REGULATORY AGENCY REVIEW

# FORT WINGATE DEPOT ACTIVITY
# GALLUP, NM

# FINAL OPEN BURNING/OPEN DETONATION AREA
# RCRA INTERIM STATUS CLOSURE PLAN
# PHASE IA - CHARACTERIZATION AND ASSESSMENT OF SITE CONDITIONS FOR THE SOILS/SOLID MATRIX

**Prepared for:**

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## *LIST OF ACRONYMS*

| | |
|---|---|
| bgs | below ground surface |
| BMDO | Ballistic Missile Defense Organization |
| CFP | Closure Field Program |
| CMHP | Contaminated Materials Handling Plan |
| CPS | Closure Performance Standards |
| COR | Contracting Officer's Representative |
| CWA | Clean Water Act |
| DGPS | differential global positioning system |
| ELISA | enzyme linked immunosorbent assay |
| EM | electromagnetic induction |
| EOD | Explosive Ordnance Disposal |
| ERM | ERM Program Management Company |
| FAC | facultative |
| FACW | facultative-wet |
| FSP | Field Sampling Plan |
| FWDA | Fort Wingate Depot Activity |
| GPR | ground-penetrating radar |
| GPS | global positioning system |
| HASP | Health and Safety Plan |
| MAG | magnetic |
| mm | millimeter |
| mS/m | milliSiemens per meter |
| NMED | New Mexico Environment Department |
| NMEMNRD | New Mexico Energy, Minerals, and Natural Resources Department |
| NOD | Notice of Deficiency |
| NRCS | National Resource Conservation Service |
| NWI | National Wetlands Inventory |
| OBL | obligate |
| OB/OD | Open Burning/Open Detonation |

*LIST OF ACRONYMS (Continued)*

| | |
|---|---|
| OBDA | Open Burning and Detonation Area |
| PMC | Program Management Company |
| ppt | parts per thousand |
| QAPP | Quality Assurance Project Plan |
| RBL | Risk Based Level |
| RCRA | Resource Conservation and Recovery Act |
| RDX | hexahydro-1,3,5-trinitro-1,3,5-triazine |
| RI/FS | Remedial Investigation/Feasibility Study |
| SPLP | Synthetic Precipitation Leaching Procedure |
| TAL | Target Analyte List |
| TCLP | Toxicity Characteristics Leaching Procedure |
| TDS | total dissolved solids |
| TEPS | Total Environmental Program Support |
| TNT | 2,4,6-trinitrotoluene |
| TOC | total organic carbon |
| TSS | total suspended solids |
| UCL | upper confidence limit |
| USACE | U.S. Army Corps of Engineers |
| USAEC | U.S. Army Environmental Center |
| USEPA | U.S. Environmental Protection Agency |
| USFWS | U.S. Fish and Wildlife Service |
| USGS | U.S. Geological Survey |
| UXO | unexploded ordnance |
| XRF | X-Ray Fluorescence |

## *ES.0 EXECUTIVE SUMMARY*

Fort Wingate Depot Activity (FWDA), an inactive United States Army depot under the administrative command of the Tooele Army Depot, Tooele, Utah, is undergoing final environmental restoration prior to property transfer/reuse in accordance with the Base Realignment and Closure Act. The primary mission of FWDA, when active, was to store, ship and receive materiel and to dispose of obsolete or deteriorated explosives and ammunition. Explosives demilitarization activities occurred at several facilities within the installation, including the Open Burning/Open Detonation (OB/OD) Areas. As part of the base closure activities, the OB/OD Areas are undergoing closure.

In order to facilitate closure at the OB/OD Areas, environmental characterization efforts are being conducted in accordance with the Approved Modification to the Final Interim Status Closure Plan, approved in correspondence from the New Mexico Environment Department (NMED) dated 10 April 1997.

As part of the Closure Plan approval process, NMED identified that additional environmental characterization efforts were required.

The Approved Final Closure Field Program (CFP) Work Plans, which were incorporated into the Approved Modification to the Final Interim Status Closure Plan described the conduct of the CFP in three phases:

Phase I - Characterization and Assessment of Site Conditions;

Phase II - Description, Evaluation, and Recommendation of Closure-Remedial Option; and

Phase III - Design, Construction and Operation of Selected Closure Option.

Completion of these three phases will result in the addressing of all additional information needs identified by NMED.

The environmental characterization efforts described in this Final Phase IA Report were focussed on the identification and assessment of soil, burning/detonation debris and residues, and other solid matrix materials within the OB/OD Areas, and delineated and described (physically and chemically) all known debris/residue piles and selected detonation craters in the OB/OD Areas. The Final Phase IB Report, which will be provided under separate cover at a later date, will focus on ground water within the OB/OD Areas.

In addition to the delineation and description of the waste disposal features, an ecological habitat survey and wetland identification effort was conducted for the OB/OD Areas.

## *ES.1 PHASE IA CLOSURE FIELD PROGRAM*

The field program consisted of the conduct of geophysical surveys, background soil characterization, debris/residue pile and detonation crater trenching operations, ecological habitat surveys, and wetland identification efforts.

The background soil characterization consisted of the collection and analysis of 20 soil samples from each of two areas; the Closed OB/OD Area on the western side of the Hogback ridge which divides the OB/OD Areas roughly in half, and the Current OB/OD Area on the eastern side of the Hogback. Two sets of background were warranted because the surface geology on each side of the Hogback was substantially different, with the result that the soil chemistry on each side of the Hogback was different.

The detonation impact assessment of the detonation craters described in the CFP Work Plans was not conducted. Further review of the cost and expected degree of uncertainty of this analysis suggested that this indirect means of attempting to quantify the migration of contaminants potentially derived from the detonation activities was not practical. Direct measurement of the potential impacts were addressed by the installation and sampling of a ground water monitoring well network, that will be described in the Final Phase IB Report to be submitted under separate cover at a later date.

### *ES.1.1 Closed OB/OD Area*

The CFP was initiated with the conduct of geophysical surveys within the Closed OB/OD Area. The geophysical surveys, in support of visual observations, identified the presence of five subsurface geophysical anomalies (KGA1 through KGA5) and four distinct debris/residue piles (KP1 through KP4) within the Closed OB/OD Area. In addition, three areas of stained soils (KSA01 through KSA03) and three mounded areas were identified.

Each geophysical anomaly, debris/residue pile and/or mound, and stained area was investigated by trenching or test pit operations. All excavations were extended vertically and horizontally until visible wastes were no longer observed. Samples of waste materials and surrounding soils potentially impacted by the wastes were collected and analyzed. Field screening samples were collected and analyzed by XRF methods for

metals and immunoassay methods for explosives compounds. The field screening results allowed the sampling teams to optimize the selection of confirmation soil samples for shipment to the off-site laboratory. The confirmation soil samples were designed to delineate the extent of soil impacts potentially resulting from proximity to the waste materials. Following determination of the extent of impacted soils below and adjacent to the trenches, the volume of waste materials and impacted soils was calculated per waste disposal feature. These volume estimates will be available for use in future phases of the closure process as the basis for removal, treatment, or stabilization cost estimates.

The types of debris/residues identified at these features consisted of nails, hinges, metal cans, rusted metal shells (up to 155 mm in diameter), rusted mortar casings, rusted fuze components, smoke and flare ejectors, metal strapping, and other metal and wood debris.

The chemical data for soil and waste samples collected from within the Closed OB/OD Area were sequentially compared to background concentrations for the detected constituents, U.S. Environmental protection Agency (USEPA) Region VI risk based levels(RBLs) and FWDA-specific Closure Performance Standards (CPSs). Any detection of explosives compounds was considered to be greater than background.

*ES.1.1.1* *Old Demolition Ground*

For the Old Demolition Ground (i.e., that portion of the Closed OB/OD Area situated to west of the Hogback), 33 trenches (3,333 linear feet) of trenches were excavated and 3,475 cubic yards of waste materials were identified, mapped, and described.

Explosives compounds were detected in less than 5% of the soil samples and 29% of the waste samples. Metals were more frequently detected at concentrations greater than background. For soil samples, between four and 12 individual metal constituents were detected at each disposal feature; of these metals, between 4% and 100% were detected at concentrations greater than background. For waste samples, between nine and 17 individual metals constituents were detected at each disposal feature, and 33 to 100% of these metals were detected at concentrations greater than background.

For the Old Demolition Ground, the number of constituents that exceeded USEPA Region VI RBLs, derived from a conservative residential exposure scenario, were substantially reduced relative to those that exceeded background. No explosives were detected in soils at concentrations greater than RBLs. For waste samples, all detected explosives concentrations (representing 29% of the total waste samples) were greater

than RBLs. No metals were detected in the soil samples at concentrations exceeding the RBLs. Two metals, arsenic and iron, were detected in a maximum of 2 waste samples at levels greater than RBLs.

No explosives compounds or metals were detected at concentrations exceeding CPSs in either the soils samples or the waste samples. The CPSs were developed by the Army for FWDA to reflect actual post closure human health risk scenarios. This scenario accounts for exposure to on-site remediation workers and off-site recreational users. Because of high risks associated with the presence of probable high densities of unexploded ordnance items, the OB/OD Areas will exist in perpetuity as limited access areas under administrative control of the Army.

*ES.1.1.2* *Old Burning Ground and Demolition Landfill Area*

For the Old Burning Ground and Demolition Landfill Area (located to the east of the Hogback), 14 trenches (1,146 linear feet) were excavated and 1,190 cubic yards of waste materials were identified, mapped, and described. Explosives compounds were detected in approximately 10% of the soil samples and 19% of the waste samples. Metals were more frequently detected at concentrations greater than background.

The number of constituents that exceeded Region VI RBLs was substantially reduced relative to those that exceeded background. No explosives were detected in soils at concentrations greater than RBLs. Explosives in waste samples were detected at concentrations greater than the RBLs at a frequency of approximately 19%. Three metal/inorganic constituents (arsenic, iron, and phosphorus) were widely detected in soil samples at concentrations greater than the RBLs. This was also true for the waste samples, although additional metals were detected in exceedance of the RBLs.

No explosives compounds were detected at concentrations exceeding the CPSs in the soil samples. Concentrations of explosives greater than the CPSs were detected in less than 8% of the waste samples. Phosphorus was detected in excess of the CPS in all soil and waste samples. A single detection (in soil) of manganese greater than the CPS was identified.

*ES.1.1.3* *Explosives Stained Areas*

Three areas of soils apparently stained by explosives compounds were identified in the northeastern portion of the Old Burning Ground. All soil samples collected from these areas were found to contain concentrations of explosives compounds that exceeded background. In addition, at least one explosive compound was detected in each sample at a concentration

that exceeded the RBL. Only one detection of one explosive compound in one sample was found to exceed the CPS.

*ES.1.1.4* *Mounded Areas*

Three mounded areas within the Old Demolition Area where investigated with an excavator. The mounds were found to consist of native soils. The areas between the mounds contained scattered metal debris on the surface that appeared to be smoke grenade canisters that had been burned as part of the demilitarization process. It was estimated that approximately 550 cubic yards of debris exists in the areas between the soil mounds.

*ES.1.1.5* *Ecological Habitat Survey/Wetland Evaluation*

The ecological habitat survey of the Closed OB/OD Area determined that mature grassland and sagebrush communities were predominant. The arroyos present were typically narrow, deep, and sparsely vegetated. Occasional stands of cottonwood trees in the arroyos indicated the presence of subsurface water or soil moisture. No wetland characteristics were identified in any portion of the Closed OB/OD Area.

***ES.1.2*** ***Current OB/OD Area***

Geophysical surveys were not required in the Current OB/OD Area as the debris/residue piles were clearly visible.

The mapping and field observation efforts identified and accurately located a series of ten debris/residue piles, and 12 detonation craters. The trenching operations were conducted at each of the ten debris/residue piles and at five detonation craters. The debris/residue piles were found to be of three general types. CRP1 through CRP3 are small isolated areas at the southern end of the Current OB/OD Area. CRP4 through CRP9 represent essentially one continuous area of debris/residue disposal. CRP10 is a single isolated debris/residue pile situated in the main arroyo channel at the northern limit of the formerly active Current OB/OD Area.

*ES.1.2.1* *Debris/Residue Piles - CRP1 through CRP3*

Debris/Residue piles CRP1 through CRP3 are located at the southern end of the Current OB/OD Area and appear to have been created by the disposal of demilitarization wastes generated elsewhere. The waste materials were primarily empty fuze cans, fuze pieces, slag, metal banding, ash and other metal and wood debris. A total of eight trenches were excavated (611 linear feet) and approximately 1,500 cubic yards of waste materials were identified, mapped, and described.

Both explosives compounds and metals were detected at concentrations greater than background. The number of constituent concentrations which exceeded the residential-based Region VI RBLs was substantially less than for background. Only two explosives compounds, single detections of cadmium and nickel, and two detections of lead were found to exceed the CPSs. Under realistic exposure conditions, it would be difficult for an on-site remediation worker or an off-site recreational user to be exposed to the highest detected constituent concentrations at the frequency and duration assumed by the exposure model used to generate the CPSs.

*ES.1.2.2 Debris/Residue Piles - CRP4 through CRP9*

Debris/Residue piles CRP4 through CRP9 form a nearly continuous mass of waste demilitarization materials that appear to have been pushed off the flat working area of the Current OB/OD Area onto the eastern bank of the main arroyo. The waste materials were primarily metal banding, empty fuze cans, fuze pieces, detonator assemblies, 20, 37, 40, 57 and 75 mm projectiles (live and fragments), booster caps, fragmentation bomb windings, barrage rocket tubes, M83 butterfly bomblets (live and fragments), burned flares, ash, burn residue, cardboard, ammunition box hardware, wood debris, and ACM. A total of 50 trenches were excavated (2,590 linear feet) and 30,950 cubic yards of waste materials were identified, mapped, and described.

Explosives were detected in the soils at four of the six piles and in the wastes in five of the six piles. A wide range of metals were detected at concentrations greater than background within the soils and wastes at each of the six piles. The number of exceedances of the residential-based RBLs was substantially less than for background. Exceedances of the RBLs were identified in less than 15% of the soil samples and in 25% to 47% of the waste samples. The number of constituents that exceeded the CPSs was limited to 2 explosives compounds, 4 metals, and amosite asbestos. These constituents exceeded the CPSs at a maximum of eight sample locations. Considering the large volume of waste materials identified at these piles, the number of exceedances of the CPSs is remarkably low.

*ES.1.2.3 Debris/Residue Pile – CRP10*

CRP10 is located within the channel of the main arroyo, and was found to contain a limited quantity of smoke canister fragments and burn residues. Two trenches were excavated (119 linear feet) and approximately 50 cubic yards of waste materials were identified, mapped, and described.

Trace levels of two explosives compounds were detected, one each, in a single soil and single waste sample. A wide range of metals were detected at concentrations greater than background in soil (17% to 50% of the total soil samples) and waste (50% to 100%) of the total waste samples. Only two metals (arsenic and iron) were detected at concentrations greater than the RBLs. None of the detected constituents in soil or waste samples exceeded the CPSs.

### *ES.1.2.4 Detonation Craters*

The trenching operations at the five detonation craters identified scattered ordnance fragments, projectiles, ash, dark stained soil, rock fragments, metal banding, and packaging materials. A total of ten trenches were excavated (1,247 linear feet) and approximately 12,240 cubic yards of waste materials were identified, mapped, and described.

Low levels of explosives compounds were detected at four of the five craters, and a wide range of metals were detected in the soil and waste samples from all five craters. Chemical results for soils and wastes were similar, suggesting that the grading and regrading process associated with the active use of the craters in the past has resulted in a high degree of mixing of the soil. A lesser number of explosives compounds and metals were found to exceed the residential-based RBLs. Only one constituent (lead) in one sample from one crater was found to exceed the CPS.

### *ES.1.2.5 Ecological Habitat Survey/Wetland Evaluation*

The ecological habitat survey of the Current OB/OD Area determined that although the area had been widely disturbed until late 1992, a substantial amount of revegetation had occurred. The survey identified plants indicative of a grassland and sagebrush community, surrounded by Pinion Pine/Juniper woodland communities. The deep arroyo that bisects the site creates a variety of favorable wildlife habitats. In addition, the ephemeral presence of water, either above the land surface or just below the land surface in the arroyo channel, provides an important source of moisture to indigenous flora and fauna. Several small waterholes are apparently heavily visited by wildlife as evidenced by numerous tracks.

The Current OB/OD Area supports seasonal wetland habitat in the main arroyo. Both scrub shrub (coyote willows) and emergent (sedge meadows) wetlands were observed within the arroyo.

## *ES.2 SUMMARY AND CONCLUSIONS*

The visible demilitarization debris and residues present within both the Closed and Current OB/OD Areas were identified, mapped, described and assessed with respect to a series of environmental threshold values.

Both explosives and metals/inorganics were found to exceed established background levels for the areas. The spatial extent of the concentrations that exceed background was widespread. When these same chemical data were compared to residential-based RBLs, the number of exceedances was reduced significantly. Because the OB/OD Areas will be held under Army control in perpetuity, the residential land-use scenario assumed in the development of the RBLs is overly conservative. Site specific CPSs were developed to assess potential human health risks to on-site remediation workers and off-site recreational users. The number of exceedances of the CPSs was limited and spatially disperse. A large majority of the exceedances in the Closed OB/OD Area were attributed to phosphorus, which is of low toxicity to humans. Therefore, it is reasonable to conclude that the actual worst case exposure scenario for the on-site remediation worker and/or the off-site recreational user would unlikely result in exposure to the maximum constituent concentrations at the frequency and duration assumed by the exposure model used to calculate the CPSs. This, in turn, strongly suggests that the human health risks posed by the demilitarization debris and residue present in the OB/OD Areas are minimal.

Although the human health risks derived from the presence of demilitarization debris and residues may be minimal in the OB/OD Areas, future efforts/evaluations associated with other phases of the closure process will assess the requirements of additional regulatory programs, such as ecological risk, solid waste regulations, and surface and ground water protection programs, prior to final determination of the need for and type of specific closure activities required.

## 1.0 *INTRODUCTION*

This deliverable (ELIN A009) is the Final Phase IA Report for the environmental characterization of the soil/solid matrix at the Open Burning/ Open Detonation (OB/OD) Areas at Fort Wingate Depot Activity (FWDA), Gallup, NM. The work elements described within this document were conducted by Program Management Company (PMC) [formerly ERM Program Management Company (ERM)] of Exton, PA, as Delivery Order Nos. DA05 and DA10, under the Army Total Environmental Program Support (TEPS) contract (Contract DAAA15-91-D-0011). Contracting Officer's Representative (COR) responsibility for these delivery orders is held by the U.S. Army Corps of Engineers (USACE), Fort Worth District.

## 1.1 *PURPOSE/OBJECTIVE*

The technical scope of work elements described in this Final Report consist of a number of field and data evaluation tasks performed at the OB/OD Areas at FWDA. These tasks were:

- Description of regional and site-specific geology and hydrology to develop a conceptual model of the hydrogeologic regime;
- Development of background soil inorganic constituent concentrations for the OB/OD Areas;
- Assessment of the extent of contamination;
- Characterization of fate and transport mechanism(s) for detected constituents of concern;
- Habitat survey and qualitative ecosystem assessment; and
- Determination and characterization of wetlands.

These tasks, which are an integral component of the OB/OD Area Closure Field Program (CFP), have been performed to support the Modification to the Final Interim Status Closure Plan (ERM, 1994a) for the OB/OD Areas. The results, findings, and conclusions and recommendations of the environmental characterization efforts for soils and solid matrix materials are presented in this Final Report. All of the efforts conducted as part of Phase IA of the CFP were described in the following project support documents that were submitted for regulatory review and acceptance:

- Final OB/OD Area CFP - Field Sampling Plan (FSP) and Contaminated Materials Handling Plan (CMHP), prepared by ERM, dated 21 May 1996 (ERM, 1996a);

- Final OB/OD Area CFP - Quality Assurance Project Plan (QAPP), prepared by ERM, dated 21 May 1996 (ERM, 1996b); and

- Final OB/OD Area CFP - Health and Safety Plan (HASP), prepared by ERM, dated 21 May 1996 (ERM, 1996c).

## 1.2 *OVERVIEW*

FWDA is an inactive United States Army depot under the administrative command of the Tooele Army Depot, Tooele, Utah. The former mission of FWDA was to store, ship, and receive materiel and to dispose of obsolete or deteriorated explosives and ammunition. The active mission of FWDA ceased and the installation closed in January 1993. The installation is undergoing final environmental restoration prior to property transfer/reuse.

FWDA is situated in northwestern New Mexico, in McKinley County. The installation is located 8 miles east of Gallup, and approximately 130 miles west of Albuquerque on US Route 66 (see Figure 1-1). The installation itself contains approximately 150 miles of internal roads. FWDA is bordered on the west by Zuni tribal lands, on the south and east by the Cibola National Forest, and on the north by Red Rock State Park. Although the history of FWDA dates back to 1850 (Old Fort Wingate), almost all of the present installation facilities were constructed after 1941.

FWDA occupies approximately 34 square miles (22,120 acres) of land with facilities formerly used to operate a reserve storage activity providing for the care, preservation, and minor maintenance of assigned commodities, primarily ammunition and ordnance. The installation mission included the disassembly and demilitarization of outdated and unserviceable munitions. Ammunition maintenance facilities existed for the clipping, linking, and repackaging of small arms ammunition.

The installation can be divided into several areas based upon location and historical land use (See Figure 1-2). These major land-use areas include:

- The Administration Area - located in the northern portion of the installation and encompassing approximately 800 acres; contains former office facilities, housing, equipment maintenance facilities, warehouse buildings, and utility support facilities;

- The Workshop Area - located south of the Administration Area and encompassing approximately 700 acres; an industrial area containing former ammunition maintenance and renovation facilities;

- The Magazine (Igloo) Area - covering approximately 7,400 acres in the central portion of the installation and encompassing 10 Igloo Blocks (A through H, J and K) consisting 732 earth-covered concrete igloos and 241 earthen revetments previously used for storage of munitions;

- Protection and Buffer Areas - encompassing approximately 5,800 acres consisting of buffer zones surrounding the former magazine and demolition areas; these areas are located adjacent to the eastern, northern, and western boundaries of the installation;

- The Southern Properties - located in the southern portion of the installation and encompassing approximately 4,935 acres; consists of forested plateau and mountainous terrain, and

- The Open Burning and Detonation Area (OBDA) - located within the west central portion of the installation; the OBDA can be separated into two areas, the Closed OB/OD Area and the Current OB/OD Area.

The focus of the environmental characterization efforts described in this Final Report is solely on the soils and other solid matrix materials within the OB/OD Areas.

As discussed above, the active mission of the installation ceased in January 1993 and the installation is currently under caretaker status. However, a number of tenant operations are currently being maintained at FWDA. In addition, approximately one-half of the central portion of the installation is being used by the Ballistic Missile Defense Organization (BMDO). These activities are expected to continue during the post-closure care period. Currently, on-site Caretakers maintain access to the installation.

During the active mission of the installation, as part of routine operations, FWDA handled and stored munition items. Each year, quantities of munitions and munitions-related material were disposed of as waste. These wastes included items in storage that had failed quality assurance tests and out-of-date and obsolete explosives, propellants, munitions and munitions components. Other related waste for disposal included material that may have potentially become contaminated by munitions during storage and handling. Disposal of these items at FWDA was accomplished by open burning and open detonation.

Historic OB/OD activities at FWDA were conducted primarily within the OB/OD Areas. The Closed OB/OD Area was used from 1948 to 1955. After 1955, burning and detonation operations at the installation were performed within the Current OB/OD Area until installation closure in 1993.

## 1.3 *OB/OD OPERATIONS*

### 1.3.1 *Closed OB/OD Area*

The Closed OB/OD Area includes the Old Burning Ground and Demolition Landfill Area and the Old Demolition Area (Figure 1-3). The Closed Burning Ground and Demolition Landfill Area are located in Fenced Up Horse Valley on the eastern flank of the main Hogback ridge in an area dominated by interlayered sandstones and shales. The Old Demolition Area is located within a shale terrain situated between two sandstone ridge lines forming the Hogback and is on the western side of the main Hogback ridge.

The Old Burning Ground and Demolition Landfill Area consist of approximately 26 acres and was used from 1948 until the late 1950s to dispose of explosives contaminated wastes from the TNT Washout Plant and old equipment from the TNT drying and flaking operations. In the mid-1950s, the area was permitted by the Army to open burn up to 30,000 pounds of explosives at a time. It was reported that debris was exposed by erosion in the arroyo at depths in excess of 10 feet. The debris reportedly included shell casings, metal strapping material, and other metal materials. The extent of landfilling in this area was not documented, but was known to be constrained on the northwest by bedrock exposures along the Hogback, and on the southeast by the arroyo in Fenced Up Horse Valley. During one of the various site visits, three small areas where the soil was stained with what appeared to be explosives compounds were identified in the northeastern portion of the Old Burning Ground.

The Old Demolition Area consists of approximately 71 acres. The Army identified this area in 1981. Explosives from the holding tank of the TNT Washout Plant were transported to this area and burned in the open. The exact boundaries of this area are not well documented. However, three mounds were identified and were designated as potentially containing residue from the burning of white phosphorous rounds.

### 1.3.2 *Current OB/OD Area*

The Current OB/OD Area is located on the eastern side of the Hogback, south of Fenced-up Horse Valley (Figure 1-3). This area is approximately

38 acres in size and includes a number of detonation craters and the Burning Ground Area. In addition, an arroyo bisects the area, traversing (downstream) from south to north. The Current OB/OD Area was actively utilized between 1955 and January 1993.

The Burning Ground Area is located in a valley immediately east of the main arroyo within the Current OB/OD Area and north of the detonation craters. The Burning Ground Area is approximately 2 acres in size. From 1955 until 1993, it was used as a site to burn propellants and propellant-contaminated materials.

### 1.3.3 *Regulatory Status of OB/OD Operations*

Beginning in 1980, operations in the Current OB/OD Area were permitted and regulated under Resource Conservation and Recovery Act (RCRA) Interim Status. In response to base closure activities, Interim Status Closure of the OB/OD Areas was implemented. An Interim Status Closure Plan was initially submitted to the New Mexico Environment Department (NMED) on 6 November 1992 (ERM, 1992) to address final closure of the regulated operations within the Current OB/OD Area. During finalization of the Closure Plan, site investigations and evaluations, as well as dialogue with NMED, established the boundary of the regulated unit requiring closure. The area of the regulated unit consisted of the Current and Closed OB/OD Areas as well as a delineated boundary area representing the maximum observed extent of unexploded ordnance (UXO). The historic demilitarization and/or treatment operations at the OB/OD Areas, through detonation of accumulated munitions, ammunition, etc., had over time resulted in the areal expulsion or "kick-out" of soil and debris and potentially un-treated UXO.

The closure plan was approved by NMED in correspondence dated 20 January 1994 (NMED, 1994a). The approved closure plan included: the Final Interim Status Closure Plan, dated 1 March 1993 (ERM, 1993a); Attachment 1, Proposed Interim Status Closure Field Screening Approach, dated 20 October 1993 (ERM, 1993b); and a list of "Conditions for Closure Plan Approval" generated by NMED and attached to the approval letter. The approved closure plan included a phased approach to closure including environmental characterization sampling. Site conditions, primarily concerns for safety in the OB/OD Areas, were then determined to preclude the performance of "clean closure".

A Modification to the Final Interim Status Closure Plan was submitted to NMED on 23 May 1994 (ERM, 1994a). The results of preliminary environmental characterization efforts conducted within the OB/OD Areas, conclusions, and modified (i.e., non-clean closure) conceptual proposed closure approach were presented in the Modification. Several

comments that required additional investigation were provided by NMED in a Notice of Deficiency (NOD) letter to the Army dated 26 August 1994 (NMED, 1994b). These comments were considered during preparation of a Draft Final Interim Status Closure Work Plan, dated November 1994 (ERM, 1994b), which presented a generalized approach to characterization of the OB/OD Areas.

The Modification to the Final Interim Status Closure Plan and the Draft RCRA Interim Status Closure Work Plan together were considered by NMED to be an Amendment requested by the Army to the Approved Closure Plan. An NOD letter from NMED dated 18 July 1995 (NMED, 1995) outlined deficiencies with this Amendment and requested details regarding the proposed characterization of the OB/OD Areas.

The Army submitted Draft Final OB/OD Areas Closure Field Program (CFP) Work Plans to NMED on 18 September 1995. The CFP Work Plans presented details regarding the proposed characterization of the OB/OD Areas, in response to the 18 July 1995 NOD letter.

On 21 May 1996, the Army submitted to NMED the Final RCRA Interim Status Closure Plan (ERM, 1996d). This submittal incorporated the Final CFP Work Plans, consisting of the aforementioned FSP and CMHP (ERM, 1996a), QAPP, (ERM, 1996b), and HASP (ERM, 1996c).

NMED issued a letter to the Army on 18 June 1996 (NMED, 1996) stating that these documents met "the substantive requirements of the New Mexico Hazardous Waste Management Regulations" and a public comment period was initiated. A period of document review, comment preparation, comment resolution meetings, and comment response spanned the remainder of the 1996 and a portion of the 1997 calendar years. Approval of the Final RCRA Interim Status Closure Plan and the incorporated Final CFP Work Plans was received from NMED in a letter dated 10 April 1997 (NMED, 1997).

The net effect of the 10 April 1997 Approval of the Final RCRA Interim Status Closure Plan (ERM, 1996d) and the Final CFP Work Plans (ERM, 1996a-c) was the development of the CFP that consisted of three phases:

- Phase I - Characterization and Assessment of Site Conditions;
- Phase II - Description, Evaluation, and Recommendation of Closure-Remedial Options; and
- Phase III - Design, Construction & Operation of Selected Closure Option.

Because of safety concerns related to the presence of UXO, as well as seasonal site access limitations related to winter weather, and fiscal year funding cycles of the federal government, the CFP for the OB/OD Areas was conducted over a number of summer field seasons. The data presented in this Final Report were derived from field sampling efforts conducted in 1996 and are focussed on soil, burning/detonation debris and residues, and other solid matrix materials within the OB/OD Areas. Completion of these efforts represents Phase IA of the CFP. The results of Phase IB of the characterization/assessment effort, which was focussed on the ground water within the OB/OD Areas, will be reported in a separate Final Phase IB Report to be provided for review at a later date.

The Final RCRA Interim Status Closure Plan (ERM, 1996d) incorporated performance of a CFP to perform required environmental sampling, site characterization, and engineering evaluations to support finalization of the Closure Plan and select a closure/remedial option for implementation.

Several comments provided by NMED in the 26 August 1994 NOD letter required additional environmental characterization efforts, as described below.

1. Estimate the type and amount of hazardous waste and hazardous waste residues for each discrete area that could potentially require closure activities;

2. Perform a vertical characterization of contamination in the detonation craters;

3. Characterize the potential vertical component of impact within the detonation craters. Specifically, provide data addressing the potential for fracturing bedrock that could provide a conduit for migration of contaminants into deeper bedrock or ground water zones;

4. Perform ground water monitoring in deeper zones beneath the detonation craters to supplement information on potential impacts;

5. Set screening action levels at the analytical detection limits, and close as a landfill, areas with constituent concentrations exceeding residential exposure scenario human health risk levels;

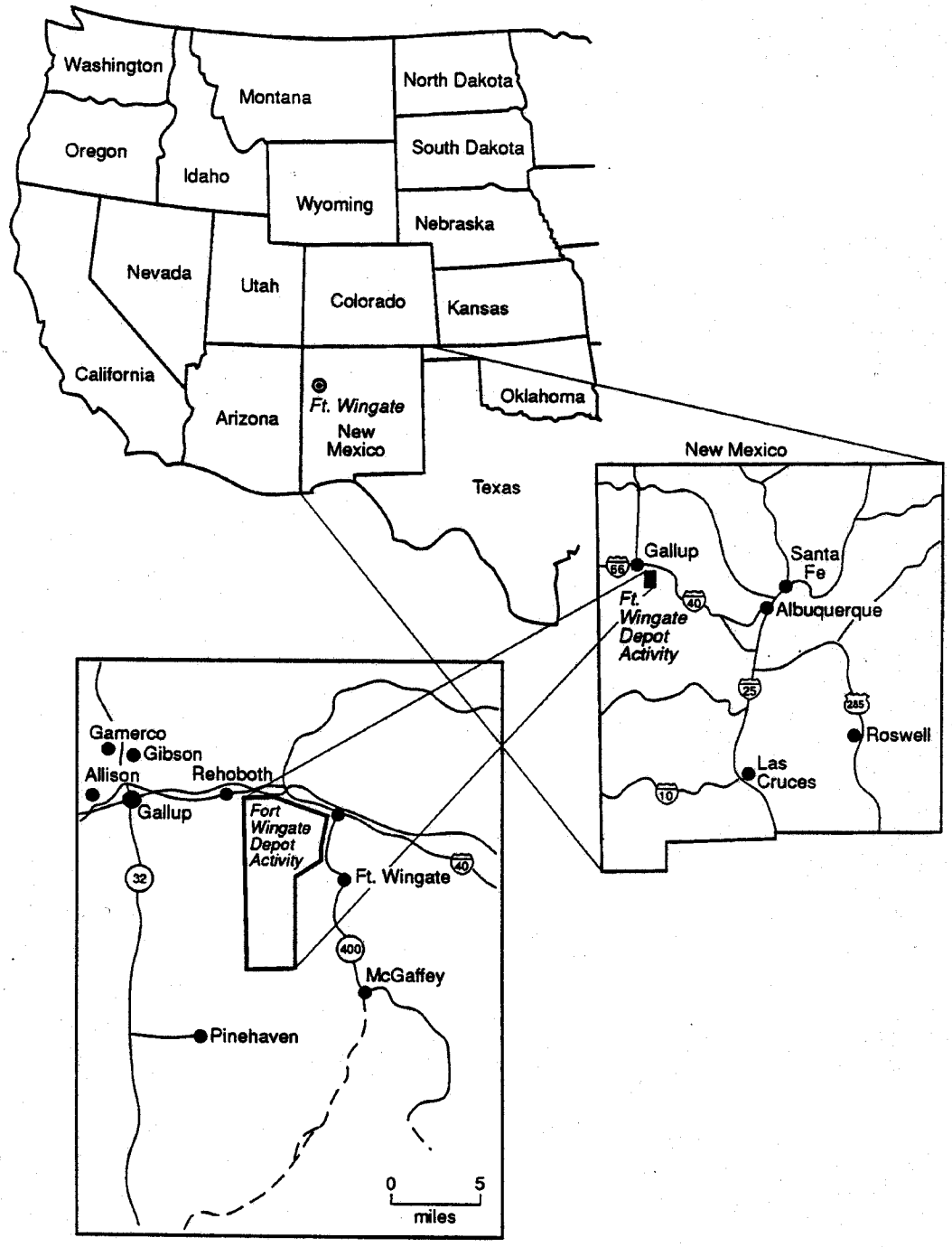
6. Provide details of how debris piles will be removed, how the disposition of materials will be performed, and how confirmatory sampling and analysis will be conducted; and

7. Provide a preliminary or conceptual (15%) engineering design and construction procedures for the proposed closure approach.

Items 1 and 2, as described above, are comprehensively addressed in this Phase IA Report. Item 3, which sought to estimate the potential for the migration to ground water of contaminants derived from the detonation activities by assessing the ability of the detonations to fracture the underlying bedrock and create ground water conduits, was not conducted (as discussed in Section 2.8). Ground water evaluation (Item 4) will be the primary focus of the Phase IB Report that will be submitted under separate cover at a later date.

Item 5 is addressed in this Phase IA Report. Items 6 and 7 will be addressed in future phases of the closure process.

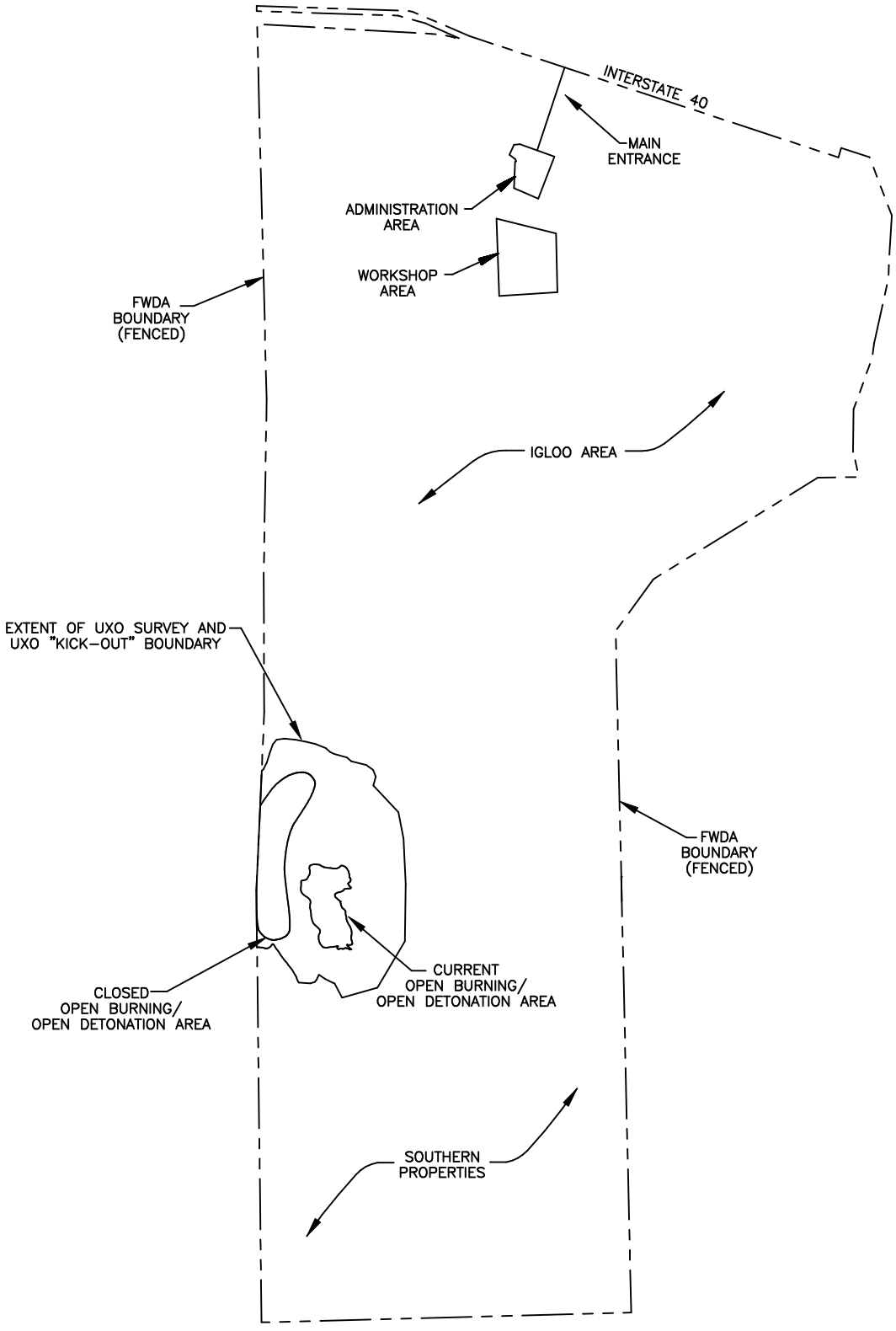
# Figure 1-1
# Installation Location
## Fort Wingate Depot Activity
## Gallup, New Mexico




SOURCE: "MASTER ENVIRONMENTAL PLAN: WINGATE DEPOT ACTIVITY, GALLUP, NEW MEXICO," DECEMBER 1990.

NOT TO SCALE

# Figure 1-2
# Historical Land Use
## Fort Wingate Depot Activity
## Gallup, New Mexico



# Figure 1-3
# Site Map
# Open Burning/
# Open Detonation Areas
## Fort Wingate Depot Activity
## Gallup, New Mexico

UXO RELATED
SCRAP "KICK-OUT"
BOUNDARY

CURRENT OPEN BURNING/
OPEN DETONATION AREA

BURNING
GROUND AREA

OLD BURNING GROUND AND
DEMOLITION LANDFILL AREA

CLOSED OPEN BURNING/
OPEN DETONATION AREA

OLD DEMOLITION AREA

LEGEND

FENCE LINE

CENTER OF ARROYO

900 450 0 900

Scale in Feet

BY PHOTOGRAMMETRIC METHODS FROM
AERIAL PHOTOGRAPHS TAKEN SEPTEMBER 28, 1995

## 2.0 *PHASE IA CLOSURE FIELD PROGRAM*

Specific field data collection efforts associated with Phase IA of the CFP were integrated with previous environmental characterization efforts conducted at both the Closed and Current OB/OD Areas. A summary description of the field methodologies is presented in Section 3.0. For a more detailed description of the field methodologies, the reader is referred to the Final FSP (ERM, 21 May 1996). The finding/results of the data collection efforts are presented in Sections 4.0 and 5.0 of this Final Phase IA Report.

### 2.1 *GEOPHYSICAL SURVEY*

Integrated geophysical surveys were performed in the 1993 summer field season to characterize subsurface conditions in the Closed OB/OD Area. Because the Closed OB/OD Area has been inactive since the 1950s, much of the land surface was featureless and revegetated. Visual signs of past disposal activities were limited to only a small portion of the area. Conversely, in the Current OB/OD Area, disposal activities were readily observable on the land surface, and no geophysical surveys were required.

The objectives of the surveys were to delineate the lateral extent of potentially disturbed ground within specific sub-areas of the Closed OB/OD Area and to detect buried metal objects. To achieve these objectives, electromagnetic induction (EM), magnetic (MAG), and ground-penetrating radar (GPR) geophysical techniques were used. EM and MAG surveys were conducted over established survey grids. GPR data were collected at specific anomalies identified by the EM and MAG surveys.

### 2.2 *GEOPHYSICAL ANOMALY AND RESIDUE/DEBRIS AREA IDENTIFICATION*

During the 1995 summer field season, an extensive field mapping exercise was conducted in the Current and Closed OB/OD Areas to physically locate and describe accumulations of burning ground residue and munitions-related debris associated with past demilitarization efforts. A team of field personnel utilized global positioning system (GPS) and laser surveying equipment to delineate the apparent lateral extent of each residue/debris area in both the Current and Closed OB/OD Areas. The results of this visual mapping effort were combined with the results of the geophysical surveys conducted in the 1993 summer field season to provide a comprehensive physical description of the residue/debris areas and the adjacent disturbed areas.

## 2.3 *BACKGROUND SOIL CHARACTERIZATION*

Concentrations of background soil constituents were developed to provide a comparative basis for the assessment of the potential for, and impacts of, environmental contamination resulting from past operations within the Current and Closed OB/OD Areas. Background data were acquired via the collection and analysis of near-surface soil samples.

The two OB/OD Areas are located on different sides of the Hogback (Fig. 1-3). As a result, the surface geology of each area is substantially different from the other. The Closed OB/OD Area is located on the Mancos Shale, while the Current OB/OD Area is located on various members (sandstone and shale) of the Chinle Formation. Each geologic formation or member has a distinct mineral composition, resulting in a different mix of background constituent concentrations. In order to address these differences, separate background data sets were collected for the Current and Closed OB/OD Areas.

## 2.4 *TRENCHING INVESTIGATION*

Portions of the Closed and Current OB/OD Areas that were identified as potential disposal areas were trenched using a trackhoe. The primary objectives of the trenching operations were:

- To characterize the types of waste/debris present in each area;
- To confirm the lateral extent of the waste/debris identified by the visual and geophysical surveys;
- To delineate the vertical extent of the waste/debris; and
- To estimate the volume of potentially impacted soil.

The vertical and horizontal soil profiles encountered in each trench were logged and any debris or waste described. Based upon these results, maps and cross-sections were prepared to show the types, amounts, and distribution of various materials encountered.

Soil samples were collected from the bottom, sidewalls, and endwalls of each trench, and screened in the field for the presence of explosive compounds and for elevated metals concentrations. Based upon the results of the field screening, the trenches were extended to a length and depth such that native soils were encountered that did not contain detectable concentrations of explosives. Selected soil samples were submitted for laboratory analysis to confirm that the extent of potential soil contamination had been fully delineated in each area.

In addition to the trenching operations in the waste/debris areas, investigative trenching was also conducted at five of the twelve identified detonation craters in the Current OB/OD Area to determine the potential vertical and horizontal extent of contamination.

The craters investigated were selected based upon their periods of use. Two of the investigated craters were located on the eastern side of the arroyo and three were located on the western side (Figure 4-8). Crater CDC04 (Current OB/OD Area Detonation Crater No. 4) had been used most recently. Army Explosives Ordnance Disposal (EOD) operations used this crater during the UXO survey of the OB/OD Areas performed in 1992 and 1993. Because of its recent use, crater CDC04 was thought to have the greatest likelihood, of the 12 existing craters, to contain explosives and metals contamination. The investigation results collected from CDC04 are also considered representative of conditions at CDC05 which was used during the same time period as CDC04.

Crater CDC02 had been inactive longer than the other existing craters and was overgrown with vegetation. Investigation of this crater evaluated the potential for explosives and metals contamination to persist in craters where detonation activities have not occurred for long periods of time. The investigation results collected from CDC02 are also considered representative of conditions at CDC01 and CDC03 which were used during the same time period as CDC02.

Seven craters were located on the western side of the arroyo. These craters were used during permitted OB/OD activities up until 1992 when regularly scheduled OB/OD operations in the Current OB/OD Area ceased. Three of these craters, CDC06, CDC08, and CDC10, were investigated. Since all of the craters located on the western side of the arroyo appeared to have been used during the same time period, the investigation results collected from CDC06, CDC08, and CDC10 are also considered representative of conditions at CDC07, CDC09, CDC11, and CDC12.

## 2.5 *ECOLOGICAL HABITAT SURVEY*

The overall objective of the Ecological Survey was to generate baseline characterization information to ensure the maintenance of existing habitat and species diversity within the OB/OD Areas throughout the closure process and in the post closure care period. Minimization of any impacts to the wetlands located in the arroyo that drains the Current OB/OD Area was of importance because evidence suggested that these wetland areas are frequented by wildlife and provide habitat value such as cover, a source of water, and hunting grounds for predators.

The specific objectives of the Ecological Survey were to:

- Identify potentially sensitive ecosystems, habitats, and organisms in the impacted areas;
- Characterize current site ecological conditions;
- Evaluate and minimize projected impacts and risks to ecosystems caused by the CFP, closure implementation, and post closure care operations; and
- Identify baseline conditions to allow for future determination of the residual risks under post closure conditions.

The ecological survey included an assessment of the potential ecological impacts associated with the closure options currently under consideration for the OB/OD Areas.

## 2.6 *WETLANDS IDENTIFICATION*

The objective of this portion of the Phase IA CFP was to physically characterize potential wetlands in the field in order that potential impacts to the identified wetland areas would be minimized during performance of investigation and closure/post-closure care activities in the OB/OD Areas. The majority of this task was completed during a preliminary site reconnaissance conducted during July 1995. Both OB/OD Areas were investigated, and one wetland area was identified in the arroyo of the Current OB/OD Area.

## 2.7 *MAPPING*

GPS technology was used during the 1993 and 1995 field seasons to map locations of geophysical anomalies, residue/debris piles, and demolition craters, as well as points along roads and other prominent site features. This information was used to create base maps for the CFP workplans.

Aerial mapping of the OB/OD Areas was completed in 1996. These maps replaced the GPS base maps in all subsequent efforts.

During the 1996 field season, differential GPS (DGPS) technology was used to map the ends of each investigation trench and other field sampling locations. Sample locations within individual trenches were recorded on the trench logs, and were manually transferred onto the base map based on location along the trench profile.

## 2.8 *DETONATION IMPACT ASSESSMENT*

The Work Plan for the characterization of soils in the Current OB/OD Area planned for a detonation impact assessment for the detonation craters. The planned objective was to evaluate the impacts of historical detonation operations on soil and rock properties, specifically focussing on the potential for the creation of bedrock fractures that could represent preferred contaminant migration pathways.

The preliminary planning steps for this assessment strongly indicated that the expected results would be sufficiently vague so as to create no significant additional value to the environmental characterization program. As a result, the assessment was deleted and the evaluation of potential contaminant migration in the subsurface was further investigated by the conduct of drilling, sampling, and monitor well installation efforts (to be described in the Phase IB Report).

# 3.0 PHASE IA CLOSURE FIELD PROGRAM METHODOLOGIES

## 3.1 GEOPHYSICAL SURVEY

Integrated geophysical surveys were performed to further characterize subsurface conditions. These non-invasive screening surveys were used as rapid reconnaissance tools designed to provide detailed coverage over a large area. The objectives of the surveys were to delineate the lateral extent of any land disturbances associated with past burning, munitions demolition, and landfill operations and to detect buried metal objects. To achieve the survey objectives, EM, MAG, and GPR geophysical techniques were used. EM and MAG were conducted over established survey grids. GPR data were collected at specific anomalies identified by the EM and MAG surveys. Additionally, in response to potential explosives safety hazards posed by UXO items, separate geophysical surveys (EM and MAG) were conducted to clear sites for access by environmental sampling teams.

### 3.1.1 *Geophysical Survey Grids*

Geophysical survey grids were established to provide accurate location and even distribution of measurement stations using a Brunton compass mounted on a Jacob's staff and a steel measuring tape. Survey stations were measured every 25 feet along grid lines spaced every 50 feet. Pin flags were labeled with the corresponding grid coordinate and were used to identify each grid node. Instrument operators paced distances between survey stations and aligned themselves with pin flags to collect data at intermediate stations.

### 3.1.2 *Electromagnetic Survey*

The EM method uses the principle of electromagnetic induction to measure the terrain conductivity of earth/fill materials. Commonly, significant contrasts in the electrical properties between non-indigenous materials and surrounding soil enable accurate delineation of former waste burial sites and buried metal objects. In general, an increase in clay or water content and the occurrence of buried waste commonly result in elevated conductivity values. In arid environments such as that found at FWDA, little soil moisture exists in the unsaturated zone. As a result, the contrast between fill materials and native soils is more subtle.

The in-phase response is more sensitive to metal objects and can be used to locate non-ferromagnetic metals such as aluminum, lead, copper, and stainless steel. Magnetic methods can only detect ferromagnetic objects such as iron or steel.

The instrument was calibrated daily prior to operation at an off-site background reference station believed to be free from cultural interference. The reference station was re-occupied at the end of each day of operation for system function checks. The EM calibration station was also used as a base station for the MAG survey. Both in-phase and terrain conductivity data were collected and digitally recorded in the field using a data logger. The data were downloaded daily to a portable computer. Contour maps were generated with the field computer using data contouring software. Interpretations were made after each site was completed to allow rapid identification of additional survey requirements.

The EM data were interpreted by plotting the EM measurements with respect to the station location and contouring the results. The resultant map identified lateral changes in conductivity or in-phase response over the survey area. Terrain conductivity maps were used to identify areas of elevated conductivity that may indicate the extent of landfilled materials. Landfilled areas typically exhibit elevated conductivity because of an increase in porosity and moisture content created by the disturbed conditions. The in-phase maps illustrated the location of highly conductive materials or objects and were used to locate potential buried metal objects.

The character of EM anomalies can be complex in the presence of buried metal objects. Anomalies can be positive or negative or both depending upon the location and orientation of the object with respect to the orientation of the instrument. If sufficient lateral resolution is achieved, anomalies caused by significant metal objects are typically manifested as a negative anomaly directly over the object surrounded by a "halo" of increased conductivity.

### 3.1.3 *Magnetic Survey*

A MAG anomaly is generated by a local disturbance in the earth's magnetic field created by the occurrence of ferromagnetic objects. MAG anomalies can exhibit a variety of forms depending upon the shape, mass, and depth of burial of the metal object, as well as the amount of induced or permanent magnetization. If a metal object has all of its magnetization induced by the earth's field (induced magnetization), then the resultant anomaly consists of a magnetic high located approximately over the object, and a magnetic low located north of the object. Permanent magnetization occurs when a metal acquires a magnetic field during solidification from molten metal to solid. Permanent magnetization can create anomalies that are negative, positive, or both.

A proton precession magnetometer/gradiometer was used to conduct the MAG surveys. The instrument records, digitally processes and displays the data as measurements of the total magnetic field in gammas.

Magnetic gradient measurements were obtained by measuring the total field at two sensors that were separated by a fixed distance. The magnetic gradient, calculated at the midpoint between the two sensors, was determined by the difference in the intensity of the total field divided by the distance between the sensors. There are several differences between total field magnetic data and vertical gradient data. First, gradient measurements are differential measurements and eliminate magnetic time variations such as magnetic storms. Second, gradient anomalies tend to greatly enhance small, shallow metal objects that can mask larger and deeper metal objects. Finally, gradient data can provide more detailed information regarding anomaly depth, shape, and location. Under certain conditions, the complementary effect of combining both total field and gradient data can provide more complete geophysical information.

Measurements of both the total magnetic field and magnetic gradient were recorded. Magnetic base station readings were collected at a two-hour maximum interval during the survey to determine whether significant magnetic time variations had occurred. All magnetic data were temporarily stored in the internal memory of the magnetometer to facilitate data manipulation and processing. The data were then transferred daily from the magnetometer to a field computer to reduce processing time and eliminate the possibility of transcription errors. The raw data were reduced using the base station data to alleviate the problem of magnetic drift. Contour maps were generated on the field computer using the data contouring software program. Interpretations were made after each survey area was completed to allow rapid assessment of further survey requirements.

### 3.1.4 *Ground-Penetrating Radar Survey*

GPR anomalies are created by local contrasts in the electrical properties of subsurface materials. The shapes of GPR anomalies vary widely. In general point source or discrete objects such as buried drums, tanks or pipelines commonly exhibit hyperbolic anomaly signatures. Interfaces between two contrasting media generally appear as linear anomalies that are consistent with the configuration and orientation of the interface.

### 3.1.5 *UXO Detection Surveys*

Because of the potential for the presence of UXO items throughout the OB/OD Areas, the detection and removal of UXO were required prior to site access and intrusive environmental sampling. Two distinct methods

of UXO survey were conducted, magnetometry and metal detection. These surveys were conducted separately from those described in Sections 3.1.1 through 3.1.4, and were focussed solely on ordnance items.

The magnetometer and metal detector were used during the UXO survey to locate subsurface metallic objects. They were very effective in areas where there was sparse metallic contamination and, conversely, of limited usefulness in areas that were heavily saturated with miscellaneous metallic debris and slag. Heavily saturated areas were deemed unsafe for intrusive environmental sampling. All areas surveyed for ordnance items were marked and mapped utilizing GPS techniques.

Identified ordnance items were removed from the survey areas. Items too sensitive to be moved were marked for destruction in place. Destruction in place activities were completed by the Army or by an EOD contractor through USACE, Huntsville Center.

Throughout the environmental sampling efforts in the OB/OD Areas, UXO specialists performed full-time safety escort for each field sampling team, and for other personnel needing access to areas potentially containing UXO.

## 3.2 *GEOPHYSICAL ANOMALY AND RESIDUE/DEBRIS AREA IDENTIFICATION*

During the 1995 summer field season, an extensive field mapping exercise was conducted in the Current and Closed OB/OD Areas to physically locate and describe all accumulations of burning ground residue and munitions-related debris associated with past demilitarization activities. A team of field personnel utilized GPS and laser surveying equipment to delineate the apparent lateral extent of each residue/debris area in both OB/OD Areas. The results of this visual mapping effort were combined with the results of the geophysical surveys conducted in the 1993 summer field season to provide a comprehensive physical description of the residue/debris areas and the adjacent disturbed areas. The specific objectives of this mapping effort were as follows:

- Stake locations of geophysical anomalies identified in 1993;
- Visually evaluate the extent of surface metal which could be the source of the identified geophysical anomalies;
- Investigate the presence, type, and location of visible residue, waste, and debris piles within the OB/OD Areas;

- Select proposed locations for investigation trenches through anomalies and waste, surface water and sediment samples, and ground water monitoring wells; and

- Collect field data necessary to produce maps of the study areas to be used in subsequent project documents.

In order to plan the trenching investigation and to aid in discussion, each of the geophysical anomalies and residue/debris piles were assigned a unique identifier. Sites in the Closed OB/OD Area were assigned identifiers beginning with "K", followed by either "GA" for geophysical anomaly or "P" for pile, and finally a sequential number. Sites in the Current OB/OD Area were assigned identifiers beginning with "C", followed by either "RP" for residue pile or "DC" for demolition crater, and finally a sequential number.

## 3.3 *BACKGROUND SOIL CHARACTERIZATION*

At the start of the 1996 field season, background soil constituent concentrations and background screening levels for the OB/OD Areas were developed for use during data assessment efforts. Background data were acquired during the CFP via collection and analysis of near-surface soil samples.

Soil samples were collected from 20 locations in each OB/OD Area. Samples were collected from undisturbed portions of each area at depths of 0.5 feet to 1.0 feet bgs. This depth interval was selected to facilitate sample collection, while minimizing the influence of any unobserved anomalous surface debris that may be present in the areas where background samples were collected. Review of background data from the Remedial Investigation/Feasibility Study (RI/FS) Report (ERM, 1995) indicated that constituent concentrations do not appear to vary significantly with depth (i.e., constituent concentrations do not consistently increase or decrease, as one moves vertically down through the soil profile). Thus, samples were collected at a single depth at each location.

Four sample sets were collected at each of five locations upstream and topographically upgradient of areas potentially impacted by facility operations. The four samples of each set were aligned perpendicular to the valleys in which the OB/OD Areas are located. Two sample sites were located on either side of the arroyo, to represent a cross-section of the soils present within the OB/OD Areas. Samples were collected following methodologies given in the FSP. Background soil samples were analyzed for Target Analyte List (TAL) metals, explosives, salinity, acidity, and total phosphorus (Closed OB/OD Area only). Total phosphorus was added in

the Closed OB/OD Area due to the discovery of munitions containing phosphorus (white and red) during UXO survey activities in this area.

Because the analytical methods for metals at the off-site laboratory differed from the field laboratory methods (different instruments and different detection levels), after off-site laboratory analysis of the background samples was complete, the samples were returned to the site for analysis at the field laboratory. In this way, background levels of metals for use in field screening were established. In other words, field screening samples analyzed at the field laboratory were compared to the background samples also analyzed at the field laboratory. Confirmation samples sent to the off-site laboratory were compared to the background samples analyzed at the off-site laboratory.

## 3.4 *TRENCHING INVESTIGATION*

Areas where disposal had occurred or where anomalies had been identified were investigated using trenching techniques. Because the nature and the extent of waste in these areas was generally unknown, a flexible plan was developed to facilitate efforts to characterize and delineate the extent of waste and debris present, and also to assess the extent of soil impacted by past disposal activities. During the trenching investigation, UXO specialists operated all excavation equipment under supervision of a UXO safety observer.

A trackhoe was used to open each trench and expose subsurface soil, debris and waste materials for field description, photography, mapping, and sampling. The extent of waste and disturbed soil in both vertical and horizontal directions was defined and logged for each trench. Soil samples were collected from the floor, sidewalls, and endwall of each excavated trench to characterize the types of soil and waste present.

Visual observation of waste limits and the results of field screening analyses directed the depth and longitudinal extent of each trench. Samples were screened for the presence of explosives using test kits for hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX) and 2,4,6-trinitrotoluene (TNT) based on enzyme linked immunosorbent assay (ELISA) methods. Samples were also screened for elevated levels of metals in an on-site laboratory using an X-Ray Fluoresence (XRF) instrument. The samples of soil for field screening were collected from areas that appeared to be beneath or beyond the edges of observable waste and debris. Field screening was used to determine when explosives were below detectable concentrations and when levels of metals were not elevated when compared to the background sample on-site XRF results, thereby indicating that the extent of contamination had been delineated.

Soil samples were also collected for laboratory analyses. Samples were collected from the base, sidewalls, and endwalls of each trench, as directed by the field screening results and visual observation of each trench. Analytical samples were collected to characterize the various types of waste and soil encountered during the trenching investigation, and to confirm that the vertical and horizontal extent of potentially impacted materials had been delineated.

A trench log was prepared for each trench to depict the type and extent of the waste and debris encountered. The soils were described using standard methods and a lithologic log was developed to characterize variations in materials over the length and depth of each trench.

### 3.4.1 *Soil and Waste Sampling*

All soil and waste samples were collected following sampling methodologies given in the FSP. Soil samples were collected along each trench for field screening and confirmatory laboratory analyses. Samples were selected in the field based upon visual observation of the extent of residue/debris and soil conditions. A generalized sample selection methodology is described below, however, the actual samples collected from each trench were dependent upon conditions encountered in the field.

Within each trench where field screening samples were collected, samples for analysis by the off-site laboratory were also collected. The results of field screening and visual observations were used to select samples for off-site laboratory analysis. Samples not selected for laboratory analysis were returned to the excavation.

Figure 3-1 presents a schematic cross-sectional view of a typical trench through a residue/debris area, and typical locations for collection of field screening and laboratory samples. Figure 3-2 presents a schematic cross-sectional view through a detonation crater. Trenching continued until the horizontal and vertical extent of the visible waste had been defined by field screening tests for explosives and metals. Once the extent of a trench was thought to be beyond the limits of waste or contaminants present, a soil sample was collected from the limit of the excavation and screened. If explosives were detected, or metals were detected above field screening concentrations, excavation continued. This process was repeated until soil was encountered which did not contain detectable concentrations of explosives or elevated concentrations of metals.

Samples for confirmatory laboratory analysis included grab soil samples from the limits of trenches as defined by field screening. Composite waste samples were collected from each trench where waste was encountered.

Each composite waste sample consisted of material collected from several locations within a particular trench, as described in the approved CFP Work Plans. Confirmatory and composite waste samples were submitted for laboratory analysis of explosives, TAL metals, and total phosphorus (Closed OB/OD only). Total phosphorus was added in the Closed OB/OD Area due to the discovery of munitions containing phosphorus (white and red) during UXO survey activities in this area.

Grab samples of waste and soil considered representative of the range of materials encountered in the OB/OD Areas were collected from each trench location to characterize the potential for leaching of constituents. Representative waste samples were collected from each of the OB/OD Areas and analyzed for total organic carbon (TOC), particle size distribution, Toxicity Characteristics Leaching Procedure (TCLP) for explosives and metals, and Synthetic Precipitation Leaching Procedure (SPLP) for explosives and metals. Representative soil samples were collected from each of the OB/OD Areas to characterize soil properties that may inhibit the migration of constituents through the soils. These samples were analyzed for moisture content, cation exchange capacity, TOC, and particle size distribution in a laboratory, and pH in the field. These analytical results will be used during future closure activities to evaluate leaching from soil and wastes present on site and the potential for migration.

### 3.4.2 *In-Place Visible Waste Volume Estimates*

As described above, the cross-section area of visible waste material or visibly impacted soil within a given investigation trench was recorded on a trench log. The investigation trench logs and other field observations were used to delineate the approximate areal extent of visible waste or visibly impacted soil within a given area. Sample calculations are included in Appendix E.

In areas where the trenches were oriented parallel to each other and visible materials appeared to have been regularly distributed (e.g. along an arroyo bank or in a disposal trench), the waste volume was estimated by the "average end area" method (Figure E-1, Appendix E). Commonly used in the construction industry for the calculation of cut and fill volumes, the average end area method multiplies the distance between two investigation trenches by the average cross section area of visible waste or impacted soil in the trenches. If waste or impacted soil continued beyond the last investigation trench within an area, the area of waste or impacted soil in the nearest trench was multiplied by the distance to the extent of the feature.

For isolated waste areas (e.g. piles or subsurface pockets not on an arroyo bank) where two investigation trenches were oriented perpendicular to each other, a different approach was used (Figure E-2, Appendix E). The areal extent was estimated by multiplying the length of waste or impacted soil in one trench by the length of waste or impacted soil in the cross trench. This area was then multiplied by an average depth of visible material to estimate the in-place volume.

For larger areas a more complex approach was taken to estimate the in-place waste volume. During trenching, trench locations were typically selected to characterize the distribution of waste materials within a given area. For waste volume estimation, each large area was divided into subareas that contained similar waste profiles (Figure E-3, Appendix E). Volume estimates for arroyo banks and bottoms were calculated using the average end area method described above. Volume estimates for flat, filled areas were calculated using the interpreted extent of fill material (plan view) based on trenching, multiplied by a conservative average waste depth (based on trench logs within the area). The in-place waste estimate was then the sum of all the subarea volumes.

