FW 95-29

Administrative Record

FORT WINGATE DEPOT ACTIVITY, GALLUP, NEW MEXICO

Document No. 95-16

Final Report Fort Wingate Depot Activity, Gallup, New Mexico, Work Plans: Field Sampling Plan and Contaminated Materials Handling Plan, Debris Piles and Burial Sites

Environmental Resources Management

December 1995

INQUIRIES REGARDING THIS DOCUMENT AND/OR THE ADMINISTRATIVE RECORD FOR FORT WINGATE DEPOT ACTIVITY SHOULD BE MADE TO:
COMMANDER, TOOELE ARMY DEPOT, TOOELE, UTAH 84074

U.S. Army
Environmental
Center

FINAL

FORT WINGATE DEPOT ACTIVITY GALLUP, NM

WORK PLANS

FIELD SAMPLING PLAN

CONTAMINATED MATERIALS HANDLING PLAN

DEBRIS PILES AND BURIAL SITES ELIN A005

Prepared for
U.S. ARMY ENVIRONMENTAL CENTER
ABERDEEN PROVING GROUND, MARYLAND 21010

Prepared by
ENVIRONMENTAL RESOURCES MANAGEMENT, INC.
855 Springdale Drive
Exton, PA 19341

Delivery Order Nos. DA10

ERM JOB NO. 00311

6 December 1995

FINAL

FORT WINGATE DEPOT ACTIVITY GALLUP, NM

FIELD SAMPLING PLAN

DEBRIS PILES AND BURIAL SITES ELIN A005

Prepared for
U.S. ARMY ENVIRONMENTAL CENTER
ABERDEEN PROVING GROUND, MARYLAND 21010

Prepared by
ENVIRONMENTAL RESOURCES MANAGEMENT, INC.
855 Springdale Drive
Exton, PA 19341

Delivery Order Nos. DA10

ERM NO. 00311

6 December 1995

Fort Wingate Depot Activity, Gallup, New Mexico
Debris Piles and Burial Sites Work Plans
Response to the State of New Mexico -
Enviroment Department (NMED) Comments

Provided below is a Response to the State of New Mexico - Environment Department's (NMED's) Draft Comments on the Draft Final Work Plans, dated 18 September 1995, for the Debris Piles and Burial Sites at the Fort Wingate Depot Activity (FWDA), Gallup, New Mexico. The Draft Comments were received in a correspondence dated 16 October 1995 from Mr. Chris Whitman, NMED, Remediation Section, Ground Water Protection and Remediation Bureau, to the U.S. Army Environmental Center, SFIM-AEC-BCA. A copy of this correspondence is included in Appendix A of the Debris Piles and Burial Sites Work Plan.

General Comment

The New Mexico Environment Department (NMED) is in receipt of the work plans for Fort Wingate Depot Activity (FWDA) entitled "Debris Piles and Burial Sites, ELIN A005," submitted by Environmental Resources Management, Inc. (ERM) on behalf of the U.S. Army Environmental Center (USAEC) on September 18, 1995. NMED generally agrees with the proposed approach for characterizing the Group C disposal area debris piles and the Central and Western landfills with the following conditions:

Comment No. 1:

Trenching of landfills is not recommended. In fact, trenching requires prior approval from the NMED Solid Waste Bureau because it is classified as excavation of closed cells. The Department recommends that you perform borings to characterize the waste. This is the standard procedure prior to any excavation. Approval of excavation plans is contingent upon characterization of the waste through borings to define specific quantity, types and location of wastes to be excavated. A specific worker safety plan and contingency plan for dealing with emergencies (like encountering hazardous wastes) must be filed with the solid waste bureau.

Response:

A request to perform trenching to characterize the debris piles and burial sites, in lieu of the installation of borings, was communicated to the NMED Solid Waste Bureau. The NMED has subsequently approved the characterization of the landfills using the trench method under the controlled conditions described in the Work Plan and Health and Safety Plan dated 18 September

1995, in a letter dated 13 November 1995, to Mr. Harold Oliver, Director, Industrial Risk Management from Mr. J. David Duran, Manager, Permit Section, Solid Waste Bureau, NMED. A copy of this letter is included in Appendix A of the Debris Piles and Burial Sites Work Plan.

Comment No. 2:

Following the characterization of the wastes deposited in the Group C and Central and Western landfill areas, NMED understands that the Army will implement closure of the sites according to the New Mexico Solid Waste Management Regulations (EIB/SWMR-4). Therefore, screening action levels determined for other areas of the FWDA will not be pertinent to the closure of the landfills. All landfills containing municipal solid waste are subject to the closure and post-closure care requirements of the NM Solid Waste Management Regulations. Specific plans will need to be submitted for approval. Landfills closed prior to 1989 do not require such plans. Those closed before October 31, 1992 are subject to the requirements in the 1989 regulations (EIB/SWMR-2). Landfills closed between October 31, 1992 and August 17, 1994 are subject to the requirements of the 1992 regulations (EIB/SWMR-3). Landfills closed after August 17, 1994 are subject to current (1994) regulations (EIB/SWMR-4).

The Solid Waste Bureau needs to be advised of the closing dates of the landfills. Please include specific plans for submittal of closure/post closure care plans in conformance with the NM Solid Waste Management Regulations. This information should be directed to David Duran, Manager, Solid Waste Bureau/Permitting Section, (505) 827-2950.

Response:

The Army intends to utilize the information obtained during the proposed investigation of the debris piles and burial sites to close the disposal sites following the applicable New Mexico Solid Waste Management Regulations.

Comment No. 3:

The arroyos in the Group C disposal area are actively meandering and incising. Therefore, it would take some engineering to stabilize the sediment and debris trenched from this area. Precautions must be taken by the contractors in order to prevent this material from violating New Mexico's stream standards.

Response:

The proposed characterization trenching of the debris in the Group C Disposal Area will be limited to confirming the lateral and vertical extent of waste material and the nature of the wastes. Excavated material will be replaced in the trenches in the order it is removed and then compacted with the bucket of the excavator. In unstable areas, backfilled and compacted trenches will be covered with gravel or appropriately-sized stone to maintain stability. Sediment control fences will also be installed approximately half way between the arroyo channel and the nearest end of the trench to inhibit trench material from entering the arroyo.

These additional procedures have been incorporated into the Debris Piles and Burial Sites Contaminated Materials Handling Plan.

Fort Wingate Depot Activity, Gallup, New Mexico
Debris Piles and Burial Sites Work Plans
Response to the U.S. Environmental Protection Agency -
(USEPA) Region VI Comments

Provided below is a Response to the U.S. Environmental Protection Agency (USEPA) - Region VI's comments on the Draft Final Work Plans, dated 18 September 1995, for the Debris Piles and Burial Sites at the Fort Wingate Depot Activity (FWDA), Gallup, New Mexico. The comments were received in a correspondence, dated 17 October 1995 from Mr. David Neleigh, USEPA-Region VI Section Chief, New Mexico Federal Facilities, Multimedia Planning and Permitting Division to Mr. Larry Fisher - BRAC Environmental Coordinator, Environmental Management Division, Tooele Army Depot, Tooele, Utah. A copy of this letter is included in Appendix A of the Debris Piles and Burial Sites Work Plan.

General Comment

We have reviewed the above-referenced document, dated September 18, 1995, provided by the U.S. Army Environment Center. As discussed earlier, we expect these areas to be closed under state of New Mexico landfill closure requirements, which will be addressed by the New Mexico Environment Department (NMED). The Environmental Protection Agency (EPA) Region 6 approves the work plan with the following comments for your consideration and for incorporation into the work plan:

Comment No. 1:

Section 5.3.2.1: Please provide details, in the project report, on the method/equipment used in the geophysical investigation.

Response:

The subsurface geophysical investigation referenced in the Draft Final Work Plans addresses unexploded ordnance (UXO) survey activities that will be performed in support of the field investigation program. The equipment to be used during the UXO survey activities will be a Foster Ferex Ordnance Locator, or equivalent magnetometer. This information will be included in the project report summarizing the results of the Debris Piles and Burial Sites investigation program.

Comment No. 2:

Section 5.5.1: The water source should also be approved by the NMED.

Response:

Analytical results obtained for a sample of the proposed source water will also be sent to NMED for their comment/approval.

Comment No. 3:

Table 6-3: EPA quality control guidelines require at least one rinsate blank and one field blank per day of sampling, and one rinsate blank per 10 samples. Since five days of sampling are planned, there should be at least five of each of these blanks.

Response:

This comment was discussed during a telephone conversation between Mr. Tim Alexander, USAEC Project Manager; Mr. Chuck Hendrickson, USEPA; and ERM Personnel. Mr. Hendrickson indicated that his comment referenced USEPA Region VI recommended quality control sample frequencies. USEPA field blank quality control guidelines require the frequency to be 1 per 20 samples. Mr. Hendrickson indicated that the quality control sample frequencies included in the work plans were acceptable.

Comment No. 4:

Tables 6-5 & 6-8: The laboratory Certified Reporting Limits (CRLs) for water matrices exceed EPA Maximum Contaminant Levels (MCLs) for vinyl chloride, antimony, arsenic, cadmium, and thallium. This deficiency should not affect this work plan since no ground water sampling is proposed. However, if the NMED requires ground water sampling at any or all of these sites, an analytical method with CRLs below the MCLs will be required.

Response:

If ground water sampling is required, alternative analytical methods that can detect contaminants at concentrations below the MCLs will be evaluated and discussed with regulatory agency personnel prior to implementation.

TABLE OF CONTENTS

ACRONYMS AND ABBREVIATIONS

LIST OF FIGURES — FOLLOWING PAGE

LIST OF TABLES

APPENDIX

ACRONYMS AND ABBREVIATIONS

AOCs	Areas of Concern
BBS	Bulletin Board System
BCT	Base Cleanup Team
bgs	below ground surface
BIP	Blow-In-Place
BLM	Bureau of Land Management
BWDP/BSI	Base-Wide Debris Pile/Burial Site Investigation
°C	Degrees Celsius
CMHP	Contaminated Materials Handling Plan
CRLs	Certified Reporting Limits
CRZ	Contamination Reduction Zone
CVAA	Cold Vapor Atomic Absorption
DC	DataChem Laboratories, Inc.
DGPS	Differential Global Positioning System
DI	Deionized
EI	Environmental Investigation
ELIN	Edit Line Item Number
ERM	Environmental Resources Management, Inc.
ESE	Environmental Science and Engineering, Inc.
°F	Degrees Farenheit
FSP	Field Sampling Plan
ft/day	feet per day
FWDA	Fort Wingate Depot Activity
gm	gram
gal/min	gallons per minute
GC	Gas Chromatograph
GC/MS	Gas Chromatography/Mass Spectrometry
GFAA	Graphite Furnace Atomic Absorption
GPS	Global Positioning System
HASP	Health and Safety Plan
HPLC	High Pressure Liquid Chromatography
ICP	Inductively Coupled Plasma
ID	Identification
IRDMIS	Installation Restoration Data Management Information System
LIMS	Laboratory Information Management System
ml	milliliter
MOA	Memorandum of Agreement
mph	miles per hour
MS	Mass Spectrometer

MSL	Mean Sea Level
NMSWMRs	New Mexico Solid Waste Management Regulations
OBDA	Open Burning and Detonation Area
OVA	Organic Vapor Analyzer
PC	Personal Computer
PCBs	Polychlorinated Biphenyls
PP	Priority Pollutant
PPE	Personal Protective Equipment
ppm	parts per million
PRI	Potomac Research, Inc.
QA	Quality Assurance
QAPP	Quality Assurance Project Plan
QC	Quality Control
RDX	Hexahydro-1,3,5-trinitro-1,3,5-triazine
RI/FS	Remedial Investigation/Feasibility Study
SHPO	State Historic Preservation Officer
SMO	Sample Management Officer
SOPs	Standard Operating Procedures
SVOCs	Semi-Volatile Organic Compounds
SWMUs	Solid Waste Management Units
TAL	Target Analyte List
TCL	Target Compound List
TEPS	Total Environmental Program Support
USAEC	U.S. Army Environmental Center
USAED	U.S. Army Engineer District
USATHAMA	U.S. Army Toxic and Hazardous Materials Agency
USEPA	U.S. Environmental Protection Agency
UTM	Universal Transverse Mercator
UV	Ultraviolet
UXB	UXB International, Inc.
UXO	Unexploded Ordnance
VOCs	Volatile Organic Compounds
µg/g	micrograms per gram
µg/l	micrograms per liter
µl	microliter

1.0 INTRODUCTION

This deliverable (Edit Line Item Number [ELIN] A005) is the Base-Wide Debris Piles and Burial Sites Investigation (BWDP/BSI) Final Field Sampling Plan (FSP) for the work to be performed at Fort Wingate Depot Activity (FWDA), Gallup, NM. The work elements described within this document will be conducted by Environmental Resources Management, Inc. (ERM) of Exton, PA, as Delivery Order DA10, under the Army Total Environmental Program Support (TEPS) contract (Contract DAAA15-91-D-0011) issued by the U.S. Army Environmental Center (USAEC), Aberdeen Proving Ground, MD.

The FWDA is currently an inactive United States Army Depot under the administrative command of the Tooele Army Depot, which is located near Salt Lake City, Utah. The former mission of the FWDA was to store, ship, and receive materiel and to dispose of obsolete or deteriorated explosives and ammunition. The active mission of the FWDA ceased in January 1993 with final property transfer targeted for September 1995. The areas addressed in this FSP include debris piles in the Group C Disposal Area and two burial sites, the Western Landfill Area and Central Landfill Area.

1.1 OBJECTIVES AND APPROACH

1.1.1 Objective

In June 1994, the FWDA Base Cleanup Team (BCT) agreed to review the status of three (3) areas relative to: (1) period of operation, (2) the nature of the wastes disposed at each location, and (3) the applicable State of New Mexico Solid Waste Management Regulations (NMSWMRs) and closure requirements. The objective of this portion of DA10 is to investigate the Group C Disposal Area, Central Landfill Area, and Western Landfill Area, evaluate the site conditions and recommend appropriate closure actions if warranted, and support the finalization of environmental reports and studies related to the base closure.

1.1.2 General Investigative Approach

A surface reconnaissance of the burial sites and disturbed areas within the Western Landfill Area, Central Landfill Area, and Group C Disposal Area-debris piles will be performed to confirm the perimeter of the waste and locations for exploratory trenches. The trenches will investigate the

vertical and horizontal extent of the waste materials and for the burial sites, the nature and extent of existing cover thickness. The waste and adjacent soil will be evaluated for the presence of constituents of concern and selected soil samples will be sent for laboratory analysis. The waste present will be described, volumes estimated, the extent of the waste will be physically delineated in the field, and waste materials will be categorized and requirements for closure confirmed. The delineated extent of the debris piles and burial sites, and soil sample locations will then be mapped using global positioning system (GPS) technology.

Due to the nature of the previous mission and operations at the FWDA, the potential exists for unexploded ordnance (UXO) to be present in the three (3) areas to be investigated. Therefore, all field efforts will be supported by the performance of UXO surveys and on-site subcontract personnel.

1.1.3 *Delivery Order Implementation*

The FWDA Environmental Investigation (EI) Program was initially implemented in the fall of 1992 to determine the nature and extent of identified releases to soils, ground water, sediments, and surface waters from the Solid Waste Management Units (SWMUs) and Areas of Concern (AOCs) previously identified for investigation and evaluation. The EI Program was implemented based upon the Final Work Plans, dated 6 November 1992, prepared by Metcalf & Eddy, Inc. and support plans prepared by ERM. A Remedial Investigation/Feasibility Study (RI/FS) Report was then prepared to summarize the findings and results of the EI Program.

This FSP has been prepared as an integral component of the Base-Wide Debris Piles and Burial Sites Investigation Work Plan. The associated project documents for the Base-Wide Debris Piles and Burial Sites Investigation include the approved Work Plans and project documents summarized below:

- The overall Delivery Order Work Plan consisting of the FSP and the Contaminated Materials Handling Plan (CMHP) prepared by ERM, dated 6 December 1995;
- Final Sampling and Analysis Plan, Volume II - Quality Assurance Project Plan (QAPP), prepared by Metcalf & Eddy, Inc., dated 6 November 1992, as amended 6 December 1995 by ERM to encompass the current field investigation activities; and

- Final Supplemental Health and Safety Plan (HASP), prepared by ERM, dated 18 September 1992, as amended 6 December 1995 by ERM to encompass the current field investigation activities.

Certain sections of this FSP provide excerpted descriptions of information directly related to the performance of the proposed scope of work. These include: (1) Section 5 - Site Investigation Methodologies, (2) Section 6 - Laboratory Analysis Program, and (3) Section 7 - Data Management. An approved QAPP and HASP currently exist for the EI Program and the reader may refer to these documents for the complete presentation of the referenced information.

1.1.4 Location

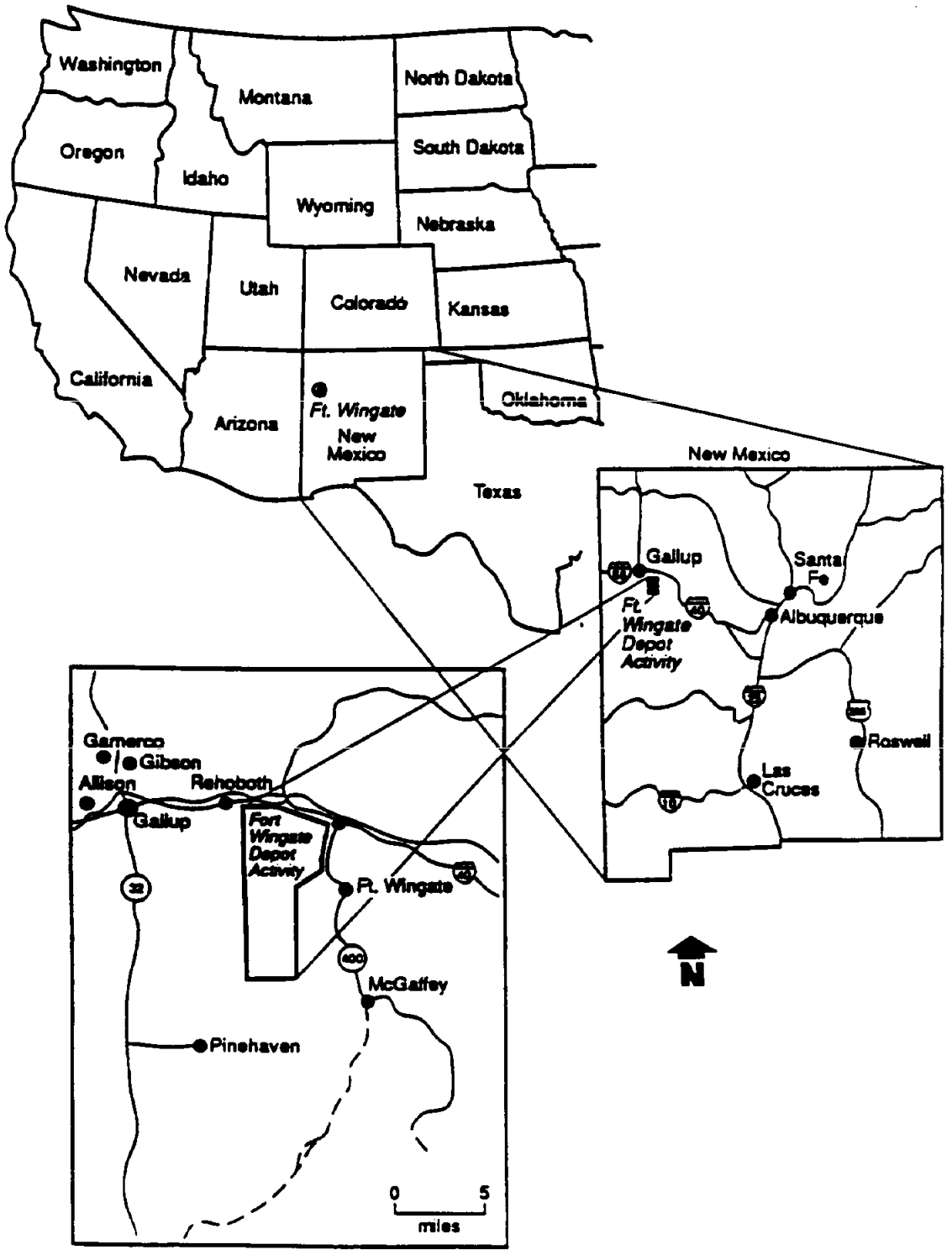
The FWDA is located in McKinley County, in west-central New Mexico (see Figure 1-1). The installation is located approximately 8 miles east of Gallup, 130 miles west of Albuquerque on Interstate 40, and 30 miles east of the Arizona-New Mexico border. The FWDA covers approximately 22,120 acres (approximately 34 square miles). The main entrance road of the FWDA connects with Route 66 approximately 8 miles east of Gallup. The depot itself contains about 150 miles of internal roads (70 miles surfaced and the rest dirt). The installation is bordered on the west by the Zuni Indian Reservation, on the south and east by the Cibola National Forest, and on the north by the Red Rock State Park.

The Group C Disposal Area is located east and south of Igloo Block C (directly across from Igloo C-1120). The Central Landfill Area is located directly off Arterial Road No. 2, east of, and across the arroyo from, the Current Landfill. The Western Landfill Area is located in the northwestern corner of the installation in the general vicinity of the Sewage Treatment Plant and Building 23 (the former Railroad Scale House). Figure 1-2 shows the location of the Group C Disposal Area, the Central Landfill Area, and the Western Landfill Area.

