in Table 9-2.

Table 9-4 – Field Quality Control Samples for Off-Site Laboratory Analyses

Field QC Sample Type	Minimum Frequency	Field Sample Collection Data Quality Indicator
Field Blank (e.g., equipment blank)	1 per day per analyte group, when using non-dedicated or reusable sampling devices	Accuracy/bias
Field Duplicate (e.g., co-located, sub-sample)	1 per 10 samples collected per analyte group, per matrix	Precision, Representativeness
Matrix Spike (e.g., matrix spike, matrix spike duplicate)	1 pair per 20 samples collected per analyte group, per matrix	Accuracy/bias, Precision, Representativeness

9.8.1 Field Duplicate Samples

Field duplicate samples are used to evaluate the precision and representativeness of the sample collection process. They assess whether separate portions of a sample contain the same analytes at similar concentrations. Two types of field duplicates will be used:

- 1) Co-located field duplicates consist of two or more separate samples collected from side-by-side locations at the same point in time and area and are carried through all steps of the sampling and analysis process in the same manner. Field duplicates assess the precision of the total method, including sampling, analysis, and site heterogeneity.
- 2) Sub-sample field duplicates consist of one sample that is collected and separated into two or more portions to be analyzed by separate method procedures. Sub-sample field duplicates are separated after field sample homogenization and preparation procedures but prior to any analytical method determinations. This type of duplicate assesses specific sample preparation heterogeneity and analysis heterogeneity, as opposed to the heterogeneity of the site area.

Maintaining the identity of field duplicates in relation to their parent samples during analysis provides an important link between sample collection and analysis, promotes an advantageous teaming relationship between field and analytical personnel, and ensures that anomalous field duplicate data result in timely corrective actions. Therefore, the use of analytical “blind” field duplicate samples will not be employed.

9.8.2 Matrix Spike/Matrix Spike Duplicate Samples

MS/MSD samples are used to evaluate the precision and bias the sample collection process and the sample matrix may have on the analytical method. The ability to assess the recovery of known concentrations of analytes artificially added (i.e., spiked) to separate portions of a field sample distinguishes field duplicates from MS samples collected and analyzed in duplicate. The subsequent evaluation of the MS/MSD samples takes into account the native concentration of analyte(s) determined to be present in a non-spiked parent sample and may not be effectively assessed when the native concentration of an analyte is significantly greater than the known concentration added to the spiked sample.

9.8.3 Field Blank Samples

Field blanks are used to evaluate the accuracy and bias of the sample collection process. They assess whether detected analytes are likely to have been artificially introduced during the sample collection, handling, and transport processes prior to analysis. The type of field blank applicable to the collection of soil samples to be analyzed for lead and PAHs include equipment blanks. Equipment blanks consist of a clean matrix (typically deionized, distilled, and/or carbon-filtered reagent water) poured over or through non-dedicated or reusable sampling equipment after routine equipment decontamination and collected in a sample container for analysis. Equipment blanks are used to detect possible contamination introduced to samples from incomplete equipment cleaning between sample collections.

9.9 Data Review

The data review procedures described in this section will ensure that data are reviewed and documented appropriately, and that reported results are accurate or qualified if necessary. The project QC Supervisor will be responsible for data review, including the verification, validation, and usability reviews of all on-site field and off-site laboratory data.

9.9.1 Data Review Process

Data review is the process by which data are examined and evaluated to ensure that data: 1) are of known and documented quality, and 2) meet measurement and project-specific quality objectives. The process involves three related assessments to ensure that project data quality needs are met:

- Verification – Confirming data completeness and ensuring that specific data sets conform and comply with procedural, documentation, and contract requirements
- Validation – Substantiating that method-specific requirements have been met and that data qualifiers have been applied appropriately and consistently

- Usability – Evaluating the adequacy of the project-specific data for the decisions being made, based on the results of the verification and validation review steps

Each step of the review process is critical to the overall assessment of data quality and successively builds on the outcome of the previous step. In order to perform data verification and data validation, the on-site field documentation and off-site laboratory reports must include detailed narratives indicating any deviations from the method requirements or project-specified measurement quality objectives. Final analytical reports must be supported by a complete raw data package containing sufficient documentation to reproduce the reported analytical results and verify that the specified analytical procedures were followed as written. Inadequate or incomplete sample information or raw data might prevent the completion of the data review process resulting in re-sampling or re-analysis.

9.9.2 Data Verification

Data verification is a sample-specific assessment performed to determine whether the requested sample information has been gathered; assess sample data for conformance with the applicable QC requirements; and assess sample data for compliance with the quality objectives of the project plan and contract requirements. All data inputs are reviewed to ensure that the field and laboratory data packages (analytical report and raw data) are complete and adequate for data verification and validation. Data packages must contain the necessary items to completely document the analytical testing, and it must be sufficient for a method-specific data validation. The data verifier evaluates whether: 1) samples were collected and analyzed for the list of analytes and the specific test methods specified in the project plan, 2) sample detection limits met project-specific objectives, 3) analytical holding times were met, and 4) measurement acceptance criteria for QC samples were met. The data verification step includes a review of all final sample results for transcription errors.

Sample-specific data verification is performed on all field samples collected and analyzed. Table 9-5 contains a list of potential data verification input items for the data review process.

9.9.3 Data Validation

Data validation is a method-specific assessment that substantiates whether analytical requirements have been met and that data qualifiers have been applied appropriately and consistently. The objectives of the data validation review step are to 1) quantitatively reproduce a subset of the analytical results while confirming that the specified analytical procedures were followed as written and 2) ensure that data qualifiers have been applied appropriately and consistently based on the data quality indicators used to assess the measurement quality objectives for the project.

The standard level of data validation is 10% of the number of normal field samples and associated field QC samples (e.g., field sample duplicates and replicates, MS/MSD samples, and field blanks) collected and analyzed for a given analytical method and matrix. The necessary level of data validation may be increased based on the results of the data verification review, previous findings for analyses performed by the laboratory, and other technical and project considerations. The data validator will document the actual level of data validation in each data validation report.

Data will be validated according to the general requirements for chemical measurements and using the specific analytical method criteria listed in the DoD QSM 4.1. Table 9-5 contains a list of potential data validation input items for the data review process.

9.9.4 Data Usability

Data usability is a project-specific assessment that evaluates the suitability of the sample data as a basis for project decisions. The usability assessment is the final step in the data review process and can only be performed on data of known and documented quality (i.e., verified and validated data). All types of data (e.g., sample collection information, on-site analytical measurements, and off-site laboratory analyses) are relevant to the usability assessment. The data quality indicators detailed in Section 9.3.2 (Measurement Quality Objectives) are used to document the degree of attainment of the measurement quality objectives used to support data usability. When the required measurement performance criteria are not achieved, additional data might be required to make project decisions. The results of the data verification assessment and data validation assessment are essential data usability input items for the data review process.

9.9.5 Data Qualification

Analytical laboratories assign flags to reported analytical results to notify the data user of potential deficiencies or biases associated with the result. In addition to project-specific measurement quality objectives, the QC protocols specified by the test method and in the DoD QSM 4.1 are the primary measure by which the laboratory assigns flags. Laboratory flags are unique to individual laboratories. Therefore, each laboratory data package must include a list of laboratory flag definitions.

Table 9-5 – Data Review Input Summary

Input Item	Verification	Validation	Usability
Project Documents			
Work Plan, Quality Assurance Project Plan	X	X	Use output from Verification and Validation
Sampling Documents			
Sample chain-of-custody form	X	X	Use output from Verification and Validation
On-site field and off-site laboratory sample receipt logs	X	X	
Analytical Results Report			
Report narrative	X	X	Use output from Verification and Validation
Sample chronology	X	X	
Sample results	X	X	
Laboratory control sample results	X	X	
Surrogate results	X	X	
Method blank results	X	X	
Reporting limits	X	X	
Hold times	X	X	
Instrument calibration summaries	X	X	
Internal standard area summaries	X	X	
Laboratory duplicates	X	X	
Analytical Raw Data Package			
Instrument calibration records		X	Use output from Verification and Validation
Manual chromatographic integrations		X	
Internal standard areas		X	
Sample dilution records		X	
Sample preparation records	X	X	
Instrument analysis logs	X	X	
Instrument tune and performance checks	X	X	
Calibration blank results	X	X	
Serial dilution & post digestion spike results	X	X	
Integration reports & chromatograms		X	

Table 9-5 – Data Review Input Summary

Input Item	Verification	Validation	Usability
Second column/detector confirmation results	X	X	
Verification of tentatively identified compounds	X	X	
Spectral identification		X	
Analyte retention times		X	
Analyte wavelengths		X	
Verification of calculations and results by recalculation from raw data		X	
Communication logs	X	X	
Documentation of corrective actions	X	X	
Field Quality Control Samples			
Matrix spike/matrix spike duplicate results	X	X	Use output from Verification and Validation
Field duplicate/field replicate results	X	X	
Equipment blank results	X	X	
Trip blank results	X	X	
Ambient blank results	X	X	

The data verifier and data validator review the laboratory-assigned flags as part of the data verification and data validation processes. The QC protocols and criteria listed in the DoD QSM 4.1 (Appendix F: SW-846 Quality Control Requirements and Appendix G: SW-846 LCS Control Limits) will be used as the default guidance during the data review process where applicable and when project-specific requirements have not been defined. If the acceptance criteria listed in the DoD QSM 4.1 instrument- and method-specific tables have not been met by the laboratory, technical judgment will be used to assess the impact on project-specific decisions. The data verifier and data validator may then assign final data review flags based on the results of the data review process, which includes an assessment of field QA samples and project quality objectives. In all cases where technical judgment conclusions supersede QC requirements specified in the DoD QSM 4.1 or the test method, the applicable data review report will include a clear and complete rationale documenting the decision. The project QC Supervisor will provide a final determination of data quality and acceptability, and categorizes the data as fully usable, usable but qualified, or rejected. Data verification and data validation reports will include full documentation of final data review flags.

The following definitions provide a brief explanation of the final data review flags that may be applied to analytical results as a result of data verification and data validation and upon completion of the data review process:

- U The analyte was not detected at or above the associated LOD.
- J The result is an estimated value (e.g., matrix interference was observed or the analyte was detected at a concentration outside the LOQ).
- B The result is associated with a contaminated field or laboratory blank.
- R The result is rejected due to analytical deficiencies, matrix interferences, and/or other circumstances and may not be used to support regulatory compliance or critical decisions.

Sample results that have not been qualified (other than for non-detection of analytes) indicate the data meet all acceptance criteria. All results will be considered usable unless specifically qualified as rejected.

9.10 Data Management, Document Control, and Reporting

All project information and sample data will be fully documented. This includes sample collection and field data, analytical results including on-site field and off-site laboratory measurements, and data review and usability assessment reports. SOPs may detail specific information necessary to be recorded.

9.10.1 Data Management

All project records will be safely and securely stored in confidence. Project record systems will be employed that promptly and legibly record the identity of the facility and personnel, the date(s), and corrections or changes to records (documented by the date, the identity of the person modifying the record, and the reason for the change) of sample receipt and handling, sample measurement system calibration and testing, and data review and reporting.

The documentation of on-site field measurements and off-site laboratory data will be sufficient to: 1) verify that specified procedures and methods were followed as written, 2) determine whether QC criteria have been met, and 3) reproduce the reported results. Information considered essential for the documentation and subsequent reproduction of data includes but is not limited to:

- The appropriateness of sample container type and preservation, and the completeness and accuracy of sample COC and identification upon receipt;
- Reference to the specific test method, instrument identification, and analytical batch associated with the data;
- Reference to specific chemical standards, reagents, and reference materials used during performance of the analytical testing procedures;
- The date and time of sample preparation, analysis, and instrument calibration, particularly for time-critical procedures;
- Data and statistical calculations;
- Intermediate values, and final sample and analytical QC results;
- The results of data review tasks;

- Data audit reports and corrective action reports; and
- All original raw analytical test data including worksheets, logbook entries, and electronic data output records.

9.10.2 Document Control

The objectives for document control procedures are to ensure that project documents issued or generated will be accounted for upon completion of the project. The document control system includes an inventory procedure and a central filing system with a designated person(s) responsible for its maintenance. Documents used or generated during the course of the project are accounted for and become a part of the project files upon completion of the task. Documents and records shall be maintained for a minimum of five (5) years from the date of generation. These documents may include but are not limited to the following:

- Project deliverables;
- Investigation requirements;
- Reports and correspondence material; and
- Contract documents.

9.10.3 Hard Copy Data Reports

Reporting of data in support of intermediate project decisions will be recorded in summary and tabular formats and may appear in appendices to reports when DQOs have anticipated the collection and analysis of samples to be semi-quantitative, semi-qualitative, or collaborative in specificity. The reporting of data in support of final decisions, and sample data found to be usable only for intermediate decisions after a usability assessment has been performed, will follow the guidance outlined for hard copy reports in the DoD QSM 4.1 at Appendix E: SW-846 Reporting Requirements. The following elements are specifically described in the DoD QSM 4.1, and will be present in every off-site laboratory report submitted:

- 1) Cover Sheet
- 2) Table of Contents (or similar organizational element)
- 3) Case Narrative
- 4) Analytical Results
- 5) Sample Management Records
- 6) QA/QC Information

In addition, off-site laboratory reports will include a complete and verifiable raw analytical chemistry data package. In order to conserve paper, data packages will be delivered as PDF files on CDs.

9.10.4 Electronic Data Deliverable

The production of electronic data in support of project decisions will follow the procedures outlined in the most current version of the Air Force ERPIMS Data Loading Handbook (DLH). ERPIMS is a relational database maintained for the Air Force, by the Air Force Center for Engineering and the Environment (AFCEE) to store and manage data collected for Air Force environmental projects. The DLH is the guide used to ensure data is entered in the proper format for insertion into the ERPIMS database. The Environmental Resource Program Tools (ERPTools) is a relational database tool that must be used for data entry and submission/delivery of ERPIMS data to AFCEE – ERPIMS electronic data can only be submitted/delivered to AFCEE using the ERPToolsX software.

Sample results produced on-site using FPXRF instrumentation for lead, and sample results produced off-site using ICP-AES and GC/MS instrumentation for lead and PAHs respectively will be processed through ERPToolsX, and delivered to AFCEE during preparation of the final report.

9.11 Corrective Action Procedures

Corrective action investigations will be initiated in response to deficiencies encountered during project and data assessments. A closed-loop corrective action process will be used and will include the following steps:

- Defining the problem;
- Assigning responsibility for problem investigation;
- Investigating and determining the cause of the problem;
- Assigning responsibility for problem resolution; and
- Verifying that the resolution has corrected the problem.

Documentation of each step of the corrective action process will be performed. This documentation will be reviewed during project assessments. Problems identified will be resolved at the level it occurred with support from project management. Problems that cannot be resolved at this level will be reported to the QC Supervisor for resolution, who will determine at which management level the problem can best be resolved, and will notify the appropriate manager.

Corrective actions will be categorized as either routine or non-routine and will require short-term or long-term action. Both types will require administrative coordination between the person initiating the corrective action and the QC Supervisor.

9.11.1 Routine Corrective Action

Routine corrective actions involve deficiencies covered by specific project procedures and will involve either a short-term action for sporadic problems or a long-term action for more chronic problems.

9.11.2 Non-Routine Corrective Action

Deficiencies that are not covered by specific procedures will require the identification of new procedures. Documentation of the corrective action investigation, assignment of responsibility for the identified corrective action, due dates for completion of the action, and validation of completion of the action(s) will be maintained. Such documentation will be reviewed during project assessments.

9.11.3 Procedure Modifications

Planned deviations from established protocols (arising from corrective or other actions) will not be implemented without concurrence from the Versar PM and QC Supervisor. Prior to receipt of such approvals, a determination will be made whether the change requires a modification to the Work Plan or a revision of a Project Procedure. If so, proposed changes to the Work Plan and protocols will be evaluated prior to implementation.

9.11.4 Stop Work Protocols

All Versar Team personnel have the authority to issue a stop work order. A stop work order will be issued under conditions such that the quality of work jeopardizes the attainment of the project objectives. A stop work order must not create an operational, safety, public health, or environmental hazard. Under a stop work order, work may not be conducted within affected activities until the responsible manager acknowledges the implementation of a corrective action in accordance with the resolution criteria of the order. Immediate notification of work stoppage must be made to the PM, SSHO, QC Supervisor, and Program Managers. Proper notification will also be made to the USACE.

9.12 Quality Assessments

Quality assessments may include a general appraisal and review of project activities in relation to project objectives, or a more detailed and comprehensive examination of the procedures and records that document the performance of project-related activities -- referred to as an "audit". Actions and procedures that can most affect data quality and influence project decisions will be targeted for oversight. Audits may include technical system audits, performance audits, and data audits.

9.12.1 Field Assessments

Field assessments are relevant to both sample collection and onsite analytical activities. Sample collection activities are generally considered to be a major contributor to overall measurement bias and error associated with project analytical data. Therefore, relevant field collection SOPs will be identified and reviewed prior to implementation. Both sampling tasks and on-site analytical tasks will be considered when planning field assessments.

Oversight of field activities is the responsibility of the PM. A thorough evaluation of critical field resources and procedures, including a review of available personnel, equipment, and SOPs, will be performed prior to field mobilization. Additional evaluations may include one or more of the following assessments:

- 1) A readiness review prior to the start of field sample collection and field-based analytical measurement activities;
- 2) An on-site technical systems audit at the start of or during actual field activities; and
- 3) A documentation review at the end of field activities.

Documentation of audits and any necessary corrective action implementations will be available to all project personnel, and be maintained as part of the project record.

9.12.2 Laboratory Assessments

Laboratory assessments include both internal reviews conducted by the laboratories generating analytical data for a project, as well as external reviews conducted by the Versar Team. During these assessments, the laboratory quality system is evaluated for overall effectiveness, and compliance with specific QC procedures and criteria. These reviews may include technical system audits, performance audits, and data audits.

9.12.3 Technical System Audits

A technical systems audit is a thorough examination during which the organization or facility, sample handling and tracking procedures, equipment, instrumentation, supplies, personnel training, on-site or off-site procedures, analytical methods, and data review and reporting processes are checked for conformance with the project-specific work plan or quality plan. A sufficient technical systems audit frequency will be demonstrated by the organization or facilities' ongoing ability to produce and report data of known and documented quality, and maintain required accreditations, certifications, and contract approvals.

9.12.4 Performance Audits

A performance audit evaluates the quality of results through the analysis of non-routine reference samples termed Proficiency Test (PT) samples. The organization or facility may be aware of the PT sample as a reference sample requiring analysis while "blind" to its composition, (a single-blind PT), or the organization or facility may be unaware of the identity of the PT sample, having been introduced as a routine sample "blind" to its purpose and composition (a double-blind PT). Laboratories are required to participate in and maintain documentation of their performance on PT audits as part of ongoing laboratory accreditation and certification requirements. PT results serve as an ongoing demonstration of a laboratory's accuracy and bias for a given analytical method.

9.12.5 Data Audits

Data audits are systematic evaluations of hard copy or electronic records documenting the handling of samples or reference materials from the time of field collection, through completion of the analytical and reporting processes. Data audits are distinct from the regular data review process described in Section 9.9, in that they are performed based on project-specific concerns or oversight objectives. Data audits are required to be performed by the QC Supervisor as part of any corrective action investigation resulting from a finding during a data review or assessment that inaccurate data have been intentionally reported.

9.13 Daily Quality Control Reports

The project operations are to be evaluated through the following basic elements:

- Correction of deficiencies identified and documented prior to and during field operations and meetings;
- Ongoing evaluation of field operations by the QC Supervisor to ensure compliance with the established protocols, requirements, and DQOs of the field sampling program; and
- Ongoing audits of field and laboratory operations (if performed) to provide an independent assessment of compliance with established protocols and DQOs.

In order to ensure that all elements are evaluated, daily quality control reports (DQCRs) are completed. These reports may include the general areas of field sampling and off-site laboratory operations. The components as they occur for the DQCR will include the following:

- Summary of sampling events;
- The sampling task manager and associated sampling personnel for the sampling event;
- Sampling summary to include associated field QC samples;
- Summary of COCs generated with copies attached;
- Summary of Phase Checklists (if applicable) (Pre-Field Operations, Preparatory, Initial, and Follow-up) generated with cross-reference to the associated sampling event;
- Summary of corrective action reports issued with copies attached;
- Summary of all audit reports completed with copies attached;
- Notification of revisions to field sampling procedures;
- Notification of revisions to analytical procedures;
- Laboratory sample status with a summary form for the status of in house samples attached;
- H&S status including violations, corrective instructions given, and corrective actions taken;
- Communication summary (primarily between the client, USACE Omaha District, and Versar Team) which would have an impact on existing protocols, procedures, or DQOs; and
- Documentation of conflicts on-site with respect to interpretation of protocols and specifications as well as action taken.

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10.0 ACCIDENT PREVENTION PLAN AND SITE SAFETY AND HEALTH PLAN (APP/SSHP)

The APP/SSHP for the CSE Phase II investigation is provided in Appendix F of this Work Plan, and was developed to address both hazards associated with chemical releases, in accordance with USACE Safety and Health Requirements Manual EM 385-1-1 (USACE, 2008a); and explosive safety hazards in accordance with USACE Explosives - Safety and Health Requirements Manual EM 385-1-97 (USACE, 2008b), Air Force Manual (AFMAN) 91-201 *Explosives Safety Standards* (revised) (USAF, 2008) and DoD 6055.09-STD, *DoD Ammunition and Explosives Safety Standards* (DoD, 2008).

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Appendix A

Final Modified CSE Phase I Report

Cannon Air Force Base, NM

December 2009

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Modified Comprehensive Site Evaluation Phase I

Cannon Air Force Base, New Mexico

FINAL

Prepared for:

Headquarters, Air Force Special Operations Command (AFSOC)

Prepared Under:

Environmental Remedial Services, Small Business

Contract Number: W91238-06-D-0022

Task Order: DK04

Prepared by:

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December 2009

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Appendix H	AFRIMS Data Input Worksheet (Provided on CD)

1.0 Introduction

Cannon Air Force Base (AFB) is home to the 27th Special Operations Wing (SOW) of the Air Force Special Operations Command (AFSOC). Cannon AFB is located in Curry County, New Mexico, situated approximately eight miles west of the City of Clovis. In support of the Military Munitions Response Program (MMRP) at Cannon AFB, a Modified Comprehensive Site Evaluation (CSE) Phase I was performed to characterize the site; evaluate actual or potential release(s) of hazardous substance(s), pollutant(s), or contaminant(s) to migration/exposure pathways (groundwater, soil, and air) from munitions response areas (MRAs); and evaluate associated targets of concern. Based on historical document reviews, potential MRAs were identified for Cannon AFB. After completion of on-site data gathering and records reviews, six of these potential MRAs were determined not to be on Cannon AFB. Another two potential MRAs were determined to be active areas. All areas with known locations are presented on **Figure 1-1**. Based on a thorough review and analysis of historical maps and data acquired during this Modified CSE Phase I, two MRAs were surveyed during the site investigation. The field observations made at these two areas are discussed in Section 5.0 of this report.

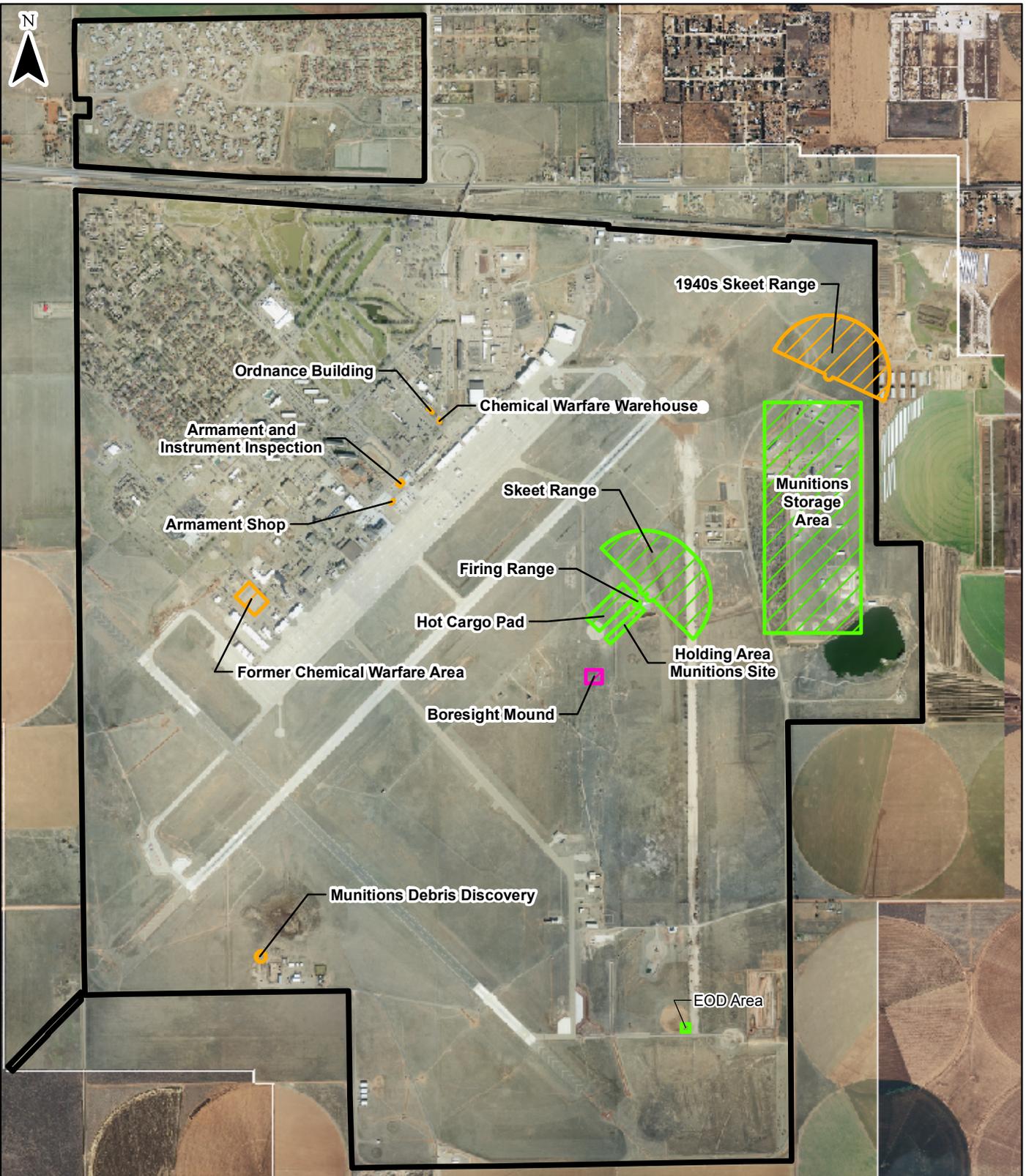
1.1 Purpose

The U.S. Air Force (USAF) developed the CSE concept from existing data acquisition methods and data analysis, tracking, and reporting tools to serve as the initial site assessment for sites covered under the MMRP (i.e., comparable to a Comprehensive Environmental Response, Compensation, and Liability Act [CERCLA] Preliminary Assessment/Site Inspection [PA/SI]). The CSE is a holistic approach to munitions response and environmental restoration that assesses the unique challenges faced at MRAs, including explosive safety issues posed by munitions and explosives of concern (MEC) and associated releases of munitions constituents (MC) (e.g., hazardous substances, pollutants, and contaminants) to the environment. An MRA is defined as any area on a defense site that is known or suspected to contain MEC (includes unexploded ordnance [UXO], discarded military munitions [DMM], MC in high enough concentrations to pose an explosive hazard) or MC. Based on information gathered during the Modified CSE Phase I and depending on site-specific factors, each MRA may be designated as a single munitions response site (MRS), or it may be subdivided for the purposes of evaluation and response into multiple MRSs. MRSs represent discrete locations within an MRA that, based on investigation or historical records, are known or suspected to contain MEC and/or MC and require a munitions response. Subdividing MRAs into multiple MRSs allows for more efficient characterization so that munitions responses specific to local conditions can be conducted.

The CSE process provides the historical, anecdotal, visual, analytical, and geophysical data that serve as the basis for USAF decision-making regarding follow-on munitions response actions.

The CSE is conducted in two distinct phases: CSE Phase I generally consists of historical records reviews (HRR), visual surveys, and interviews; CSE Phase II generally consists of visual surveys, environmental sampling, and geophysical surveys.

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-  Munitions Related ERP Site
-  Munitions Use Site
-  Active Area
-  Cannon Air Force Base Installation Boundary



Projection : NAD_1983_StatePlane_New_Mexico_East_FIPS_3001_Feet



**U.S. ARMY
CORPS OF ENGINEERS**
OMAHA DISTRICT

MILITARY MUNITIONS RESPONSE PROGRAM

FIGURE
NUMBER
1-1

POTENTIAL MRAs INVESTIGATED
FOR CSE PHASE I
CANNON AIR FORCE BASE



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The CSE Phase I and Phase II investigations differ from the traditional CERCLA PA/SI, with respect to data requirements. CSE activities primarily are focused on obtaining data to input into the Department of Defense (DoD) Munitions Response Site Prioritization Protocol (MRSPP) and for site-sequencing for cleanup. The CSE process utilizes an expanded array of analytical, tracking, and reporting tools to support decision-making, and therefore, has greater data requirements. Tools utilized as part of the CSE include:

- Conceptual Site Model (CSM) for project communication, hazard assessment, and data gap analysis;
- MRSPP (Proposed) to prioritize sites for further munitions response actions, based on relative risk;
- Hazard Ranking System (HRS) data elements to ensure full characterization of the MRA;
- Air Force Restoration Information Management System (AFRIMS) for a range of program management functions, including data calls and audits; and
- Remedial Action Cost Engineering Requirements (RACER), MMRP Module for estimating the costs of future munitions response actions.

At the beginning of the project, it was believed that there was a low probability of a significant number of MRAs being at Cannon AFB; therefore, the USAF has modified the CSE Phase I process by deferring some actions typically performed in a Phase I, to the CSE Phase II, should a Phase II be required. For this modified CSE Phase I, it was determined that the CSM, and MRSPP and HRS scoring were not required. If MRAs are identified that require future evaluation, these tools will be employed during a CSE Phase II. The objectives of this Cannon AFB Modified CSE Phase I report are to characterize sites and sources; evaluate actual or potential release(s) of related MC to migration/exposure pathways (groundwater, soil, and air); and evaluate associated MRAs. The primary goal of the CSE Phase I is to determine whether individual MRAs within the identified USAF installation warrant additional munitions response activities or documentation for a No Further Action (NFA) determination.

1.2 Project Data Quality Objectives

The data quality objectives for this investigation are based on data requirements specified in the *Air Force Guide for Conducting the Comprehensive Site Evaluation Phase I at Air Force Munitions Response Area* (Version 8.3REV) (USAF, 2005) for completion of Phase I investigations. The data collected was used to complete the RACER and AFRIMS data worksheets, presented in **Appendices G and H**.

Prior to field mobilization, a HRR was conducted to determine whether information sources used and data gathered during this phase were referenced satisfactorily. Similarly, data included in this report were compared against field records, to determine if any reported findings are documented.

1.3 Project Management

This Modified CSE Phase I report has been prepared by Innovative Technical Solutions, Inc. (ITSI) with technical support from Shaw Environmental, Inc. (Shaw) and TLI Solutions (a subsidiary of TechLaw Holdings, Inc.) – hereafter referred to as the ITSI Team, under the U.S. Army Corps of Engineers (USACE) Environmental Remediation Services (ERS) Multiple Award Task Order Contract (MATOC) W91238-06-D-0022, Task Order (TO) DK04, Modified CSE Phase I Various Installations.

1.4 Project Scope

The field investigation was comprised of three main tasks: 1) HRR; 2) visual surveys; and 3) interviews with appropriate persons.

- The HRRs included identification and review of data repositories located both on and off the installation.
- Field reconnaissance activities consisted of visual survey activities only. Investigation, sampling, or other intrusive activities were not performed as part of the CSE Phase I activities.
- Interviews were conducted with people identified as having information or knowledge relevant to the installation and related military activities. A summary of the interviews completed can be located in Section 4.2.

In locations where MEC/MC was found not to be a concern, NFA has been recommended. Confirmation of whether there is a potential for MRAs that require further evaluation at Cannon AFB or outside the installation's boundaries has also been completed.

1.5 Report Organization

This report is organized into eight sections as follows:

Section 1.0 – Introduction: Presents the introduction, objectives, and organization of this report.

Section 2.0 – Installation Background: Describes the history of activities at Cannon AFB.

Section 3.0 – Physical and Environmental Setting: Presents the physical description for Cannon AFB.

Section 4.0 – Summary of Data Collection Activities: Describes the investigation completed at Cannon AFB.

Section 5.0 – MRA Visual Survey: Presents the site-specific conditions present at each MRA.

Section 6.0 – Evaluation of Known/Suspected MEC: Describes the sources, release mechanisms, and associated MC for MEC at Cannon AFB.

Section 7.0 – Summary and Conclusions: Presents a summary and recommendations for each MRA investigated at Cannon AFB.

Section 8.0 – Recommendations: Presents cohort assignments for each retained MRA, programmatic process streamlining recommendations, and recommendations for subdividing the retained MRAs, where applicable.

Tables and figures are embedded in the text where first referenced. Definitions are presented in **Appendix A**, abbreviations and acronyms in **Appendix B** and references in **Appendix C**. See the List of Appendices for other miscellaneous information provided with this report.

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2.0 Installation Background

The Cannon AFB installation background information is presented in this section. Much of the information presented was obtained from the *Installation Restoration Program (IRP) Records Search for Cannon AFB, New Mexico* (CH2M Hill, 1983) and the *General Plan, Cannon AFB, New Mexico* (Black & Veatch, 2008).

2.1 Location and Setting

Cannon AFB is located in Curry County, New Mexico, about 8 miles west of the City of Clovis, 12 miles north of the City of Portales, and 190 miles east-southeast of the City of Albuquerque. It is situated in New Mexico's high plains, near the Texas Panhandle. US Route 60/84 runs east-west and passes through the north end of the base (**Figure 2-1**). Curry Road 7/Route 467 runs east-west just south of the base. Cannon AFB is bordered to the east by Curry Road P and to the west by Curry Road R. The boundary of the main portion of the installation has remained relatively unchanged since the base's inception. An administrative area has since been added north of Route 60 (**Figure 2-2**).

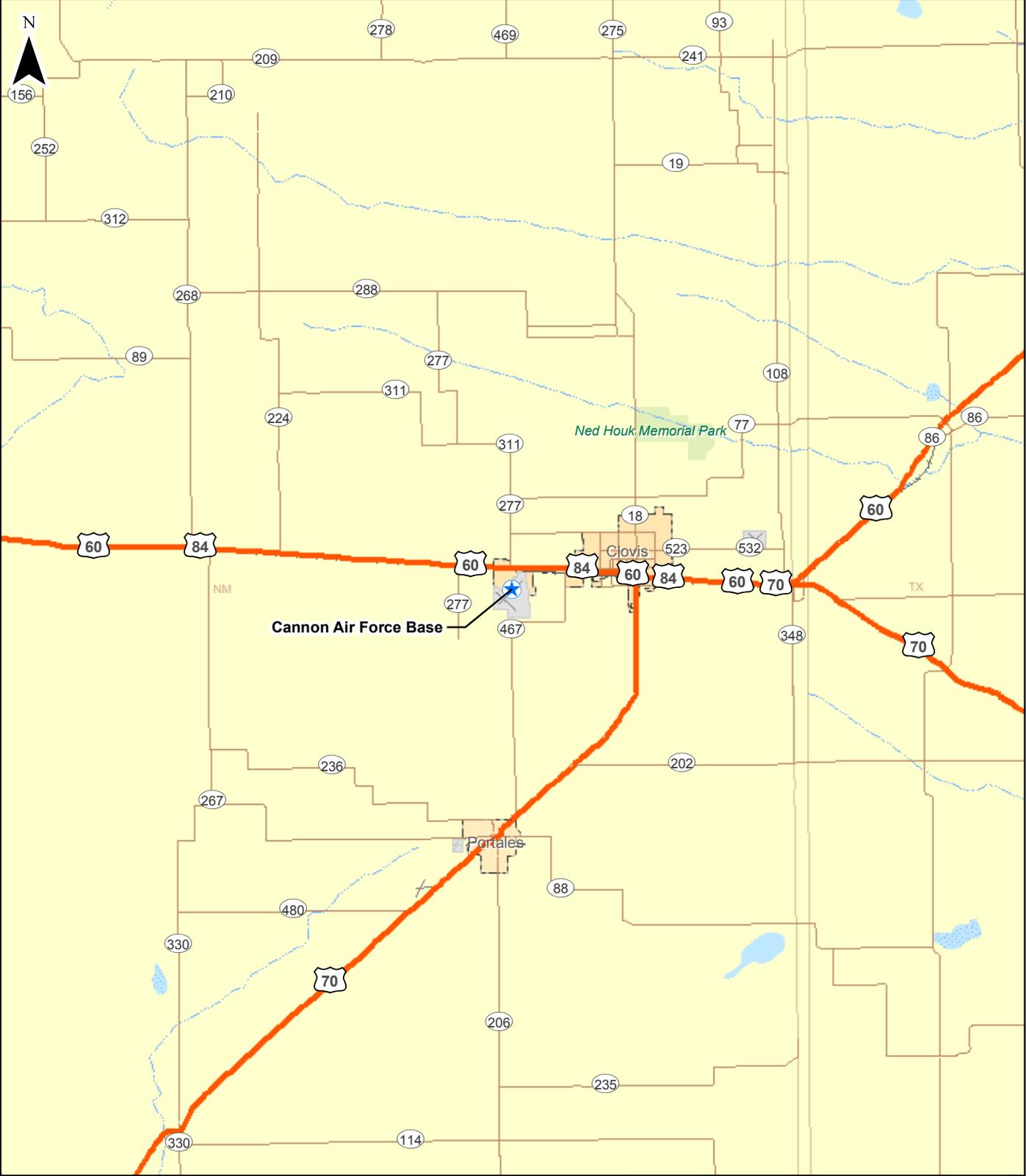
The base is situated on 3,789 acres (5.9 square miles) of federally-owned land. Buildings and administrative areas are generally found in the northern portion of the base, while the southern portion is comprised mainly of access roads and the flight line. Whispering Winds Golf Club is located in the northern portion of the base. Off-base facilities include the Melrose Air Force Range (formerly Melrose Bombing Range), about 24 miles west-southwest of the base, and the Conchas Lake Recreation Annex, about 80 miles northwest of the base. The Melrose Range is the primary training range for Cannon AFB. It is located on approximately 60,010 acres and is currently active. One endangered species candidate, the black-tailed prairie dog, is found in the vicinity of the base. It is not found at any of the potential MRAs. No other threatened or endangered species exist at the base, and there are no cultural or archaeological sites present.

2.2 Installation Mission and Operational History

The history of Cannon AFB began in 1929 with the establishment of Portair Field (later Clovis Municipal Airport), a civilian passenger terminal for early commercial transcontinental flights. The Army Air Corps took control of the site in 1942, and it became known as Clovis Army Air Base (renamed Clovis Army Air Field in 1945, and later Clovis AFB). Through the end of World War II, the base was used for flying, bombing, and gunnery classes. It was placed on reduced operational status in mid-1946 and flying activity decreased. The installation was deactivated in 1947. Up until that point, aircraft at Cannon AFB included B-17, B-24, and B-29 heavy bombers.

The base was reassigned to the Tactical Air Command in mid-1951 and was reactivated later that year. Between 1951 and 1957, aircraft at the base included the P-51 "Mustang" and F-86 "Sabre" fighter jets.

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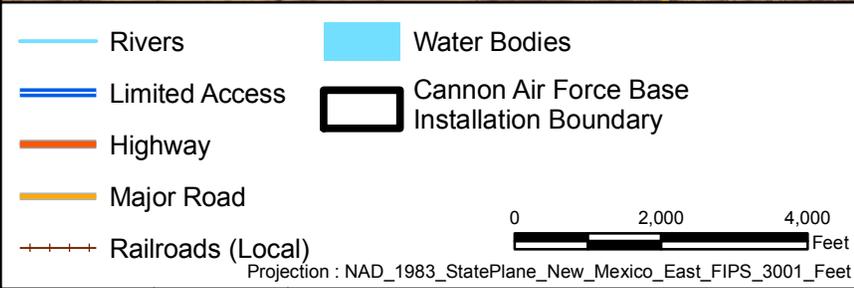
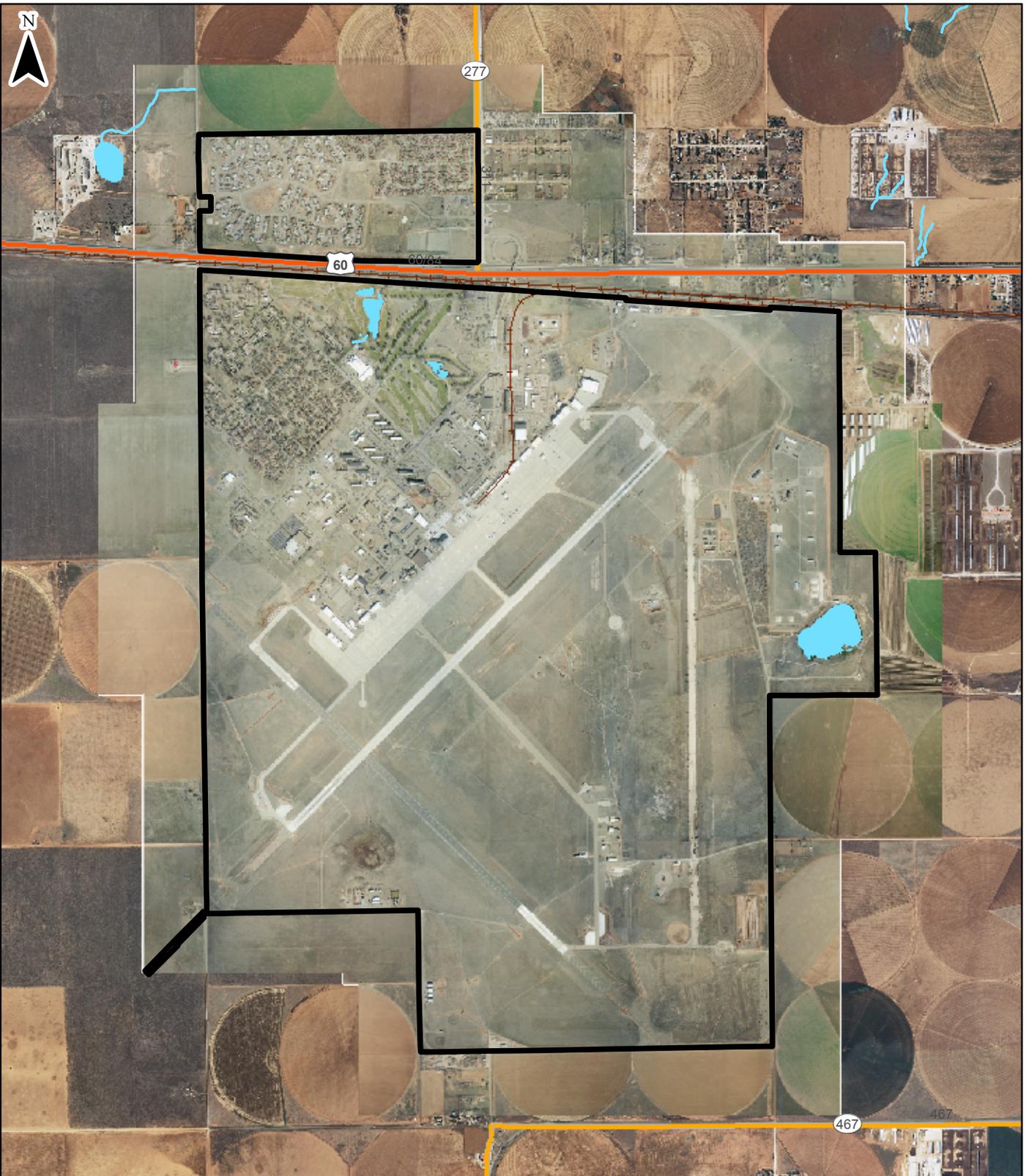
	Cannon Air Force Base
	State Boundary
	National Forests (State)

0 5 10 Miles

Projection : NAD_1983_StatePlane_New_Mexico_East_FIPS_3001_Feet

	U.S. ARMY CORPS OF ENGINEERS OMAHA DISTRICT
	MILITARY MUNITIONS RESPONSE PROGRAM
FIGURE NUMBER 2-1	LOCATION CANNON AIR FORCE BASE
Shaw Environmental, Inc.	Innovative Technical Solutions, Inc.

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	U.S. ARMY CORPS OF ENGINEERS OMAHA DISTRICT
MILITARY MUNITIONS RESPONSE PROGRAM	
FIGURE NUMBER 2-2	PHYSICAL DESCRIPTION CANNON AIR FORCE BASE
 Shaw Environmental, Inc.	 Innovative Technical Solutions, Inc.

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The base became a permanent installation in June 1957 and was renamed Cannon AFB in honor of the late General John K. Cannon, a former commander of the Tactical Air Command. In 1959, the 312th Tactical Fighter Wing (TFW) was deactivated and replaced by the 27th TFW (which, by the mid-1970s, had become the principal USAF unit at Cannon AFB). In 1965, the base's mission changed to that of a replacement training unit. Until recently, the function and operations of Cannon AFB has remained relatively unchanged.

In May 2005, the Secretary of Defense (SECDEF) recommended the closure of Cannon AFB to the Base Realignment and Closure Commission. The Commission's subsequent September 2005 final report to the President recommended that the base remain open as an enclave until at least 31 December 2009 (or until a new mission was found) and that the 27th TFW be disestablished. The SECDEF designated Special Operations as the new mission at Cannon AFB on 19 June 2006, and the 27th SOW was activated under the control of AFSOC.

Eight sites are included in the Formerly Used Defense Site (FUDS) inventory associated with Cannon AFB, entitled: 1) CANNON AFB OUTER MARK AX (Curry County, FUDS Property Number K06NM0339), 2) CLO AFB NARA VI PBR (precision bombing range) #1 (Quay County, FUDS property number K06NM0373), 3) CLOVIS AFB RAD BEA AX (Curry County, FUDS property number K06NM0372), 4) CLOVIS PBR #1 (Lea County, FUDS property number K06NM0374), 5) CLOVIS PBR #3 (Lea County, FUDS property number K06NM0375), 6) CLOVIS PBR #4 (Lea County, FUDS property number K06NM0376), 7) CLOVIS PBR #5 (Lea County, FUDS property number K06NM0377), and 8) CLOVIS SM ARMS RGE ANX (Curry County, FUDS property number K06NM0583) (**Figure 2-3**). Two of the FUDS locations, CLOVIS PBR #1 (Federal Facility Identification [FFID] NM69799F617900) and CLO AFB NARA VI PBR #1 (FFID NM69799F617800) are listed in the MMRP Site Inventory indicating that they are MMRP sites. Although the remaining FUDS may not be munitions sites, all of the FUDS associated with Cannon AFB were researched to determine if munitions operations discussed in the historical documentation was potentially associated with these FUDS rather than Cannon AFB.

CANNON AFB OUTER MARK AX (K06NM0339, FFID NM9799F6144) is a 1.0-acre site located in Curry County, New Mexico, approximately 10 miles southwest of Clovis. In 1969, the DoD acquired land by fee from a private party for the development of an Instrumental Landing Site. The land was declared excess in 1976 and disposed to General Services Administration on SF-118 dated 15 September 1976. It was then sold to a different private party by Quitclaim Deed dated 30 June 1977. The land is currently used as a commercial aggregate borrow source. This site does not appear to have been used for munitions operations.

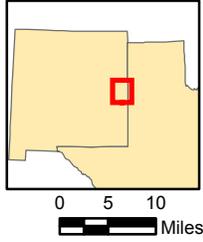
Because this site is within the FUDS program and is not on Cannon AFB property, it was not further researched as part of the Modified CSE Phase I.

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- FUDS Site Associated With Cannon AFB
- ★ Cannon Air Force Base



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	U.S. ARMY CORPS OF ENGINEERS OMAHA DISTRICT
MILITARY MUNITIONS RESPONSE PROGRAM	
FIGURE NUMBER 2-3	FUDS SITE ASSOCIATED WITH CANNON AIR FORCE BASE
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Information included on the web-based FUDS Geographic Information System (GIS) indicates that CLO AFB NARA VI PBR #1 (K06NM0373, FFID NM69799F617800) comprises 10,246 acres, located 11 miles south of Nara Visa, New Mexico, and approximately 80 miles north of Cannon AFB. In 1943, the War Department acquired the grazing land as a site for use as a practice bombing range. Twelve buildings, three observation towers, and barracks for 24 personnel were constructed at the site. This property is known or suspected to contain MEC (e.g., UXO) and, therefore, may present an explosive hazard. CLO AFB NARA VI PBR #1 is listed in the MMRP Site Inventory. Because this site is within the FUDS program and is not on Cannon AFB property, it was not further researched as part of the Modified CSE Phase I.

CLOVIS AFB RAD BEA AX is an 85.29-acre site located in Curry County. It was once used as a radio station and is currently under DoD control. This site does not appear to have been used for munitions operations. Because this site is within the FUDS program and is not on Cannon AFB property, it was not further researched as part of the Modified CSE Phase I.

Information included on the FUDS GIS indicates that CLOVIS PBR #1 consists of 640 acres, and is located 28 miles northwest of Hobbs, New Mexico, approximately 75 miles south of Cannon AFB. There is no evidence of construction on this site, and current owners use the land for agricultural purposes. In 1943, the War Department acquired the site for use as a PBR. The site was formerly used as grazing land and is currently used for farming. This property was investigated under the FUDS as it had the potential to contain MEC (e.g., UXO) and, therefore, had the potential to present an explosive hazard. CLOVIS PBR #1 is listed in the MMRP Site Inventory. Because this site is within the FUDS program and is not on Cannon AFB property, it was not further researched as part of the Modified CSE Phase I.

CLOVIS PBR #3 is a 648.8-acre site located in Lea County, approximately 90 miles southeast of Clovis. In August 1943, the Department of the Army acquired, by lease, 648.8 acres of grazing land for the Clovis Army Airfield PBR No. 3. The lease was terminated on 16 March 1944. No structures or improvements were added to the site for military munitions activities other than a bull's-eye target. Because this site is within the FUDS program and is not on Cannon AFB property, it was not further researched as part of the Modified CSE Phase I.

CLOVIS PBR #4, situated on 639.12 acres, is also located in Lea County, approximately 90 miles southeast of Clovis. In August 1943, the Department of the Army leased 639.12 acres of grazing land for the Clovis Army Airfield PBR No. 4. No structures or improvements were added to the site for military munitions activities other than a bull's-eye target. The lease was terminated on 30 June 1944. Because this site is within the FUDS program and is not on Cannon AFB property, it was not further researched as part of the Modified CSE Phase I.

The 640-acre CLOVIS PBR #5 site is in Lea County, approximately 76 miles southeast of Clovis. In August 1943, the Department of the Army leased 640 acres of grazing land for use as the Clovis Army Airfield PBR No. 5. The lease was terminated on 30 June 1944.

No structures or improvements were added to the site for military munitions activities other than a bull's-eye target. Because this site is within the FUDS program and is not on Cannon AFB property, it was not further researched as part of the Modified CSE Phase I.

Located in Curry and Roosevelt Counties, approximately 3 miles south of Cannon AFB, is the 2,402-acre CLOVIS SM ARMS RGE ANX site. The site was acquired in 1943 to provide a location for pistol, machine gun, and rifle training maneuvers. When the site was declared surplus, the land was given back to the original leasers. Improvements for military munitions activities included construction of earthen embankments for the rifle, pistol, and skeet range, an elevated firing line and trenches, and a dividing fence. Currently, the land is owned by a private party. Because this site is within the FUDS program and is not on Cannon AFB property, it was not further researched as part of the Modified CSE Phase I.

2.2.1 Installation Mission

The AFSOC mission provides USAF Special Operations Forces (SOF) for worldwide deployment and assignment to regional unified commands. The AFSOC's core tasks have been grouped into four mission areas: forward presence and engagement, information operations, precision employment and strike, and SOF mobility. The 27th SOW is the host unit at Cannon AFB. It supports the USAF component of unified command, conducting sensitive special operations missions in response to SECDEF taskings.

2.3 Summary of Munitions and Explosives of Concern-Related Activities

Potential MRAs were identified during completion of the Project Procedures and on-site records review for the Modified CSE Phase I at Cannon AFB: Munitions Storage Area (Inactive Munitions Buildings), Former Chemical Warfare Area, Skeet Range, Firing-In Butt, Ground Gunnery Range, Poorman Range, Machine Gun Range, Rifle Range, Aerial Gunnery Range, and 1940s Skeet Range. These are described briefly below, and those that required further evaluation during the Modified CSE Phase I field effort are described in greater detail in Section 5.0. Areas at Cannon AFB that are currently active or were evaluated under a separate program are also discussed below.

2.3.1 Munitions Storage Area

The Munitions Storage Area is situated in the northeast portion of the base and is currently active. Several inactive munitions buildings, which were identified as a potential MRA in the Project Procedures, are located in this area. They are scheduled to be either replaced or demolished. While inactive facilities do occur in the Munitions Storage Area, the area in its entirety is active. Due to its active status, this area is not eligible for the USAF MMRP.

2.3.2 Former Chemical Warfare Area

Base history reports from the 1940s mention a Chemical Warfare Area in the southwest portion of the base administrative area.

Training in this area included gas chamber exercises, as well as use of tear gas, chlorine gas, and mustard gas. According to a 1943 document, the gas chamber was 20 by 40 feet (ft) in size and equipped with two air locks. The document indicates the gas chamber was used for tear gas and chlorine gas. The same 1943 document indicates the completion of an incendiary course. The purpose of the course was to drop incendiary bombs to demonstrate how they would fall from an aircraft. The course included two buildings for demonstrating methods for combating incendiaries. A decontamination course was built in the area as well. The decontamination area consisted of 4 lanes, each 15 by 50 yards in size. They were used to demonstrate methods of decontaminating persistent chemical warfare agents. The area was comprised of former Buildings 835, 864, 865, and 866 (**Figure 2-4**). The site investigation revealed that these buildings no longer exist. The area has been completely renovated and paved over and contains a parking lot with several adjacent buildings. This area is further discussed in Section 5.0.

2.3.3 Skeet Range

According to Cannon AFB personnel, a skeet range was shut down in the fall of 2007 due to inactivity. This was later determined to be inaccurate. The 2008 Base General Plan report lists this skeet range as active and scheduled for demolition in 2014. The report also lists a future skeet range scheduled for construction in 2011. This range will be located south of the current range in the eastern portion of the installation. The future skeet range will phase out the current skeet range. During the site investigation, it was confirmed that the current skeet range is active but is scheduled to be demolished and replaced by the future skeet range. Once it is demolished, the current skeet range may qualify for the USAF MMRP. Due to its active status, however, this area is currently ineligible for the USAF MMRP.

2.3.4 Ground Gunnery Range

A Jeep Type Moving Target Range is discussed in a series of base correspondence from 1942 and 1943. Authorization was initially given for the construction of this range. It was rescinded shortly thereafter, however, and the project was deleted. The Jeep Range was later constructed at the Ground Gunnery Range (off of Cannon AFB). According to correspondence from 1949 and 1950, the requirement for these ranges no longer existed after 30 June 1950. Since they were no longer needed, land leases were cancelled. The exact location of this site has not been determined. No Cannon AFB personnel had any information indicating that this range had been constructed on Cannon AFB property. A review of historical aerial photography also did not identify a Jeep Type Moving Target Range on Cannon AFB. Therefore, it was determined that this range was never located on property owned or maintained by Cannon AFB. This site is not further discussed in this report.

2.3.5 Poorman Range

Base correspondence from 1945 discusses a Poorman Range. The correspondence referenced powerline construction in the vicinity of the range. The exact location of this site has not been determined.

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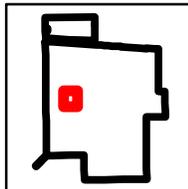
Former Chemical Warfare Area



Munitions Use Site



Cannon Air Force Base Installation Boundary



0 100 200 Feet

Projection : NAD_1983_StatePlane_New_Mexico_East_FIPS_3001_Feet



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OMAHA DISTRICT

MILITARY MUNITIONS RESPONSE PROGRAM

FIGURE
NUMBER
2-4

FORMER CHEMICAL WARFARE AREA
1966 AERIAL PHOTOGRAPH
CANNON AIR FORCE BASE



Shaw Environmental, Inc.



Innovative
Technical
Solutions, Inc.

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No other information corroborating the construction of this Poorman Range on Cannon AFB property was identified in the historical records. Further, no Cannon AFB personnel had any information indicating that this Poorman Range had been constructed on Cannon AFB. A review of historical aerial photography also did not identify a Poorman Range on Cannon AFB. Therefore, it was determined that this range was never located on property owned or maintained by Cannon AFB. Given the proximity and similar history, it is possible that this Poorman Range was constructed at the CLOVIS SM ARMS RGE ANX, a FUDS site discussed in Section 2.2. Therefore, this site is not further discussed in this report.

2.3.6 Machine Gun Range

The Machine Gun Range was mentioned in correspondence from 1943 pertaining to fencing for the area. The range is referred to as being off-post. The exact location of this site has not been determined. No other information corroborating the construction of this Machine Gun Range on Cannon AFB property was identified in the historical records. Further, no Cannon AFB personnel had any information indicating that this Machine Gun Range had been constructed on Cannon AFB. A review of historical aerial photography also did not identify a Machine Gun Range on Cannon AFB. Therefore, it was determined that this range was never located on property owned or maintained by Cannon AFB. Given the proximity and similar history, it is possible that this Machine Gun Range was constructed at the CLOVIS SM ARMS RGE ANX, a FUDS site discussed in Section 2.2. Therefore, this site is not further discussed in this report.

2.3.7 Rifle Range

Base correspondence from 1943 states that a Rifle Range was to be completed on or before 1 August 1943. The facility was to include a .30-caliber rifle range, a 200-yard firing position, targets, and a target storehouse. M-2 ammunition, requiring a safety zone of 4,000 yards, was to be fired at the range. The exact location of this site has not been determined. No other information corroborating the construction of this Rifle Range on Cannon AFB property was identified in the historical records. Further, no Cannon AFB personnel had any information indicating that this Rifle Range had been constructed on Cannon AFB. A review of historical aerial photography also did not identify a Rifle Range on Cannon AFB. Therefore, it was determined that this range was never located on property owned or maintained by Cannon AFB. Given the proximity and similar history, it is possible that this Machine Gun Range was constructed at the CLOVIS SM ARMS RGE ANX, a FUDS site discussed in Section 2.2. This site is not further discussed in this report.

2.3.8 Aerial Gunnery Range

A real estate report from 1942 discussed the proposal of construction of an Aerial Gunnery Range. The facility was to be located approximately 60 miles southwest of Clovis Airport (about 50 miles southwest of the base). It was to be 20 by 40 miles in size and used for air-to-ground munitions testing. This facility was later called the Clovis Aerial Gunnery Range. The exact location of this site has not been determined.

However, based on the distance from Cannon AFB, it is possible that this aerial gunnery range was associated with one of the FUDS sites discussed in Section 2.2. During the site investigation, it was determined that this range was never located on property owned or maintained by Cannon AFB. Therefore this site is not further discussed in this report.

2.3.9 1940s Skeet Range

A 1940s Skeet Range was discovered during the on-site record gathering. According to an August 1943 Building index for Clovis Airfield, Clovis, New Mexico, Building T-2150 was a skeet range. The location of Building T-2150 was identified on an April 1944 Water Distribution System map for Clovis Airfield Clovis, New Mexico. This map depicts Building T-2150 as being located just north of the Ordnance Storage Area, which is still used as an active Munitions Storage Area. The 1944 map appears to be a firing arc for a skeet range although it is oriented firing to the south towards the ordnance storage area. Because both the skeet range and ordnance storage area were active during the same time period, the skeet range could not have fired to the south. Review of a 1946 aerial photograph appears to show the firing direction to the north. The location of the former range is in the northeast portion of the base, just north of the active ordnance area (**Figure 2-5**). This area is further discussed in Section 5.0.

2.3.10 Armament and Instrument Inspection and Adjustment

According to an August 1943 Building index for Clovis Airfield, Clovis, New Mexico Building T-159 was used for Armament and Instrument Inspection and Adjustment. The building appears on an April 1944 Water Distribution System map as being approximately 300 feet from the aircraft parking apron in the central portion of the installation. Based on the proximity of the building to the flight line it could have been used to support aircraft armament systems. Based on the building description it is likely that all operations took place indoors.

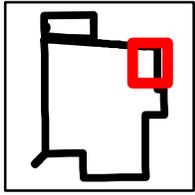
No other information detailing operations taking place in this building was identified. A review of historical aerial photography shows the area to be fully developed in support of the flight line. The Modified CSE Phase I site inspection showed the area to be redeveloped with parking and new buildings. This site is not further discussed in this report.

2.3.11 Armament Shop

According to an August 1943 Building index for Clovis Airfield, Clovis, New Mexico Building T-166 was used as an Armament Shop. The building appears on an April 1944 Water Distribution System map as being approximately 250 feet from the aircraft parking apron in the central portion of the installation. Based on the proximity of the building to the flight line, it could have been used to support aircraft armament systems. Based on the building description, it is likely that all operations took place indoors. No other information detailing operations taking place in this building was identified. A review of historical aerial photography shows the area to be fully developed in support of the flight line. The Modified CSE Phase I site inspection showed the area to be redeveloped with parking and new buildings. This site is not further discussed in this report.



-  Munitions Use Site
-  Cannon Air Force Base Installation Boundary



Projection : NAD_1983_StatePlane_New_Mexico_East_FIPS_3001_Feet



**U.S. ARMY
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OMAHA DISTRICT

MILITARY MUNITIONS RESPONSE PROGRAM

FIGURE
NUMBER
2-5

**1940s SKEET RANGE
1966 AERIAL PHOTOGRAPH
CANNON AIR FORCE BASE**



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2.3.12 Chemical Warfare Warehouse

According to an August 1943 Building index for Clovis Airfield, Clovis, New Mexico Building T-331 was used as a Chemical Warfare Warehouse. The building appears on an April 1944 Water Distribution System map as being northeast of the aircraft parking apron in the northern portion of the installation. Based on the building description, it is likely that all operations took place indoors. No other information detailing operations taking place in this building was identified. A review of historical aerial photography shows the area to be fully developed in support of the flight line. The Modified CSE Phase I site inspection showed the area to be redeveloped with parking and new buildings. This site is not further discussed in this report.

2.3.13 Ordnance Building

According to an August 1943 Building index for Clovis Airfield, Clovis, New Mexico Building T-379 was used as an Ordnance Building. The building appears on an April 1944 Water Distribution System map as being northwest of the Chemical Warfare Warehouse. Based on the building description, it is likely that all operations took place indoors. No other information detailing operations taking place in this building was identified. A review of historic aerial photography shows the area to be fully developed in support of the flight line. The Modified CSE Phase I site inspection showed the area to be redeveloped with parking and new buildings. This site is not further discussed in this report.

2.3.14 Hot Cargo Pad

The Hot Cargo Pad is an active area located in the eastern portion of the base, east of the flight line. This area is located between the taxiway and the active firing range. The Hot Cargo pad is actively used to support the Cannon AFB mission. Due to its active status, this area is not eligible for the USAF MMRP.

2.3.15 Firing Range

The firing range is an active area located in the eastern portion of the base, east of the flight line. The firing range is a modern small arms range currently utilized for small arms training. This range appears and is labeled as Rifle Range on a 1971 *Location of Geodetic Survey Requirements for Electromagnetic Compass Calibration Map, Cannon AFB, Clovis, New Mexico*, as well as on aerial photography from 1966. Due to its active status, this area is not eligible for the USAF MMRP.

2.3.16 Holding Area Munitions Site

The Holding Area Munitions Site is an active area located in the eastern portion of the base, east of the flight line. This area is located between the taxiway and the active firing range.

The Holding Area Munitions Site is actively used to support the Cannon AFB mission. Due to its active status, this area is not eligible for the USAF MMRP.

2.3.17 EOD Area

The Explosive Ordnance Disposal (EOD) Area is an active area located in the southeast portion of the base. This area is located in the southeast corner of the installation. The Holding Area Munitions Site is actively used to support the Cannon AFB mission. Due to its active status, this area is not eligible for the USAF MMRP.

2.3.18 Boresight Mound

Base correspondence from 1953 indicates that the Tactical Air Command requested an interim Firing-In Butt for the base. This FIB was likely constructed and has been referred to as the Boresight Mound. According to ERP documents, this range was in use from 1957 to 1971 to calibrate aircraft weapons. This range appears and is labeled as a Firing-In Butt on a 1971 *Location of Geodetic Survey Requirements for Electromagnetic Compass Calibration Map, Cannon AFB, Clovis, New Mexico* as well as on aerial photography from 1966. The Boresight Mound has been investigated under RCRA and removed. The Boresight Mound qualified for NFA approval under the IRP in 2004 and is currently closed. As this site achieved regulatory closure as part of a separate program, it was not further investigated under the USAF MMRP. This area is further discussed in Section 2.5.

2.3.19 Munitions Debris Discovery Area

This is a small area just south of South Playa Lake where a discovery of munitions debris was made in early 2009. This area was being worked on to discourage bird nesting as part of the installation Bird Aircraft Strike Hazard (BASH) program. In February 2009, Cannon AFB EOD responded to a discovery of practice bombs in the area of South Playa Lake. The practice bombs were identified by EOD as BDU-8B practice bombs and reportedly did not contain any explosive charge. EOD removed the items and performed a sweep of the area and did not identify any additional munitions debris. EOD has not been called to this area before or since this discovery. The South Playa is a RCRA site that is actively being addressed under RCRA as SWMU-28. Because the area has been cleared by EOD, this site will not be further addressed under the CSE Phase I.

2.4 Introduction of Munitions Response Areas

The off-site HRR conducted during the work planning efforts identified potential MRAs that required evaluation during the field effort. During the Modified CSE Phase I field effort, one additional potential MRA was identified that required evaluation. **Figure 1-1** presents the locations of potential MRAs with known locations. However, based on an evaluation of the site conditions and historical information for these sites discussed in Section 2.3, only two sites were further evaluated during the Modified CSE Phase I field effort as listed below:

- Former Chemical Warfare Area
- 1940s Skeet Range

These two sites are further discussed in Sec 5.0 and recommendations on whether to retain these areas for further evaluation under the MMRP CSE Phase II are presented in Section 8.0 of this report.

2.5 Previous Investigations

A previous military munitions response investigation took place at the Boresight Mound at Cannon AFB. This area, also designated DP-35 and Area of Concern F, is located east of the northeast-southwest runway. The report states that this was the targeting area for aircraft boresight maintenance operations conducted during the 1950s and 1960s. The site consisted of a large, earthen berm with limited amounts of expended small-caliber practice munitions and some construction material around the perimeter. This site was assessed in a 1998 site investigation (Woodward & Clyde, 1999). According to the 1999 SI report, the mound was irregularly shaped, approximately 15 feet high and consisted of fill material comprised of sandy soil with numerous rock fragments. A target support structure existed approximately 150 feet north of the berm. The target structure reportedly had projectiles imbedded in it at the time of the site inspection. The mound itself had small amounts of debris in it including telephone poles, small arms shell casings, metal pipes, projectiles from boresight operations, and several partially buried empty metal drums.

The 1998 site investigation consisted of the collection of soil samples from a grid pattern on top of the mound, around the mound and around the target structure. Soil samples were collected from 0-0.5, 1.5-2.0 and 3.5-4.0 feet below the surface of the mound. The soils collected around the target structure and around the mound were collected from 0-2.0 feet bgs. These samples were analyzed for lead, antimony and arsenic. In total, 36 soil samples were collected and analyzed. The maximum level of lead detected was 151 mg/kg and the maximum level of arsenic was 5 mg/kg. While these levels of arsenic and lead were above site-specific background levels, the results of the risk assessment showed acceptable levels of risk associated with these results. The site investigation report recommended No Further Action for the Boresight Mound.

In 2000, the Air Force formally proposed NFA for the Boresight Mound (URS, 2000), as no evidence of serious contamination was identified in the 1998 PA/SI. The mound was subsequently removed although the exact date of removal was not available. In 2004, NMED determined that the site qualified for NFA approval and it is currently closed. As this site achieved regulatory closure as part of a separate program, it will not be further investigated under the USAF MMRP.

No past environmental or munitions-related investigations have been conducted at any of the other potential MRAs evaluated at Cannon AFB.

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3.0 *Physical and Environmental Setting*

The physical and environmental setting for Cannon AFB is presented in this section. Much of the information presented was obtained from the *Installation Restoration Program (IRP) Records Search for Cannon AFB, New Mexico* (CH2M Hill, 1983) and the *General Plan, Cannon AFB, New Mexico* (Black & Veatch, 2008). The decision to use these specific documents was based on the ITSI Team’s review and evaluation of the documents in Cannon AFB’s administrative record (AR).

3.1 *Climate*

The climate at Cannon AFB is mainly hot and dry. Monthly mean high temperatures range from 50 degrees Fahrenheit (°F) in January to 89°F in July. Monthly mean low temperatures range from 25°F in January to 65°F in July. Average annual precipitation is approximately 15.8 inches. Annual mean snowfall is approximately 13.3 inches. **Table 3-1** reflects the annual climate and weather normally encountered at Cannon AFB (MyForecast.com).

Table 3-1 Cannon AFB Climate Information												
Temperature Type	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Mean Max Temperature (°F)	50	55	62	71	79	88	89	88	81	72	59	51
Mean Min Temperature (°F)	25	28	34	43	52	61	65	64	57	46	34	26
Mean Precipitation (inches)	0.4	0.5	0.5	0.6	1.7	2.3	2.8	2.7	1.9	1.4	0.5	0.5
Mean Snowfall (inches)	3.2	3.2	1.6	0.4	0.0	0.0	0.0	0.0	0.0	0.3	1.5	3.1
Max Snowfall (inches)	12.1	18.7	12.3	5.0	0.5	0.0	0.0	0.0	0.0	7.3	12.0	17.1
Max Windspeed (knots)	60	61	73	59	65	63	66	69	70	63	59	67
Thunderstorm Days	1	1	1	3	7	9	10	10	5	2	1	1

3.2 *Topography*

Cannon AFB is situated in the Southern High Plains section of the Great Plains physiographic province. The section is a plateau, bordered to the north by the Canadian River (approximately 60 miles north of the base), to the east and west by escarpments rising up to 300 ft, and to the south by the Edwards Plateau in western Texas. Cannon AFB is situated near the center of the plateau and features relatively flat land with nearly no relief (CH2M Hill, 1983). Elevations range from 4,260 ft above mean sea level (msl) in the southeast portion of the base to 4,330 ft above msl in the northwest portion (CH2M Hill, 1983). The base slopes slightly downward toward the southeast (**Figure 3-1**).

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- Ground Surface Contour 10ft Interval
- Cannon Air Force Base Installation Boundary



Projection : NAD_1983_StatePlane_New_Mexico_East_FIPS_3001_Feet

	U.S. ARMY CORPS OF ENGINEERS OMAHA DISTRICT
MILITARY MUNITIONS RESPONSE PROGRAM	
FIGURE NUMBER 3-1	TOPOGRAPHY CANNON AIR FORCE BASE
 Shaw Environmental, Inc.	 Innovative Technical Solutions, Inc.

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3.3 Hydrology

Cannon AFB is situated near the headwaters of the Brazos River. However, due to low precipitation, high evapotranspiration, and gently-sloping terrain, little if any water ever reaches the river (CH2M Hill, 1983). Moreover, surface water streams are non-existent in the vicinity of the base. Running Water Draw is located about 10 miles north of the base and is the nearest drainage feature, although it is dry most of the time. Drainage in the vicinity of the base is poorly developed due to low annual rainfall and lack of relief (CH2M Hill, 1983). The Southern High Plains area generally does not contribute to streamflow except during periods of excessive rainfall, which are rare. The only significant surface water features at the base are several playas and ponds, located in the northern, eastern, and southern portions of the base (**Figure 3-2**).

3.4 Soil and Vegetation Types

The majority of Cannon AFB contains Amarillo fine sandy loam. This soil is well-drained, and the depth to the underlying water table is about 250 ft (**Figures 3-3A and 3-3B**; CH2M Hill, 1983).

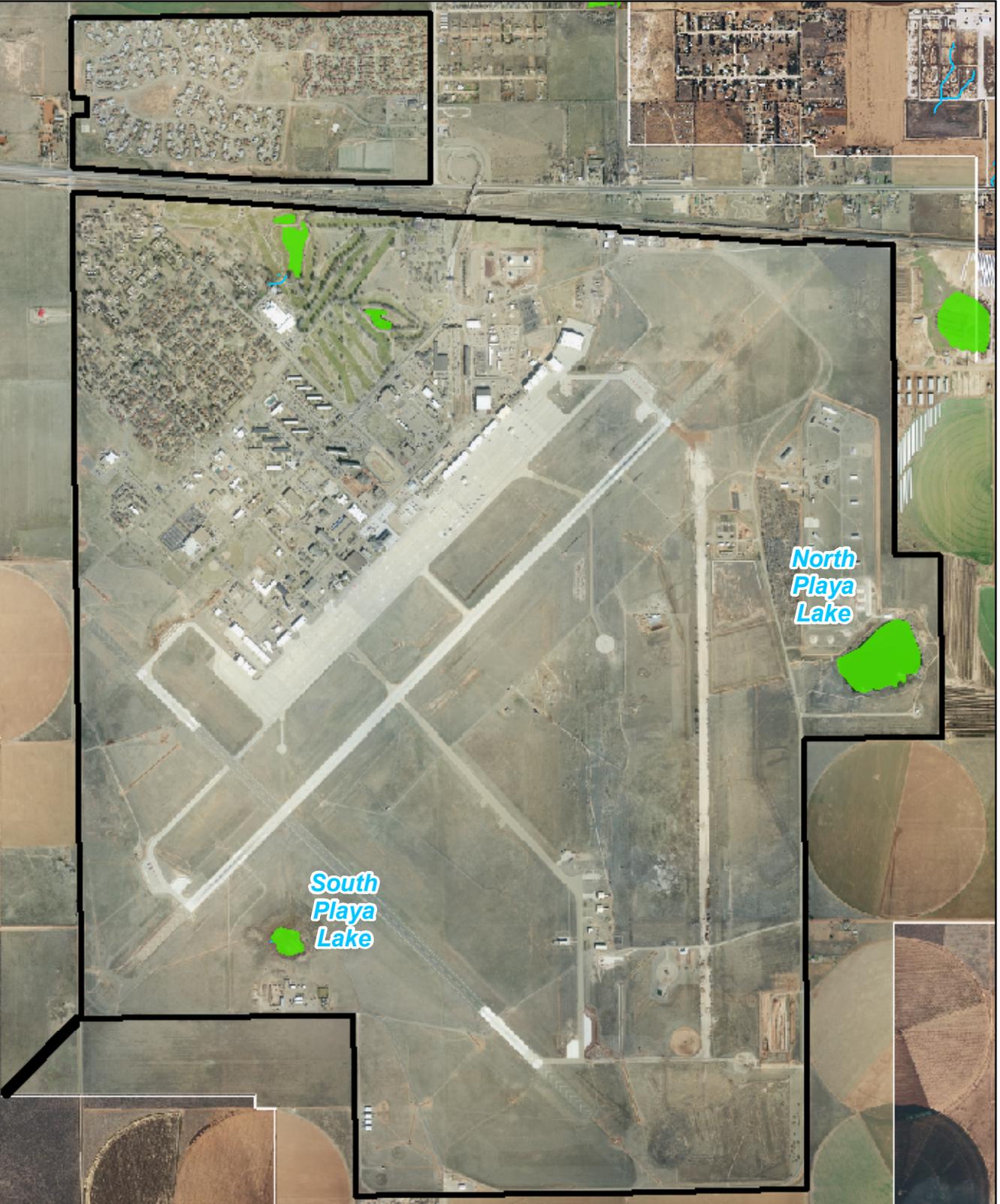
The vegetation of Cannon AFB is typical of semiarid short grass prairies and is limited by water availability (CH2M Hill, 1983). The prairie grasslands found at the base are utilized by a variety of birds and mammals. Several species of larks, hawks, and waterfowl are found in the area, as well as several species of rabbits, squirrels, and mice. Two communities of black-tailed prairie dogs also occur here, one near the active munitions storage area and one near the runways (CH2M Hill, 1983). The black-tailed prairie dog is a Federal Endangered Species Act candidate animal. It occurs at the base and has also been documented in the vicinity of the Melrose Range. There are no other known threatened or endangered species at Cannon AFB.

3.5 Geology and Hydrogeology

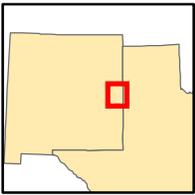
Geology beneath Cannon AFB mainly consists of a thick, 200 to 400 ft layer of unconsolidated sediments deposited over Triassic sandstone. The sandstone forms the base of the High Plains aquifer (regionally called the Ogallala aquifer), which is situated within the overlying gravel, sand, silt, and clay sediments (Black & Veatch, 2008).

The unconfined aquifer beneath Cannon AFB is the sole source of water supply for the base. Cannon AFB is situated over a section of the High Plains aquifer, which is regionally known as the Ogallala Aquifer. This aquifer system developed in an area of unconsolidated sediments (Black & Veatch, 2008). Due to a general lack of permanent surface water in the area, regional groundwater supplies irrigation, industrial, and domestic needs. The aquifer is a drinking water aquifer with unknown potential for contamination. The aquifer ranges in thickness from 0 to 150 ft. Groundwater flow is typically east to southeast, and water table slope is approximately 7 to 15 ft per mile (Black & Veatch, 2008).

Intentionally Blank



-  Surface Water Drainage
-  Wetlands
-  Cannon Air Force Base Installation Boundary



Projection : NAD_1983_StatePlane_New_Mexico_East_FIPS_3001_Feet



**U.S. ARMY
CORPS OF ENGINEERS**
OMAHA DISTRICT

MILITARY MUNITIONS RESPONSE PROGRAM

FIGURE
NUMBER
3-2

**SURFACE WATER DRAINAGE
CANNON AIR FORCE BASE**



Shaw Environmental, Inc.



Innovative
Technical
Solutions, Inc.



 Cannon AFB Installation Boundary



Projection : NAD_1983_StatePlane_New_Mexico_East_FIPS_3001_Feet



**U.S. ARMY
CORPS OF ENGINEERS**
OMAHA DISTRICT

MILITARY MUNITIONS RESPONSE PROGRAM

FIGURE
NUMBER
3-3A

SOIL TYPES
CANNON AIR FORCE BASE



Shaw Environmental, Inc.



Innovative
Technical
Solutions, Inc.

-  AcA - Acuff loam, 0 to 1 percent slopes
-  AcB - Acuff loam, 1 to 3 percent slopes
-  AfA - Amarillo fine sandy loam, 0 to 1 percent slopes
-  AfB - Amarillo fine sandy loam, 1 to 3 percent slopes
-  AnB - Amarillo loamy fine sand, 1 to 3 percent slopes
-  EsB - Estacado loam, 1 to 3 percent slopes
-  KmB - Kimberson gravelly loam, 0 to 3 percent slopes
-  MsE - Milsand-Arch complex, 1 to 20 percent slopes
-  PMG - Potter-Mobeetie association, 8 to 45 percent slopes
-  PeA - Pep loam, 0 to 1 percent slopes
-  PeB - Pep loam, 1 to 3 percent slopes
-  PsB - Posey fine sandy loam, 1 to 3 percent slopes
-  PsC - Posey fine sandy loam, 3 to 8 percent slopes
-  RaA - Randall clay, 0 to 1 percent slopes, frequently ponded
-  RcA - Ranco clay, 0 to 1 percent slopes, frequently ponded
-  SnC - Spantara fine sand, 1 to 5 percent slopes
-  SpA - Sparenberg clay, 0 to 1 percent slopes, occasionally ponded

	U.S. ARMY CORPS OF ENGINEERS OMAHA DISTRICT
MILITARY MUNITIONS RESPONSE PROGRAM	
FIGURE NUMBER 3-3B	SOIL TYPES LEGEND CANNON AIR FORCE BASE
 Shaw Environmental, Inc.	 Innovative Technical Solutions, Inc.

4.0 Summary of Data Collection Activities

4.1 Historical Records Review

ITSI's subcontractor, TLI Solutions, Inc., visited data repositories located off the installation, including national historical archives and command archives. The ITSI Team reviewed files at the base, as well as state and local sources (e.g., libraries, local historical societies, and museums) when available, and considered these to be on-site data resources. Data acquisition from both types of repositories is discussed in the following sections.

4.1.1 On-Site Data Repositories

The ITSI Team researched and inspected physical and electronic files from an array of sources located at the base. Copies of all applicable documents were made and marked using standard archival techniques as to the location of the original document. A master record was maintained that shows the file location, point of contact address and telephone number, record group (RG), and file and box number.

Repositories visited and considered to be on-site data resources for Cannon AFB are as follows:

- Historical Maps – Cannon AFB GIS/map room;
- EOD Records; and
- Real Property Information.

All pertinent information was photocopied. All applicable documents located are presented in **Appendix E**.

4.1.1.1 Historical Maps

In addition to the aerial photograph/historical map review completed for the off-site HRR, a review of historical maps from Cannon AFB historical files was completed. Available historical maps were reviewed to document operations throughout the base area from the 1950s through current operations at Cannon AFB. A primary benefit of the analysis of this information was to identify areas that have changed through the history of operations at the base. The historical maps for Cannon AFB were scanned and are included on the CD in **Appendix E** to this report.

4.1.1.2 EOD Records

Mr. Alvin Pollard of Cannon AFB EOD provided access to EOD records which dated back to 1987. The ITSI Team searched these records, the majority of which dealt with the active Melrose Range. No information pertinent to the Cannon AFB MMRP was identified.

4.1.1.3 Real Property

The ITSI Team reviewed the records at the Real Property office. The search confirmed that all of the buildings in the active munitions storage areas had the same designation since construction. No real property records were identified for the 1940s Skeet Range or Chemical Warfare Area. No records were identified for any other potential MRAs.

4.1.2 Off-Site Data Repositories

The data collection team reviewed national archival records located at the National Archives and Records Administration (NARA) in College Park and Suitland, Maryland, Washington, D.C., and the NARA Rocky Mountain Regional Archive in Denver, Colorado for historical information on potential MRAs at Cannon AFB. The data collection team also reviewed historical records located at local and regional data repositories, including those located at the U.S. Army Center of Military History (CMH); the U.S. Army Research, Development, and Engineering Command (RDECOM) at Edgewood Arsenal, Maryland; USAF Civil Engineering Support Agency (AFCESA); and the USAF Historical Research Agency (AFHRA) at Maxwell AFB. The data collection team also reviewed and copied any relevant records found in the initial finding aids review at the National Personnel Records Center (NPRC) in St. Louis, Missouri. In addition, the base's complete AR information is maintained by Cannon AFB and was reviewed prior to the Modified CSE Phase I field effort. Finally, the data collection team contacted the USACE offices in Omaha, Sacramento, Albuquerque, and Kansas City for site-related records, and reviewed and copied any relevant records. These records included microfiche, printed documents, still photos, maps, and aerial photographs. Copies were made of all records obtained and marked using standard professional archival techniques. A master record of all data received from local off-site sources is included on the CD in **Appendix E**. A brief discussion of the information collected from the off-site repositories follows.

4.1.2.1 National Archives and Records Administration

The RGs reviewed from NARA for this Modified CSE Phase I report included RGs listed in guidance provided by both the USACE (EP 870-1-64, Harper *et al*, 2001) and the Interstate Technology and Regulatory Council (ITRC) (2003). The list of RGs reviewed includes the following. Please note that not all RGs are available at all NARA Regional Offices or at the NPRC.

No.	RG No.	Title	Source
1.	16	Records of the Office of the Secretary of Agriculture	ITRC, USACE
2.	18	Records of the Army Air Forces	ITRC, USACE
3.	26	Records of the U.S. Coast Guard	ITRC, USACE
4.	30	Records of the Bureau of Public Roads	ITRC, USACE
5.	35	Records of the Civilian Conservation Corps	USACE
6.	38	Records of the Office of the Chief of Naval Operations	ITRC, USACE
7.	48	Records of the Office of the Secretary of the Interior	ITRC, USACE
8.	49	Records of the Bureau of Land Management	ITRC, USACE
9.	52	Records of the Bureau of Medicine and Surgery	ITRC
10.	57	Records of the U.S. Geological Survey	ITRC
11.	69	Records of the Work Projects Administration	ITRC, USACE
12.	71	Records of the Bureau of Yards and Docks	ITRC, USACE
13.	72	Records of the Bureau of Aeronautics	ITRC, USACE
14.	74	Records of the Bureau of Ordnance (Navy)	ITRC, USACE
15.	77	Records of the Office of the Chief of Engineers	ITRC, USACE
16.	80	General Records of the Department of the Navy, 1798-1947	ITRC, USACE
17.	92	Records of the Office of the Quartermaster General	ITRC, USACE
18.	94	Records of the Adjutant General's Office 1780-1917	ITRC, USACE
19.	96	Records of the Farmers Home Administration	USACE

No.	RG No.	Title	Source
20.	98	Records of the U.S. Army Commands, 1784-1821	USACE
21.	107	Records of the Office of the Secretary of War	ITRC, USACE
22.	111	Records of the Office of the Chief Signal Officer	ITRC, USACE
23.	112	Records of the Office of the Surgeon General (Army)	ITRC, USACE
24.	121	Records of the Public Buildings Service	ITRC
25.	127	Records of the U.S. Marine Corps	ITRC, USACE
26.	135	Records of the Public Works Administration	USACE
27.	143	Records of the Bureau of Supplies and Accounts (Navy)	ITRC, USACE
28.	145	Records of the Farm Service Agency	ITRC
29.	153	Records of the Office of the Judge Advocate General (Army)	ITRC, USACE
30.	156	Records of the Office of the Chief of Ordnance	ITRC, USACE
31.	159	Records of the Office of the Inspector General (Army)	ITRC, USACE
32.	160	Records of the U.S. Army Service Forces (World War II)	ITRC, USACE
33.	162	General Records of the Federal Works Agency	ITRC, USACE
34.	165	Records of the War Department General and Special Staffs	ITRC, USACE
35.	168	Records of the National Guard Bureau	ITRC, USACE
36.	175	Records of the Chemical Warfare Service	ITRC, USACE
37.	177	Records of the Chiefs of Arms	ITRC
38.	179	Records of the War Production Board	USACE
39.	181	Records of Naval Districts and Shore Establishments	ITRC, USACE
40.	197	Records of the Civil Aeronautics Board	ITRC
41.	207	General Records of the Department of Housing and Human Development	ITRC
42.	218	Records of the U.S. Joint Chiefs of Staff	ITRC
43.	225	Records of the Joint Army and Navy Boards and Committees	ITRC, USACE
44.	234	Records of the Reconstruction Finance Corporation	USACE
45.	237	Records of the Federal Aviation Administration	ITRC
46.	240	Records of Smaller War Plants Corporation	USACE
47.	250	Records of the Office of War Mobilization and Reconversion	ITRC
48.	269	Records of the General Services Administration	ITRC, USACE
49.	270	Records of the War Assets Administration	ITRC, USACE
50.	287	Publications of the U.S. Government	USACE
51.	291	Records of the Federal Property Resources Service	ITRC, USACE
52.	319	Records of Army Staff	ITRC, USACE
53.	330	Records of the Office of the Secretary of Defense	ITRC
54.	334	Records of Interservice Agencies	ITRC, USACE
55.	335	Records of the Office of the Secretary of the Army	USACE
56.	336	Records of the Office of the Chief of Transportation	USACE
57.	337	Records of Headquarters Army Ground Forces	ITRC, USACE
58.	338	Records of U.S. Army Commands	ITRC, USACE
59.	340	Records of the Office of the Secretary of the Air Force	USACE
60.	341	Records of Headquarters U.S. Air Force (Air Staff)	ITRC, USACE
61.	342	Records of the U.S. Air Force Commands, Activities, and Organizations	ITRC, USACE
62.	373	Records of the Defense Intelligence Agency	ITRC
63.	391	Records of the U.S. Army Mobile Units, 1821-1942	USACE
64.	393	Records of the U.S. Army Continental Commands 1821-1920	ITRC, USACE
65.	394	Records of the U.S. Army Continental Commands, 1920-1942	ITRC, USACE
66.	395	Records of the U.S. Army Overseas Operations & Commands 1898-1942	ITRC
67.	407	Records of the Adjutant General's Office 1917-	ITRC, USACE
68.	428	Records of the General Records of the Department of Navy, 1947-	ITRC, USACE
69.	429	Records of the Organizations in the Executive Office of the President	USACE

Researchers reviewed NARA's on-line resources to select RGs that contain records related to the site. After reviewing the on-line sources, the researchers spoke with NARA's archivists to further refine the list of RGs. Finally, individual finding aids at each archive were reviewed and boxes of documents were selected to review.

Numerous documents relevant to Cannon AFB were found. Details on the RGs investigated and the documents reviewed are presented as Cannon AFB Sources Contacted.pdf (**Appendix E**).

4.1.2.2 USACE Topographic Engineering Center's Imagery Office, Alexandria, Virginia

The USACE Topographic Engineering Center (TEC) and the TEC Imagery Office (TIO) is the USACE's central point for research, acquisition and dissemination of commercial imagery, with an extensive in-house imagery library with on-line access through ESRI software plug-in and web-based search tool.

The TIO was contacted by email on 11 February 2008 about the capabilities of the TIO to support the acquisition of historic aerial photographs for this project. A reply was received on 12 February 2008 that the TIO has a goal to acquire and host aerial imagery for the USACE and for the Installations and Environmental GIS community; however, at this time, that has not happened. As a result, no further investigation was conducted at the USACE TEC imagery office.

4.1.2.3 USACE Office of History, Alexandria, Virginia

Dr. Michael J. Brodhead, Historian, at the USACE Office of History was contacted about records and resources available at the USACE Historian's Office. Dr. Brodhead reported that on-line resources are not available at the USACE Office of History. The History Office was visited and its in-house finding aids were used to review records. The only documents found involved off-installation ranges. One document referenced the Clovis Ground Gunnery and Small Arms Range.

4.1.2.4 USACE St. Louis District, St. Louis, Missouri

A formal investigation was not conducted at the USACE St. Louis District in St. Louis, Missouri. Instead, finding aids related to the NPRC and maintained by the USACE St. Louis District were accessed.

In addition to the NPRC finding aids, the USACE St. Louis District maintains map collections of USAF facilities. The collections were assessed for Cannon AFB and 12 February 1952 and 1 October 1957 maps were copied that showed an ordnance area at the eastern edge of Cannon AFB. A third map was found titled, *Clovis Air Force Base-Vicinity Map Wind Analysis Airfield Pavement*, for the period January 1945 through December 1945, that shows the Clovis AFB Small Arms Range located south of the present day installation.

4.1.2.5 U.S. Army Research, Development and Engineering Command, Aberdeen Proving Ground, Maryland

Two sources of historical information were reviewed at RDECOM: the Historical Research and Response Center (HRRC) and the Edgewood Chemical and Biological Center (ECBC) Technical Library, both of which are located at the Edgewood Arsenal, Maryland.

Documents at the HRRC were organized by State. Approximately seven filing cabinets, with five drawers for each cabinet, were reviewed.

Two documents relating to chemical warfare munitions were found at the HRRC for Cannon AFB. The first was prepared by the HRRC staff and is titled *Areas Used by the Chemical Warfare Service During the 1900's*, and is undated. This report summarized the data on the then Clovis Field reported in a Cross Index memo, dated 4 August 1943, “The following named units having departed their stations with individual and housekeeping equipment only, it is suggested that their Apparatus, Decontaminating, Power Driven be reassigned as indicated. From: 91st Depot Repair Sq. to 740th Bomb Sq., Clovis AAB, Clovis, New Mexico.” The second document is from the Army Air Force (AAF), 234th Air Base Unit, Section D, Mnt & Sup, and lists that on 28 February 1945, chemical equipment present included one M4 HS Vapor Detector Kit. The location where the materiel were stored or expended was not provided in the documentation.

The request to review historic documentation was submitted to Edwin Gier (410-436-2884, Edwin.gier@us.army.mil) at the ECBC Technical Library. Mr. Gier indicated that, for the most part, the collection of published technical report literature at the ECBC is replicated at Defense Technical Information Center (DTIC). Secondly, he indicated that the collection of published technical reports is tailored to research involving either the manufacture of chemical and biological agents, toxicity of these agents, or, most recently, detection of chemical and biological agents. The collection may incidentally contain some information about ranges and storage areas, but such information would be difficult to find in the report literature. Based on Mr. Gier’s recommendation, it was determined that no research would be conducted at the ECBC.

4.1.2.6 U.S. Army Center of Military History, Ft. McNair, Virginia

The U.S. Army Center of Military History (CMH) records the official history of the Army in both peace and war, while advising the Army Staff on historical matters. The Center provides all levels of the Army, as well as other services, government agencies, and the public, with a growing awareness of history that goes well beyond publications alone.

The CMH was visited, and documents maintained by the CMH were reviewed. No information was found relating to this Modified CSE Phase I report.

4.1.2.7 U.S. Army Military History Institute, Carlisle Barracks, Pennsylvania

The U.S. Army Military History Institute (USAMHI) is an institute of the U.S. Army Heritage and Education Center. The mission of the USAMHI is to preserve the Army’s history and ensure access to historical research materials and serves as the primary facility where researchers study Army history. The USAMHI’s holdings include books, manuscripts, photos, and maps.

A list of the USAF installations under investigation was provided to the USAMHI reference historian. The reference historian reported that nothing was found in the USAMHI collection for Cannon AFB.

4.1.2.8 Air Force Historical Research Agency

The AFHRA is the repository for Air Force historical documents. The AFHRA's collection began in Washington, D.C. during World War II (WWII). In 1949, it moved to Maxwell AFB, the site of the Air University, to provide research facilities for professional military education students, the faculty, visiting scholars, and the general public.

All USACE and AFHRA files were reviewed and pertinent documents were photocopied in AFHRA's office at Maxwell AFB. A Document Index is provided in **Appendix E** of this report.

Records found during research at the AFHRA consisted of Unit Histories and Base Daily Journals from the 1940s and 1950s. A September 1943 Base History noted that Chemical Warfare Training began 28 September 1943 with the creation of the decontamination and incendiary bomb area at the south end of the base. The gas chamber was enlarged to 20 by 40 ft and divided into two equal sections each fitted with two air locks. One section was to be used for tear gas while the other section is for the use of chlorine gas or other toxic gases. An incendiary course was completed consisting of a bomb dropping device for the purpose of showing the way in which an incendiary bomb acts on being dropped from a plane, and two buildings for demonstration methods of combating incendiaries. One building was unprotected while the other was provided with various protective devices. A decontamination course was built, consisting of four lanes, each approximately 15 by 50 yards in size. These courses were to be used in demonstrating the decontamination of persistent chemical warfare agents on runways, shell holes, and airplanes. An undated Unit History with information from December 1943 and January 1944 discussed: 1. Chemical Warfare Training using Mustard Gas to be conducted in the southwest corner of the base beyond the ordnance area; 2. Melrose and Nara Vista ranges cleared of scrap; 3. Ground Gunnery Range used for training combat crews; 4. Chemical Warfare decontamination training area changed to an area nearer to station hospital; and 5. Ground Gunnery Range consisted of a carbine range, two pistol ranges, a submachine gun range, four skeet ranges, an overhead jeep range, a malfunctions range (.50-cal machine guns), and a jeep range. The *April 1944 Historical Narrative of the Army Air Field - Clovis, New Mexico* reported that the Chemical Warfare Training area was scraped to remove brush and high weeds and a Mustard Gas Shed was constructed for storage. A June 1955 Unit History reported that the small arms ranges south of Clovis AFB were cleaned up and put back in operation.

4.1.2.9 Air Force History Support Office, Bolling AFB, Washington, D.C.

The Air Force History Support Office (AFHSO) is located in Washington, D.C. at the Anacostia Naval Annex. It is part of the Air Force History and Museums Program, headquartered at the Pentagon. The AFHSO works in conjunction with the AFHRA at Maxwell AFB, Alabama. No research was conducted at AFHSO since it was determined that the documents would be a duplicate of the documents in AFHRA's office at Maxwell AFB, Alabama.

4.1.2.10 Air Force Safety Center, Kirtland AFB, New Mexico

The AFSC maintained the Information Preservation System (IPS). The IPS contained scanned USAF historical documents obtained from both the AFSC and non-USAF archives.

The AFSC was contacted in regard to obtaining documentation maintained in the IPS. AFSC representatives explained that all funding for the IPS had been expended and that the IPS is no longer available for research.

4.1.2.11 Air Force Civil Engineer Support Agency, Tyndall AFB, Florida

AFCESA was contacted for the Modified CSE Phase I report because it maintains EOD reports in a database for the USAF. Although it maintains no on-line databases for EOD information, AFCESA has placed its archived EOD reports on CD-ROM for the years 1986 to 2004. The EOD reports for 2005 to the present are not accessible at this time due to a system modification underway at AFCESA. The CD-ROMs for 1986 to 2004 were searched, and no information relevant to MMRP sites at Cannon AFB was found.

4.1.2.12 Department of Defense

This section provides information on the activities related to the review and collection of documents from the sources within the DoD not covered by other sections of the Modified CSE Phase I report. It deals solely with the DTIC. The DTIC consists of two databases: www.dtic.mil and www.stinet.dtic.mil.

The DTIC (<http://www.dtic.mil/>) is a DoD Field Activity under the Under Secretary of Defense for Acquisition, Technology and Logistics, reporting to the Director, Defense Research and Engineering (DDR&E). DTIC provides DoD technical information to DoD personnel, DoD contractors and potential contractors, and other U.S. Government agency personnel and their contractors. DTIC's mission is to:

- Provide direct information support to the warfighter;
- Leverage the multi-billion dollar investment in DoD scientific and technical research; and
- Prevent unnecessary or redundant research from being performed at taxpayer expense.

DoD-funded researchers are required to search DTIC's collections of technical reports and summaries of ongoing research to ensure that unnecessary research is not undertaken.

- "Cannon Air Force Base" – 2,785 documents
- "Cannon Air Force Base + Range" – zero documents
- "Portair Field" - three documents
- "Clovis Field" – four document
- "Clovis Army Air Field" – five documents
- "Clovis Army Air Base" – four documents
- "Clovis Air Force Base" – 44 documents

Due to a large number of results for Cannon AFB (2,785), the second online DTIC database, the Public Scientific and Technical Information Network (STINET) database, was accessed to narrow the search to relevant documents.

The STINET includes publicly accessible collections of scientific and technical information and helps the DoD community access pertinent scientific and technical information to meet mission needs effectively (<http://stinet.dtic.mil/>).

The STINET was searched for:

- “Cannon Air Force Base” – 22 documents
- “Cannon AFB” – 44 documents
- “Cannon Air Force Base + Range” – 0 documents
- “Portair Field” – 0 documents
- “Clovis Field” – 0 document
- “Clovis Army Air Field” – 0 documents
- “Clovis Army Air Base” – 0 documents
- “Clovis Air Force Base” – 0 documents

Documents were reviewed, and no documents related to this Modified CSE Phase I report were found.

Additional searches on the term Range resulted in 106,884 documents, a number too large to review. Instead, specific terms were searched:

- Anti-Aircraft Artillery Range – 0 documents
- Anti-Tank Range – 2 documents
- Artillery Range – 30 documents
- Bombing Range – 54 documents
- Demolition Range – 7 documents
- EOD – 175 documents
- Experimental Range – 87 documents
- Field Firing – 15 documents
- Firing Range – 200 documents
- Firing-In Butt – 0 documents
- Gunnery Range – 34 documents
- Impact Area – 191 documents
- Machine Gun Range – 3 documents
- Maneuver Area – 55 documents
- Munitions Disposal – 56 documents
- Mortar Range – 0 documents
- Open Burn Open Detonation – 63 documents
- Pistol Range – 6 documents
- Rifle Range – 32 documents
- Rocket Range – 29 documents
- Skeet Range – 0 documents

- Small Arms Range – 63 documents
- Target Range – 295 documents
- Training Range – 198 documents
- UXO – 508 documents
- Unexploded Ordnance – 548 documents

No documents related to this Modified CSE Phase I report were found.

4.1.2.13 Library of Congress

The Library of Congress on-line catalog was used to search for documents that might be related to Cannon AFB: <http://catalog.loc.gov/cgi-bin/Pwebrecon.cgi?DB=local&PAGE=First>. As a result of the on-line research at the Library of Congress, no on-site research was conducted. No documents relating to the Cannon AFB were found.

4.1.2.14 Aerial Photographs

Historic aerial photographs were collected for Cannon AFB as part of the research for the Modified CSE Phase I report. Efforts were made to locate and obtain aerial photographs of the installation for a minimum of three decades: 1940s, 1950s, and 1960s, in order to document changes over time at the installation related to the MMRP. Below are the aerial photographs obtained to-date.

Source	Date of Photo	Scale	Project	Can	Roll	Frame
USDA	15-Aug-66	1:20,000	CIJ	29536	3GG	63, 63, 135 & 136

Aerial photographs were obtained from 1966 for Cannon AFB. These 1966 aerial photographs revealed an Ordnance Storage Area and what appeared to be a Shooting-In Butt directly north of runway 30. A 1951 aerial photograph has been ordered from NARA, but not received as of this date. No official aerial photographs earlier than 1951 were found for Cannon AFB; however, a 1946 overhead photograph of the base was discovered during the site investigation. The 1940s Skeet Range is visible in this photograph. The 1946 overhead photograph can be found in **Appendix D** of this report.

4.2 Personal Interviews

Interviews were conducted to document anecdotal information and activities that occurred at the MRAs. ITSI attempted to identify any former personnel who may have first-hand knowledge about site training activities by contacting Cannon AFB personnel for recommendations, local historical societies, local history enthusiasts, and/or local residents. Based on leads provided, the ITSI Team contacted and interviewed anyone that may have knowledge of past munitions and environmental activities. The following interviews were conducted for this CSE Phase I.

4.2.1 Contact Record 1: Jerry Pelfrey, Remediation Program Manager

Name of Individual Contacted: Jerry Pelfrey
Title or Position: **Remediation Program Manager**
Company or Agency Name: Cannon AFB
Means of Communication: Personal Interview
Contact Made by: Rob Souder – Shaw Environmental, Inc.
Nathaniel Cole – ITSI
Date: 10 March 2009

SUMMARY OF CONTACT: ITSI representatives interviewed Mr. Jerry Pelfrey regarding the Modified CSE Phase I. Mr. Pelfrey has been at Cannon AFB for several years and is very familiar with the MMRP. The ITSI Team presented the findings of the historical records review and asked if he had any knowledge of any of the potential MRAs identified in the Project Procedures. He had no first hand knowledge of any of the potential MRAs that would be eligible for the MMRP. He had no knowledge of any other areas at Cannon AFB that would be eligible for the USAF MMRP. Furthermore, he stated that the Firing-In Butt, Ground Gunnery Range, Poorman Range, Machine Gun Range, Rifle Range, and Aerial Gunnery Range were likely never present at Cannon AFB.

4.2.2 Contact Record 2: Hugh Hanson, Project Engineer/Manager

Name of Individual Contacted: Hugh Hanson
Title or Position: **Project Engineer/Manager**
Company or Agency Name: Cannon AFB
Means of Communication: Personal Interview
Contact Made by: Rob Souder – Shaw Environmental, Inc.
Nathaniel Cole – ITSI
Date: 10 March 2009

SUMMARY OF CONTACT: ITSI representatives interviewed Mr. Hugh Hanson regarding the Modified CSE Phase I. The ITSI Team presented the findings of the historical records review and asked if he had any knowledge of any of the potential MRAs identified in the Project Procedures. Mr. Hanson has been at Cannon AFB for about one year. He had no knowledge of any of the potential MRAs that had been identified at Cannon AFB. Additionally, he did not have knowledge of any other areas at Cannon that would be eligible for the USAF MMRP.

4.2.3 Contact Record 3: Alvin Pollard, EOD

Name of Individual Contacted: Alvin Pollard
Title or Position: **EOD**
Company or Agency Name: Cannon AFB
Means of Communication: Personal Interview
Contact Made by: Rob Souder – Shaw Environmental, Inc.
Nathaniel Cole – ITSI
Date: 10 March 2009

SUMMARY OF CONTACT: ITSI representatives interviewed Mr. Alvin Pollard regarding the CSE Phase I. Mr. Pollard has been at Cannon AFB since 2007. The ITSI Team presented the findings of the historical records review and asked if he had any knowledge of any of the potential MRAs identified in the Project Procedures. He had no knowledge of any of the potential MRAs that had been identified at Cannon AFB. Additionally, he did not have knowledge of any other areas at Cannon that would be eligible for the USAF MMRP.

Mr. Pollard indicated that practice bombs had been found and removed from the area near Playa Lake (South Playa Lake). Playa Lake is the surface water body in the southwest corner of the installation. According to Mr. Pollard, the practice bombs that were found in Playa Lake were inert and contained no explosives of any kind including spotting charges. To his knowledge there were no other munitions found to-date on Cannon AFB. Additional information on this munitions debris discovery was obtained from Sgt. Berry of Cannon EOD.

Mr. Pollard indicated that Cannon EOD had records dating to 1987. He indicated that the majority of the records dealt with the active Melrose range area. The ITSI Team searched the EOD records and did not find any pertinent information to Cannon AFB.

4.2.4 Contact Record 4: MSgt Warren Downing, EOD

Name of Individual Contacted: MSgt Warren Downing
Title or Position: **EOD**
Company or Agency Name: Cannon AFB
Means of Communication: Personal Interview
Contact Made by: Rob Souder – Shaw Environmental, Inc.
Nathaniel Cole – ITSI
Date: 10 March 2009

SUMMARY OF CONTACT: ITSI representatives interviewed MSgt Warren Downing regarding the CSE Phase I. MSgt Downing has been at Cannon AFB since 1996. The ITSI Team presented the findings of the historical records review and asked if he had any knowledge of any of the potential MRAs identified in the Project Procedures. He had no knowledge of any of the potential MRAs that had been identified at Cannon AFB. Mr. Warren indicated that he had a thorough knowledge of the munitions area and had never heard of a skeet range (1940s Skeet Range) in proximity to the munitions area. Additionally, he did not have knowledge of any other areas at Cannon that would be eligible for the USAF MMRP.

The ITSI Team discussed the historical maps that labeled North Playa Lake as Disposal Lake. The team asked if the term Disposal Lake implied the disposal of munitions items. Mr. Warren indicated that he was unaware of any munitions disposal in this lake. He believed the name came from sewage disposal into the lake.

4.2.5 Contact Record 5: Kenny Cable, Deputy Chief, Operations Flight

Name of Individual Contacted: Kenny Cable
Title or Position: **Deputy Chief, Operations Flight**
Company or Agency Name: Cannon AFB
Means of Communication: Personal Interview
Contact Made by: Rob Souder – Shaw Environmental, Inc.
Nathaniel Cole – ITSI
Date: 10 March 2009

SUMMARY OF CONTACT: ITSI representatives interviewed Mr. Kenny Cable regarding the CSE Phase I. Mr. Cable has been at Cannon AFB since 1972. The ITSI Team presented the findings of the historical records review and asked if he had any knowledge of any of the potential MRAs identified in the Project Procedures. He had no knowledge of any of the potential MRAs that had been identified at Cannon AFB. Additionally, he did not have knowledge of any other areas at Cannon that would be eligible for the USAF MMRP.

Mr. Cable provided access to framed aerial photographs. Review of one of the aerial photographs from 1946 showed a potential skeet range north of the Ordnance Storage Area. The photo was taken at an oblique angle and while the skeet range was visible, it was not extremely clear. While Mr. Cable did not have any first hand knowledge of a skeet range in the area, he did recall a brick structure in this area.

4.2.6 Contact Record 6: Harold Walker, Chief of Design/Construction

Name of Individual Contacted: Harold Walker
Title or Position: **Chief of Design/Construction**
Company or Agency Name: Cannon AFB
Means of Communication: Personal Interview
Contact Made by: Rob Souder – Shaw Environmental, Inc.
Nathaniel Cole – ITSI
Date: 10 March 2009

SUMMARY OF CONTACT: ITSI representatives interviewed Mr. Harold Walker regarding the CSE Phase I. Mr. Walker has been at Cannon AFB since 1983. The ITSI Team presented the findings of the historical records review and asked if he had any knowledge of any of the potential MRAs identified in the Project Procedures. Mr. Walker did recall grenades being found in the area of the Firing-In Butt. He recalled that these items had been removed by EOD. He indicated that all of the munitions items associated with the Firing-In Butt have subsequently been cleaned up. He did not have knowledge of any other areas at Cannon that would be eligible for the USAF MMRP.

4.2.7 Contact Record 7: MSgt Clifford Gonzales, Weapons Safety

Name of Individual Contacted: MSgt Clifford Gonzales
Title or Position: **Weapons Safety**
Company or Agency Name: Cannon AFB
Means of Communication: Personal Interview
Contact Made by: Rob Souder – Shaw Environmental, Inc.
Nathaniel Cole – ITSI
Date: 11 March 2009

SUMMARY OF CONTACT: ITSI representatives interviewed MSgt Clifford Gonzales regarding the CSE Phase I. MSgt Gonzales has been at Cannon AFB since 2005. The ITSI Team presented the findings of the historical records review and asked if he had any knowledge of any of the potential MRAs identified in the Project Procedures. He had no knowledge of any of the potential MRAs that had been identified at Cannon AFB. Additionally, he did not have knowledge of any other areas at Cannon that would be eligible for the USAF MMRP. He had no knowledge of Weapons Safety responding to any discoveries or incidents related to munitions.

