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WORK PLANS

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CLOSURE PLAN FOR ROSWELL COMPRESSOR STATION SURFACE IMPOUNDMENTS

VOLUME I: Text, Figures, Tables

Prepared for

ENRON Environmental Affairs

Houston, Texas

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LIST OF ACRONYMS AND ABBREVIATIONS

ACL	Alternative concentration limit
B&C	Brown and Caldwell
B&R	Brown & Root Environmental
bgs	Below ground surface
BLM	Bureau of Land Management
BTEX	Benzene, toluene, ethylbenzene, and xylenes
CES	Cypress Engineering Services
DBS&A	Daniel B. Stephens & Associates, Inc.
DO	Dissolved oxygen
DQOs	Data quality objectives
EDAC	Earth Data Analysis Center
EPA	Environmental Protection Agency
FID	Flame ionization detector
Halliburton	Halliburton NUS Environmental Corporation
HLA	Harding Lawson Associates
HWMR	Hazardous Waste Management Regulations
mL	Milliliter
MS/MSD	Matrix spike/matrix spike duplicate
NMED	New Mexico Environment Department
NMSHTD	New Mexico State Highway and Transportation Department
OCD	Oil Conservation Division
O.D.	Outside diameter
OVA	Organic vapor analyzer
PARCC	Precision, accuracy, representativeness, completeness, and comparability
PID	Photoionization detector
QA	Quality assurance
QAPP	Quality assurance project plan
QC	Quality control
PPE	Personal protective equipment
PSH	Phase-separated hydrocarbons
PVC	Polyvinyl chloride
RCRA	Resource Conservation and Recovery Act
RPD	Relative percent difference
SCT	Salinity-conductivity-temperature meter
SEO	State Engineer Office
SVE	Soil vapor extraction
TCA	1,1,1-trichloroethane
TCLP	Toxic characteristic leaching procedure
TNRCC	Texas Natural Resources Conservation Commission
TPH	Total petroleum hydrocarbons
Transwestern	Transwestern Pipeline Company
USGS	United States Geological Survey
VOCs	Volatile organic compounds

1. INTRODUCTION

At the request of Transwestern Pipeline Company (Transwestern), a wholly owned subsidiary of ENRON Operations Corporation, Daniel B. Stephens & Associates, Inc. (DBS&A) has prepared this Closure Plan for closure of three former surface impoundments located at Transwestern's Compressor Station No. 9 (Roswell compressor station) near Roswell, New Mexico (Figure 1-1). The closure plan has been prepared for submission to the Hazardous and Radioactive Materials Bureau of the New Mexico Environment Department (NMED) in order to satisfy the requirements of the New Mexico Hazardous Waste Management Regulations (HWMR-7). Sections 1.1 through 1.3 provide information on the scope of work, objectives, and organization of the closure plan, along with a cross-reference to the relevant regulations.

1.1 Scope of Work

This closure plan addresses proposed activities for closure of three former surface impoundments located at the Roswell compressor station. The three former surface impoundments were located in the northeastern corner of the compressor station and were operated during the period between 1960 and 1986. The impoundments served primarily to contain pipeline condensate, a non-hazardous liquid hydrocarbon waste that accumulates within natural gas pipelines. Pipeline condensate and other similar petroleum wastes are generally exempt from regulation under the Resource Conservation and Recovery Act (RCRA) by the petroleum exclusion. However, small quantities of RCRA-regulated spent halogenated solvents (F001 wastes) were also inadvertently placed in the impoundments, along with miscellaneous non-hazardous solid wastes such as filters, engine parts, and office trash (Campbell, 1993). Therefore, NMED has requested that a RCRA closure plan be prepared to address the possible presence of RCRA hazardous wastes beneath the former impoundments.

The closure plan was prepared in accordance with the requirements of Part VI of HWMR-7, which incorporate by reference the federal requirements contained in 40 CFR Part 265. In addition, the closure plan is intended to address the list of required information requested by NMED in the Notice of Deficiency dated March 7, 1994 (Appendix A).

1.2 Closure Plan Objectives, Organization, and Amendments

The overall objective of this closure plan is to provide the basis for performing final closure of three former surface impoundments. Closure will be considered complete upon receipt of a signed Closure Certificate from NMED. As described in 40 CFR Part 265, the two available options for closure of surface impoundments include (1) clean closure and (2) landfill closure. Transwestern intends to attempt clean closure of the impoundments, whereby hazardous wastes are removed to the extent that future threats to human health and the environment attributable to the facility no longer exist.

In order to accomplish the overall clean closure objective, the following steps will be performed:

1. Existing data regarding the nature and extent of subsurface contamination will be summarized.
2. Data gaps in the existing data set will be identified.
3. Supplemental subsurface investigations will be performed to fill the data gaps.
4. Cleanup criteria will be established for soil and ground water.
5. A corrective action plan will be developed and implemented to remove the contaminants to levels within the cleanup criteria.
6. Verification sampling will be performed to ensure that cleanup criteria have been achieved.
7. Clean closure certification will be requested from NMED.

This closure plan is organized sequentially in accordance with the above objectives. The site background and regulatory status of the former impoundments will be described first (Section 2) to provide a basis for the proposed closure activities. The results of all previous subsurface environmental investigations will then be summarized (Section 3). A proposed soil assessment plan (Section 4) and a ground-water quality assessment plan (Section 5) follow, along with a Quality Assurance Project Plan (Section 6). Finally, a proposed corrective action plan is outlined (Section 7), followed by project schedule and conditions for closure certification (Section 8).

This document is intended to provide the basic framework for all subsequent closure activities. However, it is recognized that modifications to the closure plan may be necessary as closure proceeds and more information becomes available. Modifications to the proposed corrective action technologies are particularly likely because the volumes of impacted soil and ground water are not currently known with great certainty. Therefore, it is anticipated that one or more amendments to this closure plan will likely prove necessary following collection of additional data as proposed in the soil and ground-water assessment plans (Sections 4 and 5). Subsequent closure plan amendments, if necessary, will be prepared according to the procedures specified in 40 CFR Part 265.112 and submitted to NMED for review and comment prior to approval.

1.3 Regulatory Requirements of 40 CFR Parts 264/265

The closure regulations in Subpart G of 40 CFR Parts 264/265 include a specific list of requirements that must be fulfilled. An attempt has been made to address each of these requirements in this closure plan.

In order to facilitate the review and approval of this closure plan by NMED, a closure plan checklist has been included in Appendix B. The format for the checklist was developed by the U.S. Environmental Protection Agency (U.S. EPA, 1987) for evaluation of surface impoundment closure plans and includes citations of the regulatory requirements outlined in Subpart G of 40 CFR Parts 264/265, along with reference to the sections or subsections of this closure plan containing the information that pertains to those requirements. The checklist can be used as a guideline to ensure that all relevant regulatory requirements have been adequately addressed.

In addition to the closure requirements (Subpart G), the ground-water monitoring requirements stipulated in 40 CFR Parts 264/265 Subpart F have been addressed in Section 5 of this document.

In accordance with the financial requirements of 40 CFR Parts 264/265 Subpart H, documentation of financial assurance for closure must be provided with this closure plan. As owner of the Roswell compressor station, Transwestern can demonstrate that it passes the financial test specified in Part 265.143(e). A letter from the chief financial officer of Transwestern documenting the results of the financial test is provided in Appendix C of this closure plan, along with several supporting documents. This information is the same as that previously submitted to NMED on July 1, 1993.

2. SITE BACKGROUND

The Roswell compressor station is located approximately 9 miles north of the city center of Roswell, New Mexico along the east side of U.S. Highway 285 (Figure 1-1). Sections 2.1 through 2.5 provide background information regarding the facility layout and operation, history of the former surface impoundments that are the subject of closure under this plan, as well as the regional geographic, geologic, and hydrologic setting.

2.1 Facility Description

The Roswell compressor station is situated on approximately 80 acres of land in Sections 21 and 28, Chaves County, New Mexico (Figure 1-1). The property is privately owned by Transwestern Pipeline Company, while the remainder of Sections 21 and Section 28 are State Trust Land (Glenn, 1993). Site access is via U.S. Highway 285, and the entire property is secured by a chain link fence. The following is a list of pertinent information regarding the facility:

Facility name	Transwestern Pipeline Company Compressor Station No. 9
Facility address	Transwestern Pipeline Company 6381 North Main Street P.O. Box 1717 Roswell, New Mexico 88202-1717
Telephone number	(505) 625-8022
EPA I.D. number	NMD 986676955
County and state	Chaves County, New Mexico
Property legal description	SW¼ of the SW¼ of Section 21, T. 9S. R. 24E. NW¼ of the NW¼ of Section 28, T. 9S. R. 24E.
Latitude of former impoundments	33°30'32" north
Longitude of former impoundments	104°31'01" west
Site elevation	Approximately 3610 feet above sea level

The Roswell compressor station is one of numerous similar facilities located along the Transwestern natural gas pipeline that extends from Texas to California. Natural gas is received from the east through two 24-inch pipelines, the West Texas Lateral and the Panhandle Lateral, and leaves to the northwest through two 30-inch pipelines. The primary function of the compressor station is to boost the pressure of the natural gas stream by means of piston compressors powered by natural gas internal combustion engines. The facility also includes the district offices for Transwestern's New Mexico operations, along with other ancillary buildings including a warehouse and a repair shop (Figure 2-1). The compressor station has been in operation at this location since August 9, 1960.

The only environmental permit currently in force is Discharge Plan GW-52 with the New Mexico Oil Conservation Division (OCD). An RCRA Part A permit application was filed with NMED in January 1993 for closure of the former impoundments under interim status.

2.2 History and Operation of Former Surface Impoundments

Little information exists about the operational history of the surface impoundments. Much of what is known is based on the recollection of present or former Transwestern employees. The following discussion summarizes the available information regarding the locations, sizes, and periods of operation of the former surface impoundments.

As mentioned in Section 1, the primary function of the former impoundments was to contain pipeline condensate, a hydrocarbon liquid that accumulates during the periodic cleaning of the natural gas pipelines. Natural gas is composed mostly of alkane compounds, with methane being the most abundant (Eiceman, 1986). In addition, natural gas contains variable concentrations of heavier molecular weight hydrocarbons (C4+), which may condense due to changes in temperature and pressure within the pipelines. Besides the higher molecular weight hydrocarbons derived from the natural gas itself, pipeline condensate may also contain lube oil blow-by derived from upstream reciprocating engine gas compressors located at other compressor stations. The lube oil blow-by consists of crankcase lubricating oil that bypasses the compressor piston rings and enters the natural gas pipeline.

Pipeline condensate is periodically removed from the pipeline through "pigging" operations, which make use of a cylindrical piston-like device known as a "pig." The pig cleans the condensate from the interior pipeline wall by scraping and brushing as it is carried through the pipeline by the pressurized gas stream. The pig and the accumulated liquid condensate are removed from the pipeline at the "pig receiver" (Figure 2-1). Currently, all condensate is collected and stored prior to shipment for off-site disposal. Formerly, the condensate was stored in one or more unlined surface impoundments that are the subject of this closure plan. The impoundments have been variously referred to as the "disposal pit" or the "burn pits." The latter term refers to the reported practice of periodically burning the hydrocarbon liquids in the impoundment to reduce their volume (Campbell, 1993).

The first reported use of a surface impoundment at this location was in August of 1960, shortly following construction of the compressor station in 1960 (Campbell, 1993). However, no records are currently available showing the exact location or size of this surface impoundment or others that may have been used subsequently until the last remaining surface impoundment was backfilled in 1986. Correspondence among Transwestern, NMED, and OCD has generally referred to a single impoundment as "the disposal pit" (Campbell, 1992) or "the burn pit." However, the General Plan map for the Roswell compressor station (Transwestern, 1959) showed two surface impoundments located in the northeast corner of the facility, in the NE¼ of the SW¼ of the SW¼ of Section 21, T. 9S. R. 24E. The locations of the two former burn pits as previously shown on the General Plan were found to be incorrect, as discussed below.

Figure 3 of a report prepared by Metric Corporation (1991) indicated the possibility that three pits had existed in the northeast corner of the facility. This was reportedly based on discussions with a former compressor station supervisor who was able to recall the approximate locations of three former surface impoundments (Campbell, 1994). The three pits are designated in the Metric report (1991) as Pit 1 (southernmost), Pit 2 (northeast), and Pit 3 (northwest). The employee was said to have pointed out the approximate former locations of the pits to the Metric field staff. For the sake of consistency, these designations will be retained through this closure plan.

Prior to the preparation of this closure plan, the location and number of former surface impoundments was not known precisely. In order to clarify the number and exact locations of the former impoundments, DBS&A obtained historical aerial photographs showing the compressor station. The following sources were contacted during this effort: the Earth Data Analysis Center (EDAC, Albuquerque), the Bureau of Land Management (BLM, Albuquerque), the New Mexico State Highway and Transportation Department (NMSHTD, Santa Fe), IntraSearch (Denver), and the United States Geological Survey (USGS) Earth Science Information Center (Denver). Several aerial photographs showing the compressor station were located, and contact prints were obtained for five different photographs taken on the following dates:

Date Flown	Approximate Scale	Source
07/28/61	1:23,000	EDAC-Albuquerque
10/10/72	1:25,000	NMSHTD-Santa Fe
06/21/73	1:32,000	BLM-Albuquerque
04/19/81	1:26,000	BLM-Albuquerque
08/05/82	1:19,000	NMSHTD-Santa Fe

The 1961 aerial photograph shows a single feature that appears to be a surface impoundment in the extreme northeast corner of the property. This impoundment corresponds to Pit 2 on Figure 2-1. This appears to be the first surface impoundment constructed at the compressor station.

The 1972 and 1973 photographs reveal two features that appear to be surface impoundments. In order to more clearly see these features, enlargements were made of the 1973 and 1981 BLM photographs to scales of 1:5340 and 1:4330, respectively. Examination of the 1973 photograph shows two surface impoundments (Pit 1 and Pit 2 on Figure 2-1), with a third feature that may represent a backfilled impoundment (Pit 3 on Figure 2-1).

In the 1981 and 1982 photographs, only Pit 1 remains visible (Figure 2-1). The features labeled as Pit 2 and Pit 3 appear to have been backfilled prior to the April 19, 1981 flight. Pit 1 was reportedly backfilled in June of 1986 (Campbell, 1993). No wastes of any type were received after that date. Based on the aerial photographs, the dimensions and approximate periods of operation of the three former surface impoundments were as follows:

Impoundment	Approximate Dimensions	Date Constructed	Date Backfilled
Pit 1	40' x 70' (rectangular)	After 7/61, before 10/72	6/86
Pit 2	70' diameter (circular)	Before 7/61	Before 4/81
Pit 3	50' diameter (circular)	After 7/61, before 10/72	Before 4/81

It is estimated that the impoundments were at most 10 feet deep. Therefore, the maximum volumes of Pits 1, 2, and 3 during their operational lifetimes were approximately 1,037, 1,425, and 727 cubic yards, respectively.

2.3 Regulatory Background

This section provides a brief history of prior communications and regulatory actions related to the former surface impoundments being closed under this closure plan. This information is included to facilitate an understanding of events pertinent to regulation and closure of the impoundments.

As discussed in Section 1, operations involving wastes generated during the production and transmission of natural gas are generally exempt from regulation under RCRA as a result of the petroleum exclusion. Thus Transwestern's Compressor Station No. 9, along with other compressor stations in New Mexico, have historically been regulated by the New Mexico OCD.

As discussed in greater detail in Section 3, chlorinated solvents were first detected in soil gas near the former surface impoundments during a soil vapor survey by Harding Lawson Associates (HLA) in 1991. The compound detected most frequently was 1,1,1-trichloroethane (1,1,1-TCA). Because chlorinated volatile organic compounds (VOCs) are not natural components of natural gas or pipeline condensate, and because spent halogenated solvents are classified as F001 "Listed Wastes" under RCRA, the NMED Hazardous and Radioactive Materials Bureau became involved.

Following a subsequent soil investigation by Metric Corporation completed in December 1991, Transwestern attended a series of meetings with NMED and OCD to discuss the potential corrective action at the former surface impoundments. Because it appeared possible that RCRA-regulated wastes had been inadvertently placed in the impoundments, NMED requested that Transwestern submit a RCRA Part A permit application.

On November 30, 1992, Transwestern submitted the RCRA Part A application to NMED and OCD. During a joint meeting of NMED and OCD with Transwestern on December 10, 1992, NMED requested that the Part A application be resubmitted using the proper EPA forms. This was done on January 5, 1993.

On February 17, 1993, NMED requested that Transwestern submit a RCRA closure plan for the former impoundments in accordance with the New Mexico Hazardous Waste Regulations, Part VI, Section 40 CFR 265.112(a). Although the impoundments had in fact been physically closed since June of 1986, Transwestern prepared a closure plan, which was delivered to NMED on July 1, 1993. NMED rejected this closure plan on March 7, 1994, however, on the grounds that it was incomplete and requested that another closure plan be submitted at a later date. On April 8, 1994, Transwestern met with NMED to discuss the Notice of Deficiency. The NMED requested that an administratively-complete closure plan be delivered by June 1, 1994.

Meanwhile, Transwestern had begun interim corrective measures to recover free hydrocarbon product from monitor well MW-1. Three additional wells, MW-1B, MW-2, and RW-1, were subsequently connected to the product recovery system. Transwestern has continued to keep NMED and OCD informed of the results of all subsurface investigations, as well as the performance of the product recovery system.

In addition to the above summary, Appendix D of this closure plan is a detailed chronology of events and relevant communications between Transwestern and the regulatory agencies regarding the former surface impoundments. The chronology is included to document the events preceding the submission of this closure plan and is intended to aid the reviewer in understanding the context in which it was developed.

Transwestern continues to maintain that the hydrocarbon contaminants that originated from past disposal practices at the surface impoundments represent petroleum industry wastes, which are therefore exempt from regulation under RCRA. Furthermore, Transwestern believes that the soil and ground water underlying the former impoundments are best addressed in a manner similar to other petroleum hydrocarbon spill sites. However, in accordance with NMED's request, Transwestern has prepared this closure plan to satisfy the requirements of RCRA.

2.4 Geographic Setting

The Roswell compressor station is located approximately 6 miles west of the Pecos River within the Pecos Valley drainage basin. The entire area west of the Pecos River is generally referred to as the west Pecos slope (Kelley, 1971), which rises westward from elevations of about 3,300 feet at the Pecos River to over 10,000 feet in the Capitan Mountains some 50 miles to the west. Tributary surface streams drain west to east toward the Pecos River. Local topography is generally of low relief. The mean annual precipitation as measured at the Roswell Municipal Airport for a 23-year period was 9.82 inches. The majority of the precipitation occurs in July and August during frequent summer thunderstorms.

2.5 Regional Hydrogeology

The Roswell compressor station lies within the northernmost portion of the Roswell hydrologic basin. The basin is structurally controlled by eastward-dipping carbonate and evaporite sequences of Permian age which were uplifted during the Tertiary period during the development of the Sacramento and Guadalupe Mountains along the western margin of the basin (Kelley, 1971). Eastward flowing tributaries originating in the western highlands have deposited Quaternary alluvium over the Permian age rocks west of the Pecos River.

Because the average dip of the Permian rocks is greater than the slope of the land surface, progressively younger units are encountered eastward toward the Pecos River. Several prominent northeast trending ridges and hills interrupt the gently sloping plains near the site. These structures are narrow fault zones referred to as the Border Hills, Six-Mile Hill, and the Y-O faulted anticlines.

The stratigraphic units of importance with regard to water resources are, in ascending order, the San Andres Formation (Permian), the Artesia Group (Permian), and the undifferentiated

Quaternary valley fill alluvium. Figure 2-2 shows the generalized stratigraphy in the vicinity of the site. Ground water is produced from both a shallow water-table aquifer (alluvium) and a deeper artesian aquifer that includes the two bedrock units (Welder, 1983). The deep bedrock aquifer is commonly known as the Roswell artesian aquifer. According to the State Engineer Office (SEO), approximately 400,000 acre-feet of water are pumped annually from the two aquifers of the Roswell hydrologic basin (DBS&A, 1992). The two aquifers are separated by a semi-confining layer, but are connected where the carbonate aquifer rises structurally to meet the shallow aquifer. Both aquifers are recharged along surface exposures on the slopes to the west and are believed to discharge to the Pecos River at the eastern margin of the basin.

The following subsections describe each of the hydrostratigraphic units in the Roswell basin in detail.

2.5.1 San Andres Formation

The San Andres Formation consists primarily of a thick sequence of limestones, dolomitic limestones, and dolomites, with increasing quantities of interbedded anhydrite and gypsum to the north (Kelley, 1971). The formation is divided into three members, in ascending order: the Rio Bonito, the Bonney Canyon, and the Fourmile Draw members (Figure 2-2; Kelley, 1971). The average thickness of the formation is about 1,000 feet in the Roswell basin (Bean, 1949).

The Fourmile Draw member is the principal water-bearing unit within the San Andres Formation. High permeability has resulted from an irregular network of collapsed breccias, cavities, caves, and other interconnected open structures which were formed by dissolution of evaporite and carbonate beds. Gypsum beds become much more abundant in the Fourmile Draw member from Roswell northward (Kelley, 1971), and a well-developed karst surface is exposed where the unit is not covered by alluvium. In the northern portion of the basin the water-bearing zones of the San Andres Formation are approximately 400 to 600 feet thick and ground-water flow is primarily to the east-southeast toward the Pecos River.

In general, the lower boundary of the Roswell artesian aquifer, in general, is defined by low permeability zones that commonly occur within the Bonney Canyon member, which lies approximately 450 feet below the surface in the vicinity of the Roswell compressor station (Figure 2-2). SEO well records for wells near the site indicate that the upper boundary of the San Andres is approximately 92 feet below ground surface (bgs) in this area.

2.5.2 Artesia Group

The Artesia Group includes the following formations, in ascending order: the Grayburg, Queen, Seven Rivers, Yates, and Tansill Formations. In the vicinity of the Roswell compressor station, only the first three formations are present. The Artesia Group consists primarily of dolomite, sandstone, and gypsum units of Permian age. The sedimentary sequence represents a rapid lateral change in depositional environments from the southern massive reef complexes near Carlsbad to the northern clastic and evaporitic sequences representative of back reef and shelf environments (Kelley, 1971).

The Grayburg Formation unconformably overlies the San Andres Formation and ranges in thickness from 140 to 360 feet. The bottom of the Grayburg Formation provides a leaky confining bed that allows artesian ground water to move upward through the Artesia Group into the shallow alluvial aquifer. The thickness of this confining bed varies from 0 to 1,000 feet across the basin.

Drillers logs in the Roswell area indicate that discontinuous permeable units in the upper Artesia Group act as water-bearing zones (Welder, 1983). Fractures and cracks between fragments of collapsed breccia and solution-enlarged bedding planes and joints constitute the principal sources of permeability. These water-bearing zones generally occur in the upper quarter of the confining unit and may yield water to wells that tap both the upper Artesia Group and the shallow alluvium.

In most areas the Artesia Group is covered by a veneer of Quaternary alluvium west of the Pecos River. In the northwest portion of the basin, the bedrock confining unit is thin or absent, and the clay beds within the valley fill act as the confining bed for the lower confined carbonate aquifer. Historically, the lower carbonate aquifer discharged upward into the alluvium, but within the past 50 years, the vertical gradient across the confining bed has reversed because of ground-water pumping from the deep aquifer. This reversal has resulted in a downward gradient, causing ground water in the shallow aquifer to discharge to the deeper carbonate aquifer in some areas (DBS&A, 1992).

2.5.3 Quaternary Valley Fill

The Quaternary valley fill in the Roswell area was deposited by shifting streams flowing from the west toward the Pecos River. The valley fill consists of poorly to moderately consolidated deposits of gravel, sand, and clay which mantle the underlying Permian rocks. The thickness of alluvial sediments varies considerably from one locality to another because of the irregular bedrock erosional surface upon which the alluvium was deposited. In some areas the alluvial fill is moderately well cemented.

The thickness of the shallow alluvium is shown on Figure 2-3 for the northern portion of the Roswell Basin. Lyford (1973) developed the thickness (isopach) map after examination of drill cuttings from 225 wells penetrating the valley fill. Lyford's map indicates that the alluvium near the site is generally less than 50 feet thick. In other areas, however, the thickness can exceed 250 feet thick where the alluvium fills depressions in the underlying bedrock surface. Recent SEO well records indicate that the alluvium near the site is approximately 70 feet thick (DBS&A, 1992).

Lyford (1973) described three distinct units in the valley fill of the Roswell Basin. These units were termed the quartzose, clay, and carbonate gravels. The quartzose unit consists of sandstone, quartzite, quartz, chert, and igneous and carbonate fragments with varying degrees of calcium carbonate cemention. The quartzose unit in the vicinity of the Pecos River consists primarily of medium to coarse, uncemented quartz grains (Welder,1983). Silt and clay deposits occur as lenses overlying the quartzose unit. These lenses were deposited in small ponds and lakes that resulted from the dissolution and collapse of the underlying carbonate rocks. The carbonate-gravel unit overlies the other valley fill deposits and generally consists of coarse carbonate gravel with intermixed silts and caliche.

The alluvial sediments underlying the compressor station, as observed in borings drilled during several investigations (Section 3), consist predominantly of interbedded cobbles, gravel, sand, silt, and clay. The finer-grained zones form lenticular beds which appear to be discontinuous across the site. Some of the alluvial deposits are firmly cemented in some places. These lithologic descriptions are consistent with Lyford's descriptions of the valley fill.

The principal water-bearing zones of sands and gravels are separated by less permeable lenses of silt and clay. According to Welder (1983), one to five water-bearing zones exist within the valley fill, and in many areas the alluvium is hydraulically connected to the upper bedrock units of the Artesia Group. The perimeter of the shallow alluvial aquifer is generally bounded by a margin of less permeable alluvium.

Figure 2-4 shows the approximate elevation of the water table in the shallow alluvium, as determined from measurements of water levels in wells completed in the alluvium (DBS&A, 1992). The map indicates that the station lies slightly outside the mapped extent of the shallow alluvial aquifer and that ground-water flow is toward the Pecos River. Although a thin layer of saturated alluvium exists as far north as Arroyo del Macho, Welder (1983) did not include this area within the extent of the shallow alluvial aquifer as defined by him, primarily because the ground-water quality in this area is too poor to be used for water supply purposes (DBS&A, 1992). The poor water quality in the shallow alluvial aquifer from slightly south of the Roswell compressor station northward is due to the presence of gypsum beds of the Fourmile Draw member at the base of the alluvium.

Because of the poor water quality and the low yields, most wells completed in the shallow alluvium are used primarily as livestock water supplies. In general, the chloride content of water in the shallow aquifer increases from west to east and ranges from 20 mg/L to 3700 mg/L (Welder, 1983). The presence of gypsum beds results in objectionably high calcium and sulfate concentrations in the shallow alluvial aquifer in the vicinity of the Roswell compressor station and northward. Sulfate concentrations are typically in the range of 2,000 to 3,000 mg/L, which is approximately equal to the equilibrium saturation concentration for ground water in direct contact with gypsum ($CaSO_4 \cdot 2H_2O$). Thus, background sulfate concentrations in this area are four to five times above the New Mexico Water Quality Control Commission ground-water standard for sulfate of 600 mg/L. The poor water quality in the alluvium is consistent with the high total dissolved solids concentrations reported for ground water from the on-site monitor wells, as discussed further in Section 3.

2.6 Water Well Inventory

A survey was conducted to locate water supply wells within 2 miles of the Roswell compressor station. This survey was accomplished by searching a water well database created by DBS&A that is based on the USGS Ground-Water Sites Inventory database. The database contains the locations of all known water wells plus additional information regarding well construction, well use, and aquifer penetrated. The water well database was compiled by DBS&A for a ground-water modeling project conducted for the SEO.

A review of the database revealed that there are 14 wells within 2 miles of the compressor station. Table 2-1 details the location, total depth, depth to water, use, and completion aquifer for each of these 14 wells, along with their distance from the compressor station, and Figure 2-5 shows the locations of the wells relative to the site. The database indicates that 3 of the wells are abandoned (no longer in use). Known uses of the other wells include 2 wells reportedly used as observation wells, 2 as livestock wells, 1 as a domestic well, and 4 as irrigation wells. The use of the 2 remaining wells is unknown.

The closest well to the former surface impoundments is a shallow livestock well completed in alluvium to a depth of 58 feet (well 3 on Figure 2-5). This well, which is no longer in use, is located about a half mile due east of the impoundments in the direction that would presumably be downgradient. The well is completed with 8⅝-inch casing, and the depth to water measured in 1937 reportedly was 15 feet. The well is presently abandoned and may be dry because of declining water levels in the Roswell area.

The next nearest well is a 352-foot-deep well located in the southwestern portion of the compressor station property (well 2 on Figure 2-5). This well was reportedly drilled in 1969 for use as a water supply well for the compressor station (Campbell, 1994). Following connection of the facility to the City of Roswell water distribution system, however, use of the well was turned over to the Pecos Valley Artesian Conservancy District for monitoring water levels in the Roswell bedrock aquifer. Based on comparison of the drillers' log with the local stratigraphy, the well is completed in limestone of the San Andres Formation. The well is cased with 9⅝-inch steel casing from the surface to a depth of 240 feet, and is open from 240 feet to the total depth of 352 feet. The depth to water as measured in 1969 was 85 feet.

The only reported domestic water supply well within 2 miles of the facility is located approximately 1.3 miles northeast of the compressor station. Although the well is reportedly a domestic well, no dwelling could be seen on aerial photographs at this location. The well is completed to a depth of 375 feet in the San Andres Formation. The depth to water was reportedly 45 feet in 1961, and examination of the drillers' log shows that the well is cased from the surface to a depth of 370 feet.

Several active irrigation and livestock wells are reportedly located from 1 to 2 miles east of the site (Figure 2-5). All of these wells are completed in the San Andres limestone aquifer. Given the distance to the downgradient wells and the presence of the aquitard between the alluvium and the bedrock aquifer, it is very unlikely that ground water from the compressor station could impact any of the active water supply wells.

3. PREVIOUS ENVIRONMENTAL INVESTIGATIONS

Several hydrogeologic investigations have been completed at the Roswell compressor station to characterize the extent of subsurface impacts near the former surface impoundments. The investigations have included (1) a comprehensive soil vapor survey and soil coring program by HLA, (2) a drilling and soil sampling program by Metric Corporation, (3) installation of a monitor well by Halliburton NUS Environmental Corporation (Halliburton), (4) installation of a product recovery pump in monitor well MW-1 by Cypress Engineering Services (CES), (5) a drilling and soil sampling program by Brown & Root Environmental (B&R), and (6) system operation and optimization by Brown & Caldwell.

The above investigations and the interim corrective action program have been undertaken in phases beginning in the spring of 1990 and continuing to the present. During this period extensive data have been collected regarding subsurface soils and ground-water conditions at the site.

Sections 3.1 through 3.5 provide an accounting of each of the field investigations conducted to date, and Section 3.6 summarizes the extent of subsurface impacts resulting from past surface impoundment operations. Table 3-1 provides a summary of the soil borings and monitor wells installed during each investigation. Analytical summaries of hydrocarbon compounds detected in soil and ground water are provided in Tables 3-2 through 3-6.

3.1 Harding Lawson Associates Shallow Subsurface Investigation (1990)

During the spring of 1990, a soil investigation was performed by HLA to confirm or refute the suspected presence of VOCs in the shallow subsurface in the vicinity of the former surface impoundments (HLA, 1991a). The HLA investigation included an extensive soil gas survey and a soil coring and sampling program.

During the soil gas survey, HLA collected a total of 812 soil vapor samples from the locations shown on Figure 3-1. Soil gas samples were collected from depths ranging from 2 feet to 36 feet by driving a soil vapor probe several feet ahead of the hollow-stem auger bit. Soil vapor samples were analyzed in a mobile laboratory by subcontractor Fahrenthold & Associates using a gas chromatograph equipped with an electron capture detector. Five target purgeable halocarbons were quantified, including 1,1,1-TCA, trichloroethene, perchloroethene, chloroform, and carbon tetrachloride. The laboratory results for the soil gas samples are provided in Appendix E of this document.

The highest VOC concentrations were measured near the surface impoundments located in the northeast portion of the facility. The most frequently detected compound was 1,1,1-TCA, which was also detected at the highest concentrations (up to 372 ppmv). The areal distribution of 1,1,1-TCA at the 10-foot depth, as determined by HLA, is illustrated in Figure 3-2. The mass of vapor phase 1,1,1-TCA within the plume is estimated to be approximately 18 kg, assuming that the concentrations at the 10 foot depth apply to all soils from the surface to the water table at a depth of about 60 feet. This is equivalent to a volume of liquid 1,1,1-TCA of only about 3.5 gallons.

Following completion of the soil gas survey, HLA undertook a program of continuous coring and soil sampling in order to validate the soil vapor survey results. A total of 11 borings were drilled to depths of up to 65 feet. Continuous 5-foot-long soil cores were collected using a hollow-stem auger drill rig. Figure 3-3 shows the location of each boring drilled by HLA. The soil samples were analyzed in the laboratory for a suite of selected VOCs, semivolatile organic compounds, total petroleum hydrocarbons (TPH), and toxic characteristic leaching procedure (TCLP) metals. The results of these analyses are summarized in Tables 3-2 and 3-3, and the complete laboratory reports are provided in Appendix E.

Only a few of the HLA soil samples contained detectable concentrations of the target purgeable halocarbons. A soil sample collected from 35 to 37 feet deep in boring SB-9-07 near the surface impoundments contained the highest concentration of 1,1,1-TCA (2 mg/kg). This boring also contained somewhat higher concentrations of Freon-113, ethylbenzene, xylenes, and TPH.

In 4 of the 11 borings, HLA encountered perched water on top of a clay lens at approximately 30 feet bgs. The boreholes that contained water were near the utility garage and engine room (Figure 2-1). HLA postulated that the clay formed an aquitard with an undulating surface, thus allowing the water to pond within depressions in the upper surface of the clay. Water samples collected from these borings contained concentrations of 1,1,1-TCA below EPA drinking water MCLs.

3.2 Metric Corporation Shallow Subsurface Investigation (1991)

During July and November 1991, Metric Corporation drilled 20 additional soil borings to delineate the areal and vertical extent of the VOCs identified by HLA near the surface impoundments (Metric, 1991). The locations of borings drilled by Metric are shown on Figure 3-4. Soil borings were generally advanced to approximately 30 to 40 feet bgs in order to characterize soil type and to determine if VOCs were present above the uppermost clay unit. Only four soil borings were drilled to depths greater than 50 feet bgs (Table 3-1).

Metric collected soil samples using a continuous tube sampler, and each core was screened for the presence of VOCs using an organic vapor analyzer (OVA). Within a given soil core, the material with the highest concentration of organic vapors was submitted to the laboratory for analysis of the following constituents: TPH, benzene, toluene, ethylbenzene, and xylenes (BTEX); and purgeable halocarbons by EPA Methods 418.1, 8010, and 8020, respectively. The results of these laboratory analyses are summarized in Tables 3-2 and 3-4. Several of the borings contained VOC concentrations above the soil cleanup standards enforced by NMED and OCD.

Based on the analytical results, Metric estimated that the areal and vertical extent of VOC impacts extended approximately 240 feet east and approximately 100 feet north of the northeast property corner. The investigation further established that purgeable halocarbons are present to depths of at least 30 feet bgs near surface impoundments 1 and 2 (soil borings "Pit 1" and "Pit 2") and along the eastern fence line (soil boring SG 86). In addition, some soil samples contained TPH concentrations of 100 mg/kg, or greater, to depths exceeding 27 feet in soil borings "Pit 1," "Pit 2," SG 86, and OS BH-9.

Most borings drilled previously by HLA and Metric had penetrated a clay layer at approximately 30 feet bgs. However, clay was not encountered in soil boring "Pit 2" above about 68 feet bgs. This prompted Metric to conclude that a natural clay basin existed beneath the surface impoundments, with the sides sloping from the 30 to 40 foot depth around the perimeter, to approximately 70 feet bgs near the basin bottom.

However, subsequent drilling programs verified that the upper clay is, in fact, present at the 35 to 40 foot depth near the "Pit 2" soil boring, but is thinner and contains coarser sediments. The upper clay unit appears to grade laterally into a coarser zone of sandy clays near soil boring "Pit 2." Further, the clay unit identified at 67.9 feet bgs by Metric is actually part of the lower clay unit that underlies the entire site. This lower clay may lie near the contact between the valley-fill alluvium and the underlying Artesia Group Permian bedrock units (see Figure 2-2, Section 2.5).

Ground water was encountered at depths ranging from 37 to 57 feet bgs in 6 of the 20 borings drilled by Metric. Soil borings "Pit 2" and SG 361 (Figure 3-4) contained thin perched water zones (1 to 6 feet thick) above fine-grained sandy clays which correspond to the upper clay unit. Approximately 1-foot of water was measured at the bottom of soil borings OS BH-8 and OS BH-9 (Figure 3-4) at approximately 49 feet bgs. The water measured at the 49-foot depth may have migrated down the boreholes from the top of the upper clay unit. Finally, the ground water encountered at depths of about 55 feet bgs likely represents the water table of the uppermost aquifer, as these depths to water were generally reported in borings drilled to depths of approximately 70 feet bgs.

3.3 Halliburton NUS Corporation Monitor Well Installation (1992)

During July 1992, Halliburton installed one monitor well within the natural clay basin determined by Metric (Section 3.2) (Halliburton, 1992). The boring was drilled to a depth of 60 feet prior to sampling, at which point continuous samples were collected with a split-spoon sampler until a red clay layer containing very hard sulfate lenses was encountered at 68 feet bgs. Monitor well MW-1 was installed at the location depicted on Figure 3-5.

Following installation of MW-1, the well was developed by bailing and subsequently sampled for the Appendix IX RCRA ground-water monitoring list of volatile and semivolatile organics, TPH, and total metals. The analytical results indicated that the ground water within monitor well MW-1 contained aromatic and halogenated hydrocarbons, as well as several semivolatile organic compounds. These results are summarized in Table 3-4.

3.4 Brown & Root Environmental Ground-Water Assessment (1993)

In April 1993, B&R, a division of Halliburton, completed a limited assessment of ground-water impacts resulting from disposal activities at the former surface impoundments (B&R, 1993). The investigation was undertaken to determine if two separate saturated zones existed within the alluvium and to establish ground-water quality beneath the former impoundments.

As part of their investigation, seven soil borings were drilled, and four of these were completed as monitor wells. Figure 3-5 shows the locations of soil borings and monitor wells installed by B&R. Soil samples were collected from each boring using a split-spoon sampler or continuous core barrel. The samples were screened for the presence of VOCs using an OVA. Unfortunately, the OVA was not functioning during the drilling of soil borings SB-4, SB-5, and SB-1C. Soil samples were collected above the two saturated zones and analyzed for TPH using EPA Method 418.1; the results are summarized in Table 3-4.

Perched water was not encountered above the upper clay unit during drilling of soil borings SB-1B, SB-2, SB-3, and SB-5 (Figure 3-5). However, phase-separated hydrocarbons (PSH) and water were encountered in soil boring SB-1A immediately above the upper clay layer at approximately 40 feet bgs. This boring was subsequently plugged and abandoned by B&R. Soil boring SB-4 encountered a small saturated zone in fractured limestone at approximately 47 feet bgs. This boring is located approximately 250 feet east of the property boundary, and the limestone probably corresponds to the top of the Artesia Group (Section 2.5).

B&R installed four monitor wells in the uppermost aquifer within soil borings SB-1B, SB-2, SB-3, and SB-5. The monitor wells, identified as MW-1B, MW-2, MW-3, and MW-5, were set at total depths ranging from 65 to 70 feet bgs (Table 3-1). The newly installed wells were then checked for the presence of PSH, developed, and sampled.

Approximately 4 feet of PSH was present on top of the water table in monitor wells MW-1B and MW-2. Ground-water samples were collected from the two monitor wells without PSH (MW-3 and MW-5) and analyzed for TPH (EPA Method 418.1), volatile organics (EPA Method 624 and 8240), and total dissolved solids (EPA Method 160.1). The results of these analyses are summarized in Tables 3-4 and 3-5.

B&R concluded that two water bearing zones were present in the alluvium and that both were impacted by VOCs. The two zones included (1) the upper thin zone of perched water on the upper clay unit (approximately 40 feet bgs) and (2) a deeper zone of saturated silty sand and sand at depths ranging from 55 to 65 feet bgs. During the drilling of soil borings SB-1B and SB-2, B&R identified zones of residual saturation and PSH above the upper clay unit. Following construction of monitor wells MW-1B and MW-2 in the uppermost aquifer, approximately 4 feet of PSH was measured in each well.

In June 1993 B&R returned to the site to install PSH recovery wells in the upper water-bearing zone above the upper clay unit. An additional seven borings were drilled near the surface impoundments, designated RB-1 through RB-7 (Figure 3-5). Only one of the seven additional borings contained perched liquids. The one boring which contained liquid (RB-7) was completed as recovery well RW-1 near monitor well MW-1 (Figure 3-5). Approximately 1.4 feet of PSH was measured in recovery well RW-1 following its construction.

On March 23, 1994, CES removed an inoperative recovery pump from MW-1 and collected ground-water samples from monitor wells MW-3 and MW-5. On April 15, 1994, B&R installed a pneumatic product recovery pump and skimmer in monitor well MW-1. At that time B&R measured the following depths to PSH and to ground water in the four wells containing free hydrocarbon product:

Well	Date	Depth to PSH[1] (feet)	Depth to Water[1] (feet)	PSH Thickness (feet)
MW-1	04-15-94	53.30	61.54	8.24
MW-1B	04-15-94	58.42	61.30	2.88
MW-2	04-15-94	58.68	61.50	2.82
RW-1	04-15-94	38.70	39.00	0.30

[1] Depth in feet below top of casing.

3.5 Interim PSH Removal Program

On May 21, 1993 a recovery pump was installed in MW-1 by CES. During July 1993, B&R installed PSH recovery pumps in monitor wells MW-1B, MW-2, and RW-1. Since that time, PSH and water have been pumped from these wells and routed to an aboveground storage tank. Rollins Environmental Services then periodically transports the waste hydrocarbon liquid to Deer Park, Texas for incineration.

The interim PSH recovery system has been operated and maintained by Brown and Caldwell (B&C). During the fall of 1993, B&C installed skimmers on each recovery pump to reduce the volume of water recovered. Prior to the installation of the skimmers, B&C measured PSH levels and ground-water levels of approximately 58. 5 and 62 feet bgs in monitor wells MW-1B and MW-2, respectively. The depth to water was approximately 38.6 feet bgs in recovery well RW-1, which contained approximately 0.06 feet of PSH at the time of measurement. The interim PSH recovery system has successfully removed approximately 8,000 gallons of PSH to date.

3.6 Extent of Soil and Ground-Water Contamination

The investigations completed to date and described in Sections 3.1 through 3.5 have been conducted to characterize the subsurface hydrogeology and the distribution of VOCs in the soils and ground water beneath the former surface impoundments. Figure 3-6 shows the locations of all borings and monitor wells installed to date. The contaminants detected consist primarily of petroleum hydrocarbons that are typical components of pipeline condensate, which was formerly held in the surface impoundments. Tables 3-2 through 3-5 provide summaries of the organic and inorganic constituents detected in soils and ground water during each of the previous investigations.

Sections 3.6.1 through 3.6.3 summarize the findings of the investigations discussed above and provide an accounting of the subsurface distribution of constituents exceeding regulatory guidelines set by NMED and EPA.

3.6.1 Site Hydrogeology

The Quaternary sediments beneath the impoundments consist of interbedded cobbles, gravel, sand, silt, and clay to depths of approximately 70 feet bgs. The lithology of the alluvium is consistent with the descriptions provided by Lyford (1973). A generalized hydrogeologic cross section of the sediments underlying the impoundments constructed along a north-south line (Figure 3-6) is provided in Figure 3-7. Soil types in Figure 3-7 are defined using the Unified Soil Classification System. The hydrogeology underlying the site is as follows:

- From the ground surface to depths of approximately 30 to 35 feet bgs, brown gravelly sands and clays are present. Perched water is often encountered within the bottom few feet of this interval.

- At depths of approximately 35 to 60 feet, light brown to reddish-colored interbedded silts, sands, and clays are encountered. The fine-grained clay lenses serve as the perching layer for the downward moving fluids.

- At depths of approximately 60 to 70 feet, saturated silty sands and sands are present. This zone is referred to as the uppermost aquifer.

- At approximately 70 feet, a red plastic clay of unknown thickness is present. This unit probably represents the transition from the Quaternary alluvium to the Permian-age bedrock of the Artesia Group.

- As discussed in Section 2.5, the background water quality in the shallow alluvial aquifer is very poor in the vicinity of the site due to the presence of gypsum beds beneath the alluvium. TDS concentrations exceed 3000 mg/L in on-site monitor wells MW-3 and MW-5 (Table 3-5). These two wells do not appear to be impacted by site activities; rather, the elevated TDS concentrations in these wells simply reflect the poor background quality of ground water in the region.