## 3.5 *ECOLOGICAL HABITAT SURVEY*

### 3.5.1 *Background Research*

A preliminary characterization of the biological features in the OB/OD Areas was performed during completion of the RI/FS effort (ERM, 1995). It consisted of a literature review to develop a summary of the local ecology. General ecological information concerning northwestern New Mexico habitats was compiled during the ecological risk assessment conducted for the remainder of the FWDA, which was completed in 1993 and 1994. These data provided an overview of the pertinent ecosystems and identified potential sensitive sub-populations and any threatened or endangered species that may inhabit the local area. Information regarding land and designated resource uses upgradient and downgradient of the OB/OD Areas was collected from local planning documents.

### 3.5.2 *Field Investigation*

An ecological field reconnaissance was conducted by a team of PMC ecologists to field-truth the location and types of physical features identified on existing site maps and aerial photos, document species, and the composition of habitats, and to observe associated wildlife directly or by sign (tracks, calls, scat, etc.). The reconnaissance focussed on: the habitats present in each OB/OD Area; the wildlife likely to be found in these habitats; and the animal and plant species of special concern (including federal and state designated endangered and threatened

species) that are potentially present. Any areas of stressed vegetation were identified on a detailed resource map of the OB/OD Areas. During this survey, field observations of ecological effects or stressors (such as the unlikely occurrence of mammal or bird mortality, stressed vegetation, absence of locally abundant mammal and bird species, and changes in the structure of the aquatic community) were recorded and used to focus the assessment on known stressors and ecological effects.

The methodologies for conducting the ecological field investigation are provided in greater detail below.

*3.5.2.1 Ecological Evaluation*

Previously gathered information regarding physical features, areas of concern, habitat types, habitat species composition and wildlife receptors for the OB/OD Areas were confirmed through a more detailed, site-specific field investigation of each area. The field program was focused on areas of concern where closure activities may impact unique habitats in and immediately adjacent to the arroyos where OB/OD activities are known to have taken place and waste materials have been deposited. Additional information obtained from appropriate resource management agencies (both federal and state) regarding potential aquatic and terrestrial species potentially present in and around the vicinity of the OB/OD Areas were used during the field program when available. An aerial photograph of the OB/OD Areas was used to verify the locations and extent of physical features, changes in habitat covertypes, disturbed or unvegetated land and areas of potential concern.

An ecological field survey was conducted to characterize ecological receptors and ecological components present within the OB/OD Areas. This characterization described: the habitats present in each of the OB/OD Areas and their associated vegetative composition; the wildlife identified in these habitats; and the animal and plant species of special concern (including federal and state designated endangered and threatened species) that were identified. Indicator species to be evaluated in subsequent risk assessment efforts were identified.

Areas of stressed vegetation, if present, were identified on a detailed resource map of the OB/OD Areas and compared to observations made during previous field studies. Also during this survey, field observations of ecological effects or stressors such as the occurrence of mammal or bird mortality, and absence of locally abundant mammal and bird species were recorded and used to focus the assessment on known stressors and ecological effects.

In conducting this assessment of the OB/OD Areas, the ecologists investigated existing habitats in the affected areas. The ecologists surveyed each area by foot with a UXO escort, mapped the observed habitats, and documented the associated vegetative species composition. Identifications of vegetative species located within each habitat were made via the use of vegetation field guides that specifically covered the flora found in New Mexico and the southwestern United States. Habitats were mapped in relation to the existing physical/geologic features, fence lines, roads, arroyos and craters so that areas potentially subject to closure activities could be identified in relation to the known locations of protected or unique habitats. To support future site management decisions, coverages of each vegetation community and all physical features (such as detonation craters, refuse/debris piles, burning grounds, arroyos and unvegetated areas) were recorded on the generated habitat covertype map.

Detonation craters, refuse/debris piles, burning grounds, arroyos, unvegetated areas and optimal habitat areas were among the features evaluated during the ecological reconnaissance survey of the OB/OD Areas. Although the entire OB/OD Areas were surveyed, areas potentially subject to closure activities were evaluated for their ability to support ecological receptors that may be currently at risk; consideration was also made of how closure activities would impact areas that support ecological receptors.

Areas of potential exposure pathways were evaluated in the field as well as in the office. Field observations included identifying locations where visible disturbances or areas potentially subject to closure activities and ecological receptor communities/home ranges overlap (USEPA, 1992).

## 3.6 *WETLANDS IDENTIFICATION*

### 3.6.1 *Background Research*

Wetland identification activities included a detailed analysis of the U.S. Geologic Survey (USGS) topographic maps, Fish and Wildlife Service National Wetlands Inventory (NWI) maps and the National Resource Conservation Service (NRCS) soil mapping work completed for the FWDA area.

### 3.6.2 *Field Program*

The field program conducted in 1995 included a characterization of potential wetlands located in the OB/OD Areas based upon topography, hydrology, vegetation, and soils. To avoid or minimize impacts to wetland areas during field investigation and closure/post-closure

activities, this task was completed first before other field activities. As required by the New Mexico Energy, Minerals, and Natural Resources Department (NMEMNRD) and the USACE, the wetland delineation was conducted according to the methodology described in the *U.S. Army Corps of Engineers Wetland Delineation Manual* (USACE, 1987). Using the routine on-site determination method, wetland-upland boundaries were determined by evaluating hydrophytic (wetland) vegetation, hydric (wet) soils, and wetland hydrology. All three parameters must be present under normal environmental circumstances in order to classify an area as a wetland.

The presence of hydrophytic vegetation was determined by comparing the plants identified on the property with the U.S. Fish and Wildlife Service (USFWS) *National List of Plant Species That Occur In Wetlands: Southwest (Region 7)* (Reed, 1988) which lists common southwestern United States wetland plant species and their wetland indicator status. If an area had 50 percent or more of the dominant plant species having a wetland indicator status of obligate (OBL), facultative-wet (FACW), or facultative (FAC), then the area would have been designated as positive for hydrophytic vegetation.

Hydric soils were identified by field indicators of saturated soil conditions. Such indicators often include reduced (unoxidized) soils that exhibit a gray or dark black matrix or mottles. Therefore, examination of soil color often reveals the most visible indicator of wet soils. Soil color was determined by comparing soil samples with the *Munsell Soil Color Charts* (Munsell Color, 1992). Munsell colors for soils are written in a symbolic notation that identifies the hue, value, and chroma. An example of soil color notation is 5YR 7/1; where 5YR is the hue, 7 is the value, and 1 is the chroma. Soils within 12 inches of the land surface that exhibit either of the following characteristics would have been designated as hydric: (1) a matrix chroma of one or less; or, (2) a chroma of two or less with mottles.

Wetland hydrology was evaluated through the presence of saturated or inundated areas or through the observation of signs of previous prolonged inundation (matted, water-stained leaves, drift lines and sediment deposits).

All delineated wetland boundaries within the OB/OD Areas were physically staked with fluorescent orange painted wooden stakes, flagged with fluorescent colored flagging tape in the field and labeled with alphanumeric symbols. The approximate location of each wetland boundary marker was depicted on a field map of the OB/OD Areas. Potential impacts to these habitats during field investigation and closure/post-closure activities were minimized.

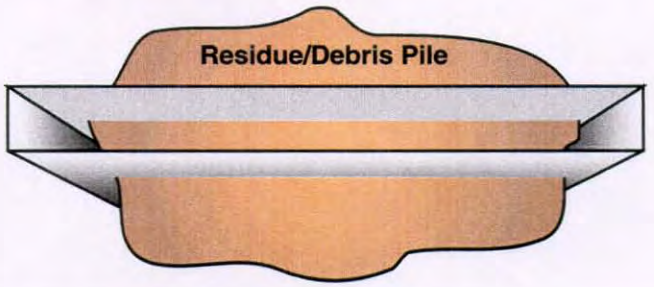
## 3.7 *MAPPING*

Aerial mapping of the OB/OD Areas was completed in 1996 by Atlantic Technologies, Ltd., of Huntsville, Alabama, under contract to the U.S. Army Environmental Center (USAEC). At the end of the trenching program, a survey crew used DGPS technology to map locations of geophysical anomalies, residue/debris piles, demolition craters, investigation trenches, and other field sampling locations. All mapping was conducted under the escort of a UXO specialist.

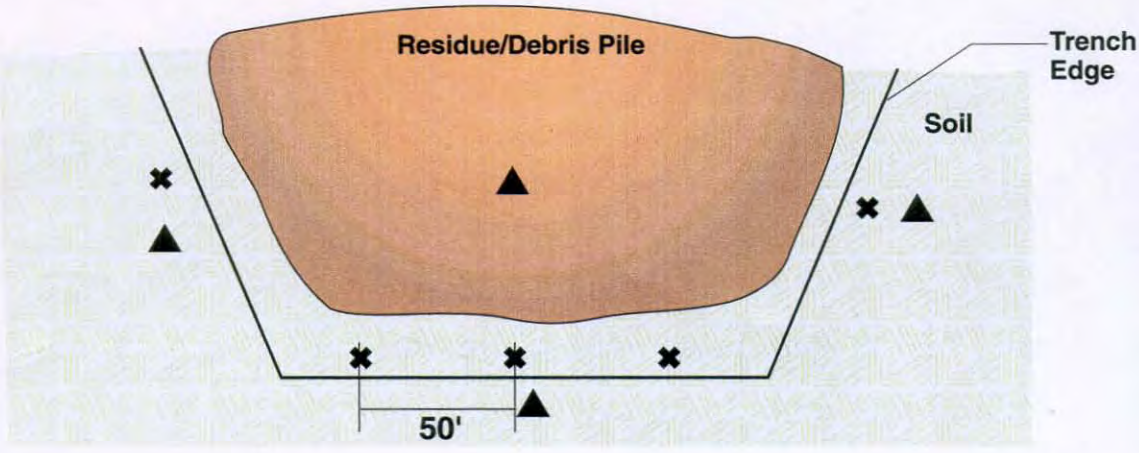
Sample locations within investigation trenches were recorded on the trench logs and transferred onto maps manually based on location along the trench profile.

# Figure 3-1
# Residue/Debris Pile Sampling Location Schematic
## Fort Wingate Depot Activity
## Gallup, New Mexico

Schematic plan view showing location of trench cross-section through residue/debris pile.




Cross Section of Trench Through Residue/Debris Pile
(Not to Scale)



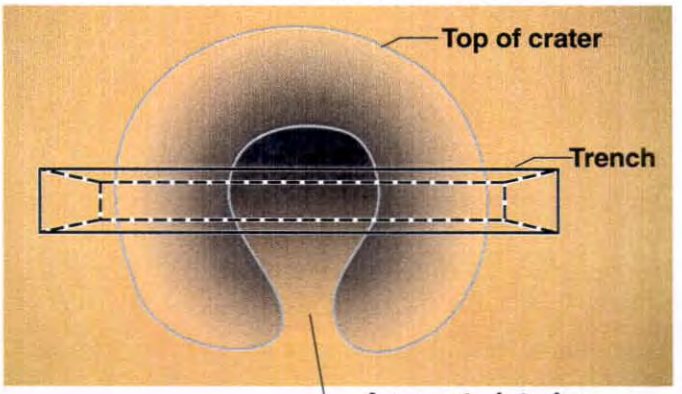

LEGEND

✖ Field Screening Samples:
- 2 ends of trench
- 1 approximately every 50 linear feet along base of excavation

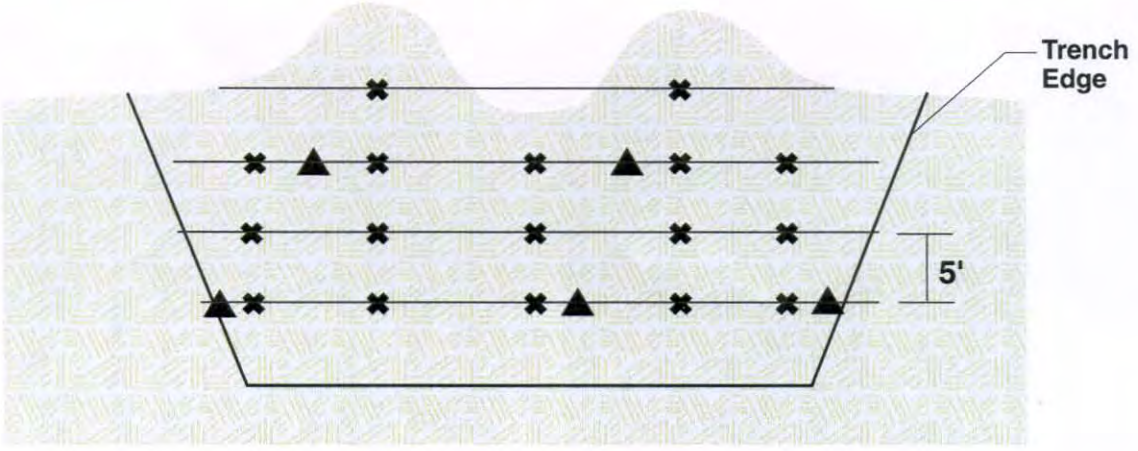
▲ Lab Samples:
- 2 grabs, 1 from each end of trench
- 1 grab along base of excavation for every additional 50 linear feet over 100 feet of trench
- 1 composite in waste

# Figure 3-2
# Detonation Crater Sampling Location Schematic
## Fort Wingate Depot Activity
## Gallup, New Mexico

Schematic plan view showing location of trench cross-section through detonation crater.




Cross Section of Trench Through Detonation Crater
(Not to Scale)




**LEGEND**

✖ Field Screening Samples, approximately every 5 feet depth (Total of 17 samples)
- 2 outside of crater
- 2 beneath arms of crater
- 1 beneath crater

▲ Lab Samples (Total of 5 samples)
- 2 beneath arms or crater
- 2 ends of trench at base of excavation
- 1 beneath crater at base of excavation

# 4.0 PHASE IA CLOSURE FIELD PROGRAM FINDINGS/RESULTS

The purpose of this section is to discuss results from each field activity up to and including visual findings from the 1996 trenching investigation. Analytical results from sampling conducted during the trenching investigation are discussed in Section 5.0.

## 4.1 GEOPHYSICAL SURVEY

Geophysical surveys were conducted in the Closed OB/OD Area during the 1993 field season. No geophysical surveys were conducted in the Current OB/OD Area because wastes and areas of past disposal activities were readily observable on the land surface.

### 4.1.1 *Old Burning Ground and Demolition Landfill Area*

#### 4.1.1.1 *Electromagnetic Conductivity Data*

Figures 4-1 and 4-2 are plan view drawings showing apparent EM conductivity and in-phase contour data collected at the Old Burning Ground and Demolition Landfill Area. The results of the terrain conductivity ranged from -57.5 to 17.54 milliSiemens per meter (mS/m). In-phase data ranged from -30.7 to 7.02 parts per thousand (ppt). Both data sets were characterized by strong anomalies in the southern and southeastern portion of the survey area, near the edge of the arroyo. This area also corresponded to metallic debris protruding from the arroyo walls as observed during previous investigations. These anomalies represented the general extent of buried metal detected during the EM survey. One exception is an anomaly located at station 1300N/250E that was attributed to an isolated buried metal object.

The zone of elevated conductivity (Figure 4-1) along the southwestern border of the survey area was consistent with a bedrock outcrop at the base of the Hogback. The increase in conductivity was attributed to conductive minerals in the rock and was not interpreted as being associated with buried material. Similarly, the increase in the eastern corner of the area was thought to be caused by natural conditions, although exposed bedrock was not observed in this area.

#### 4.1.1.2 *Magnetic Data*

Figures 4-3 and 4-4 are plan view drawings showing total magnetic field and vertical magnetic gradient data collected at the Old Burning Ground and Demolition Landfill Area. The total field ranged from 48,913 to 53,672

gammas. The vertical gradient data ranged from -610.2 to 1093 gammas per meter. These data were generally consistent with the EM data in that they identified an anomalous zone associated with the occurrence of buried metal. Similarly, the anomaly near station 1300N/250E was also observed and was attributed to an isolated buried metal object. The EM anomaly detected in the eastern corner of the area was not evident in the MAG data.

The gradient data (Figure 4-4) identified more anomalous areas than does the total field magnetic data contour map. Because of the scattered nature of these smaller anomalies, it was believed that they might be caused by random areas containing ferromagnetic material. It is possible that these anomalies were caused by cobbles or boulders containing ferromagnetic minerals. This interpretation is consistent with magnetic responses recorded at other survey areas within FWDA.

#### 4.1.1.3 *Ground-Penetrating Radar*

GPR was not used at the Old Burning Ground and Demolition Landfill Area because it was assumed that further clarification of the buried metal objects would not be provided. A GPR survey had been initiated at another area within FWDA where penetration of the signal was found to be insufficient. This was believed to have been caused by a high ferromagnetic mineral content in the site soils. Because the soils at the Old Burning Ground and Demolition Landfill Area were similar to those at the other FWDA study area, similar signal attenuation was expected. In addition, steep slopes in portions of the survey area would have made completion of the GPR survey impractical.

#### 4.1.1.4 *Summary of Geophysical Survey Results – Old Burning Ground and Demolition Landfill Area*

Two geophysical surveys (conductivity and magnetometer) were performed at the Old Burning Ground and Demolition Landfill Area. In the conductivity survey, the zone of elevated conductivity observed along the southern and southeastern border of the survey area was interpreted to be caused by buried materials. The total field (magnetometer) survey confirmed this area of buried metal and identified a magnetic anomaly that was attributed to an isolated buried metal object. The identified anomalies were found to correspond to the approximate delineated boundaries of the Old Burning Ground and Detonation Landfill Area and observed metallic refuse areas within and bordering the arroyo. Three geophysical anomaly areas were identified for further characterization during subsequent phases of the CFP.

### 4.1.2 *Old Demolition Area*

#### 4.1.2.1 *Electromagnetic Conductivity Survey*

Figures 4-5 and 4-6 are plan view drawings showing apparent EM conductivity and in-phase contour data collected at the Old Demolition Area. The apparent conductivity ranged from -1.98 to 13.07 mS/m and the in-phase data ranged from -1.28 to 13.1 ppt. The large blank area in the northwestern portion of the survey area represents the location of a bedrock outcrop with steep slopes where data could not be collected. The halo of elevated conductivity surrounding this portion of the Hogback is seen on both the in-phase and terrain conductivity data. This increase was attributed to conductive minerals in the bedrock and is consistent with the EM response measured at other survey areas within FWDA.

The in-phase data (Figure 4-6) identified two significant areas where buried conductive objects were believed to be present. The first area was located at Station 1950N/200E along the southern edge of the arroyo that marked the northern boundary of the survey area. A conductivity anomaly also was detected over this location. The second area (Station 1700N/200E) was located near the northernmost of three dirt piles noted during previous investigations. This in-phase anomaly did not correlate to an apparent conductivity anomaly and suggested that it may have been caused by one or more buried metal objects.

#### 4.1.2.2 *Magnetic Data*

Because of an instrument malfunction, viable magnetic data were limited to the western portion of the survey area. The area was not re-surveyed because of the limited success achieved using this technique at three other survey sites at FWDA not within the OB/OD Area. The salvageable magnetic field data identified strong anomalies near Station 1900N/150E that were consistent with the in-phase EM anomaly. Similar to interpretations of the magnetic data at other areas within FWDA, the randomly spaced anomalies were attributed to natural subsurface conditions.

#### 4.1.2.3 *Summary of Geophysical Survey Results – Old Demolition Area*

The geophysical survey identified areas where buried metal objects may have been located. This was consistent with the results of the UXO survey of the area. Two geophysical anomalies were identified for further characterization during subsequent phases of the CFP.

## 4.2 *GEOPHYSICAL ANOMALY AND RESIDUE/DEBRIS AREA IDENTIFICATION*

### 4.2.1 *Closed OB/OD Area*

#### 4.2.1.1 *Old Burning Ground and Demolition Landfill Area*

The detailed field mapping effort used the 1993 geophysical survey as the starting point. The estimated boundaries of the three previously identified geophysical anomalies (designated KGA3, KGA4, and KGA5) and three residue/debris pile locations (KP2, KP3, and KP4) were staked in the field and are shown in Figure 4-7. Photographs of residue/debris observed in the Closed Burning Ground and Demolition Landfill Area during the detailed site walkover are included in Appendix B.

The western-most anomaly, KGA3, was located between the Hogback and the arroyo in the western portion of the Old Burning Ground and Demolition Landfill Area. Large metal objects including pieces of a conveyor, catwalk, and high-pressure pipe were visible within and on the banks of the arroyo in the western portion of KGA3. A large number of metal black powder can lids, presumably from cans of powder burned in this area, were also visible on the ground within KGA3. Portions of KGA3 were devoid of vegetation and the ground surface was generally flat and contained charcoal, ash, and scattered metal debris. The northern bank of the arroyo contained areas of metal banding, burn residue, and red-brown explosives stained soil. Much of this material was located on unstable slopes within and adjacent to the arroyo. The orientation of site features in this area suggested that burning operations were conducted on the flat upland areas and residues were then pushed from these areas onto the arroyo bank. This pattern of use was consistent with verbal reports from past facility workers.

The center anomaly, KGA4, appeared to contain waste/debris similar in nature and distribution to that observed at KGA3, except that no powder can lids were observed. Also, areas of metal slag were observed near the top edge and at the bottom of the arroyo. The waste at KGA4 was concentrated along the arroyo with only scattered surface metal visible throughout the majority of KGA4. The distribution of waste materials suggested that activity in this area was concentrated near the arroyo.

The eastern-most anomaly, KGA5, did not appear to contain surface metal that could result in the large anomaly detected. Two buried metal contacts, approximately 2 by 3 feet in size, were detected using a magnetometer. No waste was observed in this area.

Two additional areas along the arroyo that contained visible waste were designated as KP2 and KP3. These areas contained metal banding, metal debris, burn residue, explosives stained soil, and 37 millimeter (mm) shells in unstable walls of the arroyo.

Pile KP4 was located along the right side of the road entering the Old Demolition Area, immediately adjacent to and within the arroyo across from KGA3. The edge of this pile was exposed in the arroyo bank and consisted of black burn residue and metal debris in a wedge above native soils. This material was very unstable and was actively being eroded and transported along the arroyo channel during storm events.

4.2.1.2 *Old Demolition Area*

The estimated boundaries of the two previously identified geophysical anomalies (designated KGA1 and KGA2) and one residue/debris pile locations (KP1) were staked in the field and are shown in Figure 4-7. Photographs of residue/debris observed in the Old Demolition Area during the detailed site walkover are included in Appendix B.

Anomaly KGA1 was located west of the northern-most of the three dirt mounds and extended nearly to the edge of the arroyo. Scattered surface metal was observed throughout the area of the anomaly. Earth moving activities in and adjacent to the arroyo near the northwestern portion of KGA1 were performed in 1995 in support of UXO investigations under the direction of USACE, Huntsville Center. Areas where subsurface soil had been exposed revealed the presence of burned smoke canisters.

The second geophysical anomaly, KGA2, was located immediately adjacent to the arroyo northeast of KGA1. Scattered surface metal was observed throughout the area of the anomaly. Burn residue was observed on portions of the ground surface and on the arroyo banks within the anomaly. An area where ordnance items/shell fragments were previously observed to be eroding out of the lower portion of arroyo bank was located within KGA2. Numerous shells were observed in this location in 1993 and were removed during the UXO survey of this area. During the field mapping effort, the arroyo channel was observed to contain several additional shells, some of which appeared to have been transported during storm events. It appeared that burning of munitions was conducted on the flat areas and residues were then pushed into the arroyo. This pattern of use was consistent with other areas.

In addition, a debris pile was identified during the field mapping effort. KP1 consisted of shells that were eroding out of the bank of a small side arroyo. Numerous shells were observed in this location in 1993 and were

removed during the UXO survey of this area. Several additional shells were observed during the site walkover and subsurface metal contacts were detected with metal detectors.

### 4.2.2 *Current OB/OD Area*

#### 4.2.2.1 *Burning Ground Area*

Previous surveys of the Current OB/OD Area arroyo identified areas of burn residue/debris. During the field mapping effort, several burn residue/debris areas were observed along the east bank of the main arroyo. The type of debris ranged from trash to metallic debris and drums. Significant quantities of burn residue and/or debris were rarely observed within the base (channel) or the west bank of the arroyo. The amount of vegetation and the slope of the channel walls varied along the arroyo. Where the slope was steep, surface runoff had eroded the bank and burn residue/debris was often visible.

As shown in Figure 4-8, the field mapping effort further defined these areas and resulted in the identification of ten areas of residue/debris along the banks and channel of the arroyo that required further characterization. Photographs of the residue/debris piles observed in the Current OB/OD Area during the field mapping effort are included in Appendix A.

The southernmost residue/debris area, CRP1 was identified within a side arroyo off the main arroyo, adjacent to an access road. Metal debris including drums were observed on the ground surface at the closed (southern) end of CRP1. Residue extending to the north was apparent on the surface of the channel and side slopes.

CRP2 was identified as a small circular area of residue, approximately 50 feet in diameter, located along the bank of the main arroyo.

CRP3 was identified as a small oval area approximately 75 feet by 70 feet located within a shallow depression along the upper bank of the main arroyo with residue, metal drums partially filled with burn residue, and other metal debris apparent at its southern end.

CRP4 consisted of burn residue scattered along the side slope of the arroyo and extended to a length of approximately 300 feet. The side slope of the arroyo in this area appeared to be fairly well stabilized and vegetated.

CRP5 was identified as an area of residue and debris covering approximately 250 feet of the arroyo bank. A significant amount of exposed residue/debris was apparent throughout its length. The side slopes of the arroyo were very steep through this area and soil, burn residue, trash, and debris were observed to be eroding from the arroyo bank.

CRP6 was identified as an area of residue and debris scattered over approximately 250 feet of arroyo bank immediately north of CRP5. CRP6 was differentiated because it contained less exposed residue/debris. The side slopes were fairly shallow, stable, and vegetated. An access road crosses the arroyo and separates the northern end of CRP6 from the southern end of CRP7.

CRP7 extended along the arroyo bank north from the access road for approximately 275 feet. The southern portion of the area was characterized by very shallow side slopes with established vegetation. Burn residue lined the top of the arroyo bank along the northern portion with several areas where surface runoff was eroding the side slopes of the arroyo

CRP8 extended approximately 450 feet along the arroyo bank and contained exposed burn residue in patches along the entire length. Several washouts and eroded areas were observed, with recent signs of debris/residue movement into the arroyo.

CRP9 was identified within a side arroyo off the main arroyo, and extended approximately 110 feet before joining the main arroyo. The area contained visible residue along the southern bank of the side arroyo and metallic debris at the closed (eastern) end.

CRP10 was a small mound of burn residue measuring approximately 65 feet by 35 feet and was identified at the northern end of the arroyo, approximately 400 feet north of CRP9. The burn residue was located on a raised area within the arroyo bottom.

#### 4.2.2.2 *Detonation Craters*

As shown in Figure 4-8, the field mapping effort identified twelve detonation craters along both sides of the arroyo. As discussed in Section 2.0, five of the detonation craters were designated for further investigation. Two of these were located on the eastern side arroyo, and three were located on the western side of the arroyo.

## 4.3 *BACKGROUND SOIL CHARACTERIZATION*

Background soil sample locations are shown in Figure 4-9 (Appendix B). Chemical results are summarized and discussed in Section 5.0.

## 4.4 *TRENCHING OPERATIONS*

As discussed in Section 3.4, investigation trenches were excavated through known residue/debris piles and geophysical anomalies. Samples were collected from the trenches to characterize the materials encountered and their impacts on the adjacent soils. Six types of samples were collected during the trenching investigation.

- Field screening samples were grab samples collected from within waste materials or from soils in a trench underneath or laterally beyond the extent of visible waste/debris, to assess potential impacts and to guide further excavation within a trench. These samples were analyzed in the field laboratory using field test kits for explosives (TNT and RDX) and XRF for metals.

- Confirmation or "limit" samples were grab soil samples collected in a trench from soils underneath or laterally beyond the extent of visible waste/debris and beyond impacts based on results of field screening. These samples were sent to analytical laboratories for analysis of explosives, TAL metals, and total phosphorus (Closed OB/OD Area samples only).

- Surface soil samples were grab samples collected in potentially impacted areas from surface soils between or near investigation trenches, or in an area not investigated by trenching. These samples were sent to analytical laboratories for analysis of explosives, TAL metals, and total phosphorus (Closed OB/OD Area samples only).

- Waste composite samples were samples of all the wastes encountered in a given trench, composited together to provide one sample. These samples were sent to analytical laboratories for analysis of explosives, TAL metals, and total phosphorus (Closed OB/OD Area samples only).

- Representative waste samples were grab samples collected from visibly distinct waste types encountered in different areas. These are distinct from the waste composite samples because they are grab samples of one visible waste or residue type. These samples were sent to analytical laboratories for analysis of TCLP explosives and TAL metals, SPLP explosives and TAL metals, TOC, and grain size.

- Representative soil samples were grab samples collected from subsurface soils which were believed to be representative of a given soil type in a given area. These are distinct from the confirmation or "limit" samples only because they were not collected in all investigation trenches, only where necessary to characterize "representative" underlying soils for assessment during closure design activities. These samples were sent to analytical laboratories for analysis of TOC, cation exchange capacity, grain size, and moisture content.

### 4.4.1 *Closed OB/OD*

The Closed Area is located in an alluvial valley, which accumulated sedimentary deposits from the local and surrounding Cretaceous sandstones, siltstones, and shales. The lithology of the alluvial sediments consists predominantly of reworked sand, silt, gravel, some clay and local cobbles in an alluvial valley-fill facies package. The local presence of clay or fine-grained silt creates a hard, blocky texture to the finer-grained sediments. The sediments were typically dry; however, local moisture was present in the courser and deeper sands. Sandstone bedrock was not encountered in any trenches except locally by excavating inside the arroyo. No ground water was encountered in the Closed OB/OD area during the trenching activities.

Investigation trench locations and interpreted locations of visible surface and subsurface residue/debris are shown in Figure 4-10 (Appendix B). Trench logs are included in Appendix C. Sample locations (all samples except field screening samples) are shown in Figure 5-1 (Appendix B). Sample results are summarized and discussed in Section 5.0.

#### 4.4.1.1 *Old Burning Ground and Demolition Landfill Area*

Trenching investigation field observations for the Old Burning Ground and Demolition Landfill Area are summarized in Table 4-1.

*KGA3*

Figure 4-11 shows the approximate extent of the geophysical anomaly, locations of investigation trenches, and areas of subsurface residue/debris.

A total of 14 trenches were excavated in area KGA3. The trenches ranged from 55 to 285 feet in length and from 5 to 20 feet in depth. Widely scattered small sized metal debris was present throughout the KGA3 area on the ground surface and multiple piles of larger metallic waste were

present on the edge of the arroyo bank. Buried waste was encountered as isolated accumulations or thin horizons in 10 of the trenches (Table 4-1). The dimensions of the subsurface waste ranged from 8 to 58 feet in length and from 0 to 8 feet in depth. The estimated volume of visible waste materials present at KGA3 was approximately 2,100 cubic yards.

In area KGA3, a total of 106 field screening samples were collected. Of these screening samples, 53 were also submitted as confirmation samples for laboratory analysis. Twelve waste composite samples were submitted for laboratory analysis. In addition, 11 representative waste samples and three representative soil samples were submitted.

To supplement the subsurface soil samples collected during the trenching investigation, 18 surface soil samples were collected from the ground surface at various locations around the KGA3 area (Figure 4-11). These surface soil samples were analyzed for the same parameters as the confirmation samples.

Trench KGA301 (Appendix C) was 105-feet long, 20-feet deep, and excavated in a southeast to northwest orientation. At the arroyo bank, a single 75 mm projectile, metal can lids, nails and hinges were encountered in a sandy silt matrix from 0 to 45 feet along the trench and at a depth of 1 to 3 feet bgs. From 67 to 81 feet along the trench, metal strapping, fused metallic aluminum or magnesium, nails, screws, and charcoal were encountered at a depth of 0 to 8 feet bgs. A total of 20 field screening samples were collected. In addition, 3 confirmation samples, 2 composite waste samples, and 3 representative waste samples were collected.

Trench KGA302 (Appendix C) was 85-feet long, from 10- to 20-feet deep, and was excavated in a southeast to northwest orientation. Fused and oxidized aluminum, metal banding, ash, charcoal, and some asbestos-like material were encountered in a sandy silt matrix from 17 to 54 feet along the trench and at a depth of 0 to 8 feet bgs. Except for this and scattered surface debris, no other waste was encountered in the trench. A total of nine field screening samples were collected. In addition, three confirmation samples, one composite waste sample, and two representative waste samples were collected.

Trench KGA303 (Appendix C) was 100-feet long, mostly 5-feet deep, a maximum of 13-feet deep, and was excavated in a southeast to northwest orientation. Metal banding, nails, and charcoal were encountered in a sandy silt matrix from 27 to 58 feet along the trench and at a depth of 0 to 2 feet bgs. Except for this and scattered surface debris, no other waste was encountered in the trench. A total of four field screening samples were

collected. In addition, two confirmation samples, one composite waste sample, and one representative waste sample were collected.

Trench KGA304 (Appendix C) was 103-feet long, mostly 5- to 10-feet deep, a maximum of 16-feet deep, and excavated in a southeast to northwest orientation. From the arroyo bank, 75 mm projectiles, metal banding, fuze components, nails, hinges, ash, and charcoal were encountered in a sandy silt matrix from 0 to 21 feet along the trench and at a depth of 0 to 5 feet bgs. From 69 to 83 feet along the trench, 8- to 14-inch long by 3-inches wide pieces of crushed metal pallets, and strongly oxidized silty sand, were encountered at a depth of 2 to 6 feet bgs. A total of 12 field screening samples were collected. In addition, four confirmation samples and one composite waste sample were collected.

Trench KGA305 (Appendix C) was 175-feet long, 5-feet deep, and excavated in a southeast to northwest orientation. From the arroyo bank, a large pile of trash consisting of rusted metal and tree branches was located approximately 35 feet north of trench KGA305. Except for scattered surface debris, no waste was encountered in the trench. A total of two field screening samples and four confirmation samples were collected. One representative waste sample was collected from a debris pile on the arroyo bank approximately 35 feet north of KGA305.

Trench KGA306 (Appendix C) was 110-feet long, mostly 5-feet deep, a maximum of 20-feet deep, and excavated in a southeast to northwest orientation. From the arroyo bank, metal banding, cans, rods, nails, hinges, and charcoal were encountered in a sandy silt matrix from 0 to 21 feet along the trench and at a depth of 0 to 4 feet bgs. At 99 feet along the trench, an 8-foot long, 5-inch diameter dual wall pipe was encountered at a depth of 6 inches bgs. A total of 11 field screening samples were collected. In addition, four confirmation samples and one composite waste sample were collected.

Trench KGA307 (Appendix C) was 100-feet long, mostly 5-feet deep, a maximum of 20-feet deep, and excavated in a southeast to northwest orientation. from the arroyo bank, metal banding, nails, hinges, and charcoal were encountered in a sandy silt matrix from 0 to 55 feet along the trench and at a depth of 0 to 3 feet bgs. Except for this and scattered surface debris, no other waste was encountered in the trench. A total of 11 field screening samples were collected. In addition, three confirmation samples, and one composite waste sample were collected.

Trench KGA308 (Appendix C) was 285-feet long, mostly 5-feet deep, a maximum of 20-feet deep, and excavated in a southeast to northwest

orientation. From the arroyo bank, rusted metal banding, rods, nails, hinges, and charcoal were encountered in a sandy silt matrix from 0 to 30 feet along the trench and at a depth of 0 to 3 feet bgs. From 90 to 101 feet along the trench, dull-white fused metallic aluminum or magnesium, charcoal, and asbestos-looking material were encountered at a depth of zero to three feet bgs. From 104 to 118 feet along the trench, large pieces (up to 6-feet long and 2-feet wide) of rusted metal, including I-beams, sheet metal, and pipes in a sandy silt matrix were encountered a depth of 0 to 5 feet bgs. From 190 to 226 feet along the trench, pieces of wood and disseminated charcoal in a sandy matrix were encountered at a depth of zero to two feet bgs. A total of 24 field screening samples were collected. In addition, eight confirmation samples, three composite waste samples, and one representative waste sample were collected.

Trench KGA309 (Appendix C) was 55-feet long, from 5- to 6-feet deep, and excavated in a southeast to northwest orientation. Except for scattered surface debris, no waste was encountered in the trench. A total of two field screening samples were collected. In addition, two confirmation samples were collected.

Trench KGA310 (Appendix C) was 230-feet long, mostly 5-feet deep, a maximum of 20-feet deep, and excavated in a south to north orientation. From the arroyo bank, 6-foot diameter rusted metal tanks, cans, pipes, charcoal, and scattered rust were encountered in a sandy silt matrix from 0 to 14 feet along the trench and at a depth of 0 to 4 feet bgs. From 53 to 61 feet along the trench, concrete blocks, metal banding, and rebar were encountered in a sandy silt matrix at a depth of 0 to 4 feet bgs. From 134 to 161 feet along the trench, pieces of wood and scattered charcoal were encountered in a sandy matrix at a depth of 0 to 4 feet bgs. A total of two field screening samples were collected. In addition, seven confirmation samples and three representative soil samples were collected.

Trench KGA311 (Appendix C) was 260-feet long, 5-feet deep, and excavated in a southwest to northeast orientation. The trench was installed approximately perpendicular to trenches KGA305, 306, 307, 308, and 312. From the arroyo bank, rusted nails, hinges, banding, can lids, and charcoal were encountered in a sandy silt matrix from 0 to 27 feet along the trench and at a depth of 0 to 1 foot bgs. From 101 to 146 feet along the trench, three discarded washout tanks (15.5 by 5.5 by 3.7 feet) and associated piping were encountered in a sandy matrix at a depth of 0 to 5 feet bgs. The washout tanks and piping were removed and staged for subsequent disposal. From 244 to 254 feet along the trench, metal can lids, hinges, nails, and charcoal were encountered in a sandy matrix at a depth of 0 to 4 feet bgs. A total of two field screening samples were collected. In

addition, four confirmation samples, one waste composite sample and one representative waste samples were collected.

Trench KGA312 (Appendix C) was 82-feet long, 5-feet deep, and excavated in a southeast to northwest orientation. Except for scattered surface debris, no waste was encountered in the trench. A total of two field screening samples were collected. In addition, two confirmation samples were collected.

Trench KGA313 (Appendix C) was 90-feet long, 5-feet deep, and excavated in a southeast to northwest orientation. Except for scattered surface debris, no waste was encountered in the trench. A total of two field screening samples were collected. In addition, two confirmation samples were collected.

Trench KGA314 (Appendix C) was 245-feet long, mostly 5-feet deep, a maximum of 20-feet deep, and excavated in a southeast to northwest orientation. From the arroyo bank, rusted metal cans, nails, hinges, and charcoal were encountered in a sandy silt matrix from 0 to 11 feet along the trench and at a depth of 0 to 1 feet bgs. From 70 to 81 feet along the trench, rusted metal banding, nails, hinges, and charcoal were encountered in a sandy silt matrix at a depth of 0 to 4 feet bgs. A total of three field screening samples were collected. In addition, five confirmation samples, one waste composite sample, and two representative waste samples were collected.

***KGA4***

Figure 4-12 shows the approximate extent of the geophysical anomaly, locations of investigation trenches, and areas of subsurface residue/debris.

A total of eight trenches were excavated in area KGA4. The trenches ranged from 15 to 160 feet in length and from 5 to 21 feet in depth. Widely scattered small metal debris was present throughout the KGA4 area on the ground surface and waste piles were locally present on the edge of the arroyo bank. Subsurface waste was encountered in six of the trenches (Table 4-1). The dimensions of the subsurface waste ranged from 12 to 79 feet in length and from 0 to 8 feet in depth. The estimated volume of visible waste materials at KGA4 was approximately 750 cubic yards.

In area KGA4, a total of 44 screening samples were collected. Twenty-nine were submitted as confirmation samples for laboratory analysis. Six waste composite samples were also submitted. In addition, three

representative waste samples and three representative soil samples were submitted.

To supplement the subsurface soil samples collected during the trenching investigation, five surface soil samples were collected from the ground surface at various locations around the KGA4 area (Figure 4-12). These surface soil samples were analyzed for the same parameters as the confirmation samples).

Trench KGA401 (Appendix C) was 160-feet long, from 5- to 17-feet deep, and excavated in an east to west orientation. From the arroyo bank, metal banding, ordnance fragments, fuze components, slag, ash, and charcoal were encountered in a sandy silt matrix from 0 to 14 feet along the trench and at a depth of 0 to 2 feet bgs. Except for this waste and scattered surface debris, no other waste was encountered in the trench. A total of 13 field screening samples were collected. In addition, four confirmation samples, one composite waste sample, and one representative waste sample were collected.

Trench KGA402 (Appendix C) was 100-feet long, mostly 5-feet deep, a maximum of 10-feet deep, and excavated in a southeast to northwest orientation. From 16 to 95 feet along the trench, a laterally extensive charcoal and sandy silt horizon was encountered at a depth of 1 to 2 feet bgs. Except for this horizon and scattered surface debris, no other waste was encountered in the trench. A total of five field screening samples were collected. In addition, six confirmation samples and one composite waste sample were collected.

Trench KGA403 (Appendix C) was 42-feet long, from 5- to 16-feet deep, and excavated in a southeast to northwest orientation. Except for scattered surface debris, no waste was encountered in the trench. A total of six field screening samples were collected. In addition, four confirmation samples were collected.

Trench KGA404 (Appendix C) was 30-feet long, 5-feet deep, and excavated in a southeast to northwest orientation. From 4 to 19 feet along the trench, thin dull white seams of residue-like material were encountered in blocky silt at a depth of 1 to 2 feet bgs. Except for scattered surface debris and the residue, no other waste was encountered in the trench. A total of five field screening samples were collected. In addition, five confirmation samples and one composite waste sample were collected.

Trench KGA406 (Appendix C) was 55-feet long, 5- to 6-feet deep, and

excavated in a southeast to northwest orientation. From the arroyo bank, rusted metal cans, nails, hinges, and charcoal were encountered in a silt matrix from 1 to 28 feet along the trench and at a depth of 0 to 2 feet bgs. Except for the arroyo bank waste and scattered surface debris, no other waste was encountered in the trench. A total of six field screening samples were collected. In addition, three confirmation samples and one composite waste sample were collected.

Trench KGA409 (Appendix C) was 65-feet long, 6- to 10-feet deep, and excavated in a southeast to northwest orientation. From the arroyo bank, oxidized metal scrap and charcoal were encountered in a silt matrix from 0 to 24 feet along the trench and at a depth of 0 to 10 feet bgs. Except for the arroyo bank waste and scattered surface debris, no other waste was encountered in the trench. A total of four field screening samples were collected. In addition, three confirmation samples, one composite waste sample, and one representative waste sample were collected.

Trench KGA410 (Appendix C) was 100-feet long, mostly 5-feet deep, a maximum of 21-feet deep, and excavated in a southwest to northeast orientation. From 6 to 18 feet along the trench, oxidized metal scrap, incinerated fuze components, and ash were encountered in a sandy silt matrix from 0 to 10 feet bgs. The only other waste encountered in the trench was widely scattered surface debris. A total of four field screening samples were collected. In addition, three confirmation samples, one composite waste sample, one representative waste sample, and two representative soil samples were collected.

Trench KGA411 (Appendix C) was 15-feet long, 5-feet deep, and excavated in a southeast to northwest orientation. Except for scattered surface debris, no waste was encountered in the trench. A confirmation sample and a representative soil sample were collected.

*KGA5*

Figure 4-12 shows the approximate extent of the geophysical anomaly, locations of investigation trenches, and areas of subsurface residue/debris.

A total of two trenches were excavated in area KGA5. The trenches were 54 and 45 feet in length, 8 and 17 feet in depth, and intersected at a 90-degree angle. Widely scattered small metal debris was present throughout the KGA5 area on the ground surface. Both trenches encountered the same subsurface waste (Table 4-1). The subsurface waste was 4 by 14 feet in lateral dimension at a depth of 1 to 2 feet bgs. The

estimated volume of visible waste materials at KGA5 was approximately 10 cubic yards.

In area KGA5, a total of ten screening samples were collected. Of these screening samples, four were also submitted as confirmation samples for laboratory analysis. One waste composite sample and two representative soil samples were submitted.

Trench KGA501 (Appendix C) was 54-feet long, 4- to 5-feet deep, and excavated in a northeast to southwest orientation. From 29 to 39 feet along the trench, metal scrap, nails, clay bricks, burn residue, and ash were encountered in a silt matrix at a depth of 1 to 2 feet bgs. Except for this waste and scattered surface debris, no other waste was encountered in the trench. A total of two field screening samples were collected. In addition, two confirmation samples and one composite waste sample were collected.

Trench KGA502 (Appendix C) was 45-feet long, 8- to 17-feet deep, and excavated in a southeast to northwest orientation. From 23 to 27 feet along the trench metal scrap, nails, clay bricks, burn residue, and ash were encountered in a silt matrix at a depth of 1 to 2 feet bgs. This was the same waste encountered at 29 to 39 feet in trench KGA501. Except for this waste and scattered surface debris, no other waste was encountered in the trench. A total of eight field screening samples were collected. In addition, two confirmation samples, and two representative soil samples were collected.

*KP2*

Figure 4-13 shows the approximate extent of the residue/debris pile, locations of investigation trenches, and areas of surface or subsurface residue/debris.

A total of four trenches were excavated in area KP2. The trenches ranged from 47 to 159 feet in length and from five to 20 feet in depth. Widely scattered small debris was present throughout the KP2 area on the ground surface and waste piles were present on the edge of the adjacent arroyo. Subsurface waste was encountered as thin near-surface horizons in two of the trenches (Table 4-1). The dimensions of the waste encountered ranged from 17 to 42 feet in length and from 0 to 1 foot in depth. The estimated volume of visible waste materials at KP2 was approximately 125 cubic yards.

In area KP2, a total of 34 screening samples were collected. Of these screening samples, 11 were also submitted as confirmation samples for

laboratory analysis. Three waste composite samples were also submitted. In addition, three representative waste samples were submitted.

To supplement the subsurface soil samples collected during the trenching investigation, three surface soil samples were collected from the ground surface at various locations around the KP2 area (Figure 4-13). These surface soil samples were analyzed for the same parameters as the confirmation samples.

Trench KP201 (Appendix C) was 47-feet long, mostly 3-feet deep, a maximum of 8-feet deep, and excavated in a southeast to northwest orientation. From 4 to 21 feet along the trench, metal banding and a few ordnance fragments were encountered in dark red oxidized silt from 0 to 1 feet bgs. The only other waste encountered in the trench was widely scattered surface debris. A total of three field screening samples were collected. In addition, two confirmation samples, one composite waste sample, and one representative waste sample were collected.

Trench KP203 (Appendix C) was 159-feet long, 18- to 20-feet deep, and excavated in a southeast to northwest orientation. Except for scattered metal banding and local red-brown stain on the ground surface, no other waste was encountered in the trench. A total of 15 field screening samples were collected. In addition, four confirmation samples, one waste composite sample, and one representative waste sample were collected.

Trench KP204 (Appendix C) was 52-feet long, mostly 7-feet deep, a maximum of 11-feet deep, and excavated in a southeast to northwest orientation. From the arroyo bank, some metal banding and ordnance fragments were encountered in dark red oxidized silt from 0 to 42 feet along the trench and at a depth of 0 to 1 feet bgs. Except for the arroyo-bank waste and scattered surface debris, no other waste was encountered in the trench. A total of 10 field screening samples were collected. In addition, two confirmation samples and one representative waste sample were collected.

Trench KP205 (Appendix C) was 63-feet long, 4- to 5-feet deep, and excavated in a southeast to northwest orientation. Except for scattered metal banding and local red-brown stain on the ground surface, no other waste was encountered in the trench. A total of six field screening samples were collected. In addition, three confirmation samples and one waste composite sample were collected.

*KP3*

Figure 4-13 shows the approximate extent of the residue/debris pile, locations of investigation trenches, and areas of surface or subsurface residue/debris.

A total of three trenches and five test pits were excavated in area KP3. The trenches ranged from 18 to 218 feet in length and from two to 20 feet in depth. Widely scattered small debris was present throughout the KP3 area on the ground surface, and a pile of debris was encountered on the arroyo bank face. No subsurface waste was encountered in the trenches or test pits (Table 4-1). The estimated volume of visible waste materials at KP3 was approximately 90 cubic yards.

In area KP3, a total of 32 screening samples were collected. Of these screening samples, ten were also submitted as confirmation samples for laboratory analysis. In addition, one representative soil sample was submitted.

To supplement the subsurface soil samples collected during the trenching investigation, two surface soil samples were collected from the ground surface at various locations around the KP3 area (Figure 4-13). These surface soil samples were analyzed for the same parameters as the confirmation samples.

Trench KP301 (Appendix C) was 218-feet long, 17- to 20-feet deep, and excavated in a southeast to northwest orientation. Except for scattered debris on the ground surface, no other waste was encountered in the trench. A total of 22 field screening samples were collected. In addition, six confirmation samples and one representative soil sample were collected.

Trench KP302 (Appendix C) was 50-feet long, 12- to 18-feet deep, and excavated in a southeast to northwest orientation. Except for scattered debris on the ground surface, no other waste was encountered in the trench. A total of eight field screening samples were collected. In addition, two confirmation samples were collected.

Trench KP303 (Appendix C) was 18-feet long, 2-feet deep, and excavated in a southeast to northwest orientation. Except for scattered debris on the ground surface, no other waste was encountered in the trench. However, to verify the absence of waste, two confirmation samples were collected.

Test pits KP3TP01 through KP3TP05 (Appendix C) were excavated as a non-continuous northwest extension of trench KP301 to confirm the

absence of waste in open, apparently non-impacted areas adjacent to the known disposal area. The test pits were from 22 to 26 feet in length and from 16 to 21 feet deep. No waste was encountered in any of the test pits. Two field screening samples were collected from test pit KP3TP01. No other field screening samples, nor other samples, were collected from the test pits.

*KP4*

Figure 4-13a shows the approximate extent of the residue/debris pile, locations of investigation trenches, and areas of surface or subsurface residue/debris.

Area KP4 contained a pile of waste estimated to be 30 by 50 feet in lateral dimension and up to 8 feet deep. The waste was bisected by and overhanging the steep southeast bank of the arroyo; the waste was a likely source of debris scattered downstream along the arroyo bottom. A total of two trenches were excavated and a cross-sectional profile of the arroyo was studied to determine the dimensions of the waste (Table 4-1). As a corrective best management practice, the waste was pulled back from the arroyo bank, staged on plastic and stabilized with erosion control measures. The estimated volume of visible waste materials at KP4 was approximately 400 cubic yards.

In area KP4, a total of three screening samples were collected. Of these screening samples, three were also submitted as confirmation samples for laboratory analysis. One waste composite sample was also submitted. In addition, one representative waste sample was submitted.

Trench KP401 (Appendix C) was 25-feet long, 20-feet deep, and excavated in a northwest to southeast orientation approximately 10 feet north of the waste. Except for scattered debris on the ground surface, no other waste was encountered in the trench. A total of two field screening samples were collected. In addition, one confirmation sample was collected.

Trench KP402 (Appendix C) was 10-feet long, 2-feet deep, and excavated in a west to east orientation approximately 5 feet south of the waste. Except for scattered debris on the ground surface, no other waste was encountered in the trench. A field screening sample was collected. In addition, one confirmation sample was collected.

The steep southeast bank of the arroyo was designated KP4AP for "arroyo profile" (Appendix C). The profile is oriented approximately perpendicular to trenches KP401 and KP402. The profile is 60 feet long and up to 15 feet deep. As sketched on the profile, the waste extends from

5 to 55 feet along the bank and from 0 to 8 feet bgs. The waste consisted of tightly packed rusted metal cans, cardboard tubes, fused aluminum, burn residue, fuze components, ammunition boxes, charcoal, hinges, nails, metal bars, and wire rope. Ordnance was not evident. A total of three field screening samples were collected. In addition, one confirmation sample, one waste composite sample, and one representative waste sample were collected.

***Explosives Stained Areas***

During site reconnaissance in 1996, three areas of explosives stained surface soils were observed in a vegetated area west of the access road to the Closed Burning Ground and Demolition Landfill Area (Figure 4-10, Appendix B). These explosives stained areas were small, less than 100 square feet each, and exhibited red brown staining characteristic of TNT in an area without vegetation. Samples were collected from 1 foot and 2 feet below the surface in the center of each stained area. These samples were submitted to analytical laboratories for analysis of explosives and TAL metals.

4.4.1.2 *Old Demolition Area*

Trenching investigation field observations for the Old Demolition Area are summarized in Table 4-2.

***KGA1***

Figure 4-14 shows the approximate extent of the geophysical anomaly, locations of investigation trenches, and areas of subsurface residue/debris.

A total of five trenches and one test pit were excavated in area KGA1. The trenches ranged from 45 to 200 feet in length and from 5 to 20 feet in depth. Small debris such as nails, metal cans, and rusted metal shells (up to 20 mm in diameter) were widely scattered throughout the KGA1 area on the ground surface. Subsurface waste was encountered in one of the trenches and in the test pit (Table 4-2). The estimated volume of visible waste materials at KGA1 was approximately 140 cubic yards.

In area KGA1, a total of 49 screening samples were collected. Of these screening samples, 17 were also submitted as confirmation samples for laboratory analysis. Two composite waste samples were also submitted. In addition, two representative waste samples and five representative soil samples were submitted.

Trench KGA101 (Appendix C) was 100-feet long, mostly 5 feet deep, a maximum of 13-feet deep, and excavated in a southeast to northwest orientation. Except for scattered surface debris, no waste was encountered in the trench. A total of nine field screening samples were collected. In addition, four confirmation samples and two representative soil samples were collected.

Trench KGA102 (Appendix C) was 60-feet long, mostly 5-feet deep, a maximum of 8-feet deep, and excavated in a southeast to northwest orientation. Except for scattered surface debris, no waste was encountered in the trench. A total of four field screening samples were collected. In addition, one confirmation sample and one representative soil sample were collected.

Trench KGA103 (Appendix C) was 200-feet long, mostly 5-feet deep, a maximum of 20-feet deep, and excavated in a northwest to southeast orientation. Except for scattered surface debris, no waste was encountered in the trench. A total of 17 field screening samples were collected. In addition, five confirmation samples and one representative soil sample were collected.

Trench KGA104 (Appendix C) was 171-feet long, mostly 5-feet deep, a maximum of 20-feet deep, and excavated in a northwest to southeast orientation. Smoke and flare ejectors and a few rusted 75 mm projectiles were encountered in a silt matrix from 19 to 32 feet along the trench at a depth of 0 to 4 feet below the ground surface (bgs). From 49 to 70 feet along the trench, rusted fuze components, nails, and hinges were encountered in silt matrix as a thin surface horizon at a depth of 0 to 1 feet bgs. A total of 17 field screening samples were collected. In addition, six confirmation samples, two composite waste samples, two representative waste samples, and one representative soil sample were collected.

Trench KGA105 (Appendix C) was 45-feet long, 5-feet deep, and excavated in a southeast to northwest orientation. Except for scattered surface debris, no waste was encountered in the trench. A total of two field screening samples were collected. In addition, one confirmation sample was collected.

Because waste encountered in trench KGA104 was not encountered in trench KGA103, Test pit KGA1TP01 was excavated perpendicular to trench KGA103 to define the southwestern extent of waste encountered in KGA104. Test pit KGA1TP01 (Appendix C) was 25-feet long, 4- to 5-feet deep, and excavated in a southwest to northeast orientation. The interpreted extent of the waste pocket is shown in Figure 4-14. This

corresponds to the southwestern end of a visible surface depression, likely from a former disposal trench. No field screening or confirmation samples were collected.

*KGA2*

Figure 4-14 shows the approximate extent of the geophysical anomaly, locations of investigation trenches, and areas of subsurface residue/debris.

A total of six trenches and one test pit were excavated in area KGA2. The trenches ranged from 35 to 120 feet in length and from 5 to 20 feet in depth. Widely scattered small debris was present throughout the KGA2 area on the ground surface and one waste pile was present as a bench immediately above the bottom of the adjacent arroyo. Subsurface waste was encountered in four of the trenches (Table 4-2). The dimensions of the buried waste ranged from 5 to 16 feet in length and from 0 to 6 feet in depth. The estimated volume of visible waste materials at KGA2 was approximately 350 cubic yards.

In area KGA2, a total of 55 screening samples were collected. Of these screening samples, 22 were also submitted as confirmation samples for laboratory analysis. Three waste composite samples were also submitted. In addition, three representative waste samples and five representative soil samples were submitted.

Trench KGA201 (Appendix C) was 105-feet long, mostly 5-feet deep, a maximum of 20-feet deep, and excavated in a northwest to southeast orientation. A concentrated accumulation of rusted 75 and 90 mm projectiles, smoke and flare ejectors, nails and hinges were encountered in a silt matrix from 71 to 86 feet along the trench at a depth of 1 to 5 feet bgs. This was the same type of buried waste as encountered at 19 to 32 feet in KGA104 and test pit KGA1TP01. Except for the buried waste from 71 to 86 feet and scattered surface debris, no other waste was encountered in trench KGA201. A total of 12 field screening samples were collected. In addition, five confirmation samples, one composite waste sample, one representative waste sample, and two representative soil samples were collected.

Trench KGA202 (Appendix C) was 120-feet long, mostly 5-feet deep, a maximum of 20-feet deep, and excavated in a northwest to southeast orientation. Some 40, 75 and 90 mm projectiles, smoke and flare candles, nails and hinges were encountered in a sandy silt matrix from 70 to 84 feet along the trench at a depth of 0 to 6 feet bgs. This was the same type of

waste as encountered in trenches KGA201 and KGA104, and test pit KGA1TP01. Except for the buried waste from 70 to 84 feet and scattered surface debris, no other waste was encountered in the trench. A total of 12 field screening samples were collected. In addition, four confirmation samples, one composite waste sample, one representative waste sample, and one representative soil sample were collected.

Trench KGA203 (Appendix C) was 100-feet long, mostly 5-feet deep, a maximum of 20-feet deep, and excavated in a northwest to southeast orientation. Except for a thin veneer of surface debris consisting of scattered nails, hinges, and can lids from 36 to 65 feet along the trench length, no other waste was encountered. A total of eight field screening samples were collected. In addition, three confirmation samples were collected.

Trench KGA204 (Appendix C) was 48-feet long, mostly 5-feet deep, a maximum of 20-feet deep, and excavated in a northwest to southeast orientation. A few rusted mortar casings were encountered in a sandy silt matrix from 47 to 61 feet along the trench at a depth of 0 to 2 feet bgs. Except for this waste and scattered surface debris, no other waste was encountered in the trench. A total of 12 field screening samples were collected. In addition, six confirmation samples and one representative soil sample were collected.

Trench KGA205 (Appendix C) was 48-feet long, mostly 5-feet deep, a maximum of 20-feet deep, and excavated in a northwest to southeast orientation. Except for scattered surface debris, no waste was encountered in the trench. A total of five field screening samples were collected. In addition, three confirmation samples were collected.

Trench KGA206 (Appendix C) was 35-feet long, a maximum of 20-feet deep over the arroyo bank, and oriented from northwest to southeast. It was designed to evaluate a 15 by 30 foot unnatural-looking bench approximately 5 feet above the arroyo. At the maximum reach of the excavator, 90 and 155 mm projectiles and metal rods were encountered at the uphill extent of the bench. Upon manual excavation in the center of the bench, more rusted projectiles and metal rods were exposed. A total of two field screening samples were collected. In addition, one confirmation samples, one composite waste sample, one representative waste sample, and one representative soil sample were collected.

Test pit KGA2TP01 (Appendix C) was excavated approximately perpendicular to trench KGA202 to define the northeastern extent of the buried waste in the former disposal trench and encountered in trenches

KGA201, KGA202, KGA104, and test pit KGA1TP01. Test pit KGA2TP01 was 30-feet long, 4- to 5-feet deep, and excavated in a southwest to northeast orientation. The southwestern extent of the waste encountered in trenches KGA201, KGA202, KGA104, and test pit KGA1TP01 is 58 feet northeast of trench KGA202 and 14 feet southwest of trench KGA203 (Figure 4-14). This corresponds to the northeastern end of the former disposal trench. Because it was a test pit, no field screening or confirmation samples were collected.

*KP1*

Figure 4-15 shows the approximate extent of the residue/debris pile, locations of investigation trenches, and areas of surface or subsurface residue/debris.

A total of three trenches were excavated in area KP1. The trenches ranged from 35 to 40 feet in length and from 15 to 16 feet in depth. Surface waste consisted of a few rusted 105 mm experimental mortar rounds that had been staged along the road during the geophysical survey. Subsurface waste consisted of a concentrated accumulation of buried mortar rounds encountered in two of the three trenches (Table 4-2). The buried waste was estimated to be 15 by 30 feet in lateral extent and ranged from 0 to 8 feet in depth. The estimated volume of visible waste materials at KP1 was approximately 150 cubic yards.

In area KP1, a total of 13 screening samples were collected. Of these screening samples, nine were also submitted as confirmation samples for laboratory analysis. One waste composite sample was also submitted. In addition, one representative waste sample and three representative soil samples were submitted

Trench KP101 (Appendix C) was 39-feet long, 16-feet deep, and excavated in a northeast to southwest orientation. A few 105 mm mortar rounds in a silt matrix were encountered. A total of five field screening samples were collected. In addition, four confirmation samples and one representative soil sample were collected.

Trench KP102 (Appendix C) was 40-feet long, 15-feet deep, and excavated in a northeast to southwest orientation. Approximately 250 mortar rounds (105 mm) were encountered in a sandy silt matrix from 2 to 17 feet along the trench at a depth of 1 to 6 feet bgs. A total of four field screening samples were collected. In addition, three confirmation samples, one waste composite sample, one representative waste sample, and one representative soil sample were collected.

Trench KP103 (Appendix C) was 35-feet long, 15-feet deep, and excavated in a northeast to southwest orientation. Trench KP103 was excavated 30 feet downgradient from trench KP102; subsurface waste was not encountered in trench KP103. A total of four field screening samples were collected. In addition, two confirmation samples and one representative soil sample were collected.

*Mound Area Excavations*

Three earthen mounds observed in the Old Demolition Area (Figure 4-10, Appendix B) were investigated during the 1993 field season. These mounds reportedly contained residue from treatment of munitions containing white phosphorus. Exploratory trenches were excavated in and between each of the mounds. Detailed descriptions of these trenches were not recorded. The mounds appeared to contain only soil; no evidence of white phosphorus munitions was observed. The areas between the mounds contained scattered metal debris consisting mostly of smoke canisters that appeared to have been burned. Debris was encountered at a depth of 1 to 2 feet below ground surface (bgs). The estimated volume of visible debris buried between the mounds is 550 cubic yards.

4.4.1.3 *Closed OB/OD Area Summary*

The wastes encountered during the Closed OB/OD trenching investigation were typically identified as military and industrial solid wastes generated during the operation and maintenance of FWDA. Isolated accumulations of buried waste including demilitarized munitions were exposed and identified. Except for the ordnance itemized below, the solid wastes consist primarily of many types of rusted metal including containers (cans to drums), banding, pallets, pipes, and rods. The largest accumulations of solid waste occur along the arroyo bank as multiple piles of up to 10- by 20-feet in size. In addition, remnants of the former washout facility including three very large rusted metal washout tanks and associated piping were excavated in the center of the southern end of the largest disposal area (KGA3).

Accumulations of smaller sized waste were also dumped on and over the arroyo bank, and occur as isolated subsurface pockets throughout the area. The subsurface waste typically consists of scattered to concentrated accumulations of nails, hinges, banding, crushed and broken pallets, smoke and flare ejectors, wood, burn residue including ash and charcoal. Scattered charcoal is ubiquitous across the disposal sites. Some of the 5-gallon size metal containers exposed in the subsurface contained

variegated ash as the remains of incinerated contents.

The accumulations of small sized waste were incorporated into the arroyo bank and upper subsurface of the alluvial valley fill by mechanical spreading and covering with native alluvial material; the subsurface wastes are typically supported by a matrix of native alluvial silt and sand. The growth of indigenous vegetation and development of a surface soil horizon facilitated the burial process. Small sized waste material such as nails, can lids, small ordnance items, charcoal and ash, are scattered but ubiquitous across the disposal areas. In addition, the trenching and associated backfilling conducted during the Closed OB/OD subsurface investigation exacerbated the distribution of small sized waste material.