4.2.8 Contact Record 8: Rick Shea, Historian

Name of Individual Contacted: Rick Shea
Title or Position: **Historian**
Company or Agency Name: Cannon AFB
Means of Communication: Personal Interview
Contact Made by: Rob Souder – Shaw Environmental, Inc.
Nathaniel Cole – ITSI
Date: 11 March 2009

SUMMARY OF CONTACT: ITSI representatives interviewed Mr. Rick Shea regarding the CSE Phase I. Mr. Shea has been at Cannon AFB since 2008. The ITSI Team presented the findings of the historical records review and asked if he had any knowledge of any of the potential MRAs identified in the Project Procedures. He had no knowledge of any of the potential MRAs that had been identified at Cannon AFB. Additionally, he did not have knowledge of any other areas at Cannon that would be eligible for the USAF MMRP.

ITSI representatives inquired if any historical documents were present in the history office that may contain information pertinent to the MMRP. Mr. Shea provided access to some historical documents which were searched by the ITSI Team. The 1946 aerial photograph previously provided by Mr. Cable was in the records. Mr. Shea indicated the best repository would be the Civil Engineering Map Vault.

4.2.9 Contact Record 9: Bruce Ford, Assistant Chief, Fire Prevention

Name of Individual Contacted: Bruce Ford
Title or Position: **Assistant Chief, Fire Prevention**
Company or Agency Name: Cannon AFB
Means of Communication: Personal Interview
Contact Made by: Rob Souder – Shaw Environmental, Inc.
Nathaniel Cole – ITSI
Date: 11 March 2009

SUMMARY OF CONTACT: ITSI representatives interviewed Mr. Bruce Ford regarding the CSE Phase I. Mr. Ford has been at Cannon AFB since 1992. The ITSI Team presented the findings of the historical records review and asked if he had any knowledge of any of the potential MRAs identified in the Project Procedures. He had no knowledge of any of the potential MRAs that had been identified at Cannon AFB. Additionally, he did not have knowledge of any other areas at Cannon that would be eligible for the USAF MMRP. Mr. Ford indicated that he only had knowledge of active operations not historical ones. Mr. Ford was asked about “Disposal Lake”; he believed that the term was reflective of the fact that the lake received run-off and sewage, not that items had been disposed of in the lake.

4.2.10 Contact Record 10: William Phipps, Heating

Name of Individual Contacted: William Phipps
Title or Position: **Heating**
Company or Agency Name: Cannon AFB
Means of Communication: Personal Interview
Contact Made by: Rob Souder – Shaw Environmental, Inc.
Nathaniel Cole – ITSI
Date: 11 March 2009

SUMMARY OF CONTACT: ITSI representatives interviewed Mr. William Phipps regarding the CSE Phase I. Mr. Phipps has been at Cannon AFB since 1962. Mr. Phipps had worked on the Cannon AFB flight line in the 1960s. The ITSI Team presented the findings of the historical records review and asked if he had any knowledge of any of the potential MRAs identified in the Project Procedures. He had no knowledge of any of the potential MRAs that had been identified at Cannon AFB. Additionally, he did not have knowledge of any other areas at Cannon that would be eligible for the USAF MMRP. Mr. Phipps indicated that all of the munitions areas that he was familiar with were still active.

4.2.11 Contact Record 11: Sgt Berry, EOD

Name of Individual Contacted: Sgt. Berry
Title or Position: **EOD**
Company or Agency Name: Cannon AFB
Means of Communication: Telephone Interview
Contact Made by: Nathaniel Cole – ITSI
Date: 14 September 2009

SUMMARY OF CONTACT: ITSI representatives interviewed Sgt. Berry regarding the EOD response to South Playa Lake in February of 2009. Sgt Berry indicated that EOD responded back in February 2009 to a suspected munitions find at the South Playa. The suspected items were found during a clean up effort along the perimeter of the playa in support of the BASH program. EOD removed the items and determined that they were inert practice bombs that did not contain a charge of any kind. The exact nomenclature of the items was BDU-8B. He explained that these items are used to simulate the warhead of a nuclear bomb and the only safety concern would be if the fins were attached to the bombs, which in this case they were not. The entire area was also swept by the EOD team at this time for similar items of concern; nothing more was found. He also said that EOD has not been called to this area before or since this time.

4.3 Visual Surveys

A visual survey of each potential MRA identified was performed. The surveys were intended to confirm the presence of MEC. At Cannon AFB, two MRAs warranted evaluation, as discussed in Section 2.4. The visual survey results are discussed in Section 5.0.

The visual survey team field-located, via global positioning system (GPS), the location of potential MEC features, and in most cases, photographed them for the record (**Appendix D**). This data was then mapped using GIS tools for planning and reporting purposes.

4.4 Off-Site Reconnaissance

An off-site reconnaissance was conducted to assess the population, land use, and operations that may be affected by site operations and conditions. The reconnaissance identified adjacent land ownership, land use, water supplies, waste disposal practices, and potential receptors of any wastes that may have migrated off-site. The off-site reconnaissance also identified whether there were potentially-related areas outside the defined MRA that require investigation (i.e., areas where MEC may potentially be present). One off-site area potentially impacted by military munitions activities was identified. The area of the 1940s Skeet Range extends beyond the Cannon AFB installation boundary and encompasses two off-site buildings. The buildings are part of Rajen Dairy, a private property. The property was observed through the Cannon AFB boundary fence, but since a Right of Entry (ROE) was not obtained, a physical visual survey of the area was not performed. In the future, a visual survey of this off-site property may need to be performed as part of subsequent military munitions response activities. For this work, a ROE will be required.

4.5 Data Management

4.5.1 Electronic Data

The electronic files provided by Cannon AFB were stored securely within a specified project directory on a secure private network located at the ITSI office in Denver, Colorado.

Access to these files is restricted to only those personnel with key responsibilities to the project and who have been granted authority by the ITSI Project Manager. These electronic files are backed up daily, weekly, monthly, and yearly.

4.5.2 Hardcopy Data

Various hardcopy files including technical reports, correspondences, figures, and drawings also are stored within the secure Cannon AFB project files located at the ITSI office in Denver, Colorado. Access to the office is limited to ITSI personnel, and the hardcopy files are stored in a locked file cabinet.

4.5.3 GIS Data

The GIS data layer files are stored on a separate directory within the secure private network located at the ITSI office in Denver, Colorado. Again, access to these files is restricted to only those personnel with key responsibilities to the project and who have been granted explicit access rights. These electronic files also are backed up daily, weekly, monthly, and yearly.

The conversion of raw data into the database and mapping software was performed at Shaw's Denver, Colorado office. The output from the database was checked by the Quality Control (QC) Specialist or his/her designee to determine if it was consistent with the raw data.

5.0 MRA Visual Survey

Two MRAs were determined to require visual surveys at Cannon AFB, as discussed in Section 2.3. The site characteristics for each of these areas vary greatly; therefore, this section has been broken down by individual MRA.

The information presented in this section was extracted from historical maps/aerial photographs, historical documents, and personal interviews, and evaluated during the Modified CSE Phase I field effort. Changes were made based on the field observations, when appropriate.

5.1 Former Chemical Warfare Area

5.1.1 Site Description

The Former Chemical Warfare Area is a 2.7-acre site located in the western portion of the base, in the southwest portion of the administrative area. It is 400 ft by 290 ft with a perimeter of 1,390 ft. The coordinates of this site are 34.388591 degrees latitude, -103.328576 degrees longitude. The area currently contains a parking lot. Several in-use buildings are adjacent to the area. There are no wetlands associated with this site. Soils consist of Amarillo fine sandy loam. Depth to groundwater is approximately 250 ft (CH2M Hill, 1983).

5.1.2 History of MEC Activities

Base history reports from 1943 to 1944 mention a Chemical Warfare Area in the southwest portion of the base administrative area. Former Buildings 835, 864, 865, and 866 were associated with this area. Training in this area included gas chamber exercises, as well as use of tear gas, chlorine gas, and mustard gas. According to a 1943 document, the gas chamber was 20 by 40 ft in size and equipped with two air locks. The document indicates the gas chamber was used for tear gas and chlorine gas. The same 1943 document indicates the completion of an incendiary course. The purpose of the course was to drop incendiary bombs to demonstrate how they would drop from an aircraft. The course included two buildings for demonstrating methods for combating incendiaries. A decontamination course was built in the area as well. The decontamination area consisted of four lanes, each 15 by 50 yards in size. They were used to demonstrate methods of decontaminating persistent chemical warfare agents.

5.1.3 Current Land Use

A parking lot currently occupies this area. Buildings 835, 864, 865, and 866 are no longer present.

5.1.4 Access Controls

Access to Cannon AFB requires admittance through a security gate, and there is a fence around the perimeter of the installation. Therefore, this potential MRA is restricted to the general public but accessible to authorized personnel. However, once on Cannon AFB property, there are no restrictions to accessing this potential MRA.

5.1.5 Restrictions

There are no restrictions specific to this MRA. Due to its location on Cannon AFB, access is limited to authorized base personnel and contractors.

5.1.6 Visual Survey Observations and Results

Figure 5-1 shows the location of the Former Chemical Warfare Area. The ITSI Team performed a visual survey of this area and collected waypoints at each of the former Chemical Warfare building locations. The area has been completely renovated and paved over; none of the buildings or features of this MRA are still present. The area currently contains a parking lot, and several in-use buildings are located nearby. **Appendix D** contains photos of the location of each of the former Chemical Warfare Building locations.

5.1.7 Off-Site Reconnaissance Observations

The former chemical warfare area is contained within Cannon AFB. No potential for impact to off-site areas was identified.

5.1.8 Receptors

5.1.8.1 Nearby Population

Cannon AFB is located 8 miles west of the city of Clovis, New Mexico. According to the U.S. Census Bureau, Clovis had a population of 32,352 in 2008 (U.S. Census Bureau, 2008).

5.1.8.2 Buildings near/within MRA

There are several in-use buildings near this area, though none are within the MRA.

5.1.8.3 Utilities on/near MRA

Utilities associated with Cannon AFB can be expected near the site.

5.2 1940s Skeet Range

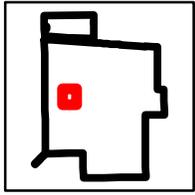
5.2.1 Site Description

The 1940s Skeet Range is a 29.4-acre site located in the northeast portion of the base, just north of the active ordnance area. The eastern portion of the site extends beyond the installation boundary onto Rajen Dairy private property. The acreage of this site includes both Cannon AFB and Rajen Dairy property. The site is 1,800 ft by 960 ft with a perimeter of 4,700 ft. The coordinates of this site are 34.398436 degrees latitude, -103.299443 degrees longitude. The area consists of an open field that does not contain any facilities. There are no wetlands associated with this site. Soils consist of Amarillo fine sandy loam. Depth to groundwater is approximately 250 ft (CH2M Hill, 1983).

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-  Munitions Use Site
-  Cannon Air Force Base Installation Boundary



Projection : NAD_1983_StatePlane_New_Mexico_East_FIPS_3001_Feet



**U.S. ARMY
CORPS OF ENGINEERS**
OMAHA DISTRICT

MILITARY MUNITIONS RESPONSE PROGRAM

FIGURE
NUMBER
5-1

**FORMER CHEMICAL WARFARE AREA
VISUAL SURVEY OBSERVATIONS
CANNON AIR FORCE BASE**



Shaw Environmental, Inc.



Innovative Technical Solutions, Inc.

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5.2.2 History of MEC Activities

A 1940s Skeet Range was discovered during the on-site record gathering. According to an August 1943 Building index for Clovis Airfield, Clovis, New Mexico, Building T-2150 was a skeet range. The location of Building T-2150 was identified on an April 1944 Water Distribution System map for Clovis Airfield Clovis, New Mexico. This map depicts Building T-2150 as being located just north of the Ordnance Storage Area, which is still used as an active Munitions Storage Area. The 1944 map appears to be a firing arc for a skeet range although it is oriented firing to the south towards the ordnance storage area. Because both the skeet range and ordnance storage area were active during the same time period the skeet range could not have fired to the south. Review of a 1946 aerial photograph appears to show the firing direction to the north. The location of the former range is in the northeast portion of the base, just north of the active ordnance area (**Figure 2-5**). This area is discussed further in Section 5.0.

5.2.3 Current Land Use

The portion of the site on Cannon AFB property is an open field with no current use. No buildings or other facilities are present. The portion on Rajen Dairy property is private property, agricultural land. Two Rajen Dairy buildings are present in this area.

5.2.4 Access Controls

Access to Cannon AFB requires admittance through a security gate, and there is a fence around the perimeter of the installation. Therefore, the portion of this MRA on Cannon AFB property is restricted to the general public but accessible to authorized base personnel. However, once on Cannon AFB property, there are no restrictions to accessing this MRA. The portion on Rajen Dairy property is private land with no restrictions.

5.2.5 Restrictions

There are no restrictions specific to this MRA. Due to its location on Cannon AFB, access is limited to authorized base personnel and contractors. Furthermore, the portion of this site that is off-base is private land with no restrictions.

5.2.6 Visual Survey Observations and Results

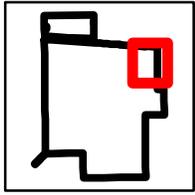
As shown on **Figure 5-2**, transects were performed at the 1940s Skeet Range. The range is no longer present, and the area on Cannon AFB property is an empty, open field. Clay pigeon debris and several slabs of concrete were observed in the area, as depicted in **Appendix D**. While the off-base portion of this site was observed through the installation fence, a true site survey was not performed, as ROE was not obtained.

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1940s Skeet Range

-  Visual Survey Observation Transect
-  Munitions Use Site
-  Cannon Air Force Base Installation Boundary



Projection : NAD_1983_StatePlane_New_Mexico_East_FIPS_3001_Feet



**U.S. ARMY
CORPS OF ENGINEERS**
OMAHA DISTRICT

MILITARY MUNITIONS RESPONSE PROGRAM

FIGURE NUMBER
5-2

**1940s SKEET RANGE
VISUAL SURVEY OBSERVATIONS
CANNON AIR FORCE BASE**



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5.2.7 Off-Site Reconnaissance Observations

No off-site reconnaissance of this MRA was performed for Cannon AFB. However, a portion of the 1940s Skeet Range fan extends off the base property. The ITSI Team observed this area through the fence surrounding the installation. The area consists of agricultural land owned by Rajen Dairy. Two buildings are located in the area and are part of Rajen Dairy property.

5.2.8 Receptors

5.2.8.1 Nearby Population

Cannon AFB is located 8 miles west of the city of Clovis, New Mexico. According to the U.S. Census Bureau, Clovis had a population of 32,352 in 2008 (U.S. Census Bureau, 2008).

5.2.8.2 Buildings near/within MRA

This MRA extends beyond the Cannon AFB installation boundary. Two off-installation buildings occur within the MRA. These buildings are owned by Rajen Dairy.

5.2.8.3 Utilities on/near MRA

Utilities associated with Cannon AFB can be expected near the site.

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6.0 Evaluation of Known/Suspected MEC

6.1 MEC Technical Data

Based on evaluation of historical information, munitions items used at the 1940s skeet range were limited to shotgun ammunition. Because only small arms were identified at the 1940s skeet range, no MEC technical data sheets are presented.

6.2 MEC Locations

Based on the review of archival records, available documentation, and visual observations, the principle activity that occurred at Cannon AFB that may have caused MC to be present was use of a skeet range. No information identified during the Modified CSE Phase I indicates release of MEC at Cannon AFB. No conventional MEC was used at the Former Chemical Warfare Area.

There was no evidence of small arms projectiles observed during the Modified CSE Phase I site investigation. However, the presence of clay pigeon debris at the 1940s Skeet Range is indicative of past use of the range.

6.3 Special Consideration MEC

In addition to conventional ordnance contamination, the Modified CSE Phase I also examined the site for the presence of special consideration MEC (i.e., Chemical Warfare Materiel [CWM], depleted uranium). CWM was likely used at the Former Chemical Warfare Area. Use included gas chamber exercises, as well as use of tear gas, chlorine gas, and mustard gas. An incendiary bomb area was located in this area as well. However, no evidence of release or disposal was identified during the CSE Phase I.

6.4 Known/Suspected MC

The MEC and CWM used at Cannon AFB is described in Sections 6.1 and 6.3. A listing of the primary MC associated with the 1940s skeet range is provided below:

- Small arms –Lead and polyaromatic hydrocarbons (PAHs).

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7.0 Summary and Conclusions

This section summarizes the significant results obtained and recommendations for each MRA investigated during the Modified CSE Phase I field activities conducted at Cannon AFB.

7.1 Summary of Modified CSE Phase I Activities

This Modified CSE Phase I activity compiled and evaluated information on Cannon AFB relating to the possible presence of potentially explosive MEC, site physical conditions, and future land uses and activities. Information sources included archival records from Cannon AFB, interviews with Cannon AFB personnel, additional archival information collected from public sources, and observations made during the visual surveys. This information was reviewed and used to evaluate the extent of MEC and/or potential for MC exposure at the site.

7.2 Summary of the Modified CSE Phase I Findings

The Modified CSE Phase I has resulted in the collection, evaluation, and synthesis of a large amount of information regarding past ordnance-related activities at Cannon AFB, the current conditions on-site with respect to the presence of MEC, and the physical setting of the land. A summary of the characteristics and data collected at each MRA investigated during the Modified CSE Phase I is provided below:

Former Chemical Warfare Area

- Type: Chemical Warfare, Training.
- Size: 2.7 acres.
- Topography: Flat.
- Vegetative Cover: Barren/none (pavement).
- Soil Type: Fine sandy loam.
- Features: The Former Chemical Warfare Area consisted mainly of training facilities. Former Buildings 835, 864, 865, and 866 were associated with this area. Training included gas chamber exercises, as well as use of tear gas, chlorine gas, and mustard gas. The site currently contains a parking lot with several buildings nearby. There are no remnants of the chemical warfare training facilities, and former Buildings 835, 864, 865, and 866 have been removed.
- Small Arms/Munitions Debris (MD): None.
- Anomaly Density: Low (<10 anomalies/acre).
- MEC/CWM Found: None.
- Environmental Sampling: None.
- Access: No access restrictions.

- Impacted Media: None.
- Ownership: Cannon AFB.
- Retain for Evaluation under MMRP: No.
- Recommendations: As no evidence of MEC or CWM was observed and the site has been redeveloped as a parking lot, NFA is recommended for this area.

1940s Skeet Range

- Type: Small Arms, Skeet Range, Land to Land.
- Size: 29.4 acres.
- Topography: Flat.
- Vegetative Cover: Low grasses.
- Soil Type: Fine sandy loam.
- Features: The history of the 1940s Skeet Range is not known. It was identified on a historic base map and on a 1946 aerial photograph of the base. Clay pigeon debris and several concrete slabs were observed at the site. There are no facilities on the Cannon AFB portion of this area; the land is vacant. The eastern portion of the area extends beyond the Cannon AFB installation boundary onto Rajen Dairy property. Two Rajen Dairy buildings are situated within the MRA.
- Small Arms/MD: None. However clay pigeon debris was found at this MRA.
- Anomaly Density: Low (<10 anomalies/acre).
- MEC Found: None identified during the Modified CSE Phase I.
- Environmental Sampling: None.
- Access: The portion of the site on Cannon AFB is restricted to authorized base personnel only. The portion on Rajen Dairy property is unrestricted and accessible.
- Impacted Media: Soil (surface and subsurface).
- Contaminants of Concern: Lead and PAHs.
- Ownership: Cannon AFB and Rajen Dairy.
- Retain for Evaluation under MMRP: Yes.
- Recommendations: Recommend CSE Phase II efforts as defined in the USAF developed Scope of Objectives (SOO) and Draft CSE Phase II guidance to include:
 - Sampling to assess if MC has been released to the environment:
 - Surface soil samples, and
 - Subsurface soil samples.

7.3 Assessment of Potential Munitions Constituent Releases

An evaluation of the likelihood of environmental release of MC at the MRAs identified at Cannon AFB has been conducted. Review of historical documentation and the Cannon AFB AR indicates that no environmental samples have been collected to-date at any of the MRAs. Therefore, this evaluation has been conducted based on site history, visual survey results, and professional judgment.

Based on the findings of this CSE Phase I, there is no evidence of MC releases that would indicate immediate action is warranted. Furthermore, at one of the potential MRAs, there is no indication of a release of MC as discussed in Section 5.1.

It was determined that there is a potential for environmental impacts from MC to have occurred at the remaining MRA, the 1940s Skeet Range. Based on experience at similar sites, lead is the primary contaminant of concern at the 1940s Skeet Range. An additional Hazardous, Toxic, Radioactive Waste concern at the 1940s Skeet Range would be the release of PAHs from the clay pigeons. An assessment of the potential impact of MC and other contaminants associated with historical military munitions activities at this MRA would typically involve sampling the potentially impacted media (e.g., soil, sediment, groundwater, and/or surface water) at locations where appreciable amounts of small arms and/or clay pigeon debris are present and where the release or migration of metal and PAH constituents may be expected. Therefore, an assessment of the potential for environmental release of MC during the performance of a CSE Phase II is warranted for the 1940s Skeet Range. Environmental sampling was not performed as part of the CSE Phase I, but will be performed, as applicable, as part of the CSE Phase II activities.

A formal evaluation of the chemical constituents associated with the former military munitions activities at the 1940s Skeet Range, performed in accordance with the CERCLA requirements and protocols for a PA/SI, is warranted.

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8.0 Recommendations (further investigation and/or action)

8.1 MRA Recommendations

A summary of the results and recommendations for the Cannon AFB MRAs and other munitions use sites from the Modified CSE Phase I are presented as **Table 8-1**.

Table 8-1
MRA Recommendations Summary

MRA	CSE Phase I Summary	Recommendations
Munitions Storage Area	Type: Ordnance Storage CSE Phase I Conclusion: Area is active and therefore not eligible for USAF MMRP.	NFA
Former Chemical Warfare Area	Type: CWM CSE Phase I Conclusion: No evidence of MEC or CWM observed; site has been redeveloped.	NFA
Skeet Range	Type: Range CSE Phase I Conclusion: Area is active and therefore not eligible for USAF MMRP.	NFA
Ground Gunnery Range	Type: Range CSE Phase I Conclusion: Location unknown.	NFA
Poorman Range	Type: Range CSE Phase I Conclusion: Location unknown; possibly already FUDS site.	NFA
Machine Gun Range	Type: Range CSE Phase I Conclusion: Location unknown; possibly already FUDS site.	NFA
Rifle Range	Type: Range CSE Phase I Conclusion: Location unknown; possibly already FUDS site.	NFA
Aerial Gunnery Range	Type: Range CSE Phase I Conclusion: Location unknown.	NFA
1940s Skeet Range	Type: Range Size: 29.4 acres MEC Results: No MEC identified CSE Phase II Objective: MC analysis of potentially impacted media	CSE Phase II*
Armament and Instrument Inspection and Adjustment	Type: Ordnance Building CSE Phase I Conclusion: No evidence of MEC or CWM observed; site has been redeveloped.	NFA
Armament Shop	Type: Ordnance Building CSE Phase I Conclusion: No evidence of MEC or CWM observed; site has been redeveloped.	NFA

Chemical Warfare Warehouse	Type: Ordnance Building CSE Phase I Conclusion: No evidence of MEC or CWM observed; site has been redeveloped.	NFA
Ordnance Building	Type: Ordnance Building CSE Phase I Conclusion: No evidence of MEC or CWM observed; site has been redeveloped.	NFA
Hot Cargo Pad	Type: Hot Cargo Pad CSE Phase I Conclusion: Area is active and therefore not eligible for USAF MMRP.	NFA
Firing Range	Type: Range CSE Phase I Conclusion: Area is active and therefore not eligible for USAF MMRP.	NFA
Holding Area Munitions Site	Type: Munitions Site CSE Phase I Conclusion: Area is active and therefore not eligible for USAF MMRP.	NFA
EOD Area	Type: EOD CSE Phase I Conclusion: Area is active and therefore not eligible for USAF MMRP.	NFA
Boresight Mound	Type: Firing-In Butt CSE Phase I Conclusion: Area was investigated and achieved regulatory closure under RCRA.	NFA

* - Please note that the CSE Phase II for these sites will include developing CSM, MRSPP, and HRS. While these steps are normally carried out in the CSE Phase I, in the case of this Modified CSE Phase I for Cannon AFB, these activities have been deferred to the CSE Phase II.

8.2 Cohort Assignment

To comply with the AF Knowledge Driven/Performance-Based Management initiative, MRAs are subdivided into seven “cohorts.” The assignment of MRAs to different cohorts supports the streamlining of the restoration process, including the development and implementation of presumptive remedies for specific cohort types. The cohort type will be reflected in the site description in AFRIMS. The seven USAF MMRP cohorts are shown in **Table 8-2**.

Table 8-2
Air Force MMRP Cohort Assignments

Cohort	Description
A	Small Arms Ranges
B	Bore-Sight Ranges
C	Explosive Ordnance Disposal (EOD) Ranges and Open Burn/Open Detonation (OB/OD) Sites
D	Chemical Warfare Materiel (CWM) Sites
E	Pyrotechnic/Practice Sites

Cohort	Description
F	All Other Sites
G	Munitions Constituents

As the USAF MMRP evolves, the cohort assignments may be expanded or consolidated to reflect what has been learned about the MRA. During implementation of the CSE Phase I, the cohort type was defined by the range-type as designated in documentation. The cohort assignment will be further refined based on field investigation in future phases. Any MRA with a site description of “multi-use” in AFRIMS shall be assigned a site description that reflects a specific cohort. The site description shall be revised to the range-type designated in documentation. Reassignments of cohort or site descriptions may be required in the future and will be based on the types of munitions found during future fieldwork.

8.2.1 Cannon AFB Cohort Assignment

A cohort type is required for one area, the 1940s Skeet Range. The cohort assignment for the 1940s Skeet Range is A (Small Arms Ranges). For all other areas investigated for this Modified CSE Phase I, no evidence of MEC, CWM, or MC was identified. Therefore, a cohort assignment is not required.

8.3 Process Streamlining Opportunities

Process streamlining opportunities for Cannon AFB include involving the regulators early in the planning process. On-board review of documents may also streamline the review process. In addition, the sampling program will be developed such that a decision process will be established and exit points will be clearly defined for the stakeholders.

The proposed scope of the Phase II effort and anticipated decision process should be developed to address the data gaps (MC contamination, potential for off-site impacts, etc.) identified for the 1940s Skeet Range.

8.4 Additional MRS (splitting the MRA)

Based on information gathered during the Modified CSE Phase I and depending on site-specific factors, each MRA may be designated as a single MRS, or it may be subdivided for the purposes of evaluation and response into multiple MRSs. Subdividing MRAs into multiple MRSs allows for more efficient characterization so that munitions responses specific to local conditions can be conducted.

An MRA must be comprised of at least one MRS, but may contain multiple MRSs. The total area of all MRSs contained within an MRA must, however, equal the area of the MRA. This will ensure that the total acreage within an MRA is investigated during the CSE Phases I and II.

Typical site-specific factors that may be considered during subdivision of MRAs into MRSs include:

- The prevalence of MEC or the extent of MC-contaminated media present within different areas of the MRA;
- The type of MEC or MC present within the MRA;
- Physical features (vegetation, topography, land areas versus water bodies, accessibility, and location of receptors that may be potentially exposed to MEC, etc.); and
- Geological and hydrogeological characteristics.

Areas within the MRA where the presence of MEC is not suspected or has not been confirmed during the CSE can be aggregated into a single MRS.

Based upon the visual survey and site evaluation, none of the MRAs at Cannon AFB are recommended to be divided into multiple MRSs.

8.5 *Newly Identified MRA*

An effort was made to evaluate whether any potentially new MRAs existed at the installation. At the conclusion of the CSE Phase I, one area was recommended for further evaluation. The 1940s Skeet Range is recommended to be retained as an MRA (**Figure 8-1**).



-  Munitions Response Area
-  Cannon Air Force Base Installation Boundary



Projection : NAD_1983_StatePlane_New_Mexico_East_FIPS_3001_Feet

	U.S. ARMY CORPS OF ENGINEERS OMAHA DISTRICT
	MILITARY MUNITIONS RESPONSE PROGRAM
FIGURE NUMBER 8-1	IDENTIFIED MRAs AT THE CONCLUSION OF THE MODIFIED CSE PHASE I RECOMMENDED FOR CSE PHASE II CANNON AIR FORCE BASE
 Shaw Environmental, Inc.	 Innovative Technical Solutions, Inc.

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Appendix A
Definitions

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Definitions

Anomaly – Any identified subsurface mass that may be geologic in origin, unexploded ordnance (UXO), or some other man-made material. Such identification is made through geophysical investigation and reflects the response of the sensor used to conduct the investigation. (Handbook on the Management of Munitions Response Actions, Interim Final, EPA, May 2005)

Anomaly Avoidance – Techniques employed on property known or suspected to contain unexploded ordnance, other munitions that may have experienced abnormal environments (e.g., discarded military munitions), munitions constituents in high enough concentrations to pose an explosive hazard, or chemical agents, regardless of configuration, to avoid contact with potential surface or subsurface explosive or CA hazards, to allow entry to the area for the performance of required operations. (AF Manual 91-201 and DoD 6055.9-STD)

Applicable or Relevant and Appropriate Requirements – Applicable requirements are cleanup standards, standards of control, and other substantive environmental protection requirements promulgated under Federal or state environmental law that specifically address a hazardous substance, pollutant, contaminant, remedial action, location or other circumstance found at a CERCLA site. Relevant and appropriate requirements are cleanup standards that, while not “applicable,” address situations sufficiently similar to those encountered at a CERCLA site where their use is well suited to the particular site. (NCP, 40 CFR Part 300, July 2005)

Chemical Agent (CA) – An agent that, through its chemical properties, produces lethal or other damaging effects on human beings, except that such term does not include riot control agents, chemical herbicides, smoke, and other obscuration materials. This definition is based on the definition of “chemical agent and munition” in 50 U.S.C. 1521(j)(1).

Chemical Warfare Materiel (CWM) – Items generally configured as a munition containing a chemical compound that is intended to kill, seriously injure, or incapacitate a person through its physiological effects. CWM includes V- and G-series nerve agents or H-series (mustard) and L-series (lewisite) blister agents in other-than-munition configurations; and certain industrial chemicals (e.g., hydrogen cyanide [AC], cyanogen chloride [CK], or carbonyl dichloride [called phosgene or CG]) configured as a military munition. CWM does not include riot control devices, chemical defoliants and herbicides, industrial chemicals (e.g., AC, CK, or CG) not configured as a munition, smoke and other obscuration producing items, flame and incendiary producing items, or soil, water, debris or other media contaminated with low concentrations of chemical agents where no CA hazards exist. (MRSPP, 32 CFR Part 179, October 2005)

CWM contains the following four subcategories:

- 1) **CWM, explosively configured** – All UXO or DMM that contain a CA fill and any explosive component. Examples are M55 rockets with CA, the M23 VX mine, and the M360 105-mm GB artillery cartridge.
- 2) **CWM, nonexplosively configured** – All UXO or DMM that contain a CA fill but that do not contain any explosive components. Examples are any chemical munitions that do not contain explosive components and VX or mustard agent spray canisters.
- 3) **CWM, bulk container** – All discarded (e.g., buried) non-munitions-configured containers of CA (e.g., a ton container) and CAIS K941, toxic gas set M-1 and K942, toxic gas set M-2/E11.
- 4) **Chemical Agent Identification Sets (CAIS)** – Military training aids containing small quantities of various CA and other chemicals. All forms of CAIS are scored the same in this rule, except CAIS K941, toxic gas set M-1; and CAIS K942, toxic gas set M-2/E11,

which are considered forms of CWM, bulk container, due to the relatively large quantities of agent contained in those types of sets.

Closed Range – A military range that has been taken out of service as a range and that either has been put to new uses that are incompatible with range activities or is not considered by the military to be a potential range area. A closed range is still under the control of a Component. (MGDERP, September 2001)

Defense Sites – Locations that are or were owned by, leased to, or otherwise possessed or used by the Department of Defense. The term does not include any operational range, operating storage or manufacturing facility, or facility that is used for or was permitted for the treatment or disposal of military munitions. (10 U.S.C. 2710(e)(1))

Department of Defense Components – The Office of the Secretary of Defense (OSD), the Military Departments, the Defense Agencies, the Department Field Activities, and any other Department organizational entity or instrumentality established to perform a government function. (MRSPP, 32 CFR Part 179, October 2005)

Discarded Military Munitions (DMM) – Military munitions that have been abandoned without proper disposal or removed from storage in a military magazine or other storage area for the purpose of disposal. The term does not include unexploded ordnance, military munitions that are being held for future use or planned disposal, or military munitions that have been properly disposed of consistent with applicable environmental laws and regulations. (10 U.S.C. 2710(e)(2))

Explosive Ordnance Disposal (EOD) Personnel – Active duty military personnel of any military service branch that are trained in the detection, identification, field evaluation, safe rendering, recovery, and final disposal of explosive ordnance and of other munitions that have become an imposing danger, for example, by damage or deterioration. (Handbook on the Management of Munitions Response Actions, Interim Final, EPA, May 2005)

Facility – A building, structure, or other improvement to real property, in relation to work classification. (10 U.S.C. 2801)

Formerly Used Defense Sites (FUDS) – Facility or site (property) that was under the jurisdiction of the Secretary of Defense and owned by, leased to, or otherwise possessed by the United States at the time of actions leading to the contamination by hazardous substances. By the DoD Environmental Restoration Program (ERP) policy, the FUDS program is limited to those real properties that were transferred from DoD control prior to 17 October 1986. FUDS properties can be located within the 50 States, District of Columbia, Territories, Commonwealths, and possessions of the United States. (FUDS Program Policy, ER 200 3-1, May 2004)

Hazardous Substance – (A) Any substance designated pursuant to Section 1321(b)(2)(A) of title 33, (B) any element, compound, mixture, solution, or substance designated pursuant to Section 9602 of this title, (C) any hazardous waste having the characteristics identified under or listed pursuant to Section 3001 of the Solid Waste Disposal Act [42 U.S.C. 6921] (but not including any waste the regulation of which under the Solid Waste Disposal Act [42 U.S.C. 6901 et seq.] has been suspended by Act of Congress), (D) any toxic pollutant listed under section 1317(a) of title 33, (E) any hazardous air pollutant listed under Section 112 of the Clean Air Act [42 U.S.C. 7412], and (F) any imminently hazardous chemical substance or mixture with respect to which the Administrator has taken action pursuant to Section 2606 of Title 15. The term does not include petroleum, including crude oil or any fraction thereof, which is not otherwise specifically listed or designated as a hazardous substance under subparagraphs (A) through (F) of this paragraph, and the term does not include natural gas, natural gas liquids, liquefied natural

gas, or synthetic gas usable for fuel (or mixtures of natural gas and such synthetic gas). (CERCLA, 42 U.S.C. § 9601 et seq.)

Installation (as defined by the RMIS Data Element Dictionary for a Federal Facility Identification [FFID]) – The FFID number is a unique identifier, assigned to an installation/property in RMIS. The 14-character aggregate string is used in RMIS as the key column for each data table and is used to track all associated records for each installation. An installation may have a single range or multiple ranges (and each range may have more than one site contained within its boundaries) and a single or multiple sites, not associated with a range. (Management Guidance for the Defense Environmental Restoration Program, September 2001)

Land Use Controls (LUCs) – Physical, legal, or administrative mechanisms that restrict the use of, or limit access to, contaminated property in order to reduce risk to human health and the environment. Physical mechanisms encompass a variety of engineered remedies to contain or reduce contamination and/or physical barriers to limit access to property, such as fences or signs. The legal mechanisms are generally the same as those used for institution controls (ICs) as discussed in the NCP. ICs are a subset of LUCs and are primarily legal mechanisms imposed to ensure the continued effectiveness of land use restrictions imposed as part of a remedial decision. Legal mechanisms include restrictive covenants, negative easements, equitable servitudes, and deed notices. Administrative mechanisms include notices, adopted local land use plans and ordinances, construction permitting, or other existing land use management systems that may be used to ensure compliance with use restrictions. (MGDERP, September 2001)

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

Military Installation – A base, camp, post, station, yard, center, or other activity under the jurisdiction of the Secretary of a Military Department, or, in the case of an activity in a foreign country, under the operational control of the Secretary of a military department or the Secretary of Defense, without regard to the duration of operational control. (10 U.S.C. 2801)

Military Munitions – All ammunition products and components produced for or used by the Armed Forces for national defense and security, including ammunition products or components under the control of the Department of Defense, the Coast Guard, the Department of Energy, and the National Guard. The term includes confined gaseous, liquid, and solid propellants; explosives, pyrotechnics, chemical and riot control agents, smokes, and incendiaries, including bulk explosives and chemical warfare agents; chemical munitions, rockets, guided and ballistic missiles, bombs, warheads, mortar rounds, artillery ammunition, small arms ammunition, grenades, mines, torpedoes, depth charges, cluster munitions and dispensers, and demolition charges; and devices and components of any item thereof. The term does not include wholly inert items, improvised explosive devices, and nuclear weapons, nuclear devices, nuclear components, other than non-nuclear components of nuclear devices that are managed under the nuclear weapons program of the Department of Energy after all required sanitization operations under the Atomic Energy Act of 1954 (42 U.S.C. 2011 et seq.) have been completed. (10 U.S.C. 101(e)(4))

Military Range – Designated land and water areas set aside, managed, and used to research, develop, test, and evaluate military munitions, other ordnance, or weapon systems, or to train military personnel in their use and handling. Ranges include firing lines and positions, maneuver areas, firing lanes, test pads, detonation pads, impact areas, and buffer zones with restricted access and exclusionary areas. (40 CFR 266.201)

Munitions and Explosives of Concern (MEC) – Military munitions that are 1) unexploded ordnance, as defined in 10 U.S.C. 101(e)(5); 2) abandoned or discarded, as defined in 10 U.S.C. 2710(e)(2); 3) MC (e.g., TNT, RDX) present in soil, facilities, equipment, or other materials in high enough concentrations so as to pose an explosive hazard. (MRSPP, 32 CFR Part 179, October 2005)

Munitions Constituent (MC) – Any material that originates from UXO, DMM, or other military munitions, including explosive and non-explosive materials, and emission, degradation, or breakdown elements of such ordnance or munitions. (10 U.S.C. 2710(e)(4))

Munitions Debris (MD) – Remnants of munitions (e.g., fragments, penetrators, projectiles, shell casings, links, fins) remaining after munitions use, demilitarization, or disposal. (DoD 6055.9-STD)

Munitions Response – Response actions, including investigation, removal actions, and remedial actions, to address the explosives safety, human health, or environmental risks presented by UXO, DMM, or MC or to support a determination that no removal or remedial action is required. (MRSPP, 32 CFR Part 179, October 2005)

Munitions Response Area (MRA) – Any area on a defense site that is known or suspected to contain UXO, DMM, or MC. Examples include former ranges and munitions burial areas. A munitions response area is comprised of one or more munitions response sites. (MRSPP, 32 CFR Part 179, October 2005)

Munitions Response Site (MRS) – A discrete location within an MRA that is known to require a munitions response. (MRSPP, 32 CFR Part 179, October 2005)

Operational Range – A range that is under the jurisdiction, custody, or control of the Secretary of Defense and that is used for range activities, or although not currently being used for range activities, that is still considered by the Secretary to be a range and has not been put to a new use that is incompatible with range activities. (10 U.S.C. 101(e)(3))

Outlier – An outlier is an observation that lies an abnormal distance from other values in a random sample from a population. In a sense, this definition leaves it up to the analyst (or a consensus process) to decide what will be considered abnormal. Before abnormal observations can be singled out, it is necessary to characterize normal observations.

Pollutant and Contaminant – These terms include, but are not be limited to, any element, substance, compound, or mixture, including disease-causing agents, which after release into the environment and upon exposure, ingestion, inhalation, or assimilation into any organism, either directly from the environment or indirectly by ingestion through food chains, will or may reasonably be anticipated to cause death, disease, behavioral abnormalities, cancer, genetic mutation, physiological malfunctions (including malfunctions in reproduction) or physical deformations, in such organisms or their offspring; except that the term pollutant or contaminant shall not include petroleum, including crude oil or any fraction thereof which is not otherwise specifically listed or designated as a hazardous substance under subparagraphs (A) through (F) of paragraph (14) and shall not include natural gas, liquefied natural gas, or synthetic gas of pipeline quality (or mixtures of natural gas and such synthetic gas). (CERCLA, 42 U.S.C. § 9601 et seq.)

Range Activities – Research, development, testing, and evaluation of military munitions, other ordnance, and weapons systems; and the training of members of the Armed Forces in the use and handling of military munitions, other ordnance, and weapons systems. (10 U.S.C. 101(3)(2))

Range-Related Debris – Debris, other than munitions debris, collected from operational ranges or from former ranges (e.g., targets, military munitions packaging and crating material). (DoD 6055.9-STD)

Range Residue – Material, including but not limited to, parts and sections of practice bombs, artillery, small arms, mortars, projectiles, bombs, missiles, rockets, rocket mortars, targets, grenades, incendiary devices, experimental items, demolition devices, and any other material fired on or discovered on a range. (AFI 13-212, Range Planning and Operations, August 2001)

Real Property – Real estate owned by the United States and under the control of the DoD. Includes lands, buildings, structures, utilities systems, improvements and appurtenances thereto. Includes equipment attached to and made part of buildings and structures (such as heating systems) but not moveable equipment (such as plant equipment). (MGDERP, September 2001)

Relative Risk – The evaluation of individual sites to determine high, medium, or low relative risk to human health and the environment, based on contaminant hazards, migration pathways and receptors, in accordance with the DoD's *Risk-Based Site Evaluation Primer*. (MGDERP, September 2001)

Removal – The cleanup or removal of released hazardous substances from the environment. Such actions may be taken in the event of the threat of release of hazardous substances into the environment, such actions as may be necessary to monitor, assess, and evaluate the release or threat of release of hazardous substances, the disposal of removed material, or the taking of such other actions as may be necessary to prevent, minimize, or mitigate damage to the public health or welfare or to the environment, which may otherwise result from a release or threat of release. The term includes, in addition, without being limited to, security fencing or other measures to limit access, provision of alternative water supplies, temporary evacuation and housing of threatened individuals not otherwise provided for, action taken under Section 9604(b) of this title, and any emergency assistance which may be provided under the Disaster Relief and Emergency Assistance Act [42 U.S.C. 5121 et seq.] The requirements for removal actions are addressed in 40 CFR §§300.410 and 300.415. The three types of removals are emergency, time-critical, and non-time critical removals. (CERCLA, 42 U.S.C. § 9601 et seq.)

There are three types of removals:

- 1) Emergency – Emergency removal or response is performed when an immediate or imminent danger to public health or the environment is present and action is required within hours. Trained responders identify the explosive threat and make the decision as to whether the munitions and explosive of concern should be moved or blown in place and ensure the threat is removed safely and expeditiously.
- 2) Time-critical – A response to a release or threat of release that poses such a risk to public health (serious injury or death), or the environment, that cleanup or stabilization actions must be initiated within six months.
- 3) Non-time critical – An action initiated in response to a release or threat of a release that poses a risk to human health and welfare, or the environment. Initiation of removal cleanup actions may be delayed for six months or more.

Risk Reduction – The movement of any site from a higher to lower relative risk category as a result of natural attenuation, interim remedial, remedial, or removal actions taken. (DoD Instruction 4715.7, Environmental Restoration Program, April 1996)

Site (as defined in the Restoration Management Information System Data Element Dictionary for a SITE ID)

– A unique name given to a distinct area of an installation containing one or more releases or threatened releases of hazardous substances treated as a discreet entity or consolidated grouping for response purposes. Includes any building, structure, impoundment, landfill, storage container, or other site or area where a hazardous substance was or has come to be located, including formerly used sites eligible for building demolition/debris removal. Installations and ranges may have more than one site. (MGDERP, September 2001)

Stakeholder – Groups or individuals who were interested in, concerned about, affected by, who had a vested interest in, or would be involved in the munitions response at an MRA/MRS.

Transferred Range – A property formerly used as a military range that is no longer under military control and had been leased by the DoD, transferred, or returned from the DoD to another entity, including federal entities. This includes a military range that is no longer under military control but was used under the terms of a withdrawal, executive order, special-use permit or authorization, right-of-way, public land order, or other instrument issued by the federal land manager. (MGDERP, September 2001)

Transferring Range – A military range that is proposed to be transferred or returned from the DoD to another entity, including federal entities. This includes a military range that is used under the terms of a withdrawal, executive order, act of Congress, public land order, special-use permit or authorization, right-of-way, or other instrument issued by the federal land manager or property owner. An operational or closed range will not be considered a “transferring range” until the transfer is imminent. (MGDERP, September 2001)

Unexploded Ordnance (UXO) – Military munitions that have been primed, fused, armed, or otherwise prepared for action and have been fired, dropped, launched, projected, or placed in such a manner as to constitute a hazard to operations, installations, personnel, or material, and remain unexploded either by malfunction, design, or any other cause. (10 U.S.C. 101(e)(5))

UXO Technicians – Personnel who are qualified for and filling Department of Labor, Service Contract Act, Directory of Occupations, contractor positions of UXO Technician I, UXO Technician II, and UXO Technician III. (Department of Defense Explosive Safety Board TP18, December 2004)

Appendix B
Abbreviations and Acronyms

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Abbreviations and Acronyms

°F	Degrees Fahrenheit
AAF	Army Air Force
AFB	Air Force Base
AFCESA	Air Force Civil Engineer Support Agency
AFHRA	Air Force Historical Research Agency
AFHSO	Air Force History Support Office
AFRIMS	Air Force Restoration Information Management System
AFSC	Air Force Safety Center
AFSOC	Air Force Special Operations Command
AR	Administrative Record
BASH	Bird Aircraft Strike Hazard
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CMH	Center of Military History
CSE	Comprehensive Site Evaluation
CSM	Conceptual Site Model
CWM	Chemical Weapons Materiel
DDR&E	Director, Defense Research and Engineering
DMM	Discarded Military Munitions
DoD	Department of Defense
DTIC	Defense Technical Information Center
ECBC	Edgewood Chemical and Biological Center
EOD	Explosive Ordnance Disposal
ERP	Environmental Restoration Program
ERS	Environmental Remediation Services
FFID	Federal Facility Identification
ft	Foot/Feet
FUDS	Formerly Used Defense Site
GIS	Geographic Information System
GPS	Global Positioning System
HRR	Historical Records Review
HRRC	Historical Research and Response Center
HRS	Hazard Ranking System
IPS	Information Preservation System
IRP	Installation Restoration Program
ITRC	Interstate, Technology, and Regulatory Council
ITSI	Innovative Technical Solutions, Inc.
MATOC	Multiple Award Task Order Contract
MC	Munitions Constituents
MD	Munitions Debris
MEC	Munitions and Explosives of Concern
MMRP	Military Munitions Response Program
MRA	Munitions Response Area
MRS	Munitions Response Site
MRSPP	Munitions Response Site Prioritization Protocol
msl	Mean Sea Level
NARA	National Archives and Records Administration
NFA	No Further Action
NPRC	National Personnel Records Center

OB/OD	Open Burn/Open Detonation
PAH	Polyaromatic Hydrocarbons
PA/SI	Preliminary Assessment/Site Inspection
PBR	Precision Bombing Range
QC	Quality Control
RAC	Risk Assessment Code
RACER	Remedial Action Cost Engineering Requirements
RDECOM	Research, Development, and Engineering Command
RCRA	Resource Conservative and Recovery Act
ROE	Right of Entry
RG	Record Group
SECDEF	Secretary of Defense
Shaw	Shaw Environmental, Inc.
SOF	Special Operations Forces
SOO	Scope of Objectives
SOW	Special Operations Wing
STINET	Scientific and Technical Information Network
TEC	Topographic Engineering Center
TFW	Tactical Fighter Wing
TIO	TEC Imagery Office
TLI	Subsidiary of TechLaw
TO	Task Order
USACE	U.S. Army Corps of Engineers
USAF	U.S. Air Force
USAMHI	U.S. Army Military History Institute
USGS	U.S. Geological Survey
UXO	Unexploded Ordnance
WWII	World War II

Appendix C
References

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Appendix D
Photo-Documentation Log
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Former Chemical Warfare Area – Area of former Building 835



Former Chemical Warfare Area – Area of former Building 864



Former Chemical Warfare Area – Area of former Building 865



Former Chemical Warfare Area – Area of former Building 866



1940s Skeet Range – Facing north toward empty field



1940s Skeet Range – Facing northeast toward empty field



1940s Skeet Range – Facing northwest toward access road



1940s Skeet Range – View of access road



1940s Skeet Range – Facing south toward active ordnance area



1940s Skeet Range – Facing southeast toward active ordnance area



1940s Skeet Range – View along northern fence of active ordnance area



1940s Skeet Range – Asphalt patches in field



1940s Skeet Range – View of field and active ordnance area



1940s Skeet Range – Clay pigeon debris



1940s Skeet Range – More clay pigeon debris



1940s Skeet Range – Patch of concrete



1940s Skeet Range – Concrete slabs



1940s Skeet Range – 1946 aerial photograph



1940s Skeet Range – 1946 aerial photograph (2)



1940s Skeet Range – 1946 aerial photograph (3)



Location of Former Building T-159 – Armament and Instrument Inspection



Location of Former Building T-166 – Armament Shop



Location of Former Building T-331 Chemical Warfare Warehouse



Location of Former Building T-379 Ordnance Building



Appendix E
Project Source Data Index
(Source Files Provided on CD)

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Canon AFB Appendix E

Document Number Range	Doc Date	Doc Type	Author/Author Organization	Document Title	Comments
AIR FORCE HISTORICAL RESEARCH AGENCY (AFHRA), MAXWELL AFB, AL					
AFHRA-CANAFB-0001	11-Nov-42	Corres.	L.P. Whitten, Col. Air Corps, Director of Base Services	Moving Target Ranges-Second Air Force Stations. [1st Ind]	Authorization for construction of Jeep Type Moving Target Ranges at all 2nd AF bases except Pueblo Army Air Base. No maps or other information to identify location on installation.
AFHRA-CANAFB-0002	25-Oct-42	Corres.	John L. Grimes, Capt., A.G.D, Asst. Adj. General	Moving Target Ranges-Second Air Force Stations	Alamogordo and Clovis Field authorized for Jeep Moving Target Range. No maps or other information to identify location on installation.
AFHRA-CANAFB-0003	14-Nov-42	Corres.	E.C. Itschner, Colonel, Corps of Engineers, Assistant; Operations Branch, Construction Division	Construction of One (1) "Jeep" Type Moving Target Range at Clovis Airfield, New Mexico	Clovis Field authorization. No maps or other information to identify location on installation.
AFHRA-CANAFB-0004	15-Nov-42	Corres.	War Department, Office of the Chief of Engineers, Washington	Construction of One (1) "Jeep" Type Moving Target Range at Clovis Airfield, New Mexico	Authorization to proceed. No maps or other information to identify location on installation.
AFHRA-CANAFB-0005	26-May-43	Index Sheet	Unknown	Contr No. A 13783 for const on rifle range. Completion will be on or before Aug 1, 1943	No maps or other information to identify location on installation.
AFHRA-CANAFB-0006	7-Oct-43	Cross Index	Unknown	Request Dir Cons as indicated in directive for additional hours. At High Altitude and Low Altitude bombing ranges be cancelled.	Off-installation ranges.
AFHRA-CANAFB-0007	22-Jan-45	Corres.	OCE, Military Constrn. Div.	Generators are not available.	Off-installation ranges.
AFHRA-CANAFB-0008	25-Jan-45	Corres.	OCE	Construction of powerline for Poorman Range should be completed as presently agreed.	No maps or other information to identify location on installation.
AFHRA-CANAFB-0009	15-Dec-42	Corres.	J.L. Person, Lt. Colonel, Corps of Engineers, Assistant, Operations Branch, Construction Division	Jeep Type Moving Target Range, Clovis, New Mexico, (Ltr. fr. OCE to CG, AAF 11-26-42.)	Concurrence on deletion of construction for the Jeep Moving Range.
AFHRA-CANAFB-0010	10-Dec-42	Corres.	L.P. Whitten, Col. Air Corps, Director of Base Services	Jeep Type Moving Target Range - Clovis, New Mexico [1st Ind]	No maps or other information to identify location on installation.
AFHRA-CANAFB-0011	26-Nov-42	Corres.	Mark S. Gurnee, Captain, Corps of Engineers, Assistant; Operations Branch, Construction Division	Jeep Type Moving Target Range - Clovis, New Mexico. Deletion of one "Jeep" Type Moving Target Range at Clovis	No maps or other information to identify location on installation.
AFHRA-CANAFB-0012	15-Dec-42	Corres.	J.L. Person, Lt. Colonel, Corps of Engineers, Assistant; Operations Branch, Construction Division	Jeep Type Moving Target Range, Clovis, New Mexico, (Ltr. fr. OCE to CG, AAF 11-26-42.) [2nd Ind] Authority of construction of range is rescinded.	Concurrence on deletion of construction for the Jeep Moving Range.

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Document Number Range	Doc Date	Doc Type	Author/Author Organization	Document Title	Comments
AFHRA-CANAFB-0013	10-Dec-42	Corres.	L.P. Whitten, Col. Air Corps, Director of Base Services	Jeep Type Moving Target Range - Clovis, New Mexico [1st Ind]	Duplicate of Document Number AFHRA-CANAFB-0010
AFHRA-CANAFB-0014	26-Nov-42	Corres.	Mark S. Gurnee, Captain, Corps of Engineers, Assistant; Operations Branch, Construction Division	Jeep Type Moving Target Range - Clovis, New Mexico Deletion of one "Jeep" Type Moving Target Range at Clovis	Duplicate of Document Number AFHRA-CANAFB-0011.
AFHRA-CANAFB-0015 - 0016	22-Dec-42	Corres.	Edward J. Sheridan, Captain, Corps of Engineers	Information requested about "Jeep Type" target range, Clovis, N. Mexico. Target range has been in and out so many times that clarification of status is desired. Requesting as to whether or not the Army Air Forces desire to proceed with the construction of this target range.	No maps or other information to identify location on installation.
AFHRA-CANAFB-0017 - 0018	22-May-43	Corres.	Edward J. Sheridan, Major, Corps of Engineers, Assistant; Military Construction Branch, Construction Division	Construction Directive for Rifle Range at Clovis Airfield, Clovis, New Mexico. Authorizing construction for project.	No maps or other information to identify location on installation.
AFHRA-CANAFB-0019 - 0020	1-Jun-43	Corres.	Edward J. Sheridan, Major, Corps of Engineers, Assistant; Military Construction Branch, Construction Division	Construction Directive for Jeep Type Moving Target Range at Clovis, New Mexico. Authorizing construction for project.	No maps or other information to identify location on installation.
AFHRA-CANAFB-0021	1-Jul-43	Corres.	R.E. Cole, Lt. Col., Corps of Engineers, District Engineer	Drawings and specifications for construction of Rifle Range, Clovis Airfield, Clovis, New Mexico	No maps or other information to identify location on installation. Drawings not included.
AFHRA-CANAFB-0022	2-Jul-43	Corres.	R.E. Cole, Lt. Col., Corps of Engineers, District Engineer	Drawings and specifications for construction of Jeep Type Moving Target, Clovis Airfield, Clovis, New Mexico	No maps or other information to identify location on installation. Drawings not included.
AFHRA-CANAFB-0023	26-Jul-43	Corres.	R.E. Cole, Lt. Col., Corps of Engineers, District Engineer	Construction Directive for Rifle Range at Clovis Airfield, Clovis, New Mexico. (Ltr. From OCE, Wash., D.C., to Div. Engr., SWD, Dallas, Tex., 22 May 1943.) [2nd Ind] Transmitting four prints/drawings indicating location of authorized facilities as approved by Commanding Officer.	No maps or other information to identify location on installation. Drawings not included.
AFHRA-CANAFB-0024	4-Aug-43	Corres.	Edward J. Sheridan, Major, Corps of Engineers, Assistant; Military Construction Branch, Construction Division	Construction Directive for Rifle Range at Clovis Airfield, Clovis, New Mexico. [4th Ind]	No maps or other information to identify location on installation. Drawings not included.

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AFHRA-CANAFB-0025 - 0026	6-Aug-43	Corres.	Edward J. Sheridan, Major, Corps of Engineers, Assistant, Military Construction Branch, Construction Division	Revision of Construction Directive for Jeep Type Moving Target Range, Clovis, New Mexico.	No maps or other information to identify location on installation. Drawings not included.
AFHRA-CANAFB-0027 - 0028	15-Aug-43	Corres.	E.C. Light, Major, AC, Adjutant	Construction of Precision Bombing Targets. Requesting approval for projects and allocation for funds to the Area Engineering for construction.	No maps or other information to identify location on installation. Drawings not included.
AFHRA-CANAFB-0029	19-Aug-43; 27 Aug-43	Corres.	John L. Grimes, Major, AGD, Adjutant General; John M. Dick, Capt. AGD, Asst Adjutant General	Construction of Precision Bombing Targets (Ltr. COAB, Clovis, N.M. to CG, 2AF, thru CG, I.B.C., 8/15/43.) [1st Ind] approved; and [2nd Ind] Request authorization for construction of three precision bombing targets.	Off-installation ranges.
AFHRA-CANAFB-0030	6-Sep-43	Corres.	J.C. Shively, Col., A.C., Buildings and Grounds Section	Construction of Precision Bombing Targets, Clovis, New Mexico. [3rd Ind]. Authorization to proceed with construction of three precision bombing targets.	Off-installation ranges.
AFHRA-CANAFB-0031 - 0032	16-Sep-43	Corres.	Edward J. Sheridan, Major, Corps of Engineers, Assistant; Military Construction Branch, Construction Division	Construction Directive for Precision Bombing Targets, Clovis, New Mexico. Authorization for project.	Off-installation ranges.
AFHRA-CANAFB-0033	9-Oct-43	Corres.	R.E. Cole, Lt. Col., Corps of Engineers, District Engineer	Drawings and specifications for construction of Small Arms Ranges, Clovis Airfield, Clovis, New Mexico	No maps or other information to identify location on installation. Drawings not included.
AFHRA-CANAFB-0034 - 0035	22-Oct-43	Corres.	R.E. Cole, Lt. Col., Corps of Engineers, District Engineer	Field Estimate of Cost, Construction of Job No. Clovis A(6-4) formerly Job No. Clovis A(5-9), Clovis Army Air Field, New Mexico	No maps or other information to identify location on installation. Drawings not included.
AFHRA-CANAFB-0036	8-Jun-45	Corres.	The Division Engineer, Southwestern Division, Dallas, Texas	Field estimate of cost of construction - Job No. Clovis ESA 210-20 and Clovis ESA 210-21	Sonic bombing targets, location not indicated.
AFHRA-CANAFB-0037	30-Apr-45	Corres.	Edward J. Sheridan, Major, Corps of Engineers, Assistant; Troop Facilities Branch, Military Construction Division	Construction Directive for Tracking Mock-Ups, Clovis Army Air Field, Texas. Authorization for construction.	Photo gunnery tracking
AFHRA-CANAFB-0038	30-Apr-45	Corres.	Unknown	Construction Directive for Tracking Mock-Ups, Clovis Army Air Field, Texas. Authorization for construction.	Photo gunnery tracking

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AFHRA-CANAFB-0039 - 0040	9-Feb-45	Form	Charles F. Reming, Major, Corps of Engineers (Submitted); Herbert Morgan, Jr., Colonel, Air Corps (Approved)	Individual Project Estimate Repairs and Utilities	Photo gunnery tracking
AFHRA-CANAFB-0041	13-Jun-44	Corres.	OCE	Correspondence covering replacement of engine generator unit with an 8 KW engine generator unit as a stand-by for lighting of bombing ranges at Clovis Army Air Fld.	Off-installation ranges.
AFHRA-CANAFB-0042	13-Jun-44	Corres.	Louis C. McCabe, Lt. Col, Corps of Engineers, Assistant; Repairs & Utilities Branch, Military Construction Division	Replacement of a 5 KW Stand-by Engine Generator Set with an 8 KW Engine Generator Set. [1st Ind]	Off-installation ranges.
AFHRA-CANAFB-0043	12-Sep-44	Corres.	H.B. Benedict, Lt. Colonel, Air Corps, Chief, Distribution Section, Office of the Asst. C/AS, M&S	Requisition No. PE 29-031-715-44. [6th Ind]	Off-installation ranges.
AFHRA-CANAFB-0044	8-Jul-43	Teletype	Edward J. Sheridan, Major, Corps of Engineers, Assistant; Military Construction Branch, Construction Division	Authorization of transfer for construction of .30 caliber rifle range	No maps or other information to identify location on installation.
AFHRA-CANAFB-0045	26-Aug-43	Corres.	Edward J. Sheridan, Major, Corps of Engineers, Assistant; Military Construction Branch, Construction Division	Transfer of Job A(5-9) to Job Series A6, Clovis, New Mexico, Jeep Moving Target Range.	No maps or other information to identify location on installation. Drawings not included.
AFHRA-CANAFB-0046	27-Oct-43	Corres.	Edward J. Sheridan, Major, Corps of Engineers, Assistant; Military Construction Branch, Construction Division	Establishment of Completion Date, Job A 7, Clovis, New Mexico, Jeep Target Range.	No maps or other information to identify location on installation. Drawings not included.
AFHRA-CANAFB-0047 - 0049	11-Jun-42	Report	Albuquerque District Office, Albuquerque District, Albuquerque, New Mexico	Preliminary Real Estate Report Aircraft Gunnery Range for use in Connection with Clovis, New Mexico, Airfield	Appears to be off-installation.
AFHRA-CANAFB-0050	30-Sep-43	Corres.	Edward J. Sheridan, Major, Corps of Engineers, Assistant; Military Construction Branch, Construction Division	Fencing Machine Gun Range	No maps or other information to identify location on installation.
AFHRA-CANAFB-0051	4-Sept-43; 8-Sept-43	Corres.	W.E. Clapp, Capt, AC, Base S-4; Thomas L. Hightower, Senior Engineer, Area Engineer	Fencing Machine Gun Range, includes [1st Ind]	No maps or other information to identify location on installation. Drawings not included.

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AFHRA-CANAFB-0052	13-Sept-43; 21-Sept-43	Corres.	R.E. Cole, Lt. Col., Corps of Engineers, District Engineer; F.T. Thayer, Jr., Major, Corps of Engineers, Repairs and Utilities Branch	Fencing Machine Gun Range (Ltr. fr. AAB, Clovis, N.M. to AE, Clovis N.M. 4 Sept. 1943.), includes [2nd Ind] and [3rd Ind]	No maps or other information to identify location on installation. Drawings not included.
AFHRA-CANAFB-0053	21-Sep-43	Corres.	F.T. Thayer, Jr., Major, Corps of Engineers, Repairs and Utilities Branch	Fencing Machine Gun Range (Ltr fr CO Clovis AAB to Area Eng Clovis, 4 Sept 1943) [3rd Ind]	Partial Duplicate of Document Number AFHRA-CANAFB-0052
AFHRA-CANAFB-0054	13-Sep-43	Corres.	R.E. Cole, Lt. Col., Corps of Engineers, District Engineer.	Fencing Machine Gun Range (Ltr. fr. AAB, Clovis, N.M. to A.E., Clovis, New Mex., 4 Sept. 1943.) [2nd Ind]	Partial Duplicate of Document Number AFHRA-CANAFB-0052
AFHRA-CANAFB-0055	8-Sep-43	Corres.	Thomas L. Hightower, Senior Engineer, Area Engineer	Fencing Machine Gun Range [1st Ind, page 2]	2nd page to Document Number AFHRA-CANAFB-0051
AFHRA-CANAFB-0056	4-Sep-43	Corres.	W.E. Clapp, Capt, AC, Base S-4	Fencing Machine Gun Range	No maps or other information to identify location on installation.
AFHRA-CANAFB-0057 - 0059	29-Feb-44	Report	Headquarters 497th Bombardment Group (VH) Army Air Field, Clovis, New Mexico.	History (Revised) For the Period 1 February to 29 February, 1944	Ranges were open for all personnel; however, only the skeet range was able to provide instructors. Pistol firing was conducted.
AFHRA-CANAFB-0060 - 0062	31-Dec-42	Report	997th Guard Squadron Army Air Base - Clovis, New Mexico	The Narrative History of the 997th Guard Squadron Army Air Base - Clovis, New Mexico From date of Inception to December 31, 1942	The Squadron was trained on the skeet range and the rifle range. All personnel took the course of instruction in Chemical Warfare, consisting of several training exercises and gas chamber exercises.
AFHRA-CANAFB-0063 - 0071	31-Dec-43	Report	Army Air Base Clovis, New Mexico	Base Histories Army Air Base Clovis, New Mexico	1. Chemical Warfare Training using Mustard Gas to be conducted in the SW corner of the base beyond the ordnance area.; 2. Melrose and Nara Vista ranges cleared of scrap; 3. Ground Gunnery Range used for training combat crews; 4. Chemical Warfare decontamination training area changed to latrine nearer to station hospital; 5. Ground Gunnery Range consisted of carbine range, two pistol ranges, a submachine gun range, four skeet ranges, an overhead jeep range, a malfunctions range (.50 cal machine guns), and a jeep range.

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AFHRA-CANAFB-0072 - 0074	30-Sep-43	Report	Army Air Base Clovis, New Mexico	Historical Report September 1943 Clovis Army Air Base	Chemical Warfare Training began 28 Sep with the decontamination and incendiary bomb area at the South end of the base. The gas chamber was enlarged to twenty by forty feet and divided into two equal sections each fitted with two air locks. One section is to be used for chloracetophene (tear gas) while the other section is for the use of chlorine gas or other toxic gases. An incendiary course was completed consisting of a bomb drooping device for the purpose of showing the way in which an incendiary bomb acts on being dropped from a plane, and two buildings for demonstration methods of combating incendiaries. One building is unprotected while the other is provided with various protective devices. A decontamination course was built, consisting of four lanes, each approximately fifteen by fifty yards in size. These courses will be used in demonstrating the decontaminating of persistent chemical warfare agents on runways, shell holes and airplanes.
AFHRA-CANAFB-0075 - 0077	29-Apr-44	Report	Army Air Base Clovis, New Mexico	April Historical Narrative of the Army Air Field - Clovis, New Mexico	Chemical Warfare Training area was scraped to remove brush and high weeds and a Mustard Gas Shed was constructed for storage
AFHRA-CANAFB-0078 - 0080	30-May-44	Report	Army Air Base Clovis, New Mexico	May Historical Narrative of the Army Air Field - Clovis, New Mexico	A Mustard Gas Decontamination exercise was conducted.
AFHRA-CANAFB-0081 - 0082	30-May-44	Report	Army Air Base Clovis, New Mexico	Historical Narrative for the Training Section May 1944 Army Air Field - Clovis, New Mexico	Five more bombing sites requisitioned. Apparently these are off-site.
AFHRA-CANAFB-0083 - 0084	30-Jun-44	Report	Army Air Base Clovis, New Mexico	Historical Narrative for the Training Section June 1944 Army Air Field - Clovis, New Mexico	Five more bombing sites in use. Apparently these are off-site.
AFHRA-CANAFB-0085 - 0087	31-Aug-44	Report	Army Air Base Clovis, New Mexico	Historical Narrative of the Department of Training	66,850 rounds of .50 cal ammunition fired

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AFHRA-CANAFB-0088 - 0089	30-Jun-45	Report	Army Air Base Clovis, New Mexico	History of the Clovis Army Air Field for June 1945, Narrative History	Cyanide used for case-hardening in the welding shop and firearms accidents have occurred.
AFHRA-CANAFB-0090 - 0091	30-Sep-45	Report	Army Air Base Clovis, New Mexico	History of Clovis Army Air Field (16th Bombardment Operational Training Wing) (Second Air Force) for July, August, and September 1945	Skeet shooting has begun for recreational purposes.
AFHRA-CANAFB-0092 - 0093	30-Nov-45	Report	Army Air Base Clovis, New Mexico	History of Clovis Army Air Field (17th Bombardment Operational Training Wing) (Second Air Force) for November 1945	Additional gunnery equipment from other bases received.
AFHRA-CANAFB-0094 - 0095	30-Jun-55	Report	Army Air Base Clovis, New Mexico	History of the 312th Fighter-Bomber Wing 1 January -- 30 June 1955 AU-D5, Clovis Air Force Base Clovis, New Mexico	Small arms ranges south of Clovis AFB were cleaned up and put back in operation
COE HISTORIAN'S OFFICE, ALEXANDRIA, VA					
COEHO-CANAFB-0001	No date	Form	Unknown	Realty Control File Summary Land Acquisitions and Disposals - Clovis. Acquisition: 3,982.87 acres leased, \$2,715 p/a; Disposal 3,982.87 acres \$2,715 p/a	Off-installation ranges.
COEHO-CANAFB-0002 - 0004	No date	Form	Unknown	Realty Control File Summary Land Acquisitions and Disposals-Clovis, Land Ownership and Cost Data	Off-installation ranges.
USACE, ST. LOUIS, MO					
COESL-CANAFB-0001	1-Oct-57	Map	Department of Air Force	Map - Canon Air Force Base	
COESL-CANAFB-0002	12-Feb-52	Map	Department of Air Force	Map - Clovis Air Force Base; Clovis, New Mexico Preliminary Master Plan	
COESL-CANAFB-0003	No date	Map	Department of Air Force	Map - Clovis Air Force Base-Vicinity Map Wind Analysis Airfield Pavement	

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NARAI, COLLEGE PARK, MD					
NARAI-CANAFB-0001	No date	Folder	Unknown	Clovis, New Mexico Airfield	
NARAI-CANAFB-0002	31-Jul-44	Corres.	Henry L. Stimson, Secretary of War	U.S. vs. Bushwood W. Kinsolving, et. al. Supplemental Decls. Of Taking Nos. 1 and 2.	Acquisition of off-installation bombing ranges, Clovis Aerial Gunnery Range.
NARAI-CANAFB-0003	28-Jul-44	Corres.	John J. O'Brien, Colonel, Corps of Engineers, Chief, Real Estate Branch	U.S. vs. Bushwood W. Kinsolving, et. al, Suppl. Decls Nos 1 and 2. Acquisition of Land.	Acquisition of off-installation bombing ranges, Clovis Aerial Gunnery Range.
NARAI-CANAFB-0004	4-Jun-43	Corres.	Henry L. Stimson, Chief, Secretary of War	U.S. vs. Bushwood W. Kinsolving, et. al, No. 1.	Acquisition of off-installation bombing ranges, Clovis Aerial Gunnery Range.
NARAI-CANAFB-0005	4-Jun-43	Corres.	John J. O'Brien, Colonel, Corps of Engineers, Chief, Real Estate Branch	U.S vs. Bushwood W. Kinsolving, et al. D/T #1 Acquisition of Land. Requesting Attorney General file in pending condemnation proceeding a declaration of taking pursuant to existing law.	Acquisition of off-installation bombing ranges, Clovis Aerial Gunnery Range.
NARAI-CANAFB-0006	31-Mar-43	Corres.	Henry L. Stimson, Secretary of War	U.S. vs. Bushwood W. Kinsolving, et. al. Amendment. The need for certain additional land be acquired for use in connection with this project.	Acquisition of off-installation bombing ranges, Clovis Aerial Gunnery Range.
NARAI-CANAFB-0007	30-Mar-43	Corres.	John J. O'Brien, Colonel, Corps of Engineers, Chief, Real Estate Branch	U.S. vs. Bushwood W. Kinsolving, et. al. Amendment. Amendment to Petition in Condemnation.	Acquisition of off-installation bombing ranges, Clovis Aerial Gunnery Range.
NARAI-CANAFB-0008 - 0009	9-Mar-43	Corres.	Henry L. Stimson, Secretary of War	Clovis Aerial Gunnery Range - SPELC U.S. vs. 3,220.42 acres of land, et. al.	Acquisition of off-installation bombing ranges, Clovis Aerial Gunnery Range.
NARAI-CANAFB-0010	8-Mar-43	Corres.	John J. O'Brien, Colonel, Corps of Engineers, Chief, Real Estate Branch	U.S. vs. 3,220.41 acres of land, et al. Acquisition of Land.	Acquisition of off-installation bombing ranges
NARAI-CANAFB-0011	No date	Folder	Unknown	601.1 Clovis Army Airfield, N.M.	
NARAI-CANAFB-0012	12-Dec-45	Memorandum	Connolly, Chief, Acquisition Division	Clovis Army Airfield, Air-to-Ground Gunnery Range. Direction to authorize acquisition of leasehold interest in 15,345 acres to provide an air-to-ground gunnery range at Clovis Army Airfield.	Acquisition of off-installation bombing ranges, Clovis Aerial Gunnery Range.
NARAI-CANAFB-0013	29-Oct-45	Corres.	Robert Kauch, Brig. Gen., USA, Chief, Air Installations Division Assistant Chief of Air Staff-4	Condemnation Assembly, Tract 6, Air to Ground Gunnery Range No. 2, Clovis Army Air Field, New Mexico [11th Ind]. Fort Sumner Army Airfield is no longer considered necessary for use by the Army Air Forces.	Acquisition of off-installation bombing ranges.

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NARAII-CANAFB-0014	2-Mar-45	Corres.	Joseph Connolly, Chief, Acquisition Division, Real Estate	Condemnation Assembly, Tract 6, Air to Ground Gunnery Range [10th Ind] Advise office as to whether or not the land will be required for the use of your Headquarters in post-war period	Acquisition of off-installation bombing ranges.
NARAII-CANAFB-0015	20-Sep-45	Corres.	Leonard M. Cowley, Lt. Col, CE, Chief, Real Estate Division	Condemnation Assembly, Tr 6, Air to Ground Gunnery Rge No 2, Clovis AAF, N.M. [9th Ind] Air Installations Division, Army Air Force headquarters, be requested to determine future needs of Fort Sumner Army Air Field.	Acquisition of off-installation bombing ranges.
NARAII-CANAFB-0016	14-Sep-45	Corres.	Floyd T. Snyder, Captain, Corps of Engineers, Acting Officer in Charge, SWD Real Estate Suboffice.	Condemnation Assembly, Tract 6, Air to Ground Gunnery Range No. 2, Clovis Army Air Field, New Mexico [8th Ind] Considered that future use of the subject installation will be required by the Fort Sumner Field.	Acquisition of off-installation bombing ranges.
NARAII-CANAFB-0017	12-Sep-45	Corres.	Leonard M. Cowley, Lt. Col, CE, Chief, Real Estate Division	Condemnation Assembly, Tract 6, Air to Ground Gunnery Range No. 2, Clovis Army Air Field, New Mexico [7th Ind] Request Commanding Officer obtain information to future use of Air to Ground Gunnery Range No. 2	Acquisition of off-installation bombing ranges.
NARAII-CANAFB-0018	6-Jul-45	Corres.	Leonard M. Cowley, Lt. Col, CE, Chief, Real Estate Division	Condemnation Assembly, Tract 6, Air to Ground Gunnery Range No 2, Clovis AAF, N Mex [5th Ind]	Acquisition of off-installation bombing ranges.
NARAII-CANAFB-0019	29-Jun-45	Corres.	Floyd T. Snyder, Captain, Corps of Engineers, Acting Officer in Charge, SWD Real Estate Suboffice.	Condemnation Assembly, Tract 6, Air to Ground Gunnery Range No. 2, Clovis Army Air Field, New Mexico [4th Ind] Four additional oil and gas leases have been secured under Moratorium Agreement; these areas have been deleted from area proposed for condemnation.	Acquisition of off-installation bombing ranges.
NARAII-CANAFB-0020	25-Jun-45	Corres.	Leonard M. Cowley, Lt. Col, CE, Chief, Real Estate Division	Condemnation Assembly, Tract No. 6, Air to Ground Gunnery Range No. 2, Clovis AAF, N. M. [3rd Ind]	Acquisition of off-installation bombing ranges.

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NARAII-CANAFB-0021	20-Jun-45	Corres.	Joseph Connolly, Chief, Acquisition Division, Real Estate	U.S. vs. 2602.51 acres in De Baca and Roosevelt Counties, N.M. [2nd Ind] Advise as to method of acquiring surface interests in the 2602.51 acres of land and whether or not the lands will be used for the term ending 30 June 1946.	Acquisition of off-installation bombing ranges.
NARAII-CANAFB-0022	6-Mar-45	Corres.	Leonard M. Cowley, Lt. Col, Corps of Engineers, Director, Real Estate Division	Condemnation Assembly, Tract 6, Air to Ground Gunnery Range No. 2, Clovis Army Air Field, New Mexico [1st Ind] Memorandum lease directive dated 16 May 1944 on 15,345 acres.	Acquisition of off-installation bombing ranges.
NARAII-CANAFB-0023 - 0025	2-Mar-45	Corres.	Floyd T. Snyder, Captain, Corps of Engineers, Officer in Charge, SWD Rel Estate Suboffice.	Condemnation Assembly, Tract 6, Air to Ground Gunnery Range No. 2, Clovis Army Air Field. Advising to condemn the land under the Second War Powers Act.	Acquisition of off-installation bombing ranges.
NARAII-CANAFB-0026	1-Oct-45	Corres.	Joseph Connolly, Chief, Acquisition Division, Real Estate	Condemnation Assembly, Tract 6, Air to Ground Gunnery Range (2 Mar 1945) [10th Ind] Advise office as to whether or not the land will be required for the use of your Headquarters in post-war period	Duplicate of Document NARAII-CANFB-0014
NARAII-CANAFB-0027	20-Sep-45	Corres.	Leonard M. Cowley, Lt. Col, CE, Chief, Real Estate Division	Condemnation Assembly, Tract 6, Air to Ground Gunnery Rge No. 2, Clovis AAF, N. M. [9th Ind] Air Installations Division, Army Air Force headquarters, be requested to determine future needs of Fort Sumner army Air Field.	Duplicate of Document NARAII-CANAFB-0015
NARAII-CANAFB-0028 - 0029	9-Jun-48	Corres.	L.J. Erler, Colonel, USAF, Acting Director of Installations Office, Deputy Chief of Staff, Material	Declaration of Surplus Real Estate-Melrose Bombing Range [5th Ind]. Requesting as to whether a military requirement will exist for the utilization of Melrose Bombing Range.	Off-installation ranges.
NARAII-CANAFB-0030	8-Jun-48	Corres.	H.S. Aurand, Lieutenant General, GSC, Director of Logistics and W.M. Breckinridge, Lt. Col., GSC, Asst. Chief Installations Branch, Logistics Division	Status of Installation [1st Ind]. Requesting amendment to all records pertaining to Clovis Air Force Base to indicate that subject installation was placed in an inactive status effective 28 May 1947.	Clovis AFB placed on inactive status.

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NARAII-CANAFB-0031	7-May-48	Corres.	L.J. Erler, Colonel, USAF, Acting Director of Installations Office, Deputy Chief of Staff, Material	Extension of Condemnation Proceedings, Melrose Precision Bombing Range No. 2, Clovis AFB, N. M. Requesting condemnation proceedings be extended for a period beyond 30 June 1948, also requesting the leasehold interest be extended for another year because of the need for this Range.	Acquisition of off-installation bombing ranges
NARAII-CANAFB-0032	0/0/1949	Folder	Unknown	Clovis Fld, N.M., 1949 NARAII College Park, MD, RG 341 Headquarters, US Air Force	
NARAII-CANAFB-0033	25-Mar-49	Corres.	Montie Thompson, Jr., 1st Lt., USAF, Asst Adj Gen	Strategic Air Command Base Utilization Plan and 1st endorsement [5th Ind]. No foreseeable future requirement exists for Melrose Range; it is excess to command.	Off-installation ranges.
NARAII-CANAFB-0034	3-Feb-49	Corres.	Joseph O. Killian, Lt Col, CE, District Engineer	Civil Action 620, Precision Bombing Range, Clovis Air Force Base, Clovis, New Mexico. Advice be furnished by endorsement as to whether or not headquarters desires renewal of the term for an additional year.	Acquisition of off-installation bombing ranges
NARAII-CANAFB-0035	7-Feb-49	Corres.	William M. Thompson, Major, USAF, Commanding	Civil Action 620, Precision Bombing Range, Clovis Air Force Base, Clovis, New Mexico (3 Feb 1949). [1st Ind] All Precision Bombing Ranges have been transferred from jurisdiction of headquarters. Melrose PBR was transferred to WAFB, Roswell, New Mexico on 2 May 1947 - clarify which range is specified	
NARAII-CANAFB-0036	10-Feb-49	Corres.	Joseph O. Killian, Lt Col, CE, District Engineer	CA 620, PBR, CAFB, Clovis, N.M. (Ltr fr DE, Alb, N.M., dtd 3 Feb 49) [2nd Ind] Confirming range referred to is located 3 miles south-westerly from the town of Melrose, New Mexico.	Acquisition of off-installation bombing ranges
NARAII-CANAFB-0037	24-Feb-49	Corres.	Harold S. Gillogly, 2d Lt, USAF, Assistant Adjutant	Civil Action 620, Precision Bombing Range, Clovis Air Force Base, Clovis, New Mexico [3rd Ind] Request was made to extend lease until 30 June 1949. Information requested as to status of bombing range for FY 1950.	Acquisition of off-installation bombing ranges

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NARAII-CANAFB-0038	3-Feb-49	Corres.	John E. Hall, Major, AGD, Asst. Adj. Gen.	Civil Action 620, Precision Bombing Range, Clovis AF Base, Clovis, New Mexico. [4th Ind] Melrose Range declared surplus. No foreseeable future needs exists for the property subject range, it is recommended that the land be declared as surplus and the condemnation proceedings be allowed to terminate.	Off-installation ranges.
NARAII-CANAFB-0039	11-May-49	Corres.	L.J. Erler, Colonel, USAF, Acting Director of Installations Office, Deputy Chief of Staff, Material	Extension of Condemnation Proceedings, Melrose Precision Bombing Range No 2, Clovis AFB, N M. Requesting condemnation proceedings be extended for a period beyond 30 June 1948, also requesting the leasehold interest be extended for another year because of the need for this Range.	Acquisition of off-installation bombing ranges
NARAII-CANAFB-0040	8-Aug-49	Corres.	Scott W. Donaldson, Special Assistant to the Assistant Secretary of the Air Force	Abandonment of Condemnation Proceeding, Tracts 7 and 8, Civil No. 727, Clovis Ground Gunnery Range, New Mexico [2nd Ind]	Acquisition of off-installation bombing ranges
NARAII-CANAFB-0041	8-Aug-49	Corres.	Joseph E. Gill, Lt. Colonel, USAF, Executive, Directorate of Installations, Deputy Chief of Staff, Material	Abandonment of Condemnation Proceeding, Tracts 7 and 8, Civil No. 727, Clovis Ground Gunnery Range, New Mexico [1st Ind]. Request tracts be returned to owners.	Acquisition of off-installation bombing ranges
NARAII-CANAFB-0042 - 0043	28-Jul-49	Corres.	William E. Whalen, Asst, Acquisition Division Real Estate	Abandonment of Condemnation Proceeding, Tracts 7 and 8, Civil No. 727, Clovis Ground Gunnery Range, New Mexico. Tracts 6, 7, and 1-D of Clovis Gunnery Range are no longer required by the Air Force.	Acquisition of off-installation bombing ranges
NARAII-CANAFB-0044 - 0045	8-Aug-49	Corres.	Eugene M. Zuckert	Secretary of Air Force determined a military necessity no longer exists for the use and occupancy of Tracts 7 and 8 and these tracts should be returned to owners and the acquisition abandoned at the earliest possible date.	Off-installation ranges.
NARAII-CANAFB-0046	19-Jul-49	Corres.	Joseph E. Gill, Lt. Colonel, USAF, Executive, Directorate of Installations, Deputy Chief of Staff, Material	Clovis Ground Gunnery Range, New Mexico [2nd Ind] Tracts Nos. 6, 7, 8 and 1D are not longer required by the Air Force.	Off-installation ranges.

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NARAII-CANAFB-0047	18-Jul-49	Corres.	Earl C. Miller, Major, USAF, Asst Adj General	Request to discontinue Civil Action 727 covering 155 acres of land (tracts 7 and 8). Tracts 6 and 1D were requested to not be retained beyond 30 June 1949.	Acquisition of off-installation bombing ranges, Clovis Aerial Gunnery Range.
NARAII-CANAFB-0048	3-Feb-49	Corres.	Joseph O. Killian, Lt Col, CE, District Engineer	Civil Action 672, Tract No. 2, Small Arms Range, and Civil Action 727 Nos. 7 and 8, Clovis AFB, Clovis, New Mexico, Small Arms Range.	No maps or legal description included.
NARAII-CANAFB-0049	8-Feb-49	Corres.	William M. Thompson, Major, USAF, Commanding	Civil Action 672, Tract No. 2, Small Arms Range, and Civil Action 727 Tracts Nos. 7 and 8, Clovis AFB, Clovis, New Mexico, Small Arms Range. [1st Ind] Tract 2 be retained for use as part of the Ground Gunnery Range; Tracts Nos. 7 and 8 were acquired as additions to Ground Gunnery Range for use as a Poorman Range, as were tracts Nos 6 and 1D. Headquarters does not consider it necessary to retain any of tracts Nos. 6, 7, 9 and 1D since they are of no further use to Government.	No maps or legal description included.
NARAII-CANAFB-0050	15-Feb-49	Corres.	John E. Hall, Major, AGD, Asst Adj Gen.	[2nd Ind] Leased real estate which no present or foreseeable requirement exists: tracts 1D, 6, 7 and 8, Clovis Air Force Base.	Off-installation ranges.
NARAII-CANAFB-0051	3-Feb-49	Corres.	A.W. Kissner, Brigadier General, USAF, Chief of Staff	[3rd Ind] Requesting terms for years acquired in Civil Action 672 for Tract 2 of Small Arms Range be extended for an additional year beyond 30, June 1949. Requesting that terms for years acquired herein for tracts 1D, 6, 7 and 8 not be continued beyond the current term.	No maps or legal description included.
NARAII-CANAFB-0052	29-Jun-49	Corres.	W.A. Anderson, Major, USAF, Exec. Officer, Facilities Division, Directorate of Installations, Office, Deputy Chief of Staff, Material	Clovis Ground Gunnery Range. Since Clovis Air Force Base and its auxiliary facilities are being retained for possible future use, justification for the release of track Nos. 7 and 8 is requested. Requesting information as to why Tract No. 6 was not included with the release of Tracks Number 7 and 8.	Off-installation ranges.

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NARAII-CANAFB-0053 - 0054	22-Dec-53	Corres.	Gilbert T. Perry, Lt. Colonel, USAF, Chief, Zone of Interior Branch, Construction Division, Directorate of Installations, DCS/O	Air Force Construction Directive No. 53/1/1480/4. Current approved operating and financial plan for the subject program. Requesting financial commitments and obligations for construction projects.	Off-installation ranges.
NARAII-CANAFB-0055	3-Feb-53	Corres.	L.C. Wright, Civ. Chief, Bldgs & Grounds Branch, Maintenance Division, Directorate of Installations, DCS/O	Firing-in-Butt, Clovis Air Force Base, New Mexico. Tactical Air Command's request information and/or comment in regards to providing an interim shooting-in-butt at Clovis Air Force Base	No maps or legal description included.
NARAII-CANAFB-0056	12-Jul-50	Corres.	W.G. Walker, Jr. Lt. Colonel, USAF, D/Ch, Real Estate Division, Directorate of Installations, Office, Deputy Chief of Staff, Material	Transfer of Clovis Air Force Base, Clovis, New Mexico from Strategic Air Command to Air Training Command [2nd Ind]	
NARAII-CANAFB-0057	29-Jun-50	Routing and Record Sheet	M.J. Wetzel, Lt Colonel, USAF, Executive, Operations Division, Directorate, Plans and Operations	Transfer of Clovis Air Force Base, Clovis, New Mexico from Strategic Air Command to Air Training Command. No objection to cancellation of leases covering the Ground Gunnery Range and Radio facilities at Clovis Air Force Base.	Off-installation ranges.
NARAII-CANAFB-0058	2-Jun-50	Routing and Record Sheet	W.G. Walker, Jr. Lt. Colonel, USAF, D/Ch, Real Estate Division, Directorate of Installations, Office, Deputy Chief of Staff, Material	Transfer of Clovis Air Force Base, from Strategic Air Command to Air Training Command. Transmittal of correspondence concerning disposal of Ground Gunnery Range and Radio Range for remarks and recommendations.	Off-installation ranges.
NARAII-CANAFB-0059	23-Jun-50	Routing and Record Sheet	George H. Sparhawk, Colonel, USAF, Chief, Electronic Systems Division	Transfer of Clovis Air Force Base, Clovis New Mexico from Strategic Air Command to Air Training Command. No objection to cancellation of lease for Clovis air Force Base Radio Range site. Electronics and power equipments have been removed from subject site.	Off-installation ranges.
NARAII-CANAFB-0060	1-Jun-50	Corres.	W.G. Walker, Jr. Lt. Colonel, USAF, D/Ch, Real Estate Division, Directorate of Installations, Office, Deputy Chief of Staff, Material	Transfer of Clovis Air Force Base, Clovis, New Mexico from Strategic Air Command to Air Training Command. Transmittal of correspondence concerning disposal of Ground Gunnery Range and Radio Range for remarks and recommendations.	Off-installation ranges.

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NARAII-CANAFB-0061 through NARAII-CANAFB-0062	25-May-50	Corres.	D.R. LeMaster, Lt. Col., USAF, Adjutant General	Transfer of Clovis Air Force Base, Clovis, New Mexico from Strategic Air Command to Air Training Command [1st Ind] Transfer of jurisdiction for numerous leases	Off-installation ranges.
NARAII-CANAFB-0063	18-Apr-50	Corres.	C.F. Dreyer, Colonel, USAF, Chief, Real Estate Division, Directorate of Installations, Office, Deputy Chief of Staff, Material	Excess Bombing Ranges - Clovis Air Force Base, N.M. It has been determined that a military necessity no longer exists for Clovis Ground Gunnery Range, Clovis Jeep Target Range and Clovis Blind Landing Range. They are excess effective 30 June 1950.	Off-installation ranges.
NARAII-CANAFB-0064	8-Apr-50	Teletype	Department of the Air Force	Requirement for Melrose Bombing and Gunnery Range and Clovis Ground Gunnery Range and Jeep Target Range. Command has not repeat, present or future requirement for referenced ranges.	Off-installation ranges.
NARAII-CANAFB-0065	15-Feb-50	Corres.	Charles H. McNutt, Colonel, CE, District Engineer	Clovis Ground Gunnery Range and Jeep Target, N.M. Civil Action 672. Term acquired will expire 30 June 1950; the right has been reserved to extend term for additional yearly periods. Request whether or not the use of the lands will be required for fiscal year ending 30 June 1951.	Off-installation ranges.
NARAII-CANAFB-0066	16-Feb-50	Corres.	Richard W. Elliott, Major, USAF, Commanding	Clovis Ground Gunnery Range and Jeep Target, N.M. Civil Action 672. [1st Ind] No foreseeable need exists for Clovis Ground Gunnery and Jeep Target Range in the fiscal year of 1951.	Off-installation ranges.
NARAII-CANAFB-0067	21-Feb-50	Corres.	Charles H. McNutt, Colonel, CE, District Engineer [2nd Ind]; and Earl C. Miller, Major, USAF, Adjutant General [3rd Ind]	Clovis Ground Gunnery Rge and Jeep Target, N.M., CA 672. (Ltr fr AD to CO, Clovis AFB, Clovis, N.M., dtd 15 Feb 50) [2nd Ind] [3rd Ind] Confirming Department of Air force will have no need for Clovis Ground Gunnery and Jeep Target Range during fiscal year 1951.	Off-installation ranges.
NARAII-CANAFB-0068	15-Feb-50	Corres.	Earl C. Miller, Major, USAF, Adjutant General	Clovis Ground Gunnery Range and Jeep Target, Civil Action 672 [3rd Ind] Confirming Department of Air force will have no need for Clovis Ground Gunnery and Jeep Target Range after 30 June 1950.	Duplicate of 3rd Ind. of document NARAII-CANAFB-0067

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NARAII-CANAFB-0069	31-Mar-50	Corres.	G.A. Wheeler, Major, USAF, Asst Adj Gen	Clovis Ground Gunnery Range and Jeep Target, Civil Action 672 [1st Ind] Confirming no requirement exists in command for Clovis Ground Gunnery and Jeep Target Range or the Clovis Blind Landing Field after 30 June 1950.	Off-installation ranges.
NARAII-CANAFB-0070	17-Mar-50	Corres.	Howard W. Penney, Lt Col, CE, Executive Officer	Clovis Blind Landing Field, New Mexico, and Ground Gunnery Range Jeep Target, Civil Actions 620 and 672. Advise whether or not the lands included in subject civil actions are needed by the Air Force for the fiscal year ending 30 June 1951.	Off-installation ranges.
NARAII-CANAFB-0071	21-Mar-50	Teletype	Department of the Air Force	Advise to support action of this dist in contractual adjustments with land owner. Walker AFB advises premises not needed.	Off-installation ranges.
NARAII-CANAFB-0072 - 0094	26-Dec-51	Report	Appraised by V.P. Szusziyzyk, Appraiser; Approval recommended by J. Frank Stockton, Chief, Appraisal Branch, Real Estate Division, Albuquerque District Corps of Engineers, U.S. Army; Reviewed and approved by E. K. Shadel, Chief Real Estate Division, Albuquerque District Corps of Engineers, U.S. Army	Real Estate Planning Report - Air to Ground Gunnery Range, Clovis Air Force Base, Clovis, New Mexico	Off-installation ranges.
NARAII-CANAFB-0095	4-Apr-52	Corres.	Bert E. Johnson, Brigadier General, USAF, Asst Judge Advocate General, USAF.	Air-to-Ground Gunnery Range-Clovis Air Force Base, Clovis, New Mexico. If range is not fenced the US would be liable for loss or damage to stock due to the negligence of US personnel.	Off-installation ranges.
NARAII-CANAFB-0096	2-Apr-52	Routing and Record Sheet	Robert Hogg, Lt. Colonel, USAF, Executive, Air Bases Division, Directorate of Operations	Air-to-Ground Gunnery Range-Clovis Air Force Base, Clovis, New Mexico. Not regarded necessary that the range be fenced in completely. Air Judge Advocate General is requested to comment on the legal aspects.	Off-installation ranges.

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NARAII-CANAFB-0097	19-Mar-52	Routing and Record Sheet	John B. Milling, Lt. Colonel, USAF, Dep Chief, Realty Opns Br. Real Estate Div. Directorate of Installations, DCS/O	Air-to-Ground Gunnery Range-Clovis Air Force Base, Clovis, New Mexico. Request comments and recommendations for fencing gunnery range. Office unaware of any state laws which require fencing. Estimate a perimeter fence will cost approximately \$72,000 to construct and funds for such are not available to Tactical Air Command.	Off-installation ranges.
NARAII-CANAFB-0098	19-Feb-52	Corres.	Ivins L.R. Browne, Colonel, USAF, Acting OIC, USAF Installations, Representatives Office, SWD	Real Estate Planning Report for Air to Ground Gunnery Range - Clovis Air Force Base. Transmitting real estate report; Recommendation that perimeter fencing not be accomplished; TAC approved leasehold acquisition of \$14,000 figure reported in planning report (rather than \$8,700 figure estimated by 9th AF)	Off-installation ranges.
NARAII-CANAFB-0099	22-Sep-52	Corres.	John P. Reighter, Major, USAF, Ch, Realty Opns Br, Real Estate Div. Directorate of Installations, DCS/O	Fencing Requirements, Air-to-Ground Range, Clovis Air Force Base, New Mexico. [2nd Ind] Discuss and approve the government paying for required fencing on the boundary line between J.J. Steel Ranch and the range.	Off-installation ranges.
NARAII-CANAFB-0100	18-Jul-52	Corres.	H.K. Shadel, Chief, Real Estate Division	Fencing Requirements, Air-to-Ground Range - Clovis Air Force Base, New Mexico. Fence in question may be installed for \$1,700.	Off-installation ranges.

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NARAII-CANAFB-0101	18-Jul-52	Corres.	Unknown	Fencing Requirements, Air-to-Ground Range - Clovis Air Force Base, New Mexico [1st Ind] Mr. JJ Steele (owner of land) contends that by severance of pastures he will be deprived of utilizing them unless proper fencing is constructed along the boundary line between the range and portions of the land to be retained by him. approximately 7 miles of electric livestock fence will be required to comply with Mr. Steele's request. Therefore requested Chief of Engineers be authorized to negotiate with Mr. Steele for lease of land, which includes a monetary consideration not to exceed \$1,700 for construction of required fence.	Off-installation ranges.
NARAII-CANAFB-0102 - 0104	9-Jul-52	Corres.	Herbert N. Turner, Lt. Col, CE, Executive Officer	Fencing Requirements, Air-to-Ground Range - Clovis Air Force Base, New Mexico. Discuss placing of the fence around area to be acquired for military purposes. Proposal of Mr. Steele is reasonable; 7 miles of electric livestock fence would meet requirements. Recommend decision be rendered at earliest possible date, due to current target date for pending military activity in use of the range, set for 1 August 1952. (includes map of area)	Off-installation ranges.
NARAII-CANAFB-0105	1-Aug-52	Corres.	Joseph Friedlander, Jr., Colonel, USAF, Chief, Real Estate Division, Directorate of Installations, DCS/O	Acquisition of Leasehold Interest, Air to Ground Gunnery Range, Clovis Air Force Base, New Mexico. Request for acquisition of leasehold interest in certain land 7,768 acres in Roosevelt County, which is required for use as Air to Ground Gunnery Range in connection with Clovis Air Force Base. Immediate possession to property is required for commencement of range preparation and installation of facilities in connection with operations of the project.	Off-installation ranges.

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NARAII-CANAFB-0106	1-Aug-52	Corres.	E.V. Huggins, Acting Secretary of the Air Force	Acquisition of Leasehold Interest, Air to Ground Gunnery Range, Clovis Air Force Base, New Mexico [1st Ind] Transmitting letter to Attorney General requesting acquisition of leasehold estate in and to approximately 7,768 acres of land for use in connection with Air to Ground Gunnery Range at Clovis Air Force Base.	Off-installation ranges.
NARAII-CANAFB-0107 - 0108	6-Aug-52	Corres.	E.V. Huggins, Acting Secretary of the Air Force	Clovis Air Force Base, New Mexico (Air to Ground Gunnery Range) U.S. vs. 7,768.82 Acres, et al. Letter to Attorney General requesting approval for acquisition of land.	Off-installation ranges.
NARAII-CANAFB-0109 - 0110	31-Jul-52	Corres.	Woodrow Berge, Chief, Acquisition Division, Real Estate	Clovis Air Force Base, New Mexico (Air to Ground Gunnery Range) U.S. vs. 7,768.82 Acres, et al. Letter to The Chief of Staff discussing approval for acquisition of land; Possession of the land is required by 1 August 1952, which makes it necessary that cattle occupying the area be removed prior to that date. Estimated annual lease rental in the sum of \$14,000 funds are available for the acquisition under the Act of Congress approved 10 July 1952	Off-installation ranges.
NARAII-CANAFB-0111	1-Aug-52	Corres.	Joseph Friedlander, Jr., Colonel, USAF, Chief, Real Estate Division, Directorate of Installations, DCS/O	Acquisition of Leasehold Interest, Air to Ground Gunnery Range, Clovis Air Force Base, New Mexico. Discuss annual estimated rental cost; requirement/need for immediate possession to the property.	Off-installation ranges.
NARAII-CANAFB-0112	17-Mar-52	Corres.	Alfred J. Neslen, Lt. Colonel, USAF, Dep Chief, Real Estate Division, Directorate of Installations, DCS/O	Disposal of Real Estate Small Arms Gunnery Range, Clovis Air Force Base, New Mexico [1st Ind] Concur with request to retain area containing 889.21 acres or less, of Tracts 1-A and 1-B; and dispose of all excess lands indicated in red on Real Estate Tract Map. Requesting office to proceed with the disposal of referenced excess lands.	Within Clovis AFB.
NARAII-CANAFB-0113-0115	4-Jan-52	Corres.	Erlath W. Zuehl, Colonel, USAF, Air Adjutant General	Disposal of Real Estate, Small Arms Gunnery Range, Clovis Air Force Base, New Mexico. Discuss the status of disposal action.	Within Clovis AFB.

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NARAII-CANAFB-0116	30-Jan-52	Routing and Record Sheet	Robert Hogg, Lt. Colonel, USAF, Executive, Air Bases Division, Directorate of Operations, DCS/O	Disposal of Real Estate, Small Arms Gunnery Range, Clovis Air Force Base, New Mexico. Recommend the request of Tactical Air Command for disposal of the land covered in correspondence be approved provided TAC indicates that the are cannot be expanded or is undesirable for use as an air-to-ground range for the Fighter Bomber Units stationed at Clovis AFB.	Within Clovis AFB.
NARAII-CANAFB-0117	9-Jan-52	Routing and Record Sheet	Joseph Friedlander, Jr., Colonel, USAF, Ch, Realty Opns Br, Real Estate Div., Directorate of Installations Office, Deputy Chief of Staff, Material	Disposal of Real Estate, Small Arms Gunnery Range, Clovis Air Force Base, New Mexico. To Director of Operations-Transmitting letter from TAC recommending disposal of land; and copy of Real Estate Planning Report. Request review correspondence and furnish office recommendations regarding disposal of subject land.	Within Clovis AFB.
NARAII-CANAFB-0118	26-Dec-51	Corres.	Erlath W. Zuehl, Colonel, USAF, Air Adjutant General	Clovis Small Arms Gunnery Range, Clovis Air Force Base, New Mexico [1st Ind] Determined that command has no requirement for land in Tracts 1-A and 1-B other than the 889.21 acres described and recommended in Paragraph 1, 1st Preference, pg 16 Real Estate Report. Action is being initiated for the disposal of excess acreage now under lease.	Within Clovis AFB.
NARAII-CANAFB-0119	10-Dec-51	Corres.	Joseph Friedlander, Jr., Colonel, USAF, Ch, Realty Opns Br, Real Estate Div., Directorate of Installations Office, Deputy Chief of Staff, Material	Clovis Small Gunnery Range, Clovis Air Force Base, New Mexico. Refer to Planning Report revealing Tracts 1-A and 1-B are now leased and no additional land is required for establishment of a Ground Gunnery Range for subject installation.	Off-installation ranges.

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NARAII-CANAFB-0120	29-Nov-51	Corres.	Kirk H. Scott, Colonel, USAF, OIC, USAF Installations Representatives Office, SWD	Real Estate Planning Report Dated 18 October 1951 for Small Arms Gunnery Range, Clovis AFB N Mex. Transmitting Real Estate Planning Report for review. This office recommends 889.21 acres be retained under current leases covering Tracts 1-A and 1-B and remainder of land now under lease be returned to the owners.	Within Clovis AFB.
NARAII-CANAFB-0121	8-Jan-52	Corres.	Joseph Friedlander, Jr., Colonel, USAF, Ch, Realty Opns Br, Real Estate Div., Directorate of Installations Office, Deputy Chief of Staff, Material	Air to Ground Gunnery Range, Clovis AFB, Clovis, New Mexico. [2nd Ind] Discuss need for brief planning report be submitted because it is believed that \$8,700 not sufficient for 7,880 acres for use as air-to-ground gunnery at Clovis Air Force Base.	Off-installation ranges.
NARAII-CANAFB-0122	19-Dec-51	Corres.	Carl E. Rantzow, Chief, Real Estate Division	Air to Ground Gunnery Range, Clovis AFB, Clovis, New Mexico. Authorizing leasing of 7,680 acres in Roosevelt County for use as an air-to-ground gunnery, rocketry and dive bombing range for Clovis Air Force Base. Request brief planning report be submitted - District Engineer, Albuquerque District believes \$8,700 is not considered sufficient. Lease planning report is being prepared for early submission.	Off-installation ranges.
NARAII-CANAFB-0123	9-Jan-52	Corres.	Joseph Friedlander, Jr., Colonel, USAF, Ch, Realty Opns Br, Real Estate Div., Directorate of Installations Office, Deputy Chief of Staff, Material	Disposal of Real Estate, Small Arms Gunnery Range, Clovis Air Force Base, New Mexico. Transmitting Real Estate Planning Report dated 18 October 1951, requesting review or correspondence and furnish recommendations regarding disposal of subject land.	Within Clovis AFB.
NARAII-CANAFB-0124 - 0126	4-Jan-52	Corres.	Erlath W. Zuehl, Colonel, USAF, Air Adjutant General	Disposal of Real Estate, Small Arms Gunnery Range, Clovis Air Force Base, New Mexico. Discuss the status of disposal action.	Duplicate of Document Nos. NARAII-CANAFB-0113 through NARAII-CANAFB-0115

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NARAII-CANAFB-0127	26-Dec-51	Corres.	Erlath W. Zuehl, Colonel, USAF, Air Adjutant General	Clovis Small Arms Gunnery Range, Clovis Air Force Base, New Mexico [1st Ind] Determined that command has no requirement for land in Tracts 1-A and 1-B other than the 889.21 acres described and recommended in Paragraph 1, 1st Preference, pg 16 Real Estate Report. Action is being initiated for the disposal of excess acreage now under lease.	Duplicate of Document No. NARAII-CANAFB-0118
NARAII-CANAFB-0128	29-Nov-51	Corres.	John Trommershausser, Maj. USAF for Kirk H. Scott, Colonel, USAF, OIC, USAF Installations Representatives Office, SWD	Real Estate Planning Report Dated 18 October 1951 for Small Arms Gunnery Range, Clovis AFB, N Mex. Transmitting Real Estate Planning Report for review. This office recommends 889.21 acres be retained under current leases covering Tracts 1-A and 1-B and remainder of land now under lease be returned to the owners.	Duplicate of Document No. NARAII-CANAFB-0120 except document was signed by John Trommershausser, Maj, USAF for Kirk H. Scott
NARAII-CANAFB-0129	21-Dec-54	Corres.	Donald L. Black, Deputy Chief, Real Estate Division, Directorate of Real Property, Assistant Chief of Staff, Installations	Real Estate Planning Report - Ammunition Storage Area, Clovis Air Force Base [5th Ind] Establish military requirement requesting proceed with the acquisition of perpetual restrictive easements over 30.8 acres of land at an estimated cost of \$2,000 in support of ammunition storage area at Clovis Air Force Base. Request acquisition be coordinated with Tactical Air Command.	Within Clovis AFB.
NARAII-CANAFB-0130	21-Jul-53	Corres.	Howard B. Sprague, Lt. Col, USAF; Robert R. Conner, Colonel, USAF Officer-in-Charge	Real Estate Planning Report - Ammunition Storage Area, Clovis Air Force Base. Request Albuquerque District Engineer be advised to prepare a Real Estate Planning Report to cover land required as outlined in plans; also want a breakout of total funds are required.	Within Clovis AFB.

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NARAII-CANAFB-0131	24-Jul-53	Corres.	H.E. Cox, Acting Chief, Real Estate Division	Real Estate Planning Report - Ammunition Storage Area, Clovis Air Force Base (AFIRO ltr, 21 Jul 53) [1st Ind] Requesting Real Estate Planning Report, and separate cost data be furnished for area delineated in blue and red, together with toil funds required for simultaneous acquisition of required interest in all areas.	Within Clovis AFB.
NARAII-CANAFB-0132	1-Sep-53	Corres.	H. K. Shadel, Chief, Real Estate Division	Real Estate Planning Report - Ammunition Storage Area, Clovis Air Force Base (AFIRO, SWDiv ltr, 21 Jul 53) [2nd Ind] Transmitting Real Estate Planning Report, also includes cost data breakdown requested.	Within Clovis AFB.
NARAII-CANAFB-0133	17-Dec-53	Corres.	Carl E. Rantzow, Chief, Real Estate Division	Real Estate Planning Report - Ammunition Storage Area, Clovis AFB (AFIRO ltr, 21 Jul 53) [3rd Ind] Recapitulation of the costs involved. Estimate of costs if acquisition of only Tract C-1 is authorized. Approval of report received from AF Installations Representative, SWD and from Headquarters.	Within Clovis AFB.
NARAII-CANAFB-0134	15-Jan-54	Corres.	H.V. Canan, Colonel, Corps of Engineers, Assistant Chief of Engineers	Real Estate Planning Report - Ammunition Storage Area, Clovis Air Force Base [4th Ind] Transmitting Real Estate Planning Report covering proposed acquisition of restrictive easements in connection with ammunition storage at Clovis AFB. Recommending the acquisition be approved by Headquarters.	Within Clovis AFB.
NARAII-CANAFB-0135	14-Dec-54	Corres.	Department of the Air Force (name illegible)	Authorization for Acquisition of Real Estate. Authority is given for acquisition of perpetual restrictive assessments over 30.8 acres of land in support of ammunition storage area at Clovis Air Force Base.	Within Clovis AFB.
NARAII-CANAFB-0136	1-Dec-54	Corres.	N.H. Colby Lt Col, USAF for Gilbert T. Perry, Lt. Colonel, U.S. Air Force, Chief, Zone of Interior Branch, Construction Division, Directorate of Construction, ACS/I	Restrictive Easements for Ammunition Storage Area, Clovis Air Force Base, New Mexico. Referencing memorandum of 6 Oct 1954 - portion of the memorandum pertaining to Clovis Air Force Base needs to be corrected.	Within Clovis AFB.