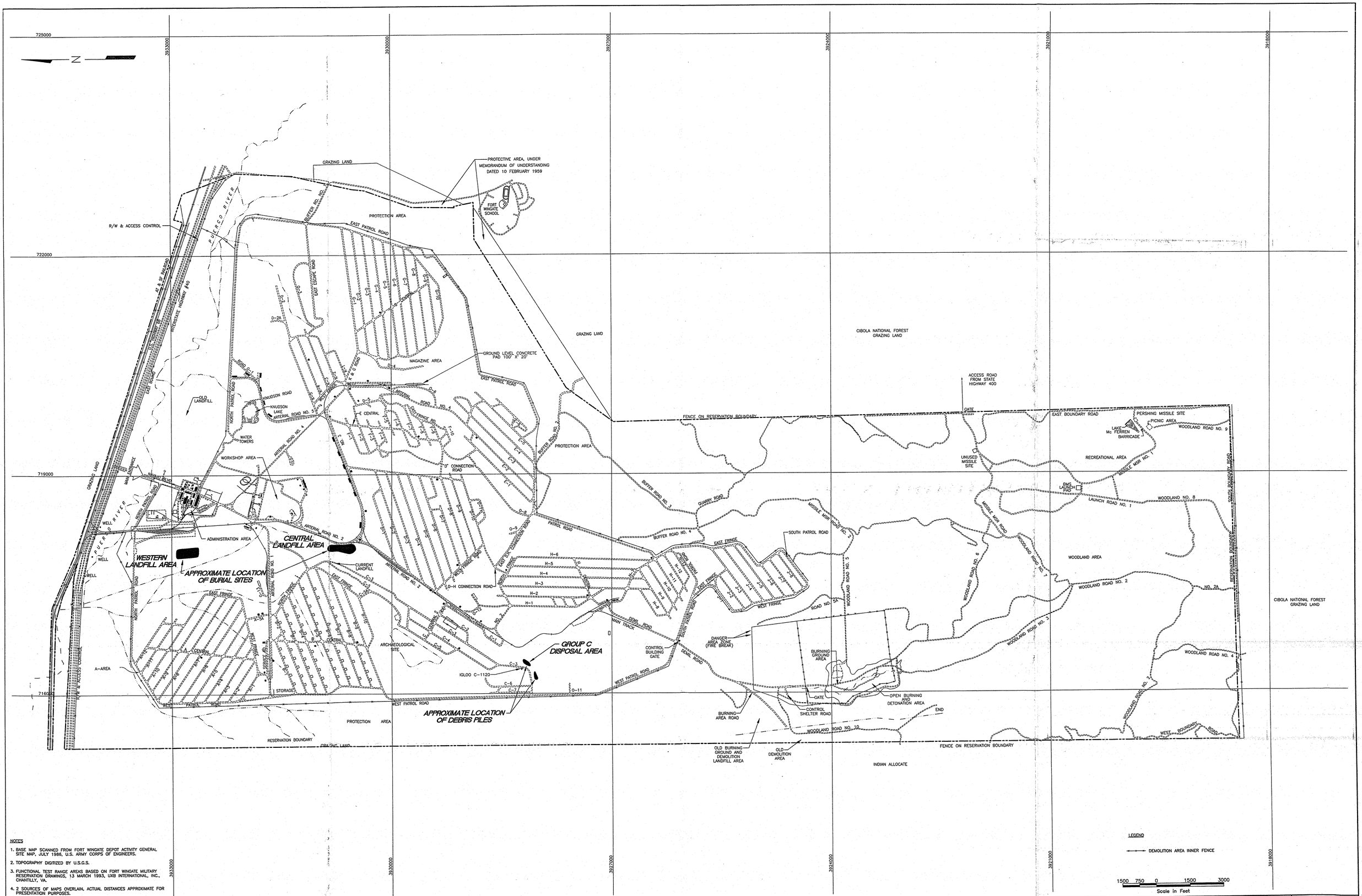
1.2 PREHISTORIC AND HISTORIC CULTURAL RESOURCES

The cultural resources within the boundaries of the FWDA have been the subject of a number of studies and a Memorandum of Agreement (MOA) concerning the preservation of on-site cultural resources through the closure and disposal of the FWDA. The U. S. Army Engineer District (USAED), Albuquerque, is currently performing a survey of the installation regarding potential archaeological and cultural resources.

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



Source: "Master Environmental Plan: Ft. Wingate Depot Activity, Gallup, New Mexico," December 1990.



NOTES

1. BASE MAP SCANNED FROM FORT WINGATE DEPOT ACTIVITY GENERAL SITE MAP, JULY 1986, U.S. ARMY CORPS OF ENGINEERS.
2. TOPOGRAPHY DIGITIZED BY U.S.G.S.
3. FUNCTIONAL TEST RANGE AREAS BASED ON FORT WINGATE MILITARY RESERVATION DRAWINGS, 13 MARCH 1993, UXB INTERNATIONAL, INC., CHANTILLY, VA.
4. 2 SOURCES OF MAPS OVERLAIN, ACTUAL DISTANCES APPROXIMATE FOR PRESENTATION PURPOSES.

NO.	DATE	APPR.	REVISION	NO.	DATE	APPR.	REVISION

Fort Wingate Depot Activity
Gallup, New Mexico
Contract No. DAAA15-91-D-0011, Delivery Order No. 10
United States Army Environmental Center
Aberdeen, Maryland

Environmental Resources Management, Inc.
Exton, Pennsylvania 19341 (610) 524-3900

ERM

CHECKED		DATE
DESIGN ENGINEER		
PROJECT GEOLOGIST		
PROJECT MANAGER		
APPROVED		
APPROVED		
DRAWN	MK BOND/MKB	DATE 09.12.95/11.30.95
SCALE	1" = 1500'	W.O. No. PM306.80.01/A4081B

Figure 1-2
Site Map and Location of Burial Sites and Debris Piles

CLIENT APPROVAL
ISSUED FOR DATE
DRAWING NO.
REV. NO.
SHEET OF

Moore Anthropological Research, Aztec, NM will provide archaeologic support services during the performance of intrusive (i.e., excavation) field investigation activities. The planned field efforts will be coordinated with the USAED, Albuquerque and the New Mexico - State Historic Preservation Officer (SHPO).

2.0 SITE BACKGROUND

This section provides general site information and summarizes the physiographic, climatic, geologic, and hydrogeologic setting of the FWDA.

2.1 SITE INFORMATION

Prior to closure, the mission of the FWDA included three primary functions: (1) to provide facilities for the storage of material, namely, ammunition components (explosive and inert), and other commodities (such as equipment and spare parts); (2) to handle the shipping and receiving of material, primarily by rail or vehicular transport; and (3) to demilitarize and dispose of obsolete or deteriorated explosives and munitions, rendering them harmless.

The installation can be divided into several areas based upon location and historical land use. These areas include the Administration Area, consisting of former office and equipment maintenance facilities; the Workshop Area, an industrial area formerly containing ammunition maintenance and renovation facilities; the Magazine (Igloo) Area, consisting of over 730 earth-covered concrete igloos in ten (10) Igloo Block Areas (A through H, J, and K) previously used for the storage of ammunition; an Open Burning and Detonation Area (OBDA); and a Protection and Buffer Area. The land use at the FWDA, during the active mission, was dominated by the storage of high-explosive munitions in the Magazine (igloo) facilities and the protection and buffer zones that surround them.

2.2 PHYSIOGRAPHY

The FWDA is almost entirely surrounded by federally owned or administered lands that are largely undeveloped. North and east of the FWDA is the Navajo Indian Reservation. To the south and southeast is the Cibola National Forest. The land to the west is in checkerboard ownership, with management responsibilities divided between the Bureau of Land Management (BLM), Bureau of Indian Affairs (Navajo tribal trust land), Navajo tribe, and individual Indian allottees.

The FWDA is located within the Navajo section of the Colorado Plateau Physiographic Province. Topographically, the FWDA may be divided into

three areas: (1) the rugged north-to-south trending Hogback along the western and the southwestern boundaries; (2) the northern hill slopes of the Zuni Mountain Range in the southern portion; and (3) the alluvial plains marked by bedrock remnants in the northern portion of the installation. The Hogback area is formed by interbedded Mesozoic sedimentary rocks dipping sharply to the west and is dissected by northeastern-trending intermittent streams. The streams transport sediment to low-lying areas in the northern part of the installation, creating an extensive alluvial deposit among remnants of bedrock. The streams eventually discharge to the South Fork of the Puerco River near the northern boundary of the FWDA. The debris piles and burial sites under investigation are located in the alluvial plains portion of the FWDA.

The elevation of the FWDA installation ranges from approximately 8,200 feet above mean sea level (MSL) in the south to 6,660 feet above MSL in the north. Main drainages, following the topography, flow from south to north and discharge to the South Fork of the Puerco River. However, many tributaries follow the regional trend, flowing from southwest to northeast. Because of the nature of precipitation in this arid region, the surface drainage is relatively shallow near headwaters. Downward erosion intensifies as the stream moves downstream, resulting in a system of well-developed, steep-walled arroyos. Arroyos form because of the erodibility of localized areas of silt- and clay-rich bedrock.

2.3 *CLIMATOLOGY*

Northwestern New Mexico is characterized by a semiarid continental climate. Most precipitation occurs from May through October as localized and brief summer storms. Mean annual rainfall for the area ranges between 10 and 16 inches, while the recorded average annual precipitation for the FWDA is 11 inches. Most of the precipitation occurs as rain or hail in summer thunderstorms, and the remainder results from light winter snow accumulations. Spring and fall droughts are common in this area.

The average seasonal temperatures for the area vary with elevation and topographic features. During winter, daily temperatures fluctuate as much as 50 degrees Fahrenheit (°F) to 70°F in a 24-hour period. In summer, daily high temperatures are between 85°F and 95°F. Average temperatures in winter are about 27°F and in summer 70°F, while extreme temperatures are as low as -30°F in winter and as high as 100°F in summer. There are 100 to 150 frost-free days during the year from the middle of May to the middle of October. During spring, the area experiences strong winds from the west and southwest, with an average wind speed of 12

miles per hour (mph). Strong winds, high temperatures, and low relative humidities in the area contribute to high evaporation rates.

2.4 *SURFACE WATER*

The FWDA lies between the South Fork of the Puerco River and the northern foothills of the Zuni Mountain Range. All drainages in this area are intermittent, with flow occurring only during, and after, heavy rainfall events or during snowmelt. Drainages are fed by washes in the Zuni Mountain Range and the Hogback. The drainages generally flow toward the north until the South Fork of the Puerco River is encountered, except in the southwestern corner of the installation where drainage is toward the west. Major drainage systems are divided by either bedrock ridges or bedrock remnants. A surface drainage system map is presented as Figure 2-1. The debris piles and burial sites are not located along main surface drainage channels.

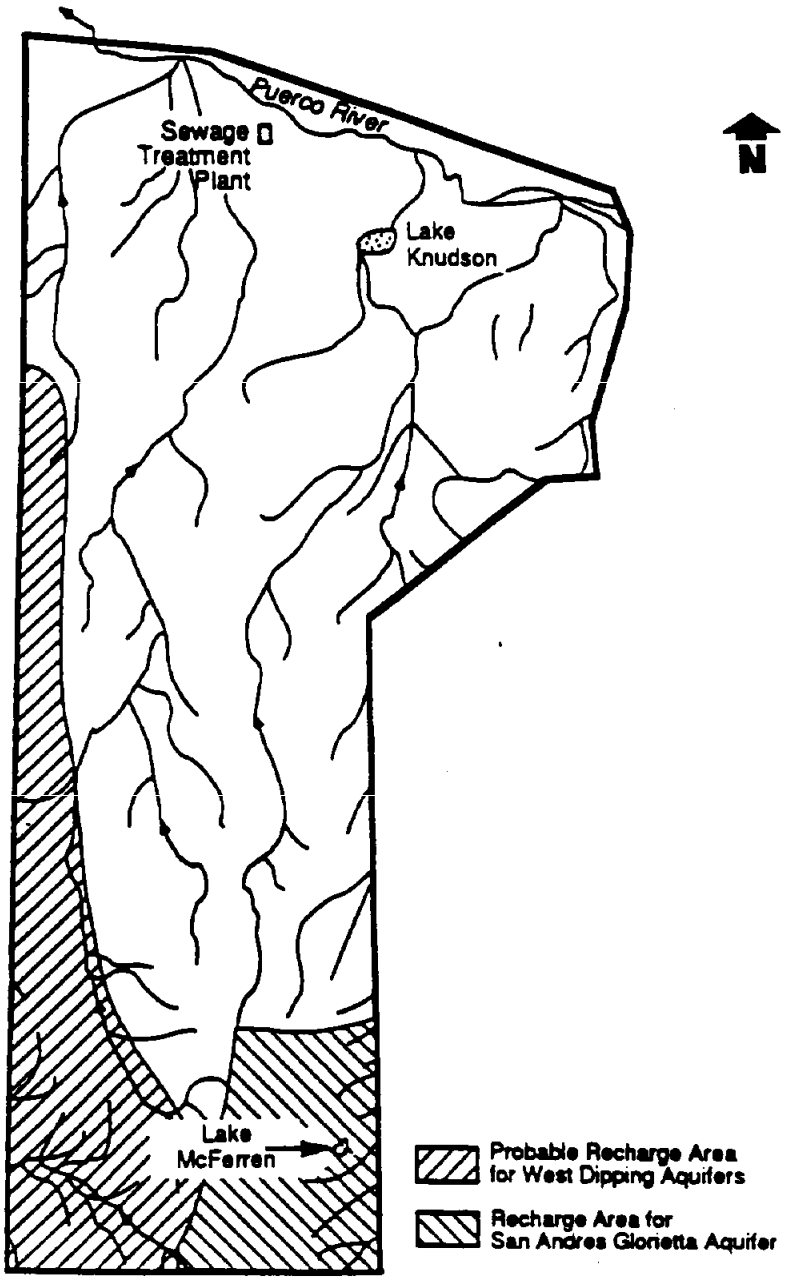
There are two man-made lakes and one pond on the FWDA. Lake McFerren (2-acres) is located near the southeastern boundary in a wooded area. Lake Knudson, a 20-acre shallow intermittent lake, is located at the intersection of two drainages on the northern portion of the installation. Water can be diverted into the lake through a (diversion) dam. A small pond fed by a well and used for watering livestock is located along Eastern Patrol Road. The debris piles and burial sites are not located near the surface water features described above.

2.5 *GEOLOGY*

The FWDA is located in an erosional basin. During the uplift of the Zuni Mountain Range in the southern and southeastern portion of the installation, the area occupied by the erosional basin was under tensional stress that extensively fractured the bedrock. Differential weathering and erosion along the fractures resulted in the formation of the basin currently occupied by the FWDA.

The majority of the FWDA is underlain by the Chinle Formation (Triassic) and dissected by arroyos. The Chinle Formation consists primarily of calcareous mudstone, with minor amount of fine-grained calcareous sandstone. The sandstone is relatively weather-resistant and forms the cap rock of the remnant bedrock exposures in the northern portion of the FWDA. The softer mudstone is easily eroded to form badlands or arroyos on hillslopes and in eroded valleys.

Figure 2-1
Surface Water Drainage System
Fort Wingate Depot Activity
Gallup, New Mexico



Source: "Master Environmental Plan: Ft. Wingate Depot Activity, Gallup, New Mexico," December 1990.

Alluvial deposits are most prevalent in the northern part of the FWDA in lowland areas between bedrock remnants. Alluvial deposits are also present along streams draining the Hogback and Zuni Mountains which flow through the northern part of the installation before joining the South Fork of the Puerco River. Because the alluvium was generally deposited by braided streams, the texture and internal structure are characterized by lateral and vertical variability. The grain size of the alluvium ranges from clay to gravel, typical of braided stream deposits. The alluvium has been shown to be 150 feet thick northwest of the installation near the South Fork of the Puerco River. In the Administration Area, well records indicate that it is 30 to 70 feet thick.

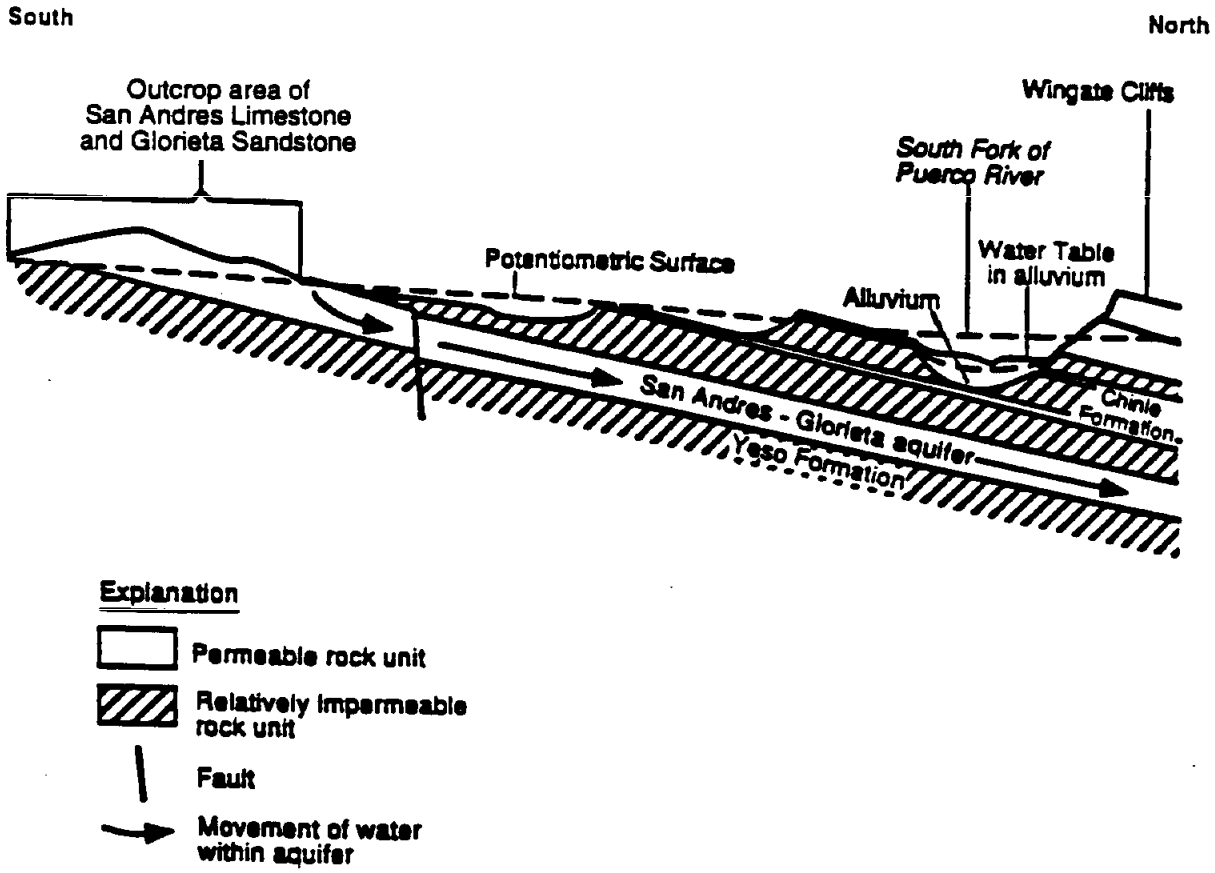
2.6 *GROUND WATER HYDROGEOLOGY*

Ground water is present in most of the rock units underlying the FWDA. Examination of these rocks and records of wells in the area indicate that the only formations at the FWDA capable of yielding more than a few gallons per minute (gal/min) are the Quatowam Alluvium (Quaternary) and the San Andres Limestone and Glorieta Sandstone (Permian). However, minor amounts of ground water are present within the Chinle Formation (Triassic) and underlying rock units. Water-bearing formations of Jurassic and Cretaceous ages, capable of yielding 100 gal/min or more, are present 4 to 6 miles to the west of the FWDA, but not within facility boundaries. Figure 2-2 is a hydrogeologic cross-section of the FWDA.

Ground water is expected to flow from areas of higher elevation toward lower elevation, parallel to the direction of flow in the arroyos. At the FWDA, the general flow direction is from the Zuni Mountain Range, at the southern boundary of the FWDA, to areas of lower elevation such as the Puerco River Valley, north of the FWDA. The saturated thickness of the alluvial aquifer varies greatly and tends to increase as it nears drainage channels.

The alluvial aquifer, which includes deposits in the Puerco River Valley along the northern edge of the installation, is composed of gravel, sand, silt, and clay derived from rocks of Triassic and Jurassic age that border the valley. In general, depths to water in the alluvium near the Administration Area range from 20 to 30 feet and fluctuate dramatically during the year, in response to rainstorms or snowmelt. A well located just north of the installation, near the community of Indian Village, taps the alluvium aquifer at a depth of 50 feet, where the saturated thickness is 165 feet. This well yields over 100 gal/min and is believed to be located in the thickest alluvium in the area. The hydraulic conductivity of the

Figure 2-2
General Hydrogeologic Cross-Section
Fort Wingate Depot Activity
Gallup, New Mexico



Source: "Water Resources of Fort Wingate Army Depot and Adjacent Areas, McKinley County, New Mexico", Shoemaker, 1971

alluvium ranges from 0.17 to 23 feet per day (ft/day), depending on the silt content of the aquifer.