3.6.2 Soil Impacts

Based on field OVA measurements and analytical chemistry results, elevated VOC concentrations in soil appear to encompass an area of approximately 600 feet by 400 feet centered between the three former surface impoundments. Figure 3-8 shows the estimated areal extent of impacted soil, in excess of 100 mg/kg TPH.

Near the former surface impoundments, the vertical extent of impacted soils extends from approximately land surface to the uppermost aquifer at approximately 60 feet. The vertical extent of impacted soil decreases as one moves laterally away from the surface impoundments. Due to local soil heterogeneities, it appears that VOCs have spread out along preferential pathways on top of the upper clay unit at the 30- to 40-foot depth, prior to continued downward migration to the uppermost aquifer.

A generalized cross-sectional profile of impacted soils is shown in Figure 3-9; Figure 3-6 shows the location of the cross section. The estimated distribution of impacted soils is based both on field organic vapor analyzer readings and soil TPH concentrations as determined in the laboratory.

The extent of 1,1,1,-TCA detected in soil samples is limited to the area immediately below the former surface impoundments. However, elevated 1,1,1-TCA soil vapor concentrations are present throughout the estimated area of actionable soils (Figure 3-8).

3.6.3 Ground-Water Impacts

The estimated extent of actionable VOCs in ground water is difficult to ascertain due to the limited number of existing monitor wells. However, the lateral extent is bounded on-site by the two clean monitor wells along the northern (MW-5) and eastern (MW-5) fencelines. The ground-water plume most likely extends downgradient beyond the estimated extent of actionable soil contamination. Although the direction of the ground-water head gradient cannot be determined with certainty at present, regional water level information obtained from wells completed in the shallow alluvium suggests that the flow direction is generally to the east.

PSH is present in on-site monitor wells MW-1, MW-2, and MW-1B completed in the uppermost aquifer at 55 to 70 feet bgs, and in recovery well RW-1, completed in the limited perched zone from 35 to 42 feet bgs. The extent of PSH off-site, if any, remains to be defined.

4. SOIL ASSESSMENT PLAN

The focus of the soil assessment plan is to characterize the lateral and vertical extent of VOC impacts to soils underlying the former surface impoundments. The sampling strategy is based on information collected from previous investigations at the facility (Section 3) and examination of historical aerial photographs (Section 2.2).

4.1 Soil Sampling Strategy

The soil assessment plan will concentrate on two separate areas targeted for further investigation. The first area consists of the soils surrounding what is believed to have been the former surface impoundment identified as Pit 3 on the aerial photographs (Section 2.2). No previous environmental investigations have been conducted within the Pit 3 area; thus, one of the objectives of this soil assessment is to determine the vertical extent of soil contamination below the former impoundment. The remainder of the soils investigation will concentrate on other areas where additional information is required to adequately define both the vertical and lateral extent of impacted soils surrounding the former surface impoundments.

As part of the soil assessment, we propose to drill and sample 13 to 15 soil borings, 2 of which will be drilled within the apparent boundary of Pit 3 (Figure 4-1) to determine the vertical extent of soil contamination below the impoundment. One of these soil borings will be drilled to the top of the upper clay layer (approximately 30 feet bgs), and the second soil boring will be drilled to the top of the bedrock (approximately 70 feet bgs).

The remaining soil borings will be drilled at the other locations shown in Figure 4-1 to define the lateral and vertical extent of contaminated soils. All of these soil borings will be drilled to the top of the bedrock at a depth of about 70 feet. Ground-water monitor wells will be installed within several of these soil borings as part of the ground-water assessment (Section 5); monitor well installation procedures are described in Section 5.1. All soil borings will be drilled using a hollow-stem auger drilling rig equipped with minimum 6-inch-outside-diameter (O.D.) augers. The drilling operations will be conducted in accordance with DBS&A SOP 13.3.1, Drilling Operations (Appendix F).

4.2 Soil Sampling Procedures

Soil samples will be collected at 10-foot intervals using a split-barrel sampler containing 6-inch-long brass liner rings. In general, the bottom and center rings will be used to collect samples for chemical analysis (Section 4.4). The remaining sample ring will be used for geologic logging and field screening for VOCs. Field screening will be conducted by the headspace method following the protocols specified in NMED Underground Storage Tank Regulations (USTR-12). Soil grab samples will also be collected periodically to further define the geologic conditions at the site. All soil samples will be collected in accordance with DBS&A SOP 13.3.2, Soils Logging, Sampling, Handling, and Shipping for Geotechnical and Chemical Analyses (Appendix F).

Once the desired sampling depth is reached, a clean split-barrel sampler will be assembled and lowered to the bottom of the borehole. The split-barrel sampler will then be driven below the bottom of the borehole using a top-mounted hammer with uniform drive-pressure/drop height. Blow counts will be recorded for all split-barrel drives. The total depth of penetration will also be recorded to ensure that the samples are representative of the indicated depth. Following retrieval from the borehole, the split-barrel sampler will be placed on a table covered with a clean plastic sheet. The split-barrel sampler will then be opened and the bottom and center liner rings removed. Excess soil will be shaved from the ends of the rings and the ends will be sealed with Teflon membranes and plastic caps taped in place with solvent-free tape. Every attempt will be made to minimize loss of VOCs from the soil samples due to volatilization.

All sample containers will be labeled using waterproof ink. Label information will include the sampling location, depth interval, sampling date and time, type of analysis requested, project number, and the initials of the sampler. The containers will be sealed and placed in clear plastic bags. The sealed containers will be put into coolers on bags of ice or frozen ice packs. Plastic bubble pack or other suitable packing material will be used to protect the samples during shipping. Chain-of-custody forms will be completed in triplicate for each sample shipment as described in Section 6.5.

Field personnel will ship the sample coolers to the laboratory using an overnight courier service. The fastest possible shipping method will be used, and all sample shipments will be carefully tracked to ensure that samples arrive intact and that all holding times are met.

4.3 Borehole Abandonment Procedures

The two soil borings located within Pit 3 (Figure 4-1) will be abandoned following completion of drilling and sampling. These two borings will not be completed as monitor wells because the impacted soils within the former pit will be excavated as described in Section 7.3.1. All abandonment procedures will be in accordance with DBS&A SOP 13.4.4, Well and Boring Abandonment (Appendix F).

In general, those boreholes to be abandoned will be plugged by emplacing a 3-percent bentonite/cement grout mixture through the hollow-stem augers. Prior to abandonment, the approximate volume of the borehole will be determined to estimate the volume of grout required. The quantity of grout actually used will be recorded for each borehole abandoned. After addition of each batch of grout, the augers and tremie pipe will be pulled up an equivalent distance. This procedure will be repeated until the level of the grout reaches the ground surface. At no time during the abandonment procedure will the distance between the bottom of the augers and the top of the cement/bentonite grout exceed 10 feet.

4.4 Laboratory Analysis of Soil Samples

Field VOC headspace screening will be performed on all soil samples, and the two highest samples submitted for laboratory analyses of TPH by EPA Method 418.1 and halogenated and aromatic VOCs by EPA Methods 8010 and 8020. The analytical methods and parameters for soil samples are discussed further in Section 6. Chemical analyses will be performed in accordance with procedures in *Test Methods for Evaluating Solid Waste* (U.S. EPA, 1986).

4.5 Decontamination Procedures

All non-disposable field equipment that may potentially come in contact with any soil sample will be decontaminated in accordance with DBS&A SOP 13.5.2, Decontamination of Field Equipment (Appendix F), in order to minimize the potential for cross-contamination between sampling locations. Clean latex or plastic gloves will be worn during all decontamination operations. The following sequence of decontamination procedures will be followed prior to each sampling event:

1. Wash all down-hole equipment in a solution of non-phosphate detergent (Liquinox®) and distilled/deionized water. All surfaces that may come into direct contact with the soil sample will be washed. Use a clean Nalgene® tub to contain the wash solution and a scrub brush to mechanically remove loose particles.

2. Rinse the equipment twice with distilled/deionized water.

3. Allow the equipment to air dry prior to the next use.

The drill rig and all down-hole equipment will be steam-cleaned and allowed to air dry between borings. A decontamination area lined with plastic sheeting will be set up to contain all wash water associated with the steam-cleaning operation. Liquid wastes produced during equipment decontamination will be contained in 55-gallon drums at a designated on-site drum storage area. Pending the results of laboratory analyses, all liquids will be handled as potentially hazardous wastes, as described in Section 4.6.

4.6 Management of Investigation-Derived Wastes

All soil cuttings, decontamination fluids, and used personal protective equipment (PPE) will be stored in 55-gallon drums and labeled to identify contents, date of generation, and amount of material generated. All wastes, with the exception of PPE, will be handled as potentially hazardous wastes, pending results of laboratory analyses for associated samples.

Liquid wastes generated during decontamination of drilling and sampling equipment will be stored pending results of associated soil sample laboratory results. For example, the disposition of wash water associated with a particular boring will be determined from the analytical results of soil samples collected from that particular boring. If the water is determined to be hazardous, it will be filtered through an activated carbon filtration system as described in Section 5.7.

Soil cuttings generated during the soil assessment will be stored in 55-gallon drums pending analytical results for soil samples collected from associated soil borings. Hydrocarbon contaminated soils will be segregated from clean soils, and placed in the biotreatment cells as described in Section 7.3.1. Clean soils will be disposed of on-site by spreading soil cuttings on the ground surface. PPE and dry waste associated with these materials will be disposed of in a sanitary landfill.

5. GROUND-WATER ASSESSMENT PLAN

The existing ground-water monitoring network at the Roswell compressor station consists of five monitor wells completed within the uppermost aquifer at depths of approximately 70 feet bgs (Figure 3-6). The current number and configuration of monitor wells make it difficult to estimate the extent of actionable VOCs in ground water. The lateral extent of impacted ground water is bounded by the two clean monitor wells MW-5 and MW-3; however, to some extent, the longitudinal extent of impacted ground water is unknown. Although the direction of ground-water flow cannot be determined with certainty at present, regional water level information collected from wells completed in the uppermost aquifer suggest that the flow direction is generally to the east (see Figure 2-4).

The ground-water assessment plan will be implemented to characterize ground-water quality and quantity within the uppermost aquifer underlying the former surface impoundments. This program will be conducted in accordance with the NMED HWMR-7, Part VI, and 40 CFR 265.93(d)(4). The objectives of the ground-water assessment plan are as follows:

- Establish the lateral extent of actionable VOCs in the uppermost aquifer beneath and around the former surface impoundments.
- Determine the ground-water flow direction and hydraulic gradient within the uppermost aquifer.
- Collect additional ground-water quality data from the uppermost aquifer to determine background (natural) conditions.
- Collect ground-water quality data from the deep bedrock aquifer to establish background conditions and to determine if impacts have occurred.
- Establish aquifer hydraulic parameters for ground-water flow and transport calculations.

The elements of the proposed ground-water assessment plan and procedures to accomplish the above objectives are described in the following sections.

5.1 Monitor Well Installation

The current ground-water monitoring network consists of five wells completed within the uppermost aquifer and one well completed within the perched ground water (Figure 3-6). As part of the ground-water assessment, we propose to install approximately eight additional monitor wells within the uppermost aquifer and one deep bedrock monitor well. Information collected from the new shallow monitor wells will help to establish ground-water flow direction, background ground-water quality, and the lateral extent of actionable VOCs in the uppermost aquifer. The deep bedrock well will be used to determine ground-water characteristics of the San Andres Formation bedrock aquifer.

The shallow monitor wells will be installed to the east and north downgradient of the former surface impoundments (Figure 5-1). The deep bedrock monitor well will be installed downgradient of the former surface impoundments. All monitor wells will be constructed in accordance with the NMED Ground Water Section Monitor Well Construction and Abandonment Guidelines (NMED, 1989), and DBS&A SOP 13.4.1, Monitor Well Design and Installation (Appendix F).

5.1.1 Installation of Shallow Monitor Wells

The exact construction details of the shallow monitor wells will be determined based on field observations during drilling. The construction details provided here are based on hydrogeologic data compiled from previous investigations at the site (see Section 3). The uppermost aquifer wells will all be completed to the top of bedrock, which is expected to lie at a depth of approximately 70 to 80 feet bgs (Figure 3-7). The shallow wells will be screened over the entire interval of the uppermost aquifer, which is expected to be between 10 and 20 feet thick.

The shallow monitor wells will be completed within the uppermost aquifer using hollow-stem auger drilling techniques. Prior to well installation, pilot soil borings will be drilled to the total depth at each location with minimum 6-inch-O.D. augers. Soil samples will be collected at 10-foot intervals during the drilling of the pilot hole using the procedures described in Section 4. Soil grab samples will also be collected periodically during drilling to better define the geologic conditions at the site. All soil samples will be collected in accordance with DBS&A SOP 13.3.2, Soils Logging, Sampling, Handling, and Shipping for Geotechnical and Chemical Analyses (Appendix F).

The shallow monitor wells will be installed within the hollow-stem augers following the completion of the pilot soil boring. Immediately prior to well construction, the total depth of the borehole will be determined using a clean, weighted steel tape or tag line. The monitor wells will be constructed of 2-inch-diameter schedule 40 polyvinyl chloride (PVC) pipe and will include, in ascending order, a 6-inch flush-threaded silt trap (sump) at the bottom, 10 to 20 feet of flush-threaded 0.01-inch machine-slotted PVC screen, and blank casing from the top of the screen to approximately 2 feet above ground surface.

Once the well casing has been lowered to the bottom of the borehole, a sandpack consisting of #10-20 mesh silica sand will be poured down the annulus of the auger in 3-foot lifts. After each 3-foot interval is filled, the augers will be pulled up approximately the same distance. This procedure will be repeated until the sand pack level is approximately 2 feet above the top of the screened section. The annular space above the sand pack will then be filled with a minimum 2-foot pelletized bentonite seal, which will be hydrated with distilled water. The remaining annular space will be filled with a cement/bentonite slurry grout consisting of approximately 3 percent bentonite by weight. The top of the well casing will be protected by a PVC cap, and the exposed casing will be protected by a locking steel shroud. A 6-inch-thick concrete pad will then be constructed around the shroud. Generalized monitor well construction details are shown in Figure 5-2.

5.1.2 Installation of Deep Bedrock Monitor Well

One deep bedrock monitor well will be installed dowgradient of the former surface impoundments as part of the ground-water assessment. This well will be placed adjacent to one of the newly installed shallow monitor wells in the uppermost aquifer (Figure 5-1). The placement of this well will allow for direct comparison of ground-water quality of the individual aquifers, as well as the hydraulic gradient between them. As with the uppermost aquifer wells, the exact construction details of the background monitor well will be determined based on field observations made during drilling. The following construction details are based on the regional hydrogeologic information presented in Section 2.5.

The deep bedrock monitor well will be installed using a combination of hollow-stem auger and mud rotary drilling techniques. The upper interval of the borehole, from ground surface to approximately 3 feet into the San Andres Formation, will be reamed to a diameter of approximately 12 inches using hollow-stem auger drilling techniques. After the 12-inch borehole has been reamed to the desired depth, the augers will be removed from the borehole. Flush-threaded, 8-inch-O.D. schedule 80 PVC surface casing will then be lowered to the bottom of the borehole. A clean, weighted steel tape will be used to ensure that no caving has occurred within the borehole prior to the installation of the surface casing.

Once the surface casing has been installed to the desired depth, a tremie pipe will be lowered to the bottom of the borehole within the annulus between the surface casing and the borehole wall. The annulus between the surface casing and borehole wall will then be grouted with a cement/bentonite grout consisting of approximately 3 percent bentonite by weight. The grout will be pumped from the bottom up through the tremie pipe in order to construct a seal to prevent possible downward movement of water from the uppermost alluvial aquifer into the deep bedrock aquifer below.

After the cement/bentonite grout has been allowed to cure a minimum of 24 hours, drilling will resume into the San Andres Formation using mud rotary drilling techniques. A boring approximately 7-inches in diameter will be advanced from the base of the surface casing until the first significant water-bearing zone is encountered. We anticipate that the deep monitor well will be completed at a depth of between 150 and 250 feet bgs. After the total depth has been reached, the drilling mud will be thinned out with potable water. After most of the mud has been removed from the borehole, the monitor well will be installed.

The deep well will be constructed of 2-inch-diameter schedule 40 PVC and will include, from the bottom up, a 6-inch flush-threaded silt trap (sump) at the bottom, 10 to 20 feet of flush-threaded 0.01-inch machine-slotted PVC screen, and blank casing from the top of the screen to about 2 feet above ground surface. Once the well casing has been installed to the proper depth, a sandpack consisting of #10-20 mesh silica sand will be pumped using a tremie pipe into the borehole annulus. This procedure will be repeated until the sand pack level is approximately 2 feet above the top of the screened section. The annular space above the sand pack will then be filled with a minimum 2-foot pelletized bentonite seal and hydrated with distilled water. The remaining annular space will be filled with a cement/bentonite slurry grout consisting of approximately 3 percent bentonite by weight. The top of the well casing will be protected by a

PVC cap, and the exposed casing will be protected by a locking steel shroud. A 6-inch-thick concrete pad will then be constructed around the shroud.

5.2 Monitor Well Development Procedures

The newly installed monitor wells will be developed by a sequence of surging and pumping and/or bailing in accordance with DBS&A SOP 13.4.3, Well Development (Appendix F). Initially, the wells will be surged with a surge block to dislodge any smeared material on the borehole wall that would otherwise inhibit ground-water flow and to remove fine particles from the formation. The suspended sediments will be removed by bailing and/or pumping. During well development, pH, temperature, specific conductance, and turbidity will be monitored periodically to determine when the wells have been sufficiently developed. Development will be considered complete when the water becomes relatively clear and water quality parameters have stabilized to within ± 5 percent over three consecutive measurements.

5.3 Ground-Water Sampling Procedures

Ground-water samples will be collected on a quarterly basis for the first year and on an annual basis thereafter. This monitoring schedule will be maintained until closure certification has been achieved. Ground-water samples will be collected from (1) existing monitor wells MW-3 and MW-5, (2) all of the new uppermost aquifer monitor wells, and (3) the new deep bedrock monitor well. All ground-water samples will be collected in accordance with DBS&A SOP 13.5, Water Sampling (Appendix F). Dedicated bladder pumps will be installed in all new monitor wells, except those containing PSH, to allow purging and collection of representative ground-water samples using low flow rates.

Prior to ground-water sample collection, the following preparations will be made:

1. The area around the wellhead will be inspected for integrity, cleanliness, and signs of possible contamination.

2. A clean plastic sheet will be spread over the ground around the wellhead.

3. *The cap on the wellhead will be removed and a flame ionization detector (FID) or* photoionization detector (PID) will be used to determine if VOC vapors are present. Any obvious odors will be noted in the field logbook.

4. The static water level will be measured to the nearest 0.01 foot using an electrical water level sounder. The presence of any obvious contamination on the water level sounder will be noted in the field logbook. The sounder will be decontaminated between wells, as described in Section 5.6, in order to prevent cross contamination.

5. Prior to purging the wells, a thief-type bailer will be used to collect a sample of water which will be visually checked for the presence of PSH. After an initial visual inspection, the contents of the bailer will be slowly poured into a small container to check for a sheen or other indications of PSH, and an FID or PID headspace screen of the fluid will be made. The presence or absence of PSH will be recorded in the field logbook.

6. The well will then be purged to remove standing/stagnant water in order to ensure the collection of representative ground-water samples. Purging will be accomplished using the dedicated bladder pump at a rate equal to or greater than the anticipated sample collection flow rate. The field parameters pH, electric conductivity, dissolved oxygen, and temperature will be measured throughout the purging process. These parameters will be measured at the pump outlet within a clean container or a closed flow-through cell. Purging will continue for a minimum of three casing volumes and until the field parameters remain stable to within ±5 percent over at least one casing volume, except if the well is a very poor producer. In this case, the well will be purged dry once prior to sample collection. All fluids produced during purging will be contained for later disposal as described in Section 5.7.

Following purging, ground-water samples will be collected as soon as possible using the dedicated bladder pump. Under no circumstances will the well be allowed to stand for more than three hours after well purging before collecting samples. The only exception is for very low-yield wells that are pumped dry under normal purging and sampling rates. In this case, the well will be pumped dry and allowed to recover until sufficient water is present in the well to allow a sample to be collected.

The samples will be collected in order of decreasing volatility, with samples for VOC analysis being collected first. The pumping rate during sample collection of VOC samples will be maintained at 100 milliliters (mL) per minute or less to minimize volatilization. All samples will be collected in precooled, acidified, certified-clean 40-mL glass vials with septum caps supplied by the laboratory.

Sample labeling, packaging, and chain-of custody procedures will be performed as described in Section 6.5. The sample coolers with the associated chain-of-custody forms will be shipped to the laboratory using an overnight commercial carrier. The fastest possible shipping method will be used, and all sample shipments will be carefully tracked to ensure that samples arrive intact and that all holding times are met.

5.4 Laboratory Analysis of Ground-Water Samples

For the first four sampling events, ground-water samples from each well will be analyzed for the major cations and anions (Ca, Mg, Mn, Na, K, Cl, Fe, bicarbonate, nitrate, and sulfate) and for halogenated and aromatic VOCs by EPA Method 8010/8020 and TPH by Method 418.1. During subsequent sampling events, only organics analyses will be performed. Chemical analyses will be performed in accordance with procedures set forth in *Test Methods for Evaluating Solid Waste* (U.S. EPA, 1986). Table 5-1 lists the analytical parameters and methods applicable to ground-water samples.

In addition to the analytical parameters listed in Table 5-1, one ground-water sample will be analyzed for the entire suite of analytes on the Appendix IX RCRA Groundwater Monitoring List (40 CFR Part 264, Appendix IX). This sample will be collected from one of the newly installed shallow monitor wells during the initial sampling event. The purpose of the Appendix IX analysis is to make certain that no potential contaminants have been overlooked as target analytes.

5.5 Aquifer Testing

Aquifer slug tests will be performed on existing monitor wells MW-3 and MW-5, each of the newly installed shallow wells, and the newly installed deep bedrock monitor well (Figure 5-1). Data collected from the individual slug tests will be used to estimate the hydraulic conductivity of both the uppermost aquifer and deep bedrock aquifer. All slug tests will be performed in accordance with the procedures described in DBS&A SOP 13.6.2, Slug Testing (Appendix F).

Slug tests are performed by causing a sudden change in the water level in the well and then measuring the water level recovery rate. Slug tests will be accomplished by either rapidly removing water from the water column or immersing a solid cylinder (slug) into the water column and measuring the resulting water level recovery. If the slug removal method is used (rising head), water will be removed from the well using a bailer. If the slug immersion method is used (falling head), water will be displaced in the well using a clean, solid PVC cylinder. Whichever method is used, the slug will be of sufficient size to achieve an instantaneous water level change of at least 2 feet.

Water levels will be measured immediately prior to the aquifer test and throughout the recovery period until water levels have recovered to within approximately 95 percent of the static water level. Water levels will be recorded using a downhole pressure transducer and electronic data logger. The transducer will be calibrated prior to the test using standard procedures required by the manufacturer. In addition, periodic manual water level measurements will be made using an electric water level indicator for comparison with the data recorded by the data logger.

Standard aquifer testing equations will be used to estimate the hydraulic conductivity of both the uppermost aquifer and deep bedrock aquifer. Appropriate analytical procedures are presented in *Groundwater and Wells* (Driscoll, 1986) and *Analysis and Evaluation of Pumping Test Data* (Kruseman and de Ridder, 1992).

5.6 Decontamination Procedures

All non-disposable field equipment that may potentially come in contact with contaminated ground water or soils will be decontaminated in accordance with DBS&A SOP 13.5.2, Decontamination of Field Equipment (Appendix F), in order to minimize the potential for cross-contamination between sampling locations. Clean latex or plastic gloves will be worn during all decontamination operations. The following sequence of decontamination procedures will be followed prior to each sampling and/or testing event:

1. Wash the equipment in a solution of non-phosphate detergent (Liquinox®) and distilled/deionized water. Use a clean Nalgene® tub to contain the wash solution and a scrub brush to mechanically remove loose particles.

2. Rinse the equipment twice with distilled/deionized water.

3. Allow the equipment to air dry before the next use.

All wash water generated during equipment decontamination will be contained in 55-gallon drums for proper disposal. All liquids will be assumed to be contaminated and properly labeled as described in Section 5.7. Decontamination water will remain on-site pending the results of laboratory analysis of the associated ground-water samples. The laboratory results for the ground-water samples will be used to determine the method of disposal for the drummed wash water, as described in Section 5.7. All drilling equipment will be decontaminated as described in Section 4.5.

5.7 Management of Investigation-Derived Wastes

A variety of wastes will be generated during the implementation of the ground-water assessment plan. These wastes include soil cuttings, drilling mud, decontamination fluids, used PPE, and ground water produced during well development and purging. All wastes, with the exception of PPE, will be handled as potentially hazardous wastes.

All waste materials will be drummed and labeled to identify the contents, date of generation, and amount of material generated. Waste material will be stored in 55-gallon drums, with the exception of mud generated from the drilling of the deep bedrock aquifer well; this mud will be stored in a plastic-lined rolloff bin. All waste containers generated during the ground-water assessment will be stored in a designated drum storage area within the facility.

For those wastes that are associated with a particular sample collected during the ground-water assessment (e.g., soil cuttings collected during the drilling of a well with soil samples collected for chemical analyses at 10-foot intervals, or purged ground water from a well that was subsequently sampled and analyzed), the analytical results will be used to determine if the drummed materials constitute hazardous waste. All contaminated water and water that is potentially contaminated but cannot be associated with a particular sample or set of samples will be passed through an activated carbon filtration system to remove all organic constituents. A sample of the clean filtered water will then be collected for laboratory analysis of VOCs. Upon verification that the water is clean, it will be released to the ground surface on-site. The carbon filter will be disposed of at a licensed hazardous waste disposal facility such as the Rollins facility in Deer Park, Texas that is currently receiving PSH product from the recovery well system. PPE and dry refuse associated with these materials will be disposed of in a sanitary landfill.

6. QUALITY ASSURANCE PROJECT PLAN

This section describes the procedures that will be followed to ensure that the data obtained during this investigation will be adequate for the project objectives. The Quality Assurance Project Plan (QAPP) presented herein describes the laboratory analyses to be performed, data quality objectives, and quality assurance/quality control (QA/QC) procedures to be used to ensure that project objectives are met. Sections 6.1 through 6.12 have been prepared in accordance with the *Interim Guidelines and Specifications for Preparing Quality Assurance Project Plans* (U.S. EPA, 1983), and are those elements required for consideration in any QAPP, according to EPA.

6.1 Analytical Parameters and Methods

The list of target analytes for soil and ground-water assessment is based largely on the results of the previous studies described in Section 3. Petroleum hydrocarbons and the chlorinated solvent 1,1,1-TCA are recognized as the principal threats to ground water in the study area. As described in Section 3.6 of this closure plan, soil samples are to be collected at the locations shown in Figures 4-1 and 5-1 using a hollow-stem auger drill rig and split-barrel sampler. Soil samples will be analyzed for the suite of target analytes listed in Table 5-1.

As discussed previously in Section 5, ground-water samples will be collected from the new monitor wells and from existing monitor wells MW-3 and MW-5. These ground-water samples will be analyzed for the suite of target analytes listed in Table 5-1.

In addition to the analytical parameters listed in Table 5-1, one ground-water sample will be analyzed for the full RCRA Appendix IX list of constituents (U.S. EPA, 1992). The purpose of the Appendix IX analysis is to make certain that no potential contaminants have been overlooked as target analytes. If possible, the ground-water sample selected for Appendix IX analysis will be chosen from one of the monitor wells within the impacted area.

6.2 Data Quality Objectives

Data quality objectives (DQOs) are the qualitative and quantitative objectives established to ensure that the data generated meet the needs of the project. Therefore DQOs are project-specific and depend largely on the ultimate use for which the data are intended. DQOs have been established for this project in accordance with EPA guidance documents, particularly *Data Quality Objectives for Remedial Response Activities* (U.S. EPA, 1987a), and *RCRA Ground-Water Monitoring: Draft Technical Guidance* (U.S. EPA, 1992). The parameters used to quantify data quality include precision, accuracy, representativeness, completeness, and comparability (PARCC).

Objectives or goals for the so-called PARCC parameters (U.S. EPA, 1987a) constitute the project-specific DQOs for a particular investigation. Each PARCC parameter is described below, along with the proposed DQO for this closure plan, where applicable. The proposed DQOs for this investigation are summarized in Table 5-1.

- **Precision** is a quantitative measure of the reproducibility (or variability) of the analytical results. Precision will be calculated by determining the relative percent difference (RPD) between the concentrations reported for field duplicate samples collected from the same location. Methods for collecting duplicate field samples are discussed in Section 5.3. The proposed RPD precision objective is 20 or less.

- **Accuracy** is defined as the degree to which the reported analytical result approaches the "true" value. Accuracy will be estimated through the analysis of matrix spikes (MS). The percent recovery (%R) of the "true" spike concentration will be calculated for each MS. The accuracy objective is within the range of 80 to 120 percent recovery of the matrix spike.

- **Representativeness** refers to how well the analytical data reflect subsurface contaminant concentrations. Due to numerous site-specific factors, such as the degree of heterogeneity in the subsurface, representativeness is difficult to define and even more difficult to quantify. For this project, representative data will be attained through the use of consistent and approved sampling and analytical procedures and through a well defined sampling plan that specifies adequate investigation of all areas of concern.

- **Completeness** is the percentage of samples collected that meet or exceed the DQOs for precision, accuracy, and representativeness, as estimated from the analysis of QA/QC samples described above. The completeness objective for this project is 90%.

- **Comparability** is an assessment of the relative consistency of the data. No quantitative method exists for evaluating comparability; hence, professional judgment must be relied upon. Internal comparability of the soil and ground-water data set will be achieved by the use of consistent sampling and analysis procedures throughout the project. Likewise, by using identical analytical methods to those employed during previous investigations, the data generated during this investigation will be comparable with existing data.

The sensitivity of the analytical methods used, as reflected in detection limits, is also an important consideration in determining the utility of the data for subsequent tasks and decisions. Detection limits for EPA Methods 8010/8020 for VOCs in ground water are shown in Table 5-2.

6.3 Quality Assurance/Quality Control Samples

QA/QC samples include matrix spikes/matrix spike duplicates (MS/MSD), field duplicates, trip blanks, and equipment blanks. EPA guidance recommends that QA/QC samples be collected at a minimum 5-percent frequency (U.S. EPA, 1987). For this project, both soil and ground-water QA/QC samples will be analyzed at this frequency.

Equipment blank samples are collected in order to determine if any of the analytes detected in environmental samples may be attributable to improper and/or incomplete decontamination of field sampling equipment. Equipment blanks will be collected in the following manner. After the sampling device has been decontaminated in accordance with DBS&A SOP 13.5.2, Decontamination of Field Equipment (Appendix F), it will be rinsed with deionized water. The rinsate will be collected and sent to the laboratory as an equipment blank.

Field duplicate samples will be collected to provide a measure of precision for the analytical results. VOC soil duplicates will be collected by submitting two adjacent brass liner rings from the same split-barrel sample. The ground-water duplicate samples will be collected by filling sample containers in an alternating manner following the sampling protocol described in Section 5.3 of this closure plan.

One VOC trip blank will accompany each shipment to the laboratory. VOC trip blanks are prepared as a check on possible contamination originating from container preparation methods, shipment, handling, storage, or other site-specific conditions. VOC trip blanks will consist of deionized, organic-free water added to a clean 40-mL glass septum vial.

In addition to the above QA/QC samples, MS/MSD analyses will be performed in the laboratory by spiking the soil or water samples with a known quantity of the analyte of interest. MS/MSD analyses are performed to determine laboratory accuracy and precision and to determine if any matrix interferences exist. MS/MSD analysis will be specified on the chain-of custody form for at least 5 percent of the samples collected.

6.4 Sampling Procedures

The soil and ground-water sampling procedures described in Sections 4.2 and 5.3 will be performed in accordance with DBS&A SOPs 13.3.2 and 13.5, respectively (Appendix F). A summary of the analytical methods, required sample volumes, containers, and sample preservation is provided in Table 5-3. All sample containers will be acquired from the laboratory and will be certified clean.

Adhesive labels will be applied to the sample containers, and a waterproof marking pen will be used to complete the labels. Information will include the date and time of sample collection, type of analysis to be performed, preservative used (if any), depth of sample (for soils), and the initials of sampling personnel. The containers will be sealed and placed in clear plastic bags. The sealed containers will be put in coolers on bags of ice or frozen ice packs. Plastic bubble pack or other suitable packing material will be used to prevent breakage.

The field personnel will ship the sample coolers to the laboratory using an overnight courier service. The fastest possible shipping method will be used, and all sample shipments will be carefully tracked to ensure that samples arrive intact and that all holding times are met.

6.5 Chain of Custody Procedures

For analytical data to be valid, samples must be traceable from the time of collection through chemical analysis and final disposition. Chain-of-custody forms have been developed for this purpose. The necessary blank documents will be obtained from the laboratory, including chain-of-custody forms and seals.

Chain-of-custody forms will be completed in triplicate. The original form and one copy will be placed inside each cooler, and one copy will be retained by field personnel. The chain-of-custody forms accompanying each cooler will be sealed in a plastic bag and taped to the inside of the cooler lid. Each cooler will have a clearly visible return address. The cooler lids will be secured with shipping tape that encircles the cooler ends. A chain-of-custody seal will be placed at the front left and rear right sides of the cooler so that opening the lid will break the chain-of-custody seals.

Field activities and sample collection will be documented in a bound logbook dedicated to the project. For each sample, the location, time, monitor well/boring number, sample depth, sample volumes and preservation, and other pertinent field observations will be recorded. Each page of the logbook will be dated, numbered, and signed by those individuals making entries.

6.6 Equipment Calibration Procedures and Frequency

Numerous instruments will be used in the field and the laboratory during this investigation. In order for reliable data to be generated, it is important that these instruments be routinely calibrated. Calibration of analytical instruments within the laboratory will be the responsibility of the contracted laboratory. Although the details of the laboratory calibration procedures are beyond the scope of this QAPP, the frequency of initial and continuing calibrations will adhere to established EPA protocols, as described in the analytical method (U.S. EPA, 1986). In addition, the laboratory's QA manual will be available for review upon request.

During this investigation, DBS&A anticipates using the following field equipment:

- PID (Thermo Environmental 580B or equivalent)
- FID type OVA (Foxboro 108 or equivalent)
- Salinity-conductivity-temperature (SCT) meter (YSI Model 33 or equivalent)
- pH meter (Orion Model 250A or equivalent)
- Dissolved oxygen (DO) meter (YSI Model 57 or equivalent)
- Water level indicator (Solinst or equivalent)

Calibration and maintenance procedures for each of these instruments are described in the following paragraphs. Documentation of daily calibration for each of these instruments will be recorded in the field logbook, along with any required maintenance procedures performed.

A PID and/or FID will be used to screen soil samples for volatile organic compounds using the headspace method. The PID or FID will also serve for health and safety monitoring of the work area for organic vapors. Background VOC concentrations will be recorded daily in the logbook. The PID and/or FID will be calibrated daily with standard isobutylene (PID) or standard methane (FID). Recalibration of the PID and/or FID can occur during the work day at the discretion of the site health and safety officer in the event of suspect readings. Care will be taken to ensure that the PID and/or FID remains free of sand and dirt. The battery will be charged on a daily basis.

The SCT meter calibration will be checked initially with a standard potassium chloride solution and mercury thermometer, and a battery check will be performed daily prior to beginning field work. In the event of erratic measurements, the instrument calibration will be checked in the field. When not in use, the electrode will be kept immersed in deionized water to keep the platinum black surfaces fully hydrated, in accordance with manufacturers' instructions.

Prior to use each day, the pH meter will be calibrated using two pH buffers. The buffer solutions will be chosen to bracket the expected ground-water pH range. Calibration of the instrument will be periodically checked throughout the day using the pH buffers to ensure accurate readings. In the event of instrument drift, the pH meter will be recalibrated. The electrode will be rinsed with deionized water following each measurement and placed in the appropriate potassium chloride storage solution.

The DO meter will be calibrated in air by adjusting the calibration control until the oxygen concentration reads the correct value for the elevation and temperature at the site. The DO meter calibration will be checked periodically during the day and recalibrated if necessary.

The water level indicator will be initially calibrated against a steel tape, prior to commencement of field activities. The battery and electrical connections will be periodically checked to ensure proper functioning of the instrument. The indicator probe and tape will be rinsed clean following each measurement.

6.7 Data Reduction and Reporting

Data reduction will be performed by the laboratory in accordance with EPA protocols for the respective analytical method. Data from the analytical laboratory will be reviewed following the laboratory's internal QA/QC plan. All EPA required elements will be provided with the data package. If the analytical data do not meet the minimum data quality objectives, the laboratory will implement the corrective actions described in Section 6.10. All data falling outside the quality control limits defined in this QAPP will be flagged by the laboratory, as required by EPA protocol. Any discrepancies noted in the laboratory QA review will be noted in the case summaries included with the data packages.

Following the field investigation phase of the project, the degree to which the data quality objectives have been met will be examined by comparing the actual results for the QA/QC samples with the objectives listed in Table 5-1. The results of this comparison will be tabulated in the final report, along with detailed descriptions of any deviations from the protocols proposed in this closure plan.

6.8 Internal Quality Control Checks

The specific quality control checks to be used are included with the individual analytical methods specified for each parameter. The quality control criteria for VOCs and TPH (gasoline) are described in *Test Methods for Evaluating Solid Wastes - SW-846*, (U.S. EPA, 1986).

6.9 Performance and System Audits

Performance and system audits are the practices followed by analytical laboratories to evaluate quality control procedures and laboratory performance (U.S. EPA, 1983). System audits are performed in order to assess whether a new analytical system is functioning properly. Performance audits rate the ongoing performance of the laboratory in terms of the accuracy and precision of the analytical data generated. Examples of performance audits include the analysis of performance evaluation samples, such as standard reference materials obtained from the National Institute of Standards and Technology or EPA, or participation in interlaboratory performance evaluation studies using "round-robin" samples. Each participating laboratory is graded and ranked based on the results. The performance and system audits of the laboratory contracted for this closure plan will be provided and available for review.

6.10 Corrective Actions

If QA activities reveal apparent problems or deficiencies with the analytical data, corrective actions must be applied. The type of corrective action depends on the specific problem that occurs, but a general sequence of corrective actions will be followed. If the data do not fall within the prescribed data quality objectives, the affected samples will be re-analyzed by the laboratory until the objectives are met. Any data falling outside QC limits will be flagged and qualified to explain the nature of the data quality problem.

6.11 Routine Data Assessment Procedures

Routine procedures to assess the precision, accuracy, and completeness of the analyses include RPD for field duplicates and MS/MSD samples, as well as percent recovery (%R) for MS samples. The specific statistical techniques to be used are described with the appropriate analytical method (U.S. EPA, 1986). Any problems or deficiencies will be reported to the NMED in the quarterly progress reports, or by telephone, if warranted by the nature and urgency of the problem.

6.12 Quality Assurance Reports to Management

Periodic assessment of data accuracy, precision, and completeness will be performed by the QA manager of the contracted laboratory. The results of these assessments, as well as the results of laboratory performance and system audits, will be available upon request. The laboratory QA manager will also review the case narratives and accompanying analytical data package to ensure that all data quality objectives are met. In the event that objectives are not met, the QA manager will consult with the laboratory manager to correct the problem.

7. PRELIMINARY CORRECTIVE ACTION PLAN

A complete understanding of the soil and ground-water conditions requiring corrective action will not be available until after the soil and ground-water assessment plans described in Sections 4 and 5 have been implemented. Thus the corrective actions proposed here remain tentative. Nevertheless, it is important to begin discussion of the remedial options at this time, as the selection of the most appropriate technologies will be critical to the successful clean closure of the site. The following sections describe interim corrective measures completed to date and discuss preliminary corrective action alternatives, based on the current understanding of subsurface conditions.

7.1 Interim Corrective Measures Completed to Date

As discussed in Section 3.5, a PSH recovery system has been in operation since May 1993. Recovery pumps have been installed in wells MW-1, MW1B, MW-2, and RW-1. The locations of the recovery wells are shown in Figure 3-6. MW-1 and RW-1 are 4-inch wells, while MW-1B and MW-2 are 2 inches in diameter (Table 3-1).

Each recovery well is currently equipped with a skimmer-type bladder pump, and all of the wells are plumbed into a single piping system that delivers the recovered PSH/water mixture to a 4000 gallon aboveground storage tank. The combined fluid recovery rate of all four wells is less than 1 gallon per hour. The fluid level in the tank is checked periodically, and when necessary, the liquid is shipped off-site to the Rollins incinerator facility in Deer Park, Texas, for incineration as hazardous waste. The Rollins facility is located approximately 750 miles from the compressor station.

During the period from startup of the PSH recovery system in May 1993 through January 27, 1994, a total of 53,926 pounds of liquid had been shipped for off-site disposal. Assuming a 60/40 oil/water mixture and a liquid density of 7.5 pounds per gallon, this amount represents approximately 7,200 gallons of liquid disposed of through January 1994. The PSH recovery system continues to operate at the present time. Transwestern will explore other disposal options for recovered hydrocarbon product, including recycling of the waste hydrocarbon liquid by a waste oil processing company or refinery.

7.2 PSH Recovery System

Transwestern will continue to operate the PSH recovery system until liquid-phase recovery becomes impractical. In order to recover as much liquid hydrocarbon as possible, Transwestern proposes to install two additional recovery wells along the north and east fencelines, as shown in Figure 7-1. The new recovery wells will be completed to depths of approximately 70 feet bgs and will be constructed in such a manner that they may be converted to soil vapor extraction (SVE) wells and/or ground-water recovery wells if necessary. A schematic diagram of a typical PSH recovery well is shown in Figure 7-2. Following installation of skimmer or total fluids pumps, the two new wells will be connected to the existing product recovery plumbing system.

7.3 Soil Remedial Options

Two separate strategies are proposed for cleanup of impacted soils. A combination of excavation and biotreatment is proposed for near surface soils, while remediation of deeper soils will be accomplished using SVE.

7.3.1 Near-Surface Soils

For remediation of the most highly impacted soils that lie at depths of less than about 10 feet, a combination of excavation and biotreatment is proposed. The corrective action strategy for these near-surface soils involves the following steps. Hydrocarbon impacted soil will be excavated to a depth of approximately 10 feet using a backhoe, trackhoe, or front-end loader. A berm will be constructed around the perimeter of each excavation to minimize entry of storm water during the short time period when the excavations are open. The actual volume excavated will depend on the extent and concentrations of hydrocarbons in the soil. This will best be determined by TPH and field headspace VOC analyses during excavation activities. Soil samples will be collected from the base and sides of each excavation to evaluate the quality of soils that will remain.

The excavated soil will be temporarily stockpiled to the side of the excavation. Any solid waste materials encountered during excavation will be segregated and handled in an appropriate manner by Transwestern. Following excavation to the maximum depth of about 10 feet below grade, a plastic liner will be placed in the bottom of the excavation to eliminate infiltration of surface water through the underlying soils, and to prevent short circuiting of air flow during subsequent SVE activities, as described in section 7.3.2 below.

Soil biotreatment cells will then be constructed within each of the excavations. In order to enable easy access by heavy equipment, the steep sidewalls of the excavations will first be knocked in so that the maximum depth of each excavation is reduced to about five feet. Next, ventilation piping will be placed at the bottom of the excavation to allow active introduction of oxygen into the base of each biotreatment cell. The stockpiled hydrocarbon-impacted soil will then be shredded and screened using a mechanical soil shredder, and placed back in the excavation on top of the ventilation piping, creating several soil biotreatment cells within each former surface impoundment. The purpose of shredding and screening the soil is two-fold. First, large rocks are removed from the soil, thereby reducing the volume of soil to be treated in the biotreatment cells. Second, the screening action aerates the soil and provides an opportunity to add nutrients and other bioenhancement additives to the soil as it exits the screening equipment. Additives being considered include the nutrients nitrogen, phosphorous, and potassium, bio-degradable surfactants, and naturally occurring bacterial cultures. The additives would be prepared in a fresh water solution and sprayed on the soil as it exits the screening equipment.

Additional ventilation piping will be placed within and on top of each biotreatment cell. The ventilation piping will then be connected to an air compressor, and aerobic biotreatment of the hydrocarbon impacted soils begun. Small amounts of water will be applied on the soil surface, as necessary, to maintain optimum moisture conditions for bacterial growth within the treatment cells. Biotreatment of the near-surface soils in the treatment cells is expected to be completed within one year or less. Upon completion, the soil surface will then be graded and crowned so as to shed surface water and prevent ponding. Confirmation soil sampling to verify that biotreatment has been effective is discussed in Section 8.