Unusual materials identified in the Closed OB/OD subsurface investigation include the following:

- Multi-sized ordnance (40, 75, 90, 155 mm) buried at the former disposal trench and inside the arroyo in KGA1 and KGA2;
- 105 mm ordnance buried at KP1, and
- Former washout facility equipment (tanks, piping) buried at KGA3.

Interpreted boundaries of waste materials observed during the trenching investigation are shown on Figure 4-10, Appendix B. A summary of the wastes encountered by area is included in Table 4-3. The estimated total volume of visible waste based on the trenching investigation in the Closed OB/OD Area is 3,975 cubic yards.

### 4.4.2 *Current OB/OD Area*

The Current OB/OD Area is located on the eastern flank of the Hogback that parallels the western boundary of the installation. The Hogback is the surface expression of a deep crustal uplift, centered along the channel of the main arroyo in the Current OB/OD Area, which deformed the formerly flat lying sedimentary rocks into the westward dipping rocks of the Hogback. Along the eastern side of the Current OB/OD Area, the bedrock remains essentially flat-lying, with a dip to the north of approximately 5 to 10 degrees. All of the Current OB/OD Area lies in a fault valley between the Hogback to the west and the flat-lying rocks to the east. The subsurface of the area is characterized by substantial block faulting and is deeply weathered. The subsurface materials are predominately shales and sandstones that have undergone significant mechanical alteration associated with the regional uplift. Ground water

was encountered during the trenching activities in the bottom of the main arroyo, although the occurrence was spatially discontinuous.

Investigation trench locations and interpreted locations of visible surface and subsurface residue/debris are shown in Figure 4-16 (Appendix B). Trench logs are included in Appendix C. Sample locations (all samples except field screening samples) are shown in Figure 5-2 (Appendix B). Sample results are summarized and discussed in Section 5.0.

4.4.2.1 *Burning Ground Area*

Trenching investigation field observations for the Burning Ground Area are summarized in Table 4-4.

*CRP1*

Figure 4-17 shows the approximate extent of the residue/debris pile, locations of investigation trenches, and areas of surface or subsurface residue/debris.

A total of four trenches and two test pits were excavated in area CRP1. The trenches ranged from 20 to 190 feet in length and from 5 to 13 feet in depth. Rusted metal drums of burn residue (solids only, no liquids) and other metal debris were visible on the surface. An area of explosives stained soil was observed on the surface of the east bank. Subsurface waste including additional metal drums of burn residue, ash, and other metal and wood debris was encountered in two of the four trenches and in the eastern end of one of the test pits (Table 4-4). Areas of subsurface explosives staining were encountered in the two trenches without other debris/waste. The area of surface and subsurface waste was estimated to be approximately 140 feet long by 30 feet wide, and appeared to be the result of dumping onto the east bank of the side arroyo. The estimated volume of visible waste materials at CRP1 was approximately 500 cubic yards.

In area CRP1, a total of 22 field screening samples were collected. Of these screening samples, eight were also submitted as confirmation samples for laboratory analysis. Two waste composite samples, one representative waste sample and one representative soil sample were submitted.

Trench CRP101 (Appendix C) was 190-feet long, mostly 7 feet deep, with a maximum depth of 11 feet, and was excavated in a southeast to northwest orientation. The waste consisted of empty fuze cans, metal banding, ash, burn residue (mostly contained inside 40-gallon metal drums), and other metal and wood debris were encountered in a sandy silt matrix from 10 to

140 feet along the trench and at a depth of up to 6 feet bgs. A total of 11 field screening samples were collected. In addition, four confirmation samples, one composite waste sample, and one representative waste sample were collected.

Trench CRP102 was 28-feet long, mostly 5-feet deep, with a maximum depth of 13 feet, and was excavated in an east to west orientation. Explosives stained soil was encountered in a clayey silt matrix from 15 to 28 feet along the trench and at a depth of 0 to 3 feet bgs. No other waste was encountered in this trench. A total of four field screening samples were collected. In addition, two confirmation samples and one composite waste sample were collected.

Trench CRP103 (Appendix C) was 20-feet long, 13-feet deep, and was excavated in an east to west orientation. Metal banding, wire, ash, and burn residue (mostly contained inside 40-gallon metal drums) were encountered in a sandy silt matrix from 5 to 20 feet along the trench and at a depth of 0 to 4 feet bgs. A total of three field screening samples were collected. One confirmation sample was collected. Because the waste was identical to that encountered in the southeast end of trench CRP101, no waste samples were collected.

Trench CRP104 (Appendix C) was 34-feet long, 12-feet deep, and was excavated in a north to south orientation. Explosives stained soil was encountered in a clayey silt matrix from 15 to 30 feet along the trench and at a depth of 0 to 4 feet bgs. A total of four field screening samples were collected. In addition, one confirmation sample and one representative soil sample were collected. Because the waste was identical to that encountered in trench CRP102, no waste samples were collected.

Test pits CRP01TP1 and CRP101TP2 (Appendix C) were excavated in the bank on the west side of the side arroyo to determine how far waste encountered in trench CRP101 extended to the west. The test pits were approximately 10 feet long and were approximately 6 feet deep. Waste was encountered in test pit CRP1TP1 at the eastern end, adjacent to trench CRP101, and was made up of the same waste seen in CRP101. No waste was encountered in test pit CRP1TP2 that extended to within 1 foot of trench CRP101. No samples were collected from the test pits.

*CRP2*

Figure 4-17 shows the approximate extent of the residue/debris pile, locations of investigation trenches, and areas of surface or subsurface residue/debris.

A total of two trenches and one test pit were excavated in area CRP2. The trenches ranged from 65 to 95 feet in length and from 6 to 10 feet in depth. Rusted pieces of fuzes and other metal debris were visible on the surface. Subsurface waste including additional rusted fuzes, burn residue, and pockets of oxidation was encountered in both trenches (Table 4-4). The area of surface and subsurface waste was estimated to be approximately 50 feet long by 40 feet wide, and appeared to be the result of dumping. The estimated volume of visible waste materials at CRP2 was approximately 250 cubic yards.

In area CRP2, a total of eleven field screening samples were collected. Of these screening samples, three were also submitted as confirmation samples for laboratory analysis. One waste composite sample, one representative waste sample and one representative soil sample were submitted.

Trench CRP201 (Appendix C) was 95-feet long, mostly 6-feet deep, a maximum of 10-feet deep, and excavated in an east to west orientation. Burn residue, fuze pieces, and other metal fragments were encountered in a silty sand matrix from 15 to 80 feet along the trench and at a depth of 0 to 4 feet bgs. A total of eight field screening samples were collected. In addition, two confirmation samples, one composite waste sample, and one representative waste sample were collected.

Trench CRP202 (Appendix C) was 65-feet long, 6-feet deep, and excavated in a north to south orientation. Burn residue, fuze pieces, and other metal fragments were encountered in a silty sand matrix from 5 to 10 feet along the trench and at a depth of 0 to 4 feet bgs. The surface pile of fuze pieces and residue covered from 15 to 43 feet along the trench, and was assumed to extend to a depth of 4 feet bgs as seen in CRP201. Scattered metal fragments and two 75 mm projectiles were observed from 43 to 60 feet along the trench to a depth of 6 feet. A total of three field screening samples were collected. In addition, one confirmation sample and one representative soil sample were collected.

Test pit CRP2TP1 (Appendix C) was approximately 10-feet long, 6-feet deep, and was excavated in an east to west orientation 10 feet east of CRP202 and 20 feet north of CRP201. Waste was encountered in one spot on the west end, which was assumed to delineate the eastern extent of the waste observed in the northern portion of CRP202. No samples were collected.

*CRP3*

Figure 4-18 shows the approximate extent of the residue/debris pile, locations of investigation trenches, and areas of surface or subsurface residue/debris.

A total of two trenches and one test pit were excavated in area CRP3. The trenches ranged from 40 to 93 feet in length and from 9 to 14 feet in depth. Rusted empty drums and other metal debris were visible on the surface. Subsurface waste including additional rusted empty drums, burn residue, and pockets of oxidation were encountered in both trenches and the test pit (Table 4-4). The area of surface and subsurface waste was estimated to be approximately 60 feet long by 60 feet wide. The estimated volume of visible waste materials at CRP3 was approximately 750 cubic yards.

In area CRP3, a total of eleven field screening samples were collected. Of these screening samples, seven were also submitted as confirmation samples for laboratory analysis. Two waste composite samples, one representative waste sample and one representative soil sample were submitted.

Trench CRP301 (Appendix C) was 93-feet long, mostly 9-feet deep with a maximum depth of 12 feet, and was excavated in a north to south orientation. Ash, burn residue, slag, empty drums (labeled "scrap propellant for burning"), metal banding, and pockets of oxidation were encountered in a sandy clay matrix from 15 to 80 feet along the trench, and at a depth of 0 to 8 feet bgs. Five field screening samples were collected. In addition, three confirmation samples, one waste composite sample, and one representative waste sample were collected.

Trench CRP302 (Appendix C) was 86-feet long, mostly 9-feet deep with a maximum depth of 14 feet, and was excavated in a west to east orientation. Waste identical to that in CRP301 was encountered from 30 to 82 feet along the trench, and at a depth of 0 to 7 feet bgs. Six field screening samples were collected. In addition, four confirmation samples, one composite waste sample, and one representative soil sample were collected.

Test pit CRP3TP1 (Appendix C) was 40-feet long and 9-feet deep, and was excavated in a west to east orientation south of CRP302 to delineate the edge of the subsurface waste in that direction. Waste identical to that found in CRP301 and 302 was encountered from 0 to 40 feet along the pit, with depth of a maximum of 0 to 8 feet in the center tapering to the ground surface at the east end. No samples were collected.

*CRP4*

Figure 4-18 shows the approximate extent of the residue/debris pile, locations of investigation trenches, and areas of surface or subsurface residue/debris.

A total of two trenches and one test pit were excavated in area CRP4. The trenches ranged from 30 to 70 feet in length and from 4 to 6 feet in depth. Widely scattered burn residue and some metal debris was visible on the surface. Significant subsurface waste was not encountered in either of the trenches or the test pit (Table 4-4).

In area CRP4, a total of five field screening samples were collected. Of these screening samples, four were also submitted as confirmation samples for laboratory analysis. In addition, one representative soil sample was submitted.

Trench CRP401 (Appendix C) was 65-feet long, mostly 5-feet deep with a maximum depth of 6 feet, and was excavated in a northeast to southwest orientation. A pile of metal banding, empty fuze cans, and other metal debris was encountered on the arroyo bank surface from 40 to 50 feet along the trench. No subsurface waste was encountered. Three field screening samples were collected. In addition, two confirmation samples were collected.

Trench CRP402 (Appendix C) was 70-feet long, mostly 6-feet deep with a maximum depth of 7 feet, and was excavated in a northeast to southwest orientation. No surface or subsurface waste was encountered in the trench. Two field screening samples were collected. In addition, two confirmation samples and one representative soil sample were collected.

Test pit CRP4TP1 (Appendix C) was 30-feet long and 6-feet deep, and was excavated in a north to south orientation. A small pocket of rusted metal fragments was encountered from 0 to 10 feet along the trench, and at a depth of 0 to 1 feet bgs. No samples were collected.

*CRP5*

Figure 4-19 shows the approximate extent of the residue/debris pile, locations of investigation trenches, and areas of surface or subsurface residue/debris.

A total of 13 trenches and two test pits were excavated in area CRP5. The trenches ranged from 15 to 110 feet in length and from 6 to 22 feet in depth. Significant quantities of metal debris and burn residue were

visible on the arroyo bank. Subsurface waste was encountered in 11 of the trenches and in one of the test pits (Table 4-4). The waste encountered in the northern portion of CRP5 appears to be in a former side arroyo that was filled. The estimated volume of visible waste materials at CRP5 was approximately 1,600 cubic yards.

In area CRP5, a total of 43 field screening samples were collected. Of these screening samples, 16 were also submitted as confirmation samples for laboratory analysis. Three waste composite samples, two representative waste samples and three representative soil samples were submitted.

Shallow ground water was encountered in two trenches (CRP506 and CRP514) excavated in the bottom of the arroyo.

Trench CRP501 (Appendix C) was 30-feet long and 6-feet deep, and was excavated in an east to west orientation. Burned rocket motors and empty canisters were encountered in a sandy silt matrix from 5 to 30 feet along the trench, and to a depth of 0 to 4 feet bgs. A total of two field screening samples were collected. In addition, one confirmation sample was collected.

Trench CRP502 (Appendix C) was 55-feet long, mostly 7 feet deep with a maximum depth of 13 feet, and was excavated in a north to south orientation. Burned rocket motors, empty canisters, and metal banding were encountered in a sandy silt matrix from 15 to 45 feet along the trench, and to a depth of 0 to 6 feet bgs. A total of six field screening samples were collected. In addition, two confirmation samples and one composite waste sample were collected.

Trench CRP503 (Appendix C) was 100-feet long, mostly 6-feet deep with a maximum depth of 10 feet, and was excavated in an east to west orientation. Burned parachute flares, empty drums, and burn residue were encountered in a silty clay matrix from 5 to 90 feet along the trench, and to a depth of 0 to 6 feet bgs. Explosives stained soil was encountered from 70 to 95 feet along the trench, and to a depth of 0 to 2 feet bgs. A total of nine field screening samples were collected. In addition, two confirmation samples, one composite waste sample, one representative waste sample, and one representative soil sample were collected.

Trench CRP505 (Appendix C) was 30-feet long, mostly 10-feet deep with a maximum depth of 19 feet, and was excavated in an east to west orientation. Burned parachute flares and burn residue were encountered in a silty clay matrix from 0 to 25 feet along the trench, and to a depth of 0 to 6 feet bgs. Explosives stained soil was encountered from 14 to 25 feet along the trench, at a depth of 0 to 2 feet bgs. A total of two field

screening samples were collected. In addition, one confirmation sample was collected.

Trench CRP506 (Appendix C) was 35-feet long, mostly 10-feet deep with a maximum depth of 17 feet, and was excavated in an east to west orientation. This trench was excavated at the foot of the arroyo bank and into the arroyo bottom. Significant quantities of metal and wood debris were exposed on the arroyo bank on both sides and above the east end of the trench, but the trench could not be extended further east without pulling the pile on the arroyo bank down into the arroyo. Empty canisters, cardboard, metal banding, wood debris, and other ordnance-related wastes were encountered in a sandy clay matrix from 0 to 30 feet along the trench, and at a depth of 0 to 12 feet bgs. Shallow ground water was observed seeping into the trench at a depth of 17 feet bgs in the east end. The length of the trench to the west was limited by the presence of the wetland in the arroyo bottom. Additional soil sampling beyond the 35-foot length of the trench was performed using a hand auger. A total of six field screening samples were collected. In addition, two confirmation samples were collected.

Trench CRP507 (Appendix C) was 28-feet long, mostly 15-feet deep with a maximum depth of 20 feet, and was excavated in an east to west orientation. Empty canisters and metal banding were encountered in a silty clay matrix from 0 to 26 feet along the trench, and at a depth of 0 to 8 feet bgs. A total of two field screening samples were collected. In addition, one confirmation sample was collected.

Trench CRP508 (Appendix C) was 49-feet long and 7-feet deep, and was excavated in a northwest to south east orientation. Metal banding, empty canisters, ash, and dunnage were encountered in a silty clay matrix throughout the entire length, and at a depth of 0 to 7 feet bgs. One field screening sample was collected.

Trench CRP509 (Appendix C) was 35-feet long and 10-feet deep, and was excavated in an east to west orientation. Burned parachute flares and burn residue were encountered in a silty clay matrix throughout the entire length of the trench, and to a depth of 0 to 7 feet bgs. A total of three field screening samples were collected. In addition, one confirmation sample was collected.

Trench CRP510 (Appendix C) was 54-feet long, mostly 10-feet deep with a maximum depth of 19 feet, and was excavated in an east to west orientation. Burned parachute flares, ash, burn residue, and explosives stained soil was encountered in a silty clay matrix from 3 to 50 feet along

the trench, and at a depth of 0 to 8 feet bgs. A total of three field screening samples were collected. In addition, two confirmation samples were collected.

Trench CRP511 (Appendix C) was 15-feet long, mostly 11-feet deep with a maximum depth of 15 feet, and was excavated in an east to west orientation. Burned parachute flares, ash, burn residue, chunks of high explosive mixed with packing materials, and explosives stained soil was encountered in a silty clay matrix throughout the entire length, and at a depth of 0 to 8 feet bgs. A total of two field screening samples were collected. In addition, one confirmation sample was collected.

Trench CRP512 (Appendix C) was 110-feet long, mostly 7-feet deep with a maximum depth of 15 feet, and was excavated in an east to west orientation. Burned parachute flares, pipes, metal banding, ash, fuze pieces, explosives stained soils, and other debris were encountered in a silty clay matrix from 10 to 80 feet along the trench, and at a depth of 0 to 7 feet bgs. Several steam headers wrapped in suspect asbestos-containing material (ACM) wrapping were also unearthed in this trench. Field personnel donned appropriate personal protective equipment and removed the headers and visible ACM from the trench. The items were double wrapped in plastic sheeting and staged to the side for off-site disposal. A total of seven field screening samples were collected. In addition, four confirmation samples, one composite waste sample, and one representative waste sample were collected.

Trench CRP513 (Appendix C) was 25-feet long and 22-feet deep, and was excavated in a north to south orientation in the bottom of the arroyo just west of the end of CRP512. The purpose of this trench was to collect a representative soil sample from each soil layer encountered. No waste was encountered. Four layers of soil were encountered between ground surface and 22 feet bgs (maximum excavator reach). The top layer of sand with washed gravel was encountered from 0 to 5 feet bgs. The second layer, a sandy gravel mix, was encountered from 5 to 9 feet bgs. The third layer, a reddish clay/sand/gravel mix, was encountered from 9 to 16 feet bgs. The fourth layer, a red clay, was encountered from 16 feet to the trench bottom at 22 feet bgs. No field screening samples were collected. However, one representative soil sample was collected from each of the four layers.

Trench CRP514 (Appendix C) was 19-feet long and 16-feet deep, and was excavated in a north to south orientation in the bottom of the arroyo at the west end of CRP503. The purpose of this trench was to collect a representative soil sample from the deepest soil encountered. No waste

was encountered. Shallow ground water was observed seeping into the trench at a depth of approximately 8 feet bgs. No field screening samples were collected. However, one representative soil sample was collected from the bottom red clay with sand and gravel layer. Because of the proximity of CRP514 to CRP503, the representative soil sample was assigned a sample number of CRP5030516.

Test pit CRP5TP1 (Appendix C) was 20-feet long and 12-feet deep, and was excavated in an east to west orientation. This test pit was excavated approximately 2 weeks before trench CRP507, and encountered the same types of waste (empty canisters and metal banding) as found in CRP507. Because it was a test pit, no samples were collected. After reviewing trench logs, it was determined that samples should have been collected at this location, and CRP507 (described above) was installed just to the north for that purpose.

Test pit CRP5TP2 (Appendix C) was 25-feet long and 15-feet deep, and was excavated in an east to west orientation. This test pit was excavated in a flat area approximately 40 feet from the east end of trench CRP503,to determine if buried materials extended into the area. No waste was encountered. No samples were collected.

*CRP6*

Figure 4-19 shows the approximate extent of the residue/debris pile, locations of investigation trenches, and areas of surface or subsurface residue/debris.

A total of four trenches and six test pits were excavated in area CRP6. The trenches ranged from 12 to 140 feet in length and from 5 to 15 feet in depth. Subsurface waste was encountered in all of the trenches and test pits (Table 4-4). Although the 1995 walkover indicated that waste appeared to be limited to the arroyo bank face, subsurface waste and debris were found to be present in the majority of the flat area to the east that was identified as the burning ground. The estimated volume of visible waste materials (including disturbed soils with widely scattered debris encountered in the flat burning ground area) at CRP6 was approximately 9,000 cubic yards.

In area CRP6, a total of six field screening samples were collected. Of these screening samples, three were also submitted as confirmation samples for laboratory analysis. Four waste composite samples, and two representative soil samples were submitted.

Shallow ground water was encountered in one trench (CRP603) excavated in the bottom of the arroyo.

Trench CRP601 (Appendix C) was 140-feet long, 5- to 6-feet deep, and was excavated in a northwest to southeast orientation parallel to the top of the arroyo bank. Metal banding, metal fragments, 20 and 40 mm projectiles, fuze pieces, burn residue, and burned wood debris were encountered in a clayey silt matrix from 15 to 140 feet along the trench, and from a depth of 0 to 4 feet bgs. Two field screening samples were collected. In addition, one confirmation sample and one waste composite sample were collected.

Trench CRP602 (Appendix C) was 70-feet long, mostly 6-feet deep with a maximum depth of 8 feet, and was excavated in a northeast to southwest orientation. Debris consisting of metal banding and rods were visible on the surface at 10 feet along the trench. A pocket of metal banding and fragments was encountered in a silty sand matrix from 12 to 30 feet along the trench, and at a depth of 0 to 3 feet bgs. Scattered metal fragments were encountered in a sand with gravel matrix from 30 to 70 feet along the trench, and at a depth of 0 to 1 foot bgs. Four field screening samples were collected. In addition, two confirmation samples, one waste composite sample, and one representative soil sample were collected.

Trench CRP603 (Appendix C) was 85-feet long, mostly 6-feet deep with a maximum depth of 10 feet, and was excavated in an east to west orientation. The trench started in the bottom of the arroyo just north of the identified boundary between CRP5 and CRP6, and extended up over the arroyo bank and into the flat of the burning ground. Metal banding and fragments were encountered in a sand with silt matrix from 0 to 25 feet along the trench, and at a depth of 0 to 3 feet bgs. A layer of burned wood, ammunition box hardware, and ash was encountered from 0 to 45 feet along the trench, underlying the metal debris in the west end of the trench from 3 to 5 feet bgs, and at a depth of 0 to 5 feet bgs from 25 to 45 feet along the trench. Scattered metal fragments were encountered in a silty/clayey sand matrix from 45 to 70 feet along the trench, and at a depth of 0 to 1 foot bgs. Shallow ground water was observed flowing into the west end of the trench (in the arroyo bottom) at a depth of 10 feet bgs during excavation. Three field screening samples were collected. In addition, one confirmation sample, one waste composite sample, and one representative soil sample were collected.

Trench CRP604 (Appendix C) was 12-feet long and 6-feet deep, and was excavated in an east to west orientation in the bottom of the arroyo adjacent to the access road that separates CRP6 from CRP7. Burned wood, ammunition box hardware, and ash were encountered scattered in a sand

with silt matrix from 4 to 12 feet along the trench, and at a depth of 0 to 4 feet bgs. One field screening sample was collected. In addition, one waste composite sample was collected.

Six test pits (CRP6TP1 through CRP6TP6) were excavated in the flat area that was the burning ground. The purpose of these test pits was to delineate the extent of the layer of scattered metal fragments in soil that had been observed at the eastern ends of CRP602 and CRP603. The layer of scattered metal fragments, rusty metal, and pockets of oxidation was encountered in all six test pits, generally from 0 to 2 feet bgs in the perimeter pits (CRP6TP1, 4, 5, and 6), and 0 to 5 feet bgs in the middle (CRP6TP2 and 3). Almost 600 live 40 mm projectiles were removed from the eastern portion of CRP6TP3. UXO specialists moved these projectiles to the emergency demolition crater for disposal by the USACE Huntsville Center explosive ordnance disposal (EOD) contractor. No samples were collected from the test pits.

*CRP7*

Figure 4-20 shows the approximate extent of the residue/debris pile, locations of investigation trenches, and areas of surface or subsurface residue/debris.

A total of seven trenches were excavated in area CRP7. The trenches ranged from 15 to 150 feet in length and from 5 to 17 feet in depth. Subsurface waste was encountered in six of the trenches (Table 4-4). The estimated volume of visible waste materials at CRP7 was approximately 2,400 cubic yards.

In area CRP7, a total of 32 field screening samples were collected. Of these screening samples, 14 were also submitted as confirmation samples for laboratory analysis. Five waste composite samples and four representative waste samples were submitted. Results are summarized and discussed in Section 5.0.

Trench CRP701 (Appendix C) was 30-feet long, mostly 6-feet deep with a maximum depth of 12 feet, and was excavated in an east to west orientation. Pieces of fuzes, booster cups, fragmentation bomb windings, and other ordnance debris were encountered in a clay matrix from 0 to 23 feet along the trench, and at a depth of 0 to 6 feet bgs. The subsurface waste appeared to stop at the top of the arroyo bank. A total of three field screening samples were collected. In addition, one confirmation sample, one waste composite sample, and two representative waste samples were collected.

Trench CRP702 (Appendix C) was 80-feet long, mostly 7-feet deep with a maximum depth of 16 feet, and was excavated in a northeast to southwest orientation. Black ash, ammunition box hardware, fragmentation bomb windings, booster cups, and projectiles (40, 57, and 75 mm) were encountered in a silty clay matrix from 0 to 77 feet along the trench, and at a depth of 0 to 6 feet bgs. A total of four field screening samples were collected. In addition, two confirmation samples and one waste composite sample were collected.

Trench CRP703 (Appendix C) was 150-feet long, mostly 6-feet deep with a maximum depth of 15 feet, and was excavated in a northeast to southwest orientation. Wastes similar to those found in CRP702 were encountered in a silty clay matrix from 10 to 43 feet along the trench, and at a depth of 0 to 8 feet bgs. Shallow ground water was observed in the trench at 14 feet bgs in the southwest (arroyo bottom) end. A total of ten field screening samples were collected. In addition, three confirmation samples were collected.

Trench CRP704 (Appendix C) was 85-feet long, mostly 5-feet deep with a maximum depth of 19 feet, and was excavated in an east to west orientation. Ammunition box hardware, metal banding, and projectiles (37 and 40 mm) were encountered in a silty clay matrix from 23 to 80 feet along the trench, and at a depth of 0 to 3 feet bgs. A total of ten field screening samples were collected. In addition, four confirmation samples, one waste composite sample, and one representative waste sample were collected.

Trench CRP705 (Appendix C) was 45-feet long, mostly 5-feet deep with a maximum depth of 7 feet, and was excavated in an east to west orientation. Burned wood, ammunition box hardware, metal banding, and projectiles (40 and 75 mm) were encountered in a silty clay matrix from 5 to 40 feet along the trench, and at a depth of 0 to 6 feet bgs. A total of three field screening samples were collected. In addition, two confirmation samples and one waste composite sample were collected.

Trench CRP706 (Appendix C) was 15-feet long and 10-feet deep, and was excavated in a north to south orientation in the arroyo bottom just north of the access road dividing CRP6 and CRP7. A pile of metal rods was observed on the surface at 12 feet along the trench. Scattered black ash and ammunition box hardware were encountered in a silty clay matrix along the entire 15-foot length, and at a depth of 1 to 9 feet bgs. Shallow ground water was observed entering the bottom of the trench. One field screening sample was collected. In addition, one confirmation sample,

one waste composite sample, and one representative waste sample were collected.

Trench CRP707 (Appendix C) was 15-feet long and 12-feet deep, and was excavated in a north to south orientation in the arroyo bottom between trenches CRP703 and CRP704. No subsurface waste was encountered. One field screening sample was collected. In addition, one confirmation sample was collected.

*CRP8*

Figure 4-20 shows the approximate extent of the residue/debris pile, locations of investigation trenches, and areas of surface or subsurface residue/debris.

A total of 16 trenches were excavated in area CRP8. The trenches ranged from 18 to 90 feet in length and from 3 to 20 feet in depth. Subsurface waste was encountered in 14 of the trenches (Table 4-4). The estimated volume of visible waste materials (including disturbed soils with widely scattered debris encountered in the flat area) at CRP8 was approximately 15,500 cubic yards. Two UXO items that were believed to be sensitive enough to require demolition in place were discovered in the trenches.

In area CRP8, a total of 42 field screening samples were collected. Of these screening samples, 23 were also submitted as confirmation samples for laboratory analysis. Eleven waste composite samples and two representative waste samples were submitted.

Trench CRP801 (Appendix C) was 85-feet long, mostly 5-feet deep with a maximum depth of 7 feet, and was excavated in an east to west orientation. Metal banding, metal lids, barrage rocket tubes, burned wood, and ammunition box hardware were encountered in a silty clay matrix from 15 to 55 feet along the trench, and at a depth of 0 to 4 feet bgs. A total of seven field screening samples were collected. In addition, three confirmation samples, one waste composite sample, and one representative waste sample were collected.

Trench CRP802 (Appendix C) was 90-feet long, mostly 6-feet deep with a maximum depth of 11 feet, and was excavated in an east to west orientation. Pieces of ordnance, metal banding, ammunition box hardware, live 40 mm projectiles, and fuzes were encountered in a sandy clay matrix from 0 to 90 feet along the trench, and at a depth of 0 to 9 feet bgs. The deepest pocket of waste was encountered near the east end of the trench, near the access road between CRP6 and CRP8. A total of four

field screening samples were collected. In addition, three confirmation samples and one waste composite sample were collected.

Trench CRP803 (Appendix C) was 75-feet long, mostly 6-feet deep with a maximum depth of 7 feet, and was excavated in an east to west orientation. Scattered metal fragments and metal debris was encountered in a sandy clay matrix from 0 to 35 feet along the trench, at a depth of 0 to 2 feet bgs. This soil and debris was similar in appearance to that observed across the road in the flat portion of CRP6. Ammunition box hardware, burned wood, booster cups, metal banding, metal fragments, and 40 mm projectiles were encountered in a soil matrix from 35 to 50 feet along the trench, at a depth of 0 to 4 feet bgs. Ammunition box hardware, metal banding, 40 and 75 mm projectiles, and M83 "Butterfly" bomblets (most in pieces, but one intact and live) were encountered in a soil matrix from 50 to 75 feet along the trench, and at a depth of 0 to 3 feet bgs. The live "butterfly" bomblet was too sensitive to be moved and detonated in place by the USACE Huntsville EOD contractor. A total of five field screening samples were collected. In addition, three confirmation samples and one waste composite sample were collected.

Trench CRP804 (Appendix C) was 65-feet long, mostly 6-feet deep with a maximum depth of 10 feet, and was excavated in a northeast to southwest orientation. Metal banding, ammunition box hardware, burned wood, and live 40 mm projectiles were encountered in a sandy clay matrix throughout the entire length of the trench, and at a depth of 0 to 9 feet bgs. Two field screening samples were collected. In addition, two confirmation samples and one waste composite sample were collected.

Trench CRP805 (Appendix C) was 60-feet long, mostly 5-feet deep with a maximum depth of 15 feet, and excavated in an east to west orientation. Metal banding, packaging materials, fuze pieces, and projectiles (37 and 40 mm) were encountered in a sandy clay matrix from 0 to 30 feet along the trench, and at a depth of 0 to 7 feet bgs. The trench was not opened in the 30 to 40 foot interval because of the high density of UXO. Metal banding, packaging materials, fuze pieces, and 40 mm projectiles were encountered in a soil matrix from 40 to 50 feet along the trench, and at a depth of 0 to 1 feet bgs. Bedrock was encountered at 20 feet along the trench, at a depth of 15 feet bgs. Bedrock was also encountered at the west end of the trench, which extended to the west bank of the arroyo. A total of four field screening samples were collected. In addition, one confirmation sample and one waste composite sample were collected.

Trench CRP806 (Appendix C) was 80-feet long, mostly 8-feet deep with a maximum depth of 10 feet, and was excavated in an northwest to

southeast orientation. Fuze pieces, "butterfly" bomblet pieces, metal fragments, and 40 mm projectiles were encountered in a sandy clay matrix from 0 to 55 feet along the trench, and at a depth of 0 to 10 feet bgs. Black ash, metal lids, metal banding, ammunition box hardware, and additional 40 mm projectiles were found overlying the above waste layer from 25 to 50 feet along the trench, at a depth of 0 to 4 feet bgs. As with CRP805, this trench was not opened in the 50 to 70 foot interval because of the high density of UXO. Fuze pieces, metal banding, and metal fragments were encountered in a soil matrix from 70 to 75 feet along the trench, at a depth of 0 to 1 foot bgs. Bedrock was encountered at the northwest end of the trench at the west bank of the arroyo. Another live "butterfly" bomblet was uncovered in this trench and was detonated in place by the USACE Huntsville EOD contractor. A total of three field screening samples were collected. In addition, two confirmation samples and one waste composite sample were collected.

Trench CRP807 (Appendix C) was 35-feet long and 15-feet deep, and was excavated in a northeast to southwest orientation in the flat area near the access road between CRP6 and CRP8. Metal fragments and 40 mm projectiles were encountered in a sandy clay matrix from 0 to 12 feet along the trench, at a depth of 0 to 4 feet bgs. The same type of waste was encountered from 12 to 35 feet along the trench, at a depth of 0 to 1 foot bgs. The material is similar in composition to that observed in the flat areas east of the arroyo in CRP6 and CRP7. Two field screening samples were collected. In addition, one confirmation sample was collected.

Trench CRP808 (Appendix C) was 30-feet long and 16-feet deep, and was excavated in a northeast to southwest orientation in the flat area near the access road between CRP6 and CRP8. Metal fragments, fuzes, and projectiles (20, 40, and 57 mm) were encountered in a sandy clay matrix throughout the entire length of the trench, at a depth of 0 to 6 feet bgs. The material is similar in composition to that observed in the flat areas east of the arroyo in CRP6 and CRP7. A total of three field screening samples were collected. In addition, one confirmation sample was collected.

Trench CRP809 (Appendix C) was 25-feet long, mostly 18-feet deep with a maximum depth of 20 feet, and was excavated in a northeast to southwest orientation in the flat area near the access road between CRP6 and CRP8. Metal fragments, fuzes, metal banding, "butterfly" bomblet pieces, and projectiles (20 and 40 mm) were encountered in a clay matrix throughout the entire length of the trench, at a depth of 0 to 6 feet bgs. The material is similar in composition to that observed in the flat areas east of the arroyo

in CRP6 and CRP7. A total of three field screening samples were collected. In addition, one confirmation sample was collected.

Because debris had been observed throughout the northernmost trench (CRP807), it was determined that additional trenches would be excavated on the east side of the main access road. Trench CRP810 (Appendix C) was 24-feet long and 14-feet deep, and was excavated in an east to west orientation. Fuzes, detonator assemblies, fragmentation bomb windings, "butterfly" bomblet fragments, and 40 mm projectiles were encountered in a clay matrix throughout the entire length of the trench, at a depth of 0 to 1 foot bgs. A total of three field screening samples were collected. In addition, one confirmation sample was collected.

Trench CRP811 (Appendix C) was 32-feet long and 3-feet deep, and was excavated in a northwest to southeast orientation. Scattered ordnance fragments were observed on the ground surface. No subsurface waste was encountered. One screening sample was collected. In addition, one confirmation sample was collected.

Trench CRP812 (Appendix C) was 28-feet long and 5-feet deep, and was excavated in a north to south orientation. Ordnance fragments were encountered in a clay matrix throughout the entire length of the trench, at a depth of 0 to 4 feet bgs. One field screening sample was collected. In addition, one confirmation sample, one waste composite sample, and one representative waste sample were collected.

Trench CRP813 (Appendix C) was 25-feet long and 5-feet deep, and was excavated in a northeast to southwest orientation. Metal fragments, fuzes, "butterfly" bomblet fragments, fragmentation bomb windings, and projectiles (20, 37, 40, and 57 mm) were encountered in a clay matrix throughout the entire length of the trench, at a depth of 0 to 3 feet bgs. The material is similar in composition to that observed in the flat areas east of the arroyo in CRP6 and CRP7. One field screening sample was collected. In addition, one confirmation sample and one waste composite sample were collected.

Trench CRP814 (Appendix C) was 18-feet long and 10-feet deep, and was excavated in a north to south orientation in the bottom of the arroyo west of CRP802 and between CRP801 and CRP803. Scattered debris including metal fragments and 40 mm projectiles were encountered in a silty sand matrix throughout the entire length of the trench, at a depth of 0 to 3 feet bgs. One field screening sample was collected. In addition, one confirmation sample and one waste composite sample were collected.

Trench CRP815 (Appendix C) was 18-feet long and 15-feet deep, and was excavated in a north to south orientation in the bottom of the arroyo west of CRP802 and between CRP801 and CRP803. Metal fragments and 40 mm projectiles were encountered in a silty sand matrix throughout the entire length of the trench, at a depth of 0 to 5 feet bgs. One field screening sample was collected. In addition, one confirmation sample and one waste composite sample were collected.

Trench CRP708 (Appendix C) was 20-feet long and 17-feet deep, and was excavated in a north to south orientation in the arroyo bottom. Although this trench was identified as a CRP7 trench in the field, it was located just off the west end of trench CRP801, and therefore will be discussed here. Scattered metal fragments, metal rods, and ammunition box hardware were encountered in a soil matrix throughout the entire length of the trench, at a depth of 0 to 8 feet bgs. One field screening sample was collected. In addition, one confirmation sample and one waste composite sample were collected.

*CRP9*

Figure 4-21 shows the approximate extent of the residue/debris pile, locations of investigation trenches, and areas of surface or subsurface residue/debris.

A total of eight trenches were excavated in area CRP9. The trenches ranged from 20 to 173 feet in length and from 4 to 12 feet in depth. Subsurface waste was encountered in all of the trenches (Table 4-4). The waste encountered in CRP9 appears to be in a side arroyo that was filled. The estimated volume of visible waste materials at CRP9 was approximately 2,450 cubic yards.

In area CRP9, a total of 27 field screening samples were collected. Of these screening samples, 15 were also submitted as confirmation samples for laboratory analysis. Eight waste composite samples, three representative waste samples, and one representative soil sample were submitted.

Trench CRP901 (Appendix C) was 173-feet long, mostly 7-feet deep with a maximum depth of 12 feet, and was excavated in a northwest to southeast orientation. Metal banding, live projectiles (37 and 40 mm), black ash, and burn residue were encountered in a silty sand matrix from 0 to 100 feet along the trench, and at a depth of 0 to 8 feet bgs. As in CRP8, a live "butterfly" bomblet was uncovered in this trench and was detonated in place by the USACE Huntsville EOD contractor. Fragmentation bomb windings, live projectiles (37, 40, and 90 mm), black ash, burn residue, and fuze pieces were encountered in a silty sand matrix from 100 to 110 and

140 to 170 feet along the trench, and at a depth of 0 to 5 feet bgs. The trench was not opened from 110 to 140 feet because of the high concentration of UXO items. A total of seven field screening samples were collected. In addition, four confirmation samples and one waste composite sample were collected.

Trench CRP902 (Appendix C) was 50-feet long, mostly 7-feet deep with a maximum depth of 11 feet, and was excavated in a northeast to southwest orientation. Metal banding, black ash, and live projectiles (37 and 40 mm) were encountered in a sandy clay matrix from 0 to 37 feet along the trench, and at a depth of 0 to 4 feet bgs. A total of six field screening samples were collected. In addition, two confirmation samples and one waste composite sample were collected.

Trench CRP903 (Appendix C) was 45-feet long, mostly 4-feet deep with a maximum depth of 9 feet, and was excavated in a northeast to southwest orientation. Metal banding, fuze pieces, live projectiles (37 and 40 mm), burn residue, and fragmentation bomb windings were encountered in a sand with clay matrix from 0 to 20 feet along the trench, and at a depth of 0 to 6.5 feet bgs. A total of four field screening samples were collected. In addition, two confirmation samples, one waste composite sample, and one representative waste sample were collected.

Trench CRP904 (Appendix C) was 70-feet long, mostly 5-feet deep with a maximum depth of 10 feet, and was excavated in a northeast to southwest orientation. Metal banding fragmentation bomb windings, "butterfly" bomblet pieces, ammunition box hardware, black ash, and live projectiles (37 and 40 mm) were encountered in a sandy clay matrix from 0 to 50 feet along the trench, and at a depth of 0 to 6 feet bgs. Scattered metal fragments and projectiles (37 and 40 mm) were encountered in a soil matrix from 50 to 70 feet along the trench, at a depth of 0 to 3 feet bgs. The material is similar in composition to that observed in the flat areas east of the arroyo in CRP6, CRP7, and CRP8. A total of three field screening samples were collected. In addition, two confirmation samples, one waste composite sample, and one representative soil sample were collected.

Trench CRP906 (Appendix C) was 40-feet long, mostly 6-feet deep with a maximum depth of 8 feet, and was excavated in a northeast to southwest orientation. Metal banding, black ash, "butterfly" bomblet pieces, fuzes, and live projectiles (37, 40, and 90 mm) were encountered in a silty sand matrix from 0 to 15 feet along the trench, and at a depth of 0 to 7 feet bgs. A total of three field screening samples were collected. In addition, two confirmation samples and one waste composite sample were collected.

Trench CRP907 (Appendix C) was 20-feet long and 9-feet deep, and was excavated in a northeast to southwest orientation in the bottom of the arroyo. Scattered metal banding, metal fragments, and live 40 mm projectiles were encountered in a sand with silt matrix throughout the entire length of the trench, at a depth of 0 to 3 feet bgs. One field screening sample was collected. In addition, one confirmation sample and one waste composite sample were collected.

Trench CRP908 (Appendix C) was 20-feet long and 12-feet deep, and was excavated in a northeast to southwest orientation in the bottom of the arroyo. Scattered metal banding, metal fragments, pieces of 75 mm projectiles, "butterfly" bomblet pieces, fragmentation bomb windings, and live 40 mm projectiles were encountered in a sand with silt matrix throughout the entire length of the trench, at a depth of 0 to 3 feet bgs. One field screening sample was collected. In addition, one confirmation sample, one waste composite sample, and one representative waste sample were collected.

Trench CRP1003 (Appendix C) was 15-feet long and 10-feet deep, and was excavated in a northeast to southwest orientation. Although this trench was identified as a CRP10 trench in the field, it appears to delineate the downgradient end of the subsurface waste from CRP9, and therefore will be discussed here. Scattered metal fragments and ammunition box hardware were encountered in a sand and gravel matrix throughout the entire length of the trench, and at a depth of 4 to 5 feet bgs. Two field screening samples were collected. In addition, one confirmation sample, one waste composite sample, and one representative waste sample.

*CRP10*

Figure 4-21 shows the approximate extent of the residue/debris pile, locations of investigation trenches, and areas of surface or subsurface residue/debris.

A total of two trenches were excavated in area CRP10. The trenches ranged from 40 to 74 feet in length and from 5 to 8 feet in depth. Subsurface waste was encountered in both trenches (Table 4-4). The estimated volume of visible waste materials at CRP10 was approximately 50 cubic yards.

In area CRP10, a total of 14 field screening samples were collected. Of these screening samples, six were also submitted as confirmation samples for laboratory analysis. One waste composite sample was also submitted.

Trench CRP1001 (Appendix C) was 74-feet long, mostly 7-feet deep with a maximum depth of 8 feet, and was excavated in a northeast to southwest orientation. Burn residue and pieces of smoke canisters were encountered in a silty sand matrix from 12 to 25 feet along the trench, and at a depth of 0 to 2 feet bgs. A total of eight field screening samples were collected. In addition, three confirmation samples and one waste composite sample were collected.

Trench CRP1002 (Appendix C) was 45-feet long, mostly 5-feet deep with a maximum depth of 8 feet, and was excavated in a northwest to southeast orientation. Burn residue and pieces of smoke canisters were encountered in a silty sand matrix from 8 to 35 feet along the trench, and at a depth of 0 to 2 feet bgs. A total of six field screening samples were collected. In addition, three confirmation samples were collected.

4.4.2.2 *Detonation Craters*

Trenching investigation field observations for the Detonation Craters are summarized in Table 4-5.

*CDC02*

Figure 4-22 shows the locations of investigation trenches, and areas of subsurface residue/debris.

A total of two trenches were excavated in crater CDC02. The trenches ranged from 108 to 138 feet in length and from 15 to 20 feet in depth. Subsurface debris were encountered in both trenches (Table 4-5). The debris were widely scattered within the clay matrix, and appeared to be the result of a repeated process of detonation of ordnance followed by backfill of the hole created by the detonation. The estimated volume of visible debris at CDC02 was approximately 5,000 cubic yards.

In area CDC02, a total of 33 field screening samples were collected. Of these screening samples, ten were also submitted as confirmation samples for laboratory analysis. One waste composite sample, one representative waste sample, and one representative soil sample were submitted.

Trench CDC0201 (Appendix C) was 108-feet long, mostly 15-feet deep with a maximum depth of 20 feet, and was excavated in an east to west orientation through the crater/berm. Scattered ordnance fragments, ash, dark stained soil, and bits of rock were encountered throughout the entire length of the trench, and at a depth of 0 to 16 feet bgs. A total of 19 field screening samples were collected. In addition, six confirmation samples,

one waste composite sample, one representative waste sample, and one representative soil sample were collected.

Trench CDC0202 (Appendix C) was 138-feet long and 15-feet deep, and was excavated in a north to south orientation through the crater/berm. Scattered ordnance fragments, ash, dark stained soil, and bits of rock were encountered throughout the entire length of the trench, and at a depth of 0 to 15 feet bgs. The trench was not opened from 50 to 85 feet along the trench, because that area had been characterized by trench CDC0201. A total of 14 field screening samples were collected. In addition, four confirmation samples were collected.

*CDC04*

Figure 4-22 shows the locations of investigation trenches, and areas of subsurface residue/debris.

A total of two trenches were excavated in crater CDC04. The trenches ranged from 108 to 145 feet in length and 15 feet in depth. Subsurface debris were encountered in both trenches (Table 4-5). The debris were widely scattered within the sandy clay matrix, and appeared to be the result of a repeated process of detonation of ordnance followed by backfill of the hole created by the detonation. The estimated volume of visible debris at CDC04 was approximately 3,100 cubic yards.

In area CDC04, a total of 31 field screening samples were collected. Of these screening samples, seven were also submitted as confirmation samples for laboratory analysis. One waste composite sample, one representative waste sample, and one representative soil sample were submitted.

Trench CDC0401 (Appendix C) was 108-feet long and 15-feet deep, and was excavated in an east to west orientation through the crater/berm. Scattered ordnance fragments, projectiles, ash, dark stained soil, and bits of rock were encountered in a soil matrix from 20 to 93 feet along the trench, and at a depth of 0 to 13 feet bgs. A total of 17 field screening samples were collected. In addition, five confirmation samples were collected.

Trench CDC0402 (Appendix C) was 145-feet long and 15-feet deep, and was excavated in a north to south orientation through the crater/berm. Scattered ordnance fragments, ash, dark stained soil, and bits of rock were encountered throughout the entire length of the trench, and at a depth of 0 to 13 feet bgs. A total of 14 field screening samples were collected. In addition, two confirmation samples, one waste composite sample, one

representative waste sample, and one representative soil sample were collected.

*CDC06*

Figure 4-23 shows the locations of investigation trenches, and areas of subsurface residue/debris.

A total of two trenches were excavated in crater CDC06. The trenches ranged from 135 to 150 feet in length and ranged from 15 to 20 feet in depth. Subsurface debris were encountered one trench (Table 4-5). The estimated volume of visible debris at CDC06 was approximately 170 cubic yards.

In area CDC06, a total of 31 field screening samples were collected. Of these screening samples, eight were also submitted as confirmation samples for laboratory analysis. One representative soil sample was also submitted.

Trench CDC0601 (Appendix C) was 135-feet long, mostly 15-feet deep with a maximum depth of 20 feet, and was excavated in an east to west orientation through the crater/berm. Scattered ordnance fragments, dark stained soil, and ash were encountered in a soil matrix from 70 to 95 feet along the trench, and at a depth of 0 to 13 feet bgs. A total of 17 field screening samples were collected. In addition, five confirmation samples were collected.

Trench CDC0602 (Appendix C) was 150-feet long and 15-feet deep, and was excavated in a north to south orientation through the crater/berm. No subsurface debris were encountered. A total of 14 field screening samples were collected. In addition, three confirmation samples and one representative soil sample were collected.

*CDC08*

Figure 4-23 shows the locations of investigation trenches, and areas of subsurface residue/debris.

A total of two trenches were excavated in crater CDC08. The trenches ranged from 90 to 95 feet in length and were 15 feet in depth. Subsurface debris were encountered in both trenches (Table 4-5). The estimated volume of visible debris at CDC08 was approximately 300 cubic yards.

In area CDC08, a total of 31 field screening samples were collected. Of these screening samples, nine were also submitted as confirmation

samples for laboratory analysis. One waste composite sample, one representative waste sample, and one representative soil sample were submitted.

Trench CDC0801 (Appendix C) was 95-feet long and 15-feet deep, and was excavated in an east to west orientation through the crater/berm. Metal banding, other packaging materials, and black ash were encountered in a soil matrix from 0 to 70 feet along the trench, and at a depth of 0 to 5 feet bgs. A total of 17 field screening samples were collected. In addition, five confirmation samples were collected.

Trench CDC0802 (Appendix C) was 90-feet long and 15-feet deep, and was excavated in a north to south orientation through the crater/berm. Metal banding, other packaging materials, and black ash were encountered in a soil matrix from 10 to 25 feet along the trench, and at a depth of 4 to 6 feet bgs. A total of 14 field screening samples were collected. In addition, four confirmation samples, one waste composite sample, one representative waste sample, and one representative soil sample were collected.

*CDC10*

Figure 4-24 shows the locations of investigation trenches, and areas of subsurface residue/debris.

A total of two trenches were excavated in crater CDC10. The trenches ranged from 135 to 143 feet in length and ranged from 15 to 20 feet in depth. Subsurface debris were encountered in both trenches (Table 4-5). The debris were widely scattered within the soil matrix, and appeared to be the result of a repeated process of detonation of ordnance followed by backfill of the hole created by the detonation. The estimated volume of visible debris at CDC10 was approximately 3,670 cubic yards.

In area CDC10, a total of 33 field screening samples were collected. Of these screening samples, ten were also submitted as confirmation samples for laboratory analysis. One waste composite sample and one representative waste sample was submitted.

Trench CDC1001 (Appendix C) was 135-feet long, mostly 15-feet deep with a maximum depth of 20 feet, and was excavated in an east to west orientation through the crater/berm. Ordnance fragments and dark stained soil were encountered in a soil matrix from 20 to 110 feet along the trench, and at a depth of 3 to 20 feet bgs. A total of 19 field screening samples were collected. In addition, six confirmation samples, one waste composite sample, and one representative waste sample were collected.

Trench CDC1002 (Appendix C) was 143-feet long and 15-feet deep, and was excavated in a north to south orientation through the crater/berm. Ordnance fragments and dark stained soil were encountered in a soil matrix from 10 to 110 feet along the trench, and at a depth of 0 to 13 feet bgs. A total of 14 field screening samples were collected. In addition, four confirmation samples were collected.

### 4.4.3 *Current OB/OD Area Summary*

The wastes encountered during the Current OB/OD trenching investigation were typically identified as military residue and debris generated during OB/OD operations.

Four isolated areas of waste/debris were identified (CRP1, CRP2, CRP3, and CRP10). These were found to contain residues and debris associated with the burning of various munitions and their packing materials. Drums found in CRP1 and CRP3 were either empty or contained solid burn residue. No drums containing liquids were encountered during the investigation. One area, CRP4, was found to contain only isolated surface debris.

The other five waste/debris piles appear to be interrelated. These were separated into CRP5, CRP6, CRP7, CRP8, and CRP9 based upon what was visible on the arroyo bank at the time of the 1995 walkover. Based on the trenching investigation, visible waste/debris extend back from the arroyo bank into the flat areas of the former burning ground, and appear to be in a layer of fill near the ground surface with isolated pockets of deeper material. This is believed to be consistent with OB/OD operations conducted on open ground followed by earthmoving to clear residue and debris from the working areas. The waste in these five areas is similar in composition and contained burn residue, ordnance fragments, ash, burned wood, metal banding, and numerous pieces of ordnance. The ordnance encountered included various size projectiles (20, 37, 40, 57, 75,and 90 mm), most of which were believed to be live and were removed from the excavation and staged for emergency disposal by the USACE Huntsville Center EOD contractor. Three M83 "butterfly" bomblets were encountered during excavation in these areas. These bomblets were believed to be live and were too sensitive to be moved, and were detonated in place by the USACE Huntsville EOD contractor before excavation continued. It is believed that significant quantities of ordnance remain in all five of these areas.

Five of the twelve existing demolition craters were investigated. Scattered ordnance fragments, black stained/scorched soils, and bits of rock were

found in the soils under each of the five craters. The debris encountered were widely scattered in the soils, and appeared to be consistent with a repeated process of detonation of ordnance followed by backfill of the hole created by the detonation. Although significant quantities of live ordnance were not encountered in the five craters investigated, it cannot be assumed that live ordnance does not exist in the other seven craters.

Interpreted boundaries of the surface and subsurface waste materials observed during the trenching investigation are shown on Figure 4-16, Appendix B. A summary of the wastes encountered by area is included in Table 4-6. The estimated total volume of visible waste based on the trenching investigation in the Current OB/OD Area is 44,740 cubic yards.

## 4.5 *ECOLOGICAL HABITAT SURVEY*

A preliminary ecological habitat survey of the OB/OD Areas was conducted during the period 24 through 31 July 1995. The survey consisted of a literature search of threatened and endangered species (Table 4-7) and a critical habitat survey completed via a walkover of the site by two ecologists escorted by a UXO specialist.

The objective of this survey was to generate baseline characterization information. This baseline information would be used to evaluate the potential for impacts to potentially important habitat located along the base of the main arroyo that drains the Current OB/OD Area during the conduct of the CFP in this area. In addition, the baseline information will be used to ensure the maintenance of existing habitat and species diversity within the Current and Closed OB/OD Areas throughout the performance of closure and during the post closure care period.

A wetland characterization was completed by on-site field mapping of each upland area and arroyo as well as the physical marking of any observed wetland-upland boundaries in the field. Preliminary results of the site walkover are presented in the following subsections.

### 4.5.1 *Wildlife and Habitat Survey*

The wildlife and habitat survey was conducted during the preliminary ecological survey of the OB/OD Areas (24 through 31 July 1995) in order to assess the current status of habitats on this site. This portion of the survey identified actual and probable usage of ecological habitats by indigenous wildlife species. Special attention was paid to the actual and potential for use of habitats by rare, threatened, or endangered species. Probable and observed exposure pathways and potential receptors were also characterized.

4.5.1.1 *Results of Preliminary Wildlife and Habitat Survey*

***Closed OB/OD Area***

The Closed OB/OD Area was mapped as predominantly grassland covertype as part of the RI/FS effort (ERM, 1995). During the preliminary ecological survey conducted in July 1995, it was observed that the Closed OB/OD Area has revegetated. Plants indicative of a mature grassland and sagebrush community were dominant in the Closed OB/OD Area (Figure 4-25)

Two deep arroyos are present within the Closed OB/OD Area. The two arroyos join to form one channel that extends northward and eventually intersects an arroyo that drains the Current OB/OD Area. Surface water flow, when present, within these arroyos is generally toward the east and north. Based on the July 1995 field reconnaissance, surface water flow in the arroyos is intermittent and only likely to be found immediately following a rainstorm or during spring snowmelt. The lack of vegetation in the bottom of the arroyos suggests that the sediments are extremely dry during dry times of the year and that significant scouring of the arroyo bottom occurs during flow events. The arroyos draining the Closed OB/OD Area are steeper in slope, resulting in greater run-off velocities than found in the arroyo draining the Current OB/OD Area. The preliminary field investigation revealed no indication of wet areas (e.g., wetlands or springs) close to the ground surface in the Closed OB/OD Area. However, several stands of cottonwood trees along the arroyo bottom indicated that those areas have a source of subsurface water close to the ground surface. This subsurface water may exist as soil moisture rather than as flowing ground water.

Most of the arroyo is sparse in vegetation. As described above, several stands of cottonwoods were observed; one of these stands, located at the confluence of the north and south arroyos, appeared to have high wildlife use. This high use is the result of the dense cover provided by the trees in close proximity to winter foraging areas of the Closed OB/OD Area, and the proximity to other habitats, primarily the Pinion Pine/Juniper woodland, and the rock faces of the Hogback.

***Current OB/OD Area***

The Current OB/OD Area was in regularly scheduled active operation until late 1992, and previously was disturbed on a regular basis. Currently plants are re-establishing an ecological community in the Current OB/OD Area. Even highly disturbed areas such as the craters and the Burning Ground Area are revegetating. While the habitats are

less structured and mature compared to areas in the Closed OB/OD Area, pioneer vegetation has become established throughout much of the previously bare areas.

A preliminary ecological survey of the Current OB/OD Area identified plants indicative of a grassland and sagebrush community. The Current OB/OD Area also supports a wetland habitat found in the arroyo that bisects the site as discussed in the wetland characterization (Section 4.6).

4.5.1.2 *Potential for Aquatic Ecosystems*

Based on the July 1995 preliminary site reconnaissance, the existence of an aquatic community is unlikely or limited to highly seasonal species. For the purposes of this Final Report, aquatic ecosystems are defined as those developing in streams, lakes, and perennial ponds. Several areas within the Current OB/OD Area (the bottom of the arroyo as well as several small water holes) were found to have plant species that are dependent on the presence of wet soils. The observed water holes have been seen on several site visits but only at wet times of the year (during snow melt and during the rainy season). At other times of the year, these water holes have been observed to be dry. Therefore, because of their small size, and the large ambient evaporation rate, these water holes are assumed, under typical conditions, to be dry during the drier portions of the year. Based on these observations it has been assumed that there are no year-round aquatic ecosystems in the OB/OD Areas.

The existence of even a seasonal aquatic ecosystem is unlikely because of the intermittent presence of water and water holes. If aquatic ecosystems did exist, they would be limited to algae, and invertebrates with short aquatic life stages. The water holes were evaluated during the July 1995 site investigation to determine if a seasonal aquatic ecosystem may have been present. No true aquatic species other than algae were identified as living in these water holes, therefore, further ecological assessment of habitat and wildlife was limited to terrestrial and wetland systems. The exposure of animals that drink water from these water holes and consume vegetation living in this water was believed to be a more significant exposure route.

The Closed OB/OD Area did not support plant species that are dependent on wet soils in the base of the arroyo; therefore, no aquatic habitat exists in this area.

### 4.5.1.3 *Habitat Characterization*

The July 1995 field effort identified general habitat types and potential receptors associated with each habitat type. The following descriptions of the habitat is based on the observations made during the field reconnaissance.

The Current OB/OD Area consists primarily of a field/sagebrush community, surrounded by a Pinion Pine/Juniper woodland community. A deep arroyo bisects the Current OB/OD Area and creates a variety of favorable wildlife habitats, as well as providing an "edge" effect (i.e., where two habitat types come into contact) which is preferred by many species. Wet periods of the year result in stream-like conditions in the arroyo. Although these periods appear to be temporary, the water may provide an opportunity for amphibians and aquatic insects to lay their eggs and complete their life cycle. At the time of the survey, a temporary pond existed in the arroyo near the center of the Current OB/OD Area. If the pond were able to hold water for longer periods of time, habitat suitable for migratory waterfowl could exist. During dry weather, the bottom of the arroyo within the Current OB/OD Area, although appearing dry, contains water close to the surface throughout most of its length. This water was observed in two areas that contained small water holes that apparently are heavily visited by wildlife as evidenced by many tracks observed during the site reconnaissance.

The presence of water also supports wetland vegetation along the majority of the arroyo (only the northern most portion of the arroyo does not support wetland plants). The wetland plants form two communities, a sedge meadow community and a coyote willow community. Both wetland communities are important to wildlife. The sedge meadows provide a food source for herbivores, and the willows, which form dense stands of low trees, provide shade and refuge areas as well as ambush sites for the predators. In several areas, deer bone remains of mountain lion kills were observed as well as recent mountain lion tracks and coyote tracks.

The Closed OB/OD Area is similar to the Current OB/OD Area in terms of habitat, except that wetlands or other aquatic communities are not present. The arroyos that flow through the Closed OB/OD Area are much drier habitats, with no surface expressions of water. Hence, little vegetation and no wetland vegetation are present in these arroyo bottoms. A large grove of cottonwood trees stands at the confluence of the North and South arroyo, and this area appears heavily used by wildlife. However, no surface water is present. Cliff swallow bank nests are

plentiful in the steeper walls of the arroyo and several abandoned coyote dens were observed.

## 4.6 *WETLANDS CHARACTERIZATION*

### 4.6.1 *Regulatory Background*

Wetlands in New Mexico are regulated under Section 404 and Section 401 of the Clean Water Act (CWA). Section 404 of the CWA is under the jurisdiction of the USACE, who conducts wetland delineation determinations (i.e., verification of a consultant's delineation) and regulation of the discharge of fill into wetlands via Nationwide Permits or, for larger project impacts, Individual Permits. Administration of Section 401 CWA regulations (water quality certification) has been assumed by the NMEMNRD. For impacts to wetlands that are greater than 0.5 acres, the NMEMNRD Surface Water Quality Bureau has permitting jurisdiction. The NMEMNRD Surface Water Quality Bureau is currently updating their New Mexico Wetland Plan, which will further define state wetland regulations.

According to wetland mapping conventions, wetland delineation in New Mexico of areas that are not agricultural lands (such as FWDA) must be conducted using the methodology found in the *U.S. Army Corps of Engineers Wetland Delineation Manual* (USACE, 1987), referred to as the 1987 manual. The routine on-site determination method specified in the 1987 manual was used to determine wetland-upland boundaries in the OB/OD Area. Hydrophytic (wetland) vegetation, hydric (wet) soils, and wetland hydrology must be present under normal environmental circumstances in order to characterize an area as a wetland according to this method.

Exceptions to the requirement that all three wetland parameters exist are allowed for disturbed (altered by human activities) and problem area wetlands. In these areas, one or more of the three field indicators may not be present as a result of recent change or naturally occurring conditions. Problem areas include seasonal wetlands (such as those occurring in New Mexico and other southwestern states) where wetland indicators of all three parameters are present during the wetter portion of the growing season. Such problem area wetlands may be inundated or saturated during the wetter part of the growing season, but wetland hydrology indicators may be totally lacking during the drier portion of the growing season.

For the wetland hydrology criteria to be positive under the 1987 Manual, hydrology must be present between 5 to 12.5 percent of the total growing

season. Therefore, with a growing season of approximately 131 days for the Gallup, New Mexico area (as determined by NRCS), an area could be considered having met the wetland hydrology criteria if an area is inundated or saturated between 7 to 16 consecutive days. If actual measurements of the duration of hydrology is not feasible, then physical evidence of recent wetland hydrology (water marks, drift lines, sediment deposits and drainage patterns) serve as positive evidence for wetland hydrology.

### 4.6.2 *Results of the Preliminary Wetland Survey*

To support the performance of the closure field program within the Closed and Current OB/OD Areas and the RCRA Interim Status Closure, a wetlands survey was performed that included identification and characterization. Previously, in support of the RI/FS (ERM, 1995), ecologists conducted identification and habitat covertype mapping in an effort to locate unique and regulated habitats within all of FWDA, including the OB/OD Areas. During past reconnaissance and review of available resource documentation for FWDA, it was observed that seasonal wetlands may exist in areas of the FWDA property in the form of small emergent and open water wetlands. These wetlands include emergent areas located along arroyos and small ponded bodies of water, both of which have been known to seasonally occur within the OB/OD Areas.

Results of the preliminary wetland survey did not identify wetland areas within the Closed OB/OD Area. The Current OB/OD Area supports wetland habitat found in the arroyo that bisects the site. Both scrub shrub (coyote willows) and emergent (sedge meadows) wetlands were observed within this arroyo. The wetland habitats are confined to the bottom of the arroyo and were not expected to be impacted by the waste trenching operations conducted during Phase IA of the CFP. The approximate location and extent of habitats located within the Current OB/OD Area are illustrated in Figure 4-25.

