REGULATORY AGENCY REVIEW

FORT WINGATE DEPOT ACTIVITY
GALLUP, NM

FINAL OPEN BURNING/OPEN DETONATION AREA RCRA INTERIM STATUS CLOSURE PLAN PHASE IB - CHARACTERIZATION AND ASSESSMENT OF SITE CONDITIONS FOR THE GROUND WATER MATRIX

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LIST OF ACRONYMS

bgs	below ground surface
Blackhawk	Blackhawk Geometrics, Inc.
BMDO	Ballistic Missile Defense Organization
CDP	Common depth point
CFP	Closure Field Program
CMHP	Contaminated Materials Handling Plan
cm/sec	centimeters per second
COR	Contracting Officer's Representative
CPS	Closure Performance Standard
CY	Calendar year
ERM	ERM Program Management Company
ESPS	Environmental Services Program Support
EWG	Elastic wave generator
FSP	Field Sampling Plan
FWDA	Fort Wingate Depot Activity
DGPS	Differential Global Positioning System
GWQB	Ground Water Quality Bureau
HASP	Health and Safety Plan
HMX	Cyclotetramethylenetetranitramine
HRMB	Hazardous and Radioactive Materials Bureau
Hz	Hertz
MCL	Maximum Contaminant Level
NMED	New Mexico Environment Department
OB/OD	Open Burning/Open Detonation
OBDA	Open Burning Detonation Area
PMC	Program Management Company
QAPP	Quality Assurance Project Plan
RBL	Risk-based Screening Level
RCRA	Resource Conservation and Recovery Act
RDX	Hexahydro-1,3,5-trinitro-1,3,5-triazine
SEI	Safe Environment, Inc.
SPB	Seismic Profile Boring
TAL	Target Analyte List
TAT	Turn-around-time
TDS	Total dissolved solids

LIST OF ACRONYMS (continued)

TOC	Total organic carbon
TSS	Total suspended solids
UCL	Upper Confidence Limit
USACE	U.S. Army Corps of Engineers
USEPA	U.S. Environmental Protection Agency
USGS	U.S. Geological Survey
UXO	Unexploded ordnance
%	Percent

ES.0 EXECUTIVE SUMMARY

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

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

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

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

Phase I – Characterization and Assessment of Site Conditions;

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

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

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

The environmental characterization efforts described in this Final Phase IB Report were focussed on the identification and assessment of ground water, soil borings, surface water, and sediment in the OB/OD Areas. The Final Phase IA Report, which has been provided under separate cover, focuses on soil, burning/detonation debris and residues, and other solid matrix materials within the OB/OD Areas.

ES.1 GROUND WATER INVESTIGATIONS

Ground water investigations have been conducted in the Closed and Current OB/OD Areas during calendar years (CYs) 1996, 1997, 1998, and 1999. These efforts consisted of monitoring well installation and sampling, a seismic profile survey, ground water elevation measurements, a well survey, geologic mapping, surface water sampling, and sediment sampling.

ES.1.1 1996 Investigation

A ground water investigation was performed in the OB/OD Areas in CY 1996 to assess the presence and quality of shallow ground water and characterize the shallow hydrogeologic regime. This investigation consisted of drilling and sampling of soil borings, completion of shallow and intermediate depth monitoring wells, performance of downhole video logging and slug tests on newly-installed monitoring wells, and collection of ground water, surface water, and sediment samples.

Three wells were installed in the Closed OB/OD Area and 11 wells were installed in the Current OB/OD Area. Explosive constituents were detected in wells installed within the Closed and Current OB/OD Areas, but the areal extent of contamination was not defined. Because of the water quality results and uncertainty associated with the hydrogeology, further subsurface characterization of the Current OB/OD Area was required to define the distribution of ground water and assess potential ground water transport pathways.

ES.1.2 1997 Investigation

Subsurface characterization efforts were conducted during CY 1997 to obtain additional data concerning the stratigraphy and structural setting of the OB/OD Areas. This investigation consisted of a surface seismic survey, borehole installation and logging, geologic mapping, and fracture trace analysis.

Data collected during the CY 1997 subsurface characterization and previous field efforts were compiled and interpreted to select the model that most likely describes the hydrogeologic setting of the OB/OD Areas. Two ground water systems have been identified in the OB/OD Areas. Uplifted and tilted sandstone and shale units forming a significant ridgeline known as the Hogback physically separate the ground water systems.

ES.1.2.1 Closed OB/OD Area Ground Water System

The Closed OB/OD Area ground water system contains the portion of the Closed OB/OD Area (Old Demolition Area) located west of the Hogback. In this area, a thin veneer of unconsolidated materials is present overlying a thick shale unit (Mancos Shale Formation) that is dipping steeply westward. Results of the CY 1997 characterization efforts were used to identify locations for monitoring wells proposed for completion in CY 1998. The wells were located to provide background ground water quality data, evaluate impacts to shallow ground water from identified waste disposal areas, determine the direction of shallow ground water flow within the Closed OB/OD Area ground water system, and evaluate the potential for migration of contaminated ground water toward the west, following the structural dip of the bedrock.

ES.1.2.2 Current OB/OD Area Ground Water System

The Current OB/OD Area ground water system contains the Current OB/OD Area and portions of the Closed OB/OD Area (Old Burning Ground and Demolition Landfill Area) located east of the Hogback. In this area, a thin veneer of unconsolidated materials is present overlying a thick sequence of shale units belonging to the Chinle Formation.

The seismic survey identified the Sonsela Sandstone Member as the water-bearing zone where explosive compounds were detected. The Sonsela Sandstone Member was correlated toward the upgradient direction (south) to identify the potential source of the explosive compounds. It can be concluded that shallow ground water, in contact with waste/residue areas within the Current OB/OD Area, is dissolving explosives and transporting these constituents into the Sonsela Sandstone Member. From the Current OB/OD Area, ground water within the Sonsela Sandstone Member migrates down dip, in a northern direction. Results of the CY 1997 characterization efforts were used to identify locations for monitoring wells proposed for completion in CY 1998. Monitoring well locations were selected to identify the downgradient extent of explosives in ground water.

ES.1.3 1998 Investigation

Hydrogeologic characterization efforts were performed in CY 1998 to confirm the conceptual hydrogeologic model of OB/OD Areas, confirm potential ground water transport pathways, and install a compliance monitoring well network. This investigation consisted of the completion of drilling and sampling of soil borings, installation of monitoring wells, electric logging and slug tests on newly-installed monitoring wells, alluvial and bedrock ground water sampling, an installation-wide ground water elevation survey, an off-site well identification survey to evaluate potential receptors, and focussed geologic mapping.

ES.1.3.1 *Closed OB/OD Area Ground Water System*

Within the Closed OB/OD Area ground water system a thin veneer of unconsolidated material was identified that grades into competent shale of the Mancos Shale Formation. No ground water was detected in the unconsolidated materials, but ground water flow within this material would generally follow topography and be toward the center of the valley. Thus, the unconsolidated materials in the Closed OB/OD Area ground water system may act as a closed basin with limited lateral movement of shallow ground water.

Shallow ground water was encountered in the Mancos Shale Formation and the Dakota Sandstone Formation. An additional boring drilled into the Dakota Sandstone Formation in the location thought most likely to receive infiltration of surface water and shallow ground water contained no free water throughout the entire thickness of the Dakota Sandstone Formation. No evidence of contamination was identified in any of these locations. Thus, it is considered unlikely that installation activities have impacted the Dakota Sandstone Formation. Future impact to this formation is also considered unlikely.

ES.1.3.2 *Current OB/OD Area Ground Water System*

Within the Current OB/OD Area ground water system, a thin veneer of unconsolidated materials is present overlying a thick sequence of shale units belonging to the Chinle Formation. Water table conditions are present only within the thin unconsolidated materials present on top of the weathered shale bedrock. This shallow ground water may discharge to surface water pools within the Current OB/OD Area arroyo; however, no evidence of significant surface water flow has been observed since October 1996. Based upon these data, the potential of exposure to shallow ground water via its discharge to surface water is thought to be sporadic; therefore, this is not considered to be a complete exposure pathway.

Ground water flow within the weathered and competent shale bedrock, located in the Current OB/OD Area, is dominated by fracture flow. It is considered likely that the Sonsela Sandstone Member subcrops beneath the unconsolidated materials and fractured shale located in and near the arroyo of the Current OB/OD Area. Shallow ground water in contact with the waste/residue areas appears to be dissolving explosives and transporting these constituents into the Sonsela Sandstone Member. From the Current OB/OD Area, ground water within the Sonsela Sandstone Member migrates down dip, in a northern direction. A monitoring well network has been installed along this flow path that characterizes the ground water system and provides a compliance monitoring well network.

Intense structural deformation associated with formation of the Hogback prevents correlation of lithologic units from the eastern and central portions of the Current OB/OD Area ground water system toward the western portion. This lack of correlation precludes identification of the ground water flow paths in a westward direction.

Extensive shale units underlying the Current OB/OD Area ground water system, being of inherently lower primary permeability than surrounding sandstone units, inhibit vertical movement of ground water to underlying potable aquifer units, such as the Glorieta Sandstone. The shale units also restrict movement of potentially impacted ground water from the Current OB/OD Area down dip toward the west. If limited transport of impacted ground water toward the west were to occur, it would be at a significantly greater stratigraphic depth than the overlying Dakota and Gallup Sandstones, which are used as potable ground water sources in areas west of FWDA. Thus, it is considered highly unlikely that exposure to this ground water would occur, and this is not considered a complete exposure pathway.

ES.2 CHEMICAL DATA ASSESSMENT

The chemical data derived from the sampling and analysis of ground water, soil, sediment, and surface water samples were assessed by comparison to select environmental quality benchmark values. Chemical data were sequentially screened against: 1.) Area-specific background values, 2.) Screening criteria including U.S. Environmental Protection Agency (USEPA) Maximum Contaminant Levels (MCLs) and USEPA Region VI risk-based screening levels (RBLs), and 3.) Closure Performance Standards (CPSs) developed for the OB/OD Areas. RBLs based upon a residential exposure scenario were used as screening criteria. The RBLs provide a conservative bias during this stage of the data assessment process. Because the OB/OD Areas will be held under Army control in perpetuity, CPSs that are based upon more realistic future exposure scenarios were also used to evaluate the data.

ES.2.1 *Closed OB/OD Area Ground Water System*

Three monitoring wells were installed within Closed OB/OD Area ground water system, two screened within the Mancos Shale Formation and one screened within the Dakota Sandstone Formation. The only constituent detected in the Mancos Shale Formation ground water that exceeded the CPS was ammonia. No constituent concentrations detected in ground water from the Dakota Sandstone Formation exceed the CPSs.

Four borings were completed in the Closed OB/OD Area ground water system. Three of these were completed as monitoring wells; one did not encounter free water and was abandoned. Soil samples were collected from the four borings and submitted for chemical analyses. No soil constituent concentrations exceeded the CPSs.

Ten sediment samples were collected in the Closed OB/OD Area. Selected constituent concentrations exceeded the CPSs, but were not detected in the sediment samples located downgradient. Phosphorus exceeded the CPS; however, this does not necessarily represent an unacceptable risk to human health under the selected future land use scenarios.

Ten surface water samples were collected in the Closed OB/OD Area. No constituents were present at concentrations exceeding background levels in the most downgradient sample; thus, it does not appear that dissolved contaminants are being transported out of the Closed OB/OD Area via surface water flow.

ES.2.2 *Current OB/OD Area Ground Water System*

Sixteen bedrock monitoring wells were installed within the Current OB/OD Area ground water system, ten screened within undifferentiated intervals of the Chinle Formation, one screened within the Painted Desert Member, four screened within the Sonsela Sandstone Member, and one screened within the Entrada Sandstone Formation. The concentrations of a single explosive compound and five metal/inorganic constituents exceeded the CPSs in wells screened within the undifferentiated Chinle Formation. Two metals were detected at concentrations exceeding the CPSs in the well screened in the Painted Desert Member. Three inorganic/metal constituents were detected at concentrations exceeding the CPSs in wells screened within the Sonsela Sandstone Member. The only constituent detected in the Entrada Sandstone Formation that exceeded the CPS was ammonia.

Thirty-three borings were completed in the Current OB/OD Area ground water system. Eighteen of these were completed as monitoring wells. Soil samples were collected from the borings and submitted for chemical analyses. Two inorganic/metal constituents were detected in soils at concentrations exceeded the CPSs.

Fifteen sediment samples were collected from 10 locations in the Current OB/OD Area. No sediment constituent concentrations exceeded the CPSs.

Eighteen surface water and alluvial ground water samples were collected in the Current OB/OD Area. Explosive compounds were detected in seven of the samples, and between five and 17 individual inorganic/metal constituents were detected at concentrations greater than background. It does not appear that dissolved explosives are being transported out of the Current OB/OD Area via surface water flow.

ES.3 SUMMARY AND CONCLUSIONS

ES.3.1 Closed OB/OD Area Ground Water System

It is considered unlikely that installation activities have impacted ground water within the Dakota Sandstone Formation which is used a source of potable water. It is also considered unlikely that ground water in this formation will be impacted in the future. Monitoring of ground water quality within the Mancos Shale Formation and the Dakota Sandstone Formation is planned. Sampling will be conducted on a quarterly basis for the period of one year, starting in January 2000. At the end of four quarters of ground water monitoring, the results will be compiled and potential trends evaluated. At that time, the need for continued ground water monitoring will be assessed and discussed with the appropriate regulatory agencies.

ES.3.2 Current OB/OD Area Ground Water System

The potential of exposure to shallow ground water via its discharge to surface water is thought to be sporadic and is not considered a complete exposure pathway. The potential exposure to impacted ground water within the undifferentiated Chinle Formation is addressed by the potential exposure considerations for the Sonsela Sandstone Member. It is considered unlikely that installation activities have impacted ground water within the Entrada Sandstone Formation and the Dakota Sandstone Formation. It is also considered unlikely that ground water in these formations will be impacted in the future, or that exposure to this ground water would occur. Therefore, exposure to ground water within these formations is not considered to be a complete pathway.

Ground water contamination was delineated in the Painted Desert Member and the Sonsela Sandstone Member. Ground water flow within these intervals is toward the north, following the bedrock dip and topography. Monitoring wells located downgradient of the lateral extent of contaminated ground water provide downgradient sentinel monitoring wells screened in these intervals.

Future monitoring of ground water quality within the Chinle Formation, Painted Desert Member, and Sonsela Sandstone Member is planned. Sampling will be conducted on a quarterly basis for the period of one year, starting in January 2000. At the end of four quarters of ground water monitoring, the results will be compiled and potential trends evaluated. At that time, the need for continued ground water monitoring will be assessed and discussed with the appropriate regulatory agencies.

1.0 *INTRODUCTION*

This deliverable (ELIN A009) is the Final Phase IB Report for the environmental characterization of the ground water matrix at the Open Burning/ Open Detonation (OB/OD) Areas at Fort Wingate Depot Activity (FWDA), Gallup, NM. The work elements described within this document were conducted by Program Management Company (PMC) [Formerly ERM Program Management Company (ERM)] of Exton, PA. This document is being prepared to fulfill requirements of Delivery Order No. 0005, under the Army Environmental Services Program Support (ESPS) contract (Contract DACA31-94-D-0067). Contracting Officer's Representative (COR) and technical oversight responsibilities for the tasks described in this document were provided by the U.S. Army Corps of Engineers (USACE), Fort Worth District.

1.1 *PURPOSE/OBJECTIVE*

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

- Description of regional and site-specific geology and hydrology to develop a conceptual model of the hydrogeologic regime;
- Development of background ground water constituent concentrations for the OB/OD Areas;
- Assessment of the extent of ground water contamination; and
- Characterization of fate and transport mechanism(s) for detected constituents of concern.

These tasks, which were an integral component of the OB/OD Areas Closure Field Program (CFP), have been performed to support the Final Resource Conservation and Recovery Act (RCRA) Interim Status Closure Plan process for the OB/OD Areas. The results, findings, and conclusions and recommendations of the environmental characterization efforts for ground water, soil borings, surface water, and sediment are presented in this Final Phase IB Report. All of the efforts conducted as part of Phase IB of the CFP were described in the following project support documents that were submitted as part of the Approved Final Interim Status Closure Plan (ERM, 1996a):

1996 Project Plans

- Final OB/OD Area CFP – Field Sampling Plan (FSP) and Contaminated Materials Handling Plan (CMHP), prepared by ERM, dated 21 May 1996 (ERM, 1996b);
- Final OB/OD Area CFP – Quality Assurance Project Plan (QAPP), prepared by ERM, dated 21 May 1996 (ERM, 1996c); and
- Final OB/OD Area CFP - Health and Safety Plan (HASP), prepared by ERM, dated 21 May 1996 (ERM, 1996d).

1997 Project Plans

- Final OB/OD Area Work Plan - prepared by ERM, dated 1 August 1997 (ERM, 1997a); and
- Final HASP – prepared by ERM, dated 1 August 1997 (ERM, 1997b).

1998 Project Plans

- Final OB/OD Area Work Plan - prepared by PMC, dated 29 May 1998 (PMC, 1998a);
- Final FSP – prepared by PMC, dated 9 June 1998 (PMC, 1998b);
- Final QAPP – prepared by PMC, dated 9 June 1998 (PMC, 1998c); and
- Final HASP – prepared by PMC, dated 17 June 1998 (PMC, 1998d).

1.2 OVERVIEW

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

FWDA is situated in northwestern New Mexico, in McKinley County. The installation is located 8 miles east of Gallup, and approximately 130 miles west of Albuquerque on US Route 66 (Figure 1-1). The installation itself contains approximately 150 miles of internal roads. FWDA is bordered on the west by Zuni tribal lands, on the south and east by the

Cibola National Forest, and on the north by Red Rock State Park. Although the history of FWDA dates back to 1850 (Old Fort Wingate), almost all of the present installation facilities were constructed after 1941.

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

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

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

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

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

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

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

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

The focus of the environmental characterization efforts described in this Draft Report is on ground water and surface water within the OB/OD Areas.

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

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

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

1.3 *OB/OD OPERATIONS*

1.3.1 *Closed OB/OD Area*

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

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

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

1.3.2 *Current OB/OD Area*

The Current OB/OD Area is located on the eastern side of the Hogback, south of Fenced-up Horse Valley (Figure 1-3). This area is approximately 38 acres in size and includes a number of detonation craters and the Burning Ground Area. In addition, an arroyo bisects the area, traversing (downstream) from south to north. The Current OB/OD Area was actively utilized between 1955 and January 1993.

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

1.3.3 *Regulatory Status of OB/OD Operations*

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

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

A Modification to the Final Interim Status Closure Plan was submitted to NMED on 23 May 1994 (ERM, 1994a). The results of preliminary environmental characterization efforts conducted within the OB/OD Areas, conclusions, and modified (i.e., non-clean closure) conceptual proposed closure approach were presented in the Modification. Several comments that required additional investigation were provided by NMED in a Notice of Deficiency (NOD) letter to the Army dated 26 August 1994 (NMED, 1994b). These comments were considered during preparation of a Draft Final Interim Status Closure Work Plan, dated November 1994 (ERM, 1994b), which presented a generalized approach to characterization of the OB/OD Areas.

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

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

On 21 May 1996, the Army submitted to NMED the Final RCRA Interim Status Closure Plan (ERM, 1996a). This submittal incorporated the Final

CFP Work Plans, consisting of the aforementioned FSP and CMHP (ERM, 1996b), QAPP (ERM, 1996c), and HASP (ERM, 1996d).

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

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

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

Because of safety concerns related to the presence of UXO, as well as seasonal site access limitations related to winter weather, and fiscal year funding cycles of the federal government, the CFP for the OB/OD Areas was conducted over a number of summer field seasons. The data presented in this Final Phase IB Report were derived from field sampling efforts conducted in 1996, 1997, 1998, and 1999 and are focussed on ground water, soil borings, surface water, and sediments within the OB/OD Areas. Completion of these efforts represents Phase IB of the CFP. The results of Phase IA of the characterization/assessment effort, which was focussed on the soils, burning/detonation debris and residues, and other solid matrix materials within the OB/OD Areas, have been reported in a separate Final Phase IA Report (PMC, 1999).

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

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

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

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

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

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

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

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

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

Items 1 and 2, as described above, have been comprehensively addressed in the Phase IA Report (PMC, 1999). Item 3, which sought to estimate the potential for the migration to ground water of contaminants derived from the detonation activities by assessing the ability of the detonations to fracture the underlying bedrock and create ground water conduits, was not conducted (as discussed in Section 2.8; PMC, 1999). Ground water evaluation (Item 4) is the primary focus of this Phase IB Report.

Item 5 has been addressed in Phase IA Report (PMC, 1999). Items 6 and 7 will be addressed in future phases of the closure process.

1.4 GEOLOGY OF THE OB/OD AREAS

Geologic mapping of the OB/OD Areas was performed in Calendar Year (CY) 1997 by the U.S. Geological Survey (USGS) located in Flagstaff, Arizona. Mapping tasks are described in Section 2.2.4 of this report. Results are presented below to provide a detailed description of the geologic and stratigraphic setting of the OB/OD Areas.

Geologic Summary

FWDA is underlain primarily by Triassic mudstone and sandstone layers that are tilted gently to the northwest. In the western and southern portions of the installation, however, Jurassic and Cretaceous sandstone and shale layers are exposed along the Nutria Monocline (the 'Hogback'), which is a steeply west dipping, north trending monoclinal fold.

Stratigraphy

The Petrified Forest Formation (Triassic) comprises greater than 75 percent of the surface exposure at FWDA and all of the exposed rock east of the Hogback within the OB/OD Areas (Figures 1-4 and 1-5). The Petrified Forest Formation consists primarily of mudstone, shale, and minor amounts of muddy sandstone. A middle member consisting of a thick, continuous sandstone layer (Sonsela Sandstone Member) separates the upper and lower members.

The Painted Desert Member is the upper member of the Petrified Forest Formation. This consists of mudstone, siltstone, sandy-mudstone, and lenticular sandstone layers. Sandstone lenses within the Painted Desert Member are thin (less than 20 feet thick), laterally discontinuous, and contain high quantities of very fine, muddy matrix. As a result, the apparent permeability of these lenses, and the Painted Desert Member as a whole, is very low.

The Sonsela Sandstone Member has a variable thickness (20 to 80 feet thick) and is laterally continuous. This unit is a clean, well-sorted, quartzose sandstone that contains very small amounts of matrix and therefore has a high apparent permeability. Below the Sonsela Sandstone Member is the lower member of the Petrified Forest Formation, the Blue Mesa Member. The lithology and apparent permeability of the Blue Mesa Member is similar to that of the Painted Desert Member.

Younger Jurassic and Cretaceous sandstone and shale layers are exposed along the Hogback from the main arroyo in the Current OB/OD Area west to the FWDA boundary. The Jurassic Entrada Sandstone, Zuni Sandstone, and Morrison Formation account for approximately 1,200 feet of section and consist of massive, cross-bedded sandstones with a high apparent permeability. To the west, and stratigraphically above these units, is a series of Cretaceous shales and sandstones including the Dakota Sandstone (approximately 200 feet thick), the Mancos Shale (approximately 600 feet thick), and the Gallup Sandstone (approximately 200 feet thick). These sandstone layers typically have a high quantity of muddy matrix and a moderate apparent permeability.

The stratigraphy of the eastern portion of the Closed OB/OD Area is consistent with the description in the preceding paragraph. The stratigraphy is much less complex in the western portion of the Closed OB/OD Area where bedrock exposures are dominated by the Mancos Shale.

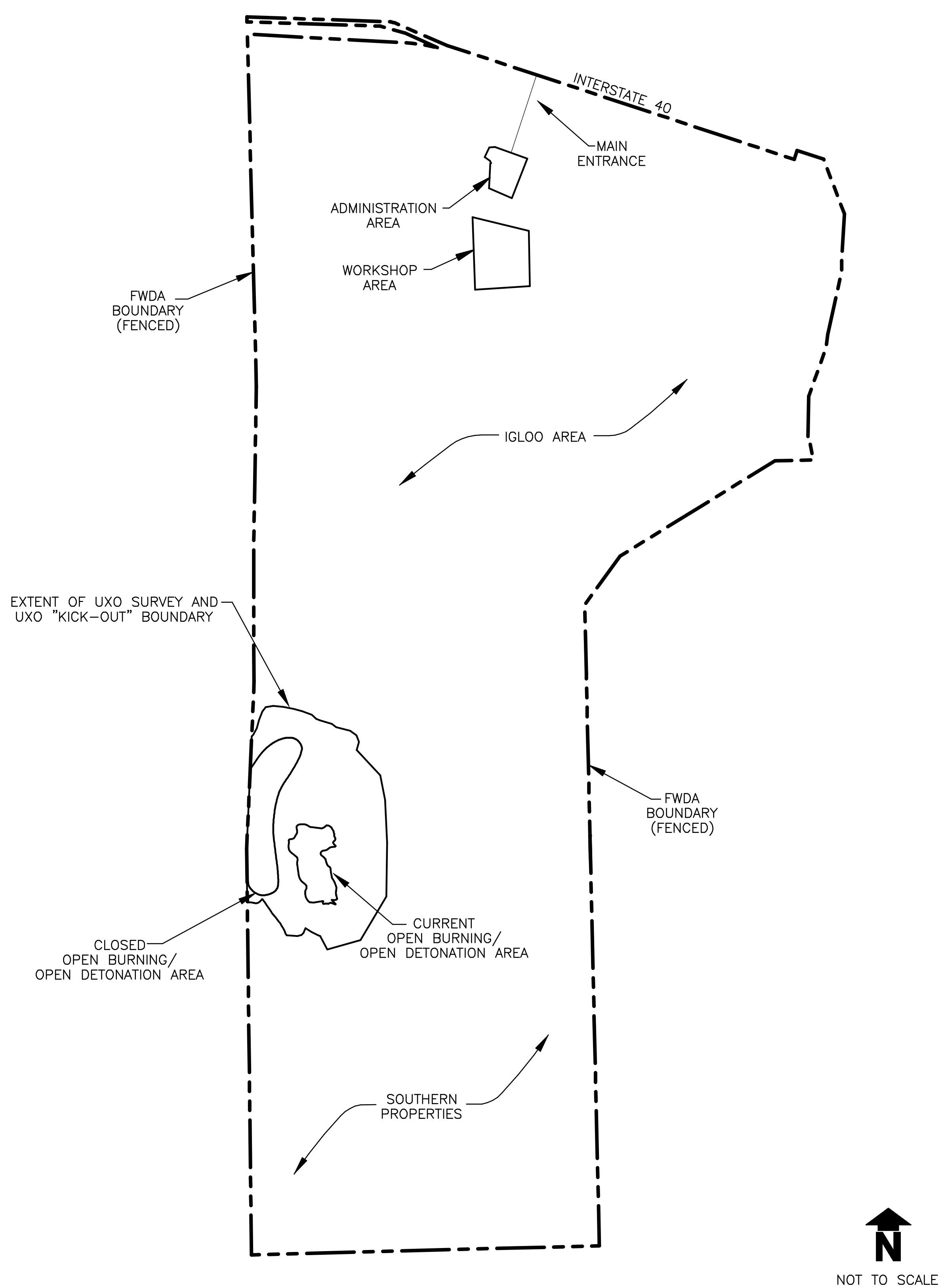
Sub-surface rocks below the Current OB/OD Area include the lower Petrified Forest Formation, the Moenkopi Formation, the San Andres Limestone, and the Glorieta Sandstone. The lower Petrified Forest Formation and the Moenkopi Formation consist of 250 to 300 feet of mudstones and sandstones with a relatively low apparent permeability. Below this is approximately 100 feet of the San Andres Limestone underlain by approximately 120 feet of the Glorieta Sandstone. A major reflecting surface, identified in the seismic data at a depth of approximately 700 feet below ground surface (bgs), was interpreted to be the top of the San Andres/Glorieta Aquifer.

Structural Geology

As the Hogback is approached from the east, the orientation of bedding changes sharply from a gentle northwest dip to a steep westerly dip of approximately 60 degrees along the north-trending Nutria Monocline. The fold axis, which is cut by steeply dipping, roughly north-south trending faults, bisects the Current OB/OD Area and the eastern portion of the Closed OB/OD Area along the eastern face of the Hogback. The Painted Desert Member of the Petrified Forest Formation is exposed along this fold axis throughout the Current OB/OD Area and the eastern portion of the Closed OB/OD Area. Bedding is probably discontinuous across the fold axis, as a result of faulting within the subsurface, however, these faults may not extend to the surface in many locations.

Rock fractures (joints) are present in most sandstone units throughout the geologic section. These steeply dipping joints are oriented primarily northwest-southeast and northeast-southwest. They are typically closed to tight, bedding-confined, and do not contain mineral deposits. This suggests a lack of previous ground water transport along these joints. Joint surfaces with demonstrable offset of less than 15 centimeters indicate small amounts of left-lateral slip accommodating east-west bending in the monoclinal fold axis of the Hogback. This small-scale slip along the fractures has been interpreted as a consequence of the monoclinal fold axis being slightly oblique to the regional shortening direction.

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



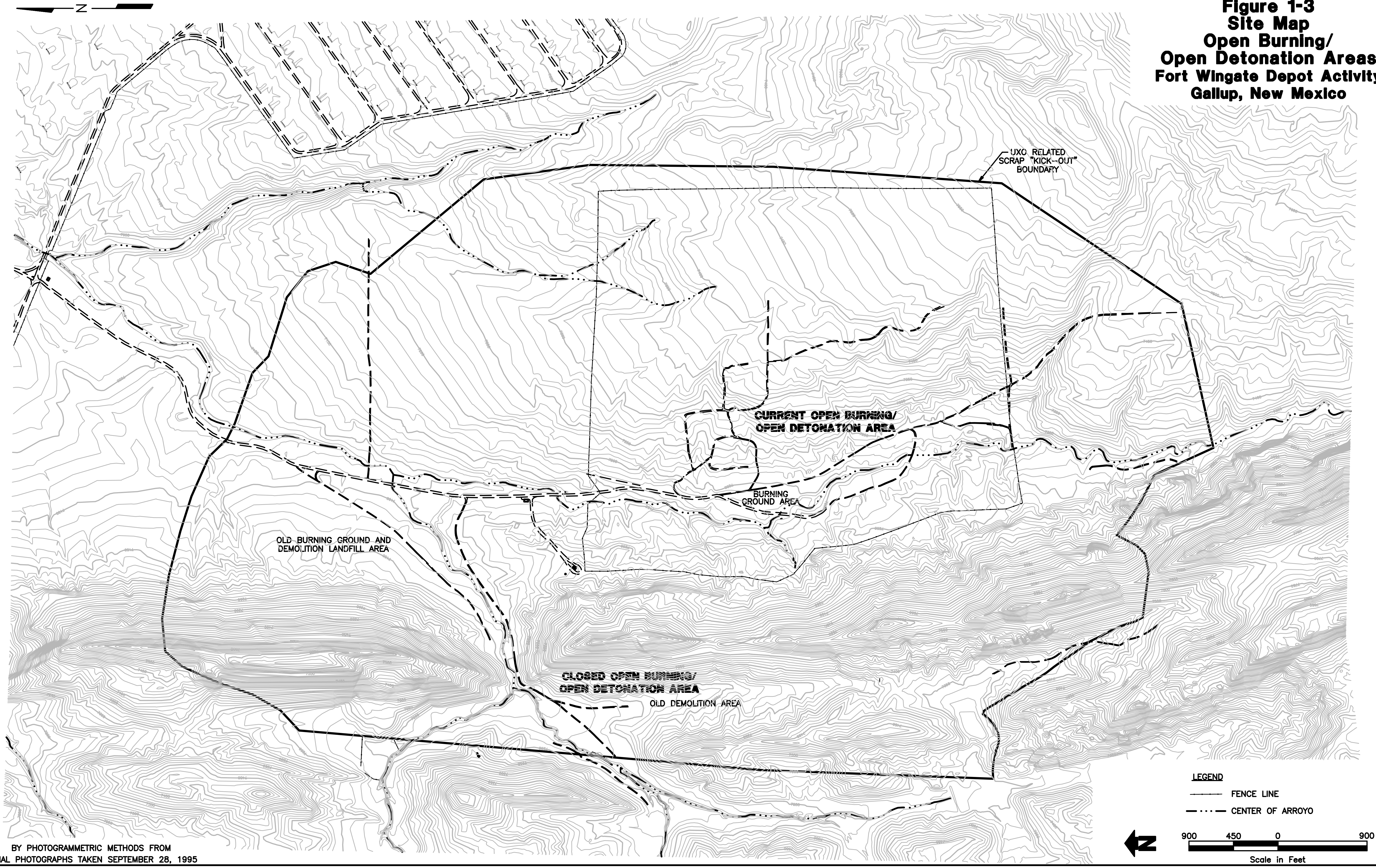


Figure 1-3
Site Map
Open Burning/
Open Detonation Areas
Fort Wingate Depot Activity
Gallup, New Mexico

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

Fort Wingate Depot Activity
Gallup, New Mexico

United States Army Industrial Operations Command
Tooele Army Depot, Utah

Program Management Company
Exton, Pennsylvania 19341 (610) 280-5000

PMC

CHECKED	DATE
DESIGN ENGINEER	
PROJECT ENGINEER	
PROJECT MANAGER	
APPROVED	
APPROVED	

Figure 1-4
Geologic Map
OB/OD Areas

DRAWN	DATE	CLIENT APPROVAL	
D. Taylor/DST	10.20.99/12.14.99.99		
SCALE	W.O. No.	ISSUED FOR	DATE
1" = 400'	00805.80.05/13013C		

DRAWING NO.

REV. NO.

SHEET OF

2.0 GROUND WATER INVESTIGATIONS

Ground water investigations have been conducted in the Closed and Current OB/OD Areas during CYs 1996, 1997, 1998, and 1999. These efforts (Table 2-1) consisted of monitoring well installation and sampling, a seismic profile survey, ground water elevation measurements, a well survey, geologic mapping, surface water sampling, and sediment sampling. The objectives and results of each are described in the following sections.

2.1 1996 INVESTIGATION ACTIVITIES

A ground water investigation was performed in the OB/OD Areas in CY 1996 to assess the presence and quality of shallow ground water and characterize the shallow hydrogeologic regime. This investigation consisted of drilling and sampling of soil borings, completion of shallow and intermediate depth monitoring wells, performance of downhole video logging and slug tests on newly-installed monitoring wells, and collection of ground water, surface water, and sediment samples (Table 2-1).

Two conceptual models were initially proposed to describe potential ground water flow in the OB/OD Areas. In the first model, the arroyo bisecting the Current OB/OD Area was viewed as part of a losing stream system. All shallow ground water base flow would be derived from infiltration of surface water from periodic stream flow in the arroyo. The lateral extent of shallow ground water would be limited to areas immediately adjacent to the arroyo.

In the second model, the arroyo was viewed as part of a gaining stream system. The shallow ground water surface (i.e., the water table) generally would follow the land surface contours adjacent to the arroyo and, therefore, shallow ground water would flow downgradient toward the arroyo from the surrounding highlands. In this model, the lateral extent of the shallow ground water would not be limited to the immediate vicinity of the arroyo.

2.1.1 Soil Boring and Monitoring Well Installation and Sampling

The rationale for selection of soil boring and monitoring well locations is summarized in Table 2-2. This table also explains deviations from the FSP (ERM, 1996a) that were required based upon field conditions. Soil boring and monitoring well locations are shown in Figure 2-1 (Appendix A).

Survey data are presented Appendix I. Copies of soil boring logs and monitoring well construction diagrams are found in Appendices B and C, respectively. Table 2-3 presents monitoring well construction details and Table 2-4 presents well development data.

Shallow well locations were selected to provide data concerning changes in ground water quality from upstream to downstream areas along the arroyo and to determine the lateral extent of ground water perpendicular to the axis of the arroyo. Interconnection between shallow ground water and deeper aquifers did not appear to be likely based upon the regional geology and field observations. It was anticipated that bedrock beneath the OB/OD Areas would be shale, and intermediate depth monitoring wells were designed to confirm the presence of an aquitard.

One well, KMW10, was installed into a westward dipping aquifer to evaluate if contamination was migrating down dip from the eastern portion of the Closed OB/OD Area. The well location was selected because it was thought most likely to receive recharge from surface water or shallow ground water that had been in contact with waste.

Arroyo sediment borings were drilled within the Closed OB/OD Area arroyo using a hand auger and soil samples were collected from the depth intervals of 0.5 to 1.0 feet bgs, 2.5 to 3.0 feet bgs, and 4.5 to 5.0 feet bgs. The soil samples were analyzed for explosives, Target Analyte List (TAL) metals, and total phosphorous. Total phosphorus was added based upon the discovery of munitions containing phosphorus (white and red) during UXO survey activities in the Closed OB/OD Area.

Soil borings for the installation of monitoring wells were advanced using either a hand auger or hollow stem auger drilling methods. Soil samples were collected continuously for lithologic logging from the ground surface to the depth of auger refusal. Air rotary drilling methods were used to advance the boreholes to the depth of first water. For the boreholes completed using a drill rig, soil samples were collected using split spoon sampling methods. Samples for laboratory analysis were collected at five-foot intervals and from the lower-most interval. All soil samples collected during borehole drilling were analyzed for explosives and TAL metals. In addition, soil samples from the Closed OB/OD Area were also analyzed for total phosphorous based upon the discovery of munitions containing phosphorus (white and red) during UXO survey activities.

Downhole video surveys were performed at CMW10, CMW14, CMW16, CMW19, KMW09 and KMW10 to aid in the identification of water-producing zones. The videos were studied to determine the intervals to be screened in the completed wells.

Slug tests were performed on selected newly-installed wells located in the Closed and Current OB/OD Areas. This aquifer test provides an estimate of the hydraulic conductivity of the screened interval of the well. Slug-in and slug-out measurements were collected and analyzed using the Bouwer-Rice methodology (Bouwer and Rice, 1976).

Ground water samples were collected from monitoring wells in the Closed and Current OB/OD Areas in October 1996 and February 1997. Ground water samples from the Current OB/OD Area were analyzed for explosives, TAL metals (total and dissolved) and Total Dissolved Solids (TDS). Samples from the Closed OB/OD Area were analyzed for the same suite of parameters plus total phosphorous based upon the discovery of munitions containing phosphorus (white and red) during UXO survey activities.

Ground water level measurements were also collected from all of the wells in the Closed and Current OB/OD Areas during one 12-hour period. This was done in October 1996 and February 1997. A contemporaneous set of water levels is collected to evaluate the direction of ground water flow. Collection of ground water levels during different seasons allows an evaluation of seasonal changes in ground water levels and flow direction.

2.1.2 *Surface Water and Sediment Sampling*

Ten co-located surface water and sediment samples (Figure 2-1, Appendix A) were collected from within a dry arroyo that bisects the Closed OB/OD Area during a storm event in September 1996. The sediment samples were analyzed for explosives, TAL metals, salinity, total phosphorus, total organic carbon (TOC), and pH (Table 2-1). The surface water samples were analyzed for explosives, TAL metals, TDS, total suspended solids (TSS), hardness, salinity, and total phosphorus, except for KSW01 and KSW10 which were not analyzed for TDS because of insufficient volume.

Five co-located surface water and sediment samples (Figure 2-1, Appendix A) were collected from within a dry arroyo that bisects the Current OB/OD Area during a storm event in September 1996. Samples were not collected at the remaining five locations during this sampling event because no surface water was present. The surface water samples were analyzed for explosives, TAL metals, TDS, TSS, hardness, and salinity. Sediment samples were collected in October 1996 from ten locations, five of which had been sampled in September (Table 2-1). No surface water was present during the October 1996 sampling event; thus, no co-located surface water samples were collected at that time. The sediment samples were analyzed for explosives, TAL metals, salinity, TOC, and pH.

2.1.3 1996 Investigation Results

.2.1.3.1 Closed OB/OD Area Results

Three wells (KMW09 through KMW11) were installed in the Closed OB/OD Area with finished depths ranging from 63 to 108 feet bgs. At two of the three wells (KMW09 and KMW11) the materials encountered during drilling generally consisted of 25 feet of silt and sand, overlying up to 80 feet of sandy or silty clay. The sandy/silty clay materials were interpreted as being components of shale with variable competence. Air rotary drilling methods were used below the depth of auger refusal during the installation of these wells and it is likely that subsurface materials were broken and ground during the drilling action.

The location of KMW10 was selected based upon the presence and measured dip angle (approximately 55 degrees) of a sandstone/siltstone outcrop exposed in the Closed OB/OD Area arroyo. KMW10 was drilled in a location approximately 100 feet west of the observed outcrop. This distance was selected as sufficient to allow water to enter the sandstone and be detected as ground water. The anticipated borehole depth was calculated based upon the distance from the outcrop, thickness of the outcrop, and dip angle. It was anticipated that approximately 150 feet of drilling would be required to penetrate the entire thickness of the siltstone/sandstone of the targeted westward dipping aquifer.

In KMW10, the targeted westward dipping aquifer was encountered below 30 feet of silt and sand. Drilling continued through a siltstone/sandstone to a total depth of 173 feet bgs. KMW10 was installed in the first water-bearing zone of the westward dipping aquifer, at a depth of approximately 170 feet bgs. Considering that the anticipated drilling depth was based upon field measurements and geometric calculations, the lithologies encountered at KMW10 are considered consistent with those anticipated at this location.

Slug tests were conducted at KMW09 and KMW11. Hydraulic conductivities ranged from 1.7 X 10^{-5} centimeters per second (cm/sec) to 4.6 X 10^{-5} cm/sec (Table 2-5). These values are indicative of a mixture of silt and clay (Driscoll, 1986), and the lithology described in the boring logs supports this conclusion. Copies of the hydraulic conductivity graphs are provided in Appendix D.

Explosive constituents were detected at KMW09 only, at a ground water depth of approximately 100 feet bgs. No explosive constituents were detected in the westward dipping aquifer well (KMW10). Further discussion and evaluation of analytical results is presents in Section 3.0.

2.1.3.2 *Current OB/OD Area Results*

Eleven wells (CMW02, CMW04, CMW06, CMW07, CMW10, CMW14, and CMW16 through CMW20) were installed in the Current OB/OD Area with finished depths ranging from 3 to 137 feet bgs. The materials encountered during drilling generally consisted of 20 feet of silt and sand, overlying up to 150 feet of silty clay with thin layers of shale or sandstone. Similar to the Closed OB/OD Area, these materials were thought to be components of a shale unit that were broken and ground while employing air rotary drilling methods.

Slug tests were conducted at CMW02, CMW04, CMW07 and CMW17. Hydraulic conductivities ranged from 5.8×10^{-6} cm/sec to 6.6×10^{-5} cm/sec (Table 2-5). These values are indicative of a mixture of silt and clay (Driscoll, 1986), and the lithology described in the boring logs supports this conclusion. The value for CMW17 (5.8×10^{-6} cm/sec), is an order of magnitude lower than the other wells and may indicate an increased amount of clay. Copies of the hydraulic conductivity graphs are provided in Appendix D.

Water level data collected in October 1996 (and again in February 1997) indicated that the distribution of hydraulic heads within the Current OB/OD Area was complex and did not appear to fit either of the relatively simple conceptual models proposed. Table 2-6 presents ground water elevation data for this and subsequent rounds of sampling.

Explosives were detected in ground water samples from six of the wells (CMW06, CMW16, CMW17, CMW18, CMW19, and CMW20). The highest concentrations of explosives were detected in ground water at CMW18, collected at an approximate depth of 45 feet bgs. The most downgradient well (CMW16) was found to contain explosives at a ground water depth of approximately 30 feet bgs. Further discussion and evaluation of analytical results is presented in Section 3.0.

2.1.4 *1996 Investigation Conclusions*

Explosives were detected at wells installed in the Closed and Current OB/OD Areas but the areal extent was not defined. Explosives were not detected in the westward dipping aquifer, indicating that contaminant migration down dip was not occurring at this location within the Closed OB/OD Area.

Based on these results, three supplemental conceptual models were developed for the OB/OD Areas and were discussed in the OB/OD Area Work Plan (ERM, 1997a). The supplemental models represented three alternative hydrogeologic scenarios. Because of the water quality results and the uncertainty associated with the hydrogeology, further subsurface characterization of the Current OB/OD Area was required to define the distribution of ground water and assess potential ground water transport pathways.

2.2 *1997 INVESTIGATION ACTIVITIES*

Subsurface characterization efforts in the Current OB/OD Area during CY 1997 consisted of a surface seismic survey, borehole installation and logging, geologic mapping, and fracture trace analysis. The objective of these activities was to obtain additional data concerning the stratigraphy and structural setting of the Current OB/OD Area. Table 2-1 summarizes these efforts. Table 2-2 summarizes the rationale for each boring and explains any deviations from the work plan.

2.2.1 *Seismic Survey*

The initial plan for the survey was to collect data along five transect lines oriented generally east-west across the valley and one transect line oriented generally north-south through the center of the valley (Figure 2-2). Modifications in the program were made in the field based upon site conditions and access. The northern-most seismic line oriented in the east-west direction (Line 5) was moved to a position south of its proposed location. The revised location was selected to provide data near the northern boundary of the property, which was proposed to remain under Army control following closure. The north-south trending seismic line (Line 6) was extended approximately 1,300 feet beyond the northern-most and southern-most east-west oriented seismic lines to improve the quality of the data at the tie point with the southern-most east-west line (Line 1).

2.2.1.1 *Survey Design*

The seismic method chosen for the geophysical survey was based on the objectives of the survey. Seismic reflection is well suited to imaging the structure of several subsurface horizons. Prior to the survey it was not known if seismic reflection data of sufficient quality could be acquired in the OB/OD Areas. For this reason, an initial test phase was planned to evaluate both seismic reflection and seismic refraction. If the seismic reflection field test did not produce good quality data seismic refraction would be used to image the upper lithologic units. General information regarding the seismic reflection method is contained in the Seismic Reflection Survey Report (Blackhawk Geometrics, Inc. [Blackhawk], 1999). A copy of this report is included in Appendix E.

Both subsurface imaging and health and safety considerations guided the initial survey design. Based on previous drilling and knowledge of the surface geology, the subsurface targets included steeply dipping strata, at least one large reverse fault, and a variable thickness, low-velocity, unconsolidated surface layer. The health and safety concerns stem from the abundance of UXO throughout the OB/OD Areas. During munitions disposal activities in the area, ordnance items were sometimes distributed a considerable distance from the detonation site. Although a concentrated effort had previously been made to remove UXO from the OB/OD Areas, surface and subsurface UXO clearance was performed along each of the seismic lines in a 10-foot wide swath to provide safe corridors in which the seismic survey could be conducted.

To effectively image the near-surface lithology, a small receiver spacing was needed for either seismic method. Because the investigation targets also included deeper lithologic horizons, it was critical to plan for a sufficient offset between the source and farthest geophone. The initial specifications included a minimum of 96 recording channels, a 5-foot geophone station spacing, testing of single, clustered, and small linear geophone arrays, and a split-spread configuration. The station spacing was increased to 10 feet to achieve an offset capable of imaging the probable depth of the Glorieta formation (700 feet). A 120-channel, 24-bit Geometrics Strataview seismograph recording system was used for the survey. The geophones selected were single component 40-hertz (Hz) resonant frequency geophones, which are capable of recording frequencies in excess of 500 Hz.

The seismic source was chosen to minimize the possibility of sympathetic detonations of UXO. With this objective in mind, no explosives or ammunition-based sources were considered for the survey. Impulse sources such as a hammer or weight drop and vibratory sources were tested. The impulse source tested was a Bison Elastic Wave Generator (EWG) and the vibratory source was an iVi Minibuggy vibrator. The EWG is a pickup truck mounted weight drop source. The weight of approximately 75 pounds, is picked up by a hydraulic system, and is accelerated downward by thick rubber bands which are stretched over the weight. The Minibuggy source uses a hydraulic system to generate vibrations that are translated to the ground surface by a base plate. The Minibuggy is capable of generating frequencies from 10 to 300 Hz.

As an added safety measure, a ground motion vibration test was performed for each of the sources in an area known to be cleared of UXO. Although no data were available regarding the critical ground acceleration required for sympathetic detonation of UXO in the area, a qualitative evaluation was made using a vibration monitor. The monitor selected for this survey was a Vibratech MultiSeis.

2.2.1.2 *Field Testing*

The field testing for the feasibility segment of the survey began on 11 August 1997. Line 4 of the survey was chosen for the field testing because it was on a road, which improved its accessibility and decreased the probability of encountering UXO.

2.2.1.2.1 *Ground Motion Vibration Testing*

Vibration monitor measurements were performed in an area thought to be most likely free of UXO. Peak particle velocity was compared for varying offsets from each of the energy sources. The vibration monitor was stepped out in 2-foot intervals and measurements made at each location to a maximum offset of 10 feet. The EWG had a greater peak particle velocity than the Minibuggy in the near offsets, but had greater decay of energy with increasing offset. The opinion of the UXO contractor, Safe Environment Inc. (SEI), was that the 10-foot buffer planned for each of the seismic line corridors would be sufficient to avoid sympathetic detonation of UXO, given the observed vibrations.

2.2.1.2.2 *Reflection Survey Testing*

Geophones were planted 10 feet apart on the east end of Line 4 for the initial spread location of the reflection survey. The source was placed between the first and second geophone for testing of the source signal parameters. The source strength of the EWG was not sufficient to image the deeper horizons or to reach the longer offsets and the overall data amplitude was not sufficient for use as a reflection seismic source. Several parameters were tested for the Minibuggy including the sweep and the spread geometry. The sweep for a vibratory source refers to one transmitted signal. Sweep parameters that can be varied for a vibratory source include starting and ending vibratory frequency, sweep duration or length, sweep repetition at each source location, and duration of the signal at a given frequency. If the signal spends an equal amount of time at each frequency within the sweep, it is referred to as a linear sweep. A non-linear sweep can be programmed to emphasize either the lower or higher frequencies, depending on the survey objectives. Frequency ranges of 20 to 120, 30 to 180, 40 to 180, 40 to 240, and 80 to 240 Hz were tested using a linear sweep. The duration ranged from 4 to 8 seconds with up to four repetitions. The selected parameters were a frequency range of 30 to 180 Hz, with four, 6-second sweeps per source location.

The source location was then moved up through the spread to the mid-point to determine the source-receiver geometry. A split-spread configuration was planned as this geometry better images steeply dipping strata because both up-dip and down-dip travelling waves are recorded at the same source location. An asymmetric split-spread was chosen with the source located between channels 35 and 36. No frequency filters were used during data acquisition. These filters are often used in the presence of electrical utilities or other frequency-dependent noise sources. None of these types of noise sources were present in the OB/OD Areas.

2.2.1.2.3 *Refraction Survey Testing*

A refraction test spread was collected in the same location as the reflection test spread was acquired. The EWG was used as the source for this test, because an impulse source produces a more distinct refraction event than a vibratory source does and a refraction survey does not require as much energy penetration as reflection does. The refraction data was of useable quality, however, this method was not chosen for acquisition of the rest of the survey. Reflection data provides more information regarding the deeper horizons of interest and fault definition and was considered more appropriate with respect to the survey objectives.

2.2.1.2.4 *Methodology Chosen for Seismic Acquisition*

The parameters chosen for acquisition of the remainder of the seismic survey consisted of the Minibuggy source, 120 recording channels and a 10-foot geophone spacing. The vibratory signal generated by the Minibuggy had a frequency range of 30 to 180 Hz, with four, 6-second sweeps per source location. Each source point was located between the pair of geophones that recorded channels 35 and 36. The ends of each line were recorded by "rolling through" the spread. This means that at the beginning of the line the source is placed between channels one and two, the source is moved until it reaches channels 35 and 36, and then the position of the recorded geophones moves with the source, maintaining its position between channels 35 and 36. Similarly, at the end of the line the source moves from channels 35 and 36 through the end of the geophone positions.

The location of each of the seismic survey lines was surveyed using Differential Global Positioning System (DGPS) technology. Horizontal coordinates and ground surface elevations were recorded at a maximum spacing of 50 linear feet along the ground surface. Ground surface elevations were collected at closer intervals in areas of steep topography and at changes in slope. DGPS data were collected to a horizontal and vertical accuracy of ± 1 foot.

Processing of the seismic data was performed to compensate for factors such as the geometry of the source relative to the receivers, the velocity of the subsurface materials, and other properties of the subsurface strata. The seismic survey and DGPS data were then combined to create seismic profiles of each survey line.

2.2.1.3 *Surface Seismic Reflection Acquisition*

The parameters selected during the field testing were used to collect the five east-west lines and one north-south line. A total of 27, 800 linear feet of surface seismic survey was performed. During all operations the UXO subcontractor cleared every source and geophone location, as well as all access routes. While in the OB/OD Areas, personnel were escorted at all times by the UXO subcontractor. Further details regarding the data acquisition and production schedule are contained in the Seismic Reflection Survey Report (Blackhawk, 1999) (Appendix E).

2.2.1.4 *Seismic Data Processing*

Veritas DGC GeoServices of Denver, Colorado processed the seismic reflection data from this survey. The procedures used to process the data are typical of procedures used to process oil and gas industry data. Although the exploration targets for oil and gas surveys are typically located at depths of several thousand feet, rather than the tens or hundreds of feet targeted by this survey, the signal processing objectives are the same for both surveys. The types of processing needed for reflection data include re-ordering of the seismic traces from the "shot gather" to the "common depth point (CDP) gather" format. A gather is a set of recorded traces, with the shot gather being those collected together from a single source point in the field and a CDP gather being those traces from a given subsurface reflection point. The records require compensation for the source signature (deconvolution), the variable elevations along the lines (statics), travel time from the source to the receiver (velocity analysis), various types of both organized and random noise, and energy scattering (migration). Some types of noise present in seismic records are expected and organized and some types are random and disorganized. A variety of spatial and frequency filters can be used to suppress unwanted noise from the records and to emphasize the desired reflection events. A summary of the processing parameters used for the OB/OD Areas seismic reflection data is contained in the Seismic Reflection Survey Report (Blackhawk, 1999) (Appendix E). The final product of the processing sequence is a cross section type display showing the seismic traces as horizontal distance and travel time.

2.2.2 *Borehole Installation and Logging*

Two borings were installed on Line 2 (Figure 2-2) to identify the lithologic formations present in the upper 250 feet and to perform a downhole velocity survey (check-shot). The borings were given the designations Seismic Pilot Boring (SPB) 1 and 2. Air rotary drilling methods were used and lithologic logs of the boreholes were created based upon cuttings. SPB 1 was drilled to a depth of 251 feet bgs and a stratigraphic log was completed (Appendix B). However, problems maintaining the integrity of the borehole occurred during electrical logging, and cave-in resulted. The subsequent depth of SPB 1 was 120 feet bgs. SPB 2 was drilled and a stratigraphic log completed to 250 feet bgs (Appendix B). Subsequently, cave-in occurred and the depth was reduced to 190 feet bgs. Downhole electrical and geophysical logging were conducted across these reduced depths.

Electric logging of boreholes SPB 1 and SPB 2 was performed by Southwest Geophysical Services, Inc., of Farmington, New Mexico. Each of these boreholes was logged using caliper, induction-resistivity, conductivity, and gamma ray methods. Copies of the electric logs are presented in Appendix F.

A downhole geophysical survey called a check-shot was performed on SPB 1 and SPB 2. The check-shot was conducted by placing a three-component downhole geophone in the boring and placing a seismic source on the surface. The two sources tested for the survey were a sledgehammer and the Minibuggy vibrator. It is often preferable to use the same seismic source for downhole surveys as was used for the surface survey. However, in this case, the sledgehammer provided sufficient energy and a more distinct first arrival, which is the event used to calculate the check-shot velocities. The results of the check-shot survey can be found in the Seismic Reflection Survey Report (Blackhawk, 1999) (Appendix E).

2.2.3 *Results and Interpretation*

2.2.3.1 *Borehole Logging*

The gamma ray log is a measurement of the natural radioactivity of the formations. In sedimentary formations the log normally reflects the shale content of the formations. This is because the radioactive elements tend to concentrate in clays and shales. Sandy formations usually have a very low level of radioactivity, unless radioactive materials such as volcanic ash or granite wash are present or the formation waters contain dissolved radioactive salts. (Schlumberger, 1989). In general, the formations present in the OB/OD Areas were not expected to have radioactive constituents present in the sandy units and an increased gamma ray reading was expected to represent clays or shales and a decreased response was expected to indicate the presence of sands.

Based upon the cuttings observed during drilling, SPB 1 encountered the Sonsela Sandstone Member at approximately 20 feet bgs and the top of the Blue Mesa Formation at approximately 60 feet bgs. SPB 2 appeared to encounter only the Painted Desert Formation.

Interpretation of seismic reflection data consists of correlation of reflection events across the seismic section display. The geological horizons of interest were identified during the drilling of borings SPB 1 and SPB 2, located along Line 2 (Figure 2-2). For stratigraphic intervals not represented by these boreholes, their depth was estimated based upon nearby thicknesses and regional dip of the strata. The velocity surveys collected at SPB 1 and SPB 2 were then used to estimate the seismic time that corresponded to the depth of the horizons of interest. Reflectors present at a given travel time were interpreted to represent a given geological interface.

2.2.3.2 *Seismic Survey*

The horizons mapped on the seismic sections were the top of the Sonsela Sandstone Member, the top of the Blue Mesa Member, the Middle Member of the Bluewater Creek Formation within the Chinle Formation, the top of the Moenkopi Formation, and the top of the Glorieta Sandstone

Formation. The Sonsela Sandstone Member was of interest because it is a relatively continuous, highly porous sandstone, which is used as a source of potable water in the vicinity of FWDA. The Glorieta Sandstone was chosen as a target for interpretation based on its use as a drinking water aquifer north of FWDA. Intermediate reflectors representing the other mapped horizons were chosen based on being either a high contrast interface, and thus an easily mapped reflector, or of lithological significance. Table 2-7 summarizes the range of interpreted depths for each of the formations along each of the seismic lines.

A number of faults were interpreted to be present on the seismic lines (Figures 2-3 through 2-5). Ideally, reflection events terminate sharply as the point of reflection reaches the fault plane and resume again in displaced positions on the other side of the fault. In addition, if the reflection has a sufficiently distinctive character, the two portions on opposite sides of the fault can be recognized and the fault throw determined (Telford et al., 1976). Fault orientations are often oblique to the cross sections, and hence the indicated sense of motion represents only one component of the true fault kinematics.

The cross sections along Lines 2 and 4 (and to a lesser extent, Lines 1 and 3) show the monoclinal axis of the Nutria Monocline being cut by apparent eastward-dipping reverse faults which are associated with the formation of the Hogback structure (Figures 2-3 and 2-4). A thrust zone composed of up to three faults is visible on most of the east-west seismic lines. To the west, in the up-thrown block of the monocline, several faults are present, with a normal component of slip, that appear to pre-date the reverse faults. The steeply westward dipping beds forming the Hogback are also visible in the western portion of Lines 2 and 4.

On the east side of the arroyo valley, a number of normal faults with a small amount of throw are present. In several areas, the upper sediments appear to have erosional features that may have been paleochannels that are either tributary or parallel to the present day arroyo. In the eastern-most portion of these cross sections, gently dipping beds, representative of the northern portion of FWDA, are visible.

The cross section along Line 6 is oriented north-south and parallels the monoclinal axis. The faulting strike is oriented parallel or sub-parallel to the seismic line (Figure 2-5). This gives the appearance on the Line 6 cross section of the fault trace displacing only a portion of the lithologic section and the lithologic section is either missing, in the case of a normal fault, or repeated, in the case of a reverse fault, along the fault trace between the interpreted horizons.

The Painted Desert Member is exposed at the ground surface in much of the Current OB/OD Area (Figure 1-4). The seismic cross sections indicate that this unit extends to a depth of approximately 50 feet within the Current OB/OD Area arroyo (Figure 2-3). The bottom of this unit increases with depth to approximately 300 feet bgs approaching the Hogback toward the west because of structural deformation. In the northeastern portion of the Current OB/OD Area ground water system, the bottom of the Painted Desert Member is approximately 250 feet bgs as a result of the regional northward bedrock dip (Figure 2-4). The presence of numerous faults has been interpreted in the seismic cross sections, but many of these faults probably do not extend to the ground surface and may not displace the entire thickness of the Painted Desert Member.

The Sonsela Sandstone Member is exposed at the ground surface in the southern portion of the Current OB/OD Area ground water system (Figure 1-4). Within the Current OB/OD Area, it has been interpreted to occur at a depth of approximately 50 feet bgs where it likely subcrops beneath the surface alluvium and Painted Desert Member, in the main areas of waste disposal within the arroyo (Figure 2-3). The Sonsela Sandstone Member was identified as the water-bearing zone in CMW-16 and then correlated in the downgradient direction to identify a probable migration pathway for ground water. In the northeastern portion of the Current OB/OD Area ground water system, the Sonsela Sandstone Member occurs at a depth of approximately 250 feet bgs (Figure 2-4). The seismic cross sections indicate that the thickness of the Sonsela Sandstone Member varies from approximately 80 to 140 feet (Figure 2-3). The presence of numerous faults has been interpreted in the seismic cross sections, many of which displace the entire thickness of the Sonsela Sandstone Member.

The Glorieta Sandstone Formation has been interpreted to occur at a depth of approximately 650 feet bgs within the Current OB/OD Area (Figures 2-3 through 2-5). The interval between the bottom of the Sonsela Sandstone Member and the top of the Glorieta Sandstone Formation consists of approximately 500 feet of bedrock composed predominantly of mudstone. Numerous faults in the seismic cross sections have been interpreted to extend into the Glorieta Sandstone Formation.

2.2.4 *Geologic Mapping and Fracture Trace Analysis*

Geologic mapping was performed by the USGS located in Flagstaff, Arizona. The objectives of the mapping were to identify geologic units exposed at the ground surface, their thickness, stratigraphic orientation, and evidence of structural deformation. A detailed analysis of the orientation and distribution of fracture joints and joint sets was also performed. Data were recorded regarding the location, orientation, size, opening, and nature of infilling of individual fractures. The results of mapping and fracture trace analysis were discussed in Section 1.4. Surficial materials and geologic structures identified in the OB/OD Areas are presented in Figure 1-4.

Information obtained during the geologic mapping and fracture trace analysis were incorporated with the results of the seismic survey and borehole logging. This assisted with identification of stratigraphic intervals and their correlation along seismic lines. It also identified surface and subsurface conditions, such as faults, that may affect ground water occurrence, movement, and recharge.

2.2.5 *Selected Conceptual Hydrogeologic Model*

Data collected during the CY 1997 subsurface characterization and previous field efforts were compiled and interpreted into a model that most likely describes the hydrogeologic setting of the OB/OD Areas. Seismic Line 2 (Figure 2-3) provides a detailed diagram of the hydrogeologic model of the OB/OD Areas. The formation of the geologic structures and resulting hydrogeologic setting of the OB/OD Areas is schematically represented in Figure 2-6. Reverse faulting uplifted overlying layers, creating an elevated surface feature. Faulting and fracturing along the axis of the geologic structure (trending generally north-south) caused a zone of weakness, which was preferentially eroded. This erosion resulted in the westward dipping beds in the west and the relatively flat beds to the east. Regional structural stresses caused deformation and faulting as seen in the interpreted seismic cross sections (Figures 2-3 through 2-5).

Two separate ground water systems have been identified in the OB/OD Areas and are discussed below (Figure 2-7). Ground water in these two systems is physically separated by sandstone and shale units of the Hogback that are topographically higher in elevation. West to east trending surface water flow through an arroyo connects these two ground water systems; however, surface water flow exists generally as high velocity, short duration events that are likely to result in minimal surface water infiltration into subsurface geologic intervals.

2.2.5.1 *Closed OB/OD Area Ground Water System*

The Closed OB/OD Area ground water system contains the portion of the Closed OB/OD Area located west of the Hogback (Old Demolition Area) (Figure 2-7). Monitoring well KMW09 is located within the Closed OB/OD Area ground water system. Based upon the hydrogeologic data collected, the other two monitoring wells drilled in the Closed OB/OD Area (KMW10 and KMW11) are physically separated from the area located west of the Hogback, therefore wells KMW10 and KMW11 are located within the Current OB/OD Area ground water system.

Within the Closed OB/OD ground water system, a thin veneer of unconsolidated materials is present overlying a thick shale unit (Mancos Shale) that is dipping steeply westward. These results are derived from the hydrogeologic data collected from one monitoring well drilled in this area in CY 1996 (KMW09). Hollow stem augers were used to drill to a refusal depth of 45 feet bgs at this location. This is likely where competent bedrock is first encountered in the subsurface. Below the depth of hollow stem auger refusal, air rotary drilling methods were used to advance the borehole to the depth of first water. The majority of the materials drilled using this method were logged as silty clay, which is consistent with a shale that has been pulverized by air rotary drilling.

As stated previously, ground water in the Closed OB/OD Area ground water system is physically separated from ground water located on the eastern side of the Hogback. Because there was only one monitoring well drilled in this area during CY 1996, ground water flow direction in the Closed OB/OD Area ground water system was unknown.

2.2.5.2 *Current OB/OD Area Ground Water System*

The Current OB/OD Area ground water system contains the Current OB/OD Area and portions of the Closed OB/OD Area located east of the Hogback (Old Burning Ground and Demolition Landfill Area) (Figure 2-7). Monitoring wells CMW02, CMW04, CMW06, CMW07, CMW10, CMW14, CMW16, CMW17, CMW18, CMW19, CMW20, FW38, KMW10, and KMW11 are located within the Current OB/OD Area ground water system.

Within the Current OB/OD Area ground water system, a thin veneer of unconsolidated materials is present overlying a thick sequence of shale units belonging to the Chinle Formation. These results are consistent with the hydrogeologic data collected from the monitoring wells drilled in CY 1996. Within the arroyo channel located in the Current OB/OD Area, boreholes drilled using a hand auger encountered refusal between the depths of 3 and 21 feet bgs. These refusal depths are likely the point where a highly weathered and fractured shale is first encountered in the subsurface. Hollow stem augers were used to drill selected boreholes in CY 1996, and refusal was encountered between the depths of 11 and 60 feet bgs; however, one borehole extended to a depth of 85 feet bgs without encountering refusal. The hollow stem auger refusal depths are likely the locations where competent bedrock is first encountered in the subsurface. Below the depth of hollow stem auger refusal, air rotary drilling methods were used to advance the boreholes to the depth of first water. The majority of the materials drilled using this method were logged as silty clay, which is consistent with a shale that has been pulverized by air rotary drilling.

The complex distribution of hydraulic heads observed in the monitoring wells installed in CY 1996 is consistent with the selected conceptual hydrogeologic model. Water table conditions are present only within the thin unconsolidated materials present on top of the weathered shale bedrock. Ground water flow within the weathered and competent shale bedrock, located below the thin unconsolidated materials, is dominated by fracture flow.

The direction of ground water flow within the Current OB/OD Area is structurally controlled, generally in a northward direction. The geologic structure east of the Current OB/OD Area arroyo inhibits ground water flow in the eastern direction. This is caused by two factors: 1) bedrock located east of the Current OB/OD Area arroyo dips toward the north and northwest at approximately 10 degrees, thus ground water moving down dip would flow toward these directions; and 2) the surface exposures of stratigraphic units located east of the Current OB/OD Area are considerably higher in elevation than exposures of the same units located within and west of the Current OB/OD Area arroyo; thus, eastward flow in these units is not possible. Extensive shale units underlying the Current OB/OD Area ground water system, being of inherently lower primary permeability than surrounding sandstone units, inhibit vertical movement of ground water to underlying potable aquifer units. These shale units also restrict movement of potentially impacted shallow ground water from the Current OB/OD Area down dip toward the west. If limited transport of impacted ground water is possible to the west, it would occur at a significantly greater stratigraphic depth than the overlying Dakota and Gallup Sandstones, which are used as potable ground water sources in areas west of FWDA.

There are two possible ground water flow directions near the location of CMW16 and the intersection of Lines 4 and 6 (Figure 2-2). Strata in this vicinity may be dipping gently toward the north or toward the west at varying degrees, depending on the location relative to the Hogback. Ground water flow in this area is thought to be controlled by the dip of the geologic strata. Thus, depending on the location relative to the Hogback, ground water in this area may be flowing toward the north or the west.

The direction of ground water flow could also be affected by faults and fractures present in the subsurface. The interpreted faults and fractures visible on the cross sections could represent zones of preferential ground water movement either to deeper water bearing units or to westward dipping sandstone aquifers. However, visible fracture planes suggest a lack of previous ground water transport along these joints. Thus, it is more likely that the faults and fractures either do not affect ground water flow, or act as a barrier to flow in a western direction.

2.2.6 *1997 Investigation Conclusions*

2.2.6.1 *Closed OB/OD Area Ground Water System*

The results of the ground water characterization efforts conducted during CYs 1996 and 1997 identified the Closed OB/OD Area ground water system as physically separated from ground water located on the eastern side of the Hogback. Only one monitoring well was drilled in this area during CY 1996, and because explosives were detected in this well during one of two ground water sampling events, this well was not considered representative of background conditions within the Closed OB/OD Area ground water system.

Monitoring well locations were proposed to provide background ground water quality data, evaluate impacts to shallow ground water from identified waste disposal areas, determine the direction of shallow ground water flow within the Closed OB/OD Area ground water system, and evaluate the potential for migration of contaminated ground water toward the west, following the structural dip of the bedrock.

Project plans were developed and submitted for regulatory agency review in January and March 1998. Comments were provided by the reviewing agencies and responses were prepared by the Army. Final project plans (PMC, 1998a-d) were submitted for regulatory agency approval in May and June 1998.