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Document Number Range	Doc Date	Doc Type	Author/Author Organization	Document Title	Comments
NARAII-CANAFB-0137	24-Apr-44	Corres.	J.S. Marriott, Colonel, Air Corps, War Department Member	Approval of Air-to-Ground Gunnery Range for Clovis Army Air Field, Clovis, New Mexico.	Off-installation ranges.
NARAII-CANAFB-0138	20-Apr-44	Corres.	L.P. Whitten, Brig, General, U.S. Army, Chief, Air Services Division, Office of Asst. Chief of Air Staff, Material, Maintenance & Distribution	Acquisition of an Air-to-Ground Gunnery Range for Clovis Army Air Field, Clovis, N.M. Authority be granted for acquisition of 15,346 acres for \$4,250.00 for first year; \$2,650 during succeeding years to provide gunnery range at Clovis.	Off-installation ranges.
NARAII-CANAFB-0139	5-May-44	Corres.	John M. Lyle, Lt. Col, AC, Buildings and Grounds Section, Office, Asst Chief Air Staff, MM&D	Acquisition of an Air-to-Ground Gunnery Range for Clovis Army Air Field, Clovis, New Mexico [1st Ind] Request action be instituted to acquire lease of 15,346 acres	Off-installation ranges.
NARAII-CANAFB-0140 - 0142	4-Apr-44	Corres.	U.G. Ent, Brigadier General, U.S. Army, Commanding	Acquisition of Site for Air-to-Ground Gunnery Range for Army Air Field, Clovis, New Mexico	Off-installation ranges.
NARAII-CANAFB-0143	1-Apr-44	Corres.	John J. O'Brien, Colonel, Corps of Engineers, Chief, Real Estate Division	Transmittal, Gross Appraisal, Addition to Air-to-Ground Gunnery Range, Clovis Army Airfield, Clovis, N.M. [5th Ind] Proposed acquisition of additional \$5,345.94 acres of land to be used in connection with range at Clovis.	Off-installation ranges.
NARAII-CANAFB-0144	23-Mar-44	Corres.	Leonard M. Cowley, Lt. Col, Corps of Engineers, Director, Real Estate Division	Transmittal, Gross Appraisal, Addition to Air-to-Ground Gunnery Range, Clovis, Army Air Field, Clovis, N.M. [4th Ind] Request authority be granted to proceed with the acquisition on a lease and suspension basis.	Off-installation ranges.
NARAII-CANAFB-0145	17-Mar-44	Corres.	Floyd T. Snyder, Captain, Corps of Engineers, Head, Division Real Estate Suboffice.	Transmittal, Gross Appraisal, Addition to Air-to-Ground Gunnery Range [3rd Ind] Transmittal of Appraisal Report	Off-installation ranges.
NARAII-CANAFB-0146	28-Feb-44	Corres.	Leonard M. Cowley, Lt. Col, Corps of Engineers, Chief, Real Estate Branch	Transmittal, Gross Appraisal, Addition to air to ground gunnery range, Clovis Army Airfield, Clovis, N.M. [2nd Ind] Give careful direction to the cost of abandonment of existing range and acquisition of substitute range as proposed to the cost of enlargement of existing range with consideration of criticism of the landowner.	Off-installation ranges.

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NARAII-CANAFB-0147	22-Feb-44	Corres.	William Fane, Lt. Col., AGD, Asst Adj General	Transmittal, Gross Appraisal, Addition to Air-to-Ground Gunnery Range, Clovis Army Air Field, Clovis, New Mexico [1st Ind] Not considered desirable to attempt to expand this range. Clovis Air Base is directed to coordinate with representatives in selection of a satisfactory site.	Off-installation ranges.
NARAII-CANAFB-0148	10-Feb-44	Corres.	Leonard M. Cowley, Lt. Col, Corps of Engineers, Chief, Real Estate Branch	Transmittal, Gross Appraisal, Addition to Air to Ground Gunnery Range, Clovis Army Airfield, Clovis, New Mexico. Subject area should be authorized for acquisition if required on a lease basis.	Off-installation ranges.
NARAII-CANAFB-0149	26-Apr-44	Corres.	L.P. Whitten, Brig. General, US Army, Chief, Air Service Division, Office of Asst. Chief of Air Staff, Material, Maintenance & Distribution	Acquisition of an Air-to-Ground Gunnery Range for Clovis Army Air Field, Clovis, N.M. Requesting authority be granted for acquisition of 15,346 acres of land to provide range for Clovis; estimated land can be leased for \$4,250.00 the first year and \$2,650.00 during successive years.	Off-installation ranges.
NARAII-CANAFB-0150	22-Mar-44	Corres.	John J. O'Brien, Colonel, Corps of Engineers, Chief, Real Estate Branch	Declaration of Taking - relating to the acquisition of 160 acres of land.	Off-installation ranges.
NARAII-CANAFB-0151	2-Mar-44	Corres.	Warren S. Ege, Colonel, Air Corps, Chief, Legislative Services	Investigation of expansion of Clovis Gunnery Range - Determined the extension of range was not feasible.	Off-installation ranges.
NARAII-CANAFB-0152	17-Feb-44	Corres.	John M. Lyle, Lt. Col, A.C., Buildings and Grounds Section, Construction Branch, AC/AS, M.M.D	Acquisition of Land for Clovis Aerial Gunnery Range, New Mexico.	Off-installation ranges.
NARAII-CANAFB-0153	8-Feb-44	Corres.	Carl A. Hatch, Senator	Transmitting communication from Mr. R.E. Moore (fearful that his property is to be included in boundaries of aerial range)	Off-installation ranges.
NARAII-CANAFB-0154	22-Feb-44	Corres.	A.W. Seibt, Major, AGD, Asst Adjutant General	Additional Land for Aerial Gunnery Range, Clovis, N.M. (Ltr AAF to 2AF, dtd 15 Feb. 44 file AFDBS (2A-2/2).) [1st Ind]	Off-installation ranges.
NARAII-CANAFB-0155	15-Feb-44	Corres.	John M. Lyle, Lt. Col, A.C., Buildings and Grounds Section, Construction Branch, AC/AS, M.M.D	Additional Land for Aerial Gunnery Range, Clovis, N.M.	Off-installation ranges.

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NARAII-CANAFB-0156	5-Feb-44	Corres.	Carl A. Hatch, Senator	Reference letter from Mr. George W. Lee - Portion of his property is about to be included in the boundaries of aerial gunnery range.	Off-installation ranges.
NARAII-CANAFB-0157	1-Feb-44	Corres.	Geo W. Lee	Land owner of land that boundaries aerial gunnery range. Discusses issues with Army taking portion of his land.	Off-installation ranges.
NARAII-CANAFB-0158	9-Feb-44	Corres.	Warren S. Ege, Colonel, Air Corps, Chief, Legislative Services	Reference letter from George Lee - immediate investigation is being made to determine whether military necessity for acquiring Mr. Lee's property.	Off-installation ranges.
NARAII-CANAFB-0159	5-Feb-44	Corres.	Carl A. Hatch, Senator	Transmitting communication from Mr. Lee (fearful that his property is to be included in boundaries of aerial range)	Off-installation ranges.
NARAII-CANAFB-0160	1-Feb-44	Corres.	Geo W. Lee	Land owner of land that boundaries aerial gunnery range. Discusses issues with Army taking portion of his land.	Duplicate of Document Number NARAII-CANAFB 0157
NARAII-CANAFB-0161	15-Feb-44	Corres.	John M. Lyle, Lt. Col., A.C., Building and Grounds Section, Construction Branch, AC/AS, M.M.D	Additional Land for Aerial Gunnery Range, Clovis, N.M. Requesting comments on letter from Senator Carl Hatch and Mr. George Lee.	Off-installation ranges.
NARAII-CANAFB-0162	31-Dec-43	Corres.	John J. O'Brien, Colonel, Corps of Engineers, Chief, Real Estate Branch	Declaration of Taking. Precision Bombing Range-US vs. May Walker Hart et al. (Clovis Blind Landing Field, New Mexico) Acquisition of 2,560 acres of land.	Off-installation ranges.
NARAII-CANAFB-0163	10-Nov-43	Corres.	Leonard M. Cowley, Lt. Col, Corps of Engineers, Chief, Real Estate Branch	Lease W-41-038-eng-589 - with Anna H. Johnson et al, covering 2,402.245 acres of land for use as a gunnery and jeep target range.	Off-installation ranges.
NARAII-CANAFB-0164	21-Oct-43	Corres.	J.S. Marriott, Lt. Colonel, Air Corps, WD Member, Interdepartmental Air Traffic Control Board	Rescission of Approval of Aerial Gunnery Range for Army Airfield, Clovis, New Mexico - The Board rescinded its previous approval of this aerial gunnery range.	Off-installation ranges.
NARAII-CANAFB-0165	11-Oct-43	Corres.	James B. Newman Jr., Brigadier General, AUS, Chief, Buildings & Grounds Section, AC/AS, MM&D	Rescission Request for Aerial Gunnery Range for use by Clovis Army Airfield, Clovis, New Mexico. Requesting clearance be rescinded on various aerial gunnery range which was cleared in meeting for use by Clovis Army Air Field.	Off-installation ranges.

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NARAII-CANAFB-0166	20-Oct-43	Corres.	John J. O'Brien, Colonel, Corps of Engineers, Chief, Real Estate Branch	Declaration of Taking - U.S. vs. State of New Mexico, et. al. (Clovis Blind Landing Field, High Altitude Bombing Range, New Mexico.) Relating to the acquisition of 10,246 acres of land.	Off-installation ranges.
NARAII-CANAFB-0167	18-Sep-43	Corres.	Headquarters Second Air Force, Office of the Commanding General	Withdrawal of Request for Acquisition of Aerial Gunnery Range Army Air Base, Clovis, New Mexico.	Off-installation ranges.
NARAII-CANAFB-0168	25-Sep-43	Corres.	J.C. Shively, Col., A.C., Buildings and Grounds Section, Office, Ass't Chief Air Staff, M.M.D.	Withdrawal of Request for Acquisition of Aerial Gunnery Range, Army Air Base, Clovis, New Mexico [1st Ind]	Off-installation ranges.
NARAII-CANAFB-0169 - 0170	15-Aug-43	Corres.	E.C. Light, Major, AC, Adjutant	Construction of Precision Bombing Targets. Request for approval of various projects; and allocation of funds for construction.	Off-installation ranges.
NARAII-CANAFB-0171	19-Aug-43	Corres.	John L. Grimes, Major, A.G.D., Adjutant General	Approval. [1st Ind]	Off-installation ranges.
NARAII-CANAFB-0172	27-Aug-43	Corres.	Illegible	Construction of Precision Bombing Targets [2nd Ind]	Off-installation ranges.
NARAII-CANAFB-0173	6-Sep-43	Corres.	J.C. Shively, Col, A.C. Buildings and Grounds Section, Office, Ass't Chief Air Staff, M.M.D.	Construction of Precision Bombing Targets, Clovis, New Mexico [3rd Ind]	Off-installation ranges.
NARAII-CANAFB-0174	10-Jul-43	Corres.	J.S. Marriott, Lt. Col, Air Corps, War Department Member, Interdepartmental Air Traffic Control Board	Three Precision Bombing Ranges for Use by Clovis Army Airfield, Clovis, New Mexico	Off-installation ranges.
NARAII-CANAFB-0175	19-Jul-43	Corres.	G.R. Dougherty, Capt, A.G.D., Asst. Adjutant General	Requests approval for three ranges be rescinded [1st Ind]	Off-installation ranges.
NARAII-CANAFB-0176	28-Jul-43	Corres.	J.S. Marriott, Lt.Col, Air Corps, War Department Member, Interdepartmental Air Traffic Control Board	Three Precision Bombing Ranges for Use by Clovis Army Airfield, Clovis, New Mexico [2nd Ind]	Off-installation ranges.
NARAII-CANAFB-0177	29-Jun-43	Routing and Record Sheet	James B. Newman, Jr., Colonel, Air Corps, Chief, Buildings & Grounds Section	Clearance Request for Precision Bombing Ranges for Clovis Army Air Field, Clovis, New Mexico. Obtain clearance from Interdepartmental Air Traffic Control Board for various Precision Bombing Ranges for use by Clovis Air Field.	Off-installation ranges.

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NARAII-CANAFB-0178	15-Jul-43	Routing and Record Sheet	James B. Newman, Jr., Colonel, Air Corps, Chief, Buildings & Grounds Section	Rescission of Clearances on Three Precision Bombing Ranges for Clovis Army Air Field, Clovis, New Mexico. Requests IATCB be advised to rescind clearance on various ranges which were approved for use by Clovis Air Field.	Off-installation ranges.
NARAII-CANAFB-0179	8-Jul-43	Corres.	J.C. Shively, Col, A.C., Buildings and Grounds Section, Office, Ass't Chief Air Staff, M.M.D.	Availability of ranges 1, 2, 3 and 4, Clovis, New Mexico	Off-installation ranges.
NARAII-CANAFB-0180	4-Jul-43	Teletype	Johnson CG, 2nd Air Force	Acquisition of land - Ranges 1, 2, 3 and 4, Clovis New Mexico	Off-installation ranges.
NARAII-CANAFB-0181	10-Jun-43	Corres.	J.C. Shively, Col., A.C., Buildings and Grounds Section, Office, Ass't Chief Air Staff, M.M.D.	Completion Date - Moving Target Range - Clovis, New Mexico. Request efforts be made to expedite completion of subject project.	Off-installation ranges.
NARAII-CANAFB-0182 - 0183	22-May-43	Corres.	Edward J. Sheridan, Major, Corps of Engineers, Assistant, Military Construction Branch, Construction Division	Construction Directive for Rifle Range at Clovis Airfield, Clovis, New Mexico.	No maps or legal description included.
NARAII-CANAFB-0184	24-May-43	Corres.	G. Mallory Collins, Capitan, Corps of Engineers, Assistant, Planning Section, Operations Branch	Construction Directive for Rifle Range at Clovis Airfield, Clovis, New Mexico [1st Ind] Notify immediately by teletype whether or not additional land is required.	No maps or legal description included.
NARAII-CANAFB-0185	26-Jul-43	Corres.	R.E. Cole, Lt. Col., Corps of Engineers, District Engineer	Construction Directive for Rifle Range at Clovis Airfield, Clovis, New Mexico (Ltr. From OCE Wash., D.C. to Div. Engr., SWD, Dallas, Tex., 22 May 1943.) [2nd Ind] Transmitting prints/drawings indicating location of authorized facilities as approved by Commanding Officer.	Off-installation ranges.
NARAII-CANAFB-0186	4-Aug-43	Corres.	Edward J. Sheridan, Major, Corps of Engineers, Assistant, Military Construction Branch, Construction Division	Construction Directive for Rifle Range at Clovis Airfield, Clovis, New Mexico [4th Ind]	No maps or legal description included.
NARAII-CANAFB-0187	19-May-43	Corres.	J.S. Marriott, Lt. Col., Air Corps, War Department Member, Interdepartmental Air Traffic Control Board	Bombing and Aerial Gunnery Areas for A.A.B., Clovis, New Mexico	Off-installation ranges.

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NARAII-CANAFB-0188 - 0189	8-May-43	Corres.	Harris F. Scherer, Colonel, A.G.D., Adjutant General	Acquisition of Aerial Gunnery Range, for Army Air Base, Clovis, New Mexico	Off-installation ranges.
NARAII-CANAFB-0190	13-May-43	Corres.	J.C. Shively, Col, A.C., Buildings and Grounds Section, Office, Ass't Chief Air Staff, M.M.D.	Acquisition of Aerial Gunnery Range, for Army Air Base, Clovis, New Mexico [1st Ind]	Off-installation ranges.
NARAII-CANAFB-0191	15-Apr-43	Corres.	J.S. Marriott, Lt. Colonel, Air Corps, War Department Member, Interdepartmental Air Traffic Control Board	Aerial Gunnery Range, Clovis Army Airfield, Clovis, New Mexico. Request for Aerial Gunnery Range	Off-installation ranges.
NARAII-CANAFB-0192	23-Mar-43	Routing and Record Sheet	L.P. Whitten, Brig, General, U.S.A.	Clearance Request for Clovis Aerial Gunnery Range for use by Clovis Army Air Field, New Mexico	Off-installation ranges.
NARAII-CANAFB-0193	15-Mar-43	Corres.	J.S. Marriott, Lt. Col., Air Corps, War Department Member, Interdepartmental Air Traffic Control Board	Relocation of Ranges at Clovis Army Airfield, New Mexico	Off-installation ranges.
NARAII-CANAFB-0194	17-Feb-43	Routing and Record Sheet	L.P. Whitten, Brig, General, U.S.A.	Relocation of Ranges at Clovis Army Airfield, New Mexico	Off-installation ranges.
NARAII-CANAFB-0195 - 0196	23-Mar-43	Corres.	John M. Dick, 1st Lieut, Air Corps, Actg. Asst. Adjutant General	Acquisition of Land for Aerial Gunnery Range, Clovis, New Mexico	Off-installation ranges.
NARAII-CANAFB-0197	23-Mar-43	Corres.	John M. Dick, 1st Lieut., Air Corps, Actg. Asst. Adjutant General	Request for Amended Gross Appraisal, Clovis Aerial Gunnery Range	Off-installation ranges.
NARAII-CANAFB-0198	29-Mar-43	Corres.	Leonard M. Cowley, Lt. Colonel, Corps of Engineers, Chief, Real Estate Branch	Request for Amended Gross Appraisal, Clovis Aerial Gunnery Range [1st Ind]	Off-installation ranges.
NARAII-CANAFB-0199	3-Apr-43	Corres.	John J. O'Brien, Colonel, Corps of Engineers, Chief, Real Estate Branch	Request for Amended Gross Appraisal, Clovis Aerial Gunnery Range [2nd Ind]	Off-installation ranges.
NARAII-CANAFB-0200	17-May-43	Corres.	J.C. Shively, Col, A.C., Buildings and Grounds Section, Office, Ass't Chief Air Staff, M.M.D.	Request for Amended Gross Appraisal, Clovis Aerial Gunnery Range, New Mexico [3rd Ind]	Off-installation ranges.
NARAII-CANAFB-0201	17-Mar-43	Corres.	John J. O'Brien, Colonel, Corps of Engineers, Chief, Real Estate Branch	Acquisition of Land. Acquisition of 3,220.41 acres of land in Roosevelt County for use in connection with Clovis Aerial Gunnery Range.	Off-installation ranges.

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NARAII-CANAFB-0202	1-Mar-43	Corres.	Leonard M. Cowley, Lt. Colonel, Corps of Engineers, Chief, Real Estate Branch	Transmittal of Gross Appraisal, Aerial Gunnery Range, Clovis Heavy Bombardment Airfield, New Mexico	Off-installation ranges.
NARAII-CANAFB-0203	9-Mar-43	Corres.	John J. O'Brien, Colonel, Corps of Engineers, Chief, Real Estate Branch	Transmittal of Gross Appraisal, Aerial Gunnery Range, Clovis Heavy Bombardment Airfield, New Mexico. [1st Ind]	Off-installation ranges.
NARAII-CANAFB-0204 - 0205	24-Mar-43	Corres.	L.P. Whitten, Brig, General, U.S. Army, Director of Base Services and J.C. Shively, Col. Air Corps	Transmittal of Gross Appraisal, Aerial Gunnery Range, Clovis Heavy Bombardment Airfield, New Mexico [2nd Ind]	Off-installation ranges.
NARAII-CANAFB-0206	27-Jan-43	Corres.	L.P. Whitten, Brig, General, U.S. Army, Director of Base Services and J.C. Shively, Col. Air Corps	Acquisition of Bombing and Gunnery Range for Clovis Army Air Base, New Mexico.	Off-installation ranges.
NARAII-CANAFB-0207	4-Feb-43	Corres.	John J. O'Brien, Colonel, Corps of Engineers, Chief, Real Estate Branch	Acquisition of Bombing & Gunnery Range for Clovis Army Air Base, New Mexico [1st Ind]	Off-installation ranges.
NARAII-CANAFB-0208	10-Feb-43	Corres.	L.P. Whitten, Brig, General, U.S. Army, Director of Base Services and J.C. Shively, Col. Air Corps	Acquisition of Bombing & Gunnery Ranges for Clovis Army Air Base, New Mexico [2nd Ind]	Off-installation ranges.
NARAII-CANAFB-0209 - 0210	24-Jan-43	Teletype	Olds	Requesting acquisition of sites for bombing and gunnery ranges.	Off-installation ranges.
NARAII-CANAFB-0211	12-Jan-43	Corres.	L.P. Whitten, Brig, General, U.S. Army, Director of Base Services and J.C. Shively, Col. Air Corps	Change in Boundary of Bombing Ranges, Clovis, New Mexico.	Off-installation ranges.
NARAII-CANAFB-0212	31-Dec-42	Teletype	Olds	Slight change be made in legal description pattern bombing range to facilitate obtaining right of entry and possession. Correct legal description of 2,460 in Curry County.	Off-installation ranges.
NARAII-CANAFB-0213	1-Jan-43	Routing and Record Sheet	F.W. Evans, Brig. Gen., USA, Dir., WO&M	Clearance Request for Four Substitute Ranges for Clovis Army Airfield, New Mexico. [Comment No. 3] Request substitute ranges set forth; Board also rescinded its approval of the Pattern Gunnery Range, High Altitude Bombing Range and Pattern Bombing Range for Clovis Army Airfield. Recommend revised sites be redesignated as Danger Areas.	Off-installation ranges.

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NARAII-CANAFB-0214 - 0215	12-Dec-42	Routing and Record Sheet	L.P. Whitten, Col., Air Corps	Clearance Request for Four Substitute Ranges for Clovis Army Airfield, New Mexico. Request clearance be obtained for High Altitude Bombing Range, Pattern Gunnery Range, Pattern Bombing Range, and Aerial Gunnery Range.	Off-installation ranges.
NARAII-CANAFB-0216	22-Dec-42	Corres.	Edward J. Sheridan, Captain, Corps of Engrs., Asst. Operations Branch, Construction Division	Information requested about "Jeep Type" Target Range, Clovis, N. Mex.	Off-installation ranges.
NARAII-CANAFB-0217	4-Jan-43	Corres.	L.P. Whitten, Brig. General, U.S. Army, Director of Base Services and J.C. Shively, Col. Air Corps	Information requested about "Jeep Type" Target Range, Clovis, New Mexico [1st Ind]	Off-installation ranges.
NARAII-CANAFB-0218 - 0220	12-Dec-42	Corres.	A.W. Seibt, 1st Lieut., A.G.D., Asst. Adjutant General	Correction of Sites for Pattern Bombing and Gunnery Ranges, High Altitude Bombing Range and Aerial Gunnery Range for Army Air Base, Clovis, New Mexico.	Off-installation ranges.
NARAII-CANAFB-0221	10-Jan-43	Corres.	L.P. Whitten, Brig. General, U.S. Army, Director of Base Services and J.C. Shively, Col. Air Corps	Correction of Sites for Pattern Bombing and Gunnery Ranges, High Altitude Bombing Range and Aerial Gunnery Range for Army Air Base, Clovis, New Mexico [1st Ind]	Off-installation ranges.
NARAII-CANAFB-0222 - 0223	11-Dec-42	Teletype	Olds	Requesting clearance of Pattern Bombing and Gunnery Ranges, High Altitude Bombing Range and Aerial Gunnery Range. Relocation of these ranges have been required and is requested that sites be cancelled and areas be substituted.	Off-installation ranges.
NARAII-CANAFB-0224	30-Dec-42	Corres.	L.P. Whitten, Brig. General, U.S. Army, Director of Base Services and J.C. Shively, Col. Air Corps	Clearance of Ranges for Clovis Army Airfield, New Mexico [1st Ind]	Off-installation ranges.
NARAII-CANAFB-0225 - 0237	30-Nov-42	Report	Headquarters Second Air Force; Office of the Commanding General; Fort George Wright, Washington	Army Air Base, Clovis, New Mexico. Construction Program	Includes Ordnance Storage Area (Magazines), Gas Instruction Building,
NARAII-CANAFB-0238	26-Nov-42	Corres.	Neyland; Mark S. Gurnee, Captain, Corps of Engineers, Assistant, Operations Branch Construction Division	Jeep Type Moving Target Range - Clovis, New Mexico	Off-installation ranges.

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NARAII-CANAFB-0239	10-Dec-42	Corres.	L.P. Whitten, Brig, General, U.S. Army, Director of Base Services and J.C. Shively, Col. Air Corps	Jeep Type Moving Target Range - Clovis, New Mexico [1st Ind]	Off-installation ranges.
NARAII-CANAFB-0240	25-Nov-42	Routing and Record Sheet	L.P. Whitten, Colonel, Air Corps	Clearance for Planning Purposes of 3 Satellite Fields for Clovis, New Mexico Army Air Base.	Off-installation ranges.
NARAII-CANAFB-0241 - 0243	23-Nov-42	Corres.	John L. Grimes, Captain, A.G.D., Asst. Adjutant General	Acquisition of Sites for Pattern Bombing & Gunnery Ranges, High Altitude Bombing Range and Aerial Gunnery Range for Clovis Army Air Base, Clovis, New Mexico.	Off-installation ranges.
NARAII-CANAFB-0244	19-Nov-42	Routing and Record Sheet	Unknown	Clearance Request for Four Ranges for Clovis Army Airfield, New Mexico.	Off-installation ranges.
NARAII-CANAFB-0245	16-Dec-42	Routing and Record Sheet	F.W. Evans, Col., A.C., Dir., WO&M	Clearance Request for Four Ranges for Clovis Army Airfield, New Mexico.	Off-installation ranges.
NARAII-CANAFB-0246 - 0247	15-Nov-42	Teletype	Olds	Clearance requested of sites for bombing and gunnery ranges for Clovis AAB-Pattern Bombing Range, Pattern Gunnery Range, High Altitude Bombing Range and Aerial Gunnery Range.	Off-installation ranges.
NARAII-CANAFB-0248	10-Dec-42	Corres.	L.P. Whitten, Brig, General, U.S. Army, Director of Base Services and J.C. Shively, Col. Air Corps	Clearance of Pattern Gunnery Range, High Altitude Bombing Range and Pattern Bombing Range for Clovis Army Airfield, New Mexico [1st Ind]	Off-installation ranges.
NARAII-CANAFB-0249	No date	Map	War Department, Construction Division	Final Ownership Map-Clovis Army Air Field Precision Bombing Range	Off-installation ranges.
NARAII-CANAFB-0250	20-Feb-47	Corres.	Neal J. O'Brien, Colonel, AGD, Adjutant General	Guadalupe Gunnery Range, New Mexico [1st Ind]	Off-installation ranges.
NARAII-CANAFB-0251	20-Feb-48	Corres.	Robert Kauch, Brigadier General, USAF, Director of Air Installations, Office, Deputy Chief of Staff, Material	Guadalupe Gunnery Range, New Mexico	Off-installation ranges.
NARAII-CANAFB-0252	20-Feb-48	Corres.	Robert Kauch, Brigadier General, USAF, Director of Air Installations, Office, Deputy Chief of Staff, Material	Guadalupe Gunnery Range, New Mexico	Duplicate of Document Number NARAII-CANAFB 0251

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Document Number Range	Doc Date	Doc Type	Author/Author Organization	Document Title	Comments
NARAII-CANAFB-0253	27-Feb-48	Corres.	Robert Kauch, Brigadier General, USAF, Director of Air Installations, Office, Deputy Chief of Staff, Material	Guadalupe Gunnery Range, New Mexico (Federal) Public Lands [8th Ind]	Off-installation ranges.
NARAII-CANAFB-0254	31-Oct-47	Corres.	Henry K. Shadel, Chief, Real Estate Division	Guadalupe Gunnery Range, New Mexico (Federal) Public Lands	Off-installation ranges.
NARAII-CANAFB-0255	17-Nov-47; 25 Nov-47	Corres.	Leonard M. Cowley, Chief, Real Estate Division [1st Ind]; Colin C. Bickford, Assistant, Acquisition Division Real Estate [2nd Ind]	Guadalupe Gunnery Range, N Mex (Federal) Public Lands [1st Ind] and [2nd Ind]	Off-installation ranges.
NARAII-CANAFB-0256	28-Nov-47; No Date; 19-Dec-47	Corres.	Leonard M. Cowley, Chief, Real Estate Division [3rd Ind]; Henry K. Shadel, Chief, Real Estate Division [4th Ind]; M.D. Ferres, CWO, USAF, Asst Adjutant [5th Ind]	Guadalupe Gunnery Range, (Federal) Public Lands [3rd Ind], [4th Ind] and [5th Ind]	Off-installation ranges.
NARAII-CANAFB-0257	3-Feb-48	Corres.	W.R. Purpus, Major, USAF, Asst Adj Gen	Guadalupe Gunnery Range, New Mexico (Federal) Public Lands [6th Ind]	Off-installation ranges.
NARAII-CANAFB-0258	19-Feb-48	Corres.	J.K. Brock, Captain, A.C., Asst. Adj. Gen.	Guadalupe Gunnery Range, New Mexico (Federal) Public Lands [7th Ind]	Off-installation ranges.
NARAII-CANAFB-0259 - 0260	8-Dec-43	Corres.	Harold L. Ickes, Secretary of the Interior	Subject to existing rights and existing withdrawals, permission is hereby granted to the War Department to use the public lands in described areas for purpose stated, as long as military need therefore continue - but not beyond the expiration for the six month's period Proclamation No. 2487 of May 27, 1941.	
NARAII-CANAFB-0261	5-Aug-48	Corres.	H.E. Fisher, Colonel, USAF, Chief, Facilities Division, Directorate of Installations, Office, Deputy Chief of Staff, Material	Query on Reduction in Area of Guadalupe Bombing and Gunnery Range, New Mexico	Off-installation ranges.
NARAII-CANAFB-0262	5-Aug-48	Corres.	H.E. Fisher, Colonel, USAF, Chief, Facilities Division, Directorate of Installations, Office, Deputy Chief of Staff, Material	Query on Reduction in Area of Guadalupe Bombing and Gunnery Range, New Mexico	Duplicate of Document Number NARAII-CANAFB 0261

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Document Number Range	Doc Date	Doc Type	Author/Author Organization	Document Title	Comments
NARAII-CANAFB-0263	9-Jul-48	Corres.	L.J. Erler, Colonel, USAF, Chief, Installations Engineering Division, Directorate of Installations Office, Deputy Chief of Staff, Material	Real Property Utilization Inspection Report - Clovis Army Airfield, New Mexico [11th Ind]	
NARAII-CANAFB-0264	4-Aug-47	Corres.	Leonard M. Cowley, Chief, Real Estate Division	Real Property Utilization Inspection Report - Clovis Army Airfield, New Mexico	
NARAII-CANAFB-0265	26-Apr-48	Corres.	L.J. Erler, Colonel, USAF, Acting Director of Installations Office, Deputy Chief of Staff, Material	Guadalupe Gunnery Range, New Mexico (Federal) Public Lands [10th Ind]	Off-installation ranges.
NARAII-CANAFB-0266	19-Apr-48	Routing and Record Sheet	John R. Richards, Lt. Colonel, USAF, Assistant Executive, Operations Division	Guadalupe Gunnery Range, New Mexico (Federal) Public Lands	Off-installation ranges.
NARAII-CANAFB-0267 - 0268	16-Mar-48	Corres.	John A. Roberts, Lt. Col., USAF, Actg Chief of Staff	Conference Report: Guadalupe Bombing and Gunnery Range	Off-installation ranges.
NARAII-CANAFB-0269 - 0270	24-Mar-48	Corres.	D.W. Hutchison, Brigadier General, USAF, AC/S, A-3	Conference Report: Guadalupe Bombing and Gunnery Range [1st Ind]	Off-installation ranges.
NARAII-CANAFB-0271	13-Oct-43	Corres.	J.C. Shively, Col, A.C., Buildings and Grounds Section, Office, Ass't Chief Air Staff, M.M.D.	Second Air Force Range Requirements (1 October 1943)	Off-installation ranges.
NARAII-CANAFB-0272	29-Jul-44	Corres.	W.T. Abbott, Colonel, GSC for Harold A. McGinnis, Colonel Air Corps	Report: Maps and Data on Second Air Force Bombing and Gunnery Ranges. Transmittal letter for report.	Off-installation ranges.
NARAII-CANAFB-0273	15-Jan-43	Corres.	Robert A. Lovett, Assistant Secretary of War for Air	Memorandum transmitting agreement and explanatory map forming a part thereof, in settlement of the Pasco matter between Army and Navy. Clear agreement through IATCB.	Off-installation ranges.
NARAII-CANAFB-0274 - 0276	9-Jan-43	Corres.	Robert Olds, Major General, U.S. Army, Commanding General, Second Air Force; Frank D. Wagner, Rear Admiral, U.S.N., Commander, Fleet Air, Seattle	Coordination of Army Air Forces Operational Training and Naval Primary Training and Carrier Group Operational Training in Washington Valley Area.	Off-installation ranges.
NARAII-CANAFB-0277	11-Jan-43	Corres.	Fletcher, Admiral, USN	Approved with understanding that agreement will go into effect upon completion of full clearance and establishment of operating rights by the Army in the Horse Heaven Aerial Gunnery Range area.	Off-installation ranges.

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Document Number Range	Doc Date	Doc Type	Author/Author Organization	Document Title	Comments
NARAII-CANAFB-0278 - 0296	24-Aug-43	Report	Headquarters Second Air Force, Office of the Commanding General, Colorado Springs, Colorado	Second Air Force Bombing and Gunnery Range Requirements.	
NARA NATIONAL PERSONNEL RECORDS CENTER, ST. LOUIS, MO					
NARAPR-CANAFB-0001	6-Jul-42; 13-Jul-42	Corres.	H.H. Kinkade, 2d Lt., Army Air Forces, Actg Asst Adj Gen [3rd Ind]; Gustav A. Neuberg, 1st Lieut., Army Air Force, Actg Asst Adjutant General [4th Ind]	[3rd Ind], [4th Ind] To facilitate OTU training for heavy bombardment groups and combat crew replacement units, requesting three each trainer, serial gunnery type E-1 be allocated to the multiple stations for training purposes.	
NARAPR-CANAFB-0002	16-Jun-42; 23-Jun-42	Corres.	George W. Polk, Jr., Colonel, A.A.F. Commanding [1st Ind]; W.O. Briggs, Jr., 2nd Lt., Army Air Forces, Assistant, Air Force Section [2nd Ind]	[1st Ind] HQ has no information concerning desired gunnery ranges. [2nd Ind] Records indicate 140 each Trainer, Aerial Gunnery, Type E-1 procured and issued to flexible gunnery schools at Las Vegas, Panama City and Harlingen.	
NARAPR-CANAFB-0003	21-Apr-45	Corres.	R.E. Cole, Lt. Col., Corps of Engineers, District Engineer	Advance Notice on Sonic Bomb Scoring Devices at Eight Locations	
NARAPR-CANAFB-0004 through NARAPR-CANAFB-0005	22-Jan-46	Corres.	Headquarters Second Air Force, Colorado Springs, Colorado	Flights in Danger Areas	
NARAPR-CANAFB-0006	5-Apr-45	Corres.	H.H. Dunham, Maj, CE for Edward J. Sheridan, Major, Corps of Engineers, Assistant, Troop Facilities Branch, Military Construction Division	Construction Directive for Installation of Type E-1 Sonic Bomb Scoring Targets	
NARAPR-CANAFB-0007 through NARAPR-CANAFB-0010	11-Dec-44	Corres.	R.B. Batte, Lt. Col., C.E., Air Installations Division, Office of Ass't Chief of Air Staff, Material and Services	Poorman Ranges-Replacing of Old Style Motors, Includes [1st Ind] and tabulation showing locations of old style azimuth and elevation drive motors, amplitudyne and junction boxes shipped from the manufacturers up to and including 11 November 1944, also shows location of new type equipment shipped by manufacturers up to and including the same date.	
NARAPR-CANAFB-0011	11-Dec-43	Corres.	Floyd T. Snyder, Captain, Corps of Engineers, Head, Division Real Estate Suboffice.	Utilization of Discontinued Bombing Targets, Clovis Airfield, Clovis, New Mexico	

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Document Number Range	Doc Date	Doc Type	Author/Author Organization	Document Title	Comments
NARAPR-CANAFB-0012	4-Feb-44	Corres.	Floyd T. Snyder, Captain, Corps of Engineers, Head, Division Real Estate Suboffice.	Discontinuance of Bombing Ranges and Camp Site - Clovis Airfield, Clovis, New Mexico	
NARAPR-CANAFB-0013	23-Mar-44	Corres.	Floyd T. Snyder, Captain, Corps of Engineers, Head, Division Real Estate Suboffice.	Discontinuance of Bombing Ranges and Camp Site - Clovis Airfield, Clovis, New Mexico [2nd Ind]	
NARAPR-CANAFB-0014	28-Mar-44	Corres.	Leonard M. Cowley, Lt. Col., Corps of Engineers, Director, Real Estate Division	Discontinuance of Bombing Ranges and Camp Site - Clovis Airfield, Clovis, N.M. (Ltr fr SWD Real Estate Suboffice, Albuquerque, N.M. to SWD, dtd. 4 February 1944) [3rd Ind]	
NARAPR-CANAFB-0015	4-May-44	Corres.	John J. O'Brien, Colonel, Corps of Engineers, Chief, Real Estate Division	Discontinuance of Bombing Ranges and Camp Site - Clovis Airfield, Clovis, New Mexico (Basic: 4 Feb 44) [4th Ind]	
NARAPR-CANAFB-0016	23-May-44	Corres.	John M. Lyle, Lt. Col., A.C., Buildings and Grounds Section, Office, Ass't Chief Air Staff, MM&D	Discontinuance of Bombing Ranges and Camp Site - Clovis Army Air Field, New Mexico [5th Ind]	
NARAPR-CANAFB-0017 through NARAPR-CANAFB-0018	29-Jun-44	Corres.	W.C. Weaver, Lt. Colonel, CSC, Asst. Dept. Chief of Staff, Maintenance & Supply	Discontinuance of Bombing Ranges and Camp Site - Clovis AAF, Clovis, New Mex (Ltr. Div. Engr., Southwestern Div., Div. Real Estate Suboffice, Albuquerque, New Mex. To Div. Engr. Southwestern Div., Dallas, 2, Texas, 2/4/44, ARC.) [6th Ind]	
NARAPR-CANAFB-0019	8-Aug-44	Corres.	Hogo G. Erickson, Maj, AC, Actg Asst Adjutant General	Discontinuance of Bombing Ranges and Camp Site - Clovis Airfield [9th Ind]	
NARA ROCKY MOUNTAIN REGION, DENVER, CO					
NARARMR-CANAFB-0001	27-Oct-45	Corres.	W. Stuart Symington, Administrator	Bombing Range, Clovis. Reference Letter from Wayne Orandorff. Discuss property located southwest of Portales-has not yet been declared surplus to the needs of the War Department. Request for rights of former owners.	
NARARMR-CANAFB-0002	1-Oct-45	Corres.	Wayne D. Orendorff, Secretary-Manager	Discuss the opportunity for landowners to purchase back their property and how it will be handled.	
NARARMR-CANAFB-0003	7/194?	Map	U.S. Engineer Office, Albuquerque, NM	Clovis Airfield-Clovis, New Mexico, Jeep Type Moving Target - Plan, Sections and Index	

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AIR FORCE CIVIL ENGINEER SUPPORT AGENCY, EXPLOSIVE ORDNANCE DISPOSAL					
EOD-CANAFB-0001 through EOD-CANAFB-0075	1986-1987	Report	Cannon AFB EOD	EOD Reports 1986-87 Cannon AFB	
EOD-CANAFB-0076 through EOD-CANAFB-0089	0/0/1988	Report	Cannon AFB EOD	EOD Reports 1988 Cannon AFB	
EOD-CANAFB-0090 through EOD-CANAFB-0094	0/0/1989	Report	Cannon AFB EOD	EOD Reports 1989 Cannon AFB	
EOD-CANAFB-0095 through EOD-CANAFB-0143	0/0/1990	Report	Cannon AFB EOD	EOD Reports 1990 Cannon AFB	
EOD-CANAFB-0144 through EOD-CANAFB-0178	0/0/1991	Report	Cannon AFB EOD	EOD Reports 1991 Cannon AFB	
EOD-CANAFB-0179 through EOD-CANAFB-0308	1992-1993	Report	Cannon AFB EOD	EOD Reports 1992-93 Cannon AFB	
EOD-CANAFB-0309 through EOD-CANAFB-0373	0/0/1994	Report	Cannon AFB EOD	EOD Reports 1994 Cannon AFB	
EOD-CANAFB-0374 through EOD-CANAFB-0380	0/0/1995	Report	Cannon AFB EOD	EOD Reports 1995 Cannon AFB	
EOD-CANAFB-0381 through EOD-CANAFB-0417	0/0/1996	Report	Cannon AFB EOD	EOD Reports 1996 Cannon AFB	
EOD-CANAFB-0418 through EOD-CANAFB-0435	0/0/1997	Report	Cannon AFB EOD	EOD Reports 1997 Cannon AFB	
HISTORICAL RESEARCH AND RESPONSE CENTER (HRRC)					
HRRC-CANAFB-0001 - 0002	No date	Report	Ciolfi, Kathy, Historical Division, U.S. Army Chemical and Biological Defense Command	Areas Used by the Chemical Warfare Service During the 1900's.	
HRRC-CANAFB-0003 - 0004	28-Feb-45	Report	Statistical Control Division, Office of Management Control	Controlled and Other Critical Items of Equipment in Units and Depots - Army Air Forces and Assigned Arms and Services, Chemical Warfare Items, AAF Form No. 108A	
U.S. DEPARTMENT OF AGRICULTURE (USDA)					
USDA-CANAFB-0001	15-Aug-66	Aerial Photo	U.S. Dept of Agriculture	Project CIJ, Can 29536, Roll 3GG, Frame 62	Scale: 1:20,000

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Document Number Range	Doc Date	Doc Type	Author/Author Organization	Document Title	Comments
USDA-CANAFB-0002	15-Aug-66	Aerial Photo	U.S. Dept of Agriculture	Project CIJ, Can 29536, Roll 3GG, Frame 63	Scale: 1:20,000
USDA-CANAFB-0003	15-Aug-66	Aerial Photo	U.S. Dept of Agriculture	Project CIJ, Can 29536, Roll 3GG, Frame 135	Scale: 1:20,000
USDA-CANAFB-0004	15-Aug-66	Aerial Photo	U.S. Dept of Agriculture	Project CIJ, Can 29536, Roll 3GG, Frame 136	Scale: 1:20,000
ADMINISTRATIVE RECORD (ADMREC)					
ADMREC-CANAFB-0001	Dec-04	Report	USACE	Environmental Restoration Program Management Action Plan, Cannon AFB, New Mexico	
ADMREC-CANAFB-0002	Aug-83	Report	CH2M Hill	Installation Restoration Program Records Search for Cannon AFB, New Mexico	
ADMREC-CANAFB-0003	2008	Report	Air Force Special Operations Command	Facility Excellence Guide	
ADMREC-CANAFB-0004	No date	Map	Unknown	No Title	Land area map of Cannon AFB
ADMREC-CANAFB-0005	No date	Report	Unknown	Installation Natural Resources Management Plan, Cannon AFB and Melrose AFR	Portion of the INRMP; pages 3-1 to 4-13
ADMREC-CANAFB-0006	Feb-08	Report	Black & Veatch	General Plan, Cannon AFB, New Mexico	
ADMREC-CANAFB-0007	Nov-03	Report	Interstate Technology and Regulatory Council (ITRC)	Munitions Response Historical Records Review	
ADMREC-CANAFB-0008	Jan-08	Map	Department of the Air Force, Directorate of Civil Engineering DCS/P & R - Washington, D.C.	Cannon Air Force Base, New Mexico, Long Range Development Plan	Scale: 1"=533'
ADMREC-CANAFB-0009	No date	Map	New Mexico Department of Transportation	New Mexico Scenic Byways & Historic Trails	
INTERNET RESEARCH (INT)					
INT-CANAFB-0001	2-Sep-09	Website	Google Maps	http://maps/google.com	Google map of Cannon AFB
INT-CANAFB-0002	2-Sep-09	Website	United States Air Force	http://cannon.af.mil	Cannon AFB main website
CIVIL ENGINEERING (CIVENG)					
CIVENG-CANAFB-0001	No date	Map	Unknown	Plan of Ordnance Area, Supplement to Site Request 65-3	Scale: 1"=400'
CIVENG-CANAFB-0002	Apr-44	Map	Wilson & Co., Engineers	Water Distribution System, Clovis Airfield, Clovis, New Mexico, Record Drawings	Scale: 1"=400' Shows location of Building T-2150
CIVENG-CANAFB-0003	Aug-43	Map	Wilson & Co., Engineers	Building Index & Conventional Symbols, Clovis Airfield, New Mexico, Record Drawings, Sheet No. 2	Lists Skeet Range as Building T-2150
CIVENG-CANAFB-0004	1-Mar-54	Map	Office of the Installation Engineer	Building Legend, Clovis Air Force Base, Clovis, New Mexico	

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CIVENG-CANAFB-0005	Apr-71	Map	Department of the Air Force, Directorate of Civil Engineering DCS/P & R - Washington, D.C.	Location of Geodetic Survey Requirements For Electron Magnetic Compass Calibration Site, Clovis Air Force Base, Clovis, New Mexico	Scale: 1"=400'; shows rifle range
CIVENG-CANAFB-0006	May-61	Map	U.S. Army Corps of Engineers, Albuquerque District	Cannon Air Force Base, Horizontal & Vertical Control & Plane Sheet Layout, Clovis, New Mexico	Scale: 1"=400'
CIVENG-CANAFB-0007	Illegible	Map	Unknown	Recreational Facilities, Cantonment Area, Clovis Army Airfield, Clovis, New Mexico	Scale unknown
CIVENG-CANAFB-0008	16-Feb-65	Map	Unknown	Proposed Siting of 1. Open Storage Pads, 2. Rocket Storage, 3. Electro Explosive Cubicle, 4. New Fence, 5. Remove From F-1 Tab, 6. Storage Sheds, Cannon AFB, N.M.	Scale: 1"=200'

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HISTORICAL RECORDS RESEARCH SOURCES CONTACTED

CANNON AIR FORCE BASE CLOVIS, NM



**Prepared for:
United States Air Force**



**Prepared by:
U.S. Army Corps of Engineers
Omaha District**



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June 2008

Historical Records Research Sources Contacted Report

**CANNON AIR FORCE BASE
Clovis, NM**

Prepared For:

United States Air Force

Prepared by:

**U.S. Army Corps of Engineers
Omaha District**

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June 2008

HISTORICAL RECORDS RESEARCH SOURCES CONTACTED – CLOVIS AIR FORCE BASE, NM

EXECUTIVE SUMMARY

Historical Record Research (HRR) was conducted for Cannon Air Force Base (AFB) as part of the United States (U.S.) Air Force Military Munitions Response Program (MMRP) Comprehensive Site Evaluations (CSE) Phase Is at 37 Air Force Installations. In addition to Cannon AFB, searches at all sources listed in this report were also conducted for all names that Cannon AFB was known including: Portair Field; Clovis Municipal Airport; Clovis Army Air Field; and Clovis Air Force Base.

Background on the CSE/MMRP

At Cannon AFB and across the country, the U.S. Armed Forces have historically conducted live-firing, weapons testing, and munitions disposal to ensure military readiness. Decades of these munitions-related activities have resulted in the presence of unexploded ordnance (UXO), discarded military munitions (DMM), and Munitions Constituents (MC) on ranges and disposal areas throughout the country. UXO, DMM, and other materials potentially presenting an explosive hazard (MPPEH) are referred to as Munitions and Explosives of Concern (MEC). Due to changes in military structure and locations of installations, the military is currently using many of these ranges and disposal areas in ways that may be incompatible with the presence of MEC or MC contamination.

In 1986, Congress created the Defense Environmental Restoration Program to clean up sites owned or used by the U.S. Department of Defense (DoD). For nearly 20 years, this program has focused on cleanup of hazardous chemicals (e.g., solvents, oils, pesticides) in environmental media. In September 2001, DoD established the MMRP to address hazards associated with MEC and MC within areas that are no longer used for operational range activities. These non-operational range areas are called Munitions Response Areas (MRAs) and may encompass one or more discrete munitions response sites (MRSs). The goal of the Air Force MMRP is to make MRAs safe for reuse while protecting human health and the environment. In December 2001, the Congress passed the National Defense Authorization Act for Fiscal Year 2002 that required DoD to develop and maintain an inventory of MRSs. This requirement is codified in Title 10, Section 2710 of the U.S. Code (10 USC 2710).

A critical component of the Air Force MMRP is the CSE, which serves as the initial assessment of MRAs pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and the National Oil and Hazardous Substance Pollution Contingency Plan (NCP). The Air Force is implementing the CSE in two phases. The CSE Phase I fulfills the requirements of the CERCLA Preliminary Assessment and Phase II fulfills the requirements of the CERCLA Site Investigation.

Background on Cannon AFB

Cannon AFB home of the 27th Special Operations Wing, lies in the high plains of eastern New Mexico, near the Texas Panhandle. The base is eight miles west of Clovis, NM, about 190 miles east-south-east of Albuquerque, NM, and is 4,295 feet above sea level. It is named in honor of General John Kenneth Cannon (1892-1955) who held a variety of command positions in World War II. Previous names of Cannon AFB include: Portair Field; Clovis Municipal Airport; Clovis Army Air Field; and Clovis Air Force Base. Currently, approximately 2,600 active-duty members and civilians make up the work force at Cannon AFB, approximately 2100 Airmen and 500 civilian employees.

The host wing is the 27th Special Operations Wing (27 SOW) of the Air Force Special Operations Command (AFSPC), whose mission includes infiltration, exfiltration and re-supply of special operations forces; air refueling of special operations rotary wing and tiltrotor aircraft; and precision fire support. These capabilities support a variety of special operations missions including direct action, unconventional warfare, special reconnaissance, counter-terrorism, personnel recovery, psychological operations and information operations.

The history of the base began in the late 1920s, when a civilian passenger facility, Portair Field, was established on the site. Portair, a terminal for early commercial transcontinental flights, flew passengers in the Ford Trimotor "Tin Goose" by day, and used Pullman trains for night travel. In the 1930s, Portair was renamed Clovis Municipal Airport. During World War II, the first military unit to use the facility was a glider detachment. The 16th Bombardment Operational Wing, a training unit for B-24, B-17 and then B-29 heavy bombers, arrived in January 1943. On April 8, 1943, the base was renamed Clovis Army Air Field. Flying, bombing, gunnery and photographic reconnaissance classes continued through the end of World War II. By mid-1946, however, the airfield was placed on reduced operational status and flying activities decreased. The installation was deactivated in May 1947.

Results of the Historical Records Research

The results of the Historical Records Research for Cannon AFB included:

The National Archives Administration

- **NARA Archives I, Washington, DC** – The records maintained by NARA's Archives I predated Cannon AFB, and as a result no records were found for this report.
- **NARA Archives II College Park, MD** – The records found at NARA Archives II primarily documented the acquisition of off-installation ranges such as a Jeep Moving Target Range, the Clovis Air-to Ground Gunnery Range, the Melrose Bombing Range, the Guadalupe Bombing Range and several Precision Bombing Ranges. A few documents were related to acquisition and possible disposal of a Small Arms Gunnery Range at Cannon AFB containing 889.21 acres. It is not clear from the available documentation whether this range remained with Cannon AFB or if it was declared surplus and transferred to private ownership. No maps or aerial photographs were located at NARA II that could identify the past or present location of this small arms range.

- **NARA Rocky Mountain Region, Denver, CO** – Documents copied at NARA Rocky Mountain Region also primarily documented the off-installation ranges. One map was located for the Jeep Moving Target Range, an off-installation range. No documents were found for potential MMRP sites on Cannon AFB.
- **National Personnel and Records Center, St. Louis, MO** – Correspondence was found that requested a Sonic Bombing Scoring Range be constructed to Cannon AFB and several other ranges. It appears that this range may have become the Melrose Bombing Range, an off-installation range for Cannon AFB. The remainder of the documents involved the identification of off-installation ranges for disposal.

U.S. Army Corps of Engineers

- **USACE Topographic Engineering Center and Image Office, Alexandria, VA** – The USACE Topographical Engineering Center and Image Office was contacted about its capabilities to support the acquisition of historical aerial photographs for this project. Unfortunately, the office did not have a collection of historical aerial photographs for the installations under investigation; it was unable to query its database to determine an inventory of available aerial photographs; and its image inventory does not include historical aerial photographs maintained by NARA or other archives.
- **USACE Office of History, Alexandria, VA** – The only documents found involved off-installation ranges. One document referenced the Clovis Ground Gunnery and Small Arms Range.
- **USACE St. Louis District, St. Louis, MO** – Maps from 12-Feb-52 and 1-Oct-57 were copied that showed an ordnance area at the eastern of Cannon AFB. A third map was found titled, *Clovis Air Force Base-Vicinity Map Wind Analysis Airfield Pavement*, for the period January 1945 through December 1945, that shows the Clovis AFB Small Arms Range south of the present day installation.

U.S. Army

- **U.S. Army Research, Development and Engineering Command, Aberdeen, MD** – Two sources of historical information were researched at the U.S. Army Research, Development, and Engineering Command at Edgewood Arsenal, MD.
 - **Historical Research and Response Center** – Two documents relating to chemical warfare were found at the Historical Research and Response Center (HRRC) for Cannon AFB. The first was prepared by the HRRC staff and is titled *Areas Used by the Chemical Warfare Service During the 1900's*, and is undated. This report summarized the data on the then Clovis Field reported in a Cross Index, dated 4 Aug-43 memo, "The following named units having departed their stations with individual and housekeeping equipment only, it is suggested that their Apparatus, Decontaminating, Power Driven be reassigned as indicated. From: 91st Depot Repair Sq. to 740th Bomb Sq., Clovis AAB, Clovis, New Mexico." The second documents is from the AAF, 234th Air Base Unit, Section D, Mnt & Sup, and lists on 28 Feb 1945 chemical equipment present to include 1 M4 HS Vapor Detector Kit. The location where the materiel were stored or expended was not provided in the documentation.
 - **Edgewood Chemical Biological Center Technical Library** – Based on the recommendation of the Edgewood Chemical Biological Center Technical Library staff, no research was conducted at this facility.

- **U.S. Army Center of Military History, Fort McNair, VA** – The U.S. Army Center of Military History contained no information relating to MMRP issues.
- **U. S. Army Institute of Military History, Carlisle Barracks, PA** – The reference historian at the U.S. Army Institute of Military History, Carlisle Barracks, PA reported that nothing was found in the facility's collection for Clovis AFB.

U.S. Air Force

- **Air Force Historical Research Agency** – Records found during research at the Air Force Historical Research Agency (AFHRA) consisted of Unit Histories and Base Daily Journals from the 1940s and 1950s. A September 1943 Base History, noted that Chemical Warfare Training began 28-Sep-43 with the decontamination and incendiary bomb area at the south end of the base. The gas chamber was enlarged to twenty by forty feet and divided into two equal sections each fitted with two air locks. One section was to be used for tear gas while the other section is for the use of chlorine gas or other toxic gases. An incendiary course was completed consisting of a bomb dropping device for the purpose of showing the way in which an incendiary bomb acts on being dropped from a plane, and two buildings for demonstration methods of combating incendiaries. One building is unprotected while the other is provided with various protective devices. A decontamination course was built, consisting of four lanes, each approximately fifteen by fifty yards in size. These courses were to be used in demonstrating the decontamination of persistent chemical warfare agents on runways, shell holes and airplanes. An undated Unit History with information from December 1943 and January 1944 discussed: 1. Chemical Warfare Training using Mustard Gas to be conducted in the southwest corner of the base beyond the ordnance area; 2. Melrose and Nara Vista ranges cleared of scrap; 3. Ground Gunnery Range used for training combat crews; 4. Chemical Warfare decontamination training area changed to an area nearer to station hospital; 5. Ground Gunnery Range consisted of carbine range, two pistol ranges, a submachine gun range, four skeet ranges, an overhead jeep range, a malfunctions range (.50 cal machine guns), and a jeep range. The *April 1944 Historical Narrative of the Army Air Field - Clovis, New Mexico* reported that the Chemical Warfare Training area was scraped to remove brush and high weeds and a Mustard Gas Shed was constructed for storage. A June 1955 Unit History reported that the small arms ranges south of Clovis AFB were cleaned up and put back in operation.
- **Air Force History Support Office** – The Air Force History Support Office located at Bolling AFB in Washington, DC contained a subset of the records maintained by the Air Force Historical Research Agency. No new information was found at this facility.
- **Air Force Safety Center** – The Air Force Safety Center, located at Kirtland AFB, Albuquerque, NM, formerly maintained the Information Preservation System. The Information Preservation System contained scanned Air Force historical documents obtained from both the Air Force Safety Center and non-Air Force archives. Unfortunately, due to a lack of funding, the Information Preservation System is no longer available for research.
- **Air Force Civil Engineer Support Agency** – The Air Force Civil Engineer Support Agency maintains historic records for Explosive Ordnance Disposal for Cannon AFB which were copied. These records consisted of responses to flightline emergencies, assistance to local and state police, responses to on-installation to suspected Improvised

Explosive Devices, clearance actions at active ranges (off-installation), routine training, and routine ordnance disposal. No information was found on potential MMRP sites at Cannon AFB.

Department of Defense

- **Defense Technical Information Center** – The DoD’s Defense Technical Information Center (DTIC) was accessed. The DTIC consists of two databases: www.dtic.mil and stinet.dtic.mil. Both databases were searched and no documents relevant to this report were found.

Library of Congress

- **Library of Congress** – The Library of Congress on-line catalog was reviewed and no documents related to this report were found.

Aerial Photographs

- Aerial photographs were obtained from 1966 for Cannon AFB. A 1951 aerial photograph has been ordered from NARA but not received as of this date. No aerial photographs earlier than 1951 were found for Cannon AFB. The 1966 aerial photographs obtained for Cannon AFB revealed the Ordnance Storage Area and what appeared to be a shooting-in-butt directly north of runway 30.

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Appendix A – Document Index

Attachment – Supporting Document

ACRONYMS AND ABBREVIATIONS

AFCESA	Air Force Civil Engineer Support Agency
AFHRA	Air Force Historical Research Agency
AFHSO	Air Force Historical Studies Office
AFSC	Air Force Safety Center
ANG	Air National Guard
APSRs	Aerial Photography Summary Record System
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CMA	Chemical Materials Agency
CMH	Center of Military History
CSE	Comprehensive Site Evaluation
CSIL	Commercial Satellite Imagery Library
DDR&E	Director, Defense Research & Engineering
DMM	Discarded Military Munitions
DoD	Department of Defense
DTIC	Defense Technical Information Center
ECBC	Edgewood Chemical Biological Center
EOD	Explosive Ordnance Disposal
EROS	Earth Resources Observation Systems
ESIC	Earth Science Information Service
FAA	Federal Aviation Agency
FHA	Farmers Home Administration
FSA	Farm Security Administration
GLO	General Land Office
GSA	General Services Administration
HRR	Historical Records Research
HRRC	Historical Research and Response Center
HRR-SC	HRR Sources Contacted
IPS	Information Preservation System
IRIS	Inferential Retrieval Indexing System
ITRC	Interstate Technology and Regulatory Council
ITSI	Innovative Technological Solutions, Inc.
MARC	Machine-Readable Cataloging
MC	Munitions Constituents
MEC	Munitions and Explosives of Concern
MMRP	Military Munitions Response Program
MPPEH	Materials Potentially Presenting an Explosive Hazard
MRA	Munitions Response Area
MRS	Munitions Response Site
NARA	National Archives and Records Administration
NCP	National Oil and Hazardous Substance Pollution Contingency Plan
NGA	National Geospatial Agency
NPRC	National Personnel Records Center
OCE	Office of the Chief of Engineers
OCE/P	Office of the Assistant Chief of Engineers

ACRONYMS AND ABBREVIATIONS (concluded)

PDF	Portable Document Format
RDECOM	Research, Development and Engineering Command
RFC	Reconstruction Finance Corporation
RG	Record Group
RSAF	Republic of Singapore Air Force
SBCCOM	Soldier and Biological Chemical Command
SOS	Service of Supply
SSC	Soldiers Systems Center
STINET	Scientific & Technical Information Network
TAC	Tactical Air Command
TEC	Topographic Engineering Center
TIO	TEC Imagery Office
TLI	TLI Solutions, Inc.
U.S.	United States
USACE	U.S. Army Corps of Engineers
USAMHI	U.S. Army Institute of Military History
USDA	U.S. Department of Agriculture
USGS	U.S. Geological Survey
UXO	Unexploded Ordnance
WAA	War Assets Administration

1.0 INTRODUCTION

TLI Solutions, Inc. (TLI) is a subcontractor to Innovative Technological Solutions, Inc. (ITSI) who is, in turn, under contract with the United States (U.S.) Army Corps of Engineers (USACE) Omaha District, to conduct U.S. Air Force Military Munitions Response Program (MMRP) Comprehensive Site Evaluations (CSE) Phase Is at 37 Air Force installations. TLI has been tasked with conducting the historical records research (HRR) component of the CSE Phase Is for the 37 Air Force facilities. This HRR Sources Contacted (HRR-SC) Report summarizes research that was conducted for the 37 Air Force facilities. This HRR Sources Contacted (HRR-SC) Report summarizes research that was conducted for Cannon Air Force Base (AFB) located in Clovis, NM. Searches at all sources listed in this report were also conducted for previous names identified for Cannon AFB at one time throughout the history of the installation.

1.1 Background

In 1986, Congress created the Defense Environmental Restoration Program to clean up sites owned or used by the U.S. Department of Defense (DoD). For nearly 20 years, this program has focused on cleanup of hazardous chemicals (e.g., solvents, oils, pesticides) in environmental media. In September 2001, DoD established the MMRP to address hazards associated with Munitions and Explosives of Concern (MEC) and Munitions Constituents (MC) within areas that are no longer used for operational range activities. These non-operational range areas are called Munitions Response Areas (MRAs) and may encompass one or more discrete munitions response sites (MRSs). The goal of the Air Force MMRP is to make MRAs safe for reuse while protecting human health and the environment. In December 2001, the Congress passed the National Defense Authorization Act for Fiscal Year 2002 that required DoD to develop and maintain an inventory of MRSs. This requirement is codified in Title 10, Section 2710 of the U.S. Code (10 USC 2710).

A critical component of the Air Force MMRP is the CSE, which serves as the initial assessment of MRAs pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and the National Oil and Hazardous Substance Pollution Contingency Plan (NCP). The Air Force is implementing the CSE in two phases. The CSE Phase I fulfills the requirements of the CERCLA Preliminary Assessment and Phase II fulfills the requirements of the CERCLA Site Investigation.

1.2 Purpose of this HRR-SC Report

The purpose of this HRR-SC Report is to support the development of the CSE Phase I for AFP 6. At AFP 6 and across the country, the U.S. Armed Forces have historically conducted live-firing, weapons testing, and munitions disposal to ensure military readiness. Decades of these munitions-related activities have resulted in the presence of unexploded ordnance (UXO), discarded military munitions (DMM), and MC on ranges and disposal areas throughout the country. UXO, DMM, and other materials potentially presenting an explosive hazard (MPPEH) are referred to as MEC. Due to changes in military structure and locations of installations, the military is currently using many of these ranges and disposal areas in ways that may be incompatible with the presence of MEC or MC contamination.

1.3 Cannon AFB

Location:	Cannon AFB is located five miles west of Clovis, NM, about 190 miles east-south-east of Albuquerque, NM.
Date Established:	1 Jun 1942
Construction Began:	3 Sep 1942
Date of Beneficial Occupancy:	c 24 Dec 1942.
Date of Current Name:	8 Jun 1957
Name:	Named in honor of General John Kenneth Cannon (1892-1955). General Cannon received his wings in 1922 and held a variety of command positions in World War II, including command of all air operations for the invasion of Southern Europe in Aug 1944 and Commander in Chief, Allied Air Forces in the Mediterranean Theatre. In 1950 he returned to Europe as Commander in Chief of USAFE. General Cannon retired in 1954 as Commanding General, Tactical Air Command.
Previous Names:	Portair Field, 1920s; Clovis Municipal Airport, 1930s; Clovis Army Air Field, 8 Apr 1943; Clovis Air Force Base, 15 Nov 1951.

History: Cannon Air Force Base, a major Air Combat Command installation, lies in the high plains of eastern New Mexico, near the Texas Panhandle. The base is six miles west of Clovis, NM and is 4,295 feet above sea level.

Cannon AFB was the home of the 27th Fighter Wing. The primary mission of the 27th Fighter Wing was to maintain an F-16 Fighting Falcon fighter wing capable of day and night combat operations for war fighting commanders, world-wide, at any time. In 2005, however, the DoD's BRAC Recommendations called for Cannon AFB to close and the 27th's aircraft to be distributed.

The history of the base began in the late 1920's, when a civilian passenger facility, Portair Field, was established on the site. Portair, a terminal for early commercial transcontinental flights, flew passengers in the Ford Trimotor "Tin Goose" by day, and used Pullman trains for night travel. In the 1930's Portair was renamed Clovis Municipal Airport.

After the United States entered World War II, the first military unit to use the facility was a glider detachment. The 16th Bombardment Operational Wing, a training unit for B-24, B-17 and then B-29 heavy bombers, arrived in January 1943. On April 8, 1943, the base was renamed Clovis Army Air Field. Flying, bombing, gunnery and photographic reconnaissance classes continued through the end of World War II. By mid-1946, however, the airfield was placed on reduced operational status and flying activities decreased. The installation was deactivated in May 1947.

The base was reactivated and assigned to Tactical Air Command (TAC) in July 1951. The first unit, the 140th Fighter Bomber Wing, arrived in October of that year. Air National Guard (ANG) elements from Colorado, Utah and Wyoming made up the 140th, which flew the P-51

“Mustang” fighter. The 140th formally reactivated the airfield on November 15, 1951, as Clovis Air Force Base. At the end of 1952, the 140th returned to Air National Guard control. The 50th Fighter Bomber Wing, another fighter unit, was activated at the base January 1, 1953. The F-86 “Sabre” began arriving in early 1953. The 50th Fighter Bomber Wing served at the base until it was transferred overseas in August of that year.

Clovis AFB’s second F-86 unit was the 388th Fighter Bomber Wing, activated in November 1953. The 388th was sent overseas in October 1954. It was replaced at the base by the 312th Fighter Bomber Group, which flew F-84s before switching to the F-86 in 1955.

A second fighter bomber group, the 474th, transferred to Clovis AFB from Taegu, Korea, in December 1954. The base became a major training installation for “Sabre” pilots. The first F-100 “Super-Sabre” arrived in December 1956. The F-100 became the principal base aircraft for the next 12 years.

Several changes occurred at Clovis AFB in 1957. On June 8, the base was renamed Cannon AFB in honor of the late General John K. Cannon, a former commander of Tactical Air Command. In October of the same year, the 312th and 474th Fighter Bomber Groups were redesignated tactical fighter wings. The 832nd Air Division was activated to oversee their activities.

Cannon AFB F-100s and crews deployed to Taiwan during the 1958 Formosa Crisis. They also deployed to Turkey the same year. In 1959, the 312th was deactivated and replaced at Cannon by the 27th Tactical Fighter Wing. The 27th, another F-100 unit, transferred to Cannon from Bergstrom AFB, Texas. Succeeding major deployments of Cannon AFB’s F-100s took place during the 1961 Berlin Crisis and the 1962 Cuban Crisis.

Units from Cannon AFB deployed the first F-100 squadron to Thailand in 1962-1963, and Vietnam in 1964. In 1965, other deployments to Thailand and Vietnam followed. The 474th Tactical Fighter Wing moved to Luke AFB, Arizona, in September 1965. In December 1965, the base’s mission changed to a replacement training unit. The 27th Tactical Fighter Wing became the largest such unit in TAC.

After three years of F-100 replacement training operations, the 27th began conversion to the F-111. In late 1969, the wing received its first F-111E aircraft and in July 1972, the last operational Air Force F-100s were transferred to the Air National Guard. In mid-1972, the 27th completed conversion to the highly sophisticated F-111D, after ferrying the F-111Es to England. There were three operational fighter squadrons and one training squadron.

The 27th also trained forward air controllers and air liaison officers in AT-33s from 1968 to 1973. The 481st Tactical Fighter Training Squadron was deactivated in January 1980 and the 524th Tactical Fighter Squadron was redesignated the 524th Tactical Fighter Training Squadron. That left the 27th with one training and two operational fighter squadrons.

December 28, 1988, marked the beginning of Cannon AFB’s expansion as a result of decisions made by the Secretary of Defense’s Commission on Base Realignment and Closures. On April

1, 1990, the 428th Fighter Training Squadron was reactivated at Cannon AFB as part of the installation's expanding mission. With the reactivation of the 428th FTS, FB-111 aircraft from Strategic Air Command arrived at Cannon AFB and were converted to F-111Gs. F-111Es replaced Cannon AFB's squadron of F-111Gs when they were retired.

On June 1, 1992, Cannon AFB and the 27th Fighter Wing were integrated into Air Combat Command as part of the reorganization of Tactical Air Command and Strategic Air Command. Three squadrons of F-111Fs arrived from Royal Air Force Lakenheath, England, replacing Cannon AFB's fleet of F-111Ds in 1993. The 430th Electronic Combat Squadron's 25 EF-111A Ravens began arriving from the 390th ECS, Mountain Home, Idaho, and the 42nd ECS, RAF Upper Heyford, England in May 1992. The 430th ECS was replaced by the 429th ECS in June 1993.

With the retirement of the F-111, Cannon AFB became home for 69 F-16s in March 1995. The first operational flight of the F-16 lifted off Cannon AFB's runway in September 1995. Three fighter squadrons--522 FS, 523 FS, and 524 FS--were fully equipped with F-16s by August 1996. Following a period of training, the first operational squadron was ready for combat operations around the world in January 1997. The wing also maintained its EF-111 mission as the only Raven unit in the Air Force.

The United States Air Force officially retired the EF-111A June 30, 1998. This retirement ended the 429 ECS' 2,780 days and 32 rotations of continuous support of Operation SOUTHERN WATCH. As a result of the retirement, the 429th Electronic Combat Squadron was inactivated June 19, 1998.

On September 15, 1998, the 428th Fighter Squadron was reactivated at Cannon AFB. The PEACE CARVIN III squadron is a hybrid US Air Force/Republic of Singapore Air Force (RSAF) F-16 Fighter Squadron manned by highly experienced instructor pilots, maintenance and support personnel. The squadron should be fully equipped by March 2000 and will operate 12 RSAF-owned Block 52, F-16C/Ds. With approximately 25 Air Force personnel and 140 RSAF personnel, the unit is responsible for continuation training of Singapore personnel in rapid deployment and tactical employment of the F-16 throughout a wide spectrum of missions including air-to-air, joint maritime and precision air-to-ground weapons delivery.

(Source: Mueller, Robert, *Air Force Bases Volume I: Active Air Force Bases Within the United States of America on 17 September 1982*, United States Air Force Historical Research Center, Office of Air Force History, United States Air Force, Washington, D.C., 1989 and <http://www.globalsecurity.org/military/facility/cannon.htm>)

1.4 Document Numbering System

TLI utilized a document numbering system to identify the source of all documents that were collected during the HRR-SC Report activities. Each page of every document that was collected was numbered for document control purposes.

Each page of every document was labeled in the lower right corner with a unique alpha-numeric designation. The first three to seven letter prefix to each document number serves as a code that

identifies the source of the document (government agency or other organization from which a copy of the document was obtained). The second five to seven letter group identifies the Air Force Installation. The four digit number that follows the second letter group represents the document page number.

“NARAII-PETA FB-0001” is an example document number. This number identifies the first page of the document collection from the National Archives and Records Administration II located in College Park, Maryland, for Cannon AFB.

The chart below lists the three to seven letter prefix codes that were used to identify the sources of the documents.

Code	Source
AFHRA	Air Force Historical Research Agency, Maxwell AFB, AL
AFHSO	Air Force History Support Office, Bolling AFB, D.C.
AFSCK	Air Force Safety Center Kirtland AFB, NM
ARMCBD	U.S. Army Soldier Chemical and Biological Defense Command, Aberdeen Proving Ground, MD
ARMCMH	U.S. Army Center of Military History, Ft. McNair, D.C.
ARMEA	U.S. Army Environmental Center, Edgewood Arsenal, MD
COEHO	USACE Office of History, Alexandria, VA
COEOM	USACE, Omaha District
COESL	USACE, St. Louis District
COETEC	USACE Topographic Engineering Center, Alexandria, VA
DTIC	Defense Technical Information Service
EOD	Air Force Civil Engineer Support Agency, Explosive Ordnance Disposal
INT	Internet Research
LIBCON	Library of Congress
NARA I	National Archives and Records Administration (NARA) I, Washington, D.C.
NARA II	NARA II, College Park, MD
NARABOS	NARA Northeast Region, Boston, MA
NARAMAR	NARA Mid Atlantic Region, Philadelphia, PA
NARANY	NARA Northeast Region, New York City, NY
NARAPAC	NARA Pacific Region, California
NARAPAR	NARA Pacific Alaska Region, Anchorage, AK
NARAPR	NARA National Personnel Records Center, St. Louis, MO
NARARMR	NARA Rocky Mountain Region, Denver, CO
NARASE	NARA Southeast Region, Atlanta, GA
NARASW	NARA Southwest Region, Fort Worth, TX

Code	Source
NHC	Naval History Center, Operational Archives Branch
USDA	U.S. Department of Agriculture
USGS	U.S. Geological Survey

Documents were logged into a Supporting Document Index (Index) as they were received from the field research teams in order to record the document sources. The Index is designed to serve as a document control tool to track documents that were collected at each Historical Records Research source. The Index is not designed to serve as an inventory of all individual documents, although it can be helpful as a general reference.

An entry in the Index that consists of a document number range represents either a single multi-page document or several documents that pertain to a single subject. The information in the comment field will indicate if more than one document is represented by a number range. Where more than one document is represented by a document number range, only the date and author from the first document in the group is provided in the index.

1.5 Report Organization

The HRR-SC Report is organized into the following sections:

Section 2.0: National Archives and Records Administration – This section provides information on the activities related to the review and collection of documents from the National Archives and Records Administration (NARA) for Cannon AFB. It discusses the research efforts at the NARA offices in Washington, D.C.; the Regional Archives; and the National Personnel Records Center.

Section 3.0: U.S. Army Corps of Engineers – This section provides information on the activities related to the review and collection of documents from the USACE for Cannon AFB. It discusses the research efforts at the USACE Topographical Engineering Center in Alexandria, VA, the USACE Historian’s Office also in Alexandria, VA, and the USACE St. Louis District.

Section 4.0: U.S. Army – This section provides information on the activities related to the review and collection of documents from the U.S. Army for Cannon AFB. It discusses the research efforts at the U.S. Army Research, Development and Engineering Command, the Edgewood Arsenal, the U.S. Army Center of Military History, and the U.S. Army Institute of Military History.

Section 5.0: U.S. Air Force – This section provides information on the activities related to the review and collection of documents from the U.S. Air Force for Cannon AFB. It discusses the research efforts at: the Air Force Historical Research Agency at Maxwell AFB, AL; the Air Force History Support Office at Bolling AFB, Washington, D.C.; the Air Force Safety Center, Kirtland AFB, NM; and the Air Force Civil Engineer Support Agency, Tyndall AFB, FL.

Section 6.0: Department of Defense – This section provides information on the activities related to the review and collection of documents from the sources within the DoD not covered by other sections for Cannon AFB. This section includes only information from the Defense Technical Information Center.

Section 7.0: Library of Congress – This section provides information on the activities related to the review and collection of documents from the Library of Congress for Cannon AFB.

Section 8.0: Aerial Photographs – This section provides information on the activities related to the review and collection of aerial photographs.

Section 9.0: Summary of the Records Research – This section summarizes the results of the historical records research.

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2.0 NATIONAL ARCHIVES AND RECORDS ADMINISTRATION

This section provides information on the activities related to the review and collection of documents from the National Archives and Records Administration (NARA).

2.1 Introduction to NARA

NARA is an independent agency of the U.S. Federal Government charged with preserving and documenting government and historical records. It is also charged with allowing public access to those documents.

NARA administers a nationwide network of facilities that serves both the public and federal agencies. NARA facilities in the Washington D.C. area hold records from facilities throughout the world. In addition, eleven Regional Archives cover different territories that include specific states. NARA facilities are located in 14 major cities throughout the continental U.S.

Record Groups - NARA's holdings are classified into "Record Groups" reflecting the governmental department or agency from which they originated. The records include paper records, microfilmed records, still pictures, motion pictures, and electronic media. NARA arranges its holdings according to the archival principle of *provenance*. This principle provides that records be:

- attributed to the agency that created or maintained them and
- arranged there under as they were filed when in active use.

In the NARA, application of the principle of provenance takes the form of **numbered Record Groups**, with each Record Group comprising the records of a major government entity, usually a bureau or an independent agency. For example, *National Archives Record Group 4* is *Records of the U.S. Food Administration*. The number assigned to a Record Group reflects the order in which it was established by the NARA.

Some record sets may be further designated by Subgroups which are a set of series that are related by their common origin, function or activity. Subgroups may be formed on the basis of date or geography.

Series - Within a Record Group, the records of a government agency are organized into **series**. Each series is a set of documents arranged according to the creating office's filing system or otherwise kept together by the creating office because they:

- relate to a particular subject or function,
- result from the same activity,
- document a specific kind of transaction,
- take a particular physical form, or
- have some other relationship arising out of their creation, receipt, or use.

Records are typically designated by a file unit. For example, for paper records, the file unit may be a folder or bound volume; for microfilm, it is the roll. [NOTE: The National Personnel

Records Center does not maintain on-line finding aids, nor does it organize its records in the same manner as other NARA facilities.

2.1.1 NARA Research Methodology

Research at NARA consisted of three main steps. First, researchers reviewed NARA’s on-line resources to identify the Record Groups that are available at NARA locations and to select Record Groups that may contain records related to the site. After reviewing the on-line sources, the researchers conducted telephone interviews with NARA archivists to further refine the list of RGs that should be reviewed, and to obtain any additional research suggestions based on the archivists’ corporate knowledge. Finally, trips were made to the archives in order to meet with archivists and review finding aids. Documents were then reviewed and photocopies of selected documents were made.

2.1.2 NARA Record Groups Selected for Review

The Record Groups (RG) reviewed from NARA for this HRR-SC Report included RGs listed in guidance provided by both the USACE (*Environmental Cleanup at Former and Current Military Sites: A Guide to Military Research* Harper, Michael W.; Reunhardt, Thomas R.; Sude, Barry R., Office of History and Environmental Division, Headquarters, U.S. Army Corps of Engineers Alexandria, Virginia; EP 870-1-64) and the Interstate Technology and Regulatory Council (ITRC) (*Munitions Response: Historical Records Review*, Interstate Technology & Regulatory Council, Unexploded Ordnance Team, November 2003). The list of RGs reviewed includes the following. Please note that not all RGs are available at all NARA Regional Offices or at the National Personnel Record Center.

No.	RG No.	Title	Source
1.	16	Records of the Office of the Secretary of Agriculture	ITRC, USACE
2.	18	Records of the Army Air Forces	ITRC, USACE
3.	26	Records of the U.S. Coast Guard	ITRC, USACE
4.	30	Records of the Bureau of Public Roads	ITRC, USACE
5.	35	Records of the Civilian Conservation Corps	USACE
6.	38	Records of the Office of the Chief of Naval Operations	ITRC, USACE
7.	48	Records of the Office of the Secretary of the Interior	ITRC, USACE
8.	49	Records of the Bureau of Land Management	ITRC, USACE
9.	52	Records of the Bureau of Medicine and Surgery	ITRC
10.	57	Records of the U.S. Geological Survey	ITRC
11.	69	Records of the Work Projects Administration	ITRC, USACE
12.	71	Records of the Bureau of Yards and Docks	ITRC, USACE
13.	72	Records of the Bureau of Aeronautics	ITRC, USACE
14.	74	Records of the Bureau of Ordnance (Navy)	ITRC, USACE
15.	77	Records of the Office of the Chief of Engineers	ITRC, USACE
16.	80	General Records of the Department of the Navy, 1798-1947	ITRC, USACE
17.	92	Records of the Office of the Quartermaster General	ITRC, USACE
18.	94	Records of the Adjutant General's Office 1780-1917	ITRC, USACE
19.	96	Records of the Farmers Home Administration	USACE
20.	98	Records of the U.S. Army Commands, 1784-1821	USACE
21.	107	Records of the Office of the Secretary of War	ITRC, USACE
22.	111	Records of the Office of the Chief Signal Officer	ITRC, USACE

No.	RG No.	Title	Source
23.	112	Records of the Office of the Surgeon General (Army)	ITRC, USACE
24.	121	Records of the Public Buildings Service	ITRC
25.	127	Records of the U.S. Marine Corps	ITRC, USACE
26.	135	Records of the Public Works Administration	USACE
27.	143	Records of the Bureau of Supplies and Accounts (Navy)	ITRC, USACE
28.	145	Records of the Farm Service Agency	ITRC
29.	153	Records of the Office of the Judge Advocate General (Army)	ITRC, USACE
30.	156	Records of the Office of the Chief of Ordnance	ITRC, USACE
31.	159	Records of the Office of the Inspector General (Army)	ITRC, USACE
32.	160	Records of the U.S. Army Service Forces (World War II)	ITRC, USACE
33.	162	General Records of the Federal Works Agency	ITRC, USACE
34.	165	Records of the War Department General and Special Staffs	ITRC, USACE
35.	168	Records of the National Guard Bureau	ITRC, USACE
36.	175	Records of the Chemical Warfare Service	ITRC, USACE
37.	177	Records of the Chiefs of Arms	ITRC
38.	179	Records of the War Production Board	USACE
39.	181	Records of Naval Districts and Shore Establishments	ITRC, USACE
40.	197	Records of the Civil Aeronautics Board	ITRC
41.	207	General Records of the Department of Housing and Human Development	ITRC
42.	218	Records of the U.S. Joint Chiefs of Staff	ITRC
43.	225	Records of the Joint Army and Navy Boards and Committees	ITRC, USACE
44.	234	Records of the Reconstruction Finance Corporation	USACE
45.	237	Records of the Federal Aviation Administration	ITRC
46.	240	Records of Smaller War Plants Corporation	USACE
47.	250	Records of the Office of War Mobilization and Reconversion	ITRC
48.	269	Records of the General Services Administration	ITRC, USACE
49.	270	Records of the War Assets Administration	ITRC, USACE
50.	287	Publications of the U.S. Government	USACE
51.	291	Records of the Federal Property Resources Service	ITRC, USACE
52.	319	Records of Army Staff	ITRC, USACE
53.	330	Records of the Office of the Secretary of Defense	ITRC
54.	334	Records of Interservice Agencies	ITRC, USACE
55.	335	Records of the Office of the Secretary of the Army	USACE
56.	336	Records of the Office of the Chief of Transportation	USACE
57.	337	Records of Headquarters Army Ground Forces	ITRC, USACE
58.	338	Records of U.S. Army Commands	ITRC, USACE
59.	340	Records of the Office of the Secretary of the Air Force	USACE
60.	341	Records of Headquarters U.S. Air Force (Air Staff)	ITRC, USACE
61.	342	Records of the U.S. Air Force Commands, Activities, and Organizations	ITRC, USACE
62.	373	Records of the Defense Intelligence Agency	ITRC
63.	391	Records of the U.S. Army Mobile Units, 1821-1942	USACE
64.	393	Records of the U.S. Army Continental Commands 1821-1920	ITRC, USACE
65.	394	Records of the U.S. Army Continental Commands, 1920-1942	ITRC, USACE
66.	395	Records of the U.S. Army Overseas Operations & Commands 1898-1942	ITRC
67.	407	Records of the Adjutant General's Office 1917-	ITRC, USACE
68.	428	Records of the General Records of the Department of Navy, 1947-	ITRC, USACE
69.	429	Records of the Organizations in the Executive Office of the President	USACE

The results of the research process for each NARA facility are described below.

2.2 NARA Washington, D.C.

Two NARA archives are found in the Washington, D.C. area: Archives I in Washington, D.C. and Archives II in College Park, MD.

2.2.1 NARA Archives I, Washington, D.C.

The first NARA archive investigated was the facility in Washington, D.C., Archives I:

National Archives and Records Administration, Archives I
700 Pennsylvania Avenue, NW
Washington, D.C. 20408-0001

Archives I houses textual and microfilm records relating to: genealogy; American Indians; the District of Columbia; Federal courts from the District of Columbia; Congress; maritime matters; pre-World War I Army; and pre-World War II Navy.

2.2.1.1 Archives I On-Line Research

The on-line research and finding aids for Archives I were accessed and reviewed. The on-line information indicated that Archives I maintains records only for the period before the creation of Cannon AFB.

2.2.1.2 Archives I On-Site Research

No research was conducted at Archives I because the information maintained there for the Army and Air Force predated the creation of Cannon AFB.

2.2.1.3 Results of the Records Research at Archives I

All the records maintained by NARA's Archives I predated Cannon AFB, and as a result no records were found for this report at NARA Archives I.

2.2.2 NARA Archives II, College Park, MD

The second NARA archive investigated was the facility in College Park, MD, Archives II:

National Archives at College Park, Archives II
8601 Adelphi Road
College Park, MD 20740-6001

Records at Archives II include: textual records from most civilian agencies; Army records dating from World War I; Naval records dating from World War II; still pictures; electronic records; cartographic and architectural holdings; Nixon Presidential Materials; motion picture, sound, and video records; John F. Kennedy Assassination Records Collection; and the Berlin Documents Center microfilm.

The following subsections describe the research conducted and summarize the results of the research.

2.2.2.1 Archives II On-Line Research

Archives II maintains all of the USACE/ITRC referenced RGs, except RG 98: Records of the U.S. Army Commands, 1784-1821. (<http://www.archives.gov/research/guide-fed-records/index-numeric/>). The on-line references for each RG were accessed and reviewed for records that may be related to this installation. The summary of information on the RGs at Archives II in hard copy exceeded 500 pages and as a result is not included in the HRR-SC Report. The following eleven RGs were selected for further research based on the on-line review.

No.	RG No.	RG Names
1.	18	Records of the Army Air Forces
2.	35	Records of the Civilian Conservation Corps
3.	49	Records of the Bureau of Land Management.
4.	57	Records of the U.S. Geological Survey
5.	77	Records of the Office of the Chief of Engineers
6.	92	Records of the Office of the Quartermaster General
7.	121	Records of the Public Buildings Service
8.	234	Records of the Reconstruction Finance Corporation (1928-1968)
9.	341	Records of the Headquarters U.S. Air Force (Air Staff)
10.	342	Records of the U.S. Air Force Commands, Activities, and Organizations
11.	394	Records of the U.S. Army Commands, 1920-1942

The results of the on-site records review are discussed in the following subsection.

2.2.2.2 Archives II On-Site Research

After reviewing the research approach with Archivists at Archives II, four additional Record Groups were identified for on-site research:

- Record Group 51: Records of the Office of Management and Budget;
- Record Group 107: Records of the Office of the Secretary of War
- Record Group 156: Records of the Chief of Ordnance; and
- Record Group 429: Records of the Organizations in the Executive Office of the President (1963-1985).

The findings aids for each Record Group identified were reviewed and boxes of records selected for review. The following list provides the entries and boxes identified and reviewed for this HRR-SC Report.

Record Group 18: Records of the Army Air Forces

- Entry 2C, Mail & Records Division Unclassified Records Section Decimal File 1947.
 - Boxes 2799, 2802, 2805, 2806, 2807, 2809, 2810, 2811, 2812, 2815, 2796.
- Entry 2E, Air Adjutant General; Mail & Records Section Unclassified Records Section, Decimal Files, 1948.
 - Boxes 3189, 3192, 3194, 3196, 3197, 3199, 3200, 3201, 3202, 3203, 3204, 3205.
- Entry 166, Central Decimal Files, 1917-38; Project Files Airfields.

- Boxes 1334, 1517, 2687, 2688, 2689, 2690, 2691, 2692, 2693, 2694, 2695, 2696, 2697, 2698, 2699, 2797.
- Entry 166, Central Decimal Files, 1917-38; Project Files Airfields.
 - Boxes 1334, 1517, 2687, 2688, 2689, 2690, 2691, 2692, 2693, 2694, 2695, 2696, 2697, 2698, 2699, 2797.
- Entry 168, Central Decimal Files, 1917-38; Project Files Airfields.
 - Boxes 1336, 1339, 1714, 1715, 2795, 2796.
- Entry 211, Establishment of Airfields and Air Bases, 1940-45.
 - Box 211.
- Entry 292, Office of the Commanding General; Central Decimal Files, Oct. 1942-May 1944; Decimal 600 (Construction).
 - Boxes 1460, 1462, 1463, 1464, 1469, 1471, 1474, 1479, 1480, 1481, 1483, 1486, 1487, 1499, 1502, 1503, 1513, 1521, 1522, 1524, 1527, 1536, 1539, 1545, 1549, 1552, 1557, 1559, 1562, 1567, 1568, 1569, 1570, 1590.
- Entry 294, Formerly Security Classified Bulky Files, Army Air Bases & Aviation Fields, Site Surveys & Site Board Reports, 1942-44.
 - Boxes 799, 801, 802, 817, 827, 832, 838, 850, 873, 875, 877, 885, 886, 889, 905, 907, 912, 925, 931, 932, 941, 942, 943, 53, 955, 969, 977, 978, 979, 1035, 1107.
- Entry 295, Project Files: Air Fields 1939-1942.
 - Boxes 1234, 1235, 1236, 1237, 1238, 1239, 1240, 1241, 1242, 1243, 1244, 1245, 1287, 1288, 1290, 1313, 1362, 1367, 1370, 1372, 1829, 1830.
- Entry 341, Records of Installations, 1917-40; General Correspondence, 1918-39.
 - Boxes 1, 2, 3, 4, 5, 6, 7, 8, 9, 10.
- Entry 1011, Security-Classified Subject Files, 1940-45.
 - Box 44.

Record Group 51: Records of the Office of Management and Budget

- Entry 149B, War Projects Unit, Inspection Reports, 1940-45.
 - Boxes 2, 32, 33, 37, 42, 43, 47, 56, 57, 95, 104, 120, 121, 129, 139, 162, 164.

Record Group 77: Records of the Office of the Chief of Engineers

- Entry 102, Coordination & Records Project Decimal File, 1943-Jan 1946 Aviation Fields & Air Bombing Ranges.
 - Box 133.
- Entry 295, Project Files: Air Fields 1939-1942.
 - Box 1289.
- Entry 391, Construction Completion Reports, 1917-1943.
 - Boxes 11, 12, 20, 22, 42, 43, 44, 81.
- Entry 391A, Construction Completion Reports, 1917-1943.
 - Boxes 333, 334, 335, 336.
- Entry 391B, Construction Completion Reports, 1917-1943.
 - Box 82.
- Entry 1011, Security-Classified Subject Files, 1940-45.
 - Boxes 44, 201, 260, 289, 290, 292, 317, 322, 323, 327, 510, 513, 520, 540, 571, 580, 645, 646, 700, 706, 720, 762, 763, 764, 795, 810, 841, 856, 862, 865.

Record Group 107: Records of the Office of the Secretary of War

- Entry 102, Coordination & Records Project Decimal File, 1943-Jan 1946; Aviation Fields & Air Bombing Ranges.
 - Boxes 126, 127, 128, 129, 130, 131, 132, 133.
- Entry 211, Establishment of Airfields & Air Bases, 1940-45.
 - Boxes 203, 204, 206, 207, 208, 209, 210, 211, 212, 213.

Record Group 156: Records of the Office of the Chief of Ordnance

- Entry 892A, Reports and Technical Documents Accumulated as a Result of Ordnance Contracts, 1941-44; Allis-Chalmers to York Safe & Lock.
 - Boxes 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13.

Record Group 341: Records of Headquarters U.S. Air Force (Air Staff)

- Entry 494, Assistant Chief of Staff, Installations, Executive Office, Administrative Services, Branch, Correspondence re Air Force Real Estate Facilities, 1948-55.
 - Boxes 17, 18, 19, 20, 21, 22, 23, 24, 27, 28, 29, 30, 32, 33, 34, 35, 36, 41, 42, 43, 44, 45, 71, 72, 73, 74, 76, 77, 78, 79, 80, 81, 82, 83, 84, 86, 87, 88, 89, 90, 92, 93, 94, 95, 96, 99, 102, 104, 105, 107, 108, 109, 112, 113, 154, 155, 156, 157, 158, 159, 160, 161, 162, 164, 165, 167, 168, 169, 170, 176, 177, 178, 179, 214, 215, 216, 217, 234, 235, 236, 238, 239, 246, 251, 252, 261, 262, 264, 265, 326, 330, 337, 338, 339, 343, 346, 347, 348, 354, 356, 360, 362, 365, 366, 367, 429, 430, 434, 437, 439, 449, 450, 453, 456, 466, 469, 473, 474, 478, 479, 480, 540, 541, 542, 547, 551, 552, 553, 564, 565, 567, 570, 575, 577, 589, 590, 594, 596, 599, 600, 601, 683, 684, 685, 689.

Record Group 429: Records of the Organizations in the Executive Office of the President (1963-1985).

- Entry 12, Federal Property Council; Central Real Property Surveys.
 - Boxes 1, 13, 19, 21, 22, 25, 26, 27, 34, 49, 51, 53, 54, 61, 62, 63, 94, 97, 98, 113.

2.2.2.3 Results of the Records Research at Archives II

The records found at NARA Archives II primarily documented the acquisition of off-installation ranges such as a Jeep Moving Target Range, the Clovis Air-to Ground Gunnery Range, the Melrose Bombing Range, the Guadalupe Bombing Range and several Precision Bombing Ranges. A few documents were related to acquisition and possible disposal of a Small Arms Gunnery Range at Cannon AFB containing 889.21 acres. It is not clear from the available documentation whether this range remained with Cannon AFB or if it was declared surplus and transferred to private ownership. No maps or aerial photographs were located at NARA II that could identify the past or present location of this small arms range.

2.3 NARA Rocky Mountain Region, Denver, CO

The NARA Rocky Mountain Region office in Denver, CO maintains archived records for Colorado, Montana, New Mexico, North Dakota, South Dakota, Utah, and Wyoming. Cannon AFB is located in Colorado, one of the states for which the NARA Rocky Mountain office maintains records.

The office for NARA's Rocky Mountain Region is located at:

Denver Federal Center
Building 48
P.O. Box 25307
Denver, Colorado 80225
Phone: (303) 407-5740
Fax: (303) 407-5753
E-mail: denver.archives@nara.gov

Research was conducted at NARA Rocky Mountain Region for Cannon AFB in a two step process. First, the on-line resources were reviewed. Second, an on-site visit was made to review records of interest.

2.3.1 NARA Rocky Mountain Region On-Line Research

The on-line record resources for NARA's Rocky Mountain Region office were reviewed for the Record Groups described above in subsection 2.1. From the Record Groups listed, the on-line review identified the following eight Record Groups for on-site review.

No.	RG No.	RG Names
1.	18	Records of the Army Air Forces
2.	77	Records of the Office of the Chief of Engineers
3.	121	Records of the Public Buildings Service
4.	270	Records of the War Assets Administration
5.	291	Records of the Federal Property Resources Administration
6.	338	Records of U.S. Army Commands
7.	341	Records of the Headquarters U.S. Air Force (Air Staff)
8.	342	Records of the U.S. Air Force Commands, Activities, and Organizations

The steps taken to identify these eight Record Groups are described below.

First, 50 Record Groups listed in the guidance documents referenced above in subsection 2.1.2, were not listed in the on-line finding aids for NARA's Rocky Mountain Region-Denver and as a result were eliminated from investigation. (<http://www.archives.gov/rocky-mountain/holdings/guide.html>) Second, the following 19 Record Groups, listed in the guidance documents referenced above, were researched further.

No.	RG No.	Title
1.	18	Records of the Army Air Forces
2.	30	Records of the Bureau of Public Roads
3.	48	Records of the Office of the Secretary of the Interior
4.	49	Records of the Bureau of Land Management
5.	57	Records of the U.S. Geological Survey
6.	77	Records of the Office of the Chief of Engineers
7.	92	Records of the Office of Quartermaster

-
8. 96 Records of the Farmers Home Administration (1918-1975)
 9. 121 Records of the Public Building Service
 10. 143 Records of the Bureaus of Supplies and Accounts (Navy)
 11. 156 Records of the Office of the Chief of Ordnance
 12. 207 Records of the Housing and Home Finance Agency
 13. 237 Records of the Federal Aviation Administration
 14. 270 Records of the War Assets Administration
 15. 291 Records of the Federal Property Resources Administration
 16. 336 Records of the Office of the Chief of Transportation (1917-1966)
 17. 338 Records of the U.S. Army Commands
 18. 341 Records of the Headquarters U.S. Air Force (Air Staff)
 19. 342 Records of the U.S. Air Force Commands, Activities, and Organizations

The following subsections summarize the information available on-line for the 19 Record Groups (<http://www.archives.gov/rocky-mountain/holdings/>).

2.3.1.1 Record Group 18: Records of the Army Air Forces

Administrative History – The Army Air Forces originated August 1, 1907, as the Aeronautical Division in the Office of the Chief Signal Officer. After various reorganizations and name changes, the Army Air Forces was established on March 9, 1942, under the Secretary of War and the War Department General Staff. It served as the primary land-based air arm of the American armed forces until it was detached from the Army and became the U.S. Air Force in 1947.

Until the onset of World War II, most field installations of the Army Air Forces and its predecessors, such as airfields, schools, and administrative agencies, were located within the borders of the U.S. and its territories.

Records Description – Dates: 1917-18, 1937-39; Volume: 4 cubic feet.

Records of Lowry Field, Denver, including the following units:

- Armament Detachment;
- Aviation Examination Board;
- Photographic Detachment;
- Special Branch – Air Corps Technical School.

The records document the administration of technical units at Lowry Field. They are primarily correspondence, rosters, and special orders. Non-textual records include photographs.

Finding Aids – Maizie H. Johnson, comp., *Preliminary Inventory of the Textual Records of the Army Air Forces*, NM 53 (1965); Sarah D. Powell and Maizie H. Johnson, comps., *Supplement to Preliminary Inventory NM 53, Textual Records of the Army Air Forces*, NM 90 (1967).

Result of On-Line Research – This Record Group was selected for further investigation for Cannon AFB.

2.3.1.2 Record Group 30: Records of the Bureau of Public Roads

Administrative History – The Bureau of Public Roads had its origins in an act of March 3, 1893, which authorized the creation of an Office of Road Inquiry in the Department of Agriculture. After a number of changes in title, the Office became the Bureau of Public Roads in 1918 and retained that designation until 1939 when it became the Public Roads Administration as part of the Federal Works Agency. On July 1, 1949, it was transferred to the General Services Administration (GSA) and renamed the Bureau of Public Roads, which was then transferred to the Department of Commerce by Reorganization Plan No. 7 of 1949. An act of October 15, 1966, transferred the Bureau to the Department of Transportation, where its functions were assigned to the Federal Highway Administration.

Under the Federal Aid Road Act of 1916, the Bureau has supervised Federal-State cooperative programs for road construction, reconstruction, and improvement. It also administers the highway beautification program and is responsible for developing and administering highway safety programs, constructing defense highways and roads in national parks and forests, expanding the interstate highway system, and providing assistance to foreign governments.

Records Description – Dates: 1916-71; Volume: 163 cubic feet.

Records of the following offices:

- Cheyenne, Wyoming
- Denver, Colorado
- Helena, Montana
- Missoula, Montana
- Phoenix, Arizona
- Santa Fe, New Mexico

The records document the funding and construction of roads, including interstate highways, throughout the Rocky Mountain and Southwest region. They include budgets, plans, reports, and specifications. Non-textual records include right-of-way maps and photographs.

Finding Aid – Truman R. Strobridge, comp., *Preliminary Inventory of the Records of the Bureau of Public Roads*, PI 134 (1962).

Result of On-Line Research – This Record Group was eliminated from further research. No records were indicated that would be relevant to Cannon AFB.

2.3.1.3 Record Group 48: Records of the Office of the Secretary of the Interior

Administrative History – The Department of the Interior was created by an act of March 3, 1849. During the more than 130 years of its existence some functions have been added and others removed so that its role has changed from that of general housekeeper for the Federal Government to that of custodian of the nation's natural resources. The Secretary of the Interior, as the head of an executive department, reports directly to the President and is responsible for the direction and supervision of all activities of the Department.

Records Description – Dates: 1967-1981; Volume: 19 cubic feet.

Records of the Office of the Solicitor in Billings, Montana and Denver, Colorado. The records document precedent-setting cases. The records are case files including briefs, correspondence, court decisions, memorandums, and research papers.

Finding Aid – Box contents lists for some records.

Result of On-Line Research – This Record Group was eliminated from further research. No records were indicated that would be relevant to Cannon AFB.

2.3.1.4 Record Group 49: Records of the Bureau of Land Management

Administrative History – The General Land Office (GLO) was established within the Department of the Treasury by an act of April 25, 1812, to administer all public land transactions except surveying and map work (which came under the supervision of the GLO in 1836). In 1849, the GLO was transferred to the Department of the Interior where it was merged with the Grazing Service in 1946 to form the Bureau of Land Management. The Bureau classifies, manages, and disposes of public lands and their resources and administers Federally-owned mineral resources on non-Federal land and on the Outer Continental Shelf.

Records Description – Dates: 1854-1993; Volume: 7,960 cubic feet

Records of surveyors general for Colorado, Montana, New Mexico, Utah, and Wyoming and of the Supervisor of Surveys, ca. 1860-1960. The records document surveys of the public domain prior to its opening for settlement. Included are correspondence, connected sheets, group survey files, location certificates, mineral survey case files, mineral survey field notes (Colorado only), survey contracts and bonds, and administrative records. Non-textual records include survey plats.

Records of the district (local) land offices in Colorado, Montana, North Dakota, New Mexico, South Dakota, Utah, and Wyoming, ca. 1860-1960. The records document entries upon the public domain and the process of transferring title from the Federal government to the entryman. Included are abstract books, administrative records, correspondence, canceled land entry case files, serial registers, and tract books.

Records of the Grazing Division, U.S. Grazing Service, and district grazing offices in Arizona, Colorado, Montana, New Mexico, North Dakota, South Dakota, Utah, and Wyoming, ca. 1935-1976. The records document the establishment and administration of grazing districts, and the range improvement activities of Civilian Conservation Corps camps. The records include advisory board minutes, camp reports and administrative records, correspondence, and hearings and appeals.

Records of State and regional offices for Colorado, Montana, New Mexico, Utah, and Wyoming, ca. 1946-1992. The records document the administrative and program activities of the offices and include cooperative agreements, reports, correspondence, river basin studies, land acquisition case files, and land use case files.

Finding Aid – Harry P. Yoshpe and Philip P. Brower, comps., *Preliminary Inventory of the Land-Entry Papers of the General Land Office*, PI 22 (1949).

Related Microfilm Publications – **M25**, *Miscellaneous Letters Sent by the General Land Office, 1796-1889*; **M27**, *Letters Sent by the General Land Office to Surveyors General, 1796-1901*.

Result of On-Line Research – This Record Group was eliminated from further research. No records were indicated that would be relevant to Cannon AFB.

2.3.1.5 Record Group 57: Records of the U.S. Geological Survey

Administrative History – The Geological Survey was established in the Department of the Interior by an act of March 3, 1879, providing for the "classification of the public lands and the examination of the geological structure, mineral resources, and products of the public domain." An act of September 5, 1962, expanded this authorization to examinations outside the public domain, while topographical mapping and chemical and physical research were authorized by an act of October 2, 1888. The Survey's chief functions are to survey, investigate, and conduct research on the Nation's topography, geology, and mineral and water resources; classify land according to mineral composition and water power resources; furnish engineering supervision for power permits and Federal Power Commission licenses; supervise naval petroleum reserves and mineral leasing operations on public and Indian lands; and disseminate data relating to these activities.

Records Description – Dates: 1874-1970; Volume: 109 cubic feet.

Records of the National Mapping Division, Rocky Mountain Mapping Center, Denver. The records document mapping operations and the creation of topographical maps covering Arizona, Colorado, Montana, New Mexico, Texas, Utah, and Washington. The records include correspondence and field notebooks. Non-textual records include photographs.

Records of the Hayden Survey, 1874-1894. The records are notebooks that relate to computations concerning triangulations made during surveys in Colorado.

Records of the National Center, Reston, Virginia. The records document cooperative work with private industry involving mineral resources in the western states. The records consist of correspondence.

Finding Aid – Box contents list.

Result of On-Line Research – This Record Group was eliminated from further research. No records were indicated that would be relevant to Cannon AFB.

2.3.1.6 Record Group 77: Records of the Office of the Chief of Engineers

Administrative History – The Corps of Engineers, U.S. Army, with headquarters at Washington, D.C., was a result of orders of April 3, 1818. The military responsibilities of the

Office of the Chief of Engineers (OCE) have included producing and distributing Army maps, building roads, planning camps, and constructing and repairing fortifications and other installations.

Its civil duties have included maintaining and improving inland waterways and harbors, formulating and executing plans for flood control, operating dams and locks, and approving plans for construction of bridges, wharves, piers, and other works over navigable waters. Expansion of the OCE's river and harbor improvement work after the Civil War necessitated the establishment of district offices throughout the U.S. The engineer officer in charge of each district reported directly to the Chief of Engineers until 1888 when engineer divisions were created with administrative jurisdiction over the district offices.

Records Description – Dates: 1879, 1935-1969; Volume: 382 cubic feet.

Records of the following engineering districts: Albuquerque, New Mexico; Fort Peck, Montana; Fort Worth, Texas; Garrison and Salt Lake City, Utah; Omaha, Nebraska; Tooele, Utah. The records document the planning and construction of public works engineering projects and include administrative files, construction files, correspondence, reports, and field survey notebooks. Non-textual records include engineering drawings and maps, including an 1879 map of the Yellowstone River.

Finding Aids – Shelf list.

Related Microfilm Publications – M66, *Letters Sent by the Topographical Bureau of the War Department and by Successor Divisions in the Office of the Chief of Engineers, 1829-1870.*

Result of On-Line Research – This Record Group was selected for further research for Cannon AFB.

2.3.1.7 Record Group 92: Records of the Office of the Quartermaster General

Administrative History – In 1818, Congress created a Quartermaster's Department under a single Quartermaster General to ensure an efficient system of supply and accountability of Army officers who were responsible for monies or supplies. At various times, the Quartermasters had authority over procurement and distribution of supplies, pay, transportation, and construction. After a number of changes in functions and command relationships, Congress authorized a Quartermaster Corps in 1912 and designated its chief the Quartermaster General in 1914. The Corps was responsible for the operation of a number of general supply depots and subdepots throughout the U.S. The Office of the Quartermaster General was abolished in 1962.

Records Description – Dates: 1895-1914, 1943-50; Volume: 6 cubic feet.

Records of the Santa Fe National Cemetery, 1895-1914. The records relate to administration and include correspondence and orders. Records of the Ogden General Depot, Utah, 1943-1950. The records document administration, civilian personnel, and training. They include circulars, memorandums, orders, and publications.

Finding Aid – Shelf list.

Result of On-Line Research – This Record Group was eliminated from further research. No records were indicated that would be relevant to Cannon AFB.

2.3.1.8 Record Group 96: Records of the Farmers Home Administration

Administrative History – The Farmers Home Administration (FHA) was established in the Department of Agriculture by an act of August 14, 1946, to succeed the Farm Security Administration (FSA), which had been established in 1937. The FSA succeeded the Resettlement Administration, which had been established in 1935 to administer rural rehabilitation and land programs begun in 1933 under the Subsistence Homesteads Division of the Department of the Interior and the Federal Emergency Relief Administration.

The FHA provides small farmers with credit to construct or repair homes, improve farming operations, or become farm owners, and gives individual guidance in farm and home management.

Records Description – Dates: 1934-1946; Volume: 150 cubic feet.

Records of the Region 10 office, covering Colorado, Montana, and Wyoming. The records document administrative functions, farm ownership, land acquisition, and resettlement projects. Included are administrative records and case files.

Records of selected county offices in Colorado, Montana, North Dakota, South Dakota, Utah, and Wyoming. The records document rural rehabilitation loans to farmers. They are case files and include the loan application, a farm and home management plan (which contains information about the farm family's assets, expenses, food consumption, income, and production), and farm visit reports.

Finding Aids – Box contents list; Stanley W. Brown and Virgil E. Baugh, comps., *Preliminary Inventory of the Records of the Farmers Home Administration*, PI 118 (1959)

Result of On-Line Research – This Record Group was eliminated from further research. No records were indicated that would be relevant to Cannon AFB.

2.3.1.9 Record Group 121: Records of the Public Buildings Service

Administrative History – Federal construction activities outside the District of Columbia were performed by individual agencies and, to some extent, by special commissions and officers appointed by the Secretary of the Treasury until 1853, when a Construction Branch was created in the Department of the Treasury. The Branch later became the Bureau of Construction in the Office of the Supervising Architect, and that office, in turn, was transferred in 1933 to the Public Buildings Branch of the Procurement Division. The Public Buildings Administration was created in the Federal Works Agency in 1939 by consolidating the Public Buildings Branch and the National Park Service's Branch of Buildings Management. The latter branch had inherited responsibilities for Federal construction in the District of Columbia from the Office of Public Buildings and Public Parks of the National Capitol.

An act of June 30, 1949, abolished the Public Buildings Administration and transferred its functions to the newly established GSA. The Public Buildings Service was established December 11, 1949, by the Administrator of General Services to assume the functions once assigned to the Public Buildings Administration.