The San Andres-Glorieta aquifer, which constitutes the primary ground water source for the FWDA, outcrops near the FWDA's southern boundary and dips to the north. Ground water flows in a northwesterly direction. The top of the aquifer lies about 1,100 feet below land surface near the Administration Area. Here, the aquifer is about 200 feet thick and under artesian pressure. Local variations in aquifer permeability are reportedly large and unpredictable. The hydraulic conductivity ranges from 0.05 to 150 ft/day with yields that are highly variable from one location to another. The horizontal hydraulic gradient of the aquifer at the FWDA has reportedly declined with time. Ground water from the San Andres-Glorieta aquifer flows upward along fractures because of the upward hydraulic gradient. The region around Gallup, including the FWDA, was declared an underground water basin in 1980 by the State of New Mexico. This action prohibits any major new ground water withdrawals without the approval of the State Engineer. The basin covers 1,439 square miles and includes the communities of Gallup, Fort Wingate, Camerco, Mariano Lake, Navajo Wingate Village, and Rehoboth.

Currently, one deep artesian well (FW36), located at Building 69, supplies most of the FWDA's water. This well is 1,351 feet deep and the hydraulic head has been diminishing with time. While the FWDA was in active status, 12 water samples were collected from sampling locations throughout the water distribution system on a quarterly basis. Samples were analyzed for inorganic anions, water quality parameters, radioactivity, and biological constituents. Results over the last two years of facility operation indicate that water quality has been consistent with no suspect parameters detected.

3.0 SITE SPECIFIC FIELD INVESTIGATIONS

A detailed description of the work to be performed at the Group C Disposal Area debris piles and the Western and Central Landfill Areas is presented below. Field investigation methods will include: excavation of exploratory trenches; collection and analysis of soil samples; and mapping of debris piles and burial sites using GPS techniques. The methodologies to be used are described in detail in Section 5.0. Additionally, an archaeologist will be present on-site during the performance of intrusive field efforts to monitor for potential cultural/historical resources.

3.1 GROUP C DISPOSAL AREA DEBRIS PILES

Debris piles have been observed at selected locations within arroyos located east and south of Igloo Block C (see Figure 1-2). In these locations, visually observable waste material consisting primarily of trash/debris (e.g. wood, tires, metal strapping, ammunition packaging) has been apparently dumped into arroyos from the top of the bank. These debris piles, identified as the Group C Disposal Area, have been investigated previously, however, the contents and volume of the waste are not known. This investigation will generate the information necessary to remove and properly dispose of the waste materials present, and provide justification that no further action is necessary.

3.1.1 *Previous Investigations*

The EI Sampling and Analysis Plan (Metcalf & Eddy, 1992) indicated that spent shell casings, tires, and metal scraps had been observed adjacent to, and in the arroyo east of the southern end of Igloo Block C. The plan stated that disposed materials were present in the arroyo walls to a depth of three feet below ground surface (bgs) and areas adjacent to the arroyo may have been graded. The possibility that this area contained UXO was suggested.

In 1981, Environmental Science and Engineering, Inc. (ESE) collected one soil sample from the Group C Disposal Area to detect potential contaminants associated with the refuse in the arroyo. The soil sample was analyzed for Priority Pollutant (PP) acid and base/neutral compounds, nitroaromatics, explosives by high pressure liquid chromatography (HPLC) screen, hexahydro-1,3,5-trinitro-1,3,5-triazine

(RDX), and anions. Analytical results did not detect elevated levels of any of the target parameters (ESE, 1981).

As part of the EI field program, ERM collected five surface soil samples, 12 subsurface soil samples from four soil borings, and two sediment samples. Laboratory analyses were conducted for explosives, Target Analyte List (TAL) metals, nitrate/nitrite, and total phosphorus. No target parameters were detected above background levels in the subsurface soil or sediment samples. Two metals were detected above background levels in one surface soil sample, however, the concentrations present did not pose unacceptable risks to human or ecological receptors and no further action was recommended based on environmental contamination. Additionally, as part of the field investigation effort, a UXO survey was performed of proposed sampling locations prior to any intrusive activities. A UXO item was identified and removed from a debris pile during the previous field investigation efforts.

3.1.2 *Planned Investigation*

A detailed reconnaissance of the debris piles present within arroyos near Igloo Block C will be performed and the identified debris pile areas located on existing maps. Exploratory trenches will then be excavated to delineate the nature, extent, and volume of waste materials and potentially contaminated soil. The debris piles and soil sample locations will then be accurately mapped using GPS technology. Field efforts will be coordinated with the UXO Subcontractor, UXB International, Inc. (UXB) of Chantilly, Virginia for the performance of UXO clearance/surveys. The contents of the piles will be evaluated, categorized, and volumes of each type of material will be estimated. An estimated 10 additional soil samples will be collected to characterize debris materials and adjacent soils. Soil samples will be sent for laboratory analysis of TAL metals, Target Compound List (TCL) volatile organic compounds (VOCs), TCL semi-volatile organic compounds (SVOCs), pesticides/polychlorinated biphenyls (PCBs), explosives, and nitrate/nitrite.

3.2 *CENTRAL AND WESTERN LANDFILL AREAS-BURIAL SITES*

Two inactive burial sites, the Western Landfill Area and the Central Landfill Area, have been identified in the northern portion of the FWDA. It is suspected that non-hazardous material was placed in these locations and covered with soils native to the facility. The location, content, nature,

extent of the buried materials, and thickness of cover will be evaluated with respect to the applicable state solid waste management requirements.

3.2.1 *Western Landfill Area*

The Western Landfill Area is located in the northwestern corner of the installation (see Figure 1-2) to the southwest of the Sewage Treatment Plant and directly west of Building 23 (the former Railroad Scale House). A large mound of dirt remains in the vicinity and the landfilled area appears to consist of three (3) elongated, trench-like areas of disturbed vegetation, each approximately 100 feet in length and 50 feet in width. Personnel previously stationed at the FWDA reported that the trenches were excavated shortly before the facility was closed and non-hazardous materials (e.g., trash, refuse, debris, etc.) were disposed of in the trenches. In addition, several large disturbed areas are located in close proximity to the trenches. Figure 3-1 provides a schematic diagram of the Western Landfill Area.

3.2.1.1 *Previous Investigations*

No prior sampling was performed within the Western Landfill Area.

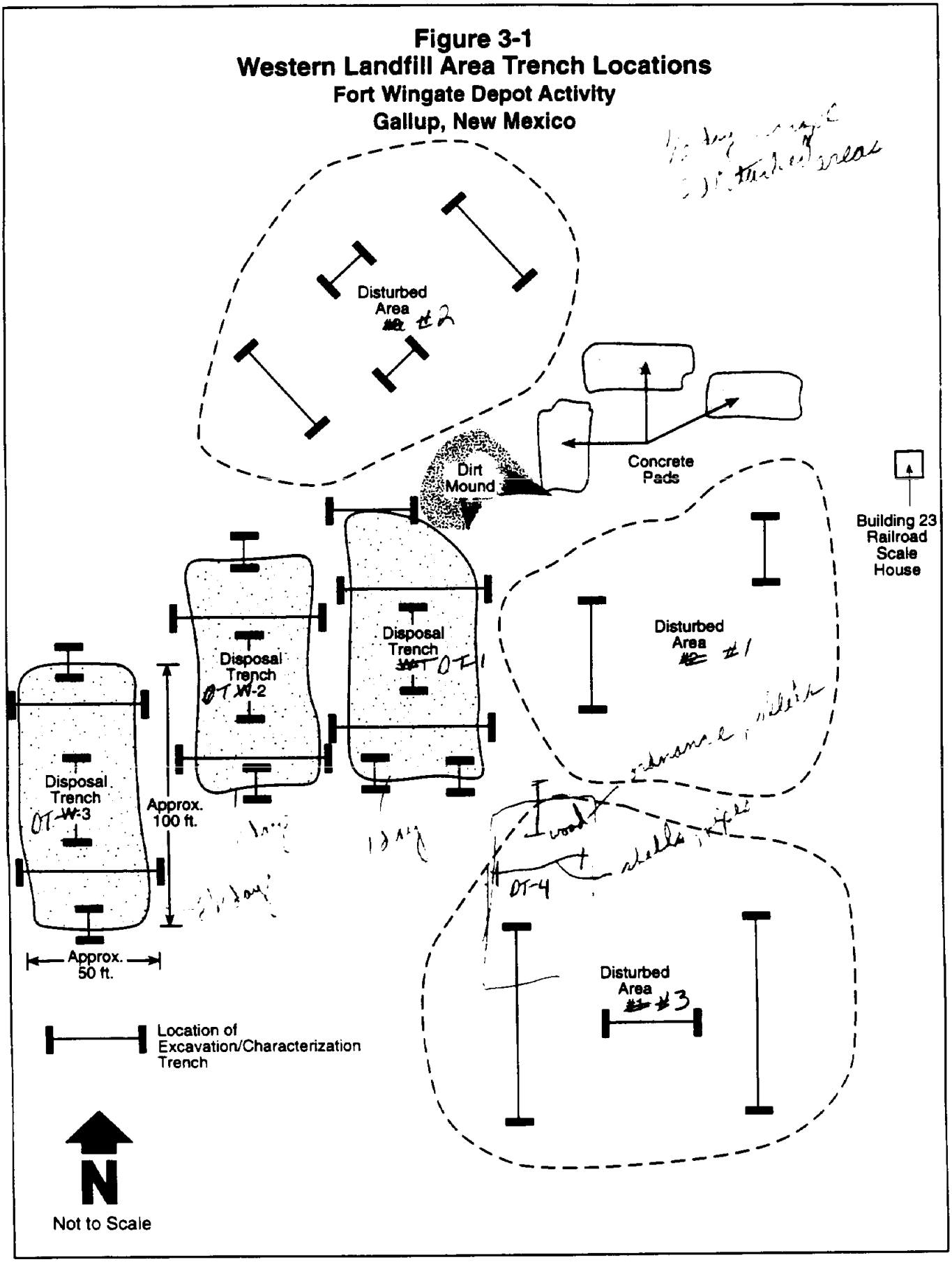
3.2.1.2 *Planned Investigations*

An initial walkover of the observable sites was conducted to confirm the areal limits of each of the disposal and disturbed areas. Excavation trenches will be spaced as shown on Figure 3-1 through the disposal and disburbed areas. Trenches will be excavated to the depth of native soil, the maximum reach of the excavator, or until water is encountered, whichever occurs first. The contents of the disposal areas will be evaluated, categorized, and the volumes of each type of material will be estimated. Additionally, the nature and extent of existing cover material will be established. Shallow excavations will be located through the disturbed areas to confirm the absence of landfilled materials.

During trenching, the waste and adjacent soil will be evaluated for the presence of constituents of concern. An estimated 15 soil samples will be collected from excavation trenches and sent for laboratory analysis of TAL metals, TCL VOCs, TCL SVOCs, pesticides/PCBs, explosives, and nitrate/nitrite.

Upon completion of trenching operations, the horizontal extent of waste materials will be physically delineated in the field. The burial sites and

Figure 3-1
Western Landfill Area Trench Locations
Fort Wingate Depot Activity
Gallup, New Mexico



soil sample locations will then be accurately mapped using GPS technology.

It is not expected that UXO will be present in this area, however, UXB will perform UXO clearance surveys in support of the intrusive investigation activities. The excavation, sampling, and mapping methodologies to be implemented are presented in Section 5.0.

3.2.2 *Central Landfill Area*

The Central Landfill Area is located off of Arterial Road No. 2 east of, and across the arroyo from, the Current Landfill (see Figure 1-2). It has been reported that landfilling of non-hazardous materials consisting of municipal-type waste was conducted at this location in the past. This burial site is believed to be a filled-in portion of an arroyo, extending approximately 1,100 feet in length and varying in width from 50 to 100 feet. The depth of waste has been estimated at 10 to 15 feet. The limits of the arroyo are visually apparent and will initially be used to define the lateral limits of the suspected site. Figure 3-2 provides a schematic diagram of the Central Landfill Area.

3.2.1.1 *Previous Investigations*

No prior sampling was performed within the Central Landfill Area.

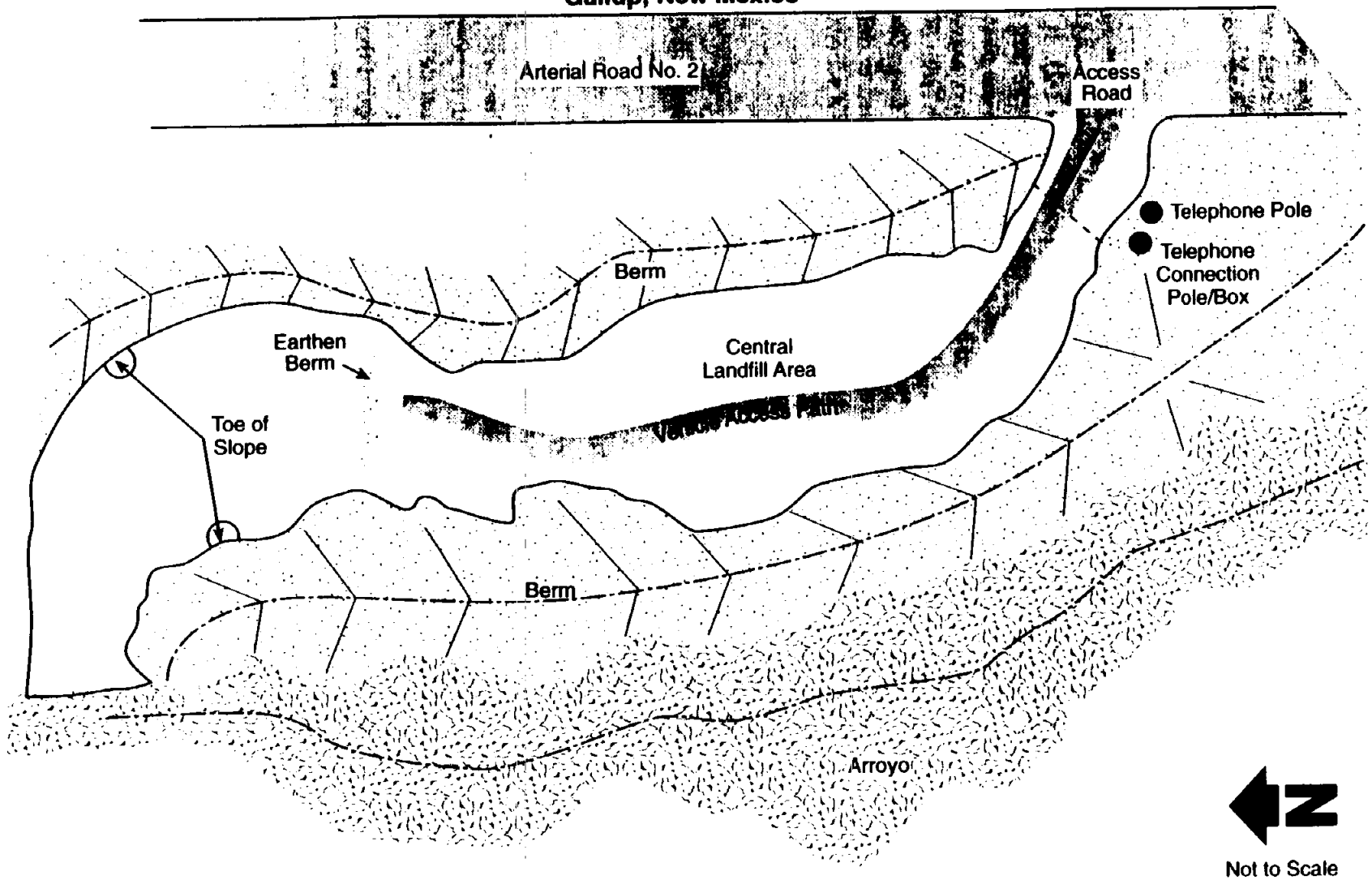
3.2.1.2 *Planned Investigations*

An initial walkover was conducted to determine the areal limits of the Central Landfill Area. The surveyed landfill area and proposed trench locations are presented in Figure 3-3. Excavation trenches will be spaced through the arroyo and will be oriented along the length or perpendicular to the length of the arroyo as required to characterize and delineate the waste/disposal area. Trenches will be excavated across the arroyo as far as the excavation equipment allows. This procedure would then be repeated from the other side of the arroyo. Trenches will be excavated to the depth of native soil, the maximum reach of the excavator, or until water is encountered, whichever occurs first. The contents of the disposal area will be evaluated, categorized and the volumes of each type of waste material will be estimated. Additionally, the nature and extent of existing cover material will be established.

During trenching, the waste and adjacent soil will be evaluated for the presence of constituents of concern. An estimated 15 soil samples will be collected from excavation trenches and sent for laboratory analysis of TAL

ERM, INC

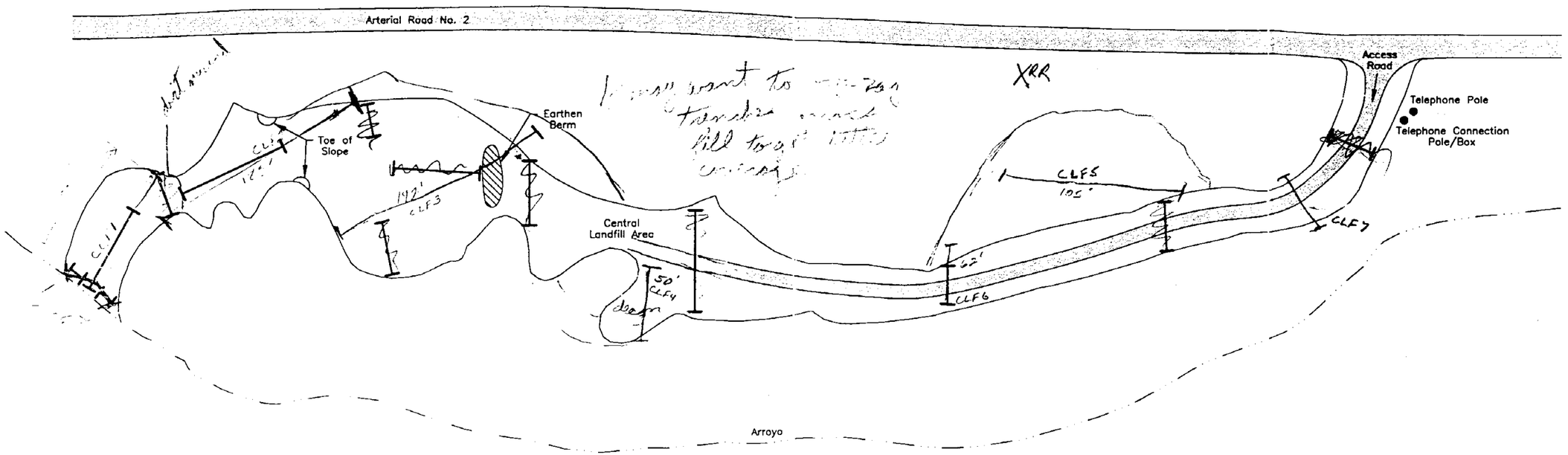
Figure 3-2
Central Landfill Area
Fort Wingate Depot Activity
Gallup, New Mexico



Approximate Landfill dimensions–1,100 ft. in Length x 40-60 ft. in Width

PM311.90.01 / adc 8.16.95 rev 11.29.95

Figure 3-3
Trench Locations
Central Landfill Area
Fort Wingate Depot Activity
Gallup, New Mexico



metals, TCL VOCs, TCL SVOCs, pesticides/PCBs, explosives, and nitrate/nitrite.

Upon completion of trenching operations, the horizontal extent of waste materials will be physically delineated in the field. The burial sites and soil sample locations will then be accurately mapped using GPS technology.

It is not expected that UXO will be present in this area, however, UXB will perform UXO clearance surveys in support of the intrusive investigation activities. The excavation, sampling, and mapping methodologies to be implemented are presented in Section 5.0.

4.0 PLANNING AND MOBILIZATION

Critical tasks that are to be completed prior to the implementation of field activities are identified and discussed in this section. These activities will include subcontractor coordination, materials sampling and approval, project schedule, and miscellaneous logistical activities.

4.1 COORDINATION OF SUBCONTRACTORS

Subcontractors will provide UXO oversight for all field activities, archaeologic oversight, analytical services, excavation services, and GPS mapping.

UXB will provide qualified personnel and equipment necessary to direct field personnel to avoid all ordnance, energetic, and explosive items present in work areas. UXB will escort field personnel during reconnaissance, surveying, and GPS mapping activities and directly support the proposed sampling and trenching activities.

Moore Anthropological Research, Aztec, NM will provide archaeologic support services to the field investigation effort.

DataChem Laboratories, Inc. (DC) of Salt Lake City, Utah will perform all analyses in compliance with this FSP and the approved QAPP. DC holds USAEC validation and New Mexico certifications necessary to complete the analytical requirements of this task.

4.2 PROJECT SCHEDULE

A project schedule has been completed for DA10. For the proposed BWDP/BSI, it is estimated that the evaluation of the debris piles in the Group C Disposal Area will require three days. Similarly, it is estimated that the excavation of the Western Landfill Area will require 19 days and the Central Landfill Area will require 18 days. Mapping all burial sites and debris piles is estimated to require four days.