7.3.2 Deep Soils

Excavation is not practical for soils deeper than about 10 feet, or for shallower impacted soils outside the immediate confines of the former surface impoundments. Therefore, other remedial options will be considered for these soils. Based on DBS&A's previous experience at similar sites impacted by petroleum hydrocarbons, SVE is proposed as the technology most likely to be successful in removing VOCs to levels below cleanup criteria. SVE is also capable of recovering residual PSH that cannot be recovered by the recovery well system.

Assuming that SVE is chosen for cleanup of impacted soils, SVE wells similar to that shown in Figure 7-3 will be constructed to depths of approximately 65 feet, such that the bottom portion of the well is within the saturated zone. This depth will allow collection of ground-water samples from the SVE wells and will also permit conversion to ground-water extraction wells at a later date, should that be deemed necessary. This strategy will allow maximum flexibility for future corrective action. Dual screen SVE wells (Figure 7-3) will allow recovery of hydrocarbon vapors from both the upper and lower portions of the unsaturated zone.

An SVE well installed in relatively sandy material typically has a radius of influence of approximately 50 feet. This spacing is expected to be adequate because the upper 30 feet of the vadose zone underlying the site consists predominantly of sand and gravel (Figure 3-7), and because the bulk of the hydrocarbons are expected to reside within the shallow subsurface. Assuming a 50-percent overlap for adjacent SVE wells, a well spacing of approximately 80 feet is proposed. This spacing will result in between 6 and 8 wells per acre of impacted soil.

If SVE is selected as the remedial option, an SVE pilot test will be performed to verify the radius of influence and to aid in determining the required size and type of off-gas treatment system. The pilot test will be performed by drawing soil vapor out of one or more SVE wells for a period of 4 to 8 hours while monitoring vapor composition and vacuum response in adjacent observation wells. The purpose of the SVE pilot test is to (1) determine the approximate radius of influence of an SVE well and (2) to estimate the expected hydrocarbon concentrations in the vapor off-gas stream.

Given the presence of PSH underlying the site, high vapor-phase hydrocarbon concentrations are expected during the initial operation of an SVE system. Such high concentrations will most likely require treatment in order to comply with air quality standards. Although several options will be explored for off-gas treatment, at this time the only practical approach appears to be on-site combustion using a thermal oxidizer.

Because vapor withdrawal rates would undoubtedly exceed 10 pounds per hour, an air permit will have to be obtained from the NMED Air Quality Bureau. It may be possible to obtain the air permit simultaneously with the permit for the entire compressor station facility, which is expected to file a Title V operating permit application within the next year.

It is recognized that on-site combustion of hydrocarbon vapors as part of a RCRA corrective action can be problematic. However, based on the definitions in 40 CFR Parts 260 and 261, SVE off-gas vapors technically cannot be considered hazardous wastes because such vapors do not qualify as solid waste. In spite of any regulatory considerations, SVE is almost certainly the technology that will result in the most rapid and thorough cleanup of impacted soils.

7.4 Ground-Water Remedial Options

Any in-depth discussion of potential corrective action for ground water must await completion of the ground-water quality assessment plan described in Section 5. Accordingly, any decisions regarding ground-water treatment options must be postponed to be presented as an amendment to this closure plan.

Nevertheless, based on our current understanding of ground-water conditions, it appears that corrective action options for ground-water treatment are fairly limited. On-site ground-water pump-and-treat may be proposed following removal of the source area directly within and beneath the former impoundments. Such a system could operate concurrently with the SVE system used for soil cleanup, and a number of similar systems are currently being operated by DBS&A throughout New Mexico.

Presently there is no conclusive evidence of impacts to off-site ground water. If off-site impacts in excess of cleanup criteria is discovered, some combination of hydraulic control, air sparging, and in situ biodegradation are likely the most suitable technologies. Corrective action options for on-site and off-site ground water, if necessary, will be addressed in an amendment to this plan.

7.5 Clean-up Criteria

Due to the uncertainty regarding the extent of ground-water impacts, establishment of ground-water cleanup criteria will be deferred until after the ground-water quality assessment has been completed. Therefore, only soil cleanup criteria will be discussed further here.

As a starting point, we propose to apply the RCRA Corrective Action Proposed Rule soil cleanup criteria (Subpart S standards), as shown in Table 7-1. Although not yet approved by EPA, the proposed criteria have been developed to be protective of human health and the environment.

For those constituents for which RCRA subpart S standards do not exist, other cleanup criteria are proposed. For TPH in soil, we propose to use the OCD cleanup standard of 5,000 mg/kg (Table 7-1). The 5000 mg/kg TPH cleanup criterion is based on the OCD ranking system that accounts for the depth to ground water and the distances to the nearest domestic well and surface water body. At the compressor station, the depth to the regional bedrock aquifer is over 100 feet, the distance to the nearest domestic well is greater than 200 feet, and the nearest surface water body is more than 1000 feet away. For BTEX compounds in soil, we propose to apply the OCD soil cleanup standards for benzene (10 mg/kg) and total BTEX (50 mg/kg) (Table 7-1).

It has been necessary to consult other information sources to obtain cleanup criteria for several other constituents for which RCRA Subpart S standards and OCD cleanup criteria do not exist. These constituents include 1,1-DCA, cis 1,2-DCE, and trans 1,2-DCE. For these compounds, the Texas Natural Resources Conservation Commission (TNRCC) Risk Reduction cleanup criteria for non-residential soils are proposed, as shown in Table 7-1.

Based on previous sampling and analysis of soils underlying the former impoundments, it appears that TPH concentrations will be the controlling factor for the completion of corrective action activities. As shown in Table 3-2, with the exception of TPH, all other constituents have historically been below the cleanup criteria proposed in Table 7-1.

7.6 Confirmation Sampling

A set of soil confirmation samples will be collected and analyzed to verify that the soil cleanup criteria have been met. The near-surface soils and deep soils will be addressed separately as discussed below.

7.6.1 Biotreatment Cells

A minimum of 10 soil samples will be collected from each excavation area and analyzed for 8010/8020 VOCs and TPH. Soil cleanup will be considered complete when the geometric mean of the concentrations within a single excavation falls below the soil cleanup criteria in Table 7-1.

7.6.2 Deep Soils

One boring will be drilled through each of the former impoundments and soil samples collected at 10-foot intervals from 20 feet to a total depth of approximately 70 feet. The soil samples from each boring will be submitted for laboratory analysis of 8010/8020 VOCs and TPH. Deep soil cleanup will be considered complete when the geometric mean of the concentrations within a single excavation falls below the soil cleanup criteria in Table 7-1.

7.7 Options to Limit Infiltration of Surface Water

As discussed in Section 7.3.1, the biotreatment cells will be constructed to minimize infiltration of surface water. A plastic liner placed at the base of each excavation will prevent direct percolation of water through underlying soils. Other measures to limit infiltration will include constructing berms surrounding the excavations and planning the excavation for a period when little precipitation is expected. Finally, upon completion of biotreatment, the biotreatment cells will be graded to prevent ponding. These measures are expected to be adequate to eliminate or significantly reduce surface water infiltration.

7.8 Quarterly Reporting

Quarterly reports will be submitted to describe corrective action activities completed during the previous three months and expected activities during the upcoming reporting period. The quarterly reports will include such information as the quantity of liquid hydrocarbon recovered by the PSH recovery system and the volume of liquid hydrocarbon equivalent recovered by the SVE system, if one is installed. The results of all ground-water and soil sampling will also be included, along with descriptions of any problems encountered.

7.9 Decontamination Procedures for Remedial Equipment

Decontamination of equipment used during remedial activities will consist of hot water wash using a steam cleaner followed by air drying. This procedure will be adequate for the volatile constituents of concern at this site.

Decontamination of equipment will be conducted in a designated plastic-lined decontamination area constructed to collect all runoff. All wash water will be containerized in 55-gallon drums until either (1) laboratory analyses are available to demonstrate that the wash water is not hazardous or (2) the water is passed through an activated carbon filter to remove all hazardous constituents. The clean wash water will then be disposed of on-site.

8. PROJECT SCHEDULE AND CONDITIONS FOR CLOSURE CERTIFICATION

The proposed project schedule will require about two years to complete all closure tasks (Figure 8-1). Quarterly progress reports will be prepared for submittal to NMED from the time field work begins until closure certification is achieved. The progress reports will provide a means of tracking the schedule for investigative and corrective action activities and explain the need for any modifications to the proposed project schedule.

The soil assessment plan (Section 4) and ground-water assessment plan (Section 5) will be initiated approximately four weeks following approval of this closure plan. The drilling and monitor well installation program is expected to require approximately six weeks to complete. Monitor well development, ground-water sampling, and aquifer testing will require an additional three weeks.

Excavation of the former impoundments (Section 7.3.1) is scheduled to begin after receipt of the laboratory results of soil and ground-water samples, approximately 16 weeks after the start of field work. Soil excavation to effect source removal will require at least 6 weeks.

An SVE pilot test will be performed early in the soil assessment to determine the feasibility of SVE as a soil corrective action technology. Assuming that SVE is chosen as the corrective action technology for cleanup of impacted soils, construction of the SVE system will begin after biotreatment of near-surface soils is complete and the off-gas treatment system is delivered, approximately 50 weeks following approval of this closure plan. Construction of the SVE system will take approximately four weeks.

Operation of the SVE system will begin immediately following construction. We estimate that the SVE system will need to operate for approximately one year before soil cleanup criteria can be met. The SVE vapor stream will be monitored frequently to track hydrocarbon concentrations and total cumulative hydrocarbon recovery. This will allow prediction of the total SVE operation time needed to achieve the soil cleanup criteria.

When vapor concentrations have dropped to levels which suggest that cleanup criteria have been met, confirmation soil sampling will be conducted. If the confirmation samples confirm that cleanup criteria have been met (Section 7.6), soil corrective action will be considered complete, the SVE system will be shut down, and a request will be made for certification of clean closure.

If, on the other hand, the confirmation sampling indicates that concentrations are still above the cleanup criteria, operation of the SVE system will continue until either (1) subsequent confirmation sampling verifies that cleanup criteria have been met or (2) it can be demonstrated that it is technically infeasible to achieve the proposed cleanup criteria. In the latter case, alternative concentration limits (ACLs) may be proposed according to established procedures (U.S. EPA, 1987b) prior to petitioning NMED for closure certification.

The above discussion assumes that ground-water remediation is not necessary. If the ground-water assessment reveals that ground water is impacted above the yet-to-be-determined cleanup criteria, then a ground-water treatment system will be proposed in an amendment to this closure plan. If ground-water remediation is necessary, the closure schedule will be affected accordingly, and attainment of closure certification could be postponed. If necessary, a closure plan amendment to establish ground-water cleanup criteria and address ground-water cleanup activities will be submitted to the NMED within 18 months of approval of this closure plan.

9. REFERENCES

Bean, Robert T. 1949. Geology of the Roswell artesian basin, New Mexico, and its relation to the Hondo Reservoir. New Mexico State Engineer Technical Report No. 9, 31 p.

Brown & Root Environmental. 1993. Draft report: Groundwater assessment at Roswell Compressor Station No. 9, Transwestern Pipeline Company, Roswell, New Mexico, Project No. 5T72. Prepared for Enron Corporation, Houston, Texas, June 1993.

Campbell, Larry. 1992. Letter from Mr. Campbell (Transwestern) to Mr. Ed Horst (NMED) regarding remediation investigation and closure of the disposal pit, dated November 30, 1992.

Campbell, Larry, 1993. Letter from Mr. Campbell (Transwestern) to Ms. Barbara Hoditschek (NMED) regarding history of operation of 20 x 20 foot surface impoundment, dated February 7, 1993.

Campbell, Larry, 1994. Personal communication between Larry Campbell (Transwestern) and Jeffrey Forbes (DBS&A) regarding locations of former surface impoundments, May 13, 1994.

Cypress Engineering Services (CES). 1994. Letter report from George Robinson (CES) to Bill Kendrick (ENRON).

Daniel B. Stephens & Associates, Inc. 1992. Task 1 summary report, data acquisition and review, Roswell Basin. Prepared for New Mexico State Engineer Office, December 1, 1992.

Driscoll, F.G. 1986. Groundwater and Wells, Second Edition. Johnson Filtration Systems, Inc., St. Paul, MN. 1089 p.

Eiceman, G.A. 1986. Hazardous organic wastes from natural gas production, processing, and distribution: Environmental fates. New Mexico Water Resources Research Institute Report No. 227.

Glenn, Pleas. 1993. Letter from Pleas Glenn (New Mexico Office of the Commissioner of Public Lands) to Larry Campbell (Transwestern) regarding land ownership status, dated July 7, 1993.

Halliburton NUS Environmental Corporation. 1992. Final report: Monitor well installation, Transwestern Pipeline Company, Compressor Station No. 9, Roswell, New Mexico. Southwest Region, October 1992.

Harding Lawson Associates. 1991a. Shallow subsurface investigation: Transwestern Pipeline Company, Compressor Station No. 9, Roswell, New Mexico. Prepared for Transwestern Pipeline Company, Houston, Texas. Houston, Texas, June 20, 1991.

Harding Lawson Associates. 1991b. Supplemental data report for volatile organic constituents: Transwestern Pipeline Company, Compressor Station No. 9, Roswell, New Mexico. Prepared for Transwestern Pipeline Company, Houston, Texas, June 21, 1991.

Kelley, Vincent. 1971. Geology of the Pecos country, southeastern New Mexico. New Mexico Bureau of Mines & Mineral Resources, Memoir 24, 78 p.

Kruseman, G.P. and N.A. de Ridder. 1992. Analysis and Evaluation of Pumping Test Data, Second Edition. International Institute of Land Reclamation and Improvement.

Lyford, Forest P. 1973. Valley fill in the Roswell-Artesia area, New Mexico. U.S. Geological Survey Open-File Report 73-163, September 1973.

Metric Corporation. 1991. Shallow subsurface investigation at Roswell compressor station, Chaves County, New Mexico. Prepared for Transwestern Pipeline Company, Roswell, New Mexico, December 1991.

State of New Mexico Environmental Improvement Board. 1989. Underground Storage Tank Regulations, Part XII - Corrective Actions For Petroleum UST Systems, Appendix C - Soil Testing for Petroleum Releases, EIB/USTR-12.

State of New Mexico Environmental Improvement Board. 1989. Underground Storage Tank Regulations, Part XII - Corrective Actions For Petroleum UST Systems, Appendix D - Monitoring Well Construction and Abandonment Policy, EIB/USTR-12.

Transwestern Pipeline Company. 1959. General plan, Station No. 9, Roswell, Scale 1"=100' 1:1200. Drawing No. 9-85-000, May 19, 1959.

U.S. Environmental Protection Agency (U.S. EPA). 1983. Interim guidelines and specifications for preparing quality assurance project plans. QAMS-005/80, December 1983.

U.S. EPA. 1986. Test methods for evaluating solid waste, physical and chemical properties, 3rd ed. EPA-SW-846, November 1986.

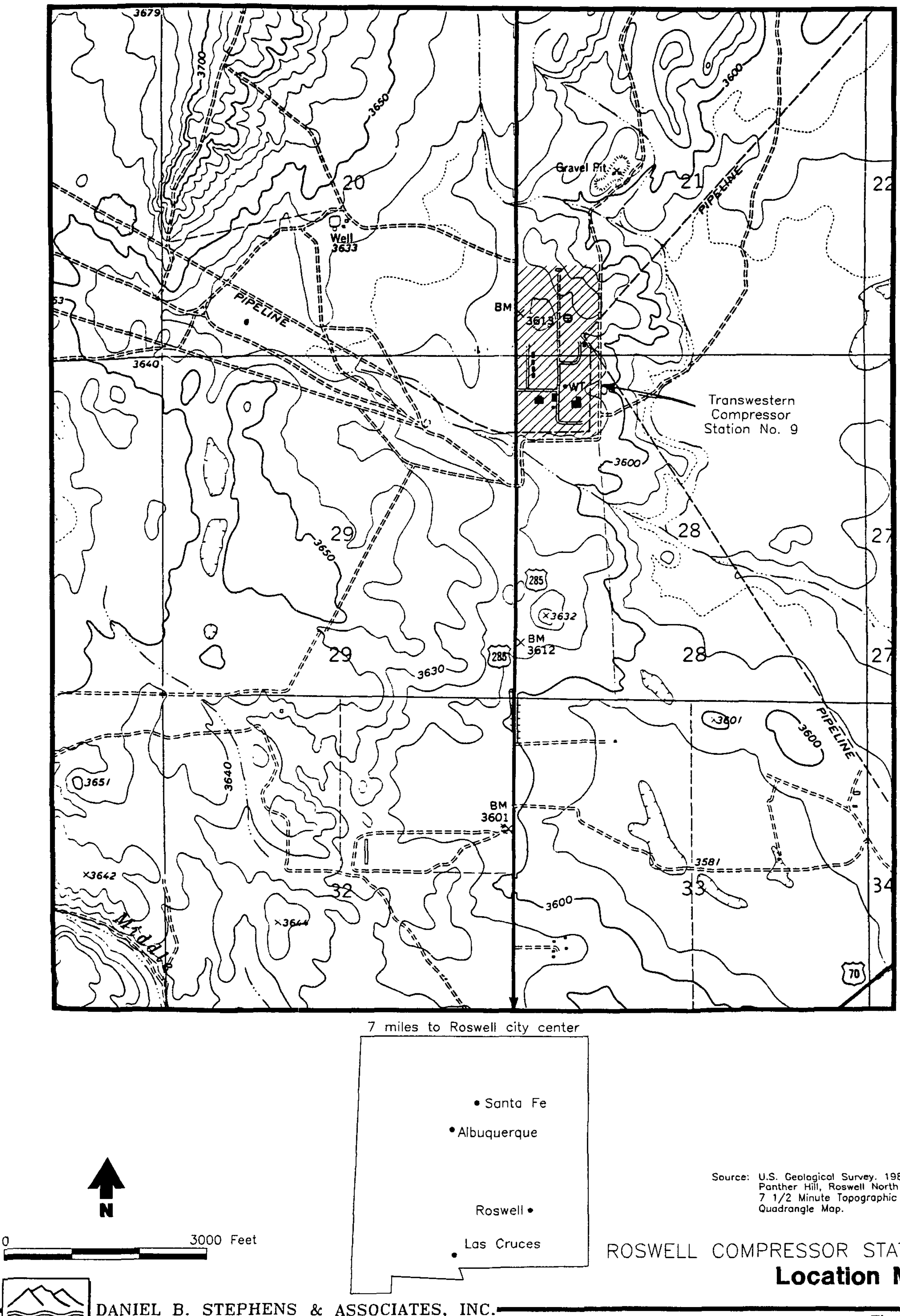
U.S. EPA. 1987a. Data quality objectives for remedial response activities. EPA/540/G-87/003 (OSWER Directive 9355.0-7B), March 1987.

U.S. EPA. 1987b. Alternate concentrations limit guidance, Part 1, ACL Policy and Info Requirements. Interim Final, July 1987. EPA/530-SW-87-017, OSWER Directive 9481.

U.S. EPA. 1992. RCRA ground-water monitoring: Draft technical guidance. EPA/530-R-93-001, November 1992.

Welder, G.E. 1983. Geohydrologic framework of the Roswell ground-water basin, Chaves and Eddy Counties, New Mexico. New Mexico State Engineer Technical Report 42.

FIGURES



Source: U.S. Geological Survey. 1982 Panther Hill, Roswell North 7 1/2 Minute Topographic Quadrangle Map.

ROSWELL COMPRESSOR STATION

Location Map

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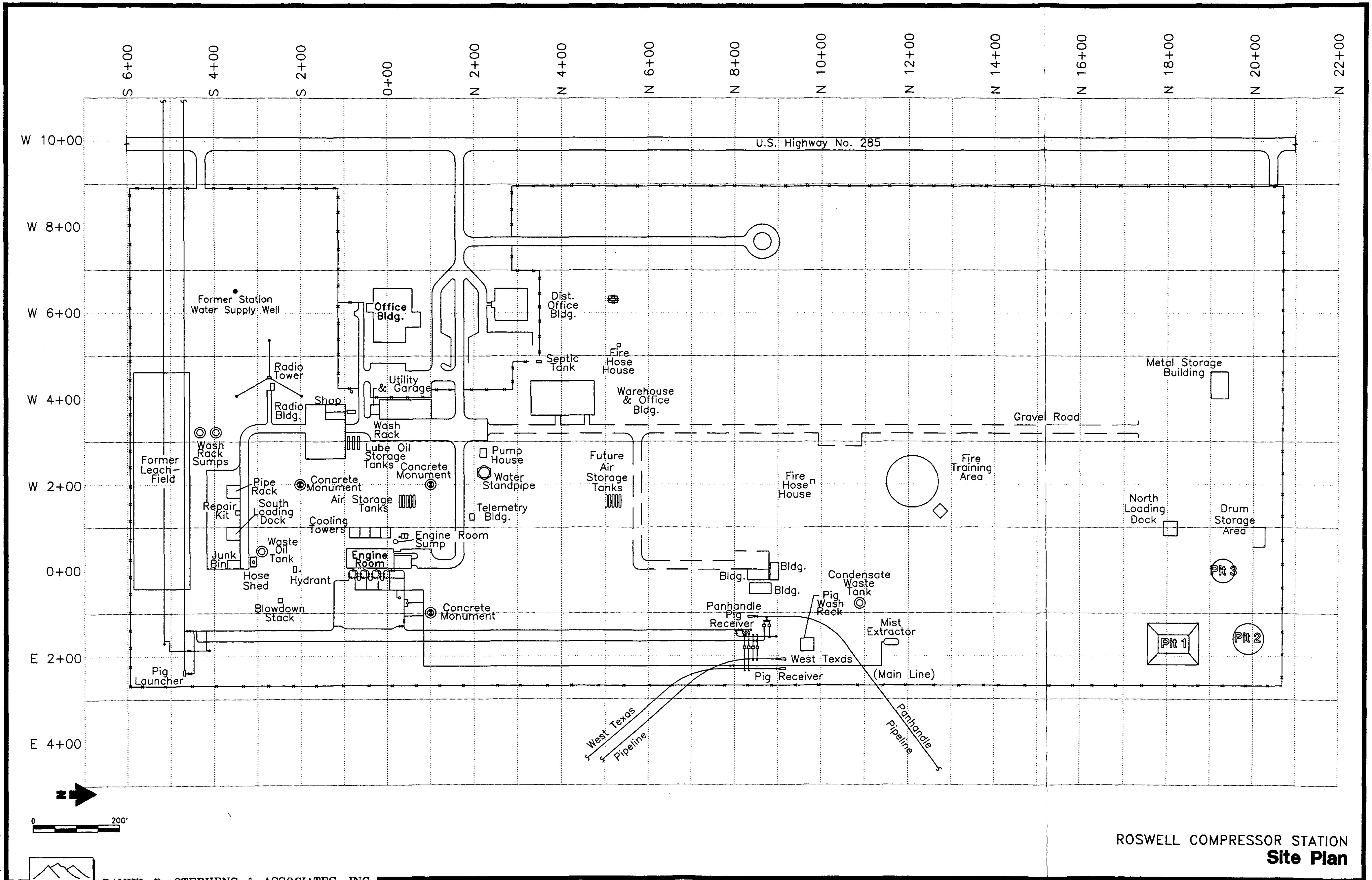
Figure 1-1

D\4115\1-1LM



D\4115\2-1SP

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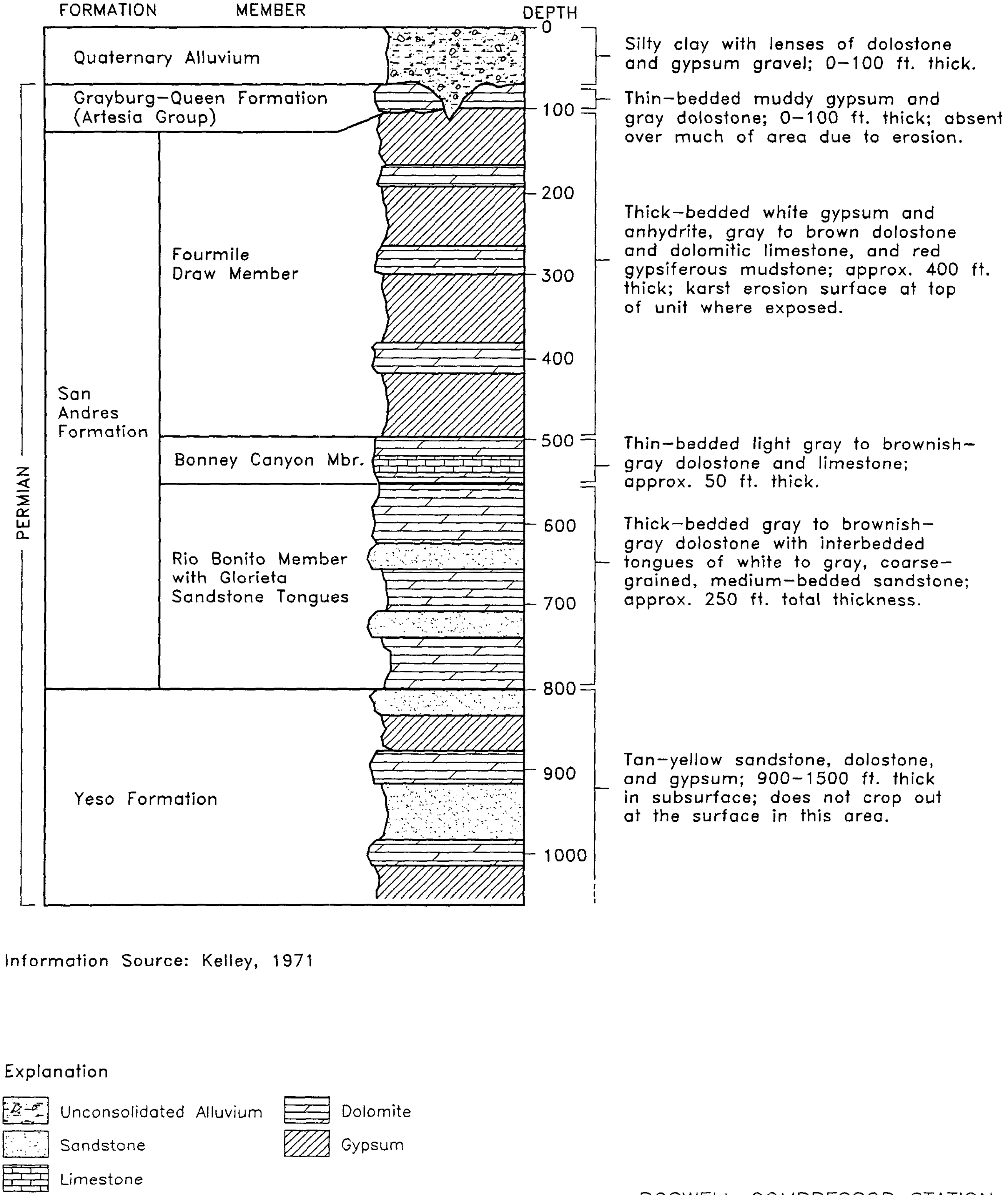
ROSWELL COMPRESSOR STATION
Site Plan

Figure 2-1



ROSWELL COMPRESSOR STATION

Generalized Stratigraphic Section Near Roswell Compressor Station

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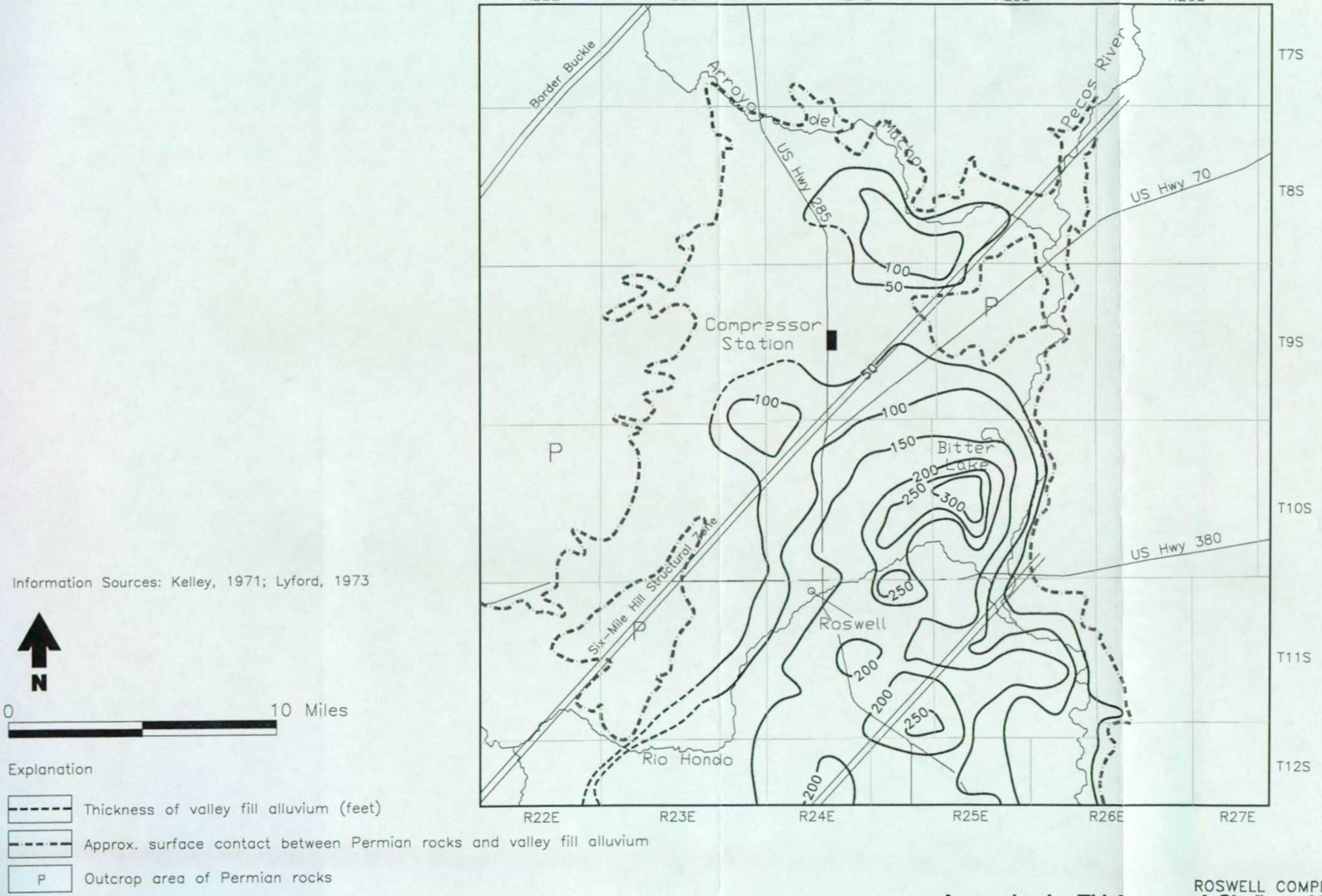
Figure 2-2

D/4115/2-2GSS.DWG



ROSWELL COMPRESSOR STATION

Approximate Thickness of Shallow Alluvial Aquifer

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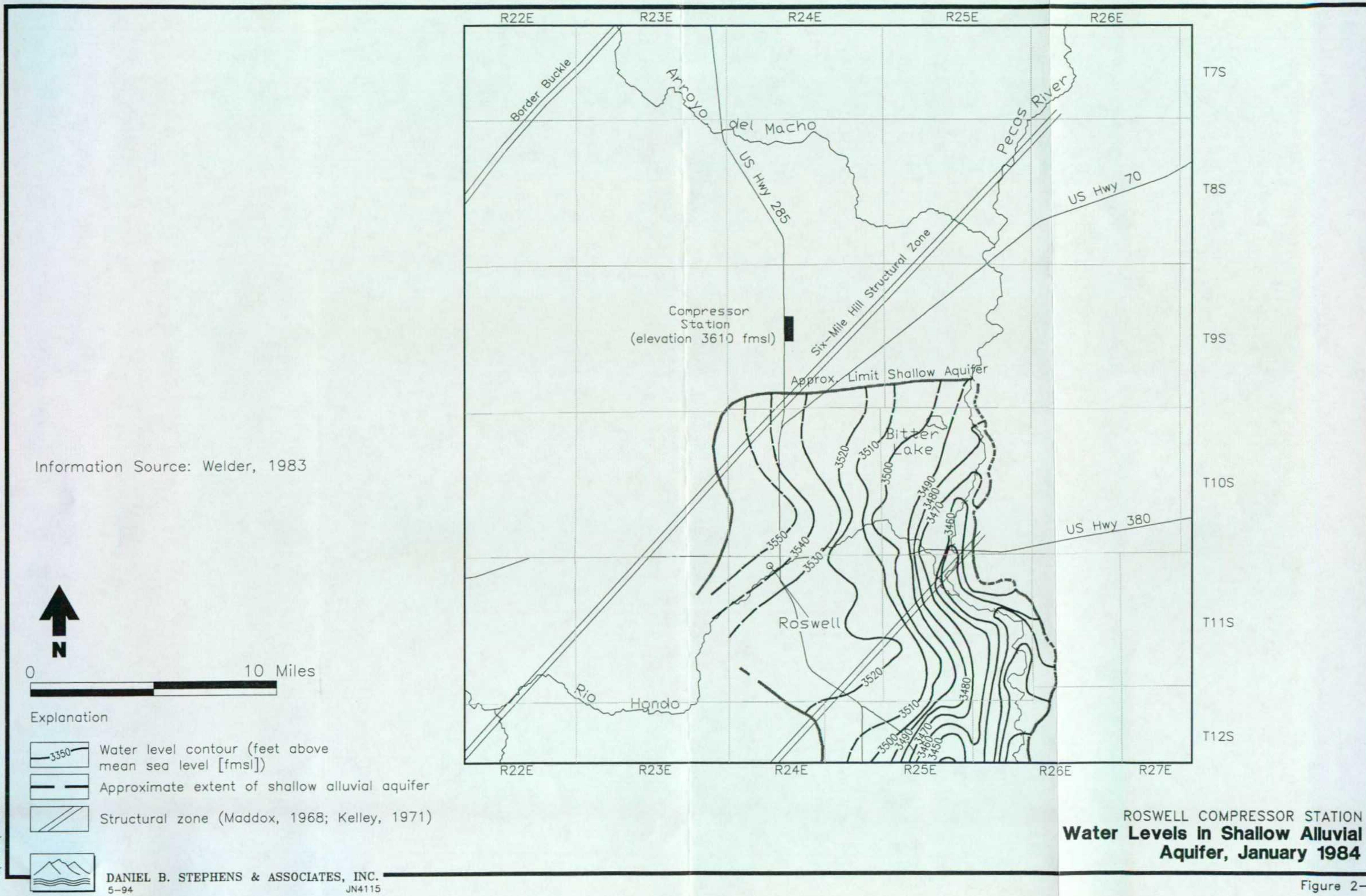
D\4115\2-1TSAA

Figure 2-3



ROSWELL COMPRESSOR STATION

Water Levels in Shallow Alluvial Aquifer, January 1984

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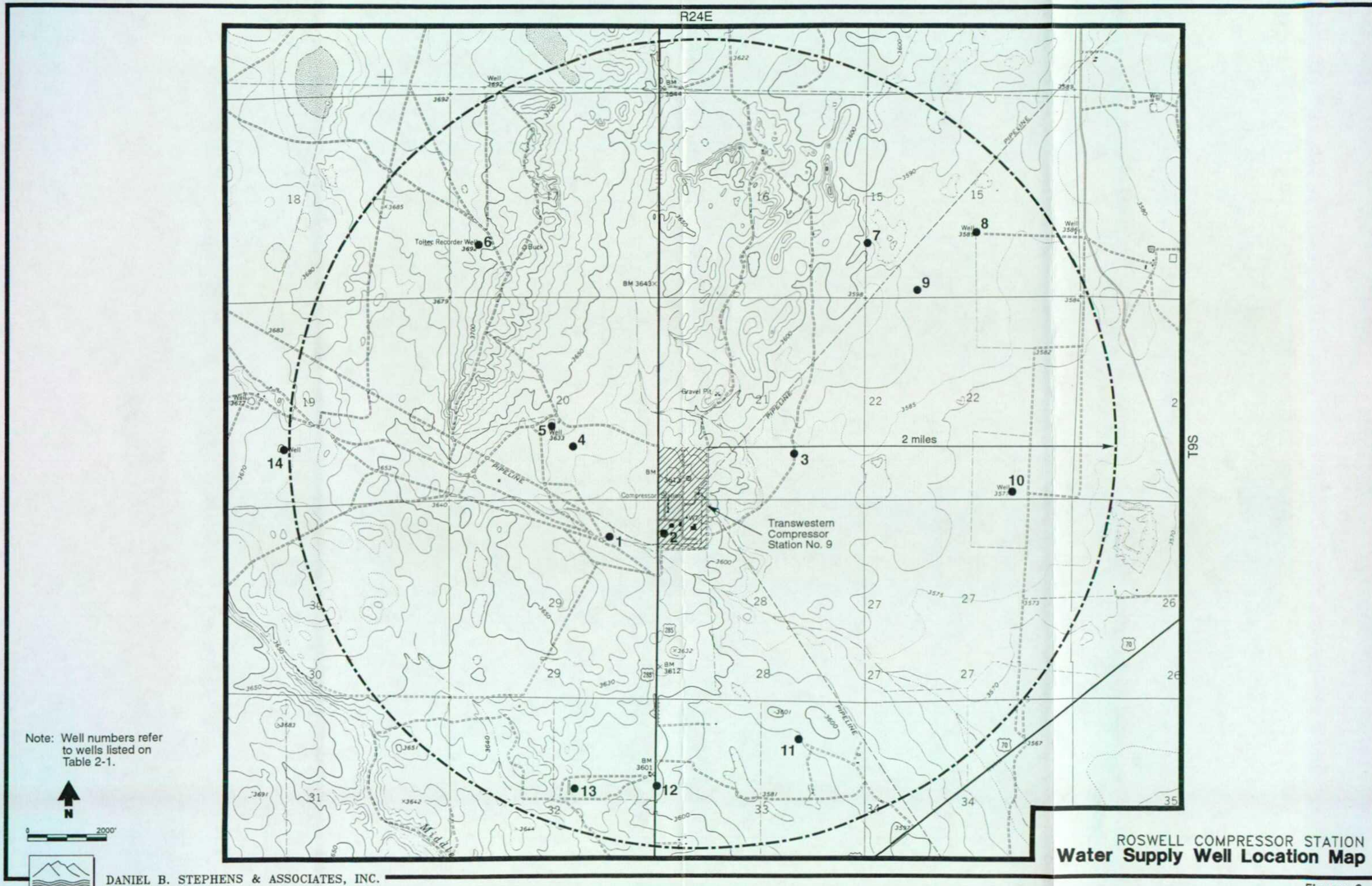
Figure 2-4



ROSWELL COMPRESSOR STATION
Water Supply Well Location Map

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Figure 2-5

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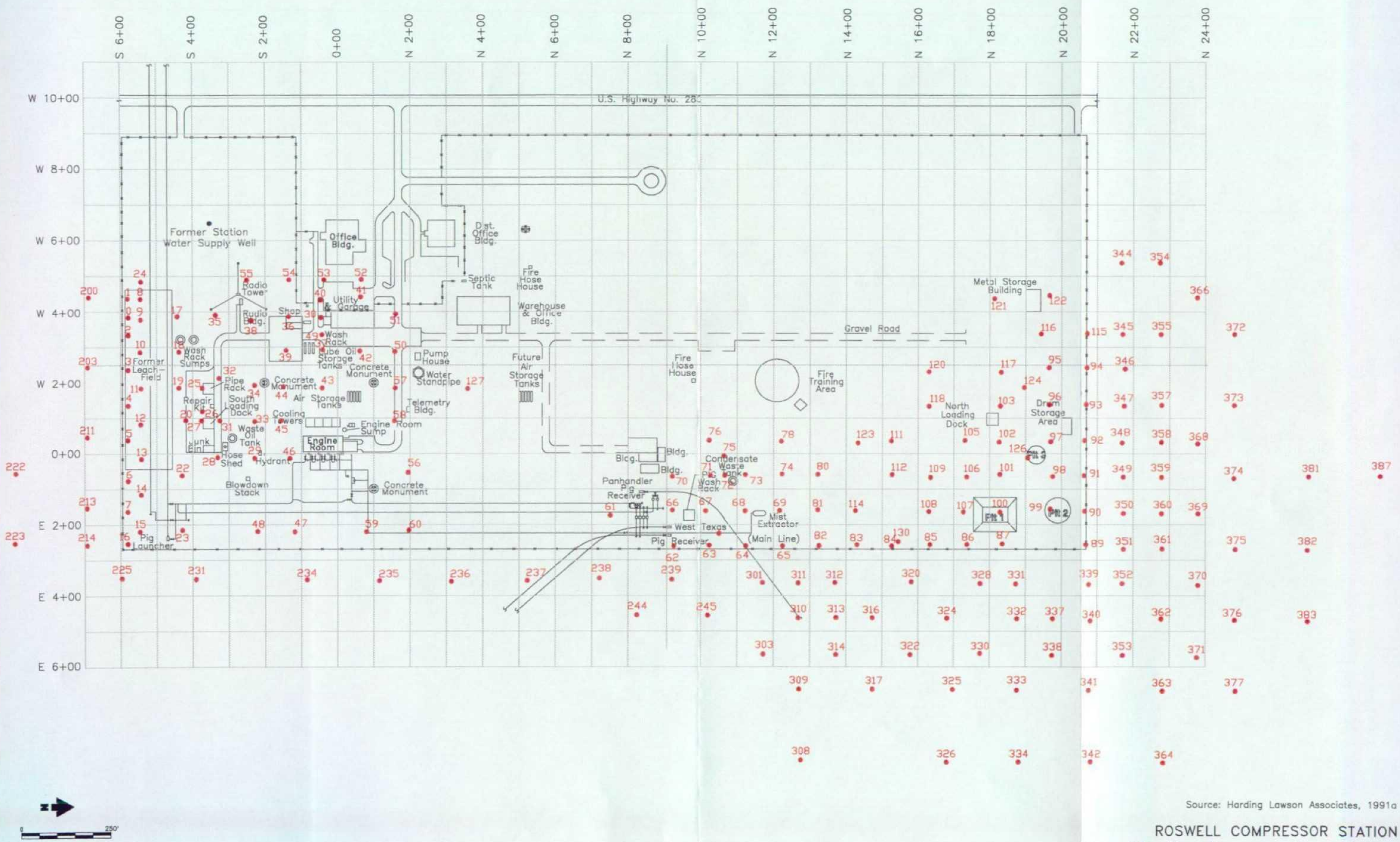

Source: Harding Lawson Associates, 1991a

ROSWELL COMPRESSOR STATION

Harding Lawson Associates Soil Vapor Sample Locations

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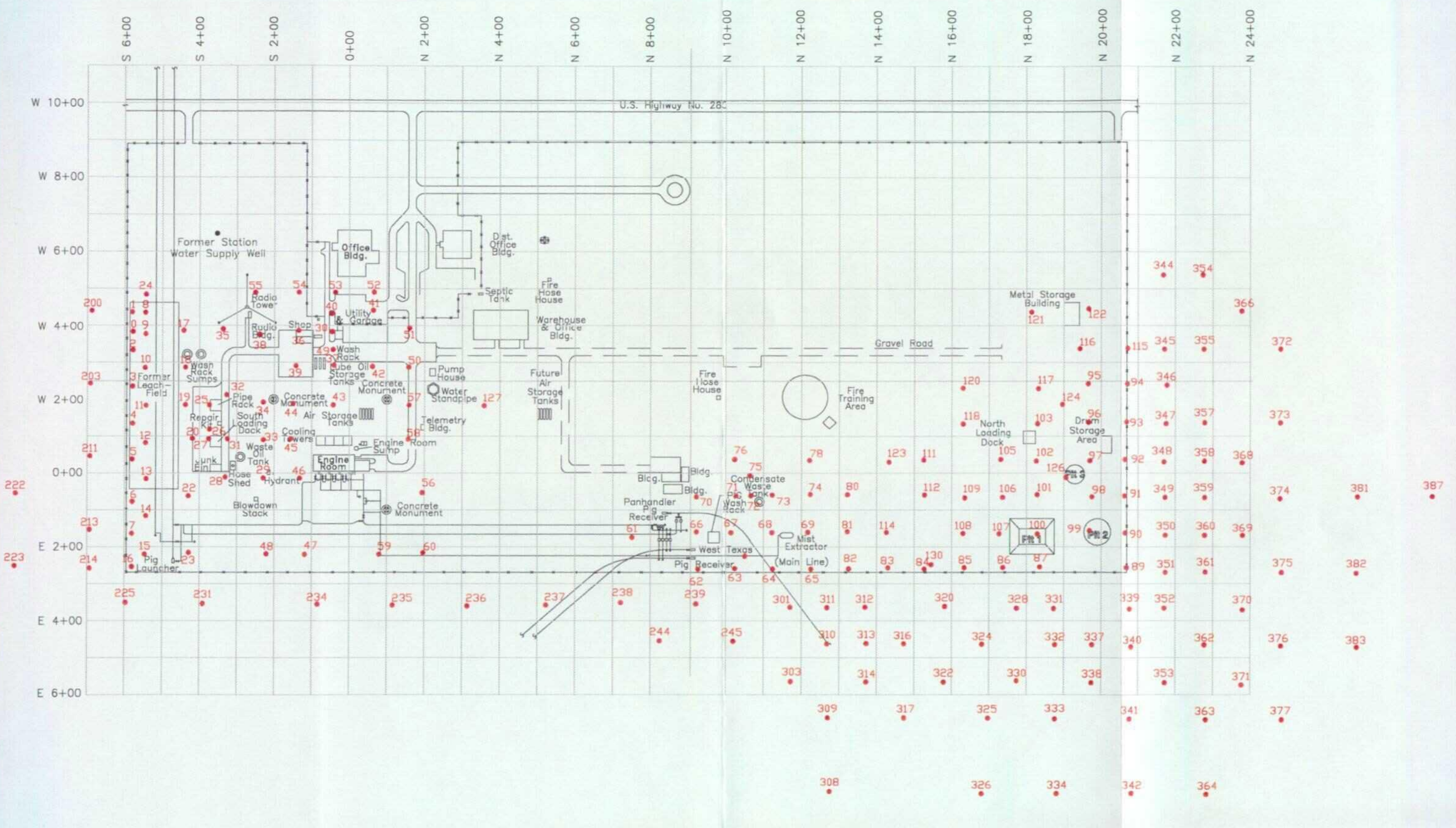
Figure 3-1