The Public Buildings Service designs, constructs, manages, maintains, and protects most federally owned and leased buildings. It is also responsible for the acquisition, utilization, and custody of GSA real and related personal property.

Records Description – Dates: 1889-1996; Volume: 105 cubic feet.

Records of the Office of Real Property Disposal, Fort Worth. The records concern the disposal of surplus Federal real property (such as airfields, ordnance plants, military depots, buildings and installations, prisoner-of-war camps, school buildings, Atlas and Titan Missile installations and Veterans Administration hospitals) in Colorado, Montana, New Mexico, North Dakota, South Dakota, Utah, and Wyoming. They are case files, which include correspondence, deeds, reports of surveys, studies, and title searches. Non-textual records within the case files include drawings and maps.

Records of the Construction Management Division, Denver. The records document the design and construction of Federal buildings in the Rocky Mountain Region including a 1978 addition to the Denver Mint, and construction of Buildings 20 and 41 at the Denver Federal Center. In addition there are files relating to the historical development of the Denver Federal Center from 1941, when it was the Denver Ordnance Plant, to 1996. Included are correspondence, reports, specifications, and non-textual records such as drawings and photographs.

Finding Aids – Box contents lists for the real property disposal case files.

Result of On-Line Research – This Record Group was selected for further research for Cannon AFB.

2.3.1.10 Record Group 143: Records of Bureau of Supplies and Accounts (Navy)

Administrative History – The Bureau of Provisions and Clothing was established in the Department of the Navy by an act of August 31, 1842, and renamed in 1892 the Bureau of Supplies and Accounts. At first its functions, taken over from the former Board of Navy Commissioners, were to supply the Navy with provisions, clothing, and small stores, and to perform Department accounting. Later many of the duties of the Bureau of Equipment were transferred to it. Through the end of World War II, the Bureau was also Paymaster General of the Navy. Among other functions, the Bureau supervised the procurement, receipt, storage, shipment, and issuance of food, fuel, clothing, general stores, and other materials; maintained and operated naval supply depots and similar units and supervised activities of Supply Corps officers; procured, allocated, and disbursed funds; and kept money and property accounts. The Bureau of Supplies and Accounts was abolished May 1, 1966, as part of a Defense Department reorganization, and its functions were assigned to the Naval Supply Systems Command.

Records Description – Dates: 1942-45; Volume: 1 cubic foot.

Record titled History of U.S. Navy Supply Depot, Clearfield, Utah, 1942-45. The record is a narrative account of the development, construction, commissioning, and operation of the depot. Non-textual records include photographs. The record is a bound volume.

Result of On-Line Research – This Record Group was eliminated from further research. No records were indicated that would be relevant to Cannon AFB.

2.3.1.11 Record Group 156: Records of the Office of the Chief of Ordnance

Administrative History – The Ordnance Department was established as an independent bureau of the War Department by an act of May 14, 1812. It was responsible for the procurement and distribution of ordnance and equipment, the maintenance and repair of equipment, and the development and testing of new types of ordnance. The Department was abolished in 1962, and its functions were transferred to the U.S. Army Material Command.

Among the field establishments maintained by the Ordnance Department within the U.S. have been armories, arsenals, and ordnance depots, district offices, and plants.

Records Description – Dates: 1940-64; Volume: 31 cubic feet.

Records of the following arsenals, depots, and plants:

- Black Hills Ordnance Depot, Igloo, South Dakota;
- Denver Ordnance Zone and Plant;
- Deseret Depot, Tooele, Utah;
- 58th Quartermaster Depot, Ogden, Utah;
- Fort Wingate Army Depot, Gallup, New Mexico;
- Ogden Arsenal, Ogden, Utah;
- Pueblo Ordnance and Army Depot, Pueblo, Colorado;
- Tooele Depot, Tooele, Utah;
- Utah Depot, Ogden, Utah.

The records document the administration and operation of all facilities and the activation and deactivation of some. The records include circulars, correspondence, manuals, memorandums, orders, planning files, regulations, reports, and unit histories.

Finding Aid – Shelf list.

Result of On-Line Research – This Record Group was eliminated from further research. No records were indicated that would be relevant to Cannon AFB.

2.3.1.12 Record Group 207: General Records of the Department of Housing and Urban Development

Administrative History – The Department of Housing and Urban Development had its origins in the Housing and Home Finance Agency (HHFA), which was established by Reorganization

Plan No. 3 in 1947 as the replacement for the National Housing Agency, which had been created in 1942 to coordinate wartime housing activities. The HHFA was responsible for implementing the Housing Act of 1949 until its functions and powers were transferred to the Department of Housing and Urban Development by an act of September 9, 1965.

Records Description – Date: 1970-88; Volume: 2 cubic feet

Records of the Community Disposition Office, Los Alamos, New Mexico. The records document Federally-held mortgages in the Los Alamos area. They are case files including discharge papers, mortgage notes, payment schedules, property surveys and field reports, statements of repairs or improvements, tax and insurance documents, warranty deeds, and related memorandums.

Finding Aid – List of case file numbers.

Result of On-Line Research – This Record Group was eliminated from further research. No records were indicated that would be relevant to Cannon AFB.

2.3.1.13 Record Group 237: Records of the Federal Aviation Administration

Administrative History – The Civil Aeronautics Act of June 23, 1938, established an independent Civil Aeronautics Authority "to promote the development and safety and to provide for the regulation of civil aeronautics." In 1940, the authority was divided into a Civil Aeronautics Board with safety regulatory authority and a Civil Aeronautics Administration to enforce civil air regulations; aid in the development of a national airport system; and plan, construct, and operate the Federal Airways System. Both organizations were part of the Department of Commerce until the establishment in 1958 of the Federal Aviation Agency which assumed all of their functions. The Federal Aviation Agency became a part of the Department of Transportation by an act of October 15, 1966, and was redesignated the Federal Aviation Administration.

Records Description – Dates: 1962-75; Volume: 11 cubic feet.

Records of the Northwest Mountain Regional Office. The records document the effects airport construction and alteration have on the use of airspace, and include airport airspace analysis case files, comments from the public, correspondence, and feasibility reports.

Finding Aid – Folder title list.

Result of On-Line Research – This Record Group was eliminated from further research. No records were indicated that would be relevant to Cannon AFB.

2.3.1.14 Record Group 270: Records of the War Assets Administration

Administrative History – The War Assets Administration (WAA) was established in the Office for Emergency Management by Executive order on March 25, 1946. The chief WAA function was the disposal of surplus consumer, capital, and producer goods; industrial and maritime real property; and airports and aircraft located in the U.S. and its Territories. The WAA was

abolished by an act of June 30, 1949, and its functions were transferred to the newly created GSA.

Records Description – Dates: 1939-62; Volume: 141 cubic feet

Records of the Office of Real Property Disposal. The records document the disposal of real property, such as industrial and airport properties, including the reporting of property as excess, notification of availability, inspection and appraisal, and approval of disposition in Colorado, Montana, New Mexico, North Dakota, South Dakota, Utah, and Wyoming. They consist primarily of case files. Non-textual records include blueprints, drawings, and maps.

Finding Aids – Box and shelf lists.

Result of On-Line Research – This Record Group was selected for further research for Cannon AFB.

2.3.1.15 Record Group 291: Records of the Federal Property Resources Service

Administrative History – The Property Management and Disposal Service (PMDS), established July 29, 1966, as part of the Federal Property Resources Service, assumed functions formerly assigned to the Defense Materials Service and the Utilization and Disposal Service. PMDS acquires, stores, and manages inventories of strategic and critical materials and promotes maximum utilization of Federal personal and real property through donations, sales, and other authorized methods.

Records Description – Dates: 1944-73; Volume: 55 cubic feet.

Records of the Utilization and Disposal Service. The records relate to the disposal of Federal property (such as housing projects, former military installations, and Veterans Administration hospitals) in Arizona, Colorado, New Mexico, Utah, and Wyoming. Included are appraisal reports, correspondence, cost estimates, declarations of excess and certifications of surplus, deeds, instruments of conveyance, newspaper clippings, and reports of survey and title searches. Non-textual records include drawings and maps.

Records of the Market and Technical Services Division, Office of Stockpile Disposal. The records document inspections by mining engineers of mining properties and metallurgical processes world wide that related to the national stockpile of strategic materials. The records are engineering reports.

Finding Aid – Folder title list.

Result of On-Line Research – This Record Group was selected for further research for Cannon AFB.

2.3.1.16 Record Group 336: Records of the Office of the Chief of Transportation

Administrative History – The Office of the Chief of Transportation was established in the Services of Supply, War Department on March 2, 1942, to head the Transportation Division. It

was abolished by General Order 39 of December 1, 1964. Within the U.S., the Office administered a variety of field installations and functions, including ports of embarkation, port agencies, transportation depots, offices, and zones.

Records Description – Dates: 1942-1952; Volume: 1 cubic foot.

Records of the Ninth Transportation Zone, Salt Lake City. The records document the administration and activities of the office. They include operating procedures, orders, organizational charts, and reports.

Result of On-Line Research – This Record Group was eliminated from further research. No records were indicated that would be relevant to Cannon AFB.

2.3.1.17 Record Group 338: Records of U.S. Army Commands

Administrative History – The present system of U.S. Army commands, which are organized both functionally and geographically, emerged from a War Department reorganization of February 28, 1942. The system has a complex administrative structure including massive domestic and overseas operations.

Records Description – Dates: 1874-1997; Volume: 127 cubic feet.

Records of the State army advisory groups in Montana, North Dakota, South Dakota, Utah, and Wyoming. The records document commendations and delegations of authority. They are subject files.

Records of Auburn General Depot, Seattle. The records document the administration and activities of the unit. Included are planning files, program manuals, and unit histories.

Records of Dugway Proving Grounds, Utah, and Fort Carson, Colorado. The records document the operation of the army hospital, including Red Cross activities, and include annual reports, diaries, general orders, and reports.

Records of the Fourth Transportation Zone, Salt Lake City. The records document the administration and activities of the unit. Included are general orders, minutes of meetings, organizational charts, and program plans.

Finding Aids – Shelf list.

Result of On-Line Research – This Record Group was selected for further research for Cannon AFB.

2.3.1.18 Record Group 341: Records of the Headquarters U.S. Air Force

Administrative History – Headquarters U.S. Air Force, also known as the Air Staff, was established September 18, 1947, under terms of the National Security Act of 1947. The Chief of Staff is directly responsible to the Secretary of the Air Force and presides over the Air Staff which is divided into five functional groupings each headed by a deputy chief of staff.

Records Description – Date: 1950; Volume: 3 cubic feet.

Records of the Director of Construction, Missouri River Region. The records document the site selection for the Air Force Academy and construction programs for aircraft control and warning stations. Included are memorandums and reports.

Finding Aids – Helene Bowen, comp., *Preliminary Inventory of the Records of Headquarters, United States Air Force*, NM 15 (1963).

Result of On-Line Research – This Record Group was selected for further research for Cannon AFB.

2.3.1.19 Record Group 342: Records of the U.S. Air Force Commands, Activities, and Organizations

Administrative History – The U.S. Air Force was established in 1947 as the successor of the Army Air Forces, which had developed from a series of military air services dating back to 1907. The Record Group consists of records of the field organization of the U.S. Air Force and its predecessors.

Records Description – Dates: 1963-1968; Volume: 2 cubic feet.

Records of the Information Office, Sundance Air Force Station, Wyoming. The records relate to base activities, entertainment, personnel training, and public programs. Included are memorandums, press releases, and reports.

Finding Aid – Folder title list.

Result of On-Line Research – This Record Group was eliminated from further research. No records were indicated that would be relevant to Cannon AFB.

2.3.2 NARA Rocky Mountain Region On-Site Research

After the researchers reviewed the NARA Rocky Mountain Region's on-line resources to select Record Groups that contained records related to the Air Force Installation, the researchers spoke with NARA Rocky Mountain Region's Archivists to confirm the on-line sources and further refine the list of Record Groups. Finally, individual finding aids for each Record Group were reviewed and boxes of documents were selected to review. The results are described below.

Record Group 18: Records of the Army Air Forces

- The finding aids for Record Group 18: Records of the Army Air Forces contained the following:
 - Aviation Examinations Board, 1917-18, Box 1 and 2
 - Entry 473, 1938, Roster of Troops
 - Entry 474, Rosters and Orders of the Photograph Detachment
 - Entry 475, Special Orders of the Denver Branch of the Air Corps Technical School
 - No Entry Number for the Rosters and Reports of the 3rd Provisional Detachment

- Box 3, 8NN-018-92-164, 8NN018-97 –165 & 166, containing records of the Armament Detachment was reviewed; however, no documentation relevant to the Air Force Installation was found.

Record Group 77: Records of the Office of the Chief of Engineers

- USACE Omaha District, Site History Files 1933-54
 - Boxes 101, 114, 123, 126, 137

Record Group 121: Records of the Public Buildings Service

- Real Property Case Files, 1946-72
 - Boxes 23, 24, 25, 30, 30, 33, 59, 93

Record Group 270: Records of the War Assets Administration

- Real Property Disposal Files, 1939-1962
 - Boxes 1, 20, 25, 32, 33, 34, 71, 73, 86, 87

Record Group 291: Records of the Federal Property Resources Administration

- Real Property Disposal Files
 - Boxes 1, 3, 5, 64

Record Group 338: Records of U.S. Army Commands

- Air Defense Command and Anti-Aircraft Command
 - Boxes 1, 2, 3, 4, 5, 6, 7

Record Group 341: Records of Headquarters U.S. Air Force (Air Staff)

- Entry 496, Aircraft and Warning
 - Box 1
- Office of the Assistant Chief of Staff, Installations, Missouri River Division
 - Box 1, 2, 3, 4

Record Group 342: Records of the U.S. Air Force Commands, Activities, and Organizations

- Special Orders and Promotion Orders
 - Box 1

2.3.3 Results of the Records Research at NARA Rocky Mountain Region

Documents copied at NARA Rocky Mountain Region also primarily documented the off-installation ranges. One map was located for the Jeep Moving Target Range, an of-installation range. No documents were found for potential MMRP sites on Cannon AFB.

2.4 National Personnel and Records Center

The National Personnel Records Center (NPRC) is one of NARA's largest facilities. It is a central repository for personnel-related records, both military and civil service. The NPRC also maintains archived military records, but does not maintain on-line finding aids.

National Personnel Records Center
9700 Page Ave.
St. Louis, MO 63132-5100
Telephone: 314-801-9250
Fax: 314-801-9269
Email: cpr.center@nara.gov

Manual inventories developed by the NPRC and the USACE St. Louis were reviewed to conduct research at the NPRC.

2.4.1 NPRC On-Line Research

The NPRC does not maintain on-line finding aids for the records stored at the facility. No formal finding aids are available for the records. Manual inventories of the boxes of documents have been developed by the NPRC. The USACE St. Louis has developed a rudimentary list of boxes and their contents. The information developed by the NPRC and the USACE St. Louis were reviewed to develop a list of 412 boxes potentially related to this HRR-SC Report.

2.4.2 NPRC On-Site Research

The NPRC was visited and the box list developed as potentially related to this report was used as a guide for the records search. Two record groups were available for review: Record Group 338, Records of the U.S. Army Commands and Record Group 342, Records of the U.S. Air Force Commands, Activities, and Organization. [NOTE: The NPRC records do not have the Entry System level identification of box content used by the other NARA facilities.] No boxes were identified that contained documents specific to Cannon AFB; however, in the course of researching the other 36 installations related to this report, information was found for Cannon AFB and it is discussed in the next subsection.

2.4.3 Results of the Records Research at the NPRC

Correspondence was found that requested a Sonic Bombing Scoring Range be constructed to Cannon AFB and several other ranges. It appears that this range may have become the Melrose Bombing Range, an off-installation range for Cannon AFB. The remainder of the documents involved the identification of off-installation ranges for disposal.

3.0 U.S. ARMY CORPS OF ENGINEERS

This section provides information on the activities related to the review and collection of documents from the USACE.

3.1 USACE Topographical Engineering Center Alexandria, VA

The USACE Topographic Engineering Center (TEC) and the TEC Imagery Office (TIO) is the USACE's central point for research, acquisition and dissemination of commercial imagery, with an extensive in-house imagery library with on-line access through ESRI software plug-in and web-based search tool.

USACE Topographic Engineering Center
7701 Telegraph Road
Alexandria, VA 22315-3864
703-428-6600, x2433

The TEC offers experience with: the imagery research/collection architecture and the National Geospatial Agency (NGA); NGA ClearView and NextView commercial imagery contract vehicles/licensing; the U.S. Geological Survey (USGS) imagery products catalog/search/order tools; imagery processing services such as pan-sharpening, creating mosaics, format or bit conversion; and is a central repository for LIDAR, IFSAR and Terra-Explorer Fly-Thru's. (<http://www.tec.army.mil/>)

3.1.1 Background on the USACE TEC and TIO

The mission of the TEC is to provide the warfighter with a superior knowledge of the battlefield and to support the nation's civil and environmental initiatives. This mission is accomplished through research, development, and the application of expertise in topographic and related sciences.

The TIO was designated by the Office of the Assistant Chief of Engineers (OCE/P) in 1990 to act as the U.S. Army's Commercial Imagery Acquisition monitor. This action was designed to prevent Army agencies/organizations from duplicating commercial imagery data purchases. In addition, TIO was designated as the repository of selected commercial imagery data pertaining to terrain analysis and water resources operations.

The primary goal for the TIO is to provide commercial imagery at no cost. The TIO utilizes the NGA Commercial Satellite Imagery Library (CSIL) daily in order to research the availability of this no cost data. The CSIL currently has more than 300,000 scenes of commercial imagery, to include IKONOS, QuickBird, SPOT, Landsat, RADARSAT, IRS, Star 3i airborne SAR data, Eagle Vision, and various special products. The CSIL primarily contains standard imagery. The most common image format found in the CSIL is "nitf" and "GeoTIFF", but there are many other vendor formats as well.

Point of Contact

Mary Brenke, Team Lead TIO
Commercial (703) 428-6909; DSN 364-6909
DLL-CEERD-TIO@erdc.usace.army.mil
Internet e-mail address: mary.r.brenke@erdc.usace.army.mil
Intelink S e-mail address: mbrenke@tec.army.smil.mil
Web site: http://www.tec.army.mil/tio/TIO_Imagery_Request_Form.html

3.1.2 Results of the Records Research at the USACE TEC and TIO

The TIO was contacted by email on 11 Feb 07 about the capabilities of the TIO to support the acquisition of historical aerial photographs for this project. A reply was received on 12 Feb 08 that the TIO has a goal to acquire and host aerial imagery for the USACE and for the Installations and Environmental GIS community; however, as of this time that has not happened.

In answer to specific questions that were asked about their capabilities, the response stated that:

- The TEC imagery office database would not be an aid to the collection of historical aerial photographs for the installations under investigation;
- The TEC imagery office is not able to query its database to determine an inventory of available aerial photographs from the TEC because the imagery library will show commercial satellite imagery and the only aerial coverage in the library is the collection after Hurricanes Katrina, Rita and Wilma; and
- The TEC image inventory does not include historical aerial photographs maintained by the National Archives and Records Administration at College park, MD.

As a result, no further investigation was conducted at the USACE TEC imagery office.

3.2 USACE Historian's Office Alexandria, VA

The USACE Historian's Office in Alexandria, VA was contacted as a possible source of information.

3.2.1 Background on the USACE Office of History

The USACE Office of History is a separate office of the USACE Headquarters, located at the Humphreys Engineer Center on Telegraph Road in Alexandria, Virginia.

USACE Office of History
7701 Telegraph Road
Alexandria, VA 22315-3865
(703) 428-6559
Web Site: <http://www.hq.usace.army.mil/history/>

The mission of the Office of History is to collect, document, interpret, and preserve the history and heritage of the USACE.

3.2.2 Results of the Records Research at the USACE Office of History

Dr. Michael J. Brodhead, Historian, at the USACE Office of History was contacted about records and resources available at the USACE Office of History. Dr. Brodhead reported that on-line resources are not available at the USACE Office of History. The History Office was visited and its in-house finding aids were used to review records for Cannon AFB. The only documents found involved off-installation ranges. One document referenced the Clovis Ground Gunnery and Small Arms Range.

3.3 USACE St. Louis District, St. Louis, MO

A formal investigation was not conducted at the USACE St. Louis District in St. Louis, MO. Instead, finding aids that relate to the NPRC and maintained by the USACE St. Louis District were accessed. Please see Subsection 2.4 for information on the NPRC records search.

In addition to the NPRC finding aids, the USACE St. Louis District maintains map collections of Air Force facilities. The collections were accessed for Cannon AFB and 12-Feb-52 and 1-Oct-57 maps were copied that showed an ordnance area at the eastern edge of Cannon AFB. A third map was found titled, *Clovis Air Force Base-Vicinity Map Wind Analysis Airfield Pavement*, for the period January 1945 through December 1945, that shows the Clovis AFB Small Arms Range south of the present day installation.

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4.0 U.S. ARMY

This section provides information on the activities related to the review and collection of documents from the U.S. Army.

4.1 U.S. Army Research, Development and Engineering Command, Aberdeen Proving Ground, MD

On March 1, 2004, the U.S. Army Research, Development and Engineering Command (RDECOM) was officially established as a major subordinate command within the Army Materiel Command, as a result of the re-designation of the Soldier and Biological Chemical Command (SBCCOM). SBCCOM was re-designated into: RDECOM; CMA (Chemical Materials Agency); GUARDIAN BRIGADE; PM NBC (PM Nuclear, Biological and Chemical Defense); and SSC (Soldiers System Center).

RDECOM's official mission statement is: "to field technologies that sustain America's Army as the premier land force in the world." Part of RDECOM includes headquarters facilities and the Edgewood Chemical and Biological Center (ECBC) located in the Edgewood Area of the Aberdeen Proving Ground and the entire Aberdeen Proving Ground Garrison.

Two sources of historical information at RDECOM that may impact this HRR-SC Report are the Historical Research and Response Center and the ECBC Technical Library, both of which are located at the Edgewood Arsenal, MD.

4.1.1 Historical Research and Response Center, Aberdeen Proving Ground, MD

The Historical Research and Response Center (HRRC), under RDECOM, holds a collection of historical documents regarding chemical and biological information. A request to review historic documentation was submitted to Jeffery K. Smart, Command Historian (410-436-2295, jeffery.smart@us.army.mil).

4.1.1.1 *Results of the Records Research at the Historical Research and Response Center Research*

Documents at the HRRC were organized by State. Approximately seven file cabinets, with five drawers for each cabinet, were reviewed. Two documents relating to chemical warfare munitions were found at the HRRC for Cannon AFB. The first was prepared by the HRRC staff and is titled *Areas Used by the Chemical Warfare Service During the 1900's*, and is undated. This report summarized the data on the then Clovis Field reported in a Cross Index, dated 4 Aug-43 memo, "The following named units having departed their stations with individual and housekeeping equipment only, it is suggested that their Apparatus, Decontaminating, Power Driven be reassigned as indicated. From: 91st Depot Repair Sq. to 740th Bomb Sq., Clovis AAB, Clovis, New Mexico." The second documents is from the AAF, 234th Air Base Unit, Section D, Mnt & Sup, and lists on 28 Feb 1945 chemical equipment present to include 1 M4 HS Vapor Detector Kit. The location where the materiel were stored or expended was not provided in the documentation.

4.1.2 Edgewood Chemical Biological Center Technical Library, Edgewood Arsenal, MD

The ECBC Technical Library, formerly known as the Edgewood Arsenal Technical Library, houses publications of chemical and biological technical reports between World War I to present.

4.1.2.1 Results of the Records Research at the Edgewood Chemical Biological Center Technical Library

The request to review historic documentation was submitted to Edwin Gier (410-436-2884, Edwin.gier@us.army.mil) at the ECBC Technical Library. Mr. Gier indicated that, in most part, the collection of published technical report literature at the ECBC is replicated at Defense Technical Information Center (DTIC). Secondly, he indicated that the collection of published technical reports is tailored to research involving either the manufacture of chemical and biological agents, toxicity of these agents, or, most recently, detection of chemical and biological agents. The collection may incidentally contain some information about ranges and storage areas, but such information would be difficult to find in the report literature. Based on Mr. Gier's recommendation, it was determined that no research would be conducted at the ECBC.

4.2 U.S. Army Center of Military History, Ft. McNair, VA

The U.S. Army Center of Military History (CMH) is responsible for the appropriate use of history throughout the U.S. Army. Traditionally, this mission meant recording the official history of the Army in both peace and war, while advising the Army Staff on historical matters. In terms of this tradition, the Center traces its lineage back to those historians under the Secretary of War who compiled the Official Records of the Rebellion, a monumental history of the Civil War begun in 1874, and to a similar work on World War I prepared by the Historical Section of the Army War College.

Since its formation, CMH has provided historical support to the Army Secretariat and Staff, contributing essential background information for decision making, staff actions, command information programs, and public statements by Army officials. In recent decades it also has progressively expanded its role in the vital areas of military history education, the management of the Army's museum system, and the introduction of automated data-retrieval systems. The Center's work with Army schools ensures that the study of history is a significant part of the training of officers and noncommissioned officers. It also supports the use of history to foster unit pride and give today's soldiers an understanding of the Army's past. Much of this educational work is also performed at field historical offices and in Army museums. The Center thus provides all levels of the Army as well as other services, government agencies, and the public with a growing awareness of history that goes well beyond publications alone.

4.2.1 Results of the Records Research at U.S. Army Center of Military History

The CMH was visited and documents maintained by the CMH were reviewed. No information was found relating to this HRR-SC Report.

4.3 U.S. Army Institute of Military History, Carlisle Barracks, PA

The U.S. Army Military History Institute (USAMHI) is an institute of the U.S. Army Heritage and Education Center. The mission of the USAMHI is to preserve the Army's history and ensure

access to historical research materials and serves as the primary facility where researchers study Army history. The USAMHI's holdings include books, manuscripts, photos, and maps.

4.3.1 Results of the Records Research at the U.S. Army Institute of Military History

A list of the Air Force installations under investigation were provided to the USAMHI reference historian. The reference historian reported that nothing was found in the USAMHI collection for this installation.

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5.0 U.S. AIR FORCE

This section provides information on the activities related to the review and collection of documents from the U.S. Air Force.

5.1 Air Force Historical Research Agency

The Air Force Historical Research Agency (AFHRA) is the repository for Air Force historical documents. The AFHRA's collection, begun in Washington, D.C., during World War II, moved in 1949 to Maxwell AFB, the site of the Air University, to provide research facilities for professional military education students, the faculty, visiting scholars, and the general public. The address for AFHRA is:

Air Force Historical Research Agency
600 Chennault Circle
Bldg 1405
Maxwell, AFB, AL 36112-6424
<http://www.maxwell.af.mil/au/afhra/>

The AFHRA consists today of over 70,000,000 pages devoted to the history of the Air Force, and represents the world's largest and most valuable organized collection of documents on U.S. military aviation.

More than 90% of the AFHRA's pre-1955 holdings are declassified. The AFHRA's collection is also recorded on 16mm microfilm.

The holdings maintained by the AFHRA include Air Force Unit Histories and related historical documents that Air Force organizations prepared and submitted periodically since the establishment of the Air Force History Program in 1942. Reporting requirements have changed from time to time over the years, and the submissions vary in quality. The coverage provided by unit histories is supplemented by special collections, including historical monographs and studies; oral history interview transcripts; End-of-Tour Reports; personal papers of retired general officers and other Air Force personnel; reference materials on the early period of military aviation; course materials of the Air Corps Tactical School of the 1920s and 1930s; working documents of various joint and combined commands; miscellaneous documents or collections of various organizations, including the U.S. Army, British Air Ministry, and German Air Force; U.S. Air Force individual aircraft record cards; and a large collection of material relating to U.S. Air Force activities in the war in Southeast Asia and Operations Desert Shield and Desert Storm.

These materials are available at the Air Force Historical Studies Office in Washington, D.C. and at the AFHRA at Maxwell AFB, AL.

The Agency accessions approximately 2,000,000 pages of historical material each year, including the annual and quarterly histories of Air Force units as well as additions to the special collections. Working closely with the Air Force Historian and the History Offices of the major commands, the Agency conducts an oral history program to record important historical data that

would otherwise be lost. The Agency also gives special attention to the acquisition of personal papers of value for documenting Air Force and airpower history.

5.1.1 Air Force Civil Engineer Support Agency Research Methodology

Development of the Inferential Retrieval Indexing System (IRIS) information management system began in 1972 and in 1974, the first system was developed. IRIS was designed to replace the AFHRA's card catalog. The card catalog contains references to materials that were received prior to 1980. IRIS contains references to everything that is in the card catalog as well as materials that were received after 1980.

In 1979, the basic Machine-Readable Cataloging (MARC) data structure of the Library of Congress was adopted. The metadata contained in each record represents one item of the Agency's holdings, including titles, authors, subjects, inclusive coverage dates and publication dates, security classification, issuing organization, and an abstract indicating the subjects covered and important facts contained in the item. Since 1980, over 600,000 entries have been added to the IRIS system.

A card catalog, computer database (IRIS) and published finding aids were utilized to conduct research. Also, archivists and archives technicians assisted in researching the AFHRA's files.

5.1.1.1 Card Catalog and IRIS

The card catalog and IRIS were searched at the AFHRA for installation names (including aliases). Call numbers that were found in the card catalog for installations were searched in IRIS to locate records. When records pertaining to an installation were found in the card catalog and/or IRIS, a bibliography for the records was downloaded from the IRIS system for subsequent review by TLI researchers. The bibliographic fields include an abstract of each record, a microfilm reel number, and the range of frames that comprise the record on the microfilm reel. Based on the review of bibliographic information, copies of microfilm reels that contained records of interest were purchased by TLI for subsequent review at the TLI office in Golden, CO.

5.1.1.2 Finding Aid – U.S. Army Corps of Engineers Site Listing

The "USACE Site Listing" is a finding aid for files that were transferred to the AFHRA for archival. The majority of the USACE files have not yet been incorporated into IRIS, nor have they been microfilmed. The AFHRA is in the process of filming and incorporating the USACE documents into IRIS.

5.1.2 Results of the Records Research at the Air Force Historical Research Agency

All USACE and AFHRA files were reviewed and pertinent documents were photocopied at the AFHRA office at Maxwell AFB. A Document Index is provided in Appendix A of this report.

Records found during research at the Air Force Historical Research Agency (AFHRA) consisted of Unit Histories and Base Daily Journals from the 1940s and 1950s. A September 1943 Base History, noted that Chemical Warfare Training began 28-Sep-43 with the decontamination and

incendiary bomb area at the south end of the base. The gas chamber was enlarged to twenty by forty feet and divided into two equal sections each fitted with two air locks. One section was to be used for tear gas while the other section is for the use of chlorine gas or other toxic gases. An incendiary course was completed consisting of a bomb dropping device for the purpose of showing the way in which an incendiary bomb acts on being dropped from a plane, and two buildings for demonstration methods of combating incendiaries. One building is unprotected while the other is provided with various protective devices. A decontamination course was built, consisting of four lanes, each approximately fifteen by fifty yards in size. These courses were to be used in demonstrating the decontamination of persistent chemical warfare agents on runways, shell holes and airplanes. An undated Unit History with information from December 1943 and January 1944 discussed: 1. Chemical Warfare Training using Mustard Gas to be conducted in the southwest corner of the base beyond the ordnance area; 2. Melrose and Nara Vista ranges cleared of scrap; 3. Ground Gunnery Range used for training combat crews; 4. Chemical Warfare decontamination training area changed to an area nearer to station hospital; 5. Ground Gunnery Range consisted of carbine range, two pistol ranges, a submachine gun range, four skeet ranges, an overhead jeep range, a malfunctions range (.50 cal machine guns), and a jeep range. The *April 1944 Historical Narrative of the Army Air Field - Clovis, New Mexico* reported that the Chemical Warfare Training area was scraped to remove brush and high weeds and a Mustard Gas Shed was constructed for storage. A June 1955 Unit History reported that the small arms ranges south of Clovis AFB were cleaned up and put back in operation.

5.2 Air Force History Support Office, Bolling AFB, Washington, D.C.

The AFHSO is located in Washington, D.C. at the Anacostia Naval Annex. It is a part of the Air Force History and Museums Program, headquartered at the Pentagon. The AFHSO houses the "rapid response" team of historians who provide historical information and analysis to our country's leaders, as well as the authors who document the Air Force's activities and history. While not a public research facility, this office provides limited reference services to authorized individuals doing historical research on the Air Force.

AFHSO consists of the following divisions:

- **The Reference & Analysis Division:** provides historical information, analysis, and perspective to Air Force leaders and their staffs to support planning, policy development, and decision making. Also responds to requests for information about the Air Force's history from private organizations, government agencies, and the general public.
- **The Publications Division:** produces books, monographs, studies, and reports to preserve the history of the U.S. Air Force. Many of these are available for purchase through the Government Printing Office. The Outreach Division: provides materials to publicize the history and accomplishments of the Air Force, and represents the Air Force History & Museums program at exhibits at many international air shows each year.

5.2.1 Results of the Records Research at the Air Force History Support Office

AFHSO works in conjunction with the AFHRA at Maxwell AFB, AL. No research was conducted at AFHSO since it was determined that the documents would be duplicative of the documents with AFHRA at Maxwell AFB, AL.

5.3 Air Force Safety Center, Kirtland AFB, NM

The Air Force Safety Center (AFSC) is a field operating agency with headquarters at Kirtland AFB, NM. (<http://www.af.mil/factsheets/factsheet.asp?fsID=153>)

Air Force Safety Center
9700 G Avenue SE, Suite 282A
Kirtland AFB, New Mexico 87117-5670
(505) 846-0936

The Mission of the AFSC is to preserve and enhance combat capability through resource preservation for both Airmen and equipment which is accomplished by mishap elimination. The center develops, implements, executes and evaluates Air Force aviation, ground, weapons, space and system mishap prevention, policy and nuclear surety programs. The center oversees mishap investigations, evaluates corrective actions, ensures implementation and maintains the mishap database Air Force-wide. It also develops and directs safety education and media programs for all safety disciplines.

The Air Force Chief of Safety, who also holds the title of commander, AFSC, heads the organization and is located at the Pentagon with an Air Staff liaison division. The AFSC is composed of the Deputy Chief of Safety/Executive Director and nine divisions at its Kirtland AFB location, which include the following:

- **Analyses and Integration Division** ensures proactive mishap prevention guidance for all safety disciplines including nuclear surety by providing interactive dialogue and program expertise.
- **Aviation Safety Division** consists of safety-trained professionals spanning the domain of human and autonomous flight.
- **Ground Safety Division** manages the Air Force ground safety program including operational, occupational, sports and recreation, and traffic safety.
- **Space Safety Division** responsible for two diverse disciplines. The assured safe access to space and the safe management of emerging directed energy weapons, or DEW, systems.
- **Weapons Safety Division** establishes and executes mishap prevention programs for all nuclear and conventional weapons systems.
- **Safety Assessment Division** facilitates mishap prevention through hazard identification and risk mitigation recommendations.
- **Media Education, and Force Development Division** provides safety education and training to personnel, focusing on career and additional duty safety professionals, to enhance their knowledge and awareness to safely accomplish the mission and preserve vital national resources.
- **Resource Management, Manpower, and Career Programs Division** establishes policy and manages Air Force safety civilian and enlisted career fields.
- **Issues Division**, a detachment in the Pentagon, provides a direct interface with members of the Air Staff to facilitate responses to questions on safety related issues raised by the Chief of Staff and members of the staff.

- **Office of the Staff Judge Advocate** provides legal advice and general counsel on all aspects of Air Force mishap prevention programs and safety investigations.

5.3.1 Results of the Records Research at the Air Force Safety Center

The AFSC maintained the Information Preservation System (IPS). The IPS contained scanned Air Force historical documents obtained from both the AFSC and non-Air Force archives. The AFSC was contacted in regard to obtaining documentation maintained in the IPS. AFSC representatives explained that all funding for the IPS had been expended and that the IPS is no longer available for research.

5.4 Air Force Civil Engineer Support Agency, Tyndall AFB, FL

The Air Force Civil Engineer Support Agency (AFCESA), headquartered at Tyndall AFB, Fla., provides the best tools, practices and professional support to maximize Air Force civil engineer capabilities in base and contingency operations.

Air Force Civil Engineer Support Agency
139 Barnes Drive, Suite 1
Tyndall AFB, Florida 32403-5319
(850) 283-6156
<http://www.afcesa.af.mil/>

AFCESA, a field-operating agency of the Office of the Civil Engineer of the Air Force, Washington, D.C., provides products and services in the following major product areas:

- Readiness and Emergency Management
- Facility Energy
- Fire Emergency Services
- Explosive Ordnance Disposal
- Operations and Readiness Support
- Infrastructure Engineering
- Direct Field Support
- Career Field Management
- Civil Engineer Training
- Civil Engineer Automation
- Project Execution Support

(<http://www.afcesa.af.mil/>)

5.4.1 Results of the Records Research at the Air Force Civil Engineer Support Agency

AFCESA was contacted for this HRR-SC Report because it maintains Explosive Ordnance Disposal (EOD) reports in a database for the Air Force.

AFCESA maintains no on-line databases for EOD information.

AFCESA placed its archived EOD reports on CD-ROM. The CD-ROMs cover the years 1986 to 1997. These files were searched and copies related to this installation were copied for this HRR-SC Report. These records consisted of responses to flightline emergencies, assistance to local and state police, responses to on-installation to suspected Improvised Explosive Devices, clearance actions at active ranges (off-installation), routine training, and routine ordnance disposal. No information was found on potential MMRP sites at Cannon AFB.

EOD documents for the period prior to 1987 are not maintained and are not otherwise available. Documents from 1998 to the present are maintained in an active database at AFCESA. Arrangements were made with AFCESA to download EOD documents related to this HRR-SC Report in Adobe Acrobat's portable document format (PDF) to CD-ROM. As of the date of this report, no additional records have been received from AFCESA. Should AFCESA respond, the information will be provided to ITSI and the USACE.

6.0 DEPARTMENT OF DEFENSE

This section provides information on the activities related to the review and collection of documents from the sources within the DoD not covered by other sections of this HRR-SC Report. It deals solely with the Defense Technical Information Center (DTIC). The DTIC consists of two databases: www.dtic.mil and stinet.dtic.mil. Information on the research conducted at the DTIC is contained in the following subsections.

6.1 Background on the DTIC

The DTIC (<http://www.dtic.mil/>) is a DoD Field Activity under the Under Secretary of Defense for Acquisition, Technology and Logistics, reporting to the Director, Defense Research & Engineering (DDR&E). DTIC provides DoD technical information to DoD personnel, DoD contractors and potential contractors, and other U.S. Government agency personnel and their contractors. DTIC's mission is to:

- Provide direct information support to the warfighter.
- Leverage the multi-billion dollar investment in DoD scientific and technical research.
- Prevent unnecessary or redundant research from being performed at taxpayer expense.

DoD-funded researchers are required to search DTIC's collections of technical reports and summaries of ongoing research to ensure that unnecessary research is not undertaken.

6.2 On-Line Research

Two on-line databases exist within the DTIC web site: the DTIC Science and Technology Database and the Public Scientific and Technical Information Network (STINET). The following subsections describe the on-line search conducted for Cannon AFB for each database.

6.2.1 DTIC Database

The first DTIC database is found at the web address <http://www.dtic.mil/> and it includes:

- DTIC Science and Technology which searches public access research reports generated for and by DoD which includes report citations and in some instances full-text copies of the reports;
- DoD Wide Science and Technology Web sites which searches a combination of public scientific and technical web sites that allows the user to search for information from elements of the defense and military establishments; and
- DoD Web Sites which searches a wide collection of DoD web sites in multiple domains that allow the searches to be narrowed by defense agencies, unified commands, the service agencies, and other defense and military sources.

6.2.1.1 *Results of the Records Research Using the DTIC Database*

The DTIC Technology Database was searched for:

- “Cannon Air Force Base” – 2,785 documents
- “Cannon Air Force Base + Range” - zero documents

- “Portair Field” - three documents
- “Clovis Field” – four document
- “Clovis Army Air Field” – five documents
- “Clovis Army Air Base – four documents
- Clovis Air Force Base” – 44 documents

All the records were reviewed, except for the 2,785 documents for Cannon Air Force Base, and no documents related to this HRR-SC Report were found. Further research was conducted under the STINET database on Cannon AFB in an effort to narrow the number of documents.

6.2.2 STINET Database

The second on-line database for DTIC also includes publicly accessible collections and available for display or download of scientific and technical information, using the Public STINET service. The STINET Service helps the DoD community access pertinent scientific and technical information to meet mission needs effectively. <http://stinet.dtic.mil/>

6.2.2.1 Results of the Records Research Using the STINET Database

The STINET was searched for:

- “Cannon Air Force Base” – 22 documents
- “Cannon AFB” – 44 documents
- “Cannon Air Force Base + Range” – 0 documents
- “Portair Field” – 0 documents
- “Clovis Field” – 0 document
- “Clovis Army Air Field” – 0 documents
- “Clovis Army Air Base” – 0 documents
- “Clovis Air Force Base” – 0 documents

The documents were reviewed and no documents related to this HRR-SC Report were found.

Additional terms were searched including the term Range, which resulted in 106,884 documents, a number too large to review. The additional specific terms searched on, included:

- Anti-Aircraft Artillery Range – 0 documents
- Anti-Tank Range – 2 documents
- Artillery Range – 30 documents
- Bombing Range – 54 documents
- Demolition Range – 7 documents
- EOD – 175 documents
- Experimental Range – 87 documents
- Field Firing – 15 documents
- Firing Range – 200 documents
- Firing-In Butt – 0 documents
- Gunnery Range – 34 documents

- Impact Area – 191 documents
- Machine Gun Range – 3 documents
- Maneuver Area – 55 documents
- Munitions Disposal – 56 documents
- Mortar Range – 0 documents
- Open Burn Open Detonation – 63 documents
- Pistol Range – 6 documents
- Rifle Range – 32 documents
- Rocket Range – 29 documents
- Skeet Range – 0 documents
- Small Arms Range – 63 documents
- Target Range – 295 documents
- Training Range – 198 documents
- UXO – 508 documents
- Unexploded Ordnance – 548 documents

The documents were reviewed and no documents related to this HRR-SC Report were found.

6.3 On-Site Research

No on-site research is possible at the DTIC as all information is available only through internet access.

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7.0 LIBRARY OF CONGRESS

This section provides information on the activities related to the review and collection of documents from the Library of Congress.

The Library of Congress
101 Independence Ave, SE
Washington, D.C. 20540
<http://www.loc.gov/index.html>

Information on the research conducted at the Library of Congress is contained in the following subsections.

7.1 Background

The Library of Congress is the nation's oldest federal cultural institution and serves as the research arm of Congress. It is also the largest library in the world, with millions of books, recordings, photographs, maps and manuscripts in its collections.

The Library's mission is to make its resources available and useful to Congress and the American people and to sustain and preserve a universal collection of knowledge and creativity for future generations.

An agency of the legislative branch of the U.S. Government, the Library includes several internal divisions (or service units), including the Office of the Librarian, Congressional Research Service, U.S. Copyright Office, Law Library of Congress, Library Services, and the Office of Strategic Initiatives. (<http://www.loc.gov/about/generalinfo.html>)

7.2 Library of Congress On-Line Research

The Library of Congress on-line catalog was used to search for documents that might be related to Cannon AFB: <http://catalog.loc.gov/cgi-bin/Pwebrecon.cgi?DB=local&PAGE=First>.

7.3 Library of Congress On-Site Research

As a result of the on-line research at the Library of Congress, no on-site research was conducted.

7.4 Results of the Records Research at the Library of Congress

No documents relating to the Cannon AFB were found.

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8.0 AERIAL PHOTOGRAPHS

Historic aerial photographs were collected for Cannon AFB as part of the research for this HRR-SC Report. Efforts were made to locate and obtain aerial photographs of the installation for a minimum of three decades: 1940s, 1950s, and 1960s, in order to document changes at the installation over time related to the MMRP.

8.1 Background on Aerial Photograph Research

Searches for aerial photos were conducted at the U.S. Geological Survey (USGS) Infoservices office located at USGS Earth Science Information Service (ESIC) at the Federal Center in Denver, Colorado. A database called the Aerial Photography Summary Record System (APSR) was searched at the ESIC office. The APSRS is a record of aerial photographic coverage of the U.S. from federal sources and participating state, regional, and commercial sources. The sources that were listed on the APSRS were contacted to obtain copies of aerial photographs.

Aerial photographs from federal agencies were ordered primarily through the USGS Earth Resources Observation Systems (EROS) Data Center in Sioux Falls, South Dakota, the U.S. Department of Agriculture's Aerial Photo Field Office in Salt Lake City, Utah, and National Archives and Records Administration in College Park, Maryland.

State offices as well as private and commercial sources were researched for aerial photographs if suitable photos from federal agencies were not identified.

Efforts were made to obtain aerial photos with the best available scale and adequate resolution. Electronic scans of the photographs were ordered when available at the highest possible dots per inch resolution. When the electronic versions were not available, black and white paper prints or negatives were ordered.

8.2 Results of the Aerial Photograph Research

Aerial photographs were obtained from 1966 for Cannon AFB. A 1951 aerial photograph has been ordered from NARA, but not received as of this date. No aerial photographs earlier than 1951 were found for Cannon AFB.

Source	Date of Photo	Scale	Project	Can	Roll	Frame
USDA	15-Aug-66	1:20,000	CIJ	29536	3GG	63, 63, 135 & 136
NARA	7-Jun-51	1:20,000	CIJ	NA	CIJ 5H; CIH 7H	31 & 33; 9 & 11

The 1966 aerial photographs obtained for Cannon AFB revealed the Ordnance Storage Area and what appeared to be a shooting-in-butt directly north of runway 30.

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9.0 SUMMARY OF THE RECORDS RESEARCH

The following summarizes the results for this HRR-SC Report.

9.1 Archives Researched

Historic records research for Cannon AFB was conducted at following locations:

- **National Archives and Records Administration:**
 - NARA Archives I, Washington, D.C.
 - NARA Archives II, College Park, MD
 - NARA Rocky Mountain Region, Denver, CO
 - National Personnel Records Center, St. Louis, MO
- **U.S. Army Corps of Engineers:**
 - USACE Topographic Engineering Center Imagery Office, Alexandria, VA
 - USACE Office of History, Alexandria, VA
 - USACE St. Louis District, St. Louis, MO
- **U.S. Army:**
 - U.S. Army Research, Development and Engineering Command, Aberdeen Proving Ground, MD
 - o Historic Research and Response Center
 - o Edgewood Chemical Biological Center Technical Library
 - U.S. Army Center of Military Research, Ft. McNair, VA
 - U.S. Army Institute of Military History, Carlisle Barracks, PA
- **U.S. Air Force:**
 - Air Force Historical Research Agency, Maxwell AFB, Montgomery, AL
 - Air Force History Support Office, Bolling AFB, Washington, D.C.
 - Air Force Safety Center, Kirtland AFB, Albuquerque, NM
 - Air Force Engineer Support Agency, Tyndall AFB, FL
- **Department of Defense:**
 - Defense Technical Information Center Database
 - STINET Database
- **Library of Congress**
- **Historic Aerial Photographs**

9.2 Results of the Records Research

The results from the records research include the following:

- **National Archives and Records Administration:**
 - **NARA Archive I** – All the records maintained by NARA’s Archives I predated Cannon AFB, and as a result no records were found for this report.
 - **NARA Archive II** – The records found at NARA Archives II primarily documented the acquisition of off-installation ranges such as a Jeep Moving Target Range, the Clovis Air-to Ground Gunnery Range, the Melrose Bombing Range, the Guadalupe Bombing Range and several Precision Bombing Ranges. A few documents were related to acquisition and possible disposal of a Small Arms Gunnery Range at Cannon AFB containing 889.21 acres. It is not clear from the available

- documentation whether this range remained with Cannon AFB or if it was declared surplus and transferred to private ownership. No maps or aerial photographs were located at NARA II that could identify the past or present location of this small arms range.
- **NARA Rocky Mountain Region** – Documents copied at NARA Rocky Mountain Region also primarily documented the off-installation ranges. One map was located for the Jeep Moving Target Range, an of-installation range. No documents were found for potential MMRP sites on Cannon AFB.
 - **National Personnel Records Center** – Correspondence was found that requested a Sonic Bombing Scoring Range be constructed to Cannon AFB and several other ranges. It appears that this range may have become the Melrose Bombing Range, an off-installation range for Cannon AFB. The remainder of the documents involved the identification of off-installation ranges for disposal.
- **U.S. Army Corps of Engineers:**
 - **USACE Topographic Engineering Center and Image Office** – The USACE Topographical Engineering Center and Image Office was contacted about its capabilities to support the acquisition of historical aerial photographs for this project. Unfortunately, the office did not have a collection of historical aerial photographs for the installations under investigation; it was unable to query its database to determine an inventory of available aerial photographs; and its image inventory does not include historical aerial photographs maintained by NARA or other archives.
 - **USACE Office of History** – The only documents found involved off-installation ranges. One document referenced the Clovis Ground Gunnery and Small Arms Range.
 - **USACE St. Louis District** – Maps from 12-Feb-52 and 1-Oct-57 were copied that showed an ordnance area at the eastern of Cannon AFB. A third map was found titled, *Clovis Air Force Base-Vicinity Map Wind Analysis Airfield Pavement*, for the period January 1945 through December 1945, that shows the Clovis AFB Small Arms Range south of the present day installation.
 - **U.S. Army Corps of Engineers:**
 - **U.S. Army Research, Development and Engineering Command** – Two sources of historical information were researched at the U.S. Army Research, Development, and Engineering Command at Edgewood Arsenal, MD.
 - **Historical Research and Response Center** – Two documents relating to chemical warfare were found at the HRRC for Cannon AFB. The first was prepared by the HRRC staff and is titled *Areas Used by the Chemical Warfare Service During the 1900's*, and is undated. This report summarized the data on the then Clovis Field reported in a Cross Index, dated 4 Aug-43 memo, "The following named units having departed their stations with individual and housekeeping equipment only, it is suggested that their Apparatus, Decontaminating, Power Driven be reassigned as indicated. From: 91st Depot Repair Sq. to 740th Bomb Sq., Clovis AAB, Clovis, New Mexico." The second documents is from the AAF, 234th Air Base Unit, Section D, Mnt & Sup, and lists on 28 Feb 1945 chemical

- equipment present to include 1 M4 HS Vapor Detector Kit. The location where the materiel were stored or expended was not provided in the documentation.
- **Edgewood Chemical Biological Center Technical Library** – Based on the recommendation of the Edgewood Chemical Biological Center Technical Library staff, no research was conducted at this facility.
 - **U.S. Army Center of Military History** – The U.S. Army Center of Military History contained no information relating to MMRP issues.
 - **U. S. Army Institute of Military History** – The reference historian at the U.S. Army Institute of Military History, Carlisle Barracks, PA reported that nothing was found in the facility's collection for Cannon AFB.
- **U.S. Army Corps of Engineers:**
 - **Air Force Historical Research Agency** – Records found during research at the Air Force Historical Research Agency (AFHRA) consisted of Unit Histories and Base Daily Journals from the 1940s and 1950s. A September 1943 Base History, noted that Chemical Warfare Training began 28-Sep-43 with the decontamination and incendiary bomb area at the south end of the base. The gas chamber was enlarged to twenty by forty feet and divided into two equal sections each fitted with two air locks. One section was to be used for tear gas while the other section is for the use of chlorine gas or other toxic gases. An incendiary course was completed consisting of a bomb dropping device for the purpose of showing the way in which an incendiary bomb acts on being dropped from a plane, and two buildings for demonstration methods of combating incendiaries. One building is unprotected while the other is provided with various protective devices. A decontamination course was built, consisting of four lanes, each approximately fifteen by fifty yards in size. These courses were to be used in demonstrating the decontamination of persistent chemical warfare agents on runways, shell holes and airplanes. An undated Unit History with information from December 1943 and January 1944 discussed: 1. Chemical Warfare Training using Mustard Gas to be conducted in the southwest corner of the base beyond the ordnance area; 2. Melrose and Nara Vista ranges cleared of scrap; 3. Ground Gunnery Range used for training combat crews; 4. Chemical Warfare decontamination training area changed to an area nearer to station hospital; 5. Ground Gunnery Range consisted of carbine range, two pistol ranges, a submachine gun range, four skeet ranges, an overhead jeep range, a malfunctions range (.50 cal machine guns), and a jeep range. The *April 1944 Historical Narrative of the Army Air Field - Clovis, New Mexico* reported that the Chemical Warfare Training area was scraped to remove brush and high weeds and a Mustard Gas Shed was constructed for storage. A June 1955 Unit History reported that the small arms ranges south of Clovis AFB were cleaned up and put back in operation.
 - **Air Force History Support Office** – The Air Force History Support Office located at Bolling AFB in Washington, D.C. contained a subset of the records maintained by the Air Force Historical Research Agency. No new information was found at this facility.
 - **Air Force Safety Center** – The Air Force Safety Center, located at Kirtland AFB, Albuquerque, NM, formerly maintained the Information Preservation System. The Information Preservation System contained scanned Air Force historical documents

obtained from both the Air Force Safety Center and non-Air Force archives. Unfortunately, due to a lack of funding, the Information Preservation System is no longer available for research.

- **Air Force Civil Engineer Support Agency** – The Air Force Civil Engineer Support Agency maintains historic records for Explosive Ordnance Disposal for Cannon AFB which were copied. These records consisted of responses to flightline emergencies, assistance to local and state police, responses to on-installation to suspected Improvised Explosive Devices, clearance actions at active ranges (off-installation), routine training, and routine ordnance disposal. No information was found on potential MMRP sites at Cannon AFB.
- **Department of Defense** – DoD research consisted of accessing DTIC's consists of two databases: www.dtic.mil and stinet.dtic.mil. Both databases were searched and no documents relevant to this HRR-SC were found.
- **Library of Congress** - No documents relating to Cannon AFB were found.
- **Historic Aerial Photographs** - Aerial photographs were obtained from 1966 for Cannon AFB. A 1951 aerial photograph has been ordered from NARA but not received as of this date. No aerial photographs earlier than 1951 were found for Cannon AFB. The 1966 aerial photographs obtained for Cannon AFB revealed the Ordnance Storage Area and what appeared to be a shooting-in-butt directly north of runway 30.

Appendix A Document Index

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**Cannon AFB
CSE HRR Document Index**

Document Number Range	Doc Date	Doc Type	Author/Author Organization	Document Title	Comments
AIR FORCE HISTORICAL RESEARCH AGENCY (AFHRA), MAXWELL AFB, AL					
AFHRA-CANAFB-0001	11-Nov-42	Corres.	L.P. Whitten, Col. Air Corps, Director of Base Services	Moving Target Ranges-Second Air Force Stations. [1st Ind]	Authorization for construction of Jeep Type Moving Target Ranges at all 2nd AF bases except Pueblo Army Air Base. No maps or other information to identify location on installation.
AFHRA-CANAFB-0002	25-Oct-42	Corres.	John L. Grimes, Capt., A.G.D, Asst. Adj. General	Moving Target Ranges-Second Air Force Stations	Alamogordo and Clovis Field authorized for Jeep Moving Target Range. No maps or other information to identify location on installation.
AFHRA-CANAFB-0003	14-Nov-42	Corres.	E.C. Itschner, Colonel, Corps of Engineers, Assistant; Operations Branch, Construction Division	Construction of One (1) "Jeep" Type Moving Target Range at Clovis Airfield, New Mexico	Clovis Field authorization. No maps or other information to identify location on installation.
AFHRA-CANAFB-0004	15-Nov-42	Corres.	War Department, Office of the Chief of Engineers, Washington	Construction of One (1) "Jeep" Type Moving Target Range at Clovis Airfield, New Mexico	Authorization to proceed. No maps or other information to identify location on installation.
AFHRA-CANAFB-0005	26-May-43	Index Sheet	Unknown	Contr No. A 13783 for const on rifle range. Completion will be on or before Aug 1, 1943	No maps or other information to identify location on installation.
AFHRA-CANAFB-0006	7-Oct-43	Cross Index	Unknown	Request Dir Cons as indicated in directive for additional hours. At High Altitude and Low Altitude bombing ranges be cancelled.	Off-installation ranges.
AFHRA-CANAFB-0007	22-Jan-45	Corres.	OCE, Military Constrn. Div.	Generators are not available.	Off-installation ranges.
AFHRA-CANAFB-0008	25-Jan-45	Corres.	OCE	Construction of powerline for Poorman Range should be completed as presently agreed.	No maps or other information to identify location on installation.
AFHRA-CANAFB-0009	15-Dec-42	Corres.	J.L. Person, Lt. Colonel, Corps of Engineers, Assistant, Operations Branch, Construction Division	Jeep Type Moving Target Range, Clovis, New Mexico, (Ltr. fr. OCE to CG, AAF 11-26-42.)	Concurrence on deletion of construction for the Jeep Moving Range.
AFHRA-CANAFB-0010	10-Dec-42	Corres.	L.P. Whitten, Col. Air Corps, Director of Base Services	Jeep Type Moving Target Range - Clovis, New Mexico [1st Ind]	No maps or other information to identify location on installation.
AFHRA-CANAFB-0011	26-Nov-42	Corres.	Mark S. Gurnee, Captain, Corps of Engineers, Assistant; Operations Branch, Construction Division	Jeep Type Moving Target Range - Clovis, New Mexico. Deletion of one "Jeep" Type Moving Target Range at Clovis	No maps or other information to identify location on installation.
AFHRA-CANAFB-0012	15-Dec-42	Corres.	J.L. Person, Lt. Colonel, Corps of Engineers, Assistant; Operations Branch, Construction Division	Jeep Type Moving Target Range, Clovis, New Mexico, (Ltr. fr. OCE to CG, AAF 11-26-42.) [2nd Ind] Authority of construction of range is rescinded	Concurrence on deletion of construction for the Jeep Moving Range.
AFHRA-CANAFB-0013	10-Dec-42	Corres.	L.P. Whitten, Col. Air Corps, Director of Base Services	Jeep Type Moving Target Range - Clovis, New Mexico [1st Ind]	Duplicate of Document Number AFHRA-CANAFB-0010

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AFHRA-CANAFB-0014	26-Nov-42	Corres.	Mark S. Gurnee, Captain, Corps of Engineers, Assistant; Operations Branch, Construction Division	Jeep Type Moving Target Range - Clovis, New Mexico Deletion of one "Jeep" Type Moving Target Range at Clovis	Duplicate of Document Number AFHRA-CANAFB-0011.
AFHRA-CANAFB-0015 - 0016	22-Dec-42	Corres.	Edward J. Sheridan, Captain, Corps of Engineers	Information requested about "Jeep Type" target range, Clovis, N. Mexico. Target range has been in and out so many times that clarification of status is desired. Requesting as to whether or not the Army Air Forces desire to proceed with the construction of this target range.	No maps or other information to identify location on installation.
AFHRA-CANAFB-0017 - 0018	22-May-43	Corres.	Edward J. Sheridan, Major, Corps of Engineers, Assistant; Military Construction Branch, Construction Division	Construction Directive for Rifle Range at Clovis Airfield, Clovis, New Mexico. Authorizing construction for project.	No maps or other information to identify location on installation.
AFHRA-CANAFB-0019 - 0020	1-Jun-43	Corres.	Edward J. Sheridan, Major, Corps of Engineers, Assistant; Military Construction Branch, Construction Division	Construction Directive for Jeep Type Moving Target Range at Clovis, New Mexico. Authorizing construction for project.	No maps or other information to identify location on installation.
AFHRA-CANAFB-0021	1-Jul-43	Corres.	R.E. Cole, Lt. Col., Corps of Engineers, District Engineer	Drawings and specifications for construction of Rifle Range, Clovis Airfield, Clovis, New Mexico	No maps or other information to identify location on installation. Drawings not included.
AFHRA-CANAFB-0022	2-Jul-43	Corres.	R.E. Cole, Lt. Col., Corps of Engineers, District Engineer	Drawings and specifications for construction of Jeep Type Moving Target, Clovis Airfield, Clovis, New Mexico	No maps or other information to identify location on installation. Drawings not included.
AFHRA-CANAFB-0023	26-Jul-43	Corres.	R.E. Cole, Lt. Col., Corps of Engineers, District Engineer	Construction Directive for Rifle Range at Clovis Airfield, Clovis, New Mexico. (Ltr. From OCE, Wash., D.C., to Div. Engr., SWD, Dallas, Tex., 22 May 1943.) [2nd Ind] Transmitting four prints/drawings indicating location of authorized facilities as approved by Commanding Officer.	No maps or other information to identify location on installation. Drawings not included.
AFHRA-CANAFB-0024	4-Aug-43	Corres.	Edward J. Sheridan, Major, Corps of Engineers, Assistant; Military Construction Branch, Construction Division	Construction Directive for Rifle Range at Clovis Airfield, Clovis, New Mexico. [4th Ind]	No maps or other information to identify location on installation. Drawings not included.
AFHRA-CANAFB-0025 - 0026	6-Aug-43	Corres.	Edward J. Sheridan, Major, Corps of Engineers, Assistant, Military Construction Branch, Construction Division	Revision of Construction Directive for Jeep Type Moving Target Range, Clovis, New Mexico.	No maps or other information to identify location on installation. Drawings not included.

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AFHRA-CANAFB-0027 - 0028	15-Aug-43	Corres.	E.C. Light, Major, AC, Adjutant	Construction of Precision Bombing Targets. Requesting approval for projects and allocation for funds to the Area Engineering for construction.	No maps or other information to identify location on installation. Drawings not included.
AFHRA-CANAFB-0029	19-Aug-43; 27 Aug-43	Corres.	John L. Grimes, Major, AGD, Adjutant General; John M. Dick, Capt. AGD, Asst Adjutant General	Construction of Precision Bombing Targets (Ltr. COAB, Clovis, N.M. to CG, 2AF, thru CG, I.B.C., 8/15/43.) [1st Ind] approved; and [2nd Ind] Request authorization for construction of three precision bombing targets.	Off-installation ranges.
AFHRA-CANAFB-0030	6-Sep-43	Corres.	J.C. Shively, Col., A.C., Buildings and Grounds Section	Construction of Precision Bombing Targets, Clovis, New Mexico. [3rd Ind]. Authorization to proceed with construction of three precision bombing targets.	Off-installation ranges.
AFHRA-CANAFB-0031 - 0032	16-Sep-43	Corres.	Edward J. Sheridan, Major, Corps of Engineers, Assistant; Military Construction Branch, Construction Division	Construction Directive for Precision Bombing Targets, Clovis, New Mexico. Authorization for project.	Off-installation ranges.
AFHRA-CANAFB-0033	9-Oct-43	Corres.	R.E. Cole, Lt. Col., Corps of Engineers, District Engineer	Drawings and specifications for construction of Small Arms Ranges, Clovis Airfield, Clovis, New Mexico	No maps or other information to identify location on installation. Drawings not included.
AFHRA-CANAFB-0034 - 0035	22-Oct-43	Corres.	R.E. Cole, Lt. Col., Corps of Engineers, District Engineer	Field Estimate of Cost, Construction of Job No. Clovis A(6-4) formerly Job No. Clovis A(5-9), Clovis Army Air Field, New Mexico	No maps or other information to identify location on installation. Drawings not included.
AFHRA-CANAFB-0036	8-Jun-45	Corres.	The Division Engineer, Southwestern Division, Dallas, Texas	Field estimate of cost of construction - Job No. Clovis ESA 210-20 and Clovis ESA 210-21	Sonic bombing targets, location not indicated.
AFHRA-CANAFB-0037	30-Apr-45	Corres.	Edward J. Sheridan, Major, Corps of Engineers, Assistant; Troop Facilities Branch, Military Construction Division	Construction Directive for Tracking Mock-Ups, Clovis Army Air Field, Texas. Authorization for construction.	Photo gunnery tracking
AFHRA-CANAFB-0038	30-Apr-45	Corres.	Unknown	Construction Directive for Tracking Mock-Ups, Clovis Army Air Field, Texas. Authorization for construction.	Photo gunnery tracking
AFHRA-CANAFB-0039 - 0040	9-Feb-45	Form	Charles F. Reming, Major, Corps of Engineers (Submitted); Herbert Morgan, Jr., Colonel, Air Corps (Approved)	Individual Project Estimate Repairs and Utilities	Photo gunnery tracking
AFHRA-CANAFB-0041	13-Jun-44	Corres.	OCE	Correspondence covering replacement of engine generator unit with an 8 KW engine generator unit as a stand-by for lighting of bombing ranges at Clovis Army Air Fld.	Off-installation ranges.

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AFHRA-CANAFB-0042	13-Jun-44	Corres.	Louis C. McCabe, Lt. Col, Corps of Engineers, Assistant; Repairs & Utilities Branch, Military Construction Division	Replacement of a 5 KW Stand-by Engine Generator Set with an 8 KW Engine Generator Set. [1st Ind]	Off-installation ranges.
AFHRA-CANAFB-0043	12-Sep-44	Corres.	H.B. Benedict, Lt. Colonel, Air Corps, Chief, Distribution Section, Office of the Asst. C/AS, M&S	Requisition No. PE 29-031-715-44. [6th Ind]	Off-installation ranges.
AFHRA-CANAFB-0044	8-Jul-43	Teletype	Edward J. Sheridan, Major, Corps of Engineers, Assistant; Military Construction Branch, Construction Division	Authorization of transfer for construction of .30 caliber rifle range	No maps or other information to identify location on installation.
AFHRA-CANAFB-0045	26-Aug-43	Corres.	Edward J. Sheridan, Major, Corps of Engineers, Assistant; Military Construction Branch, Construction Division	Transfer of Job A(5-9) to Job Series A6, Clovis, New Mexico, Jeep Moving Target Range.	No maps or other information to identify location on installation. Drawings not included.
AFHRA-CANAFB-0046	27-Oct-43	Corres.	Edward J. Sheridan, Major, Corps of Engineers, Assistant; Military Construction Branch, Construction Division	Establishment of Completion Date, Job A 7, Clovis, New Mexico, Jeep Target Range.	No maps or other information to identify location on installation. Drawings not included.
AFHRA-CANAFB-0047 - 0049	11-Jun-42	Report	Albuquerque District Office, Albuquerque District, Albuquerque, New Mexico	Preliminary Real Estate Report Aircraft Gunnery Range for use in Connection with Clovis, New Mexico. Airfield	Appears to be off-installation.
AFHRA-CANAFB-0050	30-Sep-43	Corres.	Edward J. Sheridan, Major, Corps of Engineers, Assistant; Military Construction Branch, Construction Division	Fencing Machine Gun Range	No maps or other information to identify location on installation.
AFHRA-CANAFB-0051	4-Sept-43; 8-Sept-43	Corres.	W.E. Clapp, Capt, AC, Base S-4; Thomas L. Hightower, Senior Engineer, Area Engineer	Fencing Machine Gun Range, includes [1st Ind]	No maps or other information to identify location on installation. Drawings not included.
AFHRA-CANAFB-0052	13-Sept-43; 21-Sept-43	Corres.	R.E. Cole, Lt. Col., Corps of Engineers, District Engineer; F.T. Thayer, Jr., Major, Corps of Engineers, Repairs and Utilities Branch	Fencing Machine Gun Range (Ltr. fr. AAB, Clovis, N.M. to AE, Clovis N.M. 4 Sept. 1943.), includes [2nd Ind] and [3rd Ind]	No maps or other information to identify location on installation. Drawings not included.
AFHRA-CANAFB-0053	21-Sep-43	Corres.	F.T. Thayer, Jr., Major, Corps of Engineers, Repairs and Utilities Branch	Fencing Machine Gun Range (Ltr fr CO Clovis AAB to Area Eng Clovis, 4 Sept 1943) [3rd Ind]	Partial Duplicate of Document Number AFHRA-CANAFB-0052
AFHRA-CANAFB-0054	13-Sep-43	Corres.	R.E. Cole, Lt. Col., Corps of Engineers, District Engineer.	Fencing Machine Gun Range (Ltr. fr. AAB, Clovis, N.M. to A.E., Clovis, New Mex., 4 Sept. 1943.) [2nd Ind]	Partial Duplicate of Document Number AFHRA-CANAFB-0052
AFHRA-CANAFB-0055	8-Sep-43	Corres.	Thomas L. Hightower, Senior Engineer, Area Engineer	Fencing Machine Gun Range [1st Ind, page 2]	2nd page to Document Number AFHRA-CANAFB-0051

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AFHRA-CANAFB-0056	4-Sep-43	Corres.	W.E. Clapp, Capt, AC, Base S-4	Fencing Machine Gun Range	No maps or other information to identify location on installation.
AFHRA-CANAFB-0057 - 0059	29-Feb-44	Report	Headquarters 497th Bombardment Group (VH) Army Air Field, Clovis, New Mexico.	History (Revised) For the Period 1 February to 29 February, 1944	Ranges were open for all personnel; however, only the skeet range was able to provide instructors. Pistol firing was conducted.
AFHRA-CANAFB-0060 - 0062	31-Dec-42	Report	997th Guard Squadron Army Air Base - Clovis, New Mexico	The Narrative History of the 997th Guard Squadron Army Air Base - Clovis, New Mexico From date of Inception to December 31, 1942	The Squadron was trained on the skeet range and the rifle range. All personnel took the course of instruction in Chemical Warfare, consisting of several training exercises and gas chamber exercises
AFHRA-CANAFB-0063 - 0071	31-Dec-43	Report	Army Air Base Clovis, New Mexico	Base Histories Army Air Base Clovis, New Mexico	1. Chemical Warfare Training using Mustard Gas to be conducted in the SW corner of the base beyond the ordnance area.; 2. Melrose and Nara Vista ranges cleared of scrap; 3. Ground Gunnery Range used for training combat crews; 4. Chemical Warfare decontamination training area changed to latrine nearer to station hospital; 5. Ground Gunnery Range consisted of carbine range, two pistol ranges, a submachine gun range, four skeet ranges, an overhead jeep range, a malfunctions range (.50 cal machine guns), and a jeep range

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AFHRA-CANAFB-0072 - 0074	30-Sep-43	Report	Army Air Base Clovis, New Mexico	Historical Report September 1943 Clovis Army Air Base	Chemical Warfare Training began 28 Sep with the decontamination and incendiary bomb area at the South end of the base. The gas chamber was enlarged to twenty by forty feet and divided into two equal sections each fitted with two air locks. One section is to be used for chloracetophene (tear gas) while the other section is for the use of chlorine gas or other toxic gases. An incendiary course was completed consisting of a bomb drooping device for the purpose of showing the way in which an incendiary bomb acts on being dropped from a plane, and two buildings for demonstration methods of combating incendiaries. One building is unprotected while the other is provided with various protective devices. A decontamination course was built, consisting of four lanes, each approximately fifteen by fifty yards in size. These courses will be used in demonstrating the decontaminating of persistent chemical warfare agents on runways, shell holes and airplanes.
AFHRA-CANAFB-0075 - 0077	29-Apr-44	Report	Army Air Base Clovis, New Mexico	April Historical Narrative of the Army Air Field - Clovis, New Mexico	Chemical Warfare Training area was scraped to remove brush and high weeds and a Mustard Gas Shed was constructed for storage
AFHRA-CANAFB-0078 - 0080	30-May-44	Report	Army Air Base Clovis, New Mexico	May Historical Narrative of the Army Air Field - Clovis, New Mexico	A Mustard Gas Decontamination exercise was conducted.
AFHRA-CANAFB-0081 - 0082	30-May-44	Report	Army Air Base Clovis, New Mexico	Historical Narrative for the Training Section May 1944 Army Air Field - Clovis, New Mexico	Five more bombing sites requisitioned. Apparently these are off-site.
AFHRA-CANAFB-0083 - 0084	30-Jun-44	Report	Army Air Base Clovis, New Mexico	Historical Narrative for the Training Section June 1944 Army Air Field - Clovis, New Mexico	Five more bombing sites in use. Apparently these are off-site.
AFHRA-CANAFB-0085 - 0087	31-Aug-44	Report	Army Air Base Clovis, New Mexico	Historical Narrative of the Department of Training	66,850 rounds of .50 cal ammunition fired
AFHRA-CANAFB-0088 - 0089	30-Jun-45	Report	Army Air Base Clovis, New Mexico	History of the Clovis Army Air Field for June 1945, Narrative History	Cyanide used for case-hardening in the welding shop and firearms accidents have occurred.

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AFHRA-CANAFB-0090 - 0091	30-Sep-45	Report	Army Air Base Clovis, New Mexico	History of Clovis Army Air Field (16th Bombardment Operational Training Wing) (Second Air Force) for July, August, and September 1945	Skeet shooting has begun for recreational purposes.
AFHRA-CANAFB-0092 - 0093	30-Nov-45	Report	Army Air Base Clovis, New Mexico	History of Clovis Army Air Field (17th Bombardment Operational Training Wing) (Second Air Force) for November 1945	Additional gunnery equipment from other bases received.
AFHRA-CANAFB-0094 - 0095	30-Jun-55	Report	Army Air Base Clovis, New Mexico	History of the 312th Fighter-Bomber Wing 1 January -- 30 June 1955 AU-D5, Clovis Air Force Base Clovis, New Mexico	Small arms ranges south of Clovis AFB were cleaned up and put back in operation
COE HISTORIAN'S OFFICE, ALEXANDRIA, VA					
COEHO-CANAFB-0001	No date	Form	Unknown	Realty Control File Summary Land Acquisitions and Disposals - Clovis. Acquisition: 3,982.87 acres leased, \$2,715 p/a; Disposal 3,982.87 acres \$2,715 p/a	Off-installation ranges.
COEHO-CANAFB-0002 - 0004	No date	Form	Unknown	Realty Control File Summary Land Acquisitions and Disposals-Clovis, Land Ownership and Cost Data	Off-installation ranges.
USACE, ST. LOUIS, MO					
COESL-CANAFB-0001	1-Oct-57	Map	Department of Air Force	Map - Canon Air Force Base	
COESL-CANAFB-0002	12-Feb-52	Map	Department of Air Force	Map - Clovis Air Force Base; Clovis, New Mexico Preliminary Master Plan	
COESL-CANAFB-0003	No date	Map	Department of Air Force	Map - Clovis Air Force Base-Vicinity Map Wind Analysis Airfield Pavement	

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NARAI, COLLEGE PARK, MD					
NARAI-CANAFB-0001	No date	Folder	Unknown	Clovis, New Mexico Airfield	
NARAI-CANAFB-0002	31-Jul-44	Corres.	Henry L. Stimson, Secretary of War	U.S. vs. Bushwood W. Kinsolving, et. al. Supplemental Decls. Of Taking Nos. 1 and 2.	Acquisition of off-installation bombing ranges, Clovis Aerial Gunnery Range.
NARAI-CANAFB-0003	28-Jul-44	Corres.	John J. O'Brien, Colonel, Corps of Engineers, Chief, Real Estate Branch	U.S. vs. Bushwood W. Kinsolving, et. al, Suppl. Decls Nos 1 and 2. Acquisition of Land.	Acquisition of off-installation bombing ranges, Clovis Aerial Gunnery Range.
NARAI-CANAFB-0004	4-Jun-43	Corres.	Henry L. Stimson, Chief, Secretary of War	U.S. vs. Bushwood W. Kinsolving, et. al, No. 1.	Acquisition of off-installation bombing ranges, Clovis Aerial Gunnery Range.
NARAI-CANAFB-0005	4-Jun-43	Corres.	John J. O'Brien, Colonel, Corps of Engineers, Chief, Real Estate Branch	U.S vs. Bushwood W. Kinsolving, et al. D/T #1 Acquisition of Land. Requesting Attorney General file in pending condemnation proceeding a declaration of taking pursuant to existing law	Acquisition of off-installation bombing ranges, Clovis Aerial Gunnery Range.
NARAI-CANAFB-0006	31-Mar-43	Corres.	Henry L. Stimson, Secretary of War	U.S. vs. Bushwood W. Kinsolving, et. al. Amendment. The need for certain additional land be acquired for use in connection with this project.	Acquisition of off-installation bombing ranges, Clovis Aerial Gunnery Range.
NARAI-CANAFB-0007	30-Mar-43	Corres.	John J. O'Brien, Colonel, Corps of Engineers, Chief, Real Estate Branch	U.S. vs. Bushwood W. Kinsolving, et. al. Amendment. Amendment to Petition in Condemnation.	Acquisition of off-installation bombing ranges, Clovis Aerial Gunnery Range.
NARAI-CANAFB-0008 - 0009	9-Mar-43	Corres.	Henry L. Stimson, Secretary of War	Clovis Aerial Gunnery Range - SPELC U.S. vs. 3,220.42 acres of land, et. al.	Acquisition of off-installation bombing ranges, Clovis Aerial Gunnery Range.
NARAI-CANAFB-0010	8-Mar-43	Corres.	John J. O'Brien, Colonel, Corps of Engineers, Chief, Real Estate Branch	U.S. vs. 3,220.41 acres of land, et al. Acquisition of Land.	Acquisition of off-installation bombing ranges
NARAI-CANAFB-0011	No date	Folder	Unknown	601.1 Clovis Army Airfield, N.M.	
NARAI-CANAFB-0012	12-Dec-45	Memorandum	Connelly, Chief, Acquisition Division	Clovis Army Airfield, Air-to-Ground Gunnery Range. Direction to authorize acquisition of leasehold interest in 15,345 acres to provide an air-to-ground gunnery range at Clovis Army Airfield	Acquisition of off-installation bombing ranges, Clovis Aerial Gunnery Range.
NARAI-CANAFB-0013	29-Oct-45	Corres.	Robert Kauch, Brig. Gen., USA, Chief, Air Installations Division Assistant Chief of Air Staff-4	Condemnation Assembly, Tract 6, Air to Ground Gunnery Range No. 2, Clovis Army Air Field, New Mexico [11th Ind]. Fort Sumner Army Airfield is no longer considered necessary for use by the Army Air Forces.	Acquisition of off-installation bombing ranges.

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NARAII-CANAFB-0014	2-Mar-45	Corres.	Joseph Connolly, Chief, Acquisition Division, Real Estate	Condemnation Assembly, Tract 6, Air to Ground Gunnery Range [10th Ind] Advise office as to whether or not the land will be required for the use of your Headquarters in post-war period	Acquisition of off-installation bombing ranges.
NARAII-CANAFB-0015	20-Sep-45	Corres.	Leonard M. Cowley, Lt. Col, CE, Chief, Real Estate Division	Condemnation Assembly, Tr 6, Air to Ground Gunnery Rge No 2, Clovis AAF, N.M. [9th Ind] Air Installations Division, Army Air Force headquarters, be requested to determine future needs of Fort Sumner Army Air Field.	Acquisition of off-installation bombing ranges.
NARAII-CANAFB-0016	14-Sep-45	Corres.	Floyd T. Snyder, Captain, Corps of Engineers, Acting Officer in Charge, SWD Real Estate Suboffice.	Condemnation Assembly, Tract 6, Air to Ground Gunnery Range No. 2, Clovis Army Air Field, New Mexico [8th Ind] Considered that future use of the subject installation will be required by the Fort Sumner Field	Acquisition of off-installation bombing ranges.
NARAII-CANAFB-0017	12-Sep-45	Corres.	Leonard M. Cowley, Lt. Col, CE, Chief, Real Estate Division	Condemnation Assembly, Tract 6, Air to Ground Gunnery Range No. 2, Clovis Army Air Field, New Mexico [7th Ind] Request Commanding Officer obtain information to future use of Air to Ground Gunnery Range No. 2	Acquisition of off-installation bombing ranges.
NARAII-CANAFB-0018	6-Jul-45	Corres.	Leonard M. Cowley, Lt. Col, CE, Chief, Real Estate Division	Condemnation Assembly, Tract 6, Air to Ground Gunnery Range No 2, Clovis AAF, N Mex [5th Ind]	Acquisition of off-installation bombing ranges.
NARAII-CANAFB-0019	29-Jun-45	Corres.	Floyd T. Snyder, Captain, Corps of Engineers, Acting Officer in Charge, SWD Real Estate Suboffice.	Condemnation Assembly, Tract 6, Air to Ground Gunnery Range No. 2, Clovis Army Air Field, New Mexico [4th Ind] Four additional oil and gas leases have been secured under Moratorium Agreement; these areas have been deleted from area proposed for condemnation.	Acquisition of off-installation bombing ranges.
NARAII-CANAFB-0020	25-Jun-45	Corres.	Leonard M. Cowley, Lt. Col, CE, Chief, Real Estate Division	Condemnation Assembly, Tract No. 6, Air to Ground Gunnery Range No. 2, Clovis AAF, N. M. [3rd Ind]	Acquisition of off-installation bombing ranges.
NARAII-CANAFB-0021	20-Jun-45	Corres.	Joseph Connolly, Chief, Acquisition Division, Real Estate	U.S. vs. 2602.51 acres in De Baca and Roosevelt Counties, N.M. [2nd Ind] Advise as to method of acquiring surface interests in the 2602.51 acres of land and whether or not the lands will be used for the term ending 30 June 1946.	Acquisition of off-installation bombing ranges.

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NARAII-CANAFB-0022	6-Mar-45	Corres.	Leonard M. Cowley, Lt. Col, Corps of Engineers, Director, Real Estate Division	Condemnation Assembly, Tract 6, Air to Ground Gunnery Range No. 2, Clovis Army Air Field, New Mexico [1st Ind] Memorandum lease directive dated 16 May 1944 on 15,345 acres.	Acquisition of off-installation bombing ranges.
NARAII-CANAFB-0023 - 0025	2-Mar-45	Corres.	Floyd T. Snyder, Captain, Corps of Engineers, Officer in Charge, SWD Rel Estate Suboffice.	Condemnation Assembly, Tract 6, Air to Ground Gunnery Range No. 2, Clovis Army Air Field. Advising to condemn the land under the Second War Powers Act	Acquisition of off-installation bombing ranges.
NARAII-CANAFB-0026	1-Oct-45	Corres.	Joseph Connolly, Chief, Acquisition Division, Real Estate	Condemnation Assembly, Tract 6, Air to Ground Gunnery Range (2 Mar 1945) [10th Ind] Advise office as to whether or not the land will be required for the use of your Headquarters in post-war period	Duplicate of Document NARAII-CANFB-0014
NARAII-CANAFB-0027	20-Sep-45	Corres.	Leonard M. Cowley, Lt. Col, CE, Chief, Real Estate Division	Condemnation Assembly, Tract 6, Air to Ground Gunnery Rge No. 2, Clovis AAF, N. M. [9th Ind] Air Installations Division, Army Air Force headquarters, be requested to determine future needs of Fort Sumner army Air Field.	Duplicate of Document NARAII-CANAFB-0015
NARAII-CANAFB-0028 - 0029	9-Jun-48	Corres.	L.J. Erler, Colonel, USAF, Acting Director of Installations Office, Deputy Chief of Staff, Material	Declaration of Surplus Real Estate-Melrose Bombing Range [5th Ind]. Requesting as to whether a military requirement will exist for the utilization of Melrose Bombing Range.	Off-installation ranges.
NARAII-CANAFB-0030	8-Jun-48	Corres.	H.S. Aurand, Lieutenant General, GSC, Director of Logistics and W.M. Breckinridge, Lt. Col., GSC, Asst. Chief Installations Branch, Logistics Division	Status of Installation [1st Ind]. Requesting amendment to all records pertaining to Clovis Air Force Base to indicate that subject installation was placed in an inactive status effective 28 May 1947.	Clovis AFB placed on inactive status.
NARAII-CANAFB-0031	7-May-48	Corres.	L.J. Erler, Colonel, USAF, Acting Director of Installations Office, Deputy Chief of Staff, Material	Extension of Condemnation Proceedings, Melrose Precision Bombing Range No. 2, Clovis AFB, N. M. Requesting condemnation proceedings be extended for a period beyond 30 June 1948, also requesting the leasehold interest be extended for another year because of the need for this Range	Acquisition of off-installation bombing ranges
NARAII-CANAFB-0032	0/0/1949	Folder	Unknown	Clovis Fld, N.M., 1949 NARAII College Park, MD, RG 341 Headquarters, US Air Force	

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NARAII-CANAFB-0033	25-Mar-49	Corres.	Montie Thompson, Jr., 1st Lt., USAF, Asst Adj Gen	Strategic Air Command Base Utilization Plan and 1st endorsement [5th Ind]. No foreseeable future requirement exists for Melrose Range; it is excess to command.	Off-installation ranges.
NARAII-CANAFB-0034	3-Feb-49	Corres.	Joseph O. Killian, Lt Col, CE, District Engineer	Civil Action 620, Precision Bombing Range, Clovis Air Force Base, Clovis, New Mexico. Advice be furnished by endorsement as to whether or not headquarters desires renewal of the term for an additional year.	Acquisition of off-installation bombing ranges
NARAII-CANAFB-0035	7-Feb-49	Corres.	William M. Thompson, Major, USAF, Commanding	Civil Action 620, Precision Bombing Range, Clovis Air Force Base, Clovis, New Mexico (3 Feb 1949). [1st Ind] All Precision Bombing Ranges have been transferred from jurisdiction of headquarters. Melrose PBR was transferred to WAFB, Roswell, New Mexico on 2 May 1947 - clarify which range is specified	
NARAII-CANAFB-0036	10-Feb-49	Corres.	Joseph O. Killian, Lt Col, CE, District Engineer	CA 620, PBR, CAFB, Clovis, N.M. (Ltr fr DE, Alb, N.M., dtd 3 Feb 49) [2nd Ind] Confirming range referred to is located 3 miles south-westerly from the town of Melrose, New Mexico.	Acquisition of off-installation bombing ranges
NARAII-CANAFB-0037	24-Feb-49	Corres.	Harold S. Gillogly, 2d Lt, USAF, Assistant Adjutant	Civil Action 620, Precision Bombing Range, Clovis Air Force Base, Clovis, New Mexico [3rd Ind] Request was made to extend lease until 30 June 1949. Information requested as to status of bombing range for FY 1950.	Acquisition of off-installation bombing ranges
NARAII-CANAFB-0038	3-Feb-49	Corres.	John E. Hall, Major, AGD, Asst. Adj. Gen.	Civil Action 620, Precision Bombing Range, Clovis AF Base, Clovis, New Mexico. [4th Ind] Melrose Range declared surplus. No foreseeable future needs exists for the property subject range, it is recommended that the land be declared as surplus and the condemnation proceedings be allowed to terminate.	Off-installation ranges.
NARAII-CANAFB-0039	11-May-49	Corres.	L.J. Erler, Colonel, USAF, Acting Director of Installations Office, Deputy Chief of Staff, Material	Extension of Condemnation Proceedings, Melrose Precision Bombing Range No 2, Clovis AFB, N M. Requesting condemnation proceedings be extended for a period beyond 30 June 1948, also requesting the leasehold interest be extended for another year because of the need for this Range.	Acquisition of off-installation bombing ranges

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NARAII-CANAFB-0040	8-Aug-49	Corres.	Scott W. Donaldson, Special Assistant to the Assistant Secretary of the Air Force	Abandonment of Condemnation Proceeding, Tracts 7 and 8, Civil No. 727, Clovis Ground Gunnery Range, New Mexico [2nd Ind]	Acquisition of off-installation bombing ranges
NARAII-CANAFB-0041	8-Aug-49	Corres.	Joseph E. Gill, Lt. Colonel, USAF, Executive, Directorate of Installations, Deputy Chief of Staff, Material	Abandonment of Condemnation Proceeding, Tracts 7 and 8, Civil No. 727, Clovis Ground Gunnery Range, New Mexico [1st Ind]. Request tracts be returned to owners.	Acquisition of off-installation bombing ranges
NARAII-CANAFB-0042 - 0043	28-Jul-49	Corres.	William E. Whalen, Asst, Acquisition Division Real Estate	Abandonment of Condemnation Proceeding, Tracts 7 and 8, Civil No. 727, Clovis Ground Gunnery Range, New Mexico. Tracts 6, 7, and 1-D of Clovis Gunnery Range are no longer required by the Air Force.	Acquisition of off-installation bombing ranges
NARAII-CANAFB-0044 - 0045	8-Aug-49	Corres.	Eugene M. Zuckert	Secretary of Air Force determined a military necessity no longer exists for the use and occupancy of Tracts 7 and 8 and these tracts should be returned to owners and the acquisition abandoned at the earliest possible date	Off-installation ranges.
NARAII-CANAFB-0046	19-Jul-49	Corres.	Joseph E. Gill, Lt. Colonel, USAF, Executive, Directorate of Installations, Deputy Chief of Staff, Material	Clovis Ground Gunnery Range, New Mexico [2nd Ind] Tracts Nos. 6, 7, 8 and 1D are not longer required by the Air Force.	Off-installation ranges.
NARAII-CANAFB-0047	18-Jul-49	Corres.	Earl C. Miller, Major, USAF, Asst Adj General	Request to discontinue Civil Action 727 covering 155 acres of land (tracts 7 and 8). Tracts 6 and 1D were requested to not be retained beyond 30 June 1949.	Acquisition of off-installation bombing ranges, Clovis Aerial Gunnery Range.
NARAII-CANAFB-0048	3-Feb-49	Corres.	Joseph O. Killian, Lt Col, CE, District Engineer	Civil Action 672, Tract No. 2, Small Arms Range, and Civil Action 727 Nos. 7 and 8, Clovis AFB, Clovis, New Mexico, Small Arms Range.	No maps or legal description included.

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NARAII-CANAFB-0049	8-Feb-49	Corres.	William M. Thompson, Major, USAF, Commanding	Civil Action 672, Tract No. 2, Small Arms Range, and Civil Action 727 Tracts Nos. 7 and 8, Clovis AFB, Clovis, New Mexico, Small Arms Range. [1st Ind] Tract 2 be retained for use as part of the Ground Gunnery Range; Tracts Nos. 7 and 8 were acquired as additions to Ground Gunnery Range for use as a Poorman Range, as were tracts Nos 6 and 1D. Headquarters does not consider it necessary to retain any of tracts Nos. 6, 7, 9 and 1D since they are of no further use to Government.	No maps or legal description included.
NARAII-CANAFB-0050	15-Feb-49	Corres.	John E. Hall, Major, AGD, Asst Adj Gen.	[2nd Ind] Leased real estate which no present or foreseeable requirement exists: tracts 1D, 6, 7 and 8, Clovis Air Force Base.	Off-installation ranges.
NARAII-CANAFB-0051	3-Feb-49	Corres.	A.W. Kissner, Brigadier General, USAF, Chief of Staff	[3rd Ind] Requesting terms for years acquired in Civil Action 672 for Tract 2 of Small Arms Range be extended for an additional year beyond 30, June 1949. Requesting that terms for years acquired herein for tracts 1D, 6, 7 and 8 not be continued beyond the current term.	No maps or legal description included.
NARAII-CANAFB-0052	29-Jun-49	Corres.	W.A. Anderson, Major, USAF, Exec. Officer, Facilities Division, Directorate of Installations, Office, Deputy Chief of Staff, Material	Clovis Ground Gunnery Range. Since Clovis Air Force Base and its auxiliary facilities are being retained for possible future use, justification for the release of track Nos. 7 and 8 is requested. Requesting information as to why Tract No. 6 was not included with the release of Tracks Number 7 and 8.	Off-installation ranges.
NARAII-CANAFB-0053 - 0054	22-Dec-53	Corres.	Gilbert T. Perry, Lt. Colonel, USAF, Chief, Zone of Interior Branch, Construction Division, Directorate of Installations, DCS/O	Air Force Construction Directive No. 53/1/1480/4. Current approved operating and financial plan for the subject program. Requesting financial commitments and obligations for construction projects.	Off-installation ranges.
NARAII-CANAFB-0055	3-Feb-53	Corres.	L.C. Wright, Civ. Chief, Bldgs & Grounds Branch, Maintenance Division, Directorate of Installations, DCS/O	Firing-in-Butt, Clovis Air Force Base, New Mexico. Tactical Air Command's request information and/or comment in regards to providing an interim shooting-in-butts at Clovis Air Force Base.	No maps or legal description included.

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NARAII-CANAFB-0056	12-Jul-50	Corres.	W.G. Walker, Jr. Lt. Colonel, USAF, D/Ch, Real Estate Division, Directorate of Installations, Office, Deputy Chief of Staff, Material	Transfer of Clovis Air Force Base, Clovis, New Mexico from Strategic Air Command to Air Training Command [2nd Ind]	
NARAII-CANAFB-0057	29-Jun-50	Routing and Record Sheet	M.J. Wetzel, Lt Colonel, USAF, Executive, Operations Division, Directorate, Plans and Operations	Transfer of Clovis Air Force Base, Clovis, New Mexico from Strategic Air Command to Air Training Command. No objection to cancellation of leases covering the Ground Gunnery Range and Radio facilities at Clovis Air Force Base.	Off-installation ranges.
NARAII-CANAFB-0058	2-Jun-50	Routing and Record Sheet	W.G. Walker, Jr. Lt. Colonel, USAF, D/Ch, Real Estate Division, Directorate of Installations, Office, Deputy Chief of Staff, Material	Transfer of Clovis Air Force Base, from Strategic Air Command to Air Training Command. Transmittal of correspondence concerning disposal of Ground Gunnery Range and Radio Range for remarks and recommendations.	Off-installation ranges.
NARAII-CANAFB-0059	23-Jun-50	Routing and Record Sheet	George H. Sparhawk, Colonel, USAF, Chief, Electronic Systems Division	Transfer of Clovis Air Force Base, Clovis New Mexico from Strategic Air Command to Air Training Command. No objection to cancellation of lease for Clovis air Force Base Radio Range site. Electronics and power equipments have been removed from subject site.	Off-installation ranges.
NARAII-CANAFB-0060	1-Jun-50	Corres.	W.G. Walker, Jr. Lt. Colonel, USAF, D/Ch, Real Estate Division, Directorate of Installations, Office, Deputy Chief of Staff, Material	Transfer of Clovis Air Force Base, Clovis, New Mexico from Strategic Air Command to Air Training Command. Transmittal of correspondence concerning disposal of Ground Gunnery Range and Radio Range for remarks and recommendations.	Off-installation ranges.
NARAII-CANAFB-0061 through NARAII-CANAFB-0062	25-May-50	Corres.	D.R. LeMaster, Lt. Col., USAF, Adjutant General	Transfer of Clovis Air Force Base, Clovis, New Mexico from Strategic Air Command to Air Training Command [1st Ind] Transfer of jurisdiction for numerous leases	Off-installation ranges.
NARAII-CANAFB-0063	18-Apr-50	Corres.	C.F. Dreyer, Colonel, USAF, Chief, Real Estate Division, Directorate of Installations, Office, Deputy Chief of Staff, Material	Excess Bombing Ranges - Clovis Air Force Base, N.M. It has been determined that a military necessity no longer exists for Clovis Ground Gunnery Range, Clovis Jeep Target Range and Clovis Blind Landing Range. They are excess effective 30 June 1950.	Off-installation ranges.

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NARAII-CANAFB-0064	8-Apr-50	Teletype	Department of the Air Force	Requirement for Melrose Bombing and Gunnery Range and Clovis Ground Gunnery Range and Jeep Target Range. Command has not repeat, present or future requirement for referenced ranges.	Off-installation ranges.
NARAII-CANAFB-0065	15-Feb-50	Corres.	Charles H. McNutt, Colonel, CE, District Engineer	Clovis Ground Gunnery Range and Jeep Target, N.M. Civil Action 672. Term acquired will expire 30 June 1950; the right has been reserved to extend term for additional yearly periods. Request whether or not the use of the lands will be required for fiscal year ending 30 June 1951.	Off-installation ranges.
NARAII-CANAFB-0066	16-Feb-50	Corres.	Richard W. Elliott, Major, USAF, Commanding	Clovis Ground Gunnery Range and Jeep Target, N.M. Civil Action 672. [1st Ind] No foreseeable need exists for Clovis Ground Gunnery and Jeep Target Range in the fiscal year of 1951.	Off-installation ranges.
NARAII-CANAFB-0067	21-Feb-50	Corres.	Charles H. McNutt, Colonel, CE, District Engineer [2nd Ind]; and Earl C. Miller, Major, USAF, Adjutant General [3rd Ind]	Clovis Ground Gunnery Rge and Jeep Target, N.M., CA 672. (Ltr fr AD to CO, Clovis AFB, Clovis, N.M., dtd 15 Feb 50) [2nd Ind] [3rd Ind] Confirming Department of Air force will have no need for Clovis Ground Gunnery and Jeep Target Range during fiscal year 1951.	Off-installation ranges.
NARAII-CANAFB-0068	15-Feb-50	Corres.	Earl C. Miller, Major, USAF, Adjutant General	Clovis Ground Gunnery Range and Jeep Target, Civil Action 672 [3rd Ind] Confirming Department of Air force will have no need for Clovis Ground Gunnery and Jeep Target Range after 30 June 1950.	Duplicate of 3rd Ind. of document NARAII-CANAFB-0067
NARAII-CANAFB-0069	31-Mar-50	Corres.	G.A. Wheeler, Major, USAF, Asst Adj Gen	Clovis Ground Gunnery Range and Jeep Target, Civil Action 672 [1st Ind] Confirming no requirement exists in command for Clovis Ground Gunnery and Jeep Target Range or the Clovis Blind Landing Field after 30 June 1950.	Off-installation ranges.
NARAII-CANAFB-0070	17-Mar-50	Corres.	Howard W. Penney, Lt Col, CE, Executive Officer	Clovis Blind Landing Field, New Mexico, and Ground Gunnery Range Jeep Target, Civil Actions 620 and 672. Advise whether or not the lands included in subject civil actions are needed by the Air Force for the fiscal year ending 30 June 1951.	Off-installation ranges.

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NARAII-CANAFB-0071	21-Mar-50	Teletype	Department of the Air Force	Advise to support action of this dist in contractual adjustments with land owner. Walker AFB advises premises not needed.	Off-installation ranges.
NARAII-CANAFB-0072 - 0094	26-Dec-51	Report	Appraised by V.P. Szuszyzky, Appraiser; Approval recommended by J. Frank Stockton, Chief, Appraisal Branch, Real Estate Division, Albuquerque District Corps of Engineers, U.S. Army; Reviewed and approved by E. K. Shadel, Chief Real Estate Division, Albuquerque District Corps of Engineers, U.S. Army	Real Estate Planning Report - Air to Ground Gunnery Range, Clovis Air Force Base, Clovis, New Mexico	Off-installation ranges.
NARAII-CANAFB-0095	4-Apr-52	Corres.	Bert E. Johnson, Brigadier General, USAF, Asst Judge Advocate General, USAF.	Air-to-Ground Gunnery Range-Clovis Air Force Base, Clovis, New Mexico. If range is not fenced the US would be liable for loss or damage to stock due to the negligence of US personnel.	Off-installation ranges.
NARAII-CANAFB-0096	2-Apr-52	Routing and Record Sheet	Robert Hogg, Lt. Colonel, USAF, Executive, Air Bases Division, Directorate of Operations	Air-to-Ground Gunnery Range-Clovis Air Force Base, Clovis, New Mexico. Not regarded necessary that the range be fenced in completely. Air Judge Advocate General is requested to comment on the legal aspects.	Off-installation ranges.
NARAII-CANAFB-0097	19-Mar-52	Routing and Record Sheet	John B. Milling, Lt. Colonel, USAF, Dep Chief, Realty Opns Br. Real Estate Div. Directorate of Installations, DCS/O	Air-to-Ground Gunnery Range-Clovis Air Force Base, Clovis, New Mexico. Request comments and recommendations for fencing gunnery range. Office unaware of any state laws which require fencing. Estimate a perimeter fence will cost approximately \$72,000 to construct and funds for such are not available to Tactical Air Command.	Off-installation ranges.
NARAII-CANAFB-0098	19-Feb-52	Corres.	Ivins L.R. Browne, Colonel, USAF, Acting OIC, USAF Installations, Representatives Office, SWD	Real Estate Planning Report for Air to Ground Gunnery Range - Clovis Air Force Base. Transmitting real estate report; Recommendation that perimeter fencing not be accomplished; TAC approved leasehold acquisition of \$14,000 figure reported in planning report (rather than \$8,700 figure estimated by 9th AF)	Off-installation ranges.

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NARAII-CANAFB-0099	22-Sep-52	Corres.	John P. Reighter, Major, USAF, Ch, Realty Opns Br, Real Estate Div. Directorate of Installations, DCS/O	Fencing Requirements, Air-to-Ground Range, Clovis Air Force Base, New Mexico. [2nd Ind] Discuss and approve the government paying for required fencing on the boundary line between J.J. Steel Ranch and the range.	Off-installation ranges.
NARAII-CANAFB-0100	18-Jul-52	Corres.	H.K. Shadel, Chief, Real Estate Division	Fencing Requirements, Air-to-Ground Range - Clovis Air Force Base, New Mexico. Fence in question may be installed for \$1,700.	Off-installation ranges.
NARAII-CANAFB-0101	18-Jul-52	Corres.	Unknown	Fencing Requirements, Air-to-Ground Range - Clovis Air Force Base, New Mexico [1st Ind] Mr. JJ Steele (owner of land) contends that by severance of pastures he will be deprived of utilizing them unless proper fencing is constructed along the boundary line between the range and portions of the land to be retained by him. approximately 7 miles of electric livestock fence will be required to comply with Mr. Steele's request. Therefore requested Chief of Engineers be authorized to negotiate with Mr. Steele for lease of land, which includes a monetary consideration not to exceed \$1,700 for construction of required fence.	Off-installation ranges.
NARAII-CANAFB-0102 - 0104	9-Jul-52	Corres.	Herbert N. Turner, Lt. Col, CE, Executive Officer	Fencing Requirements, Air-to-Ground Range - Clovis Air Force Base, New Mexico. Discuss placing of the fence around area to be acquired for military purposes. Proposal of Mr. Steele is reasonable; 7 miles of electric livestock fence would meet requirements. Recommend decision be rendered at earliest possible date, due to current target date for pending military activity in use of the range, set for 1 August 1952. (includes map of area)	Off-installation ranges.

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NARAII-CANAFB-0105	1-Aug-52	Corres.	Joseph Friedlander, Jr., Colonel, USAF, Chief, Real Estate Division, Directorate of Installations, DCS/O	Acquisition of Leasehold Interest, Air to Ground Gunnery Range, Clovis Air Force Base, New Mexico. Request for acquisition of leasehold interest in certain land 7,768 acres in Roosevelt County, which is required for use as Air to Ground Gunnery Range in connection with Clovis Air Force Base. Immediate possession to property is required for commencement of range preparation and installation of facilities in connection with operations of the project.	Off-installation ranges.
NARAII-CANAFB-0106	1-Aug-52	Corres.	E.V. Huggins, Acting Secretary of the Air Force	Acquisition of Leasehold Interest, Air to Ground Gunnery Range, Clovis Air Force Base, New Mexico [1st Ind] Transmitting letter to Attorney General requesting acquisition of leasehold estate in and to approximately 7,768 acres of land for use in connection with Air to Ground Gunnery Range at Clovis Air Force Base.	Off-installation ranges.
NARAII-CANAFB-0107 - 0108	6-Aug-52	Corres.	E.V. Huggins, Acting Secretary of the Air Force	Clovis Air Force Base, New Mexico (Air to Ground Gunnery Range) U.S. vs. 7,768.82 Acres, et al. Letter to Attorney General requesting approval for acquisition of land.	Off-installation ranges.
NARAII-CANAFB-0109 - 0110	31-Jul-52	Corres.	Woodrow Berge, Chief, Acquisition Division, Real Estate	Clovis Air Force Base, New Mexico (Air to Ground Gunnery Range) U.S. vs. 7,768.82 Acres, et al. Letter to The Chief of Staff discussing approval for acquisition of land; Possession of the land is required by 1 August 1952, which makes it necessary that cattle occupying the area be removed prior to that date. Estimated annual lease rental in the sum of \$14,000 funds are available for the acquisition under the Act of Congress approved 10 July 1952.	Off-installation ranges.
NARAII-CANAFB-0111	1-Aug-52	Corres.	Joseph Friedlander, Jr., Colonel, USAF, Chief, Real Estate Division, Directorate of Installations, DCS/O	Acquisition of Leasehold Interest, Air to Ground Gunnery Range, Clovis Air Force Base, New Mexico. Discuss annual estimated rental cost; requirement/need for immediate possession to the property.	Off-installation ranges.

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NARAII-CANAFB-0112	17-Mar-52	Corres.	Alfred J. Neslen, Lt. Colonel, USAF, Dep Chief, Real Estate Division, Directorate of Installations, DCS/O	Disposal of Real Estate Small Arms Gunnery Range, Clovis Air Force Base, New Mexico [1st Ind] Concur with request to retain area containing 889.21 acres or less, of Tracts 1-A and 1-B; and dispose of all excess lands indicated in red on Real Estate Tract Map. Requesting office to proceed with the disposal of referenced excess lands.	Within Clovis AFB.
NARAII-CANAFB-0113-0115	4-Jan-52	Corres.	Erlath W. Zuehl, Colonel, USAF, Air Adjutant General	Disposal of Real Estate, Small Arms Gunnery Range, Clovis Air Force Base, New Mexico. Discuss the status of disposal action.	Within Clovis AFB.
NARAII-CANAFB-0116	30-Jan-52	Routing and Record Sheet	Robert Hogg, Lt. Colonel, USAF, Executive, Air Bases Division, Directorate of Operations, DCS/O	Disposal of Real Estate, Small Arms Gunnery Range, Clovis Air Force Base, New Mexico. Recommend the request of Tactical Air Command for disposal of the land covered in correspondence be approved provided TAC indicates that the are cannot be expanded or is undesirable for use as an air-to-ground range for the Fighter Bomber Units stationed at Clovis AFB.	Within Clovis AFB.
NARAII-CANAFB-0117	9-Jan-52	Routing and Record Sheet	Joseph Friedlander, Jr., Colonel, USAF, Ch, Realty Opns Br, Real Estate Div., Directorate of Installations Office, Deputy Chief of Staff, Material	Disposal of Real Estate, Small Arms Gunnery Range, Clovis Air Force Base, New Mexico. To Director of Operations-Transmitting letter from TAC recommending disposal of land; and copy of Real Estate Planning Report. Request review correspondence and furnish office recommendations regarding disposal of subject land.	Within Clovis AFB.
NARAII-CANAFB-0118	26-Dec-51	Corres.	Erlath W. Zuehl, Colonel, USAF, Air Adjutant General	Clovis Small Arms Gunnery Range, Clovis Air Force Base, New Mexico [1st Ind] Determined that command has no requirement for land in Tracts 1-A and 1-B other than the 889.21 acres described and recommended in Paragraph 1, 1st Preference, pg 16 Real Estate Report. Action is being initiated for the disposal of excess acreage now under lease.	Within Clovis AFB.

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NARAII-CANAFB-0119	10-Dec-51	Corres.	Joseph Friedlander, Jr., Colonel, USAF, Ch, Realty Opns Br, Real Estate Div., Directorate of Installations Office, Deputy Chief of Staff, Material	Clovis Small Gunnery Range, Clovis Air Force Base, New Mexico. Refer to Planning Report revealing Tracts 1-A and 1-B are now leased and no additional land is required for establishment of a Ground Gunnery Range for subject installation	Off-installation ranges.
NARAII-CANAFB-0120	29-Nov-51	Corres.	Kirk H. Scott, Colonel, USAF, OIC, USAF Installations Representatives Office, SWD	Real Estate Planning Report Dated 18 October 1951 for Small Arms Gunnery Range, Clovis AFB N Mex. Transmitting Real Estate Planning Report for review. This office recommends 889.21 acres be retained under current leases covering Tracts 1-A and 1-B and remainder of land now under lease be returned to the owners.	Within Clovis AFB.
NARAII-CANAFB-0121	8-Jan-52	Corres.	Joseph Friedlander, Jr., Colonel, USAF, Ch, Realty Opns Br, Real Estate Div., Directorate of Installations Office, Deputy Chief of Staff, Material	Air to Ground Gunnery Range, Clovis AFB, Clovis, New Mexico. [2nd Ind] Discuss need for brief planning report be submitted because it is believed that \$8,700 not sufficient for 7,880 acres for use as air-to-ground gunnery at Clovis Air Force Base	Off-installation ranges.
NARAII-CANAFB-0122	19-Dec-51	Corres.	Carl E. Rantzow, Chief, Real Estate Division	Air to Ground Gunnery Range, Clovis AFB, Clovis, New Mexico. Authorizing leasing of 7,680 acres in Roosevelt County for use as an air-to-ground gunnery, rocketry and dive bombing range for Clovis Air Force Base. Request brief planning report be submitted - District Engineer, Albuquerque District believes \$8,700 is not considered sufficient. Lease planning report is being prepared for early submission	Off-installation ranges.
NARAII-CANAFB-0123	9-Jan-52	Corres.	Joseph Friedlander, Jr., Colonel, USAF, Ch, Realty Opns Br, Real Estate Div., Directorate of Installations Office, Deputy Chief of Staff, Material	Disposal of Real Estate, Small Arms Gunnery Range, Clovis Air Force Base, New Mexico. Transmitting Real Estate Planning Report dated 18 October 1951, requesting review or correspondence and furnish recommendations regarding disposal of subject land.	Within Clovis AFB.
NARAII-CANAFB-0124 - 0126	4-Jan-52	Corres.	Erlath W. Zuehl, Colonel, USAF, Air Adjutant General	Disposal of Real Estate, Small Arms Gunnery Range, Clovis Air Force Base, New Mexico. Discuss the status of disposal action.	Duplicate of Document Nos. NARAII-CANAFB-0113 through NARAII-CANAFB-0115

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NARAII-CANAFB-0127	26-Dec-51	Corres.	Erlath W. Zuehl, Colonel, USAF, Air Adjutant General	Clovis Small Arms Gunnery Range, Clovis Air Force Base, New Mexico [1st Ind] Determined that command has no requirement for land in Tracts 1-A and 1-B other than the 889.21 acres described and recommended in Paragraph 1, 1st Preference, pg 16 Real Estate Report. Action is being initiated for the disposal of excess acreage now under lease.	Duplicate of Document No. NARAII-CANAFB-0118
NARAII-CANAFB-0128	29-Nov-51	Corres.	John Trommershausser, Maj. USAF for Kirk H. Scott, Colonel, USAF, OIC, USAF Installations Representatives Office, SWD	Real Estate Planning Report Dated 18 October 1951 for Small Arms Gunnery Range, Clovis AFB, N Mex. Transmitting Real Estate Planning Report for review. This office recommends 889.21 acres be retained under current leases covering Tracts 1-A and 1-B and remainder of land now under lease be returned to the owners.	Duplicate of Document No. NARAII-CANAFB-0120 except document was signed by John Trommershausser, Maj, USAF for Kirk H. Scott
NARAII-CANAFB-0129	21-Dec-54	Corres.	Donald L. Black, Deputy Chief, Real Estate Division, Directorate of Real Property, Assistant Chief of Staff, Installations	Real Estate Planning Report - Ammunition Storage Area, Clovis Air Force Base [5th Ind] Establish military requirement requesting proceed with the acquisition of perpetual restrictive easements over 30.8 acres of land at an estimated cost of \$2,000 in support of ammunition storage area at Clovis Air Force Base. Request acquisition be coordinated with Tactical Air Command.	Within Clovis AFB.
NARAII-CANAFB-0130	21-Jul-53	Corres.	Howard B. Sprague, Lt. Col, USAF; Robert R. Conner, Colonel, USAF Officer-in-Charge	Real Estate Planning Report - Ammunition Storage Area, Clovis Air Force Base. Request Albuquerque District Engineer be advised to prepare a Real Estate Planning Report to cover land required as outlined in plans; also want a breakout of total funds are required.	Within Clovis AFB.
NARAII-CANAFB-0131	24-Jul-53	Corres.	H.E. Cox, Acting Chief, Real Estate Division	Real Estate Planning Report - Ammunition Storage Area, Clovis Air Force Base (AFIRO Itr, 21 Jul 53) [1st Ind] Requesting Real Estate Planning Report, and separate cost data be furnished for area delineated in blue and red, together with toil funds required for simultaneous acquisition of required interest in all areas.	Within Clovis AFB.