4.3 MOBILIZATION

Mobilization will take approximately two days. During these two days:

- locations where access may be difficult will be identified and measures will be taken to resolve access problems;

- an overnight carrier will be contacted to arrange shipping and pick-up of samples;

- analytical results from a sample of the decontamination water source will be submitted for USAEC approval; and

- an on-site field office will be set up in Building T-16. This will include electric, water, telephone service, and a FAX machine. Field equipment will be staged here as well.

4.4 *SITE LOGISTICS*

The FWDA is located in a remote area of northwestern New Mexico and encompasses approximately 22,120 acres. Most of this is traversable only over unimproved, dirt roads. The terrain consists of mesas and abundant arroyos, with elevations differing in some areas by more than 100 feet.

During the active mission, entry to the installation and access to specific areas was restricted. Currently, access to the FWDA from I-40 and U.S. 66 is provided through the main entrance gate (now unguarded) located in the north central portion, or Administration Area of the installation. Since cessation of the active mission of the installation, access and the required/remaining operations of the FWDA are maintained by on-site Caretakers that are located within the Administration Area in Building 34 (the former Fire Station). The main entrance gate is open from 7 A.M. to 5 P.M during the week (Monday through Friday) and closed and locked at all other times.

Entry from the Administration Area to the remainder of the installation (the "limited access areas") is through a locked gate on Navaho Boulevard (located approximately 2,800 feet from the main entrance). The areas proposed for investigation are all located within the limited access area. Keys for all gates will be maintained by the Field Operations Manager, Site Safety Officer, UXB Project Leader, or designated field team personnel during field investigation activities. Each field team will have a set of gate keys to allow evacuation/exit in the event of an emergency incident. The Field Operations Manager will be responsible to see that the specific work areas at the areas under investigation are secure during non-working hours.

4.5 COMMUNICATIONS

The ERM field office will be located within the FWDA Administration Building T-16 (the former Bachelor Officers Quarters) which is equipped with telephone service and an answering machine. The ERM site telephone number is (505) 488-5753. Additionally, a mobile phone that is capable of directly contacting emergency services will be maintained during the field investigation activities. The project mobile phone number is (505) 979-0468.

The main telephone number for the FWDA as well as the Caretakers in Building 34 is (505) 488-5411. The Caretakers will be present during site activities to facilitate emergency response and office communications. In addition, the Caretakers maintain a communications base station in Building 34 and the caretaker vehicles are equipped with radios. The ERM field teams will also utilize hand-held radios during field operations that have the capability to contact the caretaker base station in the event of an emergency.

5.0 SITE INVESTIGATION METHODOLOGIES

5.1 UXO AVOIDANCE ACTIVITIES

A visual surface reconnaissance and geophysical (magnetometer) subsurface investigation will be performed over the debris piles and burial sites. The objective will be to identify physical hazards, suspected hazards, UXO, energetic materials, flammables, pyrotechnics, and unknown buried objects by position. Subsurface contacts will be located using a Ferex Ordnance Locator, or its equivalent. All contacts will be marked with a non-metallic identifier and recorded by position with registered instrument signal strength. Field personnel performing evaluation of the debris piles and burial sites will be escorted at all times by a UXO Safety Specialist. Section 11.0 of the HASP provides the Work Plan and Standard Operating Procedures (SOPs) for the performance of UXO support activities.

Any UXO items identified and recovered will be handled by UXB personnel and managed/staged according to the procedures described in the UXO Work Plan. In addition, in the event of the identification of a "blow-in-place" or "BIP" item (i.e., a UXO determined to be too sensitive to move and requiring final disposition [e.g., destruction] in-place); the ERM Field Operations Manager, or designee, and the UXB Project Leader will coordinate with the on-site USAED, Huntsville UXO contractor regarding final disposition of the BIP. Further, the USAED contractor will be responsible for the final on-site disposition of staged/accumulated UXO. These actions will also require coordination with the ERM Field Team and UXB Project Leader.

5.2 SURFACE RECONNAISSANCE

5.2.1 *Debris Piles*

Field personnel will walk throughout the arroyos near Igloo Block C to locate debris piles. The materials in the debris piles will be categorized based upon requirements for disposal (i.e., building materials, construction landfill; scrap metal, solid waste landfill; etc.). The boundaries of each debris pile and locations for trench excavation will be physically delineated in the field with stakes or flags. The lateral extent of

the debris will be measured, the depth estimated during trenching operations, and the volume of each type of material estimated.

Material in the debris piles and adjacent soil will be visually examined for evidence of potential environmental impact (e.g. staining). Soil sampling, including the selection of soil samples for laboratory analysis, will be performed according to the methodology presented in Section 5.4. Sample locations will be marked with a stake or flag which can be located by personnel performing the GPS survey.

5.2.2 *Burial Sites*

Detailed walkovers of the Western and Central Landfill Areas will be performed by field personnel. The assumed boundaries of buried materials and locations for trench excavations will be physically delineated in the field with stakes or flags. Visually observable material will be examined for evidence of potential environmental impact (e.g. staining). Soil sampling, including the selection of soil samples for laboratory analysis, will be performed according to the methodology presented in Section 5.4. Sample locations will be marked with a stake or flag which can be located by personnel performing the GPS survey.

5.3 *EXCAVATION OF TRENCHES*

Because of the possible presence of UXO, trenching in the debris piles and burial sites will be performed by UXB according to the methodology described below. ERM personnel will visually inspect and describe the trench materials, determine when the extent of the waste has been reached, and collect soil samples according to the methodology described in Section 5.4.

5.3.1 *General Safety Requirements*

Prior to opening a trench or pit, the UXB supervisor will review the established safety procedures to ensure compliance.

Employees will be protected from cave–ins by an adequate protective system. Excavations less than 5 feet in depth will be inspected to ensure the site provides no indication of potential cave–in. No personnel will enter a trench at any time.

Unknown hazards may exist in the subsurface layers of excavations sites. Personal Protective Equipment (PPE) standards must be complied with

through on site monitoring for toxic substances. Personnel working in the general area of mechanical equipment will wear hard hats, and high visibility coveralls or reflective body garments, as well as established levels of PPE (e.g., Level C).

Personnel are not to come within twenty feet of mechanical equipment until the operator has secured all moving parts and authorizes approach through positive oral communication.

Site personnel are not to advance to an open trench from a downwind location or from any open side. Trench frontal and rear approach for observation and investigation will be authorized depending on wind direction.

5.3.2 *Specific Excavation Site Requirements*

5.3.2.1 *Site Reconnaissance*

A visual surface reconnaissance and geophysical subsurface investigation will be performed over the excavation area. The objective will be to identify, physical hazards, suspected hazards, UXO, energetic materials, flammables, pyrotechnics, underground utilities, and unknown buried objects by position. Subsurface contacts will be located and marked with a non-metallic identifier and recorded by position with registered instrument signal strength.

5.3.2.2 *Trenching Procedure*

A track-excavator or a backhoe with an extended reach (e.g. 25 to 40 feet) will be used to perform the proposed excavation efforts. The procedure described below will be followed during trench excavations:

- Stage equipment in the Contamination Reduction Zone (CRZ);
- Determine wind direction;
- Place excavation equipment upwind of the proposed excavation point;
- Conduct a geophysical investigation of the surface excavation area to verify the position of subsurface contacts; mark the position of the contact and alert the equipment operator to the suspected depth, approximate size and the item's orientation relative to the surface;
- Position all personnel beyond the operating radius of the excavation equipment;

- Position UXO investigation team to the rear and upwind of excavation equipment for observation;
- Perform radio communications check with safety officer;
- Extend boom to the maximum length and position bucket to scrape surface with teeth extended down;
- Scrape 4 to 6 inches of topsoil from the surface, trenching parallel to any contacts;
- Secure the equipment and the boom to the ground prior to authorizing entry of field teams to investigate the open trench;
- Revalidate position of the contact and sweep for additional contacts that may result from movement of sub-grade material;
- Observe the excavation process for any suspect material that may be encountered; immediately halt operations when a visual inspection is required or sampling must be conducted;
- Maintain air monitoring of exposed surface, excavated soils and the breathing zone of investigating teams;
- Advance trenches using sloping procedures; sloping will be at a one to one ratio, relative to depth;
- Stage excavated material no higher than one half the depth of the trench and no closer than two feet from the trench;
- At the conclusion of sampling and investigation, close the trench with excavated materials and tamp;
- Decontaminate excavation equipment over field constructed decontamination area with pressure washer or steam cleaner; and
- Drive mechanical equipment over stable ground only; it will not be driven over a closed excavation.

5.3.2.3 *Unexploded Ordnance Encountered During Excavation*

Trenching in areas suspected of containing UXO or munitions residue requires geophysical investigation of the subsurface with the use of the Ferex Ordnance Locator. Trenching without subsurface ordnance detection may cause detonation of sensitive items.

Mechanical excavation will be used until the ferrous metal contact has 24 inches of cover remaining. At that point, manual excavation will be initiated to remove remaining layer of overburden. During manual excavation and investigation only one UXO technician may perform the

procedure. A second UXO technician must move to a safe position, taking advantage of available cover, and prepare to provide assistance in the event of an emergency.

Information secured by the UXO technician is to be recorded to confirm the type, condition, and location of the explosive ordnance and any residues present.

UXO located will be identified and removed. As previously discussed, any UXO items identified and recovered will be handled by UXB personnel and managed/staged according to the procedures described in the UXO Work Plan. In the event of the identification of a BIP item, the ERM Field Operations Manager, or designee, and the UXB Project Leader will coordinate with the on-site USAED, Huntsville UXO contractor regarding final disposition of the BIP. Further, the USAED contractor will be responsible for the final on-site disposition of staged/accumulated UXO. These actions will also require coordination with the ERM Field Team and UXB Project Leader.

5.3.2.4 Personal Protective Equipment

Modified Level C will be required when excavation/trenching operations require the operator, explosives specialist, or other personnel to be downwind of the excavation or soil stockpiles in areas where trash and debris are exposed at the surface. This is due to the potential presence of mice, which are associated with the hantavirus.

5.3.2.5 Shoring Or Sloping

Trenches that may pose a danger of sliding ground or potential cave-in shall be guarded by a shoring system or sloping technique. Sloping of excavated trenches is the preferred method for exploratory trenching. Sloping is conducted based on a one to one ratio, one foot of cut per one foot of slope. All slopes shall be excavated to this angle of repose. Excavated material will be stored downwind of the trench. Materials will not be stored any higher than half the depth of the excavated site.

5.3.2.6 Air Monitoring

Air monitoring will be conducted during all trenching operations using an organic vapor analyzer (OVA), or its equivalent, and an explosimeter. The air immediately adjacent to the trench, in the breathing zone, and adjacent to excavated materials will be monitored and recorded. If monitoring results indicate the presence of VOCs, steps outlined in the HASP will be

followed. If monitoring reveals flammable gases are present, all ignition sources will be removed and manual backfilling will commence.

5.3.2.7 *Stockpiling of Excavated Soil*

As soil is removed, it will be stockpiled downwind of the trench on 6-mil plastic sheeting. The soil will then be evaluated and replaced within the same trench. In the event of rain or snow, or if the excavated soil is not replaced by the end of the day, the stockpiled soil will be covered with 6-mil plastic sheeting.

5.4 *SOIL SAMPLING*

Soil samples will be collected to characterize waste materials and/or to confirm that native soils have not been adversely affected by contact with leachate from waste materials. Soil samples for laboratory analysis will be selected according to the methodology described below. Sample collection, logging, handling, documentation, and storage methodology are also presented below.

5.4.1 *Selection of Soil Samples for Laboratory Analysis*

A flexible sampling strategy has been designed to allow selection of samples for chemical analysis based on field observations such as changes in waste materials, visual staining of native soil adjacent to waste, changes in moisture content at the water table/vadose zone interface, or highest OVA reading. The sample collection strategy for each of these scenarios is presented below.

5.4.1.1 *Visual Change in Waste Materials or Visual Soil Staining*

Observably different waste materials, or areas with visual staining in the debris piles and burial sites will be evaluated for the presence of VOCs. If the OVA reading is less than 100 parts per million (ppm) above background, no sample will be collected. If the OVA reading is greater than 100 ppm above background, a sample of the waste will be collected and screened according to the methodology outlined in Section 5.4.1.2. In addition, trenching will continue vertically until:

- native soil is encountered and OVA readings of the native soil are less than 100 ppm,
- the maximum extension of the excavator is reached, or

- ground water is encountered.

When one of these three conditions is met, a second sample will be collected. This sample will be either native soil with an OVA reading less than 100 ppm, soil from the maximum reach of the excavator, or a sample of material from the interface with ground water. At the completion of each trench, the waste with the highest OVA reading and corresponding second sample will be sent for laboratory analysis. If OVA results are not significantly higher for any one sample, one waste and corresponding second sample will be submitted to the laboratory for every trench.

5.4.1.2 *OVA Screening of Soils*

Waste and soil samples will be screened for the presence of VOCs in the field using laboratory prepared, four ounce jars and an OVA, or its equivalent. At each sample location, two jars will be filled with soil. One jar will be sealed and placed immediately on ice. The second jar will be covered with aluminum foil and will be allowed to reach a sample temperature of between 20 and 32 degrees Celsius (°C). If the soil temperature is within this range at the time of collection, the sample screening will be conducted within five minutes. In the event that screening cannot be conducted within this timeframe, samples will be stored on ice. They will then be brought to a temperature between 20 and 32°C prior to screening.

Organic vapor concentrations will be measured within five minutes of the time the samples reach the appropriate temperature. Readings will be taken by inserting the probe of the OVA through the aluminum foil and recording the organic vapor concentration in the headspace. This data will be recorded in bound field log books.

5.4.1.3 *No Detectable Variation of Materials Encountered*

Visual observations or field screening results may not indicate any variations in the materials encountered at the debris piles and burial sites. In this instance, samples will be collected according to the following: 1) a grab surface soil sample will be collected every 50 linear feet of debris pile or 2) a grab soil sample will be collected every 50 linear feet of trench.

5.4.2 ***Collection of Soil Samples***

Prior to collecting a sample, UXB will determine that the sample location is clear of potential UXO. Soil samples will then be collected by one of two methods: 1) surface soil (0 to 6 inches below ground surface [bgs]) will be

collected using a shovel and 2) soil samples from excavations will be collected from the bucket of the excavation equipment. Sample collection equipment will be decontaminated prior to use and between sample locations using the methodology discussed in Section 5.5.2.

5.4.3 *Sample Logging and Handling*

Upon retrieval, the sample's physical characteristics will be described (e.g. color, lithology, general appearance, etc.). Visible indication of contamination will be noted at this time. For samples retained for chemical analysis, physical sample description will take place after the chemical samples have been placed in the appropriate containers. Each sample will be screened with an OVA and the readings recorded in a bound field log book.

Each chemical sample will be bottled in the shortest possible time following collection of the sample. Samples for VOC analysis will be bottled and capped first to minimize potential contaminant losses through volatilization. Samples will be placed into the appropriate laboratory prepared sample containers fitted with Teflon® caps. After the sample containers are sealed, they will be placed immediately on ice and prepared for shipment to the designated laboratory. Sample jars will be labeled to include site, trench number, depth, date, project name, project number, and sampler's initials.

Sample control and tracking information will be recorded in bound field log books and will include the following information: site, sample or trench number and location, date, sampler's name, method of sampling, sample depth, soil sample physical description, ambient weather conditions, and miscellaneous observations. Also, field instrument calibrations will be recorded in a designated portion of the notebook at the time of the calibration. Adverse trends in instrument calibration behavior will be corrected. At the conclusion of each day in the field, the ERM sampling team leader will review each page of the notebook for errors and omissions. He or she will then date and sign each reviewed page.

5.4.4 *Sample Chain-of-Custody and Shipment*

Chain-of-custody forms will be completed and will accompany each sample. Data on the forms will include the sample number, depth interval, date sampled, project name, project number, and signatures of those in possession of the sample. Forms will accompany those samples shipped to the designated laboratory so that sample possession

information can be maintained. The field team will retain a separate copy of the chain-of-custody forms at the field office.

All samples will be shipped daily by overnight air freight to the laboratory. Unless otherwise indicated, samples will be treated as environmental samples, shipped in heavy duty coolers, packed in vermiculite, and preserved with ice in sealed plastic bags. Each shipment will include the appropriate field quality control (QC) samples (i.e., trip blanks, duplicates, field blanks, and rinsate blanks). Corresponding chain-of-custody forms will be placed in waterproof bags and taped to the inside of the cooler lids. Each cooler shipped from the laboratory containing sample bottles for VOC analyses will contain a trip blank. This trip blank will stay with the cooler until the cooler is returned to the analytical laboratory.

5.4.5 *Sample Storage*

Samples awaiting analysis will be stored in a secure, temperature controlled cold room at the designated laboratory. At the completion of analyses, any remaining sample volume will be labeled, and stored in the cold room, pending final disposition. Sample disposal will take place only after verification of receipt of fully validated data by the USAEC Installation Restoration Data Management Information System (IRDMIS) and documented approval by the USAEC Project Manager.

5.5 *DECONTAMINATION OF EQUIPMENT*

The CMHP provides the procedures to be implemented to control contaminated materials and materials resulting from the proposed site operations (e.g. excavation, decontamination, etc.). These decontamination procedures for excavation and sample collection equipment are summarized below.

5.5.1 *Excavation Equipment*

Prior to initiation of the excavation program, and between each trench, the excavation equipment will be thoroughly decontaminated. Pressure cleaning of excavation equipment will be performed for each individual trench using water from the USAEC-approved source.

The excavation equipment will be positioned over a temporary decontamination area consisting of a field constructed, earthen bermed area lined with 30 mil plastic sheeting. Starting from the top and working

downward, all equipment surfaces will be steam cleaned including buckets and boom.

Once cleaning has been completed, all equipment surfaces will be visually inspected to confirm the cleaning process. If VOCs have been detected during the excavation of trenches, the excavation bucket will be monitored inside and outside with a OVA. If indications of soils or vapor contamination remain, the process will be repeated until no further indications of contamination are detected.

5.5.2 *Sample Collection Equipment*

Sample collection equipment will be thoroughly decontaminated prior to initiation of sample collection and between each sample. The decontamination process will consist of several steps. Gross contamination on the sampling equipment will be rinsed and/or brushed off with water from the USAEC-approved source. Following this initial rinse, the equipment will be thoroughly scrubbed with a dilute non-phosphate detergent solution. The detergent solution will then be rinsed with water from the USAEC-approved source. A final rinse will be completed with deionized (DI) water. Decontamination activities will occur over a temporary decontamination structure.

5.6 *GPS MAPPING*

GPS technology will be used to determine accurate coordinates for the debris piles, burial sites, and sample locations. The field crews will utilize two hand-held GPS units (Magellan 5000 Pro or equivalent), two portable computers, differential GPS (DGPS) techniques, and a simple post-processing algorithm to achieve the desired results.

The DGPS technique utilizes one hand held unit at a control point (i.e., a fixed and known location such as a survey monument) concurrent with the use of a second unit to capture position data at the specific field locations (i.e. the debris piles). The two units must use the same satellite configuration when logging data. Each hand held unit will time stamp the data points collected so that a simple post-processing program can calculate an X, Y, and Z offset for the signal received at the control point, and apply this differential to the data captured by the mobile unit to correct for the signal degradation.

Field operation entails setting the GPS-unit antennae to 2 meters height, connecting the units to the portable computers, opening the LOG files on

each computer, and starting the carrier phase function on the hand-held devices. GPS data capture for each point at the debris piles, burial sites, or sampling location will require 10 minutes of data logging. The crew members will enter the specific field location into the GPS units and the crews will communicate, via hand held radios, in order to synchronize GPS logging periods between the control point and field location.

Once the logging periods have been completed, the specific point where the data was collected will be staked. Field measurements for each area being mapped (i.e., debris pile) can then be made from this location. The results will be documented in bound field logbooks. All mapping will be conducted under the escort of a UXO specialist.

Post-processing software provides the required functionality to correct for the signal degradation. The results of this process are location data accurate to within a one meter radius in 3-dimensions. Once the GPS data has been corrected, ERM will load the position information into Autodesk's AutoCAD software so that the debris piles, burial sites, and sampling locations can be accurately placed on the FWDA base map.

6.0 *LABORATORY ANALYSIS PROGRAM*

The approved QAPP (Metcalf & Eddy, Inc., 6 November 1992, as amended 6 December 1995) provides the Laboratory Analysis Program for this Delivery Order. The chemical analysis program for this field investigation effort is summarized below.

6.1 *LABORATORY CERTIFICATION AND ANALYTICAL METHOD SUMMARIES*

The chemical analysis program for the BWDP/BSI will consist of analysis of soil samples for TCL VOCs, TCL SVOCs, Pesticides/PCBs, TAL metals, explosives, and nitrate/nitrite.

Chemical analyses for this project will be conducted by DataChem Laboratories, Inc. (DC) of Salt Lake City, Utah. DC has participated in previous USAEC projects, as well as numerous U.S. Environmental Protection Agency (USEPA) projects, and is familiar with USAEC and USEPA analytical methods and QC procedures including laboratory certification, daily control measures, and data management.