Source: Harding Lawson Associates, 1991a

ROSWELL COMPRESSOR STATION

Harding Lawson Associates
Soil Vapor Sample Locations

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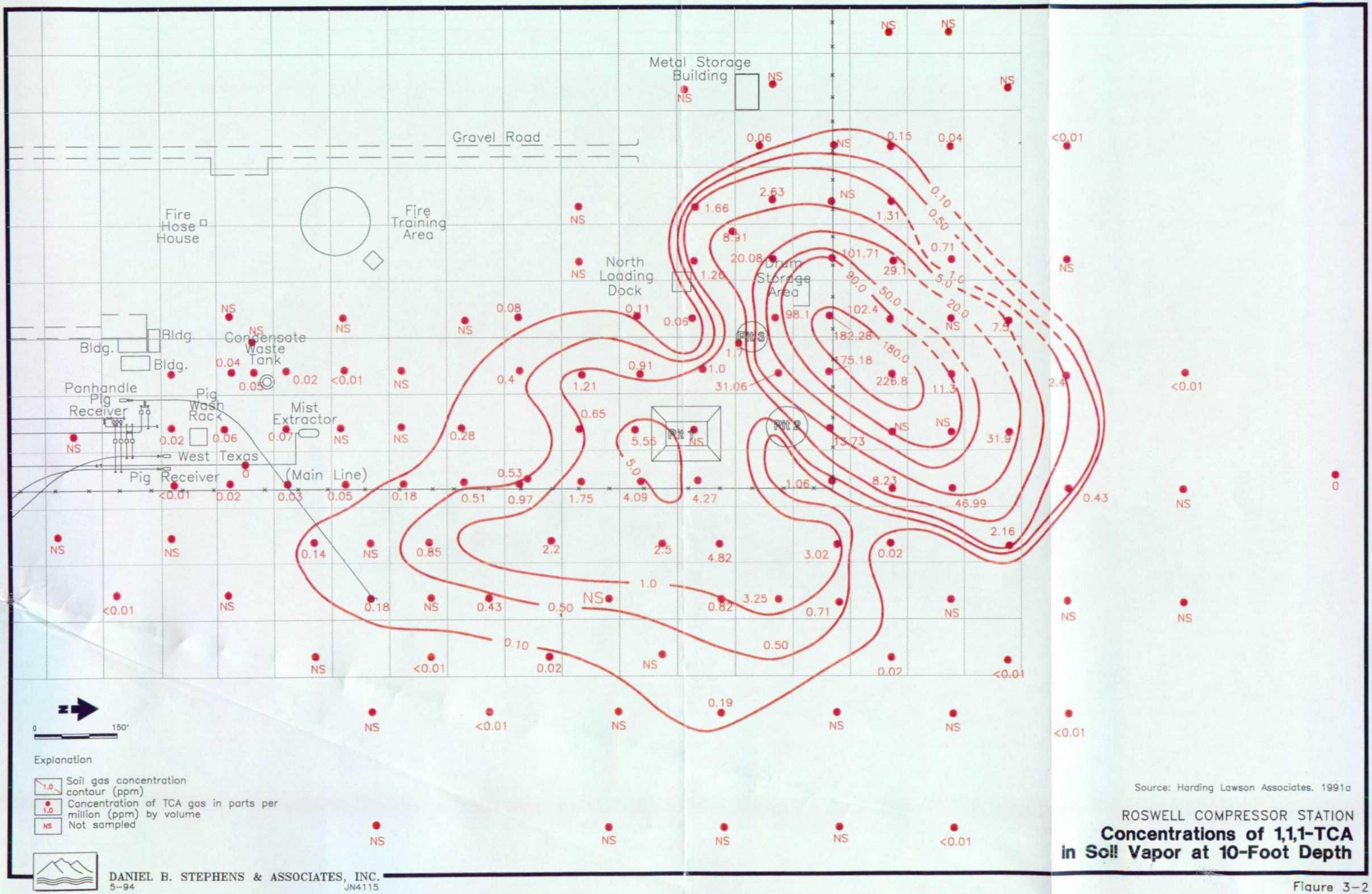
Figure 3-1

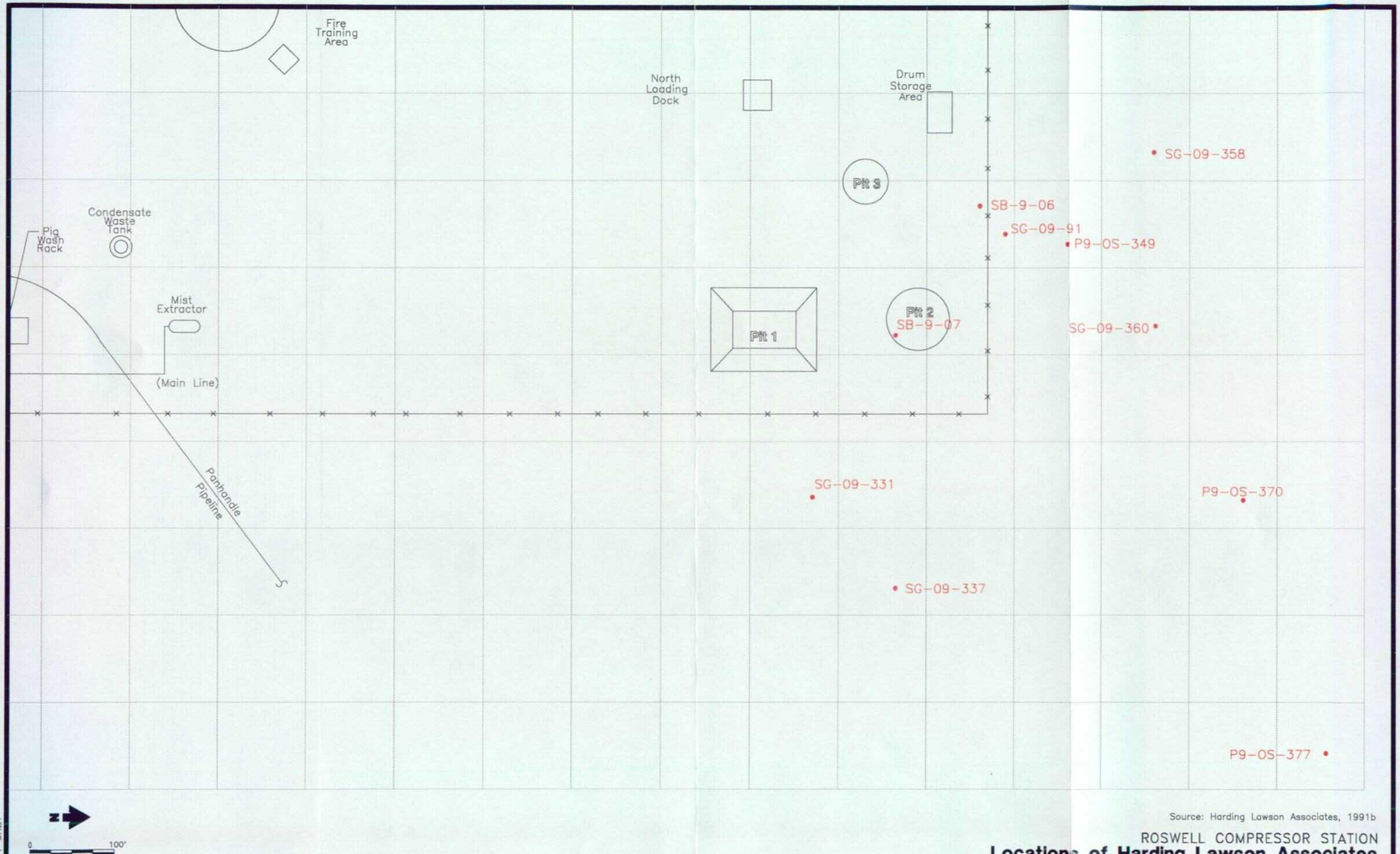


Source: Harding Lawson Associates. 1991a

ROSWELL COMPRESSOR STATION

Concentrations of 1,1,1-TCA in Soil Vapor at 10-Foot Depth

Figure 3-2



Source: Harding Lawson Associates, 1991b

ROSWELL COMPRESSOR STATION

Locations of Harding Lawson Associates Soil Borings

D\4115\4-3HLA

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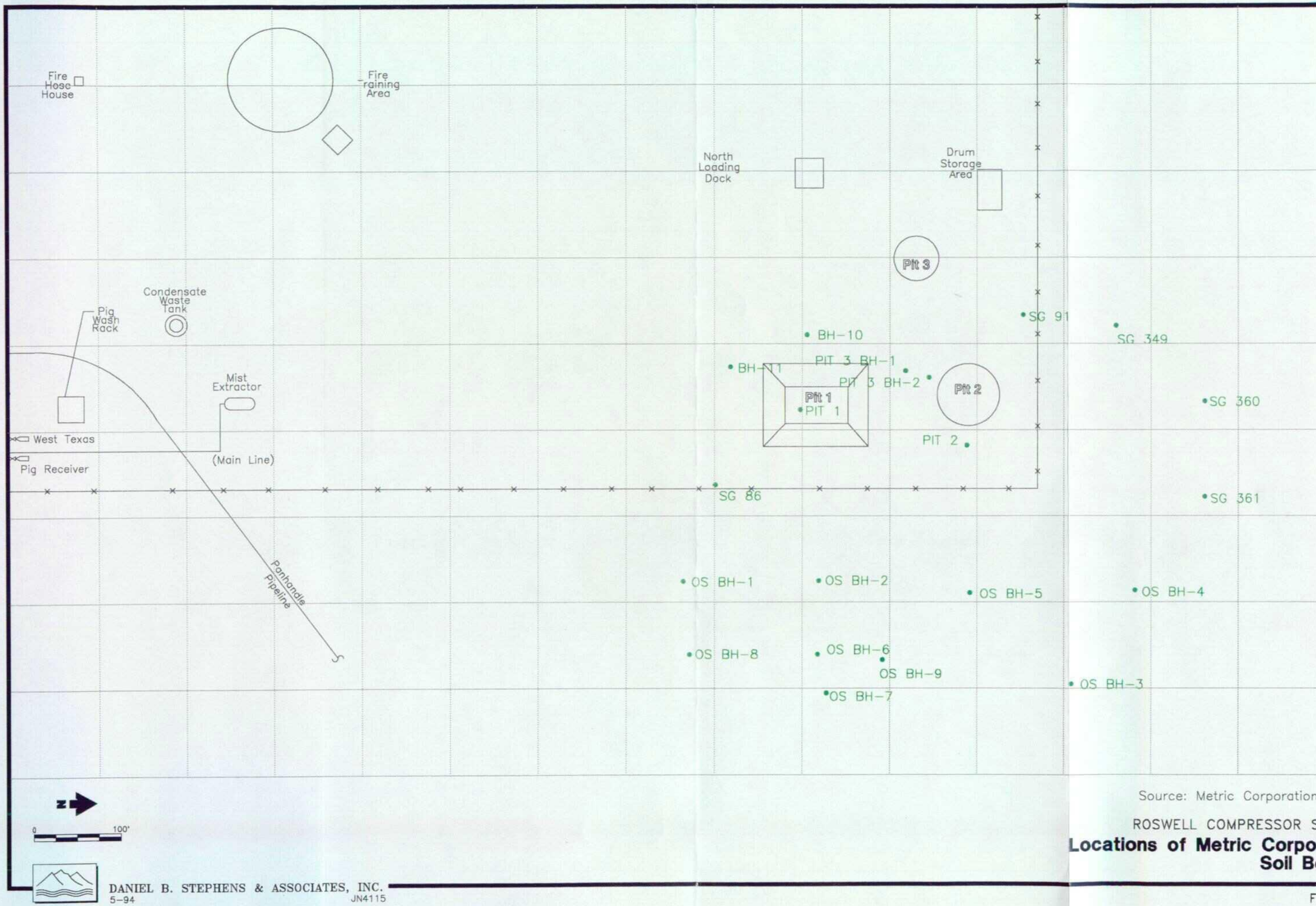
Figure 3-3



Source: Metric Corporation, 1991.

ROSWELL COMPRESSOR STATION

Locations of Metric Corporation Soil Borings

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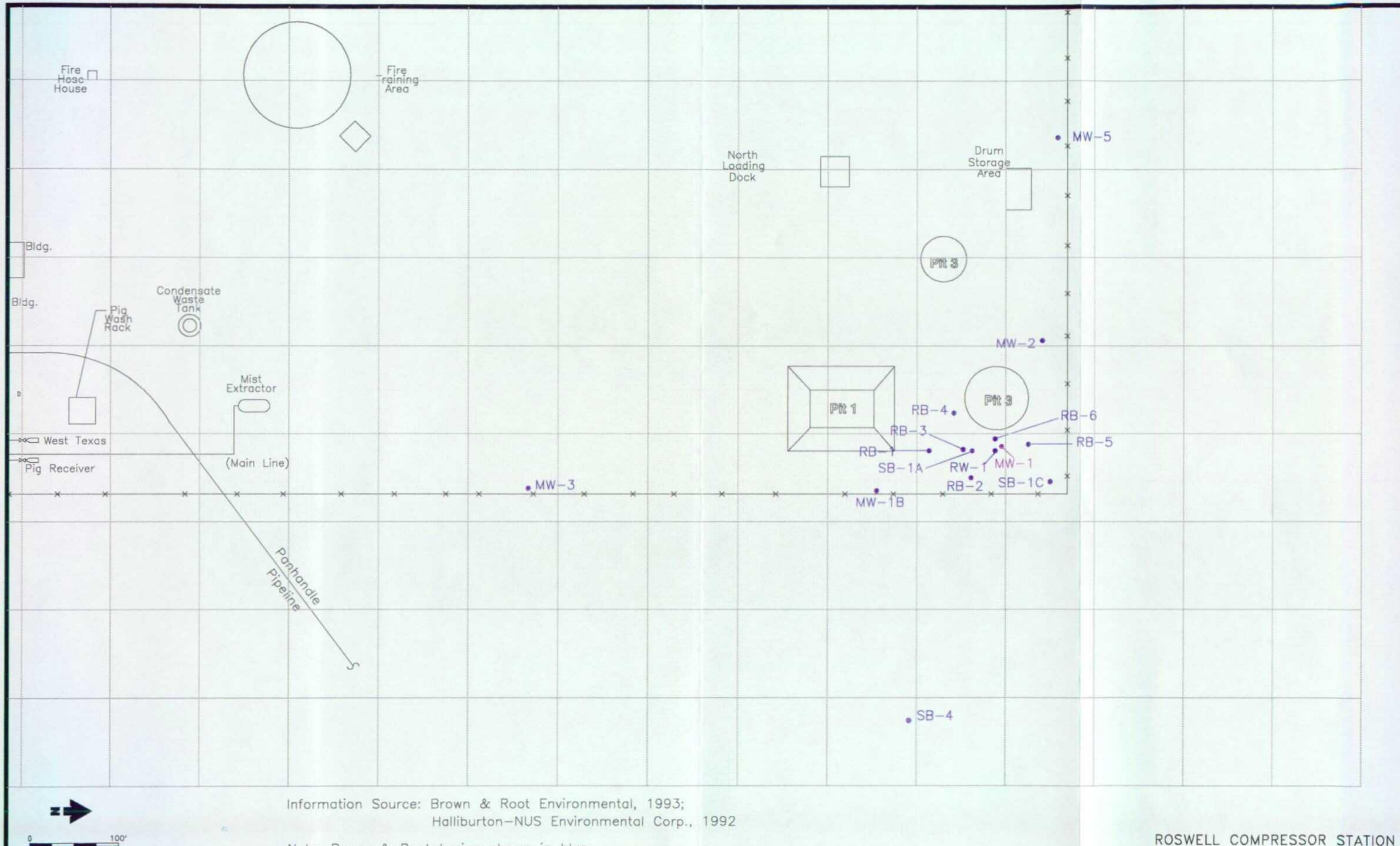
JN4115

Figure 3-4



Information Source: Brown & Root Environmental, 1993;
Halliburton-NUS Environmental Corp., 1992

Note: Brown & Root boring shown in blue.
Halliburton-NUS boring shown in purple.

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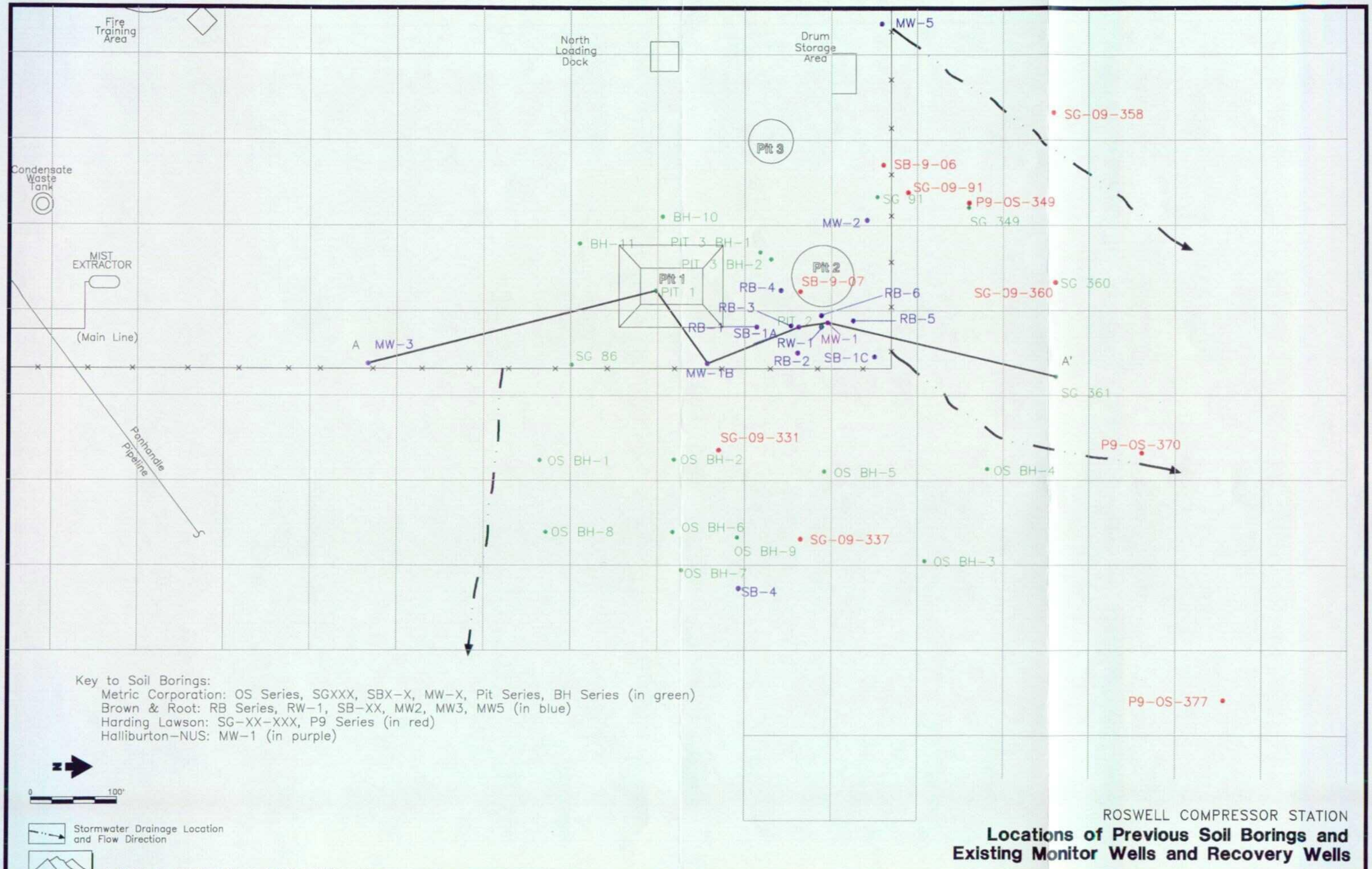
ROSWELL COMPRESSOR STATION
Locations of Halliburton and Brown & Root Soil Borings

Figure 3-5



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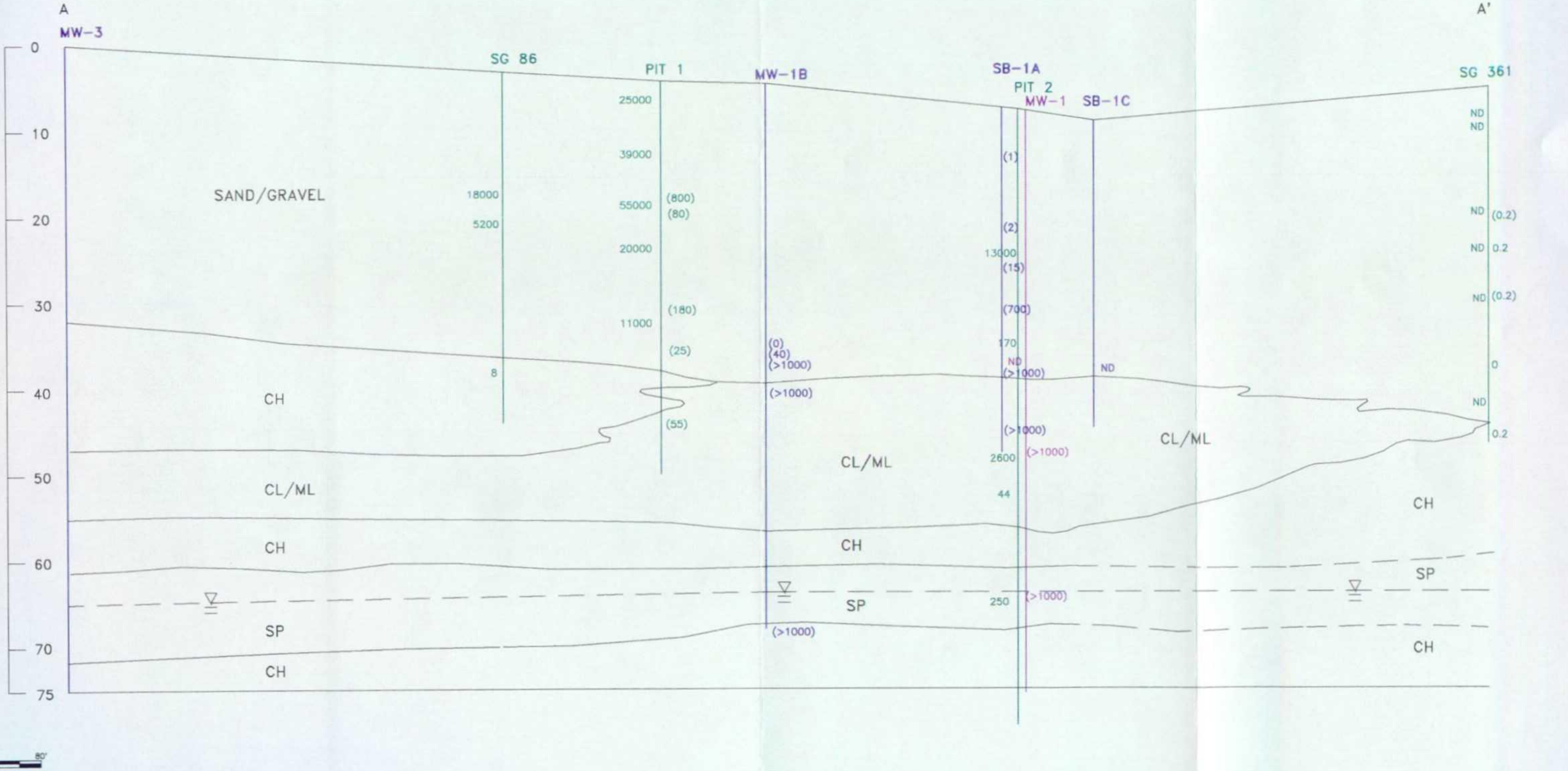
ROSWELL COMPRESSOR STATION

Locations of Previous Soil Borings and Existing Monitor Wells and Recovery Wells

Figure 3-6



SP Sand
SM Silty Sand
ML Silt
CL Silty Clay
CH Clay
20,000 Total Petroleum Hydrocarbon as Determined by EDA Method 418.1
(>1000) Headspace VOC Concentration Determined using an OVA Meter
Estimated Watertable
ND Not detected

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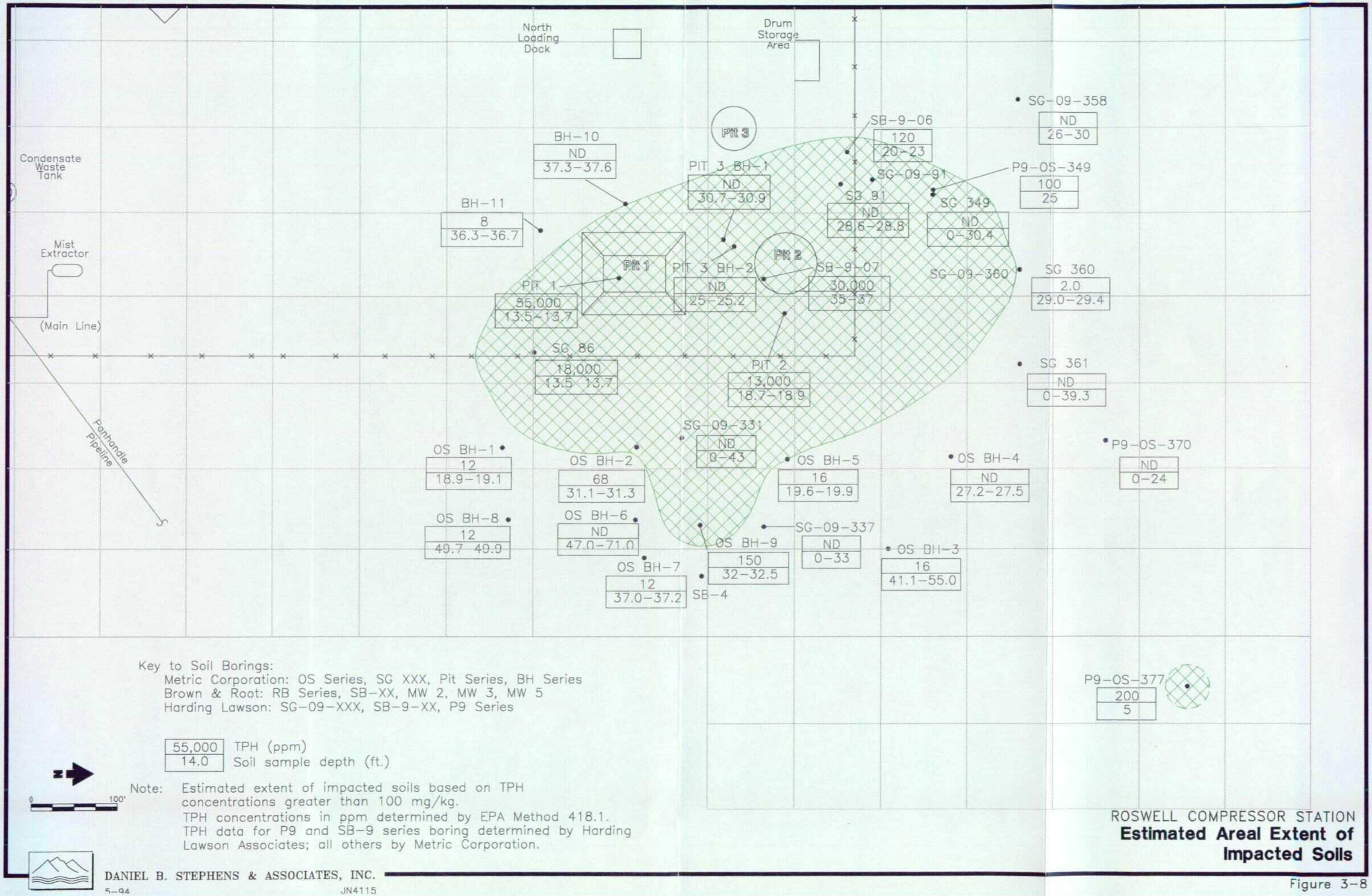
ROSWELL COMPRESSOR STATION
Hydrogeologic Cross Section

Figure 3-7


North Loading Dock
Drum Storage Area
Condensate Waste Tank
Mist Extractor
(Main Line)
Panhandle Pipeline
Pit 3
Pit 2
Pit 1
SG-09-358
ND
26-30
SB-9-06
120
20-23
BH-10
ND
37.3-37.6
PIT 3 BH-1
ND
30.7-30.9
SG-09-91
SG 91
ND
28.6-28.8
P9-OS-349
100
25
SG 349
ND
0-30.4
BH-11
8
36.3-36.7
PIT 3 BH-2
ND
25-25.2
SB-9-07
30,000
35-37
SG-09-360
SG 360
2.0
29.0-29.4
PIT 1
55,000
13.5-13.7
SG 86
18,000
13.5-13.7
PIT 2
13,000
18.7-18.9
SG 361
ND
0-39.3
SG-09-331
ND
0-43
P9-OS-370
ND
0-24
OS BH-1
12
18.9-19.1
OS BH-2
68
31.1-31.3
OS BH-5
16
19.6-19.9
OS BH-4
ND
27.2-27.5
OS BH-8
12
49.7-49.9
OS BH-6
ND
47.0-71.0
SG-09-337
ND
0-33
OS BH-9
150
32-32.5
OS BH-3
16
41.1-55.0
OS BH-7
12
37.0-37.2
SB-4
Key to Soil Borings:
Metric Corporation: OS Series, SG XXX, Pit Series, BH Series
Brown & Root: RB Series, SB-XX, MW 2, MW 3, MW 5
Harding Lawson: SG-09-XXX, SB-9-XX, P9 Series
55,000 TPH (ppm)
14.0 Soil sample depth (ft.)
P9-OS-377
200
5
N
0
100'
Note: Estimated extent of impacted soils based on TPH concentrations greater than 100 mg/kg.
TPH concentrations in ppm determined by EPA Method 418.1.
TPH data for P9 and SB-9 series boring determined by Harding Lawson Associates; all others by Metric Corporation.
ROSWELL COMPRESSOR STATION
Estimated Areal Extent of Impacted Soils
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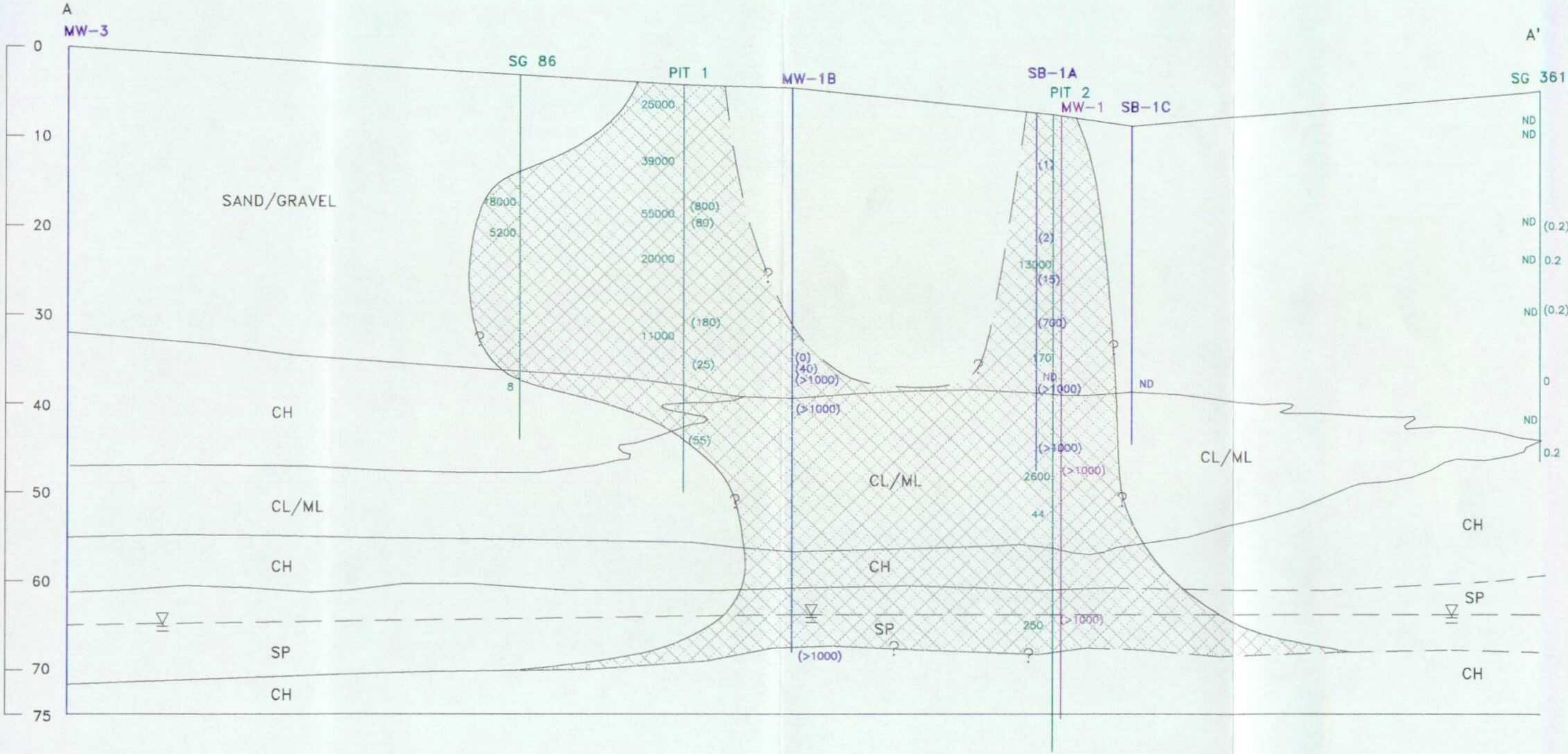
5-94
JN4115

Figure 3-8



0 80'

SP	Sand
SM	Silty Sand
ML	Silt
CL	Silty Clay
CH	Clay
(hatch)	Estimated Extent of Impacted Soil
20,000	Total Petroleum Hydrocarbon as Determined by EPA Method 418.1
(>1000)	Headspace VOC Concentration Determined using an OVA Meter
⊻	Estimated Watertable
ND	Not detected

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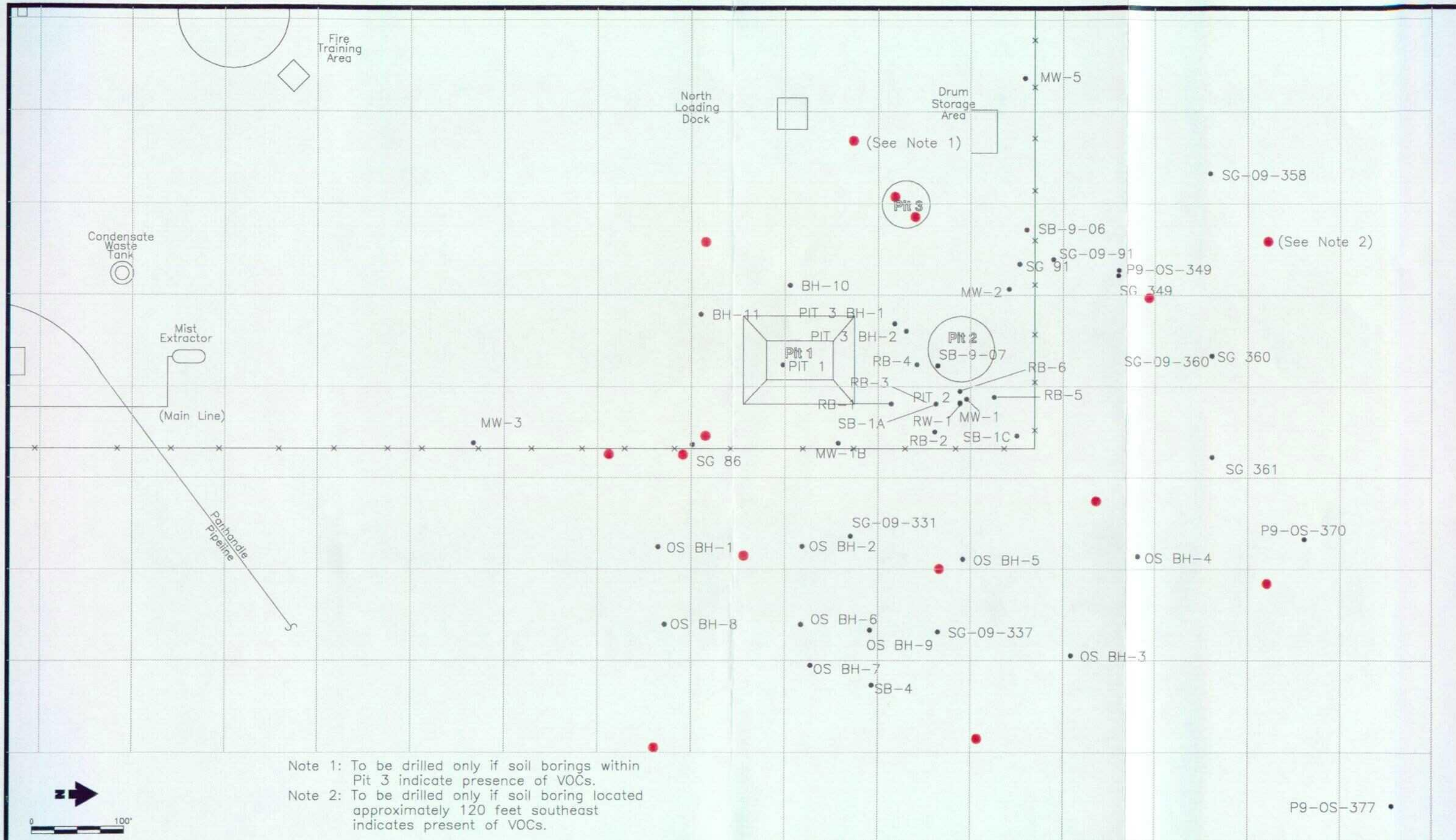
ROSWELL COMPRESSOR STATION
Estimated Vertical Extent of Impacted Soil

Figure 3-9



Note 1: To be drilled only if soil borings within Pit 3 indicate presence of VOCs.
Note 2: To be drilled only if soil boring located approximately 120 feet southeast indicates present of VOCs.