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NARAII-CANAFB-0132	1-Sep-53	Corres.	H. K. Shadel, Chief, Real Estate Division	Real Estate Planning Report - Ammunition Storage Area, Clovis Air Force Base (AFIRO, SWDiv ltr, 21 Jul 53) [2nd Ind] Transmitting Real Estate Planning Report, also includes cost data breakdown requested.	Within Clovis AFB.
NARAII-CANAFB-0133	17-Dec-53	Corres.	Carl E. Rantzow, Chief, Real Estate Division	Real Estate Planning Report - Ammunition Storage Area, Clovis AFB (AFIRO ltr, 21 Jul 53) [3rd Ind] Recapitulation of the costs involved. Estimate of costs if acquisition of only Tract C-1 is authorized. Approval of report received from AF Installations Representative, SWD and from Headquarters.	Within Clovis AFB.
NARAII-CANAFB-0134	15-Jan-54	Corres.	H.V. Canan, Colonel, Corps of Engineers, Assistant Chief of Engineers	Real Estate Planning Report - Ammunition Storage Area, Clovis Air Force Base [4th Ind] Transmitting Real Estate Planning Report covering proposed acquisition of restrictive easements in connection with ammunition storage at Clovis AFB. Recommending the acquisition be approved by Headquarters.	Within Clovis AFB.
NARAII-CANAFB-0135	14-Dec-54	Corres.	Department of the Air Force (name illegible)	Authorization for Acquisition of Real Estate. Authority is given for acquisition of perpetual restrictive assessments over 30.8 acres of land in support of ammunition storage area at Clovis Air Force Base	Within Clovis AFB.
NARAII-CANAFB-0136	1-Dec-54	Corres.	N.H. Colby Lt Col, USAF for Gilbert T. Perry, Lt. Colonel, U.S. Air Force, Chief, Zone of Interior Branch, Construction Division, Directorate of Construction, ACS/I	Restrictive Easements for Ammunition Storage Area, Clovis Air Force Base, New Mexico. Referencing memorandum of 6 Oct 1954 - portion of the memorandum pertaining to Clovis Air Force Base needs to be corrected.	Within Clovis AFB.
NARAII-CANAFB-0137	24-Apr-44	Corres.	J.S. Marriott, Colonel, Air Corps, War Department Member	Approval of Air-to-Ground Gunnery Range for Clovis Army Air Field, Clovis, New Mexico.	Off-installation ranges.
NARAII-CANAFB-0138	20-Apr-44	Corres.	L.P. Whitten, Brig, General, U.S. Army, Chief, Air Services Division, Office of Asst. Chief of Air Staff, Material, Maintenance & Distribution	Acquisition of an Air-to-Ground Gunnery Range for Clovis Army Air Field, Clovis, N.M. Authority be granted for acquisition of 15,346 acres for \$4,250.00 for first year; \$2,650 during succeeding years to provide gunnery range at Clovis	Off-installation ranges.

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NARAII-CANAFB-0139	5-May-44	Corres.	John M. Lyle, Lt. Col, AC, Buildings and Grounds Section, Office, Asst Chief Air Staff, MM&D	Acquisition of an Air-to-Ground Gunnery Range for Clovis Army Air Field, Clovis, New Mexico [1st Ind] Request action be instituted to acquire lease of 15,346 acres	Off-installation ranges.
NARAII-CANAFB-0140 - 0142	4-Apr-44	Corres.	U.G. Ent, Brigadier General, U.S. Army, Commanding	Acquisition of Site for Air-to-Ground Gunnery Range for Army Air Field, Clovis, New Mexico	Off-installation ranges.
NARAII-CANAFB-0143	1-Apr-44	Corres.	John J. O'Brien, Colonel, Corps of Engineers, Chief, Real Estate Division	Transmittal, Gross Appraisal, Addition to Air-to-Ground Gunnery Range, Clovis Army Airfield, Clovis, N.M. [5th Ind] Proposed acquisition of additional \$5,345.94 acres of land to be used in connection with range at Clovis.	Off-installation ranges.
NARAII-CANAFB-0144	23-Mar-44	Corres.	Leonard M. Cowley, Lt. Col, Corps of Engineers, Director, Real Estate Division	Transmittal, Gross Appraisal, Addition to Air-to-Ground Gunnery Range, Clovis, Army Air Field, Clovis, N.M. [4th Ind] Request authority be granted to proceed with the acquisition on a lease and suspension basis	Off-installation ranges.
NARAII-CANAFB-0145	17-Mar-44	Corres.	Floyd T. Snyder, Captain, Corps of Engineers, Head, Division Real Estate Suboffice.	Transmittal, Gross Appraisal, Addition to Air-to-Ground Gunnery Range [3rd Ind] Transmittal of Appraisal Report	Off-installation ranges.
NARAII-CANAFB-0146	28-Feb-44	Corres.	Leonard M. Cowley, Lt. Col, Corps of Engineers, Chief, Real Estate Branch	Transmittal, Gross Appraisal, Addition to air to ground gunnery range, Clovis Army Airfield, Clovis, N.M. [2nd Ind] Give careful direction to the cost of abandonment of existing range and acquisition of substitute range as proposed to the cost of enlargement of existing range with consideration of criticism of the landowner.	Off-installation ranges.
NARAII-CANAFB-0147	22-Feb-44	Corres.	William Fane, Lt. Col., AGD, Asst Adj General	Transmittal, Gross Appraisal, Addition to Air-to-Ground Gunnery Range, Clovis Army Air Field, Clovis, New Mexico [1st Ind] Not considered desirable to attempt to expand this range. Clovis Air Base is directed to coordinate with representatives in selection of a satisfactory site.	Off-installation ranges.
NARAII-CANAFB-0148	10-Feb-44	Corres.	Leonard M. Cowley, Lt. Col, Corps of Engineers, Chief, Real Estate Branch	Transmittal, Gross Appraisal, Addition to Air to Ground Gunnery Range, Clovis Army Airfield, Clovis, New Mexico. Subject area should be authorized for acquisition if required on a lease basis	Off-installation ranges.

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NARAII-CANAFB-0149	26-Apr-44	Corres.	L.P. Whitten, Brig. General, US Army, Chief, Air Service Division, Office of Asst. Chief of Air Staff, Material, Maintenance & Distribution	Acquisition of an Air-to-Ground Gunnery Range for Clovis Army Air Field, Clovis, N.M. Requesting authority be granted for acquisition of 15,346 acres of land to provide range for Clovis; estimated land can be leased for \$4,250.00 the first year and \$2,650.00 during successive years.	Off-installation ranges.
NARAII-CANAFB-0150	22-Mar-44	Corres.	John J. O'Brien, Colonel, Corps of Engineers, Chief, Real Estate Branch	Declaration of Taking - relating to the acquisition of 160 acres of land.	Off-installation ranges.
NARAII-CANAFB-0151	2-Mar-44	Corres.	Warren S. Ege, Colonel, Air Corps, Chief, Legislative Services	Investigation of expansion of Clovis Gunnery Range - Determined the extension of range was not feasible.	Off-installation ranges.
NARAII-CANAFB-0152	17-Feb-44	Corres.	John M. Lyle, Lt. Col, A.C., Buildings and Grounds Section, Construction Branch, AC/AS, M.M.D	Acquisition of Land for Clovis Aerial Gunnery Range, New Mexico.	Off-installation ranges.
NARAII-CANAFB-0153	8-Feb-44	Corres.	Carl A. Hatch, Senator	Transmitting communication from Mr. R.E. Moore (fearful that his property is to be included in boundaries of aerial range)	Off-installation ranges.
NARAII-CANAFB-0154	22-Feb-44	Corres.	A.W. Seibt, Major, AGD, Asst Adjutant General	Additional Land for Aerial Gunnery Range, Clovis, N.M. (Ltr AAF to 2AF, dtd 15 Feb. 44 file AFDBS (2A-2/2).) [1st Ind]	Off-installation ranges.
NARAII-CANAFB-0155	15-Feb-44	Corres.	John M. Lyle, Lt. Col, A.C., Buildings and Grounds Section, Construction Branch, AC/AS, M.M.D	Additional Land for Aerial Gunnery Range, Clovis, N.M.	Off-installation ranges.
NARAII-CANAFB-0156	5-Feb-44	Corres.	Carl A. Hatch, Senator	Reference letter from Mr. George W. Lee - Portion of his property is about to be included in the boundaries of aerial gunnery range.	Off-installation ranges.
NARAII-CANAFB-0157	1-Feb-44	Corres.	Geo W. Lee	Land owner of land that boundaries aerial gunnery range. Discusses issues with Army taking portion of his land.	Off-installation ranges.
NARAII-CANAFB-0158	9-Feb-44	Corres.	Warren S. Ege, Colonel, Air Corps, Chief, Legislative Services	Reference letter from George Lee - immediate investigation is being made to determine whether military necessity for acquiring Mr. Lee's property.	Off-installation ranges.
NARAII-CANAFB-0159	5-Feb-44	Corres.	Carl A. Hatch, Senator	Transmitting communication from Mr. Lee (fearful that his property is to be included in boundaries of aerial range)	Off-installation ranges.

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NARAII-CANAFB-0160	1-Feb-44	Corres.	Geo W. Lee	Land owner of land that boundaries aerial gunnery range. Discusses issues with Army taking portion of his land.	Duplicate of Document Number NARAII-CANAFB 0157
NARAII-CANAFB-0161	15-Feb-44	Corres.	John M. Lyle, Lt. Col., A.C., Building and Grounds Section, Construction Branch, AC/AS, M.M.D	Additional Land for Aerial Gunnery Range, Clovis, N.M. Requesting comments on letter from Senator Carl Hatch and Mr. George Lee.	Off-installation ranges.
NARAII-CANAFB-0162	31-Dec-43	Corres.	John J. O'Brien, Colonel, Corps of Engineers, Chief, Real Estate Branch	Declaration of Taking. Precision Bombing Range-US vs. May Walker Hart et al. (Clovis Blind Landing Field, New Mexico) Acquisition of 2,560 acres of land	Off-installation ranges.
NARAII-CANAFB-0163	10-Nov-43	Corres.	Leonard M. Cowley, Lt. Col, Corps of Engineers, Chief, Real Estate Branch	Lease W-41-038-eng-589 - with Anna H. Johnson et al, covering 2,402.245 acres of land for use as a gunnery and jeep target range.	Off-installation ranges.
NARAII-CANAFB-0164	21-Oct-43	Corres.	J.S. Marriott, Lt. Colonel, Air Corps, WD Member, Interdepartmental Air Traffic Control Board	Rescission of Approval of Aerial Gunnery Range for Army Airfield, Clovis, New Mexico - The Board rescinded its previous approval of this aerial gunnery range	Off-installation ranges.
NARAII-CANAFB-0165	11-Oct-43	Corres.	James B. Newman Jr., Brigadier General, AUS, Chief, Buildings & Grounds Section, AC/AS, MM&D	Rescission Request for Aerial Gunnery Range for use by Clovis Army Airfield, Clovis, New Mexico. Requesting clearance be rescinded on various aerial gunnery range which was cleared in meeting for use by Clovis Army Air Field.	Off-installation ranges.
NARAII-CANAFB-0166	20-Oct-43	Corres.	John J. O'Brien, Colonel, Corps of Engineers, Chief, Real Estate Branch	Declaration of Taking - U.S. vs. State of New Mexico, et. al. (Clovis Blind Landing Field, High Altitude Bombing Range, New Mexico.) Relating to the acquisition of 10,246 acres of land.	Off-installation ranges.
NARAII-CANAFB-0167	18-Sep-43	Corres.	Headquarters Second Air Force, Office of the Commanding General	Withdrawal of Request for Acquisition of Aerial Gunnery Range Army Air Base, Clovis, New Mexico.	Off-installation ranges.
NARAII-CANAFB-0168	25-Sep-43	Corres.	J.C. Shively, Col., A.C., Buildings and Grounds Section, Office, Ass't Chief Air Staff, M.M.D.	Withdrawal of Request for Acquisition of Aerial Gunnery Range, Army Air Base, Clovis, New Mexico [1st Ind]	Off-installation ranges.
NARAII-CANAFB-0169 - 0170	15-Aug-43	Corres.	E.C. Light, Major, AC, Adjutant	Construction of Precision Bombing Targets. Request for approval of various projects; and allocation of funds for construction.	Off-installation ranges.
NARAII-CANAFB-0171	19-Aug-43	Corres.	John L. Grimes, Major, A.G.D., Adjutant General	Approval. [1st Ind]	Off-installation ranges.
NARAII-CANAFB-0172	27-Aug-43	Corres.	Illegible	Construction of Precision Bombing Targets [2nd Ind]	Off-installation ranges.

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NARAII-CANAFB-0173	6-Sep-43	Corres.	J.C. Shively, Col, A.C. Buildings and Grounds Section, Office, Ass't Chief Air Staff, M.M.D.	Construction of Precision Bombing Targets, Clovis, New Mexico [3rd Ind]	Off-installation ranges.
NARAII-CANAFB-0174	10-Jul-43	Corres.	J.S. Marriott, Lt. Col, Air Corps, War Department Member, Interdepartmental Air Traffic Control Board	Three Precision Bombing Ranges for Use by Clovis Army Airfield, Clovis, New Mexico	Off-installation ranges.
NARAII-CANAFB-0175	19-Jul-43	Corres.	G.R. Dougherty, Capt, A.G.D., Asst. Adjutant General	Requests approval for three ranges be rescinded [1st Ind]	Off-installation ranges.
NARAII-CANAFB-0176	28-Jul-43	Corres.	J.S. Marriott, Lt.Col, Air Corps, War Department Member, Interdepartmental Air Traffic Control Board	Three Precision Bombing Ranges for Use by Clovis Army Airfield, Clovis, New Mexico [2nd Ind]	Off-installation ranges.
NARAII-CANAFB-0177	29-Jun-43	Routing and Record Sheet	James B. Newman, Jr., Colonel, Air Corps, Chief, Buildings & Grounds Section	Clearance Request for Precision Bombing Ranges for Clovis Army Air Field, Clovis, New Mexico. Obtain clearance from Interdepartmental Air Traffic Control Board for various Precision Bombing Ranges for use by Clovis Air Field	Off-installation ranges.
NARAII-CANAFB-0178	15-Jul-43	Routing and Record Sheet	James B. Newman, Jr., Colonel, Air Corps, Chief, Buildings & Grounds Section	Rescission of Clearances on Three Precision Bombing Ranges for Clovis Army Air Field, Clovis, New Mexico. Requests IATCB be advised to rescind clearance on various ranges which were approved for use by Clovis Air Field.	Off-installation ranges.
NARAII-CANAFB-0179	8-Jul-43	Corres.	J.C. Shively, Col, A.C., Buildings and Grounds Section, Office, Ass't Chief Air Staff, M.M.D.	Availability of ranges 1, 2, 3 and 4, Clovis, New Mexico	Off-installation ranges.
NARAII-CANAFB-0180	4-Jul-43	Teletype	Johnson CG, 2nd Air Force	Acquisition of land - Ranges 1, 2, 3 and 4, Clovis New Mexico	Off-installation ranges.
NARAII-CANAFB-0181	10-Jun-43	Corres.	J.C. Shively, Col., A.C., Buildings and Grounds Section, Office, Ass't Chief Air Staff, M.M.D.	Completion Date - Moving Target Range - Clovis, New Mexico. Request efforts be made to expedite completion of subject project.	Off-installation ranges.
NARAII-CANAFB-0182 - 0183	22-May-43	Corres.	Edward J. Sheridan, Major, Corps of Engineers, Assistant, Military Construction Branch, Construction Division	Construction Directive for Rifle Range at Clovis Airfield, Clovis, New Mexico.	No maps or legal description included.
NARAII-CANAFB-0184	24-May-43	Corres.	G. Mallory Collins, Capitan, Corps of Engineers, Assistant, Planning Section, Operations Branch	Construction Directive for Rifle Range at Clovis Airfield, Clovis, New Mexico [1st Ind] Notify immediately by teletype whether or not additional land is required.	No maps or legal description included.

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NARAII-CANAFB-0185	26-Jul-43	Corres.	R.E. Cole, Lt. Col., Corps of Engineers, District Engineer	Construction Directive for Rifle Range at Clovis Airfield, Clovis, New Mexico (Ltr. From OCE Wash., D.C. to Div. Engr., SWD, Dallas, Tex., 22 May 1943.) [2nd Ind] Transmitting prints/drawings indicating location of authorized facilities as approved by Commanding Officer.	Off-installation ranges.
NARAII-CANAFB-0186	4-Aug-43	Corres.	Edward J. Sheridan, Major, Corps of Engineers, Assistant, Military Construction Branch, Construction Division	Construction Directive for Rifle Range at Clovis Airfield, Clovis, New Mexico [4th Ind]	No maps or legal description included.
NARAII-CANAFB-0187	19-May-43	Corres.	J.S. Marriott, Lt. Col., Air Corps, War Department Member, Interdepartmental Air Traffic Control Board	Bombing and Aerial Gunnery Areas for A.A.B., Clovis, New Mexico	Off-installation ranges.
NARAII-CANAFB-0188 - 0189	8-May-43	Corres.	Harris F. Scherer, Colonel, A.G.D., Adjutant General	Acquisition of Aerial Gunnery Range, for Army Air Base, Clovis, New Mexico	Off-installation ranges.
NARAII-CANAFB-0190	13-May-43	Corres.	J.C. Shively, Col, A.C., Buildings and Grounds Section, Office, Ass't Chief Air Staff, M.M.D.	Acquisition of Aerial Gunnery Range, for Army Air Base, Clovis, New Mexico [1st Ind]	Off-installation ranges.
NARAII-CANAFB-0191	15-Apr-43	Corres.	J.S. Marriott, Lt. Colonel, Air Corps, War Department Member, Interdepartmental Air Traffic Control Board	Aerial Gunnery Range, Clovis Army Airfield, Clovis, New Mexico. Request for Aerial Gunnery Range	Off-installation ranges.
NARAII-CANAFB-0192	23-Mar-43	Routing and Record Sheet	L.P. Whitten, Brig, General, U.S.A.	Clearance Request for Clovis Aerial Gunnery Range for use by Clovis Army Air Field, New Mexico	Off-installation ranges.
NARAII-CANAFB-0193	15-Mar-43	Corres.	J.S. Marriott, Lt. Col., Air Corps, War Department Member, Interdepartmental Air Traffic Control Board	Relocation of Ranges at Clovis Army Airfield, New Mexico	Off-installation ranges.
NARAII-CANAFB-0194	17-Feb-43	Routing and Record Sheet	L.P. Whitten, Brig, General, U.S.A.	Relocation of Ranges at Clovis Army Airfield, New Mexico	Off-installation ranges.
NARAII-CANAFB-0195 - 0196	23-Mar-43	Corres.	John M. Dick, 1st Lieut, Air Corps, Actg. Asst. Adjutant General	Acquisition of Land for Aerial Gunnery Range, Clovis, New Mexico	Off-installation ranges.
NARAII-CANAFB-0197	23-Mar-43	Corres.	John M. Dick, 1st Lieut., Air Corps, Actg. Asst. Adjutant General	Request for Amended Gross Appraisal, Clovis Aerial Gunnery Range	Off-installation ranges.
NARAII-CANAFB-0198	29-Mar-43	Corres.	Leonard M. Cowley, Lt. Colonel, Corps of Engineers, Chief, Real Estate Branch	Request for Amended Gross Appraisal, Clovis Aerial Gunnery Range [1st Ind]	Off-installation ranges.

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NARAII-CANAFB-0199	3-Apr-43	Corres.	John J. O'Brien, Colonel, Corps of Engineers, Chief, Real Estate Branch	Request for Amended Gross Appraisal, Clovis Aerial Gunnery Range [2nd Ind]	Off-installation ranges.
NARAII-CANAFB-0200	17-May-43	Corres.	J.C. Shively, Col, A.C., Buildings and Grounds Section, Office, Ass't Chief Air Staff, M.M.D.	Request for Amended Gross Appraisal, Clovis Aerial Gunnery Range, New Mexico [3rd Ind]	Off-installation ranges.
NARAII-CANAFB-0201	17-Mar-43	Corres.	John J. O'Brien, Colonel, Corps of Engineers, Chief, Real Estate Branch	Acquisition of Land. Acquisition of 3,220.41 acres of land in Roosevelt County for use in connection with Clovis Aerial Gunnery Range.	Off-installation ranges.
NARAII-CANAFB-0202	1-Mar-43	Corres.	Leonard M. Cowley, Lt. Colonel, Corps of Engineers, Chief, Real Estate Branch	Transmittal of Gross Appraisal, Aerial Gunnery Range, Clovis Heavy Bombardment Airfield, New Mexico	Off-installation ranges.
NARAII-CANAFB-0203	9-Mar-43	Corres.	John J. O'Brien, Colonel, Corps of Engineers, Chief, Real Estate Branch	Transmittal of Gross Appraisal, Aerial Gunnery Range, Clovis Heavy Bombardment Airfield, New Mexico. [1st Ind]	Off-installation ranges.
NARAII-CANAFB-0204 - 0205	24-Mar-43	Corres.	L.P. Whitten, Brig, General, U.S. Army, Director of Base Services and J.C. Shively, Col. Air Corps	Transmittal of Gross Appraisal, Aerial Gunnery Range, Clovis Heavy Bombardment Airfield, New Mexico [2nd Ind]	Off-installation ranges.
NARAII-CANAFB-0206	27-Jan-43	Corres.	L.P. Whitten, Brig, General, U.S. Army, Director of Base Services and J.C. Shively, Col. Air Corps	Acquisition of Bombing and Gunnery Range for Clovis Army Air Base, New Mexico.	Off-installation ranges.
NARAII-CANAFB-0207	4-Feb-43	Corres.	John J. O'Brien, Colonel, Corps of Engineers, Chief, Real Estate Branch	Acquisition of Bombing & Gunnery Range for Clovis Army Air Base, New Mexico [1st Ind]	Off-installation ranges.
NARAII-CANAFB-0208	10-Feb-43	Corres.	L.P. Whitten, Brig, General, U.S. Army, Director of Base Services and J.C. Shively, Col. Air Corps	Acquisition of Bombing & Gunnery Ranges for Clovis Army Air Base, New Mexico [2nd Ind]	Off-installation ranges.
NARAII-CANAFB-0209 - 0210	24-Jan-43	Teletype	Olds	Requesting acquisition of sites for bombing and gunnery ranges.	Off-installation ranges.
NARAII-CANAFB-0211	12-Jan-43	Corres.	L.P. Whitten, Brig, General, U.S. Army, Director of Base Services and J.C. Shively, Col. Air Corps	Change in Boundary of Bombing Ranges, Clovis, New Mexico.	Off-installation ranges.
NARAII-CANAFB-0212	31-Dec-42	Teletype	Olds	Slight change be made in legal description pattern bombing range to facilitate obtaining right of entry and possession. Correct legal description of 2,460 in Curry County.	Off-installation ranges.

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NARAII-CANAFB-0213	1-Jan-43	Routing and Record Sheet	F.W. Evans, Brig. Gen., USA, Dir., WO&M	Clearance Request for Four Substitute Ranges for Clovis Army Airfield, New Mexico. [Comment No. 3] Request substitute ranges set forth; Board also rescinded its approval of the Pattern Gunnery Range, High Altitude Bombing Range and Pattern Bombing Range for Clovis Army Airfield. Recommend revised sites be redesignated as Danger Areas.	Off-installation ranges.
NARAII-CANAFB-0214 - 0215	12-Dec-42	Routing and Record Sheet	L.P. Whitten, Col., Air Corps	Clearance Request for Four Substitute Ranges for Clovis Army Airfield, New Mexico. Request clearance be obtained for High Altitude Bombing Range, Pattern Gunnery Range, Pattern Bombing Range, and Aerial Gunnery Range.	Off-installation ranges.
NARAII-CANAFB-0216	22-Dec-42	Corres.	Edward J. Sheridan, Captain, Corps of Engrs., Asst. Operations Branch, Construction Division	Information requested about "Jeep Type" Target Range, Clovis, N. Mex.	Off-installation ranges.
NARAII-CANAFB-0217	4-Jan-43	Corres.	L.P. Whitten, Brig, General, U.S. Army, Director of Base Services and J.C. Shively, Col. Air Corps	Information requested about "Jeep Type" Target Range, Clovis, New Mexico [1st Ind]	Off-installation ranges.
NARAII-CANAFB-0218 - 0220	12-Dec-42	Corres.	A.W. Seibt, 1st Lieut., A.G.D., Asst. Adjutant General	Correction of Sites for Pattern Bombing and Gunnery Ranges, High Altitude Bombing Range and Aerial Gunnery Range for Army Air Base, Clovis, New Mexico	Off-installation ranges.
NARAII-CANAFB-0221	10-Jan-43	Corres.	L.P. Whitten, Brig, General, U.S. Army, Director of Base Services and J.C. Shively, Col. Air Corps	Correction of Sites for Pattern Bombing and Gunnery Ranges, High Altitude Bombing Range and Aerial Gunnery Range for Army Air Base, Clovis, New Mexico [1st Ind]	Off-installation ranges.
NARAII-CANAFB-0222 - 0223	11-Dec-42	Teletype	Olds	Requesting clearance of Pattern Bombing and Gunnery Ranges, High Altitude Bombing Range and Aerial Gunnery Range. Relocation of these ranges have been required and is requested that sites be cancelled and areas be substituted.	Off-installation ranges.
NARAII-CANAFB-0224	30-Dec-42	Corres.	L.P. Whitten, Brig, General, U.S. Army, Director of Base Services and J.C. Shively, Col. Air Corps	Clearance of Ranges for Clovis Army Airfield, New Mexico [1st Ind]	Off-installation ranges.
NARAII-CANAFB-0225 - 0237	30-Nov-42	Report	Headquarters Second Air Force; Office of the Commanding General; Fort George Wright, Washington	Army Air Base, Clovis, New Mexico. Construction Program	Includes Ordnance Storage Area (Magazines), Gas Instruction Building,

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NARAII-CANAFB-0238	26-Nov-42	Corres.	Neyland; Mark S. Gurnee, Captain, Corps of Engineers, Assistant, Operations Branch Construction Division	Jeep Type Moving Target Range - Clovis, New Mexico	Off-installation ranges.
NARAII-CANAFB-0239	10-Dec-42	Corres.	L.P. Whitten, Brig, General, U.S. Army, Director of Base Services and J.C. Shively, Col. Air Corps	Jeep Type Moving Target Range - Clovis, New Mexico [1st Ind]	Off-installation ranges.
NARAII-CANAFB-0240	25-Nov-42	Routing and Record Sheet	L.P. Whitten, Colonel, Air Corps	Clearance for Planning Purposes of 3 Satellite Fields for Clovis, New Mexico Army Air Base.	Off-installation ranges.
NARAII-CANAFB-0241 - 0243	23-Nov-42	Corres.	John L. Grimes, Captain, A.G.D., Asst. Adjutant General	Acquisition of Sites for Pattern Bombing & Gunnery Ranges, High Altitude Bombing Range and Aerial Gunnery Range for Clovis Army Air Base. Clovis, New Mexico.	Off-installation ranges.
NARAII-CANAFB-0244	19-Nov-42	Routing and Record Sheet	Unknown	Clearance Request for Four Ranges for Clovis Army Airfield, New Mexico.	Off-installation ranges.
NARAII-CANAFB-0245	16-Dec-42	Routing and Record Sheet	F.W. Evans, Col., A.C., Dir., WO&M	Clearance Request for Four Ranges for Clovis Army Airfield, New Mexico.	Off-installation ranges.
NARAII-CANAFB-0246 - 0247	15-Nov-42	Teletype	Olds	Clearance requested of sites for bombing and gunnery ranges for Clovis AAB-Pattern Bombing Range, Pattern Gunnery Range, High Altitude Bombing Range and Aerial Gunnery Range.	Off-installation ranges.
NARAII-CANAFB-0248	10-Dec-42	Corres.	L.P. Whitten, Brig, General, U.S. Army, Director of Base Services and J.C. Shively, Col. Air Corps	Clearance of Pattern Gunnery Range, High Altitude Bombing Range and Pattern Bombing Range for Clovis Army Airfield, New Mexico [1st Ind]	Off-installation ranges.
NARAII-CANAFB-0249	No date	Map	War Department, Construction Division	Final Ownership Map-Clovis Army Air Field Precision Bombing Range	Off-installation ranges.
NARAII-CANAFB-0250	20-Feb-47	Corres.	Neal J. O'Brien, Colonel, AGD, Adjutant General	Guadalupe Gunnery Range, New Mexico [1st Ind]	Off-installation ranges.
NARAII-CANAFB-0251	20-Feb-48	Corres.	Robert Kauch, Brigadier General, USAF, Director of Air Installations, Office, Deputy Chief of Staff, Material	Guadalupe Gunnery Range, New Mexico	Off-installation ranges.
NARAII-CANAFB-0252	20-Feb-48	Corres.	Robert Kauch, Brigadier General, USAF, Director of Air Installations, Office, Deputy Chief of Staff, Material	Guadalupe Gunnery Range, New Mexico	Duplicate of Document Number NARAII-CANAFB 0251
NARAII-CANAFB-0253	27-Feb-48	Corres.	Robert Kauch, Brigadier General, USAF, Director of Air Installations, Office, Deputy Chief of Staff, Material	Guadalupe Gunnery Range, New Mexico (Federal) Public Lands [8th Ind]	Off-installation ranges.

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NARAII-CANAFB-0254	31-Oct-47	Corres.	Henry K. Shadel, Chief, Real Estate Division	Guadalupe Gunnery Range, New Mexico (Federal) Public Lands	Off-installation ranges.
NARAII-CANAFB-0255	17-Nov-47; 25 Nov-47	Corres.	Leonard M. Cowley, Chief, Real Estate Division [1st Ind]; Colin C. Bickford, Assistant, Acquisition Division Real Estate [2nd Ind]	Guadalupe Gunnery Range, N Mex (Federal) Public Lands [1st Ind] and [2nd Ind]	Off-installation ranges.
NARAII-CANAFB-0256	28-Nov-47; No Date; 19-Dec-47	Corres.	Leonard M. Cowley, Chief, Real Estate Division [3rd Ind]; Henry K. Shadel, Chief, Real Estate Division [4th Ind]; M.D. Ferres, CWO, USAF, Asst Adjutant [5th Ind]	Guadalupe Gunnery Range, (Federal) Public Lands [3rd Ind], [4th Ind] and [5th Ind]	Off-installation ranges.
NARAII-CANAFB-0257	3-Feb-48	Corres.	W.R. Purpus, Major, USAF, Asst Adj Gen	Guadalupe Gunnery Range, New Mexico (Federal) Public Lands [6th Ind]	Off-installation ranges.
NARAII-CANAFB-0258	19-Feb-48	Corres.	J.K. Brock, Captain, A.C., Asst. Adj. Gen.	Guadalupe Gunnery Range, New Mexico (Federal) Public Lands [7th Ind]	Off-installation ranges.
NARAII-CANAFB-0259 - 0260	8-Dec-43	Corres.	Harold L. Ickes, Secretary of the Interior	Subject to existing rights and existing withdrawals, permission is hereby granted to the War Department to use the public lands in described areas for purpose stated, as long as military need therefore continue - but not beyond the expiration for the six month's period Proclamation No. 2487 of May 27, 1941.	
NARAII-CANAFB-0261	5-Aug-48	Corres.	H.E. Fisher, Colonel, USAF, Chief, Facilities Division, Directorate of Installations, Office, Deputy Chief of Staff, Material	Query on Reduction in Area of Guadalupe Bombing and Gunnery Range, New Mexico	Off-installation ranges.
NARAII-CANAFB-0262	5-Aug-48	Corres.	H.E. Fisher, Colonel, USAF, Chief, Facilities Division, Directorate of Installations, Office, Deputy Chief of Staff, Material	Query on Reduction in Area of Guadalupe Bombing and Gunnery Range, New Mexico	Duplicate of Document Number NARAII-CANAFB-0261
NARAII-CANAFB-0263	9-Jul-48	Corres.	L.J. Erler, Colonel, USAF, Chief, Installations Engineering Division, Directorate of Installations Office, Deputy Chief of Staff, Material	Real Property Utilization Inspection Report - Clovis Army Airfield, New Mexico [11th Ind]	
NARAII-CANAFB-0264	4-Aug-47	Corres.	Leonard M. Cowley, Chief, Real Estate Division	Real Property Utilization Inspection Report - Clovis Army Airfield, New Mexico	

**Cannon AFB
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Document Number Range	Doc Date	Doc Type	Author/Author Organization	Document Title	Comments
NARAII-CANAFB-0265	26-Apr-48	Corres.	L.J. Erler, Colonel, USAF, Acting Director of Installations Office, Deputy Chief of Staff, Material	Guadalupe Gunnery Range, New Mexico (Federal) Public Lands [10th Ind]	Off-installation ranges.
NARAII-CANAFB-0266	19-Apr-48	Routing and Record Sheet	John R. Richards, Lt. Colonel, USAF, Assistant Executive, Operations Division	Guadalupe Gunnery Range, New Mexico (Federal) Public Lands	Off-installation ranges.
NARAII-CANAFB-0267 - 0268	16-Mar-48	Corres.	John A. Roberts, Lt. Col., USAF, Actg Chief of Staff	Conference Report: Guadalupe Bombing and Gunnery Range	Off-installation ranges.
NARAII-CANAFB-0269 - 0270	24-Mar-48	Corres.	D.W. Hutchison, Brigadier General, USAF, AC/S, A-3	Conference Report: Guadalupe Bombing and Gunnery Range [1st Ind]	Off-installation ranges.
NARAII-CANAFB-0271	13-Oct-43	Corres.	J.C. Shively, Col, A.C., Buildings and Grounds Section, Office, Ass't Chief Air Staff, M.M.D.	Second Air Force Range Requirements (1 October 1943)	Off-installation ranges.
NARAII-CANAFB-0272	29-Jul-44	Corres.	W.T. Abbott, Colonel, GSC for Harold A. McGinnis, Colonel Air Corps	Report: Maps and Data on Second Air Force Bombing and Gunnery Ranges. Transmittal letter for report.	Off-installation ranges.
NARAII-CANAFB-0273	15-Jan-43	Corres.	Robert A. Lovett, Assistant Secretary of War for Air	Memorandum transmitting agreement and explanatory map forming a part thereof, in settlement of the Pasco matter between Army and Navy. Clear agreement through IATCB.	Off-installation ranges.
NARAII-CANAFB-0274 - 0276	9-Jan-43	Corres.	Robert Olds, Major General, U.S. Army, Commanding General, Second Air Force; Frank D. Wagner, Rear Admiral, U.S.N., Commander, Fleet Air, Seattle	Coordination of Army Air Forces Operational Training and Naval Primary Training and Carrier Group Operational Training in Washington Valley Area.	Off-installation ranges.
NARAII-CANAFB-0277	11-Jan-43	Corres.	Fletcher, Admiral, USN	Approved with understanding that agreement will go into effect upon completion of full clearance and establishment of operating rights by the Army in the Horse Heaven Aerial Gunnery Range area.	Off-installation ranges.
NARAII-CANAFB-0278 - 0296	24-Aug-43	Report	Headquarters Second Air Force, Office of the Commanding General, Colorado Springs, Colorado	Second Air Force Bombing and Gunnery Range Requirements.	

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Document Number Range	Doc Date	Doc Type	Author/Author Organization	Document Title	Comments
NARA NATIONAL PERSONNEL RECORDS CENTER, ST. LOUIS, MO					
NARAPR-CANAFB-0001	6-Jul-42; 13-Jul-42	Corres.	H.H. Kinkade, 2d Lt., Army Air Forces, Actg Asst Adj Gen [3rd Ind]; Gustav A. Neuberg, 1st Lieut., Army Air Force, Actg Asst Adjutant General [4th Ind]	[3rd Ind], [4th Ind] To facilitate OTU training for heavy bombardment groups and combat crew replacement units, requesting three each trainer, serial gunnery type E-1 be allocated to the multiple stations for training purposes.	
NARAPR-CANAFB-0002	16-Jun-42; 23-Jun-42	Corres.	George W. Polk, Jr., Colonel, A.A.F. Commanding [1st Ind]; W.O. Briggs, Jr., 2nd Lt., Army Air Forces, Assistant, Air Force Section [2nd Ind]	[1st Ind] HQ has no information concerning desired gunnery ranges. [2nd Ind] Records indicate 140 each Trainer, Aerial Gunnery, Type E-1 procured and issued to flexible gunnery schools at Las Vegas, Panama City and Harlingen	
NARAPR-CANAFB-0003	21-Apr-45	Corres.	R.E. Cole, Lt. Col., Corps of Engineers, District Engineer	Advance Notice on Sonic Bomb Scoring Devices at Eight Locations	
NARAPR-CANAFB-0004 through NARAPR-CANAFB-0005	22-Jan-46	Corres.	Headquarters Second Air Force, Colorado Springs, Colorado	Flights in Danger Areas	
NARAPR-CANAFB-0006	5-Apr-45	Corres.	H.H. Dunham, Maj, CE for Edward J. Sheridan, Major, Corps of Engineers, Assistant, Troop Facilities Branch, Military Construction Division	Construction Directive for Installation of Type E-1 Sonic Bomb Scoring Targets	
NARAPR-CANAFB-0007 through NARAPR-CANAFB-0010	11-Dec-44	Corres.	R.B. Batte, Lt. Col., C.E., Air Installations Division, Office of Ass't Chief of Air Staff, Material and Services	Poorman Ranges-Replacing of Old Style Motors, Includes [1st Ind] and tabulation showing locations of old style azimuth and elevation drive motors, amplidyne and junction boxes shipped from the manufacturers up to and including 11 November 1944, also shows location of new type equipment shipped by manufacturers up to and including the same date.	
NARAPR-CANAFB-0011	11-Dec-43	Corres.	Floyd T. Snyder, Captain, Corps of Engineers, Head, Division Real Estate Suboffice.	Utilization of Discontinued Bombing Targets, Clovis Airfield, Clovis, New Mexico	
NARAPR-CANAFB-0012	4-Feb-44	Corres.	Floyd T. Snyder, Captain, Corps of Engineers, Head, Division Real Estate Suboffice.	Discontinuance of Bombing Ranges and Camp Site - Clovis Airfield, Clovis, New Mexico	
NARAPR-CANAFB-0013	23-Mar-44	Corres.	Floyd T. Snyder, Captain, Corps of Engineers, Head, Division Real Estate Suboffice.	Discontinuance of Bombing Ranges and Camp Site - Clovis Airfield, Clovis, New Mexico [2nd Ind]	

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Document Number Range	Doc Date	Doc Type	Author/Author Organization	Document Title	Comments
NARAPR-CANAFB-0014	28-Mar-44	Corres.	Leonard M. Cowley, Lt. Col., Corps of Engineers, Director, Real Estate Division	Discontinuance of Bombing Ranges and Camp Site - Clovis Airfield, Clovis, N.M. (Ltr fr SWD Real Estate Suboffice, Albuquerque, N.M. to SWD, dtd. 4 February 1944) [3rd Ind]	
NARAPR-CANAFB-0015	4-May-44	Corres.	John J. O'Brien, Colonel, Corps of Engineers, Chief, Real Estate Division	Discontinuance of Bombing Ranges and Camp Site - Clovis Airfield, Clovis, New Mexico (Basic: 4 Feb 44) [4th Ind]	
NARAPR-CANAFB-0016	23-May-44	Corres.	John M. Lyle, Lt. Col., A.C., Buildings and Grounds Section, Office, Ass't Chief Air Staff, MM&D	Discontinuance of Bombing Ranges and Camp Site - Clovis Army Air Field, New Mexico [5th Ind]	
NARAPR-CANAFB-0017 through NARAPR-CANAFB-0018	29-Jun-44	Corres.	W.C. Weaver, Lt. Colonel, CSC, Asst. Dept. Chief of Staff, Maintenance & Supply	Discontinuance of Bombing Ranges and Camp Site - Clovis AAF, Clovis, New Mex (Ltr. Div. Engr., Southwestern Div., Div. Real Estate Suboffice, Albuquerque, New Mex. To Div. Engr. Southwestern Div., Dallas, 2, Texas, 2/4/44, ARC.) [6th Ind]	
NARAPR-CANAFB-0019	8-Aug-44	Corres.	Hogo G. Erickson, Maj, AC, Actg Asst Adjutant General	Discontinuance of Bombing Ranges and Camp Site - Clovis Airfield [9th Ind]	
NARA ROCKY MOUNTAIN REGION, DENVER, CO					
NARARMR-CANAFB-0001	27-Oct-45	Corres.	W. Stuart Symington, Administrator	Bombing Range, Clovis. Reference Letter from Wayne Orandorff. Discuss property located southwest of Portales-has not yet been declared surplus to the needs of the War Department. Request for rights of former owners.	
NARARMR-CANAFB-0002	1-Oct-45	Corres.	Wayne D. Orendorff, Secretary-Manager	Discuss the opportunity for landowners to purchase back their property and how it will be handled.	
NARARMR-CANAFB-0003	7/194?	Map	U.S. Engineer Office, Albuquerque, NM	Clovis Airfield-Clovis, New Mexico, Jeep Type Moving Target - Plan, Sections and Index	
AIR FORCE CIVIL ENGINEER SUPPORT AGENCY, EXPLOSIVE ORDNANCE DISPOSAL					
EOD-CANAFB-0001 through EOD-CANAFB-0075	1986-1987	Report	Cannon AFB EOD	EOD Reports 1986-87 Cannon AFB	
EOD-CANAFB-0076 through EOD-CANAFB-0089	0/0/1988	Report	Cannon AFB EOD	EOD Reports 1988 Cannon AFB	

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Document Number Range	Doc Date	Doc Type	Author/Author Organization	Document Title	Comments
EOD-CANAFB-0090 through EOD-CANAFB-0094	0/0/1989	Report	Cannon AFB EOD	EOD Reports 1989 Cannon AFB	
EOD-CANAFB-0095 through EOD-CANAFB-0143	0/0/1990	Report	Cannon AFB EOD	EOD Reports 1990 Cannon AFB	
EOD-CANAFB-0144 through EOD-CANAFB-0178	0/0/1991	Report	Cannon AFB EOD	EOD Reports 1991 Cannon AFB	
EOD-CANAFB-0179 through EOD-CANAFB-0308	1992-1993	Report	Cannon AFB EOD	EOD Reports 1992-93 Cannon AFB	
EOD-CANAFB-0309 through EOD-CANAFB-0373	0/0/1994	Report	Cannon AFB EOD	EOD Reports 1994 Cannon AFB	
EOD-CANAFB-0374 through EOD-CANAFB-0380	0/0/1995	Report	Cannon AFB EOD	EOD Reports 1995 Cannon AFB	
EOD-CANAFB-0381 through EOD-CANAFB-0417	0/0/1996	Report	Cannon AFB EOD	EOD Reports 1996 Cannon AFB	
EOD-CANAFB-0418 through EOD-CANAFB-0435	0/0/1997	Report	Cannon AFB EOD	EOD Reports 1997 Cannon AFB	
HISTORICAL RESEARCH AND RESPONSE CENTER (HRRC)					
HRRC-CANAFB-0001 - 0002	No date	Report	Ciolfi, Kathy, Historical Division, U.S. Army Chemical and Biological Defense Command	Areas Used by the Chemical Warfare Service During the 1900's.	
HRRC-CANAFB-0003 - 0004	28-Feb-45	Report	Statistical Control Division, Office of Management Control	Controlled and Other Critical Items of Equipment in Units and Depots - Army Air Forces and Assigned Arms and Services, Chemical Warfare Items, AAF Form No. 108A	
U.S. DEPARTMENT OF AGRICULTURE (USDA)					
USDA-CANAFB-0001	15-Aug-66	Aerial Photo	U.S. Dept of Agriculture	Project CIJ, Can 29536, Roll 3GG, Frame 62	Scale: 1:20,000
USDA-CANAFB-0002	15-Aug-66	Aerial Photo	U.S. Dept of Agriculture	Project CIJ, Can 29536, Roll 3GG, Frame 63	Scale: 1:20,000
USDA-CANAFB-0003	15-Aug-66	Aerial Photo	U.S. Dept of Agriculture	Project CIJ, Can 29536, Roll 3GG, Frame 135	Scale: 1:20,000
USDA-CANAFB-0004	15-Aug-66	Aerial Photo	U.S. Dept of Agriculture	Project CIJ, Can 29536, Roll 3GG, Frame 136	Scale: 1:20,000

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Appendix F
MEC Technical Data Sheets
(Not Applicable)

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Appendix G
RACER Data Input Worksheet
(Provided on CD)

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COMPREHENSIVE SITE EVALUATION: RACER DATA

MAJCOM: AFSOC

FFID: NM65721244540

MRAID:

MRS: TS002

Installation: CANNON AIR FORCE BASE

City: Clovis

State: NM

County: Curry

Site Name: 1940s Skeet Range

SITE DIMENSIONS:

Acreage: 29.4

Length (Feet): 1800

Width (Feet): 960

Perimeter (Feet): 4700

SITE DIMENSIONS REFERENCES:

Section, Page #: 5.2.1

CONTAMINANTS OF CONCERN:

- | | |
|---|--|
| <input type="checkbox"/> Acids/caustics | <input type="checkbox"/> Ordnance (not residual) |
| <input type="checkbox"/> Asbestos | <input type="checkbox"/> Ordnance (residual) |
| <input type="checkbox"/> Fuels | <input type="checkbox"/> Pesticides |
| <input type="checkbox"/> SVOCs | <input checked="" type="checkbox"/> Metals |
| <input type="checkbox"/> VOCs | <input type="checkbox"/> Low Level Radioactive |
| <input type="checkbox"/> PCBs | <input checked="" type="checkbox"/> Other* |

*Description of other: Polyaromatic Hydrocarbons (PAHs)

CONTAMINANTS OF CONCERN REFERENCES:

Section:

6.4/7.2

Page:

RANGE TYPES:

- | | |
|--|--|
| <input type="checkbox"/> Air to Air | <input type="checkbox"/> OB/OD |
| <input type="checkbox"/> Air to Ground | <input type="checkbox"/> Mortar |
| <input type="checkbox"/> Artillery | <input type="checkbox"/> Multiple/combined Use |
| <input type="checkbox"/> Bombing | <input type="checkbox"/> Rifle Grenade, Anti-tank Rocket |
| <input type="checkbox"/> Burial Pits | |
| <input type="checkbox"/> Guided Missiles | <input checked="" type="checkbox"/> Small Arm |
| <input type="checkbox"/> Hand Grenade | <input type="checkbox"/> Other* |

*Description of other:

RANGE TYPES REFERENCES:

Section:

5.2/7.2

Page:

COMPREHENSIVE SITE EVALUATION: RACER DATA

MAJCOM: AFSOC

FFID: NM65721244540

MRAID:

MRS: TS002

ORDNANCE TYPES:

- | | |
|---|---|
| <input type="checkbox"/> Bombs, high explosive | <input type="checkbox"/> Mortars |
| <input type="checkbox"/> Bombs (WP, Incendiary, Photoflash) | <input type="checkbox"/> Aerial Rockets (Live) |
| <input type="checkbox"/> Bombs, Practice | <input type="checkbox"/> Aerial Rockets, Practice |
| <input type="checkbox"/> Hand Grenades, Live | <input type="checkbox"/> Guided missile |
| <input type="checkbox"/> Hand Grenades, Practice | <input type="checkbox"/> Pyrotechnics |
| <input type="checkbox"/> Ground Rockets, Rifle Grenades, Live | <input checked="" type="checkbox"/> Small Arms |
| <input type="checkbox"/> Ground Rockets, Rifle Grenades, Practice | <input type="checkbox"/> Landmines |
| <input type="checkbox"/> Medium Caliber (20mm, 25mm, 30mm) | <input type="checkbox"/> Demolition Materials |
| <input type="checkbox"/> Large Caliber (37mm and larger) | <input type="checkbox"/> Other* |

*Description of other:

ORDNANCE TYPES REFERENCES:

Section, Page #: 5.2.2/7.2

ANOMALY DENSITY: LOW

ANOMALY DENSITY REFERENCES:

Section, Page #: 7.2

AREA OF CONTAMINATION:

Depth to base of contamination (feet):

Depth to groundwater contamination (feet):

Depth to water table (feet): 250

AREA OF CONTAMINATION REFERENCES:

Section, Page #: 5.2.1

TYPE OF AQUIFER:

UNCONFINED

SOIL TYPE:

Sand-Silt Mixture/Sand-Clay Mixture

TOPOGRAPHY:

Flat

VEGETATION TYPE:

Barren or Low grass

AQUIFER, SOIL, TOPOGRAPHY, VEGETATION INFORMATION REFERENCES:

Section, Page #: 3.2/3.4/3.5/5.2.1/7.2

COMPREHENSIVE SITE EVALUATION: RACER DATA

MAJCOM: AFSOC

FFID: NM65721244540

MRAID:

MRS: TS002

IMPACTED MEDIA:

- | | |
|--|--|
| <input checked="" type="checkbox"/> Surface soil | <input type="checkbox"/> Surface water |
| <input checked="" type="checkbox"/> Subsurface | <input type="checkbox"/> Sediments |
| <input type="checkbox"/> Groundwater | |

IMPACTED MEDIA REFERENCES:

Section, Page #: 7.2

TYPICAL SAFETY LEVEL USED AT THE SITE: D

SAFETY LEVEL REFERENCES:

Section, Page #: N/A

ADDITIONAL INFORMATION THAT MAY INFLUENCE COST:

ADDITIONAL INFORMATION REFERENCES:

Section, Page #:

COMPREHENSIVE SITE EVALUATION: RACER DATA

MAJCOM: AFSOC

FFID: NM65721244540

MRAID:

MRS: IA001

Installation: CANNON AIR FORCE BASE

City: Clovis

State: NM

County: Curry

Site Name: Former Chemical Warfare Area

SITE DIMENSIONS:

Acreage: 2.7

Length (Feet): 400

Width (Feet): 290

Perimeter (Feet): 1390

SITE DIMENSIONS REFERENCES:

Section, Page #: 5.1.1

CONTAMINANTS OF CONCERN:

- | | |
|---|--|
| <input type="checkbox"/> Acids/caustics | <input type="checkbox"/> Ordnance (not residual) |
| <input type="checkbox"/> Asbestos | <input type="checkbox"/> Ordnance (residual) |
| <input type="checkbox"/> Fuels | <input type="checkbox"/> Pesticides |
| <input type="checkbox"/> SVOCs | <input type="checkbox"/> Metals |
| <input type="checkbox"/> VOCs | <input type="checkbox"/> Low Level Radioactive |
| <input type="checkbox"/> PCBs | <input type="checkbox"/> Other* |

*Description of other:

CONTAMINANTS OF CONCERN REFERENCES:

Section:

6.4/7.2

Page:

RANGE TYPES:

- | | |
|--|--|
| <input type="checkbox"/> Air to Air | <input type="checkbox"/> OB/OD |
| <input type="checkbox"/> Air to Ground | <input type="checkbox"/> Mortar |
| <input type="checkbox"/> Artillery | <input type="checkbox"/> Multiple/combined Use |
| <input type="checkbox"/> Bombing | <input type="checkbox"/> Rifle Grenade, Anti-tank Rocket |
| <input type="checkbox"/> Burial Pits | |
| <input type="checkbox"/> Guided Missiles | <input type="checkbox"/> Small Arm |
| <input type="checkbox"/> Hand Grenade | <input checked="" type="checkbox"/> Other* |

*Description of other: Chemical Warfare, Training

RANGE TYPES REFERENCES:

Section:

5.1/7.2

Page:

COMPREHENSIVE SITE EVALUATION: RACER DATA

MAJCOM: AFSOC

FFID: NM65721244540

MRAID:

MRS: IA001

ORDNANCE TYPES:

- | | |
|--|---|
| <input type="checkbox"/> Bombs, high explosive | <input type="checkbox"/> Mortars |
| <input checked="" type="checkbox"/> Bombs (WP, Incendiary, Photoflash) | <input type="checkbox"/> Aerial Rockets (Live) |
| <input type="checkbox"/> Bombs, Practice | <input type="checkbox"/> Aerial Rockets, Practice |
| <input type="checkbox"/> Hand Grenades, Live | <input type="checkbox"/> Guided missile |
| <input type="checkbox"/> Hand Grenades, Practice | <input type="checkbox"/> Pyrotechnics |
| <input type="checkbox"/> Ground Rockets, Rifle Grenades, Live | <input type="checkbox"/> Small Arms |
| <input type="checkbox"/> Ground Rockets, Rifle Grenades, Practice | <input type="checkbox"/> Landmines |
| <input type="checkbox"/> Medium Caliber (20mm, 25mm, 30mm) | <input type="checkbox"/> Demolition Materials |
| <input type="checkbox"/> Large Caliber (37mm and larger) | <input checked="" type="checkbox"/> Other* |

*Description of other: Toxic chemical agents

ORDNANCE TYPES REFERENCES:

Section, Page #: 5.1.2/7.2

ANOMALY DENSITY: LOW

ANOMALY DENSITY REFERENCES:

Section, Page #: 7.2

AREA OF CONTAMINATION:

Depth to base of contamination (feet):

Depth to groundwater contamination (feet):

Depth to water table (feet): 250

AREA OF CONTAMINATION REFERENCES:

Section, Page #: 5.1.1

TYPE OF AQUIFER:

UNCONFINED

SOIL TYPE:

Sand-Silt Mixture/Sand-Clay Mixture

TOPOGRAPHY:

Flat

VEGETATION TYPE:

Barren or Low grass

AQUIFER, SOIL, TOPOGRAPHY, VEGETATION INFORMATION REFERENCES:

Section, Page #: 3.2/3.4/3.5/5.1.1/7.2

COMPREHENSIVE SITE EVALUATION: RACER DATA

MAJCOM: AFSOC

FFID: NM65721244540

MRAID:

MRS: IA001

IMPACTED MEDIA:

- | | |
|---------------------------------------|--|
| <input type="checkbox"/> Surface soil | <input type="checkbox"/> Surface water |
| <input type="checkbox"/> Subsurface | <input type="checkbox"/> Sediments |
| <input type="checkbox"/> Groundwater | |

IMPACTED MEDIA REFERENCES:

Section, Page #: 7.2

TYPICAL SAFETY LEVEL USED AT THE SITE: D

SAFETY LEVEL REFERENCES:

Section, Page #: N/A

ADDITIONAL INFORMATION THAT MAY INFLUENCE COST:

ADDITIONAL INFORMATION REFERENCES:

Section, Page #:

Appendix H
AFRIMS Data Input Worksheet
(Provided on CD)

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COMPREHENSIVE SITE EVALUATION: AFRIMS DATA

MAJCOM: AFSOC

FFID: NM65721244540

MRAID:

MRS: IA001

Installation: CANNON AIR FORCE BASE

City: Clovis

State: NM

County: Curry

Site Name: Former Chemical Warfare Area

Site Description:

Cannon AFB is located in Curry County, New Mexico, about 8 miles west of the City of Clovis, 12 miles north of the City of Portales, and 190 miles east-southeast of the City of Albuquerque. It is situated in New Mexico's high plains, near the Texas Panhandle. US Route 60/84 runs east-west and passes through the north end of the base. Curry Road 7/Route 467 runs east-west just south of the base. Cannon AFB is bordered to the east by Curry Road P and to the west by Curry Road R. The base is situated on 3,789 acres (5.9 square miles) of federally-owned land. Buildings and administrative areas are generally found in the northern portion of the base, while the southern portion is comprised mainly of access roads and the flightline. Whispering Winds Golf Club is located in the northern portion of the base. Off-base facilities include the Melrose Air Force Range (formerly Melrose Bombing Range), about 24 miles west-southwest of the base, and the Conchas Lake Recreation Annex, about 80 miles northwest of the base. The Melrose Range is the primary training range for Cannon AFB. It is located on approximately 60,010 acres and is currently active. One endangered species candidate, the black-tailed prairie dog, is found in the vicinity of the base. It is not found at any of the MRAs. No other threatened or endangered species exist at the base, and there are no cultural or archaeological sites present. The history of Cannon AFB began in 1929 with the establishment of Portair Field (later Clovis Municipal Airport), a civilian passenger terminal. The Army Air Corps took control of the site in 1942, and it became known as Clovis Army Air Base (renamed Clovis Army Air Field in 1945, and later Clovis AFB). Through the end of World War II, the base was used for flying, bombing, and gunnery classes. The installation was deactivated in 1947, and it was reactivated and reassigned to the Tactical Air Command in 1951. The base became a permanent installation in June 1957 and was renamed Cannon AFB. In 1959 the base was assigned to the 27th TFW (which, by the mid-1970s, had become the principal USAF unit at Cannon AFB). The 27th TFW was disestablished in 2005, and the 27th SOW (AFSOC) was activated in 2006. The AFSOC mission provides USAF Special Operations Forces (SOF) for worldwide deployment and assignment to regional unified commands. The AFSOC's core tasks have been grouped into four mission areas: forward presence and engagement, information operations, precision employment and strike, and SOF mobility. The 27th SOW at Cannon supports the USAF component of unified command, conducting sensitive special operations missions in response to taskings of the Secretary of Defense. The topography at Cannon AFB is generally flat. The base slopes slightly downward toward the southeast; elevations range from 4,260 ft to 4,330 ft above mean sea level. Geology generally consists of unconsolidated gravel, sand, silt, and clay sediments. The unconfined aquifer beneath Cannon AFB is the sole source of water supplies for the base. Soils at Cannon AFB are generally composed of fine sandy loam. Base vegetation is typical of semiarid short grass prairies and is limited by water availability.

The Former Chemical Warfare Area was located in the southwest portion of the base administrative area. Training in this area included gas chamber exercises, as well as use of tear gas, chlorine gas, and mustard gas. An incendiary bomb area was located in this area as well. The area was comprised of former Buildings 835, 864, 865, and 866. The area has been completely renovated and paved over; none of the buildings or features of this MRA are still present. The area currently contains a parking lot, and several in-use buildings are located nearby. The site investigation revealed that these buildings no longer exist. The area has been completely renovated and paved over and contains a parking lot with several adjacent buildings. Topography is flat, and soils consist of fine sandy loam.

GENERAL INFORMATION REFERENCES:

Section, Page #: 2.1/2.2/2.2.1/3.2/3.4/3.5/5.1

POINT OF CONTACT INFORMATION

Last Name: Pelfrey

Address:

COMPREHENSIVE SITE EVALUATION: AFRIMS DATA

MAJCOM: AFSOC

FFID: NM65721244540

MRAID:

MRS: IA001

Installation: CANNON AIR FORCE BASE

Ordnance Types (check all that apply)	Contaminant is a Chemical residue of munitions?	Density	Ordnance Types (check all that apply)	Contaminant is a Chemical residue of munitions?	Density
Medium/Large Caliber (20 mm and larger) <input type="checkbox"/>	<input type="checkbox"/>		Demolition charges <input type="checkbox"/>	<input type="checkbox"/>	
Explosive grenades (hand or rifle) <input type="checkbox"/>	<input type="checkbox"/>		Military dynamite <input type="checkbox"/>	<input type="checkbox"/>	
Explosive landmine <input type="checkbox"/>	<input type="checkbox"/>		Less sensitive explosives (Ammonium Nitrate, etc.) <input type="checkbox"/>	<input type="checkbox"/>	
Explosive rockets <input type="checkbox"/>	<input type="checkbox"/>		Solid or liquid propellants <input type="checkbox"/>	<input type="checkbox"/>	
Guided Missiles <input type="checkbox"/>	<input type="checkbox"/>		Toxic chem. agents (choking, nerve, blood, blister) <input checked="" type="checkbox"/>	<input type="checkbox"/>	LOW
Explosive detonators <input type="checkbox"/>	<input type="checkbox"/>		War gas identification sets <input type="checkbox"/>	<input type="checkbox"/>	
Blasting caps <input type="checkbox"/>	<input type="checkbox"/>		Radiological ordnance (e.g., depleted Uranium) <input type="checkbox"/>	<input type="checkbox"/>	
Practice grenades (with spotting charges) <input type="checkbox"/>	<input type="checkbox"/>		Riot control agents (vomiting, tear) <input type="checkbox"/>	<input type="checkbox"/>	
Practice landmines (with spotting charges) <input type="checkbox"/>	<input type="checkbox"/>		Bombs (explosive) <input type="checkbox"/>	<input type="checkbox"/>	
Small arms complete round (.22-50 cal) <input type="checkbox"/>	<input type="checkbox"/>		Bombs (practice) <input type="checkbox"/>	<input type="checkbox"/>	
Small arms, expended <input type="checkbox"/>	<input type="checkbox"/>		Fuses, Boosters, Bursterns <input type="checkbox"/>	<input type="checkbox"/>	
Practice ordnance (without spotting charges) <input type="checkbox"/>	<input type="checkbox"/>		Flares, signals, & simulators (other than white phos.) <input type="checkbox"/>	<input type="checkbox"/>	
White phosphorous <input type="checkbox"/>	<input type="checkbox"/>		Torpedoes/Sea Mines <input type="checkbox"/>	<input type="checkbox"/>	
Incendiary material <input checked="" type="checkbox"/>	<input type="checkbox"/>	LOW	Secondary explosives (PETN, Compositions A, B, C, Tetryl, TNT, RDX, HMX, HBX, Black Powder, etc.) <input type="checkbox"/>	<input type="checkbox"/>	
Primary or initiating explosives <input type="checkbox"/>	<input type="checkbox"/>				

ORDNANCE TYPES REFERENCES:

Section, Page #: 5.1.2

ANOMALY DENSITY REFERENCES:

Section, Page #: 7.2

GENERAL MEDIA:

Predominant Soil Type: Other

Predominant Topography: Flat

Predominant Vegetation: Barren or low grass

GENERAL MEDIA REFERENCES:

Section, Page #: 5.1.1/7.2

GROUNDWATER:

Potential for contamination of drinking water: UNKNOWN

Depth to Groundwater (feet): 250

Is the MRS located above a drinking water aquifer? YES

COMPREHENSIVE SITE EVALUATION: AFRIMS DATA

MAJCOM: AFSOC

FFID: NM65721244540

MRAID:

MRS: IA001

Installation: CANNON AIR FORCE BASE

Sole source aquifer? Yes

GROUNDWATER REFERENCES:

Section, Page #: 3.5/5.1.1

ARCHAEOLOGICAL/ECOLOGICAL:

Threatened or endangered species present? Yes N

Archaeological or cultural sites present? Yes N

ARCHAEOLOGICAL/ECOLOGICAL REFERENCES:

Section: 2.1

WETLANDS:

Are there any wetland areas associated with this site? NO

If yes, please list acreage:

WETLANDS REFERENCES:

Section, Page #: 5.1.1

COMPREHENSIVE SITE EVALUATION: AFRIMS DATA

MAJCOM: AFSOC

FFID: NM65721244540

MRAID:

MRS: IA001

Installation: CANNON AIR FORCE BASE

ENVIRONMENTAL RESPONSE:

Have environmental response activities been initiated/conducted on this MRS? Yes No

If yes, what is the scope of the response activities?

Past practices

Chemical contamination

Current practices

Ordnance and explosives, including UXO

If yes, what is the status of the response activities?

Data collection

Investigation

Response/remedial action

Monitoring

Close out

Operation and maintenance

If yes, is contamination monitoring (i.e., groundwater sampling and analysis) needed?

If yes, under what authority were/are response actions conducted?

ENVIRONMENTAL RESPONSE REFERENCES:

Section, Page #: 2.5

UXO RESPONSE:

What types of UXO response actions have been initiated/conducted on the site?

None

Emergency response actions

UXO response actions associated with ERP activities

Unknown

Routine range clearance/maintenance

Non-time-critical removal actions with Engineering Evaluation/Cost Analysis

Other*

Time-critical removal actions

*Please specify other:

UXO RESPONSE REFERENCES:

Section: 2.5

Page:

LAND USE RESTRICTIONS:

No public access

Unrestricted public access

Limited public access

Restricted public access

ACCESS CONTROLS:

No controls

Locked gates

Access signs

Log book

Fencing

Security patrol

COMPREHENSIVE SITE EVALUATION: AFRIMS DATA

MAJCOM: AFSOC

FFID: NM65721244540

MRAID:

MRS: IA001

Installation: CANNON AIR FORCE BASE

TRANSFERRED OR TRANSFERRING RANGES:

For transferred and transferring ranges, what is the nature of the transfer?

Lease to:

- Federal agency
- State government
- Local government
- Private entity
- Tribal

Ownership transfer to:

- Federal agency
- State government
- Local government
- Private entity
- Tribal

Additional reasons:

- Lease termination
- Revocation of withdrawn land
- Other***

***Please specify:

LAND USE, ACCESS CONTROL, TRANSFERRED/TRANSFERRING RANGES REFERENCES:

Section, Page #: 5.1.4/5.1.5

LAND USE INTEREST:

- DOD
- Federal agency
- State government
- Local government
- Public sector
- Tribal
- Other****

****Please specify:

LAND USE INTEREST REFERENCES:

Section, Page #: 5.1.3

COMPREHENSIVE SITE EVALUATION: AFRIMS DATA

MAJCOM: AFSOC

FFID: NM65721244540

MRAID:

MRS: TS002

Installation: CANNON AIR FORCE BASE

City: Clovis

State: NM

County: Curry

Site Name: 1940s Skeet Range

Site Description:

Cannon AFB is located in Curry County, New Mexico, about 8 miles west of the City of Clovis, 12 miles north of the City of Portales, and 190 miles east-southeast of the City of Albuquerque. It is situated in New Mexico's high plains, near the Texas Panhandle. US Route 60/84 runs east-west and passes through the north end of the base. Curry Road 7/Route 467 runs east-west just south of the base. Cannon AFB is bordered to the east by Curry Road P and to the west by Curry Road R. The base is situated on 3,789 acres (5.9 square miles) of federally-owned land. Buildings and administrative areas are generally found in the northern portion of the base, while the southern portion is comprised mainly of access roads and the flightline. Whispering Winds Golf Club is located in the northern portion of the base. Off-base facilities include the Melrose Air Force Range (formerly Melrose Bombing Range), about 24 miles west-southwest of the base, and the Conchas Lake Recreation Annex, about 80 miles northwest of the base. The Melrose Range is the primary training range for Cannon AFB. It is located on approximately 60,010 acres and is currently active. One endangered species candidate, the black-tailed prairie dog, is found in the vicinity of the base. It is not found at any of the MRAs. No other threatened or endangered species exist at the base, and there are no cultural or archaeological sites present. The history of Cannon AFB began in 1929 with the establishment of Portair Field (later Clovis Municipal Airport), a civilian passenger terminal. The Army Air Corps took control of the site in 1942, and it became known as Clovis Army Air Base (renamed Clovis Army Air Field in 1945, and later Clovis AFB). Through the end of World War II, the base was used for flying, bombing, and gunnery classes. The installation was deactivated in 1947, and it was reactivated and reassigned to the Tactical Air Command in 1951. The base became a permanent installation in June 1957 and was renamed Cannon AFB. In 1959 the base was assigned to the 27th TFW (which, by the mid-1970s, had become the principal USAF unit at Cannon AFB). The 27th TFW was disestablished in 2005, and the 27th SOW (AFSOC) was activated in 2006. The AFSOC mission provides USAF Special Operations Forces (SOF) for worldwide deployment and assignment to regional unified commands. The AFSOC's core tasks have been grouped into four mission areas: forward presence and engagement, information operations, precision employment and strike, and SOF mobility. The 27th SOW at Cannon supports the USAF component of unified command, conducting sensitive special operations missions in response to taskings of the Secretary of Defense. The topography at Cannon AFB is generally flat. The base slopes slightly downward toward the southeast; elevations range from 4,260 ft to 4,330 ft above mean sea level. Geology generally consists of unconsolidated gravel, sand, silt, and clay sediments. The unconfined aquifer beneath Cannon AFB is the sole source of water supplies for the base. Soils at Cannon AFB are generally composed of fine sandy loam. Base vegetation is typical of semiarid short grass prairies and is limited by water availability.

The 1940s Skeet Range was located in the northeast portion of the base, just north of the active ordnance area. The range had not been identified prior to the site visit. It was identified during the site investigation on an aerial photograph of the base from 1946. No further historical information was obtained about this area. The range is no longer present, and the area is an empty, open field. Clay pigeon debris and several slabs of concrete were observed in the area. Topography is flat, and soils consist of fine sandy loam.

GENERAL INFORMATION REFERENCES:

Section, Page #: 2.1/2.2/2.2.1/3.2/3.4/3.5/5.2

POINT OF CONTACT INFORMATION

Last Name: Pelfrey

Address:

First Name: Jerry

City: Cannon AFB

Organization: Cannon AFB

State: NM

Phone #: (575) 784-6391

Zip:

Email: gerald.pelfrey@cannon.af.mil

COMPREHENSIVE SITE EVALUATION: AFRIMS DATA

MAJCOM: AFSOC

FFID: NM65721244540

MRAID:

MRS: TS002

Installation: CANNON AIR FORCE BASE

POINT OF CONTACT REFERENCES:

Section, Page #: N/A

LOCATION: City: Clovis
State: NM
County: Curry

Latitude: 34.398436
Longitude: -103.299443

LOCATION REFERENCES:

Section, Page #: 2.1/5.2.1

AREA: Acreage confirmed as containing UXO: 0
Total Acreage: 29.4 Acreage suspected or potentially containing UXO 0
Acreage confirmed as NOT containing UXO: 29.4

AREA REFERENCES:

Section, Page #: 5.2.1/7.2

CLASSIFICATION:

- | | |
|--|--|
| <input type="checkbox"/> Testing | <input checked="" type="checkbox"/> Small Arms Range |
| <input type="checkbox"/> Training | <input checked="" type="checkbox"/> Skeet Range |
| <input type="checkbox"/> Treatment OBOD RCRA | <input type="checkbox"/> Waste Military Munitions |
| <input type="checkbox"/> Disposal RCRA | <input type="checkbox"/> Other* |
| <input type="checkbox"/> Buffer Area | |

CLASSIFICATION REFERENCES:

Section: 5.2.2/7.2

Page:

*Description of other:

RANGE TYPES:

- | | | | |
|---------------------------------------|--------------------------------------|--|---------------------------------|
| <input type="checkbox"/> Air to Air | <input type="checkbox"/> Air to land | <input checked="" type="checkbox"/> Land to land | <input type="checkbox"/> Other* |
| <input type="checkbox"/> Air to water | <input type="checkbox"/> Land to air | <input type="checkbox"/> Land to water | |

*Description of other:

RANGE/SITE TYPES REFERENCES:

Section, Page #: 5.2/7.2

ORDNANCE TYPES AND RELATED ANOMALY DENSITY:

COMPREHENSIVE SITE EVALUATION: AFRIMS DATA

MAJCOM: AFSOC

FFID: NM65721244540

MRAID:

MRS: TS002

Installation: CANNON AIR FORCE BASE

Ordnance Types (check all that apply)	Contaminant is a Chemical residue of munitions?	Density	Ordnance Types (check all that apply)	Contaminant is a Chemical residue of munitions?	Density
Medium/Large Caliber (20 mm and larger) <input type="checkbox"/>	<input type="checkbox"/>		Demolition charges <input type="checkbox"/>	<input type="checkbox"/>	
Explosive grenades (hand or rifle) <input type="checkbox"/>	<input type="checkbox"/>		Military dynamite <input type="checkbox"/>	<input type="checkbox"/>	
Explosive landmine <input type="checkbox"/>	<input type="checkbox"/>		Less sensitive explosives (Ammonium Nitrate, etc.) <input type="checkbox"/>	<input type="checkbox"/>	
Explosive rockets <input type="checkbox"/>	<input type="checkbox"/>		Solid or liquid propellants <input type="checkbox"/>	<input type="checkbox"/>	
Guided Missiles <input type="checkbox"/>	<input type="checkbox"/>		Toxic chem. agents (choking, nerve, blood, blister) <input type="checkbox"/>	<input type="checkbox"/>	
Explosive detonators <input type="checkbox"/>	<input type="checkbox"/>		War gas identification sets <input type="checkbox"/>	<input type="checkbox"/>	
Blasting caps <input type="checkbox"/>	<input type="checkbox"/>		Radiological ordnance (e.g., depleted Uranium) <input type="checkbox"/>	<input type="checkbox"/>	
Practice grenades (with spotting charges) <input type="checkbox"/>	<input type="checkbox"/>		Riot control agents (vomiting, tear) <input type="checkbox"/>	<input type="checkbox"/>	
Practice landmines (with spotting charges) <input type="checkbox"/>	<input type="checkbox"/>		Bombs (explosive) <input type="checkbox"/>	<input type="checkbox"/>	
Small arms complete round (.22-50 cal) <input type="checkbox"/>	<input type="checkbox"/>		Bombs (practice) <input type="checkbox"/>	<input type="checkbox"/>	
Small arms, expended <input checked="" type="checkbox"/>	<input type="checkbox"/>	LOW	Fuses, Boosters, Bursterns <input type="checkbox"/>	<input type="checkbox"/>	
Practice ordnance (without spotting charges) <input type="checkbox"/>	<input type="checkbox"/>		Flares, signals, & simulators (other than white phos.) <input type="checkbox"/>	<input type="checkbox"/>	
White phosphorous <input type="checkbox"/>	<input type="checkbox"/>		Torpedoes/Sea Mines <input type="checkbox"/>	<input type="checkbox"/>	
Incendiary material <input type="checkbox"/>	<input type="checkbox"/>		Secondary explosives (PETN, Compositions A, B, C, Tetryl, TNT, RDX, HMX, HBX, Black Powder, etc.) <input type="checkbox"/>	<input type="checkbox"/>	
Primary or initiating explosives <input type="checkbox"/>	<input type="checkbox"/>				

ORDNANCE TYPES REFERENCES:

Section, Page #: 5.2.2

ANOMALY DENSITY REFERENCES:

Section, Page #: 7.2

GENERAL MEDIA:

Predominant Soil Type: Other

Predominant Topography: Flat

Predominant Vegetation: Barren or low grass

GENERAL MEDIA REFERENCES:

Section, Page #: 5.2.1/7.2

GROUNDWATER:

Potential for contamination of drinking water: UNKNOWN

Depth to Groundwater (feet): 250

Is the MRS located above a drinking water aquifer? YES

COMPREHENSIVE SITE EVALUATION: AFRIMS DATA

MAJCOM: AFSOC

FFID: NM65721244540

MRAID:

MRS: TS002

Installation: CANNON AIR FORCE BASE

Sole source aquifer? Yes

GROUNDWATER REFERENCES:

Section, Page #: 3.5/5.2.1

ARCHAEOLOGICAL/ECOLOGICAL:

Threatened or endangered species present? Yes N

Archaeological or cultural sites present? Yes N

ARCHAEOLOGICAL/ECOLOGICAL REFERENCES:

Section: 2.1

WETLANDS:

Are there any wetland areas associated with this site? NO

If yes, please list acreage:

WETLANDS REFERENCES:

Section, Page #: 5.2.1

COMPREHENSIVE SITE EVALUATION: AFRIMS DATA

MAJCOM: AFSOC

FFID: NM65721244540

MRAID:

MRS: TS002

Installation: CANNON AIR FORCE BASE

ENVIRONMENTAL RESPONSE:

Have environmental response activities been initiated/conducted on this MRS? Yes No

If yes, what is the scope of the response activities?

Past practices

Chemical contamination

Current practices

Ordnance and explosives, including UXO

If yes, what is the status of the response activities?

Data collection

Investigation

Response/remedial action

Monitoring

Close out

Operation and maintenance

If yes, is contamination monitoring (i.e., groundwater sampling and analysis) needed?

If yes, under what authority were/are response actions conducted?

ENVIRONMENTAL RESPONSE REFERENCES:

Section, Page #: 2.5

UXO RESPONSE:

What types of UXO response actions have been initiated/conducted on the site?

None

Emergency response actions

UXO response actions associated with ERP activities

Unknown

Routine range clearance/maintenance

Non-time-critical removal actions with Engineering Evaluation/Cost Analysis

Other*

Time-critical removal actions

*Please specify other:

UXO RESPONSE REFERENCES:

Section: 2.5

Page:

LAND USE RESTRICTIONS:

No public access

Unrestricted public access

Limited public access

Restricted public access

ACCESS CONTROLS:

No controls

Locked gates

Access signs

Log book

Fencing

Security patrol

COMPREHENSIVE SITE EVALUATION: AFRIMS DATA

MAJCOM: AFSOC

FFID: NM65721244540

MRAID:

MRS: TS002

Installation: CANNON AIR FORCE BASE

TRANSFERRED OR TRANSFERRING RANGES:

For transferred and transferring ranges, what is the nature of the transfer?

Lease to:

- Federal agency
- State government
- Local government
- Private entity
- Tribal

Ownership transfer to:

- Federal agency
- State government
- Local government
- Private entity
- Tribal

Additional reasons:

- Lease termination
- Revocation of withdrawn land
- Other***

***Please specify:

LAND USE, ACCESS CONTROL, TRANSFERRED/TRANSFERRING RANGES REFERENCES:

Section, Page #: 5.2.4/5.2.5

LAND USE INTEREST:

- DOD
- Federal agency
- State government
- Local government
- Public sector
- Tribal
- Other****

****Please specify:

LAND USE INTEREST REFERENCES:

Section, Page #: 5.2.3

Appendix B

Definitions

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APPENDIX B. DEFINITIONS

Anomaly – Any identified subsurface mass that may be geologic in origin, unexploded ordnance (UXO), or some other man-made material. Such identification is made through geophysical investigation and reflects the response of the sensor used to conduct the investigation. (Handbook on the Management of Munitions Response Actions, Interim Final, EPA, May 2005)

Anomaly Avoidance – Techniques employed on property known or suspected to contain unexploded ordnance, other munitions that may have experienced abnormal environments (e.g., discarded military munitions), munitions constituents in high enough concentrations to pose an explosive hazard, or chemical agents, regardless of configuration, to avoid contact with potential surface or subsurface explosive or chemical agent (CA) hazards, to allow entry to the area for the performance of required operations. (AF Manual 91-201 and DoD 6055.9-STD)

Applicable or Relevant and Appropriate Requirements – Applicable requirements are cleanup standards, standards of control, and other substantive environmental protection requirements promulgated under Federal or state environmental law that specifically address a hazardous substance, pollutant, contaminant, remedial action, location or other circumstance found at a CERCLA site. Relevant and appropriate requirements are cleanup standards that, while not “applicable,” address situations sufficiently similar to those encountered at a CERCLA site where their use is well suited to the particular site. (NCP, 40 CFR Part 300, July 2005)

Chemical Agent (CA) – An agent that, through its chemical properties, produces lethal or other damaging effects on human beings, except that such term does not include riot control agents, chemical herbicides, smoke, and other obscuration materials. This definition is based on the definition of “chemical agent and munition” in 50 U.S.C. 1521(j)(1).

Chemical Warfare Materiel (CWM) – Items generally configured as a munition containing a chemical compound that is intended to kill, seriously injure, or incapacitate a person through its physiological effects. CWM includes V- and G-series nerve agents or H-series (mustard) and L-series (lewisite) blister agents in other-than-munition configurations; and certain industrial chemicals (e.g., hydrogen cyanide [AC], cyanogen chloride [CK], or carbonyl dichloride [called phosgene or CG]) configured as a military munition. CWM does not include riot control devices, chemical defoliants and herbicides, industrial chemicals (e.g., AC, CK, or CG) not configured as a munition, smoke and other obscuration producing items, flame and incendiary producing items, or soil, water, debris or other media contaminated with low concentrations of chemical agents where no CA hazards exist. (MRSPP, 32 CFR Part 179, October 2005)

CWM contains the following four subcategories:

- 1) **CWM, explosively configured** – All UXO or discarded military munitions (DMM) that contain a CA fill and any explosive component. Examples are M55 rockets with CA, the M23 VX mine, and the M360 105-mm GB artillery cartridge.

- 2) CWM, nonexplosively configured – All UXO or DMM that contain a CA fill but that do not contain any explosive components. Examples are any chemical munitions that do not contain explosive components and VX or mustard agent spray canisters.
- 3) CWM, bulk container – All discarded (e.g., buried) non-munitions-configured containers of CA (e.g., a ton container) and CAIS K941, toxic gas set M-1 and K942, toxic gas set M-2/E11.
- 4) Chemical Agent Identification Sets (CAIS) – Military training aids containing small quantities of various CA and other chemicals. All forms of CAIS are scored the same in this rule, except CAIS K941, toxic gas set M-1; and CAIS K942, toxic gas set M-2/E11, which are considered forms of CWM, bulk container, due to the relatively large quantities of agent contained in those types of sets.

Closed Range – A military range that has been taken out of service as a range and that either has been put to new uses that are incompatible with range activities or is not considered by the military to be a potential range area. A closed range is still under the control of a DoD Component. (MGDERP, September 2001)

Defense Sites – Locations that are or were owned by, leased to, or otherwise possessed or used by the Department of Defense. The term does not include any operational range, operating storage or manufacturing facility, or facility that is used for or was permitted for the treatment or disposal of military munitions. (10 U.S.C. 2710(e)(1))

Department of Defense (DoD) Components – The Office of the Secretary of Defense (OSD), the Military Departments, the Defense Agencies, the Department Field Activities, and any other Department organizational entity or instrumentality established to perform a government function. (MRSP, 32 CFR Part 179, October 2005)

Discarded Military Munitions (DMM) – Military munitions that have been abandoned without proper disposal or removed from storage in a military magazine or other storage area for the purpose of disposal. The term does not include unexploded ordnance, military munitions that are being held for future use or planned disposal, or military munitions that have been properly disposed of consistent with applicable environmental laws and regulations. (10 U.S.C. 2710(e)(2))

Explosive Ordnance Disposal (EOD) Personnel – Active duty military personnel of any military service branch that are trained in the detection, identification, field evaluation, safe rendering, recovery, and final disposal of explosive ordnance and of other munitions that have become an imposing danger, for example, by damage or deterioration. (Handbook on the Management of Munitions Response Actions, Interim Final, EPA, May 2005)

Facility – A building, structure, or other improvement to real property, in relation to work classification. (10 U.S.C. 2801)

Formerly Used Defense Sites (FUDS) – Facility or site (property) that was under the jurisdiction of the Secretary of Defense and owned by, leased to, or otherwise possessed by the United States at

the time of actions leading to the contamination by hazardous substances. By the DoD Environmental Restoration Program (ERP) policy, the FUDS program is limited to those real properties that were transferred from DoD control prior to 17 October 1986. FUDS properties can be located within the 50 States, District of Columbia, Territories, Commonwealths, and possessions of the United States. (FUDS Program Policy, ER 200 3-1, May 2004)

Hazardous Substance – (A) Any substance designated pursuant to Section 1321(b)(2)(A) of Title 33; (B) any element, compound, mixture, solution, or substance designated pursuant to Section 9602 of this title; (C) any hazardous waste having the characteristics identified under or listed pursuant to Section 3001 of the Solid Waste Disposal Act (42 U.S.C. 6921) (but not including any waste the regulation of which under the Solid Waste Disposal Act [42 U.S.C. 6901 et seq.] has been suspended by Act of Congress); (D) any toxic pollutant listed under section 1317(a) of Title 33; (E) any hazardous air pollutant listed under Section 112 of the Clean Air Act (42 U.S.C. 7412); and (F) any imminently hazardous chemical substance or mixture with respect to which the Administrator has taken action pursuant to Section 2606 of Title 15. The term does not include petroleum, including crude oil or any fraction thereof, which is not otherwise specifically listed or designated as a hazardous substance under subparagraphs (A) through (F) of this paragraph, and the term does not include natural gas, natural gas liquids, liquefied natural gas, or synthetic gas usable for fuel (or mixtures of natural gas and such synthetic gas). (CERCLA, 42 U.S.C. § 9601 et seq.)

Installation (as defined by the Restoration Management Information System [RMIS] Data Element Dictionary for a Federal Facility Identification [FFID]) – The FFID number is a unique identifier, assigned to an installation/property in RMIS. The 14-character aggregate string is used in RMIS as the key column for each data table and is used to track all associated records for each installation. An installation may have a single range or multiple ranges (and each range may have more than one site contained within its boundaries) and a single or multiple sites, not associated with a range. (Management Guidance for the Defense Environmental Restoration Program, September 2001)

Land Use Controls (LUCs) – Physical, legal, or administrative mechanisms that restrict the use of, or limit access to, contaminated property in order to reduce risk to human health and the environment. Physical mechanisms encompass a variety of engineered remedies to contain or reduce contamination and/or physical barriers to limit access to property, such as fences or signs. The legal mechanisms are generally the same as those used for institution controls (ICs) as discussed in the NCP. ICs are a subset of LUCs and are primarily legal mechanisms imposed to ensure the continued effectiveness of land use restrictions imposed as part of a remedial decision. Legal mechanisms include restrictive covenants, negative easements, equitable servitudes, and deed notices. Administrative mechanisms include notices, adopted local land use plans and ordinances, construction permitting, or other existing land use management systems that may be used to ensure compliance with use restrictions. (MGDERP, September 2001)

Material That Potentially Presents an Explosive Hazard (MPPEH) – Material potentially containing explosives or munitions (e.g., munitions containers and packaging material; munitions debris remaining after munitions use, demilitarization, or disposal; and range-related debris), or material potentially containing a high enough concentration of explosives such that the material presents an explosive hazard (e.g., equipment, drainage systems, holding tanks, piping, or

ventilation ducts that were associated with munitions production, demilitarization or disposal operations). Excluded from MPPEH are munitions within DoD's established munitions management system and other hazardous items that may present explosion hazards (e.g., gasoline cans, compressed gas cylinders) that are not munitions and are not intended for use as munitions. (DoD Instruction 4140.62, Management and Disposition of MPPEH, December 2004)

Military Installation – A base, camp, post, station, yard, center, or other activity under the jurisdiction of the Secretary of a Military Department, or, in the case of an activity in a foreign country, under the operational control of the Secretary of a military department or the Secretary of Defense, without regard to the duration of operational control. (10 U.S.C. 2801)

Military Munitions – All ammunition products and components produced for or used by the Armed Forces for national defense and security, including ammunition products or components under the control of the Department of Defense, the Coast Guard, the Department of Energy, and the National Guard. The term includes confined gaseous, liquid, and solid propellants; explosives, pyrotechnics, chemical and riot control agents, smokes, and incendiaries, including bulk explosives and chemical warfare agents; chemical munitions, rockets, guided and ballistic missiles, bombs, warheads, mortar rounds, artillery ammunition, small arms ammunition, grenades, mines, torpedoes, depth charges, cluster munitions and dispensers, and demolition charges; and devices and components of any item thereof. The term does not include wholly inert items, improvised explosive devices, and nuclear weapons, nuclear devices, nuclear components, other than non-nuclear components of nuclear devices that are managed under the nuclear weapons program of the Department of Energy after all required sanitization operations under the Atomic Energy Act of 1954 (42 U.S.C. 2011 et seq.) have been completed. (10 U.S.C. 101(e)(4))

Military Range – Designated land and water areas set aside, managed, and used to research, develop, test, and evaluate military munitions, other ordnance, or weapon systems, or to train military personnel in their use and handling. Ranges include firing lines and positions, maneuver areas, firing lanes, test pads, detonation pads, impact areas, and buffer zones with restricted access and exclusionary areas. (40 CFR 266.201)

Munitions and Explosives of Concern (MEC) – Military munitions that are 1) unexploded ordnance, as defined in 10 U.S.C. 101(e)(5); 2) abandoned or discarded, as defined in 10 U.S.C. 2710(e)(2); 3) MC (e.g., TNT, RDX) present in soil, facilities, equipment, or other materials in high enough concentrations so as to pose an explosive hazard. (MRSPP, 32 CFR Part 179, October 2005)

Munitions Constituent (MC) – Any material that originates from UXO, DMM, or other military munitions, including explosive and non-explosive materials, and emission, degradation, or breakdown elements of such ordnance or munitions. (10 U.S.C. 2710(e)(4))

Munitions Debris – Remnants of munitions (e.g., fragments, penetrators, projectiles, shell casings, links, fins) remaining after munitions use, demilitarization, or disposal. (DoD 6055.9-STD)

Munitions Response – Response actions, including investigation, removal actions, and remedial actions, to address the explosives safety, human health, or environmental risks presented by UXO,

DMM, or MC or to support a determination that no removal or remedial action is required. (MRSP, 32 CFR Part 179, October 2005)

Munitions Response Area (MRA) – Any area on a defense site that is known or suspected to contain UXO, DMM, or MC. Examples include former ranges and munitions burial areas. A munitions response area is comprised of one or more munitions response sites. (MRSP, 32 CFR Part 179, October 2005)

Munitions Response Site (MRS) – A discrete location within an MRA that is known to require a munitions response. (MRSP, 32 CFR Part 179, October 2005)

Operational Range – A range that is under the jurisdiction, custody, or control of the Secretary of Defense and that is used for range activities, or although not currently being used for range activities, that is still considered by the Secretary to be a range and has not been put to a new use that is incompatible with range activities. (10 U.S.C. 101(e)(3))

Pollutant and Contaminant – These terms include, but are not be limited to, any element, substance, compound, or mixture, including disease-causing agents, which after release into the environment and upon exposure, ingestion, inhalation, or assimilation into any organism, either directly from the environment or indirectly by ingestion through food chains, will or may reasonably be anticipated to cause death, disease, behavioral abnormalities, cancer, genetic mutation, physiological malfunctions (including malfunctions in reproduction) or physical deformations, in such organisms or their offspring; except that the term pollutant or contaminant shall not include petroleum, including crude oil or any fraction thereof which is not otherwise specifically listed or designated as a hazardous substance under subparagraphs (A) through (F) of paragraph (14) and shall not include natural gas, liquefied natural gas, or synthetic gas of pipeline quality (or mixtures of natural gas and such synthetic gas). (CERCLA, 42 U.S.C. § 9601 et seq.)

Range Activities – Research, development, testing, and evaluation of military munitions, other ordnance, and weapons systems; and the training of members of the Armed Forces in the use and handling of military munitions, other ordnance, and weapons systems. (10 U.S.C. 101(3)(2))

Range-Related Debris – Debris, other than munitions debris, collected from operational ranges or from former ranges (e.g., targets, military munitions packaging and crating material). (DoD 6055.9-STD)

Range Residue – Material, including but not limited to, parts and sections of practice bombs, artillery, small arms, mortars, projectiles, bombs, missiles, rockets, rocket mortars, targets, grenades, incendiary devices, experimental items, demolition devices, and any other material fired on or discovered on a range. (AFI 13-212, Range Planning and Operations, August 2001)

Real Property – Real estate owned by the United States and under the control of the DoD. Includes lands, buildings, structures, utilities systems, improvements and appurtenances thereto. Includes equipment attached to and made part of buildings and structures (such as heating systems) but not moveable equipment (such as plant equipment). (MGDERP, September 2001)

Relative Risk – The evaluation of individual sites to determine high, medium, or low relative risk to human health and the environment, based on contaminant hazards, migration pathways and receptors, in accordance with the DoD's *Risk-Based Site Evaluation Primer*. (MGDERP, September 2001)

Removal – The cleanup or removal of released hazardous substances from the environment. Such actions may be taken in the event of the threat of release of hazardous substances into the environment, as may be necessary to monitor, assess, and evaluate the release or threat of release of hazardous substances, the disposal of removed material, or the taking of such other actions as may be necessary to prevent, minimize, or mitigate damage to the public health or welfare or to the environment, which may otherwise result from a release or threat of release. The term includes, in addition, without being limited to, security fencing or other measures to limit access, provision of alternative water supplies, temporary evacuation and housing of threatened individuals not otherwise provided for, action taken under Section 9604(b) of this title, and any emergency assistance which may be provided under the Disaster Relief and Emergency Assistance Act [42 U.S.C. 5121 et seq.] The requirements for removal actions are addressed in 40 CFR §§300.410 and 300.415. The three types of removals are emergency, time-critical, and non-time critical removals (CERCLA, 42 U.S.C. § 9601 et seq.):

- 1) Emergency – Emergency removal or response is performed when an immediate or imminent danger to public health or the environment is present and action is required within hours. Trained responders identify the explosive threat and make the decision as to whether the munitions and explosive of concern should be moved or blown in place and ensure the threat is removed safely and expeditiously.
- 2) Time-critical – A response to a release or threat of release that poses such a risk to public health (serious injury or death), or the environment, that cleanup or stabilization actions must be initiated within six months.
- 3) Non-time critical – An action initiated in response to a release or threat of a release that poses a risk to human health and welfare, or the environment. Initiation of removal cleanup actions may be delayed for six months or more.

Risk Reduction – The movement of any site from a higher to lower relative risk category as a result of natural attenuation, interim remedial, remedial, or removal actions taken. (DoD Instruction 4715.7, Environmental Restoration Program, April 1996)

Site (as defined in the Restoration Management Information System Data Element Dictionary for a SITE ID) – A unique name given to a distinct area of an installation containing one or more releases or threatened releases of hazardous substances treated as a discreet entity or consolidated grouping for response purposes. Includes any building, structure, impoundment, landfill, storage container, or other site or area where a hazardous substance was or has come to be located, including formerly used sites eligible for building demolition/debris removal. Installations and ranges may have more than one site. (MGDERP, September 2001)

Stakeholder – Groups or individuals interested in, concerned about, affected by, having a vested interest in, or may be involved in the munitions response at an MRA/MRS.

Unexploded Ordnance (UXO) – Military munitions that have been primed, fuzed, armed, or otherwise prepared for action and have been fired, dropped, launched, projected, or placed in such a manner as to constitute a hazard to operations, installations, personnel, or material, and remain unexploded either by malfunction, design, or any other cause. (10 U.S.C. 101(e)(5))

UXO Technicians – Personnel who are qualified for and filling Department of Labor, Service Contract Act, Directory of Occupations, and contractor positions of UXO Technician I, UXO Technician II, and UXO Technician III. (Department of Defense Explosive Safety Board TP18, December 2004)

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Appendix C
Acronyms and Abbreviations

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APPENDIX C. ACRONYMS AND ABBREVIATIONS

AF	Air Force
AFB	Air Force Base
AFCEE	Air Force Center for Engineering and the Environment (formerly Air Force Center for Environmental Excellence)
AFMAN	Air Force Manual
AFRIMS	Air Force Restoration Information Management System
AFSOC	Air Force Special Operations Command
APP	Accident Prevention Plan
AR	Administrative Record
BASH	Bird-Aircraft Strike Hazard
bgs	below ground surface
BRAC	Base Realignment and Closure
CAS	Chemical Abstracts Service
CE	Civil Engineering
CENWO	Corps of Engineers Northwestern Division Omaha District
CERCLA	Comprehensive Environmental Restoration, Compensation, and Liability Act
CGI	Combustible Gas Indicator
CIH	Certified Industrial Hygienist
COC	Chain-of-Custody
COR	Contracting Officer's Representative
CPR	Cardiopulmonary Resuscitation
CSC	Contract Service Center
CSE	Comprehensive Site Evaluation
CSM	Conceptual Site Model
CWM	Chemical Warfare Materiel
DDESB	Department of Defense Explosives Safety Board
DLH	Data Loading Handbook
DMM	Discarded Military Munitions
DMT	Data Management Tool
DoD	Department of Defense
DQCR	Daily Quality Control Report
DQO	Data Quality Objective
DU	Depleted Uranium
DWS	Dynamic Work Strategies
EDD	Electronic Data Deliverable
ELAP	Environmental Laboratory Accreditation Program
EM	Engineering Manual
EOD	Explosive Ordnance Detail
EPA	Environmental Protection Agency
EPC	Environmental Protection Committee

ERPIMS	Environmental Resources Program Information Management System
ERPToolsX	Environmental Resource Program Tools
eV	electron volt
FID	Flame Ionization Detector
FPXRF	Field portable X-ray fluorescence
ft	foot
GC/MS	Gas Chromatography/Mass Spectrometry
GFAA	Graphite Furnace Atomic Absorption
GIS	Geographic Information System
GPS	Global Positioning System
HAZWOPER	Hazardous Waste Operations and Emergency Response
HRR	Historical Records Review
HRS	Hazard Ranking System
HSE	Health, Safety, and Environment
HSEP	Health, Safety, and Environment Procedures
HTRW	Hazardous Toxic Radioactive Waste
ICP	Inductively Coupled Plasma
ICP-AES	Inductively Coupled Plasma-Atomic Emission Spectrometry
ICP-MS	Inductively Coupled Plasma-Mass Spectroscopy
ICSM	Interim Conceptual Site Model
ID	Identification
IDLH	Immediately Dangerous to Life or Health
IDW	Investigation-Derived Waste
IR	Information Repository
IRP	Installation Restoration Program
Jacobs	Jacobs Engineering Group
K _{oc}	organic carbon/water partition coefficient
K _{ow}	octanol/water partition coefficient
LCS	Laboratory Control Sample
LOD	Limit of Detection
LOQ	Limit of Quantitation
MAJCOM	Major Command
MC	Munitions Constituents
MEC	Munitions and Explosives of Concern
MIDAS	Munitions Item Disposition Action System
mg/kg	milligram per kilogram
mg/m ³	milligram per cubic meter
MMRP	Military Munitions Response Program
MRA	Munitions Response Area

MRS	Munitions Response Site
MRSP	Munitions Response Site Prioritization Protocol
MS	Matrix Spike
MSD	Matrix Spike Duplicate
msl	mean sea level
NA	Not Applicable
NCP	National Oil & Hazardous Substances Pollution Contingency Plan
NFA	No Further Action
NM	New Mexico
NMED	New Mexico Environmental Department
OE	Ordnance and Explosive
OSHA	Occupational Safety and Health Administration
oz	ounce
PAH	Polynuclear Aromatic Hydrocarbons
PA	Preliminary Assessment
Pb	lead
PCOC	Potential Contaminant of Concern
PEL	Permissible Exposure Limit
PID	Photo Ionization Detector
PM	Project Manager
POC	Point of Contact
PPE	Personal Protective Equipment
PT	Proficiency test
QA	Quality Assurance
QAPP	Quality Assurance Project Plan
QC	Quality Control
QCR	Quality Control Review
QSM	Quality Systems Manual 4.1
RACER	Remedial Action Cost Engineering Requirements
RL	Reporting Limit
ROE	Rights of Entry
RPD	Relative Percent Difference
RPM	Remedial Project Manager
RSD	Relative Standard Deviation
RSL	Regional Screening Level
SAR	Small Arms Range
SCBA	Self Contained Breathing Apparatus
SI	Site Inspection
SIM	Selected Ion Monitoring
SOHO	Safety and Occupational Health Office

SOO	Statement of Objectives
SOP	Standard Operating Procedure
SOR	Safety Observation Report
SPA	Safe Plan of Action
SSHO	Site Safety and Health Officer
SSHP	Site-Specific Health and Safety Plan
SSL	Soil Screening Level
TLV	Threshold Limit Value
TO	Task Order
TRG	Target Remediation Goal
TWA	Time Weighted Average
USACE	United States Army Corps of Engineers
USAF	United States Air Force
USGS	United States Geological Survey
UTM	Universal Transverse Mercator
UXO	Unexploded Ordnance
UXOSO	UXO Safety Officer
Versar, Inc.	Versar
WWII	World War II
XRF	X-ray fluorescence
°C	degrees Celsius
°F	degrees Fahrenheit

Appendix D

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APPENDIX D. REFERENCES

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Appendix E
CSE Phase II Report Format Outline

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APPENDIX E. CSE PHASE II REPORT FORMAT OUTLINE

1.0 Introduction

- 1.1 Purpose
- 1.2 Project Data Quality Objectives (DQO)
- 1.3 Project Management
- 1.4 Project Scope
- 1.5 Report Organization

2.0 Installation Background

- 2.1 Location and Setting
- 2.2 Installation Mission and Operational History
- 2.3 Summary of MEC-Related Activities
- 2.4 Identification of Munitions Response Areas (MRA)
- 2.5 Identification of Munitions Response Site Subdivisions
- 2.6 Previous Investigations

3.0 Physical and Environmental Setting

- 3.1 Climate
- 3.2 Topography
- 3.3 Hydrology
- 3.4 Soil and Vegetation Types
- 3.5 Geology and Hydrogeology

4.0 Investigation Scope and Approach

- 4.1 Site Reconnaissance
- 4.2 Geophysical Survey
 - 4.2.1 Geophysical Methodologies
 - 4.2.2 Extent of MRA
 - 4.2.3 Relative Density of Anomalies across MRA
- 4.3 Environmental Media Sampling and Analysis
 - 4.3.1 Source Sampling
 - 4.3.2 Environmental Media Sampling
- 4.4 Screening Levels
- 4.5 Data Quality
 - 4.5.1 Data Quality Objectives
 - 4.5.2 Analytical Methodology
 - 4.5.3 Data Review
 - 4.5.4 Data Validation
- 4.6 Data Management
 - 4.6.1 Electronic Data
 - 4.6.2 Hardcopy Data
 - 4.6.3 GIS Data

5.0 Munitions Response Site Characteristics

- 5.1 Site Description
- 5.2 History of MEC Activities
- 5.3 Current Land Use
- 5.4 Access Controls
- 5.5 Restrictions

- 5.6 Field Investigation Results
 - 5.6.1 Site Reconnaissance Observations
 - 5.6.2 Geophysical Survey Results
 - 5.6.3 Media Sampling Results
 - 5.6.4 Background Determination
- 5.7 Identification of Potential Receptors
 - 5.7.1 Nearby Population
 - 5.7.2 Buildings Near/Within MRA
 - 5.7.3 Utilities On/Near MRA
- 5.8 Natural Resources
- 6.0 Evaluation of Known/Suspected MEC**
 - 6.1 MEC Technical Data
 - 6.2 Primary Sources and Release Mechanisms
 - 6.3 MEC Locations (Secondary Sources)
 - 6.4 MEC Penetration Estimates
 - 6.5 Special Consideration MEC (e.g., depleted uranium, CWM)
 - 6.6 Known/Suspected MCs
 - 6.7 Explosive Safety Submission Information
- 7.0 Evaluation of Hazardous Waste/Substances**
 - 7.1 Hazardous Waste Activities
 - 7.2 Hazardous Waste Characteristics
 - 7.3 Identification of Source Areas
 - 7.4 Characterization of Potential Contaminants of Concern Known/Suspected Releases
- 8.0 Conceptual Site Model**
 - 8.1 MEC [*Graphic*]
 - 8.1.1 MEC Exposure Pathway Analysis
 - 8.1.2 Transport Processes
 - 8.1.3 Exposure Media and Accessibility
 - 8.1.4 MEC Exposure Receptors
 - 8.1.5 MEC Exposure Conclusions
 - 8.2 MCs, Hazardous Substances, Pollutants and Contaminants, and Other Constituents [*Graphic*]
 - 8.2.1 Soil Exposure Pathway Analysis
 - 8.2.1.1 Soil Exposure Receptors
 - 8.2.1.2 Soil Exposure Conclusions
 - 8.2.2 Surface Water/Sediment Migration Pathway Analysis
 - 8.2.2.1 Surface Water/Sediment Receptors
 - 8.2.2.2 Surface Water/Sediment Conclusions
 - 8.2.3 Groundwater Migration Pathway Analysis
 - 8.2.3.1 Groundwater Receptors
 - 8.2.3.2 Groundwater Conclusions
- 9.0 Screening Level Human Health Risk Assessment**
 - 9.1 General Approach
 - 9.2 Pathway and Receptors
 - 9.3 Soil

- 9.4 Surface Water
- 9.5 Sediment
- 9.6 Groundwater
- 9.7 HHRA Conclusions and Recommendations
- 10.0 Screening Level Ecological Risk Assessment**
 - 10.1 General Approach
 - 10.2 Habitat and Receptors
 - 10.3 Surface Water
 - 10.4 Sediment
 - 10.5 Soil
 - 10.6 Additional Ecological Issues
 - 10.7 SLERA Conclusions and Recommendations
- 11.0 Munitions Response Site Prioritization Protocol**
 - 11.1 Explosive Hazard Evaluation (EHE) Module
 - 11.2 Chemical Warfare Materiel Hazard Evaluation (CHE) Module
 - 11.3 Health Hazard Evaluation (HHE) Module
 - 11.4 MRSPP Score
- 12.0 Perchlorate Reporting**
 - 12.1 Field Sampling Methodologies
 - 12.2 Analytical Methodologies
 - 12.3 Perchlorate Concentration Reporting by MRA/MRS
- 13.0 Summary and Conclusions**
 - 13.1 Summary of CSE Phase II Activities
 - 13.2 Summary of the CSE Phase II Findings
 - 13.3 Assessment of Potential Munitions Constituent Releases
 - 13.4 Summary of the MRSP
- 14.0 Recommendations (Future Investigation and/or Action)**
 - 14.1 Cohort Assignment
 - 14.2 Process Streamlining Opportunities
 - 14.3 Additional MRS (splitting the MRA)
 - 14.4 Change to MRA/MRS Footprint
 - 14.5 Future Response Actions and Objectives
 - 14.6 Identify Gaps in CSM
 - 14.7 DoD MRSPP Priority
 - 14.8 Site Sequencing Considerations

CSE Phase II Report Appendices

The following Appendices should be included as supporting information to the Report:

- A – Definitions
- B – Abbreviations
- C – References
- D – Photo-Documentation Log
- E – Field Notes and Field Forms

- F – Ordnance Technical Data Sheets
- G – Geophysical Survey Data
- H – Summary of Analytical Data
- I – Data Validation Reports
- J – Background Study and Site-to-Background Comparisons
- K – Munitions Response Site Prioritization Protocol Tables
- L – RACER Data Input Worksheet
- M – AFMIS Data Input Worksheet
- N – Documentation of Public Participation Support (e.g., fact sheets, published notices)

Maps

Installation Location – identify the location of the installation within the appropriate state, province, or territory.

Site Locations – identify the locations of all MRA within the boundaries of the installation.

Results of Visual Survey – identify the areas investigated; note global positioning system (GPS) locations where specific observations were made; note firing points, target areas, berms, and other MEC locations; identify possible hazardous substance source/release areas such as waste piles, surface impoundments or drum locations; identify site features such as buildings and structures, on-site and nearby receptors such as bodies of water and wells, and boundaries abstracted from historical drawings/documents.

Results of Historical Records Review – maps showing boundaries abstracted from historical drawings/documents; range fans, firing points, target areas, berms and other MEC usage locations; identified in the CSE Phase I.

(This is the 1/18/08 revised report outline.)