2.2.6.2 *Current OB/OD Area Ground Water System*

The seismic survey identified the Sonsela Sandstone Member as the water-bearing zone in CMW16. This well had one of the highest concentrations of explosive compounds detected of the wells installed in CY 1996. The Sonsela Sandstone Member was correlated from the location of CMW16 toward the upgradient direction (south) to identify the potential source of the explosives detected in CMW16. Based upon this correlation, it is considered likely that the Sonsela Sandstone Member subcrops beneath the unconsolidated materials located in and near the arroyo of the Current OB/OD Area. Numerous waste/residue areas found to contain explosive constituents are located in this portion of the Current OB/OD Area. It can be concluded that shallow ground water in contact with the waste/residue areas is dissolving explosives and transporting these constituents into the Sonsela Sandstone Member. From the Current OB/OD Area, ground water within the Sonsela Sandstone Member migrates down dip, in a northern direction, toward CMW16. Because geologic structure causes ground water to flow toward the north, it was determined that additional characterization of ground water conditions within the Current OB/OD Area was not necessary.

The Sonsela Sandstone Member was also correlated downgradient from the location of CMW16, to identify the probable migration pathway for explosives impacted ground water. Ground water flow in this location is thought to be controlled by the dip of the geologic strata; thus, it may be flowing toward the north or the west. Monitoring well locations were proposed to identify the downgradient extent of explosives in ground water, and to determine whether thrust faults located to the west of CMW16 served as barriers to ground water migration or were leaky faults that served as preferential ground water migration pathways.

2.3 *1998 INVESTIGATION ACTIVITIES*

Hydrogeologic characterization efforts were performed in the OB/OD Areas in CY 1998 to attain the following objectives:

- confirm the revised conceptual hydrogeologic model of OB/OD Areas;
- conduct a ground water assessment to confirm potential ground water transport pathways; and
- install a compliance monitoring well network for ground water monitoring during the closure and post-closure periods, as necessary.

This investigation consisted of the completion of drilling and sampling of soil borings, installation of monitoring wells, electric logging and slug tests on newly-installed monitoring wells, alluvial and bedrock ground water sampling, an installation-wide ground water elevation survey, an off-site well identification survey to evaluate potential receptors, and focussed geologic mapping (Table 2-1).

2.3.1 *Soil Boring and Monitoring Well Installation and Sampling*

Soil boring and monitoring well locations were based on their relationship to monitoring wells containing constituents of concern, structural geology of the area and its influence on ground water flow, and geologic features such as faults that can act either as impermeable boundaries or conduits channeling ground water flow (Table 2-2). Deviations from the Work Plan (PMC, 1998a) that were required based upon field dynamics are also presented in Table 2-2. Soil boring and monitoring well locations are shown in Figure 2-1 (Appendix A). Copies of soil boring logs and monitoring well construction diagrams are found in Appendices B and C, respectively. Table 2-3 presents monitoring well construction details and Table 2-4 presents monitoring well development data.

Exploratory soil borings were used to identify specific geologic formations in the subsurface, depth encountered, thickness, moisture/water content, and water-transmitting properties. These borings were drilled to the point where ground water was encountered. Hollow stem auger drilling was used to advance the boreholes to the depth of refusal, then air rotary coring methods were used. Soil and bedrock cores were retrieved via continuous coring methods during drilling of each boring and detailed lithologic logs were prepared, as described in the FSP (PMC, 1998b). Two soil samples were collected from each boring and analyzed for explosives and TAL metals. Grab samples of ground water in the boreholes were collected and submitted for analysis of explosives and nitrate/nitrite using 24-hour turn-around-time (TAT) so that field decisions concerning final placement of each boring could be based upon the results of previously completed borings.

Conference calls were conducted periodically during the 1998 field effort to discuss data collected and to finalize the location of subsequent borings. Staff from the NMED Hazardous and Radioactive Materials Bureau (HRMB), NMED Ground Water Quality Bureau (GWQB), U.S. Environmental Protection Agency (USEPA) Region VI, USACE, and PMC participated in the calls. The following information was discussed during the calls:

- drilling completed to date;
- observed stratigraphy, interpreted correlations between boreholes, and their relationship to the hydrogeologic models derived during previous investigations; and
- results of 24-hour TAT analyses.

Concerns discussed and decisions agreed upon during each of the calls were summarized and documented in a conference call record that was forwarded to each of the participants.

Two zones of ground water were intercepted in selected borings. Those borings were drilled in such a manner that the shallow ground water zone was sealed off before drilling to the deeper zone to prevent cross-contamination. This was completed following the methods described in the Work Plan (PMC, 1998a). Grab samples of the first water encountered, and second water, if it was encountered, were both collected and analyzed as described above.

The total depth of several soil borings was based upon the depth required to drill through a targeted geologic interval. Borings located east of the Hogback, within the Current OB/OD Area ground water system, were drilled to a depth that extended through the entire thickness of the Sonsela Sandstone Member. Boring KMW14, located within the Closed OB/OD Area ground water system, extended through the entire thickness of the Dakota Sandstone Formation.

Down-hole electric logging was performed on newly-installed monitoring wells to characterize the strata encountered and identify ground water-bearing zones. Induction, gamma ray, and neutron logging techniques were implemented because they can be used through PVC well casing to characterize lithology and saturation of the surrounding strata. Open-hole logging was not considered to be feasible in the borings in the OB/OD Areas due to the high risk of the hole collapsing. In addition, most open-hole logging methods require a liquid medium to be present in the boring. The OB/OD wells produce a very limited amount of water and adding fluids to environmental borings can compromise analytical results. Copies of the borehole electric logs are presented in Appendix F.

Slug tests were performed on selected newly-installed wells located in the Closed and Current OB/OD Areas. This aquifer test provides an estimate of the hydrogeologic properties of the screened interval of the well. Slug-in and slug-out measurements were recorded and analyzed using the Bouwer-Rice methodology (Bouwer and Rice, 1976).

2.3.1.1 *Bedrock Ground Water Sampling*

Based upon hydrogeologic studies conducted in CY 1997, the boring logs collected while drilling monitoring wells in CY 1996 were re-evaluated. The majority of the monitoring wells drilled in the OB/OD Areas during CY 1996 were re-interpreted as being screened in bedrock. Monitoring wells installed in CY 1998 were all screened in bedrock formations (Table 2-2). In October 1998 and January 1999, ground water samples were collected from bedrock monitoring wells located in the Closed and Current OB/OD Areas (Table 2-1). Ground water samples were analyzed for explosives, TAL metals (total and dissolved), alkalinity (total and dissolved), ammonia (total and dissolved), TDS, nitrate/nitrite (non-specific), nitrite, chloride, and sulfate. Field parameters were measured at the time of sampling and included total iron, ferrous iron (Fe^{2+}), dissolved oxygen, oxidation-reduction potential (Eh), conductivity, temperature, and pH. Ferric iron (Fe^{3+}) was calculated from the field parameters using the following formula:

$$Fe^{3+} = (\text{Total Iron}) - (Fe^{2+}).$$

In a few cases, there was insufficient water available from the well for all parameters and a reduced set of laboratory and/or field parameters was collected as noted in Table 2-1.

2.3.1.2 *Alluvial Ground Water, Surface Water, and Sediment Sampling*

Shallow ground water was detected in unconsolidated materials in three monitoring wells located in the Current OB/OD Area (Figure 2-7), CMW06, CMW20, and FW38 (a hand auger well installed in 1995). This shallow ground water is considered to have the potential to discharge to surface pools in the Current OB/OD Area arroyo. To evaluate this potential interaction, alluvial ground water monitoring wells were to be sampled the same day as co-located surface water and sediment samples (Figure 2-1, Appendix A). No surface water was present in the Current OB/OD Area while field activities were conducted during CY 1998 or January 1999, thus no surface water or sediment samples were collected. Ground water samples were only collected from CMW06 during the October 1998 and January 1999 sampling events because monitoring wells CMW20 and FW38 were dry (Table 2-1). The October 1998 sample from CMW06 was analyzed for explosives only because there was insufficient water in the well to collect all parameters. The January 1999 sample was analyzed for explosives, TAL metals (total and dissolved), TDS, and TSS. A reduced set of field parameters was collected during both sampling events (Table 2-1).

2.3.1.3 *Installation-Wide Ground Water Elevation Survey*

An installation-wide ground water elevation survey was conducted after completion of monitoring wells in the OB/OD Areas during CY 1998. As part of this effort, ground water level measurements were collected, in October 1998 and January 1999, from all of the wells in the Closed and Current OB/OD Areas during one 12-hour period. Contemporaneous sets of water levels were collected during different seasons to allow an evaluation of seasonal changes in ground water levels and flow direction.

2.3.2 *Well Identification Survey*

A well identification survey was conducted to clarify the nature of domestic wells adjacent to the northern and western boundaries of FWDA. The purpose of this survey was to identify the uppermost usable aquifer, locations of wells withdrawing water from this interval, and thus potential receptors downgradient of the FWDA boundary. The following organizations were contacted and provided information regarding wells and springs near FWDA:

- Bureau of Indian Affairs – Navajo Area Facility, Gallup, NM;
- Navajo Area Indian Health Service, Division of Sanitation Facilities Construction, Gallup, NM;
- Navajo Nation Water Management Branch, Fort Defiance, AZ;
- Navajo Tribal Utility Authority, Fort Defiance, AZ;
- New Mexico State Engineers Office, Albuquerque, NM; and
- U.S. Geological Survey, Albuquerque, NM.

Seventy wells and seven springs were identified (Table G-1 and Figure G-1, Appendix G).

2.3.3 *Focused Geologic Mapping*

Additional mapping efforts were conducted by USGS in the base of the arroyos located in the Closed and Current OB/OD Areas during CY 1998. This effort attempted to identify surface exposures of bedrock or features that influence ground water flow, recharge areas, and interconnection between water-bearing zones. The results of this effort provided a limited amount of new information that has been incorporated into Section 2.2.4.

2.3.4 *1998 Investigation Results*

Detailed results of soil boring, ground water grab sample analyses using 24-hour TAT, and monitoring well installation completed in CY 1998 are presented in Table 2-8. This table also presents the subsurface stratigraphy encountered in each borehole, depths where ground water was encountered, and the interpreted geologic units for each of these intervals.

2.3.4.1 *Closed OB/OD Area Ground Water System Results*

Three borings drilled in CY 1998 (KMW12, KMW13, and KMW14) were located within the Closed OB/OD Area ground water system (Table 2-2 and Figure 2-7). Drilling of these borings started at the western-most location and progressed eastward based upon the results of previously completed borings. A cross section showing the geologic formations encountered in boreholes KMW10, KMW12, KMW13, and KMW14, and interpreted correlations among these locations are presented in Figure 2-8 (Appendix A).

First water was encountered in KMW12 at a depth of 58 feet bgs within a shale. This material is interpreted to be the Mancos Shale Formation that has been weathered to varying degrees. No explosive constituents were detected in the ground water grab sample collected from this borehole and the nitrate concentration did not appear elevated (Table 2-8). Based upon these results, KMW12 was completed as a background bedrock monitoring well screened in the first water-bearing zone, the Mancos Shale Formation.

Boring KMW13 was located between an area of waste identified in CY 1996 and the Hogback (Figure 2-1, Appendix A). This location was selected to evaluate the possibility of shallow ground water moving eastward through the waste and migrating into the Dakota Sandstone Formation. First water was encountered in KMW13 at a depth of 47 feet bgs within sandstone and siltstone intervals that are interpreted to be part of the Dakota Sandstone Formation. No explosive constituents were detected in the ground water grab sample collected from this borehole. Although no explosives were detected in the ground water grab sample collected from KMW13, boring KMW14 was drilled to further evaluate if shallow ground water or surface water are migrating into the Dakota Sandstone Formation. KWM13 was completed as a bedrock monitoring well screened in the first water-bearing zone, the Dakota Sandstone Formation.

Based upon conference calls with NMED HRMB, NMED GWQB, and USEPA personnel, KMW14 was drilled in the location thought most likely to receive infiltration of ground water or surface water into the Dakota Sandstone Formation. KMW14 was drilled to a total depth of 350 feet. Sandstone was encountered from 24 feet to 95.5 feet bgs and was interpreted to be the Dakota Sandstone Formation. Between the depths of 95.5 feet and 338 feet bgs, a zone of alternating sandstone and shale was encountered. According to USGS personnel performing the mapping of the OB/OD Areas, this observed stratigraphy is consistent with the type section for the Dakota Sandstone and Mancos Shale Formations where these two units interfinger producing an alternating sequence of sandstone and shale intervals. At a depth of 338 feet bgs, a dark red sandstone was encountered which was interpreted as the top of the Morrison Formation. No free water was encountered in KMW14; therefore, no well was installed and the borehole was abandoned by grouting it to the ground surface. Based upon the absence of free water within the Dakota Sandstone Formation in the location thought most likely to receive infiltration of ground water or surface water, the possibility of ground water flow into a westward dipping sandstone unit causing contaminant migration toward the west is considered unlikely.

Down-Hole Electric Logging Results

In general, lithologic recoveries were poor through several sections of wells KMW12 and KMW13. The character correlation of the geophysical logs is good between the wells indicating that similar geologic materials were encountered in each location. A change in lithologic character occurs at a depth of approximately 22 feet bgs in KMW13. This closely corresponds with the depth of auger refusal in this well bore, indicating the transition from recent unconsolidated sediments into the Mancos Shale Formation. A similar character change occurs at 46 feet bgs in KMW12. Auger refusal occurred at approximately 35 feet bgs in KMW-12, indicating a thicker unconsolidated section prior to encountering the Mancos Shale Formation. The shorter section observed in KMW13 is likely the result of the unconformity between the unconsolidated sediments and the Mancos Shale Formation.

A distinctive character in both the gamma ray and the neutron logs is noted at 47 feet bgs in KMW12 and at 22 feet bgs in KMW13. The similar character in the deeper section of each of the well bores is likely related to the interfingering of sand and shale intervals of the Dakota Sandstone Formation and Mancos Shale Formation, respectively. Although the sections correlate well, based upon the steep dip of bedrock and the distance between the wells, it is highly unlikely that these wells encountered the same sandstone interval within the interfingered Dakota/Mancos Formations.

Slug Test Results

Slug tests were conducted at KMW12 and KMW13. The hydraulic conductivity values for KMW12, screened within the Mancos Shale, were 8.7 X 10^{-5} cm/sec and 9.7 X 10^{-5} cm/sec (Table 2-5). These values are higher than would be expected for a shale and may be the result of weathering decreasing the competency of the bedrock and thus, increasing the water transmitting ability. KMW13, screened within the Dakota Sandstone Formation, had hydraulic conductivity values of 3.5 X 10^{-5} cm/sec and 4.3 X 10^{-5} cm/sec. These values are similar to those expected for a friable sandstone (Driscoll, 1986). Copies of the hydraulic conductivity graphs are provided in Appendix D.

2.3.4.2 *Current OB/OD Area Ground Water System Results*

Four borings drilled in CY 1998 (CMW21, CMW22, CMW23, and CMW25) were located north of previously-installed monitoring well CMW16 to identify the northern extent of impacted ground water within the first and second water-bearing zones (Table 2-2 and Figure 2-7). Drilling of these borings started at the southern-most location and progressed northward based upon the results of previously completed borings. A cross section showing the geologic formations encountered in wells CMW16, CMW21, CMW22, CMW23, and CMW25, and interpreted correlations among these wells is presented in Figure 2-8 (Appendix A).

First water was encountered in CMW21 at a depth of 28 feet bgs within a sandstone that is interpreted to be the Painted Desert Member. Explosive constituents were detected in the ground water grab sample collected from this borehole and the nitrate concentration was elevated. Second water was encountered at a depth of 58 feet bgs within a sandstone that is interpreted to be the Sonsela Sandstone Member. One explosive constituent was detected in the ground water grab sample collected from the second water-bearing interval of this borehole and the nitrate concentration did not appear elevated. Because explosives were detected in both the first and second water-bearing zones, boring CMW22, located farther north, was drilled and grab samples of the first and second water-bearing zones collected. CMW21 was completed as a monitoring well screened in the second water-bearing zone, the Sonsela Sandstone Member.

First water in CMW22 was encountered at a depth of 29.5 feet bgs within a sandstone that is interpreted to be the Painted Desert Member. Explosive constituents were detected in the ground water grab sample collected from this borehole and the nitrate concentration was elevated. Second water was encountered at a depth of 96.5 feet bgs within a sandstone that is interpreted to be the Sonsela Sandstone Member. One explosive constituent was detected in the ground water grab sample collected from the second water-bearing interval of this borehole, and the nitrate concentration appeared elevated. Because explosives were detected in both the first and second water-bearing zones, the proposed location of soil boring CMW23 was moved approximately 1,600 feet north of its original location to ensure that the extent of impacts to the first water-bearing zone was delineated in that direction (Figure 2-7). Grab samples of the first and second water-bearing zones in CMW23 were collected, and CMW22 was completed as a monitoring well screened in the second water-bearing zone, the Sonsela Sandstone Member.

First water in CMW23 was encountered at a depth of 46 feet bgs within a sandstone that is interpreted to be the Painted Desert Member. Explosive constituents were detected in the ground water grab sample collected from this borehole and the nitrate concentration appeared elevated. Second water was encountered at a depth of 100 feet bgs within a sandstone that is interpreted to be the Sonsela Sandstone Member. No explosive constituents were detected in the ground water grab sample collected from the second water-bearing interval of this borehole. Because explosives were detected in the first water-bearing zone, boring CMW25 was drilled approximately 1,600 feet northwest of CMW23 to ensure that the extent of impacts to the first water-bearing zone was delineated in that direction (Figure 2-7). Because no explosives were detected in the ground water grab sample collected from the second water-bearing zone of CMW23, this borehole was completed as a downgradient sentinel monitoring well screened in the second water-bearing zone, the Sonsela Sandstone Member.

First water in CMW25 was encountered at a depth of 74 feet bgs within mudstone and muddy sandstone intervals that are interpreted to be portions of the Painted Desert Member. No explosive constituents were detected in the ground water grab sample collected from this borehole and the nitrate concentration did not appear elevated. Based upon these results, CMW25 was completed as a downgradient sentinel monitoring well screened in the first water-bearing zone, the Painted Desert Member.

One boring drilled in CY 1998 (CMW24) was located north and west of previously-installed monitoring well CMW16 to determine if faults identified in the subsurface by the geophysical survey act as a ground water flow barrier or conduit, and to determine the direction of ground water flow in that area (Table 2-2 and Figure 2-7). Air rotary coring of CMW24 proved very problematic. Numerous intervals were encountered where the drill bit became stuck in the borehole and large intervals did not return any core. Air hammer drilling methods were utilized to advance selected intervals of the borehole as indicated on the lithologic log (Appendix B). This was completed in 10-foot increments between which the borehole was evaluated for moisture in an effort to minimize the chance of drilling past the first water-bearing zone. The stratigraphy encountered in CMW24 was not consistent with that observed in the other soil borings drilled in CY 1998, and it appeared to be highly structurally deformed with identified fractures, along some of which mineralization was observed. First water was encountered in CMW24 at a depth of 223 feet bgs within siltstone and sandstone intervals. Explosive constituents were detected in the ground water grab sample collected from this borehole and the nitrate concentration appeared elevated. Based upon the evidence of structural deformation encountered in CMW24 and the inability to correlate subsurface stratigraphy between CMW21 and CMW24, it was determined that drilling an additional boring in a location west of CMW24 would not provide additional useful information. Thus, the proposed boring located west of CMW24 was not drilled. CMW24 was completed as a monitoring well screened in the first water-bearing zone; however, the geologic formation could not be determined based upon the observed lithology.

Down-Hole Electric Logging Results

Interpretation of borehole electric logs is generally done by comparing the log character between boreholes. Interpretation of logs collected at CMW21 through CMW25 indicate few correlatable features. In general, the Painted Desert Formation shows few contrasts, which is expected for a silty-sandy mudstone, with few defined layers. A sharp contrast (or "kick") on the induction log can be noted on most of the borings thought to have encountered the Sonsela Sandstone Member. Based upon this induction "kick", the screened water-bearing interval in CMW24 may be the Sonsela Sandstone Member; however, the depth it was encountered (223 feet bgs) makes this correlation very uncertain. At CMW22 and CMW23, a distinct decrease in the gamma ray log indicates the presence of a sandy interval. This log response is consistent with the description of the Sonsela Sandstone Member as quartzose sandstone. Table 2-9 summarizes the depth bgs at which these features were observed on the logs.

The induction and gamma ray log responses described above represent the approximate depth bgs of the top of the Sonsela Sandstone Member. These interpreted depths are consistent with the results of the seismic survey. Lithologies and ground water occurrence observed for each of the boreholes is also consistent with the interpreted depths to the top of the Sonsela Sandstone Member, except for CMW25. An induction "kick" was observed at a depth of 85 feet bgs in CMW25. The lithologic log indicated that mudstone and muddy sandstone were encountered near this depth. The Sonsela Sandstone Member consists of a clean quartz sandstone; thus, the induction "kick" in CMW25 is interpreted as a more sandy interval within the Painted Desert Member.

Slug Test Results

Slug tests were conducted at CMW21, CMW23, and CMW24. Hydraulic conductivities for CMW21 and CMW23, screened within the Sonsela Sandstone Member, ranged from to 9.7×10^{-7} cm/sec to 3.5×10^{-5} cm/sec (Table 2-5). These values are similar to those expected for a sandstone that is well cemented to slightly friable, respectively (Driscoll, 1986). CMW24, screened within siltstone and sandstone intervals and located within the highly deformed strata of the Hogback, had hydraulic conductivity values of 2.3×10^{-5} cm/sec and 2.5×10^{-5} cm/sec. The higher hydraulic conductivity values obtained for CMW24 are likely the result of fractures increasing the bedrock's ability to transmit water. Copies of the hydraulic conductivity graphs are provided in Appendix D.

Ground Water Elevation Survey Results

Depth to ground water measurements were collected in association with each ground water sampling event. These data and calculated ground water elevations are provided on Table 2-6. Based upon the ground water elevation data, ground water flow within the first and second water-bearing intervals is generally toward the north. No figure has been provided because the wells are spread over a large area, limiting the ability to make precise interpretations.

2.3.5 Well Identification Survey

The off-site well closest to the OB/OD Areas, Well No. 19, is approximately 1,100 feet west of the western boundary of the OB/OD Areas, and little information regarding its construction was found (Table G-1 and Figure G-1, Appendix G). Well No. 19 was identified as a dug well, and therefore, is likely to be completed in shallow unconsolidated materials. The site of this well is approximately 100 feet topographically higher than the site of the monitoring wells installed in the Closed OB/OD Area ground water system. Water within unconsolidated materials is generally under unconfined conditions and ground water flow can be assumed to follow ground surface topography. Under these conditions, shallow ground water from the location of Well No. 19 would flow toward the east, then southeast, toward the Closed OB/OD Area. This would prohibit the flow of potentially impacted ground water within the shallow unconsolidated materials in the Closed OB/OD Area ground water system from migrating to the location of Well No. 19. Based upon the borings drilled in CY 1998, the possibility of ground water flow into a westward dipping sandstone unit and causing contaminant migration toward the west is considered unlikely. Thus, no exposure of human or ecological receptors to contaminated ground water originating in the Closed OB/OD Area ground water system is likely to occur.

Other supply wells are located more than 10,000 feet north, east and south of the OB/OD Areas. As described previously, geologic structure causes ground water within the Current OB/OD Area ground water system to flow toward the north; thus, water wells located to the east and south would not be affected by ground water migration from the OB/OD Areas. Monitoring wells drilled in CY 1998 have defined the lateral extent of impacted ground water in the northern direction and no wells located north of the OB/OD Areas have been impacted. Thus, currently there is no exposure of human or ecological receptors to contaminated ground water originating in the Current OB/OD Area ground water system. Based upon the hydrogeologic data collected, exposure of human or ecological receptors to contaminated ground water in the future is not likely to occur.

2.3.6 *1998 Investigation Conclusions*

2.3.6.1 *Closed OB/OD Area Ground Water System*

The Closed OB/OD Area ground water system hydrogeologic model was also confirmed by the data collected in CY 1998. Soil borings identified a thin veneer of unconsolidated material within the valley located west of the Hogback. This graded into competent shale with increasing depth. Ground water flow within this material would generally follow topography. Because the Closed OB/OD Area ground water system is located within a valley that is topographically lower than the surrounding ridges of the Hogback, ground water flow would likely be toward the center of the valley. Thus, the unconsolidated materials in the Closed

OB/OD Area ground water system may act as closed basin with limited lateral movement of shallow ground water.

The first water-bearing interval within the central portion of the Closed OB/OD Area valley was encountered within the Mancos Shale. Monitoring well KMW12 was installed as a background monitoring well within the Closed OB/OD Area ground water system.

Two borings were drilled into the Dakota Sandstone Formation. Ground water was encountered in KMW13 and this monitoring well was screened in the westward dipping Dakota Sandstone Formation. Ground water in KMW13 occurred within a sandstone and siltstone interval. Boring KMW14, drilled in the location thought most likely to receive infiltration of surface water and shallow ground water, contained no free water throughout the entire thickness of the Dakota Sandstone Formation. The lack of ground water at the location of KMW14 indicates the likelihood that the sandstone and siltstone interval where water was encountered in KMW13 was not encountered in KMW14. Thus, it is considered unlikely that installation activities will result in impacts to the Dakota Sandstone Formation.

2.3.6.2 *Current OB/OD Area Ground Water System*

Data collected during CY 1998 confirmed the conceptual hydrogeologic model of the Current OB/OD Area ground water system. Detailed lithologic logs derived from cores identified two water-bearing intervals, the first of which occurs in sandstone intervals within the Painted Desert Member. This water-bearing interval was identified in and correlated among borings CMW21, CMW22, CMW23, and CMW25. Ground water flow appears to be northward within this interval, following the regional dip and topography. The lateral extent of ground water contamination initially was identified in this interval using grab samples collected from boreholes. Monitoring well CMW25 is screened in this interval and provides a downgradient sentinel monitoring point.

The second water-bearing interval occurs within the Sonsela Sandstone Member. This water-bearing interval has been correlated among CMW16, CMW21, CMW22, and CMW23. Ground water flow within this interval also appears to be northward, following the regional dip and topography. The lateral extent of ground water contamination initially was identified in this interval using grab samples collected from boreholes. Monitoring wells CMW21, CMW22, and CMW23 are screened in the Sonsela Sandstone Member and provide downgradient monitoring points. CMW23 is located downgradient of the zone of ground water contamination and provides a sentinel monitoring well within the Sonsela Sandstone Member.

The lithology encountered in boring CMW24 was highly deformed with identified fractures, along some of which mineralization was observed. The first water-bearing interval encountered in this location was within a siltstone at a depth of 223 feet. Correlation of lithologic units between CMW21, located to the east, and CMW24 is not possible because of the intense structural deformation of the subsurface. Thus, it is also not possible to identify the ground water flow path in a westward direction.

2.4 *CONCLUSIONS OF HYDROGEOLOGIC INVESTIGATIONS*

2.4.1 *Closed OB/OD Area Ground Water System*

Within the Closed OB/OD Area ground water system a thin veneer of unconsolidated material was identified that grades into competent shale of the Mancos Shale Formation. No ground water was detected in the unconsolidated materials, but ground water flow within this material would generally follow topography and be toward the center of the valley. Thus, the unconsolidated materials in the Closed OB/OD Area ground water system may act as a closed basin with limited lateral movement of shallow ground water.

Shallow ground water was encountered in the Mancos Shale Formation and the Dakota Sandstone Formation. An additional boring drilled into the Dakota Sandstone Formation in the location thought most likely to receive infiltration of surface water and shallow ground water contained no free water throughout the entire thickness of the Dakota Sandstone Formation. No evidence of contamination was identified in any of these locations. Thus, it is considered unlikely that installation activities have impacted the Dakota Sandstone Formation. Future impact to this formation is also considered unlikely.

2.4.2 *Current OB/OD Area Ground Water System*

Within the Current OB/OD Area ground water system, a thin veneer of unconsolidated materials is present overlying a thick sequence of shale units belonging to the Chinle Formation. Water table conditions are present only within the thin unconsolidated materials present on top of the weathered shale bedrock. This shallow ground water may discharge to surface water pools within the Current OB/OD Area arroyo; however, no evidence of surface water flow has been observed since October 1996. Based upon these data, the potential of exposure to shallow ground water via its discharge to surface water is thought to be sporadic, if it occurs at all; therefore, this is not considered to be a complete exposure pathway.

Ground water flow within the weathered and competent shale bedrock, located in the Current OB/OD Area, is dominated by fracture flow. It is considered likely that the Sonsela Sandstone Member subcrops beneath the unconsolidated materials and fractured shale located in and near the arroyo of the Current OB/OD Area. Shallow ground water in contact with the waste/residue areas appears to be dissolving explosives and transporting these constituents into the Sonsela Sandstone Member. From the Current OB/OD Area, ground water within the Sonsela Sandstone Member migrates down dip, in a northern direction. A monitoring well network has been installed along this flow path that characterizes the ground water system and provides a basis for a compliance monitoring well network.

Intense structural deformation associated with formation of the Hogback makes correlation of lithologic units from the eastern and central portions of the Current OB/OD Area ground water system toward the western portion not possible. This lack of correlation precludes identification of the ground water flow paths in a westward direction.

Extensive shale units underlying the Current OB/OD Area ground water system, being of inherently lower primary permeability than surrounding sandstone units, inhibit vertical movement of ground water to underlying potable aquifer units, such as the Glorieta Sandstone. The shale units also restrict movement of potentially impacted ground water from the Current OB/OD Area down dip toward the west. If limited transport of impacted ground water toward the west were to occur, it would be at a significantly greater stratigraphic depth than the overlying Dakota and Gallup Sandstones, which are used as potable ground water sources in areas west of FWDA. Thus, it is considered highly unlikely that exposure to this ground water would occur; therefore, this is not considered to be a complete exposure pathway.

Table 2-1
Field Investigations
OB/ OD Areas
Fort Wingate Depot Activity
Gallup, New Mexico

Area of Concern	Activity	Analytes
1996 Investigation Activities		
<u>Current OB/ OD Area</u>		
• Installation of Soil Borings/Monitoring Wells	Drilled nine shallow soil borings and collected soil samples from each boring; completed two borings as ground water monitoring wells (CMW06 and CMW16) to assess the thickness and areal extent of the alluvium in and near the arroyo; to determine if there is baseflow of subsurface water within the alluvial soils within the arroyo; to assess potential impacts to water quality from residue/debris piles located adjacent to or within the arroyo. Continuous split-spoon sampling was performed.	Soil: Explosives and TAL Metals
	Seven of the nine shallow soil borings (CMW03, CMW05, CMW08, CMW09, CMW11, CMW12, and CMW15) were abandoned since water was not encountered prior to refusal. CMW01 was not drilled since first-water in CMW02 was in bedrock. CMW13 was not drilled since first-water in CMW14 was encountered in bedrock.	
	Drilled five intermediate soil borings and collected soil samples from each boring; completed the five borings as ground water monitoring wells (CMW02, CMW04, CMW07, CMW10, and CMW14) to evaluate the nature of the bedrock. Continuous split-spoon sampling was performed to refusal.	Soil: Explosives and TAL Metals

Table 2-1
Field Investigations
OB/ OD Areas
Fort Wingate Depot Activity
Gallup, New Mexico

Area of Concern	Activity	Analytes
• Installation of Additional Soil Borings/ Monitoring Wells	Drilled one shallow soil boring adjacent to the dug well and collected soil samples from boring; completed boring as a ground water monitoring well (CMW20).	Soil: Explosives and TAL Metals
	Drilled three intermediate soil borings and collected soil samples from each boring; completed each as a ground water monitoring well (CMW17, CMW18, and CMW19). CMW17 was drilled adjacent to boring CMW12, CMW18 was drilled adjacent to boring CMW11, and CMW19 was drilled adjacent to boring CMW15 to intercept the first-water bearing zone.	
• Downhole Logging	Conducted video surveys at CMW10, CMW14, CMW16, and CMW19 to identify water producing zones.	N/A
• Collection of Ground Water Samples	Collected ground water sample from existing well (FW38) and newly-installed monitoring wells (CMW02, CMW04, CMW06, CMW07, CMW10, CMW14, CMW16, CWM17, CMW18, CMW19, and CMW20).	Field Analysis: Oxidation-Reduction Potential (Eh), Conductivity, Temperature, Turbidity, and pH
	Reduced set of parameters from CMW10 because of limited available water.	Laboratory Analysis: Explosives, TAL Metals (total and dissolved), and Total Dissolved Solids (TDS)
• Collection of Surface Water and Sediment Samples	In September, collected five co-located surface water (CSW01, CSW03, CSW07, CSW08, and CSW10) and sediment (CSED01, CSED03, CSED07, CSED08, and CSED10) samples from within the arroyo.	Surface Water: Explosives, TAL Metals, TDS, Total Suspended Solids (TSS), Hardness, and Salinity
	In October, collected ten sediment samples (CSED01 through CSED10) from within the arroyo. No surface water samples were collected during this event because of the absence of water.	Sediment: Explosives, TAL Metals, Salinity, TOC, and pH

Table 2-1
Field Investigations
OB/ OD Areas
Fort Wingate Depot Activity
Gallup, New Mexico

Area of Concern	Activity	Analytes
• Water Level Measurements	Conducted two rounds of water level measurements. The first round of water level measurements was collected approximately 14 days after well development. The second round of water level measurements was collected approximately 90 days later, to provide data concerning seasonal changes in water levels.	N/A
• Slug Tests	Performed slug testing at CMW02, CMW04, CMW07, and CMW17.	N/A
<u>Closed OB/ OD Area</u>		
• Installation of Arroyo Sediment Borings	Drilled eight soil borings and collected soil samples from each boring (KB001, KB002, KB003, KB004, KB005, KB006, KB007, and KB008) to determine if ground water is present in the sediments of the arroyo between rainfall events and to determine the depth to bedrock.	Soil: Explosives, TAL Metals, and Total Phosphorous
• Installation of Soil Borings/Monitoring Wells	Drilled one shallow soil boring and collected soil samples from the boring; completed the boring as a ground water monitoring well (KMW09) to provide data concerning potential changes in water quality in a downgradient direction, from southwest to northeast along the arroyo, which may be related to potential impacts from observed residue/debris piles.	Soil: Explosives, TAL Metals, and Total Phosphorous
	Drilled one intermediate soil boring and collected soil samples from the boring; completed the boring as a ground water monitoring well (KMW11) to provide a sentinel monitoring point.	
	Drilled one soil/rock boring and collected soil samples from the boring; completed the boring as a ground water monitoring well (KMW10) to intercept any water-bearing zones within the westward dipping sandstone unit.	

Table 2-1
Field Investigations
OB/ OD Areas
Fort Wingate Depot Activity
Gallup, New Mexico

Area of Concern	Activity	Analytes
• Downhole Logging	Conducted video surveys at KMW09 and KMW10 to identify water producing zones.	N/A
• Collection of Ground Water Samples	Collected ground water samples from newly installed monitoring wells (KMW09, KMW10, and KMW11).	Field Analysis: Eh, Conductivity, Temperature, Turbidity, and pH Laboratory Analysis: Explosives, TAL Metals (total and dissolved), TDS, and Total Phosphorous
• Collection of Surface Water and Sediment Samples	Collected ten co-located surface water (KSW01 through KSW10) and sediment (KSED01 through KSED10) samples from the arroyo. Collected a reduced set of parameters from KSW01 and KSW10 because of limited available water.	Surface Water: Explosives, TAL Metals, TDS, TSS, Hardness, Salinity, and Total Phosphorous Sediment: Explosives, TAL Metals, Salinity, Total Phosphorus, TOC, and pH
• Water Level Measurements	Conducted two rounds of water level measurements. The first round of water level measurements was collected approximately 14 days after well development. The second round of water level measurements was collected approximately 90 days later, to provide data concerning seasonal changes in water levels.	N/A
• Slug Tests	Performed slug testing of newly installed monitoring wells (KMW09 and KMW11).	N/A

Table 2-1
Field Investigations
OB/ OD Areas
Fort Wingate Depot Activity
Gallup, New Mexico

Area of Concern	Activity	Analytes
1997 Investigation Activities		
<u>Current OB/ OD Area</u>		
• Surface Seismic Profiling Feasibility Study	Performed seismic profiling on one east-west study line to determine if seismic study objectives could be obtained and to select methods for the survey.	N/A
• Seismic Profiling	Performed seismic profiling on multiple east-west lines and one north-south line; surveyed seismic profile lines using Global Positioning System (GPS) technology; and installed deep pilot borings and performed electric and seismic logging.	N/A
• Geologic Mapping	Provided oversight of field geologic mapping effort conducted by the U.S. Geological Survey (USGS).	N/A
<u>Closed OB/ OD Area</u>		
• Seismic Profiling	Performed seismic profiling on multiple east-west lines and one north-south line; surveyed seismic profile lines using GPS technology; and installed deep pilot borings and performed electric and seismic logging.	N/A
• Geologic Mapping	Provided oversight of field geologic mapping effort conducted by the USGS.	N/A

Table 2-1
Field Investigations
OB/ OD Areas
Fort Wingate Depot Activity
Gallup, New Mexico

Area of Concern	Activity	Analytes
1998 Investigation Activities		
• Well Identification Survey	Performed well identification survey in area surrounding FWDA.	N/A
• Installation-Wide Ground Water Elevation Survey	Conducted ground water elevation survey in all monitoring wells on FWDA.	N/A
Current OB/ OD Area		
• Focused Geologic Mapping	Provided oversight of field geologic mapping effort conducted by the USGS focused in Current OB/OD Area arroyo.	N/A
• Installation of Soil Borings/Monitoring Wells	Installed five borings and collected soil and ground water grab samples from each boring, completed the five borings as ground water monitoring wells (CMW21, CMW22, CMW23, CMW24, and CMW25). Analyzed ground water grab samples using 24-hour TAT to confirm and further define extent of contamination in first and second water-bearing zones. Two soil samples were collected from each boring at intervals of 8 to 10 feet BGS and immediately above the first-water bearing zone.	Ground Water: Explosives and Nitrate/Nitrite (24-hour TAT) Soil: Explosives and TAL Metals
• Surface Water, Sediment, and Alluvial Ground Water Sampling	Did not collect surface water or sediment samples because no standing water was present. Collected a reduced set of field and laboratory parameters from CMW06 because of limited available water. CMW20 and FW38 were dry.	Field Analysis: Dissolved Oxygen, Eh, Conductivity, Temperature, Turbidity, and pH Laboratory Analysis: Explosives

Table 2-1
Field Investigations
OB/ OD Areas
Fort Wingate Depot Activity
Gallup, New Mexico

Area of Concern	Activity	Analytes
• Bedrock Ground Water Sampling	Collected ground water samples from existing wells (CMW02, CMW04, CMW07, CMW10, CMW14, CMW16, CMW17, CMW18, and CMW19) and from newly-installed monitoring wells (CMW21, CMW22, CMW23, CMW24, and CMW25). Performed field analyses and laboratory analyses on ground water samples. Collected a reduced set of laboratory parameters from CMW10 and CMW22 because of limited available water. Collected a reduced set of field parameters from CMW14 and CMW18.	Field Analysis: Total Iron, Ferrous Iron (Fe^{2+}), Dissolved Oxygen, Eh, Conductivity, Temperature, Turbidity, and pH Laboratory Analysis: Explosives, TAL Metals (total and dissolved), Alkalinity (total and dissolved), Ammonia (total and dissolved), TDS, Nitrate/Nitrite (non-specific), Chloride, Sulfate, and Nitrite
• Electric Logging	Performed electric logging of newly-installed monitoring wells (CMW21, CMW22, CMW23, CMW24, and CMW25).	N/A
• Slug Testing	Performed slug testing of newly-installed monitoring wells (CMW21, CMW23, and CMW24).	N/A
<u>Closed OB/ OD Area</u>		
• Focused Geologic Mapping	Provided oversight of field geologic mapping effort conducted by the USGS focused in Closed OB/OD Area arroyo.	N/A
• Installation of Soil Borings/Monitoring Wells	Installed three borings and collected soil samples from each boring; completed two borings as ground water monitoring wells (KMW12 and KMW13). Ground water samples from two borings (KMW12 and KMW13) were analyzed using 24-hour TAT to define extent of contamination. KMW14 borehole was abandoned and grouted to surface because no free water was encountered.	Ground Water: Explosives and Nitrate/Nitrite (24-hour TAT) Soil: Explosives and TAL Metals

Table 2-1
Field Investigations
OB/ OD Areas
Fort Wingate Depot Activity
Gallup, New Mexico

Area of Concern	Activity	Analytes
• Surface Water and Sediment Sampling	Did not collect surface water or sediment samples because no standing water was present.	N/A
• Bedrock Ground Water Sampling	Collected ground water samples from existing wells (KMW09, KMW10, and KMW11) and newly-installed bedrock monitoring wells (KMW12 and KMW13).	Field Analysis: Total Iron, Fe^{2+}, Dissolved Oxygen, Eh, Conductivity, Temperature, Turbidity, and pH Laboratory Analysis: Explosives, TAL Metals (total and dissolved), Alkalinity (total and dissolved), Ammonia (total and dissolved), Nitrate/Nitrite (non-specific), TDS, Chloride, Sulfate, and Nitrite
• Electric Logging	Performed electric logging of newly-installed monitoring wells (KMW12 and KMW13).	N/A
• Slug Testing	Performed slug testing of newly-installed monitoring wells (KMW12 and KMW13).	N/A

Table 2-1
Field Investigations
OB/ OD Areas
Fort Wingate Depot Activity
Gallup, New Mexico

Area of Concern	Activity	Analytes
1999 Investigation Activities		
Current OB/ OD Area		
• Surface Water, Sediment, and Alluvial Ground Water Sampling	Did not collect surface water or sediment samples because no standing water was present. Collected a reduced set of field and laboratory parameters from CMW06 because of limited available water. CMW20 and FW38 were dry.	Field Analysis: Total Iron, Dissolved Oxygen, Eh, Conductivity, Temperature, Turbidity, and pH Laboratory Analysis: Explosives, TAL Metals (total and dissolved), TDS, and TSS
• Bedrock Ground Water Sampling	Collected ground water samples from monitoring wells (CMW02, CMW04, CMW07, CMW10, CMW14, CMW16, CMW17, CMW18, CMW19, CMW21, CMW23, CMW24, and CMW25). Performed field analyses and laboratory analyses on ground water samples. Collected a reduced set of laboratory parameters from CMW22 because of limited available water.	Field Analysis: Total Iron, Fe^{2+}, Dissolved Oxygen, Eh, Conductivity, Temperature, Turbidity, and pH Laboratory Analysis: Explosives, TAL Metals (total and dissolved), Alkalinity (total and dissolved), Ammonia (total and dissolved), TDS, Nitrate/Nitrite (non-specific), Chloride, Sulfate, and Nitrite

Table 2-1
Field Investigations
OB/ OD Areas
Fort Wingate Depot Activity
Gallup, New Mexico

Area of Concern	Activity	Analytes
<u>**Closed OB/ OD Area**</u>		
• Bedrock Ground Water Sampling	Collected ground water samples from monitoring wells (KMW09, KMW10, KMW11, KMW12, and KMW13).	Field Analysis: Total Iron, Fe^{2+}, Dissolved Oxygen, Eh, Conductivity, Temperature, Turbidity, and pH Laboratory Analysis: Explosives, TAL Metals (total and dissolved), Alkalinity (total and dissolved), Ammonia (total and dissolved), Nitrate/Nitrite (non-specific), TDS, Chloride, Sulfate, and Nitrite
• Surface Water and Sediment Sampling	Did not collect surface water or sediment samples because no standing water was present.	N/A

Table 2-2
Soil Borings and Monitoring Wells
OB/OD Areas
Fort Wingate Depot Activity
Gallup, New Mexico

Area	Boring/Monitoring Well Identification	Depth to Sonsela (feet)	Total Depth of Boring (feet)	Boring/Monitoring Well Location Rationale
1996 Investigation				
Current OB/OD Area				
	CMW01	NA	NA	Not drilled since first water in CMW02 was encountered in bedrock.
	CMW02	NA	43	Confirmed presence of bedrock, completed as an upgradient bedrock monitoring well.
	CMW03	NA	2.7	Since first water was not encountered prior to refusal, boring was abandoned.
	CMW04	NA	136.6	Confirmed presence of bedrock; completed as a bedrock monitoring well.
	CMW05	NA	5	Since first water was not encountered prior to refusal, boring was abandoned.
	CMW06	NA	18.6	First water was encountered prior to refusal; completed as an alluvial monitoring well.
	CMW07	NA	66.55	Confirmed presence of bedrock; completed as a bedrock monitoring well.
	CMW08	NA	6	Since first water was not encountered prior to refusal, boring was abandoned.
	CMW09	NA	5.5	Since first water was not encountered prior to refusal, boring was abandoned.
	CMW10	NA	73.07	Confirmed presence of bedrock; completed as a bedrock monitoring well.
	CMW11	NA	12	Since first water was not encountered prior to refusal, boring was abandoned.
	CMW12	NA	3.1	Since first water was not encountered prior to refusal, boring was abandoned.
	CMW13	NA	NA	Not drilled since first water in CMW14 was encountered in bedrock.
	CMW14	NA	94.55	Confirmed presence of bedrock; completed as a bedrock monitoring well.
	CMW15	NA	3	Since first water was not encountered prior to refusal, boring was abandoned.

Table 2-2
Soil Borings and Monitoring Wells
OB/OD Areas
Fort Wingate Depot Activity
Gallup, New Mexico

Area	Boring/Monitoring Well Identification	Depth to Sonsela (feet)	Total Depth of Boring (feet)	Boring/Monitoring Well Location Rationale
	CMW16	29	31.8	Confirmed presence of bedrock; completed as a bedrock monitoring well.
	CMW17	NA	53	Drilled adjacent to CMW12 to intercept the first water-bearing zone. Confirmed presence of bedrock; completed as a bedrock monitoring well.
	CMW18	NA	53	Drilled adjacent to CMW11 to intercept the first water-bearing zone. Confirmed presence of bedrock; completed as a bedrock monitoring well.
	CMW19	NA	52.8	Drilled adjacent to CMW15 to intercept the first water-bearing zone. Confirmed presence of bedrock; completed as a bedrock monitoring well.
	CMW20	NA	5.8	Drilled adjacent to dug well to intercept the first water-bearing zone. Completed as an alluvial monitoring well.
<u>Closed OB/OD Area</u>				
	KB001-KB008	NA	NA	Drilled eight soil borings which confirmed that ground water is not present within the alluvium.
	KMW09	NA	108	Confirmed presence of bedrock; completed as a background bedrock monitoring well.
	KMW10	NA	173	Confirmed presence of a water-bearing zone within sandstone unit. Completed as a bedrock monitoring well within a westward dipping sandstone.
	KMW11	NA	63	Confirmed presence of bedrock; completed as a bedrock monitoring well.
1997 Investigation				
<u>Current OB/OD Area</u>				
	SPB 1	20	251	Confirmed presence of Sonsela Sandstone Member. Downhole electric logging and geophysical survey completed.
	SPB 2	NE	250	Presence of Sonsela Sandstone Member not confirmed. Downhole electric logging and geophysical survey completed.

Table 2-2
Soil Borings and Monitoring Wells
OB/OD Areas
Fort Wingate Depot Activity
Gallup, New Mexico

Area	Boring/Monitoring Well Identification	Depth to Sonsela (feet)	Total Depth of Boring (feet)	Boring/Monitoring Well Location Rationale
1998 Investigation				
Current OB/OD Area				
	CMW21	50	74.5	Confirmed presence of Sonsela Sandstone Member. Unit screened in CMW16 is Sonsela Sandstone Member. Ground water flow direction is toward the north. Ground water contamination was detected in Painted Desert Member and Sonsela Sandstone Member. Completed as a bedrock monitoring well within the Sonsela Sandstone Member. Installed boring CMW22 located farther north.
	CMW22	96.5	120	Confirmed presence of Sonsela Sandstone Member. Ground water contamination was detected in Painted Desert Member and Sonsela Sandstone Member. Completed as a bedrock monitoring well within the Sonsela Sandstone Member. Installed boring CMW23 located farther north.
	CMW23	94	112	Confirmed presence of Sonsela Sandstone Member. Ground water contamination was detected in Painted Desert Member. Completed as a bedrock monitoring well within the Sonsela Sandstone Member. Installed boring CMW25 located farther north.
	CMW24	239	262	Presence of Sonsela Sandstone Member not confirmed by drilling. Determined the presence of faults located between CMW16 and this location. Direction of ground water flow is unknown based upon structural deformation of subsurface. Ground water contamination was detected; completed as a bedrock monitoring well.
	CMW25	NE	97	Presence of Sonsela Sandstone Member not confirmed by drilling. Ground water flow direction is toward the north. Ground water contamination was not detected in Painted Desert Member. Completed as a bedrock monitoring well within the Painted Desert Member.

Table 2-2
Soil Borings and Monitoring Wells
OB/OD Areas
Fort Wingate Depot Activity
Gallup, New Mexico

Area	Boring/Monitoring Well Identification	Depth to Sonsela (feet)	Total Depth of Boring (feet)	Boring/Monitoring Well Location Rationale
Closed OB/OD Area				
	KMW-12	NA	60	Installed as a bedrock background monitoring well within the Mancos Shale Formation. Ground water flow direction cannot be determined.
	KMW-13	NA	60	Ground water contamination was not detected. Ground water has not been impacted by waste disposal in area between KMW09 and this location. Completed as a bedrock downgradient monitoring well within the Dakota Sandstone Formation. Drilled boring KMW14 north of this location.
	KMW-14	NA	350	Drilled through entire thickness of Dakota Sandstone Formation; no free water encountered. Borehole was abandoned.

NA - The depth to Sonsela Sandstone is not relevant to the drilling of this boring.
NE - The Sonsela Sandstone was not encountered during the drilling of this boring.

Table 2-3
Well Completion Specifications
1996 and 1998 Field Efforts
OB/OD Areas
Fort Wingate Depot Activity
Gallup, New Mexico

Well Id	Date Installed	Drilling Method	Ground Elevation (ft amsl)	Top of Casing Elevation (ft amsl)	PVC Stickup (feet)	Casing Diameter (inches)	Borehole Diameter (inches)	Total Depth Drilled (ft bgs)	Total Well Depth (ft bgs)	Screen Length (feet)	SCREENED INTERVAL (ft bgs)	Screened Interval (ft amsl)
Current OB/OD Area												
CMW02	8/15/96	H.S.A./A.R.	7256.61	7258.29	2.3	2	8	43	37.85	10	25.0 - 35.0	7221.61 - 7231.61
CMW03	8/9/96	H.A	NA - A	NA - A	NA - A	NA - A	NA - A	2.7	NA - A	NA - A	NA - A	NA - A
CMW04	8/15/96	H.S.A./A.R.	7249.50	7251.21	2.3	2	8	136.6	137.86	20	115.0 - 135.0	7114.50 - 7134.50
CMW05	8/9/96	H.A.	NA - A	NA - A	NA - A	NA - A	NA - A	5	NA - A	NA - A	NA - A	NA - A
CMW06	10/5/96	H.A.	7214.13	7216.05	2.5	2	4	18.6	20.96	10	8.3 - 18.3	7195.83 - 7205.83
CMW07	8/12/96	H.S.A./A.R.	7233.61	7235.50	2.3	2	8	65.8	66.55	20	44.0 - 64.0	7169.61 - 7189.61
CMW08	8/9/96	H.A.	NA - A	NA - A	NA - A	NA - A	NA - A	6	NA - A	NA - A	NA - A	NA - A
CMW09	8/9/96	H.A.	NA - A	NA - A	NA - A	NA - A	NA - A	5.5	NA - A	NA - A	NA - A	NA - A
CMW10	10/1/96	H.S.A/A.R.	7177.71	7179.59	2.5	2	8	70.85	73.07	20	50.5 - 70.5	7107.21 - 7127.21
CMW11	8/16/96	H.S.A	NA - A	NA - A	NA - A	NA - A	NA - A	12	NA - A	NA - A	NA - A	NA - A
CMW12	8/8/96	H.A.	NA - A	NA - A	NA - A	NA - A	NA - A	3.1	NA - A	NA - A	NA - A	NA - A
CMW14	9/30/96	H.S.A/A.R.	7151.56	7153.57	2.5	2	9	94.55	96.80	10	84.2 - 94.2	7057.36 - 7067.36
CMW15	8/9/96	H.A.	NA - A	NA - A	NA - A	NA - A	NA - A	3	NA - A		NA - A	NA - A
CMW16	9/6/96	H.S.A/A.R.	7082.17	7084.23	2	2	8	31.8	32.70	10	20 - 30	7052.17 - 7062.17
CMW17	8/17/96	H.S.A/A.R.	7143.72	7145.39	1.6	2	8	53	54.24	20	32.0 - 52.0	7091.72 - 7111.72
CMW18	8/21/96	H.S.A/A.R.	7156.63	7158.58	1.95	2	8	53	54.04	20	32.0 - 52.0	7104.63 - 7124.63
CMW19	9/28/96	H.S.A/A.R.	7128.11	7130.19	2.5	2	8	52.8	51.21	15	33.5 - 48.5	7079.61 - 7094.61
CMW20	10/5/96	H.A.	7193.14	7194.98	2.5	2	4	5.8	8.14	3	2.5 - 5.5	7187.64 - 7190.64
CMW21	8/12/98	H.S.A/A.R.	7083.66	7085.16	1.5	2	5.5	74.5	69.30	10	57-67	7016.66 - 7026.66
CMW22	8/10/98	H.S.A/A.R.	7077.48	7078.98	1.5	2	5.5	122	120.45	20	96.5-116.5	6960.98 - 6980.98
CMW23	9/4/98	H.S.A/A.R.	7030.22	7032.42	2.2	2	5.5	112	106.39	20	84-104	6926.22 - 6946.22
CMW24	7/31/98	H.S.A/A.R.	7094.94	7096.67	1.73	2	6.25	262	262.28	30	230-260	6834.94 - 6864.94
CMW25	9/15/98	H.S.A/A.R.	7002.19	7004.52	2.33	2	5	97	98.70	25	71-96	6906.19 - 6931.19
Closed OB/OD Area												
KMW09	9/28/96	H.S.A/A.R.	7186.54	7188.38	2.5	2	9	108	72.78	10	60 - 70	7116.54 - 7126.54
KMW10	9/27/96	H.S.A/A.R.	7129.65	7131.73	2.5	2	8	173	170.90	10	158 - 168	6961.65 - 6971.65
KMW11	8/6/96	H.S.A	7107.25	7109.04	1.8	2	9	63	57.34	20	35 - 55	7052.25 - 7072.25
KMW12	9/2/98	H.S.A/A.R.	7188.48	7190.23	1.75	2	8.75	75	75.33	20	53-73	7115.48 - 7135.48
KMW13	8/17/98	H.S.A/A.R.	7163.82	7165.62	1.8	2	8.75	54.5	51.94	20	32-52	7111.82 - 7131.82
KMW14	9/1/98	H.S.A/A.R.	7161.23	NA - A	NA - A	NA - A	NA - A	350	NA - A	NA - A	NA - A	NA - A

Notes:
NA - A = Not Applicable, Well Abandoned
ND = No Data Available
H.S.A. = Hollow Stem Auger
H.A. = Hand Auger
ft amsl = Feet Above Mean Sea Level
ft bgs = Feet Below Ground Surface
S.S. = Sandstone

Table 2-4
Well Development Data
1996 and 1998 Field Efforts
OB/OD Areas
Fort Wingate Depot Activity
Gallup, New Mexico

Well ID	Begin Development Date	Complete Development Date	Development Method	Depth to Water (1) (ft bgs)	Well Volume (gal)	Volume Purged (gal)	Pumping Rate (gpm)	Final pH	Final Conductivity (mmhos/cm)	Final Temperature (Celsius)	Final Turbidity (NTU)	Depth to Water (2) (ft bgs)	Recharge Rate (gph)
Current OB/OD Area													
CMW02	9/14/96	9/16/96	2" pump	12.6	11	67	2	7.7	450	16.5	>200	ND	>5
CMW04	9/16/96	9/23/96	2" pump	28.4	33.6	170	1.5	8.4	2700	26	48	28.5	58
CMW06	10/11/96	10/13/96	1.5" bailer	17.11	1.25	3.5	NA	6.8	1200	16.5	>200	17.13	ND
CMW07	9/23/96	9/24/96	2" pump	38.3	19.2	96	0.4	7.7	1100	15	42	38.32	15
CMW10	10/4/96	10/13/96	1.5" bailer	70.12	1.95	4.5	NA	10.8	9000	16.5	>200	72.29	<1
CMW14	10/4/96	10/13/96	1.5" bailer	91.42	4.98	22.5	NA	11.2	9000	16.5	58	91.2	<1
CMW16	9/12/96	9/13/96	2" pump/1.5" bailer	22.8	6.87	64.5	2.5	7.79	1157	17.44	ND	22.1	2.5
CMW17	9/25/96	10/2/96	2" pump	22.24	21.81	110	1	7.8	700	17	50.1	22.8	1.18
CMW18	9/25/96	9/30/96	2" pump	37.4	13.92	165	1	8	650	16.5	>200	37.99	<1
CMW19	10/1/96	10/13/96	2" pump	12.92	18.28	40	<1	7.3	1100	16.5	ND	30.76	<1
CMW20	10/11/96	10/13/96	1.5" bailer	6.22	0.95	5.25	NA	6.8	600	16.5	ND	6.23	ND
CMW21	8/29/98	10/2/98	2" pump/1.5" bailer	20.89	193.3	30	0.7	9.45	929	14.2	695	24.46	21
CMW22	8/28/98	9/25/98	1.5" bailer	110.44	617	13.4	NA	9.31	943	13.7	ND	117.34	ND
CMW23	9/12/98	9/30/98	1.5" bailer	95.01	221.2	22	NA	10.57	3520	14.5	298	96.38	ND
CMW24	9/19/98	10/5/98	2" pump	51.73	647	>335	1	8.8	2900	12	210	65.83	1.2
CMW25	9/19/98	9/30/98	2" pump/1.5" bailer	46.53	145.15	107	1	8.79	935	17.4	933	64.42	0.06
Closed OB/OD Area													
KMW09	9/30/96	10/11/96	2" pump	43.48	14.22	53	1	11	2600	16.5	79	48.42	<1
KMW10	10/1/96	10/13/96	1.5" bailer	166.54	3.94	22	NA	8.7	700	16.5	7200	167.16	<1
KMW11	9/11/96	9/16/96	2" pump	32.85	24.6	123	1	8.6	2150	20.05	ND	ND	>5
KMW12	9/15/98	10/2/98	1.5" bailer	51.51	131	57	NA	7.9	3700	13	>999	53.48	0.36
KMW13	8/31/98	9/25/98	1.5" bailer	44.24	67.15	26.5	NA	7.03	4440	14.8	557	46.99	0.12

Notes:
(1) Depth to water measured prior to development
(2) Depth to water 24 hours after development completed

NA = Not Applicable
ND = No Data Available

gph = Gallons Per Hour
gpm = Gallons Per Minute

ft bgs = Feet Below Ground Surface
NTU = Nephelometric Turbidity Units

gal = Gallons
mmhos/cm = micromhos per centimeter

Table 2-5
Hydraulic Conductivity Data
OB/OD Areas
Fort Wingate Depot Activity
Gallup, New Mexico

	Hydraulic Conductivity				
Monitoring Well Identification	Slug in (cm/sec)	Slug out (cm/sec)	Slug in (ft/min)	Slug out (ft/min)	Screened Formation
Current OB/OD Area					
CMW02	1.5×10^{-5}	1.4×10^{-5}	2.9×10^{-5}	2.7×10^{-5}	Chinle Formation
CMW04	1.7×10^{-5}	1.7×10^{-5}	3.3×10^{-5}	3.3×10^{-5}	Chinle Formation
CMW07	6.6×10^{-5}	5.7×10^{-5}	1.3×10^{-4}	1.1×10^{-4}	Chinle Formation
CMW17	5.8×10^{-6}	3.3×10^{-5}	1.1×10^{-5}	6.5×10^{-5}	Chinle Formation
CMW21	3.3×10^{-6}	6.6×10^{-6}	6.5×10^{-6}	1.3×10^{-5}	Sonsela Sandstone Member
CMW23	9.7×10^{-7}	3.5×10^{-5}	1.9×10^{-6}	6.9×10^{-5}	Sonsela Sandstone Member
CMW24	2.3×10^{-5}	2.5×10^{-5}	4.5×10^{-5}	5.0×10^{-5}	Sonsela Sandstone Member
Closed OB/OD Area					
KMW09	1.8×10^{-5}	1.7×10^{-5}	3.5×10^{-5}	3.3×10^{-5}	Mancos Shale Formation
KMW11	3.0×10^{-5}	4.6×10^{-5}	5.9×10^{-5}	9.0×10^{-5}	Chinle Formation
KMW12	9.7×10^{-5}	8.7×10^{-5}	1.9×10^{-4}	1.7×10^{-4}	Mancos Shale Formation
KMW13	3.5×10^{-5}	4.3×10^{-5}	6.9×10^{-5}	8.5×10^{-5}	Dakota Sandstone Formation

Notes:
cm/sec = centimeters per second
ft/min = feet per minute

Table 2-6
Ground Water Elevations
1996, 1997, 1998, and 1999 Field Efforts
OB/OD Areas
Fort Wingate Depot Activity
Gallup, New Mexico

WELL ID	Surveyed Ground Surface Elevation	Surveyed Top of Casing Elevation	Depth to Water 10/17/96	Ground Water Elevation 10/17/96	Depth to Water 2/5/97	Ground Water Elevation 2/5/97	Depth to Water 10/10/98	Ground Water Elevation 10/10/98	Depth to Water 1/19/99	Ground Water Elevation 1/19/99
Current OB/OD										
CMW02	7256.61	7258.29	13.25	7245.04	12.98	7245.31	9.56	7248.73	9.20	7249.09
CMW04	7249.50	7251.21	28.66	7222.55	29.86	7221.35	25.71	7225.50	26.00	7225.21
CMW06	7214.13	7216.02	17.11	7198.91	17.67	7198.35	19.56	7196.46	19.31	7196.71
CMW07	7233.16	7235.50	38.48	7197.02	38.28	7197.22	39.01	7196.49	39.09	7196.41
CMW10	7177.71	7179.59	72.72	7106.87	66.67	7112.92	17.32	7162.27	65.05	7114.54
CMW14	7151.56	7153.57	91.88	7061.69	38.15	7115.42	26.71	7126.86	29.88	7123.69
CMW16	7082.17	7084.23	21.24	7062.99	18.39	7065.84	19.68	7064.55	19.01	7065.22
CMW17	7143.72	7145.39	22.60	7122.79	22.74	7122.65	19.40	7125.99	17.32	7128.07
CMW18	7156.63	7158.58	38.16	7120.42	34.09	7124.49	36.51	7122.07	36.93	7121.65
CMW19	7128.11	7130.19	38.19	7092.00	22.05	7108.14	19.21	7110.98	20.11	7110.08
CMW20	7193.14	7194.98	5.63	7189.35	4.74	7190.24	6.96	7188.02	DRY	NA
CMW21	7083.66	7085.16	NA	NA	NA	NA	27.92	7057.24	22.55	7062.61
CMW22	7077.48	7078.98	NA	NA	NA	NA	116.27	6962.71	116.18	6962.80
CMW23	7030.22	7032.42	NA	NA	NA	NA	95.29	6937.13	95.57	6936.85
CMW24	7094.94	7096.67	NA	NA	NA	NA	70.65	7026.02	61.90	7034.77
CMW25	7002.19	7004.52	NA	NA	NA	NA	37.52	6967.00	35.31	6969.21
Closed OB/OD										
KMW09	7186.54	7188.38	48.42	7139.96	41.58	7146.80	40.77	7147.61	40.99	7147.39
KMW10	7129.65	7131.73	167.05	6964.68	166.69	6965.04	166.69	6965.04	166.82	6964.91
KMW11	7107.25	7109.04	33.03	7076.01	32.79	7076.25	31.49	7077.55	31.71	7077.33
KMW12	7188.48	7190.23	NA	NA	NA	NA	58.65	7131.58	50.36	7139.87
KMW13	7163.82	7165.62	NA	NA	NA	NA	44.65	7120.97	46.66	7118.96

Notes:
All depth to water measurements are in feet, measured from the top of casing.
All elevations are recorded in feet above the mean sea level.
NA = Not Applicable

Table 2-7
Interpreted Depths to Tops of Formations
OB/ OD Areas
Fort Wingate Depot Activity
Gallup, New Mexico

Formation	Line 1 (feet bgs)		Line 2 (feet bgs)		Line 3 (feet bgs)		Line 4 (feet bgs)		Line 5 (feet bgs)		Line 6 (feet bgs)	
	min	max	min	max	min	max	min	max	min	max	min	max
Sonsela Sandstone Member	0	326	0	355	0	256	40	673	39	288	0	204
Blue Mesa Member	17	456	10	411	18	348	200	750	161	456	3	338
Bluewater Creek Formation, Middle Member	197	608	133	599	275	489	308	924	197	608	160	761
Moenkopi Formation	476	775	386	709	453	639	523	1,020	476	775	434	827
Glorieta Sandstone Formation	641	959	601	853	679	810	699	1,113	641	959	603	1,443

Notes:

bgs = below ground surface
min = minimum
max = maximum

Table 2-8
1998 Monitoring Wells
OB/OD Areas
Fort Wingate Depot Activity
Gallup, New Mexico

						First Water				Second Water			
								24-Hour TAT Results				24-Hour TAT Results	
Well Identification	Depth Interval (ft)	Lithologic Description	Geologic Formation	Refusal Depth (ft)	Total Depth Drilled (ft)	Depth Water Encountered (ft)	Static Depth to Water (ft)	Explosives Detected (µg/l)	Nitrate/ Nitrite Detected (µg/l)	Depth Water Encountered (ft)	Static Depth to Water (ft)	Explosives Detected (µg/l)	Nitrate/ Nitrite Detected
Current OB/OD Area													
CMW21	0 - 23	Sand/Silt/Clay	Qal	23	74.5	28	21	HMX - 5.51	2,400	58	30	2-A-4,6-DNT - 1.23	101
	23 - 37	Sandstone	Trpps					RDX - 5.30					
	37 - 42	Siltstone	Trpp					4-A-2,6-DNT - 0.52					
	42 - 61	Sandstone	Trps										
	61 - 74.5	Siltstone	Trpb										
CMW22	0 - 27.5	Sand/Silt/Clay	Qal	27.5	122	29.5	25	HMX - 4.14	1,560	96.5	89.5	2-A-4,6-DNT - 1.60	1,110
	27.5 - 41	Sandstone	Trpp					RDX - 6.54					
	41 - 50	Siltstone	Trpp										
	50 - 58	Sandstone	Trpp										
	58 - 79	Siltstone	Trpp										
	79 - 96.5	Sandstone	Trpp										
	96.5 - 116.6	Sandstone	Trps										
	116.6 - 122	Siltstone	Trpb										
CMW23	0 - 29.5	Sand/Silt/Clay	Qal	29.5	112	46	46.5	HMX - 0.74	792	100	103	ND	303
	29.5 - 50	Sandstone	Trpp					RDX - 1.97					
	50 - 60	Siltstone	Trpp										
	60 - 80	Siltstone	Trpp										
	80 - 90.5	Sandstone	Trpp										
	90.5 - 104	Sandstone	Trps										
	104 - 112	Siltstone	Trpb										
CMW24	0 - 66	Sand/Silt/Clay	Qal	66	262	223	218	2,4,6-TNT - 0.27	759	Monitoring well installed into First Water			
	66 - 239	Siltstone w/ Clay	Trpp					2-A-4,6-DNT - 1.00					
	239 - 262	Sandstone	Trpp										
CMW25	0-74	Sand/Silt/Clay	Qal	74	97	74	46.93	ND	140	Monitoring well installed into First Water			
	74-79	Mudstone	Trpp										
	79-80.5	Muddy Sandstone	Trpp										
	80.5-83	Mudstone	Trpp										
	83-97	Sandstone	Trpps										

Table 2-8
1998 Monitoring Wells
OB/OD Areas
Fort Wingate Depot Activity
Gallup, New Mexico

Well Identification	Depth Interval (ft)	Lithologic Description	Geologic Formation	Refusal Depth (ft)	Total Depth Drilled (ft)	First Water: Depth Water Encountered (ft)	First Water: Static Depth to Water (ft)	First Water: 24-Hour TAT Results Explosives Detected (µg/l)	First Water: 24-Hour TAT Results Nitrate/Nitrite Detected (µg/l)	Second Water: Depth Water Encountered (ft)	Second Water: Static Depth to Water (ft)	Second Water: 24-Hour TAT Results Explosives Detected (µg/l)	Second Water: 24-Hour TAT Results Nitrate/Nitrite Detected
Closed OB/OD Area													
KMW12	0 - 27.5	Sand/Silt/Clay	Qal	34.5	75	58	56	ND	22.4	Monitoring well installed into First Water			
	27.5 - 75	Shale	Km										
KMW13	0 - 25.5	Sand/Silt/Clay	Qal	25.5	55	47	43.7	ND	695	Monitoring well installed into First Water			
	25.5 - 47	Shale	Km										
	47 - 55	Sandstone/Siltstone	Kd										
KMW14	0 - 24	Sand/Silt/Clay	Qal	24	350	No free water encountered. Borehole was abandoned.							
	24 - 95.5	Sandstone	Kd										
	95.5 - 210	Shale/Mudstone	Km										
	210 - 275	Sandstone	Kd										
	275 - 283	Shale/Mudstone	Km										
	283 - 296	Shear Zone	Kd										
	296 - 302	Sandstone	Kd										
	302 - 308	Shale/Mudstone	Km										
	308 - 338	Sandstone	Kd										
	338 - 350	Sandstone	Jm										