*Table 4-1*
*Closed OB/OD Area Trenching Investigation Summary Table*
*Old Burning Ground and Demolition Landfill Area*
*Fort Wingate Depot Activity*
*Gallup, New Mexico*

| Trench Identification | Approximate Trench Dimensions | | | Maximum Waste Thickness | Description of Waste Materials Encountered | Description of Underlying Materials |
|---|---|---|---|---|---|---|
| | Length (feet) | Average Depth (feet) | Max. Depth (feet) | | | |
| ***KGA3 GEOPHYSICAL ANOMALY AREA*** | | | | | | |
| KGA301 | 105 | 20 | 20 | 8 feet | One 75 mm projectile, metal banding, pallets, melted metallic masses, can lids, nails, hinges, and burned wood | Fine-coarse grained sand and gravel, very loose and well graded with many different lithologies of gravel, angular to rounded grains, occasional burned wood fragments |
| KGA302 | 85 | 10 | 20 | 8 feet | Metal banding, melted aluminum or magnesium masses, ash, and burned wood | Sandy silt, light brownish-gray, blocky and dry |
| KGA303 | 100 | 6 | 13 | 2 feet | Piles of metal banding, powder cans, rods, nails, and burned wood | Silty sand, light to dark brown, more red brown uphill from 65 ft. to end of trench |
| KGA304 | 103 | 10 | 16 | 5 feet | Metal banding, fuze components, metal pallets, nails, hinges, burned wood, one 75 mm projectile, and explosives stained soil | Silty sand, light gray brown and dry |
| KGA305 | 175 | 5 | 5 | Arroyo Edge | Multiple piles of scrap metal and branches on arroyo bank | Silty sand, light gray brown and dry |
| KGA306 | 110 | 6 | 20 | 4 feet | Metal banding, rods, cans, 8 ft section of rusted 5 in diameter dual wall pipe, nails, hinges, and burned wood | Sandy silt, light brownish gray and dry |
| KGA307 | 100 | 6 | 20 | 3 feet | Metal banding, hinges, nails, and burned wood | Fine-medium sand, light red and dry |

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| Trench Identification | Approximate Trench Dimensions | | | Maximum Waste Thickness | Description of Waste Materials Encountered | Description of Underlying Materials |
|---|---|---|---|---|---|---|
| | Length (feet) | Average Depth (feet) | Max. Depth (feet) | | | |
| ***KGA3 continued*** | | | | | | |
| KGA308 | 285 | 6 | 20 | 3 feet | Rusted meal rings, nails, hinges, melted metallic masses, wood, burned wood, and white insulation | Fine-medium sand, light reddish brown and dry |
| KGA309 | 55 | 5 | 6 | N/A | Scattered surface debris only, no subsurface waste | Sandy silt, light gray brown, blocky, hard and dry |
| KGA310 | 230 | 6 | 20 | 3 feet | Large sized (up to 6' in diameter) metal debris from tanks and pipes, concrete blocks, residue, rebar, and metal banding | Sandy silt, light brownish gray blocky and dry |
| KGA311 | 260 | 5 | 5 | 5 feet | Three metal leaching tanks (5.5' wide by 15.2' long by 3.7' deep) and associated piping (all excavated and removed to trash pile at the southwest end of the Closed Area); rusted metal, burned wood, nails, hinges, can lids, and metal banding, | Silty sand to fine sand, some silt, light reddish brown and dry |
| KGA312 | 82 | 5 | 5 | N/A | Scattered surface debris only, no subsurface waste | Fine to medium sand, light reddish brown and dry |
| KGA313 | 90 | 5 | 5 | N/A | Scattered surface debris only, no subsurface waste | Fine to medium sand, light reddish brown and dry |
| KGA314 | 245 | 5 | 20 | 4 feet | Rusted metal, nails, hinges, and burned wood | Fine sand, some silt, light brownish gray and dry |

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|---|---|---|---|---|---|---|
| | Length (feet) | Average Depth (feet) | Max. Depth (feet) | | | |
| ***KGA4 GEOPHYSICAL ANOMALY AREA*** | | | | | | |
| KGA401 | 160 | 15 | 17 | 2 feet | Impact fuzes (both bomb and projectile), scrap metal, ordnance fragments, burn kettle slag, burned wood fragments, partially burned wood, nails, and white ash | Fine to coarse sand, gravely, very loose, and dry |
| KGA402 | 160 | 6 | 10 | 2 feet | Burned wood | Fine silty sand, light gray brown, hard, blocky and dry |
| KGA403 | 42 | 12 | 16 | N/A | Scattered surface debris only, no subsurface waste | Sandy silt, light brown and dry |
| KGA404 | 30 | 5 | 5 | 2 feet | White banding, burn residue | Sandy silt, light gray brown and dry |
| KGA406 | 55 | 5 | 6 | 2 feet | Burned wood, small oxidized metal fragments, nails, fuze components, and metal banding | Sandy silt, light gray brown and dry |
| KGA409 | 65 | 66 | 10 | 10 feet | Small oxidized metal fragments, burnt fuzes, nails, and burned wood | Sandy silt, light brown and dry |
| KGA410 | 100 | 6 | 21 | 2.5 feet | Dull white, highly-oxidized aluminium or magnesium powdered waste consisting of rusted fuze components and pipe bombs | Silty fine sand, light gray brown, hard, blocky and dry |
| KGA411 | 15 | 5 | 5 | N/A | No waste was encountered | Coarse sand to fine gravel with cobbles, moist |

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| Trench Identification | Approximate Trench Dimensions | | | Maximum Waste Thickness | Description of Waste Materials Encountered | Description of Underlying Materials |
|---|---|---|---|---|---|---|
| | Length (feet) | Average Depth (feet) | Max. Depth (feet) | | | |
| ***KGA5 GEOPHYSICAL ANOMALY AREA*** | | | | | | |
| KGA501 | 54 | 6 | 8 | 1 foot | Burn residue with metal fragments (nail, flat metal), clay bricks | Very fine silty sand, loose and dry |
| KGA502 | 45 | 8 | 17 | 1 foot | Ash, rusted nails, projectiles, scrap metal | Fine to medium silty sand, loose and dry |
| ***KP2 WASTE PILE AREA*** | | | | | | |
| KP201 | 47 | 3 | 8 | 1 foot | Metal banding, ordnance fragments, and explosives stained soil | Silty sand, yellow brown and dry, overlying sand at 15 feet bgs, red brown and slightly moist |
| KP203 | 159 | 18 | 20 | Arroyo Edge | Multiple piles of scrap metal and branches on arroyo bank | Sand, fine to coarse grained, gravely, slightly moist, very loose, angular grains of many different lithologies present as gravel, occasional burned wood fragments, and<br>Sandy silty clay, very dense, mottled appearance, with white streaks filling fractures, abundant burned wood fragments, dry, occasional fractures filled with red material |
| KP204 | 52 | 7 | 11 | Arroyo Edge | Multiple piles of scrap metal and branches on arroyo bank | Sand, fine to coarse grained, gravely, slightly moist, very loose, and<br>Sandy silty clay, very dense, mottled appearance, with white streaks filling fractures, abundant burned wood fragments, dry, occasional fractures filled with red material |
| ***KP2 continued*** | | | | | | |

*Table 4-1*
*Closed OB/OD Area Trenching Investigation Summary Table*
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*Fort Wingate Depot Activity*
*Gallup, New Mexico*

| Trench Identification | Approximate Trench Dimensions | | | Maximum Waste Thickness | Description of Waste Materials Encountered | Description of Underlying Materials |
|---|---|---|---|---|---|---|
| | Length (feet) | Average Depth (feet) | Max. Depth (feet) | | | |
| KP205 | 63 | 4 | 5 | Arroyo Edge | Multiple piles of scrap metal and branches on arroyo bank | Sand, fine to coarse grained, gravely, slightly moist, very loose, and Sandy silty clay, very dense, mottled appearance, with white streaks filling fractures, abundant burned wood fragments, dry, occasional fractures filled with red material |
| ***KP3 WASTE PILE AREA*** | | | | | | |
| KP301 | 218 | 17 | 20 | Arroyo Edge | Multiple piles of scrap metal and branches on arroyo bank | Silty sand, dry, overlying poorly sorted dry sand with some gravel at 18 ft bgs. |
| KP302 | 50 | 12 | 18 | Arroyo Edge | Multiple piles of scrap metal and branches on arroyo bank | Silt with some sand, light brownish gray, blocky and dry, overlying dry silty sand at 10 ft bgs. |
| KP303 | 18 | 2 | 2 | Arroyo Edge | Multiple piles of scrap metal and branches on arroyo bank | Sand, dry, grading from light to dark brown to reddish brown at 65 ft along trench |
| KP3TP01 | 24 | 16 | 16 | N/A | No waste was encountered | Sandy silt, light brownish gray and dry, grading to sand, reddish brown and dry |
| KP3TP02 | 22 | 16 | 16 | N/A | No waste was encountered | Sandy silt, light brownish gray and dry, grading to sand, reddish brown and dry |
| KP3TP03 | 26 | 17 | 17 | N/A | No waste was encountered | Silty sand, light brownish gray and dry |
| ***KP3 continued*** | | | | | | |

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*Fort Wingate Depot Activity*
*Gallup, New Mexico*

| Trench Identification | Approximate Trench Dimensions | | | Maximum Waste Thickness | Description of Waste Materials Encountered | Description of Underlying Materials |
|---|---|---|---|---|---|---|
| | Length (feet) | Average Depth (feet) | Max. Depth (feet) | | | |
| KP3TP04 | 26 | 20 | 20 | N/A | No waste was encountered | Sandy silt, dark grayish brown and dry; overlying brown silty sand, grading to medium grained light reddish sand at 55 ft along trench |
| KP3TP05 | 25 | 21 | 21 | N/A | No waste was encountered | Silty sand, light brown and dry; overlying light reddish brown medium grained sand at 14 ft bgs and grading to dark reddish brown dry medium grained sand at 220 ft along trench. |
| ***KP4 WASTE PILE AREA*** | | | | | | |
| KP401 | 25 | 10 | 20 | N/A | No waste was encountered | Sandy silt, light gray brown and dry. |
| KP402 | 10 | 3 | 5 | N/A | No waste was encountered | Sandy silt, light gray brown and dry. |
| KP4AP | 60 | 10 | 15 | 10 feet | Rusted metal cans, cardboard tubes, melted aluminum, fuze components, burn residue, ammo boxes, charcoal, hinges, nails, and wire rope | Sandy silt, light gray brown and dry. |

*Table 4-2*
*Closed OB/OD Area Trenching Investigation Summary Table*
*Old Demolition Area*
*Fort Wingate Depot Activity*
*Gallup, New Mexico*

| Trench Identification | Approximate Trench Dimensions | | | Maximum Waste Thickness | Description of Waste Materials Encountered | Description of Underlying Materials |
|---|---|---|---|---|---|---|
| | Length (feet) | Average Depth (feet) | Max. Depth (feet) | | | |
| ***KGA1 GEOPHYSICAL ANOMALY AREA*** | | | | | | |
| KGA101 | 100 | 6 | 20 | N/A | No waste was encountered | Medium sand, light olive brown |
| KGA102 | 60 | 6 | 20 | N/A | No waste was encountered | Medium sand, light olive brown |
| KGA103 | 200 | 6 | 20 | N/A | No waste was encountered | Fine sand, slightly silty, light brownish gray |
| KGA104 | 171 | 6 | 20 | 4 feet | Several 75 mm projectiles, fuze pieces, smoke and flare ejectors, nails and hinges | Fine/medium sand with some silt, light brown and moist |
| KGA105 | 45 | 5 | 5 | N/A | No waste was encountered | Fine/medium sand with some silt, light brown and moist |
| KGA1TP01 | 25 | 5 | 5 | 3 feet | Several 75 mm projectiles, smoke and flare ejectors | Silty sand, light yellow brown and dry |
| ***KGA2 GEOPHYSICAL ANOMALY AREA*** | | | | | | |
| KGA201 | 105 | 6 | 20 | 4 feet | 75 and 90 mm projectiles, smoke and flare candles, nails and hinges | Silty sand, light yellow brown and dry |
| KGA202 | 120 | 6 | 20 | 6 feet | 40, 75, and 90 mm projectiles, nails and hinges | Silty sand, light yellow brown and dry |

*Table 4-2*
*Closed OB/OD Area Trenching Investigation Summary Table*
*Old Demolition Area*
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| Trench Identification | Approximate Trench Dimensions | | | Maximum Waste Thickness | Description of Waste Materials Encountered | Description of Underlying Materials |
|---|---|---|---|---|---|---|
| | Length (feet) | Average Depth (feet) | Max. Depth (feet) | | | |
| ***KGA2 continued*** | | | | | | |
| KGA203 | 100 | 6 | 20 | 0.1 foot | Nails, hinges, and can lids | Silty sand, light brownish gray-black, hard and dry |
| KGA204 | 105 | 6 | 20 | 2 feet | Rusted mortars | Silty sand, light brownish gray and dry; Sandy silt, light yellow brown, blocky and dry |
| KGA205 | 48 | 6 | 20 | N/A | No waste was encountered | Silty sand, light brownish gray and dry; Sandy silt, light yellow brown, blocky and dry |
| KGA206 | 35 | 10 | 20 | 5 feet | 90 and 155 mm projectiles, metal rods | Silt, some sand, light brown gray, hard and dry |
| KGA2TP01 | 30 | 5 | 5 | 2 feet | 40, 75, and 90 mm projectiles, nails and hinges | Silty sand, light brown and dry |
| ***KP1 WASTE PILE AREA*** | | | | | | |
| KP101 | 39 | 10 | 16 | 8 feet | Two 100 mm experimental projectiles, rusted and breached | Silt, some sand, light gray brown, blocky and dry |
| KP102 | 40 | 8 | 15 | 5 feet | 105 mm experimental mortars, rusted and breached or bent | Silt, some sand, light gray brown, blocky and dry |
| KP103 | 35 | 13 | 15 | N/A | No waste was encountered | Silty sand, pale brown |

*Table 4-3*
*Closed OB/OD Area Visible Waste Summary*
*Fort Wingate Depot Activity*
*Gallup, New Mexico*

| Waste Area Identification | Description of Waste Materials Encountered | Visible Waste/Debris Volume Estimate (cubic yards) |
|---|---|---|
| KGA3 | Metal banding, metal pallets, melted metallic masses, cans and can lids, nails, hinges, and charcoal, ash, fuze components, multiple piles of scrap metal and branches, rods, wood, white insulation and rusted metal<br><br>Large sized (up to 6' in diameter) metal debris from tanks and pipes, concrete blocks, residue, rebar; and three metal leaching tanks (5.5' wide by 15.2' long by 3.7' deep) and associated piping (all excavated and removed to trash pile at the southwest end of the Closed Area) | 2,100 |
| KGA4 | Impact fuzes (both bomb and projectile), scrap metal, ordnance fragments, burn kettle slag, charcoal fragments, partially burned wood, nails, and white ash; white banding, burn residue; small oxidized metal fragments, fuze components, and metal banding, burnt fuzes<br><br>Dull white, highly-oxidized aluminium or magnesium powdered waste consisting of rusted fuze components and pipe bombs | 750 |
| KGA5 | Burn residue with metal fragments (nail, flat metal), clay bricks, ash, rusted nails, bullets, scrap metal | 10 |
| KP2 | Metal banding and ordnance fragments; debris on arroyo bank | 125 |
| KP3 | Debris on arroyo bank | 90 |
| KP4 | Rusted metal cans, cardboard tubes, melted aluminum, fuze components, burn residue, ammo boxes, charcoal, hinges, nails, and wire rope | 400 |
| KGA1 | Several 75 mm projectiles, fuze pieces, smoke and flare ejectors, nails and hinges | 140 |
| KGA2 | 40, 75, 90 and 155 mm projectiles, smoke and flare candles, nails and hinges, can lids, rusted mortars, metal rods | 350 |
| KP1 | Two experimental projectiles (rusted and breached); 105 mm experimental mortars (rusted and breached or bent) | 150 |
| | Closed OB/OD Area Total | 3,975 |

*Table 4-4*
*Current OB/OD Area Trenching Investigation Summary Table*
*Burning Ground Area*
*Fort Wingate Depot Activity*
*Gallup, New Mexico*

| Trench Identification | Approximate Trench Dimensions | | | Maximum Waste Thickness | Description of Waste Materials Encountered | Description of Underlying Materials |
|---|---|---|---|---|---|---|
| | Length (feet) | Average Depth (feet) | Max. Depth (feet) | | | |
| ***CRP1 RESIDUE/DEBRIS AREA*** | | | | | | |
| CRP101 | 190 | 7 | 11 | 6 feet | Empty fuze cans, metal banding, ash, burn residue (mostly contained in 40 gallon metal drums), ordnance fragments, wood debris | Silt, some sand, red, compact and moist |
| CRP102 | 28 | 5 | 13 | 3 feet | Explosives stained soil | Silt, some clay, some sand, red, compact and moist; inclusions of silty clay, black, plastic and moist |
| CRP103 | 20 | 13 | 13 | 4 feet | Metal banding and wire, ash, burn residue (mostly contained in 40 gallon metal drums), and ordnance fragments | Silt, some clay, some sand, red, compact and dry |
| CRP104 | 34 | 6 | 12 | 4 feet | Explosives stained soil | Silt, some sand, red, compact and moist |
| CRP1TP1 | 10 | 6 | 6 | 6 feet | Empty fuze cans, metal banding, ash, burn residue drums, ordnance fragments, wood debris in east headwall (abutting CRP101) only | Silt, some sand, red, compact and moist |
| CRP1TP2 | 10 | 6 | 6 | N/A | No waste was encountered | Silt, some sand, red, compact and moist |

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| Trench Identification | Approximate Trench Dimensions | | | Maximum Waste Thickness | Description of Waste Materials Encountered | Description of Underlying Materials |
|---|---|---|---|---|---|---|
| | Length (feet) | Average Depth (feet) | Max. Depth (feet) | | | |
| ***CRP2 RESIDUE/DEBRIS AREA*** | | | | | | |
| CRP201 | 95 | 6 | 10 | 2 feet | Burn residue, pieces of fuzes, ordnance fragments | Silty clay, reddish brown, compact, moist and plastic |
| CRP202 | 65 | 6 | 7 | 4 feet | Burn residue, pieces of fuzes, ordnance fragments, and two demilitarized 75 mm projectiles | Silty sand with weathered rock inclusions, reddish brown, compact and dry; struck weathered bedrock at 5 feet bgs in north end dipping south |
| CRP2TP1 | 10 | 6 | 6 | N/A | Spots of rusty metal and cans in west headwall only | Silty clay, reddish brown, compact, moist and plastic |
| ***CRP3 RESIDUE/DEBRIS AREA*** | | | | | | |
| CRP301 | 93 | 9 | 12 | 8 feet | Ash, slag, and burn residue, empty metal scrap propellant drums, metal banding, and gray-green oxidation powder | Clay, some sand, weak red, blocky and moist |
| CRP302 | 86 | 9 | 14 | 7 feet | Ash and burn residue, empty metal scrap propellant drums, pieces of spotting candles, fuzes, and gray-green oxidation powder | Clay, some sand, red, compact and moist |
| CRP3TP1 | 40 | 9 | 9 | 8 feet | Ash and burn residue, pieces of spotting candles, fuzes, and gray-green oxidation powder | Clay, some sand, red, blocky and moist |
| ***CRP4 RESIDUE/DEBRIS AREA*** | | | | | | |
| CRP401 | 65 | 5 | 6 | N/A | Small pile of metal banding, empty fuze cans, and other metal debris on arroyo bank; no subsurface waste was encountered | Sandy clay |
| CRP402 | 70 | 6 | 7 | N/A | No subsurface waste was encountered | Clay, some sand, brown |

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| Trench Identification | Approximate Trench Dimensions | | | Maximum Waste Thickness | Description of Waste Materials Encountered | Description of Underlying Materials |
|---|---|---|---|---|---|---|
| | Length (feet) | Average Depth (feet) | Max. Depth (feet) | | | |
| CRP4TP1 | 30 | 4 | 5 | 0.5 foot | Rust and widely scattered ordnance fragments | Silt, some gravel and some sand, brown, blocky |
| ***CRP5 RESIDUE/DEBRIS AREA*** | | | | | | |
| CRP501 | 30 | 6 | 6 | 4 feet | Burned 3.5 inch rocket motors and 3.5 inch rocket canisters | Silt, some sand, some clay, reddish brown, blocky |
| CRP502 | 55 | 7 | 13 | 6 feet | Metal banding and burned 3.5 inch rocket motors | Silt, some sand, some clay, reddish brown, blocky |
| CRP503 | 100 | 6 | 10 | 2 feet | Empty barrels, burned parachute flares, gray ash, burn residue, and explosives stained soil | Silt, some sand, some clay, trace gravel, reddish brown, blocky |
| CRP505 | 30 | 10 | 19 | 5 feet | Explosives stained soil and burned parachute flares | Sand, some silt, red |
| CRP506 | 35 | 10 | 17 | 12 feet | 3.5 inch rocket canisters, cardboard, metal banding, ammo boxes, barrels, steel beams, 105 mm powder cases, misc. ordnance, and burned fuzes | Sand, some silt, trace clay, red |
| ***CRP5 continued*** | | | | | | |
| CRP507 | 28 | 15 | 20 | 8 feet | 3.5 inch rocket canisters and metal banding | Sand, some silt, red |
| CRP508 | 49 | 7 | 7 | 7 feet | Metal banding, dunnage, wood, cardboard, wire, 3.5 inch rocket canisters, black ash, hinges, and ammo boxes | Sand, some silt, red |

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*Burning Ground Area*
*Fort Wingate Depot Activity*
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| Trench Identification | Approximate Trench Dimensions | | | Maximum Waste Thickness | Description of Waste Materials Encountered | Description of Underlying Materials |
|---|---|---|---|---|---|---|
| | Length (feet) | Average Depth (feet) | Max. Depth (feet) | | | |
| CRP509 | 35 | 10 | 10 | 5 feet | Explosives stained soil and burned parachute flares | Clay, some silt, red |
| CRP510 | 54 | 10 | 19 | 8 feet | Burned parachute flares, explosives stained soils, and white ash and burn residue | Sand, some silt, red |
| CRP511 | 15 | 11 | 15 | 8 feet | Burned parachute flares, ash and burn residue, explosives staining, chunks of high explosive (HE) mixed through packing material, metal banding and tubes | Clay, some silt, red |
| CRP512 | 110 | 7 | 15 | 7 feet | Pipes, steam headers with asbestos-containing material (ACM) wrapping, burned parachute flares, metal banding, ash, explosives staining, fuze pieces, tin cans, shipping containers, charred wood, and ordnance fragments | Clay, red |
| CRP513 | 25 | 22 | 22 | N/A | No waste was encountered | Clay, some sand, some gravel, red |
| ***CRP5 continued*** | | | | | | |
| CRP5TP1 | 20 | 12 | 12 | 7 feet | Metal banding, grenade cans, and 3.5 inch rocket canisters | Silt, some sand, some clay, reddish brown, blocky |
| CRP5TP2 | 25 | 15 | 15 | N/A | No waste was encountered | Silt, some sand, some clay, reddish brown |

*Table 4-4*
*Current OB/OD Area Trenching Investigation Summary Table*
*Burning Ground Area*
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*Gallup, New Mexico*

| Trench Identification | Approximate Trench Dimensions | | | Maximum Waste Thickness | Description of Waste Materials Encountered | Description of Underlying Materials |
|---|---|---|---|---|---|---|
| | Length (feet) | Average Depth (feet) | Max. Depth (feet) | | | |
| ***CRP6 RESIDUE/DEBRIS AREA*** | | | | | | |
| CRP601 | 140 | 5 | 6 | 4 feet | Metal debris and rust, scattered burn residue, one live 40 mm projectile, 20 mm projectiles, fuzes, and fragmentation bomb windings | Silt, some clay, reddish brown |
| CRP602 | 70 | 6 | 8 | 5 feet | Metal banding and debris | Clay, some silt, some sand, some gravel, red |
| CRP603 | 85 | 6 | 10 | 2 feet | Metal banding and debris | Sand, some silt, some clay, red |
| CRP604 | 12 | 6 | 6 | 4 feet | Burned ammo boxes, nails, hardware | Sand, some silt, some clay, red |
| CRP6TP1 | 20 | 6 | 6 | 2 feet | Ordnance fragments and metal debris | Sand, some silt, some clay, red |
| CRP6TP2 | 30 | 15 | 15 | 5 feet | Metal debris | Sand, some silt, brown |
| CRP6TP3 | 50 | 5 | 10 | 5 feet | Metal debris and numerous (589) live 40 mm projectiles | Silt, some sand, light gray |
| CRP6TP4 | 30 | 15 | 15 | 2 feet | No waste was encountered | Silt, some sand, light gray |
| ***CRP6 continued*** | | | | | | |
| CRP6TP5 | 25 | 15 | 15 | 2 feet | Metal debris | Silt, some sand, light gray |
| CRP6TP6 | 12 | 6 | 6 | 2 feet | Black ash, burned ammo boxes, nails, and hinges | Sand, some silt, reddish brown |

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*Gallup, New Mexico*

| Trench Identification | Approximate Trench Dimensions | | | Maximum Waste Thickness | Description of Waste Materials Encountered | Description of Underlying Materials |
|---|---|---|---|---|---|---|
| | Length (feet) | Average Depth (feet) | Max. Depth (feet) | | | |
| ***CRP7 RESIDUE/DEBRIS AREA*** | | | | | | |
| CRP701 | 30 | 6 | 12 | 6 feet | 40 mm projectiles, booster cups, fragments from 60 mm mortar, fuze pieces, 20 lb. bomb fragments, butterfly bomb fragments, ammo box hardware, and metal banding | Clay, some sand, red |
| CRP702 | 80 | 7 | 16 | 6 feet | Black stained soil, 40 mm, 57mm, and 75 mm projectiles and cases, oxidized metal powder, fragmentation bomb windings, ammo box hardware, packing materials, booster cups, and black ash | Clay, some sand, red |
| CRP703 | 150 | 6 | 15 | 8 feet | Debris | Clay, some gravel, red |
| CRP704 | 85 | 5 | 19 | 3 feet | 40 mm and 37 mm projectiles, nose trap fragments (pressure release booby trap firing devices), ammo box hardware, metal banding, and dunnage | Clay, some sand, red |
| CRP705 | 45 | 6 | 7 | 6 feet | Live 40 mm projectiles, burned 75 mm projectiles, dunnage, metal banding, and wooden ammo box debris | Clay, some sand, red |
| ***CRP7 continued*** | | | | | | |
| CRP706 | 15 | 10 | 10 | 9 feet | Scattered black ash and ammo box hardware | Clay, some sand, some silt, red |
| CRP707 | 15 | 12 | 12 | N/A | No waste was encountered | Clay, some sand, some silt, some cobbles, some boulders, red |

*Table 4-4*
*Current OB/OD Area Trenching Investigation Summary Table*
*Burning Ground Area*
*Fort Wingate Depot Activity*
*Gallup, New Mexico*

| Trench Identification | Approximate Trench Dimensions | | | Maximum Waste Thickness | Description of Waste Materials Encountered | Description of Underlying Materials |
|---|---|---|---|---|---|---|
| | Length (feet) | Average Depth (feet) | Max. Depth (feet) | | | |
| ***CRP8 RESIDUE/DEBRIS AREA*** | | | | | | |
| CRP801 | 85 | 5 | 7 | 4 feet | Container lids, metal banding, barrage rocket tubes, charred wood, and ammo box hardware | Clay, some sand, some gravel, red |
| CRP802 | 90 | 6 | 11 | 9 feet | Live 40 mm projectiles, fuzes, butterfly bomb pieces, miscellaneous bomb components, metal banding, and ammo box hardware | Clay, some sand, red |
| CRP803 | 75 | 6 | 7 | 4 feet | Live 40 mm and 75 mm projectiles, ordnance fragments, metal debris, ammo box hardware, pieces of wood, metal booster cups, and metal banding; one M83 "butterfly" bomblet that required detonation in place | Clay, some sand, red |
| CRP804 | 65 | 6 | 10 | 9 feet | 40 mm live projectiles, burned wood, ammo box hardware, metal banding, and dunnage | Clay, some sand, red |
| ***CRP8 continued*** | | | | | | |
| CRP805 | 60 | 5 | 15 | 7 feet | Live 37 mm and 40 mm projectiles, fuze pieces, metal banding, dunnage, and pieces of butterfly bombs | Clay, some sand, red |

*Table 4-4*
*Current OB/OD Area Trenching Investigation Summary Table*
*Burning Ground Area*
*Fort Wingate Depot Activity*
*Gallup, New Mexico*

| Trench Identification | Approximate Trench Dimensions | | | Maximum Waste Thickness | Description of Waste Materials Encountered | Description of Underlying Materials |
|---|---|---|---|---|---|---|
| | Length (feet) | Average Depth (feet) | Max. Depth (feet) | | | |
| CRP806 | 80 | 8 | 10 | 8 feet | Pieces of butterfly bombs, frag, 40 mm projectiles, fuze pieces, black ash, packing container lids, metal banding, and ammo box hardware; one M83 "butterfly" bomblet that required detonation in place | Clay, red |
| CRP807 | 35 | 15 | 15 | 5 feet | 40 mm projectiles and ordnance fragments | Clay, some fractured rock, red |
| CRP808 | 30 | 16 | 16 | 7 feet | 20 mm, 40 mm, & 57 mm projectiles, miscellaneous ordnance debris, and fuze pieces | Clay, red |
| CRP809 | 25 | 18 | 20 | 9 feet | 20 mm & 40 mm projectiles, debris from 20 lb. frag bombs, butterfly bomb fragments, metal banding, fuze pieces, and dunnage | Clay, some sand, red |
| CRP810 | 24 | 11 | 14 | 1 foot | 40 mm projectiles, butterfly bomb fragments, 20 lb. frag bomb detonator assembly, and bomb fuze pieces | Clay, pale green |
| CRP811 | 32 | 3 | 3 | surface only | Ordnance fragments and rust on surface only | Clay, red |
| CRP812 | 28 | 5 | 5 | 4 feet | Ordnance fragments | Clay, pale red |
| ***CRP8 continued*** | | | | | | |
| CRP813 | 25 | 5 | 5 | 3 feet | Dark stained soil & fractured rock, 20 mm, 37 mm, 40 mm, & 57 mm fragments and projectiles, butterfly bomb fragments, 20 lb. frag bomb casings, fuzes, and primer tubes | Clay, purple/pale green/white |

*Table 4-4*
*Current OB/OD Area Trenching Investigation Summary Table*
*Burning Ground Area*
*Fort Wingate Depot Activity*
*Gallup, New Mexico*

| Trench Identification | Approximate Trench Dimensions | | | Maximum Waste Thickness | Description of Waste Materials Encountered | Description of Underlying Materials |
|---|---|---|---|---|---|---|
| | Length (feet) | Average Depth (feet) | Max. Depth (feet) | | | |
| CRP814 | 18 | 10 | 10 | 3 feet | Ordnance fragments and 40 mm projectiles | Clay, some sand, some silt, some gravel, some cobbles, red |
| CRP815 | 18 | 15 | 15 | 5 feet | Ordnance fragments and 40 mm projectiles | Clay, some sand, some silt, yellowish red |
| CRP708 | 20 | 17 | 17 | 8 feet | Ordnance fragments, metal rods, ammo box hardware, and braided steel cable | Clay, some silt, some sand, red |
| ***CRP9 RESIDUE/DEBRIS AREA*** | | | | | | |
| CRP901 | 173 | 7 | 12 | 8 feet | Numerous live projectiles (37, 40, and 90 mm), metal banding, ash/charcoal, rust stains and white powder, frag bomb windings, and fuze pieces; one M83 "butterfly" bomblet that required detonation in place | Sand, some silt, some gravel, some clay, weak red |
| CRP902 | 50 | 7 | 11 | 4 feet | 37 mm and 40 mm projectiles, metal banding, and ash | Sand clay mixture, weak red |
| CRP903 | 45 | 4 | 9 | 6.5 feet | 37 mm and 40 mm projectiles, fragmentation bomb windings, fuze components, and metal banding | Clay, some sand, weak red |
| ***CRP9 continued*** | | | | | | |
| CRP904 | 70 | 5 | 10 | 6 feet | 37 mm & 40 mm projectiles, firing wire, metal banding, dunnage, ammo box hardware, butterfly bomb fragments, miscellaneous ordnance, and fragmentation bomb windings | Sand clay mixture, red |

*Table 4-4*
*Current OB/OD Area Trenching Investigation Summary Table*
*Burning Ground Area*
*Fort Wingate Depot Activity*
*Gallup, New Mexico*

| Trench Identification | Approximate Trench Dimensions | | | Maximum Waste Thickness | Description of Waste Materials Encountered | Description of Underlying Materials |
|---|---|---|---|---|---|---|
| | Length (feet) | Average Depth (feet) | Max. Depth (feet) | | | |
| CRP906 | 40 | 6 | 8 | 7 feet | Rocket fuzes, bomb fuzes, 37 ,40, and 90 mm projectiles, butterfly bomb fragments, metal banding, charred wood, and miscellaneous charred debris | Clay, weak red |
| CRP907 | 20 | 9 | 9 | 3 feet | Ordnance fragments, banding, ordnance scrap, and 40 mm projectiles | Clay, some sand, some silt, yellowish red |
| CRP908 | 20 | 12 | 12 | 4 feet | Ordnance fragments, banding, ordnance scrap (75 mm projectiles, fragmentation bomb windings, butterfly bomb fragments), and 40 mm projectiles | Clay, some sand, some silt, yellowish red |
| CRP1003 | 15 | 10 | 10 | 1 foot | Ammunition box hardware and scattered ordnance fragments | Clay, some sand, some silt, weak red |
| ***CRP10 RESIDUE/DEBRIS AREA*** | | | | | | |
| CRP1001 | 74 | 7 | 8 | 2 feet | Burn residue and burned smoke cans | Clay, some silt, some gravel, some sand, weak red |
| CRP1002 | 45 | 5 | 8 | 2 feet | Burn residue, ash, and burned smoke cans | Clay, some silt, some sand, some gravel, weak red |

*Table 4-5*
*Current OB/OD Area Trenching Investigation Summary Table*
*Detonation Craters*
*Fort Wingate Depot Activity*
*Gallup, New Mexico*

| Trench Identification | Approximate Trench Dimensions | | | Maximum Waste Thickness | Description of Waste Materials Encountered | Description of Underlying Materials |
|---|---|---|---|---|---|---|
| | Length (feet) | Average Depth (feet) | Max. Depth (feet) | | | |
| ***CDC02 DETONATION CRATER*** | | | | | | |
| CDC0201 | 108 | 15 | 20 | 16 feet | Dark brown/black soil with fractured rock and ordnance fragments | Clay with silt and sand, weak red with gray/green mottle, and moist |
| CDC0202 | 138 | 15 | 15 | 14 feet | Dark brown/black soil with fractured rock and ordnance fragments | Clay with silt and sand, weak red with gray/green mottle, and moist |
| ***CDC04 DETONATION CRATER*** | | | | | | |
| CDC0401 | 108 | 15 | 15 | 13 feet | Dark brown/black soil with fractured rock and ordnance fragments; miscellaneous projectiles | Clay with silt and sand, weak red with gray/green mottle, and moist |
| CDC0402 | 145 | 15 | 15 | 13 feet | Dark brown/black soil with ash and fractured rock; ordnance fragments | Clay with silt and sand, weak red with gray/green mottle, and moist |
| ***CDC06 DETONATION CRATER*** | | | | | | |
| CDC0601 | 135 | 15 | 20 | 13 feet | Dark stained soil with ash and ordnance fragments | Clay with silt and sand, weak red with gray/green mottle, and moist |
| CDC0602 | 150 | 15 | 15 | N/A | No waste was encountered | Clay with silt and sand, weak red with gray/green mottle, and moist |

*Table 4-5*
*Current OB/OD Area Trenching Investigation Summary Table*
*Detonation Craters*
*Fort Wingate Depot Activity*
*Gallup, New Mexico*

| Trench Identification | Approximate Trench Dimensions | | | Maximum Waste Thickness | Description of Waste Materials Encountered | Description of Underlying Materials |
|---|---|---|---|---|---|---|
| | Length (feet) | Average Depth (feet) | Max. Depth (feet) | | | |
| ***CDC08 DETONATION CRATER*** | | | | | | |
| CDC0801 | 95 | 15 | 15 | 6 feet | Black ash, metal banding, dunnage (packing materials), and ordnance fragments | Clay with silt and sand, weak red with gray/green mottle, and moist |
| CDC0802 | 90 | 15 | 15 | 3 feet | Black ash, metal banding, dunnage, and ordnance fragments | Clay with silt and sand, weak red with gray/green mottle, and moist |
| ***CDC10 DETONATION CRATER*** | | | | | | |
| CDC1001 | 135 | 15 | 20 | 17 feet | Dark stained soil with ordnance fragments | Clay with silt and sand, weak red with gray/green mottle, and moist |
| CDC1002 | 143 | 15 | 15 | 13 feet | Dark stained soil with green coloring, ordnance fragments | Clay with silt and sand, weak red with gray/green mottle, and moist |

*Table 4-6*
*Current OB/OD Area Visible Waste Summary*
*Fort Wingate Depot Activity*
*Gallup, New Mexico*

| Waste Area Identification | Description of Waste Materials Encountered | Visible Waste/Debris Volume Estimate (cubic yards) |
|---|---|---|
| CRP1 | Explosives stained soil; empty fuze cans, metal banding, ash, burn residue, ordnance fragments, and wood debris | 500 |
| CRP2 | Burn residue, pieces of fuzes, ordnance fragments, demilitarized 75 mm projectiles | 250 |
| CRP3 | Ash, slag, and burn residue, empty metal scrap propellant drums, metal banding, pieces of spotting candles, fuzes, and gray-green oxidation powder | 750 |
| CRP4 | Rusty and widely scattered ordnance fragments on surface | N/A |
| CRP5 | Burned 3.5 inch rocket motors and 3.5 inch rocket canisters, burned parachute flares, burned fuzes and fuze pieces; grenade cans; metal banding; chunks of high explosive mixed through packing material; ammo boxes, powder cases; gray, black and white ash and burn residue; explosives stained soil<br><br>Pipes, steam headers with asbestos-containing material (ACM) wrapping; wood, wire, hinges; dunnage, cardboard, empty barrels, tin cans and steel beams. | 1,600 |
| CRP6 | Metal banding and debris, burned ammo boxes and burn residue, nails, hinges, hardware, ordnance fragments, numerous live projectiles, black ash | 9,000 |
| CRP7 | Various projectiles (some live) and cases; ordnance fragments; ammo box hardware, metal banding; metal rods, braided steel cable, dunnage and packing materials, booster cups, fuze pieces, fragmentation bomb windings, miscellaneous debris, black ash and black stained soil | 2,400 |
| CRP8 | Two live M83 "butterfly" bomblets, blown in place; various projectiles (some live); ordnance fragments; fuzes, butterfly bomb pieces, metal banding, ammo box hardware, barrage rocket tubes, fragmentation bomb debris, metal boosters cups and other metal debris, dunnage, container lids, dark stained soil and fractured rock, black ash | 15,500 |

*Table 4-6*
*Current OB/OD Area Visible Waste Summary*
*Fort Wingate Depot Activity*
*Gallup, New Mexico*

| Waste Area Identification | Description of Waste Materials Encountered | Visible Waste/Debris Volume Estimate (cubic yards) |
|---|---|---|
| CRP9 | One live M83 "butterfly" bomblet, blown in place; numerous live projectiles, metal banding, fuze components, ordnance fragments, fragmentation bomb windings, ammo box hardware, butterfly bomb fragments, rust stains and white powder, firing wire, dunnage, ash/charcoal and miscellaneous charred debris | 2,450 |
| CRP10 | Burn residue, burned smoke cans, ash, ammo box hardware and scattered ordnance fragments | 50 |
| CDC02 | Dark brown/black soil with fractured rock and ordnance fragments | 5,000 |
| CDC04 | Dark brown/black soil with fractured rock and ordnance fragments and ash | 3,100 |
| CDC06 | Dark stained soil with ash and ordnance fragments | 170 |
| CDC08 | Black ash, metal banding, dunnage (packing materials), and ordnance fragments | 300 |
| CDC10 | Dark stained soil (some with green coloring), ordnance fragments | 3,670 |
| | Current OB/OD Area Total (excludes seven demolition craters not investigated) | 44,385 |

*Table 4-7*
*Potentially Occurring Threatened and Endangered Species (a)*
*Fort Wingate Depot Activity*
*Gallup, New Mexico*

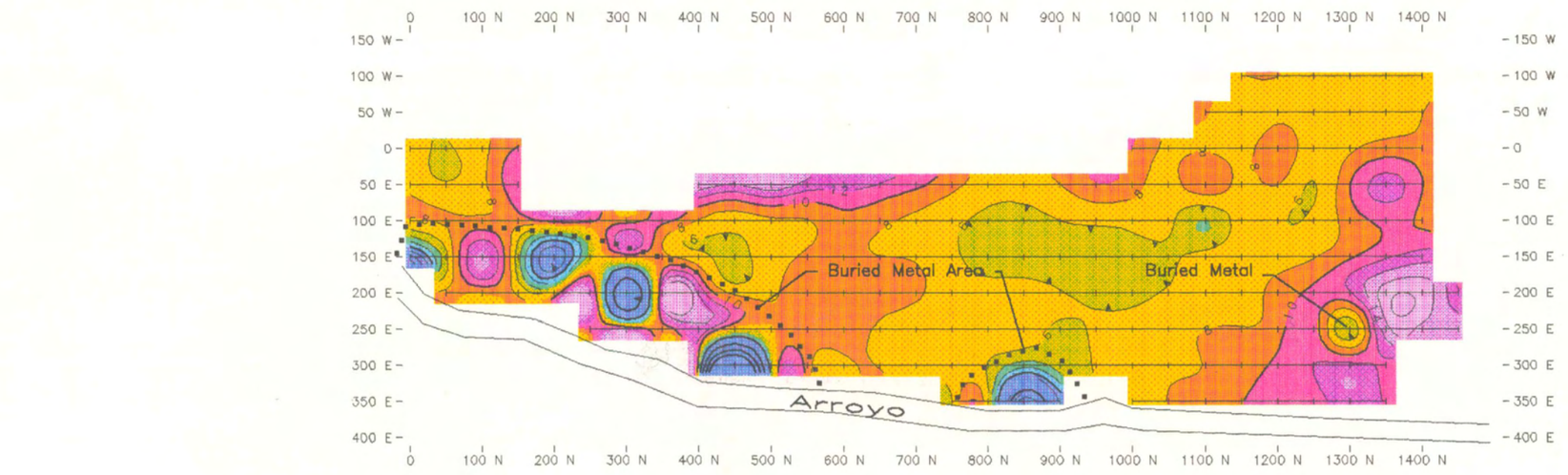
| Species (Animal) | Designation |
|---|---|
| *Bald Eagle *(Haliaetus leucocephalus)* | State and Federally endangered |
| *Peregrine Falcon *(Falco peregrine)* | State and Federally endangered |
| *Southwestern Willow Flycatcher *(Empidonax trailii extimus)* | State endangered Group 2 , Federal Notice of Review |
| *Gray Vireo *(Vireo vicinior)* | State endangered Group 2 |
| Southern Spotted Owl *(Strix occidentalis lucidor)* | Federal Category 2 Candidate |
| Northern Goshawk *(Accipiter gentilis apache)* | Federal Category 2 Candidate |
| Spotted Bat *(Euderma maculatum)* | State endangered Group 2, Federal Category 2 Candidate |
| Black-footed Ferret *(Mustela nigripes)* | Federally endangered |

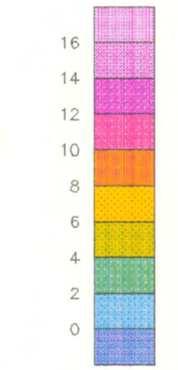
| Species (Plant) | Designation |
|---|---|
| Zuni Fleabane *(Erigeron rhizomatus)* | Federally endangered |
| Acoma Fleabane *(Erigeron acomanis)* | Federal Category 2 Candidate |
| Wright's Pincushion Cactus *(Mammilaria wrightii var. wrightii)* | State protected |
| Grama Grass Cactus *(Toumeya papyracantha)* | State protected, Federal Category 2 Candidate |
| Pecos Sunflower *(Helianthus paradoxus)* | State protected, Federal Category 1 Candidate |
| Chaco Milkvetch *(Astragalus micromerius)* | State sensitive species |
| Zuni Milkvetch *(Astragalus accumbens)* | State sensitive species |
| Orchid *(Piperia unalascensis)* | Proposed State endangered |

(a) Source: USACE (1991).

* State endangered wildlife found in McKinley County.

# Figure 4-1
## Terrain Conductivity Map
### Old Burning Ground/Demolition Landfill
### Fort Wingate Depot Activity
### Gallup, New Mexico




Scale 1:2400

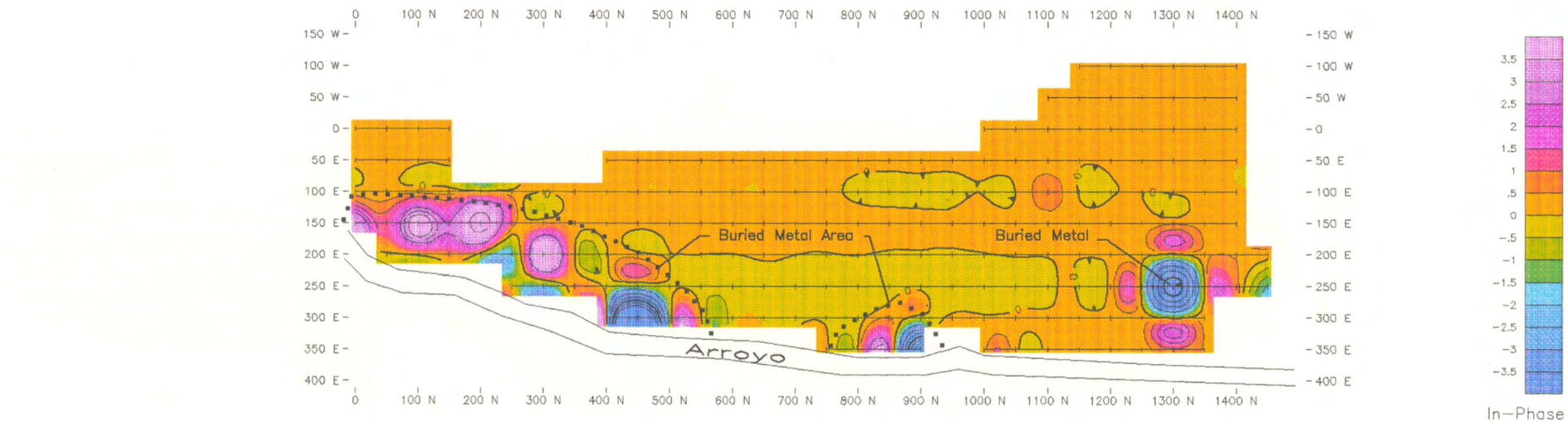
100 0 100 200 300 400 500

(feet)

PMC

PM306.80.01/EK/6.18.93 REV/10.22.97

# Figure 4-2
## In-Phase EM Map
### Old Burning Ground/Demolition Landfill
### Fort Wingate Depot Activity
### Gallup, New Mexico

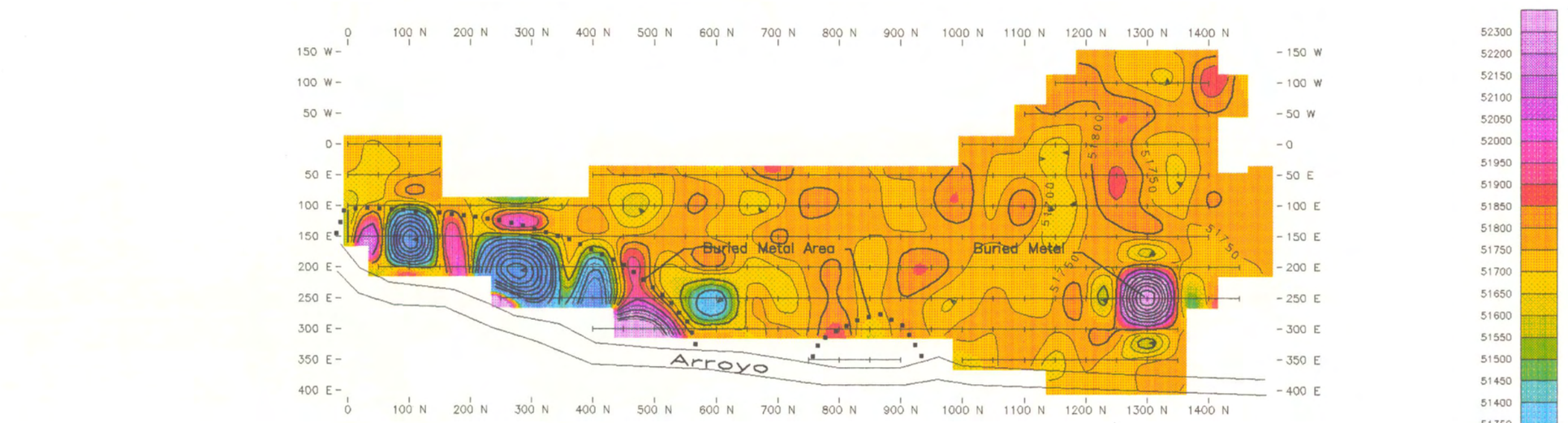



Scale 1:2400

100 0 100 200 300 400 500

(feet)

# Figure 4-3
## Total Magnetic Field Map
### Old Burning Ground/Demolition Landfill
### Fort Wingate Depot Activity
### Gallup, New Mexico





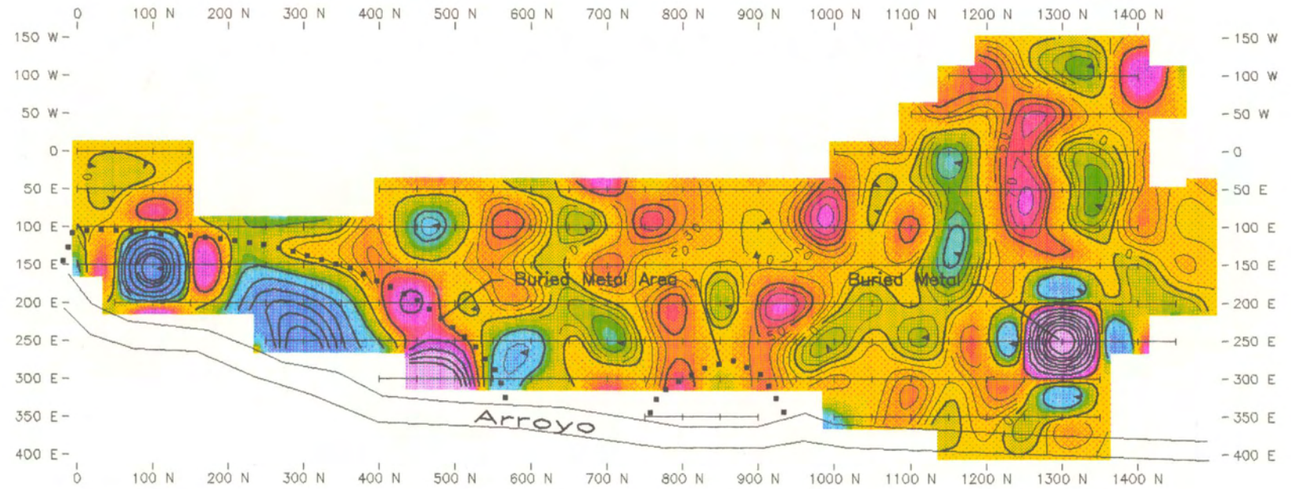


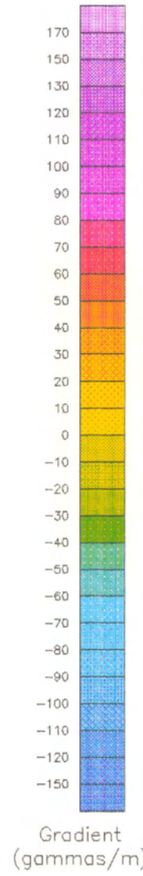
Scale 1:2400

100 0 100 200 300 400 500

(feet)

# Figure 4-4
## Vertical Magnetic Gradient Map
### Old Burning Ground/Demolition Landfill
### Fort Wingate Depot Activity
### Gallup, New Mexico



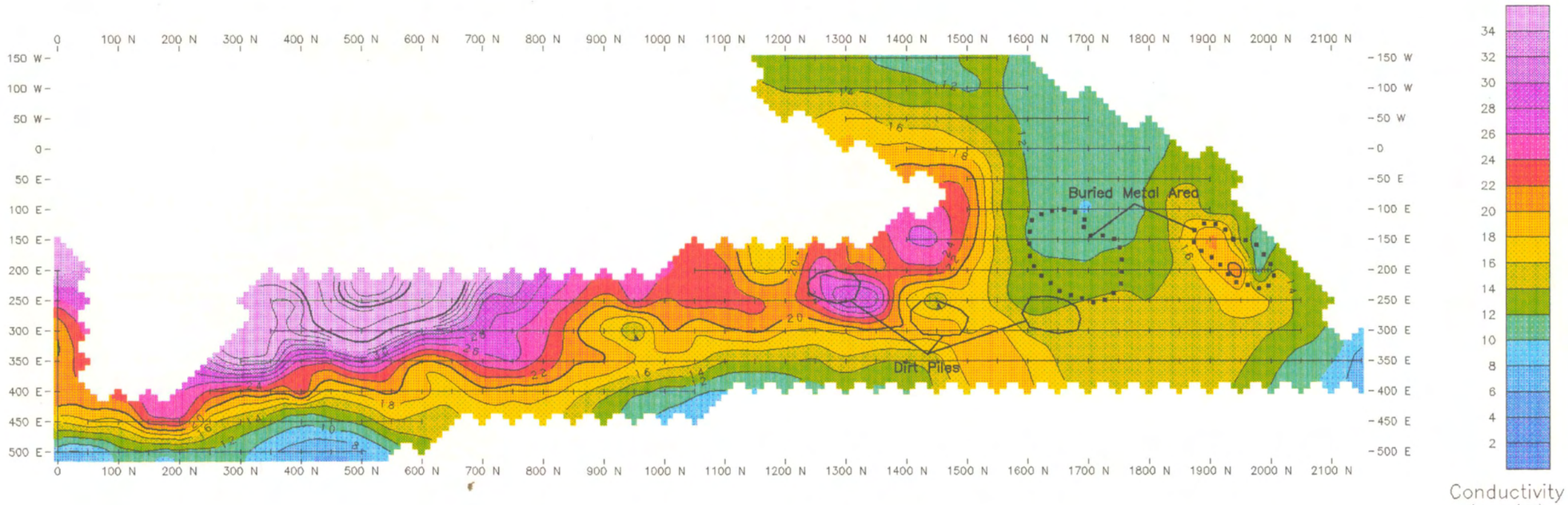




Scale 1:2400

100 0 100 200 300 400 500

(feet)

# Figure 4-5
# Terrain Conductivity Map
## Old Demolition Area
## Fort Wingate Depot Activity
## Gallup, New Mexico




Scale 1:2400

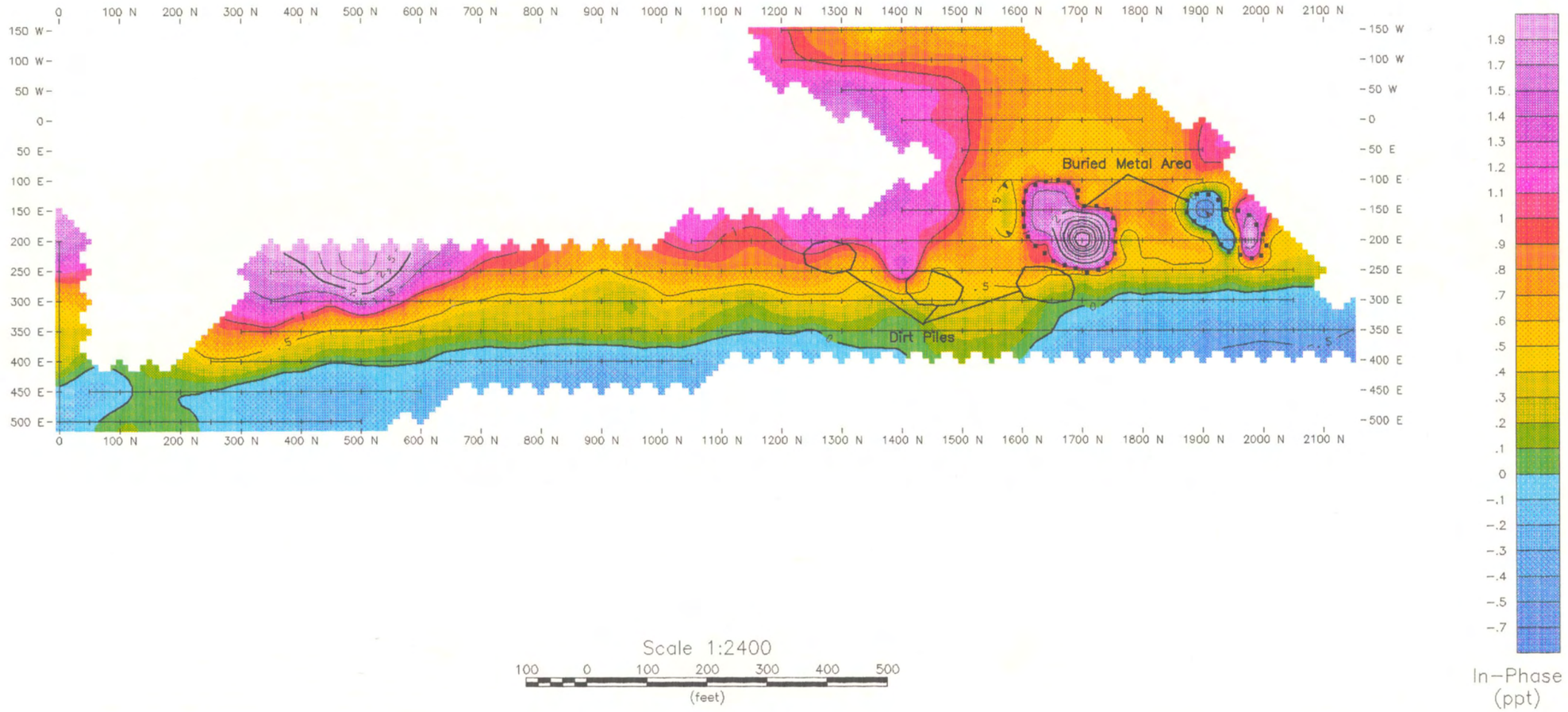
100 0 100 200 300 400 500

(feet)

PMC

PM306.80.01/EK/6.18.97 REV/10.22.97

# Figure 4-6
# In-Phase EM Map
## Old Demolition Area
## Fort Wingate Depot Activity
## Gallup, New Mexico

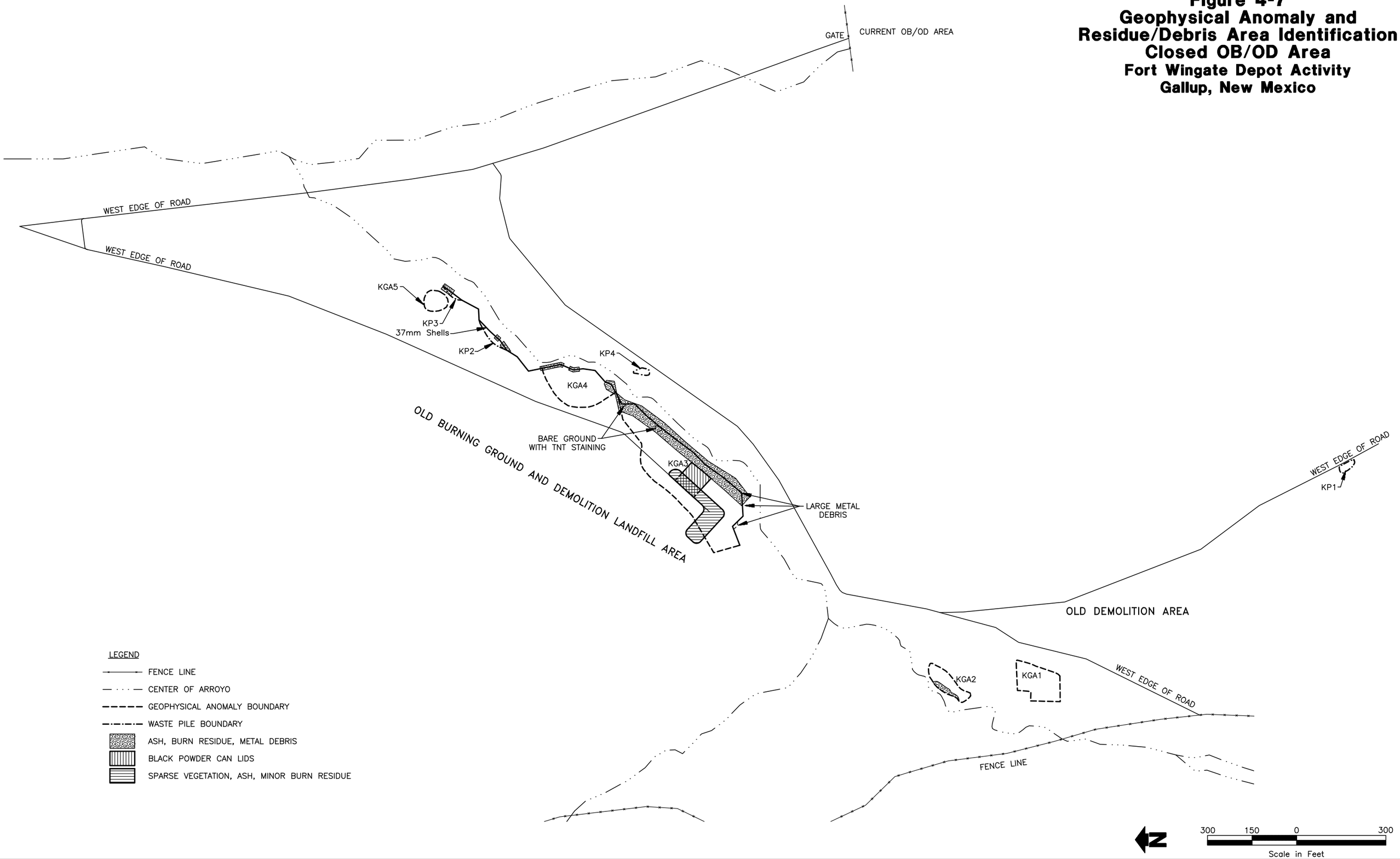



Scale 1:2400

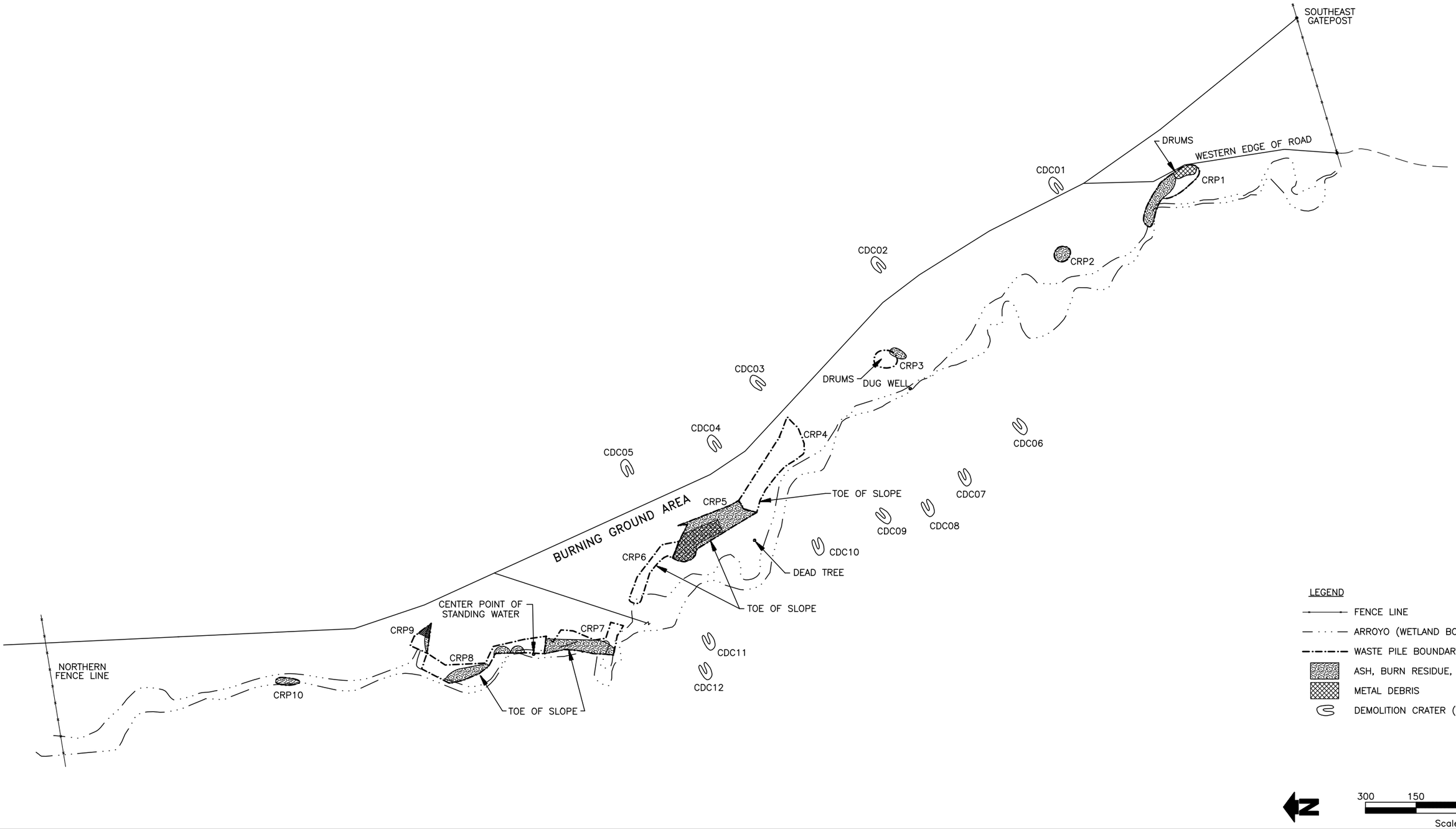
100 0 100 200 300 400 500

(feet)

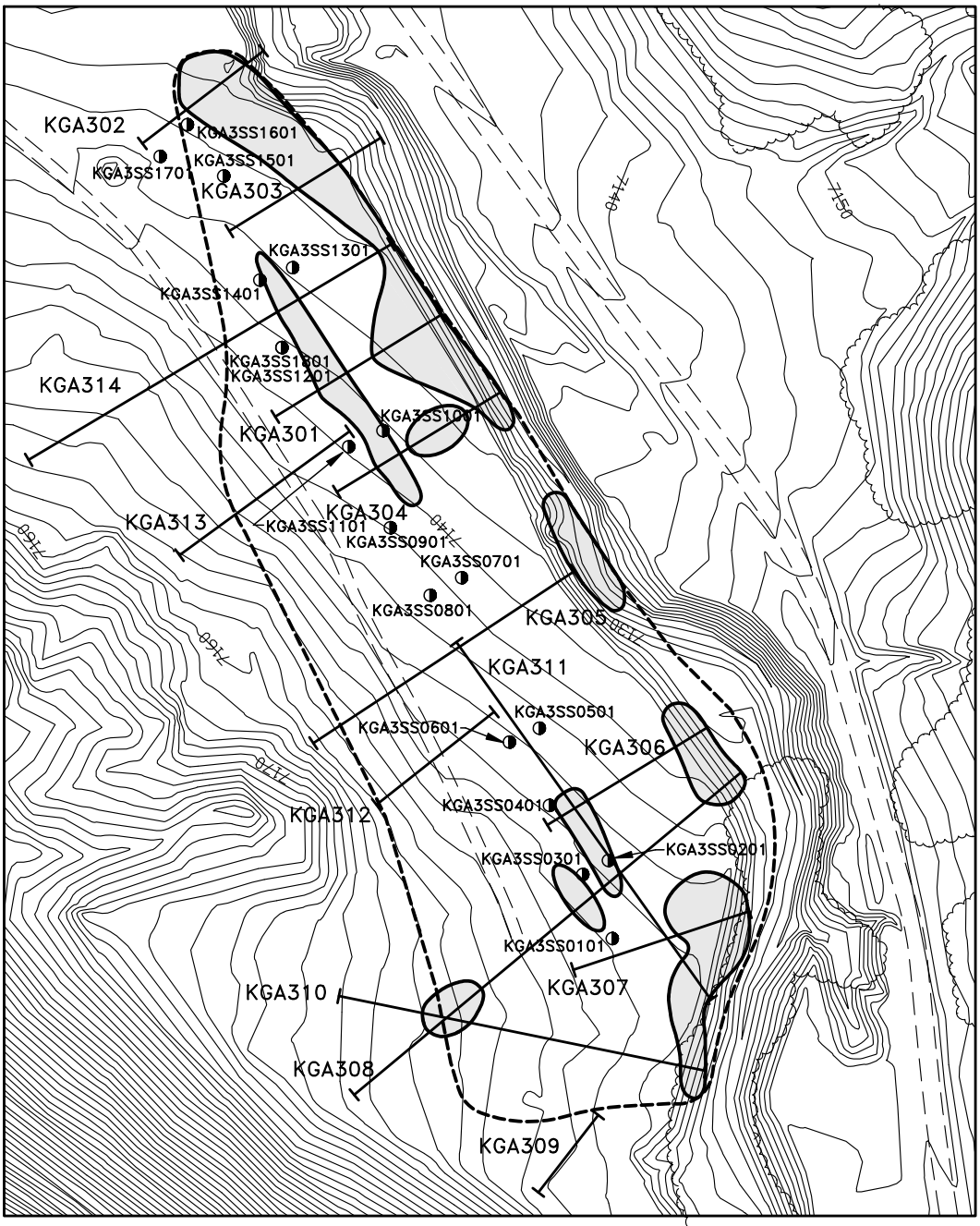
# Figure 4-7
# Geophysical Anomaly and Residue/Debris Area Identification
# Closed OB/OD Area
## Fort Wingate Depot Activity
## Gallup, New Mexico



# Figure 4-8
# Geophysical Anomaly and Residue/Debris Area Identification
# Current OB/OD Area
## Fort Wingate Depot Activity
## Gallup, New Mexico



# Figure 4-11
# KGA3 Geophysical Anomaly Investigation
## Fort Wingate Depot Activity
## Gallup, New Mexico




Waste Volume Estimate: 2,100 cubic yards

Waste Description: Metal banding, metal pallets, melted metallic masses, cans and can lids, explosives stained soil, nails, hinges, and charcoal, ash, fuze components, multiple piles of scrap metal and branches, rods, wood, white insulation and rusted metal.