Appendix F
Accident Prevention Plan and Site Safety and Health Plan

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ACCIDENT PREVENTION PLAN (APP) TITLE PAGE: U.S. Army Corps of Engineers, Omaha District		This APP is a part of the Omaha District Safety Program. Please read and comply with USACE EM 385-1-1 and CENWO OM 385-1-1.
CONTRACTOR NAME: Versar / Jacobs Engineering		
PROJECT NAME: MMRP CSE Phase II for Cannon AFB, NM		
CONTRACT NUMBER: W9128F-08-D-0027		
JOB SITE ADDRESS: Cannon AFB		
PROJECT MANAGER: Gary Torf / Jon Russ		PHONE NO.: (303) 450-1929; (303) 462-7208
SITE CONTACT: Hugh Hanson		PHONE NO.: (575) 784-6391
OBJECTIVES OF FIELD WORK: Perform CSE Phase II activities to determine whether the 1940s Skeet Range munitions response area (MRA) at Cannon AFB warrant additional munitions response activities.		SITE TYPE: Check as many as applicable <input checked="" type="checkbox"/> Active <input type="checkbox"/> Landfill <input type="checkbox"/> Natural <input checked="" type="checkbox"/> Inactive <input checked="" type="checkbox"/> Military <input type="checkbox"/> Uncontrolled <input checked="" type="checkbox"/> Secure <input type="checkbox"/> Industrial <input type="checkbox"/> Well Field <input type="checkbox"/> Unsecured <input type="checkbox"/> Residential <input type="checkbox"/> Enclosed space <input type="checkbox"/> Other specify:
FIELD ACTIVITIES INCLUDE: Field reconnaissance Environmental soil sampling and on-site analysis		
DESCRIPTION AND FEATURES: Cannon AFB is located in Curry County, New Mexico, about 8 miles west of the City of Clovis. Cannon AFB occupies a total of approximately 3,789 acres of land. The 27 th Special Operations Wing is the host unit at Cannon AFB.		
SURROUNDING POPULATION: <input checked="" type="checkbox"/> Residential <input type="checkbox"/> Industrial <input checked="" type="checkbox"/> Rural <input type="checkbox"/> Urban <input type="checkbox"/> Commercial <input checked="" type="checkbox"/> Recreational <input type="checkbox"/> Other:		

ACCIDENT PREVENTION PLAN (APP)
STATEMENT OF SAFETY AND HEALTH POLICY:
U.S. Army Corps of Engineers, Omaha District

This APP is a part of the Omaha District Safety Program. Please read and comply with USACE EM 385-1-1 and CENWO OM 385-1-1.

Safety and health are basic Versar/Jacobs Engineering Group Inc. (Jacobs) values and shall be adhered to at all Versar team job sites. The Site Safety and Health Officer (SSHO)/or UXO Safety Officer (UXOSO), where applicable and the Safety and Health Manager will maintain copies of this APP, and copies will be made available at each site with each work crew, as approved by the SSHO. Each supervisor, lead person, laborer, operator, and visitor will be held accountable and responsible for working safely and following procedures and guidance set forth in this APP.

All project personnel will follow Jacobs Health, Safety, and Environment Procedures (HSEP) in addition to this APP. The specific Jacobs HSEPs that apply to this project are presented in Attachment 1, and include:

- Safe Plan of Action (SPA), Jacobs HSEP Reference 2.16
- Safety Observation Report (SOR), Jacobs HSEP Reference 2.17
- Accident and Incidents, Jacobs HSEP Reference 5.1
- Vehicle Accidents, Jacobs HSEP Reference 5.2
- Hazardous Materials Sites and Hazardous Waste Activities, Jacobs HSEP Reference 7.3
- Hazard Control Procedures, Jacobs HSEP Reference 11.0
- Decontamination, Jacobs HSEP Reference 11.9
- PPE, Jacobs HSEP Reference 13.0
- Emergency and contingency planning, Jacobs HSEP Reference 14.0
- Maintenance and storage areas, Jacobs HSEP Reference 16.0

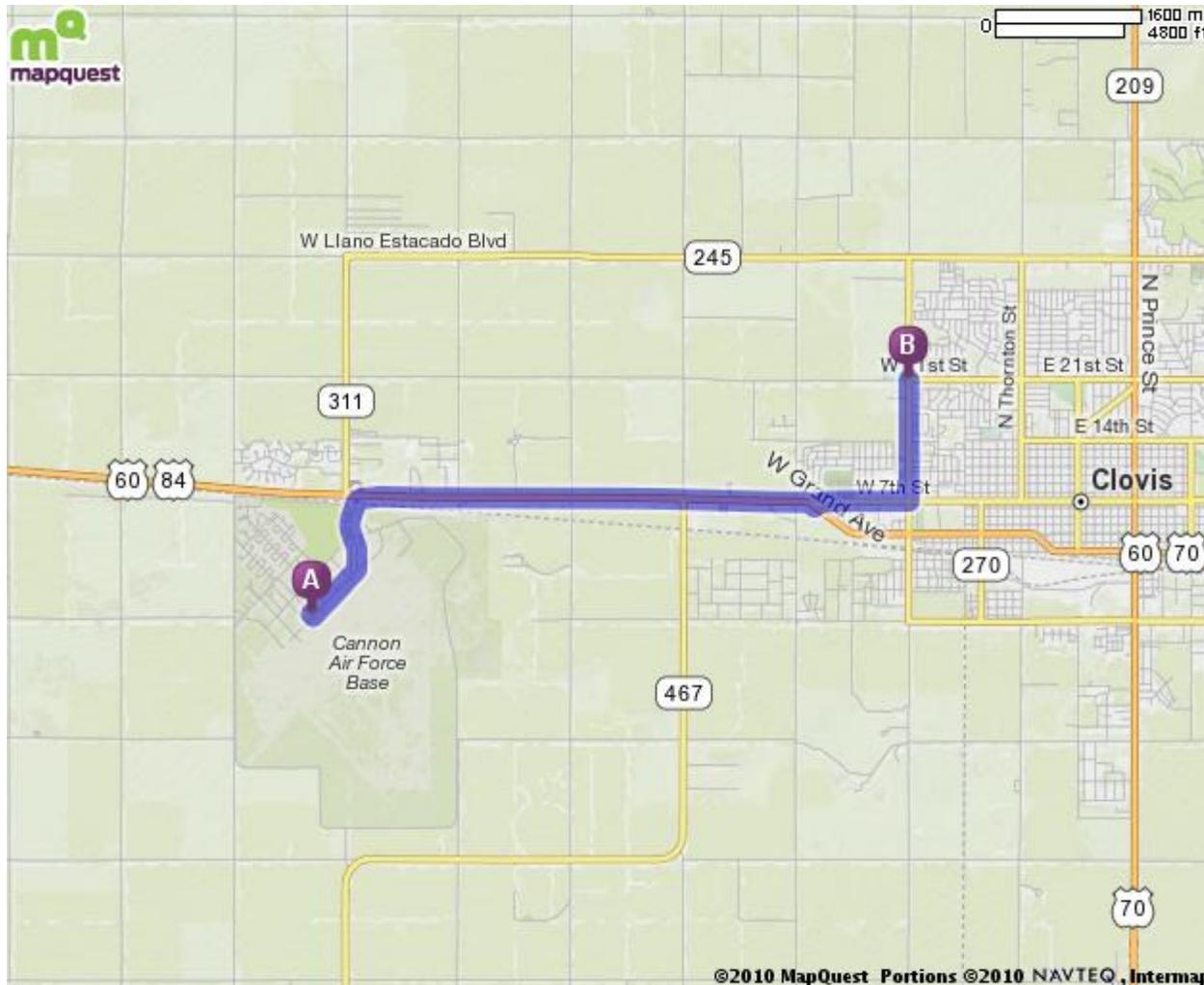
ACCIDENT PREVENTION PLAN (APP) REVIEWS AND APPROVAL US Army Corps of Engineers, Omaha District	This APP is a part of the Omaha District Safety Program. Please read and comply with USACE EM 385-1-1 and CENWO OM 385-1-1.	
Authored by: Gary Torf	Date: September 2010	Signature:
Peer review by: Jon Russ	Date: September 2010	Signature:
Quality control review (QCR) by: David Feiertag	Date: September 2010	Signature:
Reviewed by: Jana Lienemann, CIH	Date: September 2010	Signature:
Reviewed by:	Date:	Signature:
CENWO Safety and Occupational Health Office (SOHO) review:	Date:	Signature:
USACE Omaha Project Manager approval: Glenn Marks	Date:	Signature:

ACCIDENT PREVENTION PLAN (APP) EMERGENCY CONTACTS US Army Corps of Engineers, Omaha District			This APP is a part of the Omaha District Safety Program. Please read and comply with USACE EM 385-1-1 and CENWO OM 385-1-1.	
PROJECT CONTACTS			CONTACT NAME	PHONE
USACE Omaha Project Manager Glenn Marks	CENWO-PM-H	(402) 995-2286 (402) 314-6282 (cell)	Nationwide Poison Hotline	(800) 222-1222
USACE OE Safety Specialist Chris Bryant	USACE-Omaha	(402) 995-2279 (402) 740-4954 (cell)	National Response Center	(800) 424-8802
Installation POC Hugh Hanson	Cannon AFB	(575) 784-6391	Medical emergency response	911
Project Manager/Project Chemist Gary Torf	Versar	(303) 450-1929 (720) 231-8022 (cell)	Fire emergency response	911
Technical Lead David Feiertag	Versar	(303) 450-1926 (303) 618-5376 (cell)	Sheriff/Police response	911
Field Lead/ Site Safety & Health Officer (SSHO) Jon Russ	Jacobs	(303) 462-7208 (303) 408.4462 (cell)	State Highway Patrol	911
Program Health & Safety Manager Jana Lienemann, CIH	Jacobs	(303) 462-7389		

<p>ACCIDENT PREVENTION PLAN (APP) EMERGENCY CONTACTS US Army Corps of Engineers, Omaha District</p>	<p>This APP is a part of the Omaha District Safety Program. Please read and comply with USACE EM 385-1-1 and CENWO OM 385-1-1.</p>																		
<p>CONTINGENCY PLAN: Team members are to be alert to the dangers associated with the site at all times. If a hazardous condition arises, stop work, evacuate the immediate area and notify Facility POC, Versar PM, and Jacobs PM.</p> <p>FIRST AID. A first aid kit and emergency eye wash (as applicable) will be located in the field vehicle. If qualified persons (e.g., a fire department [Emergency Medical Technician], medical facility, or physician) are not accessible within five minutes of the site, at least two team members will be qualified to administer first aid and cardiopulmonary resuscitation (CPR), per USACE EM 385-1-1.</p> <p>EMERGENCY TELEPHONE NUMBERS:</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%; padding: 2px;">1. MEDICAL FACILITY: Plains Regional Medical Center</td> <td style="width: 50%; padding: 2px;">(575) 769-2141</td> </tr> <tr> <td style="padding: 2px;">2. FIRE DEPARTMENT:</td> <td style="padding: 2px;">911</td> </tr> <tr> <td style="padding: 2px;">3. POLICE DEPARTMENT:</td> <td style="padding: 2px;">911</td> </tr> <tr> <td style="padding: 2px;">4. POISON CONTROL CENTER</td> <td style="padding: 2px;">(800) 222-1222</td> </tr> <tr> <td style="padding: 2px;">5. Facility RPM/Base POC: Hugh Hanson</td> <td style="padding: 2px;">(575) 784-6391</td> </tr> <tr> <td style="padding: 2px;">6. Explosive Ordnance Detail (EOD): Sylvester (J.R.) Willis</td> <td style="padding: 2px;">(702) 576-3074</td> </tr> <tr> <td style="padding: 2px;">7. VERSAR PROJECT MANAGER: Gary Torf</td> <td style="padding: 2px;">(303) 450-1929, (720) 231-8022 (cell)</td> </tr> <tr> <td style="padding: 2px;">8. JACOBS PROJECT MANAGER: Jon Russ</td> <td style="padding: 2px;">(303) 462-7208, (303) 408-4462 (cell)</td> </tr> <tr> <td style="padding: 2px;">9. USACE (Omaha) Project Manager: Glenn Marks</td> <td style="padding: 2px;">(402) 995-2286, (402) 314-6282 (cell)</td> </tr> </table>		1. MEDICAL FACILITY: Plains Regional Medical Center	(575) 769-2141	2. FIRE DEPARTMENT:	911	3. POLICE DEPARTMENT:	911	4. POISON CONTROL CENTER	(800) 222-1222	5. Facility RPM/Base POC: Hugh Hanson	(575) 784-6391	6. Explosive Ordnance Detail (EOD): Sylvester (J.R.) Willis	(702) 576-3074	7. VERSAR PROJECT MANAGER: Gary Torf	(303) 450-1929, (720) 231-8022 (cell)	8. JACOBS PROJECT MANAGER: Jon Russ	(303) 462-7208, (303) 408-4462 (cell)	9. USACE (Omaha) Project Manager: Glenn Marks	(402) 995-2286, (402) 314-6282 (cell)
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ACCIDENT PREVENTION PLAN (APP)
EMERGENCY CONTACTS
US Army Corps of Engineers, Omaha District

This APP is a part of the Omaha District Safety Program. Please read and comply with USACE EM 385-1-1 and CENWO OM 385-1-1.



Plains Regional Medical Center
2100 Martin Luther King Jr. Blvd.
Clovis, NM 88101
(575) 769-2141

**Directions from Cannon AFB
to Plains Regional Medical
Center**

(see figure above):

Merge onto US-60 E/US-84 S.

In approx. 4 miles, turn left onto
W 7th St.

Turn left onto N Martin Luther
King JR. Blvd.

The Plains Medical Center will
be on the left at 2100 Martin
Luther King Jr. Blvd.

ACCIDENT PREVENTION PLAN (APP) HISTORY AND WASTE CHARACTERIZATION US Army Corps of Engineers, Omaha District	This APP is a part of the Omaha District Safety Program. Please read and comply with USACE EM 385-1-1 and CENWO OM 385-1-1.									
WASTE TYPES: <input type="checkbox"/> Liquid <input type="checkbox"/> Solid <input type="checkbox"/> Sludge <input type="checkbox"/> Gas <input type="checkbox"/> Unknown <input checked="" type="checkbox"/> Other (specify): soil										
WASTE CHARACTERISTICS: Check as many as applicable.										
<table style="width: 100%; border: none;"> <tr> <td style="width: 33%;"><input type="checkbox"/> Corrosive</td> <td style="width: 33%;"><input type="checkbox"/> Flammable</td> <td style="width: 33%;"><input type="checkbox"/> Radioactive</td> </tr> <tr> <td><input type="checkbox"/> Toxic</td> <td><input type="checkbox"/> Volatile</td> <td><input type="checkbox"/> Reactive</td> </tr> <tr> <td><input type="checkbox"/> Inert Gas</td> <td><input type="checkbox"/> Unknown</td> <td><input checked="" type="checkbox"/> Other (specify): Lead and PAHs in soil</td> </tr> </table>		<input type="checkbox"/> Corrosive	<input type="checkbox"/> Flammable	<input type="checkbox"/> Radioactive	<input type="checkbox"/> Toxic	<input type="checkbox"/> Volatile	<input type="checkbox"/> Reactive	<input type="checkbox"/> Inert Gas	<input type="checkbox"/> Unknown	<input checked="" type="checkbox"/> Other (specify): Lead and PAHs in soil
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HAZARDS OF CONCERN: Check as many as applicable.																
<table style="width: 100%; border: none;"> <tr> <td style="width: 25%;"><input checked="" type="checkbox"/> Heat Stress</td> <td style="width: 25%;"><input type="checkbox"/> Noise</td> <td style="width: 25%;"><input checked="" type="checkbox"/> Cold Stress</td> <td style="width: 25%;"><input type="checkbox"/> Confined Space</td> </tr> <tr> <td><input type="checkbox"/> Inorganic Chemicals</td> <td><input type="checkbox"/> Explosive/Flammable</td> <td><input type="checkbox"/> Organic Chemicals</td> <td></td> </tr> <tr> <td><input type="checkbox"/> Oxygen Deficient</td> <td><input checked="" type="checkbox"/> Motorized Traffic</td> <td><input type="checkbox"/> Radiation</td> <td></td> </tr> <tr> <td><input type="checkbox"/> Heavy Machinery</td> <td><input checked="" type="checkbox"/> Biological</td> <td><input checked="" type="checkbox"/> Slips, Trips & Falls</td> <td></td> </tr> </table>	<input checked="" type="checkbox"/> Heat Stress	<input type="checkbox"/> Noise	<input checked="" type="checkbox"/> Cold Stress	<input type="checkbox"/> Confined Space	<input type="checkbox"/> Inorganic Chemicals	<input type="checkbox"/> Explosive/Flammable	<input type="checkbox"/> Organic Chemicals		<input type="checkbox"/> Oxygen Deficient	<input checked="" type="checkbox"/> Motorized Traffic	<input type="checkbox"/> Radiation		<input type="checkbox"/> Heavy Machinery	<input checked="" type="checkbox"/> Biological	<input checked="" type="checkbox"/> Slips, Trips & Falls	
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<input type="checkbox"/> Heavy Machinery	<input checked="" type="checkbox"/> Biological	<input checked="" type="checkbox"/> Slips, Trips & Falls														
<p><input checked="" type="checkbox"/> Other (specify): The primary munitions-related items at the former skeet ranges are spent cartridges, lead bullets, shot, and clay target debris. The primary MCs associated with these ranges are metals, primarily lead and polynuclear aromatic hydrocarbons (PAHs), associated with the coal tar binding material in the clay targets at skeet ranges. As a result, small arms ranges are not anticipated to present explosive hazards (i.e., UXO, DMM, explosive soils) or MCs associated with high explosives.</p> <p>The field portable X-ray fluorescence (XRF) instrument that will be used for the CSE Phase II at Cannon AFB does not contain a radioactive source. It will be operated by designated, trained personnel, in accordance with the Standard Operating Procedure (SOP).</p>																

ACCIDENT PREVENTION PLAN (APP) HAZARDOUS MATERIAL (HAZMAT) SUMMARY US Army Corps of Engineers, Omaha District			This APP is a part of the Omaha District Safety Program. Please read and comply with USACE EM 385-1-1 and CENWO OM 385-1-1.		
EXPECTED CHEMICALS	CAS No.	CONCENTRATION	VOLUME	MSDS	NOTE
Lead	7439-92-1	N/A	N/A	N/A	N/A
PAHs	N/A	N/A	N/A	N/A	N/A
OVERALL HAZARD EVALUATION: <input type="checkbox"/> High <input type="checkbox"/> Medium <input checked="" type="checkbox"/> Low <input type="checkbox"/> Unknown Task 1: Mobilization of personnel and equipment to site Task 2: Visual surveys Task 3: Sampling and on-site analysis activities (surface soil, subsurface soil)					
JUSTIFICATION: The 1940s Skeet Range at Cannon AFB is to be investigated under the MMRP Phase II activities. Phase I activities have concluded that MEC and/or MC are not anticipated at the site. If MEC is encountered, field crews will practice anomaly avoidance as detailed in Section 6.2 of the Work Plan and the USACE Project Manager (Mr. Glenn Marks), the Program UXO Safety Officer (Mr. Sylvester Willis), and the Installation POC (Hugh Hanson) will be notified. Level D PPE will be worn for all site investigation and sampling activities, and subsequent decontamination will take place for all personnel and all non-disposable equipment and materials.					
FIRE / EXPLOSION POTENTIAL: <input type="checkbox"/> High <input type="checkbox"/> Medium <input checked="" type="checkbox"/> Low <input type="checkbox"/> Unknown					
BACKGROUND REVIEW: <input checked="" type="checkbox"/> Complete <input type="checkbox"/> Incomplete (CSE Phase I, Cannon AFB, NM 2009)					

ACCIDENT PREVENTION PLAN (APP) CHEMICAL HAZARD TABLE US Army Corps of Engineers, Omaha District					This APP is a part of the Omaha District Safety Program. Please read and comply with USACE EM 385-1-1 and CENWO OM 385-1-1.	
CONTAMINANT [CAS No.]	HIGHEST OBSERVED CONC [units and media]	PEL/TLV [units]	CEILING [units]	IDLH [units]	SYMPTOMS / EFFECTS OF ACUTE EXPOSURE [target organ]	IONIZATION POTENTIAL [eV]
Lead [7439-92-1]	N/A	0.05 [mg/m ³]	N/A	100 [mgPb/m ³]	Irritant to eyes, insomnia, facial pallor, anorexia, malnutrition, constipation, abdominal pain, colic, anemia, gingival lead line, tremor; hypotension, encephalopathy [Targets: Eyes, GI tract, CNS, kidneys, blood, gingival tissue]	N/A
PAHs (coal tar pitch volatiles)	N/A	0.2 [mg/m ³] (PEL, TWA)	N/A	80 [mg/m ³]	Dermatitis, bronchitis, [potential occupational carcinogen] [Targets: respiratory system, skin, bladder, kidneys]	(N/A for the PID range of 9.5-11.7 eV for the 17 PAHs)
NA = Not Available S = Soil A = Air NE = None Established SW = Surface Water GW = Groundwater UNK = Unknown T = Tailings SL = Sludge W = Waste D = Drums SD = Sediment OFF = Offsite						
PEL = Permissible Exposure Limit TWA = Time Weighted Average IDLH = Immediately Dangerous to Life or Health eV = Electron Volt PID = Photoionization Detector						

ACCIDENT PREVENTION PLAN (APP) TASK DESCRIPTION US Army Corps of Engineers, Omaha District			This APP is a part of the Omaha District Safety Program. Please read and comply with USACE EM 385-1-1 and CENWO OM 385-1-1.			
TASK NAME AND DESCRIPTION	TYPE	PRIMARY	CONTINGENCY	HAZARD		
				High	Medium	Low
1. Mobilization of personnel and equipment to Cannon AFB and Demobilization.	INTRUSIVE	LEVEL OF PROTECTION A B C (D)	LEVEL OF PROTECTION A B C (D)			X
	NON-INTRUSIVE	MODIFIED D	EXIT AREA			
2. Visual surveys	INTRUSIVE	LEVEL OF PROTECTION A B C (D)	LEVEL OF PROTECTION A B C (D)			X
	NON-INTRUSIVE	MODIFIED D	EXIT AREA			
3. Sampling Activities (surface soils, subsurface soils).	INTRUSIVE	LEVEL OF PROTECTION A B C (D)	LEVEL OF PROTECTION A B C (D)			X
	NON-INTRUSIVE	MODIFIED D	EXIT AREA			

ACCIDENT PREVENTION PLAN (APP) ACTIVITY HAZARD ANALYSIS US Army Corps of Engineers, Omaha District		This APP is a part of the Omaha District Safety Program. Please read and comply with USACE EM 385-1-1 and CENWO OM 385-1-1.
TASK / ACTIVITY	POTENTIAL SAFETY AND HEALTH HAZARDS	RECOMMENDED CONTROLS
1. Mobilize/demobilize equipment and personnel to the site.	Collision with other vehicle, object, or pedestrians	<ul style="list-style-type: none"> - Wear seat belt. - Keep safe distance from other vehicle(s); use 3 second rule and obey speed limit/traffic rules. - Avoid distractions, i.e., cell phones, eating/drinking, reading map – stop/pull over to perform activities that may distract. - Have proper directions to site; take route free of known road hazards, i.e., construction, pot holes, congested traffic flow. - Maintain vehicle, i.e., tire pressure, fluid levels. - Keep head lights on for maximum visibility. - Perform 360 degree walk-around of vehicle to look for potential hazards/obstructions before pulling-out of parking spaces (back-in parking space if possible).
	Slips, trips and falls	<ul style="list-style-type: none"> - Heighten awareness for uneven terrain. - Use dedicated access ways (avoid shortcuts through grass). - Use caution when exiting vehicles. - Expect slippery conditions during inclement weather and ensure solid footing.

ACCIDENT PREVENTION PLAN (APP) ACTIVITY HAZARD ANALYSIS US Army Corps of Engineers, Omaha District		This APP is a part of the Omaha District Safety Program. Please read and comply with USACE EM 385-1-1 and CENWO OM 385-1-1.
TASK / ACTIVITY	POTENTIAL SAFETY AND HEALTH HAZARDS	RECOMMENDED CONTROLS
1. (cont'd) Mobilize/demobilize equipment and personnel to the site.	Severe weather	<ul style="list-style-type: none"> - In the event of severe thunderstorm warnings, or the threat of other severe weather conditions, personnel will perform tasks necessary to stabilize the work area and evacuate the site. Personnel will proceed to assigned shelter or assembly point(s) if available. - Any work shall be suspended during lightning storms.
	Heat/cold stress	<ul style="list-style-type: none"> - Workers will be acclimated and fluid intake will be enforced during hot weather. - Personnel will be trained to recognize signs and symptoms of heat and cold stress. - Ambient temperature measurements will be taken and work/rest regimens will be performed if the temperature exceeds 90° F. - Layered clothing will be worn when the ambient air temperature falls below 36° F.
	Biological Hazards (see attachment 2)	<ul style="list-style-type: none"> - Be aware of local hazards related to insects, poisonous plants or wildlife in the area. - Inspect work area carefully and avoid placing hands or feet into concealed areas. - Use insect repellent as needed, wear long pants and sleeves as needed. - Avoid areas of limited visibility such as tall grass or heavy vegetations. - Roll sleeves down and wear gloves.

ACCIDENT PREVENTION PLAN (APP) ACTIVITY HAZARD ANALYSIS US Army Corps of Engineers, Omaha District		This APP is a part of the Omaha District Safety Program. Please read and comply with USACE EM 385-1-1 and CENWO OM 385-1-1.
TASK / ACTIVITY	POTENTIAL SAFETY AND HEALTH HAZARDS	RECOMMENDED CONTROLS
1. (cont'd) Mobilize/demobilize equipment and personnel to the site.	Strains/sprains – lifting	<ul style="list-style-type: none"> - No individual employee is permitted to lift any object that weighs over 60 pounds. Proper lifting techniques shall be used. - Use co-worker or mechanical device to move objects over 60-pounds. - Use proper bending and lifting techniques.
2. Site reconnaissance and visual surveys- implementing MEC avoidance techniques.	Exposure to potential HTRW. No MEC is expected.	<ul style="list-style-type: none"> - Conduct daily Tailgate Safety Meetings to provide short training sessions in various subjects that give the site worker knowledge and confidence in performing duties in a potentially hazardous environment. - If items are discovered that appear to be possible MEC: Stop work; Contact UXO Safety Officer and follow directions; Mark the area near the suspected item with flagging tape; Record its position and photograph the item without disturbing it; Follow notification procedures in the Work Plan. - Avoid excess contact with site soils and report any stained soils. - Do not enter exclusion zone unless authorization has been granted and potential hazards minimized by Installation personnel.

ACCIDENT PREVENTION PLAN (APP) ACTIVITY HAZARD ANALYSIS US Army Corps of Engineers, Omaha District		This APP is a part of the Omaha District Safety Program. Please read and comply with USACE EM 385-1-1 and CENWO OM 385-1-1.
TASK / ACTIVITY	POTENTIAL SAFETY AND HEALTH HAZARDS	RECOMMENDED CONTROLS
2. (cont'd) Site reconnaissance and visual surveys- implementing MEC avoidance techniques.	Slips, trips and falls	<ul style="list-style-type: none"> - Heighten awareness for uneven terrain. - Use dedicated access ways (avoid shortcuts through grass). - Use caution when exiting vehicles. - Expect slippery conditions during inclement weather and ensure solid footing. - Mark potential hazards
	Severe Weather	<ul style="list-style-type: none"> - In the event of severe thunderstorm warnings or the threat of other severe weather conditions, personnel will perform tasks necessary to stabilize the work area and evacuate the site. Personnel will proceed to assigned shelter or assembly point(s) if available. - Any work shall be suspended during lightning storms.
	Heat/cold stress	<ul style="list-style-type: none"> - Workers will be acclimated and fluid intake will be enforced during hot weather. - Personnel will be trained to recognized signs and symptoms of heat and cold stress. - Ambient temperature measurements will be taken and work/rest regimens will be performed if the temperature exceeds 90° F. - Protective clothing will be worn when the ambient air temperature falls below 36° F.

ACCIDENT PREVENTION PLAN (APP) ACTIVITY HAZARD ANALYSIS US Army Corps of Engineers, Omaha District		This APP is a part of the Omaha District Safety Program. Please read and comply with USACE EM 385-1-1 and CENWO OM 385-1-1.
TASK / ACTIVITY	POTENTIAL SAFETY AND HEALTH HAZARDS	RECOMMENDED CONTROLS
2. (cont'd) Site reconnaissance and visual surveys- implementing MEC avoidance techniques.	Biological Hazards (see attachment 2)	<ul style="list-style-type: none"> - Be aware of local hazards related to insects, poisonous plants or wildlife in the area. - Inspect work area carefully and avoid placing hands or feet into concealed areas. - Use insect repellent as needed, wear long pants and sleeves as needed. - Avoid areas of limited visibility such as tall grass or heavy vegetations. - Roll sleeves down and wear gloves.
3. Sampling and On-Site Analysis Activities (surface soil, subsurface soil).	Failure to properly plan daily activities	<ul style="list-style-type: none"> - Conduct daily Tailgate Safety Meetings to provide short training sessions in various subjects that give the site worker knowledge and confidence in performing duties in a potentially hazardous environment.
	Exposure to potential HTRW (e.g., heavy metals including lead, aluminum, zinc, PAHs) or spreading contamination.	<ul style="list-style-type: none"> - Physical contact with soil will be avoided. - Personnel working with the samples will use nitrile gloves. - Wash hands immediately after handling samples and before eating, drinking, smoking. - Do not enter exclusion zone unless authorization has been granted and potential hazards minimized by Installation personnel. - Only personnel trained to use the XRF will operate it.

ACCIDENT PREVENTION PLAN (APP) ACTIVITY HAZARD ANALYSIS US Army Corps of Engineers, Omaha District		This APP is a part of the Omaha District Safety Program. Please read and comply with USACE EM 385-1-1 and CENWO OM 385-1-1.
TASK / ACTIVITY	POTENTIAL SAFETY AND HEALTH HAZARDS	RECOMMENDED CONTROLS
3. (cont'd) Sampling and On-Site Analysis Activities (surface soil, subsurface soil).	Discovery of potential MEC	<ul style="list-style-type: none"> - Stop work. - Move the team away from the item. - Notify the Program UXO Safety Officer and the Installation RPM. - Mark the area near the suspected item with flagging tape for avoidance. - Record its position and photograph the item without disturbing it. - Follow notification procedures in Work Plan. - Select another location for sampling.
	Contact with potential underground utilities	<ul style="list-style-type: none"> - Ensure utilities are located and marked prior to any intrusive activities.
	Use of sampling tools (e.g., hand augers, drive samplers, shovels, scoops)	<ul style="list-style-type: none"> - Hand tools shall be inspected daily and before each use. Tools which are damaged shall be removed from service. - Personnel shall work in a manner and pace to reduce strains and overexertion.
	Hand injuries	<ul style="list-style-type: none"> - Items to be handled will be inspected for sharp edges prior to being handled. - Personnel will wear leather gloves when handling sharp materials. - Personnel will be aware of and avoid pinch point hazards.

ACCIDENT PREVENTION PLAN (APP) ACTIVITY HAZARD ANALYSIS US Army Corps of Engineers, Omaha District		This APP is a part of the Omaha District Safety Program. Please read and comply with USACE EM 385-1-1 and CENWO OM 385-1-1.
TASK / ACTIVITY	POTENTIAL SAFETY AND HEALTH HAZARDS	RECOMMENDED CONTROLS
3. (cont'd) Sampling and On-Site Analysis Activities (surface soil, subsurface soil).	Slips, trips and falls	<ul style="list-style-type: none"> - Heighten awareness for uneven terrain. - Use dedicated access ways (avoid shortcuts through grass). - Use caution when exiting vehicles. - Expect slippery conditions during inclement weather and near shorelines. Ensure solid footing. - Mark potential hazards.
	Severe Weather	<ul style="list-style-type: none"> - In the event of severe thunderstorm warnings or the threat of other severe weather conditions, personnel will perform tasks necessary to stabilize the work area and evacuate the site. Personnel will proceed to assigned shelter or assembly point(s) if available. - Any work shall be suspended during lightning storms.
	Heat/cold stress	<ul style="list-style-type: none"> - Workers will be acclimated and fluid intake will be enforced during hot weather. - Personnel will be trained to recognized signs and symptoms of heat and cold stress. - Ambient temperature measurements will be taken and work/rest regimens will be performed if the temperature exceeds 90° F. - Protective clothing will be worn when the ambient air temperature falls below 36° F.

ACCIDENT PREVENTION PLAN (APP) ACTIVITY HAZARD ANALYSIS US Army Corps of Engineers, Omaha District		This APP is a part of the Omaha District Safety Program. Please read and comply with USACE EM 385-1-1 and CENWO OM 385-1-1.
TASK / ACTIVITY	POTENTIAL SAFETY AND HEALTH HAZARDS	RECOMMENDED CONTROLS
3. (cont'd) Sampling and On-Site Analysis Activities (surface soil, subsurface soil).	Biological Hazards (see attachment 2)	<ul style="list-style-type: none"> - Be aware of local hazards related to insects, poisonous plants or wildlife in the area. - Inspect work area carefully and avoid placing hands or feet into concealed areas. - Use insect repellent as needed, wear long pants and sleeves as needed. - Avoid areas of limited visibility such as tall grass or heavy vegetations. - Roll sleeves down and wear gloves.

ACCIDENT PREVENTION PLAN (APP) PERSONAL PROTECTIVE EQUIPMENT (PPE) BY TASK US Army Corps of Engineers, Omaha District	This APP is a part of the Omaha District Safety Program. Please read and comply with USACE EM 385-1-1 and CENWO OM 385-1-1.
TASK(S): PPE LEVEL: <input checked="" type="checkbox"/> Primary <input type="checkbox"/> Contingency	TASK(S): PPE LEVEL: <input type="checkbox"/> Primary <input checked="" type="checkbox"/> Contingency:
Respiratory: <input checked="" type="checkbox"/> Not Needed <input type="checkbox"/> SCBA, Airline: <input type="checkbox"/> APR: <input type="checkbox"/> Cartridge: <input type="checkbox"/> Escape Mask: <input type="checkbox"/> Other: Head and Eye: <input type="checkbox"/> Not Needed <input checked="" type="checkbox"/> Safety Glasses: <input type="checkbox"/> Face Shield: <input type="checkbox"/> Goggles: <input type="checkbox"/> Hard Hat: <input type="checkbox"/> Ear plugs <input type="checkbox"/> Other: Boots: <input type="checkbox"/> Not Needed <input checked="" type="checkbox"/> Boots: <input type="checkbox"/> Over boots: <input type="checkbox"/> Rubber: Protective clothing: <input type="checkbox"/> Not Needed <input type="checkbox"/> Encapsulated Suit: <input type="checkbox"/> Splash Suit: <input type="checkbox"/> Apron <input type="checkbox"/> Tyvek Coverall: <input type="checkbox"/> Saranex Coverall: <input type="checkbox"/> Cloth Coverall: <input type="checkbox"/> Other: <input checked="" type="checkbox"/> Gloves: <input type="checkbox"/> Inner gloves: <input checked="" type="checkbox"/> Outer gloves: Nitrile <input type="checkbox"/> Other - specify:	Respiratory: <input checked="" type="checkbox"/> Not Needed <input type="checkbox"/> SCBA, Airline: <input type="checkbox"/> APR: <input type="checkbox"/> Cartridge: <input type="checkbox"/> Escape Mask: <input type="checkbox"/> Other: Head and Eye: <input type="checkbox"/> Not Needed <input checked="" type="checkbox"/> Safety Glasses: <input type="checkbox"/> Face Shield: <input type="checkbox"/> Goggles: <input checked="" type="checkbox"/> Hard Hat: <input checked="" type="checkbox"/> Ear plugs <input type="checkbox"/> Other: Boots: <input type="checkbox"/> Not Needed <input checked="" type="checkbox"/> Boots: <input type="checkbox"/> Over boots: <input type="checkbox"/> Rubber: Protective clothing: <input type="checkbox"/> Not Needed <input type="checkbox"/> Encapsulated Suit: <input type="checkbox"/> Splash Suit: <input type="checkbox"/> Apron <input checked="" type="checkbox"/> Tyvek Coverall: <input type="checkbox"/> Saranex Coverall: <input type="checkbox"/> Cloth Coverall: <input type="checkbox"/> Other: <input checked="" type="checkbox"/> Gloves <input checked="" type="checkbox"/> Inner gloves: Nitrile <input checked="" type="checkbox"/> Outer gloves: Leather <input type="checkbox"/> Other - specify:

ACCIDENT PREVENTION PLAN (APP) PROJECT PERSONNEL AND RESPONSIBILITIES US Army Corps of Engineers, Omaha District			This APP is a part of the Omaha District Safety Program. Please read and comply with USACE EM 385-1-1 and CENWO OM 385-1-1.
NAME	DUTY PHONE	DUTY TITLE AND ORGANIZATION	HEALTH CLEARANCE AND TRAINING:
Glenn Marks	(402) 995-2286	USACE Omaha Project Manager	Not applicable for responsibilities
Chris Bryant	(402) 995-2279	OE Safety Specialist	Not applicable for responsibilities
Hugh Hanson	(575) 784-6391	Cannon Air Force Base POC	Not applicable for responsibilities
Jeff Moran	(703) 642-6706	Versar Program Manager	Not applicable for responsibilities
Michael Galvin	(303) 450-1923	Versar (Jacobs Team) Deputy Program Manager	Not applicable for responsibilities
David Feiertag	(303) 450-1926	Versar (Jacobs Team) Technical Lead	OSHA HAZWOPER
Gary Torf	(303) 450-1929	Versar (Jacobs Team) Project Manager/Chemist	OSHA HAZWOPER, First Aid/CPR
Jon Russ	(303) 462-7208	Jacobs Program Manager /Field Team Lead/SSHO	OSHA HAZWOPER & Supervisor, First Aid/CPR
Jana Lienemann	(303) 462-7389	Jacobs Health and Safety	CIH, OSHA HAZWOPER & Supervisor
Sylvester (J.R.) Willis	(702) 576-3074	Jacobs UXO Safety Officer	OSHA HAZWOPER & Supervisor, First Aid/CPR
Patrick Lawler	(303) 462-7236	Jacobs Field Team	OSHA HAZWOPER, First Aid/CPR
Prior to the start of work activities all personnel working on this project and any new person visiting or conducting work on this project shall be briefed on this plan. All personnel shall sign the Safety and Health Agreement Sign-off Sheet, indicating they have been briefed and understand the requirements contained in this APP.			

<p>ACCIDENT PREVENTION PLAN (APP) PROJECT PERSONNEL AND RESPONSIBILITIES US Army Corps of Engineers, Omaha District</p>	<p>This APP is a part of the Omaha District Safety Program. Please read and comply with USACE EM 385-1-1 and CENWO OM 385-1-1.</p>
<p>DESCRIPTION OF RESPONSIBILITIES:</p> <p>The USACE – The Omaha District Project Manager (PM) is Glenn Marks. The Omaha District is the AF Contract Service Center (CSC) for this work. Mr. Marks is responsible for overall project management, contract administration, QA, and acceptance/approval of milestones with input from the Installation RPM.</p> <p>Versar’s Program Managers, Jeff Moran and Michael Galvin, have overall responsibility for the activities conducted for the Contract/this Task Order (TO).</p> <p>Versar’s Project Manager (PM), Gary Torf, has primary responsibility for the completion of activities on this TO. He is responsible to Versar’s Program Managers and the USACE PM. Mr. Torf is also the Project Chemist, and will ensure work performed is in accordance with this Work Plan and other pertinent analytical and other laboratory procedures.</p> <p>The CSE Technical Lead for this project is David Feiertag. Mr. Feiertag will be supported by Jon Russ (Jacobs Program Manager/CSE Field Lead), who will help conduct mobilization tasks and help coordinate the on-site efforts.</p> <p>The CSE Field Lead for this project is Jon Russ (Jacobs Program Manager). Mr. Russ is also the Site Safety and Health Officer (SSHO), and has the responsibility of ensuring the APP is reviewed and consistent with standards appropriate for this work. He will coordinate the initial orientation and safety meeting prior to additional field activities, as well as the daily safety meeting prior to the start of work each day of the additional activities; and monitor field operations to ensure safety and health procedures/policies are being followed, consistent with this APP.</p> <p>Patrick Lawler will support the CSE Field Lead. Mr. Lawler will help conduct mobilization tasks and help coordinate the on-site efforts. Mr. Lawler is trained on and will perform XRF analysis.</p> <p>The Program H&S Manager is Jana Lienemann, CIH. Ms. Lienemann has the overall responsibility for assuring that the Versar team work is performed consistent with internal standards and the requirements of its Contract with the USACE.</p> <p>The UXO Safety Officer for this project is Sylvester (J.R.) Willis. Mr. Willis will be available to provide remote support for field work, if necessary. No MEC have been identified at the MRA during previous investigations.</p> <p>Organizational responsibilities are addressed in detail in Section 2.0 of the CSE Phase II Work Plan.</p>	

ACCIDENT PREVENTION PLAN (APP) AIR MONITORING BY TASK US Army Corps of Engineers, Omaha District		This APP is a part of the Omaha District Safety Program. Please read and comply with USACE EM 385-1-1 and CENWO OM 385-1-1.	
INSTRUMENT	TASK NO.	ACTION GUIDELINES	COMMENTS
Combustible Gas Indicator (CGI)		Specify:	<input checked="" type="checkbox"/> Not Needed
Radiation Survey Meter (Make, Model, Type)		Specify:	<input checked="" type="checkbox"/> Not Needed
Photoionization Detector (PID) () 11.7 eV () 10.2 eV () 9.8 eV () ___ eV		Specify:	<input checked="" type="checkbox"/> Not Needed
Flame Ionization Detector (FID)		Specify:	<input checked="" type="checkbox"/> Not Needed
Gas Detector Tubes		Specify:	<input checked="" type="checkbox"/> Not Needed
Dust Monitor		Specify:	<input checked="" type="checkbox"/> Not Needed
Other: XRF Instrument (does not monitor air, but indicates contamination present in soil)	3	Specify: Not applicable – will be used to assess lead concentrations in soil that may be elevated from range activities.	<input type="checkbox"/> Not Needed

ACCIDENT PREVENTION PLAN (APP) DECONTAMINATION AND DISPOSAL US Army Corps of Engineers, Omaha District		This APP is a part of the Omaha District Safety Program. Please read and comply with USACE EM 385-1-1 and CENWO OM 385-1-1.
<u>Personalized Decontamination</u> After removing PPE (i.e., gloves) use hand sanitizers, wet wipes, or wash with water, when feasible. Hand washing is required before eating, drinking, or smoking.	<u>Sampling Equipment Decontamination</u> Disposable equipment will be used. Contaminant levels are low. No equipment decontamination is planned.	<u>Heavy Equipment Decontamination</u> N/A
<u>Containment and Disposal Method</u> Soiled PPE shall be collected and placed in plastic bags for disposal in the facility dumpster.	<u>Containment and Disposal Method</u> Soiled PPE shall be collected and placed in plastic bags for disposal in the facility dumpster.	<u>Containment and Disposal Method</u> N/A

<p>ACCIDENT PREVENTION PLAN (APP) WORK ZONES US Army Corps of Engineers, Omaha District</p>	<p>This APP is a part of the Omaha District Safety Program. Please read and comply with USACE EM 385-1-1 and CENWO OM 385-1-1.</p>
<p>The primary purpose for the site control for this project is to establish the operational zone and to prevent access by unauthorized persons. For this project, the operational zone encompasses the boundaries of work at the MRA at Cannon AFB, NM.</p> <p><u>Operational Zone</u> – Notations will be made in the field logbook of all personnel entering or working in the immediate area of active CSE activities, including the time of entry and exit for each individual. The following are standard safe work practices that apply to all site personnel and will be discussed in the safety briefing prior to initiating work on the site:</p> <ul style="list-style-type: none">• Eating, drinking, chewing gum or tobacco, and smoking are prohibited in the working zone.• Hands and face must be washed upon leaving the work area and before eating, drinking, chewing gum or tobacco, or smoking.• A buddy system will be used. Hand signals will be established to maintain communication.• During site operations, each worker will consider himself as a safety backup to his partner.• Visual contact will be maintained between buddies on site when performing activities within the work area. <p><u>Site Entry Requirements</u> – In order to allow an individual into an operational zone, s/he must meet the following requirements:</p> <ul style="list-style-type: none">• Documentation of completing training requirements;• A hazard briefing which includes current operations at the site, hazards that exist, and control measures to be followed. <p><u>Safety Inspections</u> - The following inspections are to be conducted and/or reviewed by the Site Manager/Supervisor and/or SSHO:</p> <ul style="list-style-type: none">• Conduct an HSE review of the job site before any new phase of work is initiated and periodically thereafter;• Conduct daily safety HSE inspections of each job site. Observations noted during the inspection will be documented on SORs. Deficiencies shall be posted on the deficiency tracking log;• Conduct daily tailgate meetings to discuss planned work activities, employee concerns, site conditions, monitoring results, client issues, or other topics of concern for employees;• Conduct initial and daily vehicle inspections. All deficiencies found during the inspection will be noted and corrected prior to equipment use. Vehicles that cannot be brought to safe operating condition will not be used. In addition to pre-use inspections, the vehicle’s primary driver will be responsible for inspecting the rental vehicle and ensuring scheduled and periodic maintenance to maintain a safe operable condition. At no time will anyone operate a vehicle s/he believes to be unsafe. <p>All inspection results should be reviewed with the Site Manager/Supervisor and site personnel as applicable.</p>	

<p>ACCIDENT PREVENTION PLAN (APP) HAZARD COMMUNICATION (HAZCOM) US Army Corps of Engineers, Omaha District</p>	<p>This APP is a part of the Omaha District Safety Program. Please read and comply with USACE EM 385-1-1 and CENWO OM 385-1-1.</p>
<p>I. ACCIDENT PREVENTION AND GENERAL PRECAUTIONS:</p> <p>Prior to the on-site visit, all team members are required to read this APP and sign the form acknowledging that they have read and will comply with it. If unanticipated hazardous conditions arise, team members are to stop work, evacuate the area, and notify RPM and Versar/Jacobs PMs immediately.</p> <p>II. STANDARD OPERATION SAFETY PROCEDURES, ENGINEERING CONTROLS, AND WORK PRACTICES:</p> <p>A. SITE RULES/PROHIBITIONS: At any sign of hazardous conditions, stop tasks, evacuate area, and notify Cannon AFB POC and Versar/Jacobs PMs. Smoking, eating, and drinking allowed in designated areas only.</p> <p>B. ILLUMINATION: Work during daylight hours only.</p> <p>C. SANITATION: Use existing sanitary facilities.</p> <p>D. BUDDY SYSTEM: Two persons on-site maintaining constant contact with each other. To be adhered to at all times.</p> <p>E. HEAT/COLD STRESS: Dress appropriately. Take sufficient breaks and drink plenty of fluids. Watch for signs/symptoms of cold/heat stress. Monitoring may be applicable depending on the site weather conditions and type of personal protection equipment (PPE) worn.</p> <p>F. ORDNANCE (NOT EXPECTED TO BE PRESENT AT THE CANNON AFB MRA):</p> <p>(1) General Information:</p> <ul style="list-style-type: none">a. The cardinal principle to be observed involving explosives, ammunition, severe fire hazards, or toxic materials is to limit the exposure to a minimum of personnel, for the minimum amount of time, to a minimum amount of hazardous material consistent with a safe and efficient operation.b. Old, damaged, and possibly deteriorated explosive-loaded ordnance requires extreme caution. Some explosives may react with metals, other explosives, air, or chemicals in the earth to produce extremely sensitive explosive compounds.c. When chemical agents may be present, further precautions are necessary. If the munitions item has green markings, leave the area immediately, since it may contain a chemical filler.d. Consider ordnance that has been exposed to fire as extremely hazardous. Chemical and physical changes may have occurred to the contents which render it more sensitive than it was in its original state. <p>(2) On-Site Instructions (All Personnel):</p> <ul style="list-style-type: none">a. DO NOT touch or disturb any items unless they can be positively identified as being other than ordnance/munitions	

ACCIDENT PREVENTION PLAN (APP)
HAZARD COMMUNICATION (HAZCOM)
US Army Corps of Engineers, Omaha District

This APP is a part of the Omaha District Safety Program.
Please read and comply with USACE EM 385-1-1 and
CENWO OM 385-1-1.

items, as verified by the SSHO.

- b. DO NOT visit an ordnance site if an electrical storm is occurring or approaching. If a storm approaches during a site visit, leave the site immediately and seek shelter.
- c. DO NOT use radio or cellular phones in the vicinity of suspect ordnance items.
- d. DO NOT walk across an area where the ground cannot be seen. If dead vegetation or dead animals are observed, leave the area immediately due to potential chemical agent contamination.
- e. DO NOT drive vehicles into suspected MEC areas; use clearly marked lanes.
- f. DO NOT carry matches, lighted cigarettes, lighters, or other flame producing devices into an MEC site.
- g. DO NOT rely on color codes for positive identification of ordnance items or their contents.
- h. Always assume ordnance items contain a live charge until it can be determined otherwise.

G. MEC AVOIDANCE (NOT EXPECTED TO BE PRESENT AT CANNON AFB SKEET RANGE)

If items are discovered that appear to be possible MEC (i.e., not positively identifiable as NON-MEC); Stop work; Move the team away from the item; Mark the area near the suspected item with flagging for avoidance; Record its position and photograph the item without disturbing it; Follow notification procedures in the work plan.

- (1) The purpose of MEC avoidance during CSE activities is to avoid any potential surface or subsurface anomalies. Intrusive anomaly investigation is not authorized during MEC avoidance operations. The reconnaissance and sampling field work shall be defined in the Work Plan and will be conducted by a team to include a minimum of two people. This team will be on site during all field activities.

NOTIFICATION REGARDING MEC

If MEC is encountered, Versar/Jacobs will stop work in the vicinity and make notifications as outlined in the Work Plan. Versar/Jacobs is not to conduct further investigation or removal of any MEC. Versar/Jacobs will contact the USACE PM who will contact the installation POC. The Cannon AFB POC will contact the AFSOC MAJCOM who will make the appropriate contacts to handle and dispose of any live items found during CSE Phase II operations, as warranted.

ACCIDENT PREVENTION PLAN (APP)
HAZARD COMMUNICATION (HAZCOM)
US Army Corps of Engineers, Omaha District

This APP is a part of the Omaha District Safety Program.
Please read and comply with USACE EM 385-1-1 and
CENWO OM 385-1-1.

H. MEC AVOIDANCE DURING SURFACE SOIL SAMPLING

Surface soil samples are normally collected at depths from 0 to 6 inches below ground surface. If items are discovered that appear to be possible MEC (i.e., not positively identifiable as NON-MEC): Stop work; Move the team away from the item; Mark the area near the suspected item with flagging for avoidance; Record its position and photograph the item without disturbing it; Follow notification procedures in the work plan.

I. MEC AVOIDANCE DURING SUBSURFACE SOIL SAMPLING

Subsurface soil sampling is defined as the collection of samples below a nominal depth of approximately 6 inches using hand tools. The anticipated maximum depth for subsurface soil collection is 3 feet.

If items are discovered that appear to be possible MEC (i.e., not positively identifiable as NON-MEC): Stop work; Move the team away from the item; Contact the UXO Specialist; Mark the area near the suspected item with flagging for avoidance; Record its position and photograph the item without disturbing it; Follow notification procedures in the work plan.

J. POISONOUS SNAKES OR INSECTS:

- (1) DO NOT handle any snake even those that appear to be dead.
- (2) Avoid areas of limited visibility such as tall grass or heavy vegetation.
- (3) Roll sleeves down and use insect repellent.

K. POISONOUS PLANTS:

- (1) Avoid areas of limited visibility such as tall grass or heavy vegetation.
- (2) Roll sleeves down and wear gloves; use barrier cream or Tyvek as needed.

ATTACHMENT 1

JACOBS HSEPs

Safe Plan of Action (SPA), Jacobs HSEP 2.16
Safety Observation Report (SOR), Jacobs HSEP 2.17
Accident and Incidents, Jacobs HSEP 5.1
Vehicle Accidents, Jacobs HSEP 5.2
Hazardous Materials Sites and Hazardous Waste Activities, Jacobs HSEP 7.3
Hazard Control Procedures, Jacobs HSEP 11.0
Decontamination, Jacobs HSEP 11.9
PPE, Jacobs HSEP 13.0
Emergency and contingency planning, Jacobs HSEP 14.0
Maintenance and storage areas, Jacobs HSEP 16.0

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HSE Procedure		Document No: HSEP 14.1	Page: 1 of 3
Emergency Evacuation		Supersedes: CHSP 14.1	Rev. 2
Issuing Department: Corporate HSE	Approval: Mike.Coyle@Jacobs.com	Previous Rev. Date: 1 Jun 97	Current Revision Date: 28 Aug 01

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 4.1. Organizing Emergency Evacuation Procedure 1

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5.0 FIGURES 2

 Emergency/Evacuation Procedure 3

1.0 PURPOSE AND SCOPE

Written emergency evacuation procedures must be developed and communicated to ensure designated actions are taken by the Company and employees to ensure safety from fire and other emergencies.

This Health, Safety, and Environment Procedure (HSEP) provides the minimum procedures for each project or workplace to prepare an Emergency Evacuation Procedure to cope with emergencies (fire, explosion, toxic fumes, bomb threat, natural disasters, etc.) which could endanger personnel or property. Specifics as to signals, communications, evacuation routes, and assembly points must be developed locally, publicized, and coordinated with the operating departments.

This HSEP applies to all employees and on-site contractors working in all locations; administrative, construction, maintenance, or otherwise, and that they understand Emergency Evacuation Procedures which are specific to their work environment.

2.0 RESPONSIBILITIES

Specific HSE Program implementation responsibilities are stated in HSEP 1.5. Additional management, staff, employee, and subcontractor responsibilities are stated in individual procedures that address responsibilities specific to the HSE topic.

3.0 DEFINITIONS

3.1. Emergency Action Plan

A plan for workplace, or parts thereof, describing what procedures the Company and employees must take to ensure employee safety from fire or other emergencies.

3.2. Evacuation Route

The route that employees are directed to follow in the event they are required to evacuate the workplace or seek a designated assembly point (refuge area).

4.0 PROCEDURE

4.1. Organizing Emergency Evacuation Procedure

Use the attached form ([Figure 1](#)) to help organize your emergency evacuation procedure.

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The following items must be included in all emergency evacuation plans:

4.1.1. Signals and Alarms

- Type and frequency
- Action to take for each type
- Times, days alarms tested
- How to turn in an alarm

4.1.2. Evacuation routes

- Use of wind sock to determine routes
- Identify paths for existing operating areas
- Identify paths for existing construction areas
- Identify paths for existing office buildings

4.1.3. Assembly points

- Designate points for each area and/or each alarm type
- Assign one person to each assembly point to take "head count"
- Set up communications between each

Using these guidelines and the suggested Emergency Evacuation Procedure Form ([Figure 1](#)) should allow an efficient emergency plan. Contact the HSEP Department for any additional assistance required.

4.2. Training

Documented training on jobsite/workplace emergency evacuation plans must be given to all personnel on-site.

Initially, upon initial assignment of employees, when the plan is changed or when employees receive new emergency response duties.

Training shall be repeated periodically, as deemed appropriate by Site Management to ensure proper employee actions in an emergency.

5.0 FIGURES

[Emergency/Evacuation Procedure](#)

Figure 1 Emergency/Evacuation Procedure

Job No.: _____

Location: _____

Coordinator: _____

Back-up: _____

EVACUATION ALARMS

TYPE	FOR AREA
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

“All Clear Signal”: _____

Tested on: _____ (day) _____ (time)

ASSEMBLY POINTS	FOR AREA
1. _____	_____
2. _____	_____
3. _____	_____
4. _____	_____
5. _____	_____
6. _____	_____

Evacuation route maps on back (numbered to correspond to assembly points).

General Considerations:

1. This evacuation procedure must be widely publicized and posted throughout the project.
2. All personnel must know exactly what action to take in the event alarms sound other than on the test times.
3. One person must be assigned to each “assembly point” to make a “head count”.
4. A monitor should gather all lists from assembly points and report to the Evacuation Coordinator.
5. No effort should be made to re-enter evacuated areas to locate missing persons until the “all clear” is sounded.
6. No person should leave the property unless told to by responsible authorities.

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HSE Procedure		Document No: HSEP 13.1	Page: 1 of 4
Personal Protective Equipment		Supersedes: CHSP 13.1	Rev. 2
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1.0 PURPOSE AND SCOPE

The purpose of this Corporate Health, Safety and Environment Procedure (HSEP) is to establish minimum requirements for assessing workplace hazards and establishing PPE requirements for those hazards.

This HSEP applies to all employees and on-site contractors engaged in operations covered by the Jacobs Health, Safety, and Environment Program.

2.0 RESPONSIBILITIES

Specific HSE Program implementation responsibilities are stated in HSEP 1.5. Additional management, staff, employee, and subcontractor responsibilities are stated in individual procedures that address responsibilities specific to the HSE topic.

3.0 DEFINITIONS

HASAP - Hazard Assessment Safety Action Plan	An eight item project specific safety plan outlining general areas of concern as determined from the scope of work identifies personal protective equipment and other safety procedures selected to safeguard employees during the performance of the work.
SPA - Safe Plan of Action	A task driven control document used to ensure that every task receives proper safety planning prior to beginning work. The SPA also serves as a tool to identify specific PPE required for the task. (May also be known as TSA, JSA, etc.)
TSA - Task Safety Awareness	A mini-safety meeting in which a work crew reviews the safety provisions of the SPA prior to a task or when conditions change.

4.0 PROCEDURE

4.1. Personal Protective Equipment (PPE) General Requirements

PPE shall be provided, used, and maintained in a reliable and sanitary condition.

The design of all PPE utilized shall be approved Jacobs.

Where employees provide their own PPE, Site Management shall ensure its adequacy and meets all Jacobs/Client requirements.

Examples of PPE commonly provided by employees would be those of a personal nature which could be used away from the worksite, such as non-specialty safety glasses, safety shoes, and cold weather outer wear.

Damaged or defective PPE shall not be used.

The American National Standards Institute (ANSI) establishes design and performance criteria for most PPE utilized by employees. All PPE worn by employees shall meet any applicable ANSI standards.

4.2. Hazard Assessment Safety Action Plan (HASAP)

Each work location or major project activity shall complete a written Hazard Assessment Safety Action Plan (HASAP) (or equivalent) prior to starting work. See HSEP 2.1: Zero Accident Process for additional guidance and procedures for writing a HASAP.

The HASAP consists of eight (8) key elements addressed in a brief narrative format with the exception of items numbers (5) Training Requirements, (6) Special Requirements, and (7) Hazard Assessment. Specific details concerning these areas are determined from the scope of work and regulatory compliance demands. PPE required by the planned job task hazards will be listed in the HASAP.

4.3. Safe Plan of Action (SPA) and Task Safety Awareness (TSA)

The SPA/ TSA (or equivalent) shall be completed prior to beginning each identified job task. See HSEP 2.1 Zero Accident Process for additional information on SPAs and TSAs.

Although these two tools are actually separate, they are used to compliment each other. The SPA is a task driven control document used to ensure that every task receives proper safety planning prior to beginning work. It is conducted by the immediate supervisor (foreman) over the crew assigned to perform work. The supervisor writes in the work area and task to be performed and then leads the crew in performing a "task" hazard assessment. The task hazard assessment requires the supervisor to solicit crew participation in identifying hazards and hazard control measures such as PPE, training requirements, permits, procedures, etc. Each member of the team signs the SPA to indicate their understanding of the plan and agreement to follow the plan.

The SPA also serves as a tool to identify specific PPE required and when signed and dated by the supervisors, becomes a certified hazard assessment in compliance with OSHA regulations.

4.4. Inspection and Storage

Employees are required to inspect all PPE prior to use. Equipment that is defective or damaged shall not be used and immediately replaced.

Personal Protective Equipment shall be stored in a manner that will not adversely affect its integrity. PPE must be stored in a location that is free of harmful agents such as chemicals, particulates, sunlight, temperature extremes, excessive moisture or physical agents, such as sharp objects.

4.5. Training

Employee training on assigned PPE is required as a part of initial orientation and whenever new PPE is assigned to them. Employees must be trained on:

- When to use the equipment,
- How to use the equipment,
- Limitations of the equipment, and
- Proper care, maintenance, useful life, and disposal of the equipment.

The employee must demonstrate their understanding of this training prior to being allowed to use the equipment.

The training must be documented with the employee's name, date of training, and person conducting the training. [Figure 1](#) is available for this purpose.

Retraining is required if a lack of proficiency is observed or when new equipment is introduced, unless another frequency is dictated by specific Company policies found elsewhere in this manual, such as for hearing protection and respirators.

5.0 REFERENCES

29 CFR 1910.132, Personal Protective Equipment General Requirements

29 CFR 1926.95, Criteria for Personal Protective Equipment

6.0 FIGURES

[Certification of PPE Training](#)

Figure 1 Certification of PPE Training

This is to certify that the personnel listed below understand the following elements of the training required for proper use of the identified personal protective equipment.

Training Elements:

When this PPE is necessary

How to don, doff, adjust, and wear PPE properly

Proper Care, Maintenance, Useful Life, Decontamination, and Disposal

Limitations of the PPE

Date of Training: _____ **Location:** _____

Instructor: _____

Identified PPE: _____

Employees Trained:

Name

Social Security Number

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____
9. _____
10. _____
11. _____
12. _____
13. _____
14. _____
15. _____

HSE Procedure		Document No: HSEP 11.9	Page: 1 of 1
Decontamination		Supersedes: CHSP 11.9	Rev. 2
Issuing Department: Corporate HSE	Approval: Mike.Coyle@Jacobs.com	Previous Rev. Date: 11 Apr 01	Current Revision Date: 19 Sept 01

1.0 PURPOSE AND SCOPE

In addition to good business health, safety, and environment practices, guidelines and standards for personnel and equipment decontamination can be found in various technical publications and references as well as Federal and state occupational health, safety, and environment regulations.

Guidelines from all such sources have been provided in the Section 11.9 series of HSEPs.

This series of HSEPs applies to all employees covered by the Company's Health, Safety, and Environment program who are involved in work with Hazardous Wastes.

2.0 REFERENCES

Refer to references in individual Section 11.9 series HSEPs.

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HSE Procedure		Document No: HSEP 7.3	Page: 1 of 1
Hazardous Materials/Waste Sites		Supersedes: CHSP 7.3	Rev. 2
Issuing Department: Corporate HSE	Approval: Mike.Coyle@Jacobs.com	Previous Rev. Date: 1 Jun 97	Current Revision Date: 9 Aug 01

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1.0 PURPOSE AND SCOPE

In addition to good business health and safety practices, guidelines and standards for work with hazardous materials and hazardous wastes can be found in Federal and state occupational health and safety regulations.

Guidelines from all such sources have been provided in the Section 7.3 series of HSEPs, which follow.

This series of HSEPs applies to all employees covered by the HSEP and who are involved with Hazardous Waste work at Environmental projects.

2.0 RESPONSIBILITIES

Specific HSE Program implementation responsibilities are stated in HSEP 1.5. Additional management, staff, employee, and subcontractor responsibilities are stated in individual procedures that address responsibilities specific to the HSE topic.

3.0 DEFINITIONS

Refer to Definitions section in individual Section 7 series HSEPs, which follow.

4.0 PROCEDURE

Refer to Procedure section in individual Section 7 series HSEPs, which follow.

5.0 REFERENCES

Refer to Reference section in individual Section 7 series HSEPs, which follow.

6.0 FIGURES

Refer to figures section in individual Section 7 series HSEPs, which follow.

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HSE Procedure		Document No: HSEP 5.2	Page: 1 of 4
Vehicle Accidents		Supersedes: HSEP 5.2	Revision: 5 Issue Date: 3 Jan 06
Issuing Department: Corporate HSE	Approval: Susan.Kiesling@Jacobs.com	Previous Rev. Date: 19 May 04	Effective Date: 3 Jan 06

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1.0 PURPOSE AND SCOPE

This Health, Safety, and Environment Procedure (HSEP) provides the minimum procedures to be followed in the event of a vehicle accident involving a Company owned, rented, or leased vehicle or a personal vehicle used for Company business and to any other motor vehicle, e.g. personal or borrowed and "third party motor vehicles", used by personnel engaged in Company business.

This procedure addresses all motorized vehicles.

2.0 RESPONSIBILITIES

General responsibilities for HSE Program implementation are stated in HSEP 1.5. Additional management, staff, employee, and subcontractor responsibilities that address duties specific to this topic are stated in this procedure.

2.1. Management

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

2.2. Supervisor

Supervisors shall promptly report any vehicle incidents to the Site or Office Manager, HSE Manager, and Risk Management.

Supervisors of employees involved in vehicle accidents must investigate the accident and provide information for completion of the online JSIMS Accident/Incident form.

Incident details shall also be promptly submitted to the Risk Management department.

2.3. Employee

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

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

2.4. Risk Management Department

The Risk Management Department makes available through JNet the necessary accident report forms, which are to be maintained in each vehicle covered by this HSEP.

3.0 DEFINITIONS

Definitions of terms used in this HSEP can be found in [Incident and Accident Definitions by Type, Injury Status, and Incident Classification](#), which is posted on JNet.

Additional definitions that are used in this HSEP, which do not appear in the JNet posting, are as follows.

Fleet Management Group	The department within Jacobs that manages and supports motor vehicle and heavy equipment rental, leasing, maintenance, repair, and other similar activities in North America.
Occupational Health Services	The group within Jacobs Human Resources Department that provides Health Services support and advice and maintains a list of company-approved local collection facilities in the US for drug and alcohol testing. Phone number 225 922-3360.
Risk Management Department	The department within the Jacobs that manages underwriting, claims management, and other insurance-related functions and matters. Go to JNet and click on the Global Groups tab and then click the Risk Management tab for details.
Vehicle	Motorized vehicles, including cars, trucks, busses, all-terrain vehicles, golf carts, etc.
Vehicle Operators	Employees who have been authorized by the Company to operate a motorized vehicle on Company business.

4.0 PROCEDURE

4.1. Injuries

In the event of an injury resulting from a vehicle incident, the first priority is to provide the best assistance possible to personnel who may need it and to ensure the safety of others who may be affected or acting as emergency responders. Refer to HSEP 5.1, Accidents and Incidents, for steps to follow.

In addition, for US operations, if there is a Jacobs employee injured, refer to [Workers' Compensation Claims Instructions and Forms - U.S. Only](#).

For non-U.S. locations, if there is a Jacobs employee injured as a result of the incident, promptly report the injury to the HSE Manager and Risk Management.

4.2. Vehicle Incident Reporting

Accident report forms shall be maintained in all vehicles owned, rented, leased by the Company, or personal vehicles utilized for Company business. [Vehicle Accident Report & Instructions](#) for US Operations are posted on JNet. Supervisors of employees involved in vehicle accidents must investigate the accident and complete the Risk Management department's [Vehicle Accident Report](#) with input from the person(s) involved in the incident and witnesses to the incident.

The report shall be distributed as follows:

- Project/Office Manager's File

- Risk Management
- HSE Manager
- Fleet Management Group

Each incident will be investigated by an HSE representative in order to identify the cause(s) and to determine measures to be taken to prevent a similar recurrence.

If damage to Company owned, leased, or rented property, machinery or equipment, or business interruption related to such damage, is expected to exceed U.S. \$25,000, complete the Risk Management department's [Property Damage and Business Interruption Loss Notice](#) form in addition to the standard [Vehicle Accident Report](#).

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

4.3. Post-incident Actions

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

- Stop at once to investigate.
- If necessary, have someone call for emergency medical services.
- Call the police if the incident occurs on public property.
- Do not admit liability, even if you feel you are at fault.
- Do not discuss the incident with anyone at the scene other than the police, and only answer questions asked by them.
- Copies of any statements or other documents signed or created by the employee must be forwarded to Legal Department and Risk Management.
- Do not move vehicle until cleared by the police, unless the vehicle creates a safety hazard or local ordinances require moving vehicles after an accident.
- If possible, obtain names, addresses, license numbers, and phone numbers of any witnesses and the parties to the accident.
- Promptly notify your supervisor after an incident and assist with completion of the [Vehicle Accident Report](#).
- If you are contacted by individuals or entities outside of the company after an accident, notify the company Legal Department and Risk Management departments.

4.4. Post-incident Drug Testing

Except where prohibited by law, the Company will require employees who are involved in a workplace incident which results or could have resulted in an injury to a person (other than first aid) and/or property damage, to submit to a post incident test for drugs and/or alcohol as part of the investigation of such incidents. This same policy applies to our subcontractors, as appropriate.

It is the responsibility of the Office or Site Manager working in coordination with the Human Resources and Legal Departments, to establish the program for drug and alcohol testing for their location.

Any questions that arise concerning possible prohibitions should be directed to the Human Resources and Legal Departments. Disciplinary action against an employee, who fails a drug or alcohol test, shall be coordinated by Human Resources with input from Operations and the Legal Department.

Drug testing is also governed by local regulations in many countries. Contact the company Human Resources and Legal Departments for assistance.

If results are positive, HR will notify Risk Management so that appropriate insurance follow-up arrangements can be made.

4.5. Post-incident Drug Testing Procedures for US Operations

4.5.1. Pre-selection of Local Drug Testing Collection Facilities

The Occupational Health Services (OHS) group (phone number 225 922-3360) maintains a list of company-approved local collection facilities in the US.

The local HSE Manager shall state the name, address, and phone number of the specified local collection facility in the project or office HASAP.

4.5.2. Testing After a Vehicle Incident

An employee, who has been involved in a motor vehicle incident, is responsible for immediately notifying his or her supervisor by phone or in person.

The employee or the supervisor shall also notify the Risk Management representative, 877 832-1721, and the local HSE Manager.

A Risk Management representative will, in turn, notify the designated Human Resources (HR) contact for the Operating unit. If the primary HR contact does not respond, a secondary HR contact will be notified.

The HR Manager will direct the employee to the designated collection facility and/or confirm that the post-incident specimens were promptly and properly collected.

4.5.3. Testing Notifications

The HR Manager will contact the OHS and advise them that a motor vehicle post-incident test has been initiated.

The HSE weekly summary shall list all MVAs that have been reported and confirm that alcohol (if required) and drug tests were conducted after each incident.

4.5.4. Test Results Notifications

OHS:

- Will promptly report test results to the appropriate HR Manager,
- Will track test results, and
- Will generate monthly and year-to-date statistics, which will become part of the monthly HSE Scoreboard report.

If results are positive, HR will notify Risk Management so that appropriate insurance follow-up arrangements can be made.

5.0 REFERENCES AND RELATED DOCUMENTS

HSEP 21.2, Motor Vehicle Safety

The following hyperlink takes the reader to a site that is maintained on JNet by the Risk Management Department.

[Workers' Compensation Claims Instructions and Forms - U.S. Only.](#)

[Vehicle Accident Report](#)

HSE Procedure		Document No: HSEP 5.1	Page: 1 of 14
Accidents and Incidents Investigation and Reporting		Supersedes: HSEP 5.1	Revision: 4 Issue Date: 3 Jan 06
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1.0 PURPOSE AND SCOPE

Reporting, investigating, and recording of all accidents, incidents, and illnesses are key steps in understanding and addressing root causes to prevent recurrence of incidents similar in nature, and detecting trends that may have broader implications. For this reason, it is imperative that all accidents, incidents, and illnesses be reported, investigated, and documented. This includes non-injury events, dangerous occurrences, and releases of Hazardous Chemicals and/or Radiological Materials.

This HSEP applies to accidents and incidents involving Jacobs employees and subcontractors.

For incidents involving motor vehicles, refer to HSEP 5.2.

2.0 RESPONSIBILITIES

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

2.1. Site or Office Manager

The Site or Office Manager shall

- Report accidents and incidents to their operations manager and their field services manager, as appropriate.
- Organize and participate in accident investigations and engage appropriate resources and the Legal Department, as appropriate.
- Implement appropriate corrective actions into Jacobs work processes.
- Analyze HSE records to measure the effectiveness of preventive/follow-up actions and the ongoing HSE program.

2.2. Supervisors

For accidents, incidents, and illnesses involving their personnel, supervisors must:

- Promptly report them to the HSE representative and to the Site or Office Manager,
- Lead investigations, and
- Ensure that all records are completed in a timely fashion.

2.3. Employees

Employees must immediately report all work-related accidents, incidents, and illnesses to their supervisor or the HSE representative.

2.4. HSE Representative

The HSE representative shall:

- Report accidents and incidents to their HSE Manager, as required,
- Assist the Site or Office Manager in organization of investigations and participate in them,
- Assist Supervisors in reporting and recording all accidents, incidents, and illnesses,
- Identify appropriate HSE professional to support investigations, as appropriate (especially where the HSE Representative is not also an HSE professional),
- Establish and maintain all records required by this HSEP and regulatory agency recordkeeping requirements,
- Assist the Site or Office Manager in the analysis of records to measure the effectiveness of preventive and follow-up actions and the ongoing HSE program, and
- Keep the Regional HSE Manager apprised of accidents, incidents, and illnesses and recommend lessons learned as may be appropriate to other sites/offices.

3.0 DEFINITIONS

Definitions of terms used in this HSEP can be found in [Incident and Accident Definitions by Type, Injury Status, and Incident Classification](#), which is posted on JNet.

An additional definition that is used in this HSEP, which does not appear in the JNet posting, is:

Serious Incident Incident resulting in a Days Away from Work (i.e. Lost Time) case and/or greater than USD 5,000 in damage.

4.0 PROCEDURE

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

Incidents, including non-injury or “near miss” events, which are potentially of E-1 or greater severity, and incidents that are potentially reportable to regulatory agencies, including environmental incidents, shall be promptly reported to the responsible:

- Operations Manager,
- Field Services Manager, if appropriate,
- Office Manager, if appropriate, and
- HSE Manager.

Such reports should be made promptly and directly, preferably by phone or in person.

4.1. Post-Incident Drug and/or Alcohol Testing

Except where prohibited by law, the Company will require employees, who are involved in a workplace incident, which results or could have resulted in an injury to a person (other than first aid) and/or property damage to submit, to a post incident test for drugs and/or alcohol as part of the investigation of such incidents. This same policy applies to our subcontractors, as appropriate.

It is the responsibility of the Office Manager or Site Manager, working with Human Resources and Legal, to establish the program for drug and alcohol testing for their location.

Questions that arise concerning possible prohibitions should be directed to the Human Resources and Legal Departments. Disciplinary action against an employee, who fails a drug or alcohol test, shall be coordinated by Human Resources with input from Operations and the Legal Department.

Drug testing is also governed by local regulations in many countries. Contact the company Human Resources and Legal Departments for assistance.

4.2. Accident/Incident Investigation

In order to eliminate incidents, both injury and non-injury, it is important to perform thorough investigations when accidents/incidents occur. Immediate action taken to identify causes can be utilized to prevent recurrence of future incidents of a similar nature. An accident/incident investigation is not for the purpose of fault-finding, but rather fact-finding. It is important that the approach reflects this purpose so that information is readily shared and the response effective.

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

- The person(s) involved and/or injured in the incident.
- First- and second-line supervisors of the person(s) involved in the incident.
- Site manager or office manager.
- An HSE professional.
- Subject matter/discipline specialists, as appropriate
- Legal and Risk Management representatives, in the event of a Serious Incident.
- Other senior management, as appropriate

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

The task-specific safe work plan (Safe Plan of Action and/or Job Safety Analysis) should be examined as part of the investigation process.

4.3. Investigation Reports and Recordkeeping

4.3.1. Authorization for Medical Treatment

For employee injuries or illnesses that require treatment by a medical services provider, a company supervisor shall complete an Authorization for Medical Treatment form. A new form shall be sent with the employee upon each visit to the medical services provider. (See [Figure 1](#) for a sample authorization form that can be tailored for local use.)

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

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

4.3.2. Internal Reporting

Details shall be entered in the online JSIMS Accident/Incident form.

In the event of a Serious Incident, the responsibility for report preparation may be assigned to another investigation team member and a member of the Legal Department must be consulted prior to documentation.

4.3.3. Injured Employee's Statement

Ask the employee with the illness or injury to complete an Injured Employee's Statement ([Figure 2](#)).

4.3.4. Witness Statement

The Witness Statement ([Figure 3](#)) shall be used to obtain a signed account from witnesses of their factual observations, as soon as reasonably appropriate after the incident.

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

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

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

4.3.5. Accident Analysis

The supervisor of the injured employee shall assure that an Accident Analysis ([Figure 4](#)) is completed and submitted to the HSE representative and the Regional HSE Manager.

4.3.6. First Aid Register

The First Aid Register ([Figure 5](#)) is the primary project injury log and must be kept on-site at all times.

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

4.3.7. Employer's First Report of Injury (US Only)

For US operations, if the injury or illnesses results in lost time from work or in the need for off-site medical treatment, the HSE representative is responsible for immediately completing the Injury Call-In Form ([printable/online](#)) and then calling ESIS immediately at 877 329-0695 to report the injury. ESIS provides 24-hour call-in service for claims reporting.

4.4. Interface with Risk Management (for US Operations)

4.4.1. Workers' Compensation Claim Coordinator

If an injury results in lost time from work or the need for off-site medical treatment, the HSE representative is responsible for immediately notifying the appropriate [Workers' Compensation Claim Coordinator](#) with details about the injury.

4.4.2. Documentation Checklist

The HSE representative or designee should use the [Accident Investigation Documentation Checklist](#) to ensure that all documents have been completed and submitted within 24 hours to the Workers' Compensation Claim Coordinator. If all forms are not available at the same time, send as many as are available and forward the remainder later.

4.4.3. Authorization to Release Medical Information

The injured worker will complete an [Authorization to Release Medical Information](#) and the HSE representative or designee will assure that the completed form is forwarded to the Risk Management Department to authorize the claim adjuster to obtain medical records.

4.5. Communication of Investigation Findings

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

The incident investigation team is encouraged to provide lessons learned details and recurrence prevention recommendations to the Regional HSE manager for sharing, as appropriate.

4.6. Releases/Exposures Involving Hazardous Chemicals or Radiological Materials

In addition to the investigation process defined above, incidents involving potential exposure to hazardous materials, including incidents onsite, in the office, during company travel, and hazardous material releases in reportable quantities, as defined by local regulations, e.g., EPA-RCRA in the US, must be reported to a Senior HSE Manager.

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

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

A copy of the investigation report shall be placed in the medical file of any exposed or potentially exposed employees. Use of baseline testing should be evaluated promptly after any exposure.

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

4.7. Recording Work-Related Injuries and Illnesses for Regulatory Purposes

Many local HSE regulatory agencies have incident reporting, recording, and posting requirements, which will be followed by company entities operating in those areas. The HSE Representative and/or Local HSE Manager shall ensure compliance with these requirements.

4.7.1. Recordkeeping

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

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

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

4.7.2. Posting Requirements

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

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

4.8. Serious or Fatal Accidents

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

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

In such cases, the following requirements may apply.

4.8.1. Internal Notifications

In the event of a fatal or serious accident, an immediate telephone report shall be made by the Site or Office Manager to the Operations Manager **and** by the HSE representative to the Regional and Senior HSE Managers.

The Senior HSE Manager shall immediately notify the Vice President of HSE. The Operations Manager shall immediately notify the appropriate Group Vice President. These managers will notify the Legal Department and Risk Management and other senior company managers, as appropriate.

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

4.8.2. Regulatory Agency Notifications

Any necessary notifications to local, state, or Federal agencies will be made by HSE.

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

4.8.3. Next of Kin Notification

Notification of the next of kin shall be coordinated through Human Resources.

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

The Site or Office Manager should consider the need for help with immediate, short-term transportation, lodging, or similar assistance for the next-of-kin.

4.8.4. Accident Investigation

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

A team comprised of representatives from HSE, Operations, and the Legal Department will conduct the investigation. The Legal Department will direct the investigation, including any resulting correspondence or other communication related to the accident in order to assure attorney-client privilege, as necessary.

Investigations shall include:

- Obtaining from witnesses signed statements of their complete and factual observations, as defined above. In the case of certain serious incidents, local law enforcement personnel may participate in, or conduct, collection of witness statements.
- Ensuring that adequate photographs are taken from several angles. Release of photographs shall be coordinated through the Legal Department.

- Documentation management for all photos, measurements, statements, and handwritten notes, etc., in a single file. The Legal Department may designate the contents of this file as confidential, “Attorney – Client Privilege.”

4.8.5. Media Relations

Some incidents may involve media interaction. Jacobs Global Policy Supplement, GPS1-105, Media Interaction, must be reviewed and followed before any media interactions.

4.8.6. Client Assurance

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

4.9. Property Damage and Business Interruption Loss Notice

Submit to the Risk Management Department a [Property Damage and Business Interruption Loss Notice](#) Form to report Property Loss. A Notice is required if damage to company owned, leased, or rented property, machinery, or equipment, or if business interruption related to such damage is expected to exceed \$25,000 US dollars.

4.10. Training

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

This training will be provided through the HSE Manager.

5.0 REFERENCES AND RELATED DOCUMENTS

29 CFR 1904, Recording and Reporting Occupational Injuries and Illnesses (US only)

US Department of Labor, Bureau of Labor Statistics, Recordkeeping Guidelines for Occupational Injuries and Illnesses (the “Blue Book”, US only)

Workers’ Compensation Claim Coordinator List (US only)

[Accident Investigation Documentation Checklist](#) (US only)

6.0 FIGURES

[Authorization for Medical Treatment](#)

[Injured Employee’s Statement](#)

[Witness Statement](#)

[Accident Analysis](#)

[First Aid Register](#)

Figure 1 Authorization for Medical Treatment

To: _____ Address: _____ Date: _____

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

(Employee)

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

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

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

Authorized Jacobs Representative

Date of Injury _____ Location _____ Job No. _____

How injury occurred _____

For Doctor's Use Only

Diagnosis of Injury: _____

Disposition of Patient: Occupational Non-Occupational Unable to determine

Able to resume regular duties.

Able to resume regular duties next workday.

Able to resume restricted duties with the following limitations: _____

Unable to return to work; estimated length of disability: _____

Return for follow-up visit on _____ (Date)

Discharged from care on _____ (Date)

(Doctor's Signature)

Figure 2 Injured Employee's Statement

	Date:
Name:	Title:
Employee ID or DEN:	
Temporary Address:	Phone No:
Permanent Address:	Phone No:
Location At Time Of Accident:	
Describe How The Accident Happened:	

Signature

Figure 4 Accident Analysis

Accidents result from a Direct Cause, Indirect Cause, and a Basic or Root Cause. These causes occur in the sequence shown below. Review the accident sequence. Check all factors that apply.

DIRECT CAUSE

Unsafe Act

- Improper use of tool/equipment
- Defective tool/equipment
- Failure to use proper PPE
- Improper body position
- Improper lifting/placing
- Removing guard
- Defeating safety device
- Servicing live equipment
- Horseplay
- Shortcut/Hurrying
- Other:

Unsafe Condition

- Flammable Atmosphere
- Oxygen rich/deficient
- Toxic Atmosphere
- Inadequate Illumination
- Poor housekeeping
- Congested work area
- Worn/defective tool
- Worn/defective equipment
- Ineffective guard or barricade
- Missing/lack of guarding
- Other:

INDIRECT CAUSE — Lack Of

Training

- No training
- Poor training
- Refresher needed
- Not understood
- Other:

Resources

- Time
- Tools
- Equipment
- Material
- Manpower
- Other:

Belief

- Poor morale
- Peer pressure
- Awareness
- Other:

BASIC CAUSE — Organizational Failure To

Plan

- SPA/JSA not done supervisor
- SPA/JSA inadequate
- PPE checklist not done
- PPE checklist inadequate
- Improper permit issued
- Other:

Organize

- Resources not present (tools, personnel, etc.)
- Resources not proper (tools, personnel, etc.)
- Unsafe operating condition
- Other:

Direct

- TSA not done by supervisor
- Instructions not communicated
- Instructions not understood
- Improper instructions given
- Other:

Control

- Task not conducted as planned
- Job progress not monitored
- Other:

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HSE Procedure		Document No: HSEP 2.17	Page: 1 of 5
Safety Observation Report		Supersedes: HSEP 2.1	Revision: 1 Issue Date: 17 Feb 04
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1.0 PURPOSE AND SCOPE

The purpose of the Safety Observation Report (SOR) process is to engage all workers in the observation of work in progress so that a maximum number of workers, with diverse experiences and perspectives, are involved in the HSE monitoring and observation process.

Use of this process for identification of potential workplace hazards and unsafe actions of workers will minimize workplace injuries and illnesses and damage to the environment in both the field and the office.

This process also provides a method for identifying and documenting safe acts and safe workplace conditions.

Use of SORs by members of the workforce is a recognized Company best practice and is a requirement set forth in GSOP 350.

This HSEP applies to all employees, Company subcontractors, and workers engaged in operations covered by the Company's HSE Program.

2.0 RESPONSIBILITIES

Specific Health, Safety, and Environment Program implementation responsibilities are stated in HSEP 1.5. Additional management, staff, employee, and subcontractor responsibilities are stated in individual procedures that address responsibilities specific to the HSE topic.

2.1. Site, Project, and Office Manager

The responsibilities of Site, Project, and Office Management are to seek opportunities to involve all employees in this process by:

- Providing HSE leadership by actively participating in the SOR process and conducting regular HSE observations,
- Discussing their observations in a positive constructive manner, and where necessary, agree on appropriate corrective actions,

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- Providing support for training in the SOR process,
- Participating in safety observation meetings and presentations, and
- Helping to design promotional and recognition programs to encourage SOR process quality and/or participation.

2.2. Supervisors

The responsibility of supervision is to:

- Actively participate in the SOR process by conducting regular HSE observations,
- Discuss all observations in a positive and constructive manner, and where necessary agree on appropriate corrective actions,
- Ensure that SORs are completed in a timely manner and promptly submitted, and
- Ensure completion of any required corrective action.

2.3. Employees

The responsibilities of employees are to:

- Conduct regular HSE observations of work in progress,
- Discuss observations in a positive and constructive manner and to agree on an appropriate corrective action, if unsafe acts or conditions are observed,
- Record their findings on the SOR form, and
- Submit the SOR to their supervisor or the HSE Department.

2.4. Site HSE Supervisor

The Site HSE Supervisor is responsible for:

- Providing training on the SOR process,
- Gathering and compiling SOR data,
- Generating reports and developing trends to provide feedback to employees and the project team, and
- Tracking and documenting completion of corrective actions.

3.0 PROCEDURE

The SOR ([Figure 1](#)) is a proactive process designed to identify, document, and change unsafe conditions and unsafe or at-risk behavior through supervisor and employee involvement.

This procedure incorporates employee involvement in the HSE observation process by reinforcing safe behavior, modifying unsafe behavior through training and data feedback, and assuring that corrective actions have been taken for any identified deficiencies.

The data gathered through this process is used as a leading indicator to improve the overall HSE program.

For those operations that have the necessary resources and want to take their SOR process to the next level, refer to HSEP 2.18, Behavioral Safety Observation Report Process.

3.1. Conducting HSE Observations

Observations may be conducted by individuals or teams of workers. Observers will monitor work in progress for safe or unsafe acts and safe or unsafe conditions.

Observations can include any number of workers for any length of time or workplace conditions.

Open and constructive communication between the observer(s) and worker(s) is an important feature of the SOR process. Unsafe acts and unsafe conditions should be discussed and resolved

on the spot, if possible. Safe work practices should likewise be identified and positively reinforced through compliment and praise.

If imminent danger situations are encountered, work must be immediately stopped and workers removed from the hazard, the hazard abated, and a thorough investigation conducted.

Observations shall be recorded on the Safety Observation Report form.

Although signatures by those submitting SORs are important and typically required, the reports may be submitted anonymously.

Names of workers, who might be involved with unsafe acts or unsafe conditions, are not to be recorded in the SOR.

The causes for unsafe acts or unsafe conditions should be determined through discussion and analysis among worker(s) and observer(s) and recorded in the SOR. (See [Figure 1](#).) Minor modifications of this SOR form to reflect local needs may be made with approval from Corporate HSE. [Figure 1](#) can be printed full size or reduced in size and printed on card stock to fit in a shirt pocket for convenient use in the field.

The form shall be signed and dated by the person(s) conducting the observation.

SORs can be submitted to either the employee's supervisor or the HSE Department.

3.2. Analysis of Cause(s)

The HSE Department will gather and compile SOR data, generate reports, and develop trends to provide feedback to employees and the project team. This input facilitates development of special emphasis programs designed to highlight positive behaviors and work practices and to address the specific types of deficiencies observed.

Thorough identification of the causes of observed deficiencies facilitates remedial action.

3.2.1. Typically, direct causes identified through the SOR process, are due to

- Unsafe acts or
- Unsafe conditions.

3.2.2. Typically, indirect causes identified through the SOR process, are due to a

- Lack of training (knowledge, understanding, perception of risk),
- Lack of resources (time, material, personnel), and/or
- Lack of belief (confidence, commitment, or reinforcement by supervision)

combined with other factors, such as poor morale, peer pressure, inattention, etc.

3.2.3. Typically, basic/root causes identified through the SOR process, are due to an organizational failure to

- Plan,
- Direct,
- Organize, and/or
- Control

the human and material (tools, equipment, etc.) resources.

3.3. Documenting Corrective Actions

It is important that all deficiencies reported have documented corrective actions, the majority of which should be implemented at the time the observation is made.

Some corrective actions may require a period of time to resolve if, for instance, client involvement is required, equipment must be ordered, etc.; therefore, a log or record will be kept to document the final close-out or completion of such actions.

SORs, complete with documentation that corrective measures have been taken, shall be retained by either the operating unit, the office, or the HSE Department.

3.4. Training

Proper “observer training” is required for effective implementation of the SOR process. Simply distributing and collecting SOR forms will provide minimal improvement in the HSE program. The HSE department will provide specialized training for prospective observers that will educate them in:

- The philosophies behind the process,
- Communication techniques that will provide for positive observer-worker interaction during the observation process,
- Identification of safe and at-risk actions and behaviors, and
- Identification of safe and unsafe workplace conditions.

4.0 FIGURES

[Safety Observation Report](#)

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Safe Plan of Action		Supersedes: HSEP 2.16	Revision: 1 Issue Date: 17 Jul 06
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1.0 PURPOSE AND SCOPE

The SPA is a core element of the Jacobs HSE Program (ref. GSOP 350) and defines the approach and tools used to accomplish pre-task planning. Pre-task planning shall be performed for any activity or task that could reasonably present a risk of injury, illness, environmental, or property damage. Specifically, this procedure defines the expectations and requirements for the use of the Safe Plan of Action (SPA) as a primary element of pre-task planning.

The SPA shall be used prior to starting field or shop work tasks and higher risk, non-routine activities in the office or prior to operating equipment, including motor vehicles.

This procedure applies to all activities performed by company employees, subcontractors, or other contractors when Jacobs is implementing the HSE program.

2.0 RESPONSIBILITIES

General responsibilities for HSE Program implementation are stated in HSEP 1.5. Additional management, staff, employee, and subcontractor responsibilities that address duties specific to this topic are stated in this procedure.

Management shall be responsible for ensuring that the necessary resources are available for effectively implementing pre-task planning.

Supervisors shall lead the development, implementation, and review of pre-task plans.

All workers engaged in activities requiring pre-task planning shall participate in pre-task planning at the appropriate level.

HSE personnel will facilitate implementation, monitoring, and training associated with pre-task planning, and work with management to ensure that the appropriate focus is placed on identifying hazards/risk potential and actions necessary to improve pre-task planning.

3.0 DEFINITIONS

Activity	A set of interrelated tasks typically of longer duration involving multiple crews.
Job Hazard Analysis (JHA)	An activity-level pre-task plan, which helps integrate safe work practices into a particular activity to help ensure that the work is performed in a safe and effective manner. In some countries, the JHA may be referred to as a "Method Statement" or by some similar term.
Routine Task	A routine task is one, which the worker normally performs as part of the job function and for which the worker has been trained.
Safe Plan of Action (SPA)	A pre-task plan used to integrate safe work practices into a job or task and to help ensure that the work is performed in a safe and effective manner.
Task	A specific, well-defined portion of work of relatively predictable duration and typically consisting of multiple steps. A task may be performed by one or more workers.
Task Steps	Basic sequential elements of a task that accurately define the task in terms of obtaining resources required to perform the task, preparation of the work area, movement of materials, tools, and people to and from the work area, and completion of the task.

4.0 PROCEDURE

4.1. Levels of Pre-task Planning

4.1.1. Project Level — HASAP

Pre-task planning begins with project-level HSE planning and is documented in the Hazard Assessment and Safety Action Plan (HASAP).

The primary goal of project-level planning is to identify potential hazards associated with the project work activities and to identify controls to mitigate the risk associated with those hazards.

In addition, planning at the project level should define all the HSE program elements required to accomplish activities in a safe and environmentally sound manner. HSE planning also establishes the strategies and methods for implementation and management of the HSE elements.

4.1.2. Activity Level — Various Means and Methods

Pre-task planning is next completed at the activity level and is focused on identifying hazards associated with larger, interrelated tasks, typically executed over a longer duration and by multiple work groups or crews.

Planning at the activity level is typically accomplished in advance of the activity and should facilitate more effective planning at the task level.

There are numerous acceptable means and methods to accomplish activity-level planning. Examples include use of method statements, regular supervisor and project coordination meetings, interactive planning sessions, subcontractor and client meetings, pre-construction meetings, constructability reviews, JHAs, and other means that provide focus on hazard identification and mitigation controls.

4.1.3. Task Level — SPA

Planning at the task level is accomplished through the SPA. The SPA is the most effective means of identifying the hazards associated with daily work tasks and the controls necessary to execute the task in a safe manner.

In any case, the level of planning shall be appropriate for the task or activity and shall consider:

- Hazards previously identified in the project or site safety plan (HASAP) and other pre-task plans, .e.g., JHA or Method Statement.
- Relevant procedures (including applicable Jacobs HSEPs) for identification of hazards and controls.
- Lessons learned from other tasks, activities, or projects including past incidents.
- Breaking the task into enough steps to adequately define the task.
- Identification of hazards related to adjacent activities, operations, and hazards that could affect the work.
- Identification of all foreseeable hazards and controls necessary to eliminate the hazard or reduce the risk.
- Utilization of multiple countermeasures or controls where appropriate to eliminate or reduce risk.
- Consideration of foreseeable change in the task as it progresses to completion.

4.2. General Planning Requirements

Pre-task planning is required prior to performing any activity or task that could reasonably present a risk of injury, illness, environmental, or property damage. In addition, the following are considered minimum requirements:

- The detailed plan for performing pre-task planning shall be documented in the project, site, or office-specific safety plan (ref. HSEPs 1.2, 1.4, and 2.12).
- Tasks shall be defined in terms of steps required to complete the task so that the hazards can be readily identified.
- The appropriate level of expertise shall be applied when planning each task in order to effectively identify and manage the risks associated with the task.
- Pre-task planning shall be implemented in a manner that focuses on hazard identification, hazard control, and group interaction.
- All personnel shall be involved in pre-task planning, including Jacobs employees and subcontractors. Employees of contractors, who are not directly contracted to Jacobs, should also be involved in pre-task planning when Jacobs is responsible for implementing the HSE program.
- A new SPA shall be developed for each task to ensure that the most current conditions are considered and to ensure that all personnel are involved in the planning for the task.
- The approach for implementing the SPA shall include a means for assessing and improving the quality and effectiveness of pre-task planning.

The pre-task plan shall include an SPA or equivalent method. It may also consist of one or more of the following:

- JHA – typically used for planning larger tasks or activities and for tasks that are performed on a routine or repeated basis (JHAs are typically developed by management and HSE personnel well in advance of the activity or task.);
- Detailed procedures and work instructions – typically used for routine tasks or operations where the order of execution is important; and
- Permit to work system – typically implemented for more hazardous tasks or activities (e.g., confined space entry, hot work, line break, etc.).

The remainder of this HSEP focuses on the use of the SPA as the primary pre-task planning tool, however, the SPA may also be used for activity-level planning.

4.3. SPA Implementation Plan

Each project or site shall develop a plan for implementing the requirements of this HSEP and document the plan in the project/site HSE plan (HASAP). At a minimum, this plan shall define:

- The conditions under which an SPA is used (identify tasks that require the development of an SPA, when and where the SPA is completed, etc.).
- The detailed roles and responsibilities of management, supervision, workers, and HSE in all aspects of the SPA (development, review, approval, monitoring, and assessment).
- The project/site-specific requirements for SPA development.
- The project/site specific process for SPA assessment.
- The conditions under which work stoppage should occur, including changes in conditions, task, hazard, or other factors that could affect safe execution of the work.

The SPA shall be documented using [HSEP 2.16f1](#) or a project-specific version of this form

The SPA assessment shall be performed using the SPA Assessment form, [HSEP 2.16f2](#), or a project-specific version of this form.

The SPA Assessment form may be modified, as necessary, based on site-specific conditions, such as work scope, hazards present, and other factors.

When the Safety Observation Report (SOR), Behavioral Safety Observation Report (BSOR), and SPA are used together, the forms should be modified to ensure that the checklist categories are consistent to improve the effectiveness of their use.

4.4. SPA Development

The SPA shall be developed as a team by **all** the workers involved in the task.

Supervisors shall actively participate in the collaborative effort and shall provide leadership and guidance. Supervisors shall also provide the resources necessary to plan and execute the task.

In the case of subcontract employees, the SPA development activity should be attended by Jacobs management and supervision. The purpose of this attendance is to provide real time coaching on SPA development and hazard recognition to the workers.

The SPA shall identify:

- Steps Involved in Performing the Task
- Hazards and Reaction to Change
 - associated with task steps, including physical hazards, chemical hazards, etc.
 - created by adjacent work or processes, such as owner operations
 - related to co-occupancy of the same work area by others
 - caused by inappropriate reaction to foreseeable changes (changes in conditions, failures that may occur during the task, emergency events, etc.)
 - resulting from completing the task steps in the wrong order
- Safe Plan (controls to mitigate or eliminate the hazards identified)
- Resources
 - personal protective equipment
 - permits, procedures, training, tools, equipment, materials, etc.

The controls identified in the SPA shall, to the extent possible, be selected based on the effectiveness of the controls to mitigate the risk associated with the hazards. Where possible the controls shall be selected based on the following order of effectiveness:

- Design or engineering change (eliminate or minimize the hazard, substitute materials, relocate hazard source, provide ventilation, designate site traffic patterns, etc.)
- Safety features (fuses, circuit breakers, ground fault circuit interrupters, mechanical stops or travel limiting devices, relief devices, etc.)
- Safety devices (barriers, guards, shields, personal protective equipment, gas and fire detection systems, etc.)
- Warning devices (audible and visual alarms, signs and postings, temporary signs and tapes (warning or danger tape) etc.)
- Administrative controls (procedures, work instructions, checklists, training, etc)

An SPA should be developed at the beginning of the work shift for each new task. The SPA must be reviewed and updated after any change in personnel, task or work scope, environmental conditions, or other factors that could affect the safe performance of the work. The focus of the SPA is on the relationship among the workers, the task, the tools, and the work environment. If any of these elements or their relationship changes, the SPA must be reevaluated.

For routine tasks that are performed on a repetitive basis, an SPA developed at the start of the task may be used for the duration of the task provided adequate consideration is given to changes that may affect the validity of the pre-task plan.

Unless prohibited by unusual conditions, the SPA shall be developed immediately prior to the start of the task and at the job location to maximize the opportunity to identify hazards and understand the work environment/conditions in which the task will be performed.

4.5. SPA Monitoring and Assessment

Management, supervision, workers, and HSE shall routinely monitor and assess the development and implementation of the SPA. The SPA Assessment shall be made using the [SPA Assessment form](#) or other means that achieves the same result. The criteria for monitoring and assessment should be defined in the project or site-specific HSE plan and should be based on:

- Relative risks and activities, (e.g., working at elevation, crane operations, lock out tag out work, work on live electrical components, confined space entry, etc.),
- Complexity of the task,
- Locations and varieties of tasks.

A representative sample of SPAs shall be routinely monitored and assessed during both development and the work-in-progress phases to ensure that:

- There is team interaction during the SPA development and buy-in to the plan,
- SPAs are being developed for tasks where required or appropriate,
- The quality of the SPA is appropriate for the work, and
- The work is being performed in accordance with the plan.

The sample size shall be determined by:

- The size of workforce,
- The level of experience in SPA development,
- The workforce turnover, and
- Other factors as deemed appropriate by the Management and HSE.

4.5.1. SPA Development Assessment

The SPA Development Assessment shall be conducted as supervisors and workers begin pre-task planning. Person performing the assessment shall observe the workers and interact as necessary to assure all elements of a safe work plan are addressed.

The SPA Development Assessment may be performed by an individual or a group, depending on the complexity of the task, using the [SPA Assessment form](#).

Information from the SPA development assessment should be used to provide feedback to the work group to improve the SPA.

4.5.2. SPA Work In Progress Assessment

The SPA Work In Progress Assessment shall include observation of the work being performed, noting both safe and unsafe or at-risk situations and the immediate corrective actions taken. Feedback shall be provided to the workers during the assessment.

The SPA Work In Progress portion of the form shall be completed while observing workers performing the task. Particular attention should be paid to how well the workers react to or manage changed conditions during the performance of the task.

4.6. Measurement and Improvement

Data from the SPA Assessment shall be collected, analyzed, and used to measure the quality and effectiveness of the SPA and pre-task planning. In addition, the data shall be used to identify specific improvement opportunities based on at-risk categories.

The following actions should be considered to maximize improvement.

- Completed SPAs should be used to train new workers and to re-train existing workers.
- The SPA should be reviewed with the workers at the end of the task or shift to identify improvements that can be implemented immediately.
- The observation of the SPA development phase or of work in progress should not be a data collection exercise, but rather a real time coaching, training, and mentoring event.
- Calculate and trend percent safe/at-risk for major categories on assessment checklist.

4.7. SPA Documentation Retention

The completed SPA document should be retained with site or office records in accordance with the field Hazard Assessment and Safety Action Plan (HSEP 2.12) or Office HSE Management plan (HSEP 1.4), respectively.

4.8. Training

Personnel required to perform pre-task planning shall be trained in the development of pre-task plans. [Safe Plan of Action Training Presentations and Workbooks](#) are available to HSE staff.

In addition, those personnel required to perform quality assessments of pre-task plans shall receive additional training on the SPA assessment process.

5.0 REFERENCES AND RELATED DOCUMENTS

GSOP 350, HSE Program

HSEP 1.2, Project HSE Management

HSEP 1.4, Office HSE Management

HSEP 2.12, Hazard Assessment and Safety Action Plan

HSEP 2.16f1, [Safe Plan of Action Form](#)

HSEP 2.16f2, [SPA Assessment Form](#)

HSEP 2.17, Safety Observation Report

HSEP 2.18, Behavioral Safety Observation Report Process

[Safe Plan of Action Training Presentations and Workbooks](#)

[SPA Revision Overview](#)

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HSE Procedure		Document No: HSEP 16.4	Page: 1 of 3
Housekeeping and Material Handling		Supersedes: HSEP 16.4	Revision: 3 Issue Date: 29 Jul 05
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1.0 PURPOSE AND SCOPE

This HSEP provides the minimum procedures to be followed for maintaining orderliness and for safe material handling in the workplace. It applies to all employees and subcontractors on all Jacobs projects.

2.0 RESPONSIBILITIES

Specific HSE Program implementation responsibilities are stated in HSEP 1.5. Additional management, staff, employee, and subcontractor responsibilities are stated in individual procedures that address responsibilities specific to the HSE topic.

3.0 PROCEDURE

3.1. General

3.2. Housekeeping Procedures

The procedures contained herein and good work practices and cleanliness can help to prevent most accidents and are minimum requirements for all work areas.

Keep air hoses, welding leads, and extension cords out of doorways and walkways and off the floor to prevent tripping.

Each person is responsible for keeping his immediate work area free of trash, excess scrap material, and tools not in use.

Immediately clean up all spilled liquids and barricade the area if necessary.

Stack materials and supplies in a safe manner, out of walkways.

Do not pile trash or materials in areas where they might block exits or fire doors, fire extinguishers, electrical disconnects, or safety showers.

Stack or pile safely. Always start with a safe base. Uneven surfaces of floor or yard should be leveled. Make sure the pile will not shift. Barrels or other round objects that may roll should be checked.

Pile to a safe predetermined height by floor load limit, by types of materials and strength of containers, or by requirements of fire protection. Cross-tile (interlock) the pile if necessary.

There must be a space of at least 18 inches between the top of the pile and any sprinkler heads.

More space must be allowed if materials can burn easily. Never store items close to open light bulbs or hot pipes.

Trash containers shall be emptied on a regular basis. Debris shall not be allowed to gather next to them.

3.3. Manual Material Handling and Lifting

Inspect the object that is to be lifted to estimate its size and weight and to determine whether there are nails, splinters, or other items that might cause injury.

When lifting:

- Crouch as close to the object as practical,
- Get a good grip,
- Keep feet apart and bend knees,
- Lift slowly by straightening legs. Keep back straight. Leg muscles, not the back, should do the work.
- Avoid awkward lifting positions. Shift the body until a straight lift can be made.

If the object must be lifted to more than waist high, first lift the load waist high and then rest it on a support. Next, bend the knees again to give added leg muscle power for the final lift.

When carrying an object, do not try to change its position or adjust your grip while in motion. Stop and rest the object against a support while making the change.

When changing direction of travel, do not twist. Instead, turn the entire body, including your feet.

To set the load down, bend the legs, not the back. Follow the lifting procedure in reverse order. Always set one corner of the load down first, then slide your hands out so they will not get pinched.

Get help before handling a large or heavy object. When two or more people carry a load, it should be decided beforehand how it is to be handled. Routes and clearances should be checked. One person should act as the leader. The leader should be in position to watch and coach the others. Persons carrying a long object should be on the same side of the task and remain in step with each other.

If an object appears to be too heavy, get assistance.

3.4. Training

All employees shall be instructed in the housekeeping and lifting requirements set forth in this HSEP.

3.5. Environmental

One objective of good housekeeping is to minimize material losses in the form of spills and to prevent unnecessary waste generation. Spill avoidance results in a cleaner and safer workplace since spills can lead to slip and fall accidents and exposure. Some good housekeeping practices to consider adopting are to:

- Implement a predictive maintenance program to reduce the potential for equipment breakdown that can lead to inefficient operation and leakage.
- Curtail water use for spill clean up and use dry clean-up methods to minimize the volume of waste generated.
- Contain and recover spilled fluids for reuse or recycling. Squeeze from mop, wring from rags or absorbent mats, use a wet/dry vacuum.
- Periodically inspect storage container integrity and look for leaks. If found, transfer contents immediately into a new container.

- Use flange guards, double seals; use pumps with double mechanical seals; use bellow-sealed valves or canned (seal-less) pumps to reduce or eliminate the potential for leakage.
- Inspect inventory and other storage areas for improperly labeled containers and old or expired shelf-life materials. Assure that the Material Safety Data Sheet (MSDS) binder is complete and up-to-date.
- Review the MSDS for each new product brought on site. Products containing hazardous or toxic ingredients should not be used unless no safer viable alternative is available.
- Review the MSDSs with the clients' environmental staff. Some products may be prohibited from use in the state or local jurisdiction. Shipping prohibited products in from outside the area is unacceptable practice.
- Purchase products according to need and not on price alone. The "bargain" drum of product bought at discount is not a bargain if most of it must later be disposed of as hazardous waste. Do not accept "free" vendor samples unless you have an intended use for the product.
- Control inventory for "first-in, first-out" product flow and do not allow unrestricted access to chemicals and supplies. Studies have shown that there is a marked reduction in chemical use when workers must sign out or use a debit card for obtaining supplies.

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ATTACHMENT 2

Biological Hazards Photo Log

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Black Widow Spider: Note the red anvil on its back



Western Diamondback Rattlesnake



Poison Ivy: Three leaves



Mosquito



Tick

Appendix G
Standard Operating Procedures

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**USACE, OMAHA DISTRICT SOP:
SMALL ARMS RANGE CHARACTERIZATION OF LEAD USING X-RAY
FLUORESCENCE (XRF)**

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SOP 1 SOIL SAMPLING FOR CHEMICAL ANALYSIS AT SMALL ARMS RANGES

Objective

Soil samples will be collected for on-site and off-site chemical analysis to help characterize small arms ranges (SARs) and to determine the nature and extent of contamination in soil. SARs include those sites where ammunition of .50 caliber or less and projectiles not longer than four inches were fired from rifles, shotguns, pistols, and machine guns. SARs include pistol, rifle, skeet, and trap. The primary munitions and range-related debris at SARs are lead projectiles, spent cartridges, and clay target debris (in the case of skeet and trap ranges). The principal munitions constituents (MC) associated with SARs are heavy metals – primarily lead, and polynuclear [polycyclic] aromatic hydrocarbons (PAHs) – associated with the coal tar binding material in the clay targets at skeet and trap ranges. SARs are not anticipated to present explosive hazards.

Equipment and Materials

- Appropriate number and types of sample containers as specified in the Quality Assurance Project Plan (QAPP): typically 2-, 4-, and 8-ounce (oz) pre-cleaned glass jars; quart- (32 oz) and gallon- (128 oz) size plastic bags
 - Sampling equipment: split soil core samplers with/without liners, hand augers, shovels, trowels, disposable scoops
 - Location-marking equipment: GPS unit, marking flags or stakes
 - Sample coolers and wet ice
 - Appropriate field logbooks, documentation forms and labels, and indelible ink pens
- Decontamination equipment: cleaning solutions (e.g., phosphate-free detergent solutions [Alconox[®] or equivalent]); cleaning water including potable water and reagent water (e.g., distilled, deionized, carbon-filtered); cleaning brushes and cloths; and cleaning containers (e.g., buckets, tubs)
- Waste containers
 - Health and safety equipment, as specified in the Site Safety and Health Plan (SSHP), typically safety glasses, gloves, and hard hat

Procedure

1. Preliminary sample locations may be pre-determined based on the site conceptual model or subsequently determined based on a visual survey prior to sample collection.