Explanation

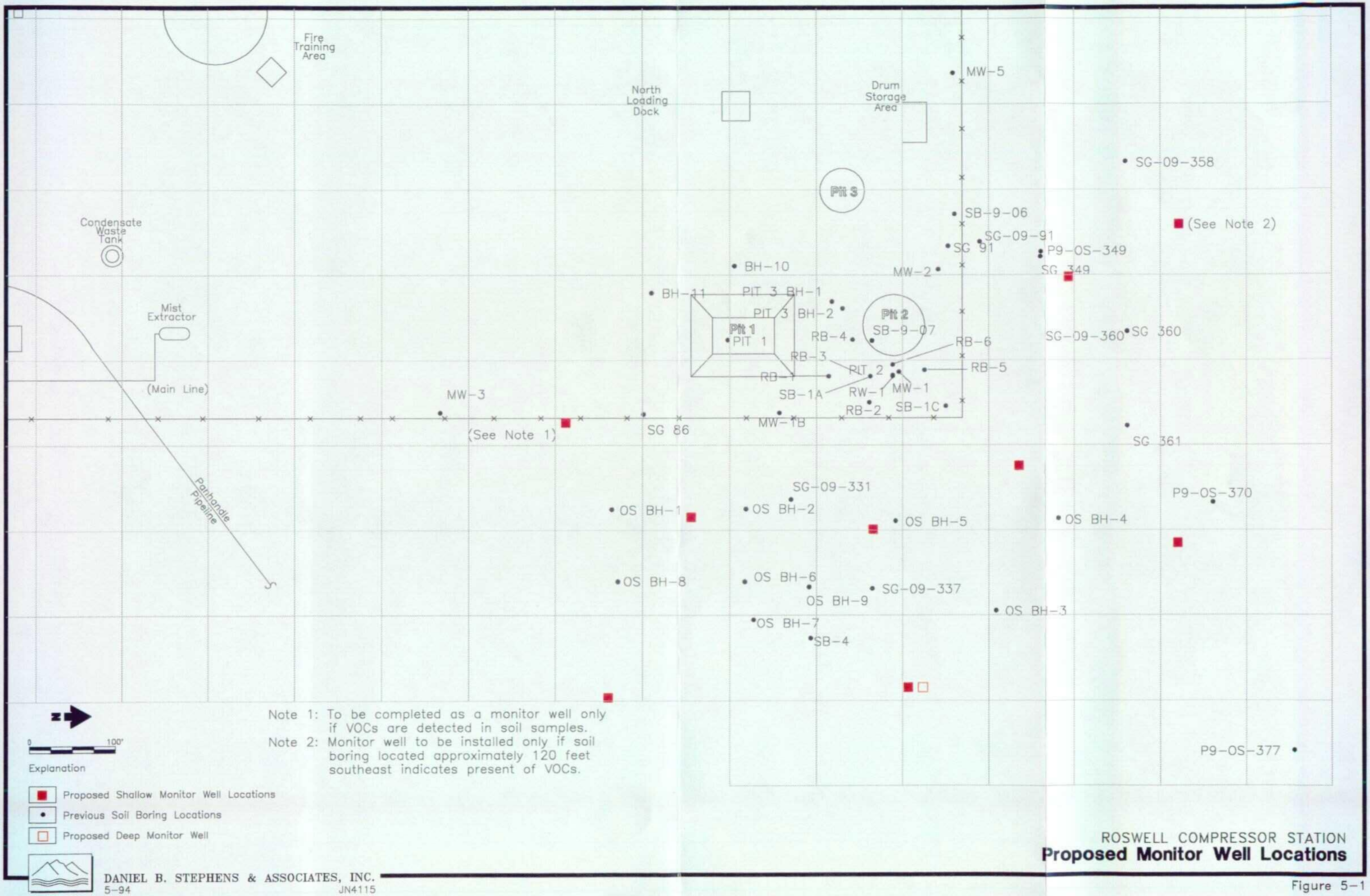
- ● Proposed Soil Boring Locations
- • Previous Soil Boring Locations

DANIEL B. STEPHENS & ASSOCIATES, INC.
5-94 JN4115

ROSWELL COMPRESSOR STATION
Proposed Soil Boring Locations

Figure 4-1

D\4115\5-1SBL



Fire Training Area
North Loading Dock
Drum Storage Area
MW-5
SG-09-358
Pit 3
SB-9-06
SG-09-91
SG 91
P9-OS-349
SG 349
(See Note 2)
Condensate Waste Tank
BH-10
MW-2
BH-11
PIT 3 BH-1
PIT 3 BH-2
Pit 2
SB-9-07
Pit 1
PIT 1
RB-4
RB-6
SG-09-360
SG 360
Mist Extractor
RB-3
RB-5
PIT 2
RB-1
MW-1
SB-1A
RW-1
(Main Line)
MW-3
RB-2
SB-1C
MW-1B
(See Note 1)
SG 86
SG 361
Panhandle Pipeline
SG-09-331
P9-OS-370
OS BH-1
OS BH-2
OS BH-5
OS BH-4
OS BH-8
OS BH-6
SG-09-337
OS BH-9
OS BH-3
OS BH-7
SB-4
N
0
100'
Note 1: To be completed as a monitor well only if VOCs are detected in soil samples.
Note 2: Monitor well to be installed only if soil boring located approximately 120 feet southeast indicates present of VOCs.
P9-OS-377
Explanation
Proposed Shallow Monitor Well Locations
Previous Soil Boring Locations
Proposed Deep Monitor Well
D:\4115\5-1SBL
DANIEL B. STEPHENS & ASSOCIATES, INC.
5-94
JN4115
ROSWELL COMPRESSOR STATION
Proposed Monitor Well Locations

Figure 5-1

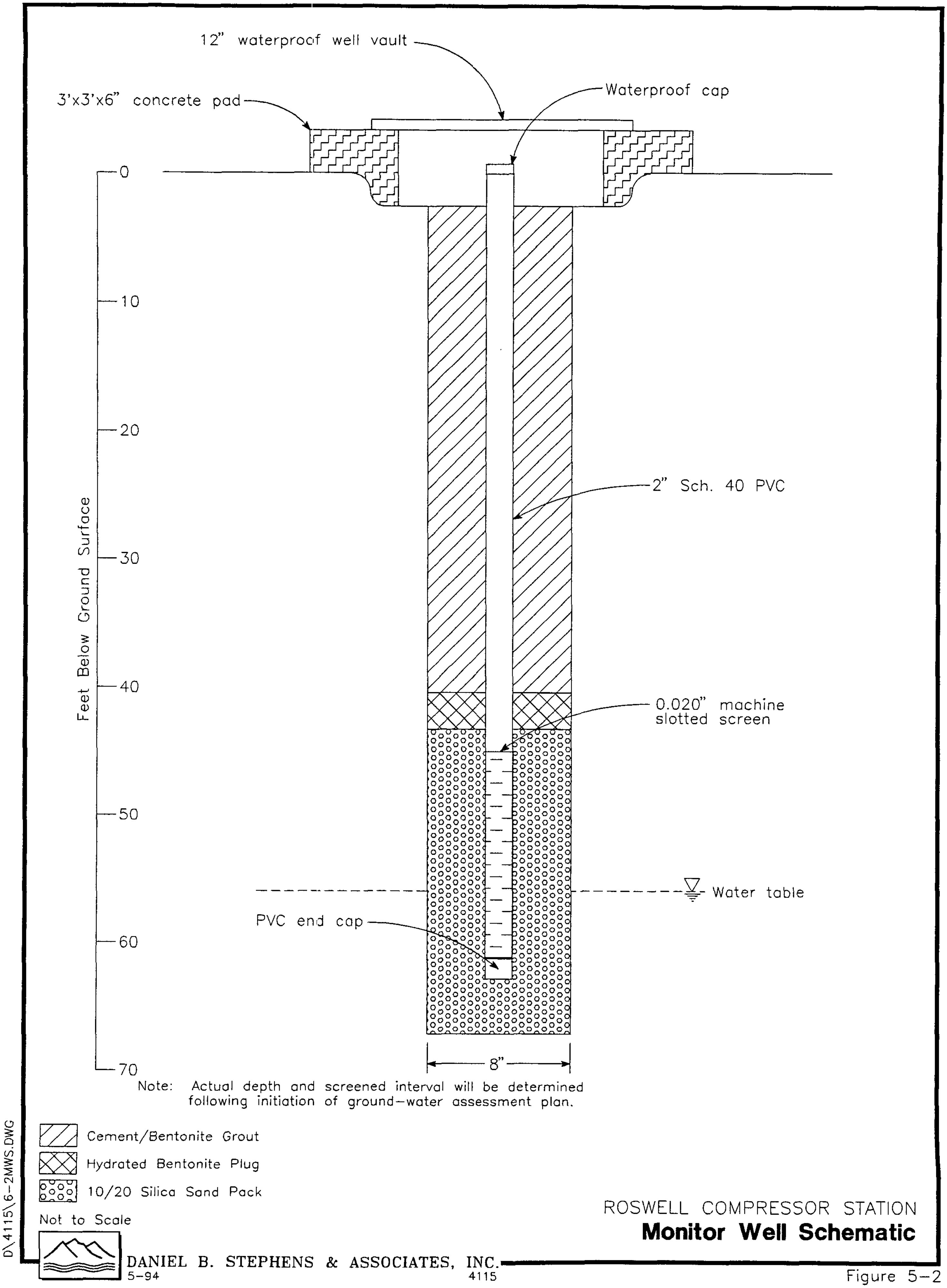
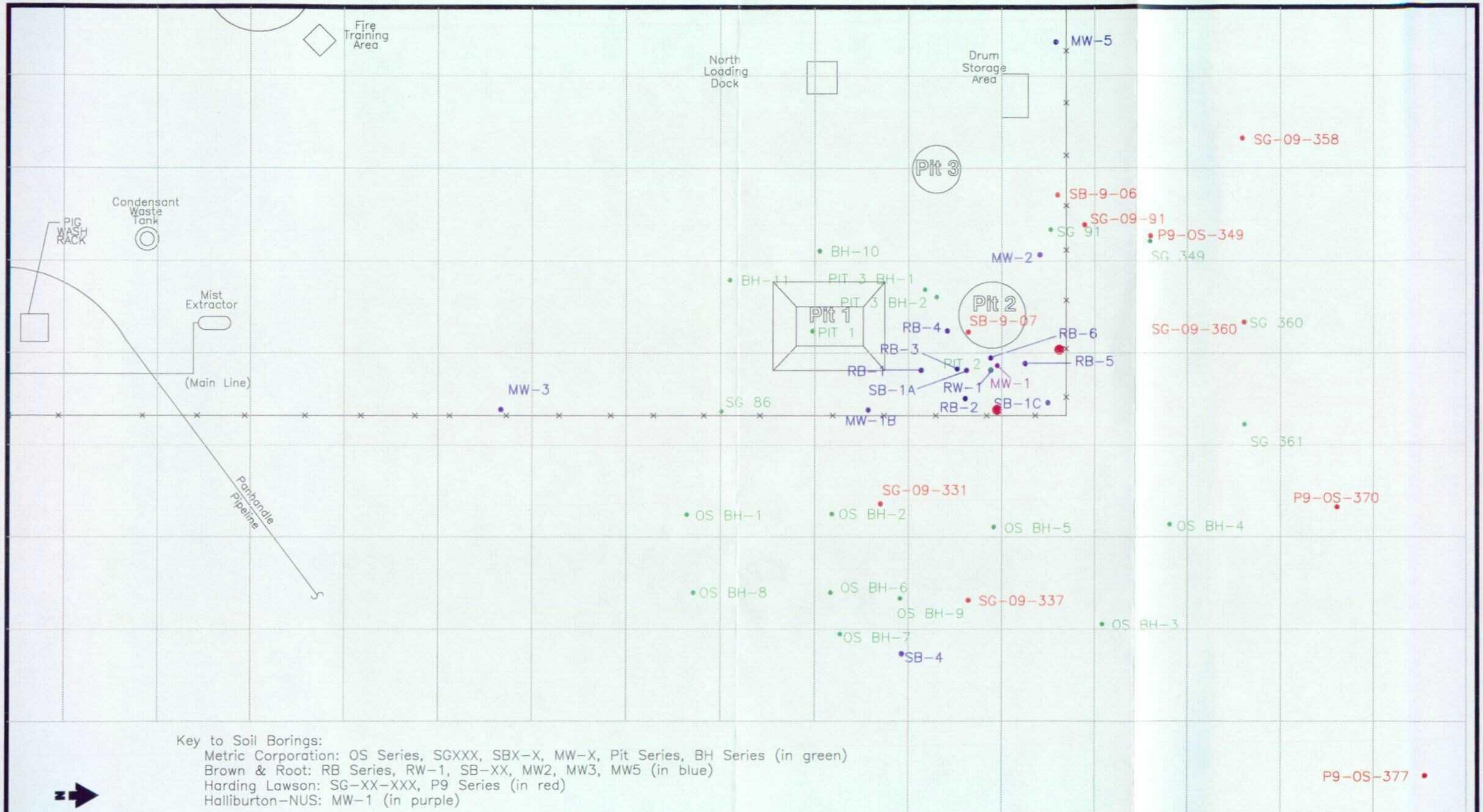

12" waterproof well vault
3'x3'x6" concrete pad
Waterproof cap
0
10
20
30
40
50
60
70
Feet Below Ground Surface
2" Sch. 40 PVC
0.020" machine slotted screen
Water table
PVC end cap
8"
Note: Actual depth and screened interval will be determined following initiation of ground-water assessment plan.
Cement/Bentonite Grout
Hydrated Bentonite Plug
10/20 Silica Sand Pack
Not to Scale
ROSWELL COMPRESSOR STATION
Monitor Well Schematic
DANIEL B. STEPHENS & ASSOCIATES, INC.
5-94
4115
D:\4115\6-2MWS.DWG

Figure 5-2



Key to Soil Borings:
Metric Corporation: OS Series, SGXXX, SBX-X, MW-X, Pit Series, BH Series (in green)
Brown & Root: RB Series, RW-1, SB-XX, MW2, MW3, MW5 (in blue)
Harding Lawson: SG-XX-XXX, P9 Series (in red)
Halliburton-NUS: MW-1 (in purple)

N
0 100'

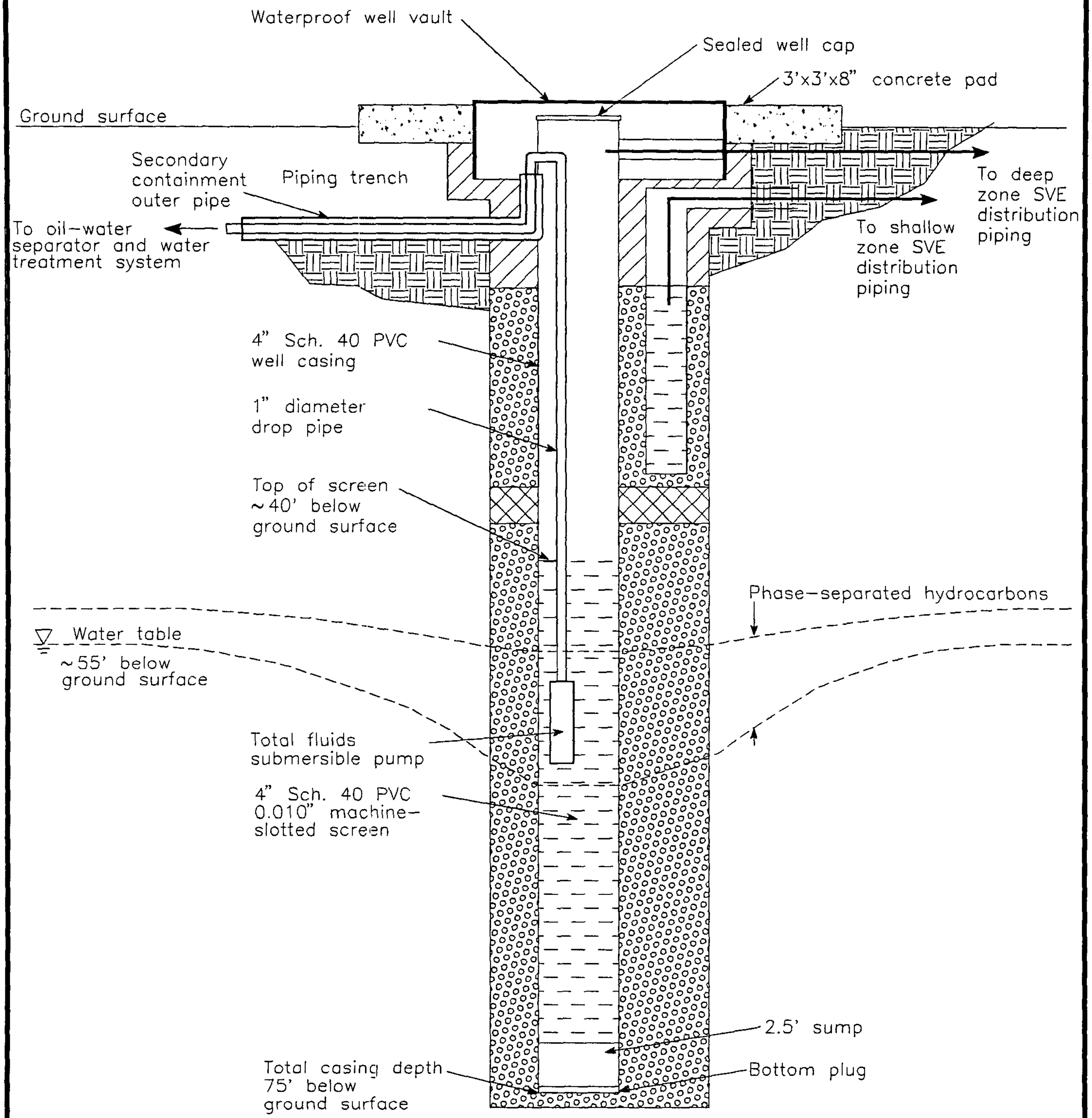
Explanation
Proposed phase-separated hydrocarbon recovery well

D:\4115\8-1RWL.DWG

DANIEL B. STEPHENS & ASSOCIATES, INC.
5-94 JN4115

ROSWELL COMPRESSOR STATION
Proposed Recovery Well Locations

Figure 7-1



Note: Actual depth and screened interval will be determined following initiation of ground-water assessment plan.

Cement/Bentonite Grout
Hydrated Bentonite Plug
10/20 Silica Sand Pack

Not to Scale

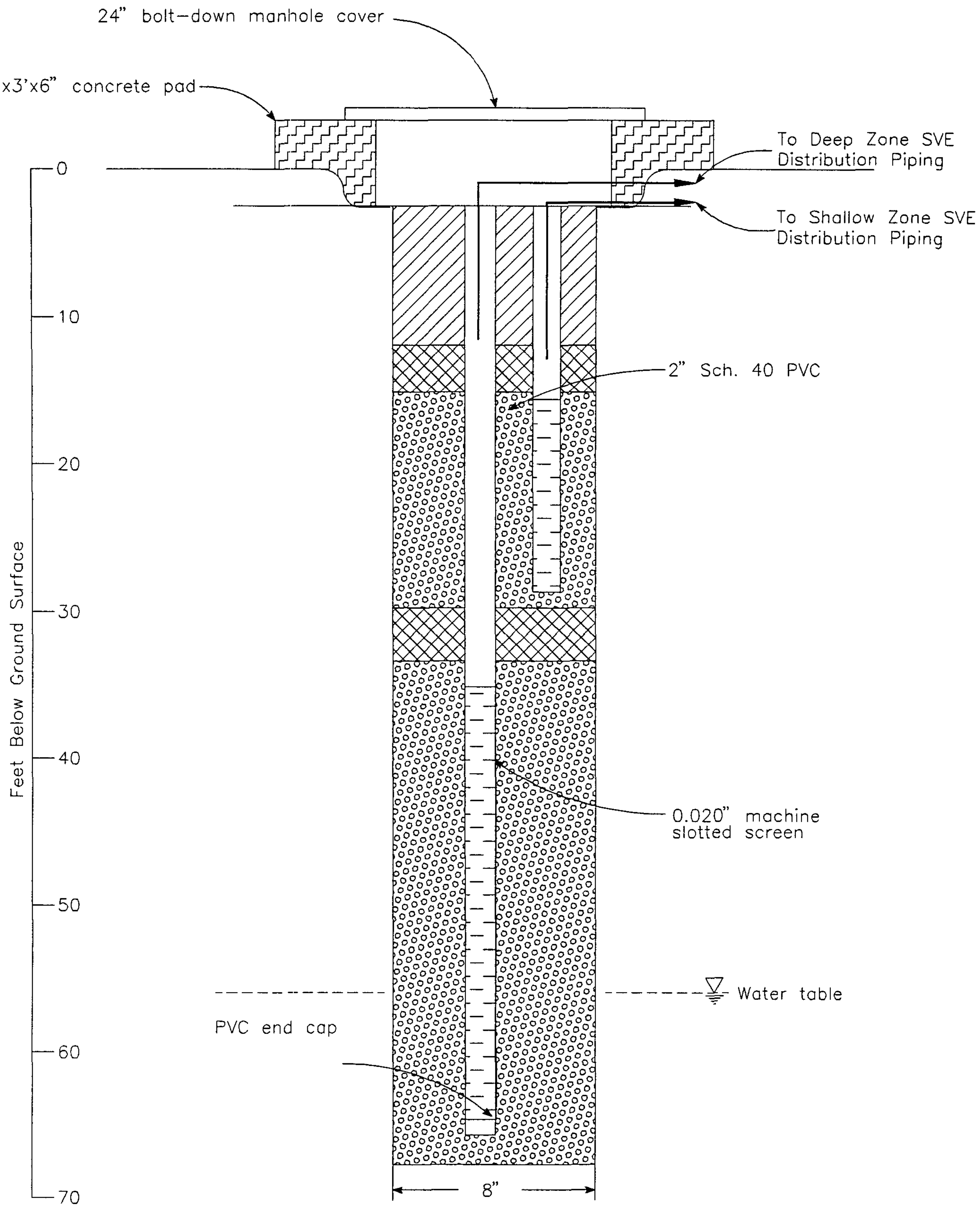
D\4115\8-2RWS.DWG

DANIEL B. STEPHENS & ASSOCIATES, INC.
5-94 4115

ROSWELL COMPRESSION STATION

Recovery Well Schematic

Figure 7-2



Note: Actual depth and screened interval will be determined following initiation of ground-water assessment plan.

Cement/Bentonite Grout

Hydrated Bentonite Plug

10/20 Silica Sand Pack

Not to Scale

ROSWELL COMPRESSOR STATION

Soil Vapor Extraction Well Schematic

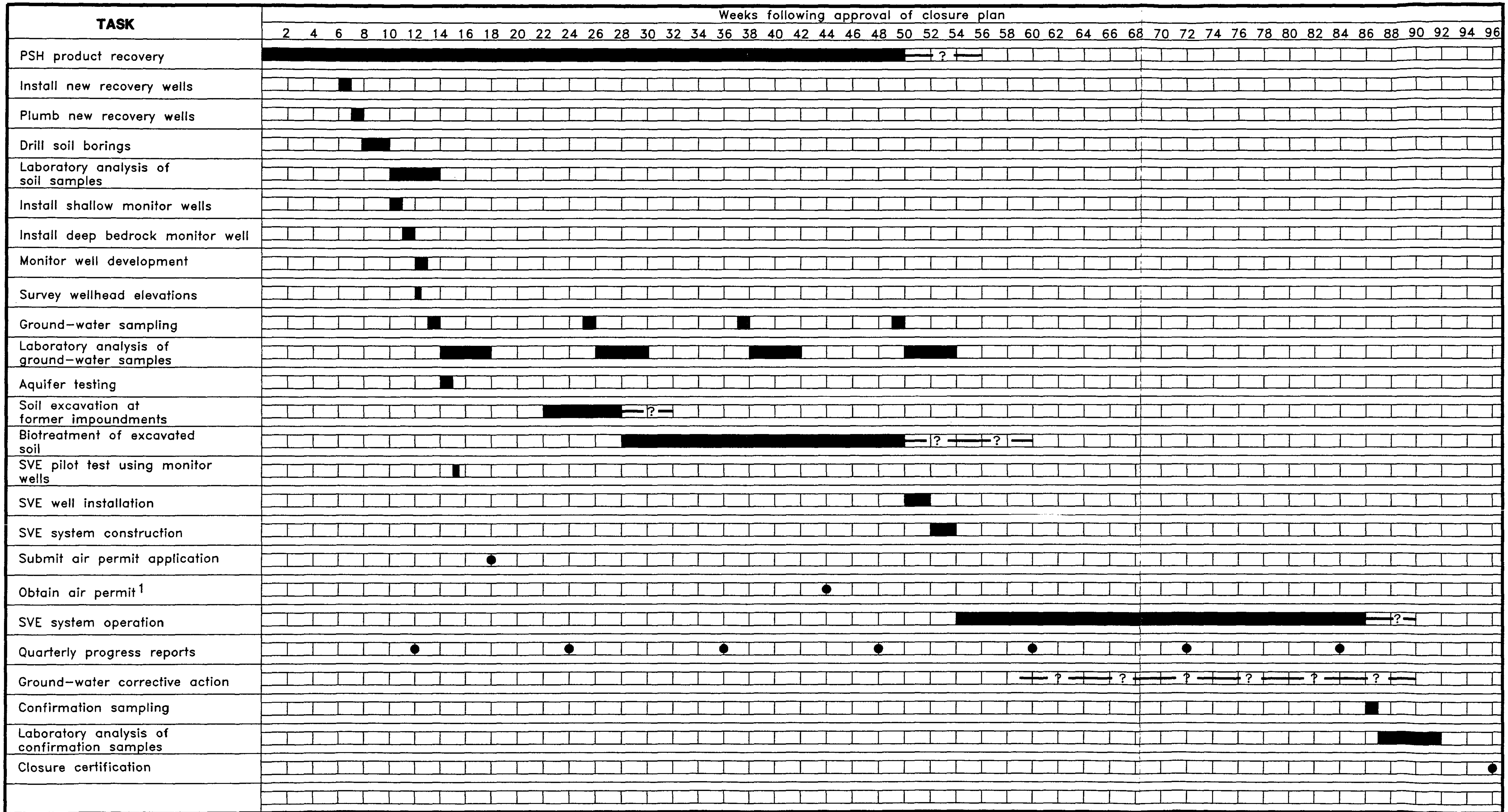
DANIEL B. STEPHENS & ASSOCIATES, INC.

5-94 4115

D\4115\7-3SVEW.DWG

Figure 7-3

Proposed Schedule of Closure Activities



[1] Approval of air permit application is expected to require approximately 180 days following submittal of application to the NMED Air Quality Bureau.

Figure 8-1

DANIEL B. STEPHENS & ASSOCIATES, INC.

TABLES

Table 2-1. Water Supply Wells Located Within 2 Miles of Roswell Compressor Station No. 9

Well Number[1]	Latitude	Longitude	Well ID	Well Depth (ft)	Depth to Water (ft) / Year	Aquifer	Approximate Distance From Site (miles)	Date Drilled	Use	Status
1	333028	1043119	09S.24E.29.223313	NA	63 / 1961	San Andres Fm	0.66	NA	Livestock	Plugged prior to 1984
2	333031	1043103	09S.24E.28.113132	352	85 / 1969	San Andres Fm	0.49	09/17/69	Observation	Former water supply well at compressor station
3	333050	1043025	09S.24E.21.43213	58	15 / 1937	Alluvial Fill	0.45	NA	Livestock	Abandoned
4	333053	1043134	09S.24E.20.413	NA	NA	San Andres Fm	0.63	NA	NA	NA
5	333059	1043135	09S.24E.20.32422	370	63 / 1948	San Andres Fm	0.73	NA	Irrigation	NA
6	333145	1043159	09S.24E.17.331222	208	119 / 1948	Artesia Group	1.54	NA	Observation	NA
7	333148	1043002	09S.24E.15.31331	375	45 / 1961	San Andres Fm	1.30	12/15/58	Domestic	NA
8	333149	1042931	09S.24E.15.41313	425	47 / 1961	San Andres Fm	1.72	03/18/59	Irrigation	NA
9	333131	1043626	09S.23E.15.33441	386	281 / 1968	San Andres Fm	1.31	NA	Livestock	NA
10	333040	1042917	09S.24E.22.434	NA	NA	NA	1.52	NA	NA	NA
11	332934	1043021	09S.24E.33.21443	510	53 / 1965	San Andres Fm	1.60	NA	Irrigation	NA
12	332927	1043106	09S.24E.32.242443	NA	43 / 1961	Artesia Group	1.66	NA	Livestock	Abandoned
13	332921	1043134	09S.24E.32.233324	116	72 / 1960	San Andres Fm	1.86	NA	Livestock	NA
14	333055	1043236	09S.24E.19.41331	550	126 / 1962	San Andres Fm	2.01	NA	Irrigation	NA

Source: United States Geological Survey Ground-Water Site Inventory

[1] Well numbers correspond to well locations shown on Figure 2-5.

NA = Not available

Table 3-1. Summary of Previous Soil Borings and Monitor Wells
Roswell Compressor Station No. 9
Page 1 of 3

Boring No.	Source[1]	Boring Type[2]	Date of Completion	Location		Ground Surface Elevation	Total Depth (feet bgs)	Casing Diameter (inches)	Screened Interval (feet bgs)	Top of Sand Pack (feet bgs)	Top of Upper Clay[3] (feet bgs)
				North	East						
SB-9-06	HLA	ASB	04/03/90	NA	NA	NA	29.0	N/A	N/A	N/A	28.0
SB-9-07	HLA	ASB	04/03/90	NA	NA	NA	38.5	N/A	N/A	N/A	38.0
P9-OS-349	HLA	ASB	05/02/90	NA	NA	NA	40.0	N/A	N/A	N/A	34.0
P9-OS-377	HLA	ASB	05/02/90	NA	NA	NA	30.0	N/A	N/A	N/A	12.0
SG-09-91	HLA	ASB	05/15/90	NA	NA	NA	33.0	N/A	N/A	N/A	31.0
SG-09-331	HLA	ASB	05/16/90	NA	NA	NA	43.0	N/A	N/A	N/A	38.0
SG-09-337	HLA	ASB	05/17/90	NA	NA	NA	33.0	N/A	N/A	N/A	28.0
SG-09-358	HLA	ASB	05/17/90	NA	NA	NA	30.0	N/A	N/A	N/A	21.0
SG-09-360	HLA	ASB	05/16/90	NA	NA	NA	34.5	N/A	N/A	N/A	30.0
SG-09-370	HLA	ASB	05/16/90	NA	NA	NA	24.0	N/A	N/A	N/A	12.0
Pit 1	Metric	ASB	07/16/91	1798	176.6	3615.72	47.8	N/A	N/A	N/A	30.6
Pit 2	Metric	ASB	07/17/91	1995	216.6	3615.72	71.6	N/A	N/A	N/A	10.1
Pit 3 (BH-1)	Metric	ASB	07/18/91	1918	131.5	3615.71	32.8	N/A	N/A	N/A	ND
Pit 3 (BH-2)	Metric	ASB	07/18/91	1948	138.5	3615.68	29.5	N/A	N/A	N/A	ND
SG 86	Metric	ASB	07/22/91	1710	268.2	3613.52	40.7	N/A	N/A	N/A	33.6
SG 91	Metric	ASB	07/22/91	2053.2	66.5	3612.28	33.0	N/A	N/A	N/A	28.2
SG 349	Metric	ASB	07/25/91	2160.2	79.0	3615.56	30.4	N/A	N/A	N/A	29.7

[1] HLA = Harding Lawson Associates, 1991
Metric = Metric Corporation, 1991
Hall-NUS = Halliburton-NUS, 1992
B&R = Brown & Root Environmental, 1993

[2] ASB = Abandoned soil boring
MW = Monitor well
RW = Product recovery well

[3] Depth below ground surface (feet) to uppermost clay reported on boring log

bgs = Below ground surface
NA = Not available
N/A = Not applicable
ND = Not detected

Table 3-1. Summary of Previous Soil Borings and Monitor Wells
Roswell Compressor Station No. 9
Page 2 of 3

Boring No.	Source[1]	Boring Type[2]	Date of Completion	Location North	Location East	Ground Surface Elevation	Total Depth (feet bgs)	Casing Diameter (inches)	Screened Interval (feet bgs)	Top of Sand Pack (feet bgs)	Top of Upper Clay[3] (feet bgs)
SG 360	Metric	ASB	07/25/91	2261.5	166.8	3610.83	29.4	N/A	N/A	N/A	28.9
SG 361	Metric	ASB	07/25/91	2261.5	277.8	3610.15	41.3	N/A	N/A	N/A	38.9
OS BH-1	Metric	ASB	07/22/91	1664.9	375.9	3622.30	35.7	N/A	N/A	N/A	34.5
OS BH-2	Metric	ASB	07/24/91	1826.0	379.0	3618.39	70.6	N/A	N/A	N/A	22.1
OS BH-3	Metric	ASB	07/26/91	2108.7	495.1	3607.04	55.0	N/A	N/A	N/A	10.2
OS BH-4	Metric	ASB	07/29/91	2181.6	386.6	3604.95	31.0	N/A	N/A	N/A	24.4
OS BH-5	Metric	ASB	07/30/91	1992.0	389.5	3611.12	24.8	N/A	N/A	N/A	19.9
OS BH-6	Metric	ASB	07/30/91	1817.5	460.9	3619.15	72.6	N/A	N/A	N/A	ND
OS BH-7	Metric	ASB	07/31/91	1827.6	505.7	3616.69	40.3	N/A	N/A	N/A	22.0
OS BH-8	Metric	ASB	07/31/91	1671.9	460.8	3620.04	49.9	N/A	N/A	N/A	33.9
OS BH-9	Metric	ASB	08/01/91	1891.6	467.2	3614.77	49.7	N/A	N/A	N/A	31.0
BH-10	Metric	ASB	11/15/91	NA	NA	3617.33	37.8	N/A	N/A	N/A	27.8
BH-11	Metric	ASB	11/15/91	NA	NA	3617.60	37.8	N/A	N/A	N/A	28.9
MW-1	Hall-NUS	MW/RW	7/21/92	NA	NA	NA	68	4	28-68	25.2	NA
MW-1B	B&R	MW/RW	04/21/93	NA	NA	95.18	65.5	2	55-65	53	34.5
MW-2	B&R	MW/RW	04/21/93	NA	NA	96.98	65.0	2	55-65	53	30
MW-3	B&R	MW	04/26/93	NA	NA	100.10	72.5	2	60-70	58	32

[1] HLA = Harding Lawson Associates, 1991
Metric = Metric Corporation, 1991
Hall-NUS = Halliburton-NUS, 1992
B&R = Brown & Root Environmental, 1993

[2] ASB = Abandoned soil boring
MW = Monitor well
RW = Product recovery well

[3] Depth below ground surface (feet) to uppermost clay reported on boring log

bgs = Below ground surface
NA = Not available
N/A = Not applicable
ND = Not detected

Table 3-1. Summary of Previous Soil Borings and Monitor Wells
Roswell Compressor Station No. 9
Page 3 of 3

Boring No.	Source[1]	Boring Type[2]	Date of Completion	Location North	Location East	Ground Surface Elevation	Total Depth (feet bgs)	Casing Diameter (inches)	Screened Interval (feet bgs)	Top of Sand Pack (feet bgs)	Top of Upper Clay[3] (feet bgs)
MW-5	B&R	MW	04/28/93	NA	NA	97.98	70	2	60-70	58	19.5
SB-1A	B&R	ASB	04/20/93	NA	NA	98.7	41.5	N/A	N/A	N/A	ND
SB-1C	B&R	ASB	04/29/93	NA	NA	91.3	36.0	N/A	N/A	N/A	30
SB-4	B&R	ASB	04/25/93	NA	NA	90.0	75	N/A	N/A	N/A	18
RB-1	B&R	ASB	6/13/93	1914	222	98.44	36.3	N/A	N/A	N/A	36.0
RB-2	B&R	ASB	6/12/93	1962	254	96.33	34.5	N/A	N/A	N/A	34.30
RB-3	B&R	ASB	6/12/93	1953	220	97.98	42	N/A	N/A	N/A	41.25
RB-4	B&R	ASB	6/13/93	1943	175	99.63	39	N/A	N/A	N/A	37.75
RB-5	B&R	ASB	6/13/93	2027	213	93.83	32	N/A	N/A	N/A	31.50
RB-6	B&R	ASB	NA	1989	206	98.58	38.5	N/A	N/A	N/A	38.5
RW-1 (RB-7)	B&R	RW	6/13/93	1987	222	97.54	42.5	4	36.8-41.7	34.8	41.5

[1] HLA = Harding Lawson Associates, 1991
Metric = Metric Corporation, 1991
Hall-NUS = Halliburton-NUS, 1992
B&R = Brown & Root Environmental, 1993

[2] ASB = Abandoned soil boring
MW = Monitor well
RW = Product recovery well

[3] Depth below ground surface (feet) to uppermost clay reported on boring log

bgs = Below ground surface
NA = Not available
N/A = Not applicable
ND = Not detected

Table 3-2. Summary of Organic Compounds Detected in Soil Samples
Roswell Compressor Station No. 9
Page 1 of 6

Sample ID	Source[2]	Concentration[1]													
		1,1,1-TCA	1,1-DCA	Acetone	Chloro-benzene	Chloro-form	PCA	PCE	Freon-113	Methylene chloride	Benzene	Toluene	Ethyl-benzene	Total Xylenes	TPH (mg/kg)
SB9-6 @ 8-11'	HLA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<20
SB9-6 @ 18-20'	HLA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<20
SB9-6 @ 20-23'	HLA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	120
SB9-6 @ 26-28'	HLA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<20
SB9-6 @ 26-28' Tube #5	HLA	<5	ND	<10	<5	ND	<5	ND	6	16	ND	ND	<5	<5	<20
SB9-6 @ 26-28' Tube #6	HLA	<7	ND	<14	<7	ND	<7	ND	23*	9*	ND	ND	<7	<7	<20
SB9-7 @ 9-12'	HLA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	1100
SB9-7 @ 21.5-24'	HLA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	2000
SB9-7 @ 25.5-28'	HLA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	2500
SB9-7 @ 29-32'	HLA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	11000
SB9-7 @ 29-32' Tube #7	HLA	<1300	ND	<2600	<1300	ND	<1300	ND	5100	<1300	ND	ND	720	1800	5000
SB9-7 @ 35-37'	HLA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	4600
SB9-7 @ 35-37' Tube #8	HLA	<640	ND	<1300	<640	ND	<640	ND	<640	<640	ND	ND	1800	4200	13000
SB9-7 @ 35-37' Tube #9	HLA	2000	ND	<1300	<670	ND	2100	ND	<670	<670	ND	ND	2800	6500	30000
P9-OS-349 @ 5'	HLA	<5	ND	<11	<5	ND	<5	ND	26*	6*	ND	ND	<5	<5	<20
P9-OS-349 @ 10'	HLA	<6	ND	<11	<6	ND	<6	ND	18	9	ND	ND	<6	<6	100
P9-OS-349 @ 20'	HLA	<5	ND	<11	<5	ND	<5	ND	45*	<5*	ND	ND	<5	<5	<20
P9-OS-349 @ 25'	HLA	<5	ND	<11	<5	ND	<5	ND	21	10	ND	ND	<5	<5	100

[1] Concentrations are in µg/kg unless otherwise noted

[2] HLA = Harding Lawson Associates (1991a)
Metric = Metric Corporation (1991)
B&R = Brown and Root Environmental (1993)
Note: All HLA analyses performed in on-site mobile laboratory

1,1,1-TCA = 1,1,1-Trichloroethane
1,1-DCA = 1,1-Dichloroethane
PCA = Tetrachloroethane
PCE = Tetrachloroethene
Freon-113 = 1,1,2-Trichloro-1,2,2-trifluoroethane
TPH = Total petroleum hydrocarbons

NA = Not analyzed
ND = Not detected
* = Compound was also detected in the QC blanks

Table 3-2. Summary of Organic Compounds Detected in Soil Samples
Roswell Compressor Station No. 9

Sample ID	Source[2]	Concentration[1]													
		1,1,1-TCA	1,1-DCA	Acetone	Chloro-benzene	Chloro-form	PCA	PCE	Freon-113	Methylene chloride	Benzene	Toluene	Ethyl-benzene	Total Xylenes	TPH (mg/kg)
P9-OS-349 @ 30'	HLA	<7	ND	<14	<7	ND	<7	ND	45*	<7	ND	ND	<7	<7	<20
P9-OS-349 @ 35'	HLA	<7	ND	<14	<7	ND	<7	ND	39	15	ND	ND	<7	<7	<20
P9-OS-349 @ 40'	HLA	<5	ND	<10	<5	ND	<5	ND	40	8	ND	ND	<5	<5	<20
P9-OS-377 @ 5'	HLA	<6	ND	34*	<6	ND	<6	ND	<6	<6	ND	ND	<6	<6	200
P9-OS-377 @ 10'	HLA	<6	ND	27*	<6	ND	<6	ND	<6	<6	ND	ND	<6	<6	<20
P9-OS-377 @ 15'	HLA	<6	ND	27*	<6	ND	<6	ND	<6	11	ND	ND	<6	<6	<20
P9-OS-377 @ 20'	HLA	<7	ND	37*	<7	ND	<7	ND	<7	7	ND	ND	<7	<7	<20
P9-OS-377 @ 25'	HLA	<6	ND	<12	<6	ND	<6	ND	46	36	ND	ND	<6	<6	<20
P9-OS-377 @ 30'	HLA	<7	ND	<13	<7	ND	<7	ND	69	23	ND	ND	<7	<7	<20
Pit 1 @ 2.8-3.0'	Metric	3200	ND	NA	ND	ND	ND	ND	NA	ND	NA	NA	NA	NA	25000
Pit 1 @ 9.2-9.4'	Metric	19000	ND	NA	ND	ND	ND	260	NA	ND	NA	NA	NA	NA	39000
Pit 1 @ 13.5-13.7'	Metric	18000	590	NA	ND	200	ND	330	NA	ND	NA	NA	NA	NA	55000
Pit 1 @ 18.8-19.0'	Metric	330	ND	NA	ND	ND	ND	870	NA	ND	NA	NA	NA	NA	20000
Pit 1 @ 26.8-27.0'	Metric	ND	ND	NA	ND	ND	ND	160	NA	ND	NA	NA	NA	NA	11000
Pit 1 @ 30.6-30.8'	Metric	ND	ND	NA	ND	ND	ND	ND	NA	ND	NA	NA	NA	NA	16
Pit 1 @ 41.6-41.8'	Metric	ND	ND	NA	ND	ND	ND	ND	NA	ND	ND	ND	ND	ND	16
Pit 1 @ 43.5-43.7'	Metric	ND	ND	NA	ND	ND	ND	ND	NA	ND	ND	ND	ND	ND	56

[1] Concentrations are in µg/kg unless otherwise noted

[2] HLA = Harding Lawson Associates (1991a)
Metric = Metric Corporation (1991)
B&R = Brown and Root Environmental (1993)
Note: All HLA analyses performed in on-site mobile laboratory

1,1,1-TCA = 1,1,1-Trichloroethane
1,1-DCA = 1,1-Dichloroethane
PCA = Tetrachloroethane
PCE = Tetrachloroethene
Freon-113 = 1,1,2-Trichloro-1,2,2-trifluoroethane
TPH = Total petroleum hydrocarbons

NA = Not analyzed
ND = Not detected
* = Compound was also detected in the QC blanks

Table 3-2. Summary of Organic Compounds Detected in Soil Samples
Roswell Compressor Station No. 9
Page 3 of 6

Sample ID	Source[2]	Concentration[1]													
		1,1,1-TCA	1,1-DCA	Acetone	Chloro-benzene	Chloro-form	PCA	PCE	Freon-113	Methylene chloride	Benzene	Toluene	Ethyl-benzene	Total Xylenes	TPH (mg/kg)
Pit 2 #1 @ 18.7-18.9'	Metric	ND	ND	NA	ND	ND	ND	ND	NA	ND	NA	NA	NA	NA	ND
Pit 2 #2 @ 18.7-18.9'	Metric	370	ND	NA	ND	ND	ND	650	NA	ND	NA	NA	NA	NA	13000
Pit 2 @ 26.0-26.2'	Metric	ND	ND	NA	ND	ND	ND	ND	NA	ND	NA	NA	NA	NA	170
Pit 2 @ 29.1-29.3'	Metric	ND	ND	NA	ND	ND	ND	ND	NA	ND	NA	NA	NA	NA	ND
Pit 2 @ 39.8-39.9'	Metric	ND	ND	NA	ND	ND	ND	ND	NA	ND	NA	NA	NA	NA	2600
Pit 2 @ 44.1-44.3'	Metric	ND	ND	NA	ND	ND	ND	ND	NA	ND	ND	ND	ND	ND	44
Pit 2 @ 57.5-57.8'	Metric	ND	ND	NA	ND	ND	ND	ND	NA	ND	NA	NA	NA	NA	250
Pit 2 @ 69.9-70.1'	Metric	ND	ND	NA	ND	ND	ND	ND	NA	ND	ND	ND	ND	ND	ND
Pit 3 BH-1 @ 30.7-30.9'	Metric	ND	ND	NA	ND	ND	ND	ND	NA	ND	ND	ND	ND	ND	ND
Pit 3 BH-2 @ 25.0-25.2'	Metric	ND	ND	NA	ND	ND	ND	ND	NA	ND	ND	ND	ND	ND	ND
SG 86 @ 13.5-13.7'	Metric	240	ND	NA	ND	ND	ND	1900	NA	ND	NA	NA	NA	NA	18000
SG 86 @ 18.7-18.9'	Metric	ND	ND	NA	ND	ND	ND	230	NA	ND	NA	NA	NA	NA	5200
SG 86 @ 24.9-25.1'	Metric	ND	ND	NA	ND	ND	ND	ND	NA	ND	NA	NA	NA	NA	ND
SG 86 @ 35.0-35.2'	Metric	ND	ND	NA	ND	ND	ND	ND	NA	ND	NA	NA	NA	NA	8.0
SG 86 @ 40.5-40.7'	Metric	ND	ND	NA	ND	ND	ND	ND	NA	ND	ND	ND	ND	ND	ND
SG 91 @ 28.6-28.8'	Metric	ND	ND	NA	ND	ND	ND	ND	NA	ND	ND	ND	ND	ND	ND
SG 349 @ 0.0-1.8'	Metric	ND	ND	NA	ND	ND	ND	ND	NA	ND	NA	NA	NA	NA	ND
SG 349 @ 2.9-4.6'	Metric	ND	ND	NA	ND	ND	ND	ND	NA	ND	NA	NA	NA	NA	ND

[1] Concentrations are in µg/kg unless otherwise noted

[2] HLA = Harding Lawson Associates (1991a)
Metric = Metric Corporation (1991)
B&R = Brown and Root Environmental (1993)
Note: All HLA analyses performed in on-site mobile laboratory

1,1,1-TCA = 1,1,1-Trichloroethane
1,1-DCA = 1,1-Dichloroethane
PCA = Tetrachloroethane
PCE = Tetrachloroethene
Freon-113 = 1,1,2-Trichloro-1,2,2-trifluoroethane
TPH = Total petroleum hydrocarbons

NA = Not analyzed
ND = Not detected
* = Compound was also detected in the QC blanks

Table 3-2. Summary of Organic Compounds Detected in Soil Samples
Roswell Compressor Station No. 9

Sample ID	Source[2]	Concentration[1]													
		1,1,1-TCA	1,1-DCA	Acetone	Chloro-benzene	Chloro-form	PCA	PCE	Freon-113	Methylene chloride	Benzene	Toluene	Ethyl-benzene	Total Xylenes	TPH (mg/kg)
SG 349 @ 9.0-10.0'	Metric	ND	ND	NA	ND	ND	ND	ND	NA	ND	NA	NA	NA	NA	ND
SG 349 @ 14.0-14.8'	Metric	ND	ND	NA	ND	ND	ND	ND	NA	ND	NA	NA	NA	NA	ND
SG 349 @ 20.3-21.3'	Metric	ND	ND	NA	ND	ND	ND	ND	NA	ND	NA	NA	NA	NA	ND
SG 349 @ 5.3-26.3'	Metric	ND	ND	NA	ND	ND	ND	ND	NA	ND	NA	NA	NA	NA	ND
SG 349 @ 29.7-30.4'	Metric	ND	ND	NA	ND	ND	ND	ND	NA	ND	ND	ND	ND	ND	ND
SG 360 @ 0.0-2.5'	Metric	ND	ND	NA	ND	ND	ND	ND	NA	ND	NA	NA	NA	NA	ND
SG 360 @ 4.0-5.0'	Metric	ND	ND	NA	ND	ND	ND	ND	NA	ND	NA	NA	NA	NA	ND
SG 360 @ 9.0-9.9'	Metric	ND	ND	NA	ND	ND	ND	ND	NA	ND	NA	NA	NA	NA	ND
SG 360 @ 14.0-14.7'	Metric	ND	ND	NA	ND	ND	ND	ND	NA	ND	NA	NA	NA	NA	ND
SG 360 @ 19.0-20.0'	Metric	ND	ND	NA	ND	ND	ND	ND	NA	ND	NA	NA	NA	NA	ND
SG 360 @ 24.0-25.0'	Metric	ND	ND	NA	ND	ND	ND	ND	NA	ND	NA	NA	NA	NA	ND
SG 360 @ 29.0-29.4'	Metric	ND	ND	NA	ND	ND	ND	ND	NA	ND	NA	NA	NA	NA	2.0
SG 361 @ 0.0-2.5'	Metric	ND	ND	NA	ND	ND	ND	ND	NA	ND	NA	NA	NA	NA	ND
SG 361 @ 4.0-5.0'	Metric	ND	ND	NA	ND	ND	ND	ND	NA	ND	NA	NA	NA	NA	ND
SG 361 @ 9.0-10.0'	Metric	ND	ND	NA	ND	ND	ND	ND	NA	ND	NA	NA	NA	NA	ND
SG 361 @ 16.0-16.4'	Metric	ND	ND	NA	ND	ND	ND	ND	NA	ND	NA	NA	NA	NA	ND
SG 361 @ 19.5-19.8'	Metric	ND	ND	NA	ND	ND	ND	ND	NA	ND	NA	NA	NA	NA	ND
SG 361 @ 24.0-25.0'	Metric	ND	ND	NA	ND	ND	ND	ND	NA	ND	NA	NA	NA	NA	ND