Notes:
Depth to water measured from ground surface.
2-A-4,6-DNT: 2-Amino-4,6-Dinitrotoluene
4-A-2,6-DNT: 4-Amino-2,6-Dinitrotoluene
3-NT: 3-Nitrotoluene
HMX: Cyclotetramethylenetetranitramine
RDX: Hexahydro-1,3,5-trinitro-1,3,5-triazine
ND: Not Detected

Jm: Morrison Formation
Kd: Dakota Formation
Km: Mancos Shale
Qal: Alluvial Deposits
Trpb: Blue Mesa Member, Petrified Forest Formation
Trpp: Painted Desert Member, Petrified Forest Formation
Trpps: Painted Desert/Sonsela Lithologic Member, Petrified Forest Formation

Trps: Sonsela Sandstone Member, Petrified Forest Formation

Table 2-9
Depth to Sonsela Sandstone Member
OB/ OD Areas
Fort Wingate Depot Activity
Gallup, New Mexico

Boring	Induction "Kick" (feet bgs)	Gamma Ray Sand Signature (feet bgs)
CMW-21	44	NO
CMW-22	96	99
CMW-23	80	81
CMW-24	223	NO
CMW-25	85	NO
SPB-1	NO	30

Notes:

bgs = below ground surface
NO = Not Observed

BY PHOTOGRAMMETRIC METHODS FROM AERIAL PHOTOGRAPHS TAKEN SEPTEMBER 28, 1995

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

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Gallup, New Mexico

United States Army Industrial Operations Command
Tooele Army Depot, Utah

Program Management Company
Exton, Pennsylvania 19341 (610) 280-5000

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Figure 2-2
Seismic Survey Locations
OB/OD Areas

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SCALE 1" = 400'	W.O. No. 00805.80.05/I3011B	ISSUED FOR	DATE

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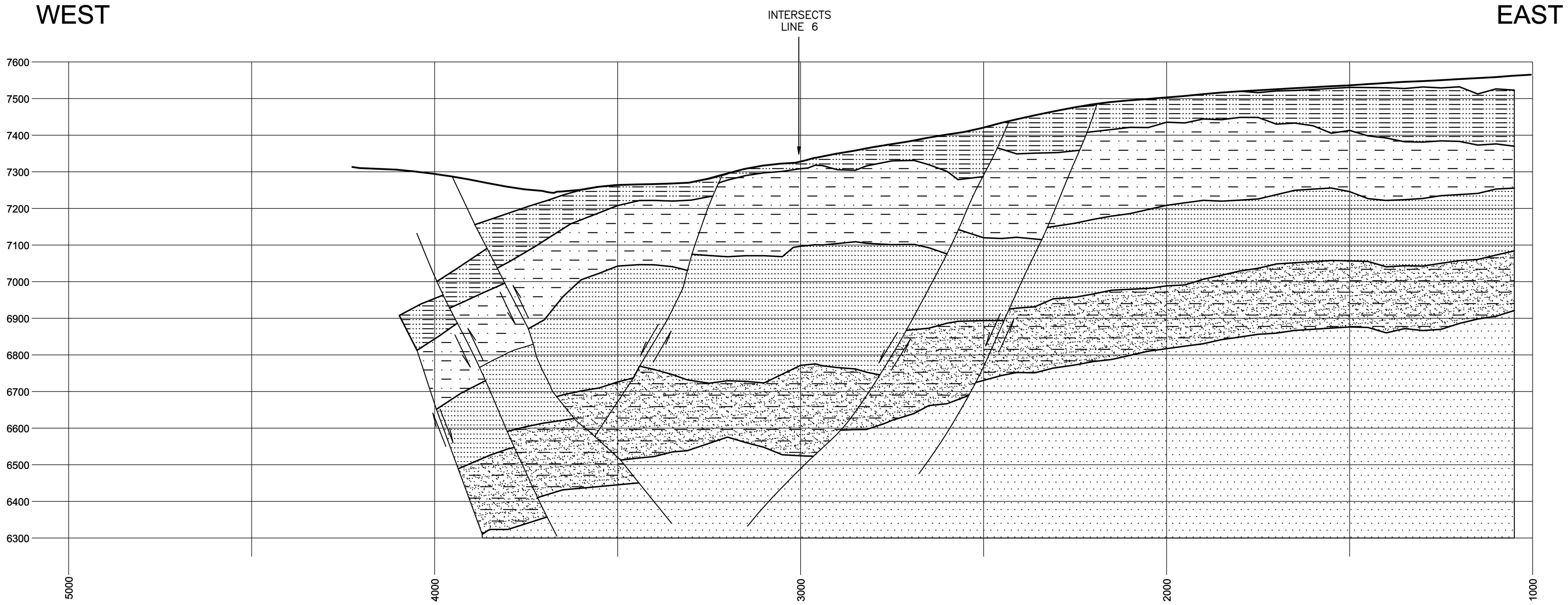
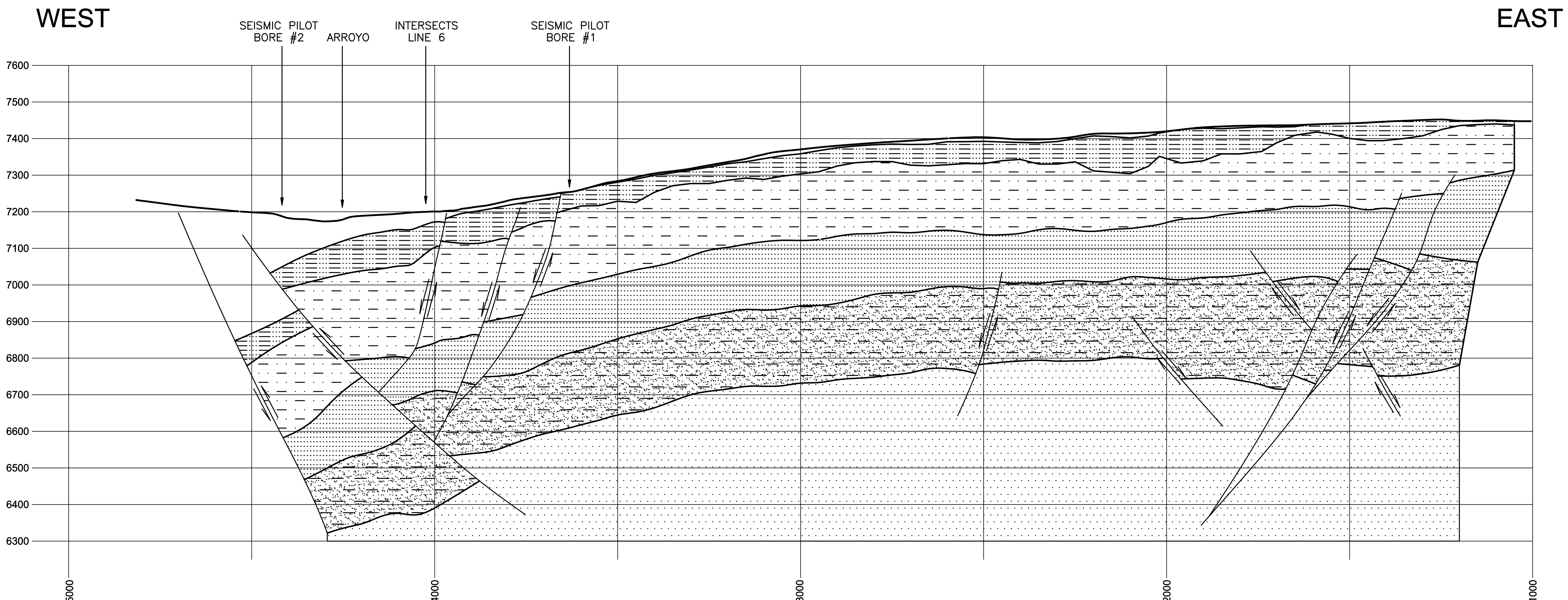


LINE 1

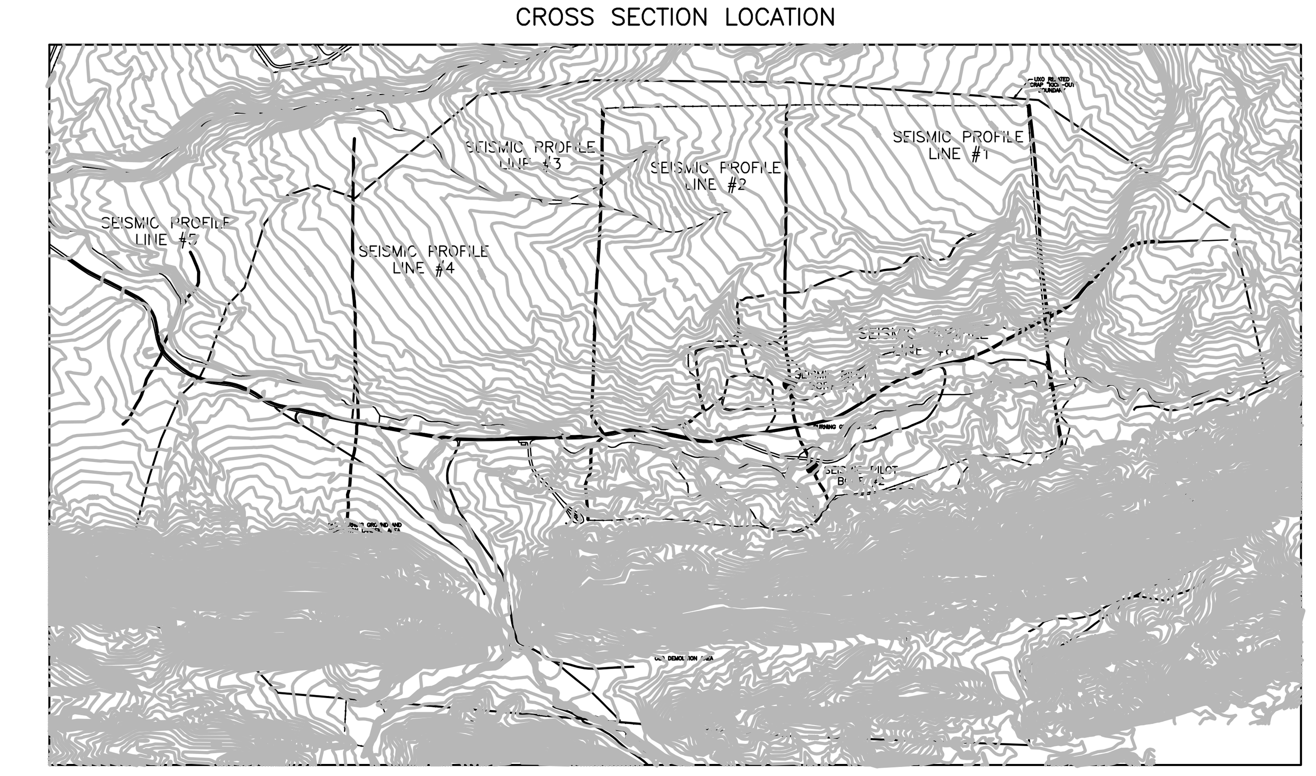


LINE 2

LEGEND

- GROUND SURFACE
- PETRIFIED FOREST FORMATION, SONSELA SANDSTONE MEMBER
- PETRIFIED FOREST FROMATION, BLUE MESA MEMBER
- BLUEWATER CREEK FORMATION, MIDDLE MEMBER
- MOENKOPI FORMATION
- GLORIETA SANDSTONE FORMATION

CROSS SECTION LOCATION



NO VERTICAL EXAGGERATION

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Gallup, New Mexico

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Figure 2-3
Interpreted Seismic Profiles of Lines 1 and 2
OB/OD Areas

DRAWN D. Taylor/DST	DATE 10.20.99/11.30.99	CLIENT APPROVAL
SCALE 1" = 200'	W.O. No. 00805.80.05/E301	ISSUED FOR / DATE

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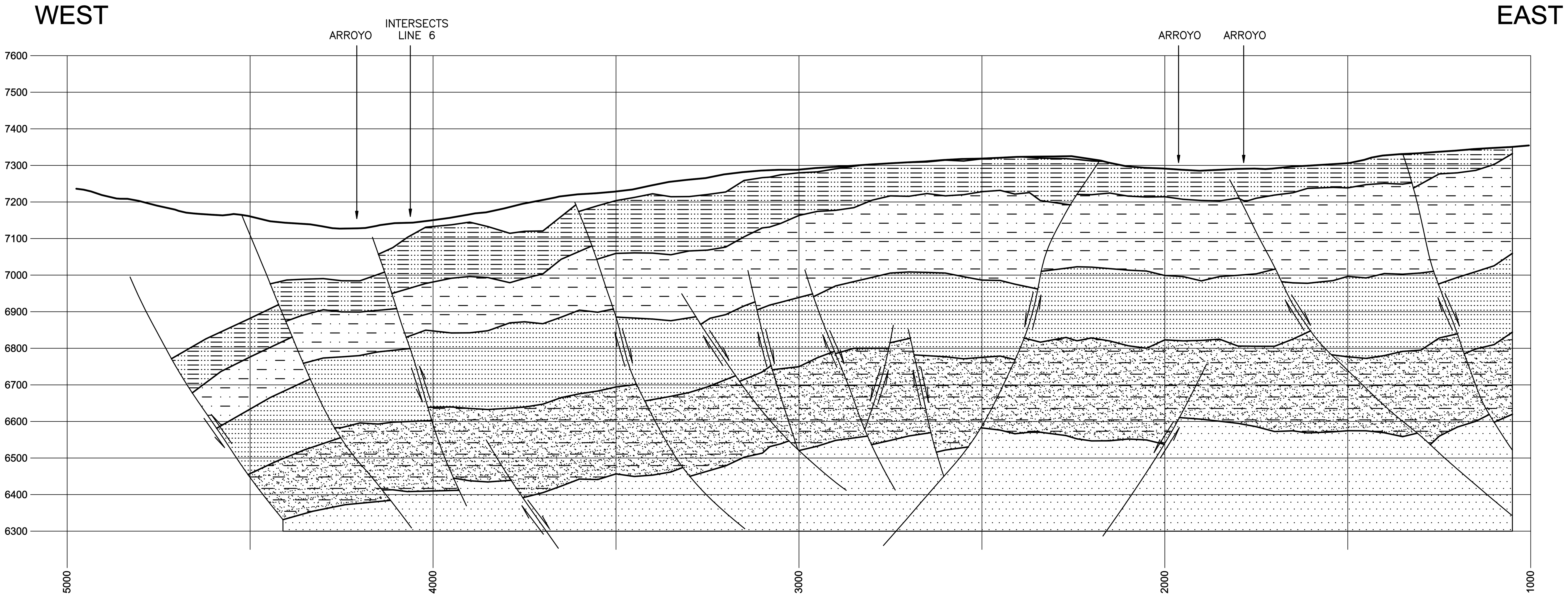
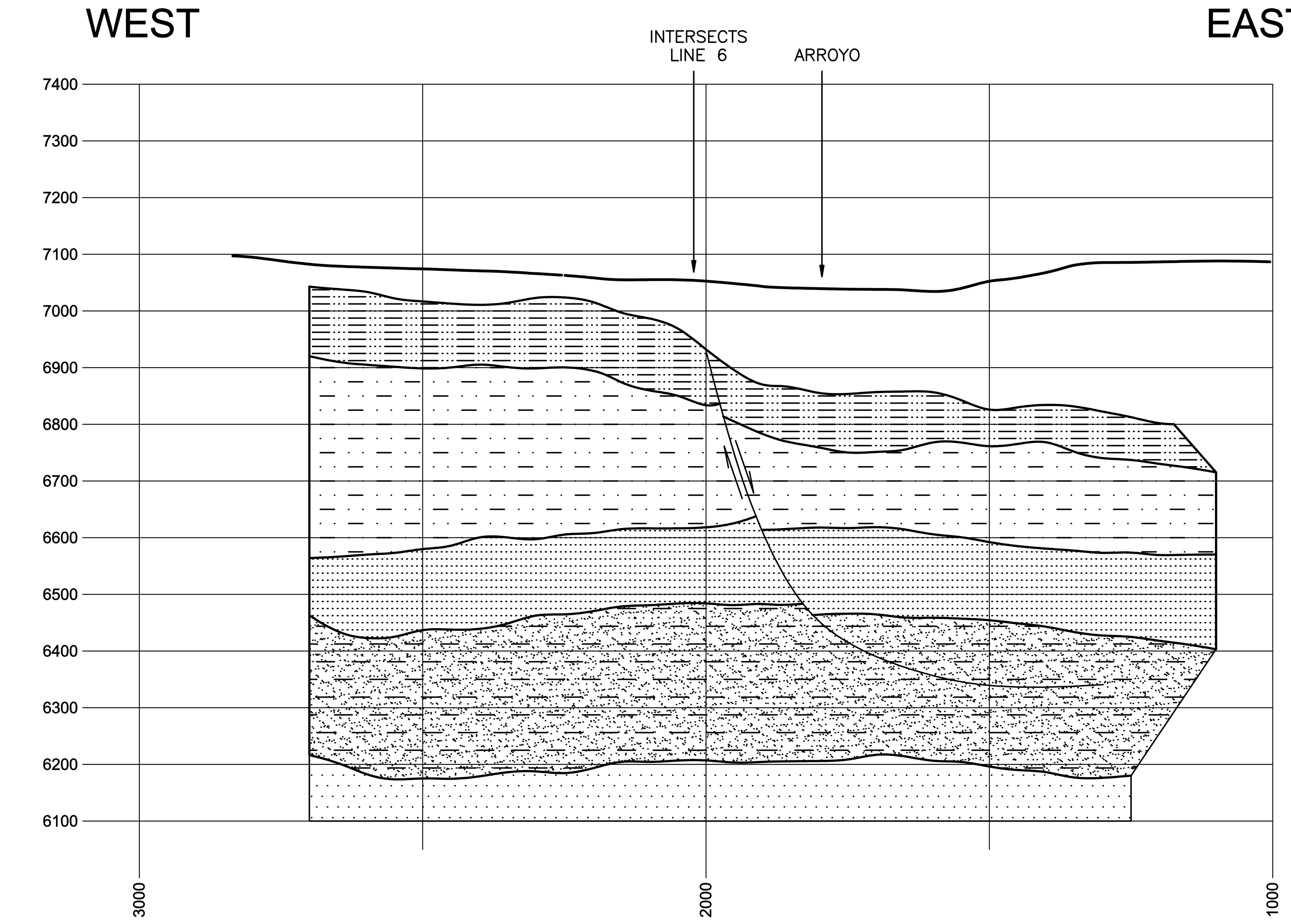
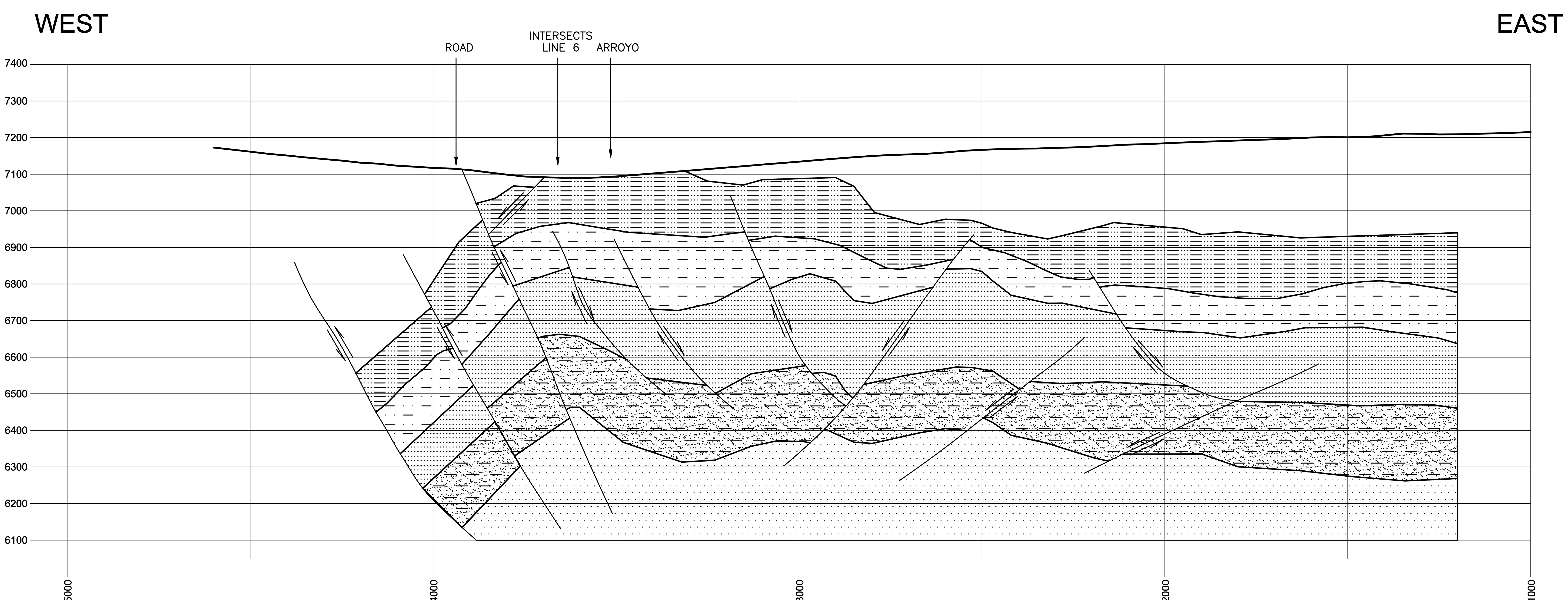


LINE 3



LINE 5

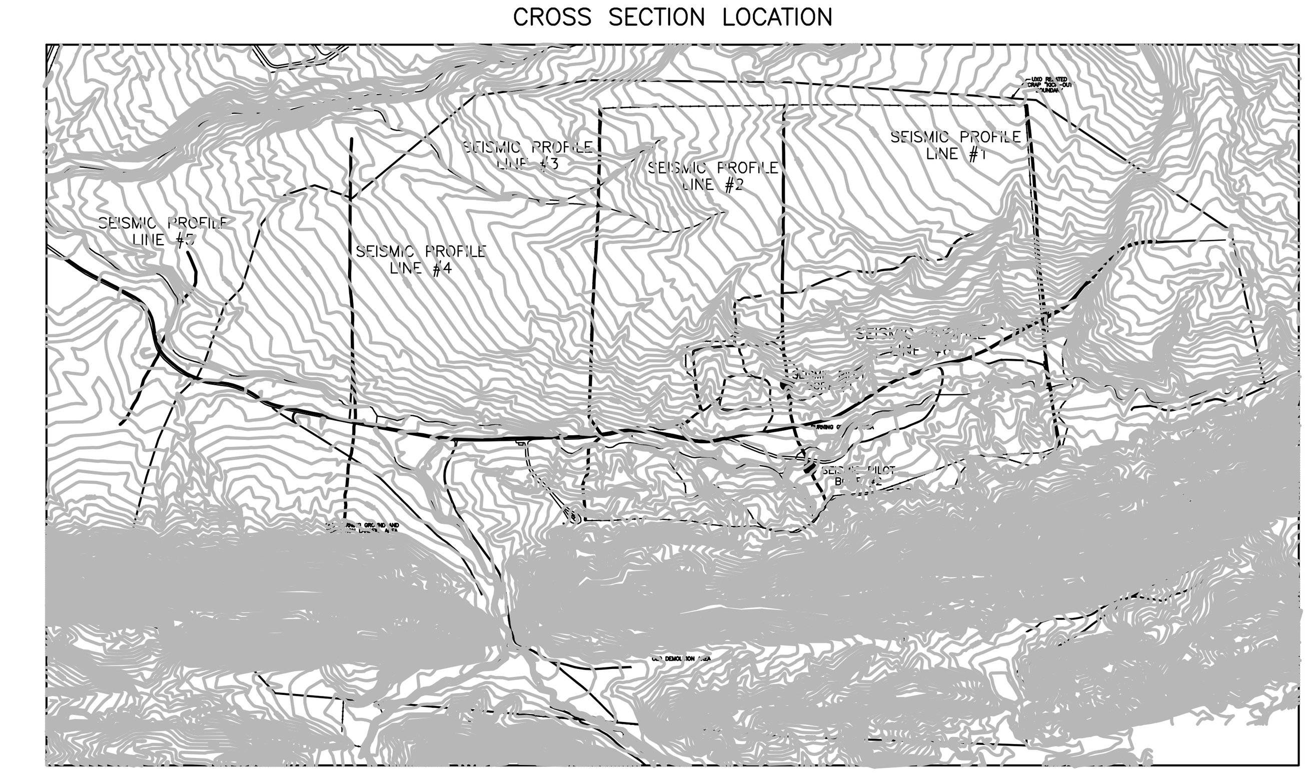


LINE 4

LEGEND

- GROUND SURFACE
- PETRIFIED FOREST FORMATION, SONSELA SANDSTONE MEMBER
- PETRIFIED FOREST FROMATION, BLUE MESA MEMBER
- BLUEWATER CREEK FORMATION, MIDDLE MEMBER
- MOENKOPI FORMATION
- GLORIETA SANDSTONE FORMATION

CROSS SECTION LOCATION



NO VERTICAL EXAGGERATION

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Figure 2-4
Interpreted Seismic Profiles of Lines 3, 4 and 5
OB/OD Areas

DRAWN D. Taylor/DST	DATE 10.20.99/11.30.99	CLIENT APPROVAL
SCALE 1" = 200'	W.O. No. 00805.80.05/E302	ISSUED FOR / DATE

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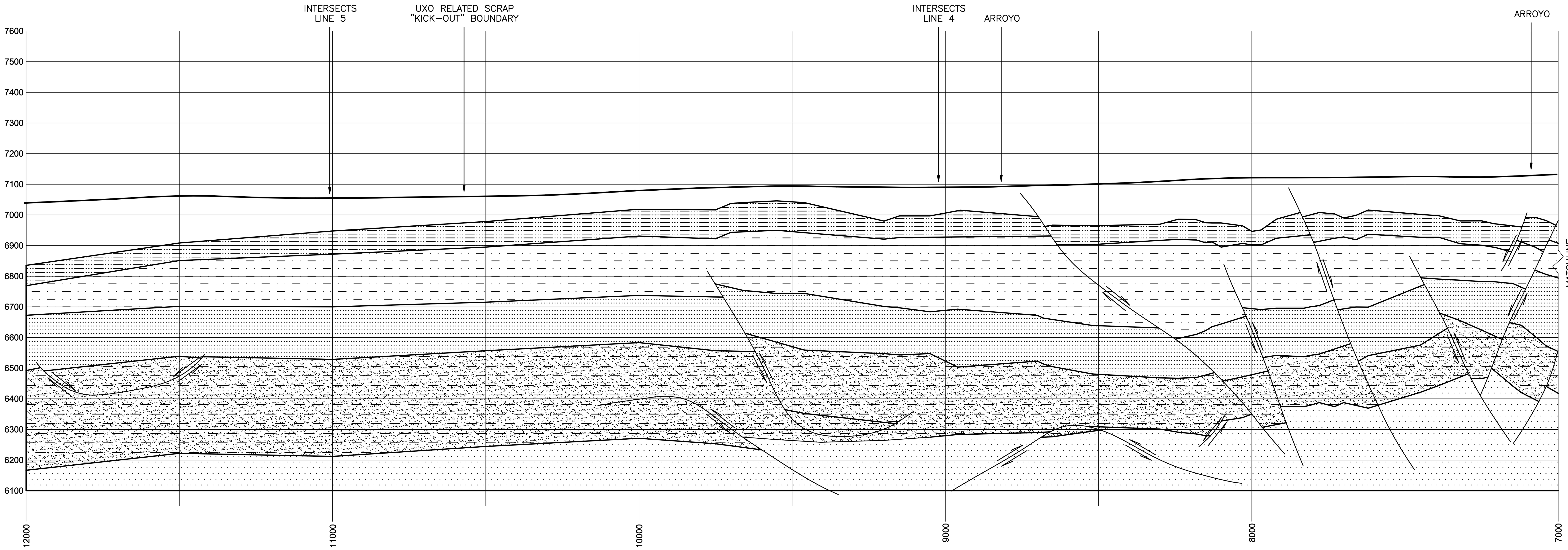
REV. NO.

SHEET OF

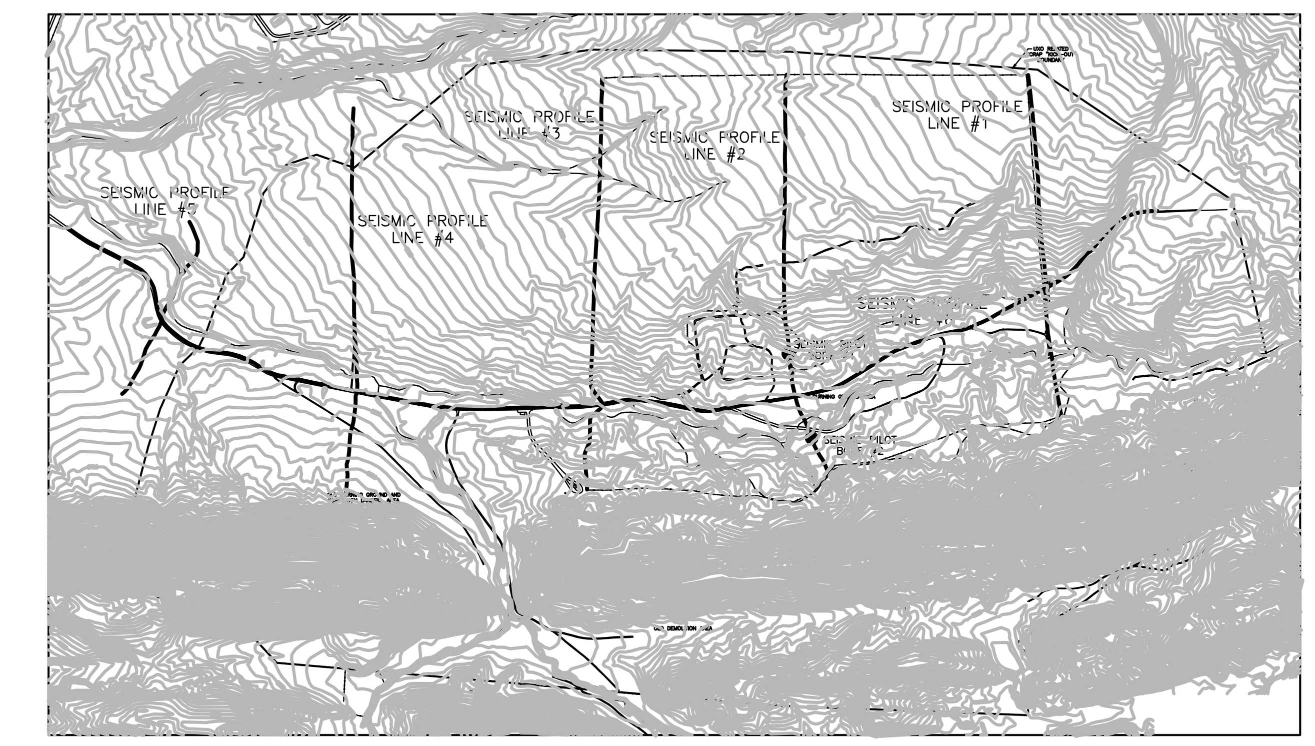
NORTH



LEGEND

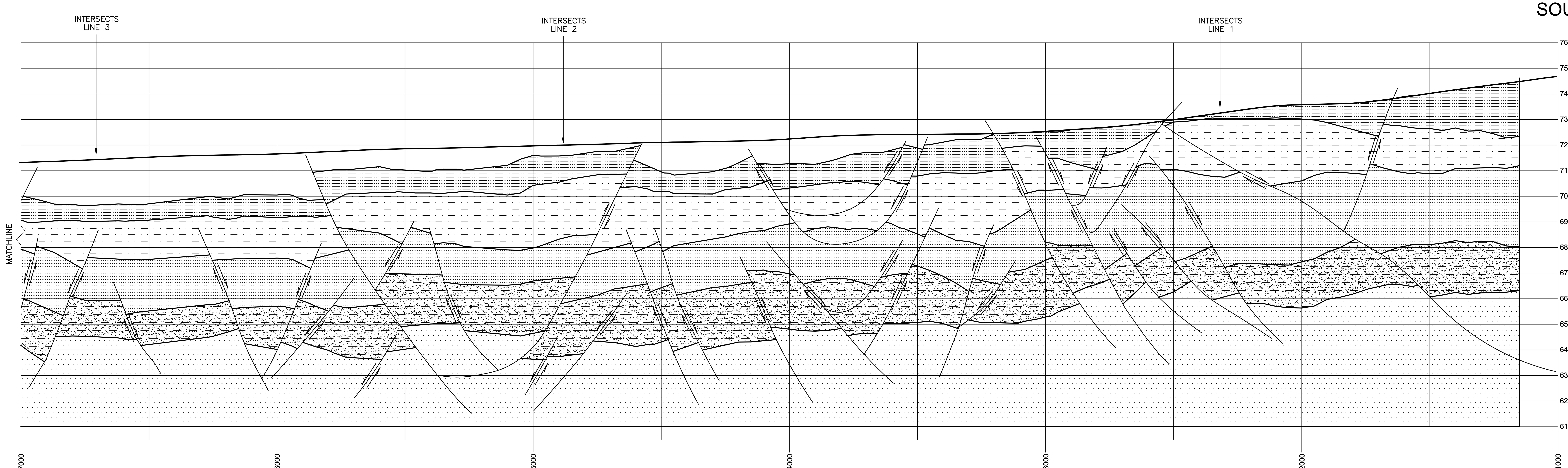
- GROUND SURFACE
- PETRIFIED FOREST FORMATION, SONSELA SANDSTONE MEMBER
- PETRIFIED FOREST FROMATION, BLUE MESA MEMBER
- BLUEWATER CREEK FORMATION, MIDDLE MEMBER
- MOENKOPI FORMATION
- GLORIETA SANDSTONE FORMATION

CROSS SECTION LOCATION



LINE 6

SOUTH



NO VERTICAL EXAGGERATION

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APPROVED	

Figure 2-5
Interpreted Seismic Profiles of Line 6
OB/OD Areas

DRAWN D. Taylor/DST	DATE 10.20.99/11.30.99	CLIENT APPROVAL
SCALE 1" = 200'	W.O. No. 00805.80.05/E303	ISSUED FOR DATE

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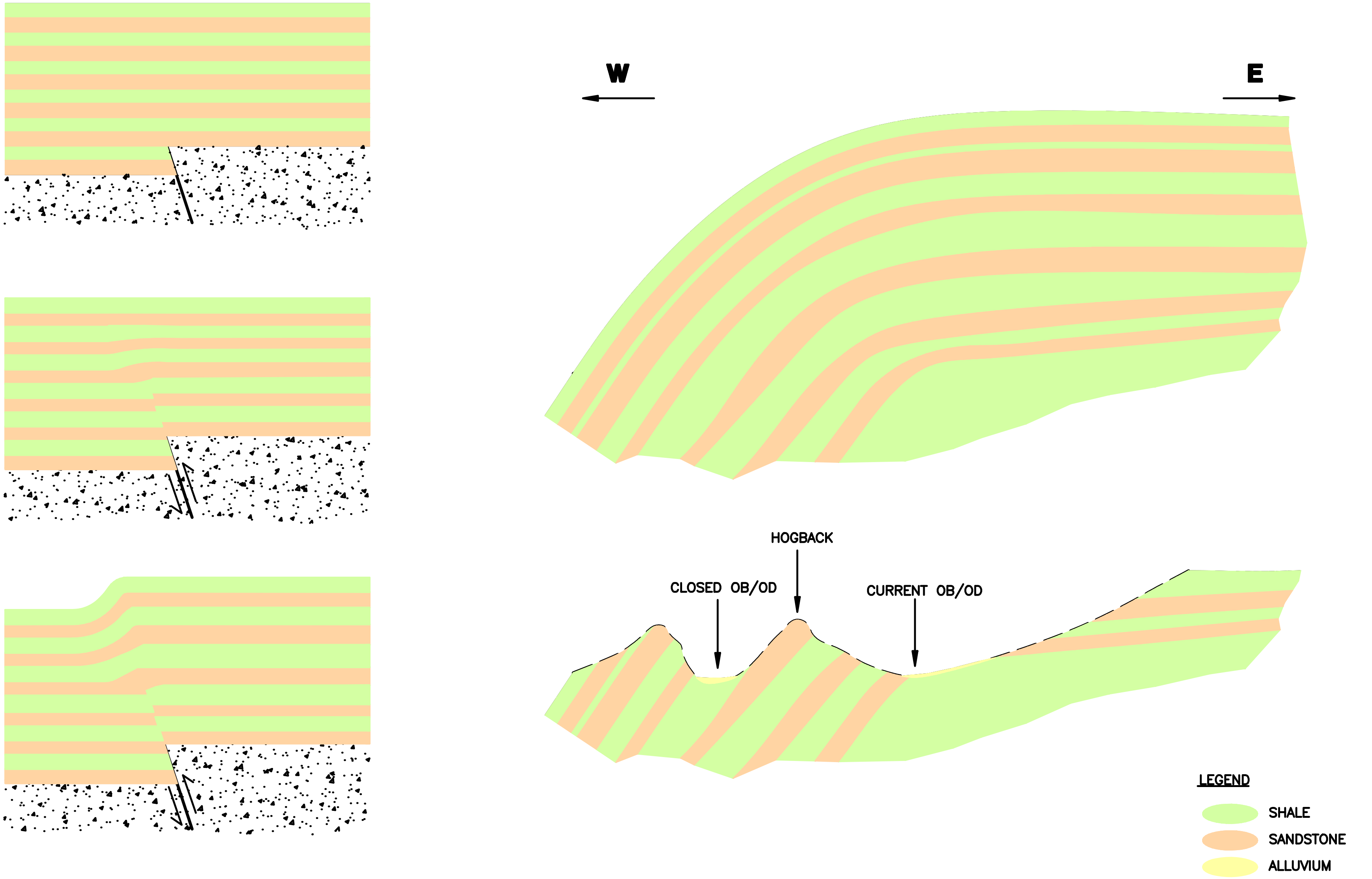
Figure 2-6
Formation of Geologic Structures
OB/OD Areas
Fort Wingate Depot Activity
Gallup, New Mexico



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BY PHOTOGRAMMETRIC METHODS FROM AERIAL PHOTOGRAPHS TAKEN SEPTEMBER 28, 1995

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Figure 2-7
Ground Water Systems
OB/OD Areas

DRAWN D. Taylor/DST	DATE 10.20.99/12.14.99.99	CLIENT APPROVAL	
SCALE 1" = 400'	W.O. No. 00805.80.05/I3014B	ISSUED FOR	DATE

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3.0 CHEMICAL DATA ASSESSMENT

The chemical data derived from the sampling and analysis of ground water, soil, sediment, and surface water samples were assessed by comparison to select environmental quality benchmark values.

Chemical data from samples collected within the OB/OD Areas at FWDA during 1996, 1997, 1998, and 1999 were sequentially screened against: 1.) Area-specific background values, 2.) Screening criteria including USEPA Maximum Contaminant Levels (MCLs) and Region VI risk-based screening levels (RBLs) and 3.) Closure Performance Standards (CPSs) developed for the OB/OD Areas.

Macronutrients have been excluded from the screening process for soil, sediment, surface water, and ground water samples. These constituents include calcium, magnesium, potassium, and sodium and were excluded because of the low toxicity associated with each of these constituents.

In soil, aluminum was also excluded from the screening assessment. Aluminum is a major component of the aluminosilicate soils found in the OB/OD Areas. Elevated concentrations of aluminum are expected as a result of the mineral composition of the soil, and are not related to anthropogenic activities at the OB/OD Areas. Several other constituents have been excluded from the screening assessment in order to focus this data assessment toward the constituents that are most likely to produce adverse health effects. Other excluded constituents include chloride, fluoride, and sulfate.

3.1 BACKGROUND CONCENTRATIONS OF COCS

3.1.1 Ground Water

Separate background values were developed for both the Closed and Current OB/OD Areas because different geologic units are present in each area, resulting in different inorganic constituent concentrations in the ground water. As discussed in Section 2.0, two samples were collected from the same well in the Closed OB/OD Area ground water system (KMW12), and three samples were collected from the same well in the Current OB/OD Area ground water system (CMW02). Figure 3-1 (Appendix B) shows the locations of the background monitoring wells. Insufficient data were available to determine background values based upon a statistic distribution analysis. Background inorganic concentrations were determined for the Closed and Current OB/OD Areas based on the maximum concentration detected during these sampling rounds. This value was then set as the background concentration for that inorganic constituent for that area. For those constituents that were not detected in the background data set, the background screening values were set at zero to provide a conservative bias to this initial screening step. Table 3-1 presents the data from each sampling event, and the background values for the Closed and the Current OB/OD Areas.

3.1.2 *Soil*

Separate background values were developed for both the Closed and Current OB/OD Areas because different geologic units are exposed at the land surface in each area, resulting in different accessory mineral (i.e., native metals) content of the soils. As discussed in the Phase IA Report, a total of 20 samples each were collected from each of the two OB/OD Areas. Figure 3-1 (Appendix A) shows the locations of the background sampling stations. Background inorganic concentrations were determined for the Closed and Current OB/OD Areas based on a statistical distribution analysis of the data (ERM, 1996b). For each inorganic constituent and each area, the data from 20 samples were inspected, normal and log-normal distributions were superimposed, and a best-fit determination was made regarding which distribution more accurately described the data. Using this determination, the 95-percentile distribution concentration (i.e., the 95th percentile upper control limit of the distribution) was calculated. This value was then set as the background concentration for that inorganic constituent for that area.

The range of detected background concentrations, the maximum detected concentrations, and the 95th percentile upper confidence limit (UCL) concentrations are shown in Table 3-2. All soil and sediment sample data were compared to the 95th UCL concentrations. For those constituents that were not detected in the background data set, the background screening values were set at zero (0) to provide a conservative bias to this initial screening step.

3.1.3 *Sediment*

Sediment background levels were derived for each of the OB/OD Areas by selecting the maximum concentration detected in background sediment samples. In the Closed OB/OD Area two background locations were sampled (KSW01 and KSW03) and in the Current OB/OD Area three background locations were sampled (CSW01, CSW02, and CSW03) (Figure 3-1, Appendix A). Data that were below the detection limit or were rejected due to blank qualification were not considered in the selection of a background value. The background sediment concentrations are presented in Table 3-3.

3.1.4 *Surface Water*

Surface water background levels were derived for the Closed and Current OB/OD Areas. The background screening levels were derived by selecting the maximum concentration detected in background surface water samples. There were two background sample locations (KSW01 and KSW03) in the Closed OB/OD Area and two background sample locations (CSW01 and CSW03) in the Current OB/OD Area (Figure 3-1, Appendix A). Data that were not detected or were rejected due to blank qualification were not considered in the selection of a background value. The background surface water concentrations are presented in Table 3-4.

3.2 *SCREENING CRITERIA*

3.2.1 *Ground Water*

3.2.1.1 *USEPA Maximum Contaminant Levels*

MCLs were used as the screening level in all instances where a primary MCL existed. Secondary MCLs were not considered in this screening because they are based on aesthetic qualities of drinking water that are not related to health effects. Lead and copper screening levels are based on the treatment technology levels. Because this data assessment considers possible health effects downgradient of the source at a compliance monitoring point only, the health-based screening levels were used in the data assessment. Only the explosive compounds, cobalt, and vanadium lacked MCLs. The MCLs are presented in Table 3-5.

3.2.1.2 *USEPA Region VI Risk-Based Screening Levels*

In instances where a primary MCL did not exist, the USEPA Region VI RBLs (Table 3-6) were used to assess the data following the initial comparison to background. The RBLs used were based on the 10^{-6} risk level or a hazard quotient of one, and residential land use. The use of residential-based screening levels allows for a conservative bias during this stage of the data assessment process because the OB/OD Areas will remain under Army control; therefore, there will be no future use of ground water within the OB/OD Areas.

3.2.2 *Soil and Sediment*

USEPA Region VI RBLs (Table 3-7) were used to assess soil and sediment data following the initial comparison to background. The RBLs used were based on the 10^{-6} risk level and residential land use (USEPA, 1999). The use of residential-based screening levels allows for a conservative bias during this stage of the data assessment process, because the OB/OD Areas will remain under Army control; therefore, future use will be consistent with current use. For those constituents that did not have an RBL, site specific values were calculated using the same methodologies that generated the established Region VI RBLs.

3.2.3 *Surface Water*

Surface water samples were collected during sporadic storm events during which surface water was present for only a short period of time. Surface water screening levels are based upon perennial surface water flow conditions. Because no perennial surface water flow conditions exist within the OB/OD Areas, no screening levels were compared to the surface water analytical data.

3.3 *RISK-BASED CLOSURE PERFORMANCE STANDARDS*

3.3.1 *Ground Water*

CPSs for ground water were derived by the Army to demonstrate compliance with potential upper bound risks and drinking water standards. All data exceeding the screening criteria were screened against the CPSs. In instances where the screening criterion selected was an MCL, then the same value was used as the CPSs. In instances where the constituent's screening criterion was the Region VI RBL, then the following steps were used to derive the CPS:

- The carcinogenic status of the constituent was evaluated;
- For noncarcinogenic constituents, RBLs were used as CPSs;

- For carcinogenic constituents, the RBL was adjusted by multiplying the RBL by 100. This value represents the difference between risks at the 1 x 10^{-6} level and the 1 x 10^{-4} risk level.

The ground water CPSs are shown in Table 3-8.

3.3.2 *Soil and Sediment*

Constituents that exceeded the Region VI RBLs were compared to site-specific CPSs developed for the OB/OD Areas. The CPSs were established by the Army to be protective of human health under realistic site-specific future land use scenarios. The Army intends that the OB/OD Areas will remain under the administrative care of the Army in perpetuity, and will continue to exist as limited access areas. Therefore, realistic current and future human receptors are restricted to on-site remediation workers and off-site recreational users. For an on-site remediation worker, direct contact with contaminated soils or solid waste residues, as well as incidental ingestion and dust inhalation were considered. For off-site recreational users, only the wind blown dust inhalation pathway was considered. The specific exposure assumptions used to generate the soil and sediment CPSs are shown in Table 3-9.

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

OFF-SITE FUGITIVE DUST EXPOSURE FOR CARCINOGENIC EFFECTS:

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

Where:

CPS_{soil}	= Concentration of constituent in soil (mg/kg)
TR	= Target Risk (unitless, $1E^{-6}$)
AT	= Averaging Time (70 years)
BW	= Body Weight of an adult (70 kg)
EF	= Exposure Frequency (days/year)
ED	= Exposure Duration (years)
CPF_i	= Inhalation CPF ($(mg/kg\text{-}day)^{-1}$)
IR_{air}	= Inhalation Rate (m^3/day)

E_i		= Dust Emission Rate - OB/OD Areas ($1x10^{-9}$ mg/m²/sec)
L		= Length of contaminated site perpendicular to wind (71.1 m based on the area of the debris/refuse piles)
u		= Mean annual wind speed (4 m/sec (Ruffner, 1985)
H		= Height of human inhalation (1.5 m).

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

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

Where,

THI	=	Target Hazard Index (unitless, 1)
AT	=	Averaging Time (years, this is equal to the exposure duration)
ED	=	Exposure Duration (years)
RfD_i	=	Inhalation Reference Dose (mg/kg-day).

The soil cleanup levels, at the 10^{-6} risk level, resulting from the use of the equations listed above for on-site remediation workers and off-site recreational users are shown in Table 3-10 and Table 3-11, respectively.

3.3.3 *Surface Water*

Surface water CPSs are based upon perennial surface water flow conditions. As described previously, no perennial surface water flow conditions exist within the OB/OD Areas; therefore, no CPSs were compared to the surface water analytical data.

3.4 *GROUND WATER SAMPLES*

The drilling, logging, and seismic data collected in the OB/OD Areas from 1996 through 1998 were used to describe the hydrogeologic settings of the OB/OD Areas (Section 2). Two separate hydrogeologic systems have been identified. Within each of these hydrogeologic systems, monitoring wells have been screened in discrete geologic formations. Ground water chemistry can be affected by the media through which it is transported;

thus, ground water chemical data from monitoring wells screened in each particular formation will be discussed together.

Four ground water sampling events were conducted in the OB/OD Areas, two following installation of monitoring wells in 1996, and two following installation of additional monitoring wells in 1998. Data collected during presample purging and field analytical results for each of the sampling events are presented in Tables 3-12 through 3-15.

3.4.1 *Closed OB/OD Area Ground Water System*

The Closed OB/OD Area ground water system exists in the area located on the western side of the Hogback. Three monitoring wells were installed within this system, two screened within the Mancos Shale Formation and one screened within the Dakota Sandstone Formation (Figure 2-7).

3.4.1.1 *Mancos Shale Formation Ground Water*

Two wells are screened in the Mancos Shale Formation, KMW09 and the background well KMW12 (Figure 2-7). Ground water samples have been collected from KMW09 four times and from KMW12 twice. The ground water samples were submitted to an off-site laboratory for chemical analysis.

3.4.1.1.1 *Comparison to Background Levels*

Table 3-16 lists the detected constituents in KMW09 that exceeded the Closed OB/OD Area ground water system background levels. One explosive compound was detected in the ground water sample collected during the first sampling event. Explosives have not been detected during the three subsequent sampling rounds; thus, the initial result appears anomalous and may have been the result of matrix interference affecting the analytical results. Several inorganic constituents were detected at concentrations exceeding their respective background levels.

3.4.1.1.2 *Comparison to Screening Criteria*

All sample constituents that exceeded background levels were compared to screening criteria. Table 3-17 lists those detected constituents in the well screened within the Mancos Shale Formation that exceeded the screening criteria. The number of exceedances of the screening criteria was substantially less than those for background. The only constituent detected in KMW09 that exceeded the screening criteria was ammonia, and this is because there is no screening level for this constituent. The only risk-based level for ammonia is based upon inhalation and not ingestion; thus, this level was not used to evaluate the ground water data. The concentration of ammonia detected in ground water from the Mancos Shale Formation would not pose an unacceptable risk if consumed.

3.4.1.1.3 *Comparison to Closure Performance Standards*

All sample constituents that exceeded screening criteria were compared to site-specific CPSs. Table 3-18 lists those detected constituents in the well screened within the Mancos Shale Formation that exceeded the CPSs. Figure 3-2 (Appendix A) shows the location of the well within the Closed OB/OD Area ground water system at which constituents were detected at concentrations exceeding the CPSs. The only constituent detected in KMW09 that exceeded the CPS was ammonia, and this is because there is no CPS for this constituent, as discussed above. The concentration of ammonia detected in ground water from the Mancos Shale Formation does not warrant further action.

3.4.1.2 *Dakota Sandstone Formation Ground Water*

One well is screened in the Dakota Sandstone Formation, KMW13 (Figure 2-7). Ground water samples have been collected from this well two times and submitted for chemical analysis.

3.4.1.2.1 *Comparison to Background Levels*

Table 3-19 lists the detected constituents in KMW13 that exceeded the Closed OB/OD Area ground water system background levels. No explosive compounds were detected in the ground water samples collected from this well. Several inorganic constituents were detected at concentrations exceeding their respective background levels.

3.4.1.2.2 *Comparison to Screening Criteria*

All sample constituents that exceeded background levels were compared to screening criteria. Table 3-20 indicates that no constituent concentrations detected in ground water from the Dakota Sandstone Formation exceed the screening criteria.

3.4.1.2.3 *Comparison to Closure Performance Standards*

All sample constituents that exceeded screening criteria were compared to site-specific CPSs. Table 3-21 indicates that no constituent concentrations detected in ground water from the Dakota Sandstone Formation exceed the CPSs.

3.4.2 *Current OB/OD Area Ground Water System*

The Current OB/OD Area ground water system exists in the area located on the eastern side of the Hogback. Sixteen bedrock monitoring wells were installed within this system, 10 screened within undifferentiated intervals of the Chinle Formation, one screened within the Painted Desert Member, four screened within the Sonsela Sandstone Member, and one screened within the Entrada Sandstone Formation (Figure 2-7).

3.4.2.1 *Undifferentiated Chinle Formation Ground Water*

Ten wells are screened within undifferentiated intervals of the Chinle Formation (Figure 2-7). Ground water samples have been collected during each of the four sampling events from the wells that existed at the time of collection. Nine wells were sampled during October 1996 and February 1997, and ten wells were sampled during October 1998 and January 1999. The ground water samples were submitted to an off-site laboratory for chemical analysis.

3.4.2.1.1 *Comparison to Background Levels*

Table 3-22 lists the detected constituents in wells screened in the undifferentiated Chinle Formation that exceeded the Current OB/OD Area ground water system background levels. Explosive compounds were detected in the ground water samples collected during each of the four sampling events from three wells, CMW17, CMW18, and CMW19. These wells are located downgradient of the residue/debris piles situated along the Current OB/OD Area arroyo (Figure 2-7). The concentration of each of the explosive constituents in these three wells increased from the first sampling event in October 1996 to the second sampling event in February 1997; however, a trend of decreasing concentrations can be seen from the second sampling event through the fourth sampling event in January 1999.

One explosive compound was detected in the ground water sample collected from KMW11 during the October 1996 sampling event. Explosives have not been detected during the three subsequent sampling rounds; thus, the initial result appears anomalous and may have been the result of matrix interference affecting the analytical results.

Many inorganic constituents were detected at concentrations exceeding their respective background levels. When data for the four sampling events are compared, the same general pattern noted for the explosive compounds of increasing then decreasing constituent concentrations is observed for the inorganic constituents.

3.4.2.1.2 *Comparison to Screening Criteria*

All sample constituents that exceeded background levels were compared to screening criteria. Table 3-23 lists those detected constituents in wells screened in the undifferentiated Chinle Formation that exceeded the screening criteria. The number of exceedances of the screening criteria was substantially less than those for background. Explosive compound concentrations exceeded the screening criteria in two wells (CMW17 and CMW18) located downgradient of the residue/debris piles adjacent to the Current OB/OD Area arroyo (Figure 2-7). In CMW17, only the concentration of a single explosive constituent in the sample collected during February 1997 exceeded the screening criterion. Additionally, the concentration of the one explosive compound detected in the ground water sample collected from KMW11 exceeded the screening criterion.

Seven metal/inorganic constituents were detected at concentrations exceeding the screening criteria. Aluminum, ammonia, chromium, and iron were detected in multiple ground water samples at concentrations exceeding the screening criteria. Selenium, cadmium, and lead were each detected in one ground water sample at concentrations exceeding the screening criteria.

3.4.2.1.3 *Comparison to Closure Performance Standards*

All sample constituents that exceeded screening criteria were compared to site-specific CPSs. Table 3-24 lists those detected constituents in wells screened in the undifferentiated Chinle Formation that exceeded the CPSs. Figure 3-2 (Appendix A) shows the locations of the wells within the Current OB/OD Area ground water system at which constituents were detected at concentrations exceeding the CPSs.

The concentrations of a single explosive compound exceeded the CPS in only one well, CMW18, during each of the sampling events. This well is located downgradient of the residue/debris piles adjacent to the Current OB/OD Area arroyo (Figure 3-2, Appendix A). As discussed above, a trend of decreasing concentrations can be seen from the second event sampling in February 1997 through the fourth sampling event in January 1999.

Five metal/inorganic constituents (ammonia, cadmium, chromium, lead, and selenium) exceeded the CPSs. Three of these constituents (cadmium, lead, and selenium) were only detected at this level in one ground water sample. The exceedances of the CPSs were nearly all in ground water samples collected from two wells, CMW10 and CMW14. The screened interval of these wells are located at similar depths bgs. The presample purge data indicates that the turbidity of water withdrawn from CMW10 and CMW14 is between two and four times greater than the maximum turbidity of the other wells. In seven instances, the concentration of a particular constituent in a total sample fraction exceeds the concentration of that constituent in the filtered fraction of the same sample. In five instances the opposite situation occurred, the filtered fraction concentration exceeded the total fraction concentration.

The results of the hydrogeologic studies conducted in the OB/OD Areas must be considered in the evaluation of potential exposure to impacted water within the undifferentiated Chinle Formation (Section 2). Borehole logging and seismic data collected during 1997 indicate that seismic pilot boring SPB 1, drilled on the western side of the arroyo within the Current OB/OD Area, encountered shale intervals of the Painted Desert Member from the ground surface to a depth of approximately 250 feet bgs. Monitoring wells CMW10, CMW14, and CMW18 are located within, or on the western side of, this arroyo. Because these wells are screened in moist zones within a silty clay material, it is likely that CMW10, CMW14, and CMW18 are screened within shale intervals of the Painted Desert Member. Ground water from these intervals is thought to be migrating through fractures to the Sonsela Sandstone Member, and then migrating generally northward following the bedrock dip and topography. Thus, potential exposure to impacted ground water within the Current OB/OD Area undifferentiated Chinle Formation wells is addressed by the potential exposure considerations for the Sonsela Sandstone Member wells.

3.4.2.2 *Painted Desert Member Ground Water*

One well, CMW25, is screened within the Painted Desert Member (Figure 2-7). Ground water samples were collected during the October 1998 and January 1999 sampling events. The ground water samples were submitted to an off-site laboratory for chemical analysis.

3.4.2.2.1 *Comparison to Background Levels*

Table 3-25 lists the detected constituents at well CMW25 that exceeded the Current OB/OD Area ground water system background levels. No explosive compounds were detected in the ground water samples collected from this well. Several inorganic constituents were detected at concentrations exceeding their respective background levels.

3.4.2.2.2 *Comparison to Screening Criteria*

All sample constituents that exceeded background levels were compared to screening criteria. Table 3-26 lists those detected constituents that exceeded the screening criteria. The number of exceedances of the screening criteria was substantially less than those for background. Four metals (aluminum, chromium, iron, and lead) were detected at concentrations exceeding the screening criteria during the October 1998 sampling event. No inorganic constituents were detected in CMW25 at concentrations exceeding the screening criteria during the January 1999 sampling event.

3.4.2.2.3 *Comparison to Closure Performance Standards*

All sample constituents that exceeded screening criteria were compared to site-specific CPSs. Table 3-27 lists those detected constituents that exceeded the CPSs. Figure 3-2 (Appendix A)shows the location of the well within the Current OB/OD Area ground water system at which constituents were detected at concentrations exceeding the CPSs.

Two metals, chromium and lead, were detected at concentrations exceeding the CPSs during the October 1998 sampling event. No inorganic constituents were detected in CMW25 at concentrations exceeding the CPSs during the January 1999 sampling event. Thus, the presence of inorganic constituents in CMW25 at concentrations exceeding the CPSs may have been a temporary condition.

3.4.2.3 *Sonsela Sandstone Member Ground Water*

Four wells, CMW16, CMW21, CMW22, and CMW23, are screened within the Sonsela Sandstone Member (Figure 2-7). Ground water samples have been collected during each of the four sampling events from the wells that existed at the time of collection. One well (CMW16) was sampled during October 1996 and February 1997, and all four wells were sampled during October 1998 and January 1999. The ground water samples were submitted to an off-site laboratory for chemical analysis.

3.4.2.3.1 *Comparison to Background Levels*

Table 3-28 lists the detected constituents in wells screened in the Sonsela Sandstone Member that exceeded the Current OB/OD Area ground water system background levels. Two explosive compounds, cyclotetramethylenetetranitramine (HMX) and hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX), were detected in the ground water samples collected during each of the four sampling events from CMW16. No clear trend is evident based upon the HMX concentrations measured over time; however, the RDX concentration has generally decreased over the time period of the four sampling events. Well CMW16 is located downgradient of the residue/debris piles adjacent to the Current OB/OD Area arroyo (Figure 2-7). Based upon the hydrogeologic discussion presented in Section 2, shallow ground water or surface water in contact with the residue/debris piles appears to be dissolving explosive constituents and transporting them into the Sonsela Sandstone Member. No explosive constituents were detected in any of the Sonsela Sandstone Member monitoring wells that are located downgradient of CMW16. It is likely that the explosive constituents detected in the 24-hour TAT samples collected from CMW21, CMW22, and CMW23 were the result of matrix interference caused by the turbidity of the grab samples, and are not representative of ground water constituent concentrations. The lateral extent of ground water impacted by explosive constituents occurs between the locations of monitoring wells CMW16 and CMW21.

Many inorganic constituents were detected at concentrations exceeding their respective background levels. No clear trend is evident based upon the concentrations measured over time.

3.4.2.3.2 *Comparison to Screening Criteria*

All sample constituents that exceeded background levels were compared to screening criteria. Table 3-29 lists those detected constituents in wells screened in the Sonsela Sandstone Member that exceeded the screening criteria. The number of exceedances of the screening criteria was substantially less than those for background. RDX was the only explosive compound detected in the ground water samples collected from the Sonsela Sandstone Member that exceeded the screening criteria. RDX was detected at concentrations exceeding the CPS in CMW16 during each of the four sampling events. As discussed above, CMW16 is the most downgradient impacted well that is screened in the Sonsela Sandstone Member, and the concentration of RDX in this well has decreased over time.

Five inorganic/metal constituents, aluminum, ammonia, antimony, iron, and lead were detected at concentrations exceeding the screening criteria. None of these constituents were detected at concentrations exceeding the screening criteria in CMW22.

3.4.2.3.3 *Comparison to Closure Performance Standards*

All sample constituents that exceeded screening criteria were compared to site-specific CPSs. Table 3-30 lists those detected constituents in wells screened in the Sonsela Sandstone Member that exceeded the CPSs. Figure 3-2 (Appendix A) shows the locations of the wells within the Current OB/OD Area ground water system at which constituents were detected at concentrations exceeding the CPSs.

Three inorganic/metal constituents (ammonia, antimony, and lead) were detected at concentrations exceeding the CPSs. As discussed in Section 3.4.1.1.2, there is no CPS for ammonia; the concentration of ammonia detected in ground water from the Sonsela Sandstone Member does not warrant further action. The antimony concentration only exceeded the CPS in CMW16. Lead concentrations exceeding the CPS were present in CMW21 and CMW23; however, these concentrations were in the total fraction only, indicating that the lead is the result of suspended particulates in the ground water rather than dissolved lead.

Monitoring wells CMW21 and CMW22 are both located within the area that is to be retained by the Army because of concerns related to the potential presence of UXO. CMW21 and CMW22 are both located downgradient of the lateral extent of ground water containing explosive compounds at concentrations exceeding the CPSs. No inorganic/metal constituent concentrations in these wells exceeded the CPSs except total lead in CMW21. Because the dissolved lead concentration is below the CPS, it is also likely that CMW21 and CMW22 are located downgradient of inorganic/metals concentrations exceeding the CPSs. These wells are located within the area to be retained by the Army; thus, CMW21 and CMW22 provide downgradient sentinel monitoring wells screened in the Sonsela Sandstone Member.

3.4.2.4 *Entrada Sandstone Formation Ground Water*

One well, KMW10 is screened within the Entrada Sandstone Formation (Figure 2-7). Ground water samples have been collected from this well during each of the four sampling events. The ground water samples were submitted to an off-site laboratory for chemical analysis.

3.4.2.4.1 *Comparison to Background Levels*

Table 3-31 lists the detected constituents in the well screened in the Entrada Sandstone Formation that exceeded the Current OB/OD Area ground water system background levels. No explosive compounds were detected in the ground water samples collected from KMW10. Several inorganic constituents were detected at concentrations exceeding their respective background levels.

3.4.2.4.2 *Comparison to Screening Criteria*

All sample constituents that exceeded background levels were compared to screening criteria. Table 3-32 lists those detected constituents that exceeded the screening criteria. The number of exceedances of the screening criteria was substantially less than those for background. Only one inorganic constituent, ammonia, was detected at concentrations exceeding the screening criteria, and as discussed above, this is because there is no screening level for this constituent. The concentration of ammonia detected in ground water from the Entrada Sandstone Formation would not pose an unacceptable risk if consumed.

3.4.2.4.3 *Comparison to Closure Performance Standards*

All sample constituents that exceeded screening criteria were compared to site-specific CPSs. Table 3-33 lists those detected constituents that exceeded the CPSs. Figure 3-2 (Appendix A) shows the location of the well within the Current OB/OD Area ground water system at which constituents were detected at concentrations exceeding the CPSs.

The only constituent detected in KMW10 that exceeded the CPSs was ammonia, and this is because there is no CPS for this constituent, as discussed above. The concentration of ammonia detected in ground water from the Entrada Sandstone Formation does not warrant further action.

3.5 *SOIL BORING SAMPLES*

Grab soil samples were collected during installation of monitoring well borings. In addition, grab soil samples were also collected from soil borings which were not completed as monitoring wells. All soil borings were completed away from areas with visible surface waste, and no subsurface waste was encountered during completion.

3.5.1 *Closed OB/OD Area Ground Water System*

Four borings were completed in the Closed OB/OD Area ground water system. Three of these (KMW09, KMW12, and KMW13) were completed as monitoring wells; one (KMW14) did not encounter free water and was abandoned by grouting it to the ground surface. A total of 17 soil samples were collected from the four borings and submitted for chemical analyses.

3.5.1.1 *Comparison to Background Levels*

Table 3-34 lists the detected constituents that exceeded the Closed OB/OD Area background levels. Explosives compounds were detected in one of the 17 soil samples. The majority of the detections and exceedances of background levels in soil samples were associated with metals. Between four and eight individual metal constituents were detected in samples at each of the four borings; of these metals, between 10 percent (%) and 100% were detected at concentrations greater than background.

3.5.1.2 *Comparison to Screening Criteria*

All sample constituents that exceeded background levels were compared to the screening criteria. Table 3-35 lists those detected constituents in the Closed OB/OD Area ground water system that exceeded the screening criteria. Only a single constituent in one soil sample (iron in KMW09 collected at 35 feet bgs) exceeded the screening criteria which are based upon residential land-use RBLs.

3.5.1.3 *Comparison to Closure Performance Standards*

All sample constituents that exceeded RBLs were screened against site-specific CPSs. Table 3-36 indicates that no constituent concentrations detected in soil samples collected within the Closed OB/OD Area ground water system exceeded the CPSs.

3.5.2 *Current OB/OD Area Ground Water System*

Thirty-three borings were completed in the Current OB/OD Area ground water system. Eighteen of these were completed as monitoring wells. A total of 170 soil samples were collected from the borings and submitted for chemical analyses.

3.5.2.1 *Comparison to Background*

Table 3-37 lists the detected constituents that exceeded the Current OB/OD Area background levels. Explosives compounds were detected in approximately 6% of the soil samples. Metals were widely detected at levels exceeding the background levels.

3.5.2.2 *Comparison to Screening Criteria*

All sample constituents that exceeded background levels were compared to the screening criteria. Table 3-38 lists those detected constituents that exceeded the screening criteria. The number of exceedances of the screening criteria was substantially less than those for background. Explosives were detected in two soil samples from one location (KB07) at concentrations greater than screening criteria. Three metal/inorganic constituents, arsenic, iron, and phosphorus, were widely detected in soil samples at concentrations greater than the screening criteria.

3.5.2.3 *Comparison to Closure Performance Standards*

All sample constituents that exceeded screening criteria were compared to site-specific CPSs. Table 3-39 lists those detected constituents that exceeded the CPSs. Figure 3-3 (Appendix A) shows the locations of the soil samples within the Current OB/OD Area ground water system at which constituents were detected at concentrations exceeding the CPSs. No explosives compounds were detected at concentrations exceeding the CPSs in the soil samples. Manganese was found to exceed the CPS in one sample from a single location (KB08 collected at 5 feet bgs). Phosphorus concentrations in 49 soil samples from 10 locations exceeded the CPS. The CPS for phosphorus was set at zero; exceedances of the CPS for phosphorus do not necessarily represent an unacceptable risk to human health under the selected future land use scenarios. Under realistic exposure conditions, it would be difficult for an on-site remediation worker or an off-site recreational user to be exposed to the highest detected constituent concentrations at the frequency and duration assumed by the exposure model.

3.6 *SEDIMENT, SURFACE WATER, AND ALLUVIAL GROUND WATER SAMPLES*

As described in Section 2, grab surface water and sediment samples were collected at ten locations in the arroyos draining the Closed OB/OD Area, and grab surface water and sediment samples were collected at five locations in the arroyo draining the Current OB/OD Area. Sediment samples only (no surface water) were collected at five additional locations in the arroyo draining the Current OB/OD Area.

Three monitoring wells located in the Current OB/OD Area are screened in the alluvium. The shallow depth of this ground water makes discharge to surface water likely; thus the chemical data collected for the CMW06, CMW20, and FW38 will be assessed with the Current OB/OD Area surface water. Each of these wells has been sampled during multiple events.

3.6.1 *Closed OB/OD Area Ground Water System*

3.6.1.1 *Sediment*

A total of ten sediment samples were collected in the Closed OB/OD Area and were submitted for chemical analysis.

3.6.1.1.1 *Comparison to Background Levels*

Table 3-40 lists the detected constituents that exceeded the Closed OB/OD Area background levels. No explosive compounds were detected in the sediment samples. Between one and nine individual inorganic constituents were detected above background levels in each of the sediment samples.

3.6.1.1.2 *Comparison to Screening Criteria*

All sample constituents that exceeded background levels were compared to the screening criteria. Table 3-41 lists those constituents detected in sediment samples that exceeded the screening criteria. Between one and three individual inorganic constituents were detected at concentrations exceeding the screening criteria in each of the sediment samples, except one.

3.6.1.1.3 *Comparison to Closure Performance Standards*

All sample constituents that exceeded the screening criteria were compared to site-specific CPSs. Table 3-42 lists those constituents detected in sediment samples that exceeded the CPSs. Figure 3-3 (Appendix A) shows the locations of the sediment samples within the Closed OB/OD Area ground water system at which constituents were detected at concentrations exceeding the CPSs. Arsenic was detected in one sample at a concentration exceeding the CPS; however, similar levels of arsenic were not detected in the sediment samples located downgradient. Seven samples exceeded the CPS for phosphorus. The CPS for phosphorus was set at zero; exceedances of the CPS for phosphorus do not necessarily represent an unacceptable risk to human health under the selected future land use scenarios. Under realistic exposure conditions, it would be difficult for an on-site remediation worker or an off-site recreational user to be exposed to the highest detected constituent concentrations at the frequency and duration assumed by the exposure model.