2. Initially, non-munitions and other non-range-related debris, including vegetation and rocks, are removed from the ground surface at the designated location prior to soil sample collection. Munitions debris (e.g., cartridge/shell/bullet fragments, clay targets, shot) located on the ground surface at the designated location should be removed prior to soil sample collection and placed in a plastic bag labeled with the designation “MD”, the location identifier and depth interval, and the date/time of collection.
3. Collect a surface soil sample (0.0 to 0.5 foot below ground surface [bgs]) from an approximate 4- by 4-inch (0.33 by 0.33 foot) square area using a decontaminated shovel or trowel, disposable scoop, hand auger, or split core sampler (decontaminated or with a disposable liner).
4. Obtain subsequent subsurface soil samples if desired (generally in 0.5-foot increments) using a hand auger or other boring device (decontaminated or disposable), split core sampler (decontaminated or with a disposable liner), decontaminated shovel or trowel, or disposable scoop. Non-munitions and non-range-related debris, including vegetation and rocks, are removed from the hole prior to soil sample collection. Munitions debris (e.g., cartridge/shell/bullet fragments, clay targets, shot) should be removed prior to soil sample collection and placed in a plastic bag labeled with the designation “MD”, the location identifier and depth interval, and the date/time of collection.

Note: the upper portion of soil in a split core sampler potentially represents material that has fallen from above or has been scraped from the sides of the auger hole; therefore, consider whether this portion of soil is representative of the sampling interval prior to placing this portion in the sample container.

5. Place the soil sample in an appropriate sample container as follows:
 - a. If the soil sample is to be sent to an off-site laboratory for analysis, place the sample in pre-cleaned 4- to 8-oz jar(s) (unless otherwise specified in project planning documents).
 - b. If the soil sample is to be further prepared prior to on-site analysis or subsequent shipping to an off-site laboratory, place the sample in a quart- or gallon-size plastic bag(s) (unless otherwise specified in project planning documents).
4. Mark the sample location with a flag or stake for later surveying, or record location coordinates with a GPS unit.
5. Prepare and attach labels to the sample containers, and prepare sample chain-of-custody forms, in accordance with the SOP for Sample Identification, Labeling, and Shipment.
6. Decontaminate all sampling equipment in accordance with the SOP for Sampling Equipment Decontamination.
7. If in accordance with investigation-derived waste (IDW) procedures and project planning documents, return excess sample and associated decontamination water to the area from where it was collected and/or generated.
8. If necessary, containerize excess sample, decontamination water, and other IDW prior to disposal in accordance with IDW procedures and project planning documents.

SOP 2 SAMPLE IDENTIFICATION, LABELING, AND SHIPMENT

Objective

Sample identification, labeling, handling, and shipping will be performed in a manner that minimizes sample damage, loss, deterioration, and artifacts. Procedures described are designed to eliminate external contamination and to ensure data quality through the use of standardized documentation and labeling procedures.

Equipment and Materials

- Laboratory shipping addresses, contact names, and phone numbers
- Shipping account number (e.g., Federal Express account number)
- Sample container labels
- Chain-of-custody record forms
- Custody seals
- Coolers or other shipping containers
- Strapping tape, clear tape
- Packing material
- Disposable gloves (latex, nitrile, or other as appropriate)
- Pen with indelible ink
- Wet ice
- Temperature blank

Procedure

Sample Identification

Each sample will be assigned a unique designation, to be written on a sample label that will be permanently affixed to the sample container. Non-quality control (QC) field sample designations consist of a location identifier (Munitions Response Area [MRA] designation and location designation) that is associated with specific ground coordinates, combined with a unique field sample identifier. Field QC sample designations always consist of the location identifier 'FIELDQC', combined with a specific QC sample identifier according to the type of field QC sample. The following descriptions and examples show the approach and style to be used when designating field sample identifiers:

Designation/Identifier

Example

MRA Designation:

SR (Skeet Range);

Location Designation:

Three (3)-digit numeric designator (**001** through 999) for non-QC field samples with assignable geographic coordinates (x-value east/west, y-value north/south).

The character designator FIELDQC will apply to field QC samples.

Location ID:

SR001

Field Sample Designation:

Reference to the soil depth range collected, and field QC sample type if applicable, where:

A = 0.0 to 0.5 foot

D = 1.5 to 2.0 feet

B = 0.5 to 1.0 foot

E = 2.0 to 2.5 feet

C = 1.0 to 1.5 feet

F = 2.5 to 3.0 feet

DUP = field duplicate

EB = equipment blank

MS = matrix spike

MSD = matrix spike duplicate

Field Sample ID:

SR001ADUP

Examples:

- A surface soil sample (0.0 to 0.5 foot bgs) identified as location 001 collected at Cannon AFB MRA SR would be designated:

Location ID: SR001, Field Sample ID: SR001A

- A field QC duplicate soil sample collected from 2.0 to 2.5 feet at Cannon AFB MRA SR location 009 would be designated:

Location ID: SR009, Field Sample ID: SR009EDUP

- An equipment blank collected at Cannon AFB MRA SR would be designated:

Location ID: FIELDQC, Field Sample ID: EB

Sample Container Labels

The sample container label specifies critical sample information used to identify and track the sample from the time the sample is collected, during the time the sample is transferred between personnel, through the time the sample is subsequently analyzed and results reported. Each

individual sample container must have a completed label affixed to the container. The label should be completed with a waterproof marker, and it is suggested that the label be protected with clear tape when placed on a container. The minimum information to be listed on a sample container label includes the following:

- Project name or site area
- Field Sample ID
- Date and time (designated by 24-hour clock, local time) the sample was collected
- Sample matrix type
- Sampler's initials and affiliation
- Sample preservative, if any
- Analyses to be performed on the sample

Sample Packaging and Shipment

Samples should be packaged and shipped according to the following procedure:

1. Sample containers should be sealed immediately upon sample collection.
2. Completed sample labels should be placed on the sample containers after sealing the sample container.
3. Labeled samples containers should be carefully packed to prevent breakage using foam, plastic, or other cushioning material, and placed in appropriately-protective holding container such as a hard-sided cooler or study box.
4. Wet ice (do not use pre-frozen cooler packs such as "blue ice") should be placed in contact with sample containers requiring temperature preservation (the ice may be placed in sealed plastic bags). Large trash bags may be used to line holding containers to minimize the leakage of melted ice and ineffectively sealed sample containers.

Note: When temperature preservation is required, samples must be placed on ice immediately and/or stored at a temperature between 0 °C and 6 °C.

5. A plastic sample bottle filled with water and labeled 'TEMPERATURE BLANK' should be placed in shipping containers requiring temperature preservation to allow recording of the container temperature upon receipt at its destination.
6. Sample chain-of-custody (COC) record forms must be completed as the primary documentation for sample collection, sample custody transfers, and sample receipt (see attached example form).
7. If the holding container is to be shipped, completed COC record forms should be placed in a sealed plastic bag and attached to the inside lid of the shipping container.

Multiple custody seals listing the date and initials of the person sealing the shipping container should be applied and secured with a single layer of clear tape. When placed on coolers, the seal must overlap where the lid meets the body of the cooler.

8. If a weekend or holiday laboratory shipment is required, the laboratory should be contacted in advance to ensure that personnel will be available to receive the samples and begin analyses within required holding times.

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SOP 3 SAMPLING EQUIPMENT DECONTAMINATION AT SMALL ARMS RANGES

Objective

Decontamination is performed as a quality assurance (QA) measure and safety precaution. The following procedures outline the steps that should be followed to ensure equipment is clean prior to its initial use and to prevent contamination of successive samples. The decontamination process includes a suitable detergent wash and rinse, and the proper collection and disposal of all decontamination media.

Equipment and Materials

- Cleaning liquids such as soap or detergent solutions (Alconox[®] or equivalent), potable water, and distilled water
- Cleaning brushes, plastic spray bottles, spray attachments for bottles/tubing
- Cleaning containers such as plastic buckets or tubs
- Materials for wrapping/holding cleaned equipment such as aluminum foil or plastic sheeting
- Pump sprayers for dispensing rinse waters
- A high-pressure hot water sprayer for cleaning drill equipment (usually provided by the drilling subcontractor)
- Waste container types in accordance with the procedures for investigation-derived waste (IDW) and project planning documents.
- Health and safety equipment, as specified in the Site Safety and Health Plan (SSHP), typically safety glasses, gloves, and hard hat

Procedure

Small, reusable equipment is decontaminated first by removing visible substances and particles from the equipment, and then by brushing and successively rinsing with liquids that include soap or detergent solutions, potable water, and distilled water. Steam cleaning should be used whenever visible contamination exists on large machinery/vehicles. Following decontamination, if the equipment is not to be reused immediately, it should be stored and protected from contamination by wrapping in a protective material such as aluminum foil or plastic. The decontamination fluids shall be managed as specified in the IDW procedures and project

planning documents. All decontamination procedures will take place in the area specified by the Field Lead, and documented in field logbooks.

Pre-sampling Decontamination Activities

1. Dress in appropriate personal protective equipment (PPE), including gloves, as specified in the SSHP and as required for the specific work area.
2. Assemble containers and equipment for decontamination.
3. Decontaminate new equipment or equipment not previously decontaminated before use by the following procedure 'Decontaminating Sampling Equipment'.
4. Disposable equipment, including polyethylene tubing and disposable scoops, do not require decontamination prior to use.
5. If the protective wrapping on pre-cleaned equipment has been torn or if there is a question of its cleanliness, the equipment should be considered contaminated and undergo full decontamination procedures before use.

Decontaminating Sampling Equipment

1. Remove solid particles from the equipment or material by brushing and rinsing with potable water. This will remove gross contamination.
2. Wash equipment using a phosphate-free detergent solution (Alconox[®] or similar laboratory detergent).
3. Rinse the equipment with potable water.
4. Unless the equipment is going to be used immediately, it must be covered with protective wrapping (if using aluminum foil, place the shiny side out) to keep it clean until needed. For large bulky equipment, clean plastic sheeting can be substituted for aluminum foil.

Decontaminating Large Equipment

Large drilling equipment (rigs, drill rods, augers, drill bits, etc.) and other large pieces of field equipment must be high-pressure steam cleaned before and after use. Steam cleaning will be performed at an appropriate decontamination area specified by the Field Lead. The decontamination area shall be capable of containing decontamination fluids and solids if necessary. Additionally, equipment subcontractors have the responsibility of ensuring that their equipment is free of leaks (i.e., hydraulic fluid, oil, gas, etc.) that could contaminate the boreholes or other areas of the site.

Disposal of Decontamination Fluids

1. If in accordance with IDW procedures and project planning documents, return decontamination fluids either to the ground from where samples were collected or to the ground at the decontamination area.
2. If necessary, containerize the decontamination fluid and other IDW, prior to disposal in accordance with the procedures listed for IDW in project planning documents.

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SOP 4 SOIL SAMPLE PREPARATION PRIOR TO THE ANALYSIS OF METALS BY FPXRF

Objective

The physical characteristics of soil can affect the accuracy and precision of Field Portable X-Ray Fluorescence (FPXRF) spectrometry analyses. Therefore, specific sample preparation techniques will be used when necessary to reduce potential matrix effects, and ensure soil samples are relatively homogenous prior to analysis for metals by FPXRF. If these field techniques are not sufficient, the samples will be submitted to an off-site laboratory for analysis by inductively-coupled plasma - atomic emission spectrometry (ICP-AES), inductively-coupled plasma - mass spectrometry (ICP-MS), or graphite furnace atomic absorption (GFAA).

Equipment and Materials

- Appropriate number and types of sample containers as specified in the Quality Assurance Project Plan (QAPP): typically 2-, 4-, and 8-ounce (oz) pre-cleaned glass jars; quart- (32 oz) and gallon- (128 oz) size plastic bags
 - Stainless steel trowels, disposable scoops, spatulas, plastic spoons
 - Bowls, trays, pans (aluminum, plastic)
 - Plastic sheeting, butcher paper (Kraft paper)
 - Appropriate field logbooks, documentation forms and labels, and indelible ink pens
- Decontamination equipment: cleaning solutions (e.g., phosphate-free detergent solutions [Alconox[®] or equivalent]); cleaning water including potable water and reagent water (e.g., distilled, deionized, carbon-filtered); cleaning brushes and cloths; and cleaning containers (e.g., buckets, tubs)
- Waste containers
 - Health and safety equipment, as specified in the Site Safety and Health Plan (SSHP), typically safety glasses and gloves

Overview

The following procedures are used to obtain a relatively homogeneous soil sample prior to analysis for metals of concern by FPXRF. The sample homogeneity objective for the purposes of FPXRF metals analysis is a relatively dry sample (visually determined as not wet), and a relative standard deviation (RSD) of 20% or less for replicate measurements of a soil sample having a measured concentration greater than 50 milligrams per kilogram (mg/kg). A sufficient volume of material should be prepared to allow for testing by additional collaborative and/or determinative methods (e.g., ICP-AES, ICP-MS, or GFAA).

Procedure

Sample Inspection and Homogenization

1. Empty the sample container onto plastic sheeting or butcher paper, or into a tray, pan, or bowl of sufficient size to contain the entire sample. Spread the sample to as thin a layer as practical. Alternatively, proceed to Step 2 without first emptying the sample from its container.
2. Visually inspect and document the appearance of each sample, noting apparent soil moisture or lack thereof, and whether the sample appears to contain particles of similar types and sizes. Mix the soil using a spoon or spatula or use kneading techniques, and repeat the inspection/homogenization.
3. If vegetation or rock debris is found, remove the debris and return it to the site. Munitions and other range-related debris (e.g., cartridge/shell/bullet fragments, clay targets, shot) should be removed and placed in a plastic bag labeled with the designation “MD”, the location identifier and depth interval, and the date/time of original collection. Document the debris removal.
4. If the soil is relatively dry and the sample matrix is judged to be relatively homogenous (i.e., the sample appears to contain particles of uniform types and sizes), the sample may be analyzed by FPXRF without further sample preparation.
5. If the soil appears to be wet (e.g., visible water, sample readily clumps/holds together due to apparent moisture); or the sample matrix is judged to be relatively heterogeneous (i.e., the sample appears to contain particles of dissimilar types and sizes), prepare sample for off-site laboratory analysis for metals, as described in SOP 2 – Sample Identification, Labeling, and Shipment.

Appendix H
Microbac Laboratories, Inc. - Ohio Valley Division
ELAP Certifications

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State of Florida
Department of Health, Bureau of Laboratories
This is to certify that
E87551

MICROBAC LABORATORIES, INC., OHIO VALLEY DIVISION
158 STARLITE DRIVE
MARIETTA, OH 45750

has complied with Florida Administrative Code 64E-1,
for the examination of Environmental samples in the following categories

NON-POTABLE WATER - EXTRACTABLE ORGANICS, NON-POTABLE WATER - GENERAL CHEMISTRY, NON-POTABLE WATER - METALS,
NON-POTABLE WATER - PESTICIDES-HERBICIDES-PCB'S, NON-POTABLE WATER - VOLATILE ORGANICS, SOLID AND CHEMICAL MATERIALS -
EXTRACTABLE ORGANICS, SOLID AND CHEMICAL MATERIALS - PESTICIDES-HERBICIDES-PCB'S, SOLID AND CHEMICAL MATERIALS - GENERAL
CHEMISTRY, SOLID AND CHEMICAL MATERIALS - METALS, SOLID AND CHEMICAL MATERIALS - VOLATILE ORGANICS

Continued certification is contingent upon successful on-going compliance with the NELAC Standards and FAC Rule 64E-1 regulations. Specific methods and analytes certified are cited on the Laboratory Scope of Accreditation for this laboratory and are on file at the Bureau of Laboratories, P. O. Box 210, Jacksonville, Florida 32231. Clients and customers are urged to verify with this agency the laboratory's certification status in Florida for particular methods and analytes.

EFFECTIVE July 01, 2010 THROUGH June 30, 2011



A handwritten signature in black ink.

Max Salfinger, M.D.
Chief, Bureau of Laboratories
Florida Department of Health
DH Form 1697, 7/04

NON-TRANSFERABLE E87551-17-07/01/2010
Supersedes all previously issued certificates

Charlie Crist
Governor



Ana M. Viamonte Ros, M.D., M.P.H.
State Surgeon General

Laboratory Scope of Accreditation

Page 1 of 28

Attachment to Certificate #: E87551-17, expiration date June 30, 2011. This listing of accredited analytes should be used only when associated with a valid certificate.

State Laboratory ID: E87551

EPA Lab Code: OH00218

(740) 373-4071

E87551

**Microbac Laboratories, Inc., Ohio Valley Division
158 Starlite Drive
Marietta, OH 45750**

Matrix: Non-Potable Water

Analyte	Method/Tech	Category	Certification Type	Effective Date
1,1,1,2-Tetrachloroethane	EPA 8260	Volatile Organics	NELAP	7/1/2003
1,1,1-Trichloroethane	EPA 624	Volatile Organics	NELAP	5/16/2003
1,1,1-Trichloroethane	EPA 8260	Volatile Organics	NELAP	7/1/2003
1,1,2,2-Tetrachloroethane	EPA 624	Volatile Organics	NELAP	5/16/2003
1,1,2,2-Tetrachloroethane	EPA 8260	Volatile Organics	NELAP	7/1/2003
1,1,2-Trichloro-1,2,2-trifluoroethane	OVL MSV01/GC-MS	Volatile Organics	NELAP	5/7/2008
1,1,2-Trichloroethane	EPA 624	Volatile Organics	NELAP	5/16/2003
1,1,2-Trichloroethane	EPA 8260	Volatile Organics	NELAP	7/1/2003
1,1-Dichloroethane	EPA 624	Volatile Organics	NELAP	5/16/2003
1,1-Dichloroethane	EPA 8260	Volatile Organics	NELAP	7/1/2003
1,1-Dichloroethylene	EPA 624	Volatile Organics	NELAP	5/16/2003
1,1-Dichloroethylene	EPA 8260	Volatile Organics	NELAP	7/1/2003
1,1-Dichloropropene	EPA 8260	Volatile Organics	NELAP	7/1/2003
1,2,3-Trichlorobenzene	EPA 8260	Volatile Organics	NELAP	7/1/2003
1,2,3-Trichloropropane	EPA 8260	Volatile Organics	NELAP	7/1/2003
1,2,4,5-Tetrachlorobenzene	EPA 8270	Extractable Organics	NELAP	3/30/2006
1,2,4-Trichlorobenzene	EPA 625	Extractable Organics	NELAP	5/16/2003
1,2,4-Trichlorobenzene	EPA 8260	Volatile Organics	NELAP	7/1/2003
1,2,4-Trichlorobenzene	EPA 8270	Extractable Organics	NELAP	7/1/2003
1,2,4-Trimethylbenzene	EPA 8260	Volatile Organics	NELAP	7/1/2003
1,2-Dibromo-3-chloropropane (DBCP)	EPA 8011	Volatile Organics	NELAP	5/7/2008
1,2-Dibromo-3-chloropropane (DBCP)	EPA 8260	Volatile Organics	NELAP	7/1/2003
1,2-Dibromoethane (EDB, Ethylene dibromide)	EPA 8011	Volatile Organics	NELAP	5/7/2008
1,2-Dibromoethane (EDB, Ethylene dibromide)	EPA 8260	Volatile Organics	NELAP	7/1/2003
1,2-Dichlorobenzene	EPA 624	Volatile Organics	NELAP	5/16/2003
1,2-Dichlorobenzene	EPA 625	Extractable Organics	NELAP	5/16/2003
1,2-Dichlorobenzene	EPA 8260	Volatile Organics	NELAP	7/1/2003
1,2-Dichlorobenzene	EPA 8270	Extractable Organics	NELAP	7/1/2003
1,2-Dichloroethane	EPA 624	Volatile Organics	NELAP	5/16/2003
1,2-Dichloroethane	EPA 8260	Volatile Organics	NELAP	7/1/2003
1,2-Dichloropropane	EPA 624	Volatile Organics	NELAP	5/16/2003
1,2-Dichloropropane	EPA 8260	Volatile Organics	NELAP	7/1/2003
1,2-Diphenylhydrazine	EPA 8270	Extractable Organics	NELAP	3/30/2006
1,3,5-Trimethylbenzene	EPA 8260	Volatile Organics	NELAP	7/1/2003
1,3,5-Trinitrobenzene (1,3,5-TNB)	EPA 8330	Extractable Organics	NELAP	3/30/2006
1,3-Butadiene	OVL MSV01/GC-MS	Volatile Organics	NELAP	5/7/2008

Clients and Customers are urged to verify the laboratory's current certification status with the Environmental Laboratory Certification Program.

Issue Date: 7/1/2010

Expiration Date: 6/30/2011



Laboratory Scope of Accreditation

Attachment to Certificate #: E87551-17, expiration date June 30, 2011. This listing of accredited analytes should be used only when associated with a valid certificate.

State Laboratory ID: E87551

EPA Lab Code:

OH00218

(740) 373-4071

E87551

**Microbac Laboratories, Inc., Ohio Valley Division
158 Starlite Drive
Marietta, OH 45750**

Matrix: Non-Potable Water

Analyte	Method/Tech	Category	Certification Type	Effective Date
1,3-Dichlorobenzene	EPA 624	Volatile Organics	NELAP	5/16/2003
1,3-Dichlorobenzene	EPA 625	Extractable Organics	NELAP	5/16/2003
1,3-Dichlorobenzene	EPA 8260	Volatile Organics	NELAP	7/1/2003
1,3-Dichlorobenzene	EPA 8270	Extractable Organics	NELAP	7/1/2003
1,3-Dichloropropane	EPA 8260	Volatile Organics	NELAP	7/1/2003
1,3-Dinitrobenzene (1,3-DNB)	EPA 8330	Extractable Organics	NELAP	3/30/2006
1,4-Dichlorobenzene	EPA 624	Volatile Organics	NELAP	5/16/2003
1,4-Dichlorobenzene	EPA 625	Extractable Organics	NELAP	5/16/2003
1,4-Dichlorobenzene	EPA 8260	Volatile Organics	NELAP	7/1/2003
1,4-Dichlorobenzene	EPA 8270	Extractable Organics	NELAP	7/1/2003
1,4-Dioxane (1,4-Diethylenoxide)	EPA 8260	Volatile Organics	NELAP	7/1/2003
1,4-Naphthoquinone	EPA 8270	Extractable Organics	NELAP	3/30/2006
1,4-Phenylenediamine	EPA 8270	Extractable Organics	NELAP	3/30/2006
1-Chlorohexane	EPA 8260	Volatile Organics	NELAP	7/1/2003
1-Methylnaphthalene	OVL MSS01/GC-MS	Extractable Organics	NELAP	5/7/2008
1-Naphthylamine	EPA 8270	Extractable Organics	NELAP	3/30/2006
2,2-Dichloropropane	EPA 8260	Volatile Organics	NELAP	7/1/2003
2,3,4,6-Tetrachlorophenol	EPA 8270	Extractable Organics	NELAP	3/30/2006
2,4,5-T	EPA 8151	Pesticides-Herbicides-PCB's	NELAP	7/1/2003
2,4,5-Trichlorophenol	EPA 8270	Extractable Organics	NELAP	7/1/2003
2,4,6-Trichlorophenol	EPA 625	Extractable Organics	NELAP	5/16/2003
2,4,6-Trichlorophenol	EPA 8270	Extractable Organics	NELAP	7/1/2003
2,4,6-Trinitrotoluene (2,4,6-TNT)	EPA 8330	Extractable Organics	NELAP	3/30/2006
2,4-D	EPA 8151	Pesticides-Herbicides-PCB's	NELAP	7/1/2003
2,4-DB	EPA 8151	Pesticides-Herbicides-PCB's	NELAP	7/1/2003
2,4-Dichlorophenol	EPA 625	Extractable Organics	NELAP	5/16/2003
2,4-Dichlorophenol	EPA 8270	Extractable Organics	NELAP	7/1/2003
2,4-Dimethylphenol	EPA 625	Extractable Organics	NELAP	5/16/2003
2,4-Dimethylphenol	EPA 8270	Extractable Organics	NELAP	7/1/2003
2,4-Dinitrophenol	EPA 625	Extractable Organics	NELAP	5/16/2003
2,4-Dinitrophenol	EPA 8270	Extractable Organics	NELAP	7/1/2003
2,4-Dinitrotoluene (2,4-DNT)	EPA 625	Extractable Organics	NELAP	5/16/2003
2,4-Dinitrotoluene (2,4-DNT)	EPA 8270	Extractable Organics	NELAP	7/1/2003
2,4-Dinitrotoluene (2,4-DNT)	EPA 8330	Extractable Organics	NELAP	3/30/2006
2,6-Dichlorophenol	EPA 8270	Extractable Organics	NELAP	3/30/2006
2,6-Dinitrotoluene (2,6-DNT)	EPA 625	Extractable Organics	NELAP	5/16/2003

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Expiration Date: 6/30/2011



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State Laboratory ID: E87551

EPA Lab Code: OH00218

(740) 373-4071

E87551

**Microbac Laboratories, Inc., Ohio Valley Division
158 Starlite Drive
Marietta, OH 45750**

Matrix: Non-Potable Water

Analyte	Method/Tech	Category	Certification Type	Effective Date
2,6-Dinitrotoluene (2,6-DNT)	EPA 8270	Extractable Organics	NELAP	7/1/2003
2,6-Dinitrotoluene (2,6-DNT)	EPA 8330	Extractable Organics	NELAP	3/30/2006
2-Acetylaminofluorene	EPA 8270	Extractable Organics	NELAP	3/30/2006
2-Amino-4,6-dinitrotoluene (2-am-dnt)	EPA 8330	Extractable Organics	NELAP	3/30/2006
2-Butanone (Methyl ethyl ketone, MEK)	EPA 8260	Volatile Organics	NELAP	7/1/2003
2-Chloroethyl vinyl ether	EPA 624	Volatile Organics	NELAP	5/16/2003
2-Chloroethyl vinyl ether	EPA 8260	Volatile Organics	NELAP	7/1/2003
2-Chloronaphthalene	EPA 625	Extractable Organics	NELAP	5/16/2003
2-Chloronaphthalene	EPA 8270	Extractable Organics	NELAP	7/1/2003
2-Chlorophenol	EPA 625	Extractable Organics	NELAP	5/16/2003
2-Chlorophenol	EPA 8270	Extractable Organics	NELAP	7/1/2003
2-Chlorotoluene	EPA 8260	Volatile Organics	NELAP	7/1/2003
2-Hexanone	EPA 8260	Volatile Organics	NELAP	7/1/2003
2-Methyl-4,6-dinitrophenol	EPA 625	Extractable Organics	NELAP	5/16/2003
2-Methyl-4,6-dinitrophenol	EPA 8270	Extractable Organics	NELAP	7/1/2003
2-Methylnaphthalene	EPA 8270	Extractable Organics	NELAP	7/1/2003
2-Methylphenol (o-Cresol)	EPA 8270	Extractable Organics	NELAP	7/1/2003
2-Naphthylamine	EPA 8270	Extractable Organics	NELAP	3/30/2006
2-Nitroaniline	EPA 8270	Extractable Organics	NELAP	7/1/2003
2-Nitrophenol	EPA 625	Extractable Organics	NELAP	5/16/2003
2-Nitrophenol	EPA 8270	Extractable Organics	NELAP	7/1/2003
2-Nitropropane	EPA 8260	Volatile Organics	NELAP	7/1/2003
2-Nitrotoluene	EPA 8330	Extractable Organics	NELAP	3/30/2006
2-Picoline (2-Methylpyridine)	EPA 8270	Extractable Organics	NELAP	3/30/2006
3,3'-Dichlorobenzidine	EPA 625	Extractable Organics	NELAP	5/16/2003
3,3'-Dichlorobenzidine	EPA 8270	Extractable Organics	NELAP	7/1/2003
3,3'-Dimethylbenzidine	EPA 8270	Extractable Organics	NELAP	3/30/2006
3-Methylcholanthrene	EPA 8270	Extractable Organics	NELAP	3/30/2006
3-Methylphenol (m-Cresol)	EPA 8270	Extractable Organics	NELAP	3/30/2006
3-Nitroaniline	EPA 8270	Extractable Organics	NELAP	7/1/2003
3-Nitrotoluene	EPA 8330	Extractable Organics	NELAP	3/30/2006
4,4'-DDD	EPA 608	Pesticides-Herbicides-PCB's	NELAP	5/16/2003
4,4'-DDD	EPA 8081	Pesticides-Herbicides-PCB's	NELAP	7/1/2003
4,4'-DDE	EPA 608	Pesticides-Herbicides-PCB's	NELAP	5/16/2003
4,4'-DDE	EPA 8081	Pesticides-Herbicides-PCB's	NELAP	7/1/2003
4,4'-DDT	EPA 608	Pesticides-Herbicides-PCB's	NELAP	5/16/2003

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Issue Date: 7/1/2010

Expiration Date: 6/30/2011



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State Laboratory ID: E87551

EPA Lab Code: OH00218

(740) 373-4071

E87551

**Microbac Laboratories, Inc., Ohio Valley Division
158 Starlite Drive
Marietta, OH 45750**

Matrix: Non-Potable Water

Analyte	Method/Tech	Category	Certification Type	Effective Date
4,4'-DDT	EPA 8081	Pesticides-Herbicides-PCB's	NELAP	7/1/2003
4-Amino-2,6-dinitrotoluene (4-am-dnt)	EPA 8330	Extractable Organics	NELAP	3/30/2006
4-Aminobiphenyl	EPA 8270	Extractable Organics	NELAP	3/30/2006
4-Bromophenyl phenyl ether	EPA 625	Extractable Organics	NELAP	5/16/2003
4-Bromophenyl phenyl ether	EPA 8270	Extractable Organics	NELAP	7/1/2003
4-Chloro-3-methylphenol	EPA 625	Extractable Organics	NELAP	5/16/2003
4-Chloro-3-methylphenol	EPA 8270	Extractable Organics	NELAP	7/1/2003
4-Chloroaniline	EPA 8270	Extractable Organics	NELAP	3/30/2006
4-Chlorophenyl phenylether	EPA 625	Extractable Organics	NELAP	5/16/2003
4-Chlorophenyl phenylether	EPA 8270	Extractable Organics	NELAP	7/1/2003
4-Chlorotoluene	EPA 8260	Volatile Organics	NELAP	7/1/2003
4-Dimethyl aminoazobenzene	EPA 8270	Extractable Organics	NELAP	3/30/2006
4-Methyl-2-pentanone (MIBK)	EPA 8260	Volatile Organics	NELAP	7/1/2003
4-Methylphenol (p-Cresol)	EPA 8270	Extractable Organics	NELAP	7/1/2003
4-Nitroaniline	EPA 8270	Extractable Organics	NELAP	7/1/2003
4-Nitrophenol	EPA 625	Extractable Organics	NELAP	5/16/2003
4-Nitrophenol	EPA 8270	Extractable Organics	NELAP	7/1/2003
4-Nitrotoluene	EPA 8330	Extractable Organics	NELAP	3/30/2006
5-Nitro-o-toluidine	EPA 8270	Extractable Organics	NELAP	3/30/2006
7,12-Dimethylbenz(a) anthracene	EPA 8270	Extractable Organics	NELAP	3/30/2006
a-a-Dimethylphenethylamine	EPA 8270	Extractable Organics	NELAP	3/30/2006
Acenaphthene	EPA 625	Extractable Organics	NELAP	5/16/2003
Acenaphthene	EPA 8270	Extractable Organics	NELAP	7/1/2003
Acenaphthylene	EPA 625	Extractable Organics	NELAP	5/16/2003
Acenaphthylene	EPA 8270	Extractable Organics	NELAP	7/1/2003
Acetic acid	OVL HPLC03/HPLC-UV	Extractable Organics	NELAP	5/7/2008
Acetone	EPA 8260	Volatile Organics	NELAP	7/1/2003
Acetonitrile	EPA 8260	Volatile Organics	NELAP	7/1/2003
Acetophenone	EPA 8270	Extractable Organics	NELAP	3/30/2006
Acetylene	OVL RSK01/GC-FID	Volatile Organics	NELAP	5/7/2008
Acidity, as CaCO3	EPA 305.1	General Chemistry	NELAP	5/16/2003
Acidity, as CaCO3	SM 2310 B (4A)	General Chemistry	NELAP	4/17/2007
Acrolein (Propenal)	EPA 624	Volatile Organics	NELAP	5/16/2003
Acrolein (Propenal)	EPA 8260	Volatile Organics	NELAP	7/1/2003
Acrylonitrile	EPA 624	Volatile Organics	NELAP	5/16/2003
Acrylonitrile	EPA 8260	Volatile Organics	NELAP	7/1/2003

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Issue Date: 7/1/2010

Expiration Date: 6/30/2011



Laboratory Scope of Accreditation

Attachment to Certificate #: E87551-17, expiration date June 30, 2011. This listing of accredited analytes should be used only when associated with a valid certificate.

State Laboratory ID: E87551

EPA Lab Code:

OH00218

(740) 373-4071

E87551

Microbac Laboratories, Inc., Ohio Valley Division
158 Starlite Drive
Marietta, OH 45750

Matrix: Non-Potable Water

Analyte	Method/Tech	Category	Certification Type	Effective Date
Aldrin	EPA 608	Pesticides-Herbicides-PCB's	NELAP	5/16/2003
Aldrin	EPA 8081	Pesticides-Herbicides-PCB's	NELAP	7/1/2003
Alkalinity as CaCO3	EPA 310.2	General Chemistry	NELAP	5/16/2003
Alkalinity as CaCO3	SM 2320 B	General Chemistry	NELAP	5/16/2003
Allyl chloride (3-Chloropropene)	EPA 8260	Volatile Organics	NELAP	3/30/2006
alpha-BHC (alpha-Hexachlorocyclohexane)	EPA 608	Pesticides-Herbicides-PCB's	NELAP	5/16/2003
alpha-BHC (alpha-Hexachlorocyclohexane)	EPA 8081	Pesticides-Herbicides-PCB's	NELAP	7/1/2003
alpha-Chlordane	EPA 8081	Pesticides-Herbicides-PCB's	NELAP	3/30/2006
Aluminum	EPA 200.7	Metals	NELAP	5/16/2003
Aluminum	EPA 6010	Metals	NELAP	7/1/2003
Amenable cyanide	EPA 335.1	General Chemistry	NELAP	5/16/2003
Amenable cyanide	EPA 9010/9014	General Chemistry	NELAP	5/7/2008
Amenable cyanide	SM 4500-CN G	General Chemistry	NELAP	4/17/2007
Ammonia as N	EPA 350.1	General Chemistry	NELAP	5/16/2003
Aniline	EPA 8270	Extractable Organics	NELAP	7/1/2003
Anthracene	EPA 625	Extractable Organics	NELAP	5/16/2003
Anthracene	EPA 8270	Extractable Organics	NELAP	7/1/2003
Antimony	EPA 200.7	Metals	NELAP	5/16/2003
Antimony	EPA 200.8	Metals	NELAP	5/16/2003
Antimony	EPA 6010	Metals	NELAP	7/1/2003
Antimony	EPA 6020	Metals	NELAP	7/1/2003
Aramite	EPA 8270	Extractable Organics	NELAP	3/30/2006
Aroclor-1016 (PCB-1016)	EPA 608	Pesticides-Herbicides-PCB's	NELAP	5/16/2003
Aroclor-1016 (PCB-1016)	EPA 8082	Pesticides-Herbicides-PCB's	NELAP	7/1/2003
Aroclor-1221 (PCB-1221)	EPA 608	Pesticides-Herbicides-PCB's	NELAP	5/16/2003
Aroclor-1221 (PCB-1221)	EPA 8082	Pesticides-Herbicides-PCB's	NELAP	7/1/2003
Aroclor-1232 (PCB-1232)	EPA 608	Pesticides-Herbicides-PCB's	NELAP	5/16/2003
Aroclor-1232 (PCB-1232)	EPA 8082	Pesticides-Herbicides-PCB's	NELAP	7/1/2003
Aroclor-1242 (PCB-1242)	EPA 608	Pesticides-Herbicides-PCB's	NELAP	5/16/2003
Aroclor-1242 (PCB-1242)	EPA 8082	Pesticides-Herbicides-PCB's	NELAP	7/1/2003
Aroclor-1248 (PCB-1248)	EPA 608	Pesticides-Herbicides-PCB's	NELAP	5/16/2003
Aroclor-1248 (PCB-1248)	EPA 8082	Pesticides-Herbicides-PCB's	NELAP	7/1/2003
Aroclor-1254 (PCB-1254)	EPA 608	Pesticides-Herbicides-PCB's	NELAP	5/16/2003
Aroclor-1254 (PCB-1254)	EPA 8082	Pesticides-Herbicides-PCB's	NELAP	7/1/2003
Aroclor-1260 (PCB-1260)	EPA 608	Pesticides-Herbicides-PCB's	NELAP	5/16/2003
Aroclor-1260 (PCB-1260)	EPA 8082	Pesticides-Herbicides-PCB's	NELAP	7/1/2003

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Expiration Date: 6/30/2011



Laboratory Scope of Accreditation

Attachment to Certificate #: E87551-17, expiration date June 30, 2011. This listing of accredited analytes should be used only when associated with a valid certificate.

State Laboratory ID: E87551

EPA Lab Code: OH00218

(740) 373-4071

E87551

**Microbac Laboratories, Inc., Ohio Valley Division
158 Starlite Drive
Marietta, OH 45750**

Matrix: Non-Potable Water

Analyte	Method/Tech	Category	Certification Type	Effective Date
Arsenic	EPA 200.7	Metals	NELAP	5/16/2003
Arsenic	EPA 200.8	Metals	NELAP	5/16/2003
Arsenic	EPA 6010	Metals	NELAP	7/1/2003
Arsenic	EPA 6020	Metals	NELAP	7/1/2003
Atrazine	OVL MSS04/GC-MS	Pesticides-Herbicides-PCB's	NELAP	5/7/2008
Barium	EPA 200.7	Metals	NELAP	5/16/2003
Barium	EPA 200.8	Metals	NELAP	3/30/2006
Barium	EPA 6010	Metals	NELAP	7/1/2003
Barium	EPA 6020	Metals	NELAP	3/30/2006
Benzaldehyde	OVL MSS01/GC-MS	Extractable Organics	NELAP	5/7/2008
Benzene	EPA 624	Volatile Organics	NELAP	5/16/2003
Benzene	EPA 8260	Volatile Organics	NELAP	7/1/2003
Benzidine	EPA 625	Extractable Organics	NELAP	5/16/2003
Benzidine	EPA 8270	Extractable Organics	NELAP	3/30/2006
Benzo(a)anthracene	EPA 625	Extractable Organics	NELAP	5/16/2003
Benzo(a)anthracene	EPA 8270	Extractable Organics	NELAP	7/1/2003
Benzo(a)pyrene	EPA 625	Extractable Organics	NELAP	5/16/2003
Benzo(a)pyrene	EPA 8270	Extractable Organics	NELAP	7/1/2003
Benzo(b)fluoranthene	EPA 625	Extractable Organics	NELAP	5/16/2003
Benzo(b)fluoranthene	EPA 8270	Extractable Organics	NELAP	7/1/2003
Benzo(g,h,i)perylene	EPA 625	Extractable Organics	NELAP	5/16/2003
Benzo(g,h,i)perylene	EPA 8270	Extractable Organics	NELAP	7/1/2003
Benzo(k)fluoranthene	EPA 625	Extractable Organics	NELAP	5/16/2003
Benzo(k)fluoranthene	EPA 8270	Extractable Organics	NELAP	7/1/2003
Benzoic acid	EPA 8270	Extractable Organics	NELAP	7/1/2003
Benzyl alcohol	EPA 8270	Extractable Organics	NELAP	7/1/2003
Beryllium	EPA 200.7	Metals	NELAP	5/16/2003
Beryllium	EPA 6010	Metals	NELAP	7/1/2003
beta-BHC (beta-Hexachlorocyclohexane)	EPA 608	Pesticides-Herbicides-PCB's	NELAP	5/16/2003
beta-BHC (beta-Hexachlorocyclohexane)	EPA 8081	Pesticides-Herbicides-PCB's	NELAP	7/1/2003
Biochemical oxygen demand	EPA 405.1	General Chemistry	NELAP	5/16/2003
Biochemical oxygen demand	SM 5210 B	General Chemistry	NELAP	5/16/2003
Biphenyl	OVL MSS01/GC-MS	Extractable Organics	NELAP	5/7/2008
bis(2-Chloroethoxy)methane	EPA 625	Extractable Organics	NELAP	5/16/2003
bis(2-Chloroethoxy)methane	EPA 8270	Extractable Organics	NELAP	7/1/2003
bis(2-Chloroethyl) ether	EPA 625	Extractable Organics	NELAP	5/16/2003

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**Microbac Laboratories, Inc., Ohio Valley Division
158 Starlite Drive
Marietta, OH 45750**

Matrix: Non-Potable Water

Analyte	Method/Tech	Category	Certification Type	Effective Date
bis(2-Chloroethyl) ether	EPA 8270	Extractable Organics	NELAP	7/1/2003
bis(2-Chloroisopropyl) ether (2,2'-Oxybis(1-chloropropane))	EPA 625	Extractable Organics	NELAP	5/16/2003
bis(2-Chloroisopropyl) ether (2,2'-Oxybis(1-chloropropane))	EPA 8270	Extractable Organics	NELAP	7/1/2003
bis(2-Ethylhexyl) phthalate (DEHP)	EPA 625	Extractable Organics	NELAP	5/16/2003
bis(2-Ethylhexyl) phthalate (DEHP)	EPA 8270	Extractable Organics	NELAP	7/1/2003
Boron	EPA 200.7	Metals	NELAP	5/16/2003
Boron	EPA 6010	Metals	NELAP	7/1/2003
Bromide	EPA 300.0	General Chemistry	NELAP	5/16/2003
Bromide	EPA 9056	General Chemistry	NELAP	5/7/2008
Bromobenzene	EPA 8260	Volatile Organics	NELAP	7/1/2003
Bromochloromethane	EPA 8260	Volatile Organics	NELAP	7/1/2003
Bromodichloromethane	EPA 624	Volatile Organics	NELAP	5/16/2003
Bromodichloromethane	EPA 8260	Volatile Organics	NELAP	7/1/2003
Bromoform	EPA 624	Volatile Organics	NELAP	5/16/2003
Bromoform	EPA 8260	Volatile Organics	NELAP	7/1/2003
Butyl benzyl phthalate	EPA 625	Extractable Organics	NELAP	5/16/2003
Butyl benzyl phthalate	EPA 8270	Extractable Organics	NELAP	7/1/2003
Butyric acid (Butanoic acid)	OVL HPLC03/HPLC-UV	Extractable Organics	NELAP	5/7/2008
Cadmium	EPA 200.7	Metals	NELAP	5/16/2003
Cadmium	EPA 200.8	Metals	NELAP	3/30/2006
Cadmium	EPA 6010	Metals	NELAP	7/1/2003
Cadmium	EPA 6020	Metals	NELAP	3/30/2006
Calcium	EPA 200.7	Metals	NELAP	5/16/2003
Calcium	EPA 6010	Metals	NELAP	7/1/2003
Caprolactam	OVL MSS01/GC-MS	Extractable Organics	NELAP	5/7/2008
Carbazole	EPA 8270	Extractable Organics	NELAP	3/30/2006
Carbon dioxide	RSK-175	Volatile Organics	NELAP	3/30/2006
Carbon disulfide	EPA 8260	Volatile Organics	NELAP	7/1/2003
Carbon tetrachloride	EPA 624	Volatile Organics	NELAP	5/16/2003
Carbon tetrachloride	EPA 8260	Volatile Organics	NELAP	7/1/2003
Carbonaceous BOD (CBOD)	SM 5210 B	General Chemistry	NELAP	5/16/2003
Chemical oxygen demand	EPA 410.4	General Chemistry	NELAP	5/16/2003
Chemical oxygen demand	HACH 8000	General Chemistry	NELAP	5/16/2003
Chlordane (tech.)	EPA 608	Pesticides-Herbicides-PCB's	NELAP	5/16/2003
Chlordane (tech.)	EPA 8081	Pesticides-Herbicides-PCB's	NELAP	7/1/2003

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E87551

Microbac Laboratories, Inc., Ohio Valley Division
158 Starlite Drive
Marietta, OH 45750

Matrix: Non-Potable Water

Analyte	Method/Tech	Category	Certification Type	Effective Date
Chloride	EPA 300.0	General Chemistry	NELAP	5/16/2003
Chloride	EPA 325.2	General Chemistry	NELAP	5/16/2003
Chloride	EPA 9056	General Chemistry	NELAP	5/7/2008
Chlorobenzene	EPA 624	Volatile Organics	NELAP	5/16/2003
Chlorobenzene	EPA 8260	Volatile Organics	NELAP	7/1/2003
Chlorobenzilate	EPA 8270	Pesticides-Herbicides-PCB's	NELAP	3/30/2006
Chloroethane	EPA 624	Volatile Organics	NELAP	5/16/2003
Chloroethane	EPA 8260	Volatile Organics	NELAP	7/1/2003
Chloroform	EPA 624	Volatile Organics	NELAP	5/16/2003
Chloroform	EPA 8260	Volatile Organics	NELAP	7/1/2003
Chloroprene	EPA 8260	Volatile Organics	NELAP	3/30/2006
Chromium	EPA 200.7	Metals	NELAP	5/16/2003
Chromium	EPA 200.8	Metals	NELAP	3/30/2006
Chromium	EPA 6010	Metals	NELAP	7/1/2003
Chromium	EPA 6020	Metals	NELAP	3/30/2006
Chromium VI	EPA 7196	General Chemistry	NELAP	3/30/2006
Chromium VI	SM 3500-Cr B (20th/21st Ed.)/UV-VIS	General Chemistry	NELAP	5/7/2008
Chromium VI	SM 3500-Cr D (18th/19th Ed.)/UV-VIS	Metals	NELAP	5/16/2003
Chrysene	EPA 625	Extractable Organics	NELAP	5/16/2003
Chrysene	EPA 8270	Extractable Organics	NELAP	3/30/2006
cis-1,2-Dichloroethylene	EPA 8260	Volatile Organics	NELAP	7/1/2003
cis-1,3-Dichloropropene	EPA 624	Volatile Organics	NELAP	5/16/2003
cis-1,3-Dichloropropene	EPA 8260	Volatile Organics	NELAP	7/1/2003
Cobalt	EPA 200.7	Metals	NELAP	5/16/2003
Cobalt	EPA 200.8	Metals	NELAP	3/30/2006
Cobalt	EPA 6010	Metals	NELAP	7/1/2003
Cobalt	EPA 6020	Metals	NELAP	3/30/2006
Color	EPA 110.2	General Chemistry	NELAP	5/16/2003
Color	SM 2120 B	General Chemistry	NELAP	4/17/2007
Conductivity	EPA 120.1	General Chemistry	NELAP	5/16/2003
Copper	EPA 200.7	Metals	NELAP	5/16/2003
Copper	EPA 200.8	Metals	NELAP	3/30/2006
Copper	EPA 6010	Metals	NELAP	7/1/2003
Copper	EPA 6020	Metals	NELAP	3/30/2006
Cyanide	EPA 335.2	General Chemistry	NELAP	5/16/2003

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State Laboratory ID: E87551

EPA Lab Code:

OH00218

(740) 373-4071

E87551

Microbac Laboratories, Inc., Ohio Valley Division
158 Starlite Drive
Marietta, OH 45750

Matrix: Non-Potable Water

Analyte	Method/Tech	Category	Certification Type	Effective Date
Cyanide	SM 4500-CN E	General Chemistry	NELAP	4/17/2007
Cyclohexane	OVL MSV01/GC-MS	Volatile Organics	NELAP	5/7/2008
Cyclohexanone	OVL MSV01/GC-MS	Volatile Organics	NELAP	5/7/2008
Dalapon	EPA 8151	Pesticides-Herbicides-PCB's	NELAP	7/1/2003
delta-BHC	EPA 608	Pesticides-Herbicides-PCB's	NELAP	5/16/2003
delta-BHC	EPA 8081	Pesticides-Herbicides-PCB's	NELAP	7/1/2003
Diallate	EPA 8270	Pesticides-Herbicides-PCB's	NELAP	3/30/2006
Dibenz(a,h)anthracene	EPA 625	Extractable Organics	NELAP	5/16/2003
Dibenz(a,h)anthracene	EPA 8270	Extractable Organics	NELAP	7/1/2003
Dibenzofuran	EPA 8270	Extractable Organics	NELAP	7/1/2003
Dibromochloromethane	EPA 624	Volatile Organics	NELAP	5/16/2003
Dibromochloromethane	EPA 8260	Volatile Organics	NELAP	7/1/2003
Dibromofluoromethane	EPA 8260	Volatile Organics	NELAP	7/1/2003
Dibromomethane	EPA 8260	Volatile Organics	NELAP	7/1/2003
Dicamba	EPA 8151	Pesticides-Herbicides-PCB's	NELAP	7/1/2003
Dichlorodifluoromethane	EPA 8260	Volatile Organics	NELAP	7/1/2003
Dichloroprop (Dichlorprop)	EPA 8151	Pesticides-Herbicides-PCB's	NELAP	7/1/2003
Dieldrin	EPA 608	Pesticides-Herbicides-PCB's	NELAP	5/16/2003
Dieldrin	EPA 8081	Pesticides-Herbicides-PCB's	NELAP	7/1/2003
Diesel range organics (DRO)	EPA 8015	Extractable Organics	NELAP	3/30/2006
Diesel range organics (DRO)	TX1005	Extractable Organics	NELAP	3/30/2006
Diethyl ether	EPA 8260	Volatile Organics	NELAP	3/30/2006
Diethyl phthalate	EPA 625	Extractable Organics	NELAP	5/16/2003
Diethyl phthalate	EPA 8270	Extractable Organics	NELAP	7/1/2003
Di-isopropylether (DIPE)	OVL MSV01/GC-MS	Volatile Organics	NELAP	5/7/2008
Dimethoate	EPA 8270	Pesticides-Herbicides-PCB's	NELAP	3/30/2006
Dimethyl phthalate	EPA 625	Extractable Organics	NELAP	5/16/2003
Dimethyl phthalate	EPA 8270	Extractable Organics	NELAP	7/1/2003
Dimethyl sulfide	OVL MSV01/GC-MS	Volatile Organics	NELAP	5/7/2008
Dimethyldisulfide	OVL MSV01/GC-MS	Volatile Organics	NELAP	5/7/2008
Di-n-butyl phthalate	EPA 625	Extractable Organics	NELAP	5/16/2003
Di-n-butyl phthalate	EPA 8270	Extractable Organics	NELAP	7/1/2003
Di-n-octyl phthalate	EPA 625	Extractable Organics	NELAP	5/16/2003
Di-n-octyl phthalate	EPA 8270	Extractable Organics	NELAP	7/1/2003
Dinoseb (2-sec-butyl-4,6-dinitrophenol, DNBP)	EPA 8151	Pesticides-Herbicides-PCB's	NELAP	7/1/2003
Dinoseb (2-sec-butyl-4,6-dinitrophenol, DNBP)	EPA 8270	Extractable Organics	NELAP	3/30/2006

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State Laboratory ID: E87551

EPA Lab Code: OH00218

(740) 373-4071

E87551

**Microbac Laboratories, Inc., Ohio Valley Division
158 Starlite Drive
Marietta, OH 45750**

Matrix: Non-Potable Water

Analyte	Method/Tech	Category	Certification Type	Effective Date
Diphenylamine	EPA 8270	Extractable Organics	NELAP	3/30/2006
Disulfoton	EPA 8270	Pesticides-Herbicides-PCB's	NELAP	3/30/2006
Endosulfan I	EPA 608	Pesticides-Herbicides-PCB's	NELAP	5/16/2003
Endosulfan I	EPA 8081	Pesticides-Herbicides-PCB's	NELAP	7/1/2003
Endosulfan II	EPA 608	Pesticides-Herbicides-PCB's	NELAP	5/16/2003
Endosulfan II	EPA 8081	Pesticides-Herbicides-PCB's	NELAP	7/1/2003
Endosulfan sulfate	EPA 608	Pesticides-Herbicides-PCB's	NELAP	5/16/2003
Endosulfan sulfate	EPA 8081	Pesticides-Herbicides-PCB's	NELAP	7/1/2003
Endrin	EPA 608	Pesticides-Herbicides-PCB's	NELAP	5/16/2003
Endrin	EPA 8081	Pesticides-Herbicides-PCB's	NELAP	7/1/2003
Endrin aldehyde	EPA 608	Pesticides-Herbicides-PCB's	NELAP	5/16/2003
Endrin aldehyde	EPA 8081	Pesticides-Herbicides-PCB's	NELAP	7/1/2003
Endrin ketone	EPA 8081	Pesticides-Herbicides-PCB's	NELAP	7/1/2003
Ethane	RSK-175	Volatile Organics	NELAP	3/30/2006
Ethanol	EPA 8015	Volatile Organics	NELAP	5/7/2008
Ethyl acetate	EPA 8260	Volatile Organics	NELAP	3/30/2006
Ethyl methacrylate	EPA 8260	Volatile Organics	NELAP	3/30/2006
Ethyl methanesulfonate	EPA 8270	Extractable Organics	NELAP	3/30/2006
Ethylbenzene	EPA 624	Volatile Organics	NELAP	5/16/2003
Ethylbenzene	EPA 8260	Volatile Organics	NELAP	7/1/2003
Ethylene	RSK-175	Volatile Organics	NELAP	3/30/2006
Ethyl-t-butylether (ETBE)	OVL MSV01/GC-MS	Volatile Organics	NELAP	5/7/2008
Famphur	EPA 8270	Pesticides-Herbicides-PCB's	NELAP	3/30/2006
Fluoranthene	EPA 625	Extractable Organics	NELAP	5/16/2003
Fluoranthene	EPA 8270	Extractable Organics	NELAP	7/1/2003
Fluorene	EPA 625	Extractable Organics	NELAP	5/16/2003
Fluorene	EPA 8270	Extractable Organics	NELAP	7/1/2003
Fluoride	EPA 300.0	General Chemistry	NELAP	5/16/2003
Fluoride	EPA 340.2	General Chemistry	NELAP	5/16/2003
Fluoride	EPA 9056	General Chemistry	NELAP	5/7/2008
Fluoride	SM 4500 F-C	General Chemistry	NELAP	5/16/2003
Formaldehyde	EPA 8315	Extractable Organics	NELAP	5/7/2008
gamma-BHC (Lindane, gamma-Hexachlorocyclohexane)	EPA 608	Pesticides-Herbicides-PCB's	NELAP	5/16/2003
gamma-BHC (Lindane, gamma-Hexachlorocyclohexane)	EPA 8081	Pesticides-Herbicides-PCB's	NELAP	7/1/2003
gamma-Chlordane	EPA 8081	Pesticides-Herbicides-PCB's	NELAP	3/30/2006

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OH00218

(740) 373-4071

E87551

**Microbac Laboratories, Inc., Ohio Valley Division
158 Starlite Drive
Marietta, OH 45750**

Matrix: Non-Potable Water

Analyte	Method/Tech	Category	Certification Type	Effective Date
Gasoline range organics (GRO)	EPA 8015	Volatile Organics	NELAP	3/30/2006
Hardness	EPA 130.2	General Chemistry	NELAP	5/16/2003
Hardness	SM 2340 B	General Chemistry	NELAP	5/16/2003
Hardness	SM 2340 C	General Chemistry	NELAP	4/17/2007
Heptachlor	EPA 608	Pesticides-Herbicides-PCB's	NELAP	5/16/2003
Heptachlor	EPA 8081	Pesticides-Herbicides-PCB's	NELAP	7/1/2003
Heptachlor epoxide	EPA 608	Pesticides-Herbicides-PCB's	NELAP	5/16/2003
Heptachlor epoxide	EPA 8081	Pesticides-Herbicides-PCB's	NELAP	7/1/2003
Hexachlorobenzene	EPA 625	Extractable Organics	NELAP	5/16/2003
Hexachlorobenzene	EPA 8270	Extractable Organics	NELAP	7/1/2003
Hexachlorobutadiene	EPA 625	Extractable Organics	NELAP	5/16/2003
Hexachlorobutadiene	EPA 8260	Volatile Organics	NELAP	7/1/2003
Hexachlorobutadiene	EPA 8270	Extractable Organics	NELAP	7/1/2003
Hexachlorocyclopentadiene	EPA 625	Extractable Organics	NELAP	5/16/2003
Hexachlorocyclopentadiene	EPA 8270	Extractable Organics	NELAP	7/1/2003
Hexachloroethane	EPA 625	Extractable Organics	NELAP	5/16/2003
Hexachloroethane	EPA 8270	Extractable Organics	NELAP	7/1/2003
Hexachlorophene	EPA 8270	Extractable Organics	NELAP	3/30/2006
Hexachloropropene	EPA 8270	Extractable Organics	NELAP	3/30/2006
Hexamethylphosphoramide (HMPA)	OVL MSS01/GC-MS	Extractable Organics	NELAP	5/7/2008
Ignitability	EPA 1010	General Chemistry	NELAP	7/1/2003
Indeno(1,2,3-cd)pyrene	EPA 625	Extractable Organics	NELAP	5/16/2003
Indeno(1,2,3-cd)pyrene	EPA 8270	Extractable Organics	NELAP	7/1/2003
Iodomethane (Methyl iodide)	EPA 8260	Volatile Organics	NELAP	3/30/2006
Iron	EPA 200.7	Metals	NELAP	5/16/2003
Iron	EPA 6010	Metals	NELAP	7/1/2003
Isobutane	OVL RSK01/GC-FID	Volatile Organics	NELAP	5/7/2008
Isobutyl alcohol (2-Methyl-1-propanol)	EPA 8260	Volatile Organics	NELAP	3/30/2006
Isodrin	EPA 8270	Pesticides-Herbicides-PCB's	NELAP	3/30/2006
Isophorone	EPA 625	Extractable Organics	NELAP	5/16/2003
Isophorone	EPA 8270	Extractable Organics	NELAP	7/1/2003
Isoprene	OVL MSV01/GC-MS	Volatile Organics	NELAP	5/7/2008
Isopropyl alcohol (2-Propanol)	EPA 8015	Volatile Organics	NELAP	5/7/2008
Isopropylbenzene	EPA 8260	Volatile Organics	NELAP	7/1/2003
Isosafrole	EPA 8270	Extractable Organics	NELAP	3/30/2006
Kepon	EPA 8270	Pesticides-Herbicides-PCB's	NELAP	3/30/2006

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Issue Date: 7/1/2010

Expiration Date: 6/30/2011



Laboratory Scope of Accreditation

Attachment to Certificate #: E87551-17, expiration date June 30, 2011. This listing of accredited analytes should be used only when associated with a valid certificate.

State Laboratory ID: E87551

EPA Lab Code: OH00218

(740) 373-4071

E87551

**Microbac Laboratories, Inc., Ohio Valley Division
158 Starlite Drive
Marietta, OH 45750**

Matrix: Non-Potable Water

Analyte	Method/Tech	Category	Certification Type	Effective Date
Kjeldahl nitrogen - total	EPA 351.2	General Chemistry	NELAP	5/16/2003
Lactic acid	OVL HPLC03/HPLC-UV	Extractable Organics	NELAP	5/7/2008
Lead	EPA 200.7	Metals	NELAP	5/16/2003
Lead	EPA 200.8	Metals	NELAP	5/16/2003
Lead	EPA 6010	Metals	NELAP	7/1/2003
Lead	EPA 6020	Metals	NELAP	7/1/2003
Lithium	EPA 200.7	Metals	NELAP	3/30/2006
Lithium	EPA 6010	Metals	NELAP	7/1/2003
Magnesium	EPA 200.7	Metals	NELAP	5/16/2003
Magnesium	EPA 6010	Metals	NELAP	7/1/2003
Malathion	EPA 8270	Pesticides-Herbicides-PCB's	NELAP	3/30/2006
Manganese	EPA 200.7	Metals	NELAP	5/16/2003
Manganese	EPA 200.8	Metals	NELAP	3/30/2006
Manganese	EPA 6010	Metals	NELAP	7/1/2003
Manganese	EPA 6020	Metals	NELAP	3/30/2006
MCPA	EPA 8151	Pesticides-Herbicides-PCB's	NELAP	7/1/2003
MCPP	EPA 8151	Pesticides-Herbicides-PCB's	NELAP	7/1/2003
Mercury	EPA 245.1	Metals	NELAP	5/16/2003
Mercury	EPA 7470	Metals	NELAP	5/16/2003
Methacrylonitrile	EPA 8260	Volatile Organics	NELAP	3/30/2006
Methane	RSK-175	Volatile Organics	NELAP	3/30/2006
Methanol	EPA 8015	Volatile Organics	NELAP	5/7/2008
Methapyrilene	EPA 8270	Extractable Organics	NELAP	3/30/2006
Methoxychlor	EPA 8081	Pesticides-Herbicides-PCB's	NELAP	7/1/2003
Methyl acetate	OVL MSV01/GC-MS	Volatile Organics	NELAP	5/7/2008
Methyl bromide (Bromomethane)	EPA 624	Volatile Organics	NELAP	5/16/2003
Methyl bromide (Bromomethane)	EPA 8260	Volatile Organics	NELAP	7/1/2003
Methyl chloride (Chloromethane)	EPA 624	Volatile Organics	NELAP	5/16/2003
Methyl chloride (Chloromethane)	EPA 8260	Volatile Organics	NELAP	7/1/2003
Methyl methacrylate	EPA 8260	Volatile Organics	NELAP	3/30/2006
Methyl methanesulfonate	EPA 8270	Extractable Organics	NELAP	3/30/2006
Methyl parathion (Parathion, methyl)	EPA 8270	Pesticides-Herbicides-PCB's	NELAP	3/30/2006
Methyl tert-butyl ether (MTBE)	EPA 8260	Volatile Organics	NELAP	3/30/2006
Methylcyclohexane	OVL MSV01/GC-MS	Volatile Organics	NELAP	5/7/2008
Methylene chloride	EPA 624	Volatile Organics	NELAP	5/16/2003
Methylene chloride	EPA 8260	Volatile Organics	NELAP	7/1/2003

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EPA Lab Code:

OH00218

(740) 373-4071

E87551

Microbac Laboratories, Inc., Ohio Valley Division
158 Starlite Drive
Marietta, OH 45750

Matrix: Non-Potable Water

Analyte	Method/Tech	Category	Certification Type	Effective Date
Molybdenum	EPA 200.7	Metals	NELAP	5/16/2003
Molybdenum	EPA 6010	Metals	NELAP	7/1/2003
m-Xylene	EPA 8260	Volatile Organics	NELAP	3/30/2006
Naphthalene	EPA 625	Extractable Organics	NELAP	5/16/2003
Naphthalene	EPA 8260	Volatile Organics	NELAP	7/1/2003
Naphthalene	EPA 8270	Extractable Organics	NELAP	7/1/2003
n-Butane	OVL RSK01/GC-FID	Volatile Organics	NELAP	5/7/2008
n-Butyl alcohol	EPA 8260	Volatile Organics	NELAP	3/30/2006
n-Butylbenzene	EPA 8260	Volatile Organics	NELAP	7/1/2003
Nickel	EPA 200.7	Metals	NELAP	5/16/2003
Nickel	EPA 200.8	Metals	NELAP	3/30/2006
Nickel	EPA 6010	Metals	NELAP	7/1/2003
Nickel	EPA 6020	Metals	NELAP	3/30/2006
Nitrate	EPA 9056	General Chemistry	NELAP	5/7/2008
Nitrate as N	EPA 300.0	General Chemistry	NELAP	5/16/2003
Nitrate as N	EPA 353.2	General Chemistry	NELAP	5/16/2003
Nitrate-nitrite	EPA 353.2	General Chemistry	NELAP	5/16/2003
Nitrite	EPA 9056	General Chemistry	NELAP	5/7/2008
Nitrite	SM 4500-NO2 B	General Chemistry	NELAP	4/17/2007
Nitrite as N	EPA 300.0	General Chemistry	NELAP	5/16/2003
Nitrite as N	EPA 354.1	General Chemistry	NELAP	5/16/2003
Nitrobenzene	EPA 625	Extractable Organics	NELAP	5/16/2003
Nitrobenzene	EPA 8270	Extractable Organics	NELAP	7/1/2003
Nitrobenzene	EPA 8330	Extractable Organics	NELAP	3/30/2006
Nitrocellulose	OVL KNITRO-C-W/UV-VIS	General Chemistry	NELAP	5/7/2008
Nitroglycerin	EPA 8330	Extractable Organics	NELAP	6/13/2007
Nitroglycerin	OVL HPLC02/HPLC-UV	Extractable Organics	NELAP	5/7/2008
Nitroguanidine	OVL HPLC05/HPLC-UV	Extractable Organics	NELAP	5/7/2008
Nitroquinoline-1-oxide	EPA 8270	Extractable Organics	NELAP	3/30/2006
n-Nitrosodiethylamine	EPA 8270	Extractable Organics	NELAP	3/30/2006
n-Nitrosodimethylamine	EPA 625	Extractable Organics	NELAP	5/16/2003
n-Nitrosodimethylamine	EPA 8270	Extractable Organics	NELAP	7/1/2003
n-Nitroso-di-n-butylamine	EPA 8270	Extractable Organics	NELAP	3/30/2006
n-Nitrosodi-n-propylamine	EPA 625	Extractable Organics	NELAP	5/16/2003
n-Nitrosodi-n-propylamine	EPA 8270	Extractable Organics	NELAP	7/1/2003
n-Nitrosodiphenylamine	EPA 625	Extractable Organics	NELAP	5/16/2003

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State Laboratory ID: **E87551** EPA Lab Code: **OH00218** (740) 373-4071

E87551
Microbac Laboratories, Inc., Ohio Valley Division
158 Starlite Drive
Marietta, OH 45750

Matrix: Non-Potable Water

Analyte	Method/Tech	Category	Certification Type	Effective Date
n-Nitrosodiphenylamine	EPA 8270	Extractable Organics	NELAP	7/1/2003
n-Nitrosomorpholine	EPA 8270	Extractable Organics	NELAP	3/30/2006
n-Nitrosopiperidine	EPA 8270	Extractable Organics	NELAP	3/30/2006
n-Nitrosopyrrolidine	EPA 8270	Extractable Organics	NELAP	3/30/2006
n-Propylbenzene	EPA 8260	Volatile Organics	NELAP	7/1/2003
o,o,o-Triethyl phosphorothioate	EPA 8270	Pesticides-Herbicides-PCB's	NELAP	3/30/2006
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	EPA 8330	Extractable Organics	NELAP	3/30/2006
Oil & Grease	EPA 1664A	General Chemistry	NELAP	5/16/2003
Organic nitrogen	TKN minus AMMONIA	General Chemistry	NELAP	5/16/2003
Orthophosphate as P	EPA 365.2	General Chemistry	NELAP	5/16/2003
Orthophosphate as P	SM 4500-P E	General Chemistry	NELAP	4/17/2007
o-Toluidine	EPA 8270	Extractable Organics	NELAP	3/30/2006
o-Xylene	EPA 8260	Volatile Organics	NELAP	3/30/2006
Parathion, ethyl	EPA 8270	Pesticides-Herbicides-PCB's	NELAP	3/30/2006
Pentachlorobenzene	OVL MSS01/GC-MS	Extractable Organics	NELAP	5/7/2008
Pentachloroethane	OVL MSS01/GC-MS	Extractable Organics	NELAP	5/7/2008
Pentachloronitrobenzene (Quintozene)	EPA 8270	Extractable Organics	NELAP	3/30/2006
Pentachlorophenol	EPA 625	Extractable Organics	NELAP	5/16/2003
Pentachlorophenol	EPA 8151	Pesticides-Herbicides-PCB's	NELAP	7/1/2003
Pentachlorophenol	EPA 8270	Extractable Organics	NELAP	7/1/2003
Pentaerythritoltetranitrate (PETN)	EPA 8330	Extractable Organics	NELAP	6/13/2007
pH	EPA 150.1	General Chemistry	NELAP	5/16/2003
pH	SM 4500-H+-B	General Chemistry	NELAP	4/17/2007
Phenacetin	EPA 8270	Extractable Organics	NELAP	3/30/2006
Phenanthrene	EPA 625	Extractable Organics	NELAP	5/16/2003
Phenanthrene	EPA 8270	Extractable Organics	NELAP	7/1/2003
Phenol	EPA 625	Extractable Organics	NELAP	5/16/2003
Phenol	EPA 8270	Extractable Organics	NELAP	7/1/2003
Phorate	EPA 8270	Pesticides-Herbicides-PCB's	NELAP	3/30/2006
Phosphorus, total	EPA 365.4	General Chemistry	NELAP	5/16/2003
p-Isopropyltoluene	EPA 8260	Volatile Organics	NELAP	7/1/2003
Potassium	EPA 200.7	Metals	NELAP	5/16/2003
Potassium	EPA 6010	Metals	NELAP	7/1/2003
Pronamide (Kerb)	EPA 8270	Extractable Organics	NELAP	3/30/2006
Propane	OVL RSK01/GC-FID	Volatile Organics	NELAP	5/7/2008
Propionic acid (Propanoic acid)	OVL HPLC03/HPLC-UV	Extractable Organics	NELAP	5/7/2008

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State Laboratory ID: E87551

EPA Lab Code: OH00218

(740) 373-4071

E87551

Microbac Laboratories, Inc., Ohio Valley Division
158 Starlite Drive
Marietta, OH 45750

Matrix: Non-Potable Water

Analyte	Method/Tech	Category	Certification Type	Effective Date
Propionitrile (Ethyl cyanide)	EPA 8260	Volatile Organics	NELAP	3/30/2006
Propylene	OVL RSK01/GC-FID	Volatile Organics	NELAP	5/7/2008
Propyne	OVL RSK01/GC-FID	Volatile Organics	NELAP	5/7/2008
p-Xylene	EPA 8260	Volatile Organics	NELAP	3/30/2006
Pyrene	EPA 625	Extractable Organics	NELAP	5/16/2003
Pyrene	EPA 8270	Extractable Organics	NELAP	7/1/2003
Pyridine	EPA 8270	Extractable Organics	NELAP	7/1/2003
Pyruvic acid	OVL HPLC03/HPLC-UV	Extractable Organics	NELAP	5/7/2008
RDX (hexahydro-1,3,5-trinitro-1,3,5-triazine)	EPA 8330	Extractable Organics	NELAP	3/30/2006
Residue-filterable (TDS)	EPA 160.1	General Chemistry	NELAP	5/16/2003
Residue-filterable (TDS)	SM 2540 C	General Chemistry	NELAP	4/17/2007
Residue-nonfilterable (TSS)	EPA 160.2	General Chemistry	NELAP	5/16/2003
Residue-nonfilterable (TSS)	SM 2540 D	General Chemistry	NELAP	4/17/2007
Residue-settleable	EPA 160.5	General Chemistry	NELAP	5/16/2003
Residue-settleable	SM 2540 F	General Chemistry	NELAP	4/17/2007
Residue-total	EPA 160.3	General Chemistry	NELAP	5/16/2003
Residue-total	SM 2540 B	General Chemistry	NELAP	4/17/2007
Residue-volatile	EPA 160.4	General Chemistry	NELAP	5/16/2003
Safrole	EPA 8270	Extractable Organics	NELAP	3/30/2006
sec-Butylbenzene	EPA 8260	Volatile Organics	NELAP	7/1/2003
Selenium	EPA 200.7	Metals	NELAP	5/16/2003
Selenium	EPA 200.8	Metals	NELAP	5/16/2003
Selenium	EPA 6010	Metals	NELAP	7/1/2003
Selenium	EPA 6020	Metals	NELAP	5/16/2003
Silica as SiO2	EPA 6010	Metals	NELAP	7/1/2003
Silica-dissolved	EPA 200.7	General Chemistry	NELAP	5/16/2003
Silicon	EPA 200.7	Metals	NELAP	5/16/2003
Silicon	EPA 6010	Metals	NELAP	7/1/2003
Silver	EPA 200.7	Metals	NELAP	5/16/2003
Silver	EPA 200.8	Metals	NELAP	3/30/2006
Silver	EPA 6010	Metals	NELAP	7/1/2003
Silver	EPA 6020	Metals	NELAP	3/30/2006
Silvex (2,4,5-TP)	EPA 8151	Pesticides-Herbicides-PCB's	NELAP	7/1/2003
Sodium	EPA 200.7	Metals	NELAP	5/16/2003
Sodium	EPA 6010	Metals	NELAP	7/1/2003
Strontium	EPA 200.7	Metals	NELAP	3/30/2006

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E87551

Microbac Laboratories, Inc., Ohio Valley Division

158 Starlite Drive

Marietta, OH 45750

Matrix: Non-Potable Water

Analyte	Method/Tech	Category	Certification Type	Effective Date
Strontium	EPA 6010	Metals	NELAP	7/1/2003
Styrene	EPA 8260	Volatile Organics	NELAP	7/1/2003
Sulfate	EPA 300.0	General Chemistry	NELAP	5/16/2003
Sulfate	EPA 375.4	General Chemistry	NELAP	5/16/2003
Sulfate	EPA 9056	General Chemistry	NELAP	5/7/2008
Sulfide	EPA 376.1	General Chemistry	NELAP	5/16/2003
Sulfide	SM 4500-S F	General Chemistry	NELAP	4/17/2007
Sulfotep	EPA 8270	Pesticides-Herbicides-PCB's	NELAP	3/30/2006
Surfactants - MBAS	SM 5540 C	General Chemistry	NELAP	4/17/2007
T-amylmethylether (TAME)	OVL MSV01/GC-MS	Volatile Organics	NELAP	5/7/2008
tert-Butyl alcohol	EPA 8260	Volatile Organics	NELAP	7/1/2003
tert-Butylbenzene	EPA 8260	Volatile Organics	NELAP	7/1/2003
Tetrachloroethylene (Perchloroethylene)	EPA 624	Volatile Organics	NELAP	5/16/2003
Tetrachloroethylene (Perchloroethylene)	EPA 8260	Volatile Organics	NELAP	7/1/2003
Tetrachlorvinphos (Stirophos, Gardona)	EPA 8270	Pesticides-Herbicides-PCB's	NELAP	3/30/2006
Tetraethyl pyrophosphate (TEPP)	EPA 8270	Pesticides-Herbicides-PCB's	NELAP	3/30/2006
Tetrahydrofuran (THF)	OVL MSV01/GC-MS	Volatile Organics	NELAP	5/7/2008
Tetryl (methyl-2,4,6-trinitrophenylnitramine)	EPA 8330	Extractable Organics	NELAP	3/30/2006
Thallium	EPA 200.7	Metals	NELAP	5/16/2003
Thallium	EPA 200.8	Metals	NELAP	5/16/2003
Thallium	EPA 6010	Metals	NELAP	7/1/2003
Thallium	EPA 6020	Metals	NELAP	7/1/2003
Thionazin (Zinophos)	EPA 8270	Pesticides-Herbicides-PCB's	NELAP	3/30/2006
Tin	EPA 200.7	Metals	NELAP	5/16/2003
Tin	EPA 6010	Metals	NELAP	7/1/2003
Titanium	EPA 200.7	Metals	NELAP	5/16/2003
Titanium	EPA 6010	Metals	NELAP	3/30/2006
Toluene	EPA 624	Volatile Organics	NELAP	5/16/2003
Toluene	EPA 8260	Volatile Organics	NELAP	7/1/2003
Total cyanide	EPA 9010/9014	General Chemistry	NELAP	5/7/2008
Total organic carbon	EPA 415.1	General Chemistry	NELAP	5/16/2003
Total organic carbon	EPA 9060	General Chemistry	NELAP	5/7/2008
Total organic carbon	SM 5310 C	General Chemistry	NELAP	4/17/2007
Total Petroleum Hydrocarbons (TPH)	EPA 1664A	General Chemistry	NELAP	5/16/2003
Total Petroleum Hydrocarbons (TPH)	TX1006	Extractable Organics	NELAP	5/7/2008
Total phenolics	EPA 420.1	General Chemistry	NELAP	5/16/2003

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Expiration Date: 6/30/2011

Charlie Crist
Governor



Ana M. Viamonte Ros, M.D., M.P.H.
State Surgeon General

Laboratory Scope of Accreditation

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State Laboratory ID: E87551

EPA Lab Code:

OH00218

(740) 373-4071

E87551

Microbac Laboratories, Inc., Ohio Valley Division
158 Starlite Drive
Marietta, OH 45750

Matrix: Non-Potable Water

Analyte	Method/Tech	Category	Certification Type	Effective Date
Toxaphene (Chlorinated camphene)	EPA 608	Pesticides-Herbicides-PCB's	NELAP	5/16/2003
Toxaphene (Chlorinated camphene)	EPA 8081	Pesticides-Herbicides-PCB's	NELAP	7/1/2003
trans-1,2-Dichloroethylene	EPA 624	Volatile Organics	NELAP	5/16/2003
trans-1,2-Dichloroethylene	EPA 8260	Volatile Organics	NELAP	7/1/2003
trans-1,3-Dichloropropylene	EPA 624	Volatile Organics	NELAP	5/16/2003
trans-1,3-Dichloropropylene	EPA 8260	Volatile Organics	NELAP	7/1/2003
trans-1,4-Dichloro-2-butene	EPA 8260	Volatile Organics	NELAP	3/30/2006
Trichloroethene (Trichloroethylene)	EPA 624	Volatile Organics	NELAP	5/16/2003
Trichloroethene (Trichloroethylene)	EPA 8260	Volatile Organics	NELAP	7/1/2003
Trichlorofluoromethane	EPA 624	Volatile Organics	NELAP	5/16/2003
Trichlorofluoromethane	EPA 8260	Volatile Organics	NELAP	7/1/2003
Turbidity	EPA 180.1	General Chemistry	NELAP	5/16/2003
Vanadium	EPA 200.7	Metals	NELAP	5/16/2003
Vanadium	EPA 200.8	Metals	NELAP	3/30/2006
Vanadium	EPA 6010	Metals	NELAP	7/1/2003
Vanadium	EPA 6020	Metals	NELAP	3/30/2006
Vinyl acetate	EPA 8260	Volatile Organics	NELAP	7/1/2003
Vinyl chloride	EPA 624	Volatile Organics	NELAP	5/16/2003
Vinyl chloride	EPA 8260	Volatile Organics	NELAP	7/1/2003
Weak acid dissociable cyanide	SM 4500 CN-I	General Chemistry	NELAP	5/7/2008
Xylene (total)	EPA 624	Volatile Organics	NELAP	5/16/2003
Xylene (total)	EPA 8260	Volatile Organics	NELAP	7/1/2003
Zinc	EPA 200.7	Metals	NELAP	5/16/2003
Zinc	EPA 200.8	Metals	NELAP	3/30/2006
Zinc	EPA 6010	Metals	NELAP	7/1/2003
Zinc	EPA 6020	Metals	NELAP	3/30/2006

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State Laboratory ID: E87551

EPA Lab Code: OH00218

(740) 373-4071

E87551

**Microbac Laboratories, Inc., Ohio Valley Division
158 Starlite Drive
Marietta, OH 45750**

Matrix: Solid and Chemical Materials

Analyte	Method/Tech	Category	Certification Type	Effective Date
1,1,1,2-Tetrachloroethane	EPA 8260	Volatile Organics	NELAP	5/16/2003
1,1,1-Trichloroethane	EPA 8260	Volatile Organics	NELAP	5/16/2003
1,1,2,2-Tetrachloroethane	EPA 8260	Volatile Organics	NELAP	5/16/2003
1,1,2-Trichloro-1,2,2-trifluoroethane	OVL MSV01/GC-MS	Volatile Organics	NELAP	5/7/2008
1,1,2-Trichloroethane	EPA 8260	Volatile Organics	NELAP	5/16/2003
1,1-Dichloroethane	EPA 8260	Volatile Organics	NELAP	5/16/2003
1,1-Dichloroethylene	EPA 8260	Volatile Organics	NELAP	5/16/2003
1,1-Dichloropropene	EPA 8260	Volatile Organics	NELAP	5/16/2003
1,2,3-Trichlorobenzene	EPA 8260	Volatile Organics	NELAP	5/16/2003
1,2,3-Trichloropropane	EPA 8260	Volatile Organics	NELAP	5/16/2003
1,2,4,5-Tetrachlorobenzene	EPA 8270	Extractable Organics	NELAP	5/16/2003
1,2,4-Trichlorobenzene	EPA 8260	Volatile Organics	NELAP	5/16/2003
1,2,4-Trichlorobenzene	EPA 8270	Extractable Organics	NELAP	5/16/2003
1,2,4-Trimethylbenzene	EPA 8260	Volatile Organics	NELAP	5/16/2003
1,2-Dibromo-3-chloropropane (DBCP)	EPA 8260	Volatile Organics	NELAP	5/16/2003
1,2-Dibromoethane (EDB, Ethylene dibromide)	EPA 8260	Volatile Organics	NELAP	5/16/2003
1,2-Dichlorobenzene	EPA 8260	Volatile Organics	NELAP	5/16/2003
1,2-Dichlorobenzene	EPA 8270	Extractable Organics	NELAP	5/16/2003
1,2-Dichloroethane	EPA 8260	Volatile Organics	NELAP	5/16/2003
1,2-Dichloropropane	EPA 8260	Volatile Organics	NELAP	5/16/2003
1,2-Diphenylhydrazine	EPA 8270	Extractable Organics	NELAP	5/16/2003
1,3,5-Trimethylbenzene	EPA 8260	Volatile Organics	NELAP	5/16/2003
1,3,5-Trinitrobenzene (1,3,5-TNB)	EPA 8270	Extractable Organics	NELAP	5/16/2003
1,3,5-Trinitrobenzene (1,3,5-TNB)	EPA 8330	Extractable Organics	NELAP	5/16/2003
1,3-Butadiene	OVL MSV01/GC-MS	Volatile Organics	NELAP	5/7/2008
1,3-Dichlorobenzene	EPA 8260	Volatile Organics	NELAP	5/16/2003
1,3-Dichlorobenzene	EPA 8270	Extractable Organics	NELAP	5/16/2003
1,3-Dichloropropane	EPA 8260	Volatile Organics	NELAP	5/16/2003
1,3-Dinitrobenzene (1,3-DNB)	EPA 8270	Extractable Organics	NELAP	5/16/2003
1,3-Dinitrobenzene (1,3-DNB)	EPA 8330	Extractable Organics	NELAP	5/16/2003
1,4-Dichlorobenzene	EPA 8260	Volatile Organics	NELAP	5/16/2003
1,4-Dichlorobenzene	EPA 8270	Extractable Organics	NELAP	5/16/2003
1,4-Dioxane (1,4-Diethyleneoxide)	EPA 8260	Volatile Organics	NELAP	5/16/2003
1,4-Naphthoquinone	EPA 8270	Extractable Organics	NELAP	5/16/2003
1,4-Phenylenediamine	EPA 8270	Extractable Organics	NELAP	5/16/2003
1-Chlorohexane	EPA 8260	Volatile Organics	NELAP	5/16/2003

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Laboratory Scope of Accreditation

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State Laboratory ID: E87551

EPA Lab Code:

OH00218

(740) 373-4071

E87551

Microbac Laboratories, Inc., Ohio Valley Division

158 Starlite Drive

Marietta, OH 45750

Matrix: Solid and Chemical Materials

Analyte	Method/Tech	Category	Certification Type	Effective Date
1-Methylnaphthalene	OVL MSS01/GC-MS	Extractable Organics	NELAP	5/7/2008
1-Naphthylamine	EPA 8270	Extractable Organics	NELAP	5/16/2003
2,2-Dichloropropane	EPA 8260	Volatile Organics	NELAP	5/16/2003
2,3,4,6-Tetrachlorophenol	EPA 8270	Extractable Organics	NELAP	5/16/2003
2,4,5-T	EPA 8151	Pesticides-Herbicides-PCB's	NELAP	5/16/2003
2,4,5-Trichlorophenol	EPA 8270	Extractable Organics	NELAP	5/16/2003
2,4,6-Trichlorophenol	EPA 8270	Extractable Organics	NELAP	5/16/2003
2,4,6-Trinitrotoluene (2,4,6-TNT)	EPA 8330	Extractable Organics	NELAP	5/16/2003
2,4-D	EPA 8151	Pesticides-Herbicides-PCB's	NELAP	5/16/2003
2,4-DB	EPA 8151	Pesticides-Herbicides-PCB's	NELAP	5/16/2003
2,4-Dichlorophenol	EPA 8270	Extractable Organics	NELAP	5/16/2003
2,4-Dimethylphenol	EPA 8270	Extractable Organics	NELAP	5/16/2003
2,4-Dinitrophenol	EPA 8270	Extractable Organics	NELAP	5/16/2003
2,4-Dinitrotoluene (2,4-DNT)	EPA 8270	Extractable Organics	NELAP	5/16/2003
2,4-Dinitrotoluene (2,4-DNT)	EPA 8330	Extractable Organics	NELAP	5/16/2003
2,6-Dichlorophenol	EPA 8270	Extractable Organics	NELAP	5/16/2003
2,6-Dinitrotoluene (2,6-DNT)	EPA 8270	Extractable Organics	NELAP	5/16/2003
2,6-Dinitrotoluene (2,6-DNT)	EPA 8330	Extractable Organics	NELAP	5/16/2003
2-Acetylaminofluorene	EPA 8270	Extractable Organics	NELAP	5/16/2003
2-Amino-4,6-dinitrotoluene (2-am-dnt)	EPA 8330	Extractable Organics	NELAP	5/16/2003
2-Butanone (Methyl ethyl ketone, MEK)	EPA 8260	Volatile Organics	NELAP	5/16/2003
2-Chloroethyl vinyl ether	EPA 8260	Volatile Organics	NELAP	5/16/2003
2-Chloronaphthalene	EPA 8270	Extractable Organics	NELAP	5/16/2003
2-Chlorophenol	EPA 8270	Extractable Organics	NELAP	5/16/2003
2-Chlorotoluene	EPA 8260	Volatile Organics	NELAP	5/16/2003
2-Hexanone	EPA 8260	Volatile Organics	NELAP	5/16/2003
2-Methyl-4,6-dinitrophenol	EPA 8270	Extractable Organics	NELAP	5/16/2003
2-Methylnaphthalene	EPA 8270	Extractable Organics	NELAP	5/16/2003
2-Methylphenol (o-Cresol)	EPA 8270	Extractable Organics	NELAP	5/16/2003
2-Naphthylamine	EPA 8270	Extractable Organics	NELAP	5/16/2003
2-Nitroaniline	EPA 8270	Extractable Organics	NELAP	5/16/2003
2-Nitrophenol	EPA 8270	Extractable Organics	NELAP	5/16/2003
2-Nitropropane	EPA 8260	Volatile Organics	NELAP	5/16/2003
2-Nitrotoluene	EPA 8330	Extractable Organics	NELAP	5/16/2003
2-Picoline (2-Methylpyridine)	EPA 8270	Extractable Organics	NELAP	5/16/2003
3,3'-Dichlorobenzidine	EPA 8270	Extractable Organics	NELAP	5/16/2003

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EPA Lab Code:

OH00218

(740) 373-4071

E87551

Microbac Laboratories, Inc., Ohio Valley Division

158 Starlite Drive

Marietta, OH 45750

Matrix: Solid and Chemical Materials

Analyte	Method/Tech	Category	Certification Type	Effective Date
3,3'-Dimethylbenzidine	EPA 8270	Extractable Organics	NELAP	5/16/2003
3-Methylcholanthrene	EPA 8270	Extractable Organics	NELAP	5/16/2003
3-Methylphenol (m-Cresol)	EPA 8270	Extractable Organics	NELAP	5/16/2003
3-Nitroaniline	EPA 8270	Extractable Organics	NELAP	5/16/2003
3-Nitrotoluene	EPA 8330	Extractable Organics	NELAP	5/16/2003
4,4'-DDD	EPA 8081	Pesticides-Herbicides-PCB's	NELAP	5/16/2003
4,4'-DDE	EPA 8081	Pesticides-Herbicides-PCB's	NELAP	5/16/2003
4,4'-DDT	EPA 8081	Pesticides-Herbicides-PCB's	NELAP	5/16/2003
4-Amino-2,6-dinitrotoluene (4-am-dnt)	EPA 8330	Extractable Organics	NELAP	5/16/2003
4-Aminobiphenyl	EPA 8270	Extractable Organics	NELAP	5/16/2003
4-Bromophenyl phenyl ether	EPA 8270	Extractable Organics	NELAP	5/16/2003
4-Chloro-3-methylphenol	EPA 8270	Extractable Organics	NELAP	5/16/2003
4-Chloroaniline	EPA 8270	Extractable Organics	NELAP	5/16/2003
4-Chlorophenyl phenylether	EPA 8270	Extractable Organics	NELAP	5/16/2003
4-Chlorotoluene	EPA 8260	Volatile Organics	NELAP	5/16/2003
4-Dimethyl aminoazobenzene	EPA 8270	Extractable Organics	NELAP	3/30/2006
4-Methyl-2-pentanone (MIBK)	EPA 8260	Volatile Organics	NELAP	5/16/2003
4-Methylphenol (p-Cresol)	EPA 8270	Extractable Organics	NELAP	5/16/2003
4-Nitroaniline	EPA 8270	Extractable Organics	NELAP	5/16/2003
4-Nitrophenol	EPA 8270	Extractable Organics	NELAP	5/16/2003
4-Nitrotoluene	EPA 8330	Extractable Organics	NELAP	5/16/2003
5-Nitro-o-toluidine	EPA 8270	Extractable Organics	NELAP	5/16/2003
7,12-Dimethylbenz(a) anthracene	EPA 8270	Extractable Organics	NELAP	5/16/2003
a-a-Dimethylphenethylamine	EPA 8270	Extractable Organics	NELAP	5/16/2003
Acenaphthene	EPA 8270	Extractable Organics	NELAP	5/16/2003
Acenaphthylene	EPA 8270	Extractable Organics	NELAP	5/16/2003
Acetone	EPA 8260	Volatile Organics	NELAP	5/16/2003
Acetonitrile	EPA 8260	Volatile Organics	NELAP	5/16/2003
Acetophenone	EPA 8270	Extractable Organics	NELAP	5/16/2003
Acrolein (Propenal)	EPA 8260	Volatile Organics	NELAP	5/16/2003
Acrylonitrile	EPA 8260	Volatile Organics	NELAP	5/16/2003
Aldrin	EPA 8081	Pesticides-Herbicides-PCB's	NELAP	5/16/2003
Allyl chloride (3-Chloropropene)	EPA 8260	Volatile Organics	NELAP	3/30/2006
alpha-BHC (alpha-Hexachlorocyclohexane)	EPA 8081	Pesticides-Herbicides-PCB's	NELAP	5/16/2003
alpha-Chlordane	EPA 8081	Pesticides-Herbicides-PCB's	NELAP	5/16/2003
Aluminum	EPA 6010	Metals	NELAP	5/16/2003

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E87551

Microbac Laboratories, Inc., Ohio Valley Division

158 Starlite Drive

Marietta, OH 45750

Matrix: Solid and Chemical Materials

Analyte	Method/Tech	Category	Certification Type	Effective Date
Aniline	EPA 8270	Extractable Organics	NELAP	5/16/2003
Anthracene	EPA 8270	Extractable Organics	NELAP	5/16/2003
Antimony	EPA 6010	Metals	NELAP	5/16/2003
Antimony	EPA 6020	Metals	NELAP	5/16/2003
Aramite	EPA 8270	Extractable Organics	NELAP	5/16/2003
Aroclor-1016 (PCB-1016)	EPA 8082	Pesticides-Herbicides-PCB's	NELAP	5/16/2003
Aroclor-1221 (PCB-1221)	EPA 8082	Pesticides-Herbicides-PCB's	NELAP	5/16/2003
Aroclor-1232 (PCB-1232)	EPA 8082	Pesticides-Herbicides-PCB's	NELAP	5/16/2003
Aroclor-1242 (PCB-1242)	EPA 8082	Pesticides-Herbicides-PCB's	NELAP	5/16/2003
Aroclor-1248 (PCB-1248)	EPA 8082	Pesticides-Herbicides-PCB's	NELAP	5/16/2003
Aroclor-1254 (PCB-1254)	EPA 8082	Pesticides-Herbicides-PCB's	NELAP	5/16/2003
Aroclor-1260 (PCB-1260)	EPA 8082	Pesticides-Herbicides-PCB's	NELAP	5/16/2003
Arsenic	EPA 6010	Metals	NELAP	5/16/2003
Arsenic	EPA 6020	Metals	NELAP	5/16/2003
Atrazine	OVL MSS04/GC-MS	Pesticides-Herbicides-PCB's	NELAP	5/7/2008
Barium	EPA 6010	Metals	NELAP	5/16/2003
Barium	EPA 6020	Metals	NELAP	3/30/2006
Benzaldehyde	OVL MSS01/GC-MS	Extractable Organics	NELAP	5/7/2008
Benzene	EPA 8260	Volatile Organics	NELAP	5/16/2003
Benzidine	EPA 8270	Extractable Organics	NELAP	5/16/2003
Benzo(a)anthracene	EPA 8270	Extractable Organics	NELAP	5/16/2003
Benzo(a)pyrene	EPA 8270	Extractable Organics	NELAP	5/16/2003
Benzo(b)fluoranthene	EPA 8270	Extractable Organics	NELAP	5/16/2003
Benzo(g,h,i)perylene	EPA 8270	Extractable Organics	NELAP	5/16/2003
Benzo(k)fluoranthene	EPA 8270	Extractable Organics	NELAP	5/16/2003
Benzoic acid	EPA 8270	Extractable Organics	NELAP	5/16/2003
Benzyl alcohol	EPA 8270	Extractable Organics	NELAP	5/16/2003
Beryllium	EPA 6010	Metals	NELAP	5/16/2003
beta-BHC (beta-Hexachlorocyclohexane)	EPA 8081	Pesticides-Herbicides-PCB's	NELAP	5/16/2003
Biphenyl	OVL MSS01/GC-MS	Extractable Organics	NELAP	5/7/2008
bis(2-Chloroethoxy)methane	EPA 8270	Extractable Organics	NELAP	5/16/2003
bis(2-Chloroethyl) ether	EPA 8270	Extractable Organics	NELAP	5/16/2003
bis(2-Chloroisopropyl) ether (2,2'-Oxybis(1-chloropropane))	EPA 8270	Extractable Organics	NELAP	5/16/2003
bis(2-Ethylhexyl) phthalate (DEHP)	EPA 8270	Extractable Organics	NELAP	5/16/2003
Boron	EPA 6010	Metals	NELAP	5/16/2003
Bromide	EPA 9056	General Chemistry	NELAP	5/16/2003

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E87551

Microbac Laboratories, Inc., Ohio Valley Division

158 Starlite Drive

Marietta, OH 45750

Matrix: Solid and Chemical Materials

Analyte	Method/Tech	Category	Certification Type	Effective Date
Bromobenzene	EPA 8260	Volatile Organics	NELAP	5/16/2003
Bromochloromethane	EPA 8260	Volatile Organics	NELAP	5/16/2003
Bromodichloromethane	EPA 8260	Volatile Organics	NELAP	5/16/2003
Bromoform	EPA 8260	Volatile Organics	NELAP	5/16/2003
Butyl benzyl phthalate	EPA 8270	Extractable Organics	NELAP	5/16/2003
Cadmium	EPA 6010	Metals	NELAP	5/16/2003
Cadmium	EPA 6020	Metals	NELAP	3/30/2006
Calcium	EPA 6010	Metals	NELAP	5/16/2003
Caprolactam	OVL MSS01/GC-MS	Extractable Organics	NELAP	5/7/2008
Carbazole	EPA 8270	Extractable Organics	NELAP	5/16/2003
Carbon disulfide	EPA 8260	Volatile Organics	NELAP	5/16/2003
Carbon tetrachloride	EPA 8260	Volatile Organics	NELAP	5/16/2003
Chlordane (tech.)	EPA 8081	Pesticides-Herbicides-PCB's	NELAP	5/16/2003
Chloride	EPA 9056	General Chemistry	NELAP	5/16/2003
Chlorobenzene	EPA 8260	Volatile Organics	NELAP	5/16/2003
Chlorobenzilate	EPA 8270	Pesticides-Herbicides-PCB's	NELAP	3/30/2006
Chloroethane	EPA 8260	Volatile Organics	NELAP	5/16/2003
Chloroform	EPA 8260	Volatile Organics	NELAP	5/16/2003
Chloroprene	EPA 8260	Volatile Organics	NELAP	5/16/2003
Chromium	EPA 6010	Metals	NELAP	5/16/2003
Chromium	EPA 6020	Metals	NELAP	3/30/2006
Chromium VI	EPA 7196	General Chemistry	NELAP	3/30/2006
Chrysene	EPA 8270	Extractable Organics	NELAP	5/16/2003
cis-1,2-Dichloroethylene	EPA 8260	Volatile Organics	NELAP	5/16/2003
cis-1,3-Dichloropropene	EPA 8260	Volatile Organics	NELAP	5/16/2003
Cobalt	EPA 6010	Metals	NELAP	5/16/2003
Cobalt	EPA 6020	Metals	NELAP	3/30/2006
Copper	EPA 6010	Metals	NELAP	5/16/2003
Copper	EPA 6020	Metals	NELAP	3/30/2006
Cyclohexane	OVL MSV01/GC-MS	Volatile Organics	NELAP	5/7/2008
Cyclohexanone	OVL MSV01/GC-MS	Volatile Organics	NELAP	5/7/2008
Dalapon	EPA 8151	Pesticides-Herbicides-PCB's	NELAP	5/16/2003
delta-BHC	EPA 8081	Pesticides-Herbicides-PCB's	NELAP	5/16/2003
Diallate	EPA 8270	Pesticides-Herbicides-PCB's	NELAP	5/16/2003
Dibenz(a,h)anthracene	EPA 8270	Extractable Organics	NELAP	5/16/2003
Dibenzofuran	EPA 8270	Extractable Organics	NELAP	5/16/2003

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Matrix: Solid and Chemical Materials

Analyte	Method/Tech	Category	Certification Type	Effective Date
Dibromochloromethane	EPA 8260	Volatile Organics	NELAP	5/16/2003
Dibromofluoromethane	EPA 8260	Volatile Organics	NELAP	5/16/2003
Dibromomethane	EPA 8260	Volatile Organics	NELAP	5/16/2003
Dicamba	EPA 8151	Pesticides-Herbicides-PCB's	NELAP	5/16/2003
Dichlorodifluoromethane	EPA 8260	Volatile Organics	NELAP	5/16/2003
Dichloroprop (Dichlorprop)	EPA 8151	Pesticides-Herbicides-PCB's	NELAP	5/16/2003
Dieldrin	EPA 8081	Pesticides-Herbicides-PCB's	NELAP	5/16/2003
Diesel range organics (DRO)	EPA 8015	Extractable Organics	NELAP	11/5/2004
Diethyl ether	EPA 8260	Volatile Organics	NELAP	5/16/2003
Diethyl phthalate	EPA 8270	Extractable Organics	NELAP	5/16/2003
Di-isopropylether (DIPE)	OVL MSV01/GC-MS	Volatile Organics	NELAP	5/7/2008
Dimethoate	EPA 8270	Pesticides-Herbicides-PCB's	NELAP	5/16/2003
Dimethyl phthalate	EPA 8270	Extractable Organics	NELAP	5/16/2003
Dimethyl sulfide	OVL MSV01/GC-MS	Volatile Organics	NELAP	5/7/2008
Dimethyldisulfide	OVL MSV01/GC-MS	Volatile Organics	NELAP	5/7/2008
Di-n-butyl phthalate	EPA 8270	Extractable Organics	NELAP	5/16/2003
Di-n-octyl phthalate	EPA 8270	Extractable Organics	NELAP	5/16/2003
Dinoseb (2-sec-butyl-4,6-dinitrophenol, DNBP)	EPA 8151	Pesticides-Herbicides-PCB's	NELAP	5/16/2003
Dinoseb (2-sec-butyl-4,6-dinitrophenol, DNBP)	EPA 8270	Extractable Organics	NELAP	5/16/2003
Diphenylamine	EPA 8270	Extractable Organics	NELAP	5/16/2003
Disulfoton	EPA 8270	Pesticides-Herbicides-PCB's	NELAP	5/16/2003
Endosulfan I	EPA 8081	Pesticides-Herbicides-PCB's	NELAP	5/16/2003
Endosulfan II	EPA 8081	Pesticides-Herbicides-PCB's	NELAP	5/16/2003
Endosulfan sulfate	EPA 8081	Pesticides-Herbicides-PCB's	NELAP	5/16/2003
Endrin	EPA 8081	Pesticides-Herbicides-PCB's	NELAP	5/16/2003
Endrin aldehyde	EPA 8081	Pesticides-Herbicides-PCB's	NELAP	5/16/2003
Endrin ketone	EPA 8081	Pesticides-Herbicides-PCB's	NELAP	5/16/2003
Ethanol	EPA 8015	Volatile Organics	NELAP	5/16/2003
Ethyl acetate	EPA 8260	Volatile Organics	NELAP	3/30/2006
Ethyl methacrylate	EPA 8260	Volatile Organics	NELAP	5/16/2003
Ethyl methanesulfonate	EPA 8270	Extractable Organics	NELAP	5/16/2003
Ethylbenzene	EPA 8260	Volatile Organics	NELAP	5/16/2003
Ethylene glycol	EPA 8015	Volatile Organics	NELAP	5/16/2003
Ethyl-t-butylether (ETBE)	OVL MSV01/GC-MS	Volatile Organics	NELAP	5/7/2008
Famphur	EPA 8270	Pesticides-Herbicides-PCB's	NELAP	5/16/2003
Fluoranthene	EPA 8270	Extractable Organics	NELAP	5/16/2003

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158 Starlite Drive

Marietta, OH 45750

Matrix: Solid and Chemical Materials

Analyte	Method/Tech	Category	Certification Type	Effective Date
Fluorene	EPA 8270	Extractable Organics	NELAP	5/16/2003
Fluoride	EPA 9056	General Chemistry	NELAP	5/16/2003
Formaldehyde	EPA 8315	Extractable Organics	NELAP	5/16/2003
gamma-BHC (Lindane, gamma-Hexachlorocyclohexane)	EPA 8081	Pesticides-Herbicides-PCB's	NELAP	5/16/2003
gamma-Chlordane	EPA 8081	Pesticides-Herbicides-PCB's	NELAP	5/16/2003
Gasoline range organics (GRO)	EPA 8015	Extractable Organics	NELAP	11/5/2004
Heptachlor	EPA 8081	Pesticides-Herbicides-PCB's	NELAP	5/16/2003
Heptachlor epoxide	EPA 8081	Pesticides-Herbicides-PCB's	NELAP	5/16/2003
Hexachlorobenzene	EPA 8270	Extractable Organics	NELAP	5/16/2003
Hexachlorobutadiene	EPA 8260	Volatile Organics	NELAP	5/16/2003
Hexachlorobutadiene	EPA 8270	Extractable Organics	NELAP	5/16/2003
Hexachlorocyclopentadiene	EPA 8270	Extractable Organics	NELAP	5/16/2003
Hexachloroethane	EPA 8270	Extractable Organics	NELAP	5/16/2003
Hexachlorophene	EPA 8270	Extractable Organics	NELAP	5/16/2003
Hexachloropropene	EPA 8270	Extractable Organics	NELAP	5/16/2003
Hexamethylphosphoramide (HMPA)	EPA 8270	Pesticides-Herbicides-PCB's	NELAP	3/30/2006
Ignitability	EPA 1010	General Chemistry	NELAP	5/16/2003
Indeno(1,2,3-cd)pyrene	EPA 8270	Extractable Organics	NELAP	5/16/2003
Iodomethane (Methyl iodide)	EPA 8260	Volatile Organics	NELAP	5/16/2003
Iron	EPA 6010	Metals	NELAP	5/16/2003
Isobutyl alcohol (2-Methyl-1-propanol)	EPA 8260	Volatile Organics	NELAP	3/30/2006
Isodrin	EPA 8270	Pesticides-Herbicides-PCB's	NELAP	5/16/2003
Isophorone	EPA 8270	Extractable Organics	NELAP	5/16/2003
Isoprene	OVL MSV01/GC-MS	Volatile Organics	NELAP	5/7/2008
Isopropyl alcohol (2-Propanol)	EPA 8015	Volatile Organics	NELAP	5/16/2003
Isopropylbenzene	EPA 8260	Volatile Organics	NELAP	5/16/2003
Isosafrole	EPA 8270	Extractable Organics	NELAP	5/16/2003
Kepone	EPA 8270	Pesticides-Herbicides-PCB's	NELAP	5/16/2003
Lead	EPA 6010	Metals	NELAP	5/16/2003
Lead	EPA 6020	Metals	NELAP	5/16/2003
Lithium	EPA 6010	Metals	NELAP	5/16/2003
Magnesium	EPA 6010	Metals	NELAP	5/16/2003
Malathion	EPA 8270	Pesticides-Herbicides-PCB's	NELAP	3/30/2006
Manganese	EPA 6010	Metals	NELAP	5/16/2003
Manganese	EPA 6020	Metals	NELAP	3/30/2006
MCPA	EPA 8151	Pesticides-Herbicides-PCB's	NELAP	5/16/2003

Clients and Customers are urged to verify the laboratory's current certification status with the Environmental Laboratory Certification Program.

Issue Date: 7/1/2010

Expiration Date: 6/30/2011

Laboratory Scope of Accreditation

Attachment to Certificate #: E87551-17, expiration date June 30, 2011. This listing of accredited analytes should be used only when associated with a valid certificate.