[1] Concentrations are in µg/kg unless otherwise noted

[2] HLA = Harding Lawson Associates (1991a)
Metric = Metric Corporation (1991)
B&R = Brown and Root Environmental (1993)
Note: All HLA analyses performed in on-site mobile laboratory

1,1,1-TCA = 1,1,1-Trichloroethane
1,1-DCA = 1,1-Dichloroethane
PCA = Tetrachloroethane
PCE = Tetrachloroethene
Freon-113 = 1,1,2-Trichloro-1,2,2-trifluoroethane
TPH = Total petroleum hydrocarbons

NA = Not analyzed
ND = Not detected
* = Compound was also detected in the QC blanks

Table 3-2. Summary of Organic Compounds Detected in Soil Samples
Roswell Compressor Station No. 9

Sample ID	Source[2]	Concentration[1]													
		1,1,1-TCA	1,1-DCA	Acetone	Chloro-benzene	Chloro-form	PCA	PCE	Freon-113	Methylene chloride	Benzene	Toluene	Ethyl-benzene	Total Xylenes	TPH (mg/kg)
SG 361 @ 38.0-39.3'	Metric	ND	ND	NA	ND	ND	ND	ND	NA	ND	NA	NA	NA	NA	ND
OS BH-1 @ 18.9-19.1'	Metric	ND	ND	NA	ND	ND	ND	ND	NA	ND	NA	NA	NA	NA	12
OS BH-1 @ 34.3-34.5'	Metric	ND	ND	NA	ND	ND	ND	ND	NA	ND	NA	NA	NA	NA	ND
OS BH-2 @ 9.9-10.1'	Metric	ND	ND	NA	ND	ND	ND	ND	NA	ND	NA	NA	NA	NA	ND
OS BH-2 @ 22.5-22.6'	Metric	ND	ND	NA	ND	ND	ND	ND	NA	ND	NA	NA	NA	NA	ND
OS BH-2 @ 31.1-31.3'	Metric	ND	ND	NA	ND	ND	ND	ND	NA	ND	NA	NA	NA	NA	68
OS BH-2 @ 41.8-42.0'	Metric	ND	ND	NA	ND	ND	ND	ND	NA	ND	NA	NA	NA	NA	24
OS BH-2 @ 55.2-55.4'	Metric	ND	ND	NA	ND	ND	ND	ND	NA	ND	NA	NA	NA	NA	16
OS BH-2 @ 69.0-69.2'	Metric	ND	ND	NA	ND	ND	ND	ND	NA	ND	NA	NA	NA	NA	16
OS BH-3 @ 21.0-21.2'	Metric	ND	ND	NA	ND	ND	ND	ND	NA	ND	ND	ND	ND	ND	ND
OS BH-3 @ 44.1-44.3'	Metric	ND	ND	NA	ND	ND	ND	ND	NA	ND	NA	NA	NA	NA	16
OS BH-3 @ 54.7-55.0'	Metric	ND	ND	NA	ND	ND	ND	ND	NA	ND	ND	ND	ND	ND	16
OS BH-4 @ 27.5-27.7'	Metric	ND	ND	NA	ND	ND	ND	ND	NA	ND	ND	ND	ND	ND	ND
OS BH-5 @ 14.0-14.2'	Metric	ND	ND	NA	ND	ND	ND	ND	NA	ND	NA	NA	NA	NA	ND
OS BH-5 @ 19.6-19.9'	Metric	ND	ND	NA	ND	ND	ND	ND	NA	ND	NA	NA	NA	NA	16
OS BH-5 @ 23.4-23.6'	Metric	ND	ND	NA	ND	ND	ND	ND	NA	ND	ND	ND	ND	ND	12
OS BH-6 @ 13.6-13.8'	Metric	ND	ND	NA	ND	ND	ND	ND	NA	ND	NA	NA	NA	NA	12
OS BH-6 @ 47.0-47.2'	Metric	ND	ND	NA	ND	ND	ND	ND	NA	ND	NA	NA	NA	NA	ND

[1] Concentrations are in µg/kg unless otherwise noted

[2] HLA = Harding Lawson Associates (1991a)
Metric = Metric Corporation (1991)
B&R = Brown and Root Environmental (1993)
Note: All HLA analyses performed in on-site mobile laboratory

1,1,1-TCA = 1,1,1-Trichloroethane
1,1-DCA = 1,1-Dichloroethane
PCA = Tetrachloroethane
PCE = Tetrachloroethene
Freon-113 = 1,1,2-Trichloro-1,2,2-trifluoroethane
TPH = Total petroleum hydrocarbons

NA = Not analyzed
ND = Not detected
* = Compound was also detected in the QC blanks

Table 3-2. Summary of Organic Compounds Detected in Soil Samples
Roswell Compressor Station No. 9
Page 6 of 6

Sample ID	Source[2]	Concentration[1]													
		1,1,1-TCA	1,1-DCA	Acetone	Chloro-benzene	Chloro-form	PCA	PCE	Freon-113	Methylene chloride	Benzene	Toluene	Ethyl-benzene	Total Xylenes	TPH (mg/kg)
OS BH-6 @ 52.6-52.8'	Metric	ND	ND	NA	ND	ND	ND	ND	NA	ND	NA	NA	NA	NA	ND
OS BH-6 @ 70.0-71.0'	Metric	ND	ND	NA	ND	ND	ND	ND	NA	ND	ND	ND	ND	ND	ND
OS BH-7 @ 22.1-22.3'	Metric	ND	ND	NA	ND	ND	ND	ND	NA	ND	ND	ND	ND	ND	ND
OS BH-7 @ 33.5-33.7'	Metric	ND	ND	NA	ND	ND	ND	ND	NA	ND	NA	NA	NA	NA	ND
OS BH-7 @ 37.0-37.2'	Metric	ND	ND	NA	ND	ND	ND	170	NA	ND	ND	ND	190	440	12
OS BH-8 @ 4.6-4.9'	Metric	ND	ND	NA	ND	ND	ND	ND	NA	ND	NA	NA	NA	NA	12
OS BH-8 @ 33.9-34.1'	Metric	ND	ND	NA	120	ND	ND	160	NA	ND	NA	NA	NA	NA	ND
OS BH-8 @ 49.7-49.9'	Metric	ND	ND	NA	ND	ND	ND	ND	NA	ND	ND	ND	140	300	12
OS BH-9 @ 4.5-4.9'	Metric	ND	ND	NA	ND	ND	ND	ND	NA	ND	NA	NA	NA	NA	8
OS BH-9 @ 32.0-32.5'	Metric	ND	ND	NA	ND	ND	ND	ND	NA	ND	NA	NA	NA	NA	150
OS BH-9 @ 49.5-49.7'	Metric	ND	ND	NA	ND	ND	ND	ND	NA	ND	ND	ND	ND	ND	8
BH-10 @ 37.3-37.6'	Metric	NA	NA	NA	ND	NA	NA	NA	NA	NA	ND	ND	ND	ND	ND
BH-11 @ 36.3-36.7'	Metric	NA	NA	NA	ND	NA	NA	NA	NA	NA	ND	ND	ND	ND	8
SB-1C @ 25-26'	B&R	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<20
SB-5 @ 19-21'	B&R	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<20
SB-5 @ 64-66'	B&R	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<20

[1] Concentrations are in µg/kg unless otherwise noted

[2] HLA = Harding Lawson Associates (1991a)
Metric = Metric Corporation (1991)
B&R = Brown and Root Environmental (1993)
Note: All HLA analyses performed in on-site mobile laboratory

1,1,1-TCA = 1,1,1-Trichloroethane
1,1-DCA = 1,1-Dichloroethane
PCA = Tetrachloroethane
PCE = Tetrachloroethene
Freon-113 = 1,1,2-Trichloro-1,2,2-trifluoroethane
TPH = Total petroleum hydrocarbons

NA = Not analyzed
ND = Not detected
* = *Compound was also detected in the QC blanks*

Table 3-3. Summary of TCLP Inorganic Constituents Detected in Soil Samples
Roswell Compressor Station No. 9

Sample ID	Source[1]	Concentration (mg/L)							
		Arsenic (TCLP Extract)	Barium (TCLP Extract)	Cadmium (TCLP Extract)	Chromium (TCLP Extract)	Lead (TCLP Extract)	Mercury (TCLP Extract)	Selenium (TCLP Extract)	Silver (TCLP Extract)
TCLP Limit	---	***5.0***	***100.0***	***1.0***	***5.0***	***5.0***	***0.2***	***1.0***	***5.0***
SB9-6 @ 8-11'	HLA	0.004	0.63	0.0010	<0.006	<0.002	<0.0002	<0.003	<0.0005
SB9-6 @ 18-20'	HLA	<0.003	1.21	<0.0005	<0.006	<0.002	<0.0002	<0.003	<0.0005
SB9-6 @ 20-23'	HLA	<0.003	0.7	<0.0005	0.011	<0.002	<0.0002	<0.003	0.0026
SB9-6 @ 26-28'	HLA	<0.003	1.22	0.0006	0.006	0.008	<0.0002	<0.003	<0.0005
SB9-6 @ 26-28' Tube #5	HLA	<0.003	1.3	0.0012	0.007	0.002	<0.0002	<0.003	<0.0005
SB9-6 @ 26-28' Tube #6	HLA	0.009	0.010	0.0008	0.011	<0.002	<0.0002	<0.003	<0.0005
SB9-7 @ 9-12'	HLA	<0.003	0.75	0.0005	0.007	0.003	<0.0002	<0.003	<0.0005
SB9-7 @ 21.5-24'	HLA	0.004	2.22	0.0010	<0.006	<0.002	<0.0002	<0.003	<0.0005
SB9-7 @ 25.5-28'	HLA	<0.003	1.81	<0.0005	0.009	<0.002	<0.0002	<0.003	<0.0005
SB9-7 @ 29-32'	HLA	0.008	3.59	0.0011	0.009	<0.002	<0.0002	<0.003	<0.0005
SB9-7 @ 29-32' Tube #7	HLA	0.008	1.81	0.0012	0.006	<0.002	<0.0002	<0.003	<0.0005
SB9-7 @ 35-37'	HLA	0.008	1.72	0.0007	0.007	<0.002	<0.0002	<0.003	<0.0005
SB9-7 @ 35-37' Tube #8	HLA	0.005	1.84	0.0006	<0.006	<0.002	<0.0002	<0.003	<0.0005
SB9-7 @ 35-37' Tube #9	HLA	0.004	3.12	0.0006	0.01	<0.002	<0.0002	<0.003	<0.0005
P9-OS-349 @ 5'	HLA	0.007	1.21	0.0009	0.012	0.012	<0.0002	<0.003	<0.0006
P9-OS-349 @ 10'	HLA	0.005	0.4	<0.0006	0.013	0.011	<0.0002	<0.01	<0.0006
P9-OS-349 @ 20'	HLA	<0.003	0.77	<0.0006	0.009	0.004	<0.0002	<0.003	<0.0006

[1] HLA = Harding Lawson Associates (1991a)

**Table 3-3. Summary of TCLP Inorganic Constituents Detected in Soil Samples
Roswell Compressor Station No. 9
Page 2 of 2**

Sample ID	Source[1]	Concentration (mg/L)							
		Arsenic (TCLP Extract)	Barium (TCLP Extract)	Cadmium (TCLP Extract)	Chromium (TCLP Extract)	Lead (TCLP Extract)	Mercury (TCLP Extract)	Selenium (TCLP Extract)	Silver (TCLP Extract)
TCLP Limit	---	*5.0*	*100.0*	*1.0*	*5.0*	*5.0*	*0.2*	*1.0*	*5.0*
P9-OS-349 @ 30'	HLA	<0.003	1.48	<0.0006	0.009	0.007	<0.0002	<0.003	<0.0006
P9-OS-349 @ 35'	HLA	<0.003	1.36	<0.0006	0.011	0.005	<0.0002	<0.003	<0.0006
P9-OS-349 @ 40'	HLA	0.005	0.23	0.0013	<0.007	<0.002	<0.0002	<0.003	<0.0006
P9-OS-377 @ 5'	HLA	0.004	1.05	<0.0006	0.009	0.003	<0.0002	<0.003	<0.0006
P9-OS-377 @ 10'	HLA	0.01	0.19	0.0018	0.007	0.004	<0.0002	<0.01	<0.0006
P9-OS-377 @ 15'	HLA	<0.003	0.15	0.003	0.011	0.009	<0.0002	<0.003	<0.0006
P9-OS-377 @ 20'	HLA	0.003	0.16	0.0010	0.011	0.003	<0.0002	<0.01	<0.0006
P9-OS-377 @ 25'	HLA	0.006	0.06	0.0009	<0.007	<0.002	<0.0002	<0.02	<0.0006
P9-OS-377 @ 30'	HLA	0.011	0.32	<0.0006	<0.007	<0.002	<0.0002	<0.003	<0.0006

[1] HLA = Harding Lawson Associates (1991a)

Table 3-4. Summary of Organic Compounds Detected in Ground-Water Samples Roswell Compressor Station No. 9

Sample ID	Source[2]	Concentration[1]											
		Benzene	Toluene	Ethyl-benzene	o-Xylene	p-Xylene, m-Xylene	1,1,1-TCA	1,1-DCA	2-Butanone (MEK)	2-Methyl-naphthalene	4-Methyl-phenol	Naphthalene	Petroleum Hydrocarbons (mg/L)
MW-1	HB	370	61	110	120	820	180	560	220	51	250	34	37
MW-2	B&R	6,500	15,000	2,100	13,000[3]		<300	<300	NA	NA	NA	NA	NA
MW-3	B&R	<5	<5	<5	NA	NA	<5	<5	NA	NA	NA	NA	<0.2
MW-5	B&R	<5	<5	<5	NA	NA	<5	<5	NA	NA	NA	NA	<0.2

[1] Concentrations are in µg/L unless otherwise noted
[2] HB = Halliburton NUS Environmental Corp. (1992)
B&R = Brown and Root Environmental (1993)
[3] Total xylenes

1,1,1-TCA = 1,1,1-Trichloroethane
1,1-DCA = 1,1-Dichloroethane
MEK = Methyl ethyl ketone

NA = Not analyzed
ND = Not detected

**Table 3-5. Summary of Inorganic Constituents Detected in Ground-Water Samples
Roswell Compressor Station No. 9**

Sample ID	Source[1]	Date	Arsenic T	Arsenic D	Barium T	Barium D	Cadmium T	Cadmium D	Chromium T	Chromium D	Lead T	Lead D	Mercury T	Mercury D	Selenium T	Selenium D	Silver T	Silver D	TDS
			Concentration (mg/L)																
MW-1	HB	09/21/92	0.19	NA	4.4	NA	<0.005	NA	0.01	NA	<0.05	NA	<0.0002	NA	<0.003	NA	<0.01	NA	NA
MW-3	B&R	04/30/93	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	3,400
	CES	03/23/94	<0.03	<0.03	0.09	0.02	<0.01	<0.01	<0.01	<0.01	0.04	<0.03	<0.0002	<0.0002	<0.04	<0.04	<0.01	<0.01	NA
MW-5	B&R	04/30/93	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	3,800
	CES	03/23/94	<0.03	<0.03	0.38	0.01	<0.01	<0.01	0.03	<0.01	0.04	<0.03	<0.0002	<0.0002	<0.04	<0.04	<0.01	<0.01	NA

[1] HB = Halliburton NUS Environmental Corp. (1992)
B&R = Brown and Root Environmental (1993)
CES = Cypress Environmental Services (1994)

TDS = Total dissolved solids
T = Total metals concentrations determined on unfiltered samples
D = Dissolved metals concentrations determined on samples filtered in the laboratory prior to analysis
NA = Not analyzed

Table 5-1. Data Quality Objectives

Method[1]	Spiking Compounds/Surrogates	Precision Objective (RPD)[2]	Accuracy Objective (%R)[3]	Completeness Objective (%)
8010/8020	Benzene	20	80 to 120	90
	Toluene	20	80 to 120	90
	Chloroform	20	80 to 120	90
	Chlorobenzene	20	80 to 120	90
	Xylenes	20	80 to 120	90
	1,1,1-Trichloroethane	20	80 to 120	90
	1,1-Dichloroethene	20	80 to 120	90
	Trichloroethene	20	80 to 120	90
	Tetrachloroethene	20	80 to 120	90
	Bromodichloromethane	20	80 to 120	90
418.1	Total petroleum hydrocarbons	20	80 to 120	90

[1] U.S. EPA, 1986.
[2] Relative percent difference between matrix spike and matrix spike duplicate.
[3] Percent recovery of matrix spike.

Table 5-2. EPA Method 8010/8020 Detection Limits for Aqueous Samples

Compounds	Detection Limit in Water (µg/L)	Compounds	Detection Limit in Water (µg/L)
EPA Method 8010 Constituents			
Bromodichloromethane	0.2	1,2-Dichloroethene (total)	0.2
Bromoform	0.2	1,2-Dichloropropane	0.2
Bromomethane	0.2	cis-1,3-Dichloropropene	0.2
Carbon tetrachloride	0.2	trans-1,3-Dichloropropene	0.2
Chloroethane	0.2	Methylene chloride	2.0
Chloroform	0.2	1,1,2,2-Tetrachloroethane	0.2
Chloromethane	0.2	Tetrachloroethene	0.2
2-Chloroethyl vinyl ether	0.5	1,1,1-Trichloroethane	0.2
Dibromochloromethane	0.2	1,1,2-Trichloroethane	0.2
Dichlorodifluoromethane	0.2	Trichloroethene	0.2
1,1-Dichloroethane	0.2	Trichlorofluoromethane	0.5
1,2-Dichloroethane	0.2	Trichlorotrifluoroethane	2.0
1,1-Dichloroethene	0.2	Vinyl chloride	0.2
EPA Method 8020 Constituents			
Benzene	0.5	Ethylbenzene	0.5
Chlorobenzene	0.5	Toluene	0.5
1,3-Dichlorobenzene	0.5	Xylenes (total)	0.5
1,2 & 1,4-Dichlorobenzene	0.5		

Table 5-3. Sample Collection Protocol

Analyte	EPA Method	Sample Volume/Container	Sample Preservation	Holding Time
Soil Matrix				
VOCs	8010/8020	2.5" x 6" brass ring	Chill to 4°C	14 days
TPH (gasoline)	418.1	2.5" x 6" brass ring	Chill to 4°C	14 days
Ground-Water Matrix				
VOCs	8010/8020	Three 40-mL septum vials	HCl to pH<2; chill to 4°C	14 days
TPH (gasoline)	418.1	Two 40-mL septum vials	HCl to pH<2; chill to 4°C	14 days
Calcium (total)	3010/6010	1-Liter plastic	HNO_3 to pH<2	6 months
Magnesium (total)	3010/6010	1-Liter plastic	HNO_3 to pH<2	6 months
Sodium (total)	3010/6010	1-Liter plastic	HNO_3 to pH<2	6 months
Potassium (total)	3010/6010	1-Liter plastic	HNO_3 to pH<2	6 months
Iron (total)	3010/6010	1-Liter plastic	HNO_3 to pH<2	6 months
Manganese (total)	3010/6010	1-Liter plastic	HNO_3 to pH<2	6 months
Bicarbonate (total)	310.1	500-mL plastic	Chill to 4°C	14 days
Chloride (total)	300.1	500-mL plastic	Chill to 4°C	28 days
Nitrate (total)	300.1	500-mL plastic	H_2SO_4 to pH<2; chill to 4°C	28 days
Sulfate (total)	300.1	500-mL plastic	Chill to 4°C	28 days

Note: All laboratory analyses to be performed on unfiltered ground-water samples.

Table 7-1. Proposed Cleanup Criteria for Organic Compounds in Soil

Compound	RCRA Corrective Action Proposed Rule for Soils (mg/kg)[a]	New Mexico Oil Conservation Division Cleanup Criteria for Soils (mg/kg)[b]	TNRCC Risk Reduction Standard for Soils[c] (mg/kg)
Benzene	NS	10[d]	NA
Toluene	20,000	NS	NA
Ethylbenzene	8,000	NS	NA
Xylenes (total)	200,000	NS	NA
Total BTEX	NS	50[d]	NA
Chlorobenzene	2,000	NS	NA
1,1-DCA	NS	NS	20,400
1,2-DCA (EDC)	8	NS	NA
1,1-DCE	10	NS	NA
cis 1,2-DCE	NS	NS	108
trans 1,2-DCE	NS	NS	256
Methylene Chloride	90	NS	NA
1,1,1-TCA	7,000	NS	NA
TCE	60	NS	NA
PCE	10	NS	NA
1,1,1,2-PCA	300	NS	NA
1,1,2,2-PCA	40	NS	NA
TPH	NS	5000[e]	NA

NA = Not applicable
NS = No standard

[a] RCRA Corrective Action Proposed Rule cleanup standards for soil, Federal Register July 27, 1990.
[b] New Mexico Oil Conservation Division (OCD) Unlined Surface Impoundment Closure Guidelines, February 1993.
[c] Texas Natural Resources Conservation Commission (TNRCC) Risk Reduction Rule soil cleanup standard for non-residential land use, based on air emissions, human ingestion, and inhalation.
[d] A field soil vapor headspace measurement of 100 ppm may be substituted for a laboratory analysis of the benzene and total BTEX concentrations limits.
[e] TPH remediation level based on OCD ranking system, assuming depth to regional bedrock aquifer is greater than 100 feet, distance to nearest water source greater than 1000 feet, distance to nearest domestic well is greater than 200 feet, and distance to nearest surface water body is greater than 1000 feet.

DANIEL B. STEPHENS & ASSOCIATES, INC.
ENVIRONMENTAL SCIENTISTS AND ENGINEERS

CLOSURE PLAN FOR ROSWELL COMPRESSOR STATION SURFACE IMPOUNDMENTS VOLUME II: Appendices

Prepared for
ENRON Environmental Affairs
Houston, Texas

May 31, 1994

6020 ACADEMY NE • SUITE 100 • ALBUQUERQUE, NM 87109 • (505) 822-9400

APPENDIX A

NMED NOTICE OF DEFICIENCY

ATTACHMENT

TRANSWESTERN PIPELINE COMPANY

NOTICE OF DEFICIENCY

Liquid Waste Impoundment Closure Plan

MARCH 7, 1994

Introduction:

The following is a list of the required information that Transwestern Pipeline Company (TW) must provide to the New Mexico Environment Department (NMED), Hazardous and Radioactive Materials Bureau (HRMB). Quotes in bold, below, are taken directly from the text submitted by TW, dated June 21, 1993:

I. Closure Plan [HWMR-7, Part VI, 40 CFR, §§265.111 and 112]

a) Provide a comprehensive Closure Plan identifying the steps necessary to perform closure of the Compression Station No. 9 Surface Impoundment (hereafter,facility). Include a description of how final closure of the facility will be conducted.

b) Present a closure schedule for the surface impoundment in question, including at a minimum, the total time required to close the hazardous waste management unit and the time required for intervening closure activities which will allow tracking of the progress of the partial and final closure.

c) (Page 5, Section 5.0,): **"Summary of Interim Corrective Measures"**

Submit a report to HRMB, on a monthly basis, describing the status of the interim corrective measures being implemented by TW. This will enable HRMB to keep track of the progress of the corrective action interim measures.

d) (Page 5, Section 6.0, second paragraph): **"The vertical and lateral extent of contamination in this zone has been clearly defined."**

Provide the documentation evidence necessary to support this statement. The copy of the Brown and Root letter report, enclosed in a September 7, 1993 letter to Mr.

Edward Horst, is insufficient documentation to support this statement.

e) Provide a map similar to Brown and Root's Attachment 1 of May 15, 1993, but with the limits of the recoverable petroleum hydrocarbons clearly established such that the lateral and vertical extent of the contamination plume limits of interest will no longer be termed **"suspect"** as indicated on the TW's Attachment 1 mentioned above. Include an indication of the locations of monitoring wells.

f) (Page 6, Section 7.0, paragraph 4): **"... an inside-out approach will be used to determine boring locations."**

Provide an adequate method to delineate the horizontal and vertical extent of contamination. This is required because the general application of an "inside-out" approach to investigating the contamination, both within the perched aquifer and the uppermost aquifer is acceptable, however, the approach specified in this section is inadequate for delineating the extent of the contamination both vertically and horizontally.

g) Submit a site-specific map indicating the location of the liquid waste impoundment under discussion in relation to the facility site. Include TW's Figure 2 that was mentioned, but not included in the June 21, 1993 report and closure plan.

h) Furnish an estimate of the maximum inventory of hazardous waste that needs to be removed from the contaminated site, including, the methods and steps TW plans to use for removing, transporting, treating, storing or disposing of all hazardous waste of interest.

i) Submit a detailed description of the measures that will be taken to remove or decontaminate all hazardous waste residues and contaminated equipment, containment system, structures, and soils during final closure.

II. <u>Amendment of Plan</u> [HWMR-7, Part VI, 40 CFR, §265.112(c)]

The Closure Plan must contain provisions for possible amendment of the Closure Plan and for notifying the Secretary, NMED at least 60 days prior to the any proposed change(s) in corrective action design or operation, preceded by a 180 day notification to the date on which TW expects to begin closure of the surface impoundment, in accordance with the approved closure plan.

III. <u>Disposal or Decontamination of Equipment, Structures and Soils</u> [HWMR-7, Part VI, 40 CFR, §265.114]

a) Demonstrate how disposal or decontamination of all equipment, soils, and structures will be conducted during partial and final closure periods. Include the anticipated amount of time within which TW plans to submit to the Secretary, NMED, by registered mail, a certification that the hazardous waste management facility has been closed in accordance with specifications in the approved closure plan.

b) (Page 5, Section 6.0, first paragraph): **"Remediation of the shallow perched zone..."**

Explain the "natural clay basin", and the "presumed basin", described in earlier portions of the Closure Plan [Section 4.0, paragraph 3, fourth sentence; and paragraph 4, first sentence]. This is confusing and may lead to misunderstanding in the future.

TW must assign a formal title to the liquid waste impoundment for all subsequent documentation. For purposes of the assessment portion of the Closure Plan, the saturated material within the liquid waste impoundment should henceforth be referred to as the "perched aquifer".

IV. <u>Ground Water monitoring</u> [HWMR-7, Part VI, §265.90-93]

a) Provide a ground-water monitoring program capable of determining the facility's impact on the quality of the ground water in the uppermost aquifer underlying the facility. The ground water monitoring system must be capable of yielding ground water samples for analysis. Also explain how any leachate collection, and run-on and run-off controls will be managed.

b) (Page 6, Section 7.0, paragraph 3): **"Additional investigations and evaluation are required prior to development of a final corrective measures plan for the lower unconfined aquifer."**

The requirements for additional investigations (a ground water quality assessment plan) are outlined and described in HWMR-7, Part VI, 40 CFR, §265.93(d)(4), 265.93(e) and 265.94(b). Additional requirements pertaining to the ground water quality assessment plan may be found in HWMR-7, Part VI, 40 CFR, §265.112(b)(4) and 265.112(b)(5).

For purposes of the assessment portion of the Closure

Plan the "lower unconfined aquifer" will be referred to as the "uppermost aquifer". See HWMR-7, Part I, 40 CFR, §260.10 for the definition of "uppermost aquifer".

c) Provide an acceptable ground water quality assessment plan which should include, at a minimum, the following:

1. A characterization of the uppermost aquifer including flow nets, cross-sections, hydraulic conductivities of the aquifer and any confining units based upon site-specific data (pump or slug test data), and all calculations of hydraulic conductivity based on the data.

2. The hydraulic conditions and potential contaminant pathways;

3. The proposed assessment monitoring system;

4. The investigative approach that will be used to fully characterize the rate, extent and concentrations of hazardous constituents and each investigatory phase involved;

5. The number, location, screen placement and depth of the wells that will initially be installed and the rationale for these decisions;

6. The strategy to be used in subsequent investigatory phases;

7. The chosen method of well drilling, construction and completion,

8. A comprehensive sampling and analysis plan (program) that will be used, including the number of samples to be collected and analyzed;

9. A data collection and data analysis quality assurance/quality control (QA/QC) program

10. The data analysis procedures that will be used to interpret the analytical data; and

11. The schedule of implementation of each phase of the assessment program.

APPENDIX B

CLOSURE PLAN CHECKLIST

CLOSURE PLAN CHECKLIST:

SURFACE IMPOUNDMENTS AT WHICH ALL WASTES ARE REMOVED

EPA I.D. 986676955

CLOSURE PLAN CHECKLIST
SURFACE IMPOUNDMENTS: ALL HAZARDOUS WASTES REMOVED*

SUBJECT REQUIREMENT	PART 264/265	PROVIDED	NOT APPLICABLE	CLOSURE PLAN SECTION
1. FACILITY DESCRIPTION	264.111/265.111			
1.1 General description (e.g., size, location)		X		2.1
1.2 Topographic map		X		Figures 1-1, 2-5
1.3 List of other HWM units and wastes handled in each			X	
1.4 Hydrogeologic information:				
• Ground-water and soil conditions		X		2.5, 3.6
• Ground-water monitoring systems		X		2.5, 3.3, 3.4, 5.0
• Corrective actions		X		7.0
1.5 Surface impoundments description:				
• Wastes managed (EPA hazardous waste numbers and quantities)		X		1.1, 2.2
• Number and size (aerial dimensions and depth) of impoundments (including engineering drawings)		X		2.2, Figure 2-1
• Liner systems and leachate collection systems design		X		3.5, 7.1, 7.2
• Run-on and run-off control systems		X		7.7
1.6 References to other environmental permits (NPDES, UIC, TSCA)		X		2.2
1.7 Anticipated waivers or exemptions			X	
2. CLOSURE PROCEDURES				
2.1 Estimates of maximum quantity of inventory (by waste type) to be removed:	264.112(b)(3)/265.112(b)(3); 264.228(a)/265.228(a)			
• Pumpable wastes in the impoundments		X		2.2, 7.1, 7.2
• Bottom sludges/residues in the impoundments		X		7.3
2.2 Procedures for handling removed inventory (address quantities, waste types, methods):	264.112(b)(3)/265.112(b)(3); 264.228(a)/265.228			

* See also Contingent Closure Plan Checklist for permitted impoundments without liner systems as specified in Section 264.221(a) (i.e., double liners)

EPA I.D. 986676955

CLOSURE PLAN CHECKLIST
SURFACE IMPOUNDMENTS: ALL HAZARDOUS WASTES REMOVED*

SUBJECT REQUIREMENT	PART 264/265	PROVIDED	NOT APPLICABLE	CLOSURE PLAN SECTION
• On-site treatment		X		7.3, 7.4
• On-site disposal			X	
• Transportation distance off-site		X		7.1
• Off-site treatment		X		5.7, 7.1, 7.2
• Off-site disposal			X	
2.3 Procedures for decontamination and/or disposal:	264.112(b)(4)/265.112(b)(4); 264.114/265.114; 264.228(a)/ 265.228(a)			
• Equipment/structures (piping, pumps) decontamination (address sampling protocol)		X		7.3, 7.9
• Cleaning agent/rinsewater treatment or disposal (address quantities, waste types, and methods):				
— On-site treatment/disposal		X		4.6, 5.7, 7.8
— Off-site treatment/disposal		X		4.6, 5.7, 7.8
• Containment systems (liners, dikes) and other equipment/structures demolition and removal (address quantities and methods):				
— On-site treatment/disposal			X	
— Off-site treatment/disposal			X	
• Other contaminated soil removal:	264.228(a)/265.228(a)			
— List or sketch of potentially contaminated areas		X		Figures 3-8, 3-9
— Estimated amount of contaminated soil to be removed (address sampling protocol)		X		2.2, 7.1, 7.3
— Soil removal methods		X		7.3
— On-site disposal			X	7.3, 7.5
— Off-site disposal			X	
• Protocol for determining "clean" closure		X		7.5

* See also Contingent Closure Plan Checklist for permitted impoundments without liner systems as specified in Section 264.221(a) (i.e., double liners)

EPA I.D. 986676955

CLOSURE PLAN CHECKLIST
SURFACE IMPOUNDMENTS: ALL HAZARDOUS WASTES REMOVED*

SUBJECT REQUIREMENT	PART 264/265	PROVIDED	NOT APPLICABLE	CLOSURE PLAN SECTION
2.4 Ground-water monitoring:	264.112(b)(5)/265.112(b)(5); 264.90/265.90			
• Number, location and frequency of samples		X		5.1, Figure 5-1
• Procedures for analysis		X		5.4
2.5 Description of security systems:	264.14(b) and (c)/ 265.14(b) and (c)			
• Posted signs and 24-hour surveillance system		X		2.1
• Fence or natural barrier		X		2.1
2.6 Closure certification:	264.115/265.115			
• Activities to be conducted		X		7.6, 8.0
• Testing and analyses to be performed		X		4.4, 7.6, 8.0
• Criteria for evaluating adequacy		X		7.6, 8.0, Table 7-1
• Schedule of inspections		X		7.6, 7.8, 8.0
• Types of documentation		X		6.0, 7.8, 8.0
3. CLOSURE SCHEDULE	264.112(b)(6)/265.112(b)(6)			
3.1 Expected year of closure	264.112(b)(7)/265.112(b)(7)	X		8.0, Figure 8-1
3.2 Frequency of partial closures			X	
3.3 Milestone chart showing time for:				
• Removal, treatment or disposal of inventory	264.113(a)/265.113(a)	X		Figure 8-1
• Decontamination of equipment/ structures		X		Figure 8-1
• Containment systems, equipment, and structures demolition and soil removal/disposal		X		Figure 8-1
• Total time to close	264.113(b)/265.113(b)	X		Figure 8-1
3.4 Request for extension to deadlines for handling inventory or completing closure	264.113(c)/265.113(c)	X		1.2, 8.0

* See also Contingent Closure Plan Checklist for permitted impoundments without liner systems as specified in Section 264.221(a) (i.e., double liners)

APPENDIX C

ENRON FINANCIAL ASSURANCE DOCUMENTS

ENRON
Transwestern Pipeline Company

P. O. Box 1188 Houston, Texas 77251-1188 (713) 853-6161

June 28, 1993

Ms. Barbara Hoditschek
RCRA Permit Program Manager
Hazardous and Radioactive Materials Bureau
State of New Mexico Environment Department
Harold Runnels Bldg.
1190 St. Francis Drive, P.O. Box 26110
Santa Fe, N.M. 87502

Dear Ms. Hoditschek:

I am the chief financial officer of Transwestern Pipeline Company, 1400 Smith Street, Houston, Texas 77002. This letter is in support of this firm's use of the financial test to demonstrate financial assurance, as specified in subpart H of 40 CFR parts 264 and 265.

The firm identified above is the owner or operator of the following facilities for which liability coverage for both sudden and nonsudden accidental occurrences is being demonstrated through the financial test specified in subpart H of 40 CFR parts 264 and 265: Roswell Compressor Station.

The firm identified above guarantees, through the guarantee specified in subpart H of 40 CFR parts 264 and 265, liability coverage for both sudden and nonsudden accidental occurrences at the following facilities owned or operated by the following: Roswell Compressor Station.

1. The firm identified above owns or operates the following facilities for which financial assurance for closure or post-closure care or liability coverage is demonstrated through the financial test specified in subpart H of 40 CFR parts 264 and 265. The current closure and/or post-closure cost estimate covered by the test are shown for each facility: Roswell Compressor Station -- @ $3,000,000.00.

2. The firm identified above guarantees, through the guarantee specified in subpart H of 40 CFR parts 264 and 265, the closure and post-closure care or liability coverage of the following facilities owned or operated by the guaranteed party. The current cost estimates for the closure or post-closure care so guaranteed are shown for each facility: NONE.

3. In States where EPA is not administering the financial requirements of subpart H of 40 CFR parts 264 and 265, this firm is demonstrating financial assurance for the closure or post-closure care of the following facilities through the use of a test equivalent or substantially equivalent to the financial test specified in subpart H of 40 CFR parts 264 and 265. The current closure or post-closure cost estimates covered by such a test are shown for each facility: NONE.

4. The firm identified above owns or operates the following hazardous waste management facilities for which financial assurance for closure or, if a disposal facility, post-closure care, is not demonstrated either to EPA or a State through the financial test or any other financial assurance mechanisms specified in subpart H of 40 CFR parts 264 and 265 or equivalent or substantially equivalent State mechanisms. The current closure and/or post-closure cost estimates not covered by such financial assurance are shown for each facility: NONE.

5. This firm is the owner or operator of the following UIC facilities for which financial assurance for plugging and abandonment is required under 40 CFR part 144. The current closure cost estimates as required by 40 CFR 144.62 are shown for each facility: NONE.

This firm is not required to file a Form 10K with the Securities and Exchange Commission (SEC) for the latest fiscal year.

The fiscal year of this firm ends on December 31st. The figures for the following items marked with an asterisk are derived from this firm's independently audited, year-end financial statements for the latest completed fiscal year ended December 31, 1992.

ALTERNATIVE II

1. Sum of current closure and post-closure cost estimates (total of all cost estimates shown in the four paragraphs above)..$3,000,000.00
2. Amount of annual aggregate liability coverage to be demonstrated...$2,000,000.00
3. Sum of lines 1 and 2.......................................$5,000,000.00
4. Current bond rating of most recent issuance of this firm and name of rating service.................................N/A
5. Date and issuance of bond.................................N/A
6. Date of maturity of bond..................................N/A

* 7. Tangible net worth (if any portion of the closure and post-closure cost estimates is included in "total liabilities" on your firm's financial statements, you may add the amount of that portion to this line)........$561,866,000.00

* 8. Total assets in U.S. (required only if less than 90% of firm's assets are located in the U.S.)...............$944,307,000.00

	Yes	No
9. Is line 7 at least $10 million?........................	X	
10. Is line 7 at least 6 times line 3?.....................	X	
*11. Are at least 90% of firm's assets located in the U.S.? If not, complete line 12..............................	X	
12. Is line 8 at least 6 times line 3?.....................	N/A	

I hereby certify that the wording of this letter is identical to the wording specified in 40 CFR 264.151(g) as such regulations were constituted on the date shown immediately below.

E. G. Parks
Vice President & Controller
Transwestern Pipeline Company

93/66

ARTHUR ANDERSEN & CO.

REPORT OF INDEPENDENT PUBLIC ACCOUNTANTS

To Transwestern Pipeline Company:

We have audited, in accordance with generally accepted auditing standards, the balance sheet of Transwestern Pipeline Company, a wholly-owned subsidiary of Enron Corp., as of December 31, 1992, and the related statements of income, retained earnings and additional paid-in capital and cash flows for the year then ended and have issued our report thereon dated February 19, 1993. We have not audited any financial statements or performed any auditing procedures for any period subsequent to December 31, 1992.

At your request, we have read the letter dated June 28, 1993, from your Chief Financial Officer to the RCRA Permit Program Manager of the Hazardous and Radioactive Materials Bureau for the State of New Mexico Environment Department to demonstrate financial assurance for both closure and/or post-closure and liability care as specified in the Code of Federal Regulations Subpart H of 40 CFR Parts 264 and 265 for the United States Environmental Protection Agency. As further required by Sections 264.143 (f)(3)(iii) and 264.145 (f)(3)(iii), we have compared the amounts comprising the data, except for the tangible net worth which is discussed in the paragraph below, which the letter from the Chief Financial Officer specifies have been derived from the independently audited financial statements as of and for the year ended December 31, 1992, referred to above, with the corresponding amounts appearing in such financial statements and found them to be in agreement.

We compared the dollar amount representing tangible net worth appearing in the letter from the Chief Financial Officer to the corresponding amount appearing on an analysis schedule prepared by Transwestern Pipeline Company, and found such amount to be in agreement. Such analysis schedule shows the components of tangible net worth. We compared the amount appearing on such analysis schedule representing total stockholder's equity to the financial statements referred to above, and found such amount to be in agreement. We compared the amount appearing on such analysis schedule representing intangible assets to Transwestern Pipeline Company's accounting records and found such amount to be in agreement. We recomputed tangible net worth and found such amount to be arithmetically correct.

In connection with the procedures described in the preceding paragraphs, no matters came to our attention that caused us to believe that the specified data should be adjusted.

This report relates only to the data specified above and does not extend to the financial statements of Transwestern Pipeline Company taken as a whole, for the year ended December 31, 1992. It is furnished solely for the use of Transwestern Pipeline Company for its distribution to the State of New Mexico Environment Department, and should not be used for any other purpose.

Arthur Andersen & Co.

Houston, Texas
June 25, 1993

ARTHUR ANDERSEN & CO.

REPORT OF INDEPENDENT PUBLIC ACCOUNTANTS

To Transwestern Pipeline Company:

We have audited the accompanying balance sheets of Transwestern Pipeline Company (a Delaware Corporation and a wholly-owned subsidiary of Enron Corp.) as of December 31, 1992 and 1991, and the related statements of income, retained earnings and additional paid-in capital and cash flows for the years then ended. These financial statements are the responsibility of Transwestern Pipeline Company's management. Our responsibility is to express an opinion on these financial statements based on our audits.

We conducted our audits in accordance with generally accepted auditing standards. Those standards require that we plan and perform the audit to obtain reasonable assurance about whether the financial statements are free of material misstatement. An audit includes examining, on a test basis, evidence supporting the amounts and disclosures in the financial statements. An audit also includes assessing the accounting principles used and significant estimates made by management, as well as evaluating the overall financial statement presentation. We believe that our audits provide a reasonable basis for our opinion.

In our opinion, the financial statements referred to above present fairly, in all material respects, the financial position of Transwestern Pipeline Company as of December 31, 1992 and 1991, and the results of its operations and its cash flows for the years then ended, in conformity with generally accepted accounting principles.

Arthur Andersen & Co.

ARTHUR ANDERSEN & CO.

Houston, Texas
February 19, 1993

TRANSWESTERN PIPELINE COMPANY
BALANCE SHEET

(In Thousands)

	December 31, 1992	December 31, 1991
ASSETS		
Current Assets:		
Cash and cash equivalents	$ 5	$ 3
Accounts receivable–		
Customers (net of allowance for doubtful accounts of $269 at December 31, 1992 and 1991)	615	52
Associated companies	251	157
Notes receivable from associated company	–	21,118
Materials and supplies, at average cost	6,707	6,626
Exchange gas receivable	8,306	2,104
Other	640	674
Total current assets	16,524	30,734
Property, Plant and Equipment, at cost:	1,098,711	1,044,343
Less – Accumulated depreciation and amortization	218,273	194,592
Net property, plant and equipment	880,438	849,751
Deferred Charges and Other Assets:		
Deferred contract reformation costs, net	5,975	8,075
Environmental cleanup cost, net	26,585	26,708
Other	14,785	10,626
Total deferred charges and other assets	47,345	45,409
Total assets	$ 944,307	$ 925,894

The accompanying notes are an integral part of these financial statements.

TRANSWESTERN PIPELINE COMPANY
BALANCE SHEET

(In Thousands)

	December 31, 1992	December 31, 1991
LIABILITIES AND STOCKHOLDER'S EQUITY		
Current Liabilities:		
Current portion of long-term debt	$ –	$ 40,000
Accounts payable –		
Trade	4,933	24,327
Other	1,779	39,426
Associated companies	3,958	4,453
Notes payable to associated companies	19,743	–
Accrued interest	1,056	3,515
Regulatory reserves	–	8,891
Other	4,208	1,164
Total current liabilities	35,677	121,776
Long-Term Debt, Net of Current Maturities	150,000	50,000
Deferred Credits and Other Liabilities:		
Deferred income taxes	187,920	174,815
Other	7,829	12,789
Total deferred credits and other liabilities	195,749	187,604
Commitments and Contingencies (Notes 8 and 9)		
Stockholder's Equity		
Common stock	1	1
Additional paid-in capital	409,191	409,191
Retained earnings	153,689	157,322
Total stockholder's equity	562,881	566,514
Total liabilities and stockholder's equity	$ 944,307	$ 925,894

The accompanying notes are an integral part of these financial statements.

TRANSWESTERN PIPELINE COMPANY
STATEMENT OF INCOME

(In Thousands)

	Year Ended December 31, 1992	1991
Revenues:		
Gas Sales	$ 15,679	$ 37,288
Transport	193,295	210,292
Other	1,838	1,315
Total revenues	210,812	248,895
Operating Expenses:		
Natural gas purchased	8,432	41,015
Operations and maintenance	69,743	88,895
Amortization of deferred contract reformation costs	15,478	45,626
Depreciation and amortization	32,083	26,525
Taxes other than income taxes	6,384	6,511
Total operating expenses	132,120	208,572
Operating Income	78,692	40,323
Other Income (Expense):		
Interest income	102	6,233
Interest expense and related charges	(7,225)	(11,287)
Allowance for funds used during construction	10,857	11,907
Other, net	(77)	133
Total other income (expense)	3,657	6,986
Income Before Income Taxes	82,349	47,309
Income Tax Expense	31,607	18,027
Net Income	$ 50,742	$ 29,282

The accompanying notes are an integral part of these financial statements.