3.6.1.2 *Surface Water*

A total of ten surface water samples were collected in the Closed OB/OD Area and were submitted for chemical analysis.

Table 3-43 lists the detected constituents that exceeded the Closed OB/OD Area background levels. One explosive compound was detected in sample KSW02 (Figure 2-1, Appendix A) which is located downgradient of a residue/debris pile identified during CY 1996 (PMC, 1999). No explosive compounds were detected in any other surface water sample collected from the Closed OB/OD Area. There is no apparent relationship between the number of individual inorganic/metal constituents exceeding background levels and the proximity of the sample site to previously identified residue/debris piles. Although samples KSW05 and KSW09 are not located near identified waste areas, more inorganic/metal constituent concentrations exceeding background levels were detected in these samples than nearly all other surface water samples. Further, samples KSW07 and KSW08, collected immediately adjacent to residue/debris piles, had fewer inorganic/metal constituent concentrations exceeding background levels than nearly all other surface water samples. No constituents were present at concentrations exceeding background levels in the most downgradient sample, KSW10.

Surface water flows occur sporadically in the Closed OB/OD Area arroyo as short duration high velocity events. Under these conditions, the majority of surface water transport is via suspended and bedload movement of solid materials rather than as dissolved constituents. Because the contact time between the surface water and the sediment within the channel of the arroyo is very brief, there is a limited amount of time for the surface water to dissolve constituents. In addition, the volume of surface water can dilute the concentrations of constituents in the surface water. Based upon the analytical data from KSW10, it does not appear that dissolved contaminants are being transported out of the Closed OB/OD Area via surface water flow.

3.6.2 *Current OB/OD Area Ground Water System*

3.6.2.1 *Sediment*

A total of 15 sediment samples were collected from ten locations in the Current OB/OD Area and were submitted for chemical analysis.

3.6.2.1.1 *Comparison to Background Levels*

Table 3-44 lists the detected constituents that exceeded the Current OB/OD Area background levels. No explosive compounds were detected in the sediment samples. Between one and 12 individual inorganic constituents were detected above background levels in each of the sediment samples.

3.6.2.1.2 *Comparison to Screening Criteria*

All sample constituents that exceeded background levels were compared to the screening criteria. Table 3-45 lists those constituents detected in sediment samples that exceeded the screening criteria. One metal, iron, was detected at a concentration exceeding the screening criteria in a single sediment sample.

3.6.2.1.3 *Comparison to Closure Performance Standards*

All sample constituents that exceeded the screening criteria were compared to site-specific CPSs. Table 3-46 indicates that no constituent concentrations detected in sediment samples collected within the Current OB/OD Area ground water system exceeded the CPSs.

3.6.2.2 *Surface Water and Alluvial Ground Water*

Five surface water samples were collected in the Current OB/OD Area. Alluvial ground water samples were collected from three shallow monitoring wells during sampling events in 1996, 1997, 1998, and 1999. A total of 18 surface water and alluvial ground water samples were submitted to an off-site laboratory for chemical analysis.

Table 3-47 lists the detected constituents that exceeded the Current OB/OD Area background levels. Explosive compounds were detected in seven of the samples (Figure 2-1, Appendix A), all but one of which were collected from sites located immediately adjacent to residue/debris piles identified during CY 1996 (PMC, 1999). No explosives were detected in the most downgradient sample, CSW10. Between five and 17 individual inorganic/metal constituents were detected at concentrations greater than background. The two samples with the greatest number of exceedances, CSW07 and CSW08, were collected from sites located immediately adjacent to residue/debris piles.

Surface water flows occur in the Current OB/OD Area arroyo very infrequently, if at all, as short duration high velocity events. No evidence of surface water flow in this area has been observed since October 1996. During high velocity surface water flow events, the majority of surface water transport is via suspended and bedload movement of solid materials rather than as dissolved constituents. Because the contact time between the surface water and the sediment within the channel of the arroyo is very brief, there is a limited amount of time for the surface water to dissolve constituents. In addition, the volume of surface water can dilute the concentrations of constituents in the surface water. Based upon the analytical data from CSW10, it does not appear that dissolved explosives are being transported out of the Current OB/OD Area via surface water flow.

Table 3-1
Summary of Selected Background Values
Ground Water
Closed and Current OB/OD Areas
Fort Wingate Depot Activity
Gallup, New Mexico

Parameter	Units	Selected Background (Filtered Fraction)	Selected Background (Total Fraction)
Closed OB/OD Area			
2,4,6-Trinitrotoluene	µg/l	0	0
2,4-Dinitrotoluene	µg/l	0	0
2,6-Dinitrotoluene	µg/l	0	0
2-Amino-4,6-dinitrotoluene	µg/l	0	0
4-Amino-2,6-dinitrotoluene	µg/l	0	0
Aluminum	µg/l	55.9	22000
Ammonia nitrogen	µg/l	547	545
Antimony	µg/l	2.16	2.09
Arsenic	µg/l	0	1.89
Barium	µg/l	44.4	94.4
Beryllium	µg/l	0	0.385
Cadmium	µg/l	0	0.153
Chromium	µg/l	0	25.7
Cobalt	µg/l	14.4	7.22
Copper	µg/l	0	7.06
Fluoride	µg/l	0	0
HMX	µg/l	0	0
Iron	µg/l	0	13600
Lead	µg/l	0	5.32
Manganese	µg/l	790	856
Mercury	µg/l	0	0
Nickel	µg/l	0	0

Table 3-1
Summary of Selected Background Values
Ground Water
Closed and Current OB/OD Areas
Fort Wingate Depot Activity
Gallup, New Mexico

Parameter	Units	Selected Background (Filtered Fraction)	Selected Background (Total Fraction)
Nitrite (as nitrite)	µg/l	0	0
Nitrite, nitrate - nonspecific (as nitrogen)	µg/l	0	174
Nitrobenzene	µg/l	0	0
RDX	µg/l	0	0
Selenium	µg/l	2.67	2.91
Silver	µg/l	0	0.176
Thallium	µg/l	0.135	0.265
Vanadium	µg/l	0	36.2
Zinc	µg/l	37	55.4
Current OB/OD Area			
2,4,6-Trinitrotoluene	µg/l	0	0
2,4-Dinitrotoluene	µg/l	0	0
2,6-Dinitrotoluene	µg/l	0	0
2-Amino-4,6-dinitrotoluene	µg/l	0	0
4-Amino-2,6-dinitrotoluene	µg/l	0	0
Aluminum	µg/l	130	13000
Ammonia nitrogen	µg/l	27.9	27.2
Antimony	µg/l	0	1.97
Arsenic	µg/l	4.14	4.87
Barium	µg/l	58.8	122
Beryllium	µg/l	0	0
Cadmium	µg/l	0	0

Table 3-1
Summary of Selected Background Values
Ground Water
Closed and Current OB/OD Areas
Fort Wingate Depot Activity
Gallup, New Mexico

Parameter	Units	Selected Background (Filtered Fraction)	Selected Background (Total Fraction)
Chromium	µg/l	3.02	7.18
Cobalt	µg/l	0	1.08
Copper	µg/l	2.32	13.4
Fluoride	µg/l	1160	0
HMX	µg/l	0	0
Iron	µg/l	48.7	6860
Lead	µg/l	0.73	2.39
Manganese	µg/l	14.1	194
Mercury	µg/l	0.133	0.0883
Nickel	µg/l	2.41	8.26
Nitrite (as nitrite)	µg/l	0	12.9
Nitrite, nitrate - nonspecific (as nitrogen)	µg/l	0	168
Nitrobenzene	µg/l	0	0
RDX	µg/l	0	0
Selenium	µg/l	9.84	11.4
Silver	µg/l	0	1.61
Thallium	µg/l	0	0
Vanadium	µg/l	58.1	65
Zinc	µg/l	8.75	16.4

Notes:
µg/l = micrograms per liter.

Table 3-2
Summary of Background Samples and Background Determination
Soils
Closed and Current OB/OD Areas
Fort Wingate Depot Activity
Gallup, New Mexico

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

Table 3-2
Summary of Background Samples and Background Determination
Soils
Closed and Current OB/OD Areas
Fort Wingate Depot Activity
Gallup, New Mexico

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

Notes:
DL = Detection limit
µg/g = micrograms per gram.

Table 3-3
Summary of Selected Background Values
Sediments
Closed and Current OB/OD Areas
Fort Wingate Depot Activity
Gallup, New Mexico

Parameter	Units	Selected Background
Closed OB/OD Area		
1,3,5-Trinitrobenzene	µg/g	0
1,3-Dinitrobenzene	µg/g	0
2,4,6-Trinitrotoluene	µg/g	0
2,4-Dinitrotoluene	µg/g	0
2,6-Dinitrotoluene	µg/g	0
2-Amino-4,6-dinitrotoluene	µg/g	0
2-Nitrotoluene	µg/g	0
3-Nitrotoluene	µg/g	0
4-Amino-2,6-dinitrotoluene	µg/g	0
4-Nitrotoluene	µg/g	0
Aluminum	µg/g	14500
Antimony	µg/g	0
Arsenic	µg/g	9.94
Barium	µg/g	374
Beryllium	µg/g	1.08
Cadmium	µg/g	0.265
Calcium	µg/g	16000
Chromium	µg/g	10.8
Cobalt	µg/g	9.92
Copper	µg/g	13.1
HMX	µg/g	0
Iron	µg/g	48000
Lead	µg/g	16
Magnesium	µg/g	3010

Table 3-3
Summary of Selected Background Values
Sediments
Closed and Current OB/OD Areas
Fort Wingate Depot Activity
Gallup, New Mexico

Parameter	Units	Selected Background
Manganese	µg/g	549
Mercury	µg/g	0
Molybdenum	µg/g	0
Nickel	µg/g	12.3
Nitrobenzene	µg/g	0
Phosphorus	µg/g	284
Potassium	µg/g	2470
RDX	µg/g	0
Selenium	µg/g	0
Silver	µg/g	0
Sodium	µg/g	0
Tetryl	µg/g	0
Thallium	µg/g	2.56
Vanadium	µg/g	33.7
Zinc	µg/g	87.7
Current OB/OD Area		
1,3,5-Trinitrobenzene	µg/g	0
1,3-Dinitrobenzene	µg/g	0
2,4,6-Trinitrotoluene	µg/g	0
2,4-Dinitrotoluene	µg/g	0
2,6-Dinitrotoluene	µg/g	0
2-Amino-4,6-dinitrotoluene	µg/g	0
2-Nitrotoluene	µg/g	0
3-Nitrotoluene	µg/g	0

Table 3-3
Summary of Selected Background Values
Sediments
Closed and Current OB/OD Areas
Fort Wingate Depot Activity
Gallup, New Mexico

Parameter	Units	Selected Background
4-Amino-2,6-dinitrotoluene	µg/g	0
4-Nitrotoluene	µg/g	0
Aluminum	µg/g	25400
Antimony	µg/g	0
Arsenic	µg/g	3.82
Barium	µg/g	730
Beryllium	µg/g	0.775
Cadmium	µg/g	0.214
Calcium	µg/g	50500
Chromium	µg/g	17.9
Cobalt	µg/g	6.62
Copper	µg/g	28
HMX	µg/g	0
Iron	µg/g	16300
Lead	µg/g	18.5
Magnesium	µg/g	6060
Manganese	µg/g	1010
Mercury	µg/g	0
Molybdenum	µg/g	0
Nickel	µg/g	12.5
Nitrobenzene	µg/g	0
Phosphorus	µg/g	0
Potassium	µg/g	6010
RDX	µg/g	0
Selenium	µg/g	0
Silver	µg/g	0

Table 3-3
Summary of Selected Background Values
Sediments
Closed and Current OB/OD Areas
Fort Wingate Depot Activity
Gallup, New Mexico

Parameter	Units	Selected Background
Sodium	µg/g	123
Tetryl	µg/g	0
Thallium	µg/g	0
Vanadium	µg/g	25.9
Zinc	µg/g	0

Notes:
µg/g = micrograms per gram.

Table 3-4
Summary of Selected Background Values
Surface Water
Closed and Current OB/OD Areas
Fort Wingate Depot Activity
Gallup, New Mexico

Parameter	Units	Selected Background
Closed OB/OD Area		
1,3,5-Trinitrobenzene	µg/l	0
1,3-Dinitrobenzene	µg/l	0
2,4,6-Trinitrotoluene	µg/l	0
2,4-Dinitrotoluene	µg/l	0
2,6-Dinitrotoluene	µg/l	0
2-Amino-4,6-dinitrotoluene	µg/l	0
2-Nitrotoluene	µg/l	0
3-Nitrotoluene	µg/l	0
4-Amino-2,6-dinitrotoluene	µg/l	0
4-Nitrotoluene	µg/l	0
Aluminum	µg/l	171000
Antimony	µg/l	0
Arsenic	µg/l	130
Barium	µg/l	4100
Beryllium	µg/l	30.3
Cadmium	µg/l	4.53
Calcium	µg/l	94500
Chromium	µg/l	270
Cobalt	µg/l	230
Copper	µg/l	460
Hardness	µg/l	191000
HMX	µg/l	0
Iron	µg/l	149000
Lead	µg/l	540

Table 3-4
Summary of Selected Background Values
Surface Water
Closed and Current OB/OD Areas
Fort Wingate Depot Activity
Gallup, New Mexico

Parameter	Units	Selected Background
Magnesium	µg/l	48200
Manganese	µg/l	5200
Mercury	µg/l	0.537
Nickel	µg/l	250
Nitrite, nitrate - nonspecific (as nitrogen)	µg/l	0
Nitrobenzene	µg/l	0
Phosphorus	µg/l	2900
Potassium	µg/l	36900
RDX	µg/l	0
Salinity	µg/l	346000
Selenium	µg/l	22.1
Silver	µg/l	2.88
Sodium	µg/l	32500
Tetryl	µg/l	0
Thallium	µg/l	6.8
Total Dissolved Solids	µg/l	768000
Total Suspended Solids	µg/l	6880000
Vanadium	µg/l	630
Zinc	µg/l	1900
Current OB/OD Area		
1,3,5-Trinitrobenzene	µg/l	0
1,3-Dinitrobenzene	µg/l	0
2,4,6-Trinitrotoluene	µg/l	0
2,4-Dinitrotoluene	µg/l	0

Table 3-4
Summary of Selected Background Values
Surface Water
Closed and Current OB/OD Areas
Fort Wingate Depot Activity
Gallup, New Mexico

Parameter	Units	Selected Background
2,6-Dinitrotoluene	µg/l	0
2-Amino-4,6-dinitrotoluene	µg/l	0
2-Nitrotoluene	µg/l	0
3-Nitrotoluene	µg/l	0
4-Amino-2,6-dinitrotoluene	µg/l	0
4-Nitrotoluene	µg/l	0
Aluminum	µg/l	29200
Antimony	µg/l	0
Arsenic	µg/l	2.63
Barium	µg/l	350
Beryllium	µg/l	1.61
Boron	µg/l	0
Cadmium	µg/l	0.309
Calcium	µg/l	39700
Chromium	µg/l	24.8
Cobalt	µg/l	9.21
Copper	µg/l	16.2
Hardness	µg/l	160000
HMX	µg/l	0
Iron	µg/l	19300
Lead	µg/l	13.8
Magnesium	µg/l	10100
Manganese	µg/l	510
Mercury	µg/l	0
Molybdenum	µg/l	0
Nickel	µg/l	17.5

Table 3-4
Summary of Selected Background Values
Surface Water
Closed and Current OB/OD Areas
Fort Wingate Depot Activity
Gallup, New Mexico

Parameter	Units	Selected Background
Nitrite, nitrate - nonspecific (as nitrogen)	µg/l	0
Nitrobenzene	µg/l	0
Phosphorus	µg/l	0
Potassium	µg/l	9090
RDX	µg/l	0
Salinity	µg/l	66200
Selenium	µg/l	0
Silver	µg/l	0
Sodium	µg/l	833
Tetryl	µg/l	0
Thallium	µg/l	0.269
Total Dissolved Solids	µg/l	96000
Total Suspended Solids	µg/l	1510000
Vanadium	µg/l	45.1
Zinc	µg/l	51.5

Notes:
µg/l = micrograms per liter.

Table 3-5
Summary of Applicable Maximum Contaminant Levels (MCLs)
Ground Water
Closed and Current OB/OD Areas
Fort Wingate Depot Activity
Gallup, New Mexico

Parameter	Units	Maximum Contaninant Level (MCL)	Comment
Antimony	µg/l	6	
Arsenic	µg/l	50	
Barium	µg/l	2000	
Beryllium	µg/l	4	
Cadmium	µg/l	5	
Chromium	µg/l	100	
Copper	µg/l	1300	Action level regarding treatment technique
Fluoride	µg/l	4000	
Lead	µg/l	15	Action level regarding treatment technique
Mercury	µg/l	2	
Nickel	µg/l	100	
Nitrate (as nitrate)	µg/l	44000	MCL as Nitrate (MCL = 10000 as Nitrogen)
Nitrite (as nitrite)	µg/l	3300	MCL as Nitrite (MCL = 1000 as Nitrogen)
Nitrite, nitrate - nonspecific (as nitrogen)	µg/l	10000	MCL as Nitrogen
Selenium	µg/l	50	
Thallium	µg/l	2	

Notes:
µg/l = micrograms per liter.

Table 3-6
Summary of Region VI Human Health Medium Specific Screening Levels
Ground Water
Closed and Current OB/OD Areas
Fort Wingate Depot Activity
Gallup, New Mexico

Parameter	Units	Region VI Screening Levels	Comment
2,4,6-Trinitrotoluene	µg/l	2	
2,4-Dinitrotoluene	µg/l	0	EPA Region VI Criteria for dinitrotoluene mixture
2,6-Dinitrotoluene	µg/l	0	EPA Region VI Criteria for dinitrotoluene mixture
2-Amino-4,6-dinitrotoluene	µg/l	0	EPA Region VI Criteria for dinitrotoluene mixture
4-Amino-2,6-dinitrotoluene	µg/l	0	EPA Region VI Criteria for dinitrotoluene mixture
Aluminum	µg/l	37000	
Ammonia nitrogen	µg/l	174	Calculated using route-to-route extrapolation.
Cobalt	µg/l	2200	
HMX	µg/l	1800	
Iron	µg/l	11000	
Manganese	µg/l	1700	
Nitrobenzene	µg/l	3	
RDX	µg/l	1	
Silver	µg/l	180	
Vanadium	µg/l	260	
Zinc	µg/l	11000	

Notes:
µg/l = micrograms per liter.

Table 3-7
EPA Region VI Risk-Based Residential Soil Screening Levels
Closed and Current OB/OD Areas
Fort Wingate Depot Activity
Gallup, New Mexico

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

Table 3-8
Summary of Closure Performance Standards
Ground Water
Closed and Current OB/OD Areas
Fort Wingate Depot Activity
Gallup, New Mexico

Parameter	Units	Closure Performance Standard	Comment
2,4,6-Trinitrotoluene	µg/l	221	Region VI Human Health Medium Specific Screening Levels, adjusted to 10^{-4}
2,4-Dinitrotoluene	µg/l	9.9	Region VI Human Health Medium Specific Screening Levels, adjusted to 10^{-4}
2,6-Dinitrotoluene	µg/l	9.9	Region VI Human Health Medium Specific Screening Levels, adjusted to 10^{-4}
2-Amino-4,6-dinitrotoluene	µg/l	9.9	Region VI Human Health Medium Specific Screening Levels, adjusted to 10^{-4}
4-Amino-2,6-dinitrotoluene	µg/l	9.9	Region VI Human Health Medium Specific Screening Levels, adjusted to 10^{-4}
Aluminum	µg/l	3700000	Region VI Human Health Medium Specific Screening Levels, adjusted to 10^{-4}
Ammonia nitrogen	µg/l	174	Noncarcinogenic, THQ=1
Antimony	µg/l	6	MCL
Arsenic	µg/l	50	MCL
Barium	µg/l	2000	MCL
Beryllium	µg/l	4	MCL
Cadmium	µg/l	5	MCL
Chromium	µg/l	100	MCL
Cobalt	µg/l	2200	Noncarcinogenic, THQ=1
Copper	µg/l	1300	MCL
Fluoride	µg/l	4000	MCL
HMX	µg/l	1800	Noncarcinogenic, THQ=1
Iron	µg/l	1100000	Region VI Human Health Medium Specific Screening Levels, adjusted to 10^{-4}
Lead	µg/l	15	MCL
Manganese	µg/l	170000	Region VI Human Health Medium Specific Screening Levels, adjusted to 10^{-4}
Mercury	µg/l	2	MCL
Nickel	µg/l	100	MCL
Nitrate (as nitrate)	µg/l	44000	MCL
Nitrite (as nitrite)	µg/l	3300	MCL

Table 3-8
Summary of Closure Performance Standards
Ground Water
Closed and Current OB/OD Areas
Fort Wingate Depot Activity
Gallup, New Mexico

Parameter	Units	Closure Performance Standard	Comment
Nitrite, nitrate - nonspecific (as nitrogen)	µg/l	10000	MCL
Nitrobenzene	µg/l	3.4	Noncarcinogenic, THQ=1
RDX	µg/l	61	Region VI Human Health Medium Specific Screening Levels, adjusted to 10^{-4}
Selenium	µg/l	50	MCL
Silver	µg/l	18000	Region VI Human Health Medium Specific Screening Levels, adjusted to 10^{-4}
Thallium	µg/l	2	MCL
Vanadium	µg/l	260	Noncarcinogenic, THQ=1
Zinc	µg/l	1100000	Region VI Human Health Medium Specific Screening Levels, adjusted to 10^{-4}

Notes:
µg/l = micrograms per liter.

Table 3-9
Soil Exposure Scenario Assumptions
Fort Wingate Depot Activity
Gallup, New Mexico

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

Notes:
NA = Not applicable
cm^2 = square centimeter
mg/day = milligrams per day
m^3/day = cubic meters per day
(1) The worker value represents 8 hours per day for 120 days.
(2) The recreational value represents 4 hours per day for 30 days.
(3) This value represents the 50th percentile area for the hands of an adult male.

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Table 3-10
Closure Performance Standards For Soil
Worker Exposure
Fort Wingate Depot Activity
Gallup, New Mexico

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

Table 3-10
Closure Performance Standards For Soil
Worker Exposure
Fort Wingate Depot Activity
Gallup, New Mexico

Constituent	IRDMIS Synonym	Oral RfD (mg/kg/d)		Inhalation RfD (mg/kg/d)		Oral CPF $(mg/kg/d)^{-1}$		Inhalation CPF $(mg/kg/d)^{-1}$		Carcinogenic Classification	Noncarcinogenic Cleanup Level (mg/kg)	Carcinogenic Cleanup Level (mg/kg)	Worker Cleanup Level (mg/kg)
Molybdenum		5.00E-03	i	5.00E-03	**	NA		NA			6.44E+03	NA	6.44E+03
Nickel	NI	2.00E-02	a5	2.00E-02	**	NA		1.68E+00	a6	A	2.57E+04	1.34E+03	1.34E+03
Nitrite		NA		NA		NA		NA			NA	NA	NA
Nitrite, nitrate		NA		NA		NA		NA			NA	NA	NA
Phosphate		NA		NA		NA		NA			NA	NA	NA
Phosphorous		NA		NA		NA		NA			NA	NA	NA
Potassium	K	NA		NA	**	NA		NA			NA	NA	NA
Selenium	SE	5.00E-03	a	5.00E-03	**	ND	a	ND	a	D	6.44E+03	NA	6.44E+03
Silver	AG	5.00E-03	a	5.00E-03	**	NA		NA		D	6.44E+03	NA	6.44E+03
Sodium	NA	NA		NA	**	NA		NA			NA	NA	NA
Sulfate		NA		NA		NA		NA			NA	NA	NA
Thallium	TL	8.00E-05	a	8.00E-05	**	ND	a	ND	a	D	1.03E+02	NA	1.03E+02
Total dissolved solids		NA		NA		NA		NA			NA	NA	NA
Total petroleum hydrocarbons, diesel fraction		NA		NA		NA		NA			NA	NA	NA
Vanadium	V	7.00E-03	b	7.00E-03	**	NA		NA			9.01E+03	NA	9.01E+03
Zinc	ZN	3.00E-01	a	3.00E-01	**	ND	a	ND	a	D	3.86E+05	NA	3.86E+05

Notes:
CPF - Carcinogen Potency Factor
RfD - Reference dose
mg/kg - milligram per kilogram
mg/kg/d - milligram per kilogram per day
NA - Not Available
ND - No Data

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

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

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

Table 3-11
Closure Performance Standards for Soil
Off-Site Recreational User
Fort Wingate Depot Activity
Gallup, New Mexico

Constituent	IRDMIS Synonym	Oral RfD (mg/kg/d)		Inhalation RfD (mg/kg/d)		Oral CPF $(mg/kg/d)^{-1}$		Inhalation CPF $(mg/kg/d)^{-1}$		Carcinogenic Classification	Noncarcinogenic Cleanup Level (mg/kg)	Carcinogenic Cleanup Level (mg/kg)	Off-Site Recreational Cleanup Level (mg/kg)
HMX	HMX	5.00E-02		5.00E-02	**	NA		NA			1.68E+10	NA	1.68E+10
RDX	RDX	3.00E-03		3.00E-03	**	1.10E-01		1.10E-01	**	C	1.01E+09	7.13E+06	7.13E+06
1,3,5-Trinitrobenzene	135TNB	3.00E-02	a	3.00E-02	**	NA		NA			1.01E+10	NA	1.01E+10
1,3-Dinitrobenzene	13DNB	1.00E-04	a	1.00E-04	**	ND	a	ND	**	D	3.36E+07	NA	3.36E+07
Nitrobenzene	NB	5.00E-04	a	5.70E-04	b	NA		NA			1.92E+08	NA	1.92E+08
N-methyl-N,2,4,6-tetranitroaniline		1.00E-02	b	1.00E-02	**	NA		NA			3.36E+09	NA	3.36E+09
2,4,6-Trinitrotoluene	246TNT	5.00E-04	a	5.00E-04	**	3.00E-02	a	3.00E-02	**	C	1.68E+08	2.62E+07	2.62E+07
2,4-Dinitrotoluene	24DNT	2.00E-03	a	2.00E-03	**	6.80E-01	a1	6.80E-01	**		6.72E+08	1.15E+06	1.15E+06
2,6-Dinitrotoluene	26DNT	1.00E-03	b	1.00E-03	**	6.80E-01	a1	6.80E-01	**	B2	3.36E+08	1.15E+06	1.15E+06
2-Nitrotoluene		1.00E-02	b	1.00E-02	**	NA		NA			3.36E+09	NA	3.36E+09
4-Nitrotoluene		1.00E-02	b	1.00E-02	**	NA		NA			3.36E+09	NA	3.36E+09
3-Nitrotoluene		1.00E-02	b	1.00E-02	**	NA		NA			3.36E+09	NA	3.36E+09
2-Amino-4,6-DNT		NA		NA		6.80E-01	a1	6.80E-01	**		NA	1.15E+06	1.15E+06
4-Amino-2,6-DNT		NA		NA		6.80E-01	a1	6.80E-01	**		NA	1.15E+06	1.15E+06
Aluminum	AL	1.00E+00	c	1.00E+00	**	NA		NA			3.36E+11	NA	3.36E+11
Ammonia nitrogen		NA		NA		NA		NA			NA	NA	NA
Amosite asbestos		NA		NA		NA		2.30E-01 ^	**	A	NA	3.41E+06	3.41E+06
Antimony	SB	4.00E-04	a	4.00E-04	**	ND	a	ND	**		1.34E+08	NA	1.34E+08
Arsenic	AS	3.00E-04	a	3.00E-04	**	1.50E+00	a	1.50E+01	a2	A	1.01E+08	5.23E+04	5.23E+04
Barium	BA	7.00E-02	a	1.40E-04	b	ND	a	ND	a		4.71E+07	NA	4.71E+07
Beryllium	BE	2.00E-03	a	5.70E-06	a	NA		8.40E+00	a	B2	1.92E+06	9.34E+04	9.34E+04
Boron		9.00E-02	a	5.70E-03	b	NA		NA			1.92E+09	NA	1.92E+09
Cadmium	CD	1.00E-03	a3	1.00E-03	**	NA	a	6.30E+00	a	B1	3.36E+08	1.25E+05	1.25E+05
Calcium	CA	NA		NA		NA		NA			NA	NA	NA
Chloride		NA		NA		NA		NA			NA	NA	NA
Chromium	CR	5.00E-03	a4	5.00E-03	**	NA	a	4.20E+01	a4	A	1.68E+09	1.87E+04	1.87E+04
Cobalt	CO	6.00E-02	x	5.70E-06	x	ND	a	ND	a		1.92E+06	NA	1.92E+06
Copper	CU	3.71E-02	b	3.71E-02	**	NA		NA		D	1.25E+10	NA	1.25E+10
Fluoride		6.00E-02	a	6.00E-02	**	NA		NA			2.02E+10	NA	2.02E+10
Iron	FE	3.00E-01	c	3.00E-01	**	NA		NA			1.01E+11	NA	1.01E+11
Lead	PB	ND	a	ND	**	NA	a	NA	a	B2	NA	NA	NA
Lithium		2.00E-02	x	2.00E-02	**	NA		NA			6.72E+09	NA	6.72E+09
Magnesium	MG	NA		NA	**	NA		NA			NA	NA	NA
Manganese	MN	1.40E-01	a3	1.43E-05	a	NA		NA		D	4.81E+06	NA	4.81E+06
Mercury	HG	3.00E-04	b	8.60E-05	b	NA		NA		D	2.89E+07	NA	2.89E+07
Molybdenum		5.00E-03	i	5.00E-03	**	NA		NA			1.68E+09	NA	1.68E+09
Nickel	NI	2.00E-02	a5	2.00E-02	**	NA		1.68E+00	a6	A	6.72E+09	4.67E+05	4.67E+05
Nitrite		NA		NA		NA		NA			NA	NA	NA

Table 3-11
Closure Performance Standards for Soil
Off-Site Recreational User
Fort Wingate Depot Activity
Gallup, New Mexico

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

Notes:
CPF - Carcinogen Potency Factor
RfD - Reference dose
mg/kg - milligram per kilogram
mg/kg/d - milligram per kilogram per day
NA - Not Available
ND - No Data

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

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

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

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Table 3-12
October 1996 Monitoring Well Purging and Field Sampling Data
OB/OD Areas
Fort Wingate Depot Activity
Gallup, New Mexico

Well & Sample ID	Sample Date	Sample Method	Initial Depth to Water (ft bgs)	Calculated Purge Volume (gal)	Total Volume Purged (gal)	Final pH	Final Conductivity (µmhos/cm)	Final Temperature (Celsius)	Final Turbidity (NTU)	Final Eh (mV)	Comments
CURRENT OB/OD AREA											
CMW02	10/22/96	2" pump	13.25	13.5	35	5.6	500	10	101	170	
CMW04	10/22/96	2" pump	28.93	34.6	155	6.4	2,500	10	>200	100	
CMW06	10/28/96	1.5" bailer	17.11	1.3	2.2	8	1,400	15	>200	-110	
CMW07	10/19/96	2" pump	38.46	21.4	65	7.6	1,400	16	>200	140	
CMW10	11/7/96	1.5" bailer	72.72	0.5	0.4	6.8	11,500	15	>200	-60	purged dry 10/28
FW38	10/28-29/96	1.5" bailer	6.13	4.0	1.75	5.8	1,300	15	>200	-10	purged dry 10/24 - 10/28
CMW14	10/29/96	2" pump	91.20	5.1	5	11	6,500	15	>200	170	purged dry 10/28
CMW16	10/22/96	2" pump	21.24	10.4	53	6	650	10	60	130	purged 10/21
CMW17	10/18/96	2" pump	22.75	22.0	111	7.8	800	16	>200	160	purged dry 10/18, 10/19
CMW18	10/19/96	2" pump	37.99	14.5	73	8.5	700	16	161	180	purged dry 10/18
CMW19	10/29/96	2" pump	30.76	15.8	10	8.1	1,100	15	>200	70	purged dry 10/28
CMW20	10/29/96	1.5" bailer	6.22	1.0	5.5	6.8	610	16.5	>200	-110	purged dry 10/28
CLOSED OB/OD AREA											
KMW09	10/29/96	2" pump	48.42	13.5	16	10.4	2,600	15	158	0	purged dry 10/28
KMW10	10/29/96	1.5" bailer	167.16	3.4	5.5	7.2	700	15	>200	170	purged dry 10/28
KMW11	10/24/96	2" pump	32.95	20.8	50	7.5	700	15	>200	190	purged dry 10/23

Notes:
ft bgs = Feet Below Ground Surface
gal = Gallons
mV = Millivolts
NTU = Nephelometric Turbidity Units
µmhos/cm = micromhos per centimeter

Table 3-13
February 1997 Monitoring Well Purging and Field Sampling Data
OB/OD Areas
Fort Wingate Depot Activity
Gallup, New Mexico

Well & Sample ID	Sample Date	Sample Method	Intitial Depth to Water (ft bgs)	Calculated Purge Volume (gal)	Total Volume Purged (gal)	Final pH	Final Conductivity (µmhos/cm)	Final Temperature (Celsius)	Fianl Turbidity (NTU)	Final Eh (mV)	Comments
CURRENT OB/OD AREA											
CMW02	2/10/97	2" pump	12.98	12.0	25	6.9	500	10	>200	5.6	purged dry 02/06, 02/08
CMW04	2/10/97	2" pump	29.86	33.7	170	7.2	2,800	10.4	2.94	-17	purged dry 02/06
CMW06	2/10/97	1.5" bailer	17.67	2.2	2.5	7.25	1,600	9.8	96	68.7	purged dry 02/07, 02/08
CMW07	2/10/97	2" pump	38.28	24.4	85	7.1	1,250	9.2	82	-22	purged dry 02/06
CMW10	2/11/97	1.5" bailer	66.67	5.9	8	11.8	9,500	11.4	112.9	-230	purged dry 02/07, 02/08
FW38	2/10/97	1.5" bailer	7.23	6.8	2	7.1	1,500	7.8	115	73.7	purged dry 02/07, 02/08, 02/10
CMW14	2/11/97	2" pump/ 1.5" bailer	38.15	18.4	22	11.3	10,000	12	> 200	-165	purged dry 02/07, 02/08
CMW16	2/10/97	2" pump	18.39	11.1	58	7.2	750	10.8	> 200	34.2	purged dry 02/10, 02/11
CMW17	2/11/97	2" pump	22.74	21.2	45	7.6	800	10.9	88	-38.1	purged dry 02/07, 02/08, 02/11
CMW18	2/11/97	2" pump	34.09	17.9	120	7.5	650	9.6	85.6	39	purged dry 02/07, 02/11
CMW19	2/10/97	2" pump	22.05	17.2	16	8.1	1,500	9.8	> 200	9.8	purged dry 02/06 - 02/08, 02/10
CMW20	2/11/97	1.5" bailer	4.74	3.4	17	6.35	700	6.9	>200	122	purged dry 02/07, 02/11
CLOSED OB/OD AREA											
KMW09	2/10/97	2" pump	41.58	13.9	25	10.5	2,500	10.6	138	-120	purged dry 02/07, 02/08, 02/10
KMW10	2/11/97	1.5" bailer	166.69	3.9	4.75	7.66	700	10.9	184	47.2	purged dry 02/07, 02/11
KMW11	2/11/97	2" pump	32.79	20.1	65	8.6	800	10.5	>200	-12.8	purged dry 02/07, 02/08, 02/11

Notes:
ft bgs = Feet below ground surface
gal = Gallons
mV = Millivolts
NTU = Nephelometric Turbidity Units
µmhos/cm = micromhos per centimeter

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Table 3-14
October 1998 Monitoring Well Purging and Field Sampling Data
OB/OD Areas
Fort Wingate Depot Activity
Gallup, New Mexico

Well & Sample ID	Sample Date	Sample Method	Initial Depth to Water (ft bgs)	Calculated Purge Volume (gal)	Total Volume Purged (gal)	Final pH	Final Conductivity (µmhos/cm)	Final Temperature (Celsius)	Final Turbidity (NTU)	Final Eh (mV)	Dissolved Oxygen (mg/L)	Unfiltered Total Iron (mg/L)	Ferrous Iron (Fe^{2+}) (mg/L)	Ferric Iron* (Fe^{3+}) (mg/L)	Comments
CURRENT OB/OD AREA															
CMW02	10/19/98	1.6" bailer	9.74	70.4	25	7.77	0.703	11.3	172	267.1	5.4	0	0	0	purged dry two times on 10/19
CMW04	10/21/98	1.6" bailer	25.92	175.3	190	8.12	4.58	12	>999	227.3	5.0	0	0	0	
CMW06	10/20/98	1.6" bailer	19.61	6.1	0.5	6.96	2.42	13.4	445	-88.8	NT	NT	NT	NT	sampled only one liter for Explosives (not enough water)
CMW07	10/20/98	1.6" bailer	39.06	106.4	110	7.83	1.65	12.9	171	208.6	1.6	0	0	0	
CMW10	10/20/98	1.6" bailer	17.30	129.5	27	9.94	4.37	13.2	52	46.5	8.0	0.82	0	0.82	purged dry 10/19, 10/20
FW38	NS	NS	DRY	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	
CMW14	10/20/98	1.6" bailer	26.84	104.6	22.5	12.06	14.4	13	37	-24.9	6.2	NT	0	NT	purged dry 10/19, 10/20
CMW16	10/21/98	1.6" bailer	19.84	57.4	58	7.72	0.95	10.8	17	ND	3.2	0.08	0	0.08	
CMW17	10/22/98	1.6" bailer	19.62	112.2	51	8.67	1.11	10.6	>999	213.1	6.8	0.18	0	0.18	purged dry three times from 10/19 - 10/22
CMW18	10/20/98	1.6" bailer	36.80	79.3	80	7.4	0.94	12	28	164.8	6.5	NT	0	NT	
CMW19	10/22/98	1.6" bailer	19.27	88.0	20	8.14	2.9	10.7	>999	183	7.4	0.06	0	0.06	purged dry three times
CMW20	NS	NS	DRY	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	
CMW21	10/23/98	1.6" bailer	24.46	71.7	12	9.21	0.903	11.8	>999	166	5.2	0.06	0	0.06	purged dry two times
CMW22	10/21/98	1.6" bailer	116.25	11.4	1.5	9.48	0.877	11.1	236	177.7	1.0	0.16	0	0.16	not enough water to get complete suite
CMW23	10/23/98	1.6" bailer	95.51	29.5	6.25	9.93	3.18	12.3	465	151.5	6.4	0.34	0	0.34	purged dry two times
CMW24	10/29/98	1.6" bailer	65.83	255.9	104	8.44	2.77	15.5	200	66.8	4.2	0.14	0	0.14	
CMW25	10/24/98	1.6" bailer	37.02	103.0	28	8.65	1.08	13.5	>999	-221.6	6.6	0.38	0	0.38	
CLOSED OB/OD AREA															
KMW09	10/23/98	1.6" bailer	40.78	70.0	20.5	9.86	3.81	10.8	ND	71.7	6.8	0.75	0	0.75	purged dry 10/21, 10/22
KMW10	10/21/98	1.6" bailer	166.83	18.2	5.75	7.71	0.967	12.7	ND	184.6	7.2	0.26	0.2	0.06	purged dry 10/19
KMW11	10/24/98	1.6" bailer	31.62	105.0	110	8.8	1.14	13.1	ND	ND	3.6	0.08	0	0.08	purged dry 10/21, 10/22
KMW12	10/26/98	1.6" bailer	53.48	97.6	25	7.8	4.11	11.1	451	158.1	5.6	0.12	0	0.12	purged dry 10/23, 10/24, 10/26
KMW13	10/22/98	1.6" bailer	44.43	41.5	7.5	6.58	4.9	11.3	80	242.4	2.2	0.1	0	0.1	

Notes:

ft bgs = Feet below ground surface
gal = Gallons
mV = Millivolts
NS = Not sampled because of insufficient water
NT = Not tested with field test kit or meter

NTU = Nephelometric Turbidity Units
µmhos/cm = micromhos per centimeter
mg/L = milligrams per liter
*Ferric Iron = (Total Iron) - (Ferrous Iron)

Table 3-15
January 1999 Monitoring Well Purging and Field Sampling Data
OB/OD Areas
Fort Wingate Depot Activity
Gallup, New Mexico

Well & Sample ID	Sample Date	Sample Method	Initial Depth to Water (ft bgs)	Calculated Purge Volume (gal)	Total Volume Purged (gal)	Final pH	Final Conductivity (µmhos/cm)	Final Temperature (Celsius)	Final Turbidity (NTU)	Final Eh (mV)	Dissolved Oxygen (mg/L)	Unfiltered Total Iron (mg/L)	Ferrous Iron (Fe^{2+}) (mg/L)	Ferric Iron* (Fe^{3+}) (mg/L)	Comments
CURRENT OB/OD AREA															
CMW02	1/21/99	1.6" bailer	9.14	70.9	25	8.19	0.739	9.1	85	162.4	4.23	0.03	0	0.03	purged dry 1/20, 1/21
CMW04	1/21/99	1.6" bailer	25.98	171.5	175	8.41	3.68	11.6	0	-45.6	3.20	0.09	0	0.09	
CMW06	1/25/99	1.6" bailer	19.31	2.6	0.5	7.06	2.57	10.0	411	48.6	NT	NT	NT	NT	purged dry 1/22, 1/23; 48 oz first purge, 18 oz second; partial suite submitted (explosives, total and dissolved TAL metals, & TSS/TDS)
CMW07	1/21/99	1.6" bailer	39.09	106.4	110	7.66	1.73	12.1	2	113.8	1.48	0.05	0	0.05	
CMW10	1/23-28/99	1.6" bailer	65.05	35.8	8	12.42	9.5	10.5	3	60.6	5.85	0	0	0	purged dry 1/22
FW38	NS	NS	DRY	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	
CMW14	1/25/99	1.6" bailer	29.88	130.7	29	12.38	10.7	11.3	7	6.19	6.97	0	0	0	purged dry 1/22, 1/23; 22 gal first purge, 7 gal second
CMW16	1/22/99	1.6" bailer	19.01	58.6	59	7.43	0.85	9.5	1	-59.4	4.15	0.04	NT	0.04	
CMW17	1/28/99	1.6" bailer	17.32	114.1	35	7.85	1.12	10.8	29	NS	NT	0.55	NT	0.55	purged dry 1/27, 1/28
CMW18	1/27/99	1.6" bailer	36.93	76.3	96	7.49	0.805	11.6	812	90.4	NT	0.1	NT	0.1	
CMW19	1/25/99	1.6" bailer	20.11	91.1	19	8.40	2.74	11.0	>999	5.07	4.19	0.11	NT	0.11	purged dry 1/21, 1/22, 1/23
CMW20	NS	NS	DRY	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	
CMW21	1/28/99	1.6" bailer	22.55	63.5	20.5	9.30	0.758	12.3	318	4.1	NT	0.26	NT	0.26	purged dry 1/22, 1/23, 1/25, 1/27
CMW22	1/26/99	1.6" bailer	116.18	11.9	1.55	9.18	0.80	10.7	112	-11	2.58	0.78	NT	0.78	purged dry 1/22, 1/23, 1/25; partial suite submitted (explosives, total and dissolved TAL metals, & TDS)
CMW23	1/26/99	1.6" bailer	95.57	48.4	7.8	9.89	2.18	11.1	NS	-118.6	4.86	0.18	NT	0.18	purged dry 1/22, 1/23, 1/25
CMW24	2/1/99	1.6" bailer	61.90	284.0	85	8.35	2.9	11.4	52	216	NT	0.3	NT	0.3	
CMW25	1/27/99	1.6" bailer	35.31	106.4	30	8.57	0.95	9.7	402	-77.1	2.45	0.21	NT	0.21	purged dry 1/25, 1/26
CLOSED OB/OD AREA															
KMW09	1/26/99	1.6" bailer	40.99	102.0	16.3	9.32	3.11	10.7	35	-88.5	3.95	0.08	NT	0.08	purged dry 1/22, 1/23, 1/25
KMW10	1/25/99	1.6" bailer	116.82	18.3	4	7.39	0.92	10.8	508	-65.7	6.53	0.1	NT	0.1	purged dry 1/22, 1/23, 1/25
KMW11	1/27/99	1.6" bailer	31.71	155.5	82	8.70	0.98	11.6	208	-108.3	4.61	0.06	NT	0.06	purged dry 1/25, 1/26
KMW12	1/26/99	1.6" bailer	50.36	155.0	18	7.40	3.61	11.4	312	-81.7	3.75	0.04	NT	0.04	purged dry 1/22, 1/23, 1/25
KMW13	1/26-29/99	1.6" bailer	46.66	31.7	5.75	6.89	4.37	10.2	7	-52.3	2.85	0.2	NT	0.2	purged dry 1/22, 1/23, 1/25

Notes:
ft bgs = Feet below ground surface
gal = Gallons
mV = Millivolts
NS = Not sampled because of insufficient water
NT = Not tested with field test kit or meter
NTU = Nephelometric Turbidity Units
µmhos/cm = micromhos per centimeter
mg/L = milligrams per liter
*Ferric Iron = (Total Iron) - (Ferrous Iron)

Table 3-16
Samples that Exceeded Background
Mancos Shale Formation
Closed OB/OD Area Ground Water System
Fort Wingate Depot Activity
Gallup, New Mexico

Formation	Parameter	Fraction	Site ID	Sample Date	Value	Units	Flag Codes	Background Concentration
Mancos Shale	Ammonia nitrogen	Filtered	KMW09	10/23/98	961	µg/l	JF	547
Mancos Shale	Ammonia nitrogen	Filtered	KMW09	1/26/99	716	µg/l	F	547
Mancos Shale	Ammonia nitrogen	Total	KMW09	10/23/98	683	µg/l	J	545
Mancos Shale	Ammonia nitrogen	Total	KMW09	1/26/99	759	µg/l		545
Mancos Shale	Arsenic	Filtered	KMW09	10/29/96	1.34	µg/l	F	0
Mancos Shale	Arsenic	Filtered	KMW09	10/23/98	1.58	µg/l	F	0
Mancos Shale	Arsenic	Total	KMW09	10/29/96	2.01	µg/l		1.89
Mancos Shale	Arsenic	Total	KMW09	10/23/98	3.73	µg/l	J	1.89
Mancos Shale	Barium	Filtered	KMW09	10/29/96	65.9	µg/l	F	44.4
Mancos Shale	Barium	Total	KMW09	10/23/98	98.9	µg/l	J	94.4
Mancos Shale	Beryllium	Total	KMW09	10/23/98	0.472	µg/l	J	0.385
Mancos Shale	Cadmium	Total	KMW09	10/23/98	0.176	µg/l	J	0.153
Mancos Shale	Chromium	Filtered	KMW09	10/29/96	7.55	µg/l	F	0
Mancos Shale	Chromium	Filtered	KMW09	2/10/97	3.57	µg/l	F	0
Mancos Shale	Copper	Filtered	KMW09	2/10/97	1.63	µg/l	F	0
Mancos Shale	Copper	Total	KMW09	10/23/98	12.7	µg/l	J	7.06
Mancos Shale	HMX	Total	KMW09	10/29/96	0.0927	µg/l	JP	0
Mancos Shale	Lead	Total	KMW09	10/23/98	8.08	µg/l	J	5.32
Mancos Shale	Nickel	Filtered	KMW09	10/29/96	6.52	µg/l	F	0
Mancos Shale	Nickel	Filtered	KMW09	2/10/97	3.25	µg/l	F	0
Mancos Shale	Nickel	Total	KMW09	10/29/96	8.21	µg/l		0
Mancos Shale	Nickel	Total	KMW09	2/10/97	5.41	µg/l		0
Mancos Shale	Nitrite (as nitrite)	Total	KMW09	10/23/98	10.1	µg/l		0
Mancos Shale	Selenium	Filtered	KMW09	10/29/96	3.26	µg/l	F	2.67
Mancos Shale	Selenium	Total	KMW09	10/29/96	3.9	µg/l		2.91
Mancos Shale	Vanadium	Filtered	KMW09	10/29/96	4.71	µg/l	F	0
Mancos Shale	Vanadium	Filtered	KMW09	2/10/97	1.36	µg/l	F	0

Notes:
µg/l = micrograms per liter.
Flagging Codes:
F - Sample filtered prior to analysis.
J - Value is estimated.
JP - Value is estimated and is less than reporting level but greater than instrumental detection limit.

Table 3-17
Samples that Exceeded Screening Criteria
Mancos Shale Formation
Closed OB/OD Area Ground Water System
Fort Wingate Depot Activity
Gallup, New Mexico

Formation	Parameter	Fraction	Site ID	Sample Date	Value	Units	Flag Codes	Background Concentration	Screening Level Concentration
Mancos Shale	Ammonia nitrogen	Filtered	KMW09	10/23/98	961	µg/l	JF	547	174
Mancos Shale	Ammonia nitrogen	Filtered	KMW09	1/26/99	716	µg/l	F	547	174
Mancos Shale	Ammonia nitrogen	Total	KMW09	10/23/98	683	µg/l	J	545	174
Mancos Shale	Ammonia nitrogen	Total	KMW09	1/26/99	759	µg/l		545	174

Notes:
µg/l = micrograms per liter.
Flagging Codes:
F - Sample filtered prior to analysis.
J - Value is estimated.

Table 3-18
Samples that Exceeded Closure Performance Standards
Mancos Shale Formation
Closed OB/OD Area Ground Water System
Fort Wingate Depot Activity
Gallup, New Mexico

Formation	Parameter	Fraction	Site ID	Sample Date	Value	Units	Flag Codes	Background Concentration	Screening Level Concentration	Closure Performance Standards Contentration
Mancos Shale	Ammonia nitrogen	Filtered	KMW09	10/23/98	961	µg/l	JF	547	174	174
Mancos Shale	Ammonia nitrogen	Filtered	KMW09	1/26/99	716	µg/l	F	547	174	174
Mancos Shale	Ammonia nitrogen	Total	KMW09	10/23/98	683	µg/l	J	545	174	174
Mancos Shale	Ammonia nitrogen	Total	KMW09	1/26/99	759	µg/l		545	174	174

Notes:
µg/l = micrograms per liter.
Flagging Codes:
F - Sample filtered prior to analysis.
J - Value is estimated.

Table 3-19
Samples that Exceeded Background
Dakota Sandstone Formation
Closed OB/OD Area Ground Water System
Fort Wingate Depot Activity
Gallup, New Mexico

Formation	Parameter	Fraction	Site ID	Sample Date	Value	Units	Flag Codes	Background Concentration
Dakota Sandstone	Aluminum	Filtered	KMW13	10/23/98	66.6	µg/l	F	55.9
Dakota Sandstone	Barium	Filtered	KMW13	1/27/99	46.5	µg/l	F	44.4
Dakota Sandstone	Barium	Total	KMW13	10/23/98	418	µg/l	J	94.4
Dakota Sandstone	Barium	Total	KMW13	1/26/99	96.2	µg/l		94.4
Dakota Sandstone	Cadmium	Filtered	KMW13	10/23/98	0.247	µg/l	F	0
Dakota Sandstone	Cadmium	Total	KMW13	10/23/98	0.468	µg/l	J	0.153
Dakota Sandstone	Cobalt	Total	KMW13	1/26/99	10.6	µg/l	JP	7.22
Dakota Sandstone	Iron	Filtered	KMW13	1/27/99	15.9	µg/l	FJP	0
Dakota Sandstone	Lead	Filtered	KMW13	1/27/99	0.308	µg/l	FJP	0
Dakota Sandstone	Nickel	Filtered	KMW13	10/23/98	28.9	µg/l	F	0
Dakota Sandstone	Nickel	Filtered	KMW13	1/27/99	22.3	µg/l	FJP	0
Dakota Sandstone	Nickel	Total	KMW13	10/23/98	33.1	µg/l		0
Dakota Sandstone	Nickel	Total	KMW13	1/26/99	14.7	µg/l	JP	0
Dakota Sandstone	Nitrite (as nitrite)	Filtered	KMW13	1/28/99	4.51	µg/l	F	0
Dakota Sandstone	Nitrite (as nitrite)	Total	KMW13	10/22/98	10.7	µg/l		0
Dakota Sandstone	Nitrite, nitrate - nonspecific (as nitrogen)	Total	KMW13	1/28/99	228	µg/l		174
Dakota Sandstone	Selenium	Filtered	KMW13	10/23/98	5.91	µg/l	F	2.67
Dakota Sandstone	Selenium	Total	KMW13	10/23/98	5.07	µg/l		2.91
Dakota Sandstone	Silver	Total	KMW13	10/23/98	0.178	µg/l		0.176
Dakota Sandstone	Thallium	Filtered	KMW13	10/23/98	0.325	µg/l	F	0.135
Dakota Sandstone	Thallium	Total	KMW13	10/23/98	0.351	µg/l		0.265
Dakota Sandstone	Zinc	Filtered	KMW13	1/27/99	117	µg/l	F	37

Notes:
µg/l = micrograms per liter.
Flagging Codes:
F - Sample filtered prior to analysis.
J - Value is estimated.
JP - Value is estimated and is less than reporting level but greater than instrumental detection limit.

Table 3-20
Samples that Exceeded Screening Criteria
Dakota Sandstone Formation
Closed OB/OD Area Ground Water System
Fort Wingate Depot Activity
Gallup, New Mexico

Formation	Parameter	Fraction	Site ID	Sample Date	Value	Units	Flag Codes	Background Concentration	Screening Level Concentration
Dakota Sandstone	No samples exceeded screening criteria.								

Notes:
µg/l = micrograms per liter.

Table 3-21
Samples that Exceeded Closure Performance Standards
Dakota Sandstone Formation
Closed OB/OD Area Ground Water System
Fort Wingate Depot Activity
Gallup, New Mexico

Formation	Parameter	Fraction	Site ID	Sample Date	Value	Units	Flag Codes	Background Concentration	Screening Level Concentration	Closure Performance Standards Contentration
Dakota Sandstone	No samples exceeded closure performance standards.									

Notes:
µg/l = micrograms per liter.

Table 3-22
Samples that Exceeded Background
Undifferentiated Chinle Formation
Current OB/OD Area Ground Water System
Fort Wingate Depot Activity
Gallup, New Mexico

Formation	Parameter	Fraction	Site ID	Sample Date	Value	Units	Flag Codes	Background Concentration
Undifferentiated Chinle	Aluminum	Filtered	CMW14	10/29/96	310	µg/l	F	130
Undifferentiated Chinle	Aluminum	Filtered	CMW14	10/20/98	136	µg/l	F	130
Undifferentiated Chinle	Aluminum	Filtered	CMW17	10/19/96	1000	µg/l	F	130
Undifferentiated Chinle	Aluminum	Filtered	CMW17	1/28/99	1090	µg/l	F	130
Undifferentiated Chinle	Aluminum	Filtered	CMW18	10/19/96	299	µg/l	F	130
Undifferentiated Chinle	Aluminum	Filtered	CMW19	2/10/97	180	µg/l	F	130
Undifferentiated Chinle	Aluminum	Filtered	CMW19	1/25/99	613	µg/l	F	130
Undifferentiated Chinle	Aluminum	Filtered	CMW19	1/25/99	258	µg/l	DF	130
Undifferentiated Chinle	Aluminum	Filtered	KMW11	10/24/96	7910	µg/l	F	130
Undifferentiated Chinle	Aluminum	Filtered	KMW11	2/11/97	511	µg/l	F	130
Undifferentiated Chinle	Aluminum	Filtered	KMW11	10/24/98	946	µg/l	JF	130
Undifferentiated Chinle	Aluminum	Filtered	KMW11	10/24/98	586	µg/l	JDF	130
Undifferentiated Chinle	Aluminum	Total	CMW04	10/22/96	30100	µg/l		13000
Undifferentiated Chinle	Aluminum	Total	CMW04	10/22/96	30100	µg/l	J	13000
Undifferentiated Chinle	Aluminum	Total	CMW07	2/10/97	52300	µg/l		13000
Undifferentiated Chinle	Aluminum	Total	CMW07	10/20/98	15100	µg/l	J	13000
Undifferentiated Chinle	Aluminum	Total	CMW07	1/21/99	15000	µg/l		13000
Undifferentiated Chinle	Aluminum	Total	CMW17	1/28/99	88200	µg/l		13000
Undifferentiated Chinle	Aluminum	Total	CMW18	10/20/98	24300	µg/l	J	13000
Undifferentiated Chinle	Aluminum	Total	CMW18	1/27/99	21400	µg/l		13000
Undifferentiated Chinle	Aluminum	Total	CMW19	2/10/97	179000	µg/l		13000
Undifferentiated Chinle	Aluminum	Total	CMW19	10/22/98	40900	µg/l	J	13000
Undifferentiated Chinle	Aluminum	Total	CMW19	1/25/99	42600	µg/l		13000
Undifferentiated Chinle	Aluminum	Total	CMW19	1/25/99	73900	µg/l	D	13000
Undifferentiated Chinle	Aluminum	Total	KMW11	10/24/96	61900	µg/l		13000
Undifferentiated Chinle	Aluminum	Total	KMW11	2/11/97	29800	µg/l		13000
Undifferentiated Chinle	Aluminum	Total	KMW11	10/24/98	23700	µg/l	J	13000
Undifferentiated Chinle	Aluminum	Total	KMW11	10/24/98	32800	µg/l	JD	13000
Undifferentiated Chinle	Ammonia nitrogen	Filtered	CMW04	10/21/98	45.3	µg/l	F	27.9
Undifferentiated Chinle	Ammonia nitrogen	Filtered	CMW04	1/21/99	50.6	µg/l	JPF	27.9

Table 3-22
Samples that Exceeded Background
Undifferentiated Chinle Formation
Current OB/OD Area Ground Water System
Fort Wingate Depot Activity
Gallup, New Mexico

Formation	Parameter	Fraction	Site ID	Sample Date	Value	Units	Flag Codes	Background Concentration
Undifferentiated Chinle	Ammonia nitrogen	Filtered	CMW04	1/21/99	31.1	µg/l	JPFD	27.9
Undifferentiated Chinle	Ammonia nitrogen	Filtered	CMW10	1/25/99	557	µg/l	F	27.9
Undifferentiated Chinle	Ammonia nitrogen	Filtered	CMW14	10/20/98	1500	µg/l	JF	27.9
Undifferentiated Chinle	Ammonia nitrogen	Filtered	CMW14	1/25/99	312	µg/l	F	27.9
Undifferentiated Chinle	Ammonia nitrogen	Filtered	CMW18	10/20/98	28.9	µg/l	F	27.9
Undifferentiated Chinle	Ammonia nitrogen	Filtered	CMW19	10/22/98	315	µg/l	JF	27.9
Undifferentiated Chinle	Ammonia nitrogen	Filtered	CMW19	1/25/99	52.1	µg/l	FD	27.9
Undifferentiated Chinle	Ammonia nitrogen	Filtered	KMW11	10/24/98	39.3	µg/l	F	27.9
Undifferentiated Chinle	Ammonia nitrogen	Filtered	KMW11	10/24/98	39.3	µg/l	DF	27.9
Undifferentiated Chinle	Ammonia nitrogen	Filtered	KMW11	1/27/99	35.4	µg/l	JPF	27.9
Undifferentiated Chinle	Ammonia nitrogen	Total	CMW04	10/21/98	33.4	µg/l		27.2
Undifferentiated Chinle	Ammonia nitrogen	Total	CMW04	1/21/99	39.2	µg/l	JP	27.2
Undifferentiated Chinle	Ammonia nitrogen	Total	CMW07	10/20/98	68.7	µg/l		27.2
Undifferentiated Chinle	Ammonia nitrogen	Total	CMW10	10/20/98	27.9	µg/l		27.2
Undifferentiated Chinle	Ammonia nitrogen	Total	CMW10	1/26/99	514	µg/l		27.2
Undifferentiated Chinle	Ammonia nitrogen	Total	CMW14	10/20/98	1580	µg/l	J	27.2
Undifferentiated Chinle	Ammonia nitrogen	Total	CMW14	1/25/99	358	µg/l		27.2
Undifferentiated Chinle	Ammonia nitrogen	Total	CMW17	10/22/98	251	µg/l		27.2
Undifferentiated Chinle	Ammonia nitrogen	Total	CMW18	10/20/98	65.2	µg/l		27.2
Undifferentiated Chinle	Ammonia nitrogen	Total	CMW19	10/22/98	452	µg/l		27.2
Undifferentiated Chinle	Ammonia nitrogen	Total	CMW19	1/25/99	41.4	µg/l	JP	27.2
Undifferentiated Chinle	Ammonia nitrogen	Total	CMW19	1/25/99	31.3	µg/l	JPD	27.2
Undifferentiated Chinle	Ammonia nitrogen	Total	CMW24	10/29/98	173	µg/l		27.2
Undifferentiated Chinle	Ammonia nitrogen	Total	CMW24	2/1/99	31.7	µg/l	JP	27.2
Undifferentiated Chinle	Ammonia nitrogen	Total	KMW11	10/24/98	52.7	µg/l		27.2
Undifferentiated Chinle	Ammonia nitrogen	Total	KMW11	10/24/98	146	µg/l	D	27.2
Undifferentiated Chinle	Antimony	Filtered	CMW04	1/21/99	2.28	µg/l	FJP	0
Undifferentiated Chinle	Antimony	Filtered	CMW04	1/21/99	2.12	µg/l	DFJP	0
Undifferentiated Chinle	Antimony	Filtered	CMW14	10/29/96	3.41	µg/l	F	0
Undifferentiated Chinle	Antimony	Filtered	CMW19	1/25/99	0.657	µg/l	FJP	0

Table 3-22
Samples that Exceeded Background
Undifferentiated Chinle Formation
Current OB/OD Area Ground Water System
Fort Wingate Depot Activity
Gallup, New Mexico

Formation	Parameter	Fraction	Site ID	Sample Date	Value	Units	Flag Codes	Background Concentration
Undifferentiated Chinle	Antimony	Filtered	CMW19	1/25/99	0.615	µg/l	DFJP	0
Undifferentiated Chinle	Antimony	Filtered	KMW11	1/27/99	2.14	µg/l	FJP	0
Undifferentiated Chinle	Antimony	Total	CMW04	1/21/99	3.3	µg/l	JP	1.97
Undifferentiated Chinle	Antimony	Total	CMW04	1/21/99	4.23	µg/l	DJP	1.97
Undifferentiated Chinle	Antimony	Total	CMW14	10/29/96	2.02	µg/l		1.97
Undifferentiated Chinle	Arsenic	Filtered	CMW17	10/19/96	6.01	µg/l	F	4.14
Undifferentiated Chinle	Arsenic	Filtered	CMW17	2/11/97	6.66	µg/l	F	4.14
Undifferentiated Chinle	Arsenic	Filtered	CMW17	10/22/98	6.87	µg/l	F	4.14
Undifferentiated Chinle	Arsenic	Filtered	CMW17	1/28/99	6.64	µg/l	FJP	4.14
Undifferentiated Chinle	Arsenic	Filtered	KMW11	10/24/96	12.5	µg/l	F	4.14
Undifferentiated Chinle	Arsenic	Filtered	KMW11	2/11/97	20.1	µg/l	F	4.14
Undifferentiated Chinle	Arsenic	Filtered	KMW11	10/24/98	20.7	µg/l	JF	4.14
Undifferentiated Chinle	Arsenic	Filtered	KMW11	10/24/98	20.5	µg/l	JDF	4.14
Undifferentiated Chinle	Arsenic	Filtered	KMW11	1/27/99	17.2	µg/l	F	4.14
Undifferentiated Chinle	Arsenic	Total	CMW17	10/19/96	5.91	µg/l		4.87
Undifferentiated Chinle	Arsenic	Total	CMW17	2/11/97	7.89	µg/l		4.87
Undifferentiated Chinle	Arsenic	Total	CMW17	10/22/98	6.5	µg/l	J	4.87
Undifferentiated Chinle	Arsenic	Total	CMW19	2/10/97	5.91	µg/l		4.87
Undifferentiated Chinle	Arsenic	Total	KMW11	10/24/96	12.7	µg/l		4.87
Undifferentiated Chinle	Arsenic	Total	KMW11	2/11/97	19.8	µg/l		4.87
Undifferentiated Chinle	Arsenic	Total	KMW11	10/24/98	19.2	µg/l	J	4.87
Undifferentiated Chinle	Arsenic	Total	KMW11	10/24/98	19.4	µg/l	JD	4.87
Undifferentiated Chinle	Arsenic	Total	KMW11	1/27/99	16.7	µg/l		4.87
Undifferentiated Chinle	Barium	Filtered	CMW10	2/11/97	540	µg/l	F	58.8
Undifferentiated Chinle	Barium	Filtered	CMW10	10/26/98	64.2	µg/l	JF	58.8
Undifferentiated Chinle	Barium	Filtered	CMW14	10/29/96	115	µg/l	F	58.8
Undifferentiated Chinle	Barium	Filtered	CMW14	2/11/97	128	µg/l	F	58.8
Undifferentiated Chinle	Barium	Filtered	CMW14	10/20/98	574	µg/l	JF	58.8
Undifferentiated Chinle	Barium	Filtered	CMW17	1/28/99	118	µg/l	F	58.8
Undifferentiated Chinle	Barium	Filtered	CMW18	2/11/97	68.7	µg/l	F	58.8

Table 3-22
Samples that Exceeded Background
Undifferentiated Chinle Formation
Current OB/OD Area Ground Water System
Fort Wingate Depot Activity
Gallup, New Mexico

Formation	Parameter	Fraction	Site ID	Sample Date	Value	Units	Flag Codes	Background Concentration
Undifferentiated Chinle	Barium	Filtered	CMW18	10/20/98	62.4	µg/l	JF	58.8
Undifferentiated Chinle	Barium	Filtered	CMW18	1/27/99	161	µg/l	F	58.8
Undifferentiated Chinle	Barium	Filtered	KMW11	10/24/96	62.3	µg/l	F	58.8
Undifferentiated Chinle	Barium	Filtered	KMW11	10/24/98	95.4	µg/l	JF	58.8
Undifferentiated Chinle	Barium	Filtered	KMW11	10/24/98	71.4	µg/l	JDF	58.8
Undifferentiated Chinle	Barium	Filtered	KMW11	1/27/99	105	µg/l	F	58.8
Undifferentiated Chinle	Barium	Total	CMW04	10/22/96	161	µg/l		122
Undifferentiated Chinle	Barium	Total	CMW07	2/10/97	430	µg/l		122
Undifferentiated Chinle	Barium	Total	CMW07	10/20/98	157	µg/l	J	122
Undifferentiated Chinle	Barium	Total	CMW07	1/21/99	419	µg/l		122
Undifferentiated Chinle	Barium	Total	CMW10	2/11/97	850	µg/l		122
Undifferentiated Chinle	Barium	Total	CMW14	10/20/98	177	µg/l	J	122
Undifferentiated Chinle	Barium	Total	CMW17	1/28/99	776	µg/l		122
Undifferentiated Chinle	Barium	Total	CMW18	10/19/96	150	µg/l		122
Undifferentiated Chinle	Barium	Total	CMW18	10/20/98	369	µg/l	J	122
Undifferentiated Chinle	Barium	Total	CMW18	1/27/99	330	µg/l		122
Undifferentiated Chinle	Barium	Total	CMW19	2/10/97	530	µg/l		122
Undifferentiated Chinle	Barium	Total	CMW19	10/22/98	279	µg/l	J	122
Undifferentiated Chinle	Barium	Total	CMW19	1/25/99	236	µg/l		122
Undifferentiated Chinle	Barium	Total	CMW19	1/25/99	381	µg/l	D	122
Undifferentiated Chinle	Barium	Total	KMW11	10/24/96	320	µg/l		122
Undifferentiated Chinle	Barium	Total	KMW11	2/11/97	123	µg/l		122
Undifferentiated Chinle	Barium	Total	KMW11	10/24/98	264	µg/l	J	122
Undifferentiated Chinle	Barium	Total	KMW11	10/24/98	357	µg/l	JD	122
Undifferentiated Chinle	Beryllium	Total	CMW04	10/22/96	0.381	µg/l		0
Undifferentiated Chinle	Beryllium	Total	CMW04	10/22/96	0.218	µg/l	D	0
Undifferentiated Chinle	Beryllium	Total	CMW07	2/10/97	0.826	µg/l		0
Undifferentiated Chinle	Beryllium	Total	CMW07	10/20/98	0.342	µg/l	J	0
Undifferentiated Chinle	Beryllium	Total	CMW07	1/21/99	0.892	µg/l	JP	0
Undifferentiated Chinle	Beryllium	Total	CMW17	1/28/99	1.03	µg/l	JP	0

Table 3-22
Samples that Exceeded Background
Undifferentiated Chinle Formation
Current OB/OD Area Ground Water System
Fort Wingate Depot Activity
Gallup, New Mexico