Analytical methods that are approved and validated by USAEC in accordance with the January 1990 U.S. Army Toxic and Hazardous Materials Agency (USATHAMA) Quality Assurance Program will be used, where applicable. All TCL compounds, TAL metals, explosives and other metals that do not have USAEC-validated Certified Reporting Limits (CRLs) and ranges will be reported as non-validated compounds.

Sample summary matrices for the debris piles and burial sites are presented in Table 6-1. These summaries include the estimated number of environmental samples that will be collected, sample analyses, validated USAEC methods, required sample containers and preservatives, and holding time requirements. Table 6-2 presents a comparison of USAEC-validated analytical methods and USEPA-certified analytical methods. Table 6-3 presents the estimated number of required field QC samples. The laboratory class certification, CRL, and method summary for the analytical methods being conducted by DC are detailed below.

Table 6-1
Sample Summary Matrix
Debris Piles and Burial Sites
and Lead-Based Paint
Fort Wingate Depot Activity
Gallup, New Mexico

Matrix	Estimated Number of Environmental Samples	Analyses	Analytical Method	Container and Preservation	Analysis Holding Time
SOILS (selected surface soil samples and soils from excavated trenches) Group C Disposal Area	10	TCL Volatiles	DC LM23	1-60 ml amber glass wide mouth with Teflon-lined lid. Cool to 4°C.	14 days
	10	TCL Semivolatiles	DC LM25	1-125 ml amber glass wide mouth with Teflon-lined lid. Cool to 4°C.	7 days until extraction, analysis within 40 days of extract preparation
	10	TCL Pesticides/PCBs*	DC LH17	1-125 ml amber glass wide mouth with Teflon-lined lid. Cool to 4°C.	7 days until extraction, analysis within 40 days of extract preparation
	10	TAL Metals	DC	1-125 ml amber glass wide mouth with Teflon-lined lid. Cool to 4°C.	6 months, 28 days for mercury
	10	Explosives*	DC LW23	1-125 ml amber glass wide mouth with Teflon-lined lid. Cool to 4°C.	7 days until extraction, analysis within 40 days of extract preparation
	10	Nitrate/Nitrite	DC KP17	1-125 ml plastic wide mouth. Cool to 4°C.	28 days
SOILS (selected soils from excavated trenches) Western Landfill	15	TCL Volatiles	DC LM23	1-60 ml amber glass wide mouth with Teflon-lined lid. Cool to 4°C.	14 days
	15	TCL Semivolatiles	DC LM25	1-125 ml amber glass wide mouth with Teflon-lined lid. Cool to 4°C.	7 days until extraction, analysis within 40 days of extract preparation
	15	TCL Pesticides/PCBs*	DC LH17	1-125 ml amber glass wide mouth with Teflon-lined lid. Cool to 4°C.	7 days until extraction, analysis within 40 days of extract preparation
	15	TAL Metals	DC	1-125 ml amber glass wide mouth with Teflon-lined lid. Cool to 4°C.	6 months, 28 days for mercury
	15	Explosives*	DC LW23	1-125 ml amber glass wide mouth with Teflon-lined lid. Cool to 4°C.	7 days until extraction, analysis within 40 days of extract preparation
	15	Nitrate/Nitrite	DC KP17	1-125 ml plastic wide mouth. Cool to 4°C.	28 days

Table 6-1
Sample Summary Matrix
Debris Piles and Burial Sites
and Lead-Based Paint
Fort Wingate Depot Activity
Gallup, New Mexico

Matrix	Estimated Number of Environmental Samples	Analyses	Analytical Method	Container and Preservation	Analysis Holding Time
SOILS					
(selected soils from excavated trenches)					
Central Landfill	15	TCL Volatiles	DC LM23	1-40 ml amber glass wide mouth with Teflon-lined lid. Cool to 4°C.	14 days
	15	TCL Semivolatiles	DC LM25	1-125 ml amber glass wide mouth with Teflon-lined lid. Cool to 4°C.	7 days until extraction, analysis within 40 days of extract preparation
	15	TCL Pesticides/PCBs*	DC LH17	1-125 ml amber glass wide mouth with Teflon-lined lid. Cool to 4°C.	7 days until extraction, analysis within 40 days of extract preparation
	15	TAL Metals	DC	1-125 ml amber glass wide mouth with Teflon-lined lid. Cool to 4°C.	6 months, 28 days for mercury
	15	Explosives*	DC LW23	1-125 ml amber glass wide mouth with Teflon-lined lid. Cool to 4°C.	7 days until extraction, analysis within 40 days of extract preparation
	15	Nitrate/Nitrite	DC KF17	1-125 ml plastic wide mouth. Cool to 4°C.	28 days
LEAD-BASED PAINT					
Paint Chips	130	Lead	USEPA 7421	Plastic bag. Cool to 4°C.	6 months

TCL: Target Compound List
PCBs: Polychlorinated Biphenyls
TAL: Target Analyte List
DC: DataChem Laboratories will be performing the specified analysis according to the USABC methods referenced in Tables 7-4 and 7-5 which list specific analytical methods for individual TAL metals.
* All positive lab results will be confirmed by the laboratory using a second column.
Source: IRM, 1995

Table 6-2
Comparison of Analytical Methods
Debris Piles and Burial Sites
Fort Wingate Depot Activity
Gallup, New Mexico

Aqueous Samples

PARAMETER	USAEC METHOD	METHOD DESCRIPTION	SIMILAR USEPA METHODS
Volatiles	UM21	Volatile analytes by GC/MS	SW-846 8240, 624, 524.2, CLP 3/90
Semivolatiles	UM25	Semivolatile analytes by GC/MS	SW-846 8270, CLP 3/90
Pesticides/PCBs	UH20	Pesticides/PCBs by GC/ECD	SW-846 8080, CLP 3/90
Explosives	UW25	Explosive analytes by HPLC	SW-846 8330
Metals	SD18, SD25, SS12, CC8	Metal by GFAA, ICP, CVAA	SW-846 7000 Series, SW-846 6010, CLP 3/90
Nitrate/Nitrite (NO3/NO2)	LL8	NO3/N02 by colorimetry (Technicon)	EPA 353.2

Soil Samples

PARAMETER	USAEC METHOD	METHOD DESCRIPTION	SIMILAR USEPA METHODS
Volatiles	LM23	Volatile analytes by GC/MS	SW-846 8240, CLP 3/90
Semivolatiles	LM25	Semivolatile analytes by GC/MS	SW-846 8270, CLP 3/90
Pesticides/PCBs	LH17	Pesticides/PCBs by GC/ECD	SW-846 8080, CLP 3/90
Explosives	LW23	Explosive analytes by HPLC	SW-846 8330
Metals	JS12, Y9	Metal by ICP, CVAA	SW-846 6010, SW-846 7471, CLP 3/90
Nitrate/Nitrite (NO3/NO2)	KF17	NO3/N02 by colorimetry (Technicon)	EPA 353.2

PCBs: Polychorinated Biphenyls
USAEC: U.S. Army Environmental Center
USEPA: U.S. Environmental Agency
GC/MS: Gas Chromatograph/Mass Spectrometer
GC/ECD: Gas Chromatograph/Electron Capture Detector
HPLC: High Pressure Liquid Chromatography
GFAA: Graphite Furnace Atomic Absorption
ICP: Inductively Coupled Plasma Spectrometry
CVAA: Cold Vapor Atomic Absorption

1. USEPA. 1986. Test Methods for Evaluating Solid Waste. Physical/Chemical Methods. EPA SW-846, 3rd Edition. U.S. EPA, Washington, D.C.

2. USEPA. 1988. Methods for the Determination of Organic Compounds in Drinking Water. EPA-600/4-88/039. U.S. EPA, Cincinnati, Ohio.

3. USEPA. August 1991. U.S. EPA Contract Laboratory Program. Statement of Work for Organics Analysis. OLMO1.8. U.S. EPA, Washington, D.C.

4. USEPA. 1987. Methods for the Organic Chemical Analysis of Municipal and Industrial Wastes. 40 CFR Part 136, Appendix A.

Table 6-3
Required Field QC Samples
Debris Piles and Burial Sites
Fort Wingate Depot Activity
Gallup, New Mexico

Field QC Sample Type	Estimated Number of Field Days	Estimated Number of Samples	Estimated Number of QC Samples	TCL VOCs	TCL SVOCs	TCL Pest/PCBs	TAL Metals	Nitrate/Nitrite	Explosives
Soil Sampling Program	40	40							
Travel Blanks			40	√					
Rinsate Blanks			40	√	√	√	√	√	√
Field Blanks			2	√	√	√	√	√	√
Duplicates (Blind)			2	√	√	√	√	√	√

QC samples are estimated on the number of days spent in the field. This number is subject to change based on actual field time.

QC: Quality Control
TCL: Target Compound List
VOCs: Volatile Organic Compounds
SVOCs: Semivolatile Organic Compounds
Pest/PCBs: Pesticides/Polychlorinated Biphenyls

6.1.1 *TCL Volatile Organic Compounds*

The USAEC-validated DC method for TCL VOCs in solid and aqueous samples are LM23 and UM21, respectively. The CRLs and upper limits for VOCs are presented on Tables 6-4 and 6-5. Methods LM23 and UM21 are USAEC Class 1A validated methods. Class 1A certification refers to gas chromatography/mass spectrometry (GC/MS) methods.

TCL VOCs will be analyzed using a purge and trap, GC/MS method. A 5 milliliter (ml) aliquot (liquid sample) or 5 gram (gm) in 5 ml of dilution water (solid sample) is purged with helium in a purge and trap system. The purged compounds are swept to a cooled silica gel sorbent trap and subsequently desorbed onto a gas chromatograph (GC) column. The compounds are separated on the GC column and detected using a mass spectrometer (MS).

6.1.2 *TCL Semivolatile Organic Compounds*

The USAEC-validated DC method for TCL SVOCs in solid and aqueous samples are LM25 and UM25, respectively. The CRLs and upper limit for SVOCs are presented on Tables 6-4 and 6-5. Methods LM25 and UM25 are USAEC Class 1A validated methods.

TCL SVOCs will be analyzed by a GC/MS method. Water samples are sequentially extracted with methylene chloride at a pH greater than 12 and a pH less than 2 to obtain both the base/neutral and acid fractions. The two extracts are concentrated and subsequently combined. Solid samples are extracted with a 1:1 ratio of methylene chloride to acetone and the extract concentrated. A 1 microliter (µl) aliquot of the extract is injected onto a fused-silica capillary column coated with a slightly polar silicone to separate the compounds for detection by MS. The MS provides qualitative and quantitative analysis of the target compounds.

6.1.3 *TCL Pesticides/PCBs*

The USAEC-validated DC method for Pesticides/PCBs in solid and aqueous samples are LH17 and UH20. The CRLs and upper limit for pesticides are presented on Tables 6-4 and 6-5. Methods LH17 and UH20 are USAEC-validated Class 1B methods.

Pesticides/PCB compounds will be analyzed by a GC method. Water samples are extracted using methylene chloride. Solid samples are extracted with a 1:1 methylene chloride to acetone ratio and washed with distilled water. Extracts are exchanged into hexane and analyzed on a GC

Table 6-4
DC CRLs and Upper Limits for TCL Organic Compounds
Solid Matrix
Fort Wingate Depot Activity
Gallup, New Mexico

Constituent	CAS Number	DC USAEC Certified Method	Method Class	Solid CRL (µg/g)	Solid Upper Limit (µg/g)
Volatiles					
1,1,1-Trichloroethane	71-55-6	LM23	1A	0.2	10
1,1,2,2-Tetrachloroethane	79-34-5	LM23	1A	0.2	10
1,1,2-Trichloroethane	79-00-5	LM23	1A	0.33	10
1,1-Dichlorethene	75-35-4	LM23	1A	0.27	10
1,1-Dichloroethane	75-35-3	LM23	1A	0.49	10
1,2-Dichloroethane	107-06-2	LM23	1A	0.32	10
1,2-Dichloroethene	540-54-0	LM23	1A	0.32	10
1,2-Dichloropropane	78-87-5	LM23	1A	0.53	10
2-Butanone	78-93-3	LM23	1A	4.3	10
4-Methyl-2-Pentanone	108-10-1	LM23	1A	0.63	10
Acetone	67-64-1	LM23	1A	3.3	10
Benzene	71-43-2	LM23	1A	0.1	10
Bromodichloromethane	75-27-4	LM23	1A	0.2	10
Bromoform	75-25-2	LM23	1A	0.2	10
Bromomethane	74-83-9	LM23	1A	0.26	10
Carbon Tetrachloride	56-23-5	LM23	1A	0.31	10
Chlorobenzene	108-90-7	LM23	1A	0.1	10
Chloroethane	75-00-3	LM23	1A	0.64	10
Chloroform	67-66-3	LM23	1A	0.24	10
Chloromethane	74-87-3	LM23	1A	0.96	10
Dibromochloromethane	124-48-1	LM23	1A	0.25	10
Ethyl Benzene	100-41-4	LM23	1A	0.19	10
Methylene Chloride	75-09-2	LM23	1A	4.4	10
Tetrachloroethene	127-18-4	LM23	1A	0.16	10
Toluene	108-88-3	LM23	1A	0.1	10
Total Xylenes	100-42-5	LM23	1A	0.78	20
Trichloroethene	79-01-6	LM23	1A	0.23	10
Vinyl Chloride	75-01-4	LM23	1A	1.8	10

DC: DataChem Laboratories will be performing the specified analysis according to the USAEC method referenced.
CAS: Chemical Abstract Service
CRL: Certified Reporting Limit
TCL: Target Compound List
µg/g: micrograms per gram
USAEC: U.S. Army Environmental Center

Table 6-4
DC CRLs and Upper Limits for TCL Organic Compounds
Solid Matrix
Fort Wingate Depot Activity
Gallup, New Mexico

Constituent	CAS Number	DC USAEC Certified Method	Method Class	Solid CRL (µg/g)	Solid Upper Limit (µg/g)
Semivolatiles					
1,2,4-Trichlorobenzene	120-82-1	LM25	1A	0.22	6.2
2,4,5-Trichlorophenol	95-95-4	LM25	1A	0.49	12
2,4,6-Trichlorophenol	88-06-2	LM25	1A	0.061	12
2,4-Dichlorophenol	120-83-2	LM25	1A	0.065	12
2,4-Dimethylphenol	105-67-9	LM25	1A	3	6.2
2,4-Dinitrophenol	51-28-5	LM25	1A	4.7	12
2,4-Dinitrotoluene	121-14-2	LM25	1A	1.4	6.2
2,6-Dinitrotoluene	606-20-2	LM25	1A	0.32	6.2
2-Chloronaphthalene	91-58-7	LM25	1A	0.24	12
2-Chlorophenol	95-57-8	LM25	1A	0.055	12
2-Methylnaphthalene	91-57-6	LM25	1A	0.032	12
2-Methylphenol	95-48-7	LM25	1A	0.098	6.2
2-Nitrophenol	88-75-5	LM25	1A	1.1	6.2
3-Nitroaniline	99-09-2	LM25	1A	3	12
4-Chloro-3-methylphenol	59-50-7	LM25	1A	0.93	12
4-Chlorophenyl Phenyl ether	7005-72-3	LM25	1A	0.17	6.2
4-Methylphenol	106-44-5	LM25	1A	0.24	12
4-Nitroaniline	100-01-6	LM25	1A	3.3	12
Acenaphthene	83-32-9	LM25	1A	0.041	12
Acenaphthylene	208-96-8	LM25	1A	0.033	12
Bis(2-Chloroethoxy) methane	111-91-1	LM25	1A	0.19	6.2
Bis(2-Chloroethyl)ether	111-44-4	LM25	1A	0.36	12
Bis(2-Chloroisopropyl) ether	108-60-1	LM25	1A	0.44	12
Dibenzofuran	132-64-9	LM25	1A	0.38	6.2
Diethylphthalate	84-66-2	LM25	1A	0.24	6.2
Dimethyl Phthalate	131-11-3	LM25	1A	0.063	12
Fluorene	86-73-7	LM25	1A	0.065	12
Hexachlorobutadiene	87-68-3	LM25	1A	0.97	6.2
Hexachlorocyclopentadiene	77-47-4	LM25	1A	0.52	12
Hexachloroethane	67-72-1	LM25	1A	1.8	12
Isophorone	78-59-1	LM25	1A	0.39	6.2
N-Nitrosodi-n-propylamine	621-64-7	LM25	1A	1.1	12
Naphthalene	91-20-3	LM25	1A	0.74	6.2
Nitrobenzene	98-95-3	LM25	1A	1.8	12
Phenol	108-95-2	LM25	1A	0.052	12

DC: DataChem Laboratories will be performing the specified analysis according to the USAEC method referenced.
CAS: Chemical Abstract Service
CRL: Certified Reporting Limit
TCL: Target Compound List
µg/g: micrograms per gram
USAEC: U.S. Army Environmental Center

Table 6-4
DC CRLs and Upper Limits for TCL Organic Compounds
Solid Matrix
Fort Wingate Depot Activity
Gallup, New Mexico

Constituent	CAS Number	DC USAEC Certified Method	Method Class	Solid CRL (µg/g)	Solid Upper Limit (µg/g)
Semivolatiles (cont.)					
1,2-Dichlorobenzene					
1,3-Dichlorobenzene	95-50-1	LM25	1A	0.042	12
1,4-Dichlorobenzene	541-73-1	LM25	1A	0.042	12
3,3-Dichlorobenzidine	95-50-1	LM25	1A	0.034	12
4,6-Dinitro-2-methylphenol	91-94-1	LM25	1A	1.6	25
4-Bromophenyl Phenyl ether	534-52-1	LM25	1A	0.8	6.2
Anthracene	101-55-3	LM25	1A	0.041	6.2
Benzo(a)anthracene	120-12-7	LM25	1A	0.71	6.2
Benzo(a)pyrene	56-55-3	LM25	1A	0.041	12
Benzo(b)fluoranthene	50-32-8	LM25	1A	1.2	6.2
Benzo(g,h,i)perylene	205-99-2	LM25	1A	0.31	12
Benzo(k)fluoranthene	191-24-2	LM25	1A	0.18	12
Bis(2-ethylhexyl)phthalate	207-08-9	LM25	1A	0.13	12
Butyl Benzyl Phthalate	117-81-7	LM25	1A	0.48	6.2
Chrysene	85-68-7	LM25	1A	0.39	6.2
Di-n-butylphthalate	218-01-9	LM25	1A	0.032	12
Di-n-octyl Phthalate	84-74-2	LM25	1A	1.3	6.2
Dibenz (a,h)anthracene	117-84-0	LM25	1A	0.23	3.1
Fluoranthene	53-70-3	LM25	1A	0.31	3.1
Hexachlorobenzene	206-44-0	LM25	1A	0.032	6.2
Indeno(1,2,3-cd)pyrene	118-74-1	LM25	1A	0.08	12
N-Nitrosodiphenylamine	193-39-5	LM25	1A	2.4	12
Pentachlorophenol	86-30-6	LM25	1A	0.29	12
Phenanthrene	87-86-5	LM25	1A	0.76	6.2
Pyrene	85-01-8	LM25	1A	0.032	12
	129-00-0	LM25	1A	0.083	6.2

DC: DataChem Laboratories will be performing the specified analysis according to the USAEC method referenced.
CAS: Chemical Abstract Service
CRL: Certified Reporting Limit
TCL: Target Compound List
µg/g: micrograms per gram
USAEC: U.S. Army Environmental Center

Table 6-4
DC CRLs and Upper Limits for TCL Organic Compounds
Solid Matrix
Fort Wingate Depot Activity
Gallup, New Mexico

Constituent	CAS Number	DC USAEC Certified Method	Method Class	Solid CRL (µg/g)	Solid Upper Limit (µg/g)
Pesticides/PCBs					
Aldrin	309-00-2	LH17	1B	0.0014	0.086
Alpha-BHC	319-84-6	LH17	1B	0.0028	0.1
Beta-BHC	319-85-7	LH17	1B	0.0077	0.1
Chlordane	57-74-9	LH17	1B	0.0684	0.8
DDD	72-54-8	LH17	1B	0.0027	0.1
DDE	72-55-9	LH17	1B	0.0027	0.1
DDT	50-29-3	LH17	1B	0.0035	0.1
Delta-BHC	319-86-8	LH17	1B	0.0085	0.05
Dieldrin	60-57-1	LH17	1B	0.0016	0.1
Endosulfan I	959-98-8	LH17	1B	0.001	0.0906
Endosulfan II	33213-65-9	LH17	1B	0.0007	0.0705
Endrin	72-20-8	LH17	1B	0.0065	0.05
Heptachlor	76-48-8	LH17	1B	0.0022	0.1
Heptachlor Epoxide	1024-57-3	LH17	1B	0.0013	0.1
Isodrin	465-73-6	LH17	1B	0.003	0.1
Lindane	58-89-9	LH17	1B	0.001	0.1
Methoxychlor	72-54-8	LH17	1B	0.0359	1
PCB-1016	12674-11-2	LH17	1B	0.1	2
PCB-1260	37324-23-5	LH17	1B	0.0479	2
Toxaphene	8001-35-2	LH17	1B	0.226	10

DC: DataChem Laboratories will be performing the specified analysis according to the USAEC method referenced.
CAS: Chemical Abstract Service
CRL: Certified Reporting Limit
TCL: Target Compound List
µg/g: micrograms per gram
USAEC: U.S. Army Environmental Center