State Laboratory ID: E87551

EPA Lab Code: OH00218

(740) 373-4071

E87551

Microbac Laboratories, Inc., Ohio Valley Division

158 Starlite Drive

Marietta, OH 45750

Matrix: Solid and Chemical Materials

Analyte	Method/Tech	Category	Certification Type	Effective Date
MCPP	EPA 8151	Pesticides-Herbicides-PCB's	NELAP	5/16/2003
Mercury	EPA 7471	Metals	NELAP	2/6/2004
Methacrylonitrile	EPA 8260	Volatile Organics	NELAP	5/16/2003
Methanol	EPA 8015	Volatile Organics	NELAP	5/16/2003
Methapyrilene	EPA 8270	Extractable Organics	NELAP	5/16/2003
Methoxychlor	EPA 8081	Pesticides-Herbicides-PCB's	NELAP	5/16/2003
Methyl acetate	OVL MSV01/GC-MS	Volatile Organics	NELAP	5/7/2008
Methyl bromide (Bromomethane)	EPA 8260	Volatile Organics	NELAP	5/16/2003
Methyl chloride (Chloromethane)	EPA 8260	Volatile Organics	NELAP	5/16/2003
Methyl methacrylate	EPA 8260	Volatile Organics	NELAP	5/16/2003
Methyl methanesulfonate	EPA 8270	Extractable Organics	NELAP	5/16/2003
Methyl parathion (Parathion, methyl)	EPA 8270	Pesticides-Herbicides-PCB's	NELAP	5/16/2003
Methyl tert-butyl ether (MTBE)	EPA 8260	Volatile Organics	NELAP	5/16/2003
Methylcyclohexane	OVL MSV01/GC-MS	Volatile Organics	NELAP	5/7/2008
Methylene chloride	EPA 8260	Volatile Organics	NELAP	5/16/2003
Molybdenum	EPA 6010	Metals	NELAP	5/16/2003
Naphthalene	EPA 8260	Volatile Organics	NELAP	5/16/2003
Naphthalene	EPA 8270	Extractable Organics	NELAP	5/16/2003
n-Butyl alcohol	EPA 8260	Volatile Organics	NELAP	3/30/2006
n-Butylbenzene	EPA 8260	Volatile Organics	NELAP	5/16/2003
n-Hexane	OVL MSV01/GC-MS	Volatile Organics	NELAP	5/7/2008
Nickel	EPA 6010	Metals	NELAP	5/16/2003
Nickel	EPA 6020	Metals	NELAP	3/30/2006
Nitrate	EPA 9056	General Chemistry	NELAP	5/16/2003
Nitrite	EPA 9056	General Chemistry	NELAP	5/16/2003
Nitrobenzene	EPA 8270	Extractable Organics	NELAP	5/16/2003
Nitrobenzene	EPA 8330	Extractable Organics	NELAP	5/16/2003
Nitrocellulose	OVL KNITRO-C-S/UV-VIS	General Chemistry	NELAP	5/7/2008
Nitroglycerin	EPA 8330	Extractable Organics	NELAP	6/13/2007
Nitroguanidine	OVL HPLC05/HPLC-UV	Extractable Organics	NELAP	5/7/2008
Nitroquinoline-1-oxide	EPA 8270	Extractable Organics	NELAP	5/16/2003
n-Nitrosodiethylamine	EPA 8270	Extractable Organics	NELAP	5/16/2003
n-Nitrosodimethylamine	EPA 8270	Extractable Organics	NELAP	5/16/2003
n-Nitroso-di-n-butylamine	EPA 8270	Extractable Organics	NELAP	5/16/2003
n-Nitrosodi-n-propylamine	EPA 8270	Extractable Organics	NELAP	5/16/2003
n-Nitrosodiphenylamine	EPA 8270	Extractable Organics	NELAP	5/16/2003

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E87551

Microbac Laboratories, Inc., Ohio Valley Division

158 Starlite Drive

Marietta, OH 45750

Matrix: Solid and Chemical Materials

Analyte	Method/Tech	Category	Certification Type	Effective Date
n-Nitrosomethylethylamine	EPA 8270	Extractable Organics	NELAP	5/16/2003
n-Nitrosomorpholine	EPA 8270	Extractable Organics	NELAP	5/16/2003
n-Nitrosopiperidine	EPA 8270	Extractable Organics	NELAP	5/16/2003
n-Nitrosopyrrolidine	EPA 8270	Extractable Organics	NELAP	5/16/2003
n-Propylbenzene	EPA 8260	Volatile Organics	NELAP	5/16/2003
o,o,o-Triethyl phosphorothioate	EPA 8270	Pesticides-Herbicides-PCB's	NELAP	5/16/2003
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	EPA 8330	Extractable Organics	NELAP	5/16/2003
o-Toluidine	EPA 8270	Extractable Organics	NELAP	5/16/2003
Paint Filter Liquids Test	EPA 9095	General Chemistry	NELAP	5/16/2003
Parathion, ethyl	EPA 8270	Pesticides-Herbicides-PCB's	NELAP	5/16/2003
Pentachlorobenzene	EPA 8270	Extractable Organics	NELAP	5/16/2003
Pentachloroethane	OVL MSS01/GC-MS	Extractable Organics	NELAP	5/7/2008
Pentachloronitrobenzene (Quintozene)	EPA 8270	Extractable Organics,Pesticides-Herbicides-PCB's	NELAP	5/16/2003
Pentachlorophenol	EPA 8151	Pesticides-Herbicides-PCB's	NELAP	5/16/2003
Pentachlorophenol	EPA 8270	Extractable Organics	NELAP	5/16/2003
Pentaerythritoltetranitrate (PETN)	EPA 8330	Extractable Organics	NELAP	6/13/2007
pH	EPA 9040	General Chemistry	NELAP	2/6/2004
pH	EPA 9045	General Chemistry	NELAP	2/6/2004
Phenacetin	EPA 8270	Extractable Organics	NELAP	5/16/2003
Phenanthrene	EPA 8270	Extractable Organics	NELAP	5/16/2003
Phenol	EPA 8270	Extractable Organics	NELAP	5/16/2003
Phorate	EPA 8270	Pesticides-Herbicides-PCB's	NELAP	5/16/2003
p-Isopropyltoluene	EPA 8260	Volatile Organics	NELAP	5/16/2003
Potassium	EPA 6010	Metals	NELAP	5/16/2003
Pronamide (Kerb)	EPA 8270	Extractable Organics	NELAP	5/16/2003
Propionitrile (Ethyl cyanide)	EPA 8260	Volatile Organics	NELAP	3/30/2006
Pyrene	EPA 8270	Extractable Organics	NELAP	5/16/2003
Pyridine	EPA 8270	Extractable Organics	NELAP	5/16/2003
RDX (hexahydro-1,3,5-trinitro-1,3,5-triazine)	EPA 8330	Extractable Organics	NELAP	5/16/2003
Reactive cyanide	Sec. 7.3 SW-846	General Chemistry	NELAP	5/16/2003
Reactive sulfide	Sec. 7.3 SW-846	General Chemistry	NELAP	5/16/2003
Safrole	EPA 8270	Extractable Organics	NELAP	5/16/2003
sec-Butylbenzene	EPA 8260	Volatile Organics	NELAP	5/16/2003
Selenium	EPA 6010	Metals	NELAP	5/16/2003
Selenium	EPA 6020	Metals	NELAP	11/7/2003

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State Laboratory ID: E87551

EPA Lab Code:

OH00218

(740) 373-4071

E87551

Microbac Laboratories, Inc., Ohio Valley Division

158 Starlite Drive

Marietta, OH 45750

Matrix: Solid and Chemical Materials

Analyte	Method/Tech	Category	Certification Type	Effective Date
Silver	EPA 6010	Metals	NELAP	5/16/2003
Silver	EPA 6020	Metals	NELAP	3/30/2006
Silvex (2,4,5-TP)	EPA 8151	Pesticides-Herbicides-PCB's	NELAP	5/16/2003
Sodium	EPA 6010	Metals	NELAP	5/16/2003
Strontium	EPA 6010	Metals	NELAP	5/16/2003
Styrene	EPA 8260	Volatile Organics	NELAP	5/16/2003
Sulfate	EPA 9056	General Chemistry	NELAP	5/16/2003
Sulfide	EPA 9030/9034	General Chemistry	NELAP	5/16/2003
Sulfotepp	EPA 8270	Pesticides-Herbicides-PCB's	NELAP	5/16/2003
Synthetic Precipitation Leaching Procedure	EPA 1312	General Chemistry	NELAP	5/16/2003
T-amylmethylether (TAME)	OVL MSV01/GC-MS	Volatile Organics	NELAP	5/7/2008
tert-Butyl alcohol	EPA 8260	Volatile Organics	NELAP	5/16/2003
tert-Butylbenzene	EPA 8260	Volatile Organics	NELAP	5/16/2003
Tetrachloroethylene (Perchloroethylene)	EPA 8260	Volatile Organics	NELAP	5/16/2003
Tetrachlorvinphos (Stirophos, Gardona)	EPA 8270	Pesticides-Herbicides-PCB's	NELAP	3/30/2006
Tetraethyl pyrophosphate (TEPP)	EPA 8270	Pesticides-Herbicides-PCB's	NELAP	3/30/2006
Tetryl (methyl-2,4,6-trinitrophenylnitramine)	EPA 8330	Extractable Organics	NELAP	5/16/2003
Thallium	EPA 6010	Metals	NELAP	5/16/2003
Thallium	EPA 6020	Metals	NELAP	5/16/2003
Thionazin (Zinophos)	EPA 8270	Pesticides-Herbicides-PCB's	NELAP	5/16/2003
Tin	EPA 6010	Metals	NELAP	5/16/2003
Titanium	EPA 6010	Volatile Organics	NELAP	3/30/2006
Toluene	EPA 8260	Volatile Organics	NELAP	5/16/2003
Total cyanide	EPA 9010	General Chemistry	NELAP	5/16/2003
Total organic carbon	Lloyd Khan	General Chemistry	NELAP	5/7/2008
Total Petroleum Hydrocarbons (TPH)	FL-PRO	Extractable Organics	NELAP	5/16/2003
Total Petroleum Hydrocarbons (TPH)	TX1005	Extractable Organics	NELAP	3/30/2006
Total Petroleum Hydrocarbons (TPH)	TX1006	Extractable Organics	NELAP	3/30/2006
Toxaphene (Chlorinated camphene)	EPA 8081	Pesticides-Herbicides-PCB's	NELAP	5/16/2003
Toxicity Characteristic Leaching Procedure	EPA 1311	General Chemistry	NELAP	5/16/2003
trans-1,2-Dichloroethylene	EPA 8260	Volatile Organics	NELAP	5/16/2003
trans-1,3-Dichloropropylene	EPA 8260	Volatile Organics	NELAP	5/16/2003
trans-1,4-Dichloro-2-butene	EPA 8260	Volatile Organics	NELAP	5/16/2003
Trichloroethene (Trichloroethylene)	EPA 8260	Volatile Organics	NELAP	5/16/2003
Trichlorofluoromethane	EPA 8260	Volatile Organics	NELAP	5/16/2003
Vanadium	EPA 6010	Metals	NELAP	5/16/2003

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Issue Date: 7/1/2010

Expiration Date: 6/30/2011

Charlie Crist
Governor



Ana M. Viamonte Ros, M.D., M.P.H.
State Surgeon General

Laboratory Scope of Accreditation

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State Laboratory ID: E87551

EPA Lab Code: OH00218

(740) 373-4071

E87551

Microbac Laboratories, Inc., Ohio Valley Division

158 Starlite Drive

Marietta, OH 45750

Matrix: Solid and Chemical Materials

Analyte	Method/Tech	Category	Certification Type	Effective Date
Vanadium	EPA 6020	Metals	NELAP	3/30/2006
Vinyl acetate	EPA 8260	Volatile Organics	NELAP	5/16/2003
Vinyl chloride	EPA 8260	Volatile Organics	NELAP	5/16/2003
Xylene (total)	EPA 8260	Volatile Organics	NELAP	5/16/2003
Zinc	EPA 6010	Metals	NELAP	5/16/2003
Zinc	EPA 6020	Metals	NELAP	3/30/2006

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Issue Date: 7/1/2010

Expiration Date: 6/30/2011



The American Association for Laboratory Accreditation

World Class Accreditation

Accredited DoD ELAP Laboratory

A2LA has accredited

MICROBAC LABORATORIES, INC. OHIO VALLEY DIVISION

Marietta, OH

for technical competence in the field of

Environmental Testing

In recognition of the successful completion of the A2LA evaluation process that includes an assessment of the laboratory's compliance with ISO/IEC 17025:2005, the 2003 NELAC Chapter 5 Standard, and the requirements of the Department of Defense Environmental Laboratory Accreditation Program (DoD ELAP) as detailed in the DoD Quality Systems Manual for Environmental Laboratories (QSM v4.1); accreditation is granted to this laboratory to perform recognized EPA methods as defined on the associated A2LA Environmental Scope of Accreditation. This accreditation demonstrates technical competence for this defined scope and the operation of a laboratory quality management system (refer to joint ISO-ILAC-IAF Communiqué dated 8 January 2009).



Presented this 28th day of September 2009.

A handwritten signature in black ink, appearing to read "Peter Meyer".

President & CEO
For the Accreditation Council
Certificate Number 2936.01
Valid to December 31, 2011

For the tests or types of tests to which this accreditation applies, please refer to the laboratory's Environmental Scope of Accreditation.



SCOPE OF ACCREDITATION TO ISO/IEC 17025-2005

MICROBAC LABORATORIES, INC.
 158 Starlite Drive
 Marietta, OH 45750
 Leslie Bucina Phone: 740-373-4071
 Email address lbucina@microbac.com

ENVIRONMENTAL

Valid To: December 31, 2011

Certificate Number: 2936.01

In recognition of the successful completion of the A2LA evaluation process, (including an assessment of the laboratory's compliance with ISO IEC 17025:2005, the 2003 NELAC Chapter 5 Standard, and the requirements of the DoD Environmental Laboratory Accreditation Program (DoD ELAP) as detailed in the DoD Quality Systems Manual for Environmental Laboratories (DoD QSM v4.1)) accreditation is granted to this laboratory to perform recognized EPA methods using the following testing technologies and in the analyte categories identified below:

Testing Technologies

Atomic Absorption/ICP-AES Spectrometry, ICP/MS, Gas Chromatography, Gas Chromatography/Mass Spectrometry, Gravimetry, High Performance Liquid Chromatography, LC/MS/MS, Ion Chromatography, Misc.- Electronic Probes (pH, O₂), Oxygen Demand, Hazardous Waste Characteristics Tests, Spectrophotometry (Visible), Spectrophotometry (Automated), IR Spectrometry, Titrimetry, Total Organic Carbon

Parameter/Analyte	Nonpotable Water (1)	Solid and Chemical Materials (2)
Metals		
Aluminum	EPA 200.7 EPA 3005A/6010B EPA 3015/6010B EPA 3015A/6010B EPA 3005A/6010C EPA 3015/6010C EPA 3015A/6010C	EPA 3051/6010B EPA 3051A/6010B EPA 3051/6010C EPA 3051A/6010C

Parameter/Analyte	Nonpotable Water (1)	Solid and Chemical Materials (2)
Antimony	EPA 200.7 EPA 200.8 EPA 3005A/6010B EPA 3015/6010B EPA 3015A/6010B EPA 3005A/6010C EPA 3015/6010C EPA 3015A/6010C EPA 3015/6020 EPA 3015A/6020 EPA 3015/6020A EPA 3015A/6020A	EPA 3051/6010B EPA 3051A/6010B EPA 3051/6010C EPA 3051A/6010C EPA 3051/6020 EPA 3051A/6020 EPA 3051/6020A EPA 3051A/6020A
Arsenic	EPA 200.7 EPA 200.8 EPA 3005A/6010B EPA 3015/6010B EPA 3015A/6010B EPA 3005A/6010C EPA 3015/6010C EPA 3015A/6010C EPA 3015/6020 EPA 3015A/6020 EPA 3015/6020A EPA 3015A/6020A	EPA 3051/6010B EPA 3051A/6010B EPA 3051/6010C EPA 3051A/6010C EPA 3051/6020 EPA 3051A/6020 EPA 3051/6020A EPA 3051A/6020A
Barium	EPA 200.7 EPA 200.8 EPA 3005A/6010B EPA 3015/6010B EPA 3015A/6010B EPA 3005A/6010C EPA 3015/6010C EPA 3015A/6010C EPA 3015/6020 EPA 3015A/6020 EPA 3015/6020A EPA 3015A/6020A	EPA 3051/6010B EPA 3051A/6010B EPA 3051/6010C EPA 3051A/6010C EPA 3051/6020 EPA 3051A/6020 EPA 3051/6020A EPA 3051A/6020A
Beryllium	EPA 200.7 EPA 3005A/6010B EPA 3015/6010B EPA 3015A/6010B EPA 3005A/6010C EPA 3015/6010C EPA 3015A/6010C	EPA 3051/6010B EPA 3051A/6010B EPA 3051/6010C EPA 3051A/6010C



Parameter/Analyte	Nonpotable Water (1)	Solid and Chemical Materials (2)
Boron	EPA 200.7 EPA 3005A/6010B EPA 3015/6010B EPA 3015A/6010B EPA 3005A/6010C EPA 3015/6010C EPA 3015A/6010C	EPA 3051/6010B EPA 3051A/6010B EPA 3051/6010C EPA 3051A/6010C
Cadmium	EPA 200.7 EPA 200.8 EPA 3005A/6010B EPA 3015/6010B EPA 3015A/6010B EPA 3005A/6010C EPA 3015/6010C EPA 3015A/6010C EPA 3015/6020 EPA 3015A/6020 EPA 3015/6020A EPA 3015A/6020A	EPA 3051/6010B EPA 3051A/6010B EPA 3051/6010C EPA 3051A/6010C EPA 3051/6020 EPA 3051A/6020 EPA 3051/6020A EPA 3051A/6020A
Calcium	EPA 200.7 EPA 3005A/6010B EPA 3015/6010B EPA 3015A/6010B EPA 3005A/6010C EPA 3015/6010C EPA 3015A/6010C	EPA 3051/6010B EPA 3051A/6010B EPA 3051/6010C EPA 3051A/6010C
Chromium	EPA 200.7 EPA 200.8 EPA 3005A/6010B EPA 3015/6010B EPA 3015A/6010B EPA 3005A/6010C EPA 3015/6010C EPA 3015A/6010C EPA 3015/6020 EPA 3015A/6020 EPA 3015/6020A EPA 3015A/6020A	EPA 3051/6010B EPA 3051A/6010B EPA 3051/6010C EPA 3051A/6010C EPA 3051/6020 EPA 3051A/6020 EPA 3051/6020A EPA 3051A/6020A
Cobalt	EPA 200.7 EPA 200.8 EPA 3005A/6010B EPA 3015/6010B EPA 3015A/6010B EPA 3005A/6010C EPA 3015/6010C EPA 3015A/6010C EPA 3015/6020 EPA 3015A/6020 EPA 3015/6020A EPA 3015A/6020A	EPA 3051/6010B EPA 3051A/6010B EPA 3051/6010C EPA 3051A/6010C EPA 3051/6020 EPA 3051A/6020 EPA 3051/6020A EPA 3051A/6020A



Parameter/Analyte	Nonpotable Water (1)	Solid and Chemical Materials (2)
Copper	EPA 200.7 EPA 200.8 EPA 3005A/6010B EPA 3015/6010B EPA 3015A/6010B EPA 3005A/6010C EPA 3015/6010C EPA 3015A/6010C EPA 3015/6020 EPA 3015A/6020 EPA 3015/6020A EPA 3015A/6020A	EPA 3051/6010B EPA 3051A/6010B EPA 3051/6010C EPA 3051A/6010C EPA 3051/6020 EPA 3051A/6020 EPA 3051/6020A EPA 3051A/6020A
Iron	EPA 200.7 EPA 3005A/6010B EPA 3015/6010B EPA 3015A/6010B EPA 3005A/6010C EPA 3015/6010C EPA 3015A/6010C	EPA 3051/6010B EPA 3051A/6010B EPA 3051/6010C EPA 3051A/6010C
Lead	EPA 200.7 EPA 200.8 EPA 3005A/6010B EPA 3015/6010B EPA 3015A/6010B EPA 3005A/6010C EPA 3015/6010C EPA 3015A/6010C EPA 3015/6020 EPA 3015A/6020 EPA 3015/6020A EPA 3015A/6020A	EPA 3051/6010B EPA 3051A/6010B EPA 3051/6010C EPA 3051A/6010C EPA 3051/6020 EPA 3051A/6020 EPA 3051/6020A EPA 3051A/6020A
Lithium	EPA 200.7 EPA 3005A/6010B EPA 3015/6010B EPA 3015A/6010B EPA 3005A/6010C EPA 3015/6010C EPA 3015A/6010C	EPA 3051/6010B EPA 3051A/6010B EPA 3051/6010C EPA 3051A/6010C
Magnesium	EPA 200.7 EPA 3005A/6010B EPA 3015/6010B EPA 3015A/6010B EPA 3005A/6010C EPA 3015/6010C EPA 3015A/6010C	EPA 3051/6010B EPA 3051A/6010B EPA 3051/6010C EPA 3051A/6010C



Parameter/Analyte	Nonpotable Water (1)	Solid and Chemical Materials (2)
Manganese	EPA 200.7 EPA 200.8 EPA 3005A/6010B EPA 3015/6010B EPA 3015A/6010B EPA 3005A/6010C EPA 3015/6010C EPA 3015A/6010C EPA 3015/6020 EPA 3015A/6020 EPA 3015/6020A EPA 3015A/6020A	EPA 3051/6010B EPA 3051A/6010B EPA 3051/6010C EPA 3051A/6010C EPA 3051/6020 EPA 3051A/6020 EPA 3051/6020A EPA 3051A/6020A
Mercury	EPA 245.1 EPA 7470A	EPA 7471A EPA 7471B
Molybdenum	EPA 200.7 EPA 3005A/6010B EPA 3015/6010B EPA 3015A/6010B EPA 3005A/6010C EPA 3015/6010C EPA 3015A/6010C	EPA 3051/6010B EPA 3051A/6010B EPA 3051/6010C EPA 3051A/6010C
Nickel	EPA 200.7 EPA 200.8 EPA 3005A/6010B EPA 3015/6010B EPA 3015A/6010B EPA 3005A/6010C EPA 3015/6010C EPA3015A/6010C EPA 3015/6020 EPA 3015A/6020 EPA 3015/6020A EPA 3015A/6020A	EPA 3051/6010B EPA 3051A/6010B EPA 3051/6010C EPA 3051A/6010C EPA 3051/6020 EPA 3051A/6020 EPA 3051/6020A EPA 3051A/6020A
Phosphorus	EPA 200.7 EPA 3005A/6010B EPA 3015/6010B EPA 3015A/6010B EPA 3005A/6010C EPA 3015/6010C EPA 3015A/6010C	EPA 3051/6010B EPA 3051A/6010B EPA 3051/6010C EPA 3051A/6010C
Potassium	EPA 200.7 EPA 3005A/6010B EPA 3015/6010B EPA 3015A/6010B EPA 3005A/6010C EPA 3015/6010C EPA 3015A/6010C	EPA 3051/6010B EPA 3051A/6010B EPA 3051/6010C EPA 3051A/6010C



Parameter/Analyte	Nonpotable Water (1)	Solid and Chemical Materials (2)
Selenium	EPA 200.7 EPA 200.8 EPA 3005A/6010B EPA 3015/6010B EPA 3015A/6010B EPA 3005A/6010C EPA 3015/6010C EPA 3015A/6010C EPA 3015/6020 EPA 3015A/6020 EPA 3015/6020A EPA 3015A/6020A	EPA 3051/6010B EPA 3051A/6010B EPA 3051/6010C EPA 3051A/6010C EPA 3051/6020 EPA 3051A/6020 EPA 3051/6020A EPA 3051A/6020A
Silicon	EPA 200.7 EPA 3005A/6010B EPA 3015/6010B EPA 3015A/6010B EPA 3005A/6010C EPA 3015/6010C EPA 3015A/6010C	
Silver	EPA 200.7 EPA 200.8 EPA 3005A/6010B EPA 3015/6010B EPA 3015A/6010B EPA 3005A/6010C EPA 3015/6010C EPA 3015A/6010C EPA 3015/6020 EPA 3015A/6020 EPA 3015/6020A EPA 3015A/6020A	EPA 3051/6010B EPA 3051A/6010B EPA 3051/6010C EPA 3051A/6010C EPA 3051/6020 EPA 3051A/6020 EPA 3051/6020A EPA 3051A/6020A
Sodium	EPA 200.7 EPA 3005A/6010B EPA 3015/6010B EPA 3015A/6010B EPA 3005A/6010C EPA 3015/6010C EPA 3015A/6010C	EPA 3051/6010B EPA 3051A/6010B EPA 3051/6010C EPA 3051A/6010C
Strontium	EPA 200.7 EPA 3005A/6010B EPA 3015/6010B EPA 3015A/6010B EPA 3005A/6010C EPA 3015/6010C EPA 3015A/6010C	EPA 3051/6010B EPA 3051A/6010B EPA 3051/6010C EPA 3051A/6010C



Parameter/Analyte	Nonpotable Water (1)	Solid and Chemical Materials (2)
Thallium	EPA 200.7 EPA 200.8 EPA 3005A/6010B EPA 3015/6010B EPA 3015A/6010B EPA 3005A/6010C EPA 3015/6010C EPA 3015A/6010C EPA 3015/6020 EPA 3015A/6020 EPA 3015/6020A EPA 3015A/6020A	EPA 3051/6010B EPA 3051A/6010B EPA 3051/6010C EPA 3051A/6010C EPA 3051/6020 EPA 3051A/6020 EPA 3051/6020A EPA 3051A/6020A
Tin	EPA 200.7 EPA 3005A/6010B EPA 3015/6010B EPA 3015A/6010B EPA 3005A/6010C EPA 3015/6010C EPA 3015A/6010C	EPA 3051/6010B EPA 3051A/6010B EPA 3051/6010C EPA 3051A/6010C
Titanium	EPA 200.7 EPA 3005A/6010B EPA 3015/6010B EPA 3015A/6010B EPA 3005A/6010C EPA 3015/6010C EPA 3015A/6010C	EPA 3051/6010B EPA 3051A/6010B EPA 3051/6010C EPA 3051A/6010C
Uranium	EPA 200.8 EPA 3015/6020 EPA 3015A/6020 EPA 3015/6020A EPA 3015A/6020A	EPA 3051/6020 EPA 3051A/6020 EPA 3051/6020A EPA 3051A/6020A
Vanadium	EPA 200.7 EPA 200.8 EPA 3005A/6010B EPA 3015/6010B EPA 3015A/6010B EPA 3005A/6010C EPA 3015/6010C EPA 3015A/6010C EPA 3015/6020 EPA 3015A/6020 EPA 3015/6020A EPA 3015A/6020A	EPA 3051/6010B EPA 3051A/6010B EPA 3051/6010C EPA 3051A/6010C EPA 3051/6020 EPA 3051A/6020 EPA 3051/6020A EPA 3051A/6020A



Parameter/Analyte	Nonpotable Water (1)	Solid and Chemical Materials (2)
Zinc	EPA 200.7 EPA 200.8 EPA 3005A/6010B EPA 3015/6010B EPA 3015A/6010B EPA 3005A/6010C EPA 3015/6010C EPA 3015A/6010C EPA 3015/6020 EPA 3015A/6020 EPA 3015/6020A EPA 3015A/6020A	EPA 3051/6010B EPA 3051A/6010B EPA 3051/6010C EPA 3051A/6010C EPA 3051/6020 EPA 3051A/6020 EPA 3051/6020A EPA 3051A/6020A
Zirconium	EPA 200.7 EPA 3005A/6010B EPA 3015/6010B EPA 3015A/6010B EPA 3005A/6010C EPA 3015/6010C EPA 3015A/6010C	EPA 3051/6010B EPA 3051A/6010B EPA 3051/6010C EPA 3051A/6010C
Nutrients		
Ammonia (as N)	EPA 350.1 SM 4500-NH3 B	EPA 350.1 SM 4500-NH3 B
Kjeldahl nitrogen	EPA 351.2	
Nitrate (as N)	EPA 300.0 EPA 9056 EPA 9056A EPA 353.2	EPA 9056 EPA 9056A
Nitrate-nitrite (as N)	EPA 300.0 EPA 9056 EPA 9056A EPA 353.2	EPA 9056 EPA 9056A
Nitrite (as N)	EPA 300.0 EPA 9056 EPA 9056A EPA 354.1	EPA 9056 EPA 9056A
Orthophosphate (as P)	EPA 365.2 SM 4500-P E	EPA 365.2
Total phosphorus	EPA 365.4	
Demands		
Biochemical oxygen demand	SM 5210 B	
Chemical oxygen demand	EPA 410.4 HACH 8000	
Total organic carbon	EPA 415.1 EPA 9060A SM5310 C	LLOYDKAHN

Parameter/Analyte	Nonpotable Water (1)	Solid and Chemical Materials (2)
Wet Chemistry		
Alkalinity	EPA 310.1 EPA 310.2 SM 2320 B	
Bromide	EPA 300.0 EPA 9056 EPA 9056A	EPA 9056 EPA 9056A
Chloride	EPA 300.0 EPA 9056 EPA 9056A EPA 325.2 SM 4500-CL E	EPA 9056 EPA 9056A EPA 325.2 SM 4500-CL E
Cyanide	SM 4500 CN-C,E EPA 9010C/9014	EPA 9010C/9014
Amenable Cyanide	SM 4500 CN-G EPA 9010C/9014	EPA 9010C/9014
Fluoride	EPA 300.0 EPA 9056 EPA 9056A SM 4500 F,C	EPA 300.0 EPA 9056 EPA 9056A SM 4500 F,C
pH	SM 4500-H ⁺ B EPA 9040C	EPA 9040C EPA 9045D
Oil and Grease	EPA 1664A	EPA 1664A
Phenols	EPA 420.1	EPA 420.1
Total residue	EPA 160.3 SM 2540 B	
Filterable residue	EPA 160.1 SM 2540 C	
Nonfilterable residue	EPA 160.2 SM 2540 D	
Sulfate	EPA 300.0 EPA 9056 EPA 9056A EPA 375.4 SM 426C	EPA 9056 EPA 9056A EPA 375.4 SM 426 C
Sulfide	EPA 376.1 SM 4500-S F	EPA 9030B/9034
Flashpoint	EPA 1010A	EPA 1010A
Ferrous Iron	SM 3500-Fe B	
Hexavalent chromium	SM 3500-Cr D 19 th Ed SM 3500-Cr B 20 th and 21 st Ed EPA 7196A	SM 3500-Cr D 19 th Ed SM 3500-Cr B 20 th and 21 st Ed EPA 7196A
Purgeable Organics (Volatiles)		
Acetone	EPA 624 EPA 5030B/8260B EPA 5030C/8260B	EPA 5035/8260B EPA 5035A/8260B



Parameter/Analyte	Nonpotable Water (1)	Solid and Chemical Materials (2)
Acetonitrile	EPA 624 EPA 5030B/8260B EPA 5030C/8260B	EPA 5035/8260B EPA 5035A/8260B
Acrolein	EPA 624 EPA 5030B/8260B EPA 5030C/8260B	EPA 5035/8260B EPA 5035A/8260B
Acrylonitrile	EPA 624 EPA 5030B/8260B EPA 5030C/8260B	EPA 5035/8260B EPA 5035A/8260B
Allyl chloride	EPA 624 EPA 5030B/8260B EPA 5030C/8260B	EPA 5035/8260B EPA 5035A/8260B
T-amylmethylether	EPA 624 EPA 5030B/8260B EPA 5030C/8260B	EPA 5035/8260B EPA 5035A/8260B
Benzene	EPA 624 EPA 5030B/8260B EPA 5030C/8260B	EPA 5035/8260B EPA 5035A/8260B
Bromobenzene	EPA 624 EPA 5030B/8260B EPA 5030C/8260B	EPA 5035/8260B EPA 5035A/8260B
Bromochloromethane	EPA 624 EPA 5030B/8260B EPA 5030C/8260B	EPA 5035/8260B EPA 5035A/8260B
Bromodichloromethane	EPA 624 EPA 5030B/8260B EPA 5030C/8260B	EPA 5035/8260B EPA 5035A/8260B
Bromoform	EPA 624 EPA 5030B/8260B EPA 5030C/8260B	EPA 5035/8260B EPA 5035A/8260B
Bromomethane	EPA 624 EPA 5030B/8260B EPA 5030C/8260B	EPA 5035/8260B EPA 5035A/8260B
1,3-Butadiene	EPA 624 EPA 5030B/8260B EPA 5030C/8260B	EPA 5035/8260B EPA 5035A/8260B
2-Butanone	EPA 624 EPA 5030B/8260B EPA 5030C/8260B	EPA 5035/8260B EPA 5035A/8260B
n-Butyl alcohol	EPA 624 EPA 5030B/8260B EPA 5030C/8260B	EPA 5035/8260B EPA 5035A/8260B
tert-Butyl alcohol	EPA 624 EPA 5030B/8260B EPA 5030C/8260B	EPA 5035/8260B EPA 5035A/8260B
n-Butylbenzene	EPA 624 EPA 5030B/8260B EPA 5030C/8260B	EPA 5035/8260B EPA 5035A/8260B



Parameter/Analyte	Nonpotable Water (1)	Solid and Chemical Materials (2)
Sec-Butylbenzene	EPA 624 EPA 5030B/8260B EPA 5030C/8260B	EPA 5035/8260B EPA 5035A/8260B
Tert-Butylbenzene	EPA 624 EPA 5030B/8260B EPA 5030C/8260B	EPA 5035/8260B EPA 5035A/8260B
Carbon disulfide	EPA 624 EPA 5030B/8260B EPA 5030C/8260B	EPA 5035/8260B EPA 5035A/8260B
Carbon tetrachloride	EPA 624 EPA 5030B/8260B EPA 5030C/8260B	EPA 5035/8260B EPA 5035A/8260B
Chlorobenzene	EPA 624 EPA 5030B/8260B EPA 5030C/8260B	EPA 5035/8260B EPA 5035A/8260B
Chloroethane	EPA 624 EPA 5030B/8260B EPA 5030C/8260B	EPA 5035/8260B EPA 5035A/8260B
2-Chloroethyl vinyl ether	EPA 624 EPA 5030B/8260B EPA 5030C/8260B	EPA 5035/8260B EPA 5035A/8260B
Chloroform	EPA 624 EPA 5030B/8260B EPA 5030C/8260B	EPA 5035/8260B EPA 5035A/8260B
Chloroprene	EPA 624 EPA 5030B/8260B EPA 5030C/8260B	EPA 5035/8260B EPA 5035A/8260B
1-Chlorohexane	EPA 624 EPA 5030B/8260B EPA 5030C/8260B	EPA 5035/8260B EPA 5035A/8260B
Chloromethane	EPA 624 EPA 5030B/8260B EPA 5030C/8260B	EPA 5035/8260B EPA 5035A/8260B
2-Chlorotoluene	EPA 624 EPA 5030B/8260B EPA 5030C/8260B	EPA 5035/8260B EPA 5035A/8260B
4-Chlorotoluene	EPA 624 EPA 5030B/8260B EPA 5030C/8260B	EPA 5035/8260B EPA 5035A/8260B
Cyclohexane	EPA 624 EPA 5030B/8260B EPA 5030C/8260B	EPA 5035/8260B EPA 5035A/8260B
Cyclohexanone	EPA 624 EPA 5030B/8260B EPA 5030C/8260B	EPA 5035/8260B EPA 5035A/8260B
Dibromochloromethane	EPA 624 EPA 5030B/8260B EPA 5030C/8260B	EPA 5035/8260B EPA 5035A/8260B



Parameter/Analyte	Nonpotable Water (1)	Solid and Chemical Materials (2)
Dibromofluoromethane	EPA 624 EPA 5030B/8260B EPA 5030C/8260B	EPA 5035/8260B EPA 5035A/8260B
1,2-Dibromo-3-chloropropane (DBCP)	EPA 624 EPA 5030B/8260B EPA 5030C/8260B EPA 8011	EPA 5035/8260B EPA 5035A/8260B
Dibromomethane	EPA 624 EPA 5030B/8260B EPA 5030C/8260B	EPA 5035/8260B EPA 5035A/8260B
1,2Dibromomethane (EDB)	EPA 624 EPA 5030B/8260B EPA 5030C/8260B EPA 8011	EPA 5035/8260B EPA 5035A/8260B
1,2-Dichlorobenzene	EPA 624 EPA 5030B/8260B EPA 5030C/8260B	EPA 5035/8260B EPA 5035A/8260B
1,3-Dichlorobenzene	EPA 624 EPA 5030B/8260B EPA 5030C/8260B	EPA 5035/8260B EPA 5035A/8260B
1,4-Dichlorobenzene	EPA 624 EPA 5030B/8260B EPA 5030C/8260B	EPA 5035/8260B EPA 5035A/8260B
Trans-1,4-Dichloro-2-butene	EPA 624 EPA 5030B/8260B EPA 5030C/8260B	EPA 5035/8260B EPA 5035A/8260B
Dichlorodifluoromethane	EPA 624 EPA 5030B/8260B EPA 5030C/8260B	EPA 5035/8260B EPA 5035A/8260B
1,1-Dichloroethane	EPA 624 EPA 5030B/8260B EPA 5030C/8260B	EPA 5035/8260B EPA 5035A/8260B
1,2-Dichloroethane	EPA 624 EPA 5030B/8260B EPA 5030C/8260B	EPA 5035/8260B EPA 5035A/8260B
1,1-Dichloroethene	EPA 624 EPA 5030B/8260B EPA 5030C/8260B	EPA 5035/8260B EPA 5035A/8260B
cis-1,2-Dichloroethene	EPA 624 EPA 5030B/8260B EPA 5030C/8260B	EPA 5035/8260B EPA 5035A/8260B
trans-1,2-Dichloroethene	EPA 624 EPA 5030B/8260B EPA 5030C/8260B	EPA 5035/8260B EPA 5035A/8260B
1,2-Dichloropropane	EPA 624 EPA 5030B/8260B EPA 5030C/8260B	EPA 5035/8260B EPA 5035A/8260B



Parameter/Analyte	Nonpotable Water (1)	Solid and Chemical Materials (2)
1,3-Dichloropropane	EPA 624 EPA 5030B/8260B EPA 5030C/8260B	EPA 5035/8260B EPA 5035A/8260B
2,2-Dichloropropane	EPA 624 EPA 5030B/8260B EPA 5030C/8260B	EPA 5035/8260B EPA 5035A/8260B
1,1-Dichloropropene	EPA 624 EPA 5030B/8260B EPA 5030C/8260B	EPA 5035/8260B EPA 5035A/8260B
cis-1,3-Dichloropropene	EPA 624 EPA 5030B/8260B EPA 5030C/8260B	EPA 5035/8260B EPA 5035A/8260B
trans-1,3-Dichloropropene	EPA 624 EPA 5030B/8260B EPA 5030C/8260B	EPA 5035/8260B EPA 5035A/8260B
Diethyl ether	EPA 624 EPA 5030B/8260B EPA 5030C/8260B	EPA 5035/8260B EPA 5035A/8260B
Di-isopropyl ether	EPA 624 EPA 5030B/8260B EPA 5030C/8260B	EPA 5035/8260B EPA 5035A/8260B
Dimethyldisulfide	EPA 624 EPA 5030B/8260B EPA 5030C/8260B	EPA 5035/8260B EPA 5035A/8260B
Dimethyl sulfide	EPA 624 EPA 5030B/8260B EPA 5030C/8260B	EPA 5035/8260B EPA 5035A/8260B
1,4-Dioxane	EPA 624 EPA 5030B/8260B EPA 5030C/8260B	EPA 5035/8260B EPA 5035A/8260B
Ethyl acetate	EPA 624 EPA 5030B/8260B EPA 5030C/8260B	EPA 5035/8260B EPA 5035A/8260B
Ethyl –t-butyl ether	EPA 624 EPA 5030B/8260B EPA 5030C/8260B	EPA 5035/8260B EPA 5035A/8260B
Ethyl methacrylate	EPA 624 EPA 5030B/8260B EPA 5030C/8260B	EPA 5035/8260B EPA 5035A/8260B
Ethyl benzene	EPA 624 EPA 5030B/8260B EPA 5030C/8260B	EPA 5035/8260B EPA 5035A/8260B
Gas Range Organics (GRO)	EPA 5030B/8015B EPA 5030C/8015B EPA 5030B/8015C EPA 5030C/8015C EPA 5030B/8015D EPA 5030C/8015D	EPA 5035/8015B EPA 5035/8015C EPA 5035/8015D EPA 5035A/8015B EPA 5035A/8015C EPA 5035A/8015D



Parameter/Analyte	Nonpotable Water (1)	Solid and Chemical Materials (2)
2-Hexanone	EPA 624 EPA 5030B/8260B EPA 5030C/8260B	EPA 5035/8260B EPA 5035A/8260B
Hexachlorobutadiene	EPA 624 EPA 5030B/8260B EPA 5030C/8260B	EPA 5035/8260B EPA 5035A/8260B
Isoprene	EPA 624 EPA 5030B/8260B EPA 5030C/8260B	EPA 5035/8260B EPA 5035A/8260B
Isopropylbenzene	EPA 624 EPA 5030B/8260B EPA 5030C/8260B	EPA 5035/8260B EPA 5035A/8260B
1,4-Isopropyltoluene	EPA 624 EPA 5030B/8260B EPA 5030C/8260B	EPA 5035/8260B EPA 5035A/8260B
Iodomethane	EPA 624 EPA 5030B/8260B EPA 5030C/8260B	EPA 5035/8260B EPA 5035A/8260B
Isobutyl alcohol	EPA 624 EPA 5030B/8260B EPA 5030C/8260B	EPA 5035/8260B EPA 5035A/8260B
Isopropyl alcohol	EPA 624 EPA 5030B/8260B EPA 5030C/8260B	EPA 5035/8260B EPA 5035A/8260B
Methacrylonitrile	EPA 624 EPA 5030B/8260B EPA 5030C/8260B	EPA 5035/8260B EPA 5035A/8260B
Methyl acetate	EPA 624 EPA 5030B/8260B EPA 5030C/8260B	EPA 5035/8260B EPA 5035A/8260B
Methylcyclohexane	EPA 624 EPA 5030B/8260B EPA 5030C/8260B	EPA 5035/8260B EPA 5035A/8260B
Methyl methacrylate	EPA 624 EPA 5030B/8260B EPA 5030C/8260B	EPA 5035/8260B EPA 5035A/8260B
Alpha-Methylstyrene	EPA 624 EPA 5030B/8260B EPA 5030C/8260B	EPA 5035/8260B EPA 5035A/8260B
Methyl tert-butyl ether	EPA 624 EPA 5030B/8260B EPA 5030C/8260B	EPA 5035/8260B EPA 5035A/8260B
Methylene chloride	EPA 624 EPA 5030B/8260B EPA 5030C/8260B	EPA 5035/8260B EPA 5035A/8260B
4-Methyl-2-pentanone	EPA 624 EPA 5030B/8260B EPA 5030C/8260B	EPA 5035/8260B EPA 5035A/8260B



Parameter/Analyte	Nonpotable Water (1)	Solid and Chemical Materials (2)
Naphthalene	EPA 624 EPA 5030B/8260B EPA 5030C/8260B	EPA 5035/8260B EPA 5035A/8260B
2-Nitropropane	EPA 624 EPA 5030B/8260B EPA 5030C/8260B	EPA 5035/8260B EPA 5035A/8260B
n-Propylbenzene	EPA 624 EPA 5030B/8260B EPA 5030C/8260B	EPA 5035/8260B EPA 5035A/8260B
Propionitrile	EPA 624 EPA 5030B/8260B EPA 5030C/8260B	EPA 5035/8260B EPA 5035A/8260B
Styrene	EPA 624 EPA 5030B/8260B EPA 5030C/8260B	EPA 5035/8260B EPA 5035A/8260B
1,1,1,2-Tetrachloroethane	EPA 624 EPA 5030B/8260B EPA 5030C/8260B	EPA 5035/8260B EPA 5035A/8260B
1,1,2,2-Tetrachloroethane	EPA 624 EPA 5030B/8260B EPA 5030C/8260B	EPA 5035/8260B EPA 5035A/8260B
Tetrachloroethene	EPA 624 EPA 5030B/8260B EPA 5030C/8260B	EPA 5035/8260B EPA 5035A/8260B
Tetrahydrofuran	EPA 624 EPA 5030B/8260B EPA 5030C/8260B	EPA 5035/8260B EPA 5035A/8260B
Toluene	EPA 624 EPA 5030B/8260B EPA 5030C/8260B	EPA 5035/8260B EPA 5035A/8260B
1,1,1-Trichloroethane	EPA 624 EPA 5030B/8260B EPA 5030C/8260B	EPA 5035/8260B EPA 5035A/8260B
1,1,2-Trichloroethane	EPA 624 EPA 5030B/8260B EPA 5030C/8260B	EPA 5035/8260B EPA 5035A/8260B
Trichloroethene	EPA 624 EPA 5030B/8260B EPA 5030C/8260B	EPA 5035/8260B EPA 5035A/8260B
Trichlorofluoromethane	EPA 624 EPA 5030B/8260B EPA 5030C/8260B	EPA 5035/8260B EPA 5035A/8260B
1,2,3-Trichlorobenzene	EPA 624 EPA 5030B/8260B EPA 5030C/8260B	EPA 5035/8260B EPA 5035A/8260B
1,2,3-Trichloropropane	EPA 624 EPA 5030B/8260B EPA 5030C/8260B	EPA 5035/8260B EPA 5035A/8260B



Parameter/Analyte	Nonpotable Water (1)	Solid and Chemical Materials (2)
1,2,4-Trichlorobenzene	EPA 624 EPA 5030B/8260B EPA 5030C/8260B	EPA 5035/8260B EPA 5035A/8260B
1,2,4-Trimethylbenzene	EPA 624 EPA 5030B/8260B EPA 5030C/8260B	EPA 5035/8260B EPA 5035A/8260B
1,3,5-Trimethylbenzene	EPA 624 EPA 5030B/8260B EPA 5030C/8260B	EPA 5035/8260B EPA 5035A/8260B
Vinyl acetate	EPA 624 EPA 5030B/8260B EPA 5030C/8260B	EPA 5035/8260B EPA 5035A/8260B
Vinyl chloride	EPA 624 EPA 5030B/8260B EPA 5030C/8260B	EPA 5035/8260B EPA 5035A/8260B
Xylenes, total	EPA 624 EPA 5030B/8260B EPA 5030C/8260B	EPA 5035/8260B EPA 5035A/8260B
1,2-Xylene	EPA 624 EPA 5030B/8260B EPA 5030C/8260B	EPA 5035/8260B EPA 5035A/8260B
1,3-Xylene	EPA 624 EPA 5030B/8260B EPA 5030C/8260B	EPA 5035/8260B EPA 5035A/8260B
1,4-Xylene	EPA 624 EPA 5030B/8260B EPA 5030C/8260B	EPA 5035/8260B EPA 5035A/8260B
<u>Headspace Organics</u>		
Carbon dioxide	EPA 5021/RSK175	
Methane	EPA 5021/RSK175	
Ethane	EPA 5021/RSK175	
Ethene	EPA 5021/RSK175	
Acetylene	EPA 5021/RSK175	
<u>Extractable Organics (Semivolatiles)</u>		
Acenaphthene	EPA 625 EPA 3510C/8270C EPA 3520C/8270C EPA 3510C/8270D EPA 3520C/8270D	EPA 3545/8270C EPA 3545A/8270C EPA 3550B/8270C EPA 3550C/8270C EPA 3580A/8270C EPA 3545/8270D EPA 3545A/8270D EPA 3550B/8270D EPA 3550C/8270D EPA 3580A/8270D



Parameter/Analyte	Nonpotable Water (1)	Solid and Chemical Materials (2)
Acenaphthylene	EPA 625 EPA 3510C/8270C EPA 3520C/8270C EPA 3510C/8270D EPA 3520C/8270D	EPA 3545/8270C EPA 3545A/8270C EPA 3550B/8270C EPA 3550C/8270C EPA 3580A/8270C EPA 3545/8270D EPA 3545A/8270D EPA 3550B/8270D EPA 3550C/8270D EPA 3580A/8270D
Acetophenone	EPA 3510C/8270C EPA 3520C/8270C EPA 3510C/8270D EPA 3520C/8270D	EPA 3545/8270C EPA 3545A/8270C EPA 3550B/8270C EPA 3550C/8270C EPA 3580A/8270C EPA 3545/8270D EPA 3545A/8270D EPA 3550B/8270D EPA 3550C/8270D EPA 3580A/8270D
2-Acetylaminofluorene	EPA 3510C/8270C EPA 3520C/8270C EPA 3510C/8270D EPA 3520C/8270D	EPA 3545/8270C EPA 3545A/8270C EPA 3550B/8270C EPA 3550C/8270C EPA 3580A/8270C EPA 3545/8270D EPA 3545A/8270D EPA 3550B/8270D EPA 3550C/8270D EPA 3580A/8270D
4-Aminobiphenyl	EPA 3510C/8270C EPA 3520C/8270C EPA 3510C/8270D EPA 3520C/8270D	EPA 3545/8270C EPA 3545A/8270C EPA 3550B/8270C EPA 3550C/8270C EPA 3580A/8270C EPA 3545/8270D EPA 3545A/8270D EPA 3550B/8270D EPA 3550C/8270D EPA 3580A/8270D
Anilene	EPA 3510C/8270C EPA 3520C/8270C EPA 3510C/8270D EPA 3520C/8270D	EPA 3545/8270C EPA 3545A/8270C EPA 3550B/8270C EPA 3550C/8270C EPA 3580A/8270C EPA 3545/8270D EPA 3545A/8270D EPA 3550B/8270D EPA 3550C/8270D EPA 3580A/8270D

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Parameter/Analyte	Nonpotable Water (1)	Solid and Chemical Materials (2)
Anthracene	EPA 625 EPA 3510C/8270C EPA 3520C/8270C EPA 3510C/8270D EPA 3520C/8270D	EPA 3545/8270C EPA 3545A/8270C EPA 3550B/8270C EPA 3550C/8270C EPA 3580A/8270C EPA 3545/8270D EPA 3545A/8270D EPA 3550B/8270D EPA 3550C/8270D EPA 3580A/8270D
Aramite	EPA 3510C/8270C EPA 3520C/8270C EPA 3510C/8270D EPA 3520C/8270D	EPA 3545/8270C EPA 3545A/8270C EPA 3550B/8270C EPA 3550C/8270C EPA 3580A/8270C EPA 3545/8270D EPA 3545A/8270D EPA 3550B/8270D EPA 3550C/8270D EPA 3580A/8270D
Benzidine	EPA 625 EPA 3510C/8270C EPA 3520C/8270C EPA 3510C/8270D EPA 3520C/8270D	EPA 3545/8270C EPA 3545A/8270C EPA 3550B/8270C EPA 3550C/8270C EPA 3580A/8270C EPA 3545/8270D EPA 3545A/8270D EPA 3550B/8270D EPA 3550C/8270D EPA 3580A/8270D
Benzoic acid	EPA 3510C/8270C EPA 3520C/8270C EPA 3510C/8270D EPA 3520C/8270D	EPA 3545/8270C EPA 3545A/8270C EPA 3550B/8270C EPA 3550C/8270C EPA 3580A/8270C EPA 3545/8270D EPA 3545A/8270D EPA 3550B/8270D EPA 3550C/8270D EPA 3580A/8270D
Benzo (a) anthracene	EPA 625 EPA 3510C/8270C EPA 3520C/8270C EPA 3510C/8270D EPA 3520C/8270D	EPA 3545/8270C EPA 3545A/8270C EPA 3550B/8270C EPA 3550C/8270C EPA 3580A/8270C EPA 3545/8270D EPA 3545A/8270D EPA 3550B/8270D EPA 3550C/8270D EPA 3580A/8270D



Parameter/Analyte	Nonpotable Water (1)	Solid and Chemical Materials (2)
Benzo (b) fluoranthene	EPA 625 EPA 3510C/8270C EPA 3520C/8270C EPA 3510C/8270D EPA 3520C/8270D	EPA 3545/8270C EPA 3545A/8270C EPA 3550B/8270C EPA 3550C/8270C EPA 3580A/8270C EPA 3545/8270D EPA 3545A/8270D EPA 3550B/8270D EPA 3550C/8270D EPA 3580A/8270D
Benzo (k) fluoranthene	EPA 625 EPA 3510C/8270C EPA 3520C/8270C EPA 3510C/8270D EPA 3520C/8270D	EPA 3545/8270C EPA 3545A/8270C EPA 3550B/8270C EPA 3550C/8270C EPA 3580A/8270C EPA 3545/8270D EPA 3545A/8270D EPA 3550B/8270D EPA 3550C/8270D EPA 3580A/8270D
Benzo (ghi) fluoranthene	EPA 625 EPA 3510C/8270C EPA 3520C/8270C EPA 3510C/8270D EPA 3520C/8270D	EPA 3545/8270C EPA 3545A/8270C EPA 3550B/8270C EPA 3550C/8270C EPA 3580A/8270C EPA 3545/8270D EPA 3545A/8270D EPA 3550B/8270D EPA 3550C/8270D EPA 3580A/8270D
Benzo (a) pyrene	EPA 625 EPA 3510C/8270C EPA 3520C/8270C EPA 3510C/8270D EPA 3520C/8270D	EPA 3545/8270C EPA 3545A/8270C EPA 3550B/8270C EPA 3550C/8270C EPA 3580A/8270C EPA 3545/8270D EPA 3545A/8270D EPA 3550B/8270D EPA 3550C/8270D EPA 3580A/8270D
Benzy alcohol	EPA 3510C/8270C EPA 3520C/8270C EPA 3510C/8270D EPA 3520C/8270D	EPA 3545/8270C EPA 3545A/8270C EPA 3550B/8270C EPA 3550C/8270C EPA 3580A/8270C EPA 3545/8270D EPA 3545A/8270D EPA 3550B/8270D EPA 3550C/8270D EPA 3580A/8270D



Parameter/Analyte	Nonpotable Water (1)	Solid and Chemical Materials (2)
Benzaldehyde	EPA 3510C/8270C EPA 3520C/8270C EPA 3510C/8270D EPA 3520C/8270D	EPA 3545/8270C EPA 3545A/8270C EPA 3550B/8270C EPA 3550C/8270C EPA 3580A/8270C EPA 3545/8270D EPA 3545A/8270D EPA 3550B/8270D EPA 3550C/8270D EPA 3580A/8270D
Biphenyl	EPA 3510C/8270C EPA 3520C/8270C EPA 3510C/8270D EPA 3520C/8270D	EPA 3545/8270C EPA 3545A/8270C EPA 3550B/8270C EPA 3550C/8270C EPA 3580A/8270C EPA 3545/8270D EPA 3545A/8270D EPA 3550B/8270D EPA 3550C/8270D EPA 3580A/8270D
Bis(2-chloroethoxy) methane	EPA 625 EPA 3510C/8270C EPA 3520C/8270C EPA 3510C/8270D EPA 3520C/8270D	EPA 3545/8270C EPA 3545A/8270C EPA 3550B/8270C EPA 3550C/8270C EPA 3580A/8270C EPA 3545/8270D EPA 3545A/8270D EPA 3550B/8270D EPA 3550C/8270D EPA 3580A/8270D
Bis (2-chloroethyl) ether	EPA 625 EPA 3510C/8270C EPA 3520C/8270C EPA 3510C/8270D EPA 3520C/8270D	EPA 3545/8270C EPA 3545A/8270C EPA 3550B/8270C EPA 3550C/8270C EPA 3580A/8270C EPA 3545/8270D EPA 3545A/8270D EPA 3550B/8270D EPA 3550C/8270D EPA 3580A/8270D
Bis(2-chloroisopropyl) ether	EPA 625 EPA 3510C/8270C EPA 3520C/8270C EPA 3510C/8270D EPA 3520C/8270D	EPA 3545/8270C EPA 3545A/8270C EPA 3550B/8270C EPA 3550C/8270C EPA 3580A/8270C EPA 3545/8270D EPA 3545A/8270D EPA 3550B/8270D EPA 3550C/8270D EPA 3580A/8270D



Parameter/Analyte	Nonpotable Water (1)	Solid and Chemical Materials (2)
Bis (2-ethylhexyl) phthalate	EPA 625 EPA 3510C/8270C EPA 3520C/8270C EPA 3510C/8270D EPA 3520C/8270D	EPA 3545/8270C EPA 3545A/8270C EPA 3550B/8270C EPA 3550C/8270C EPA 3580A/8270C EPA 3545/8270D EPA 3545A/8270D EPA 3550B/8270D EPA 3550C/8270D EPA 3580A/8270D
4-Bromophenylphenylether	EPA 625 EPA 3510C/8270C EPA 3520C/8270C EPA 3510C/8270D EPA 3520C/8270D	EPA 3545/8270C EPA 3545A/8270C EPA 3550B/8270C EPA 3550C/8270C EPA 3580A/8270C EPA 3545/8270D EPA 3545A/8270D EPA 3550B/8270D EPA 3550C/8270D EPA 3580A/8270D
Butyl benzyl phthalate	EPA 625 EPA 3510C/8270C EPA 3520C/8270C EPA 3510C/8270D EPA 3520C/8270D	EPA 3545/8270C EPA 3545A/8270C EPA 3550B/8270C EPA 3550C/8270C EPA 3580A/8270C EPA 3545/8270D EPA 3545A/8270D EPA 3550B/8270D EPA 3550C/8270D EPA 3580A/8270D
Caprolactam	EPA 3510C/8270C EPA 3520C/8270C EPA 3510C/8270D EPA 3520C/8270D	EPA 3545/8270C EPA 3545A/8270C EPA 3550B/8270C EPA 3550C/8270C EPA 3580A/8270C EPA 3545/8270D EPA 3545A/8270D EPA 3550B/8270D EPA 3550C/8270D EPA 3580A/8270D
Carbazole	EPA 3510C/8270C EPA 3520C/8270C EPA 3510C/8270D EPA 3520C/8270D	EPA 3545/8270C EPA 3545A/8270C EPA 3550B/8270C EPA 3550C/8270C EPA 3580A/8270C EPA 3545/8270D EPA 3545A/8270D EPA 3550B/8270D EPA 3550C/8270D EPA 3580A/8270D



Parameter/Analyte	Nonpotable Water (1)	Solid and Chemical Materials (2)
4-Chloroaniline	EPA 3510C/8270C EPA 3520C/8270C EPA 3510C/8270D EPA 3520C/8270D	EPA 3545/8270C EPA 3545A/8270C EPA 3550B/8270C EPA 3550C/8270C EPA 3580A/8270C EPA 3545/8270D EPA 3545A/8270D EPA 3550B/8270D EPA 3550C/8270D EPA 3580A/8270D
Chlorobenzilate	EPA 3510C/8270C EPA 3520C/8270C EPA 3510C/8270D EPA 3520C/8270D	EPA 3545/8270C EPA 3545A/8270C EPA 3550B/8270C EPA 3550C/8270C EPA 3580A/8270C EPA 3545/8270D EPA 3545A/8270D EPA 3550B/8270D EPA 3550C/8270D EPA 3580A/8270D
4-Chloro-3-methylphenol	EPA 625 EPA 3510C/8270C EPA 3520C/8270C EPA 3510C/8270D EPA 3520C/8270D	EPA 3545/8270C EPA 3545A/8270C EPA 3550B/8270C EPA 3550C/8270C EPA 3580A/8270C EPA 3545/8270D EPA 3545A/8270D EPA 3550B/8270D EPA 3550C/8270D EPA 3580A/8270D
1-Chloronaphthalene	EPA 3510C/8270C EPA 3520C/8270C EPA 3510C/8270D EPA 3520C/8270D	EPA 3545/8270C EPA 3545A/8270C EPA 3550B/8270C EPA 3550C/8270C EPA 3580A/8270C EPA 3545/8270D EPA 3545A/8270D EPA 3550B/8270D EPA 3550C/8270D EPA 3580A/8270D
2-Chloronaphthalene	EPA 625 EPA 3510C/8270C EPA 3520C/8270C EPA 3510C/8270D EPA 3520C/8270D	EPA 3545/8270C EPA 3545A/8270C EPA 3550B/8270C EPA 3550C/8270C EPA 3580A/8270C EPA 3545/8270D EPA 3545A/8270D EPA 3550B/8270D EPA 3550C/8270D EPA 3580A/8270D



Parameter/Analyte	Nonpotable Water (1)	Solid and Chemical Materials (2)
2-Chlorophenol	EPA 625 EPA 3510C/8270C EPA 3520C/8270C EPA 3510C/8270D EPA 3520C/8270D	EPA 3545/8270C EPA 3545A/8270C EPA 3550B/8270C EPA 3550C/8270C EPA 3580A/8270C EPA 3545/8270D EPA 3545A/8270D EPA 3550B/8270D EPA 3550C/8270D EPA 3580A/8270D
4-Chlorophenylphenyl ether	EPA 625 EPA 3510C/8270C EPA 3520C/8270C EPA 3510C/8270D EPA 3520C/8270D	EPA 3545/8270C EPA 3545A/8270C EPA 3550B/8270C EPA 3550C/8270C EPA 3580A/8270C EPA 3545/8270D EPA 3545A/8270D EPA 3550B/8270D EPA 3550C/8270D EPA 3580A/8270D
Chrysene	EPA 625 EPA 3510C/8270C EPA 3520C/8270C EPA 3510C/8270D EPA 3520C/8270D	EPA 3545/8270C EPA 3545A/8270C EPA 3550B/8270C EPA 3550C/8270C EPA 3580A/8270C EPA 3545/8270D EPA 3545A/8270D EPA 3550B/8270D EPA 3550C/8270D EPA 3580A/8270D
Cresols	EPA 3510C/8270C EPA 3520C/8270C EPA 3510C/8270D EPA 3520C/8270D	EPA 3545/8270C EPA 3545A/8270C EPA 3550B/8270C EPA 3550C/8270C EPA 3580A/8270C EPA 3545/8270D EPA 3545A/8270D EPA 3550B/8270D EPA 3550C/8270D EPA 3580A/8270D
Diallate	EPA 3510C/8270C EPA 3520C/8270C EPA 3510C/8270D EPA 3520C/8270D	EPA 3545/8270C EPA 3545A/8270C EPA 3550B/8270C EPA 3550C/8270C EPA 3580A/8270C EPA 3545/8270D EPA 3545A/8270D EPA 3550B/8270D EPA 3550C/8270D EPA 3580A/8270D



Parameter/Analyte	Nonpotable Water (1)	Solid and Chemical Materials (2)
Dibenzo (a,h) anthracene	EPA 625 EPA 3510C/8270C EPA 3520C/8270C EPA 3510C/8270D EPA 3520C/8270D	EPA 3545/8270C EPA 3545A/8270C EPA 3550B/8270C EPA 3550C/8270C EPA 3580A/8270C EPA 3545/8270D EPA 3545A/8270D EPA 3550B/8270D EPA 3550C/8270D EPA 3580A/8270D
Dibenzofuran	EPA 3510C/8270C EPA 3520C/8270C EPA 3510C/8270D EPA 3520C/8270D	EPA 3545/8270C EPA 3545A/8270C EPA 3550B/8270C EPA 3550C/8270C EPA 3580A/8270C EPA 3545/8270D EPA 3545A/8270D EPA 3550B/8270D EPA 3550C/8270D EPA 3580A/8270D
1,2-Dichlorobenzene	EPA 625 EPA 3510C/8270C EPA 3520C/8270C EPA 3510C/8270D EPA 3520C/8270D	EPA 3545/8270C EPA 3545A/8270C EPA 3550B/8270C EPA 3550C/8270C EPA 3580A/8270C EPA 3545/8270D EPA 3545A/8270D EPA 3550B/8270D EPA 3550C/8270D EPA 3580A/8270D
1,3-Dichlorobenzene	EPA 625 EPA 3510C/8270C EPA 3520C/8270C EPA 3510C/8270D EPA 3520C/8270D	EPA 3545/8270C EPA 3545A/8270C EPA 3550B/8270C EPA 3550C/8270C EPA 3580A/8270C EPA 3545/8270D EPA 3545A/8270D EPA 3550B/8270D EPA 3550C/8270D EPA 3580A/8270D
1,4-Dichlorobenzene	EPA 625 EPA 3510C/8270C EPA 3520C/8270C EPA 3510C/8270D EPA 3520C/8270D	EPA 3545/8270C EPA 3545A/8270C EPA 3550B/8270C EPA 3550C/8270C EPA 3580A/8270C EPA 3545/8270D EPA 3545A/8270D EPA 3550B/8270D EPA 3550C/8270D EPA 3580A/8270D



Parameter/Analyte	Nonpotable Water (1)	Solid and Chemical Materials (2)
3,3'-Dichlorobenzidine	EPA 625 EPA 3510C/8270C EPA 3520C/8270C EPA 3510C/8270D EPA 3520C/8270D	EPA 3545/8270C EPA 3545A/8270C EPA 3550B/8270C EPA 3550C/8270C EPA 3580A/8270C EPA 3545/8270D EPA 3545A/8270D EPA 3550B/8270D EPA 3550C/8270D EPA 3580A/8270D
2,4-Dichlorophenol	EPA 625 EPA 3510C/8270C EPA 3520C/8270C EPA 3510C/8270D EPA 3520C/8270D	EPA 3545/8270C EPA 3545A/8270C EPA 3550B/8270C EPA 3550C/8270C EPA 3580A/8270C EPA 3545/8270D EPA 3545A/8270D EPA 3550B/8270D EPA 3550C/8270D EPA 3580A/8270D
2,6-Dichlorophenol	EPA 3510C/8270C EPA 3520C/8270C EPA 3510C/8270D EPA 3520C/8270D	EPA 3545/8270C EPA 3545A/8270C EPA 3550B/8270C EPA 3550C/8270C EPA 3580A/8270C EPA 3545/8270D EPA 3545A/8270D EPA 3550B/8270D EPA 3550C/8270D EPA 3580A/8270D
Diethyl phthalate	EPA 625 EPA 3510C/8270C EPA 3520C/8270C EPA 3510C/8270D EPA 3520C/8270D	EPA 3545/8270C EPA 3545A/8270C EPA 3550B/8270C EPA 3550C/8270C EPA 3580A/8270C EPA 3545/8270D EPA 3545A/8270D EPA 3550B/8270D EPA 3550C/8270D EPA 3580A/8270D
Dimethoate	EPA 3510C/8270C EPA 3520C/8270C EPA 3510C/8270D EPA 3520C/8270D	EPA 3545/8270C EPA 3545A/8270C EPA 3550B/8270C EPA 3550C/8270C EPA 3580A/8270C EPA 3545/8270D EPA 3545A/8270D EPA 3550B/8270D EPA 3550C/8270D EPA 3580A/8270D



Parameter/Analyte	Nonpotable Water (1)	Solid and Chemical Materials (2)
4-Dimethylaminoazobenzene	EPA 3510C/8270C EPA 3520C/8270C EPA 3510C/8270D EPA 3520C/8270D	EPA 3545/8270C EPA 3545A/8270C EPA 3550B/8270C EPA 3550C/8270C EPA 3580A/8270C EPA 3545/8270D EPA 3545A/8270D EPA 3550B/8270D EPA 3550C/8270D EPA 3580A/8270D
7,12-Dimethylbenz(a)anthracene	EPA 3510C/8270C EPA 3520C/8270C EPA 3510C/8270D EPA 3520C/8270D	EPA 3545/8270C EPA 3545A/8270C EPA 3550B/8270C EPA 3550C/8270C EPA 3580A/8270C EPA 3545/8270D EPA 3545A/8270D EPA 3550B/8270D EPA 3550C/8270D EPA 3580A/8270D
3,3'-Dimethylbenzidine	EPA 3510C/8270C EPA 3520C/8270C EPA 3510C/8270D EPA 3520C/8270D	EPA 3545/8270C EPA 3545A/8270C EPA 3550B/8270C EPA 3550C/8270C EPA 3580A/8270C EPA 3545/8270D EPA 3545A/8270D EPA 3550B/8270D EPA 3550C/8270D EPA 3580A/8270D
Alpha-,alpha-Dimethylphenethylamine	EPA 3510C/8270C EPA 3520C/8270C EPA 3510C/8270D EPA 3520C/8270D	EPA 3545/8270C EPA 3545A/8270C EPA 3550B/8270C EPA 3550C/8270C EPA 3580A/8270C EPA 3545/8270D EPA 3545A/8270D EPA 3550B/8270D EPA 3550C/8270D EPA 3580A/8270D
2,4-Dimethylphenol	EPA 625 EPA 3510C/8270C EPA 3520C/8270C EPA 3510C/8270D EPA 3520C/8270D	EPA 3545/8270C EPA 3545A/8270C EPA 3550B/8270C EPA 3550C/8270C EPA 3580A/8270C EPA 3545/8270D EPA 3545A/8270D EPA 3550B/8270D EPA 3550C/8270D EPA 3580A/8270D



Parameter/Analyte	Nonpotable Water (1)	Solid and Chemical Materials (2)
Dimethyl phthalate	EPA 625 EPA 3510C/8270C EPA 3520C/8270C EPA 3510C/8270D EPA 3520C/8270D	EPA 3545/8270C EPA 3545A/8270C EPA 3550B/8270C EPA 3550C/8270C EPA 3580A/8270C EPA 3545/8270D EPA 3545A/8270D EPA 3550B/8270D EPA 3550C/8270D EPA 3580A/8270D
Di-n-butyl phthalate	EPA 625 EPA 3510C/8270C EPA 3520C/8270C EPA 3510C/8270D EPA 3520C/8270D	EPA 3545/8270C EPA 3545A/8270C EPA 3550B/8270C EPA 3550C/8270C EPA 3580A/8270C EPA 3545/8270D EPA 3545A/8270D EPA 3550B/8270D EPA 3550C/8270D EPA 3580A/8270D
Di-n-octyl phthalate	EPA 625 EPA 3510C/8270C EPA 3520C/8270C EPA 3510C/8270D EPA 3520C/8270D	EPA 3545/8270C EPA 3545A/8270C EPA 3550B/8270C EPA 3550C/8270C EPA 3580A/8270C EPA 3545/8270D EPA 3545A/8270D EPA 3550B/8270D EPA 3550C/8270D EPA 3580A/8270D
2,4-Dinitrophenol	EPA 625 EPA 3510C/8270C EPA 3520C/8270C EPA 3510C/8270D EPA 3520C/8270D	EPA 3545/8270C EPA 3545A/8270C EPA 3550B/8270C EPA 3550C/8270C EPA 3580A/8270C EPA 3545/8270D EPA 3545A/8270D EPA 3550B/8270D EPA 3550C/8270D EPA 3580A/8270D
2,4-Dinitrotoluene	EPA 625 EPA 3510C/8270C EPA 3520C/8270C EPA 3510C/8270D EPA 3520C/8270D	EPA 3545/8270C EPA 3545A/8270C EPA 3550B/8270C EPA 3550C/8270C EPA 3580A/8270C EPA 3545/8270D EPA 3545A/8270D EPA 3550B/8270D EPA 3550C/8270D EPA 3580A/8270D



Parameter/Analyte	Nonpotable Water (1)	Solid and Chemical Materials (2)
2,6-Dinitrotoluene	EPA 625 EPA 3510C/8270C EPA 3520C/8270C EPA 3510C/8270D EPA 3520C/8270D	EPA 3545/8270C EPA 3545A/8270C EPA 3550B/8270C EPA 3550C/8270C EPA 3580A/8270C EPA 3545/8270D EPA 3545A/8270D EPA 3550B/8270D EPA 3550C/8270D EPA 3580A/8270D
1,4-Dioxane	EPA 3510C/8270C EPA 3520C/8270C EPA 3510C/8270D EPA 3520C/8270D	EPA 3545/8270C EPA 3545A/8270C EPA 3550B/8270C EPA 3550C/8270C EPA 3580A/8270C EPA 3545/8270D EPA 3545A/8270D EPA 3550B/8270D EPA 3550C/8270D EPA 3580A/8270D
Diphenylamine	EPA 3510C/8270C EPA 3520C/8270C EPA 3510C/8270D EPA 3520C/8270D	EPA 3545/8270C EPA 3545A/8270C EPA 3550B/8270C EPA 3550C/8270C EPA 3580A/8270C EPA 3545/8270D EPA 3545A/8270D EPA 3550B/8270D EPA 3550C/8270D EPA 3580A/8270D
1,2-Diphenylhydrazine	EPA 3510C/8270C EPA 3520C/8270C EPA 3510C/8270D EPA 3520C/8270D	EPA 3545/8270C EPA 3545A/8270C EPA 3550B/8270C EPA 3550C/8270C EPA 3580A/8270C EPA 3545/8270D EPA 3545A/8270D EPA 3550B/8270D EPA 3550C/8270D EPA 3580A/8270D
Disulfoton	EPA 3510C/8270C EPA 3520C/8270C EPA 3510C/8270D EPA 3520C/8270D	EPA 3545/8270C EPA 3545A/8270C EPA 3550B/8270C EPA 3550C/8270C EPA 3580A/8270C EPA 3545/8270D EPA 3545A/8270D EPA 3550B/8270D EPA 3550C/8270D EPA 3580A/8270D



Parameter/Analyte	Nonpotable Water (1)	Solid and Chemical Materials (2)
DRO	EPA 3510C/8015B EPA 3510C/8015C EPA 3510C/8015D	EPA 3545/8015B EPA 3545A/8015B EPA 3550B/8015B EPA 3550C/8015B EPA 3545/8015C EPA 3545A/8015C EPA 3550B/8015C EPA 3550C/8015C EPA 3545/8015D EPA 3545A/8015D EPA 3550B/8015D EPA 3550C/8015D
Ethyl methanesulfonate	EPA 3510C/8270C EPA 3520C/8270C EPA 3510C/8270D EPA 3520C/8270D	EPA 3545/8270C EPA 3545A/8270C EPA 3550B/8270C EPA 3550C/8270C EPA 3580A/8270C EPA 3545/8270D EPA 3545A/8270D EPA 3550B/8270D EPA 3550C/8270D EPA 3580A/8270D
Ethyl parathion	EPA 3510C/8270C EPA 3520C/8270C EPA 3510C/8270D EPA 3520C/8270D	EPA 3545/8270C EPA 3545A/8270C EPA 3550B/8270C EPA 3550C/8270C EPA 3580A/8270C EPA 3545/8270D EPA 3545A/8270D EPA 3550B/8270D EPA 3550C/8270D EPA 3580A/8270D
Famphur	EPA 3510C/8270C EPA 3520C/8270C EPA 3510C/8270D EPA 3520C/8270D	EPA 3545/8270C EPA 3545A/8270C EPA 3550B/8270C EPA 3550C/8270C EPA 3580A/8270C EPA 3545/8270D EPA 3545A/8270D EPA 3550B/8270D EPA 3550C/8270D EPA 3580A/8270D



Parameter/Analyte	Nonpotable Water (1)	Solid and Chemical Materials (2)
Fluoroanthene	EPA 625 EPA 3510C/8270C EPA 3520C/8270C EPA 3510C/8270D EPA 3520C/8270D	EPA 3545/8270C EPA 3545A/8270C EPA 3550B/8270C EPA 3550C/8270C EPA 3580A/8270C EPA 3545/8270D EPA 3545A/8270D EPA 3550B/8270D EPA 3550C/8270D EPA 3580A/8270D
Fluorene	EPA 625 EPA 3510C/8270C EPA 3520C/8270C EPA 3510C/8270D EPA 3520C/8270D	EPA 3545/8270C EPA 3545A/8270C EPA 3550B/8270C EPA 3550C/8270C EPA 3580A/8270C EPA 3545/8270D EPA 3545A/8270D EPA 3550B/8270D EPA 3550C/8270D EPA 3580A/8270D
Hexachlorobenzene	EPA 625 EPA 3510C/8270C EPA 3520C/8270C EPA 3510C/8270D EPA 3520C/8270D	EPA 3545/8270C EPA 3545A/8270C EPA 3550B/8270C EPA 3550C/8270C EPA 3580A/8270C EPA 3545/8270D EPA 3545A/8270D EPA 3550B/8270D EPA 3550C/8270D EPA 3580A/8270D
Hexachlorobutadiene	EPA 625 EPA 3510C/8270C EPA 3520C/8270C EPA 3510C/8270D EPA 3520C/8270D	EPA 3545/8270C EPA 3545A/8270C EPA 3550B/8270C EPA 3550C/8270C EPA 3580A/8270C EPA 3545/8270D EPA 3545A/8270D EPA 3550B/8270D EPA 3550C/8270D EPA 3580A/8270D
Hexachlorocyclopentadiene	EPA 3510C/8270C EPA 3520C/8270C EPA 3510C/8270D EPA 3520C/8270D	EPA 3545/8270C EPA 3545A/8270C EPA 3550B/8270C EPA 3550C/8270C EPA 3580A/8270C EPA 3545/8270D EPA 3545A/8270D EPA 3550B/8270D EPA 3550C/8270D EPA 3580A/8270D

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Parameter/Analyte	Nonpotable Water (1)	Solid and Chemical Materials (2)
Hexachloroethane	EPA 625 EPA 3510C/8270C EPA 3520C/8270C EPA 3510C/8270D EPA 3520C/8270D	EPA 3545/8270C EPA 3545A/8270C EPA 3550B/8270C EPA 3550C/8270C EPA 3580A/8270C EPA 3545/8270D EPA 3545A/8270D EPA 3550B/8270D EPA 3550C/8270D EPA 3580A/8270D
Hexachlorophene	EPA 3510C/8270C EPA 3520C/8270C EPA 3510C/8270D EPA 3520C/8270D	EPA 3545/8270C EPA 3545A/8270C EPA 3550B/8270C EPA 3550C/8270C EPA 3580A/8270C EPA 3545/8270D EPA 3545A/8270D EPA 3550B/8270D EPA 3550C/8270D EPA 3580A/8270D
Hexachloropropene	EPA 3510C/8270C EPA 3520C/8270C EPA 3510C/8270D EPA 3520C/8270D	EPA 3545/8270C EPA 3545A/8270C EPA 3550B/8270C EPA 3550C/8270C EPA 3580A/8270C EPA 3545/8270D EPA 3545A/8270D EPA 3550B/8270D EPA 3550C/8270D EPA 3580A/8270D
Indeno (1,2,3-cd) pyrene	EPA 625 EPA 3510C/8270C EPA 3520C/8270C EPA 3510C/8270D EPA 3520C/8270D	EPA 3545/8270C EPA 3545A/8270C EPA 3550B/8270C EPA 3550C/8270C EPA 3580A/8270C EPA 3545/8270D EPA 3545A/8270D EPA 3550B/8270D EPA 3550C/8270D EPA 3580A/8270D
Isodrin	EPA 3510C/8270C EPA 3520C/8270C EPA 3510C/8270D EPA 3520C/8270D	EPA 3545/8270C EPA 3545A/8270C EPA 3550B/8270C EPA 3550C/8270C EPA 3580A/8270C EPA 3545/8270D EPA 3545A/8270D EPA 3550B/8270D EPA 3550C/8270D EPA 3580A/8270D



Parameter/Analyte	Nonpotable Water (1)	Solid and Chemical Materials (2)
Isophorone	EPA 625 EPA 3510C/8270C EPA 3520C/8270C EPA 3510C/8270D EPA 3520C/8270D	EPA 3545/8270C EPA 3545A/8270C EPA 3550B/8270C EPA 3550C/8270C EPA 3580A/8270C EPA 3545/8270D EPA 3545A/8270D EPA 3550B/8270D EPA 3550C/8270D EPA 3580A/8270D
Isosafrole	EPA 3510C/8270C EPA 3520C/8270C EPA 3510C/8270D EPA 3520C/8270D	EPA 3545/8270C EPA 3545A/8270C EPA 3550B/8270C EPA 3550C/8270C EPA 3580A/8270C EPA 3545/8270D EPA 3545A/8270D EPA 3550B/8270D EPA 3550C/8270D EPA 3580A/8270D
Kepone	EPA 3510C/8270C EPA 3520C/8270C EPA 3510C/8270D EPA 3520C/8270D	EPA 3545/8270C EPA 3545A/8270C EPA 3550B/8270C EPA 3550C/8270C EPA 3580A/8270C EPA 3545/8270D EPA 3545A/8270D EPA 3550B/8270D EPA 3550C/8270D EPA 3580A/8270D
Methapyrilene	EPA 3510C/8270C EPA 3520C/8270C EPA 3510C/8270D EPA 3520C/8270D	EPA 3545/8270C EPA 3545A/8270C EPA 3550B/8270C EPA 3550C/8270C EPA 3580A/8270C EPA 3545/8270D EPA 3545A/8270D EPA 3550B/8270D EPA 3550C/8270D EPA 3580A/8270D
3-Methylcholanthrene	EPA 3510C/8270C EPA 3520C/8270C EPA 3510C/8270D EPA 3520C/8270D	EPA 3545/8270C EPA 3545A/8270C EPA 3550B/8270C EPA 3550C/8270C EPA 3580A/8270C EPA 3545/8270D EPA 3545A/8270D EPA 3550B/8270D EPA 3550C/8270D EPA 3580A/8270D



Parameter/Analyte	Nonpotable Water (1)	Solid and Chemical Materials (2)
2-Methyl-4,6-Dinitrophenol	EPA 625 EPA 3510C/8270C EPA 3520C/8270C EPA 3510C/8270D EPA 3520C/8270D	EPA 3545/8270C EPA 3545A/8270C EPA 3550B/8270C EPA 3550C/8270C EPA 3580A/8270C EPA 3545/8270D EPA 3545A/8270D EPA 3550B/8270D EPA 3550C/8270D EPA 3580A/8270D
Methyl methanesulfonate	EPA 3510C/8270C EPA 3520C/8270C EPA 3510C/8270D EPA 3520C/8270D	EPA 3545/8270C EPA 3545A/8270C EPA 3550B/8270C EPA 3550C/8270C EPA 3580A/8270C EPA 3545/8270D EPA 3545A/8270D EPA 3550B/8270D EPA 3550C/8270D EPA 3580A/8270D
1-Methylnaphthalene	EPA 3510C/8270C EPA 3520C/8270C EPA 3510C/8270D EPA 3520C/8270D	EPA 3545/8270C EPA 3545A/8270C EPA 3550B/8270C EPA 3550C/8270C EPA 3580A/8270C EPA 3545/8270D EPA 3545A/8270D EPA 3550B/8270D EPA 3550C/8270D EPA 3580A/8270D
2-Methylnaphthalene	EPA 3510C/8270C EPA 3520C/8270C EPA 3510C/8270D EPA 3520C/8270D	EPA 3545/8270C EPA 3545A/8270C EPA 3550B/8270C EPA 3550C/8270C EPA 3580A/8270C EPA 3545/8270D EPA 3545A/8270D EPA 3550B/8270D EPA 3550C/8270D EPA 3580A/8270D
Methyl parathion	EPA 3510C/8270C EPA 3520C/8270C EPA 3510C/8270D EPA 3520C/8270D	EPA 3545/8270C EPA 3545A/8270C EPA 3550B/8270C EPA 3550C/8270C EPA 3580A/8270C EPA 3545/8270D EPA 3545A/8270D EPA 3550B/8270D EPA 3550C/8270D EPA 3580A/8270D



Parameter/Analyte	Nonpotable Water (1)	Solid and Chemical Materials (2)
Naphthalene	EPA 625 EPA 3510C/8270C EPA 3520C/8270C EPA 3510C/8270D EPA 3520C/8270D	EPA 3545/8270C EPA 3545A/8270C EPA 3550B/8270C EPA 3550C/8270C EPA 3580A/8270C EPA 3545/8270D EPA 3545A/8270D EPA 3550B/8270D EPA 3550C/8270D EPA 3580A/8270D
1,4-Naphthoquinone	EPA 3510C/8270C EPA 3520C/8270C EPA 3510C/8270D EPA 3520C/8270D	EPA 3545/8270C EPA 3545A/8270C EPA 3550B/8270C EPA 3550C/8270C EPA 3580A/8270C EPA 3545/8270D EPA 3545A/8270D EPA 3550B/8270D EPA 3550C/8270D EPA 3580A/8270D
1-Naphthylamine	EPA 3510C/8270C EPA 3520C/8270C EPA 3510C/8270D EPA 3520C/8270D	EPA 3545/8270C EPA 3545A/8270C EPA 3550B/8270C EPA 3550C/8270C EPA 3580A/8270C EPA 3545/8270D EPA 3545A/8270D EPA 3550B/8270D EPA 3550C/8270D EPA 3580A/8270D
2-Naphthylamine	EPA 3510C/8270C EPA 3520C/8270C EPA 3510C/8270D EPA 3520C/8270D	EPA 3545/8270C EPA 3545A/8270C EPA 3550B/8270C EPA 3550C/8270C EPA 3580A/8270C EPA 3545/8270D EPA 3545A/8270D EPA 3550B/8270D EPA 3550C/8270D EPA 3580A/8270D
2-Nitroaniline	EPA 3510C/8270C EPA 3520C/8270C EPA 3510C/8270D EPA 3520C/8270D	EPA 3545/8270C EPA 3545A/8270C EPA 3550B/8270C EPA 3550C/8270C EPA 3580A/8270C EPA 3545/8270D EPA 3545A/8270D EPA 3550B/8270D EPA 3550C/8270D EPA 3580A/8270D



Parameter/Analyte	Nonpotable Water (1)	Solid and Chemical Materials (2)
3-Nitroaniline	EPA 3510C/8270C EPA 3520C/8270C EPA 3510C/8270D EPA 3520C/8270D	EPA 3545/8270C EPA 3545A/8270C EPA 3550B/8270C EPA 3550C/8270C EPA 3580A/8270C EPA 3545/8270D EPA 3545A/8270D EPA 3550B/8270D EPA 3550C/8270D EPA 3580A/8270D
4-Nitroaniline	EPA 3510C/8270C EPA 3520C/8270C EPA 3510C/8270D EPA 3520C/8270D	EPA 3545/8270C EPA 3545A/8270C EPA 3550B/8270C EPA 3550C/8270C EPA 3580A/8270C EPA 3545/8270D EPA 3545A/8270D EPA 3550B/8270D EPA 3550C/8270D EPA 3580A/8270D
Nitrobenzene	EPA 625 EPA 3510C/8270C EPA 3520C/8270C EPA 3510C/8270D EPA 3520C/8270D	EPA 3545/8270C EPA 3545A/8270C EPA 3550B/8270C EPA 3550C/8270C EPA 3580A/8270C EPA 3545/8270D EPA 3545A/8270D EPA 3550B/8270D EPA 3550C/8270D EPA 3580A/8270D
5-Nitro-o-toluidine	EPA 3510C/8270C EPA 3520C/8270C EPA 3510C/8270D EPA 3520C/8270D	EPA 3545/8270C EPA 3545A/8270C EPA 3550B/8270C EPA 3550C/8270C EPA 3580A/8270C EPA 3545/8270D EPA 3545A/8270D EPA 3550B/8270D EPA 3550C/8270D EPA 3580A/8270D
2-Nitrophenol	EPA 625 EPA 3510C/8270C EPA 3520C/8270C EPA 3510C/8270D EPA 3520C/8270D	EPA 3545/8270C EPA 3545A/8270C EPA 3550B/8270C EPA 3550C/8270C EPA 3580A/8270C EPA 3545/8270D EPA 3545A/8270D EPA 3550B/8270D EPA 3550C/8270D EPA 3580A/8270D



Parameter/Analyte	Nonpotable Water (1)	Solid and Chemical Materials (2)
4-Nitrophenol	EPA 625 EPA 3510C/8270C EPA 3520C/8270C EPA 3510C/8270D EPA 3520C/8270D	EPA 3545/8270C EPA 3545A/8270C EPA 3550B/8270C EPA 3550C/8270C EPA 3580A/8270C EPA 3545/8270D EPA 3545A/8270D EPA 3550B/8270D EPA 3550C/8270D EPA 3580A/8270D
Nitroquinoline-1-oxide	EPA 3510C/8270C EPA 3520C/8270C EPA 3510C/8270D EPA 3520C/8270D	EPA 3545/8270C EPA 3545A/8270C EPA 3550B/8270C EPA 3550C/8270C EPA 3580A/8270C EPA 3545/8270D EPA 3545A/8270D EPA 3550B/8270D EPA 3550C/8270D EPA 3580A/8270D
n-Nitrosodiethylamine	EPA 3510C/8270C EPA 3520C/8270C EPA 3510C/8270D EPA 3520C/8270D	EPA 3545/8270C EPA 3545A/8270C EPA 3550B/8270C EPA 3550C/8270C EPA 3580A/8270C EPA 3545/8270D EPA 3545A/8270D EPA 3550B/8270D EPA 3550C/8270D EPA 3580A/8270D
n-Nitrosodimethylamine	EPA 3510C/8270C EPA 3520C/8270C EPA 3510C/8270D EPA 3520C/8270D	EPA 3545/8270C EPA 3545A/8270C EPA 3550B/8270C EPA 3550C/8270C EPA 3580A/8270C EPA 3545/8270D EPA 3545A/8270D EPA 3550B/8270D EPA 3550C/8270D EPA 3580A/8270D
n-Nitroso-di-n-butylamine	EPA 3510C/8270C EPA 3520C/8270C EPA 3510C/8270D EPA 3520C/8270D	EPA 3545/8270C EPA 3545A/8270C EPA 3550B/8270C EPA 3550C/8270C EPA 3580A/8270C EPA 3545/8270D EPA 3545A/8270D EPA 3550B/8270D EPA 3550C/8270D EPA 3580A/8270D



Parameter/Analyte	Nonpotable Water (1)	Solid and Chemical Materials (2)
n-Nitrosodi-n-propylamine	EPA 3510C/8270C EPA 3520C/8270C EPA 3510C/8270D EPA 3520C/8270D	EPA 3545/8270C EPA 3545A/8270C EPA 3550B/8270C EPA 3550C/8270C EPA 3580A/8270C EPA 3545/8270D EPA 3545A/8270D EPA 3550B/8270D EPA 3550C/8270D EPA 3580A/8270D
n-Nitrosodiphenylamine	EPA 3510C/8270C EPA 3520C/8270C EPA 3510C/8270D EPA 3520C/8270D	EPA 3545/8270C EPA 3545A/8270C EPA 3550B/8270C EPA 3550C/8270C EPA 3580A/8270C EPA 3545/8270D EPA 3545A/8270D EPA 3550B/8270D EPA 3550C/8270D EPA 3580A/8270D
n-Nitrosomorpholine	EPA 3510C/8270C EPA 3520C/8270C EPA 3510C/8270D EPA 3520C/8270D	EPA 3545/8270C EPA 3545A/8270C EPA 3550B/8270C EPA 3550C/8270C EPA 3580A/8270C EPA 3545/8270D EPA 3545A/8270D EPA 3550B/8270D EPA 3550C/8270D EPA 3580A/8270D
n-Nitrosopiperidine	EPA 3510C/8270C EPA 3520C/8270C EPA 3510C/8270D EPA 3520C/8270D	EPA 3545/8270C EPA 3545A/8270C EPA 3550B/8270C EPA 3550C/8270C EPA 3580A/8270C EPA 3545/8270D EPA 3545A/8270D EPA 3550B/8270D EPA 3550C/8270D EPA 3580A/8270D
n-Nitrosopyrrolidine	EPA 3510C/8270C EPA 3520C/8270C EPA 3510C/8270D EPA 3520C/8270D	EPA 3545/8270C EPA 3545A/8270C EPA 3550B/8270C EPA 3550C/8270C EPA 3580A/8270C EPA 3545/8270D EPA 3545A/8270D EPA 3550B/8270D EPA 3550C/8270D EPA 3580A/8270D



Parameter/Analyte	Nonpotable Water (1)	Solid and Chemical Materials (2)
Pentachlorobenzene	EPA 3510C/8270C EPA 3520C/8270C EPA 3510C/8270D EPA 3520C/8270D	EPA 3545/8270C EPA 3545A/8270C EPA 3550B/8270C EPA 3550C/8270C EPA 3580A/8270C EPA 3545/8270D EPA 3545A/8270D EPA 3550B/8270D EPA 3550C/8270D EPA 3580A/8270D
Pentachloroethane	EPA 3510C/8270C EPA 3520C/8270C EPA 3510C/8270D EPA 3520C/8270D	EPA 3545/8270C EPA 3545A/8270C EPA 3550B/8270C EPA 3550C/8270C EPA 3580A/8270C EPA 3545/8270D EPA 3545A/8270D EPA 3550B/8270D EPA 3550C/8270D EPA 3580A/8270D
Pentachloronitobenzene	EPA 3510C/8270C EPA 3520C/8270C EPA 3510C/8270D EPA 3520C/8270D	EPA 3545/8270C EPA 3545A/8270C EPA 3550B/8270C EPA 3550C/8270C EPA 3580A/8270C EPA 3545/8270D EPA 3545A/8270D EPA 3550B/8270D EPA 3550C/8270D EPA 3580A/8270D
Pentachlorophenol	EPA 625 EPA 3510C/8270C EPA 3520C/8270C EPA 3510C/8270D EPA 3520C/8270D	EPA 3545/8270C EPA 3545A/8270C EPA 3550B/8270C EPA 3550C/8270C EPA 3580A/8270C EPA 3545/8270D EPA 3545A/8270D EPA 3550B/8270D EPA 3550C/8270D EPA 3580A/8270D
Phenacetin	EPA 625 EPA 3510C/8270C EPA 3520C/8270C EPA 3510C/8270D EPA 3520C/8270D	EPA 3545/8270C EPA 3545A/8270C EPA 3550B/8270C EPA 3550C/8270C EPA 3580A/8270C EPA 3545/8270D EPA 3545A/8270D EPA 3550B/8270D EPA 3550C/8270D EPA 3580A/8270D



Parameter/Analyte	Nonpotable Water (1)	Solid and Chemical Materials (2)
Phenanthrene	EPA 625 EPA 3510C/8270C EPA 3520C/8270C EPA 3510C/8270D EPA 3520C/8270D	EPA 3545/8270C EPA 3545A/8270C EPA 3550B/8270C EPA 3550C/8270C EPA 3580A/8270C EPA 3545/8270D EPA 3545A/8270D EPA 3550B/8270D EPA 3550C/8270D EPA 3580A/8270D
Phenol	EPA 625 EPA 3510C/8270C EPA 3520C/8270C EPA 3510C/8270D EPA 3520C/8270D	EPA 3545/8270C EPA 3545A/8270C EPA 3550B/8270C EPA 3550C/8270C EPA 3580A/8270C EPA 3545/8270D EPA 3545A/8270D EPA 3550B/8270D EPA 3550C/8270D EPA 3580A/8270D
1,4-Phenylenediamine	EPA 3510C/8270C EPA 3520C/8270C EPA 3510C/8270D EPA 3520C/8270D	EPA 3545/8270C EPA 3545A/8270C EPA 3550B/8270C EPA 3550C/8270C EPA 3580A/8270C EPA 3545/8270D EPA 3545A/8270D EPA 3550B/8270D EPA 3550C/8270D EPA 3580A/8270D
Phorate	EPA 3510C/8270C EPA 3520C/8270C EPA 3510C/8270D EPA 3520C/8270D	EPA 3545/8270C EPA 3545A/8270C EPA 3550B/8270C EPA 3550C/8270C EPA 3580A/8270C EPA 3545/8270D EPA 3545A/8270D EPA 3550B/8270D EPA 3550C/8270D EPA 3580A/8270D
2-Picoline	EPA 3510C/8270C EPA 3520C/8270C EPA 3510C/8270D EPA 3520C/8270D	EPA 3545/8270C EPA 3545A/8270C EPA 3550B/8270C EPA 3550C/8270C EPA 3580A/8270C EPA 3545/8270D EPA 3545A/8270D EPA 3550B/8270D EPA 3550C/8270D EPA 3580A/8270D



Parameter/Analyte	Nonpotable Water (1)	Solid and Chemical Materials (2)
Pronamide	EPA 3510C/8270C EPA 3520C/8270C EPA 3510C/8270D EPA 3520C/8270D	EPA 3545/8270C EPA 3545A/8270C EPA 3550B/8270C EPA 3550C/8270C EPA 3580A/8270C EPA 3545/8270D EPA 3545A/8270D EPA 3550B/8270D EPA 3550C/8270D EPA 3580A/8270D
Pyrene	EPA 625 EPA 3510C/8270C EPA 3520C/8270C EPA 3510C/8270D EPA 3520C/8270D	EPA 3545/8270C EPA 3545A/8270C EPA 3550B/8270C EPA 3550C/8270C EPA 3580A/8270C EPA 3545/8270D EPA 3545A/8270D EPA 3550B/8270D EPA 3550C/8270D EPA 3580A/8270D
Pyridine	EPA 3510C/8270C EPA 3520C/8270C EPA 3510C/8270D EPA 3520C/8270D	EPA 3545/8270C EPA 3545A/8270C EPA 3550B/8270C EPA 3550C/8270C EPA 3580A/8270C EPA 3545/8270D EPA 3545A/8270D EPA 3550B/8270D EPA 3550C/8270D EPA 3580A/8270D
Safrole	EPA 3510C/8270C EPA 3520C/8270C EPA 3510C/8270D EPA 3520C/8270D	EPA 3545/8270C EPA 3545A/8270C EPA 3550B/8270C EPA 3550C/8270C EPA 3580A/8270C EPA 3545/8270D EPA 3545A/8270D EPA 3550B/8270D EPA 3550C/8270D EPA 3580A/8270D
Sulfotepp	EPA 3510C/8270C EPA 3520C/8270C EPA 3510C/8270D EPA 3520C/8270D	EPA 3545/8270C EPA 3545A/8270C EPA 3550B/8270C EPA 3550C/8270C EPA 3580A/8270C EPA 3545/8270D EPA 3545A/8270D EPA 3550B/8270D EPA 3550C/8270D EPA 3580A/8270D



Parameter/Analyte	Nonpotable Water (1)	Solid and Chemical Materials (2)
1,2,4,5-Tetrachlorobenzene	EPA 3510C/8270C EPA 3520C/8270C EPA 3510C/8270D EPA 3520C/8270D	EPA 3545/8270C EPA 3545A/8270C EPA 3550B/8270C EPA 3550C/8270C EPA 3580A/8270C EPA 3545/8270D EPA 3545A/8270D EPA 3550B/8270D EPA 3550C/8270D EPA 3580A/8270D
2,3,4,6-Tetrachlorophenol	EPA 3510C/8270C EPA 3520C/8270C EPA 3510C/8270D EPA 3520C/8270D	EPA 3545/8270C EPA 3545A/8270C EPA 3550B/8270C EPA 3550C/8270C EPA 3580A/8270C EPA 3545/8270D EPA 3545A/8270D EPA 3550B/8270D EPA 3550C/8270D EPA 3580A/8270D
o,o,o-Triethyl phosphorothioate	EPA 3510C/8270C EPA 3520C/8270C EPA 3510C/8270D EPA 3520C/8270D	EPA 3545/8270C EPA 3545A/8270C EPA 3550B/8270C EPA 3550C/8270C EPA 3580A/8270C EPA 3545/8270D EPA 3545A/8270D EPA 3550B/8270D EPA 3550C/8270D EPA 3580A/8270D
Thionazin	EPA 3510C/8270C EPA 3520C/8270C EPA 3510C/8270D EPA 3520C/8270D	EPA 3545/8270C EPA 3545A/8270C EPA 3550B/8270C EPA 3550C/8270C EPA 3580A/8270C EPA 3545/8270D EPA 3545A/8270D EPA 3550B/8270D EPA 3550C/8270D EPA 3580A/8270D
1,2,4-Trichlorobenzene	EPA 625 EPA 3510C/8270C EPA 3520C/8270C EPA 3510C/8270D EPA 3520C/8270D	EPA 3545/8270C EPA 3545A/8270C EPA 3550B/8270C EPA 3550C/8270C EPA 3580A/8270C EPA 3545/8270D EPA 3545A/8270D EPA 3550B/8270D EPA 3550C/8270D EPA 3580A/8270D



Parameter/Analyte	Nonpotable Water (1)	Solid and Chemical Materials (2)
2,4,5-Trichlorophenol	EPA 625 EPA 3510C/8270C EPA 3520C/8270C EPA 3510C/8270D EPA 3520C/8270D	EPA 3545/8270C EPA 3545A/8270C EPA 3550B/8270C EPA 3550C/8270C EPA 3580A/8270C EPA 3545/8270D EPA 3545A/8270D EPA 3550B/8270D EPA 3550C/8270D EPA 3580A/8270D
2,4,6-Trichlorophenol	EPA 625 EPA 3510C/8270C EPA 3520C/8270C EPA 3510C/8270D EPA 3520C/8270D	EPA 3545/8270C EPA 3545A/8270C EPA 3550B/8270C EPA 3550C/8270C EPA 3580A/8270C EPA 3545/8270D EPA 3545A/8270D EPA 3550B/8270D EPA 3550C/8270D EPA 3580A/8270D
O-Toluidine	EPA 625 EPA 3510C/8270C EPA 3520C/8270C EPA 3510C/8270D EPA 3520C/8270D	EPA 3545/8270C EPA 3545A/8270C EPA 3550B/8270C EPA 3550C/8270C EPA 3580A/8270C EPA 3545/8270D EPA 3545A/8270D EPA 3550B/8270D EPA 3550C/8270D EPA 3580A/8270D
Pesticides/Herbicides/PCBs		
Aldrin	EPA 608 EPA 3510C/8081A EPA 3510C/8081B	EPA 3550B/8081A EPA 3550C/8081A EPA 3580A/8081A EPA 3550B/8081B EPA 3550C/8081B EPA 3580A/8081B
alpha-BHC	EPA 608 EPA 3510C/8081A EPA 3510C/8081B	EPA 3550B/8081A EPA 3550C/8081A EPA 3580A/8081A EPA 3550B/8081B EPA 3550C/8081B EPA 3580A/8081B
Beta-BHC	EPA 608 EPA 3510C/8081A EPA 3510C/8081B	EPA 3550B/8081A EPA 3550C/8081A EPA 3580A/8081A EPA 3550B/8081B EPA 3550C/8081B EPA 3580A/8081B



Parameter/Analyte	Nonpotable Water (1)	Solid and Chemical Materials (2)
delta-BHC	EPA 608 EPA 3510C/8081A EPA 3510C/8081B	EPA 3550B/8081A EPA 3550C/8081A EPA 3580A/8081A EPA 3550B/8081B EPA 3550C/8081B EPA 3580A/8081B
Gamma-BHC	EPA 608 EPA 3510C/8081A EPA 3510C/8081B	EPA 3550B/8081A EPA 3550C/8081A EPA 3580A/8081A EPA 3550B/8081B EPA 3550C/8081B EPA 3580A/8081B
Chlordane (technical)	EPA 608 EPA 3510C/8081A EPA 3510C/8081B	EPA 3550B/8081A EPA 3550C/8081A EPA 3580A/8081A EPA 3550B/8081B EPA 3550C/8081B EPA 3580A/8081B
alpha-chlordane	EPA 608 EPA 3510C/8081A EPA 3510C/8081B	EPA 3550B/8081A EPA 3550C/8081A EPA 3580A/8081A EPA 3550B/8081B EPA 3550C/8081B EPA 3580A/8081B
gamma-chlordane	EPA 608 EPA 3510C/8081A EPA 3510C/8081B	EPA 3550B/8081A EPA 3550C/8081A EPA 3580A/8081A EPA 3550B/8081B EPA 3550C/8081B EPA 3580A/8081B
4,4'-DDD	EPA 608 EPA 3510C/8081A EPA 3510C/8081B	EPA 3550B/8081A EPA 3550C/8081A EPA 3580A/8081A EPA 3550B/8081B EPA 3550C/8081B EPA 3580A/8081B
4,4'-DDE	EPA 608 EPA 3510C/8081A EPA 3510C/8081B	EPA 3550B/8081A EPA 3550C/8081A EPA 3580A/8081A EPA 3550B/8081B EPA 3550C/8081B EPA 3580A/8081B
4,4',-DDT	EPA 608 EPA 3510C/8081A EPA 3510C/8081B	EPA 3550B/8081A EPA 3550C/8081A EPA 3580A/8081A EPA 3550B/8081B EPA 3550C/8081B EPA 3580A/8081B



Parameter/Analyte	Nonpotable Water (1)	Solid and Chemical Materials (2)
Dieldrin	EPA 608 EPA 3510C/8081A EPA 3510C/8081B	EPA 3550B/8081A EPA 3550C/8081A EPA 3580A/8081A EPA 3550B/8081B EPA 3550C/8081B EPA 3580A/8081B
Endosulfan I	EPA 608 EPA 3510C/8081A EPA 3510C/8081B	EPA 3550B/8081A EPA 3550C/8081A EPA 3580A/8081A EPA 3550B/8081B EPA 3550C/8081B EPA 3580A/8081B
Endosulfan II	EPA 608 EPA 3510C/8081A EPA 3510C/8081B	EPA 3550B/8081A EPA 3550C/8081A EPA 3580A/8081A EPA 3550B/8081B EPA 3550C/8081B EPA 3580A/8081B
Endosulfan sulfate	EPA 608 EPA 3510C/8081A EPA 3510C/8081B	EPA 3550B/8081A EPA 3550C/8081A EPA 3580A/8081A EPA 3550B/8081B EPA 3550C/8081B EPA 3580A/8081B
Endrin	EPA 608 EPA 3510C/8081A EPA 3510C/8081B	EPA 3550B/8081A EPA 3550C/8081A EPA 3580A/8081A EPA 3550B/8081B EPA 3550C/8081B EPA 3580A/8081B
Endrin aldehyde	EPA 608 EPA 3510C/8081A EPA 3510C/8081B	EPA 3550B/8081A EPA 3550C/8081A EPA 3580A/8081A EPA 3550B/8081B EPA 3550C/8081B EPA 3580A/8081B
Endrin ketone	EPA 3510C/8081A EPA 3510C/8081B	EPA 3550B/8081A EPA 3550C/8081A EPA 3580A/8081A EPA 3550B/8081B EPA 3550C/8081B EPA 3580A/8081B
Heptachlor	EPA 608 EPA 3510C/8081A EPA 3510C/8081B	EPA 3550B/8081A EPA 3550C/8081A EPA 3580A/8081A EPA 3550B/8081B EPA 3550C/8081B EPA 3580A/8081B



Parameter/Analyte	Nonpotable Water (1)	Solid and Chemical Materials (2)
Heptachlor epoxide	EPA 608 EPA 3510C/8081A EPA 3510C/8081B	EPA 3550B/8081A EPA 3550C/8081A EPA 3580A/8081A EPA 3550B/8081B EPA 3550C/8081B EPA 3580A/8081B
Methoxychlor	EPA 3510C/8081A EPA 3510C/8081B	EPA 3550B/8081A EPA 3550C/8081A EPA 3580A/8081A EPA 3550B/8081B EPA 3550C/8081B EPA 3580A/8081B
Toxaphene	EPA 608 EPA 3510C/8081A EPA 3510C/8081B	EPA 3550B/8081A EPA 3550C/8081A EPA 3580A/8081A EPA 3550B/8081B EPA 3550C/8081B EPA 3580A/8081B
PCB-1016 (Aroclor)	EPA 608 EPA 3510C/8082 EPA 3510C/8082A	EPA 3550B/8082 EPA 3550C/8082 EPA 3580A/8082 EPA 3550B/8082A EPA 3550C/8082A EPA 3580A/8082A
PCB-1221	EPA 608 EPA 3510C/8082 EPA 3510C/8082A	EPA 3550B/8082 EPA 3550C/8082 EPA 3580A/8082 EPA 3550B/8082A EPA 3550C/8082A EPA 3580A/8082A
PCB-1232	EPA 608 EPA 3510C/8082 EPA 3510C/8082A	EPA 3550B/8082 EPA 3550C/8082 EPA 3580A/8082 EPA 3550B/8082A EPA 3550C/8082A EPA 3580A/8082A
PCB-1242	EPA 608 EPA 3510C/8082 EPA 3510C/8082A	EPA 3550B/8082 EPA 3550C/8082 EPA 3580A/8082 EPA 3550B/8082A EPA 3550C/8082A EPA 3580A/8082A
PCB-1248	EPA 608 EPA 3510C/8082 EPA 3510C/8082A	EPA 3550B/8082 EPA 3550C/8082 EPA 3580A/8082 EPA 3550B/8082A EPA 3550C/8082A EPA 3580A/8082A



Parameter/Analyte	Nonpotable Water (1)	Solid and Chemical Materials (2)
PCB-1254	EPA 608 EPA 3510C/8082 EPA 3510C/8082A	EPA 3550B/8082 EPA 3550C/8082 EPA 3580A/8082 EPA 3550B/8082A EPA 3550C/8082A EPA 3580A/8082A
PCB-1260	EPA 608 EPA 3510C/8082 EPA 3510C/8082A	EPA 3550B/8082 EPA 3550C/8082 EPA 3580A/8082 EPA 3550B/8082A EPA 3550C/8082A EPA 3580A/8082A
2,4-D	EPA 8151A	EPA 8151A
Dalapon	EPA 8151A	EPA 8151A
2,4-DB	EPA 8151A	EPA 8151A
Dicamba	EPA 8151A	EPA 8151A
Dichloroprop	EPA 8151A	EPA 8151A
Dinoseb	EPA 8151A	EPA 8151A
MCPA	EPA 8151A	EPA 8151A
MCPP	EPA 8151A	EPA 8151A
Pentachlorophenol	EPA 8151A	EPA 8151A
2,4,5-T	EPA 8151A	EPA 8151A
2,4,5-TP	EPA 8151A	EPA 8151A
HPLC		
1,3,5-Trinitrobenzene	EPA 3535A/8330A EPA 3535A/8330B	EPA 8330A EPA 8330B
1,3-Dinitrobenzene	EPA 3535A/8330A EPA 3535A/8330B	EPA 8330A EPA 8330B
2,4,6-Trinitrotoluene	EPA 3535A/8330A EPA 3535A/8330B	EPA 8330A EPA 8330B
2,4-Dinitrotoluene	EPA 3535A/8330A EPA 3535A/8330B	EPA 8330A EPA 8330B
2,6-Dinitrotoluene	EPA 3535A/8330A EPA 3535A/8330B	EPA 8330A EPA 8330B
2-Amino-4,6-dinitrotoluene	EPA 3535A/8330A EPA 3535A/8330B	EPA 8330A EPA 8330B
2-Nitrotoluene	EPA 3535A/8330A EPA 3535A/8330B	EPA 8330A EPA 8330B
3-Nitrotoluene	EPA 3535A/8330A EPA 3535A/8330B	EPA 8330A EPA 8330B
4-Amino-2,6-dinitrotoluene	EPA 3535A/8330A EPA 3535A/8330B	EPA 8330A EPA 8330B
4-Nitrotoluene	EPA 3535A/8330A EPA 3535A/8330B	EPA 8330A EPA 8330B
Nitrobenzene	EPA 3535A/8330A EPA 3535A/8330B	EPA 8330A EPA 8330B
Nitroglycerin	EPA 3535A/8330A EPA 3535A/8330B	EPA 8330A EPA 8330B



Parameter/Analyte	Nonpotable Water (1)	Solid and Chemical Materials (2)
HMX	EPA 3535A/8330A EPA 3535A/8330B	EPA 8330A EPA 8330B
PETN	EPA 3535A/8330A EPA 3535A/8330B	EPA 8330A EPA 8330B
RDX	EPA 3535A/8330A EPA 3535A/8330B	EPA 8330A EPA 8330B
Tetryl	EPA 3535A/8330A EPA 3535A/8330B	EPA 8330A EPA 8330B
Nitroglycerin	EPA 3535A/8330A EPA 3535A/8330B	EPA 8330A EPA 8330B
Nitroguanidine	EPA 3535A/8330A EPA 3535A/8330B	EPA 8330A EPA 8330B
Nitrocellulose	EPA USATHAMA/353.2/353.3	EPA USATHAMA/353.2/353.3
<u>Hazardous Waste Characteristics</u>		
Corrosivity	EPA 9040C	EPA 9040C EPA 9045D
Ignitibility	EPA 1010A	EPA 1010A
Reactivity	EPA SW 846 Ch 7	EPA SW 846 Ch 7
Synthetic Precipitation Leaching Procedure (SPLP)	EPA 1312	EPA 1312
Toxicity Characteristic Leaching Procedure (TCLP)	EPA 1311	EPA 1311
<u>LC/MS/MS</u>		
Perchlorate	EPA 6850	EPA 6850

- (1) Method List includes Clean Water Act and RCRA water parameters
(2) Method List includes RCRA parameters only

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21 January 2011

MEMORANDUM FOR: Ms. Anita Lafuente, TSCA Program Manager
27 SOCES/CEAN
506 N DL Ingram Blvd
Cannon AFB NM 88103-5003

FROM: Gary Torf, Project Manager
Versar, Inc.
12050 N. Pecos Street, Suite 300
Westminster, CO 80234

SUBJECT: Version 2.0 Work Plan (with replacement pages)
AF MMRP CSE Phase II
Cannon AFB, NM

On behalf of the Omaha District of the US Army Corps of Engineers and the project manager, Glenn Marks, Versar, Inc. (Versar) is pleased to submit the Version 2.0 Work Plan (with replacement pages) for the Air Force Military Munitions Response Program (AF MMRP) Comprehensive Site Evaluation (CSE) Phase II, for your reference.

Enclosed, please find two (2) replacement page hard copies (double-sided) and two (2) electronic copies with all changes presented in redline-strikeout format for your files, and an additional set of two (2) replacement page hard copies and two (2) electronic copies for you to send under separate cover to the New Mexico Environment Department.

If you have any questions or comments, please feel free to contact me at gtorf@versar.com or by phone at 303.450.1929.

A handwritten signature in black ink that reads 'Gary Torf'.

Gary Torf
Project Manager

Attachments: 1. Version 2.0 Work Plan hard copy replacement pages
2. Version 2.0 Work Plan electronic copy with replacement pages

cc: Glenn Marks, CENWO
John Steele, AFSOC/A7AV
Michael Galvin, Versar