Formation	Parameter	Fraction	Site ID	Sample Date	Value	Units	Flag Codes	Background Concentration
Undifferentiated Chinle	Beryllium	Total	CMW18	10/19/96	0.211	µg/l		0
Undifferentiated Chinle	Beryllium	Total	CMW18	10/20/98	0.283	µg/l	J	0
Undifferentiated Chinle	Beryllium	Total	CMW18	1/27/99	0.328	µg/l	JP	0
Undifferentiated Chinle	Beryllium	Total	CMW19	2/10/97	2.51	µg/l		0
Undifferentiated Chinle	Beryllium	Total	CMW19	10/22/98	0.614	µg/l	J	0
Undifferentiated Chinle	Beryllium	Total	CMW19	1/25/99	0.901	µg/l	JP	0
Undifferentiated Chinle	Beryllium	Total	CMW19	1/25/99	1.53	µg/l	DJP	0
Undifferentiated Chinle	Beryllium	Total	KMW11	10/24/96	0.471	µg/l		0
Undifferentiated Chinle	Beryllium	Total	KMW11	2/11/97	0.336	µg/l		0
Undifferentiated Chinle	Beryllium	Total	KMW11	10/24/98	0.329	µg/l	J	0
Undifferentiated Chinle	Beryllium	Total	KMW11	10/24/98	0.51	µg/l	JD	0
Undifferentiated Chinle	Cadmium	Filtered	CMW04	10/22/96	0.248	µg/l	DF	0
Undifferentiated Chinle	Cadmium	Filtered	CMW04	2/10/97	0.216	µg/l	F	0
Undifferentiated Chinle	Cadmium	Filtered	CMW04	10/21/98	0.644	µg/l	F	0
Undifferentiated Chinle	Cadmium	Filtered	CMW04	1/21/99	0.171	µg/l	DFJP	0
Undifferentiated Chinle	Cadmium	Filtered	CMW07	1/21/99	6.81	µg/l	F	0
Undifferentiated Chinle	Cadmium	Filtered	CMW10	2/11/97	0.217	µg/l	F	0
Undifferentiated Chinle	Cadmium	Filtered	CMW10	10/26/98	1.3	µg/l	JF	0
Undifferentiated Chinle	Cadmium	Filtered	CMW14	10/29/96	0.245	µg/l	F	0
Undifferentiated Chinle	Cadmium	Filtered	CMW14	2/11/97	0.273	µg/l	F	0
Undifferentiated Chinle	Cadmium	Filtered	CMW14	10/20/98	0.34	µg/l	F	0
Undifferentiated Chinle	Cadmium	Filtered	CMW19	10/29/96	0.206	µg/l	F	0
Undifferentiated Chinle	Cadmium	Filtered	CMW19	2/10/97	0.271	µg/l	F	0
Undifferentiated Chinle	Cadmium	Filtered	CMW19	10/22/98	0.737	µg/l	F	0
Undifferentiated Chinle	Cadmium	Filtered	CMW24	10/29/98	0.263	µg/l	JF	0
Undifferentiated Chinle	Cadmium	Total	CMW04	10/22/96	0.118	µg/l		0
Undifferentiated Chinle	Cadmium	Total	CMW04	10/22/96	0.101	µg/l	D	0
Undifferentiated Chinle	Cadmium	Total	CMW04	2/10/97	0.172	µg/l		0
Undifferentiated Chinle	Cadmium	Total	CMW04	10/21/98	0.657	µg/l	J	0
Undifferentiated Chinle	Cadmium	Total	CMW04	1/21/99	0.174	µg/l	JP	0

Table 3-22
Samples that Exceeded Background
Undifferentiated Chinle Formation
Current OB/OD Area Ground Water System
Fort Wingate Depot Activity
Gallup, New Mexico

Formation	Parameter	Fraction	Site ID	Sample Date	Value	Units	Flag Codes	Background Concentration
Undifferentiated Chinle	Cadmium	Total	CMW10	2/11/97	0.213	µg/l		0
Undifferentiated Chinle	Cadmium	Total	CMW10	10/20/98	0.883	µg/l	J	0
Undifferentiated Chinle	Cadmium	Total	CMW14	10/29/96	0.389	µg/l		0
Undifferentiated Chinle	Cadmium	Total	CMW14	2/11/97	0.248	µg/l		0
Undifferentiated Chinle	Cadmium	Total	CMW14	10/20/98	0.709	µg/l	J	0
Undifferentiated Chinle	Cadmium	Total	CMW14	1/25/99	0.2	µg/l	JP	0
Undifferentiated Chinle	Cadmium	Total	CMW19	10/29/96	0.271	µg/l		0
Undifferentiated Chinle	Cadmium	Total	CMW19	2/10/97	0.42	µg/l		0
Undifferentiated Chinle	Cadmium	Total	CMW19	10/22/98	1.43	µg/l	J	0
Undifferentiated Chinle	Cadmium	Total	CMW19	1/25/99	0.213	µg/l	JP	0
Undifferentiated Chinle	Cadmium	Total	CMW19	1/25/99	0.136	µg/l	DJP	0
Undifferentiated Chinle	Cadmium	Total	CMW24	10/29/98	0.251	µg/l	J	0
Undifferentiated Chinle	Cadmium	Total	KMW11	10/24/96	0.118	µg/l		0
Undifferentiated Chinle	Cadmium	Total	KMW11	10/24/98	0.148	µg/l	JD	0
Undifferentiated Chinle	Chromium	Filtered	CMW10	2/11/97	181	µg/l	F	3.02
Undifferentiated Chinle	Chromium	Filtered	CMW10	10/26/98	270	µg/l	F	3.02
Undifferentiated Chinle	Chromium	Filtered	CMW10	1/23/99	199	µg/l	F	3.02
Undifferentiated Chinle	Chromium	Filtered	CMW14	10/29/96	95.2	µg/l	F	3.02
Undifferentiated Chinle	Chromium	Filtered	CMW14	2/11/97	54.2	µg/l	F	3.02
Undifferentiated Chinle	Chromium	Filtered	CMW14	10/20/98	142	µg/l	JF	3.02
Undifferentiated Chinle	Chromium	Filtered	CMW14	1/25/99	66.6	µg/l	F	3.02
Undifferentiated Chinle	Chromium	Filtered	CMW17	10/19/96	3.86	µg/l	F	3.02
Undifferentiated Chinle	Chromium	Filtered	KMW11	10/24/96	6.5	µg/l	F	3.02
Undifferentiated Chinle	Chromium	Total	CMW07	10/19/96	32.4	µg/l		7.18
Undifferentiated Chinle	Chromium	Total	CMW07	2/10/97	7.21	µg/l		7.18
Undifferentiated Chinle	Chromium	Total	CMW07	10/20/98	10.4	µg/l	J	7.18
Undifferentiated Chinle	Chromium	Total	CMW10	2/11/97	173	µg/l		7.18
Undifferentiated Chinle	Chromium	Total	CMW10	10/20/98	282	µg/l	J	7.18
Undifferentiated Chinle	Chromium	Total	CMW10	1/23/99	174	µg/l		7.18
Undifferentiated Chinle	Chromium	Total	CMW14	10/29/96	87.2	µg/l		7.18

Table 3-22
Samples that Exceeded Background
Undifferentiated Chinle Formation
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Formation	Parameter	Fraction	Site ID	Sample Date	Value	Units	Flag Codes	Background Concentration
Undifferentiated Chinle	Chromium	Total	CMW14	2/11/97	46.6	µg/l		7.18
Undifferentiated Chinle	Chromium	Total	CMW14	10/20/98	113	µg/l	J	7.18
Undifferentiated Chinle	Chromium	Total	CMW14	1/25/99	75.2	µg/l		7.18
Undifferentiated Chinle	Chromium	Total	CMW17	1/28/99	58.6	µg/l		7.18
Undifferentiated Chinle	Chromium	Total	CMW18	10/20/98	23.2	µg/l	J	7.18
Undifferentiated Chinle	Chromium	Total	CMW18	1/27/99	20.4	µg/l		7.18
Undifferentiated Chinle	Chromium	Total	CMW19	2/10/97	23.7	µg/l		7.18
Undifferentiated Chinle	Chromium	Total	CMW19	10/22/98	49.4	µg/l	J	7.18
Undifferentiated Chinle	Chromium	Total	CMW19	1/25/99	39.8	µg/l		7.18
Undifferentiated Chinle	Chromium	Total	CMW19	1/25/99	66	µg/l	D	7.18
Undifferentiated Chinle	Chromium	Total	CMW24	10/29/98	10.1	µg/l		7.18
Undifferentiated Chinle	Chromium	Total	KMW11	10/24/96	10	µg/l		7.18
Undifferentiated Chinle	Chromium	Total	KMW11	10/24/98	16.4	µg/l		7.18
Undifferentiated Chinle	Chromium	Total	KMW11	10/24/98	23.6	µg/l	D	7.18
Undifferentiated Chinle	Cobalt	Filtered	CMW07	1/21/99	7.11	µg/l	FJP	0
Undifferentiated Chinle	Cobalt	Filtered	CMW10	2/11/97	1.58	µg/l	F	0
Undifferentiated Chinle	Cobalt	Filtered	CMW10	1/23/99	12	µg/l	FJP	0
Undifferentiated Chinle	Cobalt	Filtered	CMW14	10/29/96	1.23	µg/l	F	0
Undifferentiated Chinle	Cobalt	Filtered	CMW14	2/11/97	1.18	µg/l	F	0
Undifferentiated Chinle	Cobalt	Filtered	CMW14	1/25/99	14.2	µg/l	FJP	0
Undifferentiated Chinle	Cobalt	Filtered	CMW17	10/19/96	1.85	µg/l	F	0
Undifferentiated Chinle	Cobalt	Total	CMW04	10/22/96	1.31	µg/l		1.08
Undifferentiated Chinle	Cobalt	Total	CMW04	1/21/99	8.08	µg/l	JP	1.08
Undifferentiated Chinle	Cobalt	Total	CMW07	10/19/96	1.69	µg/l		1.08
Undifferentiated Chinle	Cobalt	Total	CMW07	2/10/97	2.59	µg/l		1.08
Undifferentiated Chinle	Cobalt	Total	CMW10	2/11/97	2.14	µg/l		1.08
Undifferentiated Chinle	Cobalt	Total	CMW14	10/29/96	1.23	µg/l		1.08
Undifferentiated Chinle	Cobalt	Total	CMW14	2/11/97	1.12	µg/l		1.08
Undifferentiated Chinle	Cobalt	Total	CMW17	10/19/96	2.66	µg/l		1.08
Undifferentiated Chinle	Cobalt	Total	CMW17	2/11/97	1.27	µg/l		1.08

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Formation	Parameter	Fraction	Site ID	Sample Date	Value	Units	Flag Codes	Background Concentration
Undifferentiated Chinle	Cobalt	Total	CMW18	10/19/96	1.86	µg/l		1.08
Undifferentiated Chinle	Cobalt	Total	CMW19	2/10/97	8.96	µg/l		1.08
Undifferentiated Chinle	Cobalt	Total	CMW19	1/25/99	8.59	µg/l	DJP	1.08
Undifferentiated Chinle	Cobalt	Total	KMW11	10/24/96	3.41	µg/l		1.08
Undifferentiated Chinle	Copper	Filtered	CMW04	1/21/99	3.51	µg/l	DFJP	2.32
Undifferentiated Chinle	Copper	Filtered	CMW10	2/11/97	14.6	µg/l	F	2.32
Undifferentiated Chinle	Copper	Filtered	CMW10	1/23/99	3.48	µg/l	FJP	2.32
Undifferentiated Chinle	Copper	Filtered	CMW14	10/29/96	30.3	µg/l	F	2.32
Undifferentiated Chinle	Copper	Filtered	CMW14	2/11/97	6.19	µg/l	F	2.32
Undifferentiated Chinle	Copper	Filtered	CMW14	10/20/98	8.18	µg/l	JF	2.32
Undifferentiated Chinle	Copper	Filtered	CMW17	10/19/96	8.14	µg/l	F	2.32
Undifferentiated Chinle	Copper	Filtered	CMW18	10/19/96	3.19	µg/l	F	2.32
Undifferentiated Chinle	Copper	Filtered	CMW19	10/29/96	4.61	µg/l	F	2.32
Undifferentiated Chinle	Copper	Filtered	CMW19	2/10/97	2.62	µg/l	F	2.32
Undifferentiated Chinle	Copper	Filtered	CMW19	1/25/99	5.75	µg/l	DFJP	2.32
Undifferentiated Chinle	Copper	Filtered	KMW11	10/24/96	5.7	µg/l	F	2.32
Undifferentiated Chinle	Copper	Filtered	KMW11	10/24/98	5.04	µg/l	F	2.32
Undifferentiated Chinle	Copper	Total	CMW10	2/11/97	17.6	µg/l		13.4
Undifferentiated Chinle	Copper	Total	CMW14	10/29/96	27.3	µg/l		13.4
Undifferentiated Chinle	Copper	Total	CMW17	1/28/99	13.6	µg/l	JP	13.4
Undifferentiated Chinle	Copper	Total	CMW19	2/10/97	36.9	µg/l		13.4
Undifferentiated Chinle	Copper	Total	CMW19	10/22/98	41	µg/l	J	13.4
Undifferentiated Chinle	Copper	Total	CMW19	1/25/99	17.2	µg/l	JP	13.4
Undifferentiated Chinle	Copper	Total	CMW19	1/25/99	37.5	µg/l	D	13.4
Undifferentiated Chinle	Fluoride	Filtered	CMW07	1/21/99	2190	µg/l	F	1160
Undifferentiated Chinle	Fluoride	Total	CMW04	1/21/99	3890	µg/l		0
Undifferentiated Chinle	Fluoride	Total	CMW04	1/21/99	3860	µg/l	D	0
Undifferentiated Chinle	HMX	Total	CMW18	10/19/96	25.4	µg/l	C	0
Undifferentiated Chinle	HMX	Total	CMW18	2/11/97	37.2	µg/l	C	0
Undifferentiated Chinle	HMX	Total	CMW18	10/20/98	22.6	µg/l	C	0

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Formation	Parameter	Fraction	Site ID	Sample Date	Value	Units	Flag Codes	Background Concentration
Undifferentiated Chinle	HMX	Total	CMW18	1/27/99	19.4	µg/l		0
Undifferentiated Chinle	Iron	Filtered	CMW17	10/19/96	608	µg/l	F	48.7
Undifferentiated Chinle	Iron	Filtered	CMW17	1/28/99	501	µg/l	F	48.7
Undifferentiated Chinle	Iron	Filtered	CMW18	10/19/96	164	µg/l	F	48.7
Undifferentiated Chinle	Iron	Filtered	CMW19	2/10/97	63.7	µg/l	F	48.7
Undifferentiated Chinle	Iron	Filtered	CMW19	1/25/99	240	µg/l	F	48.7
Undifferentiated Chinle	Iron	Filtered	CMW19	1/25/99	103	µg/l	DF	48.7
Undifferentiated Chinle	Iron	Filtered	CMW24	2/1/99	62.1	µg/l	F	48.7
Undifferentiated Chinle	Iron	Filtered	KMW11	10/24/96	4470	µg/l	F	48.7
Undifferentiated Chinle	Iron	Filtered	KMW11	10/24/96	4470	µg/l	FJ	48.7
Undifferentiated Chinle	Iron	Filtered	KMW11	2/11/97	228	µg/l	F	48.7
Undifferentiated Chinle	Iron	Filtered	KMW11	10/24/98	443	µg/l	JF	48.7
Undifferentiated Chinle	Iron	Filtered	KMW11	10/24/98	254	µg/l	JDF	48.7
Undifferentiated Chinle	Iron	Total	CMW04	10/22/96	15200	µg/l		6860
Undifferentiated Chinle	Iron	Total	CMW04	10/22/96	15200	µg/l	J	6860
Undifferentiated Chinle	Iron	Total	CMW07	2/10/97	27800	µg/l		6860
Undifferentiated Chinle	Iron	Total	CMW07	10/20/98	7230	µg/l	J	6860
Undifferentiated Chinle	Iron	Total	CMW17	1/28/99	46300	µg/l		6860
Undifferentiated Chinle	Iron	Total	CMW18	10/20/98	14500	µg/l	J	6860
Undifferentiated Chinle	Iron	Total	CMW18	1/27/99	10900	µg/l		6860
Undifferentiated Chinle	Iron	Total	CMW19	2/10/97	101000	µg/l		6860
Undifferentiated Chinle	Iron	Total	CMW19	10/22/98	18900	µg/l	J	6860
Undifferentiated Chinle	Iron	Total	CMW19	1/25/99	18800	µg/l		6860
Undifferentiated Chinle	Iron	Total	CMW19	1/25/99	36100	µg/l	D	6860
Undifferentiated Chinle	Iron	Total	KMW11	10/24/96	36300	µg/l		6860
Undifferentiated Chinle	Iron	Total	KMW11	2/11/97	17900	µg/l		6860
Undifferentiated Chinle	Iron	Total	KMW11	10/24/98	13600	µg/l	J	6860
Undifferentiated Chinle	Iron	Total	KMW11	10/24/98	20600	µg/l	JD	6860
Undifferentiated Chinle	Lead	Filtered	CMW14	10/29/96	3.09	µg/l	F	0.73
Undifferentiated Chinle	Lead	Filtered	CMW14	10/20/98	1.09	µg/l	F	0.73

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Formation	Parameter	Fraction	Site ID	Sample Date	Value	Units	Flag Codes	Background Concentration
Undifferentiated Chinle	Lead	Filtered	CMW17	1/28/99	1.05	µg/l	FJP	0.73
Undifferentiated Chinle	Lead	Filtered	CMW19	1/25/99	1.08	µg/l	DFJP	0.73
Undifferentiated Chinle	Lead	Filtered	CMW24	10/29/98	1.2	µg/l	JF	0.73
Undifferentiated Chinle	Lead	Filtered	KMW11	10/24/96	1.5	µg/l	F	0.73
Undifferentiated Chinle	Lead	Total	CMW07	2/10/97	6.18	µg/l		2.39
Undifferentiated Chinle	Lead	Total	CMW07	10/20/98	3.26	µg/l	J	2.39
Undifferentiated Chinle	Lead	Total	CMW07	1/21/99	7.77	µg/l		2.39
Undifferentiated Chinle	Lead	Total	CMW14	10/29/96	4.65	µg/l		2.39
Undifferentiated Chinle	Lead	Total	CMW17	1/28/99	9.46	µg/l		2.39
Undifferentiated Chinle	Lead	Total	CMW18	10/20/98	5.8	µg/l	J	2.39
Undifferentiated Chinle	Lead	Total	CMW18	1/27/99	5.21	µg/l		2.39
Undifferentiated Chinle	Lead	Total	CMW19	2/10/97	25.9	µg/l		2.39
Undifferentiated Chinle	Lead	Total	CMW19	10/22/98	10.2	µg/l	J	2.39
Undifferentiated Chinle	Lead	Total	CMW19	1/25/99	7.82	µg/l		2.39
Undifferentiated Chinle	Lead	Total	CMW19	1/25/99	13.3	µg/l	D	2.39
Undifferentiated Chinle	Lead	Total	CMW24	10/29/98	2.77	µg/l	J	2.39
Undifferentiated Chinle	Lead	Total	KMW11	10/24/96	7.29	µg/l		2.39
Undifferentiated Chinle	Lead	Total	KMW11	2/11/97	3.02	µg/l		2.39
Undifferentiated Chinle	Lead	Total	KMW11	10/24/98	4.67	µg/l	J	2.39
Undifferentiated Chinle	Lead	Total	KMW11	10/24/98	6.04	µg/l	JD	2.39
Undifferentiated Chinle	Manganese	Filtered	CMW04	10/22/96	58.4	µg/l	F	14.1
Undifferentiated Chinle	Manganese	Filtered	CMW04	10/22/96	47.9	µg/l	DF	14.1
Undifferentiated Chinle	Manganese	Filtered	CMW04	2/10/97	33.2	µg/l	F	14.1
Undifferentiated Chinle	Manganese	Filtered	CMW04	10/21/98	62.7	µg/l	JF	14.1
Undifferentiated Chinle	Manganese	Filtered	CMW04	1/21/99	45.8	µg/l	F	14.1
Undifferentiated Chinle	Manganese	Filtered	CMW04	1/21/99	45	µg/l	DF	14.1
Undifferentiated Chinle	Manganese	Filtered	CMW19	2/10/97	29.2	µg/l	F	14.1
Undifferentiated Chinle	Manganese	Filtered	CMW19	10/22/98	51.5	µg/l	JF	14.1
Undifferentiated Chinle	Manganese	Filtered	CMW24	10/29/98	56.9	µg/l	JF	14.1
Undifferentiated Chinle	Manganese	Filtered	CMW24	2/1/99	69.4	µg/l	F	14.1

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Samples that Exceeded Background
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Formation	Parameter	Fraction	Site ID	Sample Date	Value	Units	Flag Codes	Background Concentration
Undifferentiated Chinle	Manganese	Total	CMW07	2/10/97	480	µg/l		194
Undifferentiated Chinle	Manganese	Total	CMW07	10/20/98	245	µg/l	J	194
Undifferentiated Chinle	Manganese	Total	CMW07	1/21/99	356	µg/l		194
Undifferentiated Chinle	Manganese	Total	CMW17	1/28/99	767	µg/l		194
Undifferentiated Chinle	Manganese	Total	CMW18	10/20/98	445	µg/l	J	194
Undifferentiated Chinle	Manganese	Total	CMW18	1/27/99	370	µg/l		194
Undifferentiated Chinle	Manganese	Total	CMW19	2/10/97	700	µg/l		194
Undifferentiated Chinle	Manganese	Total	CMW19	10/22/98	464	µg/l	J	194
Undifferentiated Chinle	Manganese	Total	CMW19	1/25/99	343	µg/l		194
Undifferentiated Chinle	Manganese	Total	CMW19	1/25/99	862	µg/l	D	194
Undifferentiated Chinle	Manganese	Total	KMW11	10/24/96	290	µg/l		194
Undifferentiated Chinle	Manganese	Total	KMW11	10/24/98	366	µg/l	J	194
Undifferentiated Chinle	Manganese	Total	KMW11	10/24/98	572	µg/l	JD	194
Undifferentiated Chinle	Mercury	Filtered	CMW07	1/21/99	0.175	µg/l	FJP	0.133
Undifferentiated Chinle	Nickel	Filtered	CMW10	2/11/97	10.1	µg/l	F	2.41
Undifferentiated Chinle	Nickel	Filtered	CMW14	10/29/96	7.64	µg/l	F	2.41
Undifferentiated Chinle	Nickel	Filtered	CMW14	2/11/97	4.41	µg/l	F	2.41
Undifferentiated Chinle	Nickel	Filtered	CMW14	1/25/99	18.4	µg/l	FJP	2.41
Undifferentiated Chinle	Nickel	Filtered	CMW18	10/19/96	3.64	µg/l	F	2.41
Undifferentiated Chinle	Nickel	Filtered	CMW18	2/11/97	3.09	µg/l	F	2.41
Undifferentiated Chinle	Nickel	Filtered	CMW18	1/27/99	18.5	µg/l	FJP	2.41
Undifferentiated Chinle	Nickel	Filtered	KMW11	10/24/96	2.44	µg/l	F	2.41
Undifferentiated Chinle	Nickel	Total	CMW07	10/19/96	49.5	µg/l		8.26
Undifferentiated Chinle	Nickel	Total	CMW10	2/11/97	11.5	µg/l		8.26
Undifferentiated Chinle	Nickel	Total	CMW17	1/28/99	31.1	µg/l	JP	8.26
Undifferentiated Chinle	Nickel	Total	CMW18	10/20/98	15.6	µg/l	J	8.26
Undifferentiated Chinle	Nickel	Total	CMW18	1/27/99	21.8	µg/l	JP	8.26
Undifferentiated Chinle	Nickel	Total	CMW19	2/10/97	21.5	µg/l		8.26
Undifferentiated Chinle	Nickel	Total	CMW19	10/22/98	38.6	µg/l	J	8.26
Undifferentiated Chinle	Nickel	Total	CMW19	1/25/99	21	µg/l	JP	8.26

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Formation	Parameter	Fraction	Site ID	Sample Date	Value	Units	Flag Codes	Background Concentration
Undifferentiated Chinle	Nickel	Total	CMW19	1/25/99	34.9	µg/l	DJP	8.26
Undifferentiated Chinle	Nickel	Total	KMW11	10/24/96	12.5	µg/l		8.26
Undifferentiated Chinle	Nickel	Total	KMW11	10/24/98	19	µg/l		8.26
Undifferentiated Chinle	Nickel	Total	KMW11	10/24/98	28.3	µg/l	D	8.26
Undifferentiated Chinle	Nitrite (as nitrite)	Total	CMW07	10/20/98	13.9	µg/l	J	12.9
Undifferentiated Chinle	Nitrite (as nitrite)	Total	CMW10	10/27/98	26	µg/l		12.9
Undifferentiated Chinle	Nitrite (as nitrite)	Total	CMW14	10/20/98	24.8	µg/l		12.9
Undifferentiated Chinle	Nitrite (as nitrite)	Total	CMW18	10/20/98	13.4	µg/l	J	12.9
Undifferentiated Chinle	Nitrite (as nitrite)	Total	CMW24	10/29/98	20.2	µg/l		12.9
Undifferentiated Chinle	Nitrite (as nitrite)	Total	KMW11	10/24/98	27.8	µg/l		12.9
Undifferentiated Chinle	Nitrite (as nitrite)	Total	KMW11	10/24/98	17.9	µg/l	D	12.9
Undifferentiated Chinle	Nitrite, nitrate - nonspecific (as nitrogen)	Total	CMW10	10/20/98	4240	µg/l	J	168
Undifferentiated Chinle	Nitrite, nitrate - nonspecific (as nitrogen)	Total	CMW10	1/26/99	3500	µg/l		168
Undifferentiated Chinle	Nitrite, nitrate - nonspecific (as nitrogen)	Total	CMW17	10/22/98	179	µg/l	J	168
Undifferentiated Chinle	Nitrite, nitrate - nonspecific (as nitrogen)	Total	CMW17	1/28/99	500	µg/l		168
Undifferentiated Chinle	Nitrite, nitrate - nonspecific (as nitrogen)	Total	CMW18	10/20/98	1860	µg/l	J	168
Undifferentiated Chinle	Nitrite, nitrate - nonspecific (as nitrogen)	Total	CMW18	1/27/99	1580	µg/l		168
Undifferentiated Chinle	Nitrite, nitrate - nonspecific (as nitrogen)	Total	KMW11	10/24/98	498	µg/l	J	168
Undifferentiated Chinle	Nitrite, nitrate - nonspecific (as nitrogen)	Total	KMW11	10/24/98	488	µg/l	JD	168
Undifferentiated Chinle	Nitrite, nitrate - nonspecific (as nitrogen)	Total	KMW11	1/27/99	455	µg/l		168
Undifferentiated Chinle	RDX	Total	CMW17	10/19/96	0.278	µg/l	C	0
Undifferentiated Chinle	RDX	Total	CMW17	2/11/97	0.264	µg/l	C	0
Undifferentiated Chinle	RDX	Total	CMW17	10/22/98	0.407	µg/l	C	0
Undifferentiated Chinle	RDX	Total	CMW17	1/28/99	0.286	µg/l		0
Undifferentiated Chinle	RDX	Total	CMW18	10/19/96	120	µg/l	C	0
Undifferentiated Chinle	RDX	Total	CMW18	2/11/97	170	µg/l	C	0
Undifferentiated Chinle	RDX	Total	CMW18	10/20/98	100	µg/l	C	0
Undifferentiated Chinle	RDX	Total	CMW18	1/27/99	81.3	µg/l		0
Undifferentiated Chinle	RDX	Total	CMW19	10/29/96	0.173	µg/l	C	0
Undifferentiated Chinle	RDX	Total	KMW11	2/11/97	0.0923	µg/l	JPC	0

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Formation	Parameter	Fraction	Site ID	Sample Date	Value	Units	Flag Codes	Background Concentration
Undifferentiated Chinle	Selenium	Filtered	CMW10	2/11/97	19	µg/l	F	9.84
Undifferentiated Chinle	Selenium	Filtered	CMW10	10/26/98	82.1	µg/l	F	9.84
Undifferentiated Chinle	Selenium	Filtered	CMW10	1/23/99	41.5	µg/l	F	9.84
Undifferentiated Chinle	Selenium	Total	CMW10	2/11/97	17.2	µg/l		11.4
Undifferentiated Chinle	Selenium	Total	CMW10	10/20/98	84.5	µg/l		11.4
Undifferentiated Chinle	Selenium	Total	CMW10	1/23/99	46.3	µg/l		11.4
Undifferentiated Chinle	Silver	Total	CMW17	1/28/99	5.49	µg/l	JP	1.61
Undifferentiated Chinle	Thallium	Total	CMW19	2/10/97	0.16	µg/l		0
Undifferentiated Chinle	Thallium	Total	CMW19	10/22/98	0.163	µg/l		0
Undifferentiated Chinle	Thallium	Total	KMW11	10/24/96	0.136	µg/l		0
Undifferentiated Chinle	Thallium	Total	KMW11	10/24/98	0.119	µg/l		0
Undifferentiated Chinle	Thallium	Total	KMW11	10/24/98	0.128	µg/l	D	0
Undifferentiated Chinle	Vanadium	Filtered	CMW17	1/28/99	76.2	µg/l	F	58.1
Undifferentiated Chinle	Vanadium	Filtered	KMW11	10/24/96	168	µg/l	F	58.1
Undifferentiated Chinle	Vanadium	Filtered	KMW11	2/11/97	200	µg/l	F	58.1
Undifferentiated Chinle	Vanadium	Filtered	KMW11	10/24/98	198	µg/l	F	58.1
Undifferentiated Chinle	Vanadium	Filtered	KMW11	10/24/98	199	µg/l	DF	58.1
Undifferentiated Chinle	Vanadium	Filtered	KMW11	1/27/99	191	µg/l	F	58.1
Undifferentiated Chinle	Vanadium	Total	CMW07	2/10/97	79.3	µg/l		65
Undifferentiated Chinle	Vanadium	Total	CMW07	1/21/99	69	µg/l		65
Undifferentiated Chinle	Vanadium	Total	CMW17	1/28/99	205	µg/l		65
Undifferentiated Chinle	Vanadium	Total	CMW19	2/10/97	97.7	µg/l		65
Undifferentiated Chinle	Vanadium	Total	CMW19	10/22/98	67	µg/l	J	65
Undifferentiated Chinle	Vanadium	Total	CMW19	1/25/99	101	µg/l	D	65
Undifferentiated Chinle	Vanadium	Total	KMW11	10/24/96	220	µg/l		65
Undifferentiated Chinle	Vanadium	Total	KMW11	2/11/97	230	µg/l		65
Undifferentiated Chinle	Vanadium	Total	KMW11	10/24/98	242	µg/l		65
Undifferentiated Chinle	Vanadium	Total	KMW11	10/24/98	260	µg/l	D	65
Undifferentiated Chinle	Vanadium	Total	KMW11	1/27/99	198	µg/l		65
Undifferentiated Chinle	Zinc	Filtered	CMW04	1/21/99	9.88	µg/l	FJP	8.75

Table 3-22
Samples that Exceeded Background
Undifferentiated Chinle Formation
Current OB/OD Area Ground Water System
Fort Wingate Depot Activity
Gallup, New Mexico

Formation	Parameter	Fraction	Site ID	Sample Date	Value	Units	Flag Codes	Background Concentration
Undifferentiated Chinle	Zinc	Filtered	CMW17	1/28/99	16.3	µg/l	FJP	8.75
Undifferentiated Chinle	Zinc	Filtered	CMW18	1/27/99	80.2	µg/l	F	8.75
Undifferentiated Chinle	Zinc	Filtered	CMW24	2/1/99	23.8	µg/l	F	8.75
Undifferentiated Chinle	Zinc	Filtered	KMW11	2/11/97	9.82	µg/l	F	8.75
Undifferentiated Chinle	Zinc	Filtered	KMW11	10/24/98	107	µg/l	JF	8.75
Undifferentiated Chinle	Zinc	Filtered	KMW11	1/27/99	10	µg/l	FJP	8.75
Undifferentiated Chinle	Zinc	Total	CMW04	1/21/99	17.5	µg/l	JP	16.4
Undifferentiated Chinle	Zinc	Total	CMW07	1/21/99	24.5	µg/l		16.4
Undifferentiated Chinle	Zinc	Total	CMW17	1/28/99	82.3	µg/l		16.4
Undifferentiated Chinle	Zinc	Total	CMW18	10/20/98	37.1	µg/l	J	16.4
Undifferentiated Chinle	Zinc	Total	CMW18	1/27/99	32.8	µg/l		16.4
Undifferentiated Chinle	Zinc	Total	CMW19	2/10/97	38.3	µg/l		16.4
Undifferentiated Chinle	Zinc	Total	CMW19	10/22/98	66.9	µg/l	J	16.4
Undifferentiated Chinle	Zinc	Total	CMW19	1/25/99	49.3	µg/l		16.4
Undifferentiated Chinle	Zinc	Total	CMW19	1/25/99	88.5	µg/l	D	16.4
Undifferentiated Chinle	Zinc	Total	CMW24	10/29/98	54.8	µg/l	J	16.4
Undifferentiated Chinle	Zinc	Total	KMW11	10/24/96	16.5	µg/l		16.4
Undifferentiated Chinle	Zinc	Total	KMW11	10/24/98	40	µg/l	JD	16.4
Painted Desert	Aluminum	Filtered	CMW25	10/24/98	209	µg/l	F	130
Painted Desert	Aluminum	Filtered	CMW25	10/24/98	2710	µg/l	JDF	130
Painted Desert	Aluminum	Filtered	CMW25	1/27/99	768	µg/l	F	130
Painted Desert	Aluminum	Total	CMW25	10/24/98	162000	µg/l	J	13000
Painted Desert	Aluminum	Total	CMW25	10/24/98	69100	µg/l	JD	13000
Painted Desert	Ammonia nitrogen	Total	CMW25	10/24/98	115	µg/l		27.2
Painted Desert	Ammonia nitrogen	Total	CMW25	10/24/98	138	µg/l	D	27.2
Painted Desert	Antimony	Filtered	CMW25	1/27/99	0.639	µg/l	FJP	0
Painted Desert	Arsenic	Total	CMW25	10/24/98	6.67	µg/l	J	4.87
Painted Desert	Barium	Filtered	CMW25	10/24/98	125	µg/l	JDF	58.8
Painted Desert	Barium	Filtered	CMW25	1/27/99	81.4	µg/l	F	58.8
Painted Desert	Barium	Total	CMW25	10/24/98	890	µg/l	J	122

Table 3-22
Samples that Exceeded Background
Undifferentiated Chinle Formation
Current OB/OD Area Ground Water System
Fort Wingate Depot Activity
Gallup, New Mexico

Formation	Parameter	Fraction	Site ID	Sample Date	Value	Units	Flag Codes	Background Concentration
Painted Desert	Barium	Total	CMW25	10/24/98	279	µg/l	JD	122
Painted Desert	Beryllium	Total	CMW25	10/24/98	3.6	µg/l	J	0
Painted Desert	Beryllium	Total	CMW25	10/24/98	1.28	µg/l	JD	0
Painted Desert	Cadmium	Total	CMW25	10/24/98	0.398	µg/l	J	0
Painted Desert	Cadmium	Total	CMW25	10/24/98	0.269	µg/l	JD	0
Painted Desert	Chromium	Total	CMW25	10/24/98	180	µg/l	J	7.18
Painted Desert	Chromium	Total	CMW25	10/24/98	87.9	µg/l	JD	7.18
Painted Desert	Cobalt	Total	CMW25	10/24/98	37.2	µg/l		1.08
Painted Desert	Copper	Total	CMW25	10/24/98	37.7	µg/l	J	13.4
Painted Desert	Iron	Filtered	CMW25	10/24/98	69	µg/l	F	48.7
Painted Desert	Iron	Filtered	CMW25	10/24/98	955	µg/l	JDF	48.7
Painted Desert	Iron	Filtered	CMW25	1/27/99	276	µg/l	F	48.7
Painted Desert	Iron	Total	CMW25	10/24/98	64600	µg/l	J	6860
Painted Desert	Iron	Total	CMW25	10/24/98	28700	µg/l	JD	6860
Painted Desert	Lead	Total	CMW25	10/24/98	32.4	µg/l	J	2.39
Painted Desert	Lead	Total	CMW25	10/24/98	11.5	µg/l	JD	2.39
Painted Desert	Manganese	Filtered	CMW25	10/24/98	16	µg/l	JDF	14.1
Painted Desert	Manganese	Total	CMW25	10/24/98	1580	µg/l	J	194
Painted Desert	Manganese	Total	CMW25	10/24/98	482	µg/l	JD	194
Painted Desert	Nickel	Total	CMW25	10/24/98	95.5	µg/l	J	8.26
Painted Desert	Nickel	Total	CMW25	10/24/98	49.4	µg/l	JD	8.26
Painted Desert	Nitrite (as nitrite)	Total	CMW25	10/24/98	170	µg/l	J	12.9
Painted Desert	Nitrite (as nitrite)	Total	CMW25	10/24/98	142	µg/l	J	12.9
Painted Desert	Thallium	Total	CMW25	10/24/98	0.233	µg/l		0
Painted Desert	Thallium	Total	CMW25	10/24/98	0.17	µg/l	D	0
Painted Desert	Vanadium	Total	CMW25	10/24/98	170	µg/l	J	65
Painted Desert	Vanadium	Total	CMW25	10/24/98	69.4	µg/l	JD	65
Painted Desert	Zinc	Filtered	CMW25	1/27/99	13.8	µg/l	FJP	8.75
Painted Desert	Zinc	Total	CMW25	10/24/98	693	µg/l	J	16.4
Painted Desert	Zinc	Total	CMW25	10/24/98	143	µg/l	JD	16.4

Table 3-22
Samples that Exceeded Background
Undifferentiated Chinle Formation
Current OB/OD Area Ground Water System
Fort Wingate Depot Activity
Gallup, New Mexico

Formation	Parameter	Fraction	Site ID	Sample Date	Value	Units	Flag Codes	Background Concentration
Sonsela Sandstone	Aluminum	Filtered	CMW16	10/22/96	208	µg/l	F	130
Sonsela Sandstone	Aluminum	Filtered	CMW21	10/23/98	470	µg/l	JF	130
Sonsela Sandstone	Aluminum	Filtered	CMW21	1/27/99	1850	µg/l	F	130
Sonsela Sandstone	Aluminum	Filtered	CMW22	2/2/99	318	µg/l	FJ	130
Sonsela Sandstone	Aluminum	Filtered	CMW23	1/26/99	426	µg/l	F	130
Sonsela Sandstone	Aluminum	Total	CMW16	2/10/97	44000	µg/l	D	13000
Sonsela Sandstone	Aluminum	Total	CMW16	2/10/97	46200	µg/l		13000
Sonsela Sandstone	Aluminum	Total	CMW21	1/27/99	92700	µg/l		13000
Sonsela Sandstone	Aluminum	Total	CMW22	1/29/99	22600	µg/l		13000
Sonsela Sandstone	Aluminum	Total	CMW23	10/22/98	46700	µg/l		13000
Sonsela Sandstone	Aluminum	Total	CMW23	1/26/99	18200	µg/l		13000
Sonsela Sandstone	Ammonia nitrogen	Filtered	CMW21	10/23/98	456	µg/l	JF	27.9
Sonsela Sandstone	Ammonia nitrogen	Filtered	CMW23	10/23/98	35.4	µg/l	F	27.9
Sonsela Sandstone	Ammonia nitrogen	Filtered	CMW23	1/26/99	95.1	µg/l	F	27.9
Sonsela Sandstone	Ammonia nitrogen	Total	CMW16	10/21/98	64.7	µg/l		27.2
Sonsela Sandstone	Ammonia nitrogen	Total	CMW21	10/23/98	381	µg/l	J	27.2
Sonsela Sandstone	Ammonia nitrogen	Total	CMW23	10/22/98	199	µg/l		27.2
Sonsela Sandstone	Ammonia nitrogen	Total	CMW23	1/26/99	169	µg/l		27.2
Sonsela Sandstone	Antimony	Filtered	CMW16	1/22/99	10.2	µg/l	F	0
Sonsela Sandstone	Antimony	Filtered	CMW21	10/23/98	0.777	µg/l	F	0
Sonsela Sandstone	Antimony	Filtered	CMW22	10/27/98	0.631	µg/l	F	0
Sonsela Sandstone	Antimony	Filtered	CMW23	10/23/98	0.706	µg/l	F	0
Sonsela Sandstone	Antimony	Filtered	CMW23	1/26/99	0.654	µg/l	FJP	0
Sonsela Sandstone	Antimony	Total	CMW16	1/22/99	23.3	µg/l		1.97
Sonsela Sandstone	Arsenic	Filtered	CMW21	10/23/98	4.83	µg/l	F	4.14
Sonsela Sandstone	Arsenic	Filtered	CMW22	10/27/98	5.3	µg/l	JF	4.14
Sonsela Sandstone	Arsenic	Filtered	CMW23	10/23/98	10.1	µg/l	F	4.14
Sonsela Sandstone	Arsenic	Total	CMW23	10/22/98	10.4	µg/l	J	4.87
Sonsela Sandstone	Arsenic	Total	CMW23	1/26/99	9.11	µg/l	JP	4.87
Sonsela Sandstone	Barium	Filtered	CMW16	10/22/96	82.8	µg/l	F	58.8

Table 3-22
Samples that Exceeded Background
Undifferentiated Chinle Formation
Current OB/OD Area Ground Water System
Fort Wingate Depot Activity
Gallup, New Mexico

Formation	Parameter	Fraction	Site ID	Sample Date	Value	Units	Flag Codes	Background Concentration
Sonsela Sandstone	Barium	Filtered	CMW16	2/10/97	72.8	µg/l	DF	58.8
Sonsela Sandstone	Barium	Filtered	CMW16	2/10/97	74.3	µg/l	F	58.8
Sonsela Sandstone	Barium	Filtered	CMW16	10/21/98	72.3	µg/l	JF	58.8
Sonsela Sandstone	Barium	Filtered	CMW16	1/22/99	72.9	µg/l	F	58.8
Sonsela Sandstone	Barium	Filtered	CMW21	1/27/99	132	µg/l	F	58.8
Sonsela Sandstone	Barium	Filtered	CMW22	10/27/98	133	µg/l	JF	58.8
Sonsela Sandstone	Barium	Filtered	CMW22	2/2/99	174	µg/l	F	58.8
Sonsela Sandstone	Barium	Total	CMW16	10/22/96	310	µg/l		122
Sonsela Sandstone	Barium	Total	CMW16	2/10/97	440	µg/l	D	122
Sonsela Sandstone	Barium	Total	CMW16	2/10/97	430	µg/l		122
Sonsela Sandstone	Barium	Total	CMW16	10/21/98	498	µg/l	J	122
Sonsela Sandstone	Barium	Total	CMW16	1/22/99	228	µg/l		122
Sonsela Sandstone	Barium	Total	CMW21	10/23/98	153	µg/l	J	122
Sonsela Sandstone	Barium	Total	CMW21	1/27/99	884	µg/l		122
Sonsela Sandstone	Barium	Total	CMW22	10/24/98	183	µg/l	J	122
Sonsela Sandstone	Barium	Total	CMW22	1/29/99	179	µg/l		122
Sonsela Sandstone	Barium	Total	CMW23	10/22/98	160	µg/l		122
Sonsela Sandstone	Beryllium	Total	CMW16	10/22/96	0.309	µg/l		0
Sonsela Sandstone	Beryllium	Total	CMW16	2/10/97	0.966	µg/l	D	0
Sonsela Sandstone	Beryllium	Total	CMW16	2/10/97	1.26	µg/l		0
Sonsela Sandstone	Beryllium	Total	CMW16	10/21/98	0.259	µg/l	J	0
Sonsela Sandstone	Beryllium	Total	CMW21	10/23/98	0.378	µg/l	J	0
Sonsela Sandstone	Beryllium	Total	CMW21	1/27/99	2.27	µg/l	JP	0
Sonsela Sandstone	Beryllium	Total	CMW22	10/24/98	0.48	µg/l	J	0
Sonsela Sandstone	Beryllium	Total	CMW22	1/29/99	0.583	µg/l	JP	0
Sonsela Sandstone	Beryllium	Total	CMW23	10/22/98	1.51	µg/l	J	0
Sonsela Sandstone	Beryllium	Total	CMW23	1/26/99	0.516	µg/l	JP	0
Sonsela Sandstone	Cadmium	Filtered	CMW23	10/23/98	0.148	µg/l	F	0
Sonsela Sandstone	Cadmium	Total	CMW21	10/23/98	0.133	µg/l	J	0
Sonsela Sandstone	Cadmium	Total	CMW21	1/27/99	0.145	µg/l	JP	0

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Samples that Exceeded Background
Undifferentiated Chinle Formation
Current OB/OD Area Ground Water System
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Formation	Parameter	Fraction	Site ID	Sample Date	Value	Units	Flag Codes	Background Concentration
Sonsela Sandstone	Cadmium	Total	CMW22	10/24/98	0.131	µg/l	J	0
Sonsela Sandstone	Cadmium	Total	CMW23	10/22/98	0.544	µg/l	J	0
Sonsela Sandstone	Chromium	Filtered	CMW23	10/23/98	44.2	µg/l	JF	3.02
Sonsela Sandstone	Chromium	Filtered	CMW23	1/26/99	24.8	µg/l	F	3.02
Sonsela Sandstone	Chromium	Total	CMW21	10/23/98	16.8	µg/l	J	7.18
Sonsela Sandstone	Chromium	Total	CMW21	1/27/99	66.1	µg/l		7.18
Sonsela Sandstone	Chromium	Total	CMW22	1/29/99	11.2	µg/l		7.18
Sonsela Sandstone	Chromium	Total	CMW23	10/22/98	65.1	µg/l		7.18
Sonsela Sandstone	Chromium	Total	CMW23	1/26/99	52.5	µg/l		7.18
Sonsela Sandstone	Cobalt	Total	CMW16	10/22/96	2.33	µg/l		1.08
Sonsela Sandstone	Cobalt	Total	CMW16	2/10/97	2.59	µg/l	D	1.08
Sonsela Sandstone	Cobalt	Total	CMW16	2/10/97	2.7	µg/l		1.08
Sonsela Sandstone	Copper	Filtered	CMW23	1/26/99	8.3	µg/l	FJP	2.32
Sonsela Sandstone	Copper	Total	CMW16	1/22/99	14.9	µg/l	JP	13.4
Sonsela Sandstone	Copper	Total	CMW23	10/22/98	24.9	µg/l		13.4
Sonsela Sandstone	Fluoride	Filtered	CMW16	1/22/99	1310	µg/l	F	1160
Sonsela Sandstone	Fluoride	Total	CMW23	1/26/99	2780	µg/l		0
Sonsela Sandstone	HMX	Total	CMW16	10/22/96	7.86	µg/l	C	0
Sonsela Sandstone	HMX	Total	CMW16	2/10/97	6.39	µg/l	C	0
Sonsela Sandstone	HMX	Total	CMW16	2/10/97	7.12	µg/l	CVD	0
Sonsela Sandstone	HMX	Total	CMW16	10/21/98	8.09	µg/l	C	0
Sonsela Sandstone	HMX	Total	CMW16	1/22/99	7.63	µg/l		0
Sonsela Sandstone	Iron	Filtered	CMW16	10/22/96	93.9	µg/l	F	48.7
Sonsela Sandstone	Iron	Filtered	CMW21	10/23/98	173	µg/l	JF	48.7
Sonsela Sandstone	Iron	Filtered	CMW21	1/27/99	704	µg/l	F	48.7
Sonsela Sandstone	Iron	Filtered	CMW22	2/2/99	121	µg/l	F	48.7
Sonsela Sandstone	Iron	Filtered	CMW23	1/26/99	152	µg/l	F	48.7
Sonsela Sandstone	Iron	Total	CMW16	2/10/97	18400	µg/l	D	6860
Sonsela Sandstone	Iron	Total	CMW16	2/10/97	19100	µg/l		6860
Sonsela Sandstone	Iron	Total	CMW21	1/27/99	38300	µg/l		6860

Table 3-22
Samples that Exceeded Background
Undifferentiated Chinle Formation
Current OB/OD Area Ground Water System
Fort Wingate Depot Activity
Gallup, New Mexico

Formation	Parameter	Fraction	Site ID	Sample Date	Value	Units	Flag Codes	Background Concentration
Sonsela Sandstone	Iron	Total	CMW22	1/29/99	7770	µg/l		6860
Sonsela Sandstone	Iron	Total	CMW23	10/22/98	19700	µg/l		6860
Sonsela Sandstone	Lead	Filtered	CMW22	10/27/98	0.785	µg/l	JF	0.73
Sonsela Sandstone	Lead	Total	CMW16	2/10/97	7.47	µg/l	D	2.39
Sonsela Sandstone	Lead	Total	CMW16	2/10/97	7.88	µg/l		2.39
Sonsela Sandstone	Lead	Total	CMW16	10/21/98	3.24	µg/l	J	2.39
Sonsela Sandstone	Lead	Total	CMW16	1/22/99	2.98	µg/l	JP	2.39
Sonsela Sandstone	Lead	Total	CMW21	10/23/98	2.84	µg/l	J	2.39
Sonsela Sandstone	Lead	Total	CMW21	1/27/99	18.6	µg/l		2.39
Sonsela Sandstone	Lead	Total	CMW22	10/24/98	3.46	µg/l	J	2.39
Sonsela Sandstone	Lead	Total	CMW22	1/29/99	5.23	µg/l		2.39
Sonsela Sandstone	Lead	Total	CMW23	10/22/98	40.4	µg/l	J	2.39
Sonsela Sandstone	Lead	Total	CMW23	1/26/99	2.96	µg/l	JP	2.39
Sonsela Sandstone	Manganese	Filtered	CMW16	10/22/96	22.5	µg/l	F	14.1
Sonsela Sandstone	Manganese	Filtered	CMW22	2/2/99	50.9	µg/l	F	14.1
Sonsela Sandstone	Manganese	Total	CMW16	10/22/96	220	µg/l		194
Sonsela Sandstone	Manganese	Total	CMW16	2/10/97	290	µg/l	D	194
Sonsela Sandstone	Manganese	Total	CMW16	2/10/97	290	µg/l		194
Sonsela Sandstone	Manganese	Total	CMW21	1/27/99	1060	µg/l		194
Sonsela Sandstone	Manganese	Total	CMW22	1/29/99	289	µg/l		194
Sonsela Sandstone	Manganese	Total	CMW23	10/22/98	383	µg/l		194
Sonsela Sandstone	Mercury	Filtered	CMW23	10/23/98	1.09	µg/l	F	0.133
Sonsela Sandstone	Mercury	Total	CMW23	10/22/98	0.837	µg/l		0.0883
Sonsela Sandstone	Nickel	Filtered	CMW16	10/22/96	6.83	µg/l	F	2.41
Sonsela Sandstone	Nickel	Filtered	CMW21	1/27/99	29.7	µg/l	FJP	2.41
Sonsela Sandstone	Nickel	Total	CMW21	1/27/99	34.8	µg/l	JP	8.26
Sonsela Sandstone	Nickel	Total	CMW23	10/22/98	21.2	µg/l		8.26
Sonsela Sandstone	Nitrite (as nitrite)	Total	CMW21	10/23/98	13.4	µg/l		12.9
Sonsela Sandstone	Nitrite (as nitrite)	Total	CMW23	10/23/98	18.6	µg/l		12.9
Sonsela Sandstone	Nitrite, nitrate - nonspecific (as nitrogen)	Total	CMW16	10/21/98	304	µg/l	J	168

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Samples that Exceeded Background
Undifferentiated Chinle Formation
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Formation	Parameter	Fraction	Site ID	Sample Date	Value	Units	Flag Codes	Background Concentration
Sonsela Sandstone	Nitrite, nitrate - nonspecific (as nitrogen)	Total	CMW16	1/22/99	416	µg/l		168
Sonsela Sandstone	Nitrite, nitrate - nonspecific (as nitrogen)	Total	CMW23	1/26/99	489	µg/l		168
Sonsela Sandstone	RDX	Total	CMW16	10/22/96	17.3	µg/l	C	0
Sonsela Sandstone	RDX	Total	CMW16	2/10/97	13.2	µg/l	C	0
Sonsela Sandstone	RDX	Total	CMW16	2/10/97	14.5	µg/l	CVD	0
Sonsela Sandstone	RDX	Total	CMW16	10/21/98	15.8	µg/l	C	0
Sonsela Sandstone	RDX	Total	CMW16	1/22/99	12.4	µg/l		0
Sonsela Sandstone	Selenium	Filtered	CMW22	10/27/98	18.9	µg/l	F	9.84
Sonsela Sandstone	Selenium	Filtered	CMW23	10/23/98	28.1	µg/l	F	9.84
Sonsela Sandstone	Selenium	Filtered	CMW23	1/26/99	15.4	µg/l	F	9.84
Sonsela Sandstone	Selenium	Total	CMW23	10/22/98	20.2	µg/l		11.4
Sonsela Sandstone	Selenium	Total	CMW23	1/26/99	17	µg/l		11.4
Sonsela Sandstone	Silver	Total	CMW16	1/22/99	1.68	µg/l	JP	1.61
Sonsela Sandstone	Thallium	Filtered	CMW23	10/23/98	0.217	µg/l	F	0
Sonsela Sandstone	Thallium	Total	CMW23	10/22/98	0.263	µg/l		0
Sonsela Sandstone	Vanadium	Total	CMW21	1/27/99	75.8	µg/l		65
Sonsela Sandstone	Zinc	Filtered	CMW16	10/22/96	14.3	µg/l	F	8.75
Sonsela Sandstone	Zinc	Filtered	CMW21	1/27/99	21.1	µg/l	F	8.75
Sonsela Sandstone	Zinc	Filtered	CMW23	1/26/99	28.9	µg/l	F	8.75
Sonsela Sandstone	Zinc	Total	CMW16	10/21/98	65.3	µg/l	J	16.4
Sonsela Sandstone	Zinc	Total	CMW16	1/22/99	23.8	µg/l		16.4
Sonsela Sandstone	Zinc	Total	CMW21	10/23/98	63.4	µg/l	J	16.4
Sonsela Sandstone	Zinc	Total	CMW21	1/27/99	137	µg/l		16.4
Sonsela Sandstone	Zinc	Total	CMW22	10/24/98	58.4	µg/l	J	16.4
Sonsela Sandstone	Zinc	Total	CMW22	1/29/99	62	µg/l		16.4
Sonsela Sandstone	Zinc	Total	CMW23	10/22/98	225	µg/l		16.4
Sonsela Sandstone	Zinc	Total	CMW23	1/26/99	46.7	µg/l		16.4
Entrada Sandstone	Aluminum	Total	KMW10	2/11/97	14000	µg/l		13000
Entrada Sandstone	Ammonia nitrogen	Filtered	KMW10	10/21/98	94.1	µg/l	F	27.9
Entrada Sandstone	Ammonia nitrogen	Filtered	KMW10	1/25/99	95.9	µg/l	F	27.9

Table 3-22
Samples that Exceeded Background
Undifferentiated Chinle Formation
Current OB/OD Area Ground Water System
Fort Wingate Depot Activity
Gallup, New Mexico

Formation	Parameter	Fraction	Site ID	Sample Date	Value	Units	Flag Codes	Background Concentration
Entrada Sandstone	Ammonia nitrogen	Total	KMW10	10/21/98	1040	µg/l	J	27.2
Entrada Sandstone	Ammonia nitrogen	Total	KMW10	1/25/99	571	µg/l		27.2
Entrada Sandstone	Barium	Total	KMW10	2/11/97	152	µg/l		122
Entrada Sandstone	Beryllium	Total	KMW10	2/11/97	0.652	µg/l		0
Entrada Sandstone	Beryllium	Total	KMW10	10/21/98	0.296	µg/l	J	0
Entrada Sandstone	Beryllium	Total	KMW10	1/25/99	0.363	µg/l	JP	0
Entrada Sandstone	Cadmium	Total	KMW10	10/29/96	0.111	µg/l		0
Entrada Sandstone	Cadmium	Total	KMW10	2/11/97	0.223	µg/l		0
Entrada Sandstone	Cadmium	Total	KMW10	10/21/98	0.358	µg/l	J	0
Entrada Sandstone	Cadmium	Total	KMW10	1/25/99	0.138	µg/l	JP	0
Entrada Sandstone	Chromium	Filtered	KMW10	10/29/96	5.2	µg/l	F	3.02
Entrada Sandstone	Chromium	Total	KMW10	2/11/97	8.84	µg/l		7.18
Entrada Sandstone	Chromium	Total	KMW10	1/25/99	8.66	µg/l	JP	7.18
Entrada Sandstone	Cobalt	Total	KMW10	10/29/96	1.16	µg/l		1.08
Entrada Sandstone	Cobalt	Total	KMW10	2/11/97	6.53	µg/l		1.08
Entrada Sandstone	Copper	Filtered	KMW10	1/25/99	5.78	µg/l	FJP	2.32
Entrada Sandstone	Iron	Total	KMW10	2/11/97	8050	µg/l		6860
Entrada Sandstone	Iron	Total	KMW10	10/21/98	8530	µg/l	J	6860
Entrada Sandstone	Lead	Total	KMW10	2/11/97	8.38	µg/l		2.39
Entrada Sandstone	Lead	Total	KMW10	10/21/98	5.24	µg/l	J	2.39
Entrada Sandstone	Manganese	Filtered	KMW10	10/29/96	14.4	µg/l	F	14.1
Entrada Sandstone	Manganese	Filtered	KMW10	1/25/99	92.6	µg/l	F	14.1
Entrada Sandstone	Manganese	Total	KMW10	2/11/97	230	µg/l		194
Entrada Sandstone	Manganese	Total	KMW10	10/21/98	229	µg/l	J	194
Entrada Sandstone	Nickel	Filtered	KMW10	10/29/96	3.77	µg/l	F	2.41
Entrada Sandstone	Nickel	Filtered	KMW10	2/11/97	5.51	µg/l	F	2.41
Entrada Sandstone	Nickel	Total	KMW10	2/11/97	12.7	µg/l		8.26
Entrada Sandstone	Nitrite (as nitrite)	Total	KMW10	10/21/98	13.8	µg/l		12.9
Entrada Sandstone	Nitrite, nitrate - nonspecific (as nitrogen)	Total	KMW10	10/21/98	8050	µg/l	J	168
Entrada Sandstone	Nitrite, nitrate - nonspecific (as nitrogen)	Total	KMW10	1/25/99	7320	µg/l		168

Table 3-22
Samples that Exceeded Background
Undifferentiated Chinle Formation
Current OB/OD Area Ground Water System
Fort Wingate Depot Activity
Gallup, New Mexico

Formation	Parameter	Fraction	Site ID	Sample Date	Value	Units	Flag Codes	Background Concentration
Entrada Sandstone	Selenium	Filtered	KMW10	10/29/96	21.9	µg/l	F	9.84
Entrada Sandstone	Selenium	Filtered	KMW10	2/11/97	20.6	µg/l	F	9.84
Entrada Sandstone	Selenium	Filtered	KMW10	10/21/98	24.4	µg/l	F	9.84
Entrada Sandstone	Selenium	Filtered	KMW10	1/25/99	20.8	µg/l	F	9.84
Entrada Sandstone	Selenium	Total	KMW10	10/29/96	22.1	µg/l		11.4
Entrada Sandstone	Selenium	Total	KMW10	2/11/97	20.2	µg/l		11.4
Entrada Sandstone	Selenium	Total	KMW10	10/21/98	23.8	µg/l		11.4
Entrada Sandstone	Selenium	Total	KMW10	1/25/99	17.6	µg/l		11.4
Entrada Sandstone	Thallium	Total	KMW10	2/11/97	0.127	µg/l		0
Entrada Sandstone	Zinc	Filtered	KMW10	1/25/99	28.2	µg/l	F	8.75
Entrada Sandstone	Zinc	Total	KMW10	2/11/97	44.7	µg/l		16.4
Entrada Sandstone	Zinc	Total	KMW10	10/21/98	53.2	µg/l	J	16.4
Entrada Sandstone	Zinc	Total	KMW10	1/25/99	21.5	µg/l		16.4

µg/l = micrograms per liter.

Flagging Codes:
C - Analysis was confirmed.
D - Duplicate analysis.
F - Sample filtered prior to analysis.
J - Value is estimated.
JP - Value is estimated and is less than reporting level but greater than instrumental detection limit.
Q - Sample interference obscured peak of interest.
V - Sample subjected to unusual storage/preservation conditions.

Table 3-23
Samples that Exceeded Screening Criteria
Undifferentiated Chinle Formation
Current OB/OD Area Ground Water System
Fort Wingate Depot Activity
Gallup, New Mexico

Formation	Parameter	Fraction	Site ID	Sample Date	Value	Units	Flag Codes	Background Concentration	Screening Level Concentration
Undifferentiated Chinle	2,4-Dinitrotoluene	Total	CMW18	10/20/98	0.103	µg/l	C	0	0.099
Undifferentiated Chinle	2-Amino-4,6-dinitrotoluene	Total	CMW18	10/19/96	2.49	µg/l	Q	0	0.099
Undifferentiated Chinle	2-Amino-4,6-dinitrotoluene	Total	CMW18	2/11/97	4.39	µg/l	Q	0	0.099
Undifferentiated Chinle	2-Amino-4,6-dinitrotoluene	Total	CMW18	10/20/98	3.23	µg/l	C	0	0.099
Undifferentiated Chinle	2-Amino-4,6-dinitrotoluene	Total	CMW18	1/27/99	2.94	µg/l		0	0.099
Undifferentiated Chinle	4-Amino-2,6-dinitrotoluene	Total	CMW17	2/11/97	0.224	µg/l	C	0	0.099
Undifferentiated Chinle	4-Amino-2,6-dinitrotoluene	Total	CMW18	10/19/96	3.18	µg/l	Q	0	0.099
Undifferentiated Chinle	4-Amino-2,6-dinitrotoluene	Total	CMW18	2/11/97	5.95	µg/l	Q	0	0.099
Undifferentiated Chinle	4-Amino-2,6-dinitrotoluene	Total	CMW18	10/20/98	4.19	µg/l	C	0	0.099
Undifferentiated Chinle	4-Amino-2,6-dinitrotoluene	Total	CMW18	1/27/99	3.81	µg/l		0	0.099
Undifferentiated Chinle	4-Amino-2,6-dinitrotoluene	Total	KMW11	2/11/97	0.259	µg/l	C	0	0.099
Undifferentiated Chinle	Aluminum	Total	CMW07	2/10/97	52300	µg/l		13000	37000
Undifferentiated Chinle	Aluminum	Total	CMW17	1/28/99	88200	µg/l		13000	37000
Undifferentiated Chinle	Aluminum	Total	CMW19	2/10/97	179000	µg/l		13000	37000
Undifferentiated Chinle	Aluminum	Total	CMW19	10/22/98	40900	µg/l	J	13000	37000
Undifferentiated Chinle	Aluminum	Total	CMW19	1/25/99	42600	µg/l		13000	37000
Undifferentiated Chinle	Aluminum	Total	CMW19	1/25/99	73900	µg/l	D	13000	37000
Undifferentiated Chinle	Aluminum	Total	KMW11	10/24/96	61900	µg/l		13000	37000
Undifferentiated Chinle	Ammonia nitrogen	Filtered	CMW10	1/25/99	557	µg/l	F	27.9	174
Undifferentiated Chinle	Ammonia nitrogen	Filtered	CMW14	10/20/98	1500	µg/l	JF	27.9	174
Undifferentiated Chinle	Ammonia nitrogen	Filtered	CMW14	1/25/99	312	µg/l	F	27.9	174
Undifferentiated Chinle	Ammonia nitrogen	Filtered	CMW19	10/22/98	315	µg/l	JF	27.9	174
Undifferentiated Chinle	Ammonia nitrogen	Total	CMW10	1/26/99	514	µg/l		27.2	174
Undifferentiated Chinle	Ammonia nitrogen	Total	CMW14	10/20/98	1580	µg/l	J	27.2	174
Undifferentiated Chinle	Ammonia nitrogen	Total	CMW14	1/25/99	358	µg/l		27.2	174
Undifferentiated Chinle	Ammonia nitrogen	Total	CMW17	10/22/98	251	µg/l		27.2	174
Undifferentiated Chinle	Ammonia nitrogen	Total	CMW19	10/22/98	452	µg/l		27.2	174
Undifferentiated Chinle	Cadmium	Filtered	CMW07	1/21/99	6.81	µg/l	F	0	5
Undifferentiated Chinle	Chromium	Filtered	CMW10	2/11/97	181	µg/l	F	3.02	100
Undifferentiated Chinle	Chromium	Filtered	CMW10	10/26/98	270	µg/l	F	3.02	100
Undifferentiated Chinle	Chromium	Filtered	CMW10	1/23/99	199	µg/l	F	3.02	100
Undifferentiated Chinle	Chromium	Filtered	CMW14	10/20/98	142	µg/l	JF	3.02	100

Table 3-23
Samples that Exceeded Screening Criteria
Undifferentiated Chinle Formation
Current OB/OD Area Ground Water System
Fort Wingate Depot Activity
Gallup, New Mexico

Formation	Parameter	Fraction	Site ID	Sample Date	Value	Units	Flag Codes	Background Concentration	Screening Level Concentration
Undifferentiated Chinle	Chromium	Total	CMW10	2/11/97	173	µg/l		7.18	100
Undifferentiated Chinle	Chromium	Total	CMW10	10/20/98	282	µg/l	J	7.18	100
Undifferentiated Chinle	Chromium	Total	CMW10	1/23/99	174	µg/l		7.18	100
Undifferentiated Chinle	Chromium	Total	CMW14	10/20/98	113	µg/l	J	7.18	100
Undifferentiated Chinle	Iron	Total	CMW04	10/22/96	15200	µg/l		6860	11000
Undifferentiated Chinle	Iron	Total	CMW04	10/22/96	15200	µg/l	J	6860	11000
Undifferentiated Chinle	Iron	Total	CMW07	2/10/97	27800	µg/l		6860	11000
Undifferentiated Chinle	Iron	Total	CMW17	1/28/99	46300	µg/l		6860	11000
Undifferentiated Chinle	Iron	Total	CMW18	10/20/98	14500	µg/l	J	6860	11000
Undifferentiated Chinle	Iron	Total	CMW19	2/10/97	101000	µg/l		6860	11000
Undifferentiated Chinle	Iron	Total	CMW19	10/22/98	18900	µg/l	J	6860	11000
Undifferentiated Chinle	Iron	Total	CMW19	1/25/99	18800	µg/l		6860	11000
Undifferentiated Chinle	Iron	Total	CMW19	1/25/99	36100	µg/l	D	6860	11000
Undifferentiated Chinle	Iron	Total	KMW11	10/24/96	36300	µg/l		6860	11000
Undifferentiated Chinle	Iron	Total	KMW11	2/11/97	17900	µg/l		6860	11000
Undifferentiated Chinle	Iron	Total	KMW11	10/24/98	13600	µg/l	J	6860	11000
Undifferentiated Chinle	Iron	Total	KMW11	10/24/98	20600	µg/l	JD	6860	11000
Undifferentiated Chinle	Lead	Total	CMW19	2/10/97	25.9	µg/l		2.39	15
Undifferentiated Chinle	RDX	Total	CMW18	10/19/96	120	µg/l	C	0	0.61
Undifferentiated Chinle	RDX	Total	CMW18	2/11/97	170	µg/l	C	0	0.61
Undifferentiated Chinle	RDX	Total	CMW18	10/20/98	100	µg/l	C	0	0.61
Undifferentiated Chinle	RDX	Total	CMW18	1/27/99	81.3	µg/l		0	0.61
Undifferentiated Chinle	Selenium	Filtered	CMW10	10/26/98	82.1	µg/l	F	9.84	50
Undifferentiated Chinle	Selenium	Total	CMW10	10/20/98	84.5	µg/l		11.4	50

Notes:
µg/l = micrograms per liter.
Flagging Codes:
C - Analysis was confirmed.
D - Duplicate analysis.
F - Sample filtered prior to analysis.
J - Value is estimated.
Q - Sample interference obscured peak of interest.

Table 3-24
Samples that Exceeded Closure Performance Standards
Undifferentiated Chinle Formation
Current OB/OD Area Ground Water System
Fort Wingate Depot Activity
Gallup, New Mexico

Formation	Parameter	Fraction	Site ID	Sample Date	Value	Units	Flag Codes	Background Concentration	Screening Level Concentration	Closure Performance Standards Contentration
Undifferentiated Chinle	Ammonia nitrogen	Filtered	CMW10	1/25/99	557	µg/l	F	27.9	174	174
Undifferentiated Chinle	Ammonia nitrogen	Filtered	CMW14	10/20/98	1500	µg/l	JF	27.9	174	174
Undifferentiated Chinle	Ammonia nitrogen	Filtered	CMW14	1/25/99	312	µg/l	F	27.9	174	174
Undifferentiated Chinle	Ammonia nitrogen	Filtered	CMW19	10/22/98	315	µg/l	JF	27.9	174	174
Undifferentiated Chinle	Ammonia nitrogen	Total	CMW10	1/26/99	514	µg/l		27.2	174	174
Undifferentiated Chinle	Ammonia nitrogen	Total	CMW14	10/20/98	1580	µg/l	J	27.2	174	174
Undifferentiated Chinle	Ammonia nitrogen	Total	CMW14	1/25/99	358	µg/l		27.2	174	174
Undifferentiated Chinle	Ammonia nitrogen	Total	CMW17	10/22/98	251	µg/l		27.2	174	174
Undifferentiated Chinle	Ammonia nitrogen	Total	CMW19	10/22/98	452	µg/l		27.2	174	174
Undifferentiated Chinle	Cadmium	Filtered	CMW07	1/21/99	6.81	µg/l	F	0	5	5
Undifferentiated Chinle	Chromium	Filtered	CMW10	2/11/97	181	µg/l	F	3.02	100	100
Undifferentiated Chinle	Chromium	Filtered	CMW10	10/26/98	270	µg/l	F	3.02	100	100
Undifferentiated Chinle	Chromium	Filtered	CMW10	1/23/99	199	µg/l	F	3.02	100	100
Undifferentiated Chinle	Chromium	Filtered	CMW14	10/20/98	142	µg/l	JF	3.02	100	100
Undifferentiated Chinle	Chromium	Total	CMW10	2/11/97	173	µg/l		7.18	100	100
Undifferentiated Chinle	Chromium	Total	CMW10	10/20/98	282	µg/l	J	7.18	100	100
Undifferentiated Chinle	Chromium	Total	CMW10	1/23/99	174	µg/l		7.18	100	100
Undifferentiated Chinle	Chromium	Total	CMW14	10/20/98	113	µg/l	J	7.18	100	100
Undifferentiated Chinle	Lead	Total	CMW19	2/10/97	25.9	µg/l		2.39	15	15
Undifferentiated Chinle	RDX	Total	CMW18	10/19/96	120	µg/l	C	0	0.61	61
Undifferentiated Chinle	RDX	Total	CMW18	2/11/97	170	µg/l	C	0	0.61	61
Undifferentiated Chinle	RDX	Total	CMW18	10/20/98	100	µg/l	C	0	0.61	61
Undifferentiated Chinle	RDX	Total	CMW18	1/27/99	81.3	µg/l		0	0.61	61
Undifferentiated Chinle	Selenium	Filtered	CMW10	10/26/98	82.1	µg/l	F	9.84	50	50
Undifferentiated Chinle	Selenium	Total	CMW10	10/20/98	84.5	µg/l		11.4	50	50

Notes:
µg/l = micrograms per liter.
Flagging Codes:
C - Analysis was confirmed.
F - Sample filtered prior to analysis.
J - Value is estimated.