TRANSWESTERN PIPELINE COMPANY
STATEMENT OF RETAINED EARNINGS AND ADDITIONAL PAID-IN CAPITAL

(In Thousands)

	Additional Paid-In Capital	Retained Earnings
Balance, December 31, 1990	$ 409,191	$ 128,040
Net Income	–	29,282
Balance, December 31, 1991	409,191	157,322
Dividend	–	(54,375)
Net Income	–	50,742
Balance, December 31, 1992	$ 409,191	$ 153,689

The accompanying notes are an integral part of these financial statements.

F

TRANSWESTERN PIPELINE COMPANY
STATEMENT OF CASH FLOWS

(In Thousands)

	Year Ended December 31,	
	1992	1991
sh Flows From Operating Activities:		
t Income	$ 50,742	$ 29,282
conciliation of net income to net ish provided by operating activities:		
epreciation and amortization	32,083	26,525
mortization of deferred contract reformation costs	15,478	45,626
eferred income taxes	13,105	(12,668)
llowance for funds used during construction	(10,857)	(11,907)
hanges in components of working capital:		
ccounts receivable	(657)	8,206
laterials and supplies	(81)	(2,367)
Other current assets	(6,168)	4,975
ccounts payable	(57,536)	48,636
Notes payable – Enron Corp.	32,738	122,473
ccrued interest	(2,459)	(88)
Other current liabilities	(5,847)	(1,683)
eferred contract reformation costs:		
Cash payments	(5,422)	(13,071)
Recoupments via direct bill	1,635	4,699
Other, net	(10,194)	24,288
et Cash Provided by Operating Activities	46,560	272,926
ash Flows Used in Investing Activities:		
Additions to property, plant and equipment	(41,802)	(243,952)
Other capital expenditures	(10,381)	(19,232)
et Cash Used in Investing Activities	(52,183)	(263,184)
ash Flows Provided by Financing Activities:		
Issuance of long–term debt	100,000	–
Decrease in long–term debt	(40,000)	(10,000)
Dividend Paid	(54,375)	–
et Cash Provided by (Used in) Financing Activities	5,625	(10,000)
crease (Decrease) in Cash	2	(258)
ash and Cash Equivalents, Beginning of Period	3	261
ash and Cash Equivalents, End of Period	$ 5	$ 3

dditional cash flow information:

terest payments and income tax payments were as follows:

	1992	1991
Interest (net of amounts capitalized)	$ 470	$ 1,975
Income taxes	18,502	30,695

The accompanying notes are an integral part of these financial statements.

TRANSWESTERN PIPELINE COMPANY

NOTES TO FINANCIAL STATEMENTS

(1) Summary of Significant Accounting Policies

Control and Financial Statement Presentation

Transwestern Pipeline Company (the Company) is a wholly-owned subsidiary of Enron Pipeline Company (EPC), which is a wholly-owned subsidiary of Enron Corp. (Enron). EPC and its subsidiaries are members of an operating group which engages in transactions characteristic of group administration and operations with other members of the group.

The Company's financial statements reflect the effect of the allocation of the purchase prices for prior acquisitions. As required under purchase accounting, the purchase price was allocated to the assets and liabilities acquired based upon their estimated value as of the acquisition dates.

Cash Equivalents

The Company records as cash equivalents all highly liquid short-term investments with original maturities of three months or less.

Property, Plant and Equipment

Property, plant and equipment is depreciated on the straight-line basis at rates ranging from 1.3% to 10%. Depreciation rates are based on the estimated useful lives of the individual properties and are subject to approval by the Federal Energy Regulatory Commission (FERC), except as discussed below.

Included in gross property, plant and equipment is an aggregate plant acquisition adjustment of $438.8 million which represents the additional cost allocated to the Company's transmission plant, as a result of prior acquisitions. Currently, such amount is not considered by the FERC in determining the tariff the Company may charge to its regulated customers. The plant acquisition adjustment is being amortized over 40 years. At December 31, 1992, $85.7 million is included in accumulated depreciation and amortization.

The Company charges to operations and maintenance expense the costs of repairs. Costs of replacements and renewals of units of property are capitalized. The original cost of property retired is charged to accumulated depreciation and amortization, net of salvage and removal costs.

Allowance for Funds Used During Construction (AFUDC)

The accrual of AFUDC is a utility accounting practice calculated under guidelines prescribed by the FERC and capitalized as part of the cost of utility plant representing the cost of servicing the capital invested in construction work in progress. Such AFUDC has been segregated into two component parts - borrowed and equity funds. The allowance for borrowed funds used during construction was $1.4 million and $1.8 million for 1992 and 1991, respectively. The allowance for equity funds was $9.4 million and $10.1 million for 1992 and 1991, respectively.

Income Taxes

The Company is included in the consolidated federal and state income tax returns filed by Enron. Under their tax sharing arrangement, each subsidiary in a taxable income position pays to Enron its income tax provision on a separate return basis. It is Enron's practice to reimburse each subsidiary in a tax loss position to the extent its deductions are utilized in the consolidated return.

The Company accounts for income taxes under the provisions of Statement of Financial Accounting Standards (SFAS) No. 96 - "Accounting for Income Taxes". Deferred income taxes have been provided for all differences in the bases of assets and liabilities for tax and financial reporting purposes.

During February 1992, the Financial Accounting Standards Board issued SFAS No. 109 - "Accounting for Income Taxes". SFAS No. 109 requires an asset and liability approach for financial accounting and reporting for income taxes and supercedes SFAS No. 96. SFAS No. 109 is effective for fiscal years beginning after December 15, 1992. The Company intends to retroactively adopt SFAS No. 109 during the first quarter of 1993 and believes the adoption will not have a material impact on the Company's results of operations or financial position.

Reclassifications

Certain reclassifications have been made in the 1991 amounts to conform with 1992 financial statement classifications.

(2) Income Taxes

The provisions for income taxes for 1992 and 1991 are as follows (in thousands):

	1992	1991
Payable currently		
Federal	$ 15,590	$ 26,579
State	2,912	4,116
Total	18,502	30,695
Payment deferred		
Federal	10,577	(11,466)
State	2,528	(1,202)
Total	13,105	(12,668)
Total income tax expense	$ 31,607	$ 18,027

Deferred tax expense results from changes in the bases of assets and liabilities for tax and financial reporting purposes as follows (in thousands):

	1992	1991
Gas Contract Settlement Charges	$ 2,869	$(7,746)
Depreciation and Amortization	3,289	(977)
Purchase and Exchange Gas	2,446	418
Reserve for Deferred Regulatory Costs and Contingencies	3,427	(6,860)
Other	1,074	2,497
Total	$ 13,105	$(12,668)

The differences between taxes computed at the U.S. federal statutory rate and the Company's income taxes for financial reporting purposes are as follows (in thousands):

	1992	1991
Statutory federal income tax provision	$ 27,999	$ 16,085
Provision for state income taxes, net of federal benefit	3,590	1,923
Other	18	19
Income tax provision	$ 31,607	$ 18,027

(3) Long-Term Debt

Long-term debt net of current maturities is summarized as follows (in thousands):

	December 31,	
	1992	1991
9.10% Notes due 2000	$ 23,000	$ 23,000
7.55% Notes due 2000	100,000	-
9.20% Notes due 1998 to 2004	27,000	27,000
	$150,000	$ 50,000

Long-term debt outstanding will begin maturing with approximately $3.9 million due in 1998 with the balance maturing through 2004.

A provision of the note agreements restricts the availability of retained earnings for the payment of dividends on common stock. Under such provision, at December 31, 1992, the Company's retained earnings was unrestricted.

At December 31, 1992, the estimated fair value of the Company's long-term debt was $154.6 million. The fair value of long-term debt is based upon market quotations of similar debt at interest rates currently available.

(4) Accounts Receivable Sales

The Company, through Enron, has entered into agreements which provide for the sale of trade accounts receivable with limited recourse provisions. At December 31, 1992 and 1991, the Company had sold receivables approximating $18.6 million and $31.7 million, respectively.

The fees incurred on the sales of these receivables and on the sales of rights to certain recoverable take-or-pay buy-out and contract reformation costs are included in "Interest expense and related charges" in the Statement of Income and totaled approximately $.9 million and $1.2 million for 1992 and 1991, respectively.

The Company has a concentration of customers in the electric and gas utility industries. These concentrations of customers may impact the Company's overall exposure to credit risk, either positively or negatively, in that the customers may be similarly affected by changes in economic or other conditions. Credit losses incurred on receivables in these industries compare favorably to losses experienced in the Company's receivable portfolio as a whole. The Company also has a concentration of customers located in the western United States, primarily within the state of California. Receivables are generally not collateralized. However, the Company's management believes that the portfolio of receivables, which includes local distribution companies and municipalities, is well diversified and that such diversification minimizes any potential credit risk.

(5) Revenue Transactions with Major Customer

The Company's revenues include billings for transportation to a major customer of approximately $126 million and $136 million for the years 1992 and 1991, respectively. The Company currently has a contract extending until October 1996 for approximately 750 mcf/day, and until October 2005 for approximately 300 mcf/day with this major customer to transport gas to California.

(6) Retirement Benefits

The Company participates in the Enron Retirement Plan (the Enron Plan), a noncontributory defined benefit plan which covers substantially all employees. Participants in the Enron Plan with five or more years of service are entitled to retirement benefits based on a formula that uses a percentage of final average pay and years of service.

As of September 30, 1992, the most recent valuation date, the actuarial present value of projected plan benefit obligations under the Enron Plan were less than plan net assets by approximately $15.1 million. The assumed discount rate used in determining the actuarial present value of projected plan benefits in both 1992 and 1991 was 9.0%. The expected long-term rate of return on assets was 10.5% and the assumed rate of increase in wages was 5.0% for both 1992 and 1991. The costs of pension expense for the Company were included in operating expense and were not significant.

Assets of the Enron Plan are comprised primarily of equity securities, fixed income securities and temporary cash investments. It is Enron's policy to fund all pension costs accrued to the minimum amount required by federal tax regulations.

In addition to providing pension benefits, the Company also provides certain health care benefits to substantially all of its retired employees and life insurance benefits to certain retirees. The costs of these postretirement benefits are recognized as expense when paid, and were not significant in 1992 and 1991.

During December 1990, the Financial Accounting Standards Board issued SFAS No. 106 "Employers' Accounting for Postretirement Benefits Other Than Pensions." SFAS No. 106 is effective for fiscal years beginning after December 15, 1992 and requires that employers providing health, life insurance or other postretirement benefits (other than pension benefits) accrue the cost of those benefits over the service lives of the employees expected to be eligible to receive such benefits. Such costs are currently accounted for on an accrual basis and are not significant. The liability for such benefits existing as of the date of adoption of SFAS No. 106 (the transition obligation) may be immediately charged to earnings or may be amortized over a period not to exceed 20 years.

The Company will adopt the provisions of SFAS No. 106 during 1993 and will amortize the transition obligation (estimated to be $2.0 million) over a period of approximately 19 years. In accordance with the FERC policy statement issued December 17, 1992, the Company intends to seek recovery of the transition obligation from its customers in future general rate case filings.

(7) Related Party Transactions

The Company purchased natural gas from subsidiaries of Enron at market prices totaling approximately $1.1 million and $.5 million during 1992 and 1991, respectively. The Company recorded no sales revenue in 1992 and $3.7 million in 1991 and transportation revenue totaling approximately $6.7 million and $25.8 million during 1992 and 1991, respectively, from subsidiaries of Enron.

The Company receives interest income and pays interest expense on its note with associated companies at rates equal to certain prevailing market rates. Interest income amounted to approximately $1.4 million and $16.9 million for 1992 and 1991, respectively. Interest expense was approximately $4.1 million and $10.8 million for 1992 and 1991, respectively.

The Company incurred corporate administrative expenses including employee benefit costs from Enron, primarily based upon usage and other factors, of approximately $12.3 million and $10.3 million for the years 1992 and 1991, respectively. The residual amounts are distributed based on components of gross property, plant and equipment, gross margin and annualized payroll.

(8) Litigation and Other Contingencies

The Company is party to various claims and litigation, the significant items of which are discussed below. Although no assurances can be given, the Company believes, based on its experience to date and additional recoveries from customers, that the ultimate resolution of such items, individually or in the aggregate, will not have a material adverse impact on its financial position or results of operations.

Take-or-Pay Provisions in Gas Purchase Contracts

The Company has substantially completed its Gas Purchase Contract Reformation/Termination efforts, though three cases are currently pending before arbitration panels. As of December 31, 1992, the Company had pending against it take-or-pay claims and litigation aggregating approximately $13.0 million. However, based upon settlements reached to date, the Company believes that it is probable that those claims will be resolved at significantly less cost than the amounts claimed. Furthermore, up to seventy-five percent of prudently paid settlement costs are eligible for recovery from transportation customers under FERC Orders 500/528.

Mewbourne Oil Company (Mewbourne) has asserted claims against the Company for approximately $250 million pursuant to pricing provisions of various gas purchase contracts between Mewbourne and the Company and as a result of alleged acts of the Company with respect to such contracts. Included are allegations of breach of contract, contract repudiation, fraud and violations of the federal Racketeering Influenced and Corrupt Organizations Act. This dispute has been submitted to arbitration. No discovery has been undertaken in this proceeding, and no date has been set for the arbitration hearing; accordingly, it is not possible to predict the outcome of this matter. However, although no assurances can be given, the Company believes that a significant portion of the claims for damages are either duplicative or without merit, and that the ultimate resolution of this matter will not have a materially adverse effect on its financial position or results of operations.

The Company continually evaluates its position relative to gas purchase contract matters, including the likelihood of loss from asserted or unasserted take-or-pay claims or above market prices. Based upon this evaluation and its experience to date, management believes that it has not incurred losses for which reserves should be provided at December 31, 1992.

Environmental Protection Agency

The Company has completed the cleanup of polychlorinated biphenyl (PCB) contaminated soils in Arizona pursuant to an agreement with the Environmental Protection Agency, Region 9, and has received final approval from Region 6, relative to the cleanup and disposal of PCB-contaminated liquids and soils in New Mexico that were found in or adjacent to its facilities. Approximately $52.8 million has been incurred for cleanup as of December 31, 1992. The total cost amortized or written off as of December 31, 1992 was $42.0 million with the remaining amount to be amortized through 1994.

As of year end, the Company has also paid $11.9 million for litigation and damages incurred through December 31, 1990 related to PCBs that migrated into one of its customer's facilities through a PCB-based lubricant. The Company paid an additional $1.8 million in January, 1993 for damages incurred through September 30, 1992. The Company is pursuing litigation against third parties for the amount paid to its customer for past damages, and for future reasonable damages.

The Company is subject to extensive federal, state and local environmental laws and regulations which require expenditures for remediation at various operating facilities and waste disposal sites, as well as expenditures in connection with the construction of new facilities. However, management does not believe that any such potential costs, including environmental cleanup mentioned above, will have a material impact on the Company's financial position or results of operations.

(9) Rate Matters and Regulatory Issues

The Company is involved in several rate matters and regulatory issues, the significant items of which are discussed below. The Company believes, based on appropriate reserves that have been established, that the ultimate outcome of such matters, individually or in the aggregate, will not have a material adverse impact in its financial position or results of operations.

The Company has filed approximately $243.1 million in transition costs with the FERC under Order No. 500 providing for recovery from customers through direct billing of approximately $58.5 million and surcharges of approximately $123.8 million. In addition, the FERC has allowed the Company to collect certain post-GIC (Gas Inventory Charge) transition costs through the Order No. 500 recovery mechanism. This matter is currently pending before the D.C. Court of Appeals.

In 1992, the Company resolved its general section 4 rate case (Docket No. RP89-48-000) with its customers with the exception of one minor issue, which should be resolved in the very near term. On March 13, 1992, the Company filed an abbreviated section 4 rate case to establish rates for the newly constructed San Juan pipeline. On November 30, 1992, the Company filed a section 4 rate case with the FERC (Docket No. RP93-34-000). The filed rates, effective January 1, 1993, reflect a slight rate decrease from the rates previously on file. On December 31, the FERC issued an order placing the rates into effect, subject to refund upon hearing.

On April 8, 1992, the FERC issued Order No. 636, restructuring the pipeline industry to require the unbundling of transportation and sales services provided by pipelines. Order No. 636 requires pipelines to implement Straight Fixed Variable rate design and authorizes capacity release programs so that firm shippers can release unwanted capacity on a temporary or permanent basis to those desiring capacity. In addition, Order No. 636 allows pipelines to recover transition costs incurred as a result of implementing the Order. On February 1, 1993, the FERC issued a final order in the Company's Order No. 636 Compliance Filing, to be effective on February 1, 1993 implementing, among other things, the above mentioned requirements and a straight fixed variable rate design. Estimated future transition costs included in the filing under the provisions of the Order are not considered to be significant in relation to total costs.

APPENDIX D

EVENTS AND CORRESPONDENCE CHRONOLOGY

EVENTS AND CORRESPONDENCE CHRONOLOGY

8/60	Compressor station begins operations.
6/73-4/81	Period during which Pits 2 and 3 are backfilled.
6/86	Pit 1 backfilled. Last use of surface impoundments.
4/90	Transwestern requests permission from the State of New Mexico Office of the Commissioner of Public Lands to drill exploratory borings on State Trust land in order to collect soil samples to assess soil contamination.
4/2/90	State of New Mexico Office of the Commissioner of Public Lands (Surface Water Resources Division) authorizes Transwestern to drill exploratory borings on State Trust land for the purpose of obtaining soil samples to be tested for contamination.
6/20/91	Harding Lawson Associates completes shallow soil vapor investigation at Compressor Station No. 9.
7/17/91	Transwestern requests authorization to drill additional soil borings on State Trust land northeast of the compressor station.
7/22/91	State of New Mexico Office of the Commissioner of Public Lands (Surface Water Resources Division) authorizes Transwestern to drill approximately 15 soil borings to allow collection of soil samples.
12/91	Metric Corporation completes report on a shallow subsurface investigation at the compressor station.
2/14/92	Larry Campbell (Transwestern) meets with Coby Muckelroy and Bruce Swanton (New Mexico Environment Department [NMED]) to discuss closure of surface impoundment at Compressor Station No. 9.
2/14/92	Larry Campbell (Transwestern) meets with Roger Anderson (Oil Conservation Division [OCD]) to discuss closure of surface impoundment at Compressor Station No. 9.
4/29/92	Bruce Swanton (NMED) calls Larry Campbell (Transwestern) to request additional information regarding the former surface impoundments.
5/6/92	Joint meeting attended by Transwestern, NMED and OCD. Transwestern states intention to hire Halliburton-NUS Corporation to install a monitor well in the center of the former pit to remove and test liquids to determine their status as hazardous or non-hazardous waste. Field work scheduled to begin July 20, 1992.
7/92	Monitor well MW-1 installed by Halliburton-NUS Environmental Corporation.
10/92	Halliburton NUS completes report on monitor well installation at the compressor station.

10/15/92	Joint meeting attended by Transwestern, NMED and OCD. Transwestern presents the results of sampling and analysis of the new monitor well. Options for closure of the site are discussed.
11/30/92	Transwestern submits duplicate copies of a RCRA Part A permit application to NMED and OCD.
12/10/92	Joint meeting attended by Transwestern, NMED and OCD to discuss remediation and closure activities at former surface impoundments. NMED requests that the RCRA Part A permit application submitted previously be resubmitted using the proper EPA forms. The schedule for submittal of other documents and information is also discussed.
1/5/93	Transwestern resubmits RCRA Part A permit application using the EPA forms.
1/25/93	Transwestern notifies NMED that monitor wells will be installed to determine ground-water quality beneath the former surface impoundments.
2/7/93	Transwestern provides NMED with historical information on the use of the former surface impoundments.
2/17/93	Transwestern meets with NMED to discuss remediation and closure of the surface impoundment.
2/17/93	Transwestern requests permission from the State of New Mexico Office of the Commissioner of Public Lands to install two monitor wells on State Trust land in order to collect ground-water samples.
2/17/93	NMED requests that Transwestern submit a closure plan in accordance with the New Mexico Hazardous Waste Management Regulations, Part VI, Section 40 CFR 265.112(a). NMED also provides Transwestern with a list of Deficiency Comments related to NMED review of the RCRA Part A permit application previously submitted and requests that a new or amended Part A application be submitted within 30 days.
3/10/93	Transwestern requests NMED to grant a 60-day extension (until July 1, 1993) for filing the closure plan.
3/16/93	George Robinson (Cypress Engineering Services) meets with Larry Campbell (Transwestern) to discuss conclusions of Metric Report.
4/6/93	NMED grants extension for filing of closure plan.
4/7/93	Transwestern submits amended RCRA Part A permit application to NMED, along with a list of responses to NMED review comments on the previous permit application.
5/19/93	Larry Campbell and Lou Soldano (Transwestern) meet with NMED to discuss NMED request for closure plan for the surface impoundments. NMED requests information regarding the proposed installation of a product recovery pump.

5/21/93	Product recovery pump installed in MW-1. Interim corrective action begins by pumping product from MW-1 into aboveground storage tank.
6/11/93	Transwestern notifies the State of New Mexico Office of the Commissioner of Public Lands that remediation operations are in progress at the compressor station.
6/22/93	Brown & Root Environmental completes a report for Transwestern describing a ground-water assessment at the compressor station.
7/1/93	Larry Campbell (Transwestern) delivers closure plan to NMED. Transwestern begins free product recovery from recovery wells MW-1B, MW-2, and RW-1.
9/7/93	Transwestern notifies OCD of the installation of product recovery pumps in three monitor wells as part of ground-water cleanup and requests associated modifications to Discharge Plan GW-52.
9/22/93	OCD requests additional information regarding the design of the product recovery system prior to approving modifications to Discharge Plan GW-52.
10/25/93	Transwestern responds to comments from OCD regarding the product recovery system.
11/18/93	OCD approves Transwestern's proposed modifications to Discharge Plan GW-52 in accordance with ongoing remedial activities.
3/7/94	Transwestern receives a letter from NMED rejecting closure plan previously submitted on July 1, 1993, on the grounds that it is incomplete. NMED includes Notice of Deficiency listing items to be included in the closure plan.
3/23/94	Cypress Engineering Services removes inoperative product recovery pump from MW-1 and collects ground-water samples from MW-3 and MW-5.
4/5/94	George Robinson (Cypress Engineering Services) prepares letter report to Bill Kendrick (Enron Operations Corporation) discussing soil and ground-water quality at the Roswell compressor station.
4/8/94	Larry Campbell (Transwestern), Bill Kendrick (Enron Operations Corporation), and George Robinson (Cypress Engineering Services) meet with NMED to discuss Notice of Deficiency. NMED requests that another closure plan be submitted by June 1, 1994.
4/15/94	Brown & Caldwell installs new product recovery pump in MW-1 and measures depth to PSH and depth to ground water in MW-1, MW-1B, MW-2, and RW-1.
5/18/94	George Robinson (Cypress Engineering Services) and Jeffrey Forbes (DBS&A) meet with Marc Sides (NMED) to discuss closure plan format.

APPENDIX E

LABORATORY REPORTS FROM PREVIOUS SUBSURFACE INVESTIGATIONS

FOOTNOTES FOR:

SUMMARY OF CORE SAMPLE ANALYTICAL RESULTS

ROSWELL, NEW MEXICO

~ = Reported value is less than the detection limit.

< = Compound analyzed for but not detected. The reported value is the minimum attainable detection limit for the sample.

* = Compound was also detected in the QC blanks.

B = Reported value was less than the Contract Required Detection Limit (CRDL) but greater than or equal to the Instrument Detection Limit (IDL).

N = Spiked sample recovery not within control limits.

S = Reported value determined by Method of Standard Addition (MSA).

U = Reported value was analyzed for but not detected.

W = Post-digestion spike for Furnace AA analysis is out of control limits (85-100%), while sample absorbance is less than 50% of spike absorbance.

NA = Not analyzed by conventional, EPA-approved methods

mg/kg = parts per million

μg/kg = parts per billion

mg/l = parts per million

μg/l = parts per billion

TABLE 1

PHASE A

SUMMARY OF ON-SITE CORE SAMPLE ANALYTICAL RESULTS

Roswell, New Mexico

Core Hole No. Sample Depth Sample ID		SB9-1 3'-6.5' S9-01.1-8	SB9-1 14'-17' S9-02.1-8		Blank # 1 Equipment	Blank # 2 Trip		SB9-2 3.5'-7.5' S9-03.1-8	SB9-2 9'-12' S9-04.1-8	SB9-2 14'-16' S9-05.1-8	SB9-2 17'-18.5' S9-06.1-8		Blank #3 Equipment	Blank #4 Trip		
TPH	mg/kg	<20	<20	mg/l	<1	6	mg/kg	40	80	80	<20	mg/l	<1	<1		
Methanol	mg/l	NA	NA	mg/l	NA	NA	mg/l	NA	NA	NA	NA	mg/l	NA	NA		
Methylene Chloride	ug/kg	NA	NA	ug/l	NA	NA	ug/kg	NA	NA	NA	NA	ug/l	NA	NA		
Acetone	ug/kg	NA	NA	ug/l	NA	NA	ug/kg	NA	NA	NA	NA	ug/l	NA	NA		
Carbon Disulfide	ug/kg	NA	NA	ug/l	NA	NA	ug/kg	NA	NA	NA	NA	ug/l	NA	NA		
Trichlorofluoromethane	ug/kg	NA	NA	ug/l	NA	NA	ug/kg	NA	NA	NA	NA	ug/l	NA	NA		
Ethyl Ether	ug/kg	NA	NA	ug/l	NA	NA	ug/kg	NA	NA	NA	NA	ug/l	NA	NA		
Freon (TF)	ug/kg	NA	NA	ug/l	NA	NA	ug/kg	NA	NA	NA	NA	ug/l	NA	NA		
2-Butanone	ug/kg	NA	NA	ug/l	NA	NA	ug/kg	NA	NA	NA	NA	ug/l	NA	NA		
1,1,1-Trichloroethane	ug/kg	NA	NA	ug/l	NA	NA	ug/kg	NA	NA	NA	NA	ug/l	NA	NA		
Carbon Tetrachloride	ug/kg	NA	NA	ug/l	NA	NA	ug/kg	NA	NA	NA	NA	ug/l	NA	NA		
Cyclohexanone	ug/kg	NA	NA	ug/l	NA	NA	ug/kg	NA	NA	NA	NA	ug/l	NA	NA		
Ethyl Acetate	ug/kg	NA	NA	ug/l	NA	NA	ug/kg	NA	NA	NA	NA	ug/l	NA	NA		
Isobutyl Alcohol	ug/kg	NA	NA	ug/l	NA	NA	ug/kg	NA	NA	NA	NA	ug/l	NA	NA		
2-Ethoxyethanol	ug/kg	NA	NA	ug/l	NA	NA	ug/kg	NA	NA	NA	NA	ug/l	NA	NA		
n-Butyl Alcohol	ug/kg	NA	NA	ug/l	NA	NA	ug/kg	NA	NA	NA	NA	ug/l	NA	NA		
Trichloroethene	ug/kg	NA	NA	ug/l	NA	NA	ug/kg	NA	NA	NA	NA	ug/l	NA	NA		
1,1,2-Trichloroethane	ug/kg	NA	NA	ug/l	NA	NA	ug/kg	NA	NA	NA	NA	ug/l	NA	NA		
Benzene	ug/kg	NA	NA	ug/l	NA	NA	ug/kg	NA	NA	NA	NA	ug/l	NA	NA		
4 Methyl 2 Pentanone	ug/kg	NA	NA	ug/l	NA	NA	ug/kg	NA	NA	NA	NA	ug/l	NA	NA		
Tetrachloroethane	ug/kg	NA	NA	ug/l	NA	NA	ug/kg	NA	NA	NA	NA	ug/l	NA	NA		
Toluene	ug/kg	NA	NA	ug/l	NA	NA	ug/kg	NA	NA	NA	NA	ug/l	NA	NA		
Chlorobenzene	ug/kg	NA	NA	ug/l	NA	NA	ug/kg	NA	NA	NA	NA	ug/l	NA	NA		
Ethylbenzene	ug/kg	NA	NA	ug/l	NA	NA	ug/kg	NA	NA	NA	NA	ug/l	NA	NA		
Xylene (total)	ug/kg	NA	NA	ug/l	NA	NA	ug/kg	NA	NA	NA	NA	ug/l	NA	NA		
Pyridine	ug/kg	NA	NA	ug/l	NA	NA	ug/kg	NA	NA	NA	NA	ug/l	NA	NA		
1,3-Dichlorobenzene	ug/kg	NA	NA	ug/l	NA	NA	ug/kg	NA	NA	NA	NA	ug/l	NA	NA		
1,4-Dichlorobenzene	ug/kg	NA	NA	ug/l	NA	NA	ug/kg	NA	NA	NA	NA	ug/l	NA	NA		
1,2-Dichlorobenzene	ug/kg	NA	NA	ug/l	NA	NA	ug/kg	NA	NA	NA	NA	ug/l	NA	NA		
2-Methylphenol	ug/kg	NA	NA	ug/l	NA	NA	ug/kg	NA	NA	NA	NA	ug/l	NA	NA		
3-Methylphenol	ug/kg	NA	NA	ug/l	NA	NA	ug/kg	NA	NA	NA	NA	ug/l	NA	NA		
4-Methylphenol	ug/kg	NA	NA	ug/l	NA	NA	ug/kg	NA	NA	NA	NA	ug/l	NA	NA		
Nitrobenzene	ug/kg	NA	NA	ug/l	NA	NA	ug/kg	NA	NA	NA	NA	ug/l	NA	NA		
Silver, total	mg/l	0.0005UW	0.0005UW	mg/l	0.0005U	0.0005U	mg/l	<.0005	<.0005	<.0005	<.0005	mg/l	<.0005	<.0005		
Arsenic, total	mg/l	0.004B	0.004BW	mg/l	0.003U	0.003U	mg/l	.005BW	.004B	<.003	.003B	mg/l	<.003	<.003		
Barium, total	mg/l	0.38	0.12B	mg/l	0.05U	0.05U	mg/l	0.38	1.28	1.01	1.1	mg/l	<.05	<.05		
Cadmium, total	mg/l	.0005UW	.0005U	mg/l	0.0005U	0.0005U	mg/l	.0006BW	.0007BW	.0006BW	.0008BW	mg/l	<.0005W	<.0005W		
Chromium, total	mg/l	.006B	.006U	mg/l	0.009B	0.006B	mg/l	<.006	0.008	<.006	.007B	mg/l	<.006	<.006		
Mercury, total	mg/l	.0002U	.0002U	mg/l	0.0002U	0.0002U	mg/l	<.0002	<.0002	<.0002	<.0002	mg/l	<.0002	<.0002		
Lead, total	mg/l	.002B	.002UW	mg/l	0.007	0.003	mg/l	.002B	0.004	.002B	0.003	mg/l	<.002W	<.002		
Selenium,total	mg/l	.003UW	.003UW	mg/l	0.003U	0.003U	mg/l	<.003W	<.003W	<.003W	<.003W	mg/l	<.003W	<.003W		

TABLE 1 (CONT)

SUMMARY OF ON-SITE CORE SAMPLE ANALYTICAL RESULTS

Roswell, New Mexico

Core Hole No. Sample Depth Sample ID		SB9-3 3'-6' S9-07.3-8	SB9-3 16'-18'.5 S9-08.1-8	SB9-3 20'-23' S9-09.1-4,7-8		Blank #5 Equipment			SB9-4 8'-13' S9-10.3-8	SB9-4 14'-16' S9-11.1-8	SB9-4 18'-21' S9-12.1-8	SB9-4 25'-27' S9-13.1-8	SB9-5 4'-9' S9-14.1-8	SB9-5 10'-13' S9-15.1-8	SB9-5 15'-17.5' S9-16.1, 3-5,7-8	SB9-5 18'-20' S9-17.1-5,7,8
TPH	mg/kg	<20	<20	110	mg/l	<1		mg/kg	120	70	70	280	<20	100	<20	<20
Methanol	mg/l	NA	NA	NA	mg/l	NA		mg/l	NA	NA	NA	NA	NA	NA	NA	NA
Methylene Chloride	ug/kg	NA	NA	NA	ug/l	NA		ug/kg	NA	NA	NA	NA	NA	NA	NA	NA
Acetone	ug/kg	NA	NA	NA	ug/l	NA		ug/kg	NA	NA	NA	NA	NA	NA	NA	NA
Carbon Disulfide	ug/kg	NA	NA	NA	ug/l	NA		ug/kg	NA	NA	NA	NA	NA	NA	NA	NA
Trichlorofluoromethane	ug/kg	NA	NA	NA	ug/l	NA		ug/kg	NA	NA	NA	NA	NA	NA	NA	NA
Ethyl Ether	ug/kg	NA	NA	NA	ug/l	NA		ug/kg	NA	NA	NA	NA	NA	NA	NA	NA
Freon (TF)	ug/kg	NA	NA	NA	ug/l	NA		ug/kg	NA	NA	NA	NA	NA	NA	NA	NA
2-Butanone	ug/kg	NA	NA	NA	ug/l	NA		ug/kg	NA	NA	NA	NA	NA	NA	NA	NA
1,1,1-Trichloroethane	ug/kg	NA	NA	NA	ug/l	NA		ug/kg	NA	NA	NA	NA	NA	NA	NA	NA
Carbon Tetrachloride	ug/kg	NA	NA	NA	ug/l	NA		ug/kg	NA	NA	NA	NA	NA	NA	NA	NA
Cyclohexanone	ug/kg	NA	NA	NA	ug/l	NA		ug/kg	NA	NA	NA	NA	NA	NA	NA	NA
Ethyl Acetate	ug/kg	NA	NA	NA	ug/l	NA		ug/kg	NA	NA	NA	NA	NA	NA	NA	NA
Isobutyl Alcohol	ug/kg	NA	NA	NA	ug/l	NA		ug/kg	NA	NA	NA	NA	NA	NA	NA	NA
2-Ethoxyethanol	ug/kg	NA	NA	NA	ug/l	NA		ug/kg	NA	NA	NA	NA	NA	NA	NA	NA
n-Butyl Alcohol	ug/kg	NA	NA	NA	ug/l	NA		ug/kg	NA	NA	NA	NA	NA	NA	NA	NA
Trichloroethene	ug/kg	NA	NA	NA	ug/l	NA		ug/kg	NA	NA	NA	NA	NA	NA	NA	NA
1,1,2-Trichloroethane	ug/kg	NA	NA	NA	ug/l	NA		ug/kg	NA	NA	NA	NA	NA	NA	NA	NA
Benzene	ug/kg	NA	NA	NA	ug/l	NA		ug/kg	NA	NA	NA	NA	NA	NA	NA	NA
4 Methyl 2 Pentanone	ug/kg	NA	NA	NA	ug/l	NA		ug/kg	NA	NA	NA	NA	NA	NA	NA	NA
Tetrachloroethane	ug/kg	NA	NA	NA	ug/l	NA		ug/kg	NA	NA	NA	NA	NA	NA	NA	NA
Toluene	ug/kg	NA	NA	NA	ug/l	NA		ug/kg	NA	NA	NA	NA	NA	NA	NA	NA
Chlorobenzene	ug/kg	NA	NA	NA	ug/l	NA		ug/kg	NA	NA	NA	NA	NA	NA	NA	NA
Ethylbenzene	ug/kg	NA	NA	NA	ug/l	NA		ug/kg	NA	NA	NA	NA	NA	NA	NA	NA
Xylene (total)	ug/kg	NA	NA	NA	ug/l	NA		ug/kg	NA	NA	NA	NA	NA	NA	NA	NA
Pyridine	ug/kg	NA	NA	NA	ug/l	NA		ug/kg	NA	NA	NA	NA	NA	NA	NA	NA
1,3-Dichlorobenzene	ug/kg	NA	NA	NA	ug/l	NA		ug/kg	NA	NA	NA	NA	NA	NA	NA	NA
1,4-Dichlorobenzene	ug/kg	NA	NA	NA	ug/l	NA		ug/kg	NA	NA	NA	NA	NA	NA	NA	NA
1,2-Dichlorobenzene	ug/kg	NA	NA	NA	ug/l	NA		ug/kg	NA	NA	NA	NA	NA	NA	NA	NA
2-Methylphenol	ug/kg	NA	NA	NA	ug/l	NA		ug/kg	NA	NA	NA	NA	NA	NA	NA	NA
3-Methylphenol	ug/kg	NA	NA	NA	ug/l	NA		ug/kg	NA	NA	NA	NA	NA	NA	NA	NA
4-Methylphenol	ug/kg	NA	NA	NA	ug/l	NA		ug/kg	NA	NA	NA	NA	NA	NA	NA	NA
Nitrobenzene	ug/kg	NA	NA	NA	ug/l	NA		ug/kg	NA	NA	NA	NA	NA	NA	NA	NA
Silver, total	mg/l	<.0005	<.0005	<.0005	mg/l	<.0006		mg/l	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005W	<.0005W
Arsenic, total	mg/l	0.01	<.003	<.003	mg/l	<.003		mg/l	.009B	<.003	<.003	<.003	.005B	<.003W	<.003W	<.003
Barium, total	mg/l	0.24	0.39	1.3	mg/l	<.05		mg/l	0.91	0.83	0.9	.17B	0.53	0.77	1.03	1.06
Cadmium, total	mg/l	.0006BW	.0009BW	<.0005W	mg/l	<.0005		mg/l	<.0005W	<.0005W	.0013BW	.0006BW	<.0005W	<.0005W	<.0005W	<.0005
Chromium, total	mg/l	<.006	.008B	.008B	mg/l	<.006		mg/l	<.006	<.006	<.006	<.006	<.006	<.006	<.006	<.006
Mercury, total	mg/l	<.0002	<.0002	<.0002	mg/l	<.0002		mg/l	<.0002	<.0002	<.0002	<.0002	<.0002	<.0002	<.0002	<.0002
Lead, total	mg/l	0.003	.002B	.002B	mg/l	0.003		mg/l	0.003	.002B	0.003	.002B	.002B	0.003	0.007	<.002N
Selenium,total	mg/l	<.003W	<.003W	<.003W	mg/l	<.003W		mg/l	<.003	<.003	<.003	<.003W	<.003W	<.003W	<.0003W	<.003WN

TABLE 1 (CONT)

SUMMARY OF ON-SITE CORE SAMPLE ANALYTICAL RESULTS

Roswell, New Mexico

Core Hole No. Sample Depth Sample ID		SB9-5 20'-22.5' S9-18.1-4,7	SB9-5 20-22.5' Tube #3	SB9-5 20'-22.5' Tube #4		Blank #6 Equipment	Blank #7 Trip			SB9-6 8-11' S9-20.1-8	SB9-6 18-20' S9-21.3-5,8	SB9-6 20'-23' S9-22.1-8	SB9-6 26'-28' S9-23.1,3,4,7		SB9-6 26'-28' Tube #5	SB9-6 26'-28' Tube #6
TPH	mg/kg	<20	<20	<20	mg/l	<1	<1		mg/kg	<20	<20	120	<20	mg/kg	<20	<20
Methanol	mg/l	NA	<1	<1	mg/l	<1	<1		mg/l	NA	NA	NA	NA	mg/kg	<50	<50
Methylene Chloride	ug/kg	NA	7*	10*	ug/l	<5	<5		ug/kg	NA	NA	NA	NA	ug/kg	16	9*
Acetone	ug/kg	NA	26	13	ug/l	<10*	<10		ug/kg	NA	NA	NA	NA	ug/kg	<10	<14
Carbon Disulfide	ug/kg	NA	<6	<6	ug/l	<5	<5		ug/kg	NA	NA	NA	NA	ug/kg	<5	<7
Trichlorofluoromethane	ug/kg	NA	<6	<6	ug/l	<5	<5		ug/kg	NA	NA	NA	NA	ug/kg	<5	<7
Ethyl Ether	ug/kg	NA	<6	<6	ug/l	<5	<5		ug/kg	NA	NA	NA	NA	ug/kg	<5	<7
Freon (TF)	ug/kg	NA	15*	15*	ug/l	<5	<5		ug/kg	NA	NA	NA	NA	ug/kg	6	23*
2-Butanone	ug/kg	NA	<11	<12	ug/l	<10	<10		ug/kg	NA	NA	NA	NA	ug/kg	<10	<14
1,1,1-Trichloroethane	ug/kg	NA	<6	<6	ug/l	<5	<5		ug/kg	NA	NA	NA	NA	ug/kg	<5	<7
Carbon Tetrachloride	ug/kg	NA	<6	<6	ug/l	<5	<5		ug/kg	NA	NA	NA	NA	ug/kg	<5	<7
Cyclohexanone	ug/kg	NA	<6	<6	ug/l	<5	<5		ug/kg	NA	NA	NA	NA	ug/kg	<5	<7
Ethyl Acetate	ug/kg	NA	<6	<6	ug/l	<5	<5		ug/kg	NA	NA	NA	NA	ug/kg	<5	<7
Isobutyl Alcohol	ug/kg	NA	<230	<230	ug/l	<200	<200		ug/kg	NA	NA	NA	NA	ug/kg	<200	<280
2-Ethoxyethanol	ug/kg	NA	<11	12	ug/l	<10	<10		ug/kg	NA	NA	NA	NA	ug/kg	<10	<14
n-Butyl Alcohol	ug/kg	NA	<110	<120	ug/l	<100	<100		ug/kg	NA	NA	NA	NA	ug/kg	<100	<140
Trichloroethene	ug/kg	NA	<6	<6	ug/l	<5	<5		ug/kg	NA	NA	NA	NA	ug/kg	<5	<7
1,1,2-Trichloroethane	ug/kg	NA	<6	<6	ug/l	<5	<5		ug/kg	NA	NA	NA	NA	ug/kg	<5	<7
Benzene	ug/kg	NA	<6	<6	ug/l	<5	<5		ug/kg	NA	NA	NA	NA	ug/kg	<5	<7
4 Methyl 2 Pentanone	ug/kg	NA	<11	<12	ug/l	<10	<10		ug/kg	NA	NA	NA	NA	ug/kg	<10	<14
Tetrachloroethane	ug/kg	NA	<6	<6	ug/l	<5	<5		ug/kg	NA	NA	NA	NA	ug/kg	<5	<7
Toluene	ug/kg	NA	<6	<6	ug/l	<5	<5		ug/kg	NA	NA	NA	NA	ug/kg	<5	<7
Chlorobenzene	ug/kg	NA	<6	<6	ug/l	<5	<5		ug/kg	NA	NA	NA	NA	ug/kg	<5	<7
Ethylbenzene	ug/kg	NA	<6	<6	ug/l	<5	<5		ug/kg	NA	NA	NA	NA	ug/kg	<5	<7
Xylene (total)	ug/kg	NA	<6	<6	ug/l	<5	<5		ug/kg	NA	NA	NA	NA	ug/kg	<5	<7
Pyridine	ug/kg	NA	<370	<380	ug/l	<40	<40		ug/kg	NA	NA	NA	NA	ug/kg	<340	<430
1,3-Dichlorobenzene	ug/kg	NA	<370	<380	ug/l	<40	<40		ug/kg	NA	NA	NA	NA	ug/kg	<340	<430
1,4-Dichlorobenzene	ug/kg	NA	<370	<380	ug/l	<40	<40		ug/kg	NA	NA	NA	NA	ug/kg	<340	<430
1,2-Dichlorobenzene	ug/kg	NA	<370	<380	ug/l	<40	<40		ug/kg	NA	NA	NA	NA	ug/kg	<340	<430
2-Methylphenol	ug/kg	NA	<370	<380	ug/l	<40	<40		ug/kg	NA	NA	NA	NA	ug/kg	<340	<430
3-Methylphenol	ug/kg	NA	<370	<380	ug/l	<40	<40		ug/kg	NA	NA	NA	NA	ug/kg	<340	<430
4-Methylphenol	ug/kg	NA	<370	<380	ug/l	<40	<40		ug/kg	NA	NA	NA	NA	ug/kg	<340	<430
Nitrobenzene	ug/kg	NA	<370	<380	ug/l	<40	<40		ug/kg	NA	NA	NA	NA	ug/kg	<340	<430
Silver, total	mg/l	.0022BW	<.0005W	<.0005	mg/l	<.0005	<.0005		mg/l	<.0005W	<.0005	.0026B	<.0005W	mg/l	<.0005W	<.0005
Arsenic, total	mg/l	.003B	.006B	.004B	mg/l	<.003	<.003		mg/l	.004B	<.003W	<.003	<.003W	mg/l	<.003	.009B
Barium, total	mg/l	1.12	0.27	0.62	mg/l	<.05	<.05		mg/l	0.63	1.21	0.7	1.22	mg/l	1.3	.010B
Cadmium, total	mg/l	.0005BW	.0005BW	.0010BW	mg/l	<.0005W	<.0005W		mg/l	.0010BW	<.0005	<.0005	.0006B	mg/l	.0012B	.0008B
Chromium, total	mg/l	<.006	<.006	<.006	mg/l	<.006	<.006		mg/l	<.006	<.006	0.011	.006B	mg/l	0.007B	0.011
Mercury, total	mg/l	<.0002	<.0002	<.0002	mg/l	<.0002	<.0002		mg/l	<.0002	<.0002	<.0002	<.0002	mg/l	<.0002	<.0002
Lead, total	mg/l	<.002N	<.002WN	<.002WN	mg/l	0.004	0.003		mg/l	<.002WN	<.002WN	<.002W	.008W	mg/l	.002W	<.002
Selenium,total	mg/l	.005BN	<.003N	<.003W	mg/l	<.003	<.003		mg/l	<.003WN	<.003N	<.003	<.003	mg/l	<.003	<.003