Large sized (up to 6' in diameter) metal debris from tanks and pipes, concrete blocks, residue, rebar; and three metal leaching tanks (5.5' wide by 15.2' long by 3.7' deep) and associated piping (all excavated and removed to trash pile at the southwest end of the Closed Area)

Legend

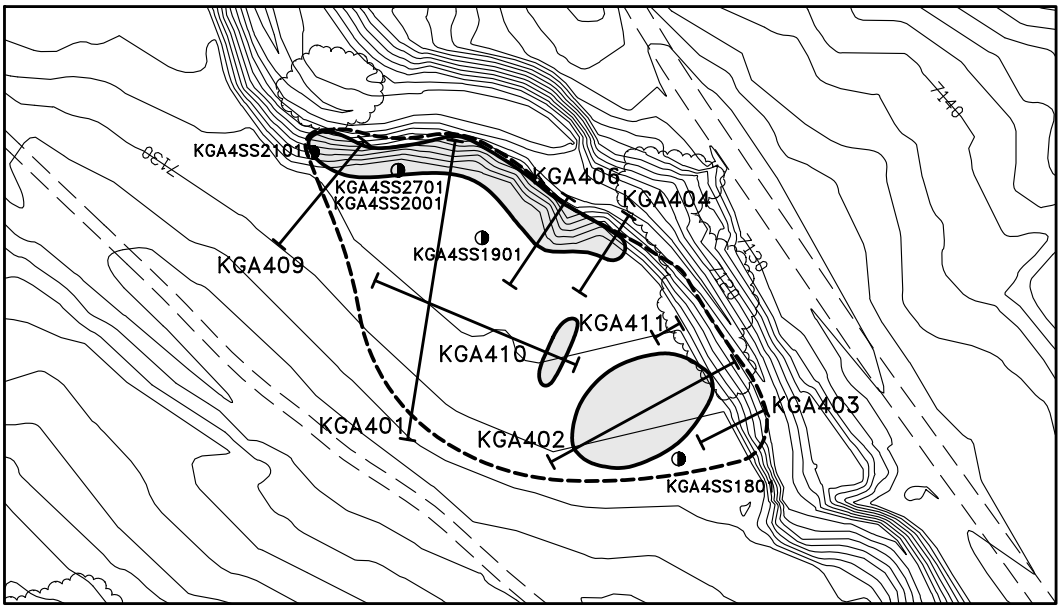
- Approximate Boundary of Geophysical Anomaly
- Interpreted Subsurface Residue/Debris Area After Excavation
- Surface Soil Sample

N

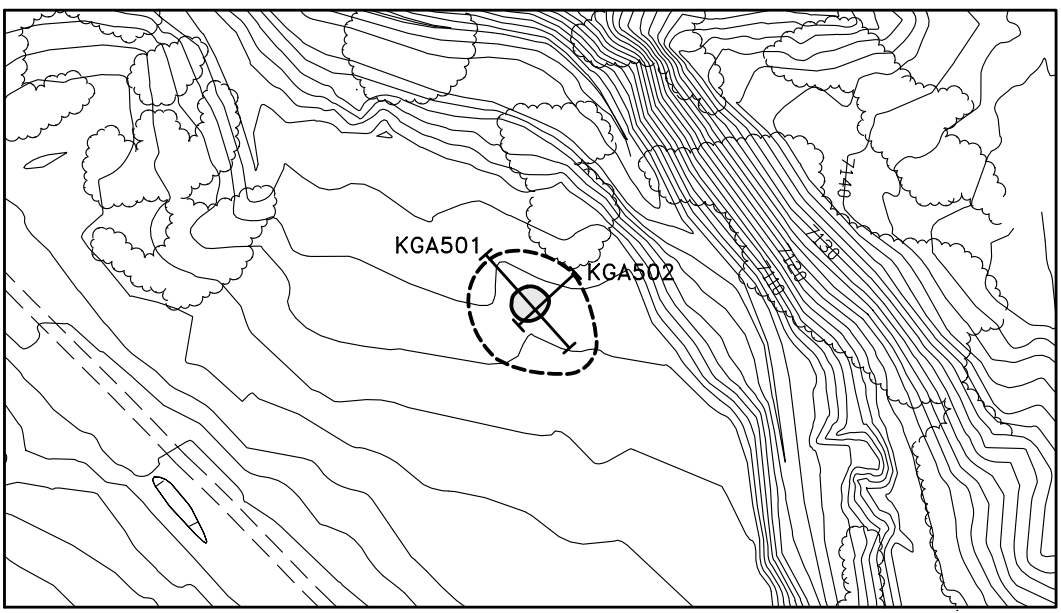
100 50 0 100

Scale in Feet

# Figure 4-12
# KGA4 and KGA5 Geophysical Anomalies Investigation
## Fort Wingate Depot Activity
## Gallup, New Mexico




Waste Volume Estimate: 750 cubic yards
Waste Description: Impact fuzes (both bomb and projectile), scrap metal, ordnance fragments, burn kettle slag, charcoal fragments, partially burned wood, nails, and white ash; white banding, burn residue; small oxidized metal fragments, fuze components, and metal banding, burnt fuzes. Dull white, highly–oxidized aluminum or magnesium powdered waste consisting of rusted fuze components and pipe bombs




Waste Volume Estimate: 10 cubic yards
Waste Description: Burn residue with metal fragments (nail, flat metal), clay bricks, ash, rusted nails, bullets, scrap metal

Legend

Approximate Boundary of Geophysical Anomaly

Interpreted Subsurface Residue/Debris Area After Excavation

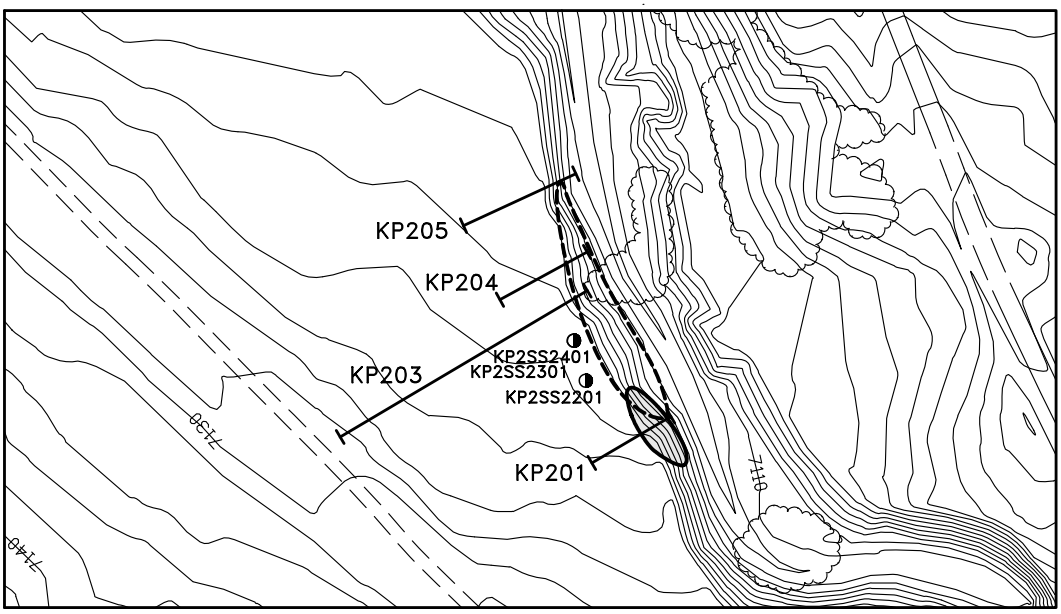
Surface Soil Sample

N

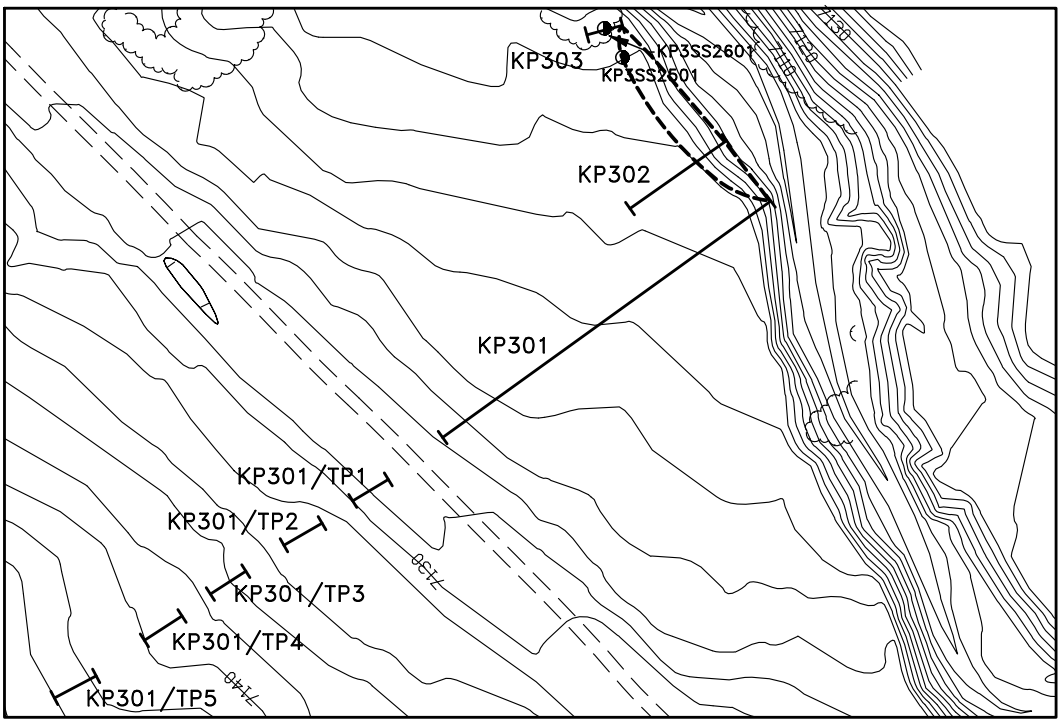
100 50 0 100

Scale in Feet

# Figure 4-13
# KP2 and KP3 Waste Piles Investigation
## Fort Wingate Depot Activity
## Gallup, New Mexico




Waste Volume Estimate: 125 cubic yards
Waste Description: Metal banding and ordnance fragments




Waste Volume Estimate: 90 cubic yards
Waste Description: No subsurface waste was encountered, metal debris on surface

Legend

Approximate Boundary of Surface Debris/Residue Pile

Interpreted Subsurface Residue/Debris Pile After Excavation

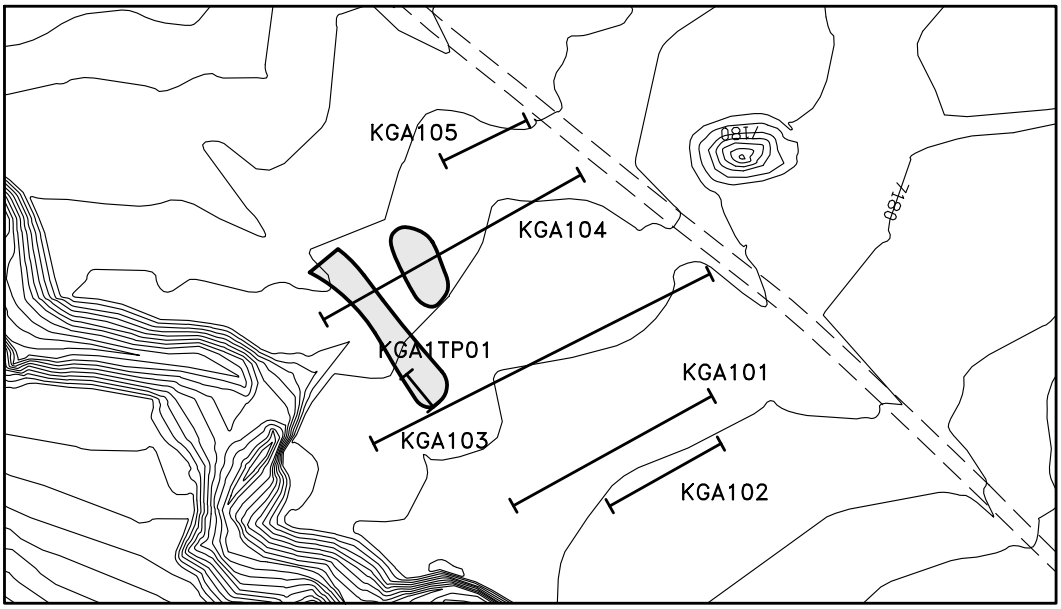
Surface Soil Sample

N

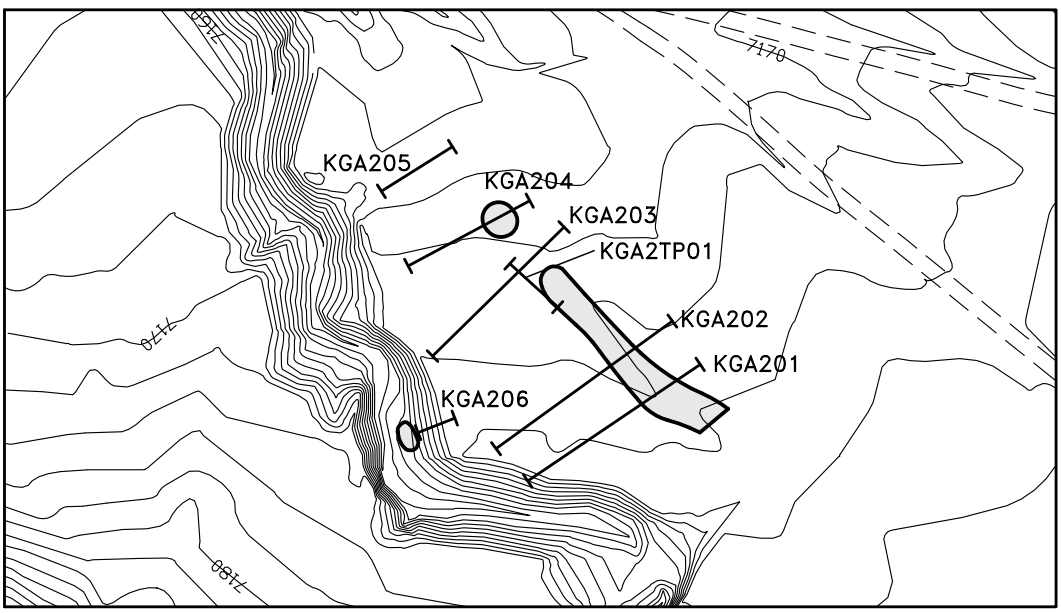
100 50 0 100

Scale in Feet

# Figure 4-14
# KGA1 and KGA2 Geophysical Anomalies Investigation
## Fort Wingate Depot Activity
## Gallup, New Mexico




Waste Volume Estimate: 140 cubic yards
Waste Description: Several 75 mm projectiles, fuze pieces, smoke and flare ejectors, nails and hinges




Waste Volume Estimate: 350 cubic yards
Waste Description: 40, 75, 90 and 155 mm projectiles, smoke and flare candles, nails and hinges, can lids, rusted mortars, metal rods

Legend

Approximate Boundary of Geophysical Anomaly

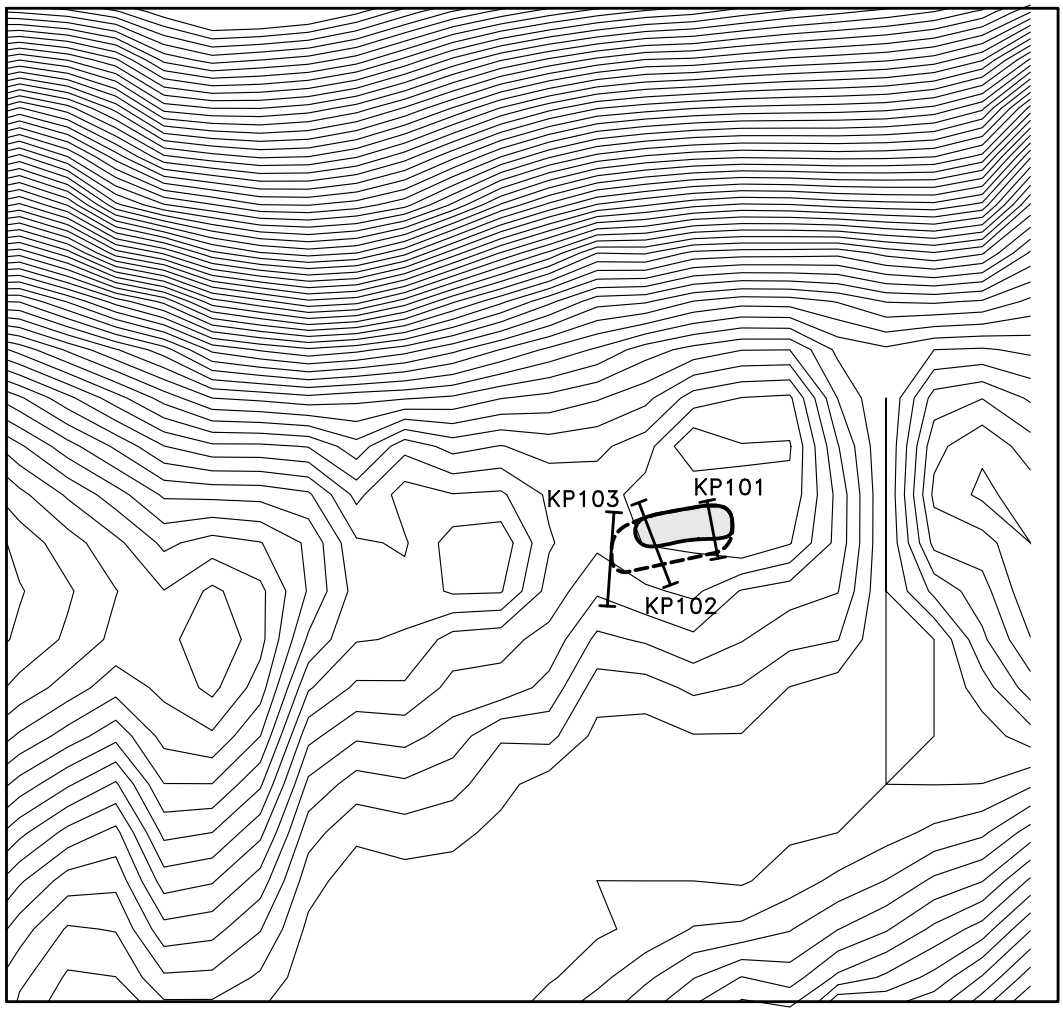
Interpreted Subsurface Residue/Debris Area After Excavation

N

100 50 0 100

Scale in Feet

# Figure 4-15
# KP1 Waste Pile Investigation
## Fort Wingate Depot Activity
## Gallup, New Mexico




Waste Volume Estimate: 150 cubic yards
Waste Description: Two experimental projectiles (rusted and breached); 105 mm experimental mortars (rusted and breached or bent)

Legend

Approximate Boundary of Surface Debris/Residue Pile

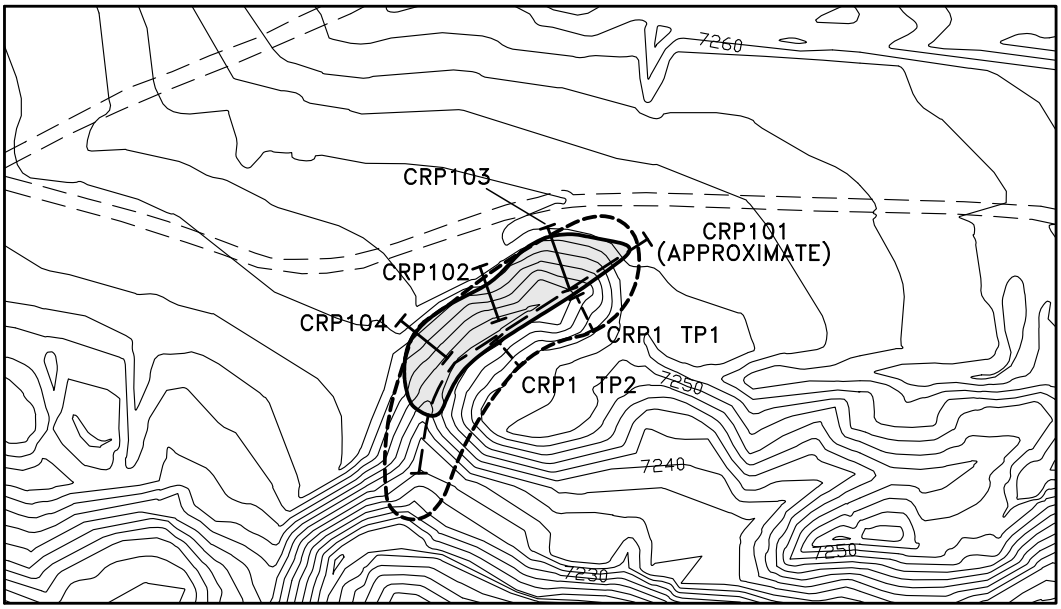
Interpreted Subsurface Residue/Debris Pile After Excavation

N

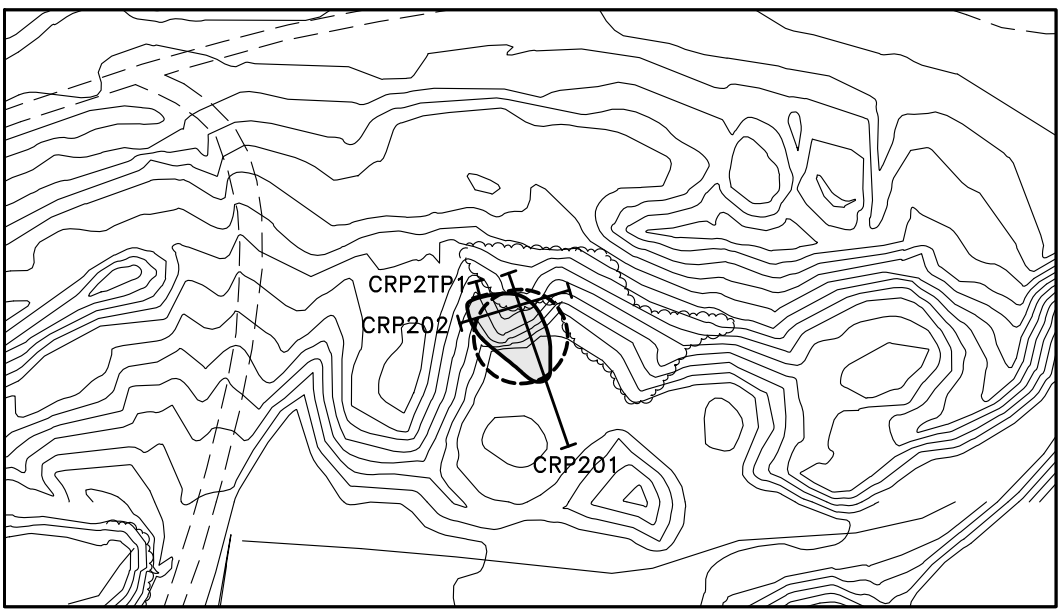
100 50 0 100

Scale in Feet

# Figure 4-17
# CRP1 and CRP2 Residue/Debris Areas Investigation
## Fort Wingate Depot Activity
## Gallup, New Mexico




Waste Volume Estimate: 500 cubic yards
Waste Description: TNT–stained soil; empty fuze cans, metal banding, ash, burn residue, ordnance fragments, wood debris, metal propellant drums




Waste Volume Estimate: 250 cubic yards
Waste Description: Burn residue, pieces of fuzes, ordnance fragments, demilitarized 75mm projectiles

Legend

Approximate Boundary of Surface Residue/Debris Pile

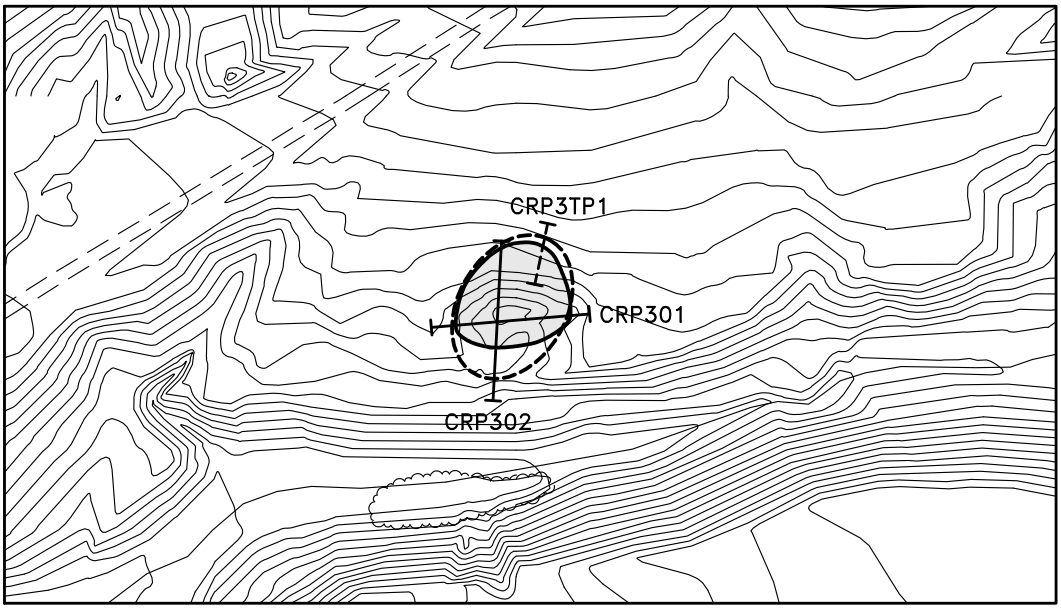
Interpreted Subsurface Residue/Debris After Excavation

N

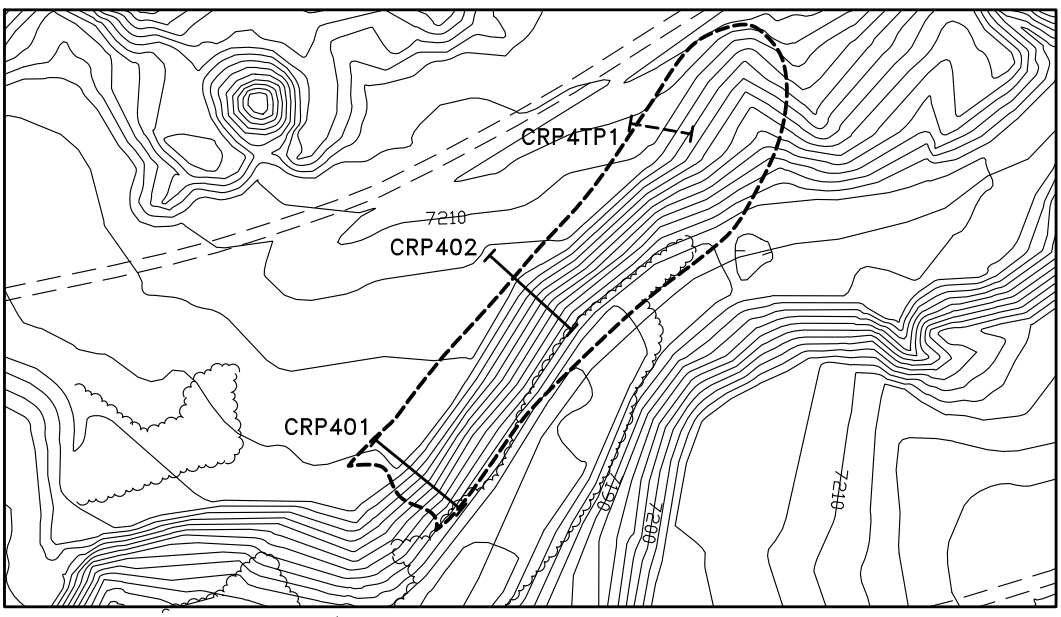
100 50 0 100

Scale in Feet

# Figure 4-18
# CRP3 and CRP4 Residue/Debris Areas Investigation
## Fort Wingate Depot Activity
## Gallup, New Mexico




Waste Volume Estimate: 750 cubic yards
Waste Description: Ash, slag, and burn residue, empty metal scrap propellant drums, metal banding, pieces of spotting candles, fuzes, and gray–green oxidation powder




Waste Volume Estimate: N/A
Waste Description: Rusty and widely scattered ordnance fragments on surface, no subsurface debris/residue observed

Legend

Approximate Boundary of Surface Residue/Debris Pile

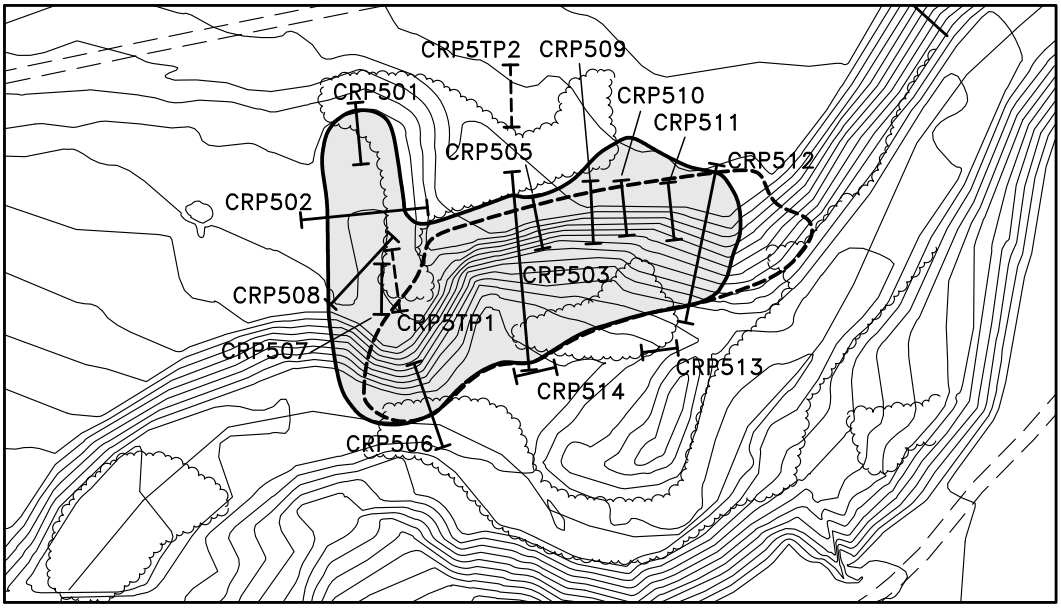
Interpreted Subsurface Residue/Debris After Excavation

N

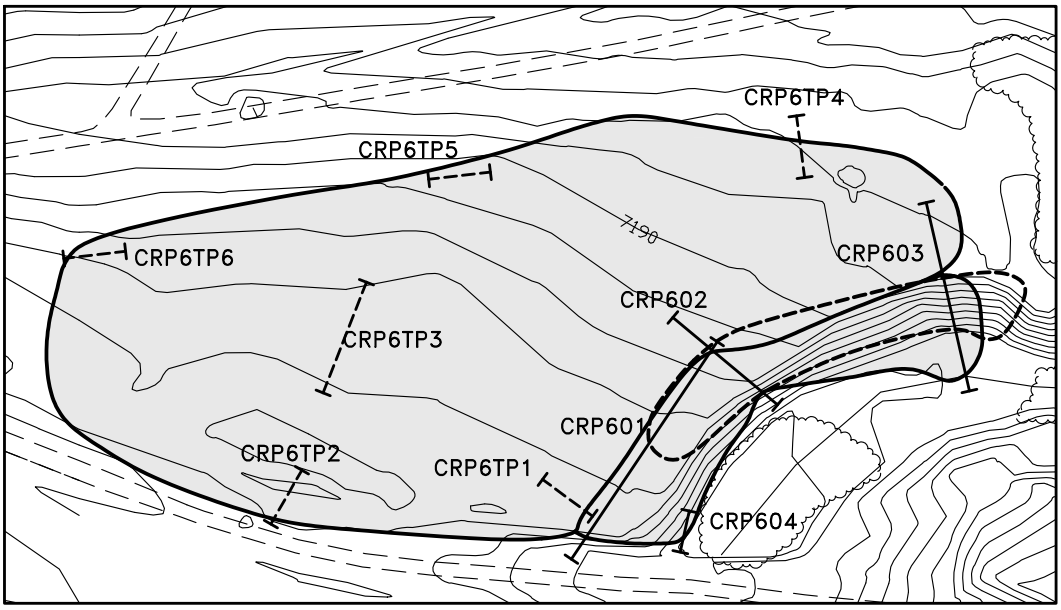
100 50 0 100

Scale in Feet

# Figure 4-19
# CRP5 and CRP6 Residue/Debris Areas Investigation
## Fort Wingate Depot Activity
## Gallup, New Mexico




Waste Volume Estimate: 1,600 cubic yards
Waste Description: Burnt 3.5 inch rocket motors and 3.5 inch rocket canisters, burnt parachute flares, burnt fuzes and fuze pieces; grenade cans; metal banding; chunks of high explosive mixed through packing material; ammo boxes, powder cases; gray, black and white ash and burn residue; TNT stained soil.
Pipes, steam headers with asbestos–containing material (ACM) wrapping; wood, wire, hinges; dunnage, cardboard, empty barrels, tin cans and steel beams




Waste Volume Estimate: 9,000 cubic yards
Waste Description: Metal banding and debris, burnt ammo boxes and burn residue, nails, hinges, hardware, ordnance fragments, live 40mm projectiles and other ORW, black ash

Legend

Approximate Boundary of Surface Residue/Debris Pile

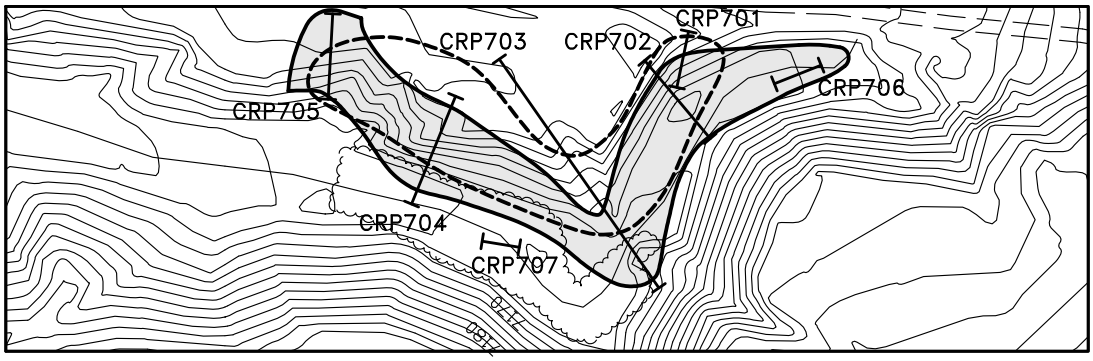
Interpreted Subsurface Residue/Debris After Excavation

N

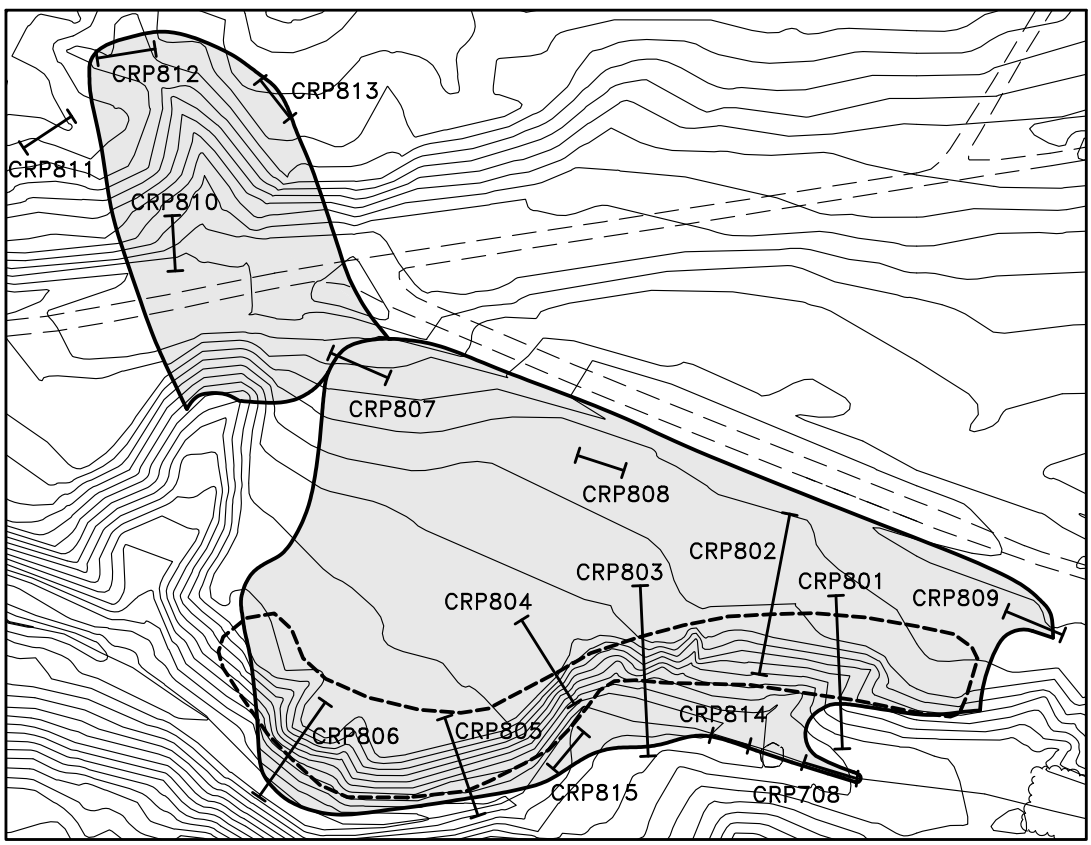
100 50 0 100

Scale in Feet

# Figure 4-20
# CRP7 and CRP8 Residue/Debris Areas Investigation
## Fort Wingate Depot Activity
## Gallup, New Mexico




Waste Volume Estimate: 2,400 cubic yards
Waste Description: Various projectiles (some live) and cases; ordnance fragments and ORW; ammo box hardware, metal banding; metal rods, braided steel cable, dunnage and packing materials, booster cups, fuze pieces, frag bomb windings, miscellaneous debris, black ash and black stained soil




Waste Volume Estimate: 15,500 cubic yards
Waste Description: 20mm, 37mm, 40 mm, 57mm and 75mm projectiles (some live); ordnance fragments; fuzes, butterfly bomb pieces, metal banding, ammo box hardware, barrage rocket tubes, 20 lb. frag bomb debris, metal boosters cups and other metal debris, dunnage, container lids, and other ORW; dark stained soil and fractured rock, black ash

Legend

Approximate Boundary of Surface Residue/Debris Pile

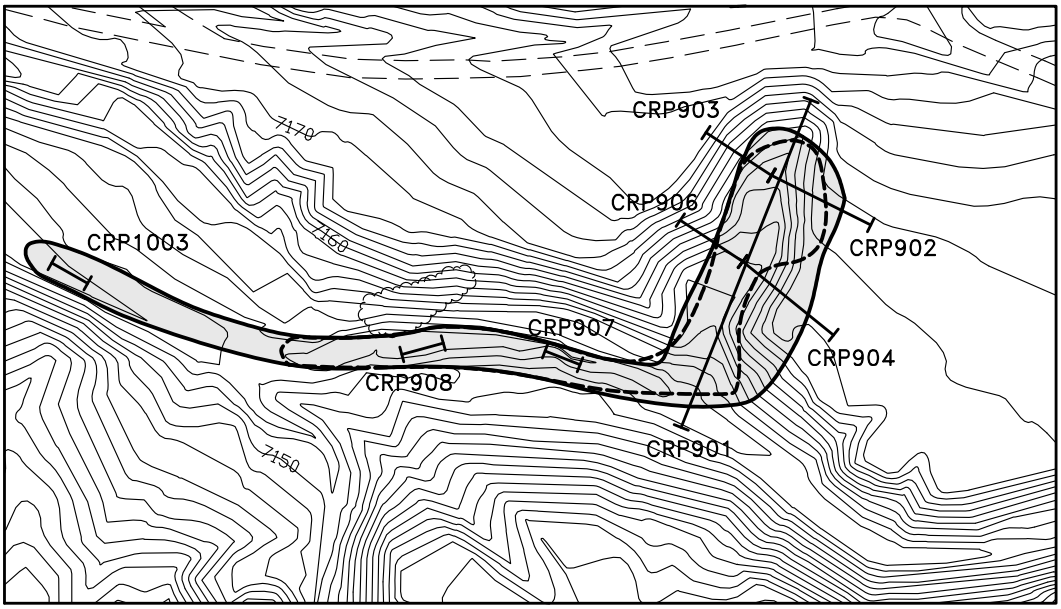
Interpreted Subsurface Residue/Debris After Excavation

N

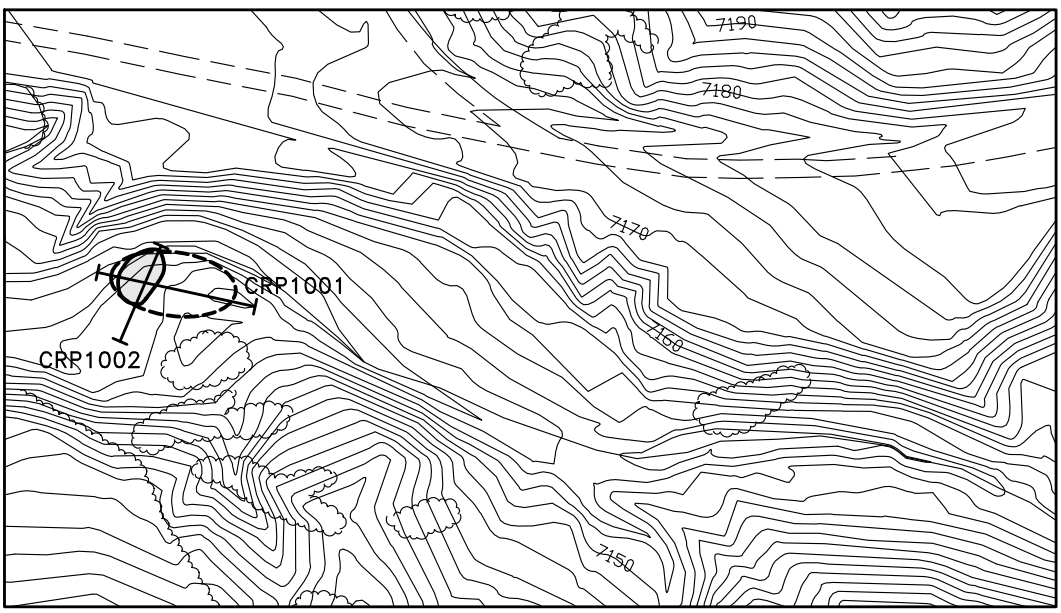
100 50 0 100

Scale in Feet

# Figure 4-21
# CRP9 and CRP10 Residue/Debris Areas Investigation
## Fort Wingate Depot Activity
## Gallup, New Mexico




Waste Volume Estimate: 2,450 cubic yards
Waste Description: Numerous live projectiles, metal banding, fuze components, ordnance fragments and ORW, frag bomb windings, ammo box hardware, butterfly bomb fragments, rust stains and white powder, firing wire, dunnage, ash/charcoal and miscellaneous charred debris




Waste Volume Estimate: 50 cubic yards
Waste Description: Burn residue, burnt smoke cans, ash, ammo box hardware and scattered ordnance fragments

Legend

Approximate Boundary of Surface Residue/Debris Pile

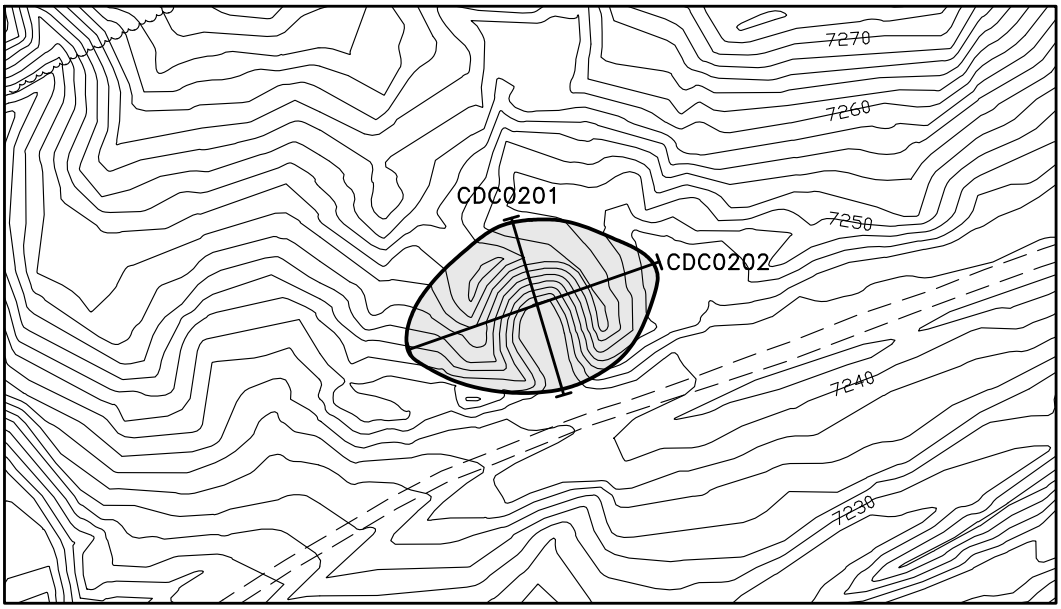
Interpreted Subsurface Residue/Debris After Excavation

N

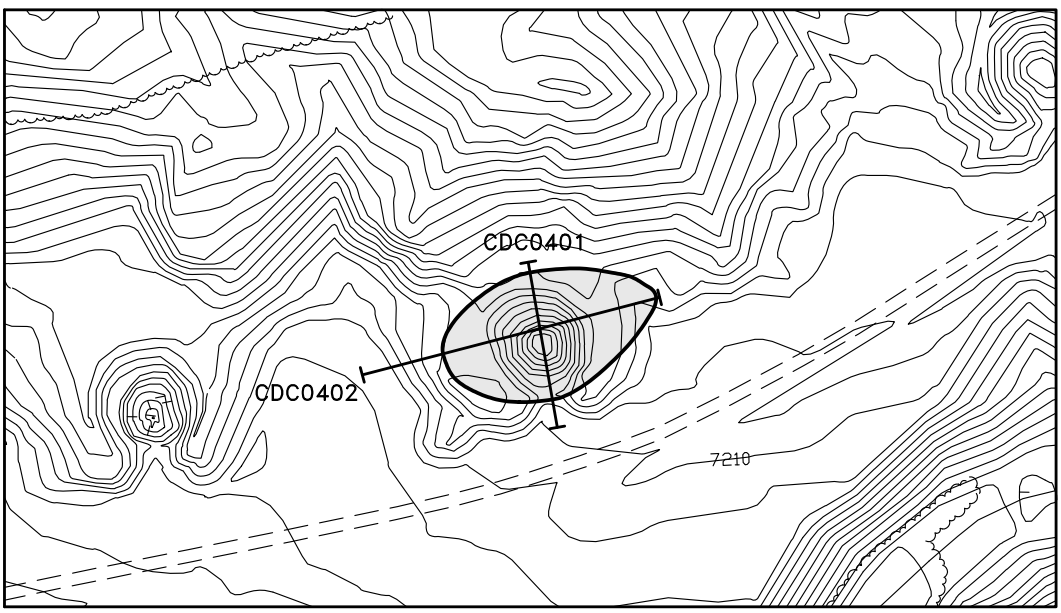
100 50 0 100

Scale in Feet

# Figure 4-22
# CDC02 and CDC04 Detonation Craters Investigation
## Fort Wingate Depot Activity
## Gallup, New Mexico




Waste Volume Estimate: 5,000 cubic yards
Waste Description: Dark brown/black soil with fractured rock and ordnance fragments




Waste Volume Estimate: 3,100 cubic yards
Waste Description: Dark brown/black soil with fractured rock and ordnance fragments and ash

Legend

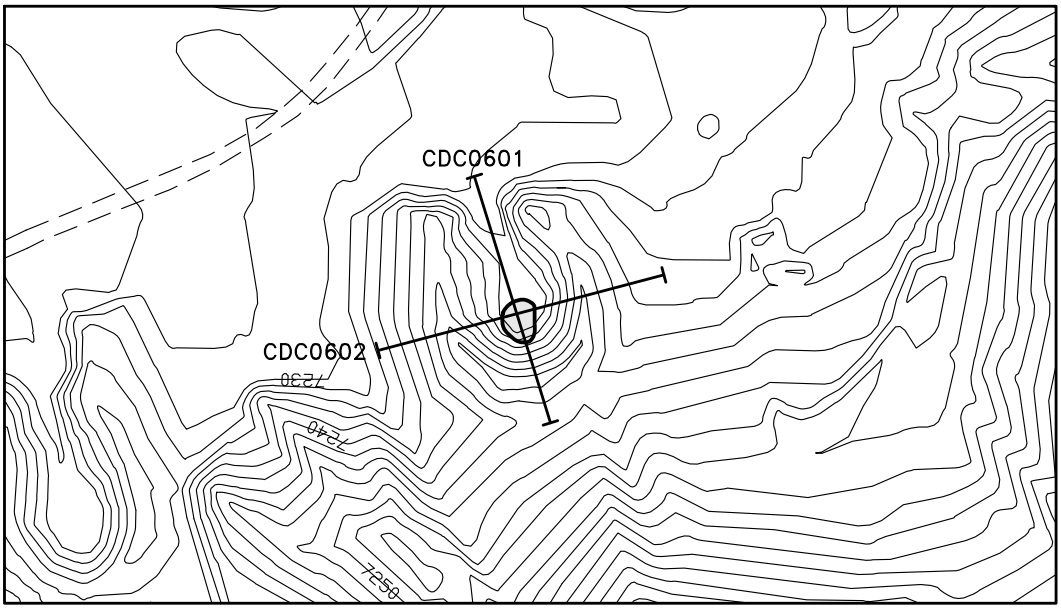
Interpreted Subsurface Residue/Debris After Excavation

N

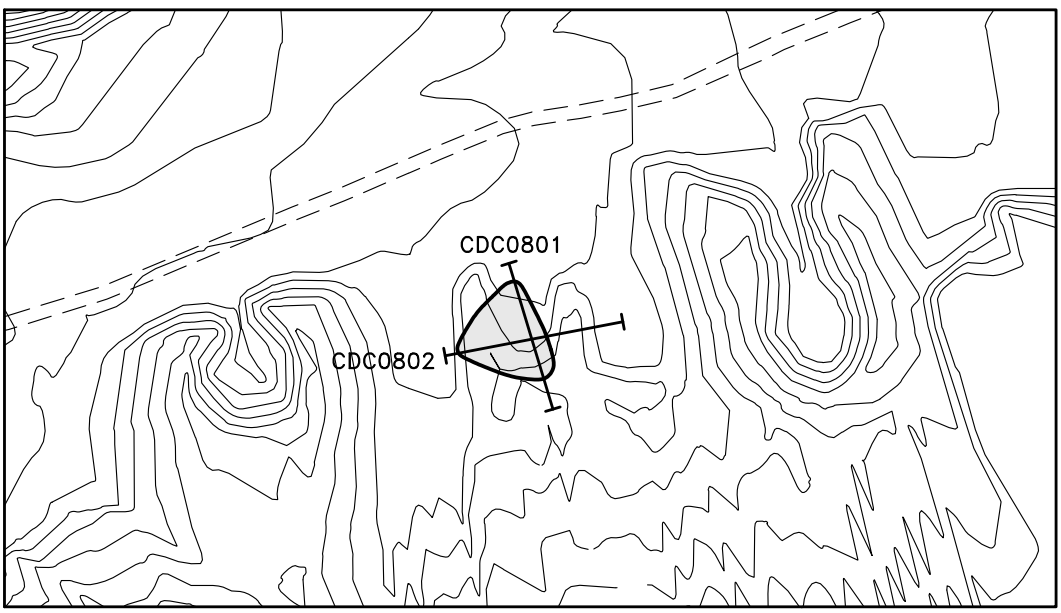
100 50 0 100

Scale in Feet

# Figure 4-23
# CDC06 and CDC08 Detonation Craters Investigation
## Fort Wingate Depot Activity
## Gallup, New Mexico




Waste Volume Estimate: 170 cubic yards
Waste Description: Dark stained soil with ash and ordnance fragments




Waste Volume Estimate: 300 cubic yards
Waste Description: Black ash, metal banding, dunnage (packing materials), and ordnance fragments

Legend

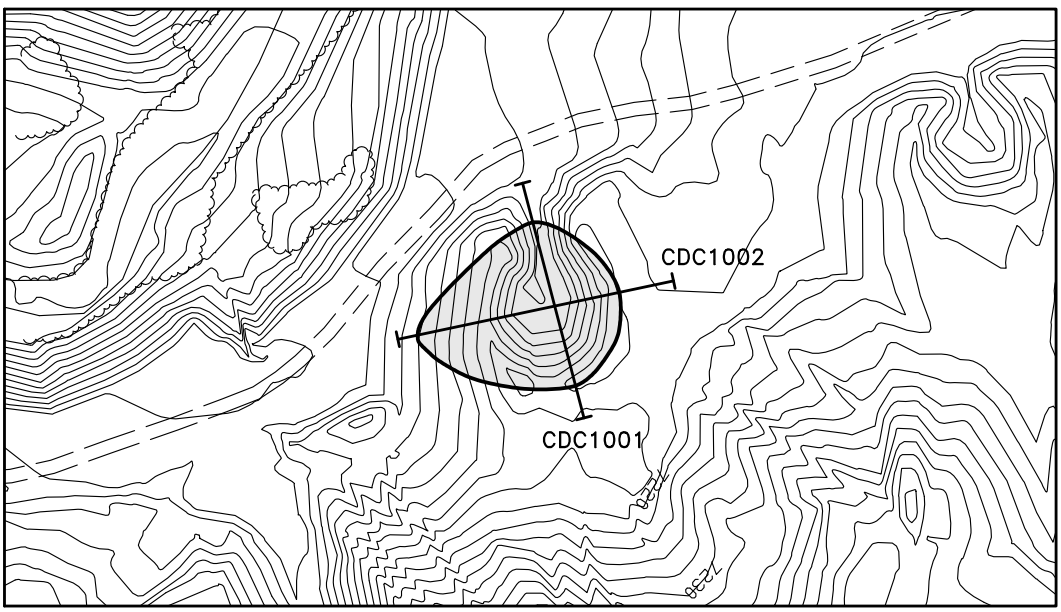
Interpreted Subsurface Residue/Debris After Excavation

N

100 50 0 100

Scale in Feet

# Figure 4-24
# CDC10 Detonation Crater Investigation
## Fort Wingate Depot Activity
## Gallup, New Mexico




Waste Volume Estimate: 3,670 cubic yards
Waste Description: Dark stained soil (some with green coloring), ordnance fragments and other related wastes

Legend

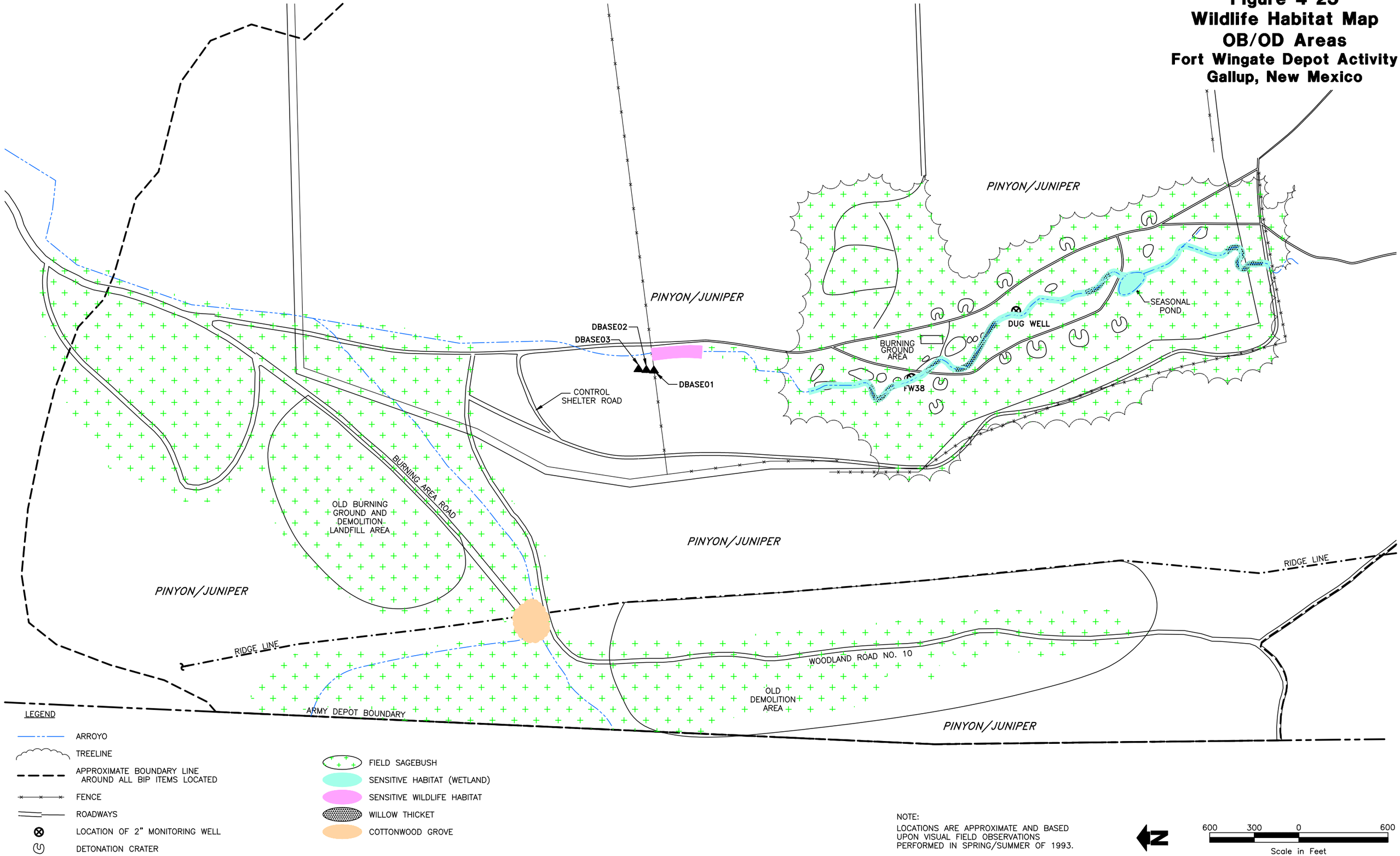
Interpreted Subsurface Residue/Debris After Excavation

N

100 50 0 100

Scale in Feet

# Figure 4-25
# Wildlife Habitat Map
# OB/OD Areas
## Fort Wingate Depot Activity
## Gallup, New Mexico



## 5.0 *CHEMICAL DATA ASSESSMENT*

The chemical data derived from the sampling and analysis of waste samples and soil samples were assessed by comparison to selected environmental quality benchmark values.