Table 3-25
Samples that Exceeded Background
Painted Desert Member
Current OB/OD Area Ground Water System
Fort Wingate Depot Activity
Gallup, New Mexico

Formation	Parameter	Fraction	Site ID	Sample Date	Value	Units	Flag Codes	Background Concentration
Painted Desert	Aluminum	Filtered	CMW25	10/24/98	209	µg/l	F	130
Painted Desert	Aluminum	Filtered	CMW25	10/24/98	2710	µg/l	JDF	130
Painted Desert	Aluminum	Filtered	CMW25	1/27/99	768	µg/l	F	130
Painted Desert	Aluminum	Total	CMW25	10/24/98	162000	µg/l	J	13000
Painted Desert	Aluminum	Total	CMW25	10/24/98	69100	µg/l	JD	13000
Painted Desert	Ammonia nitrogen	Total	CMW25	10/24/98	115	µg/l		27.2
Painted Desert	Ammonia nitrogen	Total	CMW25	10/24/98	138	µg/l	D	27.2
Painted Desert	Antimony	Filtered	CMW25	1/27/99	0.639	µg/l	FJP	0
Painted Desert	Arsenic	Total	CMW25	10/24/98	6.67	µg/l	J	4.87
Painted Desert	Barium	Filtered	CMW25	10/24/98	125	µg/l	JDF	58.8
Painted Desert	Barium	Filtered	CMW25	1/27/99	81.4	µg/l	F	58.8
Painted Desert	Barium	Total	CMW25	10/24/98	890	µg/l	J	122
Painted Desert	Barium	Total	CMW25	10/24/98	279	µg/l	JD	122
Painted Desert	Beryllium	Total	CMW25	10/24/98	3.6	µg/l	J	0
Painted Desert	Beryllium	Total	CMW25	10/24/98	1.28	µg/l	JD	0
Painted Desert	Cadmium	Total	CMW25	10/24/98	0.398	µg/l	J	0
Painted Desert	Cadmium	Total	CMW25	10/24/98	0.269	µg/l	JD	0
Painted Desert	Chromium	Total	CMW25	10/24/98	180	µg/l	J	7.18
Painted Desert	Chromium	Total	CMW25	10/24/98	87.9	µg/l	JD	7.18
Painted Desert	Cobalt	Total	CMW25	10/24/98	37.2	µg/l		1.08
Painted Desert	Copper	Total	CMW25	10/24/98	37.7	µg/l	J	13.4
Painted Desert	Iron	Filtered	CMW25	10/24/98	69	µg/l	F	48.7
Painted Desert	Iron	Filtered	CMW25	10/24/98	955	µg/l	JDF	48.7
Painted Desert	Iron	Filtered	CMW25	1/27/99	276	µg/l	F	48.7
Painted Desert	Iron	Total	CMW25	10/24/98	64600	µg/l	J	6860
Painted Desert	Iron	Total	CMW25	10/24/98	28700	µg/l	JD	6860
Painted Desert	Lead	Total	CMW25	10/24/98	32.4	µg/l	J	2.39
Painted Desert	Lead	Total	CMW25	10/24/98	11.5	µg/l	JD	2.39
Painted Desert	Manganese	Filtered	CMW25	10/24/98	16	µg/l	JDF	14.1
Painted Desert	Manganese	Total	CMW25	10/24/98	1580	µg/l	J	194

Table 3-25
Samples that Exceeded Background
Painted Desert Member
Current OB/OD Area Ground Water System
Fort Wingate Depot Activity
Gallup, New Mexico

Formation	Parameter	Fraction	Site ID	Sample Date	Value	Units	Flag Codes	Background Concentration
Painted Desert	Manganese	Total	CMW25	10/24/98	482	µg/l	JD	194
Painted Desert	Nickel	Total	CMW25	10/24/98	95.5	µg/l	J	8.26
Painted Desert	Nickel	Total	CMW25	10/24/98	49.4	µg/l	JD	8.26
Painted Desert	Nitrite (as nitrite)	Total	CMW25	10/24/98	170	µg/l	J	12.9
Painted Desert	Nitrite (as nitrite)	Total	CMW25	10/24/98	142	µg/l	J	12.9
Painted Desert	Thallium	Total	CMW25	10/24/98	0.233	µg/l		0
Painted Desert	Thallium	Total	CMW25	10/24/98	0.17	µg/l	D	0
Painted Desert	Vanadium	Total	CMW25	10/24/98	170	µg/l	J	65
Painted Desert	Vanadium	Total	CMW25	10/24/98	69.4	µg/l	JD	65
Painted Desert	Zinc	Filtered	CMW25	1/27/99	13.8	µg/l	FJP	8.75
Painted Desert	Zinc	Total	CMW25	10/24/98	693	µg/l	J	16.4
Painted Desert	Zinc	Total	CMW25	10/24/98	143	µg/l	JD	16.4

Notes:
µg/l = micrograms per liter.
Flagging Codes:
C - Analysis was confirmed.
D - Duplicate analysis.
F - Sample filtered prior to analysis.
J - Value is estimated.
JP - Value is estimated and is less than reporting level but greater than instrumental detection limit.
Q - Sample interference obscured peak of interest.
V - Sample subjected to unusual storage/preservation conditions.

Table 3-26
Samples that Exceeded Screening Criteria
Painted Desert Member
Current OB/OD Area Ground Water System
Fort Wingate Depot Activity
Gallup, New Mexico

Formation	Parameter	Fraction	Site ID	Sample Date	Value	Units	Flag Codes	Background Concentration	Screening Level Concentration
Painted Desert	Aluminum	Total	CMW25	10/24/98	162000	µg/l	J	13000	37000
Painted Desert	Aluminum	Total	CMW25	10/24/98	69100	µg/l	JD	13000	37000
Painted Desert	Chromium	Total	CMW25	10/24/98	180	µg/l	J	7.18	100
Painted Desert	Iron	Total	CMW25	10/24/98	64600	µg/l	J	6860	11000
Painted Desert	Iron	Total	CMW25	10/24/98	28700	µg/l	JD	6860	11000
Painted Desert	Lead	Total	CMW25	10/24/98	32.4	µg/l	J	2.39	15

Notes:
µg/l = micrograms per liter.
Flagging Codes:
C - Analysis was confirmed.
D - Duplicate analysis.
F - Sample filtered prior to analysis.
J - Value is estimated.
JP - Value is estimated and is less than reporting level but greater than instrumental detection limit.
Q - Sample interference obscured peak of interest.
V - Sample subjected to unusual storage/preservation conditions.

Table 3-27
Samples that Exceeded Closure Performance Standards
Painted Desert Member
Current OB/OD Area Ground Water System
Fort Wingate Depot Activity
Gallup, New Mexico

Formation	Parameter	Fraction	Site ID	Sample Date	Value	Units	Flag Codes	Background Concentration	Screening Level Concentration	Closure Performance Standards Contentration
Painted Desert	Chromium	Total	CMW25	10/24/98	180	µg/l	J	7.18	100	100
Painted Desert	Lead	Total	CMW25	10/24/98	32.4	µg/l	J	2.39	15	15

Notes:
µg/l = micrograms per liter.
Flagging Codes:
C - Analysis was confirmed.
D - Duplicate analysis.
F - Sample filtered prior to analysis.
J - Value is estimated.
JP - Value is estimated and is less than reporting level but greater than instrumental detection limit.
Q - Sample interference obscured peak of interest.
V - Sample subjected to unusual storage/preservation conditions.

Table 3-28
Samples that Exceeded Background
Sonsela Sandstone Member
Current OB/OD Area Ground Water System
Fort Wingate Depot Activity
Gallup, New Mexico

Formation	Parameter	Fraction	Site ID	Sample Date	Value	Units	Flag Codes	Background Concentration
Sonsela Sandstone	Aluminum	Filtered	CMW16	10/22/96	208	µg/l	F	130
Sonsela Sandstone	Aluminum	Filtered	CMW21	10/23/98	470	µg/l	JF	130
Sonsela Sandstone	Aluminum	Filtered	CMW21	1/27/99	1850	µg/l	F	130
Sonsela Sandstone	Aluminum	Filtered	CMW22	2/2/99	318	µg/l	FJ	130
Sonsela Sandstone	Aluminum	Filtered	CMW23	1/26/99	426	µg/l	F	130
Sonsela Sandstone	Aluminum	Total	CMW16	2/10/97	44000	µg/l	D	13000
Sonsela Sandstone	Aluminum	Total	CMW16	2/10/97	46200	µg/l		13000
Sonsela Sandstone	Aluminum	Total	CMW21	1/27/99	92700	µg/l		13000
Sonsela Sandstone	Aluminum	Total	CMW22	1/29/99	22600	µg/l		13000
Sonsela Sandstone	Aluminum	Total	CMW23	10/22/98	46700	µg/l		13000
Sonsela Sandstone	Aluminum	Total	CMW23	1/26/99	18200	µg/l		13000
Sonsela Sandstone	Ammonia nitrogen	Filtered	CMW21	10/23/98	456	µg/l	JF	27.9
Sonsela Sandstone	Ammonia nitrogen	Filtered	CMW23	10/23/98	35.4	µg/l	F	27.9
Sonsela Sandstone	Ammonia nitrogen	Filtered	CMW23	1/26/99	95.1	µg/l	F	27.9
Sonsela Sandstone	Ammonia nitrogen	Total	CMW16	10/21/98	64.7	µg/l		27.2
Sonsela Sandstone	Ammonia nitrogen	Total	CMW21	10/23/98	381	µg/l	J	27.2
Sonsela Sandstone	Ammonia nitrogen	Total	CMW23	10/22/98	199	µg/l		27.2
Sonsela Sandstone	Ammonia nitrogen	Total	CMW23	1/26/99	169	µg/l		27.2
Sonsela Sandstone	Antimony	Filtered	CMW16	1/22/99	10.2	µg/l	F	0
Sonsela Sandstone	Antimony	Filtered	CMW21	10/23/98	0.777	µg/l	F	0
Sonsela Sandstone	Antimony	Filtered	CMW22	10/27/98	0.631	µg/l	F	0
Sonsela Sandstone	Antimony	Filtered	CMW23	10/23/98	0.706	µg/l	F	0
Sonsela Sandstone	Antimony	Filtered	CMW23	1/26/99	0.654	µg/l	FJP	0
Sonsela Sandstone	Antimony	Total	CMW16	1/22/99	23.3	µg/l		1.97
Sonsela Sandstone	Arsenic	Filtered	CMW21	10/23/98	4.83	µg/l	F	4.14
Sonsela Sandstone	Arsenic	Filtered	CMW22	10/27/98	5.3	µg/l	JF	4.14
Sonsela Sandstone	Arsenic	Filtered	CMW23	10/23/98	10.1	µg/l	F	4.14
Sonsela Sandstone	Arsenic	Total	CMW23	10/22/98	10.4	µg/l	J	4.87

Table 3-28
Samples that Exceeded Background
Sonsela Sandstone Member
Current OB/OD Area Ground Water System
Fort Wingate Depot Activity
Gallup, New Mexico

Formation	Parameter	Fraction	Site ID	Sample Date	Value	Units	Flag Codes	Background Concentration
Sonsela Sandstone	Arsenic	Total	CMW23	1/26/99	9.11	µg/l	JP	4.87
Sonsela Sandstone	Barium	Filtered	CMW16	10/22/96	82.8	µg/l	F	58.8
Sonsela Sandstone	Barium	Filtered	CMW16	2/10/97	72.8	µg/l	DF	58.8
Sonsela Sandstone	Barium	Filtered	CMW16	2/10/97	74.3	µg/l	F	58.8
Sonsela Sandstone	Barium	Filtered	CMW16	10/21/98	72.3	µg/l	JF	58.8
Sonsela Sandstone	Barium	Filtered	CMW16	1/22/99	72.9	µg/l	F	58.8
Sonsela Sandstone	Barium	Filtered	CMW21	1/27/99	132	µg/l	F	58.8
Sonsela Sandstone	Barium	Filtered	CMW22	10/27/98	133	µg/l	JF	58.8
Sonsela Sandstone	Barium	Filtered	CMW22	2/2/99	174	µg/l	F	58.8
Sonsela Sandstone	Barium	Total	CMW16	10/22/96	310	µg/l		122
Sonsela Sandstone	Barium	Total	CMW16	2/10/97	440	µg/l	D	122
Sonsela Sandstone	Barium	Total	CMW16	2/10/97	430	µg/l		122
Sonsela Sandstone	Barium	Total	CMW16	10/21/98	498	µg/l	J	122
Sonsela Sandstone	Barium	Total	CMW16	1/22/99	228	µg/l		122
Sonsela Sandstone	Barium	Total	CMW21	10/23/98	153	µg/l	J	122
Sonsela Sandstone	Barium	Total	CMW21	1/27/99	884	µg/l		122
Sonsela Sandstone	Barium	Total	CMW22	10/24/98	183	µg/l	J	122
Sonsela Sandstone	Barium	Total	CMW22	1/29/99	179	µg/l		122
Sonsela Sandstone	Barium	Total	CMW23	10/22/98	160	µg/l		122
Sonsela Sandstone	Beryllium	Total	CMW16	10/22/96	0.309	µg/l		0
Sonsela Sandstone	Beryllium	Total	CMW16	2/10/97	0.966	µg/l	D	0
Sonsela Sandstone	Beryllium	Total	CMW16	2/10/97	1.26	µg/l		0
Sonsela Sandstone	Beryllium	Total	CMW16	10/21/98	0.259	µg/l	J	0
Sonsela Sandstone	Beryllium	Total	CMW21	10/23/98	0.378	µg/l	J	0
Sonsela Sandstone	Beryllium	Total	CMW21	1/27/99	2.27	µg/l	JP	0
Sonsela Sandstone	Beryllium	Total	CMW22	10/24/98	0.48	µg/l	J	0
Sonsela Sandstone	Beryllium	Total	CMW22	1/29/99	0.583	µg/l	JP	0
Sonsela Sandstone	Beryllium	Total	CMW23	10/22/98	1.51	µg/l	J	0

Table 3-28
Samples that Exceeded Background
Sonsela Sandstone Member
Current OB/OD Area Ground Water System
Fort Wingate Depot Activity
Gallup, New Mexico

Formation	Parameter	Fraction	Site ID	Sample Date	Value	Units	Flag Codes	Background Concentration
Sonsela Sandstone	Beryllium	Total	CMW23	1/26/99	0.516	µg/l	JP	0
Sonsela Sandstone	Cadmium	Filtered	CMW23	10/23/98	0.148	µg/l	F	0
Sonsela Sandstone	Cadmium	Total	CMW21	10/23/98	0.133	µg/l	J	0
Sonsela Sandstone	Cadmium	Total	CMW21	1/27/99	0.145	µg/l	JP	0
Sonsela Sandstone	Cadmium	Total	CMW22	10/24/98	0.131	µg/l	J	0
Sonsela Sandstone	Cadmium	Total	CMW23	10/22/98	0.544	µg/l	J	0
Sonsela Sandstone	Chromium	Filtered	CMW23	10/23/98	44.2	µg/l	JF	3.02
Sonsela Sandstone	Chromium	Filtered	CMW23	1/26/99	24.8	µg/l	F	3.02
Sonsela Sandstone	Chromium	Total	CMW21	10/23/98	16.8	µg/l	J	7.18
Sonsela Sandstone	Chromium	Total	CMW21	1/27/99	66.1	µg/l		7.18
Sonsela Sandstone	Chromium	Total	CMW22	1/29/99	11.2	µg/l		7.18
Sonsela Sandstone	Chromium	Total	CMW23	10/22/98	65.1	µg/l		7.18
Sonsela Sandstone	Chromium	Total	CMW23	1/26/99	52.5	µg/l		7.18
Sonsela Sandstone	Cobalt	Total	CMW16	10/22/96	2.33	µg/l		1.08
Sonsela Sandstone	Cobalt	Total	CMW16	2/10/97	2.59	µg/l	D	1.08
Sonsela Sandstone	Cobalt	Total	CMW16	2/10/97	2.7	µg/l		1.08
Sonsela Sandstone	Copper	Filtered	CMW23	1/26/99	8.3	µg/l	FJP	2.32
Sonsela Sandstone	Copper	Total	CMW16	1/22/99	14.9	µg/l	JP	13.4
Sonsela Sandstone	Copper	Total	CMW23	10/22/98	24.9	µg/l		13.4
Sonsela Sandstone	Fluoride	Filtered	CMW16	1/22/99	1310	µg/l	F	1160
Sonsela Sandstone	Fluoride	Total	CMW23	1/26/99	2780	µg/l		0
Sonsela Sandstone	HMX	Total	CMW16	10/22/96	7.86	µg/l	C	0
Sonsela Sandstone	HMX	Total	CMW16	2/10/97	6.39	µg/l	C	0
Sonsela Sandstone	HMX	Total	CMW16	2/10/97	7.12	µg/l	CVD	0
Sonsela Sandstone	HMX	Total	CMW16	10/21/98	8.09	µg/l	C	0
Sonsela Sandstone	HMX	Total	CMW16	1/22/99	7.63	µg/l		0
Sonsela Sandstone	Iron	Filtered	CMW16	10/22/96	93.9	µg/l	F	48.7
Sonsela Sandstone	Iron	Filtered	CMW21	10/23/98	173	µg/l	JF	48.7

Table 3-28
Samples that Exceeded Background
Sonsela Sandstone Member
Current OB/OD Area Ground Water System
Fort Wingate Depot Activity
Gallup, New Mexico

Formation	Parameter	Fraction	Site ID	Sample Date	Value	Units	Flag Codes	Background Concentration
Sonsela Sandstone	Iron	Filtered	CMW21	1/27/99	704	µg/l	F	48.7
Sonsela Sandstone	Iron	Filtered	CMW22	2/2/99	121	µg/l	F	48.7
Sonsela Sandstone	Iron	Filtered	CMW23	1/26/99	152	µg/l	F	48.7
Sonsela Sandstone	Iron	Total	CMW16	2/10/97	18400	µg/l	D	6860
Sonsela Sandstone	Iron	Total	CMW16	2/10/97	19100	µg/l		6860
Sonsela Sandstone	Iron	Total	CMW21	1/27/99	38300	µg/l		6860
Sonsela Sandstone	Iron	Total	CMW22	1/29/99	7770	µg/l		6860
Sonsela Sandstone	Iron	Total	CMW23	10/22/98	19700	µg/l		6860
Sonsela Sandstone	Lead	Filtered	CMW22	10/27/98	0.785	µg/l	JF	0.73
Sonsela Sandstone	Lead	Total	CMW16	2/10/97	7.47	µg/l	D	2.39
Sonsela Sandstone	Lead	Total	CMW16	2/10/97	7.88	µg/l		2.39
Sonsela Sandstone	Lead	Total	CMW16	10/21/98	3.24	µg/l	J	2.39
Sonsela Sandstone	Lead	Total	CMW16	1/22/99	2.98	µg/l	JP	2.39
Sonsela Sandstone	Lead	Total	CMW21	10/23/98	2.84	µg/l	J	2.39
Sonsela Sandstone	Lead	Total	CMW21	1/27/99	18.6	µg/l		2.39
Sonsela Sandstone	Lead	Total	CMW22	10/24/98	3.46	µg/l	J	2.39
Sonsela Sandstone	Lead	Total	CMW22	1/29/99	5.23	µg/l		2.39
Sonsela Sandstone	Lead	Total	CMW23	10/22/98	40.4	µg/l	J	2.39
Sonsela Sandstone	Lead	Total	CMW23	1/26/99	2.96	µg/l	JP	2.39
Sonsela Sandstone	Manganese	Filtered	CMW16	10/22/96	22.5	µg/l	F	14.1
Sonsela Sandstone	Manganese	Filtered	CMW22	2/2/99	50.9	µg/l	F	14.1
Sonsela Sandstone	Manganese	Total	CMW16	10/22/96	220	µg/l		194
Sonsela Sandstone	Manganese	Total	CMW16	2/10/97	290	µg/l	D	194
Sonsela Sandstone	Manganese	Total	CMW16	2/10/97	290	µg/l		194
Sonsela Sandstone	Manganese	Total	CMW21	1/27/99	1060	µg/l		194
Sonsela Sandstone	Manganese	Total	CMW22	1/29/99	289	µg/l		194
Sonsela Sandstone	Manganese	Total	CMW23	10/22/98	383	µg/l		194
Sonsela Sandstone	Mercury	Filtered	CMW23	10/23/98	1.09	µg/l	F	0.133

Table 3-28
Samples that Exceeded Background
Sonsela Sandstone Member
Current OB/OD Area Ground Water System
Fort Wingate Depot Activity
Gallup, New Mexico

Formation	Parameter	Fraction	Site ID	Sample Date	Value	Units	Flag Codes	Background Concentration
Sonsela Sandstone	Mercury	Total	CMW23	10/22/98	0.837	µg/l		0.0883
Sonsela Sandstone	Nickel	Filtered	CMW16	10/22/96	6.83	µg/l	F	2.41
Sonsela Sandstone	Nickel	Filtered	CMW21	1/27/99	29.7	µg/l	FJP	2.41
Sonsela Sandstone	Nickel	Total	CMW21	1/27/99	34.8	µg/l	JP	8.26
Sonsela Sandstone	Nickel	Total	CMW23	10/22/98	21.2	µg/l		8.26
Sonsela Sandstone	Nitrite (as nitrite)	Total	CMW21	10/23/98	13.4	µg/l		12.9
Sonsela Sandstone	Nitrite (as nitrite)	Total	CMW23	10/23/98	18.6	µg/l		12.9
Sonsela Sandstone	Nitrite, nitrate - nonspecific (as nitrogen)	Total	CMW16	10/21/98	304	µg/l	J	168
Sonsela Sandstone	Nitrite, nitrate - nonspecific (as nitrogen)	Total	CMW16	1/22/99	416	µg/l		168
Sonsela Sandstone	Nitrite, nitrate - nonspecific (as nitrogen)	Total	CMW23	1/26/99	489	µg/l		168
Sonsela Sandstone	RDX	Total	CMW16	10/22/96	17.3	µg/l	C	0
Sonsela Sandstone	RDX	Total	CMW16	2/10/97	13.2	µg/l	C	0
Sonsela Sandstone	RDX	Total	CMW16	2/10/97	14.5	µg/l	CVD	0
Sonsela Sandstone	RDX	Total	CMW16	10/21/98	15.8	µg/l	C	0
Sonsela Sandstone	RDX	Total	CMW16	1/22/99	12.4	µg/l		0
Sonsela Sandstone	Selenium	Filtered	CMW22	10/27/98	18.9	µg/l	F	9.84
Sonsela Sandstone	Selenium	Filtered	CMW23	10/23/98	28.1	µg/l	F	9.84
Sonsela Sandstone	Selenium	Filtered	CMW23	1/26/99	15.4	µg/l	F	9.84
Sonsela Sandstone	Selenium	Total	CMW23	10/22/98	20.2	µg/l		11.4
Sonsela Sandstone	Selenium	Total	CMW23	1/26/99	17	µg/l		11.4
Sonsela Sandstone	Silver	Total	CMW16	1/22/99	1.68	µg/l	JP	1.61
Sonsela Sandstone	Thallium	Filtered	CMW23	10/23/98	0.217	µg/l	F	0
Sonsela Sandstone	Thallium	Total	CMW23	10/22/98	0.263	µg/l		0
Sonsela Sandstone	Vanadium	Total	CMW21	1/27/99	75.8	µg/l		65
Sonsela Sandstone	Zinc	Filtered	CMW16	10/22/96	14.3	µg/l	F	8.75
Sonsela Sandstone	Zinc	Filtered	CMW21	1/27/99	21.1	µg/l	F	8.75
Sonsela Sandstone	Zinc	Filtered	CMW23	1/26/99	28.9	µg/l	F	8.75
Sonsela Sandstone	Zinc	Total	CMW16	10/21/98	65.3	µg/l	J	16.4

Table 3-28
Samples that Exceeded Background
Sonsela Sandstone Member
Current OB/OD Area Ground Water System
Fort Wingate Depot Activity
Gallup, New Mexico

Formation	Parameter	Fraction	Site ID	Sample Date	Value	Units	Flag Codes	Background Concentration
Sonsela Sandstone	Zinc	Total	CMW16	1/22/99	23.8	µg/l		16.4
Sonsela Sandstone	Zinc	Total	CMW21	10/23/98	63.4	µg/l	J	16.4
Sonsela Sandstone	Zinc	Total	CMW21	1/27/99	137	µg/l		16.4
Sonsela Sandstone	Zinc	Total	CMW22	10/24/98	58.4	µg/l	J	16.4
Sonsela Sandstone	Zinc	Total	CMW22	1/29/99	62	µg/l		16.4
Sonsela Sandstone	Zinc	Total	CMW23	10/22/98	225	µg/l		16.4
Sonsela Sandstone	Zinc	Total	CMW23	1/26/99	46.7	µg/l		16.4

Notes:
µg/l = micrograms per liter.
Flagging Codes:
C - Analysis was confirmed.
D - Duplicate analysis.
F - Sample filtered prior to analysis.
J - Value is estimated.
JP - Value is estimated and is less than reporting level but greater than instrumental detection limit.
Q - Sample interference obscured peak of interest.
V - Sample subjected to unusual storage/preservation conditions.

Table 3-29
Samples that Exceeded Screening Criteria
Sonsela Sandstone Member
Current OB/OD Area Ground Water System
Fort Wingate Depot Activity
Gallup, New Mexico

Formation	Parameter	Fraction	Site ID	Sample Date	Value	Units	Flag Codes	Background Concentration	Screening Level Concentration
Sonsela Sandstone	Aluminum	Total	CMW16	2/10/97	44000	µg/l	D	13000	37000
Sonsela Sandstone	Aluminum	Total	CMW16	2/10/97	46200	µg/l		13000	37000
Sonsela Sandstone	Aluminum	Total	CMW21	1/27/99	92700	µg/l		13000	37000
Sonsela Sandstone	Aluminum	Total	CMW23	10/22/98	46700	µg/l		13000	37000
Sonsela Sandstone	Ammonia nitrogen	Filtered	CMW21	10/23/98	456	µg/l	JF	27.9	174
Sonsela Sandstone	Ammonia nitrogen	Total	CMW21	10/23/98	381	µg/l	J	27.2	174
Sonsela Sandstone	Ammonia nitrogen	Total	CMW23	10/22/98	199	µg/l		27.2	174
Sonsela Sandstone	Antimony	Filtered	CMW16	1/22/99	10.2	µg/l	F	0	6
Sonsela Sandstone	Antimony	Total	CMW16	1/22/99	23.3	µg/l		1.97	6
Sonsela Sandstone	Iron	Total	CMW16	2/10/97	18400	µg/l	D	6860	11000
Sonsela Sandstone	Iron	Total	CMW16	2/10/97	19100	µg/l		6860	11000
Sonsela Sandstone	Iron	Total	CMW21	1/27/99	38300	µg/l		6860	11000
Sonsela Sandstone	Iron	Total	CMW23	10/22/98	19700	µg/l		6860	11000
Sonsela Sandstone	Lead	Total	CMW21	1/27/99	18.6	µg/l		2.39	15
Sonsela Sandstone	Lead	Total	CMW23	10/22/98	40.4	µg/l	J	2.39	15
Sonsela Sandstone	RDX	Total	CMW16	10/22/96	17.3	µg/l	C	0	0.61
Sonsela Sandstone	RDX	Total	CMW16	2/10/97	13.2	µg/l	C	0	0.61
Sonsela Sandstone	RDX	Total	CMW16	2/10/97	14.5	µg/l	CVD	0	0.61
Sonsela Sandstone	RDX	Total	CMW16	10/21/98	15.8	µg/l	C	0	0.61
Sonsela Sandstone	RDX	Total	CMW16	1/22/99	12.4	µg/l		0	0.61

Notes:
µg/l = micrograms per liter.
Flagging Codes:
C - Analysis was confirmed.
D - Duplicate analysis.
F - Sample filtered prior to analysis.
J - Value is estimated.
V - Sample subjected to unusual storage/preservation conditions.

Table 3-30
Samples that Exceeded Closure Performance Standards
Sonsela Sandstone Member
Current OB/OD Area Ground Water System
Fort Wingate Depot Activity
Gallup, New Mexico

Formation	Parameter	Fraction	Site ID	Sample Date	Value	Units	Flag Codes	Background Concentration	Screening Level Concentration	Closure Performance Standards Contentration
Sonsela Sandstone	Ammonia nitrogen	Filtered	CMW21	10/23/98	456	µg/l	JF	27.9	174	174
Sonsela Sandstone	Ammonia nitrogen	Total	CMW21	10/23/98	381	µg/l	J	27.2	174	174
Sonsela Sandstone	Ammonia nitrogen	Total	CMW23	10/22/98	199	µg/l		27.2	174	174
Sonsela Sandstone	Antimony	Filtered	CMW16	1/22/99	10.2	µg/l	F	0	6	6
Sonsela Sandstone	Antimony	Total	CMW16	1/22/99	23.3	µg/l		1.97	6	6
Sonsela Sandstone	Lead	Total	CMW21	1/27/99	18.6	µg/l		2.39	15	15
Sonsela Sandstone	Lead	Total	CMW23	10/22/98	40.4	µg/l	J	2.39	15	15

Notes:
µg/l = micrograms per liter.
Flagging Codes:
C - Analysis was confirmed.
D - Duplicate analysis.
F - Sample filtered prior to analysis.
J - Value is estimated.
JP - Value is estimated and is less than reporting level but greater than instrumental detection limit.
Q - Sample interference obscured peak of interest.
V - Sample subjected to unusual storage/preservation conditions.

Table 3-31
Samples that Exceeded Background
Entrada Sandstone Formation
Current OB/OD Area Ground Water System
Fort Wingate Depot Activity
Gallup, New Mexico

Formation	Parameter	Fraction	Site ID	Sample Date	Value	Units	Flag Codes	Background Concentration
Entrada Sandstone	Aluminum	Total	KMW10	2/11/97	14000	µg/l		13000
Entrada Sandstone	Ammonia nitrogen	Filtered	KMW10	10/21/98	94.1	µg/l	F	27.9
Entrada Sandstone	Ammonia nitrogen	Filtered	KMW10	1/25/99	95.9	µg/l	F	27.9
Entrada Sandstone	Ammonia nitrogen	Total	KMW10	10/21/98	1040	µg/l	J	27.2
Entrada Sandstone	Ammonia nitrogen	Total	KMW10	1/25/99	571	µg/l		27.2
Entrada Sandstone	Barium	Total	KMW10	2/11/97	152	µg/l		122
Entrada Sandstone	Beryllium	Total	KMW10	2/11/97	0.652	µg/l		0
Entrada Sandstone	Beryllium	Total	KMW10	10/21/98	0.296	µg/l	J	0
Entrada Sandstone	Beryllium	Total	KMW10	1/25/99	0.363	µg/l	JP	0
Entrada Sandstone	Cadmium	Total	KMW10	10/29/96	0.111	µg/l		0
Entrada Sandstone	Cadmium	Total	KMW10	2/11/97	0.223	µg/l		0
Entrada Sandstone	Cadmium	Total	KMW10	10/21/98	0.358	µg/l	J	0
Entrada Sandstone	Cadmium	Total	KMW10	1/25/99	0.138	µg/l	JP	0
Entrada Sandstone	Chromium	Filtered	KMW10	10/29/96	5.2	µg/l	F	3.02
Entrada Sandstone	Chromium	Total	KMW10	2/11/97	8.84	µg/l		7.18
Entrada Sandstone	Chromium	Total	KMW10	1/25/99	8.66	µg/l	JP	7.18
Entrada Sandstone	Cobalt	Total	KMW10	10/29/96	1.16	µg/l		1.08
Entrada Sandstone	Cobalt	Total	KMW10	2/11/97	6.53	µg/l		1.08
Entrada Sandstone	Copper	Filtered	KMW10	1/25/99	5.78	µg/l	FJP	2.32
Entrada Sandstone	Iron	Total	KMW10	2/11/97	8050	µg/l		6860
Entrada Sandstone	Iron	Total	KMW10	10/21/98	8530	µg/l	J	6860
Entrada Sandstone	Lead	Total	KMW10	2/11/97	8.38	µg/l		2.39
Entrada Sandstone	Lead	Total	KMW10	10/21/98	5.24	µg/l	J	2.39
Entrada Sandstone	Manganese	Filtered	KMW10	10/29/96	14.4	µg/l	F	14.1
Entrada Sandstone	Manganese	Filtered	KMW10	1/25/99	92.6	µg/l	F	14.1
Entrada Sandstone	Manganese	Total	KMW10	2/11/97	230	µg/l		194
Entrada Sandstone	Manganese	Total	KMW10	10/21/98	229	µg/l	J	194
Entrada Sandstone	Nickel	Filtered	KMW10	10/29/96	3.77	µg/l	F	2.41
Entrada Sandstone	Nickel	Filtered	KMW10	2/11/97	5.51	µg/l	F	2.41
Entrada Sandstone	Nickel	Total	KMW10	2/11/97	12.7	µg/l		8.26

Table 3-31
Samples that Exceeded Background
Entrada Sandstone Formation
Current OB/OD Area Ground Water System
Fort Wingate Depot Activity
Gallup, New Mexico

Formation	Parameter	Fraction	Site ID	Sample Date	Value	Units	Flag Codes	Background Concentration
Entrada Sandstone	Nitrite (as nitrite)	Total	KMW10	10/21/98	13.8	µg/l		12.9
Entrada Sandstone	Nitrite, nitrate - nonspecific (as nitrogen)	Total	KMW10	10/21/98	8050	µg/l	J	168
Entrada Sandstone	Nitrite, nitrate - nonspecific (as nitrogen)	Total	KMW10	1/25/99	7320	µg/l		168
Entrada Sandstone	Selenium	Filtered	KMW10	10/29/96	21.9	µg/l	F	9.84
Entrada Sandstone	Selenium	Filtered	KMW10	2/11/97	20.6	µg/l	F	9.84
Entrada Sandstone	Selenium	Filtered	KMW10	10/21/98	24.4	µg/l	F	9.84
Entrada Sandstone	Selenium	Filtered	KMW10	1/25/99	20.8	µg/l	F	9.84
Entrada Sandstone	Selenium	Total	KMW10	10/29/96	22.1	µg/l		11.4
Entrada Sandstone	Selenium	Total	KMW10	2/11/97	20.2	µg/l		11.4
Entrada Sandstone	Selenium	Total	KMW10	10/21/98	23.8	µg/l		11.4
Entrada Sandstone	Selenium	Total	KMW10	1/25/99	17.6	µg/l		11.4
Entrada Sandstone	Thallium	Total	KMW10	2/11/97	0.127	µg/l		0
Entrada Sandstone	Zinc	Filtered	KMW10	1/25/99	28.2	µg/l	F	8.75
Entrada Sandstone	Zinc	Total	KMW10	2/11/97	44.7	µg/l		16.4
Entrada Sandstone	Zinc	Total	KMW10	10/21/98	53.2	µg/l	J	16.4
Entrada Sandstone	Zinc	Total	KMW10	1/25/99	21.5	µg/l		16.4

Notes:
µg/l = micrograms per liter.
Flagging Codes:
F - Sample filtered prior to analysis.
J - Value is estimated.
JP - Value is estimated and is less than reporting level but greater than instrumental detection limit.

Table 3-32
Samples that Exceeded Screening Criteria
Entrada Sandstone Formation
Current OB/OD Area Ground Water System
Fort Wingate Depot Activity
Gallup, New Mexico

Formation	Parameter	Fraction	Site ID	Sample Date	Value	Units	Flag Codes	Background Concentration	Screening Level Concentration
Entrada Sandstone	Ammonia nitrogen	Total	KMW10	10/21/98	1040	µg/l	J	27.2	174
Entrada Sandstone	Ammonia nitrogen	Total	KMW10	1/25/99	571	µg/l		27.2	174

Notes:
µg/l = micrograms per liter.
Flagging Codes:
J - Value is estimated.

Table 3-33
Samples that Exceeded Closure Performance Standards
Entrada Sandstone Formation
Current OB/OD Area Ground Water System
Fort Wingate Depot Activity
Gallup, New Mexico

Formation	Parameter	Fraction	Site ID	Sample Date	Value	Units	Flag Codes	Background Concentration	Screening Level Concentration	Closure Performance Standards Contentration
Entrada Sandstone	Ammonia nitrogen	Total	KMW10	10/21/98	1040	µg/l	J	27.2	174	174
Entrada Sandstone	Ammonia nitrogen	Total	KMW10	1/25/99	571	µg/l		27.2	174	174

Notes:
µg/l = micrograms per liter.
Flagging Codes:
J - Value is estimated.

Table 3-34
Samples that Exceeded Background
Soil Borings
Closed OB/OD Area Ground Water System
Fort Wingate Depot Activity
Gallup, New Mexico

Boring	Parameter	Site ID	Sample Date	Depth	Value	Units	Flag Codes	Background Concentration
KMW09	1,3,5-Trinitrobenzene	KMW090835	09/03/96	35	0.208	µg/g	JP	0
KMW09	4-Amino-2,6-dinitrotoluene	KMW090310	09/03/96	10	0.183	µg/g	JP	0
KMW09	Barium	KMW090205	09/03/96	5	186	µg/g		159.28
KMW09	Barium	KMW090205	09/03/96	5	201	µg/g	D	159.28
KMW09	Barium	KMW090520	09/03/96	20	255	µg/g		159.28
KMW09	Barium	KMW090625	09/03/96	25	196	µg/g		159.28
KMW09	Barium	KMW090730	09/03/96	30	178	µg/g		159.28
KMW09	Barium	KMW090835	09/03/96	35	225	µg/g		159.28
KMW09	Beryllium	KMW090101	09/03/96	1	1.06	µg/g		1.02
KMW09	Beryllium	KMW090310	09/03/96	10	1.18	µg/g		1.02
KMW09	Copper	KMW090730	09/03/96	30	34	µg/g		27.84
KMW09	Iron	KMW090835	09/03/96	35	64000	µg/g		32403.68
KMW09	Manganese	KMW090625	09/03/96	25	523	µg/g		391.98
KMW09	Manganese	KMW090835	09/03/96	35	637	µg/g		391.98
KMW09	Mercury	KMW090310	09/03/96	10	0.081	µg/g	JP	0.08
KMW09	Thallium	KMW090310	09/03/96	10	0.684	µg/g	JP	0
KMW09	Thallium	KMW090835	09/03/96	35	2.77	µg/g		0
KMW09	Thallium	KMW090940	09/03/96	40	0.803	µg/g	JP	0
KMW09	Vanadium	KMW090101	09/03/96	1	39.8	µg/g		32.61
KMW09	Vanadium	KMW090310	09/03/96	10	43.9	µg/g		32.61
KMW12	Antimony	KMW120110	08/03/98	10	0.0565	µg/g		0
KMW12	Cadmium	KMW120110	08/03/98	10	0.106	µg/g		0
KMW12	Cadmium	KMW12SO56	08/06/98	56	0.0214	µg/g		0
KMW12	Silver	KMW120110	08/03/98	10	0.274	µg/g		0
KMW12	Thallium	KMW120110	08/03/98	10	0.0136	µg/g		0
KMW12	Thallium	KMW12SO56	08/06/98	56	0.051	µg/g		0
KMW12	Zinc	KMW12SO56	08/06/98	56	81.6	µg/g		77.28
KMW13	Cadmium	KMW13ASO10	08/21/98	10	0.0518	µg/g		0

Table 3-34
Samples that Exceeded Background
Soil Borings
Closed OB/OD Area Ground Water System
Fort Wingate Depot Activity
Gallup, New Mexico

Boring	Parameter	Site ID	Sample Date	Depth	Value	Units	Flag Codes	Background Concentration
KMW13	Cadmium	KMW13ASO10	08/21/98	10	0.0754	µg/g	D	0
KMW13	Cadmium	KMW13ASO25	08/21/98	25	0.0237	µg/g		0
KMW13	Manganese	KMW13ASO25	08/21/98	25	521	µg/g		391.98
KMW13	Silver	KMW13ASO10	08/21/98	10	0.0328	µg/g		0
KMW13	Silver	KMW13ASO10	08/21/98	10	0.0362	µg/g	D	0
KMW13	Silver	KMW13ASO25	08/21/98	25	0.0138	µg/g		0
KMW13	Thallium	KMW13ASO10	08/21/98	10	0.0109	µg/g	D	0
KMW14	Antimony	KMW14SO10	08/26/98	10	0.0844	µg/g		0
KMW14	Cadmium	KMW14SO10	08/26/98	10	0.0642	µg/g		0
KMW14	Cadmium	KMW14SO24	08/26/98	24	0.0526	µg/g		0
KMW14	Silver	KMW14SO10	08/26/98	10	0.041	µg/g		0
KMW14	Silver	KMW14SO24	08/26/98	24	0.0286	µg/g		0
KMW14	Thallium	KMW14SO10	08/26/98	10	0.0168	µg/g		0
KMW14	Thallium	KMW14SO24	08/26/98	24	0.0112	µg/g		0

Notes:
µg/g = micrograms per gram.
Flagging Codes:
D - Duplicate analysis.
JP - Value is estimated and is less than reporting level but greater than instrumental detection limit.

Table 3-35
Samples that Exceeded Screening Criteria
Soil Borings
Closed OB/OD Area Ground Water System
Fort Wingate Depot Activity
Gallup, New Mexico

Boring	Parameter	Site ID	Sample Date	Depth	Value	Units	Flag Codes	Background Concentration	Screening Level Concentration
KMW09	Iron	KMW090835	09/03/96	35	64000	µg/g		32403.68	23000

Notes:
µg/g = micrograms per gram.

Table 3-36
Samples that Exceeded Closure Performance Standards
Soil Borings
Closed OB/OD Area Ground Water System
Fort Wingate Depot Activity
Gallup, New Mexico

Boring	Parameter	Site ID	Sample Date	Depth	Value	Units	Flag Codes	Background Concentration	Screening Level Concentration	Closure Performance Standards Contentration
	No samples exceeded closure performance standards.									

Notes:
µg/g = micrograms per gram.

Table 3-37
Samples that Exceeded Background
Soil Borings
Current OB/OD Area Ground Water System
Fort Wingate Depot Activity
Gallup, New Mexico

Boring	Parameter	Site ID	Sample Date	Depth	Value	Units	Flag Codes	Background Concentration
CMW02	Beryllium	CMW020310	08/01/96	10	1.17	µg/g		1.1
CMW02	Chromium	CMW020310	08/01/96	10	34	µg/g		17
CMW02	Cobalt	CMW020310	08/01/96	10	9.79	µg/g		6.5
CMW02	Copper	CMW020101	08/01/96	1	21.5	µg/g		18.9
CMW02	Iron	CMW020310	08/01/96	10	26200	µg/g		17647.3
CMW02	Manganese	CMW020310	08/01/96	10	768	µg/g		458.1
CMW02	Manganese	CMW020410	08/01/96	10	600	µg/g		458.1
CMW02	Molybdenum	CMW020410	08/01/96	10	1.18	µg/g	JP	0
CMW02	Nickel	CMW020310	08/01/96	10	20.4	µg/g		14.3
CMW02	Thallium	CMW020310	08/01/96	10	1.6	µg/g		0
CMW02	Vanadium	CMW020310	08/01/96	10	43.1	µg/g		31.3
CMW02	Zinc	CMW020310	08/01/96	10	32.8	µg/g		29.2
CMW03	Arsenic	CMW030101	08/09/96	1	4.72	µg/g	J	2.7
CMW03	Cadmium	CMW030101	08/09/96	1	0.167	µg/g	JP	0
CMW03	Cadmium	CMW030203	08/09/96	3	0.0478	µg/g	JP	0
CMW03	Copper	CMW030101	08/09/96	1	36.3	µg/g		18.9
CMW03	Manganese	CMW030101	08/09/96	1	517	µg/g		458.1
CMW03	Molybdenum	CMW030101	08/09/96	1	2.04	µg/g	JP	0
CMW03	Molybdenum	CMW030203	08/09/96	3	1.78	µg/g	JP	0
CMW04	Antimony	CMW040625	08/02/96	25	6.24	µg/g	JP	0
CMW04	Antimony	CMW040730	08/02/96	30	0.561	µg/g	JP	0
CMW04	Antimony	CMW041045	08/02/96	45	2.02	µg/g	JP	0
CMW04	Antimony	CMW041570	08/03/96	70	8.52	µg/g	JP	0
CMW04	Arsenic	CMW040520	08/02/96	20	3.21	µg/g	D	2.7
CMW04	Barium	CMW040415	08/02/96	15	468	µg/g		430.7
CMW04	Barium	CMW040940	08/02/96	40	542	µg/g		430.7
CMW04	Beryllium	CMW040520	08/02/96	20	1.12	µg/g	D	1.1
CMW04	Beryllium	CMW040940	08/02/96	40	1.13	µg/g		1.1

Table 3-37
Samples that Exceeded Background
Soil Borings
Current OB/OD Area Ground Water System
Fort Wingate Depot Activity
Gallup, New Mexico

Boring	Parameter	Site ID	Sample Date	Depth	Value	Units	Flag Codes	Background Concentration
CMW04	Beryllium	CMW041150	08/02/96	50	1.31	µg/g		1.1
CMW04	Beryllium	CMW041570	08/03/96	70	1.32	µg/g		1.1
CMW04	Beryllium	CMW041675	08/03/96	75	1.16	µg/g		1.1
CMW04	Beryllium	CMW041780	08/03/96	80	1.29	µg/g		1.1
CMW04	Beryllium	CMW041884	08/03/96	84	1.21	µg/g		1.1
CMW04	Cadmium	CMW040101	08/01/96	1	0.0729	µg/g	JP	0
CMW04	Cadmium	CMW041570	08/03/96	70	0.347	µg/g		0
CMW04	Cadmium	CMW041675	08/03/96	75	0.258	µg/g		0
CMW04	Cadmium	CMW041780	08/03/96	80	0.259	µg/g		0
CMW04	Cadmium	CMW041884	08/03/96	84	0.251	µg/g		0
CMW04	Chromium	CMW040205	08/01/96	5	23.1	µg/g		17
CMW04	Chromium	CMW040415	08/02/96	15	17.7	µg/g		17
CMW04	Chromium	CMW040520	08/02/96	20	23.9	µg/g		17
CMW04	Chromium	CMW040520	08/02/96	20	27.3	µg/g	D	17
CMW04	Chromium	CMW040625	08/02/96	25	30.8	µg/g		17
CMW04	Chromium	CMW040730	08/02/96	30	27.7	µg/g		17
CMW04	Chromium	CMW040835	08/02/96	35	25.3	µg/g		17
CMW04	Chromium	CMW040940	08/02/96	40	34.6	µg/g		17
CMW04	Chromium	CMW041045	08/02/96	45	27.2	µg/g		17
CMW04	Chromium	CMW041150	08/02/96	50	34.7	µg/g		17
CMW04	Chromium	CMW041255	08/02/96	55	24.2	µg/g		17
CMW04	Chromium	CMW041360	08/02/96	60	26.9	µg/g		17
CMW04	Chromium	CMW041465	08/02/96	65	23.9	µg/g		17
CMW04	Chromium	CMW041570	08/03/96	70	36.3	µg/g		17
CMW04	Chromium	CMW041675	08/03/96	75	38.2	µg/g		17
CMW04	Chromium	CMW041780	08/03/96	80	33.1	µg/g		17
CMW04	Chromium	CMW041884	08/03/96	84	37.4	µg/g		17
CMW04	Cobalt	CMW040205	08/01/96	5	6.91	µg/g		6.5

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Table 3-37
Samples that Exceeded Background
Soil Borings
Current OB/OD Area Ground Water System
Fort Wingate Depot Activity
Gallup, New Mexico

Boring	Parameter	Site ID	Sample Date	Depth	Value	Units	Flag Codes	Background Concentration
CMW04	Cobalt	CMW040520	08/02/96	20	7.07	µg/g		6.5
CMW04	Cobalt	CMW040520	08/02/96	20	8.43	µg/g	D	6.5
CMW04	Cobalt	CMW040625	08/02/96	25	9	µg/g		6.5
CMW04	Cobalt	CMW040730	08/02/96	30	8.46	µg/g		6.5
CMW04	Cobalt	CMW040835	08/02/96	35	7.96	µg/g		6.5
CMW04	Cobalt	CMW040940	08/02/96	40	10.3	µg/g		6.5
CMW04	Cobalt	CMW041045	08/02/96	45	8.9	µg/g		6.5
CMW04	Cobalt	CMW041150	08/02/96	50	10.1	µg/g		6.5
CMW04	Cobalt	CMW041255	08/02/96	55	6.89	µg/g		6.5
CMW04	Cobalt	CMW041360	08/02/96	60	8.38	µg/g		6.5
CMW04	Cobalt	CMW041570	08/03/96	70	14.4	µg/g		6.5
CMW04	Cobalt	CMW041675	08/03/96	75	14.5	µg/g		6.5
CMW04	Cobalt	CMW041780	08/03/96	80	12.8	µg/g		6.5
CMW04	Cobalt	CMW041884	08/03/96	84	11.5	µg/g		6.5
CMW04	Copper	CMW040101	08/01/96	1	34.4	µg/g		18.9
CMW04	Copper	CMW040205	08/01/96	5	19.3	µg/g		18.9
CMW04	Iron	CMW040205	08/01/96	5	19900	µg/g		17647.3
CMW04	Iron	CMW040520	08/02/96	20	21200	µg/g		17647.3
CMW04	Iron	CMW040520	08/02/96	20	23600	µg/g	D	17647.3
CMW04	Iron	CMW040625	08/02/96	25	23800	µg/g		17647.3
CMW04	Iron	CMW040730	08/02/96	30	21600	µg/g		17647.3
CMW04	Iron	CMW040835	08/02/96	35	22100	µg/g		17647.3
CMW04	Iron	CMW040940	08/02/96	40	26400	µg/g		17647.3
CMW04	Iron	CMW041045	08/02/96	45	25500	µg/g		17647.3
CMW04	Iron	CMW041150	08/02/96	50	28600	µg/g		17647.3
CMW04	Iron	CMW041255	08/02/96	55	22400	µg/g		17647.3
CMW04	Iron	CMW041360	08/02/96	60	21700	µg/g		17647.3
CMW04	Iron	CMW041465	08/02/96	65	20800	µg/g		17647.3

Table 3-37
Samples that Exceeded Background
Soil Borings
Current OB/OD Area Ground Water System
Fort Wingate Depot Activity
Gallup, New Mexico

Boring	Parameter	Site ID	Sample Date	Depth	Value	Units	Flag Codes	Background Concentration
CMW04	Iron	CMW041570	08/03/96	70	32000	µg/g		17647.3
CMW04	Iron	CMW041675	08/03/96	75	32200	µg/g		17647.3
CMW04	Iron	CMW041780	08/03/96	80	31600	µg/g		17647.3
CMW04	Iron	CMW041884	08/03/96	84	31000	µg/g		17647.3
CMW04	Lead	CMW040520	08/02/96	20	13.1	µg/g		12.5
CMW04	Lead	CMW040520	08/02/96	20	13.2	µg/g	D	12.5
CMW04	Lead	CMW040625	08/02/96	25	12.6	µg/g		12.5
CMW04	Lead	CMW040730	08/02/96	30	12.8	µg/g		12.5
CMW04	Lead	CMW040940	08/02/96	40	13	µg/g		12.5
CMW04	Lead	CMW041150	08/02/96	50	13	µg/g		12.5
CMW04	Lead	CMW041255	08/02/96	55	14.2	µg/g		12.5
CMW04	Lead	CMW041465	08/02/96	65	14.5	µg/g		12.5
CMW04	Lead	CMW041570	08/03/96	70	13.1	µg/g		12.5
CMW04	Lead	CMW041675	08/03/96	75	13	µg/g		12.5
CMW04	Manganese	CMW040835	08/02/96	35	513	µg/g		458.1
CMW04	Molybdenum	CMW040520	08/02/96	20	2.87	µg/g	JP	0
CMW04	Molybdenum	CMW040520	08/02/96	20	3.92	µg/g	DJP	0
CMW04	Nickel	CMW040520	08/02/96	20	14.6	µg/g		14.3
CMW04	Nickel	CMW040520	08/02/96	20	16.7	µg/g	D	14.3
CMW04	Nickel	CMW040625	08/02/96	25	16.9	µg/g		14.3
CMW04	Nickel	CMW040730	08/02/96	30	17.4	µg/g		14.3
CMW04	Nickel	CMW040835	08/02/96	35	15.1	µg/g		14.3
CMW04	Nickel	CMW040940	08/02/96	40	21.9	µg/g		14.3
CMW04	Nickel	CMW041045	08/02/96	45	18.8	µg/g		14.3
CMW04	Nickel	CMW041150	08/02/96	50	19.6	µg/g		14.3
CMW04	Nickel	CMW041255	08/02/96	55	14.7	µg/g		14.3
CMW04	Nickel	CMW041360	08/02/96	60	19.2	µg/g		14.3
CMW04	Nickel	CMW041570	08/03/96	70	27.6	µg/g		14.3

Table 3-37
Samples that Exceeded Background
Soil Borings
Current OB/OD Area Ground Water System
Fort Wingate Depot Activity
Gallup, New Mexico

Boring	Parameter	Site ID	Sample Date	Depth	Value	Units	Flag Codes	Background Concentration
CMW04	Nickel	CMW041675	08/03/96	75	24.6	µg/g		14.3
CMW04	Nickel	CMW041780	08/03/96	80	24.9	µg/g		14.3
CMW04	Nickel	CMW041884	08/03/96	84	23	µg/g		14.3
CMW04	Selenium	CMW040520	08/02/96	20	0.519	µg/g	JP	0.4
CMW04	Thallium	CMW040205	08/01/96	5	0.878	µg/g	JP	0
CMW04	Thallium	CMW041570	08/03/96	70	1.2	µg/g		0
CMW04	Thallium	CMW041675	08/03/96	75	1.64	µg/g		0
CMW04	Thallium	CMW041780	08/03/96	80	1.47	µg/g		0
CMW04	Thallium	CMW041884	08/03/96	84	0.842	µg/g	JP	0
CMW04	Vanadium	CMW040205	08/01/96	5	41.6	µg/g		31.3
CMW04	Vanadium	CMW040520	08/02/96	20	67.9	µg/g		31.3
CMW04	Vanadium	CMW040520	08/02/96	20	89.6	µg/g	D	31.3
CMW04	Vanadium	CMW040625	08/02/96	25	31.5	µg/g		31.3
CMW04	Vanadium	CMW040940	08/02/96	40	52.3	µg/g		31.3
CMW04	Vanadium	CMW041045	08/02/96	45	39.2	µg/g		31.3
CMW04	Vanadium	CMW041150	08/02/96	50	35	µg/g		31.3
CMW04	Vanadium	CMW041360	08/02/96	60	152	µg/g		31.3
CMW04	Vanadium	CMW041570	08/03/96	70	54.8	µg/g		31.3
CMW04	Vanadium	CMW041675	08/03/96	75	46.7	µg/g		31.3
CMW04	Vanadium	CMW041780	08/03/96	80	63.6	µg/g		31.3
CMW04	Vanadium	CMW041884	08/03/96	84	41.5	µg/g		31.3
CMW04	Zinc	CMW040205	08/01/96	5	36	µg/g		29.2
CMW04	Zinc	CMW040940	08/02/96	40	34.3	µg/g		29.2
CMW04	Zinc	CMW041045	08/02/96	45	33.6	µg/g		29.2
CMW04	Zinc	CMW041150	08/02/96	50	38.3	µg/g		29.2
CMW04	Zinc	CMW041360	08/02/96	60	33.2	µg/g		29.2
CMW04	Zinc	CMW041570	08/03/96	70	49.1	µg/g		29.2
CMW04	Zinc	CMW041675	08/03/96	75	49	µg/g		29.2

Table 3-37
Samples that Exceeded Background
Soil Borings
Current OB/OD Area Ground Water System
Fort Wingate Depot Activity
Gallup, New Mexico

Boring	Parameter	Site ID	Sample Date	Depth	Value	Units	Flag Codes	Background Concentration
CMW04	Zinc	CMW041780	08/03/96	80	46.9	µg/g		29.2
CMW04	Zinc	CMW041884	08/03/96	84	43.2	µg/g		29.2
CMW05	Cadmium	CMW050101	08/09/96	1	0.25	µg/g		0
CMW05	Cadmium	CMW050205	08/09/96	5	0.183	µg/g	JP	0
CMW05	Chromium	CMW050101	08/09/96	1	18.1	µg/g		17
CMW05	Chromium	CMW050205	08/09/96	5	25	µg/g		17
CMW05	Cobalt	CMW050205	08/09/96	5	8.42	µg/g		6.5
CMW05	Copper	CMW050101	08/09/96	1	34.2	µg/g		18.9
CMW05	Copper	CMW050205	08/09/96	5	25.4	µg/g		18.9
CMW05	Iron	CMW050205	08/09/96	5	22800	µg/g		17647.3
CMW05	Molybdenum	CMW050101	08/09/96	1	2.83	µg/g	JP	0
CMW05	Nickel	CMW050205	08/09/96	5	15.8	µg/g		14.3
CMW05	Silver	CMW050101	08/09/96	1	0.828	µg/g	JP	0
CMW05	Thallium	CMW050205	08/09/96	5	2.2	µg/g	J	0
CMW05	Vanadium	CMW050205	08/09/96	5	39.2	µg/g		31.3
CMW05	Zinc	CMW050205	08/09/96	5	34.2	µg/g		29.2
CMW06	Arsenic	CMW060101	08/09/96	1	3.48	µg/g		2.7
CMW06	Arsenic	CMW060415	08/09/96	15	3.31	µg/g		2.7
CMW06	Beryllium	CMW060101	08/09/96	1	1.22	µg/g		1.1
CMW06	Beryllium	CMW060415	08/09/96	15	1.86	µg/g		1.1
CMW06	Cadmium	CMW060101	08/09/96	1	0.44	µg/g		0
CMW06	Cadmium	CMW060205	08/09/96	5	0.173	µg/g	JP	0
CMW06	Cadmium	CMW060310	08/09/96	10	0.259	µg/g		0
CMW06	Cadmium	CMW060415	08/09/96	15	0.246	µg/g	JP	0
CMW06	Chromium	CMW060101	08/09/96	1	28.5	µg/g		17
CMW06	Chromium	CMW060205	08/09/96	5	20	µg/g		17
CMW06	Chromium	CMW060415	08/09/96	15	42.3	µg/g		17
CMW06	Cobalt	CMW060101	08/09/96	1	9.03	µg/g		6.5

Table 3-37
Samples that Exceeded Background
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Boring	Parameter	Site ID	Sample Date	Depth	Value	Units	Flag Codes	Background Concentration
CMW06	Cobalt	CMW060205	08/09/96	5	6.86	µg/g		6.5
CMW06	Cobalt	CMW060415	08/09/96	15	12.4	µg/g		6.5
CMW06	Copper	CMW060101	08/09/96	1	31.3	µg/g		18.9
CMW06	Iron	CMW060101	08/09/96	1	24700	µg/g		17647.3
CMW06	Iron	CMW060205	08/09/96	5	17900	µg/g		17647.3
CMW06	Iron	CMW060415	08/09/96	15	34300	µg/g		17647.3
CMW06	Lead	CMW060101	08/09/96	1	29.2	µg/g		12.5
CMW06	Lead	CMW060415	08/09/96	15	16.3	µg/g		12.5
CMW06	Manganese	CMW060101	08/09/96	1	483	µg/g		458.1
CMW06	Manganese	CMW060415	08/09/96	15	483	µg/g		458.1
CMW06	Molybdenum	CMW060205	08/09/96	5	2.65	µg/g	JP	0
CMW06	Molybdenum	CMW060310	08/09/96	10	1.32	µg/g	JP	0
CMW06	Molybdenum	CMW060415	08/09/96	15	3.63	µg/g	JP	0
CMW06	Nickel	CMW060101	08/09/96	1	18.3	µg/g		14.3
CMW06	Nickel	CMW060415	08/09/96	15	24.4	µg/g		14.3
CMW06	Thallium	CMW060101	08/09/96	1	0.619	µg/g	JP	0
CMW06	Thallium	CMW060205	08/09/96	5	0.59	µg/g	JP	0
CMW06	Vanadium	CMW060101	08/09/96	1	48.9	µg/g		31.3
CMW06	Vanadium	CMW060205	08/09/96	5	35.2	µg/g		31.3
CMW06	Vanadium	CMW060415	08/09/96	15	63.3	µg/g		31.3
CMW06	Zinc	CMW060101	08/09/96	1	46.4	µg/g		29.2
CMW06	Zinc	CMW060205	08/09/96	5	31.1	µg/g		29.2
CMW06	Zinc	CMW060415	08/09/96	15	60.1	µg/g		29.2
CMW07	4-Amino-2,6-dinitrotoluene	CMW070520	08/10/96	20	0.421	µg/g	JP	0
CMW07	Arsenic	CMW070310	08/10/96	10	3.55	µg/g	J	2.7
CMW07	Beryllium	CMW070415	08/10/96	15	1.17	µg/g		1.1
CMW07	Beryllium	CMW071045	08/10/96	45	1.14	µg/g		1.1
CMW07	Cadmium	CMW070101	08/10/96	1	3.09	µg/g		0

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Boring	Parameter	Site ID	Sample Date	Depth	Value	Units	Flag Codes	Background Concentration
CMW07	Cadmium	CMW070205	08/10/96	5	0.129	µg/g	JP	0
CMW07	Cadmium	CMW070310	08/10/96	10	0.139	µg/g	JP	0
CMW07	Cadmium	CMW070415	08/10/96	15	0.223	µg/g	JP	0
CMW07	Cadmium	CMW070520	08/10/96	20	0.129	µg/g	JP	0
CMW07	Cadmium	CMW070625	08/10/96	25	0.0558	µg/g	JP	0
CMW07	Cadmium	CMW070730	08/10/96	30	0.116	µg/g	JP	0
CMW07	Cadmium	CMW070835	08/10/96	35	0.0964	µg/g	JP	0
CMW07	Cadmium	CMW070940	08/10/96	40	0.0652	µg/g	JP	0
CMW07	Cadmium	CMW071045	08/10/96	45	0.0802	µg/g	JP	0
CMW07	Cadmium	CMW071148	08/10/96	48	0.0933	µg/g	JP	0
CMW07	Chromium	CMW070101	08/10/96	1	70.8	µg/g		17
CMW07	Chromium	CMW070310	08/10/96	10	20.6	µg/g		17
CMW07	Chromium	CMW070730	08/10/96	30	24.1	µg/g		17
CMW07	Chromium	CMW070835	08/10/96	35	23	µg/g		17
CMW07	Chromium	CMW070940	08/10/96	40	23	µg/g		17
CMW07	Chromium	CMW071045	08/10/96	45	23.1	µg/g		17
CMW07	Cobalt	CMW070101	08/10/96	1	7.17	µg/g		6.5
CMW07	Cobalt	CMW070415	08/10/96	15	9.08	µg/g		6.5
CMW07	Cobalt	CMW070730	08/10/96	30	8.84	µg/g		6.5
CMW07	Cobalt	CMW070835	08/10/96	35	8.5	µg/g		6.5
CMW07	Cobalt	CMW070940	08/10/96	40	7.48	µg/g		6.5
CMW07	Cobalt	CMW071045	08/10/96	45	7.91	µg/g		6.5
CMW07	Cobalt	CMW071148	08/10/96	48	9.42	µg/g		6.5
CMW07	Copper	CMW070101	08/10/96	1	563	µg/g		18.9
CMW07	Iron	CMW070101	08/10/96	1	21400	µg/g		17647.3
CMW07	Iron	CMW070310	08/10/96	10	18500	µg/g		17647.3
CMW07	Iron	CMW070730	08/10/96	30	19200	µg/g		17647.3
CMW07	Iron	CMW070835	08/10/96	35	23300	µg/g		17647.3

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Boring	Parameter	Site ID	Sample Date	Depth	Value	Units	Flag Codes	Background Concentration
CMW07	Iron	CMW070940	08/10/96	40	26400	µg/g		17647.3
CMW07	Iron	CMW071045	08/10/96	45	26000	µg/g		17647.3
CMW07	Lead	CMW070101	08/10/96	1	13.1	µg/g		12.5
CMW07	Lead	CMW070940	08/10/96	40	13.1	µg/g		12.5
CMW07	Lead	CMW071045	08/10/96	45	12.7	µg/g		12.5
CMW07	Manganese	CMW070310	08/10/96	10	477	µg/g		458.1
CMW07	Molybdenum	CMW070101	08/10/96	1	2.49	µg/g	JP	0
CMW07	Molybdenum	CMW070310	08/10/96	10	1.89	µg/g	JP	0
CMW07	Molybdenum	CMW070415	08/10/96	15	1.25	µg/g	JP	0
CMW07	Molybdenum	CMW070625	08/10/96	25	2.14	µg/g	JP	0
CMW07	Molybdenum	CMW070730	08/10/96	30	1.94	µg/g	JP	0
CMW07	Molybdenum	CMW070835	08/10/96	35	1.77	µg/g	JP	0
CMW07	Nickel	CMW070101	08/10/96	1	37.8	µg/g		14.3
CMW07	Nickel	CMW070310	08/10/96	10	16.4	µg/g		14.3
CMW07	Nickel	CMW070730	08/10/96	30	16.8	µg/g		14.3
CMW07	Nickel	CMW070835	08/10/96	35	18.2	µg/g		14.3
CMW07	Nickel	CMW070940	08/10/96	40	17.1	µg/g		14.3
CMW07	Nickel	CMW071045	08/10/96	45	20.8	µg/g		14.3
CMW07	RDX	CMW070101	08/10/96	1	0.669	µg/g	JP	0
CMW07	Thallium	CMW070101	08/10/96	1	2.04	µg/g	J	0
CMW07	Thallium	CMW070415	08/10/96	15	2.04	µg/g	J	0
CMW07	Thallium	CMW070835	08/10/96	35	2.03	µg/g	J	0
CMW07	Thallium	CMW070940	08/10/96	40	2.3	µg/g		0
CMW07	Thallium	CMW071045	08/10/96	45	2.1	µg/g	J	0
CMW07	Thallium	CMW071148	08/10/96	48	2.15	µg/g	J	0
CMW07	Vanadium	CMW070101	08/10/96	1	39.1	µg/g		31.3
CMW07	Vanadium	CMW070310	08/10/96	10	39.8	µg/g		31.3
CMW07	Vanadium	CMW070730	08/10/96	30	34.2	µg/g		31.3

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Boring	Parameter	Site ID	Sample Date	Depth	Value	Units	Flag Codes	Background Concentration
CMW07	Vanadium	CMW070835	08/10/96	35	162	µg/g		31.3
CMW07	Vanadium	CMW071045	08/10/96	45	38.8	µg/g		31.3
CMW07	Zinc	CMW070101	08/10/96	1	45.8	µg/g		29.2
CMW07	Zinc	CMW070730	08/10/96	30	32	µg/g		29.2
CMW07	Zinc	CMW070835	08/10/96	35	33.1	µg/g		29.2
CMW07	Zinc	CMW071045	08/10/96	45	34.4	µg/g		29.2
CMW08	Cadmium	CMW080101	08/09/96	1	1.83	µg/g		0
CMW08	Cadmium	CMW080205	08/09/96	5	0.132	µg/g	JP	0
CMW08	Chromium	CMW080101	08/09/96	1	27.9	µg/g		17
CMW08	Copper	CMW080101	08/09/96	1	411	µg/g		18.9
CMW08	Lead	CMW080101	08/09/96	1	17	µg/g		12.5
CMW08	Molybdenum	CMW080205	08/09/96	5	1.65	µg/g	JP	0
CMW08	Nickel	CMW080101	08/09/96	1	19.1	µg/g		14.3
CMW08	Thallium	CMW080101	08/09/96	1	0.901	µg/g	JP	0
CMW08	Thallium	CMW080205	08/09/96	5	0.738	µg/g	JP	0
CMW08	Zinc	CMW080101	08/09/96	1	38.6	µg/g		29.2
CMW08	Zinc	CMW080205	08/09/96	5	32.2	µg/g		29.2
CMW09	2,4,6-Trinitrotoluene	CMW090205	08/09/96	5	0.256	µg/g	DJP	0
CMW09	Cadmium	CMW090101	08/09/96	1	0.619	µg/g		0
CMW09	Cadmium	CMW090205	08/09/96	5	0.347	µg/g	D	0
CMW09	Cadmium	CMW090205	08/09/96	5	0.395	µg/g		0
CMW09	Chromium	CMW090205	08/09/96	5	23.2	µg/g	D	17
CMW09	Chromium	CMW090205	08/09/96	5	25.2	µg/g		17
CMW09	Copper	CMW090101	08/09/96	1	94.1	µg/g		18.9
CMW09	Copper	CMW090205	08/09/96	5	180	µg/g	D	18.9
CMW09	Copper	CMW090205	08/09/96	5	242	µg/g		18.9
CMW09	Nickel	CMW090205	08/09/96	5	15.5	µg/g		14.3
CMW09	Thallium	CMW090205	08/09/96	5	0.587	µg/g	JP	0