Table 6-5
DC CRLs and Upper Limits for TCL Organic Compounds
Water Matrix
Fort Wingate Depot Activity
Gallup, New Mexico

Constituent	CAS Number	DC USAEC Certified Method	Method Class	Water CRL (µg/l)	Water Upper Limit (µg/l)
Volatiles					
1,1,1-Trichloroethane	71-55-6	UM21	1A	1	100
1,1,2,2-Tetrachloroethane	79-34-5	UM21	1A	1.5	150
1,1,2-Trichloroethane	79-00-5	UM21	1A	1	100
1,1-Dichlorethene	75-35-4	UM21	1A	1	150
1,1-Dichloroethane	75-35-3	UM21	1A	1	150
1,2-Dichloroethane	107-06-2	UM21	1A	1	150
1,2-Dichloroethene	540-54-0	UM21	1A	5	150
1,2-Dichloropropane	78-87-5	UM21	1A	1	150
2-Butanone	78-93-3	UM21	1A	10	100
4-Methyl-2-Pentanone	108-10-1	UM21	1A	1.4	100
Acetone	67-64-1	UM21	1A	8	100
Benzene	71-43-2	UM21	1A	1	150
Bromodichloromethane	75-27-4	UM21	1A	1	100
Bromoform	75-25-2	UM21	1A	11	100
Bromomethane	74-83-9	UM21	1A	14	150
Carbon Tetrachloride	56-23-5	UM21	1A	1	100
Chlorobenzene	108-90-7	UM21	1A	1	150
Chloroethane	75-00-3	UM21	1A	8	150
Chloroform	67-66-3	UM21	1A	1	150
Chloromethane	74-87-3	UM21	1A	1.2	100
Dibromochloromethane	124-48-1	UM21	1A	1	100
Ethyl Benzene	100-41-4	UM21	1A	1	150
Methylene Chloride	75-09-2	UM21	1A	1	150
Tetrachloroethene	127-18-4	UM21	1A	1	150
Toluene	108-88-3	UM21	1A	1	150
Total Xylenes	100-42-5	UM21	1A	2	300
Trichloroethene	79-01-6	UM21	1A	1	150
Vinyl Chloride	75-01-4	UM21	1A	12	150

DC: DataChem Laboratories will be performing the specified analysis according to the USAEC method referenced.
CAS: Chemical Abstract Service
CRL: Certified Reporting Limit
TCL: Target Compound List
USAEC: U.S. Army Environmental Center
µg/l: micrograms per liter

Table 6-5
DC CRLs and Upper Limits for TCL Organic Compounds
Water Matrix
Fort Wingate Depot Activity
Gallup, New Mexico

Constituent	CAS Number	DC USAEC Certified Method	Method Class	Water CRL (µg/l)	Water Upper Limit (µg/l)
Semivolatiles					
1,2,4-Trichlorobenzene	120-82-1	UM25	1A	2.4	200
2,4,5-Trichlorophenol	95-95-4	UM25	1A	2.8	300
2,4,6-Trichlorophenol	88-06-2	UM25	1A	3.6	300
2,4-Dichlorophenol	120-83-2	UM25	1A	8.4	300
2,4-Dimethylphenol	105-67-9	UM25	1A	4.4	300
2,4-Dinitrophenol	51-28-5	UM25	1A	176	300
2,4-Dinitrotoluene	121-14-2	UM25	1A	5.8	100
2,6-Dinitrotoluene	606-20-2	UM25	1A	6.7	100
2-Chloronaphthalene	91-58-7	UM25	1A	2.6	100
2-Chlorophenol	95-57-8	UM25	1A	2.8	100
2-Methylnaphthalene	91-57-6	UM25	1A	1.3	300
2-Methylphenol	95-48-7	UM25	1A	3.6	200
2-Nitrophenol	88-75-5	UM25	1A	8.2	300
3-Nitroaniline	99-09-2	UM25	1A	15	200
4-Chloro-3-methylphenol	59-50-7	UM25	1A	8.5	300
4-Chlorophenyl Phenyl ether	7005-72-3	UM25	1A	23	300
4-Methylphenol	106-44-5	UM25	1A	2.8	200
4-Nitrophenol	100-02-7	UM25	1A	96	600
Acenaphthene	83-32-9	UM25	1A	5.8	100
Acenaphthylene	208-96-8	UM25	1A	5.1	200
Bis(2-Chloroethoxy) methane	111-91-1	UM25	1A	6.8	300
Bis(2-Chloroethyl)ether	111-44-4	UM25	1A	7.7	200
Bis(2-Chloroisopropyl) ether	108-60-1	UM25	1A	5	300
Dibenzofuran	132-64-9	UM25	1A	5.1	300
Diethylphthalate	84-66-2	UM25	1A	5.9	200
Dimethyl Phthalate	131-11-3	UM25	1A	2.2	200
Fluorene	86-73-7	UM25	1A	9.2	100
Hexachlorobutadiene	87-68-3	UM25	1A	8.7	200
Hexachlorocyclopentadiene	77-47-4	UM25	1A	54	300
Hexachloroethane	67-72-1	UM25	1A	8.3	100
Isophorone	78-59-1	UM25	1A	2.4	200
N-Nitrosodi-n-propylamine	621-64-7	UM25	1A	6.8	100
Naphthalene	91-20-3	UM25	1A	0.23	100
Nitrobenzene	98-95-3	UM25	1A	3.7	200
Phenol	108-95-2	UM25	1A	2.2	300

DC: DataChem Laboratories will be performing the specified analysis according to the USAEC method referenced.
CAS: Chemical Abstract Service
CRL: Certified Reporting Limit
TCL: Target Compound List
USAEC: U.S. Army Environmental Center
µg/l: micrograms per liter

Table 6-5
DC CRLs and Upper Limits for TCL Organic Compounds
Water Matrix
Fort Wingate Depot Activity
Gallup, New Mexico

Constituent	CAS Number	DC USAEC Certified Method	Method Class	Water CRL (µg/l)	Water Upper Limit (µg/l)
Semivolatiles (cont.)					
1,2-Dichlorobenzene	95-50-1	UM25	1A	1.2	100
1,3-Dichlorobenzene	541-73-1	UM25	1A	3.4	100
1,4-Dichlorobenzene	95-50-1	UM25	1A	1.5	100
3,3-Dichlorobenzidine	91-94-1	UM25	1A	5	300
4-Bromophenyl Phenyl ether	101-55-3	UM25	1A	22	300
Anthracene	120-12-7	UM25	1A	5.2	100
Benzo(a)anthracene	56-55-3	UM25	1A	9.8	100
Benzo(a)pyrene	50-32-8	UM25	1A	14	200
Benzo(b)fluoranthene	205-99-2	UM25	1A	10	200
Benzo(g,h,i)perylene	191-24-2	UM25	1A	15	100
Benzo(k)fluoranthene	207-08-9	UM25	1A	10	200
Bis(2-ethylhexyl)phthalate	117-81-7	UM25	1A	7.7	200
Butyl Benzyl Phthalate	85-68-7	UM25	1A	28	200
Chrysene	218-01-9	UM25	1A	7.4	100
Di-n-butylphthalate	84-74-2	UM25	1A	33	300
Di-n-octyl Phthalate	117-84-0	UM25	1A	1.4	100
Dibenz (a,h)anthracene	53-70-3	UM25	1A	12	100
Fluoranthene	206-44-0	UM25	1A	24	300
Hexachlorobenzene	118-74-1	UM25	1A	12	100
Indeno(1,2,3-cd)pyrene	193-39-5	UM25	1A	21	200
N-Nitrosodiphenylamine	86-30-6	UM25	1A	3.7	200
Pentachlorophenol	87-86-5	UM25	1A	9.1	100
Phenanthrene	85-01-8	UM25	1A	9.9	100
Pyrene	129-00-0	UM25	1A	17	100

DC: DataChem Laboratories will be performing the specified analysis according to the USAEC method referenced.
CAS: Chemical Abstract Service
CRL: Certified Reporting Limit
TCL: Target Compound List
USAEC: U.S. Army Environmental Center
µg/l: micrograms per liter

Table 6-5
DC CRLs and Upper Limits for TCL Organic Compounds
Water Matrix
Fort Wingate Depot Activity
Gallup, New Mexico

Constituent	CAS Number	DC USAEC Certified Method	Method Class	Water CRL (µg/l)	Water Upper Limit (µg/l)
Pesticides/PCBs					
Aldrin	309-00-2	UH20	1B	0.0074	0.5
Alpha-BHC	319-84-6	UH20	1B	0.0025	0.5
Beta-BHC	319-85-7	UH20	1B	0.0099	0.5
Chlordane	57-74-9	UH20	1B	0.0312	4
DDD	72-54-8	UH20	1B	0.0081	0.572
DDE	72-55-9	UH20	1B	0.0039	0.537
DDT	50-29-3	UH20	1B	0.0025	0.25
Delta-BHC	319-86-8	UH20	1B	0.0034	0.5
Dieldrin	60-57-1	UH20	1B	0.0074	0.5
Endosulfan I	959-98-8	UH20	1B	0.0025	0.5
Endosulfan II	33213-65-9	UH20	1B	0.0077	0.5
Endrin	72-20-8	UH20	1B	0.0176	0.5
Endrin Aldehyde	7421-93-4	UH20	1B	0.0504	2.5
Heptachlor	76-48-8	UH20	1B	0.0025	0.25
Heptachlor Epoxide	1024-57-3	UH20	1B	0.0063	0.184
Isodrin	465-73-6	UH20	1B	0.0025	0.5
Lindane	58-89-9	UH20	1B	0.0025	0.5
Methoxychlor	72-54-8	UH20	1B	0.075	5
PCB-1016	12674-11-2	UH20	1B	0.385	10
PCB-1260	37324-23-5	UH20	1B	0.176	10
Toxaphene	8001-35-2	UH20	1B	1.64	50

DC: DataChem Laboratories will be performing the specified analysis according to the USAEC method referenced.
CAS: Chemical Abstract Service
CRL: Certified Reporting Limit
TCL: Target Compound List
USAEC: U.S. Army Environmental Center
µg/l: micrograms per liter

using a packed (or capillary) chromatography column and an electron capture detector. Compounds detected on the primary column are confirmed on a second confirmation column before they are reported as positive results.

6.1.4 *Explosives*

The USAEC-validated DC methods for explosives in solid and aqueous samples are LW23 and UW25, respectively. The CRLs and upper range limit for explosives in water and solids are presented in Table 6-6. Methods LW23 and UW25 are USAEC-validated Class 1 methods.

Explosive compounds will be analyzed by solvent extraction of the target compounds, using HPLC and detected with a variable wavelength ultraviolet (UV) light detector. Solid samples are extracted with acetonitrile, and the supernatant is mixed with calcium chloride. Aqueous samples are passed through a styrene divinyl benzene resin column and the analytes of interest are eluted with methanol. The methanol eluate is then mixed with a calcium chloride solution and the resulting mixtures are analyzed by HPLC. Positive results for a sample will be confirmed on a second column.

6.1.5 *TAL Metals*

The USAEC-validated DC method, the CRL, and the upper range limits for TAL Metals in solid and aqueous samples are provided in Tables 6-7 and 6-8. These methods are USAEC-validated Class 1 methods.

6.1.5.1 *TAL Metals by Inductively Coupled Plasma Spectrometry or Graphite Furnace Atomic Absorption*

The TAL metals (except mercury) will be analyzed by inductively coupled plasma (ICP) spectrometry or graphite furnace atomic absorption (GFAA). The samples are prepared by digesting an aliquot with acid (nitric and/or hydrochloric) and hydrogen peroxide. Separate digestions are required for the ICP metals and GFAA metals. The digestates are analyzed by ICP or GFAA.

6.1.5.2 *Mercury by Cold Vapor Atomic Absorption*

Mercury will be analyzed by cold vapor atomic absorption (CVAA). Aqueous samples are prepared by heating at 95°C with sulfuric acid, nitric acid, potassium permanganate, potassium persulfate, hydroxylamine hydrochloride, and stannous chloride solutions. Solid samples are

Table 6-6
DC CRLs and Upper Limits for Explosives
Solid and Water Matrices
Fort Wingate Depot Activity
Gallup, New Mexico

Compounds	CAS Number	DC USAEC Validated Method	Method Class	Water CRL (µg/l)	Water Upper Limit (µg/l)
1, 3, 5 - Trinitrobenzene	99-35-4	UW25	1	0.21	20
1,3 - Dinitrobenzene	99-65-0	UW25	1	0.458	20
2, 4, 6 - Trinitrotoluene	118-96-7	UW25	1	0.426	40
2, 4 - Dinitrotoluene	121-14-2	UW25	1	0.397	20
2, 6 - Dinitrotoluene	606-20-2	UW25	1	0.6	40
HMX	2691-41-0	UW25	1	0.533	16
Nitrobenzene	98-95-3	UW25	1	0.682	40
RDX	121-82-4	UW25	1	0.416	40
Tetryl	479-45-8	UW25	1	0.631	40

Compounds	CAS Number	DC USAEC Validated Method	Method Class	Solid CRL (µg/g)	Solid Upper Limit (µg/g)
1, 3, 5 - Trinitrobenzene	99-35-4	LW23	1	0.922	250
1,3, - Dinitrobenzene	99-65-0	LW23	1	0.504	250
2, 4, 6 - Trinitrotoluene	118-96-7	LW23	1	2	500
2, 4 - Dinitrotoluene	121-14-2	LW23	1	2.5	250
2, 6 - Dinitrotoluene	606-20-2	LW23	1	2	500
HMX	2691-41-0	LW23	1	2	500
Nitrobenzene	98-95-3	LW23	1	1.14	500
RDX	121-82-4	LW23	1	1.28	500
Tetryl	479-45-8	LW23	1	2.11	500

DC: DataChem Laboratories will perform the specified analysis according to the USAEC method referenced.
CAS: Chemical Abstract Service
CRL: Certified Reporting Limit
USAEC: U.S. Army Environmental Center
µg/l: micrograms per liter
HMX: Cyclotetramethylenetetranitramine
RDX: Hexahydro-1,3,5-trinitro-1,3,5-triazine
µg/g: micrograms per gram

Table 6-7
DC CRLs and Upper Limits for TAL Metals
Solid Matrix
Fort Wingate Depot Activity
Gallup, New Mexico

Constituent	CAS Number	DC USAEC Validated Method	Solid CRL (µg/g)	Solid Upper Limit (µg/g)
Aluminum	7429-90-5	JS12	11.2	50,000
Antimony	7440-36-0	JS12	19.6	5,000
Arsenic	7440-38-2	JS12	16.4	2,000
Barium	7440-39-3	JS12	3.29	1,000
Beryllium	7440-41-7	JS12	0.427	1,000
Cadmium	7440-43-9	JS12	1.2	1,250
Calcium	7440-70-2	JS12	25.3	50,000
Chromium	7440-47-3	JS12	1.04	1,000
Cobalt	7440-48-4	JS12	2.5	1,000
Copper	7440-50-8	JS12	2.84	1,000
Iron	7439-89-6	JS12	6.66	50,000
Lead	7439-92-1	JS12	7.44	1,000
Magnesium	7439-95-4	JS12	10.1	50,000
Manganese	7439-96-5	JS12	9.87	1,000
Mercury	7439-97-6	Y9	0.05	1
Nickel	7440-02-0	JS12	2.74	2,000
Potassium	7440-09-7	JS12	131	50,000
Selenium	7782-49-2	JS12	20.7	3,000
Sodium	7440-23-5	JS12	38.7	50,000
Silver	7440-22-4	JS12	0.803	200
Thallium	7440-28-0	JS12	34.3	5,000
Vanadium	7440-62-2	JS12	1.41	1,000
Zinc	7440-66-6	JS12	2.34	1,000

DC: DataChem Laboratories will perform the specified analysis according to the USAEC method referenced.
CAS: Chemical Abstract Service
CRL: Certified Reporting Limit
TAL: Target Analyte List
USAEC: U.S. Army Environmental Center
µg/g: micrograms per gram

Table 6-8
DC CRLs and Upper Limits for TAL Metals
Water Matrix
Fort Wingate Depot Activity
Gallup, New Mexico

Constituent	CAS Number	DC USAEC Validated Method	Water CRL (µg/l)	Water Upper Limit (µg/l)
Aluminum	7429-90-5	SS12	112	125,000
Antimony	7440-36-0	SS12	60	12,500
Arsenic	7440-38-2	SS12	117	10,000
Barium	7440-39-3	SS12	2.82	12,000
Beryllium	7440-41-7	SS12	1.12	1,000
Cadmium	7440-43-9	SS12	6.78	12,500
Calcium	7440-70-2	SS12	105	20,000
Chromium	7440-47-3	SS12	16.8	1,000
Cobalt	7440-48-4	SS12	25	10,000
Copper	7440-50-8	SS12	18.8	10,000
Iron	7439-89-6	SS12	77.5	500,000
Lead	7439-92-1	SD18	4.47	200
Magnesium	7439-95-4	SS12	135	250,000
Manganese	7439-96-5	SS12	9.67	10,000
Mercury	7439-97-6	CC8	0.1	2
Nickel	7440-02-0	SS12	32.1	20,000
Potassium	7440-09-7	SS12	1240	250,000
Selenium	7782-49-2	SD25	2.53	200
Sodium	7440-23-5	SS12	279	50,000
Silver	7440-22-4	SS12	10	2,000
Thallium	7440-28-0	SS12	125	12,500
Vanadium	7440-62-2	SS12	27.6	10,000
Zinc	7440-66-6	SS12	18	10,000

DC: DataChem Laboratories will perform the specified analysis according to the USAEC method referenced.
CAS: Chemical Abstract Service
CRL: Certified Reporting Limit
TAL: Target Analyte List
USAEC: U.S. Army Environmental Center
µg/l: micrograms per liter

prepared by heating at 95°C with hydrochloric acid, nitric acid, potassium permanganate, hydroxylamine hydrochloride, and stannous chloride solutions. The resulting vapor is analyzed using an atomic absorption spectrophotometer.

6.1.6 *Nitrate/Nitrite*

The USAEC-validated DC methods for nitrate/nitrite in solid and water matrices are KF17 and LL8, respectively. These methods are USAEC-validated Class 1 methods. The CRLs and upper reporting limits for solid and water matrices are presented on Table 6-9.

The method for the determination of nitrate/nitrite employs an automated colorimetric determination of nitrogen using a Technicon Auto Analyzer. Solid samples are extracted with a potassium chloride solution. Samples are introduced to a copper-cadmium (Cu-Cd) column which effectively reduces all nitrate to nitrite. The subsequent measurement yields results reported as total nitrates.

Table 6-9
CRLs and Upper Limits for Miscellaneous Constituents
Solid and Water Matrices
Fort Wingate Depot Activity
Gallup, New Mexico

Constituent	CAS Number	DC USAEC Validated Method	Method Class	Solid CRL (µg/g)	Solid Upper Limit (µg/g)
Nitrate/Nitrite	–	KF17	1	1	25

Constituent	CAS Number	DC USAEC Validated Method	Method Class	Water CRL (µg/l)	Water Upper Limit (µg/l)
Nitrate/Nitrite	–	LL8	1	10	200

DC: DataChem Laboratories will be performing the specified analysis according to the USAEC method referenced.
CAS: Chemical Abstract Service
CRL: Certified Reporting Limit
USAEC: U.S. Army Environmental Center
µg/g: micrograms per gram
µg/l: micrograms per liter

7.0 DATA MANAGEMENT

During the conduct of DA10, ERM will generate considerable chemical and geotechnical data which will ultimately be transmitted to the USAEC IRDMIS and used to support the conclusions reached in the required technical reports. Because this data is the foundation for the conclusions reached, well defined procedures and systems will be employed to ensure that analyses are performed on a timely basis, data are formatted properly, data have undergone appropriate QC checks, and that the data are transmitted properly to the IRDMIS Bulletin Board System (BBS).

The approved QAPP (Metcalf & Eddy, Inc., 6 November 1992, as amended 6 December 1995) provides the data management plan for this Delivery Order. A summary of the systems and procedures to be employed during this field investigation effort are provided below.

7.1 DATA MANAGEMENT SYSTEMS

The data management systems and procedures that ERM and DC will employ include:

- The USAEC IRDMIS Personal Computer (PC) Data Entry and Validation Program.
- DC's in-house Laboratory Information Management System (LIMS). This system was developed to promote a standard mechanism for analytical data collection, checking, monitoring (tracking), and reporting.
- ERM's in-house Sample Tracking System. This system was developed to track the status of samples from the time they are submitted to the laboratory to the time they reach IRDMIS Level 3. The system permits the calculation of due dates for such items as planned analysis completion, planned transfer file upload, and planned Level 3 status. Similarly, the ERM Sample Tracking System checks data for conformity with the project sampling plan and USAEC standards and conventions.
- The USAEC ORACLE-based IRDMIS. This system, managed by USAEC Contractor Potomac Research, Inc. (PRI), will be used by the engineering/science staff as the source of Level 3 data for tables and reports to support the findings and recommendations presented in the technical report.

Data transfer files created through the use of the PC IRDMIS will be submitted in accordance with the time limits presented in Table 7-1.

7.2 *ORGANIZATION*

In the following sections, the organization that will support the data management function is described, followed by more detailed descriptions of the approaches to effectively handle the geotechnical and chemical data generated under this delivery order.