Chemical data from samples collected at FWDA during the OB/OD Area trenching operations were sequentially screened against: 1.) Area-specific background values, 2.) U.S. Environmental Protection Agency (USEPA) Region VI risk based screening levels (RBLs) and 3.) Closure Performance Standards (CPSs) developed for the OB/OD Areas.

### 5.1 *BACKGROUND CONCENTRATIONS OF COCS*

Separate background values were developed for both the Closed and Current OB/OD Areas because different geologic units are exposed at the land surface in each area, resulting in different accessory mineral (i.e., native metals) content of the soils. As discussed in Section 3.3, a total of 20 samples each were collected from each of the two OB/OD Areas. Figure 4-9 (Appendix B) shows the locations of the background sampling stations. Background metals concentrations were determined for the Closed and Current OB/OD Areas based on a statistical distribution analysis of the data. For each metal constituent and each area, the data from 20 samples were inspected, normal and log-normal distributions were superimposed, and a best-fit determination was made regarding which distribution more accurately described the data. Using this determination, the 95-percentile distribution concentration (i.e., the 95$^{th}$ percentile upper control limit of the distribution) was calculated. This value was then set as the background concentration for that metal constituent for that area.

The range of detected background concentrations, the maximum detected concentrations, and the 95$^{th}$ percentile upper confidence limit (UCL) concentrations are shown in Table 5-1. All soil and waste sample data were compared to the 95$^{th}$ UCL concentrations. For those constituents that were not detected in the background data set, the background screening values were set at zero (0) to provide a conservative bias to this initial screening step.

### 5.2 *USEPA REGION VI RISK-BASED SCREENING LEVELS*

USEPA Region VI RBLs (Table 5-2) were used to assess all data following the initial comparison to background. The RBLs used were based on the $10^{-6}$ risk level and residential land use. The use of residential-based

screening levels allows for a conservative bias during this stage of the data assessment process. For those constituents that did not have an RBL, site specific values were calculated using the same methodologies that generated the established Region VI RBLs.

## 5.3 *RISK-BASED CLOSURE PERFORMANCE STANDARDS*

Constituents which exceeded the Region VI RBLs were compared to site-specific CPSs developed for the OB/OD Areas. The CPSs were established by the Army to be protective of human health under realistic site-specific future land use scenarios. The Army intends that the OB/OD Areas will remain under the administrative care of the Army in perpetuity, and will continue to exist as limited access areas. Therefore, realistic current and future human receptors are restricted to on-site remediation workers and off-site recreational users. For an on-site remediation worker, direct contact with contaminated soils or solid waste residues, as well as incidental ingestion and dust inhalation were considered. For off-site recreational users, only the wind blown dust inhalation pathway was considered. The specific exposure assumptions used to generate the CPSs are shown in Table 5-3.

The CPSs were calculated based on standard intake and toxicity assumptions. The equations derived to calculate the CPSs are based on USEPA guidance for developing preliminary remediation goals (USEPA, 1991). The equations, presented below, have been modified to account for site-specific dust generation conditions.

OFF-SITE FUGITIVE DUST EXPOSURE FOR CARCINOGENIC EFFECTS:

$$CPS_{soil} = \frac{TR \times BW \times AT \times 365\ ^{days}/_{year}}{EF \times ED\left[CPF_i \times IR_{air} \times \left(\frac{E_i \times L \times CF}{u \times H}\right)\right]}$$

Where:

| | |
|---|---|
| $CPS_{soil}$ | = Concentration of constituent in soil (mg/kg) |
| TR | = Target Risk (unitless, $1E^{-6}$) |
| AT | = Averaging Time (70 years) |
| BW | = Body Weight of an adult (70 kg) |
| EF | = Exposure Frequency (days/year) |
| ED | = Exposure Duration (years) |
| $CPF_i$ | = Inhalation CPF $((mg/kg\text{-}day)^{-1})$ |
| $IR_{air}$ | = Inhalation Rate ($m^3$/day) |
| $E_i$ | = Dust Emission Rate - OB/OD Areas ($1x10^{-9}$ mg/$m^2$/sec) |
| L | = Length of contaminated site perpendicular to wind (71.1 m |

based on the area of the debris/refuse piles)

u = Mean annual wind speed (4 m/sec (Ruffner, 1985)

H = Height of human inhalation (1.5 m).

OFF-SITE FUGITIVE DUST EXPOSURE FOR NON-CARCINOGENIC EFFECTS:

$$CPS_{soil} = \frac{THI \times BW \times AT \times 365\ ^{days}/_{year}}{EF \times ED\left[{}^{1}/_{RfD_i} \times IR_{air} \times \left(\frac{E_i \times L \times CF}{u \times H}\right)\right]}$$

Where,

THI = Target Hazard Index (unitless, 1)

AT = Averaging Time (years, this is equal to the exposure duration)

ED = Exposure Duration (years)

$RfD_i$ = Inhalation Reference Dose (mg/kg-day).

The soil cleanup levels, at the $10^{-6}$ risk level, resulting from the use of the equations listed above for on-site remediation workers and off-site recreational users are shown in Table 5-4 and Table 5-5, respectively.

## 5.4 *CLOSED OB/OD AREA*

The Closed OB/OD Area consists of two primary sub-areas; the Old Demolition Area (western side of the Hogback), and the Old Burning Ground and Demolition Landfill Area (eastern side of the Hogback).

### 5.4.1 *Old Demolition Area*

Two geophysical anomalies (KGA1 and KGA2) and one debris/residue pile (KP1) were investigated in the Old Demolition Area, as described in Section 4.0.

The trenching operations at these features identified quantities of scattered surface debris (e.g., nails, hinges, metal cans, rusted metal shells, smoke and flare ejectors, mortar casings, demilitarized 40, 75, and 90 mm rounds). Several trenches encountered buried metallic debris similar to that found on the surface.

A total of 61 soil samples and 12 waste samples were collected within the Old Demolition Area, and were submitted for chemical analyses.

#### 5.4.1.1 *Comparison to Background Levels*

Table 5-6 lists the detected constituents at the Old Demolition Area that exceeded the Closed OB/OD Area background levels. Explosives compounds were detected in less than 5% of the soil samples and approximately 29% of the waste samples. The majority of the detections and exceedances of background levels in both waste samples and soil samples were associated with metals. For soil samples, between four and 12 individual metal constituents were detected at each disposal feature; of these metals, between 4% and 100% were detected at concentrations greater than background. For waste samples, between nine and 17 individual metal constituents were detected at each disposal feature, and 33% to 100% of the detected concentrations were greater than background. The detection of metals at levels greater than background in both media types (i.e., waste and soil) is consistent with the documented disposal of metallic objects. The metals content of the disposed objects and the immediately surrounding soils would be expected to be different than the metals composition of the native soils.

#### 5.4.1.2 *Comparison to USEPA Region VI RBLs*

All sample constituents that exceeded background levels were screened against USEPA Region VI RBLs. Table 5-7 lists those detected constituents at the Old Demolition Area that exceeded the residential land-use based RBLs. The number of exceedances of the RBLs was substantially less than those for background. For waste samples, all detected explosives concentrations (representing 29% of the total number of waste samples) were greater than RBLs. No soil samples were identified to exceed RBLs. Two metals, arsenic and iron, were detected in a maximum of two waste samples at levels greater than RBLs. In all instances within the Old Demolition Area, the exceedances of RBLs were restricted to waste samples

#### 5.4.1.3 *Comparison to Closure Performance Standards*

All sample constituents that exceeded RBLs were screened against site-specific CPSs. Table 5-8 indicates that no constituent concentrations detected within the Old Demolition Area exceeded the CPSs.

### 5.4.2 *Old Burning Ground and Demolition Landfill Area*

The Old Burning Ground and Demolition Landfill Area (to be called the Old Burning Ground from this point on) was found to contain the following potential waste-containing features: three geophysical

anomalies (KGA3 through KGA5), three debris/residue piles (KP2 through KP4), and three areas of stained soils (KSA01 through KSA03).

The trenching and test pit operations at these features identified quantities of metal can lids, nails, screws, hinges, strapping, charcoal, ash, metal slag, demilitarized 75 mm projectiles, ordnance fragments, fuze components, metal scrap, bricks, metal piping, concrete and rebar on the surface and in the subsurface.

A total of 130 soil samples and 41 waste samples were collected within the Old Burning Ground during the trenching operations and were submitted for chemical analyses.

*5.4.2.1 Comparison to Background*

Table 5-9 lists the detected constituents at the Old Burning Ground that exceeded the Current OB/OD Area background levels. Explosives compounds were detected in approximately 19 percent (%) of the waste samples and approximately 10% of the soil samples collected at the geophysical anomalies (KGA3 through KGA4). At the debris/residue piles (KP2 through KP3), explosives were detected in soils at a frequency of less than 1%. Explosives were detected in the associated waste samples at frequencies ranging from 0 to 100%, depending upon the specific debris/residue pile. Metals were widely detected, in both soils and waste samples, at levels exceeding the background levels. The detection of metals at concentrations greater than established background levels is attributable to the disposal of metallic ordnance-related materials and demilitarization wastes (i.e., ash and other burn residues). Subsequent weathering/oxidation of the metallic debris has resulted in the intermedia (waste to soil) transfer of many metal constituents.

*5.4.2.2 Comparison to USEPA Region VI RBLs*

All sample constituents that exceeded background levels were screened against RBLs. Table 5-10 lists those detected constituents at the Old Burning Ground that exceeded the residential land-use based RBLs. The number of exceedances of the RBLs was substantially less than those for background. No explosives were detected in soils at concentrations greater than RBLs. Explosives in waste samples were detected at concentrations greater than the CPSs at a frequency of approximately 19%. Three metal/inorganic constituents (arsenic, iron, and phosphorus) were widely detected in soil samples at concentrations greater than the RBLs. Waste samples were found to contain a wider range of metals concentrations exceeding the RBLs, with arsenic, iron, and phosphorus being the most frequently detected.

5.4.2.3 *Comparison to Closure Performance Standards*

All sample constituents that exceeded RBLs were screened against site-specific CPSs. Table 5-11 lists those detected constituents that exceeded the CPSs. Figure 5-1 (Appendix B) shows the locations of the sampling stations within the Old Burning Ground at which constituents were detected at concentrations exceeding the CPSs. No explosives compounds were detected at concentrations exceeding the CPSs in the soil samples. Concentrations of one explosive compound (TNT) greater than the CPS were detected in less than 8% of the waste samples. The number of constituents that exceeded the CPSs was limited to 7 inorganics (arsenic, barium, cadmium, chromium, lead, manganese, and phosphorus) and one explosive compound (TNT). The number of exceedances for phosphorus dominated the data set; phosphorus concentrations in all soil and waste samples exceeded the CPS. The CPS for phosphorus was set at zero; exceedances of the CPS for phosphorus do not necessarily represent an unacceptable risk to human health under the selected future land use scenarios. Sporadic and widely distributed CPS exceedances for the other detected constituents indicate a limited potential for unacceptable human health risks in a worst case exposure situation. Under realistic exposure conditions, it would be difficult for an on-site remediation worker or an off-site recreational user to be exposed to the highest detected constituent concentrations at the frequency and duration assumed by the exposure model.

5.4.3 ***Explosives Stained Areas***

During site reconnaissance conducted in 1996, three areas of apparently explosives stained surface soils were identified in the northeastern portion of the Old Burning Ground. A total of six surface soil samples, two each at each of the three stained areas, were collected. All samples were analyzed for explosives compounds and TAL metals.

5.4.3.1 *Comparison to Background*

Table 5-12 lists the detected constituents that exceeded the background levels established for the Current OB/OD Area. At least one explosives compound was detected in each of the soil samples. No metals were detected at concentrations greater than background.

5.4.3.2 *Comparison to USEPA Region VI RBLs*

All sample constituents that exceeded background levels were screened against RBLs. Table 5-13 lists those detected constituents that exceeded the residential land-use based RBLs. Greater than 50% of the detected

explosives concentrations that exceeded background also exceeded the RBLs.

5.4.3.3 *Comparison to Closure Performance Standards*

All sample constituents that exceeded RBLs were screened against site-specific CPSs. Table 5-14 lists those detected constituents that exceeded the CPSs. Figure 5-1 (Appendix B) shows the location of the sampling stations within the Stained Areas at which constituents exceeded the CPSs. Only one explosive compound (TNT) exceeded the CPS for one soil sample collected at KSA03. Based on this assessment, the presence of soils stained by explosive compounds in these 3 areas represents a limited amount of human health risk in a realistic exposure scenario.

## 5.5 *CURRENT OB/OD AREA*

The Current OB/OD Area consists of two primary types of features that were investigated. A series of debris/residue piles are located along the eastern side of the main arroyo that bisects the site. Several of these piles extend into the main channel of the arroyo. In addition, at the time of the investigation, a series of 12 detonation craters were evident. Physical description (Section 4.0) and environmental characterization efforts were conducted at each of the debris/residue piles and at five of the detonation craters.

### 5.5.1 *Debris/Residue Piles – CRP1 through CRP3*

Debris/residue piles CRP1 through CRP3 are located at the southern end (upstream) of the Current OB/OD Area. These piles are relatively small in size and appear to have been created by the disposal of demilitarization waste that was not generated in place. The waste materials may have been generated elsewhere within the Current OB/OD Area, or may be wastes from other areas of FWDA, such as the Deactivation Furnace.

The trenching and test pits operations at these piles identified the following waste materials scattered over the ground surface and buried to depths reaching a maximum of 14 feet: empty fuze cans, fuze pieces, slag, metal banding, burn residue, ash, and other metal and wood debris. In addition, soils stained by explosives compounds, as well as small pieces of explosives compounds were noted.

A total of 21 soil samples, and 8 waste samples were collected from these three piles, and were submitted for chemical analyses.

#### 5.5.1.1 *Comparison to Background Levels*

Table 5-15 lists the detected constituents at piles CRP1 through CRP3 that exceeded the Current OB/OD Area background levels. Explosives compounds were detected in approximately 22% of the soil samples and in approximately 75% of the waste samples. A wide range of metal constituents were detected in both waste and soil samples at concentrations exceeding the background levels. The distribution and elevated concentration of metals in and adjacent to the piles is consistent with the placement of demilitarization wastes in these disposal features.

#### 5.5.1.2 *Comparison to USEPA Region VI RBLs*

All sample constituents that exceeded background levels were screened against RBLs. Table 5-16 lists those detected constituents that exceeded the residential land-use based RBLs. The number of exceedances of the RBLs was substantially less than those for background. With the exception of iron in three soil samples, no constituents were detected in soil samples at concentrations exceeding the RBLs. Explosives compounds and metals were detected frequently in waste samples at levels exceeding the RBLs.

#### 5.5.1.3 *Comparison to Closure Performance Standards*

All sample constituents that exceeded RBLs were screened against site-specific CPSs. Table 5-17 lists those detected constituents that exceeded the CPSs. Figure 5-2 (Appendix B) shows the locations of the sampling stations with the Current OB/OD Area at which constituents were detected at concentrations exceeding the CPSs. The exceedances were limited to single detections of two explosives compounds (TNT and RDX), single detections of cadmium and nickel, and two detections of lead. These sporadic and widespread CPS exceedances indicate a limited potential for unacceptable human health risks in a worst case exposure situation. Under realistic exposure conditions, it would be difficult for an on-site remediation worker or an off-site recreational user to be continuously exposed to the highest detected constituent concentrations at the frequency and duration assumed by the exposure model.

### 5.5.2 ***Debris/Residue Piles - CRP4 through CRP9***

Debris/residue piles CRP4 through CRP9 essentially form a nearly continuous mass of waste demilitarization materials that appear to have been pushed off the flat working area of the Current OB/OD Area onto the eastern bank of the main arroyo.

The trenching and test pit operations at these piles identified, on the land surface and in the subsurface, quantities of metal banding, empty fuze cans, fuze pieces, detonator assemblies, 20, 37, 40, 57 and 75 mm projectiles (live and fragments), booster cups, fragmentation bomb windings, barrage rocket tubes, M83 butterfly bomblets (live and fragments), burned flares, ash, burn residue, cardboard, ammunition box hardware, wood debris, and asbestos-containing material (ACM). In addition, areas of stained soils and observable pieces of raw explosives were noted.

A total of 82 soil samples and 42 waste samples were collected from these piles and were submitted for chemical analyses.

5.5.2.1 *Comparison to Background Levels*

Table 5-15 lists the detected constituents at piles CRP4 through CRP9 that exceeded the Current OB/OD Area background levels. Explosives were detected in the soils at four of the six piles, and were detected in the wastes at five of the six piles. Seven explosives compounds were detected at CRP5; each of these explosives were detected at their maximum concentrations in the waste samples from CRP5. A wide range of metals was detected at concentrations exceeding background at each pile, both in the soils and in the waste materials themselves. Only CRP4 was found to contain a limited number of metals (cadmium and thallium) at levels exceeding background. Observations and physical characterization of piles CRP4 through CRP9 strongly suggested that demilitarization wastes had impacted the native materials; the chemical data for soils and wastes confirmed these observations.

5.5.2.2 *Comparison to USEPA Region VI RBLs*

All sample constituents that exceeded background levels were screened against RBLs. Table 5-16 lists those detected constituents that exceeded the residential land-use based RBLs. No exceedances were identified for CRP4. The number of exceedances of the RBLs was substantially less than that for background. For soils, exceedances of the RBLs were identified in less than 15% of the samples. For waste samples, exceedances were identified in 25% to 47% of the samples per pile.

5.5.2.3 *Comparison to Closure Performance Standards*

All sample constituents that exceeded RBLs were screened against site-specific CPSs. Table 5-17 lists those detected constituents that exceeded the CPSs. Figure 5-2 (Appendix B) shows the locations of the sampling stations at which constituents exceeded the CPSs. The number of

constituents that exceeded the CPSs was limited to two explosives (TNT and RDX), 4 metals (arsenic, barium, lead, and thallium) and amosite asbestos. RDX and TNT exceeded the CPS in three waste samples only. Lead exceeded the CPS in two waste samples, barium exceeded the CPS in one waste sample only, and arsenic and thallium exceeded the CPSs in one soil sample only. Asbestos exceeded the CPS in one of two soil samples. Considering the volume of waste materials present within piles CRP4 through CRP9 and the number of samples collected and analyzed, the number of exceedances of the CPSs is remarkably low. The low frequency of CPS exceedances and the widespread spatial distribution of the exceedances indicates that limited risks exist to human receptors in the realistic future use scenarios.

### 5.5.3 *Debris/Residue Pile - CRP10*

CRP 10, located within the channel of the main arroyo at the northern limit (i.e., downstream) of the current OB/OD Area, was identified as a stand alone area with limited physical evidence of waste disposal and/or burning activities. The trenching operations identified limited quantities of burn residue and smoke canister fragments in the depth interval 0 to 2 ft bgs.

A total of six soil samples and one waste sample were collected and submitted for chemical analyses.

#### 5.5.3.1 *Comparison to Background Levels*

Table 5-15 lists the detected constituents that exceeded the background levels established for the Current OB/OD Area. Trace levels of two explosives compounds were identified, one compound in each of one soil and one waste sample. A wide range of metal constituents was detected at concentrations greater than the background levels in both the soil and waste samples. The frequency of exceedances ranged from 17% to 50% for the soil samples and 50% to 100% for the waste samples.

#### 5.5.3.2 *Comparison to USEPA Region VI RBLs*

All sample constituents that exceeded background levels were screened against RBLs. Table 5-16 lists those detected constituents that exceeded the residential land-use based RBLs. Two metals (arsenic and iron) were detected at concentrations exceeding the RBLs. Exceedances were identified for both metals in the soil samples at a frequency ranging from 17% to 50%. Only arsenic was found to exceed the RBL in one of two waste samples.

5.5.3.3 *Comparison to Closure Performance Standards*

No detected constituents in soil or waste samples collected from CRP10 exceeded the CPSs.

5.5.4 ***Detonation Craters***

Trenching operations were conducted at five of the detonation craters visible within the Current OB/OD Area. These operations identified scattered ordnance fragments, projectiles, ash, dark stained soil, rock fragments, metal banding, and packaging materials from the land surface to a maximum depth of 20 feet.

A total of 48 soil samples and eight waste samples were collected from the five craters and submitted for chemical analyses.

5.5.4.1 *Comparison to Background Levels*

Table 5-18 lists the detected constituents that exceeded the Current OB/OD Area background levels. Explosives were detected at 4 of the 5 craters at low concentrations. The greatest number of detected explosives (6) were identified at CDC06. A wide range of metal constituents was detected at concentrations greater than background in both the soil and waste samples. A general analysis of the constituent detections and concentrations suggests that the chemical character of the wastes in the craters and the adjacent soils is similar. This may be attributed to the fact that the craters, when in use, were dynamic features. Soils were graded and regraded continuously following each detonation. This resulted in a high degree of mixing of the soil.

5.5.4.2 *Comparison to USEPA Region VI RBLs*

All sample constituents that exceeded background levels were screened against RBLs. Table 5-19 lists those detected constituents that exceeded the residential land-use based RBLs. The number of exceedances of the RBLs was substantially less than those for background. Three explosives compounds were identified at CDC06 at concentrations exceeding the RBLs, and one explosives compound exceeded the RBL at CDC10. Five metals (antimony, arsenic, iron, lead, and vanadium) were detected at concentrations exceeding the RBLs. Most of the RBL exceedances for metals were associated with detections of arsenic and iron.

5.5.4.3 *Comparison to Closure Performance Standards*

All sample constituents that exceeded RBLs were screened against site-specific CPSs. Table 5-20 lists those detected constituents that exceeded

the CPSs. Figure 5-2 (Appendix B) shows the locations of the sampling stations at which constituents exceeded the CPSs. Only one constituent (lead) in one sample from one crater (CDC08) exceeded the CPS. This is consistent with the use of the craters for detonation purposes. The intent of the detonation process was to completely destroy the munitions item. Although the data indicate that complete destruction was not attained, the degree of destruction did result in very low quantities of residual risk to human receptors under realistic future land use conditions.

*Table 5-1*
*Summary of Background Samples*
*and Background Determination*
*Closed and Current OB/OD Areas*
*Fort Wingate Depot Activity*
*Gallup, New Mexico*

| Parameter | Units | Mean | Maximum | Standard Deviation | Selected Background | Basis for Background |
|---|---|---|---|---|---|---|
| **Closed OB/OD Area** | | | | | | |
| Aluminum | µg/g | 14,666 | 22,100 | 4,546 | 22,167 | Normal: 95th percentile |
| Antimony | µg/g | - | - | - | 0 | All Less than DL |
| Arsenic | µg/g | 7.69 | 8.85 | 0.98 | 9.30 | Normal: 95th percentile |
| Barium | µg/g | 93 | 156 | 40 | 159 | Normal: 95th percentile |
| Beryllium | µg/g | 0.67 | 1.01 | 0.21 | 1.02 | Normal: 95th percentile |
| Cadmium | µg/g | - | - | - | 0 | 18 Values less than DL; 2 outliers |
| Calcium | µg/g | 13,157 | 36,300 | 11,529 | 37,204 | Log Normal: 95th percentile |
| Chromium | µg/g | 11.15 | 16.1 | 3.20 | 16.4 | Normal: 95th percentile |
| Cobalt | µg/g | 7.40 | 14.80 | 2.56 | 11.80 | Log Normal: 95th percentile |
| Copper | µg/g | 14.83 | 30.0 | 7.88 | 27.84 | Normal: 95th percentile |
| Iron | µg/g | 21,260 | 34,600 | 6,754 | 32,404 | Normal: 95th percentile |
| Lead | µg/g | 14.33 | 26.5 | 4.52 | 22.4 | Log Normal: 95th percentile |
| Magnesium | µg/g | 4,197 | 7,610 | 1,487 | 6,651 | Normal: 95th percentile |
| Manganese | µg/g | 226 | 463 | 101 | 392 | Normal: 95th percentile |
| Mercury | µg/g | 0.048 | 0.093 | 0.014 | 0.080 | Log Normal: 95th percentile |
| Molybdenum | µg/g | - | - | - | 0 | 18 Values less than DL; 2 reported below DL |
| Nickel | µg/g | 11.59 | 20.1 | 3.67 | 18.4 | Log Normal: 95th percentile |
| Phosphorus | µg/g | 428 | 911 | 167 | 709 | Log Normal: 95th percentile |
| Potassium | µg/g | 2,818 | 3,990 | 694 | 3,963 | Normal: 95th percentile |
| Selenium | µg/g | 0.38 | 0.70 | 0.14 | 0.65 | Log Normal: 95th percentile |
| Silver | µg/g | - | - | - | 0 | All Less than detection limit |
| Sodium | µg/g | 95 | 137 | 22 | 136 | Normal: 95th percentile (based on 10 detected values) |
| Thallium | µg/g | - | - | - | 0 | All Less than DL |
| Vanadium | µg/g | 23.6 | 29.8 | 5.44 | 32.61 | Normal: 95th percentile |
| Zinc | µg/g | 50.5 | 78.0 | 16.20 | 77.3 | Normal: 95th percentile |

*Table 5-1*
*Summary of Background Samples*
*and Background Determination*
*Closed and Current OB/OD Areas*
*Fort Wingate Depot Activity*
*Gallup, New Mexico*

| Parameter | Units | Mean | Maximum | Standard Deviation | Selected Background | Basis for Background |
|---|---|---|---|---|---|---|
| **Current OB/OD Area** | | | | | | |
| Aluminum | µg/g | 13,991 | 33,400 | 7,929 | 28,202 | Log Normal: 95th percentile |
| Antimony | µg/g | - | - | - | 0 | All Less than detection limit |
| Arsenic | µg/g | 1.70 | 3.23 | 0.60 | 2.70 | Log Normal: 95th percentile |
| Barium | µg/g | 187 | 606 | 140 | 431 | Log Normal: 95th percentile |
| Beryllium | µg/g | 0.59 | 1.85 | 0.34 | 1.15 | Log Normal: 95th percentile |
| Cadmium | µg/g | - | - | - | 0 | 19 Values less than detection limit; 1 outlier |
| Calcium | µg/g | 9,469 | 23,400 | 6,904 | 26,081 | Log Normal: 95th percentile |
| Chromium | µg/g | 9.33 | 22.9 | 4.75 | 17.0 | Log Normal: 95th percentile |
| Cobalt | µg/g | 3.67 | 8.75 | 1.83 | 6.50 | Log Normal: 95th percentile |
| Copper | µg/g | 7.80 | 33.0 | 7.27 | 18.9 | Log Normal: 95th percentile |
| Iron | µg/g | 10,874 | 21,300 | 3,978 | 17,647 | Log Normal: 95th percentile |
| Lead | µg/g | 7.37 | 13.2 | 2.80 | 12.5 | Log Normal: 95th percentile |
| Magnesium | µg/g | 3,663 | 9,410 | 2,210 | 7,550 | Log Normal: 95th percentile |
| Manganese | µg/g | 268 | 600 | 116 | 458 | Log Normal: 95th percentile |
| Mercury | µg/g | 0.048 | 0.057 | 0.006 | 0.060 | Log Normal: 95th percentile |
| Molybdenum | µg/g | - | - | - | 0 | All Less than detection limit |
| Nickel | µg/g | 7.67 | 18.0 | 3.76 | 14.3 | Log Normal: 95th percentile |
| Potassium | µg/g | 2,130 | 4,090 | 735 | 3,465 | Log Normal: 95th percentile |
| Selenium | µg/g | 0.26 | 0.39 | 0.06 | 0.36 | Log Normal: 95th percentile |
| Silver | µg/g | - | - | - | 0 | All Less than detection limit |
| Sodium | µg/g | 81 | 92 | 11 | 99 | Normal: 95th percentile (based on 4 detected values) |
| Thallium | µg/g | - | - | - | 0 | All Less than detection limit |
| Vanadium | µg/g | 20.3 | 36.9 | 6.49 | 31.3 | Log Normal: 95th percentile |
| Zinc | µg/g | 18.6 | 31.8 | 5.95 | 29.2 | Log Normal: 95th percentile |

*Table 5-2*
*EPA Region VI Risk-Based Residential Soil Screening Levels*
*Closed and Current OB/OD Areas*
*Fort Wingate Depot Activity*
*Gallup, New Mexico*

| Parameter | Screening Level (µg/g) | Comments |
|---|---|---|
| 1,3,5-Trinitrobenzene | 1800 | |
| 1,3-Dinitrobenzene | 6.1 | |
| 2,4,6-Trinitrotoluene | 16 | |
| 2,4-Dinitrotoluene | 0.71 | EPA Region VI Criteria for dinitrotoluene mixture |
| 2,6-Dinitrotoluene | 0.71 | EPA Region VI Criteria for dinitrotoluene mixture |
| 2-Amino-4,6-dinitrotoluene | 0.71 | EPA Region VI Criteria for dinitrotoluene mixture |
| 2-Nitrotoluene | 610 | |
| 3-Nitrotoluene | 610 | |
| 4-Amino-2,6-dinitrotoluene | 0.71 | EPA Region VI Criteria for dinitrotoluene mixture |
| 4-Nitrotoluene | 610 | |
| HMX | 3000 | |
| Nitrobenzene | 17 | |
| RDX | 4.4 | |
| Tetryl | 610 | |
| Aluminum | 78000 | |
| Antimony | 31 | |
| Arsenic | 0.39 | |
| Barium | 5400 | |
| Beryllium | 150 | |
| Cadmium | 39 | |
| Calcium | 0 | No EPA Region VI Criteria; set to 0.0 for this assessment |
| Chromium | 210 | |
| Cobalt | 3400 | |
| Copper | 2900 | |
| Iron | 23000 | |
| Lead | 400 | |
| Magnesium | 0 | No EPA Region VI Criteria; set to 0.0 for this assessment |
| Manganese | 3200 | |
| Mercury | 23 | |
| Molybdenum | 390 | |
| Nickel | 1600 | |
| Potassium | 0 | No EPA Region VI Criteria; set to 0.0 for this assessment |
| Selenium | 390 | |
| Silver | 390 | |
| Sodium | 0 | No EPA Region VI Criteria; set to 0.0 for this assessment |
| Thallium | 6.3 | |
| Vanadium | 550 | |
| Zinc | 23000 | |
| Amosite asbestos | 0 | No EPA Region VI Criteria; set to 0.0 for this assessment |
| Phosphorus | 0 | No EPA Region VI Criteria; set to 0.0 for this assessment |
| Total petroleum hydrocarbons, diesel fraction | 0 | No EPA Region VI Criteria; set to 0.0 for this assessment |

*Table 5-3*
*Exposure Scenario Assumptions*
*Fort Wingate Depot Activity*
*Gallup, New Mexico*

| | | Worker | Off-Site Recreation |
|---|---|---|---|
| EF | Exposure Frequency (days/year) (1,2) | 39.6 | 5 |
| ED | Exposure Duration (years) | 1 | 30 |
| SA | Surface Area (cm^2) (3) | 820 | NA |
| IRsoil | Ingestion Rate for Soil (mg/day) | 480 | NA |
| IRair | Inhalation Rate for Air (m^3/day) | 20 | 20 |

NA- Not applicable

(1) The worker value represents 8 hours per day for 120 days.
(2) The recreational value represents 4 hours per day for 30 days.
(3) This value represents the 50th percentile area for the hands of an adult male.

*Table 5-4*
*Closure Performance Standards For Soil*
*Worker Exposure*
*Fort Wingate Depot Activity*
*Gallup, New Mexico*

| Constituent | IRDMIS Synonym | Oral RfD (mg/kg/d) | | Inhalation RfD (mg/kg/d) | | Oral CPF (mg/kg/d)^-1 | | Inhalation CPF (mg/kg/d)^-1 | | Carcinogenic Classification | Noncarcinogenic Cleanup Level (mg/kg) | Carcinogenic Cleanup Level (mg/kg) | Worker Cleanup Level (mg/kg) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| HMX | HMX | 5.00E-02 | | 5.00E-02 | ** | NA | | NA | | | 4.37E+04 | NA | 4.37E+04 |
| RDX | RDX | 3.00E-03 | | 3.00E-03 | ** | 1.10E-01 | | 1.10E-01 | ** | C | 2.62E+03 | 5.56E+02 | 5.56E+02 |
| 1,3,5-Trinitrobenzene | 135TNB | 3.00E-02 | a | 3.00E-02 | ** | NA | | NA | | | 2.62E+04 | NA | 2.62E+04 |
| 1,3-Dinitrobenzene | 13DNB | 1.00E-04 | a | 1.00E-04 | ** | ND | a | ND | ** | D | 8.74E+01 | NA | 8.74E+01 |
| Nitrobenzene | NB | 5.00E-04 | a | 5.70E-04 | b | NA | | NA | | | 4.39E+02 | NA | 4.39E+02 |
| N-methyl-N,2,4,6-tetranitroaniline | | 1.00E-02 | b | 1.00E-02 | ** | NA | | NA | | | 8.74E+03 | NA | 8.74E+03 |
| 2,4,6-Trinitrotoluene | 246TNT | 5.00E-04 | a | 5.00E-04 | ** | 3.00E-02 | a | 3.00E-02 | ** | C | 4.37E+02 | 2.04E+03 | 4.37E+02 |
| 2,4-Dinitrotoluene | 24DNT | 2.00E-03 | a | 2.00E-03 | ** | 6.80E-01 | a1 | 6.80E-01 | ** | | 1.75E+03 | 9.00E+01 | 9.00E+01 |
| 2,6-Dinitrotoluene | 26DNT | 1.00E-03 | b | 1.00E-03 | ** | 6.80E-01 | a1 | 6.80E-01 | ** | B2 | 8.74E+02 | 9.00E+01 | 9.00E+01 |
| 2-Nitrotoluene | | 1.00E-02 | b | 1.00E-02 | ** | NA | | NA | | | 8.74E+03 | NA | 8.74E+03 |
| 4-Nitrotoluene | | 1.00E-02 | b | 1.00E-02 | ** | NA | | NA | | | 8.74E+03 | NA | 8.74E+03 |
| 3-Nitrotoluene | | 1.00E-02 | b | 1.00E-02 | ** | NA | | NA | | | 8.74E+03 | NA | 8.74E+03 |
| 2-Amino-4,6-DNT | | NA | | NA | | 6.80E-01 | a1 | 6.80E-01 | ** | | NA | 9.00E+01 | 9.00E+01 |
| 4-Amino-2,6-DNT | | NA | | NA | | 6.80E-01 | a1 | 6.80E-01 | ** | | NA | 9.00E+01 | 9.00E+01 |
| Aluminum | AL | 1.00E+00 | c | 1.00E+00 | ** | NA | | NA | | | 1.29E+06 | NA | 1.29E+06 |
| Ammonia nitrogen | | NA | | NA | | NA | | NA | | | NA | NA | NA |
| Amosite asbestos | | NA | | NA | | NA | | 2.30E-01 ^ | | A | NA | NA | NA |
| Antimony | SB | 4.00E-04 | a | 4.00E-04 | ** | ND | a | ND | ** | | 5.15E+02 | NA | 5.15E+02 |
| Arsenic | AS | 3.00E-04 | a | 3.00E-04 | ** | 1.50E+00 | a | 1.50E+01 | a2 | A | 3.86E+02 | 4.42E+01 | 4.42E+01 |
| Barium | BA | 7.00E-02 | a | 1.40E-04 | b | ND | a | ND | a | | 4.31E+03 | NA | 4.31E+03 |
| Beryllium | BE | 2.00E-03 | a | 5.70E-06 | a | NA | | 8.40E+00 | a | B2 | 1.72E+02 | 2.69E+02 | 1.72E+02 |
| Boron | | 9.00E-02 | a | 5.70E-03 | b | NA | | NA | | | 7.29E+04 | NA | 7.29E+04 |
| Cadmium | CD | 1.00E-03 | a3 | 1.00E-03 | ** | NA | a | 6.30E+00 | a | B1 | 1.29E+03 | 3.58E+02 | 3.58E+02 |
| Calcium | CA | NA | | NA | | NA | | NA | | | NA | NA | NA |
| Chloride | | NA | | NA | | NA | | NA | | | NA | NA | NA |
| Chromium | CR | 5.00E-03 | a4 | 5.00E-03 | ** | NA | a | 4.20E+01 | a4 | A | 6.44E+03 | 5.38E+01 | 5.38E+01 |
| Cobalt | CO | 6.00E-02 | x | 5.70E-06 | x | ND | a | ND | a | | 1.83E+02 | NA | 1.83E+02 |
| Copper | CU | 3.71E-02 | b | 3.71E-02 | ** | NA | | NA | | D | 4.78E+04 | NA | 4.78E+04 |
| Fluoride | | 6.00E-02 | a | 6.00E-02 | ** | NA | | NA | | | 7.72E+04 | NA | 7.72E+04 |
| Iron | FE | 3.00E-01 | c | 3.00E-01 | ** | NA | | NA | | | 3.86E+05 | NA | 3.86E+05 |
| Lead | PB | ND | a | ND | ** | NA | a | NA | a | B2 | NA | NA | NA |
| Lithium | | 2.00E-02 | x | 2.00E-02 | ** | NA | | NA | | | 2.57E+04 | NA | 2.57E+04 |
| Magnesium | MG | NA | | NA | ** | NA | | NA | | | NA | NA | NA |
| Manganese | MN | 1.40E-01 | a3 | 1.43E-05 | a | NA | | NA | | D | 4.60E+02 | NA | 4.60E+02 |
| Mercury | HG | 3.00E-04 | b | 8.60E-05 | b | NA | | NA | | D | 3.51E+02 | NA | 3.51E+02 |
| Molybdenum | | 5.00E-03 | i | 5.00E-03 | ** | NA | | NA | | | 6.44E+03 | NA | 6.44E+03 |
| Nickel | NI | 2.00E-02 | a5 | 2.00E-02 | ** | NA | | 1.68E+00 | a6 | A | 2.57E+04 | 1.34E+03 | 1.34E+03 |

*Table 5-4*
*Closure Performance Standards For Soil*
*Worker Exposure*
*Fort Wingate Depot Activity*
*Gallup, New Mexico*

| Constituent | IRDMIS Synonym | Oral RfD (mg/kg/d) | | Inhalation RfD (mg/kg/d) | | Oral CPF (mg/kg/d)^-1 | | Inhalation CPF (mg/kg/d)^-1 | | Carcinogenic Classification | Noncarcinogenic Cleanup Level (mg/kg) | Carcinogenic Cleanup Level (mg/kg) | Worker Cleanup Level (mg/kg) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Nitrite | | NA | | NA | | NA | | NA | | | NA | NA | NA |
| Nitrite, nitrate | | NA | | NA | | NA | | NA | | | NA | NA | NA |
| Phosphate | | NA | | NA | | NA | | NA | | | NA | NA | NA |
| Phosphorous | | NA | | NA | | NA | | NA | | | NA | NA | NA |
| Potassium | K | NA | | NA | ** | NA | | NA | | | NA | NA | NA |
| Selenium | SE | 5.00E-03 | a | 5.00E-03 | ** | ND | a | ND | a | D | 6.44E+03 | NA | 6.44E+03 |
| Silver | AG | 5.00E-03 | a | 5.00E-03 | ** | NA | | NA | | D | 6.44E+03 | NA | 6.44E+03 |
| Sodium | NA | NA | | NA | ** | NA | | NA | | | NA | NA | NA |
| Sulfate | | NA | | NA | | NA | | NA | | | NA | NA | NA |
| Thallium | TL | 8.00E-05 | a | 8.00E-05 | ** | ND | a | ND | a | D | 1.03E+02 | NA | 1.03E+02 |
| Total dissolved solids | | NA | | NA | | NA | | NA | | | NA | NA | NA |
| Total petroleum hydrocarbons, diesel fraction | | NA | | NA | | NA | | NA | | | NA | NA | NA |
| Vanadium | V | 7.00E-03 | b | 7.00E-03 | ** | NA | | NA | | | 9.01E+03 | NA | 9.01E+03 |
| Zinc | ZN | 3.00E-01 | a | 3.00E-01 | ** | ND | a | ND | a | D | 3.86E+05 | NA | 3.86E+05 |

a - IRIS Database accessed 6/99
b - HEAST FY1997
x - Withdrawn data
^ - Asbestos toxicity value represents an inhalation unit risk in units of PCM fibers/ml

NA - Not Available
ND - No Data

a1 The CPF for this constituent is listed as the Dinitrotoluene mixture 2,4-/2,6- on IRIS.
a2 An absorption factor of 30% is applicable.
a3 This value is for food consumption.
a4 This value is for hexavalent chromium.
a5 This value is for soluble nickel salts.
a6 The CPF for nickel subsulfide was used.
(i) Study based on the inhalation study.
(o) Study based on oral study.

**** This value is based the oral toxicity value for the same constituent.**

*Table 5-5*
*Closure Performance Standards for Soil*
*Off-Site Recreational User*
*Fort Wingate Depot Activity*
*Gallup, New Mexico*

| Constituent | IRDMIS Synonym | Oral RfD (mg/kg/d) | | Inhalation RfD (mg/kg/d) | | Oral CPF (mg/kg/d)^-1 | | Inhalation CPF (mg/kg/d)^-1 | | Carcinogenic Classification | Noncarcinogenic Cleanup Level (mg/kg) | Carcinogenic Cleanup Level (mg/kg) | Recreational Cleanup Level (mg/kg) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| HMX | HMX | 5.00E-02 | | 5.00E-02 | ** | NA | | NA | | | 1.68E+10 | NA | 1.68E+10 |
| RDX | RDX | 3.00E-03 | | 3.00E-03 | ** | 1.10E-01 | | 1.10E-01 | ** | C | 1.01E+09 | 7.13E+06 | 7.13E+06 |
| 1,3,5-Trinitrobenzene | 135TNB | 3.00E-02 | a | 3.00E-02 | ** | NA | | NA | | | 1.01E+10 | NA | 1.01E+10 |
| 1,3-Dinitrobenzene | 13DNB | 1.00E-04 | a | 1.00E-04 | ** | ND | a | ND | ** | D | 3.36E+07 | NA | 3.36E+07 |
| Nitrobenzene | NB | 5.00E-04 | a | 5.70E-04 | b | NA | | NA | | | 1.92E+08 | NA | 1.92E+08 |
| N-methyl-N,2,4,6-tetranitroaniline | | 1.00E-02 | b | 1.00E-02 | ** | NA | | NA | | | 3.36E+09 | NA | 3.36E+09 |
| 2,4,6-Trinitrotoluene | 246TNT | 5.00E-04 | a | 5.00E-04 | ** | 3.00E-02 | a | 3.00E-02 | ** | C | 1.68E+08 | 2.62E+07 | 2.62E+07 |
| 2,4-Dinitrotoluene | 24DNT | 2.00E-03 | a | 2.00E-03 | ** | 6.80E-01 | a1 | 6.80E-01 | ** | | 6.72E+08 | 1.15E+06 | 1.15E+06 |
| 2,6-Dinitrotoluene | 26DNT | 1.00E-03 | b | 1.00E-03 | ** | 6.80E-01 | a1 | 6.80E-01 | ** | B2 | 3.36E+08 | 1.15E+06 | 1.15E+06 |
| 2-Nitrotoluene | | 1.00E-02 | b | 1.00E-02 | ** | NA | | NA | | | 3.36E+09 | NA | 3.36E+09 |
| 4-Nitrotoluene | | 1.00E-02 | b | 1.00E-02 | ** | NA | | NA | | | 3.36E+09 | NA | 3.36E+09 |
| 3-Nitrotoluene | | 1.00E-02 | b | 1.00E-02 | ** | NA | | NA | | | 3.36E+09 | NA | 3.36E+09 |
| 2-Amino-4,6-DNT | | NA | | NA | | 6.80E-01 | a1 | 6.80E-01 | ** | | NA | 1.15E+06 | 1.15E+06 |
| 4-Amino-2,6-DNT | | NA | | NA | | 6.80E-01 | a1 | 6.80E-01 | ** | | NA | 1.15E+06 | 1.15E+06 |
| Aluminum | AL | 1.00E+00 | c | 1.00E+00 | ** | NA | | NA | | | 3.36E+11 | NA | 3.36E+11 |
| Ammonia nitrogen | | NA | | NA | | NA | | NA | | | NA | NA | NA |
| Amosite asbestos | | NA | | NA | | NA | | 2.30E-01 ^ | | A | NA | 3.41E+06 | 3.41E+06 |
| Antimony | SB | 4.00E-04 | a | 4.00E-04 | ** | ND | a | ND | ** | | 1.34E+08 | NA | 1.34E+08 |
| Arsenic | AS | 3.00E-04 | a | 3.00E-04 | ** | 1.50E+00 | a | 1.50E+01 | a2 | A | 1.01E+08 | 5.23E+04 | 5.23E+04 |
| Barium | BA | 7.00E-02 | a | 1.40E-04 | b | ND | a | ND | a | | 4.71E+07 | NA | 4.71E+07 |
| Beryllium | BE | 2.00E-03 | a | 5.70E-06 | a | NA | | 8.40E+00 | a | B2 | 1.92E+06 | 9.34E+04 | 9.34E+04 |
| Boron | | 9.00E-02 | a | 5.70E-03 | b | NA | | NA | | | 1.92E+09 | NA | 1.92E+09 |
| Cadmium | CD | 1.00E-03 | a3 | 1.00E-03 | ** | NA | a | 6.30E+00 | a | B1 | 3.36E+08 | 1.25E+05 | 1.25E+05 |
| Calcium | CA | NA | | NA | | NA | | NA | | | NA | NA | NA |
| Chloride | | NA | | NA | | NA | | NA | | | NA | NA | NA |
| Chromium | CR | 5.00E-03 | a4 | 5.00E-03 | ** | NA | a | 4.20E+01 | a4 | A | 1.68E+09 | 1.87E+04 | 1.87E+04 |
| Cobalt | CO | 6.00E-02 | x | 5.70E-06 | x | ND | a | ND | a | | 1.92E+06 | NA | 1.92E+06 |
| Copper | CU | 3.71E-02 | b | 3.71E-02 | ** | NA | | NA | | D | 1.25E+10 | NA | 1.25E+10 |
| Fluoride | | 6.00E-02 | a | 6.00E-02 | ** | NA | | NA | | | 2.02E+10 | NA | 2.02E+10 |
| Iron | FE | 3.00E-01 | c | 3.00E-01 | ** | NA | | NA | | | 1.01E+11 | NA | 1.01E+11 |
| Lead | PB | ND | a | ND | ** | NA | a | NA | a | B2 | NA | NA | NA |
| Lithium | | 2.00E-02 | x | 2.00E-02 | ** | NA | | NA | | | 6.72E+09 | NA | 6.72E+09 |
| Magnesium | MG | NA | | NA | ** | NA | | NA | | | NA | NA | NA |
| Manganese | MN | 1.40E-01 | a3 | 1.43E-05 | a | NA | | NA | | D | 4.81E+06 | NA | 4.81E+06 |
| Mercury | HG | 3.00E-04 | b | 8.60E-05 | b | NA | | NA | | D | 2.89E+07 | NA | 2.89E+07 |
| Molybdenum | | 5.00E-03 | i | 5.00E-03 | ** | NA | | NA | | | 1.68E+09 | NA | 1.68E+09 |

*Table 5-5*
*Closure Performance Standards for Soil*
*Off-Site Recreational User*
*Fort Wingate Depot Activity*
*Gallup, New Mexico*

| Constituent | IRDMIS Synonym | Oral RfD (mg/kg/d) | | Inhalation RfD (mg/kg/d) | | Oral CPF (mg/kg/d)^-1 | | Inhalation CPF (mg/kg/d)^-1 | | Carcinogenic Classification | Noncarcinogenic Cleanup Level (mg/kg) | Carcinogenic Cleanup Level (mg/kg) | Recreational Cleanup Level (mg/kg) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Nickel | NI | 2.00E-02 | a5 | 2.00E-02 | ** | NA | | 1.68E+00 | a6 | A | 6.72E+09 | 4.67E+05 | 4.67E+05 |
| Nitrite | | NA | | NA | | NA | | NA | | | NA | NA | NA |
| Nitrite, nitrate | | NA | | NA | | NA | | NA | | | NA | NA | NA |
| Phosphate | | NA | | NA | | NA | | NA | | | NA | NA | NA |
| Phosphorous | | NA | | NA | | NA | | NA | | | NA | NA | NA |
| Potassium | K | NA | | NA | ** | NA | | NA | | | NA | NA | NA |
| Selenium | SE | 5.00E-03 | a | 5.00E-03 | ** | ND | a | ND | a | D | 1.68E+09 | NA | 1.68E+09 |
| Silver | AG | 5.00E-03 | a | 5.00E-03 | ** | NA | | NA | | D | 1.68E+09 | NA | 1.68E+09 |
| Sodium | NA | NA | | NA | ** | NA | | NA | | | NA | NA | NA |
| Sulfate | | NA | | NA | | NA | | NA | | | NA | NA | NA |
| Thallium | TL | 8.00E-05 | a | 8.00E-05 | ** | ND | a | ND | a | D | 2.69E+07 | NA | 2.69E+07 |
| Total dissolved solids | | NA | | NA | | NA | | NA | | | NA | NA | NA |
| Total petroleum hydrocarbons, diesel fraction | | NA | | NA | | NA | | NA | | | NA | NA | NA |
| Vanadium | V | 7.00E-03 | b | 7.00E-03 | ** | NA | | NA | | | 2.35E+09 | NA | 2.35E+09 |
| Zinc | ZN | 3.00E-01 | a | 3.00E-01 | ** | ND | a | ND | a | D | 1.01E+11 | NA | 1.01E+11 |

a - IRIS Database accessed 6/99
b - HEAST FY1997
x - Withdrawn data
^ - Asbestos toxicity value represents an inhalation unit risk in units of PCM fibers/ml

NA - Not Available
ND - No Data

a1 The CPF for this constituent is listed as the Dinitrotoluene mixture 2,4-/2,6- on IRIS.
a2 An absorption factor of 30% is applicable.
a3 This value is for food consumption.
a4 This value is for hexavalent chromium.
a5 This value is for soluble nickel salts.
a6 The CPF for nickel subsulfide was used.
(i) Study based on the inhalation study.
(o) Study based on oral study.

**** This value is based the oral toxicity value for the same constituent.**

*Table 5-6*
*Summary of Samples that Exceed Background*
*Closed OB/OD Area*
*Old Demolition Area*
*Fort Wingate Depot Activity*
*Gallup, New Mexico*

| Site | Material Type | Compound | Number of Samples Collected | Number of Detected Values | Maximum Detected Value | Units | Number of Samples that Exceeded Background | Background Concentration |
|---|---|---|---|---|---|---|---|---|
| KGA1 | Soil | 1,3-Dinitrobenzene | 19 | 1 | 1.32 | µg/g | 1 | 0 |
| KGA1 | Soil | 2-Nitrotoluene | 19 | 1 | 2.89 | µg/g | 1 | 0 |
| KGA1 | Soil | Antimony | 19 | 4 | 6.43 | µg/g | 4 | 0 |
| KGA1 | Soil | Barium | 19 | 19 | 316 | µg/g | 8 | 159.28 |
| KGA1 | Soil | Beryllium | 19 | 19 | 1.26 | µg/g | 10 | 1.02 |
| KGA1 | Soil | Cadmium | 19 | 11 | 0.141 | µg/g | 11 | 0 |
| KGA1 | Soil | Chromium | 19 | 19 | 16.7 | µg/g | 1 | 16.43 |
| KGA1 | Soil | Molybdenum | 19 | 1 | 1.37 | µg/g | 1 | 0 |
| KGA1 | Soil | Silver | 19 | 7 | 0.679 | µg/g | 7 | 0 |
| KGA1 | Soil | Vanadium | 19 | 19 | 45.5 | µg/g | 10 | 32.61 |
| KGA1 | Waste | 1,3,5-Trinitrobenzene | 3 | 1 | 0.188 | µg/g | 1 | 0 |
| KGA1 | Waste | 2,4,6-Trinitrotoluene | 3 | 2 | 119 | µg/g | 2 | 0 |
| KGA1 | Waste | 3-Nitrotoluene | 3 | 1 | 0.388 | µg/g | 1 | 0 |
| KGA1 | Waste | Antimony | 3 | 2 | 11.8 | µg/g | 2 | 0 |
| KGA1 | Waste | Arsenic | 3 | 3 | 41.3 | µg/g | 3 | 9.3 |
| KGA1 | Waste | Barium | 3 | 3 | 190 | µg/g | 1 | 159.28 |
| KGA1 | Waste | Cadmium | 3 | 3 | 4.24 | µg/g | 3 | 0 |
| KGA1 | Waste | Chromium | 3 | 3 | 33.8 | µg/g | 3 | 16.43 |
| KGA1 | Waste | Cobalt | 3 | 3 | 13.2 | µg/g | 2 | 11.8 |
| KGA1 | Waste | Copper | 3 | 3 | 634 | µg/g | 3 | 27.84 |
| KGA1 | Waste | Iron | 3 | 3 | 160000 | µg/g | 3 | 32403.68 |
| KGA1 | Waste | Lead | 3 | 3 | 58.9 | µg/g | 3 | 22.4 |
| KGA1 | Waste | Manganese | 3 | 3 | 744 | µg/g | 3 | 391.98 |
| KGA1 | Waste | Mercury | 3 | 3 | 0.538 | µg/g | 2 | 0.08 |

*Table 5-6*
*Summary of Samples that Exceed Background*
*Closed OB/OD Area*
*Old Demolition Area*
*Fort Wingate Depot Activity*
*Gallup, New Mexico*

| Site | Material Type | Compound | Number of Samples Collected | Number of Detected Values | Maximum Detected Value | Units | Number of Samples that Exceeded Background | Background Concentration |
|---|---|---|---|---|---|---|---|---|
| KGA1 | Waste | Molybdenum | 3 | 3 | 12.7 | µg/g | 3 | 0 |
| KGA1 | Waste | Nickel | 3 | 3 | 99.9 | µg/g | 3 | 18.4 |
| KGA1 | Waste | Silver | 3 | 3 | 5.08 | µg/g | 3 | 0 |
| KGA1 | Waste | Thallium | 3 | 3 | 2.07 | µg/g | 3 | 0 |
| KGA1 | Waste | Vanadium | 3 | 3 | 33.2 | µg/g | 1 | 32.61 |
| KGA1 | Waste | Zinc | 3 | 3 | 13000 | µg/g | 3 | 77.28 |
| KGA2 | Soil | Antimony | 23 | 8 | 8.65 | µg/g | 8 | 0 |
| KGA2 | Soil | Barium | 23 | 23 | 353 | µg/g | 14 | 159.28 |
| KGA2 | Soil | Beryllium | 23 | 23 | 1.29 | µg/g | 11 | 1.02 |
| KGA2 | Soil | Cadmium | 23 | 10 | 1.11 | µg/g | 10 | 0 |
| KGA2 | Soil | Chromium | 23 | 23 | 18.7 | µg/g | 3 | 16.43 |
| KGA2 | Soil | Copper | 23 | 23 | 43.3 | µg/g | 2 | 27.84 |
| KGA2 | Soil | Lead | 23 | 23 | 37.2 | µg/g | 1 | 22.4 |
| KGA2 | Soil | Molybdenum | 23 | 2 | 2.52 | µg/g | 2 | 0 |
| KGA2 | Soil | Silver | 23 | 1 | 0.46 | µg/g | 1 | 0 |
| KGA2 | Soil | Thallium | 23 | 1 | 0.606 | µg/g | 1 | 0 |
| KGA2 | Soil | Vanadium | 23 | 23 | 49.3 | µg/g | 14 | 32.61 |
| KGA2 | Soil | Zinc | 23 | 23 | 867 | µg/g | 4 | 77.28 |
| KGA2 | Waste | Antimony | 3 | 3 | 9.95 | µg/g | 3 | 0 |
| KGA2 | Waste | Arsenic | 3 | 3 | 9.79 | µg/g | 2 | 9.3 |
| KGA2 | Waste | Barium | 3 | 3 | 1700 | µg/g | 2 | 159.28 |
| KGA2 | Waste | Beryllium | 3 | 3 | 1.1 | µg/g | 1 | 1.02 |
| KGA2 | Waste | Cadmium | 3 | 3 | 16 | µg/g | 3 | 0 |

*Table 5-6*
*Summary of Samples that Exceed Background*
*Closed OB/OD Area*
*Old Demolition Area*
*Fort Wingate Depot Activity*
*Gallup, New Mexico*

| Site | Material Type | Compound | Number of Samples Collected | Number of Detected Values | Maximum Detected Value | Units | Number of Samples that Exceeded Background | Background Concentration |
|---|---|---|---|---|---|---|---|---|
| KGA2 | Waste | Chromium | 3 | 3 | 31.3 | µg/g | 3 | 16.43 |
| KGA2 | Waste | Cobalt | 3 | 3 | 12.5 | µg/g | 1 | 11.8 |
| KGA2 | Waste | Copper | 3 | 3 | 375 | µg/g | 3 | 27.84 |
| KGA2 | Waste | Iron | 3 | 3 | 89000 | µg/g | 2 | 32403.68 |
| KGA2 | Waste | Lead | 3 | 3 | 290 | µg/g | 2 | 22.4 |
| KGA2 | Waste | Manganese | 3 | 3 | 774 | µg/g | 2 | 391.98 |
| KGA2 | Waste | Mercury | 3 | 3 | 0.528 | µg/g | 1 | 0.08 |
| KGA2 | Waste | Molybdenum | 3 | 3 | 2.32 | µg/g | 3 | 0 |
| KGA2 | Waste | Nickel | 3 | 3 | 31.6 | µg/g | 2 | 18.4 |
| KGA2 | Waste | Silver | 3 | 2 | 3.53 | µg/g | 2 | 0 |
| KGA2 | Waste | Vanadium | 3 | 3 | 37 | µg/g | 2 | 32.61 |
| KGA2 | Waste | Zinc | 3 | 3 | 5800 | µg/g | 2 | 77.28 |
| KP1 | Soil | Barium | 9 | 9 | 249 | µg/g | 1 | 159.28 |
| KP1 | Soil | Beryllium | 9 | 9 | 1.12 | µg/g | 3 | 1.02 |
| KP1 | Soil | Silver | 9 | 2 | 0.565 | µg/g | 2 | 0 |
| KP1 | Soil | Thallium | 9 | 1 | 0.596 | µg/g | 1 | 0 |
| KP1 | Waste | Antimony | 1 | 1 | 4.22 | µg/g | 1 | 0 |
| KP1 | Waste | Arsenic | 1 | 1 | 11.8 | µg/g | 1 | 9.3 |
| KP1 | Waste | Barium | 1 | 1 | 275 | µg/g | 1 | 159.28 |
| KP1 | Waste | Beryllium | 1 | 1 | 1.83 | µg/g | 1 | 1.02 |
| KP1 | Waste | Chromium | 1 | 1 | 27.1 | µg/g | 1 | 16.43 |
| KP1 | Waste | Manganese | 1 | 1 | 396 | µg/g | 1 | 391.98 |
| KP1 | Waste | Thallium | 1 | 1 | 0.715 | µg/g | 1 | 0 |

*Table 5-6*
*Summary of Samples that Exceed Background*
*Closed OB/OD Area*
*Old Demolition Area*
*Fort Wingate Depot Activity*
*Gallup, New Mexico*

| Site | Material Type | Compound | Number of Samples Collected | Number of Detected Values | Maximum Detected Value | Units | Number of Samples that Exceeded Background | Background Concentration |
|---|---|---|---|---|---|---|---|---|
| KP1 | Waste | Vanadium | 1 | 1 | 47.5 | µg/g | 1 | 32.61 |
| KP1 | Waste | Zinc | 1 | 1 | 82 | µg/g | 1 | 77.28 |

*Table 5-7*
*Summary of Samples that Exceed RBLs*
*Closed OB/OD Area*
*Old Demolition Area*
*Fort Wingate Depot Activity*
*Gallup, New Mexico*

| Site | Material Type | Compound | Number of Samples Collected | Number of Detected Values | Maximum Detected Value | Units | Number of Samples that Exceeded Background | Number of Samples that Exceeded Screening Criteria | Background Concentration | Screening Criteria |
|---|---|---|---|---|---|---|---|---|---|---|
| KGA1 | Waste | 2,4,6-Trinitrotoluene | 3 | 2 | 119 | µg/g | 2 | 2 | 0 | 16 |
| KGA1 | Waste | Arsenic | 3 | 3 | 41.3 | µg/g | 3 | 3 | 9.3 | 0.39 |
| KGA1 | Waste | Iron | 3 | 3 | 160000 | µg/g | 3 | 3 | 32403.68 | 23000 |
| KGA2 | Waste | Arsenic | 3 | 3 | 9.79 | µg/g | 2 | 2 | 9.3 | 0.39 |
| KGA2 | Waste | Iron | 3 | 3 | 89000 | µg/g | 2 | 2 | 32403.68 | 23000 |
| KP1 | Waste | Arsenic | 1 | 1 | 11.8 | µg/g | 1 | 1 | 9.3 | 0.39 |

*Table 5-8*
*Summary of Samples that Exceed CPSs*
*Closed OB/OD Area*
*Old Demolition Area*
*Fort Wingate Depot Activity*
*Gallup, New Mexico*

| Site | Material Type | Compound | Number of Samples Collected | Number of Detected Values | Maximum Detected Value | Units | Number of Samples that Exceeded Background | Number of Samples that Exceeded Screening Criteria | Number of Samples that Exceeded Closure Performance Standards | Background Concentration | Screening Criteria | Closure Performance Standards |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| No samples from this area exceeded CPSs. | | | | | | | | | | | | |

*Table 5-9*
*Summary of Samples that Exceed Background*
*Closed OB/OD Area*
*Old Burning Ground and Demolition Landfill Area*
*Fort Wingate Depot Activity*
*Gallup, New Mexico*

| Site | Material Type | Compound | Number of Samples Collected | Number of Detected Values | Maximum Detected Value | Units | Number of Samples that Exceeded Background | Background Concentration |
|---|---|---|---|---|---|---|---|---|
| KGA3 | Soil | 4-Amino-2,6-dinitrotoluene | 76 | 1 | 0.515 | µg/g | 1 | 0 |
| KGA3 | Soil | Antimony | 76 | 8 | 7.16 | µg/g | 8 | 0 |
| KGA3 | Soil | Arsenic | 76 | 76 | 25 | µg/g | 52 | 2.7 |
| KGA3 | Soil | Barium | 76 | 76 | 1200 | µg/g | 1 | 430.7 |
| KGA3 | Soil | Beryllium | 76 | 75 | 1.79 | µg/g | 4 | 1.1 |
| KGA3 | Soil | Cadmium | 76 | 32 | 1.7 | µg/g | 32 | 0 |
| KGA3 | Soil | Chromium | 76 | 76 | 20.3 | µg/g | 2 | 17 |
| KGA3 | Soil | Cobalt | 76 | 76 | 15.8 | µg/g | 17 | 6.5 |
| KGA3 | Soil | Copper | 76 | 76 | 37.7 | µg/g | 8 | 18.9 |
| KGA3 | Soil | Iron | 76 | 76 | 92000 | µg/g | 13 | 17647.3 |
| KGA3 | Soil | Lead | 76 | 76 | 390 | µg/g | 26 | 12.5 |
| KGA3 | Soil | Manganese | 76 | 76 | 4900 | µg/g | 4 | 458.1 |
| KGA3 | Soil | Mercury | 76 | 17 | 0.066 | µg/g | 1 | 0.06 |
| KGA3 | Soil | Molybdenum | 76 | 23 | 4.85 | µg/g | 23 | 0 |
| KGA3 | Soil | Nickel | 76 | 62 | 17 | µg/g | 1 | 14.3 |
| KGA3 | Soil | Phosphorus | 78 | 74 | 396 | µg/g | 74 | 0 |
| KGA3 | Soil | Selenium | 76 | 1 | 0.505 | µg/g | 1 | 0.4 |
| KGA3 | Soil | Silver | 76 | 4 | 0.796 | µg/g | 4 | 0 |
| KGA3 | Soil | Thallium | 76 | 16 | 1.5 | µg/g | 16 | 0 |
| KGA3 | Soil | Vanadium | 76 | 76 | 69 | µg/g | 11 | 31.3 |
| KGA3 | Soil | Zinc | 76 | 76 | 1250 | µg/g | 36 | 29.2 |
| KGA3 | Waste | 1,3,5-Trinitrobenzene | 14 | 4 | 33.3 | µg/g | 4 | 0 |
| KGA3 | Waste | 2,4,6-Trinitrotoluene | 14 | 3 | 476 | µg/g | 3 | 0 |
| KGA3 | Waste | 2,4-Dinitrotoluene | 14 | 1 | 0.283 | µg/g | 1 | 0 |