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Boring	Parameter	Site ID	Sample Date	Depth	Value	Units	Flag Codes	Background Concentration
CMW10	Antimony	CMW100205	08/03/96	5	4.81	µg/g	DJP	0
CMW10	Arsenic	CMW100101	08/03/96	1	2.91	µg/g		2.7
CMW10	Arsenic	CMW100520	08/03/96	20	3	µg/g		2.7
CMW10	Barium	CMW100205	08/03/96	5	732	µg/g		430.7
CMW10	Barium	CMW100205	08/03/96	5	771	µg/g	D	430.7
CMW10	Barium	CMW100415	08/03/96	15	3000	µg/g		430.7
CMW10	Beryllium	CMW100310	08/03/96	10	1.13	µg/g		1.1
CMW10	Beryllium	CMW100625	08/05/96	25	1.14	µg/g		1.1
CMW10	Cadmium	CMW100101	08/03/96	1	0.287	µg/g		0
CMW10	Cadmium	CMW100205	08/03/96	5	0.224	µg/g		0
CMW10	Cadmium	CMW100205	08/03/96	5	0.28	µg/g	D	0
CMW10	Cadmium	CMW100310	08/03/96	10	0.338	µg/g		0
CMW10	Cadmium	CMW100415	08/03/96	15	0.323	µg/g		0
CMW10	Cadmium	CMW100520	08/03/96	20	0.302	µg/g		0
CMW10	Cadmium	CMW100625	08/05/96	25	0.347	µg/g		0
CMW10	Cadmium	CMW100730	08/05/96	30	0.274	µg/g		0
CMW10	Cadmium	CMW100833	08/05/96	33	0.292	µg/g		0
CMW10	Chromium	CMW100205	08/03/96	5	25.6	µg/g		17
CMW10	Chromium	CMW100205	08/03/96	5	27.3	µg/g	D	17
CMW10	Chromium	CMW100310	08/03/96	10	29.4	µg/g		17
CMW10	Chromium	CMW100415	08/03/96	15	25.4	µg/g		17
CMW10	Chromium	CMW100520	08/03/96	20	29.5	µg/g		17
CMW10	Chromium	CMW100625	08/05/96	25	27.5	µg/g		17
CMW10	Chromium	CMW100730	08/05/96	30	20	µg/g		17
CMW10	Chromium	CMW100833	08/05/96	33	23.1	µg/g		17
CMW10	Cobalt	CMW100205	08/03/96	5	8.3	µg/g		6.5
CMW10	Cobalt	CMW100205	08/03/96	5	8.16	µg/g	D	6.5
CMW10	Cobalt	CMW100310	08/03/96	10	8.65	µg/g		6.5

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Boring	Parameter	Site ID	Sample Date	Depth	Value	Units	Flag Codes	Background Concentration
CMW10	Cobalt	CMW100415	08/03/96	15	9.19	µg/g		6.5
CMW10	Cobalt	CMW100520	08/03/96	20	8.15	µg/g		6.5
CMW10	Cobalt	CMW100625	08/05/96	25	8.38	µg/g		6.5
CMW10	Cobalt	CMW100730	08/05/96	30	7.69	µg/g		6.5
CMW10	Cobalt	CMW100833	08/05/96	33	8.8	µg/g		6.5
CMW10	Iron	CMW100205	08/03/96	5	19900	µg/g		17647.3
CMW10	Iron	CMW100205	08/03/96	5	20200	µg/g	D	17647.3
CMW10	Iron	CMW100310	08/03/96	10	23000	µg/g		17647.3
CMW10	Iron	CMW100415	08/03/96	15	19700	µg/g		17647.3
CMW10	Iron	CMW100520	08/03/96	20	22600	µg/g		17647.3
CMW10	Iron	CMW100625	08/05/96	25	23300	µg/g		17647.3
CMW10	Iron	CMW100730	08/05/96	30	19800	µg/g		17647.3
CMW10	Iron	CMW100833	08/05/96	33	18500	µg/g		17647.3
CMW10	Lead	CMW100625	08/05/96	25	13.1	µg/g		12.5
CMW10	Manganese	CMW100101	08/03/96	1	1060	µg/g		458.1
CMW10	Manganese	CMW100205	08/03/96	5	887	µg/g		458.1
CMW10	Manganese	CMW100205	08/03/96	5	854	µg/g	D	458.1
CMW10	Manganese	CMW100310	08/03/96	10	752	µg/g		458.1
CMW10	Manganese	CMW100415	08/03/96	15	1570	µg/g		458.1
CMW10	Manganese	CMW100520	08/03/96	20	797	µg/g		458.1
CMW10	Manganese	CMW100625	08/05/96	25	770	µg/g		458.1
CMW10	Manganese	CMW100730	08/05/96	30	852	µg/g		458.1
CMW10	Manganese	CMW100833	08/05/96	33	1050	µg/g		458.1
CMW10	Molybdenum	CMW100205	08/03/96	5	1.42	µg/g	JP	0
CMW10	Molybdenum	CMW100310	08/03/96	10	1.48	µg/g	JP	0
CMW10	Molybdenum	CMW100415	08/03/96	15	1.78	µg/g	JP	0
CMW10	Molybdenum	CMW100625	08/05/96	25	1.76	µg/g	JP	0
CMW10	Molybdenum	CMW100730	08/05/96	30	1.3	µg/g	JP	0

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Boring	Parameter	Site ID	Sample Date	Depth	Value	Units	Flag Codes	Background Concentration
CMW10	Nickel	CMW100205	08/03/96	5	17.9	µg/g		14.3
CMW10	Nickel	CMW100205	08/03/96	5	18.6	µg/g	D	14.3
CMW10	Nickel	CMW100310	08/03/96	10	19.9	µg/g		14.3
CMW10	Nickel	CMW100415	08/03/96	15	18.1	µg/g		14.3
CMW10	Nickel	CMW100520	08/03/96	20	19.5	µg/g		14.3
CMW10	Nickel	CMW100625	08/05/96	25	17.5	µg/g		14.3
CMW10	Nickel	CMW100730	08/05/96	30	16.4	µg/g		14.3
CMW10	Nickel	CMW100833	08/05/96	33	16.9	µg/g		14.3
CMW10	Silver	CMW100520	08/03/96	20	0.56	µg/g	JP	0
CMW10	Thallium	CMW100101	08/03/96	1	0.572	µg/g	JP	0
CMW10	Thallium	CMW100205	08/03/96	5	1.03	µg/g	JP	0
CMW10	Thallium	CMW100310	08/03/96	10	0.944	µg/g	JP	0
CMW10	Thallium	CMW100520	08/03/96	20	0.567	µg/g	JP	0
CMW10	Vanadium	CMW100205	08/03/96	5	32.2	µg/g	D	31.3
CMW10	Vanadium	CMW100310	08/03/96	10	36.8	µg/g		31.3
CMW10	Vanadium	CMW100415	08/03/96	15	33.9	µg/g		31.3
CMW10	Vanadium	CMW100520	08/03/96	20	44.7	µg/g		31.3
CMW10	Vanadium	CMW100625	08/05/96	25	39.6	µg/g		31.3
CMW10	Vanadium	CMW100730	08/05/96	30	33.9	µg/g		31.3
CMW10	Vanadium	CMW100833	08/05/96	33	38.8	µg/g		31.3
CMW10	Zinc	CMW100310	08/03/96	10	32.9	µg/g		29.2
CMW10	Zinc	CMW100625	08/05/96	25	34.8	µg/g		29.2
CMW10	Zinc	CMW100730	08/05/96	30	31.5	µg/g		29.2
CMW10	Zinc	CMW100833	08/05/96	33	31.7	µg/g		29.2
CMW11	Cadmium	CMW110101	08/08/96	1	0.353	µg/g		0
CMW11	Cadmium	CMW110205	08/08/96	5	0.0564	µg/g	JP	0
CMW11	Cadmium	CMW110310	08/08/96	10	0.0781	µg/g	JP	0
CMW11	Cadmium	CMW110412	08/08/96	12	0.123	µg/g	JP	0

Table 3-37
Samples that Exceeded Background
Soil Borings
Current OB/OD Area Ground Water System
Fort Wingate Depot Activity
Gallup, New Mexico

Boring	Parameter	Site ID	Sample Date	Depth	Value	Units	Flag Codes	Background Concentration
CMW11	Copper	CMW110101	08/08/96	1	22.1	µg/g		18.9
CMW11	Molybdenum	CMW110101	08/08/96	1	1.86	µg/g	JP	0
CMW11	Molybdenum	CMW110205	08/08/96	5	1.86	µg/g	JP	0
CMW12	Cadmium	CMW120101	08/08/96	1	0.0961	µg/g	DJP	0
CMW12	Cadmium	CMW120101	08/08/96	1	0.0933	µg/g	JP	0
CMW12	Cadmium	CMW120203	08/08/96	3	0.308	µg/g		0
CMW12	Copper	CMW120203	08/08/96	3	37	µg/g		18.9
CMW12	Molybdenum	CMW120101	08/08/96	1	2.57	µg/g	DJP	0
CMW12	Molybdenum	CMW120101	08/08/96	1	2.22	µg/g	JP	0
CMW14	2,4,6-Trinitrotoluene	CMW140205	08/05/96	5	0.548	µg/g	JP	0
CMW14	4-Amino-2,6-dinitrotoluene	CMW141360	08/06/96	60	0.496	µg/g	JP	0
CMW14	Antimony	CMW141045	08/05/96	45	5.85	µg/g	JP	0
CMW14	Arsenic	CMW140520	08/05/96	20	4.21	µg/g		2.7
CMW14	Arsenic	CMW140625	08/05/96	25	4.26	µg/g		2.7
CMW14	Arsenic	CMW140730	08/05/96	30	6.71	µg/g		2.7
CMW14	Arsenic	CMW140835	08/05/96	35	5.76	µg/g		2.7
CMW14	Arsenic	CMW140940	08/05/96	40	11.7	µg/g		2.7
CMW14	Arsenic	CMW141045	08/05/96	45	15.8	µg/g		2.7
CMW14	Arsenic	CMW141150	08/05/96	50	15.2	µg/g		2.7
CMW14	Arsenic	CMW141255	08/05/96	55	13.6	µg/g		2.7
CMW14	Arsenic	CMW141360	08/06/96	60	10.9	µg/g		2.7
CMW14	Barium	CMW140205	08/05/96	5	626	µg/g		430.7
CMW14	Barium	CMW140730	08/05/96	30	577	µg/g		430.7
CMW14	Barium	CMW141150	08/05/96	50	503	µg/g		430.7
CMW14	Barium	CMW141360	08/06/96	60	448	µg/g		430.7
CMW14	Beryllium	CMW140101	08/05/96	1	1.18	µg/g		1.1
CMW14	Beryllium	CMW140625	08/05/96	25	1.33	µg/g		1.1
CMW14	Beryllium	CMW140730	08/05/96	30	1.15	µg/g		1.1

Table 3-37
Samples that Exceeded Background
Soil Borings
Current OB/OD Area Ground Water System
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Gallup, New Mexico

Boring	Parameter	Site ID	Sample Date	Depth	Value	Units	Flag Codes	Background Concentration
CMW14	Beryllium	CMW140940	08/05/96	40	1.2	µg/g		1.1
CMW14	Beryllium	CMW141150	08/05/96	50	1.12	µg/g		1.1
CMW14	Beryllium	CMW141255	08/05/96	55	1.26	µg/g		1.1
CMW14	Beryllium	CMW141360	08/06/96	60	1.47	µg/g		1.1
CMW14	Cadmium	CMW140101	08/05/96	1	0.429	µg/g		0
CMW14	Cadmium	CMW140205	08/05/96	5	0.383	µg/g		0
CMW14	Cadmium	CMW140205	08/05/96	5	0.418	µg/g	D	0
CMW14	Cadmium	CMW140310	08/05/96	10	0.236	µg/g		0
CMW14	Cadmium	CMW140415	08/05/96	15	0.351	µg/g		0
CMW14	Cadmium	CMW140520	08/05/96	20	0.3	µg/g		0
CMW14	Cadmium	CMW140625	08/05/96	25	0.457	µg/g		0
CMW14	Cadmium	CMW140730	08/05/96	30	0.388	µg/g		0
CMW14	Cadmium	CMW140835	08/05/96	35	0.412	µg/g		0
CMW14	Cadmium	CMW140940	08/05/96	40	0.413	µg/g		0
CMW14	Cadmium	CMW141045	08/05/96	45	0.429	µg/g		0
CMW14	Cadmium	CMW141150	08/05/96	50	0.411	µg/g		0
CMW14	Cadmium	CMW141255	08/05/96	55	0.406	µg/g		0
CMW14	Cadmium	CMW141360	08/06/96	60	0.305	µg/g		0
CMW14	Chromium	CMW140101	08/05/96	1	22.7	µg/g		17
CMW14	Chromium	CMW140205	08/05/96	5	21.3	µg/g		17
CMW14	Chromium	CMW140205	08/05/96	5	24.7	µg/g	D	17
CMW14	Chromium	CMW140415	08/05/96	15	22	µg/g		17
CMW14	Chromium	CMW140520	08/05/96	20	21.3	µg/g		17
CMW14	Chromium	CMW140625	08/05/96	25	30.1	µg/g		17
CMW14	Chromium	CMW140730	08/05/96	30	23.7	µg/g		17
CMW14	Chromium	CMW140835	08/05/96	35	24.5	µg/g		17
CMW14	Chromium	CMW141045	08/05/96	45	20.5	µg/g		17
CMW14	Chromium	CMW141150	08/05/96	50	28.6	µg/g		17

Table 3-37
Samples that Exceeded Background
Soil Borings
Current OB/OD Area Ground Water System
Fort Wingate Depot Activity
Gallup, New Mexico

Boring	Parameter	Site ID	Sample Date	Depth	Value	Units	Flag Codes	Background Concentration
CMW14	Chromium	CMW141255	08/05/96	55	20.9	µg/g		17
CMW14	Chromium	CMW141360	08/06/96	60	23.8	µg/g		17
CMW14	Cobalt	CMW140101	08/05/96	1	8.15	µg/g		6.5
CMW14	Cobalt	CMW140205	08/05/96	5	7.97	µg/g		6.5
CMW14	Cobalt	CMW140205	08/05/96	5	7.87	µg/g	D	6.5
CMW14	Cobalt	CMW140520	08/05/96	20	7.57	µg/g		6.5
CMW14	Cobalt	CMW140625	08/05/96	25	9.07	µg/g		6.5
CMW14	Cobalt	CMW140730	08/05/96	30	8.79	µg/g		6.5
CMW14	Cobalt	CMW140835	08/05/96	35	8.87	µg/g		6.5
CMW14	Cobalt	CMW140940	08/05/96	40	11.1	µg/g		6.5
CMW14	Cobalt	CMW141045	08/05/96	45	12.4	µg/g		6.5
CMW14	Cobalt	CMW141150	08/05/96	50	12.1	µg/g		6.5
CMW14	Cobalt	CMW141255	08/05/96	55	9.11	µg/g		6.5
CMW14	Cobalt	CMW141360	08/06/96	60	8.93	µg/g		6.5
CMW14	Copper	CMW140101	08/05/96	1	45.9	µg/g		18.9
CMW14	Copper	CMW140205	08/05/96	5	21.4	µg/g		18.9
CMW14	Copper	CMW140205	08/05/96	5	20.7	µg/g	D	18.9
CMW14	Iron	CMW140101	08/05/96	1	22600	µg/g		17647.3
CMW14	Iron	CMW140205	08/05/96	5	19000	µg/g		17647.3
CMW14	Iron	CMW140205	08/05/96	5	21400	µg/g	D	17647.3
CMW14	Iron	CMW140415	08/05/96	15	20800	µg/g		17647.3
CMW14	Iron	CMW140520	08/05/96	20	18500	µg/g		17647.3
CMW14	Iron	CMW140625	08/05/96	25	28200	µg/g		17647.3
CMW14	Iron	CMW140730	08/05/96	30	24400	µg/g		17647.3
CMW14	Iron	CMW140835	08/05/96	35	26500	µg/g		17647.3
CMW14	Iron	CMW140940	08/05/96	40	29700	µg/g		17647.3
CMW14	Iron	CMW141045	08/05/96	45	30700	µg/g		17647.3
CMW14	Iron	CMW141150	08/05/96	50	31400	µg/g		17647.3

Table 3-37
Samples that Exceeded Background
Soil Borings
Current OB/OD Area Ground Water System
Fort Wingate Depot Activity
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Boring	Parameter	Site ID	Sample Date	Depth	Value	Units	Flag Codes	Background Concentration
CMW14	Iron	CMW141255	08/05/96	55	27400	µg/g		17647.3
CMW14	Iron	CMW141360	08/06/96	60	28500	µg/g		17647.3
CMW14	Lead	CMW140835	08/05/96	35	14.8	µg/g		12.5
CMW14	Lead	CMW140940	08/05/96	40	13	µg/g		12.5
CMW14	Lead	CMW141045	08/05/96	45	12.8	µg/g		12.5
CMW14	Lead	CMW141150	08/05/96	50	14	µg/g		12.5
CMW14	Manganese	CMW140101	08/05/96	1	694	µg/g		458.1
CMW14	Manganese	CMW140205	08/05/96	5	803	µg/g		458.1
CMW14	Manganese	CMW140205	08/05/96	5	730	µg/g	D	458.1
CMW14	Manganese	CMW140310	08/05/96	10	836	µg/g		458.1
CMW14	Manganese	CMW140415	08/05/96	15	697	µg/g		458.1
CMW14	Manganese	CMW140520	08/05/96	20	758	µg/g		458.1
CMW14	Manganese	CMW140625	08/05/96	25	502	µg/g		458.1
CMW14	Manganese	CMW140730	08/05/96	30	526	µg/g		458.1
CMW14	Manganese	CMW140835	08/05/96	35	482	µg/g		458.1
CMW14	Manganese	CMW141255	08/05/96	55	632	µg/g		458.1
CMW14	Manganese	CMW141360	08/06/96	60	760	µg/g		458.1
CMW14	Molybdenum	CMW140101	08/05/96	1	1.39	µg/g	JP	0
CMW14	Molybdenum	CMW140205	08/05/96	5	3.07	µg/g	JP	0
CMW14	Molybdenum	CMW140205	08/05/96	5	2.06	µg/g	DJP	0
CMW14	Molybdenum	CMW140310	08/05/96	10	1.49	µg/g	JP	0
CMW14	Molybdenum	CMW140415	08/05/96	15	1.66	µg/g	JP	0
CMW14	Molybdenum	CMW140520	08/05/96	20	1.24	µg/g	JP	0
CMW14	Molybdenum	CMW140835	08/05/96	35	2.51	µg/g	JP	0
CMW14	Molybdenum	CMW141150	08/05/96	50	2.97	µg/g	JP	0
CMW14	Molybdenum	CMW141360	08/06/96	60	1.39	µg/g	JP	0
CMW14	Nickel	CMW140101	08/05/96	1	21.7	µg/g		14.3
CMW14	Nickel	CMW140205	08/05/96	5	21	µg/g		14.3

Table 3-37
Samples that Exceeded Background
Soil Borings
Current OB/OD Area Ground Water System
Fort Wingate Depot Activity
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Boring	Parameter	Site ID	Sample Date	Depth	Value	Units	Flag Codes	Background Concentration
CMW14	Nickel	CMW140205	08/05/96	5	20.9	µg/g	D	14.3
CMW14	Nickel	CMW140415	08/05/96	15	16.6	µg/g		14.3
CMW14	Nickel	CMW140520	08/05/96	20	20.3	µg/g		14.3
CMW14	Nickel	CMW140625	08/05/96	25	20.6	µg/g		14.3
CMW14	Nickel	CMW140730	08/05/96	30	20.4	µg/g		14.3
CMW14	Nickel	CMW140835	08/05/96	35	20.8	µg/g		14.3
CMW14	Nickel	CMW140940	08/05/96	40	24.7	µg/g		14.3
CMW14	Nickel	CMW141045	08/05/96	45	25.2	µg/g		14.3
CMW14	Nickel	CMW141150	08/05/96	50	26.2	µg/g		14.3
CMW14	Nickel	CMW141255	08/05/96	55	21.5	µg/g		14.3
CMW14	Nickel	CMW141360	08/06/96	60	25.3	µg/g		14.3
CMW14	RDX	CMW140205	08/05/96	5	0.537	µg/g	JP	0
CMW14	Vanadium	CMW140101	08/05/96	1	33.4	µg/g		31.3
CMW14	Vanadium	CMW140205	08/05/96	5	31.7	µg/g	D	31.3
CMW14	Vanadium	CMW140520	08/05/96	20	48.8	µg/g		31.3
CMW14	Vanadium	CMW140625	08/05/96	25	45.3	µg/g		31.3
CMW14	Vanadium	CMW140730	08/05/96	30	42.4	µg/g		31.3
CMW14	Vanadium	CMW140835	08/05/96	35	57.5	µg/g		31.3
CMW14	Vanadium	CMW140940	08/05/96	40	96.9	µg/g		31.3
CMW14	Vanadium	CMW141045	08/05/96	45	92.9	µg/g		31.3
CMW14	Vanadium	CMW141150	08/05/96	50	94.5	µg/g		31.3
CMW14	Vanadium	CMW141255	08/05/96	55	72.3	µg/g		31.3
CMW14	Vanadium	CMW141360	08/06/96	60	56.1	µg/g		31.3
CMW14	Zinc	CMW140101	08/05/96	1	30.4	µg/g		29.2
CMW14	Zinc	CMW140205	08/05/96	5	31	µg/g		29.2
CMW14	Zinc	CMW140205	08/05/96	5	35.7	µg/g	D	29.2
CMW14	Zinc	CMW140625	08/05/96	25	38.4	µg/g		29.2
CMW14	Zinc	CMW140730	08/05/96	30	37.8	µg/g		29.2

Table 3-37
Samples that Exceeded Background
Soil Borings
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Fort Wingate Depot Activity
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Boring	Parameter	Site ID	Sample Date	Depth	Value	Units	Flag Codes	Background Concentration
CMW14	Zinc	CMW140835	08/05/96	35	43	µg/g		29.2
CMW14	Zinc	CMW140940	08/05/96	40	44.4	µg/g		29.2
CMW14	Zinc	CMW141045	08/05/96	45	47.2	µg/g		29.2
CMW14	Zinc	CMW141150	08/05/96	50	46.7	µg/g		29.2
CMW14	Zinc	CMW141255	08/05/96	55	35.3	µg/g		29.2
CMW14	Zinc	CMW141360	08/06/96	60	38	µg/g		29.2
CMW15	Antimony	CMW150203	08/09/96	3	19	µg/g	JP	0
CMW15	Barium	CMW150203	08/09/96	3	1800	µg/g		430.7
CMW15	Cadmium	CMW150101	08/09/96	1	0.229	µg/g		0
CMW15	Cadmium	CMW150203	08/09/96	3	0.262	µg/g		0
CMW15	Copper	CMW150101	08/09/96	1	22.8	µg/g		18.9
CMW15	Copper	CMW150203	08/09/96	3	37.5	µg/g		18.9
CMW15	Iron	CMW150203	08/09/96	3	17900	µg/g		17647.3
CMW15	Lead	CMW150203	08/09/96	3	16	µg/g		12.5
CMW15	Manganese	CMW150203	08/09/96	3	492	µg/g		458.1
CMW15	Molybdenum	CMW150203	08/09/96	3	1.25	µg/g	JP	0
CMW15	Zinc	CMW150203	08/09/96	3	48.5	µg/g		29.2
CMW16	Antimony	CMW160101	08/29/96	1	4.87	µg/g	JP	0
CMW16	Antimony	CMW160310	08/29/96	10	5.29	µg/g	JP	0
CMW16	Antimony	CMW160415	08/29/96	15	5.75	µg/g	JP	0
CMW16	Arsenic	CMW160101	08/29/96	1	11.8	µg/g		2.7
CMW16	Arsenic	CMW160205	08/29/96	5	5.62	µg/g		2.7
CMW16	Arsenic	CMW160310	08/29/96	10	2.98	µg/g		2.7
CMW16	Barium	CMW160415	08/29/96	15	1200	µg/g		430.7
CMW16	Beryllium	CMW160310	08/29/96	10	1.66	µg/g		1.1
CMW16	Beryllium	CMW160415	08/29/96	15	1.19	µg/g		1.1
CMW16	Cadmium	CMW160101	08/29/96	1	0.0776	µg/g	JP	0
CMW16	Chromium	CMW160310	08/29/96	10	26.2	µg/g		17

Table 3-37
Samples that Exceeded Background
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Boring	Parameter	Site ID	Sample Date	Depth	Value	Units	Flag Codes	Background Concentration
CMW16	Chromium	CMW160415	08/29/96	15	24.8	µg/g		17
CMW16	Cobalt	CMW160101	08/29/96	1	14.2	µg/g		6.5
CMW16	Cobalt	CMW160310	08/29/96	10	6.93	µg/g		6.5
CMW16	Cobalt	CMW160415	08/29/96	15	8.97	µg/g		6.5
CMW16	Iron	CMW160101	08/29/96	1	55000	µg/g		17647.3
CMW16	Iron	CMW160205	08/29/96	5	38600	µg/g		17647.3
CMW16	Iron	CMW160310	08/29/96	10	25700	µg/g		17647.3
CMW16	Iron	CMW160415	08/29/96	15	18800	µg/g		17647.3
CMW16	Lead	CMW160101	08/29/96	1	18	µg/g		12.5
CMW16	Lead	CMW160205	08/29/96	5	36	µg/g		12.5
CMW16	Lead	CMW160310	08/29/96	10	13.3	µg/g		12.5
CMW16	Lead	CMW160415	08/29/96	15	12.6	µg/g		12.5
CMW16	Manganese	CMW160101	08/29/96	1	1170	µg/g		458.1
CMW16	Manganese	CMW160205	08/29/96	5	553	µg/g		458.1
CMW16	Nickel	CMW160310	08/29/96	10	16.7	µg/g		14.3
CMW16	Thallium	CMW160101	08/29/96	1	1.08	µg/g	JP	0
CMW16	Vanadium	CMW160310	08/29/96	10	54.2	µg/g		31.3
CMW16	Vanadium	CMW160415	08/29/96	15	39.5	µg/g		31.3
CMW16	Zinc	CMW160101	08/29/96	1	88.5	µg/g		29.2
CMW16	Zinc	CMW160205	08/29/96	5	185	µg/g		29.2
CMW16	Zinc	CMW160310	08/29/96	10	33.4	µg/g		29.2
CMW16	Zinc	CMW160415	08/29/96	15	34.4	µg/g		29.2
CMW17	Arsenic	CMW170310	08/16/96	10	3.34	µg/g		2.7
CMW17	Arsenic	CMW170310	08/16/96	10	3.99	µg/g	D	2.7
CMW17	Arsenic	CMW170415	08/16/96	15	3.36	µg/g		2.7
CMW17	Arsenic	CMW170735	08/16/96	35	5.04	µg/g		2.7
CMW17	Arsenic	CMW170840	08/16/96	40	6.8	µg/g		2.7
CMW17	Arsenic	CMW170945	08/16/96	45	23.2	µg/g		2.7

Table 3-37
Samples that Exceeded Background
Soil Borings
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Fort Wingate Depot Activity
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Boring	Parameter	Site ID	Sample Date	Depth	Value	Units	Flag Codes	Background Concentration
CMW17	Arsenic	CMW171052	08/17/96	52	7.44	µg/g		2.7
CMW17	Barium	CMW170310	08/16/96	10	556	µg/g		430.7
CMW17	Barium	CMW170310	08/16/96	10	1050	µg/g	D	430.7
CMW17	Barium	CMW170415	08/16/96	15	1500	µg/g		430.7
CMW17	Barium	CMW170525	08/16/96	25	680	µg/g		430.7
CMW17	Barium	CMW170630	08/16/96	30	549	µg/g		430.7
CMW17	Barium	CMW170945	08/16/96	45	946	µg/g		430.7
CMW17	Beryllium	CMW170310	08/16/96	10	1.2	µg/g		1.1
CMW17	Beryllium	CMW170525	08/16/96	25	1.15	µg/g		1.1
CMW17	Beryllium	CMW170840	08/16/96	40	1.28	µg/g		1.1
CMW17	Cadmium	CMW170101	08/16/96	1	0.0977	µg/g	JP	0
CMW17	Cadmium	CMW170205	08/16/96	5	0.35	µg/g		0
CMW17	Cadmium	CMW170310	08/16/96	10	0.196	µg/g	JP	0
CMW17	Cadmium	CMW170310	08/16/96	10	0.292	µg/g	D	0
CMW17	Cadmium	CMW170415	08/16/96	15	0.221	µg/g		0
CMW17	Cadmium	CMW170525	08/16/96	25	0.307	µg/g		0
CMW17	Cadmium	CMW170630	08/16/96	30	0.291	µg/g		0
CMW17	Cadmium	CMW170735	08/16/96	35	0.228	µg/g		0
CMW17	Cadmium	CMW170840	08/16/96	40	0.314	µg/g		0
CMW17	Cadmium	CMW170945	08/16/96	45	0.401	µg/g		0
CMW17	Cadmium	CMW171052	08/17/96	52	0.307	µg/g		0
CMW17	Chromium	CMW170310	08/16/96	10	25.7	µg/g		17
CMW17	Chromium	CMW170310	08/16/96	10	25.4	µg/g	D	17
CMW17	Chromium	CMW170415	08/16/96	15	25.2	µg/g		17
CMW17	Chromium	CMW170525	08/16/96	25	38.3	µg/g		17
CMW17	Chromium	CMW170630	08/16/96	30	41.5	µg/g		17
CMW17	Chromium	CMW170735	08/16/96	35	21.9	µg/g		17
CMW17	Chromium	CMW170840	08/16/96	40	47	µg/g		17

Table 3-37
Samples that Exceeded Background
Soil Borings
Current OB/OD Area Ground Water System
Fort Wingate Depot Activity
Gallup, New Mexico

Boring	Parameter	Site ID	Sample Date	Depth	Value	Units	Flag Codes	Background Concentration
CMW17	Chromium	CMW170945	08/16/96	45	25.2	µg/g		17
CMW17	Chromium	CMW171052	08/17/96	52	24.1	µg/g		17
CMW17	Cobalt	CMW170310	08/16/96	10	8.9	µg/g		6.5
CMW17	Cobalt	CMW170310	08/16/96	10	8.56	µg/g	D	6.5
CMW17	Cobalt	CMW170415	08/16/96	15	8.14	µg/g		6.5
CMW17	Cobalt	CMW170525	08/16/96	25	9.02	µg/g		6.5
CMW17	Cobalt	CMW170630	08/16/96	30	7.97	µg/g		6.5
CMW17	Cobalt	CMW170735	08/16/96	35	7.81	µg/g		6.5
CMW17	Cobalt	CMW170840	08/16/96	40	10.2	µg/g		6.5
CMW17	Cobalt	CMW170945	08/16/96	45	14.6	µg/g		6.5
CMW17	Cobalt	CMW171052	08/17/96	52	9.78	µg/g		6.5
CMW17	Copper	CMW170205	08/16/96	5	39.9	µg/g		18.9
CMW17	Copper	CMW170945	08/16/96	45	20.2	µg/g		18.9
CMW17	Iron	CMW170310	08/16/96	10	28200	µg/g		17647.3
CMW17	Iron	CMW170310	08/16/96	10	26900	µg/g	D	17647.3
CMW17	Iron	CMW170415	08/16/96	15	19600	µg/g		17647.3
CMW17	Iron	CMW170525	08/16/96	25	24500	µg/g		17647.3
CMW17	Iron	CMW170630	08/16/96	30	25700	µg/g		17647.3
CMW17	Iron	CMW170735	08/16/96	35	23200	µg/g		17647.3
CMW17	Iron	CMW170840	08/16/96	40	30800	µg/g		17647.3
CMW17	Iron	CMW170945	08/16/96	45	36600	µg/g		17647.3
CMW17	Iron	CMW171052	08/17/96	52	23700	µg/g		17647.3
CMW17	Manganese	CMW170630	08/16/96	30	481	µg/g		458.1
CMW17	Manganese	CMW170945	08/16/96	45	460	µg/g		458.1
CMW17	Manganese	CMW171052	08/17/96	52	485	µg/g		458.1
CMW17	Molybdenum	CMW170310	08/16/96	10	1.47	µg/g	JP	0
CMW17	Molybdenum	CMW170310	08/16/96	10	2.18	µg/g	DJP	0
CMW17	Molybdenum	CMW170630	08/16/96	30	1.38	µg/g	JP	0

Table 3-37
Samples that Exceeded Background
Soil Borings
Current OB/OD Area Ground Water System
Fort Wingate Depot Activity
Gallup, New Mexico

Boring	Parameter	Site ID	Sample Date	Depth	Value	Units	Flag Codes	Background Concentration
CMW17	Nickel	CMW170310	08/16/96	10	22.7	µg/g		14.3
CMW17	Nickel	CMW170310	08/16/96	10	23.7	µg/g	D	14.3
CMW17	Nickel	CMW170415	08/16/96	15	19.7	µg/g		14.3
CMW17	Nickel	CMW170525	08/16/96	25	20.9	µg/g		14.3
CMW17	Nickel	CMW170630	08/16/96	30	21	µg/g		14.3
CMW17	Nickel	CMW170735	08/16/96	35	20.8	µg/g		14.3
CMW17	Nickel	CMW170840	08/16/96	40	28.3	µg/g		14.3
CMW17	Nickel	CMW170945	08/16/96	45	35.2	µg/g		14.3
CMW17	Nickel	CMW171052	08/17/96	52	23.6	µg/g		14.3
CMW17	Thallium	CMW170310	08/16/96	10	2.1	µg/g		0
CMW17	Thallium	CMW170310	08/16/96	10	1.69	µg/g	D	0
CMW17	Thallium	CMW170415	08/16/96	15	1.24	µg/g		0
CMW17	Thallium	CMW170525	08/16/96	25	2.02	µg/g		0
CMW17	Thallium	CMW170630	08/16/96	30	2.2	µg/g		0
CMW17	Thallium	CMW170735	08/16/96	35	1.65	µg/g		0
CMW17	Thallium	CMW170840	08/16/96	40	2	µg/g		0
CMW17	Thallium	CMW170945	08/16/96	45	3.1	µg/g		0
CMW17	Thallium	CMW171052	08/17/96	52	2.56	µg/g		0
CMW17	Vanadium	CMW170310	08/16/96	10	51.3	µg/g		31.3
CMW17	Vanadium	CMW170310	08/16/96	10	55.8	µg/g	D	31.3
CMW17	Vanadium	CMW170415	08/16/96	15	47.7	µg/g		31.3
CMW17	Vanadium	CMW170630	08/16/96	30	37.1	µg/g		31.3
CMW17	Vanadium	CMW170735	08/16/96	35	44.3	µg/g		31.3
CMW17	Vanadium	CMW170840	08/16/96	40	63.6	µg/g		31.3
CMW17	Vanadium	CMW170945	08/16/96	45	117	µg/g		31.3
CMW17	Vanadium	CMW171052	08/17/96	52	59	µg/g		31.3
CMW17	Zinc	CMW170310	08/16/96	10	32.2	µg/g		29.2
CMW17	Zinc	CMW170310	08/16/96	10	32.2	µg/g	D	29.2

Table 3-37
Samples that Exceeded Background
Soil Borings
Current OB/OD Area Ground Water System
Fort Wingate Depot Activity
Gallup, New Mexico

Boring	Parameter	Site ID	Sample Date	Depth	Value	Units	Flag Codes	Background Concentration
CMW17	Zinc	CMW170630	08/16/96	30	32	µg/g		29.2
CMW17	Zinc	CMW170840	08/16/96	40	37.9	µg/g		29.2
CMW17	Zinc	CMW170945	08/16/96	45	45	µg/g		29.2
CMW18	Barium	CMW180520	08/19/96	20	642	µg/g	V	430.7
CMW18	Chromium	CMW180415	08/19/96	15	37.3	µg/g	V	17
CMW18	Chromium	CMW180520	08/19/96	20	25.5	µg/g	V	17
CMW18	Cobalt	CMW180520	08/19/96	20	7.57	µg/g	V	6.5
CMW18	Iron	CMW180415	08/19/96	15	20700	µg/g	V	17647.3
CMW18	Iron	CMW180520	08/19/96	20	18600	µg/g	V	17647.3
CMW18	Nickel	CMW180415	08/19/96	15	14.7	µg/g	V	14.3
CMW18	Nickel	CMW180520	08/19/96	20	16.8	µg/g	V	14.3
CMW18	Thallium	CMW180415	08/19/96	15	0.691	µg/g	VJP	0
CMW18	Thallium	CMW180520	08/19/96	20	0.713	µg/g	VJP	0
CMW18	Vanadium	CMW180415	08/19/96	15	34.4	µg/g	V	31.3
CMW18	Zinc	CMW180415	08/19/96	15	32.2	µg/g	V	29.2
CMW18	Zinc	CMW180520	08/19/96	20	30.1	µg/g	V	29.2
CMW19	Antimony	CMW190415	08/27/96	15	5.56	µg/g	JP	0
CMW19	Antimony	CMW190835	08/28/96	35	5.32	µg/g	JP	0
CMW19	Barium	CMW190310	08/27/96	10	1070	µg/g		430.7
CMW19	Beryllium	CMW190415	08/27/96	15	1.69	µg/g		1.1
CMW19	Beryllium	CMW190520	08/27/96	20	1.73	µg/g		1.1
CMW19	Beryllium	CMW190625	08/27/96	25	1.67	µg/g		1.1
CMW19	Beryllium	CMW190730	08/27/96	30	1.64	µg/g		1.1
CMW19	Beryllium	CMW190835	08/28/96	35	1.27	µg/g		1.1
CMW19	Beryllium	CMW190940	08/28/96	40	1.45	µg/g		1.1
CMW19	Cadmium	CMW190101	08/27/96	1	0.205	µg/g	JP	0
CMW19	Cadmium	CMW190205	08/27/96	5	0.16	µg/g	JP	0
CMW19	Chromium	CMW190415	08/27/96	15	40.7	µg/g		17

Table 3-37
Samples that Exceeded Background
Soil Borings
Current OB/OD Area Ground Water System
Fort Wingate Depot Activity
Gallup, New Mexico

Boring	Parameter	Site ID	Sample Date	Depth	Value	Units	Flag Codes	Background Concentration
CMW19	Chromium	CMW190520	08/27/96	20	49	µg/g		17
CMW19	Chromium	CMW190625	08/27/96	25	78.9	µg/g		17
CMW19	Chromium	CMW190730	08/27/96	30	48.7	µg/g		17
CMW19	Chromium	CMW190835	08/28/96	35	37.8	µg/g		17
CMW19	Chromium	CMW190940	08/28/96	40	43.9	µg/g		17
CMW19	Cobalt	CMW190415	08/27/96	15	13	µg/g		6.5
CMW19	Cobalt	CMW190520	08/27/96	20	12.5	µg/g		6.5
CMW19	Cobalt	CMW190625	08/27/96	25	12.2	µg/g		6.5
CMW19	Cobalt	CMW190730	08/27/96	30	12	µg/g		6.5
CMW19	Cobalt	CMW190835	08/28/96	35	9.11	µg/g		6.5
CMW19	Cobalt	CMW190940	08/28/96	40	13.4	µg/g		6.5
CMW19	Copper	CMW190101	08/27/96	1	27.4	µg/g		18.9
CMW19	Copper	CMW190205	08/27/96	5	24.3	µg/g		18.9
CMW19	Iron	CMW190415	08/27/96	15	36300	µg/g		17647.3
CMW19	Iron	CMW190520	08/27/96	20	38100	µg/g		17647.3
CMW19	Iron	CMW190625	08/27/96	25	36400	µg/g		17647.3
CMW19	Iron	CMW190730	08/27/96	30	34900	µg/g		17647.3
CMW19	Iron	CMW190835	08/28/96	35	32900	µg/g		17647.3
CMW19	Iron	CMW190940	08/28/96	40	36900	µg/g		17647.3
CMW19	Lead	CMW190415	08/27/96	15	13.6	µg/g		12.5
CMW19	Lead	CMW190520	08/27/96	20	14	µg/g		12.5
CMW19	Lead	CMW190625	08/27/96	25	14.6	µg/g		12.5
CMW19	Lead	CMW190730	08/27/96	30	12.9	µg/g		12.5
CMW19	Lead	CMW190835	08/28/96	35	13.8	µg/g		12.5
CMW19	Lead	CMW190940	08/28/96	40	15.5	µg/g		12.5
CMW19	Manganese	CMW190205	08/27/96	5	813	µg/g		458.1
CMW19	Manganese	CMW190310	08/27/96	10	651	µg/g		458.1
CMW19	Manganese	CMW190415	08/27/96	15	527	µg/g		458.1

Table 3-37
Samples that Exceeded Background
Soil Borings
Current OB/OD Area Ground Water System
Fort Wingate Depot Activity
Gallup, New Mexico

Boring	Parameter	Site ID	Sample Date	Depth	Value	Units	Flag Codes	Background Concentration
CMW19	Manganese	CMW190520	08/27/96	20	584	µg/g		458.1
CMW19	Manganese	CMW190625	08/27/96	25	649	µg/g		458.1
CMW19	Manganese	CMW190730	08/27/96	30	612	µg/g		458.1
CMW19	Nickel	CMW190415	08/27/96	15	28.1	µg/g		14.3
CMW19	Nickel	CMW190520	08/27/96	20	28.2	µg/g		14.3
CMW19	Nickel	CMW190625	08/27/96	25	27.2	µg/g		14.3
CMW19	Nickel	CMW190730	08/27/96	30	25.8	µg/g		14.3
CMW19	Nickel	CMW190835	08/28/96	35	24.7	µg/g		14.3
CMW19	Nickel	CMW190940	08/28/96	40	27.5	µg/g		14.3
CMW19	Selenium	CMW190835	08/28/96	35	0.72	µg/g	JP	0.4
CMW19	Thallium	CMW190205	08/27/96	5	0.565	µg/g	JP	0
CMW19	Thallium	CMW190520	08/27/96	20	0.842	µg/g	JP	0
CMW19	Thallium	CMW190625	08/27/96	25	0.942	µg/g	JP	0
CMW19	Thallium	CMW190730	08/27/96	30	0.798	µg/g	JP	0
CMW19	Thallium	CMW190835	08/28/96	35	0.742	µg/g	JP	0
CMW19	Thallium	CMW190940	08/28/96	40	0.898	µg/g	JP	0
CMW19	Vanadium	CMW190415	08/27/96	15	53.5	µg/g		31.3
CMW19	Vanadium	CMW190520	08/27/96	20	87.2	µg/g		31.3
CMW19	Vanadium	CMW190625	08/27/96	25	60.2	µg/g		31.3
CMW19	Vanadium	CMW190730	08/27/96	30	44.2	µg/g		31.3
CMW19	Vanadium	CMW190835	08/28/96	35	47.3	µg/g		31.3
CMW19	Vanadium	CMW190940	08/28/96	40	44.9	µg/g		31.3
CMW19	Zinc	CMW190205	08/27/96	5	38.8	µg/g		29.2
CMW19	Zinc	CMW190415	08/27/96	15	50.7	µg/g		29.2
CMW19	Zinc	CMW190520	08/27/96	20	55.5	µg/g		29.2
CMW19	Zinc	CMW190625	08/27/96	25	53.3	µg/g		29.2
CMW19	Zinc	CMW190730	08/27/96	30	53.7	µg/g		29.2
CMW19	Zinc	CMW190835	08/28/96	35	47.9	µg/g		29.2

Table 3-37
Samples that Exceeded Background
Soil Borings
Current OB/OD Area Ground Water System
Fort Wingate Depot Activity
Gallup, New Mexico

Boring	Parameter	Site ID	Sample Date	Depth	Value	Units	Flag Codes	Background Concentration
CMW19	Zinc	CMW190940	08/28/96	40	60.8	µg/g		29.2
CMW20	Cadmium	CMW200101	10/05/96	1	0.68	µg/g		0
CMW20	Cadmium	CMW200205	10/05/96	5	0.241	µg/g	JP	0
CMW20	Chromium	CMW200101	10/05/96	1	17.4	µg/g		17
CMW20	Copper	CMW200101	10/05/96	1	155	µg/g		18.9
CMW20	RDX	CMW200205	10/05/96	5	1.07	µg/g	JP	0
CMW20	Silver	CMW200101	10/05/96	1	0.515	µg/g	JP	0
CMW21	Arsenic	CMW210110	07/14/98	10	4.1	µg/g		2.7
CMW21	Beryllium	CMW210110	07/14/98	10	1.15	µg/g		1.1
CMW21	Beryllium	CMW210223	07/14/98	23	1.2	µg/g		1.1
CMW21	Cadmium	CMW210110	07/14/98	10	0.0911	µg/g		0
CMW21	Iron	CMW210223	07/14/98	23	34800	µg/g		17647.3
CMW21	Manganese	CMW210223	07/14/98	23	528	µg/g		458.1
CMW21	Silver	CMW210110	07/14/98	10	0.0493	µg/g		0
CMW21	Silver	CMW210223	07/14/98	23	0.017	µg/g		0
CMW21	Thallium	CMW210110	07/14/98	10	0.322	µg/g		0
CMW21	Thallium	CMW210223	07/14/98	23	0.174	µg/g		0
CMW21	Zinc	CMW210223	07/14/98	23	39.3	µg/g		29.2
CMW22	Cadmium	CMW220110	07/31/98	10	0.0335	µg/g	D	0
CMW22	Cadmium	CMW220110	07/31/98	10	0.0332	µg/g		0
CMW22	Silver	CMW220110	07/31/98	10	0.344	µg/g	D	0
CMW22	Zinc	CMW220110	07/31/98	10	46.2	µg/g	D	29.2
CMW22	Zinc	CMW220110	07/31/98	10	42	µg/g		29.2
CMW23	Cadmium	CMW230110	08/17/98	10	0.0479	µg/g		0
CMW23	Cadmium	CMW230229	08/17/98	29	0.0343	µg/g		0
CMW23	Silver	CMW230110	08/17/98	10	0.0293	µg/g		0
CMW23	Silver	CMW230229	08/17/98	29	0.0168	µg/g		0
CMW23	Thallium	CMW230110	08/17/98	10	0.00977	µg/g		0

Table 3-37
Samples that Exceeded Background
Soil Borings
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Fort Wingate Depot Activity
Gallup, New Mexico

Boring	Parameter	Site ID	Sample Date	Depth	Value	Units	Flag Codes	Background Concentration
CMW23	Zinc	CMW230110	08/17/98	10	42.1	µg/g		29.2
CMW24	Arsenic	CMW240110	07/15/98	10	3.37	µg/g		2.7
CMW24	Beryllium	CMW240265	07/15/98	65	1.46	µg/g		1.1
CMW24	Cadmium	CMW240110	07/15/98	10	0.0737	µg/g		0
CMW24	Silver	CMW240110	07/15/98	10	0.0436	µg/g		0
CMW24	Silver	CMW240265	07/15/98	65	0.0276	µg/g		0
CMW24	Thallium	CMW240110	07/15/98	10	0.292	µg/g		0
CMW24	Thallium	CMW240265	07/15/98	65	0.352	µg/g		0
CMW24	Zinc	CMW240110	07/15/98	10	57.7	µg/g		29.2
CMW25	Cadmium	CMW250274	09/12/98	74	0.067	µg/g		0
CMW25	Manganese	CMW250274	09/12/98	74	632	µg/g		458.1
CMW25	Selenium	CMW250274	09/12/98	74	0.448	µg/g		0.4
CMW25	Silver	CMW250274	09/12/98	74	0.0357	µg/g		0
CMW25	Thallium	CMW250110	09/09/98	10	0.0137	µg/g		0
CMW25	Thallium	CMW250274	09/12/98	74	0.047	µg/g		0
KB01	Antimony	KB010305	07/25/96	5	4.98	µg/g	JP	0
KB01	Arsenic	KB010101	07/25/96	1	6.65	µg/g		2.7
KB01	Arsenic	KB010203	07/25/96	3	6.01	µg/g		2.7
KB01	Arsenic	KB010305	07/25/96	5	8.36	µg/g	D	2.7
KB01	Arsenic	KB010305	07/25/96	5	9.02	µg/g		2.7
KB01	Cobalt	KB010101	07/25/96	1	7.11	µg/g		6.5
KB01	Cobalt	KB010203	07/25/96	3	7.71	µg/g		6.5
KB01	Cobalt	KB010305	07/25/96	5	9.28	µg/g	D	6.5
KB01	Cobalt	KB010305	07/25/96	5	6.7	µg/g		6.5
KB01	Iron	KB010101	07/25/96	1	19700	µg/g		17647.3
KB01	Iron	KB010203	07/25/96	3	19400	µg/g		17647.3
KB01	Iron	KB010305	07/25/96	5	27000	µg/g	D	17647.3
KB01	Iron	KB010305	07/25/96	5	28800	µg/g		17647.3

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Samples that Exceeded Background
Soil Borings
Current OB/OD Area Ground Water System
Fort Wingate Depot Activity
Gallup, New Mexico

Boring	Parameter	Site ID	Sample Date	Depth	Value	Units	Flag Codes	Background Concentration
KB01	Lead	KB010203	07/25/96	3	13.7	µg/g		12.5
KB01	Lead	KB010305	07/25/96	5	18.5	µg/g	D	12.5
KB01	Lead	KB010305	07/25/96	5	18.6	µg/g		12.5
KB01	Molybdenum	KB010101	07/25/96	1	1.23	µg/g	JP	0
KB01	Molybdenum	KB010203	07/25/96	3	1.22	µg/g	JP	0
KB01	Phosphorus	KB010101	07/25/96	1	268	µg/g		0
KB01	Phosphorus	KB010203	07/25/96	3	260	µg/g		0
KB01	Phosphorus	KB010305	07/25/96	5	313	µg/g	D	0
KB01	Phosphorus	KB010305	07/25/96	5	292	µg/g		0
KB01	Vanadium	KB010101	07/25/96	1	33.8	µg/g		31.3
KB01	Vanadium	KB010203	07/25/96	3	33.5	µg/g		31.3
KB01	Vanadium	KB010305	07/25/96	5	32.2	µg/g	D	31.3
KB01	Vanadium	KB010305	07/25/96	5	36.9	µg/g		31.3
KB01	Zinc	KB010101	07/25/96	1	52.5	µg/g		29.2
KB01	Zinc	KB010203	07/25/96	3	55.4	µg/g		29.2
KB01	Zinc	KB010305	07/25/96	5	82.9	µg/g	D	29.2
KB01	Zinc	KB010305	07/25/96	5	92.4	µg/g		29.2
KB02	Antimony	KB020101	07/25/96	1	4.75	µg/g	JP	0
KB02	Antimony	KB020203	07/25/96	3	6.81	µg/g	JP	0
KB02	Arsenic	KB020101	07/25/96	1	4.02	µg/g		2.7
KB02	Arsenic	KB020203	07/25/96	3	5.09	µg/g		2.7
KB02	Arsenic	KB020305	07/25/96	5	7.32	µg/g		2.7
KB02	Lead	KB020101	07/25/96	1	15.5	µg/g		12.5
KB02	Lead	KB020203	07/25/96	3	19.8	µg/g		12.5
KB02	Molybdenum	KB020203	07/25/96	3	1.17	µg/g	JP	0
KB02	Phosphorus	KB020101	07/25/96	1	188	µg/g		0
KB02	Phosphorus	KB020203	07/25/96	3	310	µg/g		0
KB02	Phosphorus	KB020305	07/25/96	5	217	µg/g		0

Table 3-37
Samples that Exceeded Background
Soil Borings
Current OB/OD Area Ground Water System
Fort Wingate Depot Activity
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Boring	Parameter	Site ID	Sample Date	Depth	Value	Units	Flag Codes	Background Concentration
KB02	Selenium	KB020203	07/25/96	3	0.424	µg/g	JP	0.4
KB02	Vanadium	KB020203	07/25/96	3	36.6	µg/g		31.3
KB02	Zinc	KB020101	07/25/96	1	153	µg/g		29.2
KB02	Zinc	KB020203	07/25/96	3	295	µg/g		29.2
KB02	Zinc	KB020305	07/25/96	5	83.5	µg/g		29.2
KB03	Antimony	KB030203	07/25/96	3	3.45	µg/g	JP	0
KB03	Arsenic	KB030101	07/25/96	1	5.29	µg/g		2.7
KB03	Arsenic	KB030203	07/25/96	3	8.95	µg/g		2.7
KB03	Arsenic	KB030305	07/25/96	5	9.07	µg/g		2.7
KB03	Cobalt	KB030203	07/25/96	3	7.17	µg/g		6.5
KB03	Cobalt	KB030305	07/25/96	5	7.3	µg/g		6.5
KB03	Iron	KB030203	07/25/96	3	30500	µg/g		17647.3
KB03	Iron	KB030305	07/25/96	5	32000	µg/g		17647.3
KB03	Lead	KB030203	07/25/96	3	12.7	µg/g		12.5
KB03	Lead	KB030305	07/25/96	5	36.3	µg/g		12.5
KB03	Manganese	KB030203	07/25/96	3	524	µg/g		458.1
KB03	Manganese	KB030305	07/25/96	5	557	µg/g		458.1
KB03	Molybdenum	KB030101	07/25/96	1	1.45	µg/g	JP	0
KB03	Molybdenum	KB030305	07/25/96	5	1.91	µg/g	JP	0
KB03	Phosphorus	KB030101	07/25/96	1	225	µg/g		0
KB03	Phosphorus	KB030203	07/25/96	3	278	µg/g		0
KB03	Phosphorus	KB030305	07/25/96	5	317	µg/g		0
KB03	Selenium	KB030203	07/25/96	3	0.66	µg/g		0.4
KB03	Selenium	KB030305	07/25/96	5	1.71	µg/g		0.4
KB03	Vanadium	KB030305	07/25/96	5	35.5	µg/g		31.3
KB03	Zinc	KB030101	07/25/96	1	46.9	µg/g		29.2
KB03	Zinc	KB030203	07/25/96	3	57.3	µg/g		29.2
KB03	Zinc	KB030305	07/25/96	5	391	µg/g		29.2

Table 3-37
Samples that Exceeded Background
Soil Borings
Current OB/OD Area Ground Water System
Fort Wingate Depot Activity
Gallup, New Mexico

Boring	Parameter	Site ID	Sample Date	Depth	Value	Units	Flag Codes	Background Concentration
KB04	Arsenic	KB040101	07/25/96	1	5.55	µg/g		2.7
KB04	Arsenic	KB040203	07/25/96	3	6.81	µg/g		2.7
KB04	Arsenic	KB040305	07/25/96	5	6.04	µg/g		2.7
KB04	Cobalt	KB040101	07/25/96	1	6.74	µg/g		6.5
KB04	Cobalt	KB040305	07/25/96	5	11.6	µg/g		6.5
KB04	Iron	KB040203	07/25/96	3	19100	µg/g		17647.3
KB04	Lead	KB040101	07/25/96	1	13	µg/g		12.5
KB04	Mercury	KB040203	07/25/96	3	0.062	µg/g	JP	0.06
KB04	Molybdenum	KB040203	07/25/96	3	2.6	µg/g	JP	0
KB04	Phosphorus	KB040101	07/25/96	1	257	µg/g		0
KB04	Phosphorus	KB040203	07/25/96	3	246	µg/g		0
KB04	Phosphorus	KB040305	07/25/96	5	241	µg/g		0
KB04	Vanadium	KB040101	07/25/96	1	32	µg/g		31.3
KB04	Zinc	KB040101	07/25/96	1	56.1	µg/g		29.2
KB04	Zinc	KB040203	07/25/96	3	49.7	µg/g		29.2
KB04	Zinc	KB040305	07/25/96	5	42.6	µg/g		29.2
KB05	4-Amino-2,6-dinitrotoluene	KB050101	07/25/96	1	0.503	µg/g	JPD	0
KB05	Arsenic	KB050101	07/25/96	1	5.25	µg/g		2.7
KB05	Arsenic	KB050101	07/25/96	1	5.8	µg/g	D	2.7
KB05	Arsenic	KB050203	07/25/96	3	5.35	µg/g		2.7
KB05	Arsenic	KB050305	07/25/96	5	5.19	µg/g		2.7
KB05	Cobalt	KB050101	07/25/96	1	6.62	µg/g	D	6.5
KB05	Cobalt	KB050101	07/25/96	1	7.15	µg/g		6.5
KB05	Phosphorus	KB050101	07/25/96	1	282	µg/g		0
KB05	Phosphorus	KB050101	07/25/96	1	239	µg/g	D	0
KB05	Phosphorus	KB050203	07/25/96	3	252	µg/g		0
KB05	Phosphorus	KB050305	07/25/96	5	267	µg/g		0
KB05	Zinc	KB050101	07/25/96	1	51.9	µg/g	D	29.2

Table 3-37
Samples that Exceeded Background
Soil Borings
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Boring	Parameter	Site ID	Sample Date	Depth	Value	Units	Flag Codes	Background Concentration
KB05	Zinc	KB050101	07/25/96	1	49.6	µg/g		29.2
KB05	Zinc	KB050203	07/25/96	3	43.6	µg/g		29.2
KB05	Zinc	KB050305	07/25/96	5	48.7	µg/g		29.2
KB06	Arsenic	KB060101	07/25/96	1	3.86	µg/g		2.7
KB06	Arsenic	KB060203	07/25/96	3	3.45	µg/g		2.7
KB06	Arsenic	KB060305	07/25/96	5	4.97	µg/g		2.7
KB06	Cadmium	KB060101	07/25/96	1	2.36	µg/g		0
KB06	Cadmium	KB060203	07/25/96	3	0.785	µg/g		0
KB06	Copper	KB060101	07/25/96	1	178	µg/g		18.9
KB06	Copper	KB060203	07/25/96	3	60.7	µg/g		18.9
KB06	Copper	KB060305	07/25/96	5	23.6	µg/g		18.9
KB06	Iron	KB060305	07/25/96	5	17700	µg/g		17647.3
KB06	Lead	KB060101	07/25/96	1	43	µg/g		12.5
KB06	Lead	KB060203	07/25/96	3	22.2	µg/g		12.5
KB06	Lead	KB060305	07/25/96	5	13.4	µg/g		12.5
KB06	Mercury	KB060101	07/25/96	1	0.0818	µg/g	JP	0.06
KB06	Molybdenum	KB060101	07/25/96	1	1.39	µg/g	JP	0
KB06	Molybdenum	KB060203	07/25/96	3	2.81	µg/g	JP	0
KB06	Phosphorus	KB060101	07/25/96	1	191	µg/g		0
KB06	Phosphorus	KB060203	07/25/96	3	194	µg/g		0
KB06	Phosphorus	KB060305	07/25/96	5	234	µg/g		0
KB06	Zinc	KB060101	07/25/96	1	536	µg/g		29.2
KB06	Zinc	KB060203	07/25/96	3	266	µg/g		29.2
KB06	Zinc	KB060305	07/25/96	5	119	µg/g		29.2
KB07	1,3,5-Trinitrobenzene	KB070203	07/25/96	3	0.804	µg/g	C	0
KB07	1,3,5-Trinitrobenzene	KB070305	07/25/96	5	0.386	µg/g	JP	0
KB07	2,4,6-Trinitrotoluene	KB070203	07/25/96	3	263	µg/g	C	0
KB07	2,4,6-Trinitrotoluene	KB070305	07/25/96	5	156	µg/g	C	0

Table 3-37
Samples that Exceeded Background
Soil Borings
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Fort Wingate Depot Activity
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Boring	Parameter	Site ID	Sample Date	Depth	Value	Units	Flag Codes	Background Concentration
KB07	Arsenic	KB070101	07/25/96	1	3.24	µg/g		2.7
KB07	Arsenic	KB070203	07/25/96	3	3.94	µg/g		2.7
KB07	Arsenic	KB070305	07/25/96	5	7.68	µg/g		2.7
KB07	Cobalt	KB070305	07/25/96	5	7.67	µg/g		6.5
KB07	Iron	KB070305	07/25/96	5	31800	µg/g		17647.3
KB07	Molybdenum	KB070203	07/25/96	3	1.35	µg/g	JP	0
KB07	Phosphorus	KB070101	07/25/96	1	157	µg/g		0
KB07	Phosphorus	KB070203	07/25/96	3	150	µg/g		0
KB07	Phosphorus	KB070305	07/25/96	5	235	µg/g		0
KB07	RDX	KB070203	07/25/96	3	0.46	µg/g	JP	0
KB07	Tetryl	KB070203	07/25/96	3	0.201	µg/g	JP	0
KB07	Vanadium	KB070305	07/25/96	5	31.5	µg/g		31.3
KB07	Zinc	KB070101	07/25/96	1	39.2	µg/g		29.2
KB07	Zinc	KB070203	07/25/96	3	45.2	µg/g		29.2
KB07	Zinc	KB070305	07/25/96	5	64.9	µg/g		29.2
KB08	Antimony	KB080203	07/25/96	3	3.42	µg/g	JP	0
KB08	Antimony	KB080305	07/25/96	5	4.49	µg/g	JP	0
KB08	Arsenic	KB080101	07/25/96	1	4.46	µg/g		2.7
KB08	Arsenic	KB080203	07/25/96	3	8.18	µg/g		2.7
KB08	Arsenic	KB080305	07/25/96	5	11.7	µg/g		2.7
KB08	Barium	KB080305	07/25/96	5	1300	µg/g		430.7
KB08	Cadmium	KB080101	07/25/96	1	0.534	µg/g		0
KB08	Cobalt	KB080203	07/25/96	3	7.44	µg/g		6.5
KB08	Copper	KB080101	07/25/96	1	22.1	µg/g		18.9
KB08	Iron	KB080203	07/25/96	3	25500	µg/g		17647.3
KB08	Iron	KB080305	07/25/96	5	88000	µg/g		17647.3
KB08	Lead	KB080101	07/25/96	1	23.1	µg/g		12.5
KB08	Manganese	KB080203	07/25/96	3	497	µg/g		458.1

Table 3-37
Samples that Exceeded Background
Soil Borings
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Boring	Parameter	Site ID	Sample Date	Depth	Value	Units	Flag Codes	Background Concentration
KB08	Manganese	KB080305	07/25/96	5	3800	µg/g		458.1
KB08	Mercury	KB080101	07/25/96	1	0.14	µg/g		0.06
KB08	Molybdenum	KB080203	07/25/96	3	3.49	µg/g	JP	0
KB08	Molybdenum	KB080305	07/25/96	5	2.24	µg/g	JP	0
KB08	Phosphorus	KB080101	07/25/96	1	239	µg/g		0
KB08	Phosphorus	KB080203	07/25/96	3	307	µg/g		0
KB08	Phosphorus	KB080305	07/25/96	5	213	µg/g		0
KB08	Selenium	KB080305	07/25/96	5	0.473	µg/g	JP	0.4
KB08	Zinc	KB080101	07/25/96	1	599	µg/g		29.2
KB08	Zinc	KB080203	07/25/96	3	65	µg/g		29.2
KB08	Zinc	KB080305	07/25/96	5	54.4	µg/g		29.2
KMW10	Antimony	KMW100310	08/22/96	10	4.28	µg/g	DJP	0
KMW10	Antimony	KMW100520	08/22/96	20	3.52	µg/g	JP	0
KMW10	Arsenic	KMW100101	08/22/96	1	2.86	µg/g		2.7
KMW10	Arsenic	KMW100205	08/22/96	5	5.32	µg/g		2.7
KMW10	Arsenic	KMW100310	08/22/96	10	5.06	µg/g		2.7
KMW10	Arsenic	KMW100310	08/22/96	10	5.37	µg/g	D	2.7
KMW10	Arsenic	KMW100415	08/22/96	15	5.36	µg/g		2.7
KMW10	Arsenic	KMW100520	08/22/96	20	4.24	µg/g		2.7
KMW10	Arsenic	KMW100625	08/22/96	25	9.15	µg/g		2.7
KMW10	Beryllium	KMW100205	08/22/96	5	1.11	µg/g		1.1
KMW10	Cadmium	KMW100101	08/22/96	1	0.102	µg/g	JP	0
KMW10	Cobalt	KMW100205	08/22/96	5	8.2	µg/g		6.5
KMW10	Cobalt	KMW100310	08/22/96	10	7.44	µg/g		6.5
KMW10	Cobalt	KMW100310	08/22/96	10	8	µg/g	D	6.5
KMW10	Cobalt	KMW100415	08/22/96	15	7.83	µg/g		6.5
KMW10	Cobalt	KMW100625	08/22/96	25	7.35	µg/g		6.5
KMW10	Iron	KMW100205	08/22/96	5	18800	µg/g		17647.3

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Samples that Exceeded Background
Soil Borings
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Boring	Parameter	Site ID	Sample Date	Depth	Value	Units	Flag Codes	Background Concentration
KMW10	Iron	KMW100625	08/22/96	25	34200	µg/g		17647.3
KMW10	Lead	KMW100205	08/22/96	5	15.1	µg/g		12.5
KMW10	Manganese	KMW100625	08/22/96	25	823	µg/g		458.1
KMW10	Phosphorus	KMW100101	08/22/96	1	154	µg/g		0
KMW10	Phosphorus	KMW100205	08/22/96	5	321	µg/g		0
KMW10	Phosphorus	KMW100310	08/22/96	10	256	µg/g		0
KMW10	Phosphorus	KMW100310	08/22/96	10	292	µg/g	D	0
KMW10	Phosphorus	KMW100415	08/22/96	15	236	µg/g		0
KMW10	Phosphorus	KMW100520	08/22/96	20	236	µg/g		0
KMW10	Phosphorus	KMW100625	08/22/96	25	245	µg/g		0
KMW10	Phosphorus	KMW100730	08/22/96	30	208	µg/g		0
KMW10	Phosphorus	KMW100835	08/22/96	35	140	µg/g		0
KMW10	Silver	KMW100205	08/22/96	5	0.571	µg/g	JP	0
KMW10	Silver	KMW100310	08/22/96	10	0.441	µg/g	JP	0
KMW10	Silver	KMW100310	08/22/96	10	0.604	µg/g	DJP	0
KMW10	Silver	KMW100415	08/22/96	15	0.45	µg/g	JP	0
KMW10	Silver	KMW100520	08/22/96	20	0.456	µg/g	JP	0
KMW10	Silver	KMW100625	08/22/96	25	0.596	µg/g	JP	0
KMW10	Vanadium	KMW100205	08/22/96	5	41.3	µg/g		31.3
KMW10	Zinc	KMW100101	08/22/96	1	829	µg/g		29.2
KMW10	Zinc	KMW100205	08/22/96	5	132	µg/g		29.2
KMW10	Zinc	KMW100310	08/22/96	10	46.4	µg/g		29.2
KMW10	Zinc	KMW100310	08/22/96	10	49.5	µg/g	D	29.2
KMW10	Zinc	KMW100415	08/22/96	15	51.1	µg/g		29.2
KMW10	Zinc	KMW100520	08/22/96	20	31.4	µg/g		29.2
KMW10	Zinc	KMW100625	08/22/96	25	42.8	µg/g		29.2
KMW10	Zinc	KMW100730	08/22/96	30	35.8	µg/g		29.2
KMW11	4-Amino-2,6-dinitrotoluene	KMW110205	08/06/96	5	0.698	µg/g	JP	0

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Samples that Exceeded Background
Soil Borings
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Boring	Parameter	Site ID	Sample Date	Depth	Value	Units	Flag Codes	Background Concentration
KMW11	4-Amino-2,6-dinitrotoluene	KMW110205	08/06/96	5	0.635	µg/g	DJP	0
KMW11	4-Amino-2,6-dinitrotoluene	KMW110310	08/06/96	10	0.562	µg/g	JP	0
KMW11	4-Nitrotoluene	KMW110415	08/06/96	15	0.562	µg/g	JP	0
KMW11	Antimony	KMW110835	08/06/96	35	4.6	µg/g	JP	0
KMW11	Arsenic	KMW110101	08/06/96	1	3.37	µg/g		2.7
KMW11	Arsenic	KMW110205	08/06/96	5	7.82	µg/g		2.7
KMW11	Arsenic	KMW110205	08/06/96	5	6.35	µg/g	D	2.7
KMW11	Arsenic	KMW110310	08/06/96	10	5.66	µg/g		2.7
KMW11	Arsenic	KMW110415	08/06/96	15	8.47	µg/g		2.7
KMW11	Arsenic	KMW110520	08/06/96	20	12.1	µg/g		2.7
KMW11	Arsenic	KMW110625	08/06/96	25	10	µg/g		2.7
KMW11	Arsenic	KMW110730	08/06/96	30	14.1	µg/g		2.7
KMW11	Arsenic	KMW110835	08/06/96	35	13.7	µg/g		2.7
KMW11	Arsenic	KMW110940	08/06/96	40	11.8	µg/g		2.7
KMW11	Arsenic	KMW111045	08/06/96	45	5.66	µg/g		2.7
KMW11	Arsenic	KMW111150	08/06/96	50	4.39	µg/g		2.7
KMW11	Arsenic	KMW111255	08/06/96	55	6.05	µg/g		2.7
KMW11	Arsenic	KMW111358	08/07/96	58	3.38	µg/g		2.7
KMW11	Barium	KMW110730	08/06/96	30	3200	µg/g		430.7
KMW11	Barium	KMW111358	08/07/96	58	467	µg/g		430.7
KMW11	Beryllium	KMW110520	08/06/96	20	1.13	µg/g		1.1
KMW11	Beryllium	KMW110625	08/06/96	25	1.36	µg/g		1.1
KMW11	Beryllium	KMW110835	08/06/96	35	1.21	µg/g		1.1
KMW11	Beryllium	KMW110940	08/06/96	40	1.39	µg/g		1.1
KMW11	Beryllium	KMW111045	08/06/96	45	1.27	µg/g		1.1
KMW11	Beryllium	KMW111150	08/06/96	50	1.3	µg/g		1.1
KMW11	Beryllium	KMW111255	08/06/96	55	1.46	µg/g		1.1
KMW11	Beryllium	KMW111358	08/07/96	58	1.47	µg/g		1.1