The management of project information requires that staff responsibilities be clearly defined, and that all project participants comply with the established procedures and protocols. The staff responsibilities that relate to data management consist of:

- Project Manager - Ultimately responsible for all project procedures and protocols used in acquiring, storing, and reporting data.
- Data Administrator - Responsible for implementing the procedures and systems developed to support data management; also responsible for the coordination of prime and subcontractor data management and tracking activities.
- Quality Assurance (QA) Coordinator - Responsible for the review of chemical and geotechnical data prior to and after entry into IRDMIS; works closely with the field and laboratory personnel, and with the Data Administrator to ensure that the established QA Program guidelines are adhered to.
- Data Technicians - Responsible for operation of the data management systems described in Section 7.1.
- Laboratory Sample Management Officer (SMO) - Responsible for overall management of the analytical process, including sample examination, data entry, due date tracking, QA, IRDMIS file creation, and reporting to the prime contractor.

The data management organization for the BWDP/BSI is illustrated in Figure 7-1.

7.3 *FIELD DATA MANAGEMENT*

There are two types of data generated by field personnel. These are: (1) general sample site location (map) information, and (2) geotechnical data. Geotechnical data is further categorized as: (2a) field drilling information,

Table 7-1
Data File Submission Time Limits
Fort Wingate Depot Activity
Gallup, New Mexico

File	Complete Submission Due	Notes
GMA - Geotechnical Map File	NLT 40 calendar days after completion of last well in drilling program.	Well is completed upon placement of protective casing.
GMA - Geotechnical Map File	NLT 14 calendar days after sampling event.	Encompasses soil, sediment, surface water, and air sampling sites.
GGS - Geotechnical Groundwater Stabilized File	NLT 7 calendar days after measurement.	
GFD - Geotechnical Field Drilling File	NLT 30 days after completion of last well in drilling program or last soil boring.	
GWC - Geotechnical Well Construction File	NLT 30 days after completion of last well in drilling program.	
CGW - Chemical, Groundwater	NLT 40 calendar days after collection of sample	
CSW - Chemical, Surface water	NLT 40 calendar days after collection of sample	
CSO - Chemical, Soils	NLT 40 calendar days after collection of sample	
CSE - Chemical, Sediment	NLT 40 calendar days after collection of sample	

Source: USAEC 1995.

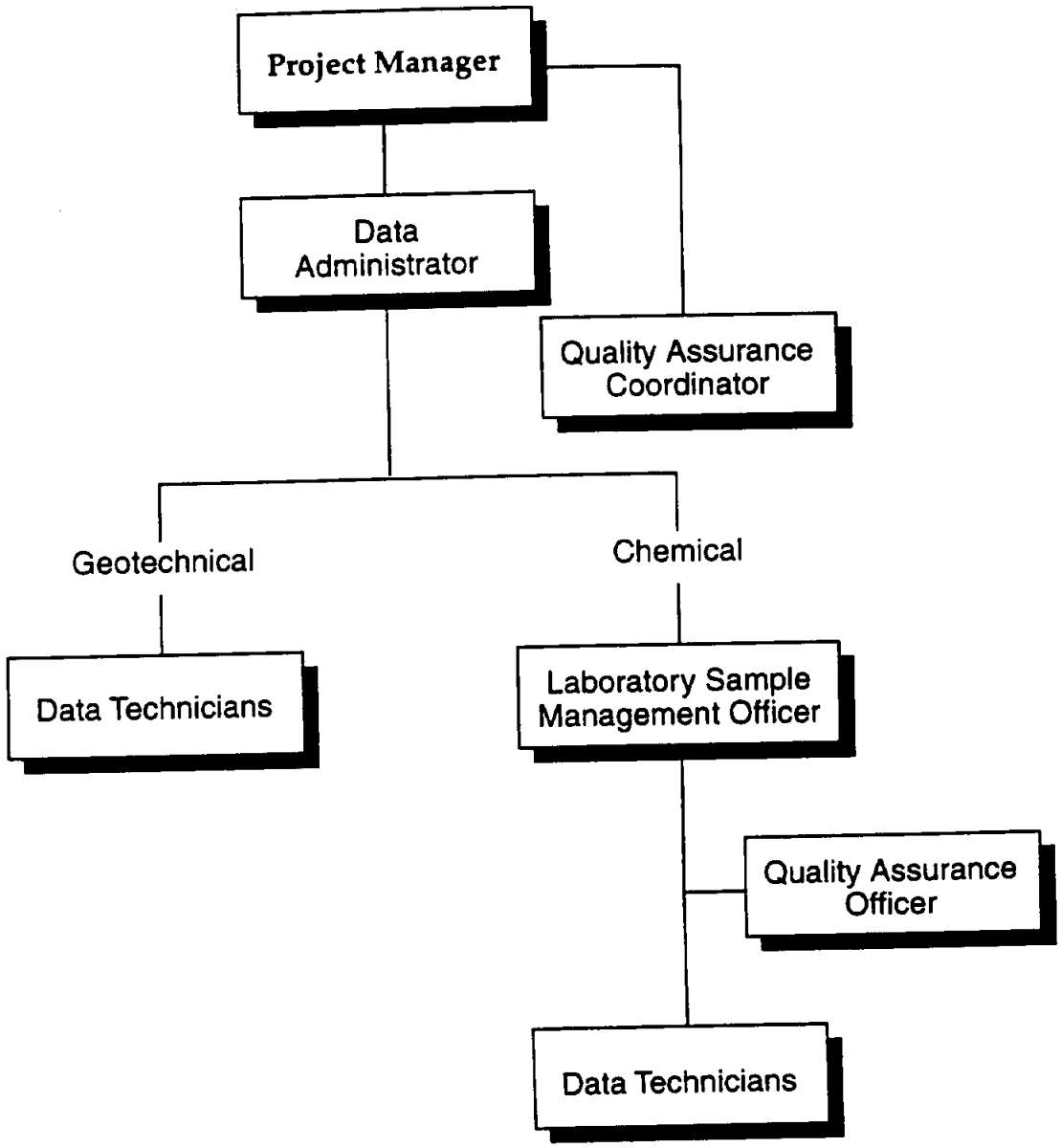


Figure 7-1

DATA MANAGEMENT ORGANIZATION FORT WINGATE DEPOT ACTIVITY GALLUP, NEW MEXICO

Prepared for:

U.S. Army Environmental Center

Aberdeen Proving Ground, Maryland

(2b) well construction information, and (2c) ground water stabilized measurements. Field activities conducted as part of the BWDP/BSI will generate site location data only. A description of both the manual and automated procedures to be followed by the ERM team for data gathering, data input, data tracking, and data uploading is presented below. Figure 7-2 outlines the flow of map site information and Figure 7-3 details the flow of data from the field through the information management group towards successful incorporation in the ORACLE-based IRDMIS system.

Generating accurate location data for sampling locations is critical for optimizing the capabilities of IRDMIS. Both the PC-and the ORACLE-based IRDMIS system require that map information be entered for every sampling location. In addition to general information about the location such as site identification (ID) and site type, the northing and easting coordinates in either State Planar or Universal Transverse Mercator (UTM) coordinates must be established and entered. Coordinates of soil samples will be obtained using GPS technology and loaded into the PC IRDMIS tool. A map transfer file will be created, then uploaded to the USAEC BBS for incorporation into IRDMIS.

7.4 *LABORATORY/CHEMICAL DATA MANAGEMENT*

Because of the volume of chemical data generated through sampling programs, effective procedures must be established to ensure that holding times are met and that the data are submitted to USAEC on a timely basis. The following subsections describe the tools and procedures to be used by DC in the management of the chemical data generated during the FWDA sampling programs.

7.4.1 *Automated Systems Description*

DC has incorporated two software systems into their chemical analysis work flow. These are the LIMS and the PC IRDMIS tool provided by USAEC. These systems provide mechanisms for: tracking data as it is prepared; maintaining compliance with internal laboratory requirements and data quality objectives; preparing data deliverables in adherence to USAEC IRDMIS data standards and formatting requirements; and ensuring data completeness.

7.4.2 *Automated Systems/Work Flow Integration*

As samples are received, the laboratory SMO will compare the samples with the associated chain-of-custody form. If there are discrepancies or if

Figure 7-2
Information Flow - Map Sites
Fort Wingate Depot Activity
Gallup, New Mexico

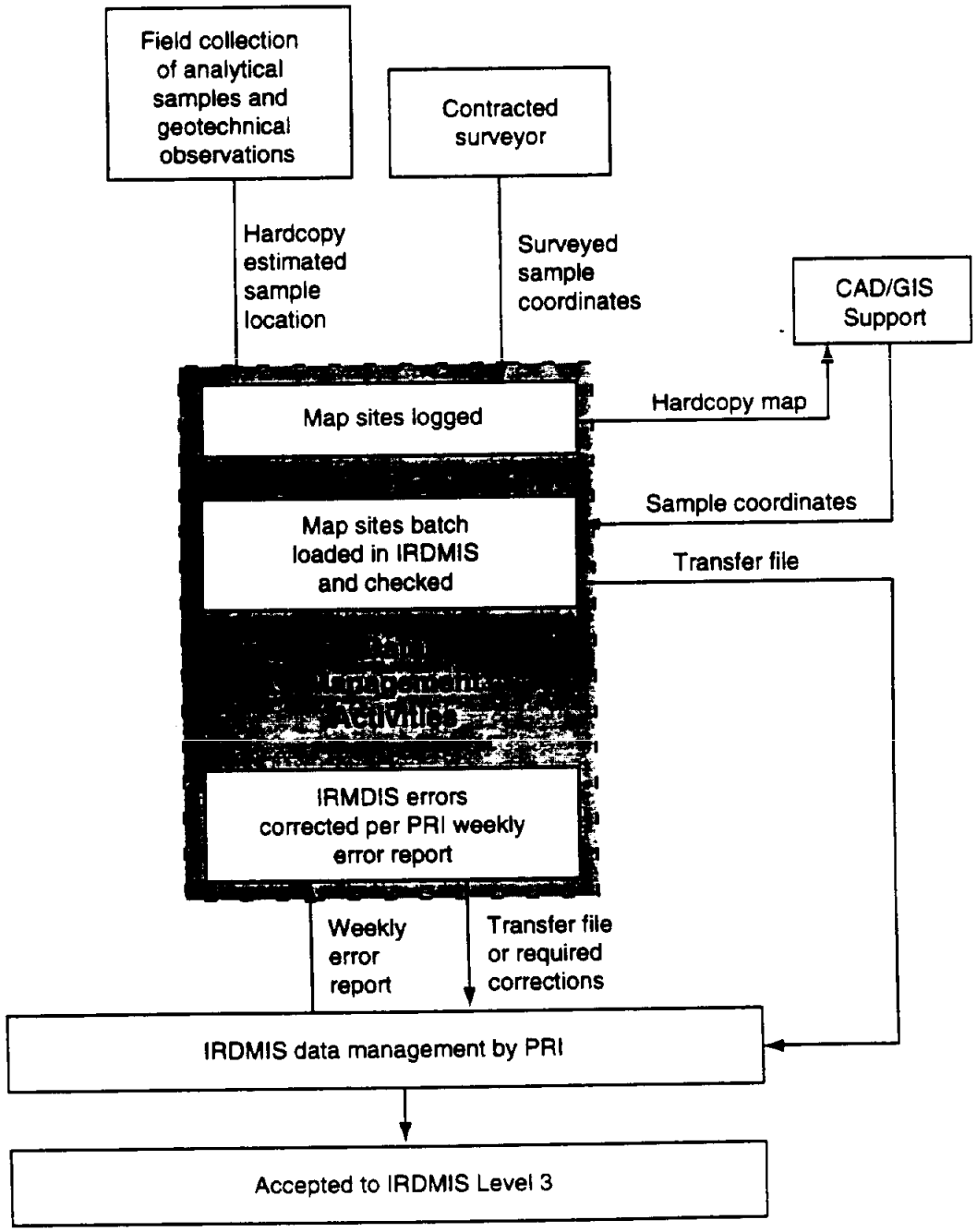
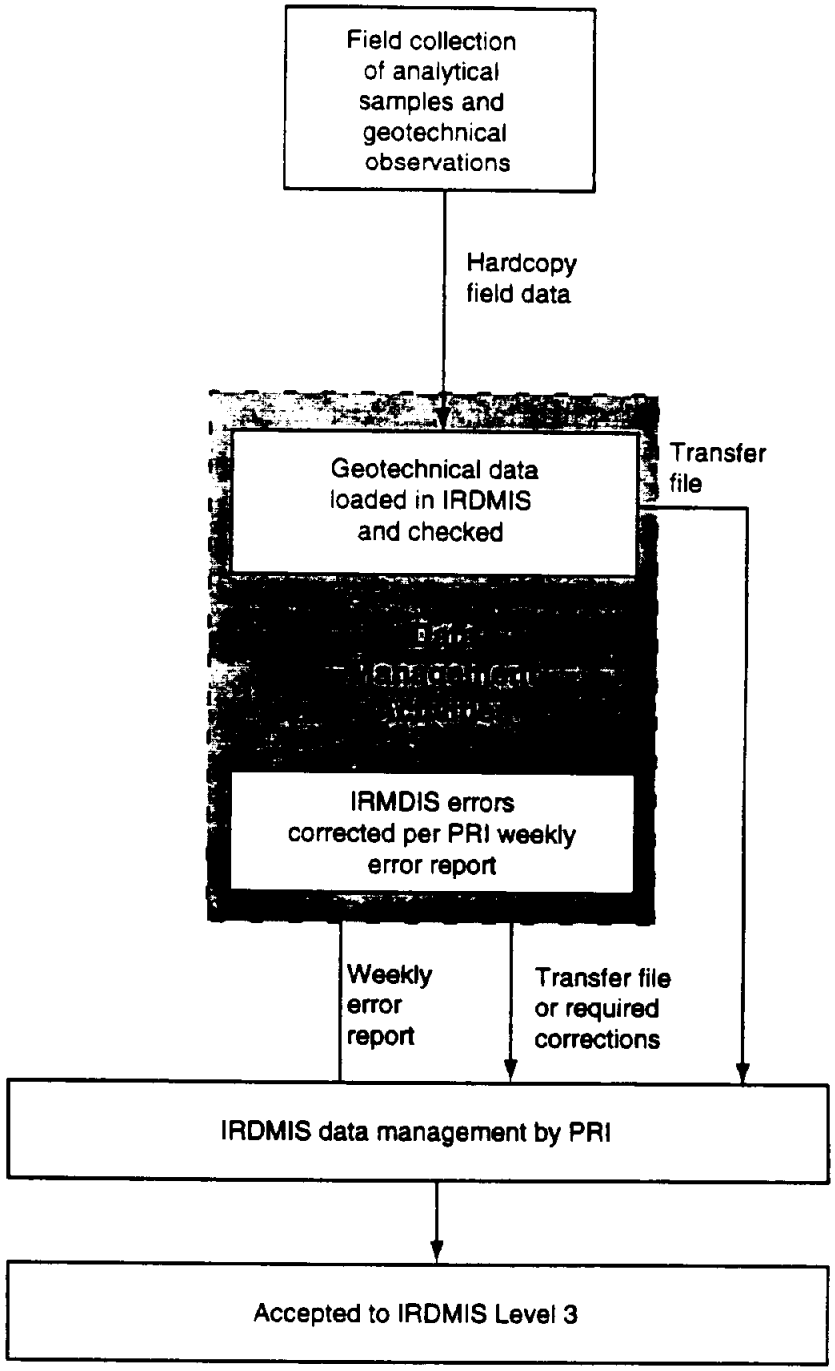


Figure 7-3
Information Flow - Geotechnical
Fort Wingate Depot Activity
Gallup, New Mexico



sample containers were damaged during shipment, the field crew will be immediately notified. If the group of samples passes this first check, then identifying information is entered into the LIMS. It is at this point that lot numbers are assigned. Lot number assignment is performed by the SMO. Samples will have the same lot number if they can be processed within a 24-hour period. Typically, organics will have no more than 10 samples per lot number, while some inorganics may have up to 50. Upon initial entry of sample data, a series of sample milestone dates are automatically generated (where possible) including preparation due dates, analysis due dates, and client deliverable due dates. Because these milestone dates are generated and actually stored in the USAEC Data Entry System database, reports can be produced that allow the monitoring of holding times, show the samples that need to be analyzed during a certain time frame, or other sample information sorted by client. Utilizing their LIMS, DC is capable of generating an IRDMIS chemical data transfer file in accordance with project specific laboratory requirements as defined in the QAPP. The PC IRDMIS tool provides two important functions. First, it provides both record and group checking. Record checking verifies that:

- Sampling event information adheres to USAEC requirements;
- Holding times are within compliance;
- Data are correctly formatted;
- The laboratory is validated for the method;
- Test names are valid for the method; and
- Concentrations are within validated range or properly diluted within range.

Group check verifies that:

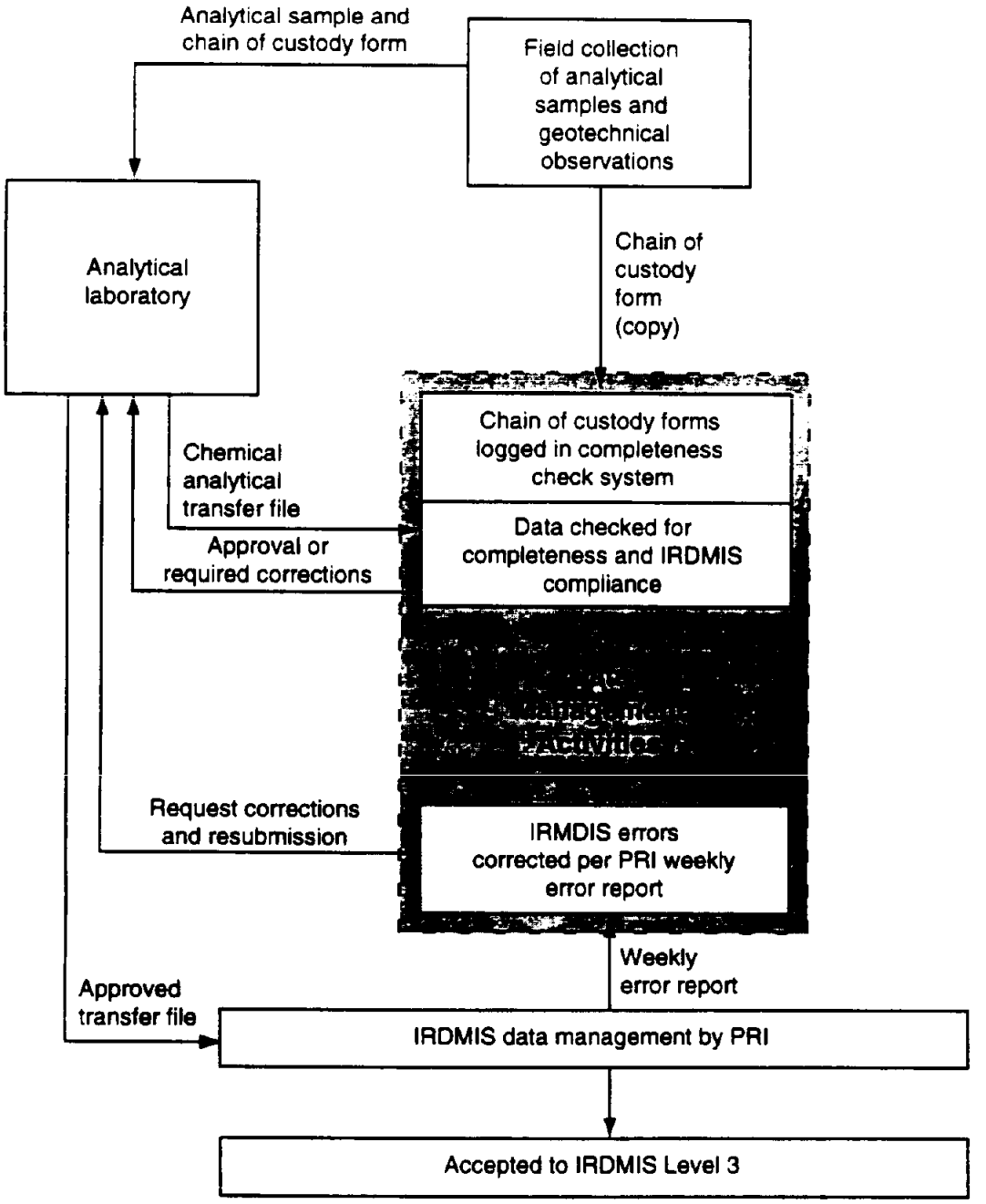
- A lot contains the correct number of QC samples;
- All analytes for a method are present; and
- All sites in a lot have a map record in the database.

The other important function PC IRDMIS provides is that it creates properly formatted transfer files for uploading, ultimately to the ORACLE-based IRDMIS.

7.5 *DATA TRACKING*

This section describes the tools and procedures that are employed in tracking the progress of the FWDA sampling efforts. Figure 7-4 details the

Figure 7-4
Information Flow - Analytical
Fort Wingate Depot Activity
Gallup, New Mexico



flow of data from the field to the laboratory, through the information management group, towards successful submission to IRDMIS.