*Table 5-9*
*Summary of Samples that Exceed Background*
*Closed OB/OD Area*
*Old Burning Ground and Demolition Landfill Area*
*Fort Wingate Depot Activity*
*Gallup, New Mexico*

| Site | Material Type | Compound | Number of Samples Collected | Number of Detected Values | Maximum Detected Value | Units | Number of Samples that Exceeded Background | Background Concentration |
|---|---|---|---|---|---|---|---|---|
| KGA3 | Waste | 2-Amino-4,6-dinitrotoluene | 14 | 2 | 1.86 | µg/g | 2 | 0 |
| KGA3 | Waste | HMX | 14 | 1 | 36.3 | µg/g | 1 | 0 |
| KGA3 | Waste | RDX | 14 | 1 | 264 | µg/g | 1 | 0 |
| KGA3 | Waste | Antimony | 13 | 5 | 107 | µg/g | 5 | 0 |
| KGA3 | Waste | Arsenic | 13 | 13 | 113 | µg/g | 9 | 2.7 |
| KGA3 | Waste | Barium | 13 | 13 | 23000 | µg/g | 7 | 430.7 |
| KGA3 | Waste | Cadmium | 13 | 13 | 990 | µg/g | 13 | 0 |
| KGA3 | Waste | Chromium | 13 | 13 | 930 | µg/g | 4 | 17 |
| KGA3 | Waste | Cobalt | 13 | 13 | 20 | µg/g | 5 | 6.5 |
| KGA3 | Waste | Copper | 13 | 13 | 8200 | µg/g | 10 | 18.9 |
| KGA3 | Waste | Iron | 13 | 13 | 120000 | µg/g | 8 | 17647.3 |
| KGA3 | Waste | Lead | 13 | 13 | 6600 | µg/g | 11 | 12.5 |
| KGA3 | Waste | Manganese | 13 | 13 | 1070 | µg/g | 5 | 458.1 |
| KGA3 | Waste | Mercury | 13 | 6 | 32 | µg/g | 2 | 0.06 |
| KGA3 | Waste | Molybdenum | 13 | 7 | 502 | µg/g | 7 | 0 |
| KGA3 | Waste | Nickel | 13 | 12 | 234 | µg/g | 7 | 14.3 |
| KGA3 | Waste | Phosphorus | 11 | 10 | 71000 | µg/g | 10 | 0 |
| KGA3 | Waste | Selenium | 13 | 2 | 0.458 | µg/g | 2 | 0.4 |
| KGA3 | Waste | Silver | 13 | 4 | 98.2 | µg/g | 4 | 0 |
| KGA3 | Waste | Thallium | 13 | 9 | 6.36 | µg/g | 9 | 0 |
| KGA3 | Waste | Vanadium | 13 | 13 | 32.2 | µg/g | 1 | 31.3 |
| KGA3 | Waste | Zinc | 13 | 13 | 9300 | µg/g | 11 | 29.2 |

*Table 5-9*
*Summary of Samples that Exceed Background*
*Closed OB/OD Area*
*Old Burning Ground and Demolition Landfill Area*
*Fort Wingate Depot Activity*
*Gallup, New Mexico*

| Site | Material Type | Compound | Number of Samples Collected | Number of Detected Values | Maximum Detected Value | Units | Number of Samples that Exceeded Background | Background Concentration |
|---|---|---|---|---|---|---|---|---|
| KGA4 | Soil | 1,3,5-Trinitrobenzene | 35 | 1 | 0.187 | µg/g | 1 | 0 |
| KGA4 | Soil | 2,4,6-Trinitrotoluene | 35 | 2 | 4.36 | µg/g | 2 | 0 |
| KGA4 | Soil | 4-Amino-2,6-dinitrotoluene | 35 | 2 | 0.51 | µg/g | 2 | 0 |
| KGA4 | Soil | Antimony | 35 | 8 | 7.29 | µg/g | 8 | 0 |
| KGA4 | Soil | Arsenic | 35 | 35 | 6.8 | µg/g | 27 | 2.7 |
| KGA4 | Soil | Beryllium | 35 | 35 | 1.45 | µg/g | 3 | 1.1 |
| KGA4 | Soil | Cadmium | 35 | 22 | 8.54 | µg/g | 22 | 0 |
| KGA4 | Soil | Chromium | 35 | 35 | 24.2 | µg/g | 2 | 17 |
| KGA4 | Soil | Cobalt | 35 | 35 | 9.36 | µg/g | 14 | 6.5 |
| KGA4 | Soil | Copper | 35 | 35 | 318 | µg/g | 6 | 18.9 |
| KGA4 | Soil | Iron | 35 | 35 | 24000 | µg/g | 11 | 17647.3 |
| KGA4 | Soil | Lead | 35 | 35 | 360 | µg/g | 21 | 12.5 |
| KGA4 | Soil | Mercury | 35 | 19 | 0.714 | µg/g | 8 | 0.06 |
| KGA4 | Soil | Molybdenum | 35 | 11 | 3.16 | µg/g | 11 | 0 |
| KGA4 | Soil | Phosphorus | 35 | 33 | 801 | µg/g | 33 | 0 |
| KGA4 | Soil | Selenium | 35 | 1 | 0.428 | µg/g | 1 | 0.4 |
| KGA4 | Soil | Silver | 35 | 1 | 2.14 | µg/g | 1 | 0 |
| KGA4 | Soil | Thallium | 35 | 8 | 2.34 | µg/g | 8 | 0 |
| KGA4 | Soil | Vanadium | 35 | 35 | 64.6 | µg/g | 16 | 31.3 |
| KGA4 | Soil | Zinc | 35 | 35 | 3700 | µg/g | 32 | 29.2 |
| KGA4 | Waste | 1,3,5-Trinitrobenzene | 7 | 2 | 32.4 | µg/g | 2 | 0 |
| KGA4 | Waste | 2,4,6-Trinitrotoluene | 7 | 2 | 730 | µg/g | 2 | 0 |
| KGA4 | Waste | 2,4-Dinitrotoluene | 7 | 1 | 0.618 | µg/g | 1 | 0 |
| KGA4 | Waste | 2-Amino-4,6-dinitrotoluene | 7 | 2 | 2.3 | µg/g | 2 | 0 |

*Table 5-9*
*Summary of Samples that Exceed Background*
*Closed OB/OD Area*
*Old Burning Ground and Demolition Landfill Area*
*Fort Wingate Depot Activity*
*Gallup, New Mexico*

| Site | Material Type | Compound | Number of Samples Collected | Number of Detected Values | Maximum Detected Value | Units | Number of Samples that Exceeded Background | Background Concentration |
|---|---|---|---|---|---|---|---|---|
| KGA4 | Waste | RDX | 7 | 1 | 0.961 | µg/g | 1 | 0 |
| KGA4 | Waste | Antimony | 7 | 5 | 64.5 | µg/g | 5 | 0 |
| KGA4 | Waste | Arsenic | 7 | 7 | 5.53 | µg/g | 4 | 2.7 |
| KGA4 | Waste | Beryllium | 7 | 7 | 1.24 | µg/g | 1 | 1.1 |
| KGA4 | Waste | Cadmium | 7 | 7 | 180 | µg/g | 7 | 0 |
| KGA4 | Waste | Chromium | 7 | 7 | 42.2 | µg/g | 3 | 17 |
| KGA4 | Waste | Cobalt | 7 | 7 | 7.78 | µg/g | 1 | 6.5 |
| KGA4 | Waste | Copper | 7 | 7 | 14000 | µg/g | 5 | 18.9 |
| KGA4 | Waste | Iron | 7 | 7 | 21200 | µg/g | 2 | 17647.3 |
| KGA4 | Waste | Lead | 7 | 7 | 530 | µg/g | 7 | 12.5 |
| KGA4 | Waste | Manganese | 7 | 7 | 724 | µg/g | 1 | 458.1 |
| KGA4 | Waste | Mercury | 7 | 6 | 0.5 | µg/g | 4 | 0.06 |
| KGA4 | Waste | Molybdenum | 7 | 5 | 4.22 | µg/g | 5 | 0 |
| KGA4 | Waste | Nickel | 7 | 6 | 529 | µg/g | 4 | 14.3 |
| KGA4 | Waste | Phosphorus | 7 | 6 | 613 | µg/g | 6 | 0 |
| KGA4 | Waste | Selenium | 7 | 1 | 0.787 | µg/g | 1 | 0.4 |
| KGA4 | Waste | Silver | 7 | 4 | 0.764 | µg/g | 4 | 0 |
| KGA4 | Waste | Thallium | 7 | 1 | 0.713 | µg/g | 1 | 0 |
| KGA4 | Waste | Vanadium | 7 | 7 | 48.1 | µg/g | 1 | 31.3 |
| KGA4 | Waste | Zinc | 7 | 7 | 5700 | µg/g | 7 | 29.2 |
| KGA5 | Soil | RDX | 4 | 1 | 0.979 | µg/g | 1 | 0 |
| KGA5 | Soil | Antimony | 4 | 2 | 6.03 | µg/g | 2 | 0 |
| KGA5 | Soil | Arsenic | 4 | 4 | 5.71 | µg/g | 4 | 2.7 |

*Table 5-9*
*Summary of Samples that Exceed Background*
*Closed OB/OD Area*
*Old Burning Ground and Demolition Landfill Area*
*Fort Wingate Depot Activity*
*Gallup, New Mexico*

| Site | Material Type | Compound | Number of Samples Collected | Number of Detected Values | Maximum Detected Value | Units | Number of Samples that Exceeded Background | Background Concentration |
|---|---|---|---|---|---|---|---|---|
| KGA5 | Soil | Beryllium | 4 | 4 | 1.45 | µg/g | 2 | 1.1 |
| KGA5 | Soil | Cadmium | 4 | 2 | 0.0698 | µg/g | 2 | 0 |
| KGA5 | Soil | Chromium | 4 | 4 | 20.2 | µg/g | 2 | 17 |
| KGA5 | Soil | Cobalt | 4 | 4 | 8.91 | µg/g | 2 | 6.5 |
| KGA5 | Soil | Copper | 4 | 4 | 37.7 | µg/g | 2 | 18.9 |
| KGA5 | Soil | Iron | 4 | 4 | 23200 | µg/g | 2 | 17647.3 |
| KGA5 | Soil | Lead | 4 | 4 | 300 | µg/g | 4 | 12.5 |
| KGA5 | Soil | Phosphorus | 4 | 4 | 369 | µg/g | 4 | 0 |
| KGA5 | Soil | Thallium | 4 | 1 | 0.794 | µg/g | 1 | 0 |
| KGA5 | Soil | Vanadium | 4 | 4 | 55.2 | µg/g | 2 | 31.3 |
| KGA5 | Soil | Zinc | 4 | 4 | 96.2 | µg/g | 4 | 29.2 |
| KGA5 | Waste | Antimony | 1 | 1 | 20.1 | µg/g | 1 | 0 |
| KGA5 | Waste | Arsenic | 1 | 1 | 4.11 | µg/g | 1 | 2.7 |
| KGA5 | Waste | Copper | 1 | 1 | 89.7 | µg/g | 1 | 18.9 |
| KGA5 | Waste | Iron | 1 | 1 | 25000 | µg/g | 1 | 17647.3 |
| KGA5 | Waste | Lead | 1 | 1 | 220 | µg/g | 1 | 12.5 |
| KGA5 | Waste | Molybdenum | 1 | 1 | 2.42 | µg/g | 1 | 0 |
| KGA5 | Waste | Phosphorus | 1 | 1 | 405 | µg/g | 1 | 0 |
| KGA5 | Waste | Zinc | 1 | 1 | 218 | µg/g | 1 | 29.2 |
| KP2 | Soil | 2,4,6-Trinitrotoluene | 15 | 1 | 1.04 | µg/g | 1 | 0 |
| KP2 | Soil | RDX | 15 | 1 | 1.46 | µg/g | 1 | 0 |
| KP2 | Soil | Antimony | 15 | 6 | 7.5 | µg/g | 6 | 0 |
| KP2 | Soil | Arsenic | 15 | 15 | 10.3 | µg/g | 10 | 2.7 |

*Table 5-9*
*Summary of Samples that Exceed Background*
*Closed OB/OD Area*
*Old Burning Ground and Demolition Landfill Area*
*Fort Wingate Depot Activity*
*Gallup, New Mexico*

| Site | Material Type | Compound | Number of Samples Collected | Number of Detected Values | Maximum Detected Value | Units | Number of Samples that Exceeded Background | Background Concentration |
|---|---|---|---|---|---|---|---|---|
| KP2 | Soil | Beryllium | 15 | 15 | 1.25 | µg/g | 3 | 1.1 |
| KP2 | Soil | Cadmium | 15 | 13 | 1.44 | µg/g | 13 | 0 |
| KP2 | Soil | Chromium | 15 | 15 | 18.5 | µg/g | 2 | 17 |
| KP2 | Soil | Cobalt | 15 | 15 | 12.5 | µg/g | 7 | 6.5 |
| KP2 | Soil | Copper | 15 | 15 | 36.9 | µg/g | 2 | 18.9 |
| KP2 | Soil | Iron | 15 | 15 | 93000 | µg/g | 4 | 17647.3 |
| KP2 | Soil | Lead | 15 | 15 | 60.4 | µg/g | 7 | 12.5 |
| KP2 | Soil | Manganese | 15 | 15 | 2500 | µg/g | 1 | 458.1 |
| KP2 | Soil | Mercury | 15 | 6 | 0.708 | µg/g | 2 | 0.06 |
| KP2 | Soil | Molybdenum | 15 | 6 | 2.65 | µg/g | 6 | 0 |
| KP2 | Soil | Phosphorus | 15 | 15 | 598 | µg/g | 15 | 0 |
| KP2 | Soil | Selenium | 15 | 6 | 0.814 | µg/g | 6 | 0.4 |
| KP2 | Soil | Silver | 15 | 1 | 0.977 | µg/g | 1 | 0 |
| KP2 | Soil | Thallium | 15 | 3 | 3.4 | µg/g | 3 | 0 |
| KP2 | Soil | Vanadium | 15 | 15 | 51.6 | µg/g | 6 | 31.3 |
| KP2 | Soil | Zinc | 15 | 15 | 347 | µg/g | 12 | 29.2 |
| KP2 | Waste | 2,4,6-Trinitrotoluene | 3 | 2 | 4.37 | µg/g | 2 | 0 |
| KP2 | Waste | 4-Amino-2,6-dinitrotoluene | 3 | 1 | 0.869 | µg/g | 1 | 0 |
| KP2 | Waste | RDX | 3 | 1 | 1.11 | µg/g | 1 | 0 |
| KP2 | Waste | Arsenic | 3 | 3 | 3.03 | µg/g | 2 | 2.7 |
| KP2 | Waste | Cadmium | 3 | 3 | 4.84 | µg/g | 3 | 0 |
| KP2 | Waste | Copper | 3 | 3 | 51.7 | µg/g | 3 | 18.9 |
| KP2 | Waste | Lead | 3 | 3 | 87.9 | µg/g | 3 | 12.5 |
| KP2 | Waste | Mercury | 3 | 3 | 1.28 | µg/g | 2 | 0.06 |

*Table 5-9*
*Summary of Samples that Exceed Background*
*Closed OB/OD Area*
*Old Burning Ground and Demolition Landfill Area*
*Fort Wingate Depot Activity*
*Gallup, New Mexico*

| Site | Material Type | Compound | Number of Samples Collected | Number of Detected Values | Maximum Detected Value | Units | Number of Samples that Exceeded Background | Background Concentration |
|---|---|---|---|---|---|---|---|---|
| KP2 | Waste | Molybdenum | 3 | 3 | 3.59 | µg/g | 3 | 0 |
| KP2 | Waste | Nickel | 3 | 3 | 37 | µg/g | 1 | 14.3 |
| KP2 | Waste | Phosphorus | 3 | 3 | 174 | µg/g | 3 | 0 |
| KP2 | Waste | Silver | 3 | 1 | 0.54 | µg/g | 1 | 0 |
| KP2 | Waste | Zinc | 3 | 3 | 512 | µg/g | 3 | 29.2 |
| KP3 | Soil | Antimony | 12 | 5 | 7.1 | µg/g | 5 | 0 |
| KP3 | Soil | Arsenic | 12 | 12 | 9.67 | µg/g | 8 | 2.7 |
| KP3 | Soil | Barium | 12 | 12 | 757 | µg/g | 3 | 430.7 |
| KP3 | Soil | Cadmium | 12 | 5 | 1.22 | µg/g | 5 | 0 |
| KP3 | Soil | Cobalt | 12 | 12 | 7.11 | µg/g | 2 | 6.5 |
| KP3 | Soil | Copper | 12 | 12 | 2900 | µg/g | 4 | 18.9 |
| KP3 | Soil | Iron | 12 | 12 | 45700 | µg/g | 2 | 17647.3 |
| KP3 | Soil | Lead | 12 | 12 | 140 | µg/g | 7 | 12.5 |
| KP3 | Soil | Manganese | 12 | 12 | 870 | µg/g | 1 | 458.1 |
| KP3 | Soil | Mercury | 12 | 8 | 6.5 | µg/g | 6 | 0.06 |
| KP3 | Soil | Molybdenum | 12 | 5 | 3.29 | µg/g | 5 | 0 |
| KP3 | Soil | Phosphorus | 12 | 12 | 332 | µg/g | 12 | 0 |
| KP3 | Soil | Selenium | 12 | 1 | 0.53 | µg/g | 1 | 0.4 |
| KP3 | Soil | Thallium | 12 | 2 | 1.44 | µg/g | 2 | 0 |
| KP3 | Soil | Vanadium | 12 | 12 | 39.2 | µg/g | 4 | 31.3 |
| KP3 | Soil | Zinc | 12 | 12 | 1310 | µg/g | 10 | 29.2 |

*Table 5-9*
*Summary of Samples that Exceed Background*
*Closed OB/OD Area*
*Old Burning Ground and Demolition Landfill Area*
*Fort Wingate Depot Activity*
*Gallup, New Mexico*

| Site | Material Type | Compound | Number of Samples Collected | Number of Detected Values | Maximum Detected Value | Units | Number of Samples that Exceeded Background | Background Concentration |
|---|---|---|---|---|---|---|---|---|
| KP4 | Soil | Antimony | 5 | 4 | 22.8 | µg/g | 4 | 0 |
| KP4 | Soil | Arsenic | 5 | 5 | 5.7 | µg/g | 5 | 2.7 |
| KP4 | Soil | Beryllium | 5 | 5 | 1.24 | µg/g | 1 | 1.1 |
| KP4 | Soil | Chromium | 5 | 5 | 19.6 | µg/g | 1 | 17 |
| KP4 | Soil | Cobalt | 5 | 5 | 8.4 | µg/g | 3 | 6.5 |
| KP4 | Soil | Iron | 5 | 5 | 21700 | µg/g | 2 | 17647.3 |
| KP4 | Soil | Lead | 5 | 5 | 210 | µg/g | 3 | 12.5 |
| KP4 | Soil | Mercury | 5 | 2 | 0.0631 | µg/g | 1 | 0.06 |
| KP4 | Soil | Phosphorus | 5 | 5 | 323 | µg/g | 5 | 0 |
| KP4 | Soil | Thallium | 5 | 2 | 0.544 | µg/g | 2 | 0 |
| KP4 | Soil | Vanadium | 5 | 5 | 50.6 | µg/g | 1 | 31.3 |
| KP4 | Soil | Zinc | 5 | 5 | 68.3 | µg/g | 5 | 29.2 |
| KP4 | Waste | 1,3,5-Trinitrobenzene | 1 | 1 | 1.04 | µg/g | 1 | 0 |
| KP4 | Waste | 2,4,6-Trinitrotoluene | 1 | 1 | 4.26 | µg/g | 1 | 0 |
| KP4 | Waste | 4-Amino-2,6-dinitrotoluene | 1 | 1 | 0.371 | µg/g | 1 | 0 |
| KP4 | Waste | Antimony | 1 | 1 | 4.85 | µg/g | 1 | 0 |
| KP4 | Waste | Arsenic | 1 | 1 | 3.81 | µg/g | 1 | 2.7 |
| KP4 | Waste | Barium | 1 | 1 | 7800 | µg/g | 1 | 430.7 |
| KP4 | Waste | Cadmium | 1 | 1 | 1.58 | µg/g | 1 | 0 |
| KP4 | Waste | Chromium | 1 | 1 | 18.9 | µg/g | 1 | 17 |
| KP4 | Waste | Cobalt | 1 | 1 | 7.9 | µg/g | 1 | 6.5 |
| KP4 | Waste | Copper | 1 | 1 | 191 | µg/g | 1 | 18.9 |
| KP4 | Waste | Iron | 1 | 1 | 28900 | µg/g | 1 | 17647.3 |
| KP4 | Waste | Lead | 1 | 1 | 310 | µg/g | 1 | 12.5 |

*Table 5-9*
*Summary of Samples that Exceed Background*
*Closed OB/OD Area*
*Old Burning Ground and Demolition Landfill Area*
*Fort Wingate Depot Activity*
*Gallup, New Mexico*

| Site | Material Type | Compound | Number of Samples Collected | Number of Detected Values | Maximum Detected Value | Units | Number of Samples that Exceeded Background | Background Concentration |
|---|---|---|---|---|---|---|---|---|
| KP4 | Waste | Manganese | 1 | 1 | 553 | µg/g | 1 | 458.1 |
| KP4 | Waste | Molybdenum | 1 | 1 | 2.48 | µg/g | 1 | 0 |
| KP4 | Waste | Phosphorus | 1 | 1 | 390 | µg/g | 1 | 0 |
| KP4 | Waste | Silver | 1 | 1 | 0.43 | µg/g | 1 | 0 |
| KP4 | Waste | Thallium | 1 | 1 | 1.25 | µg/g | 1 | 0 |
| KP4 | Waste | Zinc | 1 | 1 | 1350 | µg/g | 1 | 29.2 |

*Table 5-10*
*Summary of Samples that Exceed RBLs*
*Closed OB/OD Area*
*Old Burning Ground and Demolition Landfill Area*
*Fort Wingate Depot Activity*
*Gallup, New Mexico*

| Site | Material Type | Compound | Number of Samples Collected | Number of Detected Values | Maximum Detected Value | Units | Number of Samples that Exceeded Background | Number of Samples that Exceeded Screening Criteria | Background Concentration | Screening Criteria |
|---|---|---|---|---|---|---|---|---|---|---|
| KGA3 | Soil | Arsenic | 76 | 76 | 25 | µg/g | 52 | 52 | 2.7 | 0.39 |
| KGA3 | Soil | Iron | 76 | 76 | 92000 | µg/g | 13 | 4 | 17647.3 | 23000 |
| KGA3 | Soil | Manganese | 76 | 76 | 4900 | µg/g | 4 | 1 | 458.1 | 3200 |
| KGA3 | Soil | Phosphorus | 78 | 74 | 396 | µg/g | 74 | 74 | 0 | 0 |
| KGA3 | Waste | 2,4,6-Trinitrotoluene | 14 | 3 | 476 | µg/g | 3 | 2 | 0 | 16 |
| KGA3 | Waste | 2-Amino-4,6-dinitrotoluene | 14 | 2 | 1.86 | µg/g | 2 | 2 | 0 | 0.71 |
| KGA3 | Waste | RDX | 14 | 1 | 264 | µg/g | 1 | 1 | 0 | 4.4 |
| KGA3 | Waste | Antimony | 13 | 5 | 107 | µg/g | 5 | 1 | 0 | 31 |
| KGA3 | Waste | Arsenic | 13 | 13 | 113 | µg/g | 9 | 9 | 2.7 | 0.39 |
| KGA3 | Waste | Barium | 13 | 13 | 23000 | µg/g | 7 | 2 | 430.7 | 5400 |
| KGA3 | Waste | Cadmium | 13 | 13 | 990 | µg/g | 13 | 1 | 0 | 39 |
| KGA3 | Waste | Chromium | 13 | 13 | 930 | µg/g | 4 | 1 | 17 | 210 |
| KGA3 | Waste | Copper | 13 | 13 | 8200 | µg/g | 10 | 1 | 18.9 | 2900 |
| KGA3 | Waste | Iron | 13 | 13 | 120000 | µg/g | 8 | 8 | 17647.3 | 23000 |
| KGA3 | Waste | Lead | 13 | 13 | 6600 | µg/g | 11 | 1 | 12.5 | 400 |
| KGA3 | Waste | Mercury | 13 | 6 | 32 | µg/g | 2 | 1 | 0.06 | 23 |
| KGA3 | Waste | Molybdenum | 13 | 7 | 502 | µg/g | 7 | 1 | 0 | 390 |
| KGA3 | Waste | Phosphorus | 11 | 10 | 71000 | µg/g | 10 | 10 | 0 | 0 |
| KGA3 | Waste | Thallium | 13 | 9 | 6.36 | µg/g | 9 | 1 | 0 | 6.3 |
| KGA4 | Soil | Arsenic | 35 | 35 | 6.8 | µg/g | 27 | 27 | 2.7 | 0.39 |
| KGA4 | Soil | Iron | 35 | 35 | 24000 | µg/g | 11 | 2 | 17647.3 | 23000 |
| KGA4 | Soil | Phosphorus | 35 | 33 | 801 | µg/g | 33 | 33 | 0 | 0 |

*Table 5-10*
*Summary of Samples that Exceed RBLs*
*Closed OB/OD Area*
*Old Burning Ground and Demolition Landfill Area*
*Fort Wingate Depot Activity*
*Gallup, New Mexico*

| Site | Material Type | Compound | Number of Samples Collected | Number of Detected Values | Maximum Detected Value | Units | Number of Samples that Exceeded Background | Number of Samples that Exceeded Screening Criteria | Background Concentration | Screening Criteria |
|---|---|---|---|---|---|---|---|---|---|---|
| KGA4 | Waste | 2,4,6-Trinitrotoluene | 7 | 2 | 730 | µg/g | 2 | 2 | 0 | 16 |
| KGA4 | Waste | 2-Amino-4,6-dinitrotoluene | 7 | 2 | 2.3 | µg/g | 2 | 2 | 0 | 0.71 |
| KGA4 | Waste | Antimony | 7 | 5 | 64.5 | µg/g | 5 | 2 | 0 | 31 |
| KGA4 | Waste | Arsenic | 7 | 7 | 5.53 | µg/g | 4 | 4 | 2.7 | 0.39 |
| KGA4 | Waste | Cadmium | 7 | 7 | 180 | µg/g | 7 | 4 | 0 | 39 |
| KGA4 | Waste | Copper | 7 | 7 | 14000 | µg/g | 5 | 1 | 18.9 | 2900 |
| KGA4 | Waste | Lead | 7 | 7 | 530 | µg/g | 7 | 3 | 12.5 | 400 |
| KGA4 | Waste | Phosphorus | 7 | 6 | 613 | µg/g | 6 | 6 | 0 | 0 |
| KGA5 | Soil | Arsenic | 4 | 4 | 5.71 | µg/g | 4 | 4 | 2.7 | 0.39 |
| KGA5 | Soil | Iron | 4 | 4 | 23200 | µg/g | 2 | 1 | 17647.3 | 23000 |
| KGA5 | Soil | Phosphorus | 4 | 4 | 369 | µg/g | 4 | 4 | 0 | 0 |
| KGA5 | Waste | Arsenic | 1 | 1 | 4.11 | µg/g | 1 | 1 | 2.7 | 0.39 |
| KGA5 | Waste | Iron | 1 | 1 | 25000 | µg/g | 1 | 1 | 17647.3 | 23000 |
| KGA5 | Waste | Phosphorus | 1 | 1 | 405 | µg/g | 1 | 1 | 0 | 0 |
| KP2 | Soil | Arsenic | 15 | 15 | 10.3 | µg/g | 10 | 10 | 2.7 | 0.39 |
| KP2 | Soil | Iron | 15 | 15 | 93000 | µg/g | 4 | 1 | 17647.3 | 23000 |
| KP2 | Soil | Phosphorus | 15 | 15 | 598 | µg/g | 15 | 15 | 0 | 0 |
| KP2 | Waste | 4-Amino-2,6-dinitrotoluene | 3 | 1 | 0.869 | µg/g | 1 | 1 | 0 | 0.71 |
| KP2 | Waste | Arsenic | 3 | 3 | 3.03 | µg/g | 2 | 2 | 2.7 | 0.39 |
| KP2 | Waste | Phosphorus | 3 | 3 | 174 | µg/g | 3 | 3 | 0 | 0 |

*Table 5-10*
*Summary of Samples that Exceed RBLs*
*Closed OB/OD Area*
*Old Burning Ground and Demolition Landfill Area*
*Fort Wingate Depot Activity*
*Gallup, New Mexico*

| Site | Material Type | Compound | Number of Samples Collected | Number of Detected Values | Maximum Detected Value | Units | Number of Samples that Exceeded Background | Number of Samples that Exceeded Screening Criteria | Background Concentration | Screening Criteria |
|---|---|---|---|---|---|---|---|---|---|---|
| KP3 | Soil | Arsenic | 12 | 12 | 9.67 | µg/g | 8 | 8 | 2.7 | 0.39 |
| KP3 | Soil | Iron | 12 | 12 | 45700 | µg/g | 2 | 1 | 17647.3 | 23000 |
| KP3 | Soil | Phosphorus | 12 | 12 | 332 | µg/g | 12 | 12 | 0 | 0 |
| KP4 | Soil | Arsenic | 5 | 5 | 5.7 | µg/g | 5 | 5 | 2.7 | 0.39 |
| KP4 | Soil | Phosphorus | 5 | 5 | 323 | µg/g | 5 | 5 | 0 | 0 |
| KP4 | Waste | Arsenic | 1 | 1 | 3.81 | µg/g | 1 | 1 | 2.7 | 0.39 |
| KP4 | Waste | Barium | 1 | 1 | 7800 | µg/g | 1 | 1 | 430.7 | 5400 |
| KP4 | Waste | Iron | 1 | 1 | 28900 | µg/g | 1 | 1 | 17647.3 | 23000 |
| KP4 | Waste | Phosphorus | 1 | 1 | 390 | µg/g | 1 | 1 | 0 | 0 |

*Table 5-11*
*Summary of Samples that Exceed CPSs*
*Closed OB/OD Area*
*Old Burning Ground and Demolition Landfill Area*
*Fort Wingate Depot Activity*
*Gallup, New Mexico*

| Site | Material Type | Compound | Number of Samples Collected | Number of Detected Values | Maximum Detected Value | Units | Number of Samples that Exceeded Background | Number of Samples that Exceeded Screening Criteria | Samples that Exceeded Closure Performance Standards | Background Concentration | Screening Criteria | Closure Performance Standards |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| KGA3 | Soil | Manganese | 76 | 76 | 4900 | µg/g | 4 | 1 | 1 | 458.1 | 3200 | 460 |
| KGA3 | Soil | Phosphorus | 78 | 74 | 396 | µg/g | 74 | 74 | 74 | 0 | 0 | 0 |
| KGA3 | Waste | 2,4,6-Trinitrotoluene | 14 | 3 | 476 | µg/g | 3 | 2 | 1 | 0 | 16 | 437 |
| KGA3 | Waste | Arsenic | 13 | 13 | 113 | µg/g | 9 | 9 | 1 | 2.7 | 0.39 | 44.2 |
| KGA3 | Waste | Barium | 13 | 13 | 23000 | µg/g | 7 | 2 | 2 | 430.7 | 5400 | 4310 |
| KGA3 | Waste | Cadmium | 13 | 13 | 990 | µg/g | 13 | 1 | 1 | 0 | 39 | 358 |
| KGA3 | Waste | Chromium | 13 | 13 | 930 | µg/g | 4 | 1 | 1 | 17 | 210 | 53.8 |
| KGA3 | Waste | Lead | 13 | 13 | 6600 | µg/g | 11 | 1 | 1 | 12.5 | 400 | 400 |
| KGA3 | Waste | Phosphorus | 11 | 10 | 71000 | µg/g | 10 | 10 | 10 | 0 | 0 | 0 |
| KGA4 | Soil | Phosphorus | 35 | 33 | 801 | µg/g | 33 | 33 | 33 | 0 | 0 | 0 |
| KGA4 | Waste | 2,4,6-Trinitrotoluene | 7 | 2 | 730 | µg/g | 2 | 2 | 1 | 0 | 16 | 437 |
| KGA4 | Waste | Lead | 7 | 7 | 530 | µg/g | 7 | 3 | 3 | 12.5 | 400 | 400 |
| KGA4 | Waste | Phosphorus | 7 | 6 | 613 | µg/g | 6 | 6 | 6 | 0 | 0 | 0 |
| KGA5 | Soil | Phosphorus | 4 | 4 | 369 | µg/g | 4 | 4 | 4 | 0 | 0 | 0 |
| KGA5 | Waste | Phosphorus | 1 | 1 | 405 | µg/g | 1 | 1 | 1 | 0 | 0 | 0 |
| KP2 | Soil | Phosphorus | 15 | 15 | 598 | µg/g | 15 | 15 | 15 | 0 | 0 | 0 |
| KP2 | Waste | Phosphorus | 3 | 3 | 174 | µg/g | 3 | 3 | 3 | 0 | 0 | 0 |
| KP3 | Soil | Phosphorus | 12 | 12 | 332 | µg/g | 12 | 12 | 12 | 0 | 0 | 0 |

*Table 5-11*
*Summary of Samples that Exceed CPSs*
*Closed OB/OD Area*
*Old Burning Ground and Demolition Landfill Area*
*Fort Wingate Depot Activity*
*Gallup, New Mexico*

| Site | Material Type | Compound | Number of Samples Collected | Number of Detected Values | Maximum Detected Value | Units | Number of Samples that Exceeded Background | Number of Samples that Exceeded Screening Criteria | Samples that Exceeded Closure Performance Standards | Background Concentration | Screening Criteria | Closure Performance Standards |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| KP4 | Soil | Phosphorus | 5 | 5 | 323 | µg/g | 5 | 5 | 5 | 0 | 0 | 0 |
| KP4 | Waste | Barium | 1 | 1 | 7800 | µg/g | 1 | 1 | 1 | 430.7 | 5400 | 4310 |
| KP4 | Waste | Phosphorus | 1 | 1 | 390 | µg/g | 1 | 1 | 1 | 0 | 0 | 0 |

*Table 5-12*
*Summary of Samples that Exceed Background*
*Closed OB/OD Area*
*Stained Areas*
*Fort Wingate Depot Activity*
*Gallup, New Mexico*

| Site | Material Type | Compound | Number of Samples Collected | Number of Detected Values | Maximum Detected Value | Units | Number of Samples that Exceeded Background | Background Concentration |
|---|---|---|---|---|---|---|---|---|
| KSA01 | Soil | 1,3,5-Trinitrobenzene | 2 | 2 | 1.85 | µg/g | 2 | 0 |
| KSA01 | Soil | 2,4,6-Trinitrotoluene | 2 | 2 | 55.4 | µg/g | 2 | 0 |
| KSA01 | Soil | 2,4-Dinitrotoluene | 2 | 1 | 1.29 | µg/g | 1 | 0 |
| KSA01 | Soil | 2-Amino-4,6-dinitrotoluene | 2 | 2 | 3.61 | µg/g | 2 | 0 |
| KSA01 | Soil | 4-Amino-2,6-dinitrotoluene | 2 | 2 | 3.93 | µg/g | 2 | 0 |
| KSA02 | Soil | 1,3,5-Trinitrobenzene | 2 | 1 | 0.554 | µg/g | 1 | 0 |
| KSA02 | Soil | 2,4,6-Trinitrotoluene | 2 | 2 | 12.2 | µg/g | 2 | 0 |
| KSA02 | Soil | 2-Amino-4,6-dinitrotoluene | 2 | 2 | 3.48 | µg/g | 2 | 0 |
| KSA02 | Soil | 4-Amino-2,6-dinitrotoluene | 2 | 2 | 3.28 | µg/g | 2 | 0 |
| KSA03 | Soil | 1,3,5-Trinitrobenzene | 2 | 2 | 15.7 | µg/g | 2 | 0 |
| KSA03 | Soil | 2,4,6-Trinitrotoluene | 2 | 2 | 840 | µg/g | 2 | 0 |
| KSA03 | Soil | 2,4-Dinitrotoluene | 2 | 1 | 2.71 | µg/g | 1 | 0 |
| KSA03 | Soil | 2-Amino-4,6-dinitrotoluene | 2 | 2 | 4.06 | µg/g | 2 | 0 |
| KSA03 | Soil | RDX | 2 | 1 | 1.27 | µg/g | 1 | 0 |

*Table 5-13*
*Summary of Samples that Exceed RBLs*
*Closed OB/OD Area*
*Stained Areas*
*Fort Wingate Depot Activity*
*Gallup, New Mexico*

| Site | Material Type | Compound | Number of Samples Collected | Number of Detected Values | Maximum Detected Value | Units | Number of Samples that Exceeded Background | Number of Samples that Exceeded Screening Criteria | Background Concentration | Screening Criteria |
|---|---|---|---|---|---|---|---|---|---|---|
| KSA01 | Soil | 2,4,6-Trinitrotoluene | 2 | 2 | 55.4 | µg/g | 2 | 2 | 0 | 16 |
| KSA01 | Soil | 2,4-Dinitrotoluene | 2 | 1 | 1.29 | µg/g | 1 | 1 | 0 | 0.71 |
| KSA01 | Soil | 2-Amino-4,6-dinitrotoluene | 2 | 2 | 3.61 | µg/g | 2 | 2 | 0 | 0.71 |
| KSA01 | Soil | 4-Amino-2,6-dinitrotoluene | 2 | 2 | 3.93 | µg/g | 2 | 2 | 0 | 0.71 |
| KSA02 | Soil | 2-Amino-4,6-dinitrotoluene | 2 | 2 | 3.48 | µg/g | 2 | 1 | 0 | 0.71 |
| KSA02 | Soil | 4-Amino-2,6-dinitrotoluene | 2 | 2 | 3.28 | µg/g | 2 | 1 | 0 | 0.71 |
| KSA03 | Soil | 2,4,6-Trinitrotoluene | 2 | 2 | 840 | µg/g | 2 | 2 | 0 | 16 |
| KSA03 | Soil | 2,4-Dinitrotoluene | 2 | 1 | 2.71 | µg/g | 1 | 1 | 0 | 0.71 |
| KSA03 | Soil | 2-Amino-4,6-dinitrotoluene | 2 | 2 | 4.06 | µg/g | 2 | 2 | 0 | 0.71 |

*Table 5-14*
*Summary of Samples that Exceed CPSs*
*Closed OB/OD Area*
*Stained Areas*
*Fort Wingate Depot Activity*
*Gallup, New Mexico*

| Site | Material Type | Compound | Number of Samples Collected | Number of Detected Values | Maximum Detected Value | Units | Number of Samples that Exceeded Background | Number of Samples that Exceeded Screening Criteria | Number of Samples that Exceeded Closure Performance Standards | Background Concentration | Screening Criteria | Closure Performance Standards |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| KSA03 | Soil | 2,4,6-Trinitrotoluene | 2 | 2 | 840 | µg/g | 2 | 2 | 1 | 0 | 16 | 437 |

*Table 5-15*
*Summary of Samples that Exceed Background*
*Current OB/OD Area*
*Residue/Debris Piles*
*Fort Wingate Depot Activity*
*Gallup, New Mexico*

| Site | Material Type | Compound | Number of Samples Collected | Number of Detected Values | Maximum Detected Value | Units | Number of Samples that Exceeded Background | Background Concentration |
|---|---|---|---|---|---|---|---|---|
| CRP1 | Soil | 4-Amino-2,6-dinitrotoluene | 8 | 1 | 0.651 | µg/g | 1 | 0 |
| CRP1 | Soil | RDX | 8 | 3 | 0.953 | µg/g | 3 | 0 |
| CRP1 | Soil | Antimony | 8 | 1 | 7.51 | µg/g | 1 | 0 |
| CRP1 | Soil | Cadmium | 8 | 5 | 0.175 | µg/g | 5 | 0 |
| CRP1 | Soil | Molybdenum | 8 | 2 | 2.98 | µg/g | 2 | 0 |
| CRP1 | Soil | Selenium | 8 | 1 | 0.603 | µg/g | 1 | 0.4 |
| CRP1 | Waste | 1,3,5-Trinitrobenzene | 2 | 1 | 260 | µg/g | 1 | 0 |
| CRP1 | Waste | 2,4,6-Trinitrotoluene | 2 | 1 | 22000 | µg/g | 1 | 0 |
| CRP1 | Waste | 2,4-Dinitrotoluene | 2 | 1 | 47.3 | µg/g | 1 | 0 |
| CRP1 | Waste | 2-Amino-4,6-dinitrotoluene | 2 | 1 | 45.2 | µg/g | 1 | 0 |
| CRP1 | Waste | HMX | 2 | 2 | 3600 | µg/g | 2 | 0 |
| CRP1 | Waste | RDX | 2 | 2 | 20000 | µg/g | 2 | 0 |
| CRP1 | Waste | Cadmium | 2 | 2 | 2.98 | µg/g | 2 | 0 |
| CRP1 | Waste | Cobalt | 2 | 2 | 6.95 | µg/g | 1 | 6.5 |
| CRP1 | Waste | Copper | 2 | 2 | 39 | µg/g | 1 | 18.9 |
| CRP1 | Waste | Lead | 2 | 2 | 26.7 | µg/g | 1 | 12.5 |
| CRP1 | Waste | Molybdenum | 2 | 2 | 3.21 | µg/g | 2 | 0 |
| CRP1 | Waste | Selenium | 2 | 1 | 1.4 | µg/g | 1 | 0.4 |
| CRP1 | Waste | Vanadium | 2 | 2 | 36.6 | µg/g | 1 | 31.3 |
| CRP1 | Waste | Zinc | 2 | 2 | 49.3 | µg/g | 2 | 29.2 |
| CRP2 | Soil | Barium | 3 | 3 | 664 | µg/g | 2 | 430.7 |
| CRP2 | Soil | Cadmium | 3 | 3 | 2.82 | µg/g | 3 | 0 |
| CRP2 | Soil | Chromium | 3 | 3 | 34.8 | µg/g | 1 | 17 |

*Table 5-15*
*Summary of Samples that Exceed Background*
*Current OB/OD Area*
*Residue/Debris Piles*
*Fort Wingate Depot Activity*
*Gallup, New Mexico*

| Site | Material Type | Compound | Number of Samples Collected | Number of Detected Values | Maximum Detected Value | Units | Number of Samples that Exceeded Background | Background Concentration |
|---|---|---|---|---|---|---|---|---|
| CRP2 | Soil | Cobalt | 3 | 3 | 11.8 | µg/g | 1 | 6.5 |
| CRP2 | Soil | Copper | 3 | 3 | 73.8 | µg/g | 1 | 18.9 |
| CRP2 | Soil | Iron | 3 | 3 | 24300 | µg/g | 1 | 17647.3 |
| CRP2 | Soil | Lead | 3 | 3 | 23.6 | µg/g | 1 | 12.5 |
| CRP2 | Soil | Manganese | 3 | 3 | 564 | µg/g | 1 | 458.1 |
| CRP2 | Soil | Molybdenum | 3 | 3 | 2.89 | µg/g | 3 | 0 |
| CRP2 | Soil | Nickel | 3 | 3 | 20.3 | µg/g | 1 | 14.3 |
| CRP2 | Soil | Silver | 3 | 1 | 0.678 | µg/g | 1 | 0 |
| CRP2 | Soil | Vanadium | 3 | 3 | 34 | µg/g | 1 | 31.3 |
| CRP2 | Soil | Zinc | 3 | 3 | 106 | µg/g | 2 | 29.2 |
| CRP2 | Waste | Antimony | 1 | 1 | 89.2 | µg/g | 1 | 0 |
| CRP2 | Waste | Arsenic | 1 | 1 | 5.04 | µg/g | 1 | 2.7 |
| CRP2 | Waste | Barium | 1 | 1 | 492 | µg/g | 1 | 430.7 |
| CRP2 | Waste | Cadmium | 1 | 1 | 600 | µg/g | 1 | 0 |
| CRP2 | Waste | Chromium | 1 | 1 | 100 | µg/g | 1 | 17 |
| CRP2 | Waste | Cobalt | 1 | 1 | 13 | µg/g | 1 | 6.5 |
| CRP2 | Waste | Copper | 1 | 1 | 31000 | µg/g | 1 | 18.9 |
| CRP2 | Waste | Iron | 1 | 1 | 63000 | µg/g | 1 | 17647.3 |
| CRP2 | Waste | Lead | 1 | 1 | 5700 | µg/g | 1 | 12.5 |
| CRP2 | Waste | Manganese | 1 | 1 | 1800 | µg/g | 1 | 458.1 |
| CRP2 | Waste | Molybdenum | 1 | 1 | 7.8 | µg/g | 1 | 0 |
| CRP2 | Waste | Nickel | 1 | 1 | 1800 | µg/g | 1 | 14.3 |
| CRP2 | Waste | Selenium | 1 | 1 | 0.658 | µg/g | 1 | 0.4 |
| CRP2 | Waste | Silver | 1 | 1 | 80.1 | µg/g | 1 | 0 |

*Table 5-15*
*Summary of Samples that Exceed Background*
*Current OB/OD Area*
*Residue/Debris Piles*
*Fort Wingate Depot Activity*
*Gallup, New Mexico*

| Site | Material Type | Compound | Number of Samples Collected | Number of Detected Values | Maximum Detected Value | Units | Number of Samples that Exceeded Background | Background Concentration |
|---|---|---|---|---|---|---|---|---|
| CRP2 | Waste | Zinc | 1 | 1 | 42000 | µg/g | 1 | 29.2 |
| CRP3 | Soil | 1,3,5-Trinitrobenzene | 7 | 1 | 3.99 | µg/g | 1 | 0 |
| CRP3 | Soil | 2-Amino-4,6-dinitrotoluene | 7 | 1 | 0.423 | µg/g | 1 | 0 |
| CRP3 | Soil | Antimony | 7 | 1 | 3.87 | µg/g | 1 | 0 |
| CRP3 | Soil | Beryllium | 7 | 7 | 1.58 | µg/g | 5 | 1.1 |
| CRP3 | Soil | Chromium | 7 | 7 | 27.6 | µg/g | 6 | 17 |
| CRP3 | Soil | Cobalt | 7 | 7 | 9.36 | µg/g | 7 | 6.5 |
| CRP3 | Soil | Iron | 7 | 7 | 25200 | µg/g | 6 | 17647.3 |
| CRP3 | Soil | Lead | 7 | 7 | 12.7 | µg/g | 1 | 12.5 |
| CRP3 | Soil | Manganese | 7 | 7 | 892 | µg/g | 6 | 458.1 |
| CRP3 | Soil | Molybdenum | 7 | 6 | 3.15 | µg/g | 6 | 0 |
| CRP3 | Soil | Nickel | 7 | 7 | 17.4 | µg/g | 2 | 14.3 |
| CRP3 | Soil | Thallium | 7 | 1 | 0.521 | µg/g | 1 | 0 |
| CRP3 | Soil | Vanadium | 7 | 7 | 42.5 | µg/g | 6 | 31.3 |
| CRP3 | Soil | Zinc | 7 | 7 | 58 | µg/g | 7 | 29.2 |
| CRP3 | Waste | 1,3,5-Trinitrobenzene | 3 | 3 | 1.79 | µg/g | 3 | 0 |
| CRP3 | Waste | 2,4,6-Trinitrotoluene | 3 | 3 | 55.6 | µg/g | 3 | 0 |
| CRP3 | Waste | 2-Amino-4,6-dinitrotoluene | 3 | 1 | 0.72 | µg/g | 1 | 0 |
| CRP3 | Waste | 4-Amino-2,6-dinitrotoluene | 3 | 1 | 1.59 | µg/g | 1 | 0 |
| CRP3 | Waste | Antimony | 3 | 3 | 72.7 | µg/g | 3 | 0 |
| CRP3 | Waste | Arsenic | 3 | 3 | 3.59 | µg/g | 1 | 2.7 |
| CRP3 | Waste | Barium | 3 | 3 | 438 | µg/g | 1 | 430.7 |
| CRP3 | Waste | Cadmium | 3 | 3 | 350 | µg/g | 3 | 0 |

*Table 5-15*
*Summary of Samples that Exceed Background*
*Current OB/OD Area*
*Residue/Debris Piles*
*Fort Wingate Depot Activity*
*Gallup, New Mexico*

| Site | Material Type | Compound | Number of Samples Collected | Number of Detected Values | Maximum Detected Value | Units | Number of Samples that Exceeded Background | Background Concentration |
|---|---|---|---|---|---|---|---|---|
| CRP3 | Waste | Chromium | 3 | 3 | 140 | µg/g | 3 | 17 |
| CRP3 | Waste | Cobalt | 3 | 3 | 12.8 | µg/g | 2 | 6.5 |
| CRP3 | Waste | Copper | 3 | 3 | 21000 | µg/g | 3 | 18.9 |
| CRP3 | Waste | Iron | 3 | 3 | 77000 | µg/g | 3 | 17647.3 |
| CRP3 | Waste | Lead | 3 | 3 | 3900 | µg/g | 3 | 12.5 |
| CRP3 | Waste | Manganese | 3 | 3 | 1640 | µg/g | 3 | 458.1 |
| CRP3 | Waste | Molybdenum | 3 | 3 | 19.8 | µg/g | 3 | 0 |
| CRP3 | Waste | Nickel | 3 | 3 | 102 | µg/g | 3 | 14.3 |
| CRP3 | Waste | Silver | 3 | 3 | 39 | µg/g | 3 | 0 |
| CRP3 | Waste | Vanadium | 3 | 3 | 66.9 | µg/g | 2 | 31.3 |
| CRP3 | Waste | Zinc | 3 | 3 | 48000 | µg/g | 3 | 29.2 |
| CRP4 | Soil | Cadmium | 4 | 1 | 0.0489 | µg/g | 1 | 0 |
| CRP4 | Soil | Thallium | 4 | 1 | 0.519 | µg/g | 1 | 0 |
| CRP5 | Soil | 2,6-Dinitrotoluene | 18 | 1 | 0.997 | µg/g | 1 | 0 |
| CRP5 | Soil | 4-Nitrotoluene | 18 | 1 | 1.21 | µg/g | 1 | 0 |
| CRP5 | Soil | HMX | 18 | 1 | 0.602 | µg/g | 1 | 0 |
| CRP5 | Soil | RDX | 18 | 1 | 0.777 | µg/g | 1 | 0 |
| CRP5 | Soil | Tetryl | 18 | 1 | 0.55 | µg/g | 1 | 0 |
| CRP5 | Soil | Amosite asbestos | 2 | 1 | 2.2 | µg/g | 1 | 0 |
| CRP5 | Soil | Antimony | 18 | 3 | 7.92 | µg/g | 3 | 0 |
| CRP5 | Soil | Barium | 18 | 18 | 509 | µg/g | 1 | 430.7 |
| CRP5 | Soil | Cadmium | 18 | 5 | 0.82 | µg/g | 5 | 0 |

*Table 5-15*
*Summary of Samples that Exceed Background*
*Current OB/OD Area*
*Residue/Debris Piles*
*Fort Wingate Depot Activity*
*Gallup, New Mexico*

| Site | Material Type | Compound | Number of Samples Collected | Number of Detected Values | Maximum Detected Value | Units | Number of Samples that Exceeded Background | Background Concentration |
|---|---|---|---|---|---|---|---|---|
| CRP5 | Soil | Chromium | 18 | 18 | 22.1 | µg/g | 3 | 17 |
| CRP5 | Soil | Cobalt | 18 | 18 | 6.68 | µg/g | 1 | 6.5 |
| CRP5 | Soil | Copper | 18 | 18 | 110 | µg/g | 2 | 18.9 |
| CRP5 | Soil | Iron | 18 | 18 | 18200 | µg/g | 1 | 17647.3 |
| CRP5 | Soil | Lead | 18 | 18 | 13.2 | µg/g | 2 | 12.5 |
| CRP5 | Soil | Molybdenum | 18 | 5 | 3.83 | µg/g | 5 | 0 |
| CRP5 | Soil | Thallium | 18 | 5 | 1.44 | µg/g | 5 | 0 |
| CRP5 | Soil | Vanadium | 18 | 18 | 41.1 | µg/g | 3 | 31.3 |
| CRP5 | Soil | Zinc | 18 | 18 | 33.8 | µg/g | 3 | 29.2 |
| CRP5 | Waste | 1,3,5-Trinitrobenzene | 4 | 4 | 140 | µg/g | 4 | 0 |
| CRP5 | Waste | 2,4,6-Trinitrotoluene | 4 | 4 | 6600 | µg/g | 4 | 0 |
| CRP5 | Waste | 2,4-Dinitrotoluene | 4 | 2 | 0.948 | µg/g | 2 | 0 |
| CRP5 | Waste | 2-Amino-4,6-dinitrotoluene | 4 | 4 | 22.2 | µg/g | 4 | 0 |
| CRP5 | Waste | 4-Amino-2,6-dinitrotoluene | 4 | 1 | 10.3 | µg/g | 1 | 0 |
| CRP5 | Waste | HMX | 4 | 4 | 447 | µg/g | 4 | 0 |
| CRP5 | Waste | RDX | 4 | 4 | 3000 | µg/g | 4 | 0 |
| CRP5 | Waste | Arsenic | 4 | 4 | 3.34 | µg/g | 1 | 2.7 |
| CRP5 | Waste | Barium | 4 | 4 | 8500 | µg/g | 4 | 430.7 |
| CRP5 | Waste | Cadmium | 4 | 4 | 4.9 | µg/g | 4 | 0 |
| CRP5 | Waste | Chromium | 4 | 4 | 62.3 | µg/g | 2 | 17 |
| CRP5 | Waste | Cobalt | 4 | 3 | 7.07 | µg/g | 1 | 6.5 |
| CRP5 | Waste | Copper | 4 | 4 | 965 | µg/g | 4 | 18.9 |
| CRP5 | Waste | Iron | 4 | 4 | 28000 | µg/g | 1 | 17647.3 |
| CRP5 | Waste | Lead | 4 | 4 | 3600 | µg/g | 4 | 12.5 |

*Table 5-15*
*Summary of Samples that Exceed Background*
*Current OB/OD Area*
*Residue/Debris Piles*
*Fort Wingate Depot Activity*
*Gallup, New Mexico*

| Site | Material Type | Compound | Number of Samples Collected | Number of Detected Values | Maximum Detected Value | Units | Number of Samples that Exceeded Background | Background Concentration |
|---|---|---|---|---|---|---|---|---|
| CRP5 | Waste | Molybdenum | 4 | 4 | 2.86 | µg/g | 4 | 0 |
| CRP5 | Waste | Nickel | 4 | 4 | 27.4 | µg/g | 2 | 14.3 |
| CRP5 | Waste | Silver | 4 | 1 | 17.5 | µg/g | 1 | 0 |
| CRP5 | Waste | Thallium | 4 | 2 | 1.9 | µg/g | 2 | 0 |
| CRP5 | Waste | Vanadium | 4 | 4 | 41 | µg/g | 2 | 31.3 |
| CRP5 | Waste | Zinc | 4 | 4 | 592 | µg/g | 4 | 29.2 |
| CRP6 | Soil | Antimony | 5 | 1 | 4.94 | µg/g | 1 | 0 |
| CRP6 | Soil | Cadmium | 5 | 4 | 0.574 | µg/g | 4 | 0 |
| CRP6 | Soil | Chromium | 5 | 5 | 22.5 | µg/g | 1 | 17 |
| CRP6 | Soil | Copper | 5 | 5 | 194 | µg/g | 1 | 18.9 |
| CRP6 | Soil | Molybdenum | 5 | 1 | 1.1 | µg/g | 1 | 0 |
| CRP6 | Soil | Nickel | 5 | 5 | 14.4 | µg/g | 1 | 14.3 |
| CRP6 | Soil | Zinc | 5 | 5 | 32.8 | µg/g | 1 | 29.2 |
| CRP6 | Waste | 1,3,5-Trinitrobenzene | 4 | 1 | 2.96 | µg/g | 1 | 0 |
| CRP6 | Waste | 2,4,6-Trinitrotoluene | 4 | 2 | 39.2 | µg/g | 2 | 0 |
| CRP6 | Waste | 2-Amino-4,6-dinitrotoluene | 4 | 1 | 1.85 | µg/g | 1 | 0 |
| CRP6 | Waste | 4-Amino-2,6-dinitrotoluene | 4 | 2 | 2.38 | µg/g | 2 | 0 |
| CRP6 | Waste | HMX | 4 | 1 | 0.241 | µg/g | 1 | 0 |
| CRP6 | Waste | RDX | 4 | 2 | 0.567 | µg/g | 2 | 0 |
| CRP6 | Waste | Antimony | 4 | 2 | 252 | µg/g | 2 | 0 |
| CRP6 | Waste | Beryllium | 4 | 4 | 13 | µg/g | 1 | 1.1 |
| CRP6 | Waste | Cadmium | 4 | 4 | 25.6 | µg/g | 4 | 0 |
| CRP6 | Waste | Chromium | 4 | 4 | 64.4 | µg/g | 2 | 17 |

*Table 5-15*
*Summary of Samples that Exceed Background*
*Current OB/OD Area*
*Residue/Debris Piles*
*Fort Wingate Depot Activity*
*Gallup, New Mexico*

| Site | Material Type | Compound | Number of Samples Collected | Number of Detected Values | Maximum Detected Value | Units | Number of Samples that Exceeded Background | Background Concentration |
|---|---|---|---|---|---|---|---|---|
| CRP6 | Waste | Cobalt | 4 | 4 | 132 | µg/g | 2 | 6.5 |
| CRP6 | Waste | Copper | 4 | 4 | 4200 | µg/g | 3 | 18.9 |
| CRP6 | Waste | Iron | 4 | 4 | 41600 | µg/g | 1 | 17647.3 |
| CRP6 | Waste | Lead | 4 | 4 | 240 | µg/g | 4 | 12.5 |
| CRP6 | Waste | Manganese | 4 | 4 | 555 | µg/g | 2 | 458.1 |
| CRP6 | Waste | Mercury | 4 | 4 | 1.79 | µg/g | 4 | 0.06 |
| CRP6 | Waste | Molybdenum | 4 | 3 | 264 | µg/g | 3 | 0 |
| CRP6 | Waste | Nickel | 4 | 4 | 118 | µg/g | 3 | 14.3 |
| CRP6 | Waste | Selenium | 4 | 2 | 0.703 | µg/g | 2 | 0.4 |
| CRP6 | Waste | Silver | 4 | 1 | 47.2 | µg/g | 1 | 0 |
| CRP6 | Waste | Vanadium | 4 | 4 | 151 | µg/g | 1 | 31.3 |
| CRP6 | Waste | Zinc | 4 | 4 | 702 | µg/g | 4 | 29.2 |
| CRP7 | Soil | 1,3,5-Trinitrobenzene | 14 | 2 | 0.204 | µg/g | 2 | 0 |
| CRP7 | Soil | 2,4,6-Trinitrotoluene | 14 | 1 | 1.98 | µg/g | 1 | 0 |
| CRP7 | Soil | 3-Nitrotoluene | 14 | 1 | 0.503 | µg/g | 1 | 0 |
| CRP7 | Soil | HMX | 14 | 3 | 2.03 | µg/g | 3 | 0 |
| CRP7 | Soil | RDX | 14 | 3 | 17 | µg/g | 3 | 0 |
| CRP7 | Soil | Antimony | 14 | 4 | 67.7 | µg/g | 4 | 0 |
| CRP7 | Soil | Arsenic | 14 | 14 | 470 | µg/g | 2 | 2.7 |
| CRP7 | Soil | Barium | 14 | 14 | 986 | µg/g | 3 | 430.7 |
| CRP7 | Soil | Beryllium | 14 | 14 | 11.9 | µg/g | 2 | 1.1 |
| CRP7 | Soil | Cadmium | 14 | 10 | 10.7 | µg/g | 10 | 0 |
| CRP7 | Soil | Chromium | 14 | 14 | 51.4 | µg/g | 6 | 17 |

*Table 5-15*
*Summary of Samples that Exceed Background*
*Current OB/OD Area*
*Residue/Debris Piles*
*Fort Wingate Depot Activity*
*Gallup, New Mexico*

| Site | Material Type | Compound | Number of Samples Collected | Number of Detected Values | Maximum Detected Value | Units | Number of Samples that Exceeded Background | Background Concentration |
|---|---|---|---|---|---|---|---|---|
| CRP7 | Soil | Cobalt | 14 | 14 | 117 | µg/g | 4 | 6.5 |
| CRP7 | Soil | Copper | 14 | 14 | 550 | µg/g | 4 | 18.9 |
| CRP7 | Soil | Iron | 14 | 14 | 25800 | µg/g | 4 | 17647.3 |
| CRP7 | Soil | Lead | 14 | 14 | 240 | µg/g | 2 | 12.5 |
| CRP7 | Soil | Manganese | 14 | 14 | 1480 | µg/g | 3 | 458.1 |
| CRP7 | Soil | Mercury | 14 | 3 | 0.328 | µg/g | 2 | 0.06 |
| CRP7 | Soil | Molybdenum | 14 | 11 | 199 | µg/g | 11 | 0 |
| CRP7 | Soil | Nickel | 14 | 14 | 103 | µg/g | 4 | 14.3 |
| CRP7 | Soil | Selenium | 14 | 2 | 470 | µg/g | 2 | 0.4 |
| CRP7 | Soil | Silver | 14 | 1 | 11.4 | µg/g | 1 | 0 |
| CRP7 | Soil | Thallium | 14 | 2 | 480 | µg/g | 2 | 0 |
| CRP7 | Soil | Vanadium | 14 | 14 | 138 | µg/g | 4 | 31.3 |
| CRP7 | Soil | Zinc | 14 | 14 | 133 | µg/g | 5 | 29.2 |
| CRP7 | Waste | 1,3,5-Trinitrobenzene | 6 | 3 | 17.5 | µg/g | 3 | 0 |
| CRP7 | Waste | 2,4,6-Trinitrotoluene | 6 | 2 | 348 | µg/g | 2 | 0 |
| CRP7 | Waste | 2,4-Dinitrotoluene | 6 | 1 | 0.671 | µg/g | 1 | 0 |
| CRP7 | Waste | 2-Amino-4,6-dinitrotoluene | 6 | 2 | 2.57 | µg/g | 2 | 0 |
| CRP7 | Waste | HMX | 6 | 2 | 14.9 | µg/g | 2 | 0 |
| CRP7 | Waste | RDX | 6 | 3 | 20.2 | µg/g | 3 | 0 |
| CRP7 | Waste | Tetryl | 6 | 1 | 0.993 | µg/g | 1 | 0 |
| CRP7 | Waste | Antimony | 6 | 2 | 9.17 | µg/g | 2 | 0 |
| CRP7 | Waste | Arsenic | 6 | 6 | 19.5 | µg/g | 5 | 2.7 |
| CRP7 | Waste | Cadmium | 6 | 6 | 3.53 | µg/g | 6 | 0 |
| CRP7 | Waste | Chromium | 6 | 6 | 35.8 | µg/g | 3 | 17 |