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Samples that Exceeded Background
Soil Borings
Current OB/OD Area Ground Water System
Fort Wingate Depot Activity
Gallup, New Mexico

Boring	Parameter	Site ID	Sample Date	Depth	Value	Units	Flag Codes	Background Concentration
KMW11	Cadmium	KMW110101	08/06/96	1	0.546	µg/g		0
KMW11	Cadmium	KMW110205	08/06/96	5	0.172	µg/g	JP	0
KMW11	Cadmium	KMW110205	08/06/96	5	0.222	µg/g	DJP	0
KMW11	Cadmium	KMW110310	08/06/96	10	0.164	µg/g	JP	0
KMW11	Cadmium	KMW110415	08/06/96	15	0.269	µg/g		0
KMW11	Cadmium	KMW110520	08/06/96	20	0.319	µg/g		0
KMW11	Cadmium	KMW110625	08/06/96	25	0.305	µg/g		0
KMW11	Cadmium	KMW110730	08/06/96	30	0.134	µg/g	JP	0
KMW11	Cadmium	KMW110835	08/06/96	35	0.235	µg/g	JP	0
KMW11	Cadmium	KMW110940	08/06/96	40	0.263	µg/g		0
KMW11	Cadmium	KMW111045	08/06/96	45	0.301	µg/g		0
KMW11	Cadmium	KMW111150	08/06/96	50	0.303	µg/g		0
KMW11	Cadmium	KMW111255	08/06/96	55	0.384	µg/g		0
KMW11	Cadmium	KMW111358	08/07/96	58	0.628	µg/g		0
KMW11	Chromium	KMW110415	08/06/96	15	17.2	µg/g		17
KMW11	Chromium	KMW110520	08/06/96	20	17.5	µg/g		17
KMW11	Chromium	KMW110625	08/06/96	25	20.9	µg/g		17
KMW11	Chromium	KMW110835	08/06/96	35	19.9	µg/g		17
KMW11	Chromium	KMW110940	08/06/96	40	21.7	µg/g		17
KMW11	Chromium	KMW111045	08/06/96	45	19.8	µg/g		17
KMW11	Chromium	KMW111150	08/06/96	50	24	µg/g		17
KMW11	Chromium	KMW111255	08/06/96	55	31.4	µg/g		17
KMW11	Chromium	KMW111358	08/07/96	58	41.3	µg/g		17
KMW11	Cobalt	KMW110310	08/06/96	10	6.88	µg/g		6.5
KMW11	Cobalt	KMW110415	08/06/96	15	8.99	µg/g		6.5
KMW11	Cobalt	KMW110520	08/06/96	20	11.9	µg/g		6.5
KMW11	Cobalt	KMW110625	08/06/96	25	11.9	µg/g		6.5
KMW11	Cobalt	KMW110730	08/06/96	30	9.8	µg/g		6.5

Table 3-37
Samples that Exceeded Background
Soil Borings
Current OB/OD Area Ground Water System
Fort Wingate Depot Activity
Gallup, New Mexico

Boring	Parameter	Site ID	Sample Date	Depth	Value	Units	Flag Codes	Background Concentration
KMW11	Cobalt	KMW110835	08/06/96	35	11.9	µg/g		6.5
KMW11	Cobalt	KMW110940	08/06/96	40	10.3	µg/g		6.5
KMW11	Cobalt	KMW111045	08/06/96	45	7.92	µg/g		6.5
KMW11	Cobalt	KMW111150	08/06/96	50	10.8	µg/g		6.5
KMW11	Cobalt	KMW111255	08/06/96	55	11.7	µg/g		6.5
KMW11	Cobalt	KMW111358	08/07/96	58	12.5	µg/g		6.5
KMW11	Iron	KMW110205	08/06/96	5	18600	µg/g		17647.3
KMW11	Iron	KMW110205	08/06/96	5	24300	µg/g	D	17647.3
KMW11	Iron	KMW110415	08/06/96	15	27200	µg/g		17647.3
KMW11	Iron	KMW110520	08/06/96	20	33300	µg/g		17647.3
KMW11	Iron	KMW110625	08/06/96	25	30300	µg/g		17647.3
KMW11	Iron	KMW110835	08/06/96	35	31900	µg/g		17647.3
KMW11	Iron	KMW110940	08/06/96	40	28700	µg/g		17647.3
KMW11	Iron	KMW111045	08/06/96	45	26300	µg/g		17647.3
KMW11	Iron	KMW111150	08/06/96	50	29100	µg/g		17647.3
KMW11	Iron	KMW111255	08/06/96	55	39100	µg/g		17647.3
KMW11	Iron	KMW111358	08/07/96	58	40300	µg/g		17647.3
KMW11	Lead	KMW110415	08/06/96	15	13.2	µg/g		12.5
KMW11	Lead	KMW110520	08/06/96	20	16.2	µg/g		12.5
KMW11	Lead	KMW110625	08/06/96	25	13.6	µg/g		12.5
KMW11	Lead	KMW111045	08/06/96	45	14.3	µg/g		12.5
KMW11	Lead	KMW111150	08/06/96	50	15.5	µg/g		12.5
KMW11	Lead	KMW111255	08/06/96	55	14.9	µg/g		12.5
KMW11	Manganese	KMW110205	08/06/96	5	607	µg/g	D	458.1
KMW11	Manganese	KMW110625	08/06/96	25	476	µg/g		458.1
KMW11	Manganese	KMW110730	08/06/96	30	775	µg/g		458.1
KMW11	Manganese	KMW110940	08/06/96	40	664	µg/g		458.1
KMW11	Manganese	KMW111045	08/06/96	45	734	µg/g		458.1

Table 3-37
Samples that Exceeded Background
Soil Borings
Current OB/OD Area Ground Water System
Fort Wingate Depot Activity
Gallup, New Mexico

Boring	Parameter	Site ID	Sample Date	Depth	Value	Units	Flag Codes	Background Concentration
KMW11	Manganese	KMW111150	08/06/96	50	691	µg/g		458.1
KMW11	Molybdenum	KMW110101	08/06/96	1	2.12	µg/g	JP	0
KMW11	Molybdenum	KMW110205	08/06/96	5	1.41	µg/g	JP	0
KMW11	Molybdenum	KMW110205	08/06/96	5	2.21	µg/g	DJP	0
KMW11	Molybdenum	KMW110310	08/06/96	10	3.15	µg/g	JP	0
KMW11	Molybdenum	KMW110520	08/06/96	20	2.74	µg/g	JP	0
KMW11	Molybdenum	KMW110835	08/06/96	35	2.72	µg/g	JP	0
KMW11	Molybdenum	KMW110940	08/06/96	40	1.41	µg/g	JP	0
KMW11	Molybdenum	KMW111045	08/06/96	45	2.91	µg/g	JP	0
KMW11	Molybdenum	KMW111150	08/06/96	50	2.35	µg/g	JP	0
KMW11	Molybdenum	KMW111255	08/06/96	55	2.64	µg/g	JP	0
KMW11	Nickel	KMW110415	08/06/96	15	26.4	µg/g		14.3
KMW11	Nickel	KMW110520	08/06/96	20	28.8	µg/g		14.3
KMW11	Nickel	KMW110625	08/06/96	25	27.2	µg/g		14.3
KMW11	Nickel	KMW110730	08/06/96	30	19.1	µg/g		14.3
KMW11	Nickel	KMW110835	08/06/96	35	27.8	µg/g		14.3
KMW11	Nickel	KMW110940	08/06/96	40	26.4	µg/g		14.3
KMW11	Nickel	KMW111045	08/06/96	45	23.2	µg/g		14.3
KMW11	Nickel	KMW111150	08/06/96	50	26.1	µg/g		14.3
KMW11	Nickel	KMW111255	08/06/96	55	32.8	µg/g		14.3
KMW11	Nickel	KMW111358	08/07/96	58	30.4	µg/g		14.3
KMW11	Phosphorus	KMW110101	08/06/96	1	237	µg/g		0
KMW11	Phosphorus	KMW110205	08/06/96	5	315	µg/g		0
KMW11	Phosphorus	KMW110205	08/06/96	5	436	µg/g	D	0
KMW11	Phosphorus	KMW110310	08/06/96	10	270	µg/g		0
KMW11	Phosphorus	KMW110415	08/06/96	15	432	µg/g		0
KMW11	Phosphorus	KMW110520	08/06/96	20	496	µg/g		0
KMW11	Phosphorus	KMW110625	08/06/96	25	524	µg/g		0

Table 3-37
Samples that Exceeded Background
Soil Borings
Current OB/OD Area Ground Water System
Fort Wingate Depot Activity
Gallup, New Mexico

Boring	Parameter	Site ID	Sample Date	Depth	Value	Units	Flag Codes	Background Concentration
KMW11	Phosphorus	KMW110730	08/06/96	30	431	µg/g		0
KMW11	Phosphorus	KMW110835	08/06/96	35	527	µg/g		0
KMW11	Phosphorus	KMW110940	08/06/96	40	702	µg/g		0
KMW11	Phosphorus	KMW111045	08/06/96	45	583	µg/g		0
KMW11	Phosphorus	KMW111150	08/06/96	50	575	µg/g		0
KMW11	Phosphorus	KMW111255	08/06/96	55	476	µg/g		0
KMW11	Phosphorus	KMW111358	08/07/96	58	646	µg/g		0
KMW11	Selenium	KMW110101	08/06/96	1	0.636	µg/g	JP	0.4
KMW11	Selenium	KMW110205	08/06/96	5	0.618	µg/g		0.4
KMW11	Selenium	KMW110205	08/06/96	5	0.501	µg/g	DJP	0.4
KMW11	Selenium	KMW110310	08/06/96	10	0.488	µg/g	JP	0.4
KMW11	Thallium	KMW110415	08/06/96	15	0.674	µg/g	JP	0
KMW11	Thallium	KMW110835	08/06/96	35	0.89	µg/g	JP	0
KMW11	Thallium	KMW110940	08/06/96	40	1.08	µg/g	JP	0
KMW11	Thallium	KMW111045	08/06/96	45	1.03	µg/g	JP	0
KMW11	Thallium	KMW111150	08/06/96	50	0.926	µg/g	JP	0
KMW11	Thallium	KMW111255	08/06/96	55	1.33	µg/g		0
KMW11	Thallium	KMW111358	08/07/96	58	1.41	µg/g		0
KMW11	Vanadium	KMW110415	08/06/96	15	66.5	µg/g		31.3
KMW11	Vanadium	KMW110520	08/06/96	20	84.6	µg/g		31.3
KMW11	Vanadium	KMW110625	08/06/96	25	88.7	µg/g		31.3
KMW11	Vanadium	KMW110730	08/06/96	30	75.7	µg/g		31.3
KMW11	Vanadium	KMW110835	08/06/96	35	85.9	µg/g		31.3
KMW11	Vanadium	KMW110940	08/06/96	40	64.7	µg/g		31.3
KMW11	Vanadium	KMW111045	08/06/96	45	42.1	µg/g		31.3
KMW11	Vanadium	KMW111150	08/06/96	50	54.3	µg/g		31.3
KMW11	Vanadium	KMW111255	08/06/96	55	86.4	µg/g		31.3
KMW11	Vanadium	KMW111358	08/07/96	58	108	µg/g		31.3

Table 3-37
Samples that Exceeded Background
Soil Borings
Current OB/OD Area Ground Water System
Fort Wingate Depot Activity
Gallup, New Mexico

Boring	Parameter	Site ID	Sample Date	Depth	Value	Units	Flag Codes	Background Concentration
KMW11	Zinc	KMW110101	08/06/96	1	84.6	µg/g		29.2
KMW11	Zinc	KMW110205	08/06/96	5	45.6	µg/g		29.2
KMW11	Zinc	KMW110205	08/06/96	5	50.1	µg/g	D	29.2
KMW11	Zinc	KMW110310	08/06/96	10	43.3	µg/g		29.2
KMW11	Zinc	KMW110415	08/06/96	15	37.1	µg/g		29.2
KMW11	Zinc	KMW110520	08/06/96	20	43	µg/g		29.2
KMW11	Zinc	KMW110625	08/06/96	25	46	µg/g		29.2
KMW11	Zinc	KMW110730	08/06/96	30	32.5	µg/g		29.2
KMW11	Zinc	KMW110835	08/06/96	35	43.8	µg/g		29.2
KMW11	Zinc	KMW110940	08/06/96	40	40.6	µg/g		29.2
KMW11	Zinc	KMW111045	08/06/96	45	36.7	µg/g		29.2
KMW11	Zinc	KMW111150	08/06/96	50	41.8	µg/g		29.2
KMW11	Zinc	KMW111255	08/06/96	55	51.4	µg/g		29.2
KMW11	Zinc	KMW111358	08/07/96	58	53.8	µg/g		29.2

Notes:
µg/g = micrograms per gram.
Flagging Codes:
C - Analysis was confirmed.
D - Duplicate analysis.
J - Value is estimated.
JP - Value is estimated and is less than reporting level but greater than instrumental detection limit.
V - Sample subjected to unusual storage/preservation conditions.

Table 3-38
Samples that Exceeded Screening Criteria
Soil Borings
Closed OB/OD Area Ground Water System
Fort Wingate Depot Activity
Gallup, New Mexico

Boring	Parameter	Site ID	Sample Date	Depth	Value	Units	Flag Codes	Background Concentration	Screening Level Concentration
CMW02	Iron	CMW020310	08/01/96	10	26200	µg/g		17647.3	23000
CMW03	Arsenic	CMW030101	08/09/96	1	4.72	µg/g	J	2.7	0.39
CMW04	Arsenic	CMW040520	08/02/96	20	3.21	µg/g	D	2.7	0.39
CMW04	Iron	CMW040520	08/02/96	20	23600	µg/g	D	17647.3	23000
CMW04	Iron	CMW040625	08/02/96	25	23800	µg/g		17647.3	23000
CMW04	Iron	CMW040940	08/02/96	40	26400	µg/g		17647.3	23000
CMW04	Iron	CMW041045	08/02/96	45	25500	µg/g		17647.3	23000
CMW04	Iron	CMW041150	08/02/96	50	28600	µg/g		17647.3	23000
CMW04	Iron	CMW041570	08/03/96	70	32000	µg/g		17647.3	23000
CMW04	Iron	CMW041675	08/03/96	75	32200	µg/g		17647.3	23000
CMW04	Iron	CMW041780	08/03/96	80	31600	µg/g		17647.3	23000
CMW04	Iron	CMW041884	08/03/96	84	31000	µg/g		17647.3	23000
CMW06	Arsenic	CMW060101	08/09/96	1	3.48	µg/g		2.7	0.39
CMW06	Arsenic	CMW060415	08/09/96	15	3.31	µg/g		2.7	0.39
CMW06	Iron	CMW060101	08/09/96	1	24700	µg/g		17647.3	23000
CMW06	Iron	CMW060415	08/09/96	15	34300	µg/g		17647.3	23000
CMW07	Arsenic	CMW070310	08/10/96	10	3.55	µg/g	J	2.7	0.39
CMW07	Iron	CMW070835	08/10/96	35	23300	µg/g		17647.3	23000
CMW07	Iron	CMW070940	08/10/96	40	26400	µg/g		17647.3	23000
CMW07	Iron	CMW071045	08/10/96	45	26000	µg/g		17647.3	23000
CMW10	Arsenic	CMW100101	08/03/96	1	2.91	µg/g		2.7	0.39
CMW10	Arsenic	CMW100520	08/03/96	20	3	µg/g		2.7	0.39
CMW10	Iron	CMW100625	08/05/96	25	23300	µg/g		17647.3	23000
CMW14	Arsenic	CMW140520	08/05/96	20	4.21	µg/g		2.7	0.39
CMW14	Arsenic	CMW140625	08/05/96	25	4.26	µg/g		2.7	0.39
CMW14	Arsenic	CMW140730	08/05/96	30	6.71	µg/g		2.7	0.39
CMW14	Arsenic	CMW140835	08/05/96	35	5.76	µg/g		2.7	0.39
CMW14	Arsenic	CMW140940	08/05/96	40	11.7	µg/g		2.7	0.39
CMW14	Arsenic	CMW141045	08/05/96	45	15.8	µg/g		2.7	0.39
CMW14	Arsenic	CMW141150	08/05/96	50	15.2	µg/g		2.7	0.39

Table 3-38
Samples that Exceeded Screening Criteria
Soil Borings
Closed OB/OD Area Ground Water System
Fort Wingate Depot Activity
Gallup, New Mexico

Boring	Parameter	Site ID	Sample Date	Depth	Value	Units	Flag Codes	Background Concentration	Screening Level Concentration
CMW14	Arsenic	CMW141255	08/05/96	55	13.6	µg/g		2.7	0.39
CMW14	Arsenic	CMW141360	08/06/96	60	10.9	µg/g		2.7	0.39
CMW14	Iron	CMW140625	08/05/96	25	28200	µg/g		17647.3	23000
CMW14	Iron	CMW140730	08/05/96	30	24400	µg/g		17647.3	23000
CMW14	Iron	CMW140835	08/05/96	35	26500	µg/g		17647.3	23000
CMW14	Iron	CMW140940	08/05/96	40	29700	µg/g		17647.3	23000
CMW14	Iron	CMW141045	08/05/96	45	30700	µg/g		17647.3	23000
CMW14	Iron	CMW141150	08/05/96	50	31400	µg/g		17647.3	23000
CMW14	Iron	CMW141255	08/05/96	55	27400	µg/g		17647.3	23000
CMW14	Iron	CMW141360	08/06/96	60	28500	µg/g		17647.3	23000
CMW16	Arsenic	CMW160101	08/29/96	1	11.8	µg/g		2.7	0.39
CMW16	Arsenic	CMW160205	08/29/96	5	5.62	µg/g		2.7	0.39
CMW16	Arsenic	CMW160310	08/29/96	10	2.98	µg/g		2.7	0.39
CMW16	Iron	CMW160101	08/29/96	1	55000	µg/g		17647.3	23000
CMW16	Iron	CMW160205	08/29/96	5	38600	µg/g		17647.3	23000
CMW16	Iron	CMW160310	08/29/96	10	25700	µg/g		17647.3	23000
CMW17	Arsenic	CMW170310	08/16/96	10	3.34	µg/g		2.7	0.39
CMW17	Arsenic	CMW170310	08/16/96	10	3.99	µg/g	D	2.7	0.39
CMW17	Arsenic	CMW170415	08/16/96	15	3.36	µg/g		2.7	0.39
CMW17	Arsenic	CMW170735	08/16/96	35	5.04	µg/g		2.7	0.39
CMW17	Arsenic	CMW170840	08/16/96	40	6.8	µg/g		2.7	0.39
CMW17	Arsenic	CMW170945	08/16/96	45	23.2	µg/g		2.7	0.39
CMW17	Arsenic	CMW171052	08/17/96	52	7.44	µg/g		2.7	0.39
CMW17	Iron	CMW170310	08/16/96	10	28200	µg/g		17647.3	23000
CMW17	Iron	CMW170310	08/16/96	10	26900	µg/g	D	17647.3	23000
CMW17	Iron	CMW170525	08/16/96	25	24500	µg/g		17647.3	23000
CMW17	Iron	CMW170630	08/16/96	30	25700	µg/g		17647.3	23000
CMW17	Iron	CMW170735	08/16/96	35	23200	µg/g		17647.3	23000
CMW17	Iron	CMW170840	08/16/96	40	30800	µg/g		17647.3	23000
CMW17	Iron	CMW170945	08/16/96	45	36600	µg/g		17647.3	23000

Table 3-38
Samples that Exceeded Screening Criteria
Soil Borings
Closed OB/OD Area Ground Water System
Fort Wingate Depot Activity
Gallup, New Mexico

Boring	Parameter	Site ID	Sample Date	Depth	Value	Units	Flag Codes	Background Concentration	Screening Level Concentration
CMW17	Iron	CMW171052	08/17/96	52	23700	µg/g		17647.3	23000
CMW19	Iron	CMW190415	08/27/96	15	36300	µg/g		17647.3	23000
CMW19	Iron	CMW190520	08/27/96	20	38100	µg/g		17647.3	23000
CMW19	Iron	CMW190625	08/27/96	25	36400	µg/g		17647.3	23000
CMW19	Iron	CMW190730	08/27/96	30	34900	µg/g		17647.3	23000
CMW19	Iron	CMW190835	08/28/96	35	32900	µg/g		17647.3	23000
CMW19	Iron	CMW190940	08/28/96	40	36900	µg/g		17647.3	23000
CMW21	Arsenic	CMW210110	07/14/98	10	4.1	µg/g		2.7	0.39
CMW21	Iron	CMW210223	07/14/98	23	34800	µg/g		17647.3	23000
CMW24	Arsenic	CMW240110	07/15/98	10	3.37	µg/g		2.7	0.39
KB01	Arsenic	KB010101	07/25/96	1	6.65	µg/g		2.7	0.39
KB01	Arsenic	KB010203	07/25/96	3	6.01	µg/g		2.7	0.39
KB01	Arsenic	KB010305	07/25/96	5	8.36	µg/g	D	2.7	0.39
KB01	Arsenic	KB010305	07/25/96	5	9.02	µg/g		2.7	0.39
KB01	Iron	KB010305	07/25/96	5	27000	µg/g	D	17647.3	23000
KB01	Iron	KB010305	07/25/96	5	28800	µg/g		17647.3	23000
KB01	Phosphorus	KB010101	07/25/96	1	268	µg/g		0	0
KB01	Phosphorus	KB010203	07/25/96	3	260	µg/g		0	0
KB01	Phosphorus	KB010305	07/25/96	5	313	µg/g	D	0	0
KB01	Phosphorus	KB010305	07/25/96	5	292	µg/g		0	0
KB02	Arsenic	KB020101	07/25/96	1	4.02	µg/g		2.7	0.39
KB02	Arsenic	KB020203	07/25/96	3	5.09	µg/g		2.7	0.39
KB02	Arsenic	KB020305	07/25/96	5	7.32	µg/g		2.7	0.39
KB02	Phosphorus	KB020101	07/25/96	1	188	µg/g		0	0
KB02	Phosphorus	KB020203	07/25/96	3	310	µg/g		0	0
KB02	Phosphorus	KB020305	07/25/96	5	217	µg/g		0	0
KB03	Arsenic	KB030101	07/25/96	1	5.29	µg/g		2.7	0.39
KB03	Arsenic	KB030203	07/25/96	3	8.95	µg/g		2.7	0.39
KB03	Arsenic	KB030305	07/25/96	5	9.07	µg/g		2.7	0.39
KB03	Iron	KB030203	07/25/96	3	30500	µg/g		17647.3	23000

Table 3-38
Samples that Exceeded Screening Criteria
Soil Borings
Closed OB/OD Area Ground Water System
Fort Wingate Depot Activity
Gallup, New Mexico

Boring	Parameter	Site ID	Sample Date	Depth	Value	Units	Flag Codes	Background Concentration	Screening Level Concentration
KB03	Iron	KB030305	07/25/96	5	32000	µg/g		17647.3	23000
KB03	Phosphorus	KB030101	07/25/96	1	225	µg/g		0	0
KB03	Phosphorus	KB030203	07/25/96	3	278	µg/g		0	0
KB03	Phosphorus	KB030305	07/25/96	5	317	µg/g		0	0
KB04	Arsenic	KB040101	07/25/96	1	5.55	µg/g		2.7	0.39
KB04	Arsenic	KB040203	07/25/96	3	6.81	µg/g		2.7	0.39
KB04	Arsenic	KB040305	07/25/96	5	6.04	µg/g		2.7	0.39
KB04	Phosphorus	KB040101	07/25/96	1	257	µg/g		0	0
KB04	Phosphorus	KB040203	07/25/96	3	246	µg/g		0	0
KB04	Phosphorus	KB040305	07/25/96	5	241	µg/g		0	0
KB05	Arsenic	KB050101	07/25/96	1	5.25	µg/g		2.7	0.39
KB05	Arsenic	KB050101	07/25/96	1	5.8	µg/g	D	2.7	0.39
KB05	Arsenic	KB050203	07/25/96	3	5.35	µg/g		2.7	0.39
KB05	Arsenic	KB050305	07/25/96	5	5.19	µg/g		2.7	0.39
KB05	Phosphorus	KB050101	07/25/96	1	282	µg/g		0	0
KB05	Phosphorus	KB050101	07/25/96	1	239	µg/g	D	0	0
KB05	Phosphorus	KB050203	07/25/96	3	252	µg/g		0	0
KB05	Phosphorus	KB050305	07/25/96	5	267	µg/g		0	0
KB06	Arsenic	KB060101	07/25/96	1	3.86	µg/g		2.7	0.39
KB06	Arsenic	KB060203	07/25/96	3	3.45	µg/g		2.7	0.39
KB06	Arsenic	KB060305	07/25/96	5	4.97	µg/g		2.7	0.39
KB06	Phosphorus	KB060101	07/25/96	1	191	µg/g		0	0
KB06	Phosphorus	KB060203	07/25/96	3	194	µg/g		0	0
KB06	Phosphorus	KB060305	07/25/96	5	234	µg/g		0	0
KB07	2,4,6-Trinitrotoluene	KB070203	07/25/96	3	263	µg/g	C	0	16
KB07	2,4,6-Trinitrotoluene	KB070305	07/25/96	5	156	µg/g	C	0	16
KB07	Arsenic	KB070101	07/25/96	1	3.24	µg/g		2.7	0.39
KB07	Arsenic	KB070203	07/25/96	3	3.94	µg/g		2.7	0.39
KB07	Arsenic	KB070305	07/25/96	5	7.68	µg/g		2.7	0.39
KB07	Iron	KB070305	07/25/96	5	31800	µg/g		17647.3	23000

Table 3-38
Samples that Exceeded Screening Criteria
Soil Borings
Closed OB/OD Area Ground Water System
Fort Wingate Depot Activity
Gallup, New Mexico

Boring	Parameter	Site ID	Sample Date	Depth	Value	Units	Flag Codes	Background Concentration	Screening Level Concentration
KB07	Phosphorus	KB070101	07/25/96	1	157	µg/g		0	0
KB07	Phosphorus	KB070203	07/25/96	3	150	µg/g		0	0
KB07	Phosphorus	KB070305	07/25/96	5	235	µg/g		0	0
KB08	Arsenic	KB080101	07/25/96	1	4.46	µg/g		2.7	0.39
KB08	Arsenic	KB080203	07/25/96	3	8.18	µg/g		2.7	0.39
KB08	Arsenic	KB080305	07/25/96	5	11.7	µg/g		2.7	0.39
KB08	Iron	KB080203	07/25/96	3	25500	µg/g		17647.3	23000
KB08	Iron	KB080305	07/25/96	5	88000	µg/g		17647.3	23000
KB08	Manganese	KB080305	07/25/96	5	3800	µg/g		458.1	3200
KB08	Phosphorus	KB080101	07/25/96	1	239	µg/g		0	0
KB08	Phosphorus	KB080203	07/25/96	3	307	µg/g		0	0
KB08	Phosphorus	KB080305	07/25/96	5	213	µg/g		0	0
KMW10	Arsenic	KMW100101	08/22/96	1	2.86	µg/g		2.7	0.39
KMW10	Arsenic	KMW100205	08/22/96	5	5.32	µg/g		2.7	0.39
KMW10	Arsenic	KMW100310	08/22/96	10	5.06	µg/g		2.7	0.39
KMW10	Arsenic	KMW100310	08/22/96	10	5.37	µg/g	D	2.7	0.39
KMW10	Arsenic	KMW100415	08/22/96	15	5.36	µg/g		2.7	0.39
KMW10	Arsenic	KMW100520	08/22/96	20	4.24	µg/g		2.7	0.39
KMW10	Arsenic	KMW100625	08/22/96	25	9.15	µg/g		2.7	0.39
KMW10	Iron	KMW100625	08/22/96	25	34200	µg/g		17647.3	23000
KMW10	Phosphorus	KMW100101	08/22/96	1	154	µg/g		0	0
KMW10	Phosphorus	KMW100205	08/22/96	5	321	µg/g		0	0
KMW10	Phosphorus	KMW100310	08/22/96	10	256	µg/g		0	0
KMW10	Phosphorus	KMW100310	08/22/96	10	292	µg/g	D	0	0
KMW10	Phosphorus	KMW100415	08/22/96	15	236	µg/g		0	0
KMW10	Phosphorus	KMW100520	08/22/96	20	236	µg/g		0	0
KMW10	Phosphorus	KMW100625	08/22/96	25	245	µg/g		0	0
KMW10	Phosphorus	KMW100730	08/22/96	30	208	µg/g		0	0
KMW10	Phosphorus	KMW100835	08/22/96	35	140	µg/g		0	0
KMW11	Arsenic	KMW110101	08/06/96	1	3.37	µg/g		2.7	0.39

Table 3-38
Samples that Exceeded Screening Criteria
Soil Borings
Closed OB/OD Area Ground Water System
Fort Wingate Depot Activity
Gallup, New Mexico

Boring	Parameter	Site ID	Sample Date	Depth	Value	Units	Flag Codes	Background Concentration	Screening Level Concentration
KMW11	Arsenic	KMW110205	08/06/96	5	7.82	µg/g		2.7	0.39
KMW11	Arsenic	KMW110205	08/06/96	5	6.35	µg/g	D	2.7	0.39
KMW11	Arsenic	KMW110310	08/06/96	10	5.66	µg/g		2.7	0.39
KMW11	Arsenic	KMW110415	08/06/96	15	8.47	µg/g		2.7	0.39
KMW11	Arsenic	KMW110520	08/06/96	20	12.1	µg/g		2.7	0.39
KMW11	Arsenic	KMW110625	08/06/96	25	10	µg/g		2.7	0.39
KMW11	Arsenic	KMW110730	08/06/96	30	14.1	µg/g		2.7	0.39
KMW11	Arsenic	KMW110835	08/06/96	35	13.7	µg/g		2.7	0.39
KMW11	Arsenic	KMW110940	08/06/96	40	11.8	µg/g		2.7	0.39
KMW11	Arsenic	KMW111045	08/06/96	45	5.66	µg/g		2.7	0.39
KMW11	Arsenic	KMW111150	08/06/96	50	4.39	µg/g		2.7	0.39
KMW11	Arsenic	KMW111255	08/06/96	55	6.05	µg/g		2.7	0.39
KMW11	Arsenic	KMW111358	08/07/96	58	3.38	µg/g		2.7	0.39
KMW11	Iron	KMW110205	08/06/96	5	24300	µg/g	D	17647.3	23000
KMW11	Iron	KMW110415	08/06/96	15	27200	µg/g		17647.3	23000
KMW11	Iron	KMW110520	08/06/96	20	33300	µg/g		17647.3	23000
KMW11	Iron	KMW110625	08/06/96	25	30300	µg/g		17647.3	23000
KMW11	Iron	KMW110835	08/06/96	35	31900	µg/g		17647.3	23000
KMW11	Iron	KMW110940	08/06/96	40	28700	µg/g		17647.3	23000
KMW11	Iron	KMW111045	08/06/96	45	26300	µg/g		17647.3	23000
KMW11	Iron	KMW111150	08/06/96	50	29100	µg/g		17647.3	23000
KMW11	Iron	KMW111255	08/06/96	55	39100	µg/g		17647.3	23000
KMW11	Iron	KMW111358	08/07/96	58	40300	µg/g		17647.3	23000
KMW11	Phosphorus	KMW110101	08/06/96	1	237	µg/g		0	0
KMW11	Phosphorus	KMW110205	08/06/96	5	315	µg/g		0	0
KMW11	Phosphorus	KMW110205	08/06/96	5	436	µg/g	D	0	0
KMW11	Phosphorus	KMW110310	08/06/96	10	270	µg/g		0	0
KMW11	Phosphorus	KMW110415	08/06/96	15	432	µg/g		0	0
KMW11	Phosphorus	KMW110520	08/06/96	20	496	µg/g		0	0
KMW11	Phosphorus	KMW110625	08/06/96	25	524	µg/g		0	0

Table 3-38
Samples that Exceeded Screening Criteria
Soil Borings
Closed OB/OD Area Ground Water System
Fort Wingate Depot Activity
Gallup, New Mexico

Boring	Parameter	Site ID	Sample Date	Depth	Value	Units	Flag Codes	Background Concentration	Screening Level Concentration
KMW11	Phosphorus	KMW110730	08/06/96	30	431	µg/g		0	0
KMW11	Phosphorus	KMW110835	08/06/96	35	527	µg/g		0	0
KMW11	Phosphorus	KMW110940	08/06/96	40	702	µg/g		0	0
KMW11	Phosphorus	KMW111045	08/06/96	45	583	µg/g		0	0
KMW11	Phosphorus	KMW111150	08/06/96	50	575	µg/g		0	0
KMW11	Phosphorus	KMW111255	08/06/96	55	476	µg/g		0	0
KMW11	Phosphorus	KMW111358	08/07/96	58	646	µg/g		0	0

Notes:
µg/g = micrograms per gram.
Flagging Codes:
C - Analysis was confirmed.
D - Duplicate analysis.
J - Value is estimated.
JP - Value is estimated and is less than reporting level but greater than instrumental detection limit.
V - Sample subjected to unusual storage/preservation conditions.

Table 3-39
Samples that Exceeded Closure Performance Standards
Soil Borings
Current OB/OD Area Ground Water System
Fort Wingate Depot Activity
Gallup, New Mexico

Boring	Parameter	Site ID	Sample Date	Depth	Value	Units	Flag Codes	Background Concentration	Screening Level Concentration	Closure Performance Standards Contentration
KB01	Phosphorus	KB010101	07/25/96	1	268	µg/g		0	0	0
KB01	Phosphorus	KB010203	07/25/96	3	260	µg/g		0	0	0
KB01	Phosphorus	KB010305	07/25/96	5	313	µg/g	D	0	0	0
KB01	Phosphorus	KB010305	07/25/96	5	292	µg/g		0	0	0
KB02	Phosphorus	KB020101	07/25/96	1	188	µg/g		0	0	0
KB02	Phosphorus	KB020203	07/25/96	3	310	µg/g		0	0	0
KB02	Phosphorus	KB020305	07/25/96	5	217	µg/g		0	0	0
KB03	Phosphorus	KB030101	07/25/96	1	225	µg/g		0	0	0
KB03	Phosphorus	KB030203	07/25/96	3	278	µg/g		0	0	0
KB03	Phosphorus	KB030305	07/25/96	5	317	µg/g		0	0	0
KB04	Phosphorus	KB040101	07/25/96	1	257	µg/g		0	0	0
KB04	Phosphorus	KB040203	07/25/96	3	246	µg/g		0	0	0
KB04	Phosphorus	KB040305	07/25/96	5	241	µg/g		0	0	0
KB05	Phosphorus	KB050101	07/25/96	1	282	µg/g		0	0	0
KB05	Phosphorus	KB050101	07/25/96	1	239	µg/g	D	0	0	0
KB05	Phosphorus	KB050203	07/25/96	3	252	µg/g		0	0	0
KB05	Phosphorus	KB050305	07/25/96	5	267	µg/g		0	0	0
KB06	Phosphorus	KB060101	07/25/96	1	191	µg/g		0	0	0
KB06	Phosphorus	KB060203	07/25/96	3	194	µg/g		0	0	0
KB06	Phosphorus	KB060305	07/25/96	5	234	µg/g		0	0	0
KB07	Phosphorus	KB070101	07/25/96	1	157	µg/g		0	0	0
KB07	Phosphorus	KB070203	07/25/96	3	150	µg/g		0	0	0
KB07	Phosphorus	KB070305	07/25/96	5	235	µg/g		0	0	0
KB08	Manganese	KB080305	07/25/96	5	3800	µg/g		458.1	3200	460
KB08	Phosphorus	KB080101	07/25/96	1	239	µg/g		0	0	0
KB08	Phosphorus	KB080203	07/25/96	3	307	µg/g		0	0	0
KB08	Phosphorus	KB080305	07/25/96	5	213	µg/g		0	0	0
KMW10	Phosphorus	KMW100101	08/22/96	1	154	µg/g		0	0	0
KMW10	Phosphorus	KMW100205	08/22/96	5	321	µg/g		0	0	0
KMW10	Phosphorus	KMW100310	08/22/96	10	256	µg/g		0	0	0
KMW10	Phosphorus	KMW100310	08/22/96	10	292	µg/g	D	0	0	0

Table 3-39
Samples that Exceeded Closure Performance Standards
Soil Borings
Current OB/OD Area Ground Water System
Fort Wingate Depot Activity
Gallup, New Mexico

Boring	Parameter	Site ID	Sample Date	Depth	Value	Units	Flag Codes	Background Concentration	Screening Level Concentration	Closure Performance Standards Contentration
KMW10	Phosphorus	KMW100415	08/22/96	15	236	µg/g		0	0	0
KMW10	Phosphorus	KMW100520	08/22/96	20	236	µg/g		0	0	0
KMW10	Phosphorus	KMW100625	08/22/96	25	245	µg/g		0	0	0
KMW10	Phosphorus	KMW100730	08/22/96	30	208	µg/g		0	0	0
KMW10	Phosphorus	KMW100835	08/22/96	35	140	µg/g		0	0	0
KMW11	Phosphorus	KMW110101	08/06/96	1	237	µg/g		0	0	0
KMW11	Phosphorus	KMW110205	08/06/96	5	315	µg/g		0	0	0
KMW11	Phosphorus	KMW110205	08/06/96	5	436	µg/g	D	0	0	0
KMW11	Phosphorus	KMW110310	08/06/96	10	270	µg/g		0	0	0
KMW11	Phosphorus	KMW110415	08/06/96	15	432	µg/g		0	0	0
KMW11	Phosphorus	KMW110520	08/06/96	20	496	µg/g		0	0	0
KMW11	Phosphorus	KMW110625	08/06/96	25	524	µg/g		0	0	0
KMW11	Phosphorus	KMW110730	08/06/96	30	431	µg/g		0	0	0
KMW11	Phosphorus	KMW110835	08/06/96	35	527	µg/g		0	0	0
KMW11	Phosphorus	KMW110940	08/06/96	40	702	µg/g		0	0	0
KMW11	Phosphorus	KMW111045	08/06/96	45	583	µg/g		0	0	0
KMW11	Phosphorus	KMW111150	08/06/96	50	575	µg/g		0	0	0
KMW11	Phosphorus	KMW111255	08/06/96	55	476	µg/g		0	0	0
KMW11	Phosphorus	KMW111358	08/07/96	58	646	µg/g		0	0	0

Notes:
µg/g = micrograms per gram.
Flagging Codes:
D - Duplicate analysis.

Table 3-40
Samples that Exceeded Background
Sediments
Closed OB/OD Area
Fort Wingate Depot Activity
Gallup, New Mexico

Site	Parameter	Sample Date	Value	Units	Flag Codes	Background Concentration
KSED02	Barium	08/08/96	536	µg/g		374
KSED02	Copper	08/08/96	13.3	µg/g		13.1
KSED02	Manganese	08/08/96	626	µg/g		549
KSED02	Nickel	08/08/96	12.8	µg/g		12.3
KSED02	Phosphorus	08/08/96	393	µg/g		284
KSED04	Barium	08/08/96	475	µg/g		374
KSED04	Phosphorus	08/08/96	294	µg/g		284
KSED05	Arsenic	08/08/96	12	µg/g	J	9.94
KSED05	Nickel	08/08/96	12.8	µg/g		12.3
KSED05	Phosphorus	08/08/96	288	µg/g		284
KSED05	Thallium	08/08/96	2.67	µg/g	J	2.56
KSED06	Arsenic	08/08/96	110	µg/g	J	9.94
KSED06	Beryllium	08/08/96	1.94	µg/g		1.08
KSED06	Cobalt	08/08/96	12.3	µg/g		9.92
KSED06	Lead	08/08/96	20.7	µg/g		16
KSED06	Manganese	08/08/96	647	µg/g	J	549
KSED06	Phosphorus	08/08/96	316	µg/g		284
KSED06	Thallium	08/08/96	11	µg/g	J	2.56
KSED07	Phosphorus	08/08/96	321	µg/g		284
KSED08	Cadmium	08/08/96	0.27	µg/g		0.265
KSED09	Arsenic	08/08/96	10.3	µg/g	J	9.94
KSED09	Barium	08/08/96	640	µg/g		374
KSED09	Cadmium	08/08/96	0.501	µg/g	J	0.265
KSED09	Manganese	08/08/96	835	µg/g		549
KSED09	Phosphorus	08/08/96	396	µg/g		284
KSED09	Vanadium	08/08/96	36.8	µg/g		33.7
KSED10	Arsenic	08/08/96	27.5	µg/g	J	9.94
KSED10	Beryllium	08/08/96	1.82	µg/g		1.08

Table 3-40
Samples that Exceeded Background
Sediments
Closed OB/OD Area
Fort Wingate Depot Activity
Gallup, New Mexico

Site	Parameter	Sample Date	Value	Units	Flag Codes	Background Concentration
KSED10	Cadmium	08/08/96	1.3	µg/g	JP	0.265
KSED10	Copper	08/08/96	134	µg/g		13.1
KSED10	Lead	08/08/96	25.9	µg/g		16
KSED10	Mercury	08/08/96	0.0426	µg/g	JP	0
KSED10	Phosphorus	08/08/96	374	µg/g		284
KSED10	Thallium	08/08/96	13	µg/g		2.56
KSED10	Zinc	08/08/96	123	µg/g		87.7

Notes:
µg/g = micrograms per gram.
Flagging Codes:
J - Value is estimated.
JP - Value is estimated and is less than reporting level but greater than instrumental detection limit.

Table 3-41
Samples that Exceeded Screening Criteria
Sediments
Closed OB/OD Area
Fort Wingate Depot Activity
Gallup, New Mexico

Site	Parameter	Sample Date	Value	Units	Flag Codes	Background Concentration	Screening Level Concentration
KSED02	Phosphorus	08/08/96	393	µg/g		284	0
KSED04	Phosphorus	08/08/96	294	µg/g		284	0
KSED05	Arsenic	08/08/96	12	µg/g	J	9.94	0.39
KSED05	Phosphorus	08/08/96	288	µg/g		284	0
KSED06	Arsenic	08/08/96	110	µg/g	J	9.94	0.39
KSED06	Phosphorus	08/08/96	316	µg/g		284	0
KSED06	Thallium	08/08/96	11	µg/g	J	2.56	6.3
KSED07	Phosphorus	08/08/96	321	µg/g		284	0
KSED09	Arsenic	08/08/96	10.3	µg/g	J	9.94	0.39
KSED09	Phosphorus	08/08/96	396	µg/g		284	0
KSED10	Arsenic	08/08/96	27.5	µg/g	J	9.94	0.39
KSED10	Phosphorus	08/08/96	374	µg/g		284	0
KSED10	Thallium	08/08/96	13	µg/g		2.56	6.3

Notes:
µg/g = micrograms per gram.
Flagging Codes:
J - Value is estimated.

Table 3-42
Samples that Exceeded Closure Performance Standards
Sediments
Closed OB/OD Area
Fort Wingate Depot Activity
Gallup, New Mexico

Site	Parameter	Sample Date	Value	Units	Flag Codes	Background Concentration	Screening Level Concentration	Closure Performance Standards Contentration
KSED02	Phosphorus	08/08/96	393	µg/g		284	0	0
KSED04	Phosphorus	08/08/96	294	µg/g		284	0	0
KSED05	Phosphorus	08/08/96	288	µg/g		284	0	0
KSED06	Arsenic	08/08/96	110	µg/g	J	9.94	0.39	44.2
KSED06	Phosphorus	08/08/96	316	µg/g		284	0	0
KSED07	Phosphorus	08/08/96	321	µg/g		284	0	0
KSED09	Phosphorus	08/08/96	396	µg/g		284	0	0
KSED10	Phosphorus	08/08/96	374	µg/g		284	0	0

Notes:
µg/g = micrograms per gram.
Flagging Codes:
J - Value is estimated.

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Table 3-43
Samples that Exceeded Background
Surface Water
Closed OB/OD Area
Fort Wingate Depot Activity
Gallup, New Mexico

Site	Parameter	Sample Date	Value	Units	Flag Codes	Background Concentration
KSW02	2,6-Dinitrotoluene	08/08/96	2.4	µg/l	Q	0
KSW02	Antimony	08/08/96	1.02	µg/l		0
KSW04	Aluminum	08/08/96	280000	µg/l		171000
KSW04	Chromium	08/08/96	330	µg/l		270
KSW04	Iron	08/08/96	250000	µg/l		149000
KSW04	Mercury	08/08/96	0.925	µg/l		0.537
KSW04	Phosphorus	08/08/96	8000	µg/l		2900
KSW04	Thallium	08/08/96	7.46	µg/l		6.8
KSW04	Vanadium	08/08/96	810	µg/l		630
KSW05	Aluminum	08/08/96	376000	µg/l		171000
KSW05	Cadmium	08/08/96	5.38	µg/l		4.53
KSW05	Cobalt	08/08/96	260	µg/l		230
KSW05	Iron	08/08/96	366000	µg/l		149000
KSW05	Manganese	08/08/96	6100	µg/l		5200
KSW05	Mercury	08/08/96	1.33	µg/l		0.537
KSW05	Nickel	08/08/96	290	µg/l		250
KSW05	Selenium	08/08/96	25.6	µg/l		22.1
KSW05	Thallium	08/08/96	6.88	µg/l		6.8
KSW05	Vanadium	08/08/96	670	µg/l		630
KSW06	Aluminum	08/08/96	175000	µg/l		171000
KSW06	Arsenic	08/08/96	340	µg/l		130
KSW06	Cadmium	08/08/96	8.39	µg/l		4.53
KSW06	Chromium	08/08/96	900	µg/l		270
KSW06	Cobalt	08/08/96	500	µg/l		230
KSW06	Copper	08/08/96	940	µg/l		460
KSW06	Lead	08/08/96	1100	µg/l		540
KSW06	Manganese	08/08/96	11000	µg/l		5200
KSW06	Nickel	08/08/96	590	µg/l		250
KSW06	Selenium	08/08/96	57	µg/l		22.1
KSW06	Silver	08/08/96	5.52	µg/l		2.88
KSW06	Thallium	08/08/96	19.1	µg/l		6.8
KSW06	Vanadium	08/08/96	2000	µg/l		630

Table 3-43
Samples that Exceeded Background
Surface Water
Closed OB/OD Area
Fort Wingate Depot Activity
Gallup, New Mexico

Site	Parameter	Sample Date	Value	Units	Flag Codes	Background Concentration
KSW06	Zinc	08/08/96	4200	µg/l		1900
KSW07	Aluminum	08/08/96	352000	µg/l		171000
KSW07	Iron	08/08/96	295000	µg/l		149000
KSW07	Mercury	08/08/96	1.89	µg/l		0.537
KSW07	Phosphorus	08/08/96	11000	µg/l		2900
KSW08	Aluminum	08/08/96	481000	µg/l		171000
KSW08	Iron	08/08/96	405000	µg/l		149000
KSW09	Antimony	08/08/96	1.23	µg/l		0
KSW09	Arsenic	08/08/96	270	µg/l		130
KSW09	Cadmium	08/08/96	32.1	µg/l		4.53
KSW09	Chromium	08/08/96	670	µg/l		270
KSW09	Cobalt	08/08/96	600	µg/l		230
KSW09	Copper	08/08/96	1400	µg/l		460
KSW09	Iron	08/08/96	155000	µg/l		149000
KSW09	Lead	08/08/96	1100	µg/l		540
KSW09	Manganese	08/08/96	14000	µg/l		5200
KSW09	Mercury	08/08/96	0.601	µg/l		0.537
KSW09	Nickel	08/08/96	730	µg/l		250
KSW09	Phosphorus	08/08/96	4200	µg/l		2900
KSW09	Selenium	08/08/96	71.1	µg/l		22.1
KSW09	Silver	08/08/96	5.13	µg/l		2.88
KSW09	Thallium	08/08/96	12	µg/l		6.8
KSW09	Vanadium	08/08/96	1500	µg/l		630
KSW09	Zinc	08/08/96	5200	µg/l		1900

Notes:
µg/l = micrograms per liter.
Flagging Codes:
Q - Sample interference obscured peak of interest.

Table 3-44
Samples that Exceeded Background
Sediments
Current OB/OD Area
Fort Wingate Depot Activity
Gallup, New Mexico

Site	Parameter	Sample Date	Value	Units	Flag Codes	Background Concentration
CSED04	Vanadium	10/30/96	37.1	µg/g		25.9
CSED05	Beryllium	10/30/96	1.03	µg/g		0.775
CSED05	Cadmium	10/30/96	0.638	µg/g		0.214
CSED05	Chromium	10/30/96	25.9	µg/g		17.9
CSED05	Cobalt	10/30/96	7.88	µg/g		6.62
CSED05	Copper	10/30/96	73	µg/g		28
CSED05	Iron	10/30/96	20800	µg/g		16300
CSED05	Nickel	10/30/96	15	µg/g		12.5
CSED05	Vanadium	10/30/96	43.6	µg/g		25.9
CSED06	Cadmium	10/30/96	1.4	µg/g		0.214
CSED06	Chromium	10/30/96	21.2	µg/g		17.9
CSED06	Copper	10/30/96	107	µg/g		28
CSED06	Silver	10/30/96	1.06	µg/g	JP	0
CSED06	Vanadium	10/30/96	29.1	µg/g		25.9
CSED07	Beryllium	09/14/96	0.827	µg/g		0.775
CSED07	Beryllium	10/30/96	0.857	µg/g		0.775
CSED07	Cadmium	09/14/96	1.26	µg/g	J	0.214
CSED07	Cadmium	10/30/96	0.823	µg/g		0.214
CSED07	Chromium	09/14/96	25.1	µg/g		17.9
CSED07	Chromium	10/30/96	20.1	µg/g		17.9
CSED07	Cobalt	09/14/96	7.13	µg/g		6.62
CSED07	Cobalt	10/30/96	7.41	µg/g		6.62
CSED07	Copper	09/14/96	133	µg/g		28
CSED07	Copper	10/30/96	75.9	µg/g		28
CSED07	Iron	09/14/96	19900	µg/g		16300
CSED07	Iron	10/30/96	16500	µg/g		16300
CSED07	Nickel	09/14/96	14.9	µg/g		12.5
CSED07	Vanadium	09/14/96	39.5	µg/g		25.9
CSED07	Vanadium	10/30/96	34.8	µg/g		25.9
CSED07	Zinc	09/14/96	48.8	µg/g		0
CSED07	Zinc	10/30/96	89.6	µg/g		0
CSED08	Cadmium	09/14/96	0.626	µg/g	J	0.214

Table 3-44
Samples that Exceeded Background
Sediments
Current OB/OD Area
Fort Wingate Depot Activity
Gallup, New Mexico

Site	Parameter	Sample Date	Value	Units	Flag Codes	Background Concentration
CSED08	Chromium	09/14/96	19	µg/g		17.9
CSED08	Cobalt	09/14/96	6.78	µg/g		6.62
CSED08	Copper	09/14/96	50.9	µg/g		28
CSED08	Iron	09/14/96	18000	µg/g		16300
CSED08	Mercury	09/14/96	0.268	µg/g		0
CSED08	Vanadium	09/14/96	34.1	µg/g		25.9
CSED08	Zinc	09/14/96	70.3	µg/g		0
CSED09	Beryllium	10/30/96	1.59	µg/g		0.775
CSED09	Cadmium	10/30/96	1.8	µg/g		0.214
CSED09	Chromium	10/30/96	38.1	µg/g		17.9
CSED09	Cobalt	10/30/96	11	µg/g		6.62
CSED09	Copper	10/30/96	98.8	µg/g		28
CSED09	Iron	10/30/96	32000	µg/g		16300
CSED09	Lead	10/30/96	26.5	µg/g		18.5
CSED09	Mercury	10/30/96	0.221	µg/g	J	0
CSED09	Nickel	10/30/96	22.4	µg/g		12.5
CSED09	Thallium	10/30/96	1.39	µg/g	JP	0
CSED09	Vanadium	10/30/96	67.5	µg/g		25.9
CSED09	Zinc	10/30/96	102	µg/g		0
CSED10	Cadmium	09/14/96	0.302	µg/g	J	0.214
CSED10	Vanadium	09/14/96	29.8	µg/g		25.9
CSED10	Zinc	09/14/96	34	µg/g		0

Notes:
µg/g = micrograms per gram.
Flagging Codes:
J - Value is estimated.
JP - Value is estimated and is less than reporting level but greater than instrumental detection limit.

Table 3-45
Samples that Exceeded Screening Criteria
Sediments
Current OB/OD Area
Fort Wingate Depot Activity
Gallup, New Mexico

Site	Parameter	Sample Date	Value	Units	Flag Codes	Background Concentration	Screening Level Concentration
CSED09	Iron	10/30/96	32000	µg/g		16300	23000

Notes:
µg/g = micrograms per gram.

Table 3-46
Samples that Exceeded Closure Performance Standards
Sediments
Current OB/OD Area
Fort Wingate Depot Activity
Gallup, New Mexico

Site	Parameter	Sample Date	Value	Units	Flag Codes	Background Concentration	Screening Level Concentration	Closure Performance Standards Contentration
	No samples exceed closure performance standards.							

Notes:
µg/g = micrograms per gram.

Table 3-47
Samples that Exceeded Background
Surface Water and Alluvial Ground Water
Current OB/OD Area
Fort Wingate Depot Activity
Gallup, New Mexico

Site	Parameter	Sample Date	Value	Units	Flag Codes	Background Concentration
CMW06	4-Amino-2,6-dinitrotoluene	02/11/97	0.278	µg/l	C	0
CMW06	Arsenic	10/29/96	3.07	µg/l		2.63
CMW06	Arsenic	02/11/97	3.45	µg/l		2.63
CMW06	Arsenic	02/11/97	3.99	µg/l	F	2.63
CMW06	Cadmium	10/29/96	0.595	µg/l		0.309
CMW06	Cadmium	02/11/97	0.844	µg/l		0.309
CMW06	Manganese	10/29/96	1900	µg/l		510
CMW06	Manganese	10/29/96	950	µg/l	F	510
CMW06	Manganese	02/11/97	2300	µg/l		510
CMW06	Manganese	02/11/97	2000	µg/l	F	510
CMW06	Manganese	01/29/99	742	µg/l		510
CMW06	Manganese	02/01/99	787	µg/l	F	510
CMW06	Nickel	02/01/99	33.5	µg/l	FJP	17.5
CMW06	RDX	10/29/96	0.137	µg/l	JP	0
CMW06	Zinc	02/01/99	70	µg/l	F	51.5
CMW20	2,4,6-Trinitrotoluene	10/29/96	0.161	µg/l	C	0
CMW20	4-Amino-2,6-dinitrotoluene	02/11/97	0.248	µg/l	C	0
CMW20	Aluminum	10/29/96	138000	µg/l		29200
CMW20	Aluminum	02/11/97	86400	µg/l		29200
CMW20	Arsenic	10/29/96	5.62	µg/l		2.63
CMW20	Arsenic	02/11/97	4.52	µg/l		2.63
CMW20	Cadmium	10/29/96	1.32	µg/l		0.309
CMW20	Cadmium	02/11/97	1.1	µg/l		0.309
CMW20	Cobalt	10/29/96	17.3	µg/l		9.21
CMW20	Copper	10/29/96	83.4	µg/l		16.2
CMW20	Copper	02/11/97	113	µg/l		16.2
CMW20	Iron	10/29/96	81700	µg/l		19300
CMW20	Iron	02/11/97	51700	µg/l		19300

Table 3-47
Samples that Exceeded Background
Surface Water and Alluvial Ground Water
Current OB/OD Area
Fort Wingate Depot Activity
Gallup, New Mexico

Site	Parameter	Sample Date	Value	Units	Flag Codes	Background Concentration
CMW20	Lead	10/29/96	48.3	µg/l		13.8
CMW20	Lead	02/11/97	23	µg/l		13.8
CMW20	Manganese	10/29/96	1800	µg/l		510
CMW20	Manganese	02/11/97	1300	µg/l		510
CMW20	Nickel	10/29/96	35.2	µg/l		17.5
CMW20	RDX	10/29/96	0.578	µg/l	C	0
CMW20	RDX	02/11/97	0.715	µg/l	C	0
CMW20	Silver	10/29/96	0.239	µg/l		0
CMW20	Thallium	10/29/96	0.342	µg/l		0.269
CMW20	Vanadium	10/29/96	89.6	µg/l		45.1
CMW20	Zinc	10/29/96	99.9	µg/l		51.5
CSW01	1,3-Dinitrobenzene	09/14/96	0.137	µg/l	C	0
CSW07	2,4,6-Trinitrotoluene	09/14/96	33.8	µg/l	C	0
CSW07	2-Amino-4,6-dinitrotoluene	09/14/96	1.12	µg/l	Q	0
CSW07	4-Amino-2,6-dinitrotoluene	09/14/96	2.38	µg/l	Q	0
CSW07	Aluminum	09/14/96	56500	µg/l		29200
CSW07	Antimony	09/14/96	1.05	µg/l		0
CSW07	Arsenic	09/14/96	3.03	µg/l		2.63
CSW07	Cadmium	09/14/96	2.74	µg/l		0.309
CSW07	Cobalt	09/14/96	9.43	µg/l		9.21
CSW07	Copper	09/14/96	220	µg/l		16.2
CSW07	HMX	09/14/96	4.62	µg/l	C	0
CSW07	Iron	09/14/96	36900	µg/l		19300
CSW07	Lead	09/14/96	55.3	µg/l		13.8
CSW07	Manganese	09/14/96	840	µg/l		510
CSW07	Nickel	09/14/96	22.7	µg/l		17.5
CSW07	RDX	09/14/96	19.2	µg/l	C	0
CSW07	Silver	09/14/96	0.799	µg/l		0

Table 3-47
Samples that Exceeded Background
Surface Water and Alluvial Ground Water
Current OB/OD Area
Fort Wingate Depot Activity
Gallup, New Mexico

Site	Parameter	Sample Date	Value	Units	Flag Codes	Background Concentration
CSW07	Zinc	09/14/96	220	µg/l		51.5
CSW08	2,4,6-Trinitrotoluene	09/14/96	2.5	µg/l	C	0
CSW08	2-Amino-4,6-dinitrotoluene	09/14/96	0.116	µg/l	CJP	0
CSW08	Aluminum	09/14/96	324000	µg/l		29200
CSW08	Antimony	09/14/96	1.11	µg/l		0
CSW08	Arsenic	09/14/96	36.2	µg/l		2.63
CSW08	Cadmium	09/14/96	9.5	µg/l		0.309
CSW08	Chromium	09/14/96	220	µg/l		24.8
CSW08	Cobalt	09/14/96	80.6	µg/l		9.21
CSW08	Copper	09/14/96	460	µg/l		16.2
CSW08	HMX	09/14/96	4.65	µg/l	C	0
CSW08	Iron	09/14/96	209000	µg/l		19300
CSW08	Lead	09/14/96	300	µg/l		13.8
CSW08	Manganese	09/14/96	6000	µg/l		510
CSW08	Mercury	09/14/96	2.91	µg/l		0
CSW08	Nickel	09/14/96	189	µg/l		17.5
CSW08	RDX	09/14/96	28.7	µg/l	C	0
CSW08	Selenium	09/14/96	9.46	µg/l		0
CSW08	Silver	09/14/96	2.03	µg/l		0
CSW08	Thallium	09/14/96	2.53	µg/l		0.269
CSW08	Vanadium	09/14/96	340	µg/l		45.1
CSW08	Zinc	09/14/96	1200	µg/l		51.5
CSW10	Aluminum	09/14/96	44000	µg/l		29200
CSW10	Arsenic	09/14/96	4.36	µg/l		2.63
CSW10	Cadmium	09/14/96	0.891	µg/l		0.309
CSW10	Copper	09/14/96	42	µg/l		16.2
CSW10	Iron	09/14/96	37600	µg/l		19300
CSW10	Lead	09/14/96	16.4	µg/l		13.8

Table 3-47
Samples that Exceeded Background
Surface Water and Alluvial Ground Water
Current OB/OD Area
Fort Wingate Depot Activity
Gallup, New Mexico

Site	Parameter	Sample Date	Value	Units	Flag Codes	Background Concentration
CSW10	Manganese	09/14/96	620	µg/l		510
CSW10	Silver	09/14/96	0.169	µg/l		0
CSW10	Zinc	09/14/96	82.8	µg/l		51.5
FW38	4-Amino-2,6-dinitrotoluene	02/11/97	0.349	µg/l	C	0
FW38	Cadmium	10/28/96	0.799	µg/l		0.309
FW38	Cadmium	02/11/97	1.12	µg/l		0.309
FW38	Copper	10/28/96	35.9	µg/l		16.2
FW38	Copper	02/11/97	43.8	µg/l		16.2
FW38	Lead	10/28/96	14.6	µg/l		13.8
FW38	Lead	02/11/97	23.1	µg/l		13.8
FW38	Manganese	10/28/96	690	µg/l		510
FW38	Mercury	02/11/97	0.419	µg/l		0
FW38	Nickel	10/28/96	63.7	µg/l		17.5
FW38	Nickel	10/28/96	34.4	µg/l	F	17.5
FW38	Nickel	02/11/97	24.5	µg/l		17.5
FW38	Nitrite, nitrate - nonspecific (as nitrogen)	08/11/97	26.3	µg/l		0
FW38	Silver	10/28/96	0.125	µg/l	F	0
FW38	Zinc	10/28/96	260	µg/l		51.5
FW38	Zinc	02/11/97	320	µg/l		51.5

Notes:
µg/l = micrograms per liter.
Flagging Codes:
C - Analysis was confirmed.
F - Sample filtered prior to analysis.
J - Value is estimated.

4.0 SUMMARY AND CONCLUSIONS

4.1 CLOSED OB/OD AREA GROUND WATER SYSTEM

Within the Closed OB/OD Area ground water system a thin veneer of unconsolidated material was identified that grades into competent shale of the Mancos Shale Formation. Shallow ground water was encountered in the Mancos Shale Formation and the Dakota Sandstone Formation. An additional boring drilled into the Dakota Sandstone Formation in the location thought most likely to receive infiltration of surface water and shallow ground water, contained no free water throughout the entire thickness of the Dakota Sandstone Formation. The only constituent detected in ground water from the Mancos Shale Formation that exceeded the screening criterion and CPS was ammonia, and this is because there is no CPS for this constituent. No constituent concentrations detected in ground water from the Dakota Sandstone Formation exceed the screening criteria or CPSs. Thus, it is considered unlikely that installation activities have impacted ground water within the Mancos Shale Formation or the Dakota Sandstone Formation. It is also considered unlikely that ground water in these formations will be impacted in the future.

Future monitoring of ground water quality within the Mancos Shale Formation and the Dakota Sandstone Formation is planned. Sampling of KMW09, KMW12, and KMW13 will be conducted on a quarterly basis for the period of one year, starting in January 2000. This will allow an evaluation of seasonal changes in ground water chemistry and changes in ground water levels which may affect the direction of ground water flow. The ground water samples will be analyzed for explosives, TAL metals, nitrate, and nitrite. At the end of four quarters of ground water monitoring, the results will be compiled and potential trends evaluated. At that time, the need for continued ground water monitoring will be assessed and negotiated with the appropriate regulatory agencies.

No explosive compounds were detected at concentrations exceeding either screening criteria or CPSs in the sediment samples collected from the Closed OB/OD Area. Sediment samples contained concentrations of phosphorus exceeding the CPS; however, exceedances of the CPS for phosphorus do not necessarily represent an unacceptable risk to human health under the selected future land use scenarios. Arsenic was detected in one sample at a concentration exceeding the CPS; however, similar levels of arsenic were not detected in the sediment samples located downgradient. In the surface water samples, one explosive compound was detected and many individual inorganic/metal constituents exceeded background levels. No constituents were present at concentrations exceeding background levels in the most downgradient surface water sample; thus, it does not appear that contaminants are being transported out of the Closed OB/OD Area via surface water flow.

4.2 *CURRENT OB/OD AREA GROUND WATER SYSTEM*

Within the Current OB/OD Area ground water system, a thin veneer of unconsolidated materials is present overlying a thick sequence of shale units belonging to the Chinle Formation. Water table conditions are present only within the unconsolidated materials. This shallow ground water may discharge to surface water pools within the Current OB/OD Area arroyo; however, no evidence of surface water flow has been observed since October 1996. Based upon these data, the potential of exposure to shallow ground water via its discharge to surface water is thought to be sporadic; therefore, this is not considered to be a complete exposure pathway.

Ground water flow within the undifferentiated intervals of the Chinle Formation is dominated by fracture flow. Monitoring wells contained concentrations of RDX, ammonia, cadmium, chromium, lead, and selenium that exceeded the CPSs. Ground water from these intervals is thought to be migrating through fractures to the Sonsela Sandstone Member, and then migrating generally northward following the bedrock dip and topography. Thus, potential exposure to impacted ground water within the undifferentiated Chinle Formation is addressed by the potential exposure considerations for the Sonsela Sandstone Member.

As described previously, ground water within the Painted Desert Member is controlled by the geologic structure and flows toward the north, following the bedrock dip and topography. Chromium and lead were only detected at concentrations exceeding the CPSs during the first of two sampling events; thus, the presence of inorganic constituents at concentrations exceeding the CPSs may have been a temporary condition.

Ground water flow within the Sonsela Sandstone Member is also toward the north, following the bedrock dip and topography. Ammonia, antimony, and lead were detected at concentrations exceeding the CPSs in ground water from the Sonsela Sandstone Member. As discussed above, there is no CPS for ammonia; thus, the concentration of ammonia detected in ground water from the Sonsela Sandstone Member does not warrant further action. The antimony concentration only exceeded the CPS in

CMW16. Lead concentrations exceeding the CPS were present in CMW21 and CMW23; however, these concentrations were in the total fraction only, indicating that the lead is the result of suspended particulates in the ground water rather than dissolved lead. Monitoring wells CMW21 and CMW22 are located downgradient of the lateral extent of contaminated ground water, and will provide downgradient sentinel monitoring wells screened in the Sonsela Sandstone Member.

The Entrada Sandstone Formation occurs in the northwestern portion of the Current OB/OD Area ground water system. Ground water within this formation is thought to migrate down dip toward the west. The only constituent that exceeded the CPS was ammonia, and this is because there is no CPS for this constituent. Thus, it is considered unlikely that installation activities have impacted ground water within the Entrada Sandstone Formation. It is also considered unlikely that ground water in this formation will be impacted in the future.

Extensive shale units underlying the Current OB/OD Area ground water system, being of inherently lower primary permeability than surrounding sandstone units, inhibit vertical movement of ground water to underlying potable aquifer units, such as the Glorieta Sandstone Formation. The shale units also restrict movement of potentially impacted ground water from the Current OB/OD Area down dip toward the west. Intense structural deformation associated with formation of the Hogback makes correlation of lithologic units from the eastern and central portions of the Current OB/OD Area ground water system toward the western portion not possible. This lack of correlation makes identification of the ground water flow path in a westward direction not possible. However, if limited transport of impacted ground water toward the west were to occur, it would be at a significantly greater stratigraphic depth than the overlying Dakota and Gallup Sandstone Formations, which are used as potable ground water sources in areas west of FWDA. Thus, it is considered highly unlikely that exposure to this ground water would occur; therefore, this is not considered to be a complete exposure pathway.

Future monitoring of ground water quality within the Chinle Formation, Painted Desert Member, and Sonsela Sandstone Member is planned. Sampling of CMW02, CMW16, CMW18, CMW21, CMW22, and CMW25 will be conducted on a quarterly basis for the period of one year, starting in January 2000. This will allow an evaluation of seasonal changes in ground water chemistry and changes in ground water levels that may affect the direction of ground water flow. The ground water samples will be analyzed for explosives, TAL metals, nitrate, and nitrite. At the end of four quarters of ground water monitoring, the results will be compiled and potential trends evaluated. At that time, the need for continued ground water monitoring will be assessed and discussed with the appropriate regulatory agencies

No explosive compounds were detected in the sediment samples collected from the Current OB/OD Area. No inorganic/metal constituent concentrations detected in sediment samples collected within the Current OB/OD Area exceeded the CPSs. In the surface water and alluvial ground water samples, explosive compounds were detected and many individual inorganic/metal constituents exceeded background levels. No explosives were detected in the most downgradient sample; thus, it does not appear that explosives are being transported out of the Current OB/OD Area via surface water flow.

5.0 *REFERENCES*

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Program Management Company

REGULATORY AGENCY REVIEW

FORT WINGATE DEPOT ACTIVITY
GALLUP, NM

FINAL OPEN BURNING/OPEN DETONATION AREA RCRA INTERIM STATUS CLOSURE PLAN PHASE IB - CHARACTERIZATION AND ASSESSMENT OF SITE CONDITIONS FOR THE GROUND WATER MATRIX

Prepared for:

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29 December 1999