7.5.1 *Interfacing with Subcontractor Laboratory*

As Figure 7-1 indicates, ERM and its subcontractor laboratory will interface through ERM's Data Administrator and the laboratory's SMO. ERM maintains a secure 24-hour BBS which is available to subcontractors to expedite the transfer of data to ERM. DC has been provided with a specific file directory area and log-in procedures to promote levels of security sufficient to protect client confidentiality. Both of these individuals will work together to ensure that data are complete, milestones are DC met, transfer files are properly created, and data is elevated to Level 3 of IRDMIS.

7.5.2 *ERM's Tracking and Data Completeness System*

To best serve the science/engineering staff charged with the responsibility of data assessment and technical report generation, ERM has developed a sample tracking system which monitors the progress of analyses by subcontracted laboratories. This alerts project personnel to the impending Level 3 status of chemical data. Knowing when data have reached Level 3 is important because only Level 3 data can be used in the assessment and recommendation process. As samples are sent to the laboratory, basic information about the samples is entered into the tracking system from the Chain-of-Custody forms. This entry allows a series of milestone dates to be established covering such items as analysis due date to planned Level 3 status. As well as tracking dates, the sample tracking system utilizes a field activity table to verify adherence to a predefined sampling work plan. All laboratory data deliverables are run through this system before uploading to the IRDMIS. Deviations in sampling schedule and/or anticipated analyses, data completeness, data formatting, and data quality are reviewed by ERM's QA coordinator using this system. Where laboratory errors are noted, these problems are conveyed to the DC project manager and a resubmission is prepared.

7.5.3 *Use of Mini-Computer-Based IRDMIS*

The mini-computer-based IRDMIS is the principle analytical data repository. It is the only source of Level 3 data from which assessments are made and reports produced. ERM data management personnel use the system to determine when data have reached Level 3 status and to generate chemical reports for further analysis or for inclusion in technical reports (e.g. site investigation reports). A variety of Level 3 data plotting

routines are available to assist in the assessment of chemical and hydrogeologic data.

7.6 *SOIL SAMPLE NUMBERING SYSTEM*

Soil samples collected will be two general types: shallow grab samples and samples collected from excavations during trenching operations.

For shallow grab samples collected from the land surface, the type will be PLUG and site IDs will be established following the system below:

xxxxyy

where

xxxx = site/area abbreviation, and

yy = sequential surface soil sample number for that site.

For soil samples collected from the trenching operations, the site type will be EXCV and the following identification system will be used:

wwwwxxyyzz

where

wwww = site/area abbreviation,

xx = trench number,

yy = sequential soil sample number for that trench, and

zz = modifiers identifying specific depths sampled.

The site/area abbreviations to be used are: CLF - Central Landfill; CDA - Group C Disposal Area; and within the Western Landfill, DA - Disposal Area and DT - Disposal trench.

Map coordinates and records for soil sample locations will be established prior to collection of the samples.

Environmental Resources Management, Inc., 1992. Final Supplemental Health and Safety Plan, Fort Wingate Depot Activity, Gallup, NM, Field Investigation, Preparation of the RI/FS Report, and Accelerated Transfer of the Southwest Property, Igloo Blocks A, B, and C, and the Ballistic Missile Site Areas.

Environmental Science and Engineering, 1981. Environmental Survey of Fort Wingate Depot Activity, Gallup, New Mexico 87301, Final Report.

Metcalf & Eddy, Inc., 1992a. Final Sampling and Analysis Plan, Volume II - Quality Assurance Project Plan (QAPP) for the Environmental Investigation (EI) at Fort Wingate Depot Activity (FWDA), Gallup, New Mexico

Metcalf & Eddy, Inc., 1992b. Final Technical Plan for the Environmental Investigation (EI) at Fort Wingate Depot Activity (FWDA), Gallup, New Mexico.

U.S. Army Toxic and Hazardous Materials Agency (USATHAMA) Quality Assurance Program, January 1990.

Appendix A

Regulatory Agency Comments/Correspondence

- *NMED Draft Comments, dated 16 October 1995*
- *USEPA Region VI Comments, dated 17 October 1995*
- *NMED Letter, dated 13 November 1995*

October 16, 1995

U.S. Army Environmental Center
SFIM-AEC-BCA
Aberdeen Proving Ground
Edgewood Area, MD 21010-5401
ATTN: Tim Alexander

DRAFT

RE: Comments on the FWDA Debris Piles and Burial Sites Work Plans

Dear Mr. Alexander:

The New Mexico Environment Department (NMED) is in receipt of the work plans for Fort Wingate Depot Activity (FWDA) entitled "Debris Piles and Burial Sites, ELIN A005," submitted by Environmental Resources Management, Inc. (ERM) on behalf of the U.S. Army Environmental Center (USAEC) on September 18, 1995. NMED generally agrees with the proposed approach for characterizing the Group C disposal area debris piles and the Central and Western landfills with the following conditions:

1. Trenching of landfills is not recommended. In fact, trenching requires prior approval from the NMED Solid Waste Bureau because it is classified as excavation of closed cells. The Department recommends that you perform borings to characterize the waste. This is the standard procedure prior to any excavation. Approval of excavation plans is contingent upon characterization of the waste through borings to define specific quantity, types and location of wastes to be excavated. A specific worker safety plan and contingency plan for dealing with emergencies (like encountering hazardous wastes) must be filed with the solid waste bureau.

2. Following the characterization of the wastes deposited in the Group C and Central and Western landfill areas, NMED understands that the USAEC will implement closure of the sites according to the New Mexico Solid Waste Management Regulations (EIB/SWMR-4). Therefore, screening action levels determined for other areas of the FWDA will not be pertinent to the closure of the landfills. All landfills containing municipal solid waste are subject to the closure and post-closure care requirements of the NM Solid Waste Management

Regulations. Specific plans will need to be submitted for approval. Landfills closed prior to 1989 do not require such plans. Those closed before October 31, 1992 are subject to the requirements in the 1989 regulations (EIB/SWMR-2). Landfills closed between October 31, 1992 and August 17, 1994 are subject to the requirements of the 1992 regulations (EIB/SWMR-3). Landfills closed after August 17, 1994 are subject to current (1994) regulations (EIB/SWMR-4).

The Solid Waste Bureau needs to be advised of the closing dates of the landfills. Please include specific plans for submittal of closure/post-closure care plans in conformance with the NM Solid Waste Management Regulations. This information should be directed to David Duran, Manager, Solid Waste Bureau/Permitting Section, (505) 827-2950.

3. The arroyos in the Group C disposal area are actively meandering and incising. Therefore, it would take some engineering to stabilize the sediment and debris trenched from this area. Precautions must be taken by the contractors in order to prevent this material from violating New Mexico's stream standards.

NMED appreciates your efforts to comply with New Mexico's environmental protection regulations with regard to the closure of facilities at Port Wingate. If I can be of assistance please contact me at (505) 827-1044.

Sincerely,

DRAFT

Chris Whitman
Geologist
Remediation Section, GWPRB

CFW/cfw

cc: Larry D. Fisher, Tooele Army Depot
Charles R. Hendrickson, USEPA Region VI
Garth Graves/Terry Nelson, NMED District I
Phillip Solano, NMED-HRMB
David Duran, NMED-SWB
Cecilia Brown, NMED-SWQB

OCT 17 1995

Mr. Larry Fisher
BRAC Environmental Coordinator
Environmental Management Division
Tooele Army Depot
Tooele, Utah 84074-5000

RE: Debris Piles and Burial Sites Work Plan
Fort Wingate Depot Activity, New Mexico
EPA I.D. # NM6213820974

Dear Mr. Fisher:

We have reviewed the above-referenced document, dated September 18, 1995, provided by the U.S. Army Environment Center. As discussed earlier, we expect these areas to be closed under State of New Mexico landfill closure requirements, which will be addressed by the New Mexico Environment Department (NMED). The Environmental Protection Agency (EPA) Region 6 approves the work plan with the following comments for your consideration and for incorporation into the work plan:

1. Section 5.3.2.1: Please provide details, in the project report, on the method/equipment used in the geophysical investigation.

2. Section 5.5.1: The water source should also be approved by the NMED.

3. Table 6-3: EPA quality control guidelines require at least one rinsate blank and one field blank per day of sampling, and one rinsate blank per 10 samples. Since five days of sampling are planned, there should be at least five of each of these blanks.

4. Tables 6-5 & 6-8: The laboratory Certified Reporting Limits (CRL's) for water matrices exceed EPA Maximum Contaminant Levels (MCL's) for vinyl chloride, antimony, arsenic, cadmium, and thallium. This deficiency should not affect

6PD-N:CHendrickson:KO:A:Disk:x2196:10/16/95:DEBRISWP.W51

6PD-N
OWEN

this work plan since no ground water sampling is proposed. However, if the NMED requires ground water sampling at any or all of these sites, an analytical method with CRL's below the MCL's will be required.

We appreciate the opportunity to review this work plan. If you have any questions concerning the above comments, or if we can be of further assistance in this matter, please contact Mr. Chuck Hendrickson at (214) 665-2196.

Sincerely yours,

David Neleigh, Section Chief
New Mexico - Federal Facilities
Multimedia Planning and
Permitting Division

cc: Mr. Chris Whitman
New Mexico Environment Department
Mr. Tim Alexander
U.S. Army Environmental Center
Mr. Phillip Solano
New Mexico Environment Department

State of New Mexico
ENVIRONMENT DEPARTMENT
Harold Runnels Building
1190 St. Francis Drive, P.O. Box 26110
Santa Fe, New Mexico 87502
(505) 827-0169

CARY E. JOHNSON
GOVERNOR

MARK E. WEIDLER
SECRETARY

EDGAR T. THORNTON, III
DEPUTY SECRETARY

November 13, 1995

Harold K. Oliver
Director, Industrial Risk Management
Department of the Army
Tooele Army Depot
Tooele, Utah 84074-5000

Dear Mr. Oliver:

Thank you for your letter of October 30, 1995 providing additional justification for limited excavation of central and western landfills located within the Fort Wingate depot in New Mexico. Mr. Don Beardsley of my staff was subsequently provided with the opportunity to tour the locations on November 2, 1995.

It appears that there is some potential for encountering metals and unexploded ordinance during characterization of landfill which makes augering impractical for this application. Therefore, the Department approves characterization of these two landfills using the trench method under the controlled conditions described in the work plan and safety plan dated September 18, 1995.

Based on the dates provided for closure, the Western landfill is subject to the closure, post closure requirements of the 1989 Regulation (EIB SWMR-2). If the Western landfill closed after October 9, 1991, it also has to meet the cap requirements contained in 40 CFR Part 258. The Central landfill is subject to the requirements of the 1992 Regulations (EIB SWMR-3) however, the Department recommends closure under the 1994 Regulations (EIB SWMR-4) since they incorporate the federal cap design under 40 CFR Part 258 and allow the Department to approve alternate cap designs. I have included copies of those requirements for your review. A Groundwater Monitoring Plan or specific justifications for not requiring monitoring, needs to be addressed for each landfill.

Post-it™ brand fax transmittal memo 7671 | # of pages ▸ 2

To Tim	From Chris
Co. AEC	Co. NM ED
Dept. Base Closure	Phone # 827-1044
Fax # (410) 671-1635	Fax # (505) 827-2965

The Department appreciates your cooperation in developing proper closure and post closure care plans for these facilities. Please let me know if you have any questions or need additional information.

Sincerely,

J. David Duran
Manager
Permit Section
Solid Waste Bureau

enclosures

cc: Pat Flynt, Office of the Assistant Chief of Staff for Installation Management
Robin Mills, Office of the Assistant Chief of Staff for Installation and Management
Pete Cunanan, U.S. Army Material Command
Susan Allemeier, Headquarters, Industrial Operations Command
Timothy Alexander, U.S. Army Environmental Center
Milton L. Seekins, Office of the Secretary of the Army
Bill Birney, Office of the Assistant Secretary of the Army
Chris Whitman, Geologist, NMED Groundwater & Remediation Bureau
Garth Graves/Terry Nelson, NMED Dist. I, Albuquerque

FINAL

FORT WINGATE DEPOT ACTIVITY GALLUP, NM

CONTAMINATED MATERIALS HANDLING PLAN

DEBRIS PILES AND BURIAL SITES

Prepared for
U.S. ARMY ENVIRONMENTAL CENTER
ABERDEEN PROVING GROUND, MARYLAND 21010

Prepared by
ENVIRONMENTAL RESOURCES MANAGEMENT, INC.
855 Springdale Drive
Exton, PA 19341

Delivery Order No. DA10

ERM JOB NO. 00311

6 December 1995

TABLE OF CONTENTS

1.0 INTRODUCTION

The purpose of this Base-Wide Debris Piles and Burial Sites Investigation Contaminated Materials Handling Plan (CMHP) is to outline procedures to control contaminated materials, and materials resulting from the proposed site operations (e.g., excavation, decontamination, etc.) at the Fort Wingate Depot Activity (FWDA), Gallup, NM. The work elements described within this document will be conducted by Environmental Resources Management, Inc. (ERM) of Exton, PA, as Delivery Order No. DA10, under the Army Total Environmental Program Support (TEPS) contract (Contract DAAA15-91-D-0011) issued by the U.S. Army Environmental Center (USAEC), Aberdeen Proving Ground, MD.

This CMHP has been prepared as an integral component of the Base-Wide Debris Piles and Burial Sites Investigation Work Plan. The associated project documents for the Base-Wide Debris Piles and Burial Sites Investigation include:

- The overall Delivery Order Work Plan consisting of the Field Sampling Plan and the CMHP, prepared by ERM, dated 6 December 1995;
- Final Sampling and Analysis Plan, Volume II - Quality Assurance Project Plan (QAPP), prepared by Metcalf & Eddy, Inc., dated 6 November 1992, as amended 6 December 1995 by ERM to encompass the current field investigation activities; and
- Final Supplemental Health and Safety Plan (HASP), prepared by ERM, dated 18 December 1992, as amended 6 December 1995 by ERM to encompass the current field investigation activities.

1.1 BACKGROUND

The scope of this Delivery Order is to perform environmental sampling activities to investigate and evaluate identified debris piles and burial sites at the installation and prepare required decision documents. This CMHP has been prepared to address potential contaminated materials generated from the field investigation activities planned for the debris piles and burial sites under this Delivery Order (e.g., excavation of trenches and decontamination procedures).

Previous environmental investigation (EI) activities conducted on the FWDA have identified two types of waste disposal sites which require further evaluation:

1. Debris piles that have been observed within arroyos near Igloo Block C. These piles have been designated the Group C Disposal Area.

2. Two (2) burial sites where non-hazardous material was believed buried and covered with native soils. These burial sites have been designated the Central Landfill Area and Western Landfill Area.

The location, nature, volume and extent of the buried materials, and thickness of cover at the burial sites will be evaluated to provide the information necessary to properly close these sites in compliance with New Mexico and federal solid waste management regulations.

2.0 CONTAMINATED MATERIALS MANAGEMENT

Field activities undertaken in accordance with the approved work plan will result in the generation of solid and liquid wastes, known as investigation-derived wastes (IDW). IDW will include materials resulting from site operations such as trenching and equipment decontamination. It is anticipated that little, if any, of these materials will be contaminated to an extent that poses a risk to human health or the environment. However, the following section describes the guidelines for the management and disposal of contaminated materials.

2.1 IDENTIFICATION OF OPERATIONS POTENTIALLY GENERATING CONTAMINATED MATERIALS

The proposed field investigation activities to be implemented are trenching, and surface and subsurface soil sampling. These operations could potentially generate the following contaminated materials:

- soils/waste removed during trench excavation,
- used personal protective equipment, and
- decontamination fluids.

2.2 CONTAMINATED MATERIALS MANAGEMENT PROTOCOLS

2.2.1 Solid

All excavated soil from trenching activities will be stockpiled downwind of the trench on plastic sheeting. As soil is excavated, it will be visually inspected for staining, asbestos, and obvious signs of contamination. Excavated soil will be placed on the sheeting so it can be returned to the trench in the same order that it was removed. This will minimize disturbance of the buried material. In the event of rain or snow, or if the stockpiled material cannot be backfilled into the excavation that same day, the stockpiled material will be covered with plastic sheeting. Once all soil has been returned, the trench will be compacted using the bucket of the excavator. Where trenches are cut into a slope or exposed bank of an arroyo, additional steps may be necessary to stabilize the area after disturbance caused by excavation. In unstable areas, backfilled and compacted trenches will be covered with gravel or appropriately-sized stone to maintain stability. Sediment control fences will also be installed approximately half way between the arroyo channel and the nearest end of the trench to inhibit trench material from entering the arroyo channel.

Soil samples will be collected during trenching operations to evaluate the potential presence of contaminants. These samples will be analyzed for target analyte list (TAL) metals, target compound list (TCL) volatile organic compounds (VOCs), TCL semi-volatile organic compounds (SVOCs), pesticides/polychlorinated biphenyls (PCBs), explosives, and nitrate/nitrite, as discussed in Section 3.0 of the Field Sampling Plan. Because the purpose of this field effort is to gather information necessary to confirm closure of the debris piles and burial sites, excavated materials will be returned to each excavation in the order removed. Therefore, no solid IDW will be generated during this field effort except non-hazardous trash and used personnel protective equipment (PPE) which will be placed in plastic bags and disposed of as municipal waste.

In the event that soil or waste is generated requiring management as IDW, the following procedures will be implemented. Analytical results obtained for samples collected from the soil, or waste, will be reviewed. Should analytical results indicate that the sampled material is contaminated, additional samples of stockpiled IDW may be necessary to characterize the waste. A composite sample will be collected from the IDW. These samples will be analyzed for SVOCs, metals, pH, PCBs, flash point, toxicity characteristic leaching procedures (TCLP), reactivity, ignitability, and corrosivity. Results of sample laboratory analysis will be used to determine if the generated IDW is would be classified as hazardous waste, special waste (according to New Mexico Solid Waste Management Regulations [NMSWMRs]), or does not pose a threat to human health or the environment.

2.2.2 *Liquid*

Decontamination of excavation equipment will be performed over a temporary decontamination area located in close proximity to the area of investigation. The decontamination area will consist of a field constructed earthen excavation, approximately 3 feet in depth and 10 feet in width and length. Berming around the area will be constructed with excavated soil and the area will be lined with plastic sheeting (e.g., 30-mil.) anchored by the earthern berm. Wastewater generated during decontamination will be contained in this area and allowed to evaporate. Therefore, no liquid waste is anticipated to be generated. In the event of rain or snow, the decontamination area will be covered with plastic sheeting. At the completion of field efforts and when evaporation of accumulated liquids is complete, the plastic sheeting will be placed in plastic garbage bags and disposed of as municipal waste. Separate decontamination areas will be constructed near the Group C Disposal Area, Western Landfill Area, and Central Landfill Area.

In the event that liquid IDW is generated, composite samples of the liquid IDW will be collected, analyzed, and evaluated as discussed in Section 2.2.1.

2.3 TRANSPORTATION OF CONTAMINATED MATERIALS

2.3.1 Solid

Prior to transport, all solid waste will be identified and classified in a manner to ensure compliance with applicable federal, state, and local regulations. References such as chemical dictionaries, material safety data sheets (if available), and generator information will also be used in the waste classification process.

2.3.1.1 *Hazardous Waste*

Upon receipt of analytical results and/or classification as hazardous waste, the waste material will be containerized in Department of Transportation (DOT) approved 55-gallon drums or roll-off containers. The drums or containers will be labeled and marked to meet applicable U.S. Environmental Protection Agency (USEPA) and DOT requirements. The waste material will also undergo DOT classification prior to transport. The soil will be classified as to the transportation hazard posed. Classification procedures will comply with the Hazardous Materials Table (HMT CFR 172.101) or the definitions of DOT hazard classes listed in 49 CFR 173.

All material to be transported will be documented on a packing list. Information on this list will include, but not be limited to, generator name and location, USEPA identification (ID) number, chemical names and waste composition, amount/weight, DOT shipping description, USEPA or State waste codes, outer shipping container size and type, disposal method, approvals, and individual waste container number.

Prior to transport, a Hazardous Waste Manifest and Land Disposal Restriction form will be prepared. All manifesting will be performed in accordance with federal and state regulations. Trucks used for transport will be placarded in accordance with placarding procedures described in 49 CFR, Subpart F - Placarding.

Drums will be loaded and braced to prevent movement during transport. The drums will be loaded in accordance with federal and state laws. Hazardous waste will be transported by a company which is fully licensed and insured to transport hazardous waste.

2.3.1.2 *Special Waste*

Solid IDW classified as Special Waste according to NMSWMRs will be placed in trucks, covered, and transported to a permitted special waste disposal facility. All material transported will be documented on a packing list as described in Section 2.3.1.1.

2.3.2 *Liquid*

Prior to transport, all liquid waste will be identified, classified, and transported in a manner to ensure compliance with applicable federal, state, and local regulations.

Liquid IDW will be placed in drums or vacuum trucks for transport to a disposal facility. Other classification, documentation, and handling procedures for liquid IDW will be as described in Section 2.3.1 for solid IDW.

2.4 *TREATMENT/DISPOSAL OF CONTAMINATED MATERIALS*

2.4.1 *Solid*

Solid hazardous waste will be treated/disposed at a RCRA permitted treatment, storage, and disposal (TSD) facility. Solid IDW classified as special waste will be disposed of at a landfill permitted to receive this material according to NMSWMRs.

2.4.2 *Liquid*

Liquid hazardous waste will be treated/disposed at a RCRA permitted TSD facility. Non-hazardous liquid waste will be treated/disposed at a TSD facility approved for non-hazardous wastes.