*Table 5-15*
*Summary of Samples that Exceed Background*
*Current OB/OD Area*
*Residue/Debris Piles*
*Fort Wingate Depot Activity*
*Gallup, New Mexico*

| Site | Material Type | Compound | Number of Samples Collected | Number of Detected Values | Maximum Detected Value | Units | Number of Samples that Exceeded Background | Background Concentration |
|---|---|---|---|---|---|---|---|---|
| CRP7 | Waste | Copper | 6 | 6 | 2400 | µg/g | 6 | 18.9 |
| CRP7 | Waste | Iron | 6 | 6 | 54000 | µg/g | 3 | 17647.3 |
| CRP7 | Waste | Lead | 6 | 6 | 200 | µg/g | 5 | 12.5 |
| CRP7 | Waste | Manganese | 6 | 6 | 549 | µg/g | 2 | 458.1 |
| CRP7 | Waste | Mercury | 6 | 6 | 1.18 | µg/g | 6 | 0.06 |
| CRP7 | Waste | Molybdenum | 6 | 6 | 11 | µg/g | 6 | 0 |
| CRP7 | Waste | Nickel | 6 | 6 | 73.2 | µg/g | 3 | 14.3 |
| CRP7 | Waste | Selenium | 6 | 3 | 0.639 | µg/g | 3 | 0.4 |
| CRP7 | Waste | Thallium | 6 | 2 | 1.19 | µg/g | 2 | 0 |
| CRP7 | Waste | Zinc | 6 | 6 | 416 | µg/g | 6 | 29.2 |
| CRP8 | Soil | RDX | 24 | 3 | 0.548 | µg/g | 3 | 0 |
| CRP8 | Soil | Antimony | 24 | 4 | 5.39 | µg/g | 4 | 0 |
| CRP8 | Soil | Arsenic | 24 | 22 | 6.34 | µg/g | 4 | 2.7 |
| CRP8 | Soil | Barium | 24 | 24 | 1300 | µg/g | 1 | 430.7 |
| CRP8 | Soil | Beryllium | 24 | 24 | 3.04 | µg/g | 4 | 1.1 |
| CRP8 | Soil | Cadmium | 24 | 12 | 0.995 | µg/g | 12 | 0 |
| CRP8 | Soil | Chromium | 24 | 24 | 46.6 | µg/g | 8 | 17 |
| CRP8 | Soil | Cobalt | 24 | 22 | 9.01 | µg/g | 9 | 6.5 |
| CRP8 | Soil | Copper | 24 | 22 | 38.3 | µg/g | 4 | 18.9 |
| CRP8 | Soil | Iron | 24 | 23 | 40700 | µg/g | 8 | 17647.3 |
| CRP8 | Soil | Lead | 24 | 22 | 20.7 | µg/g | 4 | 12.5 |
| CRP8 | Soil | Manganese | 24 | 24 | 857 | µg/g | 8 | 458.1 |
| CRP8 | Soil | Mercury | 24 | 4 | 1.35 | µg/g | 3 | 0.06 |

*Table 5-15*
*Summary of Samples that Exceed Background*
*Current OB/OD Area*
*Residue/Debris Piles*
*Fort Wingate Depot Activity*
*Gallup, New Mexico*

| Site | Material Type | Compound | Number of Samples Collected | Number of Detected Values | Maximum Detected Value | Units | Number of Samples that Exceeded Background | Background Concentration |
|---|---|---|---|---|---|---|---|---|
| CRP8 | Soil | Molybdenum | 24 | 10 | 3.2 | µg/g | 10 | 0 |
| CRP8 | Soil | Nickel | 24 | 22 | 20.9 | µg/g | 3 | 14.3 |
| CRP8 | Soil | Selenium | 24 | 1 | 0.538 | µg/g | 1 | 0.4 |
| CRP8 | Soil | Thallium | 24 | 14 | 2.4 | µg/g | 14 | 0 |
| CRP8 | Soil | Vanadium | 24 | 22 | 60.7 | µg/g | 12 | 31.3 |
| CRP8 | Soil | Zinc | 24 | 22 | 74 | µg/g | 11 | 29.2 |
| CRP8 | Waste | 1,3,5-Trinitrobenzene | 10 | 5 | 2.06 | µg/g | 5 | 0 |
| CRP8 | Waste | 2,4,6-Trinitrotoluene | 10 | 5 | 15.6 | µg/g | 5 | 0 |
| CRP8 | Waste | 2-Amino-4,6-dinitrotoluene | 10 | 3 | 0.608 | µg/g | 3 | 0 |
| CRP8 | Waste | 4-Amino-2,6-dinitrotoluene | 10 | 3 | 0.514 | µg/g | 3 | 0 |
| CRP8 | Waste | HMX | 10 | 4 | 137 | µg/g | 4 | 0 |
| CRP8 | Waste | RDX | 10 | 5 | 610 | µg/g | 5 | 0 |
| CRP8 | Waste | Tetryl | 10 | 1 | 64.9 | µg/g | 1 | 0 |
| CRP8 | Waste | Antimony | 10 | 5 | 33.2 | µg/g | 5 | 0 |
| CRP8 | Waste | Arsenic | 10 | 10 | 17.3 | µg/g | 4 | 2.7 |
| CRP8 | Waste | Barium | 10 | 10 | 808 | µg/g | 2 | 430.7 |
| CRP8 | Waste | Cadmium | 10 | 10 | 12.4 | µg/g | 10 | 0 |
| CRP8 | Waste | Chromium | 10 | 10 | 45.8 | µg/g | 9 | 17 |
| CRP8 | Waste | Cobalt | 10 | 10 | 13.9 | µg/g | 4 | 6.5 |
| CRP8 | Waste | Copper | 10 | 10 | 15000 | µg/g | 10 | 18.9 |
| CRP8 | Waste | Iron | 10 | 10 | 100000 | µg/g | 10 | 17647.3 |
| CRP8 | Waste | Lead | 10 | 10 | 6000 | µg/g | 10 | 12.5 |
| CRP8 | Waste | Manganese | 10 | 10 | 683 | µg/g | 9 | 458.1 |
| CRP8 | Waste | Mercury | 10 | 10 | 11 | µg/g | 10 | 0.06 |

*Table 5-15*
*Summary of Samples that Exceed Background*
*Current OB/OD Area*
*Residue/Debris Piles*
*Fort Wingate Depot Activity*
*Gallup, New Mexico*

| Site | Material Type | Compound | Number of Samples Collected | Number of Detected Values | Maximum Detected Value | Units | Number of Samples that Exceeded Background | Background Concentration |
|---|---|---|---|---|---|---|---|---|
| CRP8 | Waste | Molybdenum | 10 | 7 | 5.56 | µg/g | 7 | 0 |
| CRP8 | Waste | Nickel | 10 | 10 | 55 | µg/g | 7 | 14.3 |
| CRP8 | Waste | Selenium | 10 | 1 | 0.479 | µg/g | 1 | 0.4 |
| CRP8 | Waste | Thallium | 10 | 8 | 5.91 | µg/g | 8 | 0 |
| CRP8 | Waste | Vanadium | 10 | 10 | 39.1 | µg/g | 2 | 31.3 |
| CRP8 | Waste | Zinc | 10 | 10 | 5100 | µg/g | 10 | 29.2 |
| CRP9 | Soil | 4-Amino-2,6-dinitrotoluene | 15 | 1 | 0.355 | µg/g | 1 | 0 |
| CRP9 | Soil | HMX | 15 | 1 | 0.2 | µg/g | 1 | 0 |
| CRP9 | Soil | Antimony | 15 | 2 | 6.66 | µg/g | 2 | 0 |
| CRP9 | Soil | Barium | 15 | 15 | 973 | µg/g | 6 | 430.7 |
| CRP9 | Soil | Beryllium | 15 | 15 | 1.29 | µg/g | 3 | 1.1 |
| CRP9 | Soil | Cadmium | 15 | 6 | 0.145 | µg/g | 6 | 0 |
| CRP9 | Soil | Chromium | 15 | 15 | 28.6 | µg/g | 11 | 17 |
| CRP9 | Soil | Cobalt | 15 | 15 | 9.45 | µg/g | 11 | 6.5 |
| CRP9 | Soil | Iron | 15 | 15 | 23400 | µg/g | 10 | 17647.3 |
| CRP9 | Soil | Lead | 15 | 15 | 12.7 | µg/g | 1 | 12.5 |
| CRP9 | Soil | Manganese | 15 | 15 | 649 | µg/g | 9 | 458.1 |
| CRP9 | Soil | Molybdenum | 15 | 4 | 2.41 | µg/g | 4 | 0 |
| CRP9 | Soil | Nickel | 15 | 15 | 18.9 | µg/g | 9 | 14.3 |
| CRP9 | Soil | Thallium | 15 | 7 | 1.11 | µg/g | 7 | 0 |
| CRP9 | Soil | Vanadium | 15 | 15 | 47.4 | µg/g | 7 | 31.3 |
| CRP9 | Soil | Zinc | 15 | 15 | 40 | µg/g | 7 | 29.2 |
| CRP9 | Waste | 2,4,6-Trinitrotoluene | 7 | 2 | 10.4 | µg/g | 2 | 0 |

*Table 5-15*
*Summary of Samples that Exceed Background*
*Current OB/OD Area*
*Residue/Debris Piles*
*Fort Wingate Depot Activity*
*Gallup, New Mexico*

| Site | Material Type | Compound | Number of Samples Collected | Number of Detected Values | Maximum Detected Value | Units | Number of Samples that Exceeded Background | Background Concentration |
|---|---|---|---|---|---|---|---|---|
| CRP9 | Waste | 2-Amino-4,6-dinitrotoluene | 7 | 1 | 11.4 | µg/g | 1 | 0 |
| CRP9 | Waste | 4-Amino-2,6-dinitrotoluene | 7 | 1 | 0.884 | µg/g | 1 | 0 |
| CRP9 | Waste | Antimony | 7 | 3 | 15.3 | µg/g | 3 | 0 |
| CRP9 | Waste | Arsenic | 7 | 7 | 6.85 | µg/g | 4 | 2.7 |
| CRP9 | Waste | Barium | 7 | 7 | 475 | µg/g | 1 | 430.7 |
| CRP9 | Waste | Cadmium | 7 | 6 | 3.65 | µg/g | 6 | 0 |
| CRP9 | Waste | Chromium | 7 | 7 | 47.7 | µg/g | 6 | 17 |
| CRP9 | Waste | Cobalt | 7 | 7 | 9.36 | µg/g | 4 | 6.5 |
| CRP9 | Waste | Copper | 7 | 7 | 1080 | µg/g | 7 | 18.9 |
| CRP9 | Waste | Iron | 7 | 7 | 61000 | µg/g | 6 | 17647.3 |
| CRP9 | Waste | Lead | 7 | 7 | 80.3 | µg/g | 7 | 12.5 |
| CRP9 | Waste | Manganese | 7 | 7 | 687 | µg/g | 5 | 458.1 |
| CRP9 | Waste | Mercury | 7 | 7 | 4.79 | µg/g | 7 | 0.06 |
| CRP9 | Waste | Molybdenum | 7 | 5 | 11.5 | µg/g | 5 | 0 |
| CRP9 | Waste | Nickel | 7 | 7 | 33.2 | µg/g | 5 | 14.3 |
| CRP9 | Waste | Thallium | 7 | 4 | 1.72 | µg/g | 4 | 0 |
| CRP9 | Waste | Vanadium | 7 | 7 | 31.6 | µg/g | 1 | 31.3 |
| CRP9 | Waste | Zinc | 7 | 7 | 548 | µg/g | 7 | 29.2 |
| CRP10 | Soil | 4-Amino-2,6-dinitrotoluene | 6 | 1 | 0.176 | µg/g | 1 | 0 |
| CRP10 | Soil | Arsenic | 6 | 6 | 4.96 | µg/g | 1 | 2.7 |
| CRP10 | Soil | Barium | 6 | 6 | 512 | µg/g | 1 | 430.7 |
| CRP10 | Soil | Beryllium | 6 | 6 | 1.64 | µg/g | 2 | 1.1 |
| CRP10 | Soil | Cadmium | 6 | 3 | 0.45 | µg/g | 3 | 0 |

*Table 5-15*
*Summary of Samples that Exceed Background*
*Current OB/OD Area*
*Residue/Debris Piles*
*Fort Wingate Depot Activity*
*Gallup, New Mexico*

| Site | Material Type | Compound | Number of Samples Collected | Number of Detected Values | Maximum Detected Value | Units | Number of Samples that Exceeded Background | Background Concentration |
|---|---|---|---|---|---|---|---|---|
| CRP10 | Soil | Chromium | 6 | 6 | 39.4 | µg/g | 3 | 17 |
| CRP10 | Soil | Cobalt | 6 | 6 | 11.8 | µg/g | 3 | 6.5 |
| CRP10 | Soil | Iron | 6 | 6 | 39800 | µg/g | 3 | 17647.3 |
| CRP10 | Soil | Lead | 6 | 6 | 12.6 | µg/g | 1 | 12.5 |
| CRP10 | Soil | Manganese | 6 | 6 | 602 | µg/g | 2 | 458.1 |
| CRP10 | Soil | Nickel | 6 | 6 | 28.3 | µg/g | 3 | 14.3 |
| CRP10 | Soil | Selenium | 6 | 2 | 0.531 | µg/g | 2 | 0.4 |
| CRP10 | Soil | Thallium | 6 | 1 | 2.45 | µg/g | 1 | 0 |
| CRP10 | Soil | Vanadium | 6 | 6 | 144 | µg/g | 3 | 31.3 |
| CRP10 | Soil | Zinc | 6 | 6 | 59.9 | µg/g | 3 | 29.2 |
| CRP10 | Waste | RDX | 2 | 1 | 0.739 | µg/g | 1 | 0 |
| CRP10 | Waste | Arsenic | 2 | 2 | 3.94 | µg/g | 1 | 2.7 |
| CRP10 | Waste | Barium | 2 | 2 | 439 | µg/g | 1 | 430.7 |
| CRP10 | Waste | Copper | 2 | 2 | 65.9 | µg/g | 2 | 18.9 |
| CRP10 | Waste | Iron | 2 | 2 | 21600 | µg/g | 1 | 17647.3 |
| CRP10 | Waste | Lead | 2 | 2 | 13.1 | µg/g | 1 | 12.5 |
| CRP10 | Waste | Mercury | 2 | 2 | 0.0938 | µg/g | 2 | 0.06 |
| CRP10 | Waste | Molybdenum | 2 | 2 | 2.67 | µg/g | 2 | 0 |
| CRP10 | Waste | Vanadium | 2 | 2 | 33 | µg/g | 1 | 31.3 |
| CRP10 | Waste | Zinc | 2 | 2 | 3900 | µg/g | 2 | 29.2 |

*Table 5-16*
*Summary of Samples that Exceed RBLs*
*Current OB/OD Area*
*Residue/Debris Piles*
*Fort Wingate Depot Activity*
*Gallup, New Mexico*

| Site | Material Type | Compound | Number of Samples Collected | Number of Detected Values | Maximum Detected Value | Units | Number of Samples that Exceeded Background | Number of Samples that Exceeded Screening Criteria | Background Concentration | Screening Criteria |
|---|---|---|---|---|---|---|---|---|---|---|
| CRP1 | Waste | 2,4,6-Trinitrotoluene | 2 | 1 | 22000 | µg/g | 1 | 1 | 0 | 16 |
| CRP1 | Waste | 2,4-Dinitrotoluene | 2 | 1 | 47.3 | µg/g | 1 | 1 | 0 | 0.71 |
| CRP1 | Waste | 2-Amino-4,6-dinitrotoluene | 2 | 1 | 45.2 | µg/g | 1 | 1 | 0 | 0.71 |
| CRP1 | Waste | HMX | 2 | 2 | 3600 | µg/g | 2 | 1 | 0 | 3000 |
| CRP1 | Waste | RDX | 2 | 2 | 20000 | µg/g | 2 | 2 | 0 | 4.4 |
| CRP2 | Soil | Iron | 3 | 3 | 24300 | µg/g | 1 | 1 | 17647.3 | 23000 |
| CRP2 | Waste | Antimony | 1 | 1 | 89.2 | µg/g | 1 | 1 | 0 | 31 |
| CRP2 | Waste | Arsenic | 1 | 1 | 5.04 | µg/g | 1 | 1 | 2.7 | 0.39 |
| CRP2 | Waste | Cadmium | 1 | 1 | 600 | µg/g | 1 | 1 | 0 | 39 |
| CRP2 | Waste | Copper | 1 | 1 | 31000 | µg/g | 1 | 1 | 18.9 | 2900 |
| CRP2 | Waste | Iron | 1 | 1 | 63000 | µg/g | 1 | 1 | 17647.3 | 23000 |
| CRP2 | Waste | Lead | 1 | 1 | 5700 | µg/g | 1 | 1 | 12.5 | 400 |
| CRP2 | Waste | Nickel | 1 | 1 | 1800 | µg/g | 1 | 1 | 14.3 | 1600 |
| CRP2 | Waste | Zinc | 1 | 1 | 42000 | µg/g | 1 | 1 | 29.2 | 23000 |
| CRP3 | Soil | Iron | 7 | 7 | 25200 | µg/g | 6 | 2 | 17647.3 | 23000 |
| CRP3 | Waste | 2,4,6-Trinitrotoluene | 3 | 3 | 55.6 | µg/g | 3 | 2 | 0 | 16 |
| CRP3 | Waste | 2-Amino-4,6-dinitrotoluene | 3 | 1 | 0.72 | µg/g | 1 | 1 | 0 | 0.71 |
| CRP3 | Waste | 4-Amino-2,6-dinitrotoluene | 3 | 1 | 1.59 | µg/g | 1 | 1 | 0 | 0.71 |
| CRP3 | Waste | Antimony | 3 | 3 | 72.7 | µg/g | 3 | 1 | 0 | 31 |
| CRP3 | Waste | Arsenic | 3 | 3 | 3.59 | µg/g | 1 | 1 | 2.7 | 0.39 |
| CRP3 | Waste | Cadmium | 3 | 3 | 350 | µg/g | 3 | 2 | 0 | 39 |

*Table 5-16*
*Summary of Samples that Exceed RBLs*
*Current OB/OD Area*
*Residue/Debris Piles*
*Fort Wingate Depot Activity*
*Gallup, New Mexico*

| Site | Material Type | Compound | Number of Samples Collected | Number of Detected Values | Maximum Detected Value | Units | Number of Samples that Exceeded Background | Number of Samples that Exceeded Screening Criteria | Background Concentration | Screening Criteria |
|---|---|---|---|---|---|---|---|---|---|---|
| CRP3 | Waste | Copper | 3 | 3 | 21000 | µg/g | 3 | 2 | 18.9 | 2900 |
| CRP3 | Waste | Iron | 3 | 3 | 77000 | µg/g | 3 | 3 | 17647.3 | 23000 |
| CRP3 | Waste | Lead | 3 | 3 | 3900 | µg/g | 3 | 2 | 12.5 | 400 |
| CRP3 | Waste | Zinc | 3 | 3 | 48000 | µg/g | 3 | 2 | 29.2 | 23000 |
| CRP5 | Soil | 2,6-Dinitrotoluene | 18 | 1 | 0.997 | µg/g | 1 | 1 | 0 | 0.71 |
| CRP5 | Soil | Amosite asbestos | 2 | 1 | 2.2 | µg/g | 1 | 1 | 0 | 0 |
| CRP5 | Waste | 2,4,6-Trinitrotoluene | 4 | 4 | 6600 | µg/g | 4 | 4 | 0 | 16 |
| CRP5 | Waste | 2,4-Dinitrotoluene | 4 | 2 | 0.948 | µg/g | 2 | 1 | 0 | 0.71 |
| CRP5 | Waste | 2-Amino-4,6-dinitrotoluene | 4 | 4 | 22.2 | µg/g | 4 | 4 | 0 | 0.71 |
| CRP5 | Waste | 4-Amino-2,6-dinitrotoluene | 4 | 1 | 10.3 | µg/g | 1 | 1 | 0 | 0.71 |
| CRP5 | Waste | RDX | 4 | 4 | 3000 | µg/g | 4 | 3 | 0 | 4.4 |
| CRP5 | Waste | Arsenic | 4 | 4 | 3.34 | µg/g | 1 | 1 | 2.7 | 0.39 |
| CRP5 | Waste | Barium | 4 | 4 | 8500 | µg/g | 4 | 1 | 430.7 | 5400 |
| CRP5 | Waste | Iron | 4 | 4 | 28000 | µg/g | 1 | 1 | 17647.3 | 23000 |
| CRP5 | Waste | Lead | 4 | 4 | 3600 | µg/g | 4 | 1 | 12.5 | 400 |
| CRP6 | Waste | 2,4,6-Trinitrotoluene | 4 | 2 | 39.2 | µg/g | 2 | 1 | 0 | 16 |
| CRP6 | Waste | 2-Amino-4,6-dinitrotoluene | 4 | 1 | 1.85 | µg/g | 1 | 1 | 0 | 0.71 |
| CRP6 | Waste | 4-Amino-2,6-dinitrotoluene | 4 | 2 | 2.38 | µg/g | 2 | 1 | 0 | 0.71 |
| CRP6 | Waste | Antimony | 4 | 2 | 252 | µg/g | 2 | 1 | 0 | 31 |
| CRP6 | Waste | Copper | 4 | 4 | 4200 | µg/g | 3 | 1 | 18.9 | 2900 |
| CRP6 | Waste | Iron | 4 | 4 | 41600 | µg/g | 1 | 1 | 17647.3 | 23000 |

*Table 5-16*
*Summary of Samples that Exceed RBLs*
*Current OB/OD Area*
*Residue/Debris Piles*
*Fort Wingate Depot Activity*
*Gallup, New Mexico*

| Site | Material Type | Compound | Number of Samples Collected | Number of Detected Values | Maximum Detected Value | Units | Number of Samples that Exceeded Background | Number of Samples that Exceeded Screening Criteria | Background Concentration | Screening Criteria |
|---|---|---|---|---|---|---|---|---|---|---|
| CRP7 | Soil | RDX | 14 | 3 | 17 | µg/g | 3 | 2 | 0 | 4.4 |
| CRP7 | Soil | Antimony | 14 | 4 | 67.7 | µg/g | 4 | 1 | 0 | 31 |
| CRP7 | Soil | Arsenic | 14 | 14 | 470 | µg/g | 2 | 2 | 2.7 | 0.39 |
| CRP7 | Soil | Iron | 14 | 14 | 25800 | µg/g | 4 | 1 | 17647.3 | 23000 |
| CRP7 | Soil | Selenium | 14 | 2 | 470 | µg/g | 2 | 1 | 0.4 | 390 |
| CRP7 | Soil | Thallium | 14 | 2 | 480 | µg/g | 2 | 1 | 0 | 6.3 |
| CRP7 | Waste | 2,4,6-Trinitrotoluene | 6 | 2 | 348 | µg/g | 2 | 2 | 0 | 16 |
| CRP7 | Waste | 2-Amino-4,6-dinitrotoluene | 6 | 2 | 2.57 | µg/g | 2 | 2 | 0 | 0.71 |
| CRP7 | Waste | RDX | 6 | 3 | 20.2 | µg/g | 3 | 2 | 0 | 4.4 |
| CRP7 | Waste | Arsenic | 6 | 6 | 19.5 | µg/g | 5 | 5 | 2.7 | 0.39 |
| CRP7 | Waste | Iron | 6 | 6 | 54000 | µg/g | 3 | 3 | 17647.3 | 23000 |
| CRP8 | Soil | Arsenic | 24 | 22 | 6.34 | µg/g | 4 | 4 | 2.7 | 0.39 |
| CRP8 | Soil | Iron | 24 | 23 | 40700 | µg/g | 8 | 5 | 17647.3 | 23000 |
| CRP8 | Waste | RDX | 10 | 5 | 610 | µg/g | 5 | 3 | 0 | 4.4 |
| CRP8 | Waste | Antimony | 10 | 5 | 33.2 | µg/g | 5 | 1 | 0 | 31 |
| CRP8 | Waste | Arsenic | 10 | 10 | 17.3 | µg/g | 4 | 4 | 2.7 | 0.39 |
| CRP8 | Waste | Copper | 10 | 10 | 15000 | µg/g | 10 | 1 | 18.9 | 2900 |
| CRP8 | Waste | Iron | 10 | 10 | 100000 | µg/g | 10 | 6 | 17647.3 | 23000 |
| CRP8 | Waste | Lead | 10 | 10 | 6000 | µg/g | 10 | 1 | 12.5 | 400 |

*Table 5-16*
*Summary of Samples that Exceed RBLs*
*Current OB/OD Area*
*Residue/Debris Piles*
*Fort Wingate Depot Activity*
*Gallup, New Mexico*

| Site | Material Type | Compound | Number of Samples Collected | Number of Detected Values | Maximum Detected Value | Units | Number of Samples that Exceeded Background | Number of Samples that Exceeded Screening Criteria | Background Concentration | Screening Criteria |
|---|---|---|---|---|---|---|---|---|---|---|
| CRP9 | Soil | Iron | 15 | 15 | 23400 | µg/g | 10 | 2 | 17647.3 | 23000 |
| CRP9 | Waste | 2-Amino-4,6-dinitrotoluene | 7 | 1 | 11.4 | µg/g | 1 | 1 | 0 | 0.71 |
| CRP9 | Waste | 4-Amino-2,6-dinitrotoluene | 7 | 1 | 0.884 | µg/g | 1 | 1 | 0 | 0.71 |
| CRP9 | Waste | Arsenic | 7 | 7 | 6.85 | µg/g | 4 | 4 | 2.7 | 0.39 |
| CRP9 | Waste | Iron | 7 | 7 | 61000 | µg/g | 6 | 4 | 17647.3 | 23000 |
| CRP10 | Soil | Arsenic | 6 | 6 | 4.96 | µg/g | 1 | 1 | 2.7 | 0.39 |
| CRP10 | Soil | Iron | 6 | 6 | 39800 | µg/g | 3 | 3 | 17647.3 | 23000 |
| CRP10 | Waste | Arsenic | 2 | 2 | 3.94 | µg/g | 1 | 1 | 2.7 | 0.39 |

*Table 5-17*
*Summary of Samples that Exceed CPSs*
*Current OB/OD Area*
*Residue/Debris Piles*
*Fort Wingate Depot Activity*
*Gallup, New Mexico*

| Site | Material Type | Compound | Number of Samples Collected | Number of Detected Values | Maximum Detected Value | Units | Number of Samples that Exceeded Background | Number of Samples that Exceeded Screening Criteria | Number of Samples that Exceeded Closure Performance Standards | Background Concentration | Screening Criteria | Closure Performance Standards |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CRP1 | Waste | 2,4,6-Trinitrotoluene | 2 | 1 | 22000 | µg/g | 1 | 1 | 1 | 0 | 16 | 437 |
| CRP1 | Waste | RDX | 2 | 2 | 20000 | µg/g | 2 | 2 | 1 | 0 | 4.4 | 321 |
| CRP2 | Waste | Cadmium | 1 | 1 | 600 | µg/g | 1 | 1 | 1 | 0 | 39 | 358 |
| CRP2 | Waste | Lead | 1 | 1 | 5700 | µg/g | 1 | 1 | 1 | 12.5 | 400 | 400 |
| CRP2 | Waste | Nickel | 1 | 1 | 1800 | µg/g | 1 | 1 | 1 | 14.3 | 1600 | 1340 |
| CRP3 | Waste | Lead | 3 | 3 | 3900 | µg/g | 3 | 2 | 2 | 12.5 | 400 | 400 |
| CRP5 | Soil | Amosite asbestos | 2 | 1 | 2.2 | µg/g | 1 | 1 | 1 | 0 | 0 | 0 |
| CRP5 | Waste | 2,4,6-Trinitrotoluene | 4 | 4 | 6600 | µg/g | 4 | 4 | 3 | 0 | 16 | 437 |
| CRP5 | Waste | RDX | 4 | 4 | 3000 | µg/g | 4 | 3 | 2 | 0 | 4.4 | 321 |
| CRP5 | Waste | Barium | 4 | 4 | 8500 | µg/g | 4 | 1 | 1 | 430.7 | 5400 | 4310 |
| CRP5 | Waste | Lead | 4 | 4 | 3600 | µg/g | 4 | 1 | 1 | 12.5 | 400 | 400 |
| CRP7 | Soil | Arsenic | 14 | 14 | 470 | µg/g | 2 | 2 | 1 | 2.7 | 0.39 | 44.2 |
| CRP7 | Soil | Thallium | 14 | 2 | 480 | µg/g | 2 | 1 | 1 | 0 | 6.3 | 103 |
| CRP8 | Waste | RDX | 10 | 5 | 610 | µg/g | 5 | 3 | 1 | 0 | 4.4 | 321 |
| CRP8 | Waste | Lead | 10 | 10 | 6000 | µg/g | 10 | 1 | 1 | 12.5 | 400 | 400 |

*Table 5-18*
*Summary of Samples that Exceed Background*
*Current OB/OD Area*
*Detonation Craters*
*Fort Wingate Depot Activity*
*Gallup, New Mexico*

| Site | Material Type | Compound | Number of Samples Collected | Number of Detected Values | Maximum Detected Value | Units | Number of Samples that Exceeded Background | Background Concentration |
|---|---|---|---|---|---|---|---|---|
| CDC02 | Soil | Antimony | 12 | 4 | 5.03 | µg/g | 4 | 0 |
| CDC02 | Soil | Arsenic | 12 | 12 | 3.44 | µg/g | 1 | 2.7 |
| CDC02 | Soil | Barium | 12 | 12 | 967 | µg/g | 3 | 430.7 |
| CDC02 | Soil | Beryllium | 12 | 12 | 1.82 | µg/g | 10 | 1.1 |
| CDC02 | Soil | Cadmium | 12 | 2 | 0.388 | µg/g | 2 | 0 |
| CDC02 | Soil | Chromium | 12 | 12 | 36.9 | µg/g | 11 | 17 |
| CDC02 | Soil | Cobalt | 12 | 12 | 14.8 | µg/g | 12 | 6.5 |
| CDC02 | Soil | Copper | 12 | 12 | 36.2 | µg/g | 2 | 18.9 |
| CDC02 | Soil | Iron | 12 | 12 | 31900 | µg/g | 11 | 17647.3 |
| CDC02 | Soil | Lead | 12 | 12 | 14.5 | µg/g | 6 | 12.5 |
| CDC02 | Soil | Manganese | 12 | 12 | 1410 | µg/g | 11 | 458.1 |
| CDC02 | Soil | Molybdenum | 12 | 1 | 1.82 | µg/g | 1 | 0 |
| CDC02 | Soil | Nickel | 12 | 12 | 24.7 | µg/g | 9 | 14.3 |
| CDC02 | Soil | Silver | 12 | 2 | 0.854 | µg/g | 2 | 0 |
| CDC02 | Soil | Thallium | 14 | 11 | 1.38 | µg/g | 11 | 0 |
| CDC02 | Soil | Vanadium | 12 | 12 | 91.7 | µg/g | 6 | 31.3 |
| CDC02 | Soil | Zinc | 12 | 12 | 55.1 | µg/g | 6 | 29.2 |
| CDC02 | Waste | Antimony | 1 | 1 | 4.74 | µg/g | 1 | 0 |
| CDC02 | Waste | Arsenic | 1 | 1 | 3.18 | µg/g | 1 | 2.7 |
| CDC02 | Waste | Barium | 1 | 1 | 453 | µg/g | 1 | 430.7 |
| CDC02 | Waste | Beryllium | 1 | 1 | 1.39 | µg/g | 1 | 1.1 |
| CDC02 | Waste | Cadmium | 1 | 1 | 0.181 | µg/g | 1 | 0 |
| CDC02 | Waste | Chromium | 1 | 1 | 26.4 | µg/g | 1 | 17 |
| CDC02 | Waste | Cobalt | 1 | 1 | 8.18 | µg/g | 1 | 6.5 |

*Table 5-18*
*Summary of Samples that Exceed Background*
*Current OB/OD Area*
*Detonation Craters*
*Fort Wingate Depot Activity*
*Gallup, New Mexico*

| Site | Material Type | Compound | Number of Samples Collected | Number of Detected Values | Maximum Detected Value | Units | Number of Samples that Exceeded Background | Background Concentration |
|---|---|---|---|---|---|---|---|---|
| CDC02 | Waste | Copper | 1 | 1 | 61.9 | µg/g | 1 | 18.9 |
| CDC02 | Waste | Iron | 1 | 1 | 20000 | µg/g | 1 | 17647.3 |
| CDC02 | Waste | Manganese | 1 | 1 | 1290 | µg/g | 1 | 458.1 |
| CDC02 | Waste | Nickel | 1 | 1 | 18 | µg/g | 1 | 14.3 |
| CDC02 | Waste | Thallium | 1 | 1 | 1.4 | µg/g | 1 | 0 |
| CDC04 | Soil | 1,3-Dinitrobenzene | 9 | 2 | 4.35 | µg/g | 2 | 0 |
| CDC04 | Soil | Antimony | 9 | 1 | 8.09 | µg/g | 1 | 0 |
| CDC04 | Soil | Arsenic | 9 | 9 | 5.48 | µg/g | 2 | 2.7 |
| CDC04 | Soil | Beryllium | 9 | 9 | 1.99 | µg/g | 5 | 1.1 |
| CDC04 | Soil | Cadmium | 9 | 3 | 2.44 | µg/g | 3 | 0 |
| CDC04 | Soil | Chromium | 9 | 9 | 35.8 | µg/g | 6 | 17 |
| CDC04 | Soil | Cobalt | 9 | 9 | 9.61 | µg/g | 4 | 6.5 |
| CDC04 | Soil | Copper | 9 | 9 | 490 | µg/g | 3 | 18.9 |
| CDC04 | Soil | Iron | 9 | 9 | 29700 | µg/g | 5 | 17647.3 |
| CDC04 | Soil | Lead | 9 | 9 | 21.8 | µg/g | 4 | 12.5 |
| CDC04 | Soil | Manganese | 9 | 9 | 1300 | µg/g | 5 | 458.1 |
| CDC04 | Soil | Nickel | 9 | 9 | 18.6 | µg/g | 3 | 14.3 |
| CDC04 | Soil | Silver | 9 | 7 | 1.86 | µg/g | 7 | 0 |
| CDC04 | Soil | Thallium | 9 | 1 | 0.603 | µg/g | 1 | 0 |
| CDC04 | Soil | Vanadium | 9 | 9 | 46.5 | µg/g | 2 | 31.3 |
| CDC04 | Soil | Zinc | 9 | 9 | 46 | µg/g | 4 | 29.2 |

*Table 5-18*
*Summary of Samples that Exceed Background*
*Current OB/OD Area*
*Detonation Craters*
*Fort Wingate Depot Activity*
*Gallup, New Mexico*

| Site | Material Type | Compound | Number of Samples Collected | Number of Detected Values | Maximum Detected Value | Units | Number of Samples that Exceeded Background | Background Concentration |
|---|---|---|---|---|---|---|---|---|
| CDC06 | Soil | 1,3,5-Trinitrobenzene | 9 | 1 | 0.4 | µg/g | 1 | 0 |
| CDC06 | Soil | 2,4,6-Trinitrotoluene | 9 | 2 | 105 | µg/g | 2 | 0 |
| CDC06 | Soil | 2-Amino-4,6-dinitrotoluene | 9 | 2 | 2.46 | µg/g | 2 | 0 |
| CDC06 | Soil | 4-Amino-2,6-dinitrotoluene | 9 | 2 | 2.5 | µg/g | 2 | 0 |
| CDC06 | Soil | HMX | 9 | 1 | 0.383 | µg/g | 1 | 0 |
| CDC06 | Soil | RDX | 9 | 2 | 2.34 | µg/g | 2 | 0 |
| CDC06 | Soil | Antimony | 9 | 1 | 54.8 | µg/g | 1 | 0 |
| CDC06 | Soil | Arsenic | 9 | 9 | 3.53 | µg/g | 4 | 2.7 |
| CDC06 | Soil | Barium | 9 | 9 | 792 | µg/g | 2 | 430.7 |
| CDC06 | Soil | Beryllium | 9 | 9 | 1.8 | µg/g | 3 | 1.1 |
| CDC06 | Soil | Cadmium | 9 | 5 | 4.03 | µg/g | 5 | 0 |
| CDC06 | Soil | Chromium | 9 | 9 | 46.6 | µg/g | 8 | 17 |
| CDC06 | Soil | Cobalt | 9 | 9 | 16.3 | µg/g | 7 | 6.5 |
| CDC06 | Soil | Copper | 9 | 9 | 375 | µg/g | 3 | 18.9 |
| CDC06 | Soil | Iron | 9 | 9 | 33200 | µg/g | 8 | 17647.3 |
| CDC06 | Soil | Lead | 9 | 9 | 17.6 | µg/g | 5 | 12.5 |
| CDC06 | Soil | Manganese | 9 | 9 | 1470 | µg/g | 6 | 458.1 |
| CDC06 | Soil | Molybdenum | 9 | 3 | 3.24 | µg/g | 3 | 0 |
| CDC06 | Soil | Nickel | 9 | 9 | 33.2 | µg/g | 8 | 14.3 |
| CDC06 | Soil | Thallium | 9 | 6 | 2.3 | µg/g | 6 | 0 |
| CDC06 | Soil | Vanadium | 9 | 9 | 690 | µg/g | 9 | 31.3 |
| CDC06 | Soil | Zinc | 9 | 9 | 64.5 | µg/g | 7 | 29.2 |

*Table 5-18*
*Summary of Samples that Exceed Background*
*Current OB/OD Area*
*Detonation Craters*
*Fort Wingate Depot Activity*
*Gallup, New Mexico*

| Site | Material Type | Compound | Number of Samples Collected | Number of Detected Values | Maximum Detected Value | Units | Number of Samples that Exceeded Background | Background Concentration |
|---|---|---|---|---|---|---|---|---|
| CDC08 | Soil | Arsenic | 9 | 9 | 6.25 | µg/g | 4 | 2.7 |
| CDC08 | Soil | Barium | 9 | 9 | 537 | µg/g | 2 | 430.7 |
| CDC08 | Soil | Beryllium | 9 | 9 | 2.18 | µg/g | 3 | 1.1 |
| CDC08 | Soil | Cadmium | 9 | 3 | 0.159 | µg/g | 3 | 0 |
| CDC08 | Soil | Chromium | 9 | 9 | 49.6 | µg/g | 3 | 17 |
| CDC08 | Soil | Cobalt | 9 | 9 | 15.9 | µg/g | 3 | 6.5 |
| CDC08 | Soil | Copper | 9 | 9 | 27.1 | µg/g | 1 | 18.9 |
| CDC08 | Soil | Iron | 9 | 9 | 43200 | µg/g | 3 | 17647.3 |
| CDC08 | Soil | Lead | 9 | 9 | 21.3 | µg/g | 3 | 12.5 |
| CDC08 | Soil | Manganese | 9 | 9 | 1070 | µg/g | 3 | 458.1 |
| CDC08 | Soil | Molybdenum | 9 | 4 | 5.25 | µg/g | 4 | 0 |
| CDC08 | Soil | Nickel | 9 | 9 | 32.6 | µg/g | 3 | 14.3 |
| CDC08 | Soil | Silver | 9 | 2 | 0.536 | µg/g | 2 | 0 |
| CDC08 | Soil | Thallium | 9 | 3 | 1.4 | µg/g | 3 | 0 |
| CDC08 | Soil | Vanadium | 9 | 9 | 85.9 | µg/g | 4 | 31.3 |
| CDC08 | Soil | Zinc | 9 | 9 | 69.5 | µg/g | 3 | 29.2 |
| CDC08 | Waste | HMX | 1 | 1 | 0.591 | µg/g | 1 | 0 |
| CDC08 | Waste | Arsenic | 1 | 1 | 3.32 | µg/g | 1 | 2.7 |
| CDC08 | Waste | Cadmium | 1 | 1 | 1.14 | µg/g | 1 | 0 |
| CDC08 | Waste | Chromium | 1 | 1 | 51.9 | µg/g | 1 | 17 |
| CDC08 | Waste | Cobalt | 1 | 1 | 8.4 | µg/g | 1 | 6.5 |
| CDC08 | Waste | Copper | 1 | 1 | 327 | µg/g | 1 | 18.9 |
| CDC08 | Waste | Iron | 1 | 1 | 24000 | µg/g | 1 | 17647.3 |
| CDC08 | Waste | Lead | 1 | 1 | 450 | µg/g | 1 | 12.5 |

*Table 5-18*
*Summary of Samples that Exceed Background*
*Current OB/OD Area*
*Detonation Craters*
*Fort Wingate Depot Activity*
*Gallup, New Mexico*

| Site | Material Type | Compound | Number of Samples Collected | Number of Detected Values | Maximum Detected Value | Units | Number of Samples that Exceeded Background | Background Concentration |
|---|---|---|---|---|---|---|---|---|
| CDC08 | Waste | Mercury | 1 | 1 | 0.0852 | µg/g | 1 | 0.06 |
| CDC08 | Waste | Molybdenum | 1 | 1 | 2.28 | µg/g | 1 | 0 |
| CDC08 | Waste | Nickel | 1 | 1 | 66.9 | µg/g | 1 | 14.3 |
| CDC08 | Waste | Silver | 1 | 1 | 3.48 | µg/g | 1 | 0 |
| CDC08 | Waste | Vanadium | 1 | 1 | 71.3 | µg/g | 1 | 31.3 |
| CDC08 | Waste | Zinc | 1 | 1 | 217 | µg/g | 1 | 29.2 |
| CDC10 | Soil | Arsenic | 11 | 11 | 23.2 | µg/g | 5 | 2.7 |
| CDC10 | Soil | Barium | 11 | 11 | 506 | µg/g | 1 | 430.7 |
| CDC10 | Soil | Beryllium | 11 | 11 | 1.24 | µg/g | 2 | 1.1 |
| CDC10 | Soil | Cadmium | 11 | 5 | 3.53 | µg/g | 5 | 0 |
| CDC10 | Soil | Chromium | 11 | 11 | 29.6 | µg/g | 10 | 17 |
| CDC10 | Soil | Cobalt | 11 | 11 | 10.4 | µg/g | 8 | 6.5 |
| CDC10 | Soil | Copper | 11 | 11 | 248 | µg/g | 5 | 18.9 |
| CDC10 | Soil | Iron | 11 | 11 | 26600 | µg/g | 5 | 17647.3 |
| CDC10 | Soil | Lead | 11 | 11 | 13.1 | µg/g | 1 | 12.5 |
| CDC10 | Soil | Manganese | 11 | 11 | 883 | µg/g | 3 | 458.1 |
| CDC10 | Soil | Nickel | 11 | 11 | 19.8 | µg/g | 4 | 14.3 |
| CDC10 | Soil | Silver | 11 | 4 | 0.942 | µg/g | 4 | 0 |
| CDC10 | Soil | Vanadium | 11 | 11 | 44.6 | µg/g | 7 | 31.3 |
| CDC10 | Soil | Zinc | 11 | 11 | 39.7 | µg/g | 6 | 29.2 |
| CDC10 | Waste | 2,4,6-Trinitrotoluene | 2 | 1 | 0.945 | µg/g | 1 | 0 |
| CDC10 | Waste | 4-Amino-2,6-dinitrotoluene | 2 | 1 | 0.815 | µg/g | 1 | 0 |
| CDC10 | Waste | Barium | 2 | 2 | 509 | µg/g | 1 | 430.7 |

*Table 5-18*
*Summary of Samples that Exceed Background*
*Current OB/OD Area*
*Detonation Craters*
*Fort Wingate Depot Activity*
*Gallup, New Mexico*

| Site | Material Type | Compound | Number of Samples Collected | Number of Detected Values | Maximum Detected Value | Units | Number of Samples that Exceeded Background | Background Concentration |
|---|---|---|---|---|---|---|---|---|
| CDC10 | Waste | Cadmium | 2 | 2 | 1.59 | µg/g | 2 | 0 |
| CDC10 | Waste | Chromium | 2 | 2 | 24.8 | µg/g | 2 | 17 |
| CDC10 | Waste | Cobalt | 2 | 2 | 6.55 | µg/g | 1 | 6.5 |
| CDC10 | Waste | Copper | 2 | 2 | 254 | µg/g | 2 | 18.9 |
| CDC10 | Waste | Iron | 2 | 2 | 18500 | µg/g | 1 | 17647.3 |
| CDC10 | Waste | Lead | 2 | 2 | 12.9 | µg/g | 1 | 12.5 |
| CDC10 | Waste | Manganese | 2 | 2 | 578 | µg/g | 1 | 458.1 |
| CDC10 | Waste | Nickel | 2 | 2 | 14.5 | µg/g | 1 | 14.3 |
| CDC10 | Waste | Silver | 2 | 1 | 0.778 | µg/g | 1 | 0 |
| CDC10 | Waste | Vanadium | 2 | 2 | 31.8 | µg/g | 1 | 31.3 |
| CDC10 | Waste | Zinc | 2 | 2 | 32.8 | µg/g | 2 | 29.2 |

*Table 5-19*
*Summary of Samples that Exceed RBLs*
*Current OB/OD Area*
*Detonation Craters*
*Fort Wingate Depot Activity*
*Gallup, New Mexico*

| Site | Material Type | Compound | Number of Samples Collected | Number of Detected Values | Maximum Detected Value | Units | Number of Samples that Exceeded Background | Number of Samples that Exceeded Screening Criteria | Background Concentration | Screening Criteria |
|---|---|---|---|---|---|---|---|---|---|---|
| CDC02 | Soil | Arsenic | 12 | 12 | 3.44 | µg/g | 1 | 1 | 2.7 | 0.39 |
| CDC02 | Soil | Iron | 12 | 12 | 31900 | µg/g | 11 | 5 | 17647.3 | 23000 |
| CDC02 | Waste | Arsenic | 1 | 1 | 3.18 | µg/g | 1 | 1 | 2.7 | 0.39 |
| CDC04 | Soil | Arsenic | 9 | 9 | 5.48 | µg/g | 2 | 2 | 2.7 | 0.39 |
| CDC04 | Soil | Iron | 9 | 9 | 29700 | µg/g | 5 | 3 | 17647.3 | 23000 |
| CDC06 | Soil | 2,4,6-Trinitrotoluene | 9 | 2 | 105 | µg/g | 2 | 1 | 0 | 16 |
| CDC06 | Soil | 2-Amino-4,6-dinitrotoluene | 9 | 2 | 2.46 | µg/g | 2 | 2 | 0 | 0.71 |
| CDC06 | Soil | 4-Amino-2,6-dinitrotoluene | 9 | 2 | 2.5 | µg/g | 2 | 2 | 0 | 0.71 |
| CDC06 | Soil | Antimony | 9 | 1 | 54.8 | µg/g | 1 | 1 | 0 | 31 |
| CDC06 | Soil | Arsenic | 9 | 9 | 3.53 | µg/g | 4 | 4 | 2.7 | 0.39 |
| CDC06 | Soil | Iron | 9 | 9 | 33200 | µg/g | 8 | 4 | 17647.3 | 23000 |
| CDC06 | Soil | Vanadium | 9 | 9 | 690 | µg/g | 9 | 1 | 31.3 | 550 |
| CDC08 | Soil | Arsenic | 9 | 9 | 6.25 | µg/g | 4 | 4 | 2.7 | 0.39 |
| CDC08 | Soil | Iron | 9 | 9 | 43200 | µg/g | 3 | 3 | 17647.3 | 23000 |
| CDC08 | Waste | Arsenic | 1 | 1 | 3.32 | µg/g | 1 | 1 | 2.7 | 0.39 |
| CDC08 | Waste | Iron | 1 | 1 | 24000 | µg/g | 1 | 1 | 17647.3 | 23000 |
| CDC08 | Waste | Lead | 1 | 1 | 450 | µg/g | 1 | 1 | 12.5 | 400 |

*Table 5-19*
*Summary of Samples that Exceed RBLs*
*Current OB/OD Area*
*Detonation Craters*
*Fort Wingate Depot Activity*
*Gallup, New Mexico*

| Site | Material Type | Compound | Number of Samples Collected | Number of Detected Values | Maximum Detected Value | Units | Number of Samples that Exceeded Background | Number of Samples that Exceeded Screening Criteria | Background Concentration | Screening Criteria |
|---|---|---|---|---|---|---|---|---|---|---|
| CDC10 | Soil | Arsenic | 11 | 11 | 23.2 | µg/g | 5 | 5 | 2.7 | 0.39 |
| CDC10 | Soil | Iron | 11 | 11 | 26600 | µg/g | 5 | 2 | 17647.3 | 23000 |
| CDC10 | Waste | 4-Amino-2,6-dinitrotoluene | 2 | 1 | 0.815 | µg/g | 1 | 1 | 0 | 0.71 |

*Table 5-20*
*Summary of Samples that Exceed CPSs*
*Current OB/OD Area*
*Detonation Craters*
*Fort Wingate Depot Activity*
*Gallup, New Mexico*

| Site | Material Type | Compound | Number of Samples Collected | Number of Detected Values | Maximum Detected Value | Units | Number of Samples that Exceeded Background | Number of Samples that Exceeded Screening Criteria | Number of Samples that Exceeded Closure Performance Standards | Background Concentration | Screening Criteria | Closure Performance Standards |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CDC08 | Waste | Lead | 1 | 1 | 450 | µg/g | 1 | 1 | 1 | 12.5 | 400 | 400 |

# 6.0 *SUMMARY AND CONCLUSIONS*

The environmental characterization efforts conducted as Phase IA of the Closure Field Program associated with the Approved Modification to the Final Interim Status Closure Plan were designed to address a number of data requirements identified by NMED during its review of Closure Plan documents submitted by the Army in support of the FWDA closure.

Additional environmental characterization efforts were required to:

1. Estimate the type and amount of hazardous waste and hazardous waste residues for each discrete area that could potentially require closure activities;

2. Perform a vertical characterization of contamination in the detonation craters;

3. Characterize the potential vertical component of impact within the detonation craters;

4. Perform ground water monitoring in deeper zones beneath the detonation craters to supplement information on potential impacts;

5. Set screening action levels at the analytical detection limits, and close as a landfill, areas with constituent concentrations exceeding residential exposure scenario human health risk levels;

6. Provide details of how debris piles will be removed, how the disposition of materials will be performed, and how confirmatory sampling and analysis will be conducted; and

7. Provide a preliminary or conceptual (15%) engineering design and construction procedures for the proposed closure approach.

Items 1 and 2, as described above, are comprehensively addressed in this Phase IA Report. Item 3, which sought to estimate the potential for the migration to ground water of contaminants derived from the detonation activities by assessing the ability of the detonations to fracture the underlying bedrock and create ground water conduits, was not conducted. Upon review of the cost of this effort, and the projected uncertainty of the final results, the Army decided to address this topic directly by the installation of a ground water monitoring network to measure, rather than to predict, the impacts of contaminant migration.

Ground water evaluation (Item 4) will be the primary focus of the Phase IB Report that will be submitted under separate cover at a later date.

Item 5 is addressed in this Phase IA Report. However, a sequential data assessment process was used consisting of comparison to established background levels, followed by comparison to USEPA Region VI RBLs, and then comparison to CPSs developed for on-site remediation workers and off-site recreational workers.

Items 6 and 7 will be addressed in future phases of the closure process.

In accordance with Items 1 and 2, an extensive field program identified, delineated and described (physically and chemically) all known debris/residue piles and selected detonation craters in the Closed and Current OB/OD Areas. During the conduct of the field efforts, any previously unknown areas (such as the stained areas within the Closed OB/OD Area) were included in the field program. In addition to the delineation and description of the waste disposal features, an ecological habitat survey and wetland identification effort was conducted for the OB/OD Areas.

## 6.1 *CLOSED OB/OD AREA*

The CFP was initiated with the conduct of geophysical surveys within the Closed OB/OD Area. The geophysical surveys, in support of visual observations, identified the presence of five subsurface geophysical anomalies (KGA1 through KGA5) and four distinct debris/residue piles (KP1 through KP4) within the Closed OB/OD Area. In addition, three areas of stained soils (KSA01 through KSA03) and three mounded areas were identified.

Each geophysical anomaly, debris/residue pile and/or mound, and stained area was investigated by trenching or test pit operations. All excavations were extended vertically and horizontally until visible wastes were no longer observed. Samples of waste materials and surrounding soils potentially impacted by the wastes were collected and analyzed. Field screening samples were collected and analyzed by XRF methods for metals and immunoassay methods for explosives compounds. The field screening results allowed the sampling teams to optimize the selection of confirmation soil samples for shipment to the off-site laboratory. The confirmation soil samples were designed to delineate the extent of soil impacts potentially resulting from proximity to the waste materials. Following determination of the extent of impacted soils below and adjacent to the trenches, the volume of waste materials and impacted soils was calculated per waste disposal feature. These volume estimates will be

available for use in future phases of the closure process as the basis for removal, treatment, or stabilization cost estimates.

The chemical data for soil and waste samples collected from within the Closed OB/OD Area were sequentially compared to background concentrations for the detected constituents, USEPA Region VI RBLs and FWDA-specific CPSs. Any detection of explosives compounds was considered to be greater than background.

### 6.1.1 *Old Demolition Ground*

The Old Demolition Ground, located to the west of the Hogback, was found to contain two significant geophysical anomalies (KGA1 and KGA2), one debris/residue pile (KP1), and an area containing three mounds of soil. An extensive trenching operation was conducted at KGA1, KGA2 and KP1. No samples for chemical analysis were collected at the soil mounds. The types of debris/residues identified at these features consisted of nails, hinges, metal cans, rusted metal shells (up to 155 mm in diameter), rusted mortar casings, rusted fuze components, smoke and flare ejectors, metal strapping, and other metal and wood debris.

Explosives compounds were detected in less than 5% of the soil samples and 29% of the waste samples collected in the Old Demolition Ground. Metals were more frequently detected at concentrations greater than background in both soil and waste samples.

The number of constituents that exceeded Region VI RBLs was substantially reduced relative to those that exceeded background. No explosives were detected in soils at concentrations greater than RBLs. For waste samples, all detected explosives were greater than RBLs. No metals were detected in the soil samples at concentrations exceeding the RBLs. Two metals, arsenic and iron, were detected in a maximum of 2 waste samples at levels greater than RBLs.

No explosives compounds or metals were detected at concentrations exceeding the CPSs in either the soils samples or the waste samples.

The three mounded areas within the Old Demolition Area where investigated with an excavator. The mounds were found to consist of native soils. The areas between the mounds contained scattered metal debris on the surface and to a depth of 1 to 2 feet bgs, which appeared to be smoke grenade canisters that had been burned as part of the demilitarization process.

### 6.1.3 *Old Burning Ground and Demolition Landfill Area*

The Old Burning Ground, located on the eastern side of the Hogback, was found to contain three geophysical anomalies (KGA3 through KGA5) and three debris/residue piles (KP2 through KP4). The types of debris/residues identified at these features consisted of nails, hinges, metal cans, rusted metal shells (up to 155 mm in diameter), rusted mortar casings, rusted fuze components, smoke and flare ejectors, metal strapping, and other metal and wood debris.

Explosives compounds were detected in approximately 10% of the soil samples and 19% of the waste samples collected during the trenching and test pit operations. Metals were more frequently detected at concentrations greater than background.

The number of constituents that exceeded Region VI RBLs was substantially reduced relative to those that exceeded background. No explosives were detected in soils at concentrations greater than RBLs. Explosives in waste samples were detected at concentrations greater than the CPSs at a frequency of approximately 19%. Three metal/inorganic constituents (arsenic, iron, and phosphorus) were widely detected in soil samples at concentrations greater than the RBLs. This was also true for the waste samples, although additional metals were detected in exceedance of the RBLs.

No explosives compounds were detected at concentrations exceeding the CPSs in the soils samples. Concentrations of explosives greater than the CPSs were detected in less than 8% of the waste samples. Phosphorus was detected in excess of the CPS in all soil and waste samples. A single detection (in soil) of manganese greater than the CPS was identified.

### 6.1.4 *Explosives Stained Areas*

Three areas of soils apparently stained by explosives compounds were identified in the northeastern portion of the Old Burning Ground. All soil samples collected from these areas were found to contain concentrations of explosives compounds that exceeded background. In addition, at least one explosive compound was detected in each sample at a concentration that exceeded the RBL. Only one detection of one explosive compound in one sample was found to exceed the CPS.

### 6.1.5 *Ecological Habitat Survey/Wetland Evaluation*

The ecological habitat survey of the Closed OB/OD Area determined that mature grassland and sagebrush communities were predominant. The

arroyos present were typically narrow, deep, and sparsely vegetated. Occasional stands of cottonwood trees in the arroyos indicated the presence of subsurface water or soil moisture. No wetland characteristics were identified in any portion of the Closed OB/OD Area.

### 6.1.6 *Summary of Contaminant Status - Closed OB/OD Area*

The visible demilitarization debris and residues present within the Closed OB/OD Area were assessed with respect to a series of environmental threshold levels. Both explosives compounds and metal/inorganic constituents were found to exceed established background levels for the area. The spatial extent of the concentrations that exceeded background was widespread. When these same chemical data were compared to residential-based RBLs, the number of exceedances was reduced significantly. Because the OB/OD Areas will be held under Army control in perpetuity, the residential land-use scenario assumed in the development of the RBLs is overly conservative. Site specific CPSs were developed to assess potential human health risks to on-site remediation workers and off-site recreational users. The number of exceedances of the CPSs was limited and spatially disperse. In addition, a large majority of the exceedances were attributed to phosphorus, which is of low toxicity to humans. Therefore, it is reasonable to conclude that the actual worst case exposure scenario for the on-site remediation worker and/or the off-site recreational user would unlikely result in exposure to the maximum constituent concentrations at the frequency and duration assumed by the exposure model used to calculate the CPSs. This, in turn, strongly suggests that the human health risks posed by the demilitarization debris and residue present in the Closed OB/OD Area are minimal.

Although the human health risks derived from the presence of demilitarization debris and residues may be minimal in the Closed OB/OD Area, future efforts/evaluations associated with other phases of the closure process will assess the requirements of additional regulatory programs, such as ecological risk, solid waste regulations, and surface and ground water protection programs, prior to final determination of the need for and type of specific closure activities required.

## 6.2 *CURRENT OB/OD AREA*

Geophysical surveys were not required in the Current OB/OD Area as the debris/residue piles were clearly visible.

The mapping and field observation efforts identified and accurately located a series of ten debris/residue piles, and 12 detonation craters. The trenching operations were conducted at each of the ten debris/residue

piles and at five detonation craters. Typical debris/residues consisted of nails, hinges, metal cans, rusted metal shells, burned rocket motors, burned parachute flares, rusted mortar casings, rusted fuze components, booster cups, fragmentation bomb windings, smoke and flare ejectors, rusted drums partially filled with burn residues, ash, wire, metal strapping, ACM, and other metal and wood debris. No drums containing liquids were observed in any of the areas investigated.

The debris/residue piles were found to be of three general types. CRP1 through CRP3 are small isolated areas at the southern end of the Current OB/OD Area. CRP4 through CRP9 represent essentially one continuous area of debris/residue disposal. CRP10 is a single isolated debris/residue pile situated in the main arroyo channel at the northern limit of the formerly active Current OB/OD Area.

### 6.2.1 *Debris/Residue Piles - CRP1 through CRP3*

Debris/Residue piles CRP1 through CRP3 are located at the southern end of the Current OB/OD Area and appear to have been created by the disposal of demilitarization wastes generated elsewhere. The waste materials were primarily empty fuze cans, fuze pieces, slag, metal banding, burn residue, ash, and other metal and wood debris.

Both explosives compounds and metals were detected at concentrations greater than background. The number of constituent concentrations which exceeded the residential-based Region VI RBLs were substantially less than for background. Only two explosives compounds, single detections of cadmium and nickel, and two detections of lead were found to exceed the CPSs. Under realistic exposure conditions, it would be difficult for an on-site remediation worker or an off-site recreational user to be exposed to the highest detect constituent concentrations at the frequency and duration assumed by the exposure model used to generate the CPSs.

### 6.2.2 *Debris/Residue Piles - CRP4 through CRP9*

Debris/Residue piles CRP4 through CRP9 form a nearly continuous mass of waste demilitarization materials that appear to have been pushed off the flat working area of the Current OB/OD Area onto the eastern bank of the main arroyo. The waste materials were primarily metal banding, empty fuze cans, fuze pieces, detonator assemblies, 20,37,40, 57 and 75 mm projectiles (live and fragments), booster caps, fragmentation bomb windings, barrage rocket tubes, M83 butterfly bomblets (live and fragments), burned flares, ash, burn residue, cardboard, ammunition box hardware, wood debris, and ACM.

Explosives were detected in the soils at four of the six piles and in the wastes in five of the six piles. A wide range of metals was detected at concentrations greater than background within the soils and wastes at each of the six piles. The number of exceedances of the residential-based RBLs was substantially less than that for background. Exceedances of the RBLs were identified in less than 15% of the soil samples and in 25% to 47% of the waste samples. The number of constituents that exceeded the CPSs was limited to two explosives compounds, four metals, and amosite asbestos. These constituents exceeded the CPSs at a maximum of eight sample locations. Considering the large volume of waste materials identified at these piles, the number of exceedances of the CPSs is remarkably low.

### 6.2.3 *Debris/Residue Pile - CRP10*

CRP10 is located within the channel of the main arroyo, and was found to contain a limited quantity of smoke canister fragments and burn residues.

Trace levels of two explosives compounds were detected, one each, in a single soil and single waste sample. A wide range of metals were detected at concentrations greater than background in soil (17% to 50% of the total soil samples) and waste (50% to 100%) of the total waste samples. Only two metals (arsenic and iron) were detected at concentrations greater than the RBLs. None of the detected constituents in soil or waste samples exceeded the CPSs.

### 6.2.4 *Detonation Craters*

The trenching operations at the five detonation craters identified scattered ordnance fragments, projectiles, ash, dark stained soil, rock fragments, metal banding, and packaging materials.

Low levels of explosives compounds were detected at four of the five craters, and a wide range of metals were detected in the soil and waste samples from all five craters. Chemical results for soils and wastes were similar, suggesting that the grading and regrading process associated with the active use of the craters in the past has resulted in a high degree of mixing of the soil. A lesser number of explosives compounds and metals were found to exceed the residential-based RBLs. Only one constituent (lead) in one sample from one crater was found to exceed the CPS.

### 6.2.5 *Ecological Habitat Survey/Wetland Evaluation*

The ecological habitat survey of the Current OB/OD Area determined that although the area had been widely disturbed until late 1992, a

substantial amount of revegetation had occurred. The survey identified plants indicative of a grassland and sagebrush community, surrounded by Pinion Pine/Juniper woodland communities. The deep arroyo that bisects the site creates a variety of favorable wildlife habitats. In addition, the ephemeral presence of water, either above the land surface or just below the land surface in the arroyo channel provides an important source of moisture to indigenous flora and fauna. Several small waterholes are apparently heavily visited by wildlife as evidenced by numerous tracks.

The Current OB/OD Area supports seasonal wetland habitat in the main arroyo. Both scrub shrub (coyote willows) and emergent (sedge meadows) wetlands were observed within the arroyo.

### 6.2.6 *Summary of Contaminant Status - Current OB/OD Area*

The visible demilitarization debris and residues present within the Current OB/OD Area were assessed with respect to a series of environmental threshold levels. In a manner similar to that described for the Closed OB/OD Area, both explosives compounds and metal/inorganic constituents were found to exceed established background levels for the area. The extent of the concentrations that exceeded background was widespread. When these same chemical data were compared to residential-based RBLs, the number of exceedances was reduced significantly. Because the OB/OD Areas will be held under Army control in perpetuity, the residential land-use scenario assumed in the development of the RBLs is overly conservative. Site specific CPSs were developed to assess potential human health risks to on-site remediation workers and off-site recreational users. The number of exceedances of the CPSs was remarkably limited, considering the volume of demilitarization debris and residues present on-site. The exceedances were also spatially disperse. Therefore, it is reasonable to conclude that the actual worst case exposure scenario for the on-site remediation worker and/or the off-site recreational user would unlikely result in exposure to the maximum constituent concentrations at the frequency and duration assumed by the exposure model used to calculate the CPSs. This, in turn, strongly suggests that the human health risks posed by the chemical constituents derived from the demilitarization debris and residue present in the Current OB/OD Area are minimal.

Although the human health risks derived from the presence of demilitarization debris and residues may be minimal in the Current OB/OD Area, future efforts/evaluations associated with other phases of the closure process will assess the requirements of additional regulatory programs, such as ecological risk, solid waste regulations, and surface and

ground water protection programs, prior to final determination of the need for and type of specific closure activities required.

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REGULATORY AGENCY REVIEW

Program Management Company

# FORT WINGATE DEPOT ACTIVITY
# GALLUP, NM

# FINAL OPEN BURNING/OPEN DETONATION AREA
# RCRA INTERIM STATUS CLOSURE PLAN
# PHASE IA - CHARACTERIZATION AND ASSESSMENT OF SITE CONDITIONS FOR THE SOILS/SOLID MATRIX

**Prepared for:**

**U.S. ARMY CORPS OF ENGINEERS**
**FORT WORTH DISTRICT**

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