TABLE 1 (CONT)

SUMMARY OF ON-SITE CORE SAMPLE ANALYTICAL RESULTS

Roswell, New Mexico

Core Hole No. Sample Depth Sample ID		Blank #10 Equipment	Blank #11 Trip			SB9-7 9'-12' S9-24.1-8	SB9-7 21.5'-24' S9-25.1-8	SB9-7 25.5'-28' S9-26.1-8	SB9-7 29'-32' S9-27.3-8	SB9-7 29'-32' Tube #7	SB9-7 35'-37' S9-28.3-8	SB9-7 35'-37' Tube #8	SB9-7 35'-37' Tube #9		Blank #12 Field	Blank #13 Equipment
TPH	mg/l	<4	<4		mg/kg	1100	2000	2500	11000	5000	4600	13000	30000	mg/l	<4	<4
Methanol	mg/l	<50	<50		mg/l	NA	NA	NA	NA	<1	NA	<1	<1	mg/l	<10	<10
Methylene Chloride	ug/l	<5	<5		ug/kg	NA	NA	NA	NA	<1300	NA	<640	<670	ug/l	<5	<5
Acetone	ug/l	10	10		ug/kg	NA	NA	NA	NA	<2600	NA	<1300	<1300	ug/l	<10	<10
Carbon Disulfide	ug/l	<5	<5		ug/kg	NA	NA	NA	NA	<1300	NA	<640	<670	ug/l	<5	<5
Trichlorofluoromethane	ug/l	<5	<5		ug/kg	NA	NA	NA	NA	<1300	NA	<640	<670	ug/l	<5	<5
Ethyl Ether	ug/l	<5	<5		ug/kg	NA	NA	NA	NA	<1300	NA	<640	<670	ug/l	<5	<5
Freon (TF)	ug/l	7	6		ug/kg	NA	NA	NA	NA	5100	NA	<640	<670	ug/l	8	7
2-Butanone	ug/l	48	<10		ug/kg	NA	NA	NA	NA	<2600	NA	<1300	<1300	ug/l	<10	<10
1,1,1-Trichloroethane	ug/l	<5	<5		ug/kg	NA	NA	NA	NA	<1300	NA	<640	2000	ug/l	<5	<5
Carbon Tetrachloride	ug/l	<5	<5		ug/kg	NA	NA	NA	NA	<1300	NA	<640	<670	ug/l	<5	<5
Cyclohexanone	ug/l	<5	<5		ug/kg	NA	NA	NA	NA	<1300	NA	<640	<670	ug/l	<5	<5
Ethyl Acetate	ug/l	<5	<5		ug/kg	NA	NA	NA	NA	<1300	NA	<640	<670	ug/l	<5	<5
Isobutyl Alcohol	ug/l	<200	<200		ug/kg	NA	NA	NA	NA	<53000	NA	<26000	<27000	ug/l	<200	<200
2-Ethoxyethanol	ug/l	<10	<10		ug/kg	NA	NA	NA	NA	<2600	NA	<1300	<1300	ug/l	<10	<10
n-Butyl Alcohol	ug/l	<100	<100		ug/kg	NA	NA	NA	NA	<26000	NA	<13000	<13000	ug/l	<100	<100
Trichloroethene	ug/l	<5	<5		ug/kg	NA	NA	NA	NA	<1300	NA	<640	<670	ug/l	<5	<5
1,1,2-Trichloroethane	ug/l	<5	<5		ug/kg	NA	NA	NA	NA	<1300	NA	<640	<670	ug/l	<5	<5
Benzene	ug/l	<5	<5		ug/kg	NA	NA	NA	NA	<1300	NA	<640	<670	ug/l	<5	<5
4 Methyl 2 Pentanone	ug/l	<10	<10		ug/kg	NA	NA	NA	NA	<2600	NA	<1300	<1300	ug/l	<10	<10
Tetrachloroethane	ug/l	<5	<5		ug/kg	NA	NA	NA	NA	<1300	NA	<640	2100	ug/l	<5	<5
Toluene	ug/l	<5	<5		ug/kg	NA	NA	NA	NA	<1300	NA	<640	<670	ug/l	<5	<5
Chlorobenzene	ug/l	<5	<5		ug/kg	NA	NA	NA	NA	<1300	NA	<640	<670	ug/l	<5	<5
Ethylbenzene	ug/l	<5	<5		ug/kg	NA	NA	NA	NA	720	NA	1800	2800	ug/l	<5	<5
Xylene (total)	ug/l	<5	<5		ug/kg	NA	NA	NA	NA	1800	NA	4200	6500	ug/l	<5	<5
Pyridine	ug/l	<40	<87		ug/kg	NA	NA	NA	NA	<350	NA	<340	<21000	ug/l	<40	<40
1,3-Dichlorobenzene	ug/l	<40	<87		ug/kg	NA	NA	NA	NA	<350	NA	<340	<21000	ug/l	<40	<40
1,4-Dichlorobenzene	ug/l	<40	<87		ug/kg	NA	NA	NA	NA	<350	NA	<340	<21000	ug/l	<40	<40
1,2-Dichlorobenzene	ug/l	<40	<87		ug/kg	NA	NA	NA	NA	<350	NA	<340	<21000	ug/l	<40	<40
2-Methylphenol	ug/l	<40	<87		ug/kg	NA	NA	NA	NA	<350	NA	<340	<21000	ug/l	<40	<40
3-Methylphenol	ug/l	<40	<87		ug/kg	NA	NA	NA	NA	<350	NA	<340	<21000	ug/l	<40	<40
4-Methylphenol	ug/l	<40	<87		ug/kg	NA	NA	NA	NA	<350	NA	<340	<21000	ug/l	<40	<40
Nitrobenzene	ug/l	<40	<87		ug/kg	NA	NA	NA	NA	<350	NA	<340	<21000	ug/l	<40	<40
Silver, total	mg/l	<.0005	<.0005		mg/l	<.0005	<.0005WN	<.0005WN	<.0005WN	<.0005WN	<.0005WN	<.0005WN	<.0005WN	mg/l	.0005W	<.0005
Arsenic, total	mg/l	<.003	<.003		mg/l	<.003	0.004B	<.003W	.008B	.008B	.008B	.005B	.004BW	mg/l	<.003	<.003
Barium, total	mg/l	<.05	<.05		mg/l	0.75	2.22	1.81	3.59	1.81	1.72	1.84	3.12	mg/l	<.05	<.05
Cadmium, total	mg/l	.0010B	.0011BW		mg/l	.0005B	.0010B	<.0005	.0011BW	.0012BW	.0007BW	.0006BW	.0006BW	mg/l	<.0005	.0006B
Chromium, total	mg/l	<.006	<.006		mg/l	.007B	<.006	.009B	.009B	.006B	.007B	<.006	0.01	mg/l	.007B	<.006
Mercury, total	mg/l	<.0002	<.0002		mg/l	<.0002	<.0002	<.0002	<.0002	<.0002	<.0002	<.0002	<.0002	mg/l	<.0002	<.0002
Lead, total	mg/l	<.002B	<.002W		mg/l	.003BWN	<.002WN	<.002WN	<.002WN	<.002N	<.002NW	<.002WN	<.002WN	mg/l	<.002S	.002BS
Selenium,total	mg/l	<.003W	<.003		mg/l	<.003	<.003W	<.003WN	<.003	<.003W	<.003N	<.003N	<.003WN	mg/l	<.003	<.003W

TABLE 1 (CONT)

Core Hole No. Sample Depth Sample ID		Blank #14 Trip	Blank #15 Trip	Blank #16 Dist. Water
TPH	mg/l	<4	<1	<1
Methanol	mg/l	<1	<1	<1
Methylene Chloride	ug/l	<5	<5	<5
Acetone	ug/l	<10	<10	23
Carbon Disulfide	ug/l	<5	<5	<5
Trichlorofluoromethane	ug/l	<5	<5	<5
Ethyl Ether	ug/l	<5	<5	<5
Freon (TF)	ug/l	9*	7*	6*
2-Butanone	ug/l	<10	<10	150
1,1,1-Trichloroethane	ug/l	<5	<5	<5
Carbon Tetrachloride	ug/l	<5	<5	<5
Cyclohexanone	ug/l	<5	<5	<5
Ethyl Acetate	ug/l	<5	<5	<5
Isobutyl Alcohol	ug/l	<200	<200	<200
2-Ethoxyethanol	ug/l	<10	<10	<10
n-Butyl Alcohol	ug/l	<100	<100	<100
Trichloroethene	ug/l	<5	<5	<5
1,1,2-Trichloroethane	ug/l	<5	<5	<5
Benzene	ug/l	<5	<5	<5
4 Methyl 2 Pentanone	ug/l	<10	<10	<10
Tetrachloroethane	ug/l	<5	<5	<5
Toluene	ug/l	<5	<5	<5
Chlorobenzene	ug/l	<5	<5	<5
Ethylbenzene	ug/l	<5	<5	<5
Xylene (total)	ug/l	<5	<5	<5
Pyridine	ug/l	<40	<40	<40
1,3-Dichlorobenzene	ug/l	<40	<40	<40
1,4-Dichlorobenzene	ug/l	<40	<40	<40
1,2-Dichlorobenzene	ug/l	<40	<40	<40
2-Methylphenol	ug/l	<40	<40	<40
3-Methylphenol	ug/l	<40	<40	<40
4-Methylphenol	ug/l	<40	<40	<40
Nitrobenzene	ug/l	<40	<40	<40
Silver, total	mg/l	<.0005N	<.0005	<.0005
Arsenic, total	mg/l	<.003	<.003W	<.003
Barium, total	mg/l	<.05	<.05	<.05
Cadmium, total	mg/l	<.0005W	<.0005	<.0005
Chromium, total	mg/l	<.006	<.006	<.006
Mercury, total	mg/l	<.0002	<.0002	<.0002
Lead, total	mg/l	.004SN	<.002WN	<.002N
Selenium,total	mg/l	<.003	<.003N	<.003N

[redacted]

							Roswell, New Mexico											
Core Hole No. Sample Depth		P9-OS-213 (5') Soil	P9-OS-213 (10') Soil	P9-OS-213 (15') Soil	P9-OS-213 (30') Soil	P9-OS-213 (23') Soil	P9-OS-213 (29'-30') Rock	P9-OS-213 (31.5'-32') Soil	P9-OS-238 (5') Soil	P9-OS-238 (10') Soil	P9-OS-238 (15') Soil	P9-OS-238 (20') Soil	P9-OS-349 (5') Soil	P9-OS-349 (10') Soil	P9-OS-349 (20') Soil	P9-OS-349 (25') Soil		P9-OS-349 (25') Duplicate Soil/Water
TPH	mg/kg	<20	<20	<20	<20	<20	<20	<20	70	120	<20	50	<20	100	<20	100		
Methanol	mg/l	<5	<5	<5	<5	<5	<1	<5	<20	<5	<10	<20	<1	<5	<1	<10	ug/l	
Methylene Chloride	ug/kg	9	<6	<7	7	<5	<5	<6	<5	<5	<5	<5	6*	9	<5*	10	ug/l	NA
Acetone	ug/kg	32*	35*	59*	33*	29*	22*	39*	29*	22*	17*	19*	<11	<11	<11	<11	ug/l	NA
Carbon Disulfide	ug/kg	<6	<6	<5	<6	<5	<5	<6	<5	<5	<5	<5	<5	<6	<5	<5	ug/l	NA
Trichlorofluoromethane	ug/kg	<6	<6	<5	<6	<5	<5	<6	<5	<5	<5	<5	<5	<6	<5	<5	ug/l	NA
Ethyl Ether	ug/kg	<6	<6	<5	<6	<5	<5	<6	<5	<5	<5	<5	<5	<6	<5	<5	ug/l	NA
Freon (TF)	ug/kg	<6	<6	<5	<6	<5	<5	<6	<5	<5	<5	<5	26*	18	45*	21	ug/l	NA
2-Butanone	ug/kg	<12	<12	<10	<13	<10	<10	<12	<10	<10	<10	<10	<11	<11	<11	<11	ug/l	NA
1,1,1-Trichloroethane	ug/kg	<6	<6	<5	<6	<5	<5	<6	<5	<5	<5	<5	<5	<6	<5	<5	ug/l	NA
Carbon Tetrachloride	ug/kg	<6	<6	<5	<6	<5	<5	<6	<5	<5	<5	<5	<5	<6	<5	<5	ug/l	NA
Cyclohexanone	ug/kg	<6	<6	<5	<6	<5	<5	<6	<5	<5	<5	<5	<5	<6	<5	<5	ug/l	NA
Ethyl Acetate	ug/kg	<6	<6	<5	<6	<5	<5	<6	<5	<5	<5	<5	<5	<6	<5	<5	ug/l	NA
Isobutyl Alcohol	ug/kg	<230	<230	<210	<260	<200	<200	<250	<200	<210	<210	<210	<220	<220	<210	<220	ug/l	NA
2-Ethoxyethanol	ug/kg	<12	<12	<10	<13	<10	<10	<12	<10	<10	<10	<10	<11	<11	<11	<11	ug/l	NA
n-Butyl Alcohol	ug/kg	<120	<120	<100	<130	<100	<100	<120	<100	<100	<100	<100	<110	<110	<110	<110	ug/l	NA
Trichloroethene	ug/kg	<6	<6	<5	<6	<5	<5	<6	<5	<5	<5	<5	<5	<6	<5	<5	ug/l	NA
1,1,2-Trichloroethane	ug/kg	<6	<6	<5	<6	<5	<5	<6	<5	<5	<5	<5	<5	<6	<5	<5	ug/l	NA
Benzene	ug/kg	<6	<6	<5	<6	<5	<5	<6	<5	<5	<5	<5	<5	<6	<5	<5	ug/l	NA
2 Methyl 4 Pentanone	ug/kg	<12	<12	<10	<13	<10	<10	<12	<10	<10	<10	<10	<11	<11	<11	<11	ug/l	NA
Tetrachloroethane	ug/kg	<6	<6	<5	<6	<5	<5	<6	<5	<5	<5	<5	<5	<6	<5	<5	ug/l	NA
Toluene	ug/kg	<6	<6	<5	<6	<5	<5	<6	<5	<5	<5	<5	<5	<6	<5	<5	ug/l	NA
Chlorobenzene	ug/kg	<6	<6	<5	<6	<5	<5	<6	<5	<5	<5	<5	<5	<6	<5	<5	ug/l	NA
Ethylbenzene	ug/kg	<6	<6	<5	<6	<5	<5	<6	<5	<5	<5	<5	<5	<6	<5	<5	ug/l	NA
Xylene (total)	ug/kg	<6	<6	<5	<6	<5	<5	<6	<5	<5	<5	<5	<5	<6	<5	<5	ug/l	NA
Pyridine	ug/kg	<380	<380	<340	<420	<340	<330	<410	<340	<340	<340	<340	<350	<370	<350	Not Tested	ug/l	NA
1,3-Dichlorobenzene	ug/kg	<380	<380	<340	<420	<340	<330	<410	<340	<340	<340	<340	<350	<370	<350	Not Tested	ug/l	NA
1,4-Dichlorobenzene	ug/kg	<380	<380	<340	<420	<340	<330	<410	<340	<340	<340	<340	<350	<370	<350	Not Tested	ug/l	NA
1,2-Dichlorobenzene	ug/kg	<380	<380	<340	<420	<340	<330	<410	<340	<340	<340	<340	<350	<370	<350	Not Tested	ug/l	NA
2-Methylphenol	ug/kg	<380	<380	<340	<420	<340	<330	<410	<340	<340	<340	<340	<350	<370	<350	Not Tested	ug/l	NA
3-Methylphenol	ug/kg	<380	<380	<340	<420	<340	<330	<410	<340	<340	<340	<340	<350	<370	<350	Not Tested	ug/l	NA
4-Methylphenol	ug/kg	<380	<380	<340	<420	<340	<330	<410	<340	<340	<340	<340	<350	<370	<350	Not Tested	ug/l	NA
Nitrobenzene	ug/kg	<380	<380	<340	<420	<340	<330	<410	<340	<340	<340	<340	<350	<370	<350	Not Tested	ug/l	NA
Silver, total	mg/l	<0.0006	<.0006	<.0006	<.0006	<.0006	<.0006	<.0006	<.0006	<.0006	<.0006	<.0006	<.0006	<.0006	<.0006	Not Tested	mg/l	<.0006
Arsenic, total	mg/l	0.008	.007B	.004B	<.003W	<.003	<.003W	.004B	.004BW	<.003	.003B	.003B	.007B	.005B	<.003	Not Tested	mg/l	<.003
Barium, total	mg/l	1.34	15B	0.22	1.05	1.54	2.03	0.68	1.01	0.39	0.33	<.06	1.21	0.4	0.77	Not Tested	mg/l	0.96
Cadmium, total	mg/l	<.0008BW	<.0006	<.0006	<.0006W	<.0006W	<.0006BW	.0011BW	.0009BW	<.0006	.0009B	<.0006	.0009BW	<.0006	<.0006	Not Tested	mg/l	.0009BW
Chromium, total	mg/l	<.007	<.007	<.007	<.007	<.007	<.007	<.007	0.011	.007B	0.01	0.01	0.012	0.013	.009B	Not Tested	mg/l	.007B
Mercury, total	mg/l	<.0002	<.0002	<.0002	<.0002	<.0002	<.0002	<.0002	<.0002	<.0002	<.0002	<.0002	<.0002	<.0002	<.0002	Not Tested	mg/l	<.0002
Lead, total	mg/l	<.002W	<.002	<.002W	<.002W	<.002W	0.004	.003B	.003N	.007N	.005N	.005WN	0.012	.0115	0.004	Not Tested	mg/l	0.009
Selenium,total	mg/l	<.003W	<.01W	<.003	<.003W	<.003W	<.01	<.003W	<.003W	<.003W	<.003W	<.02	<.003	<.01W	<.003W	Not Tested	mg/l	<.003W

TABLE 2 PHASE B

SUMMARY OF OFF-SITE CORE SAMPLE ANALYTICAL RESULTS

Roswell, New Mexico

Core Hole No. / Sample Depth		P9-OS-349 (30') Soil	P9-OS-349 (35') Soil	P9-OS-349 (40') Soil	P9-OS-377 (5') Soil	P9-OS-377 (10') Soil	P9-OS-377 (15') Soil	P9-OS-377 (20') Soil	P9-OS-377 (25') Soil	P9-OS-377 (30') Soil		P9-OS-377 (30') Duplicat Soil/Water	Field Blank	Field Blank	Trip Blank
TPH	mg/kg	<20	<20	<20	200	<20	<20	<20	<20	<20	mg/l	NA	<1	<1	<1
Methanol	mg/l	<5	<1	<5	<5	<1	<1	<5	<1	<5	mg/l	NA	<1	<1	<1
Methylene Chloride	ug/kg	<7	15	8	<6	<6	11	7	36	23	ug/l	NA	22*	<5	23*
Acetone	ug/kg	<14	<14	<10	34*	27*	27*	37*	<12	<13	ug/l	NA	<10	<10	<10
Carbon Disulfide	ug/kg	<7	<7	<5	<6	<6	<6	<7	<6	<7	ug/l	NA	<5	<5	<5
Trichlorofluoromethane	ug/kg	<7	<7	<5	<6	<6	<6	<7	<6	<7	ug/l	NA	<5	5	<5
Ethyl Ether	ug/kg	<7	<7	<5	<6	<6	<6	<7	<6	<7	ug/l	NA	<5	<5	<5
Freon (TF)	ug/kg	45*	39	40	<6	<6	<6	<7	46	69	ug/l	NA	<5	<5	<5
2-Butanone	ug/kg	<14	<14	<10	<11	<12	<12	<13	<12	<13	ug/l	NA	<10	<10	<10
1,1,1-Trichloroethane	ug/kg	<7	<7	<5	<6	<6	<6	<7	<6	<7	ug/l	NA	<5	<5	<5
Carbon Tetrachloride	ug/kg	<7	<7	<5	<6	<6	<6	<7	<6	<7	ug/l	NA	<5	<5	<5
Cyclohexanone	ug/kg	<7	<7	<5	<6	<6	<6	<7	<6	<7	ug/l	NA	<5	<5	<5
Ethyl Acetate	ug/kg	<7	<7	<5	<6	<6	<6	<7	<6	<7	ug/l	NA	<5	<5	<5
Isobutyl Alcohol	ug/kg	<290	<270	<200	<220	<240	<240	<270	<250	<260	ug/l	NA	<200	<200	<200
2-Ethoxyethanol	ug/kg	<14	<14	<10	<11	<12	<12	<13	<12	<13	ug/l	NA	<10	<10	<10
n-Butyl Alcohol	ug/kg	<140	<140	<100	<110	<120	<120	<130	<120	<130	ug/l	NA	<100	<100	<100
Trichloroethene	ug/kg	<7	<7	<5	<6	<6	<6	<7	<6	<7	ug/l	NA	<5	<5	<5
1,1,2-Trichloroethane	ug/kg	<7	<7	<5	<6	<6	<6	<7	<6	<7	ug/l	NA	<5	<5	<5
Benzene	ug/kg	<7	<7	<5	<6	<6	<6	<7	<6	<7	ug/l	NA	<5	<5	<5
2 Methyl 4 Pentanone	ug/kg	<14	<14	<10	<11	<12	<12	<13	<12	<13	ug/l	NA	<10	<10	<10
Tetrachloroethane	ug/kg	<7	<7	<5	<6	<6	<6	<7	<6	<7	ug/l	NA	<5	<5	<5
Toluene	ug/kg	<7	<7	<5	<6	<6	<6	<7	<6	<7	ug/l	NA	<5	<5	<5
Chlorobenzene	ug/kg	<7	<7	<5	<6	<6	<6	<7	<6	<7	ug/l	NA	<5	<5	<5
Ethylbenzene	ug/kg	<7	<7	<5	<6	<6	<6	<7	<6	<7	ug/l	NA	<5	<5	<5
Xylene (total)	ug/kg	<7	<7	<5	<6	<6	<6	<7	<6	<7	ug/l	NA	<5	<5	<5
Pyridine	ug/kg	<480	<450	<390	<370	<400	<400	<440	<410	Not Tested	ug/l	NA	<10	<10	<10
1,3-Dichlorobenzene	ug/kg	<480	<450	<390	<370	<400	<400	<440	<410	Not Tested	ug/l	NA	<10	<10	<10
1,4-Dichlorobenzene	ug/kg	<480	<450	<390	<370	<400	<400	<440	<410	Not Tested	ug/l	NA	<10	<10	<10
1,2-Dichlorobenzene	ug/kg	<480	<450	<390	<370	<400	<400	<440	<410	Not Tested	ug/l	NA	<10	<10	<10
2-Methylphenol	ug/kg	<480	<450	<390	<370	<400	<400	<440	<410	Not Tested	ug/l	NA	<10	<10	<10
3-Methylphenol	ug/kg	<480	<450	<390	<370	<400	<400	<440	<410	Not Tested	ug/l	NA	<10	<10	<10
4-Methylphenol	ug/kg	<480	<450	<390	<370	<400	<400	<440	<410	Not Tested	ug/l	NA	<10	<10	<10
Nitrobenzene	ug/kg	<480	<450	<390	<370	<400	<400	<440	<410	Not Tested	ug/l	NA	<10	<10	<10
Silver, total	mg/l	<.0006	<.0006	<.0006	<.0006	<.0006	<.0006	<.0006W	<.0006	<.0006	mg/l	<.0006	<.0006	<.0006	<.0006
Arsenic, total	mg/l	<.003	<.003	0.005B	.004B	0.01	<.003	.003B	.006B	0.011	mg/l	0.011	<.003	<.003	<.003
Barium, total	mg/l	1.48	1.36	0.23	1.05	.19B	.15B	.16B	.06B	0.32	mg/l	0.32	<.06	<.06	<.06
Cadmium, total	mg/l	<.0006	<.0006W	0.0013BW	<.0006W	.0018BW	.003B	.0010B	.0009B	<.0006	mg/l	<0.0006	<.0006W	<.0006W	<.0006W
Chromium, total	mg/l	.009B	0.011	<.007	.009B	.007B	0.011	0.011	<.007	<.007	mg/l	<0.007	<0.007	<0.007	<0.007
Mercury, total	mg/l	<.0002	<.0002	<.0002	<.0002	<.0002	<.0002	<.0002	<.0002	<.0002	mg/l	<.0002	<.0002	<.0002	<.0002
Lead, total	mg/l	0.007	0.005	<.002W	0.003	0.004	0.009	.003BW	<.002W	<.002	mg/l	<.002W	.003B	.003B	.002BW
Selenium,total	mg/l	<.003W	<.003W	<.003W	<.003W	<.01W	<.003W	<.01W	<.02	<.003	mg/l	<.003	<.003W	<.003	<.003W

TABLE 2 (CONT)

TABLE 2

Analysis Results for Soil Gas Samples, ppm v/v

Roswell, New Mexico
2/6/90 - 3/17/90

SAMPLE ID	DEPTH (FT.)	1,1,1-TCA PPM (V/V)	TCE PPM (V/V)	PCE PPM (V/V)	$CHCl_3$ PPM (V/V)	CCl_4 PPM (V/V)
N-00	2.0	0.02	-	1.46	-	-
N-00	4.0	-	-	0.09	-	-
N-00	9.0	-	-	0.01	-	-
N-00	14.0	0.02	-	0.45	-	-
N-01	2.0	-	-	-	-	-
N-01	4.5	-	-	-	-	-
N-01	9.0	-	-	-	-	-
N-02	2.0	-	-	<0.01	-	-
N-02	4.0	-	-	0.01	-	-
N-02	9.0	-	-	0.01	-	-
N-02	14.0	-	-	<0.01	-	-
N-03	2.0	-	-	-	-	-
N-03	4.5	-	-	-	-	-
N-03	9.0	-	-	-	-	-
N-04	2.0	-	-	-	-	-
N-04	5.0	-	-	-	-	-
N-05	4.0	-	-	-	-	-
N-06	2.0	-	-	-	-	-
N-07	1.0	0.02	-	-	-	-
N-07	3.5	0.35	-	<0.01	-	-
N-08	1.0	-	-	<0.01	-	-
N-09	1.0	0.06	-	0.03	-	-
N-09	4.5	0.31	-	0.13	-	-
N-09	6.8	0.40	-	0.20	-	-
N-09	14.0	0.62	-	0.34	-	-
N-10	8.0	-	-	-	-	-
N-11	2.0	-	-	-	-	-
N-11	4.5	<0.01	-	-	-	-
N-11	9.0	<0.01	-	-	-	-
N-12	1.0	<0.01	-	-	-	-
N-12	4.0	0.02	-	<0.01	-	-
N-12	9.5	0.05	-	<0.01	-	-
N-12	14.0	0.07	-	<0.01	-	-
N-13	3.0	0.02	-	-	-	-
N-13	4.5	0.03	-	-	-	-

SAMPLE ID	DEPTH (FT.)	1,1,1-TCA PPM (V/V)	TCE PPM (V/V)	PCE PPM (V/V)	$CHCl_3$ PPM (V/V)	CCl_4 PPM (V/V)
N-13	28.0	0.15	-	0.17	-	-
N-14	2.0	0.11	-	-	-	-
N-14	4.5	0.14	-	-	-	-
N-14	11.0	0.38	-	0.02	-	-
N-14	34.0	0.14	-	0.14	-	-
N-15	2.0	<0.01	-	-	-	-
N-15	4.0	0.01	-	-	-	-
N-15	36.0	0.06	-	0.01	-	-
N-16	2.0	-	-	-	-	-
N-16	4.5	-	-	-	-	-
N-16A	2.0	0.01	-	-	-	-
N-16A	9.0	0.02	-	-	-	-
N-16A	14.0	0.06	-	-	-	-
N-17	1.5	-	-	-	-	-
N-17	4.0	<0.01	-	<0.01	0.01	0.01
N-17	18.0	-	-	<0.01	0.05	0.02
N-18	2.0	-	-	-	-	-
N-18	4.0	-	-	-	-	-
N-18	21.0	-	-	-	-	-
N-19	2.0	0.04	-	-	-	-
N-19	4.5	0.08	-	<0.01	<0.01	-
N-19	9.0	0.21	-	0.01	0.02	-
N-19	13.0	0.52	-	0.04	0.07	-
N-20	2.0	0.04	-	0.03	-	-
N-20	4.0	0.23	-	0.19	<0.01	-
N-22	2.0	0.06	-	0.01	0.22	0.07
N-22	5.0	0.08	-	0.02	0.34	0.10
N-22	28.0	0.16	-	0.22	0.20	0.13
N-23	2.0	-	-	-	-	-
N-23A	4.0	-	-	-	-	-
N-23A	9.0	-	-	-	-	-
N-24	2.0	-	-	-	-	-
N-24	4.0	-	-	-	-	-
N-25	1.0	0.04	-	-	<0.01	-
N-25	4.0	0.07	-	<0.01	0.02	-
N-25	9.0	0.09	-	0.01	0.03	-
N-25	14.0	0.18	-	0.02	0.08	-
N-25	28.0	0.23	-	0.01	0.03	-
N-26	2.0	3.87	0.07	3.65	-	<0.01
N-26	4.0	2.93	0.05	3.65	-	<0.01

SAMPLE ID	DEPTH (FT.)	1,1,1-TCA PPM (V/V)	TCE PPM (V/V)	PCE PPM (V/V)	$CHCl_3$ PPM (V/V)	CCl_4 PPM (V/V)
N-26	28.0	-	-	0.05	-	-
N-27	2.0	0.48	-	0.48	0.01	-
N-27	4.0	1.25	0.02	1.73	0.06	-
N-27	9.0	1.38	0.02	1.98	0.08	-
N-27	28.0	-	-	<0.01	-	-
N-28	2.0	0.17	-	0.02	-	-
N-28	5.0	0.20	-	0.03	-	-
N-28	29.0	-	-	-	-	-
N-29	2.0	<0.01	-	-	-	-
N-29	4.0	0.02	-	-	-	-
N-29	28.0	-	-	-	-	-
N-30	2.0	0.41	-	0.76	-	-
N-30	4.0	0.41	0.01	0.89	-	-
N-30	23.0	0.44	0.03	1.22	-	-
N-31	2.0	0.19	-	0.27	-	-
N-31	4.0	0.23	-	0.23	-	-
N-32	2.0	-	-	-	-	-
N-32	4.0	-	-	-	-	-
N-32	9.0	<0.01	-	-	-	-
N-33	1.0	<0.01	-	-	-	-
N-33	4.5	0.18	0.38	-	-	-
N-33	9.0	0.07	0.08	-	-	-
N-33	13.0	0.03	0.02	-	-	-
N-33	19.0	0.05	-	-	-	-
N-34	2.0	-	-	<0.01	-	-
N-34	4.0	-	-	-	-	-
N-34	9.0	-	-	-	-	-
N-34	14.0	<0.01	-	-	-	-
N-34	19.0	<0.01	-	-	-	-
N-35	2.0	-	-	-	-	-
N-35	4.0	-	-	-	-	-
N-35	9.0	-	-	-	-	-
N-36	2.0	0.43	-	0.02	-	-
N-36	4.0	0.35	-	0.02	-	-
N-36	9.0	0.53	-	0.04	-	-
N-36	10.5	0.53	-	0.04	-	-
N-37	2.0	<0.01	-	<0.01	-	-
N-37	4.0	<0.01	-	<0.01	-	-
N-37	15.0	0.03	-	0.06	-	-
N-38	2.0	-	-	0.04	-	-

SAMPLE ID	DEPTH (FT.)	1,1,1-TCA PPM (V/V)	TCE PPM (V/V)	PCE PPM (V/V)	$CHCl_3$ PPM (V/V)	CCl_4 PPM (V/V)
N-38	5.0	-	-	0.06	-	-
N-38	10.0	-	-	0.06	-	-
N-38	14.0	-	-	0.07	-	-
N-38	23.5	<0.01	-	0.07	-	-
N-39	2.0	<0.01	-	0.01	-	-
N-39	4.5	<0.01	-	0.02	-	-
N-39	9.0	0.01	-	0.02	-	-
N-39	14.0	0.01	-	0.02	-	-
N-39	19.0	0.02	-	0.02	-	-
N-40	2.0	0.01	-	<0.01	-	-
N-40	5.0	0.03	-	0.02	-	-
N-40	9.0	0.04	-	0.03	-	-
N-40	14.0	0.07	-	0.04	-	-
N-41	2.0	0.01	-	-	-	-
N-41	9.0	0.11	-	0.01	-	-
N-42	1.5	0.14	-	0.01	-	-
N-42	4.5	0.23	-	0.02	-	-
N-42	9.5	0.28	-	0.02	-	-
N-43	2.0	0.02	-	<0.01	0.01	<0.01
N-43	4.0	0.02	-	<0.01	0.02	<0.01
N-43	9.0	0.03	-	<0.01	0.04	<0.01
N-43	14.0	0.05	-	0.02	0.04	<0.01
N-44	2.0	0.01	-	-	-	-
N-44	4.0	0.02	-	<0.01	-	-
N-44	9.0	0.02	-	<0.01	-	-
N-45	2.0	0.05	-	<0.01	0.01	0.06
N-45	4.0	0.11	-	0.01	0.03	0.08
N-45	9.0	0.12	-	0.02	0.05	0.16
N-45	14.0	0.20	-	0.03	0.05	0.17
N-46	2.0	0.13	-	-	-	-
N-46	4.0	0.21	-	-	-	-
N-46	9.0	0.30	-	-	-	-
N-47	2.0	-	-	-	<0.01	<0.01
N-47	4.0	-	-	-	<0.01	<0.01
N-47	9.0	-	-	-	0.03	0.01
N-47	29.0	-	-	-	0.02	<0.01
N-48	1.0	-	-	-	-	-
N-48	4.0	-	-	-	-	<0.01
N-48	9.0	-	-	-	<0.01	<0.01
N-48	28.5	-	-	-	<0.01	<0.01

SAMPLE ID	DEPTH (FT.)	1,1,1-TCA PPM (V/V)	TCE PPM (V/V)	PCE PPM (V/V)	$CHCl_3$ PPM (V/V)	CCl_4 PPM (V/V)
N-49	2.0	0.05	-	0.18	-	-
N-49	4.0	0.05	-	0.21	-	-
N-49	9.0	0.06	-	0.24	-	-
N-49	14.0	0.08	-	0.29	-	-
N-50	2.0	0.03	-	<0.01	-	-
N-50	4.0	0.04	-	<0.01	-	-
N-50	9.0	0.05	-	<0.01	-	-
N-50	14.0	0.10	-	0.02	-	-
N-51	1.5	-	-	-	-	-
N-51	4.0	<0.01	-	<0.01	-	-
N-51	8.0	<0.01	-	<0.01	-	-
N-52	2.0	-	-	-	-	-
N-52	5.0	-	-	-	-	-
N-52	9.0	-	-	-	-	-
N-53	2.0	-	-	<0.01	-	-
N-53	5.0	<0.01	-	<0.01	-	-
N-53	9.0	<0.01	-	<0.01	-	-
N-53	26.0	-	-	-	-	-
N-54	1.0	-	-	-	-	-
N-54	4.0	<0.01	-	-	-	-
N-54	9.0	0.01	-	-	-	-
N-55	2.0	-	-	-	-	-
N-55	4.0	-	-	-	-	-
N-55	9.0	-	-	-	-	-
N-55	18.5	-	-	-	-	-
N-56	1.0	-	-	-	-	-
N-56	5.0	-	-	-	-	-
N-56	9.0	-	-	-	-	-
N-56	18.5	-	-	-	-	-
N-56	24.5	0.03	-	0.02	-	-
N-57	2.0	0.02	-	0.01	-	-
N-57	4.5	0.02	-	0.01	-	-
N-57	9.5	0.04	-	0.02	-	-
N-57	26.0	0.41	-	0.04	-	-
N-58	1.0	0.03	-	-	-	-
N-58	4.0	0.08	-	-	-	-
N-58	9.0	PC	PC	PC	PC	PC
N-58	14.0	PC	PC	PC	PC	PC
N-58	26.5	0.12	-	-	<0.01	<0.01
N-59	2.0	-	-	-	-	-

PC = Probe Clogged

SAMPLE ID	DEPTH (FT.)	1,1,1-TCA PPM (V/V)	TCE PPM (V/V)	PCE PPM (V/V)	$CHCl_3$ PPM (V/V)	CCl_4 PPM (V/V)
N-59	4.0	-	-	-	0.02	<0.01
N-59	9.0	-	-	-	0.02	<0.01
N-60	2.0	-	-	-	<0.01	<0.01
N-60	4.0	-	-	-	0.02	<0.01
N-60	9.0	-	-	-	0.04	<0.01
N-60	31.0	0.06	-	-	<0.01	<0.01
N-61	2.0	0.04	-	0.02	-	-
N-61	4.0	0.02	-	0.02	-	-
N-61	9.0	0.06	-	0.05	-	-
N-61	14.0	0.08	-	0.09	-	-
N-61	26.0	0.68	-	0.18	-	-
N-62	2.0	-	-	<0.01	-	-
N-62	4.0	-	-	<0.01	-	-
N-62	9.0	<0.01	-	0.02	-	-
N-62	14.0	<0.01	-	0.03	-	-
N-63	2.,0	<0.01	-	<0.01	-	-
N-63	4.0	<0.01	-	<0.01	-	-
N-63	9.0	0.02	-	0.01	-	-
N-63	27.0	0.09	-	0.03	-	-
N-64	1.0	<0.01	-	-	-	-
N-64	4.0	0.02	-	<0.01	-	-
N-64	9.0	0.03	-	0.01	-	-
N-64	14.0	0.04	-	0.02	-	-
N-65	1.0	<0.01	-	<0.01	-	-
N-65	4.0	0.04	-	0.03	-	-
N-65	8.0	0.05	-	0.04	-	-
N-65	19.0	0.12	-	0.10	-	-
N-65	35.0	0.10	-	0.13	-	-
N-66*	2.0	-	-	0.06	-	-
N-66*	5.0	<0.01	-	0.13	-	-
N-66*	10.0	0.02	-	0.23	-	-
N-66*	15.0	0.03	-	0.21	0.03	-
N-66*	20.0	0.17	-	0.85	0.03	-
N-67*	1.0	-	-	-	-	-
N-67*	5.0	SD	SD	SD	SD	SD
N-67	10.0	-	-	0.01	-	-
N-67	25.0	0.03	-	0.05	-	-
N-68	2.0	0.05	-	0.01	-	-
N-68	5.0	0.06	-	0.01	-	-
N-68	9.0	0.07	-	0.02	-	-

SD = Sample Destroyed
* Analyzed on 3400 GC

SAMPLE ID	DEPTH (FT.)	1,1,1-TCA PPM (V/V)	TCE PPM (V/V)	PCE PPM (V/V)	$CHCl_3$ PPM (V/V)	CCl_4 PPM (V/V)
N-68	25.5	-	-	-	-	-
N-69	2.0	-	-	-	-	-
N-69	4.0	-	-	0.01	-	-
N-69	9.0	-	-	0.02	-	-
N-69	14.0	-	-	0.03	-	-
N-69	30.0	0.01	-	0.07	-	-
N-70	2.0	0.02	-	0.05	-	-
N-70	5.0	0.02	-	0.06	-	-
N-70	21.0	-	-	-	-	-
N-71	2.0	<0.01	-	-	-	-
N-71	4.0	0.02	-	<0.01	-	-
N-71	9.0	0.04	-	0.01	-	-
N-71	21.0	0.07	-	0.02	-	-
N-72	2.0	<0.01	-	-	-	-
N-72	4.0	<0.01	-	-	-	-
N-72	9.0	0.05	-	0.01	-	-
N-72	14.0	0.05	0.03	0.02	-	-
N-72	25.0	0.05	0.04	0.02	-	-
N-73	2.0	-	-	<0.01	-	-
N-73	5.0	0.01	-	0.02	-	-
N-73	9.0	0.02	-	0.02	-	-
N-73	25.0	0.06	-	0.04	-	-
N-74	2.0	-	-	0.01	-	-
N-74	4.0	-	-	0.03	-	-
N-74	9.0	<0.01	-	0.06	-	-
N-74	14.0	0.01	-	0.08	-	-
N-74	29.0	0.03	-	0.07	-	-
N-75	2.0	-	-	-	-	-
N-75	4.0	-	-	-	-	-
N-75	9.0	-	-	-	-	-
N-75	24.0	-	-	-	-	-
N-76	1.5	-	-	-	-	-
N-76	5.0	-	-	-	-	-
N-76	9.0	-	-	-	-	-
N-76	24.5	-	-	-	-	-
N-78	2.0	-	-	-	-	-
N-78	4.0	-	-	-	-	-
N-78	9.0	-	-	-	-	-
N-78	14.0	-	-	-	-	-
N-80	2.0	-	-	-	-	-

* Analyzed on 3400 GC

SAMPLE ID	DEPTH (FT.)	1,1,1-TCA PPM (V/V)	TCE PPM (V/V)	PCE PPM (V/V)	$CHCl_3$ PPM (V/V)	CCl_4 PPM (V/V)
N-80	5.0	-	-	-	-	-
N-80	10.0	-	-	-	-	-
N-80	15.0	-	-	-	-	-
N-80	28.0	-	-	-	-	-
N-81	2.0	-	-	-	-	-
N-81	5.0	-	-	-	-	-
N-81	10.0	-	-	-	-	-
N-81	15.0	-	-	<0.01	-	-
N-81	20.0	-	-	0.01	-	-
N-81	32.0	-	-	<0.01	-	-
N-82	1.0	0.02	-	0.02	-	-
N-82	4.5	0.09	-	0.09	-	-
N-82	9.0	0.18	-	0.15	-	-
N-83	2.0	0.10	-	0.07	-	-
N-83	5.0	0.21	-	0.14	-	-
N-83	9.0	0.51	-	0.33	-	-
N-83	14.0	0.33	-	0.20	-	-
N-83	37.0	1.02	-	0.89	-	-
N-84*	2.0	0.11	-	0.04	-	-
N-84*	5.0	0.76	-	0.26	-	-
N-84*	10.0	0.53	-	0.12	-	-
N-84*	15.0	4.19	-	1.76	-	-
N-84*	31.0	NS	NS	NS	NS	NS
N-85	1.0	0.21	-	0.07	-	-
N-85	4.0	1.61	-	0.39	-	-
N-85	9.0	1.75	-	0.59	-	-
N-85	14.0	1.99	-	0.83	-	-
N-85	30.0	3.71	0.06	2.14	-	-
N-86	1.0	0.08	-	0.06	-	-
N-86	4.0	1.50	-	0.90	-	-
N-86	8.0	4.09	-	2.32	-	-
N-86	20.0	15.61	0.58	12.19	-	-
N-86	39.5	-	-	0.01	-	-
N-87*	2.0	0.22	-	0.02	-	-
N-87*	5.0	1.95	-	0.13	-	-
N-87*	10.0	4.27	0.02	0.37	-	-
N-87*	15.0	7.29	0.05	0.92	-	-
N-87*	28.0	11.51	0.06	1.78	-	-
N-89*	2.0	0.12	-	<0.01	-	-
N-89*	5.0	0.56	-	0.04	-	-

NS = No Sample
* Analyzed on 3400 GC

SAMPLE ID	DEPTH (FT.)	1,1,1-TCA PPM (V/V)	TCE PPM (V/V)	PCE PPM (V/V)	$CHCl_3$ PPM (V/V)	CCl_4 PPM (V/V)
N-89*	10.0	1.06	-	0.09	-	-
N-89*	15.0	NS	NS	NS	NS	NS
N-89*	20.0	1.31	-	0.18	-	-
N-90*	2.0	6.18	-	-	-	-
N-90*	5.0	6.87	-	-	-	-
N-90*	10.0	13.73	-	0.02	-	-
N-90*	15.0	33.89	-	-	-	-
N-90*	27.0	30.77	-	-	-	-
N-91*	2.0	58.85	-	<0.01	-	-
N-91*	5.0	124.61	-	-	-	-
N-91*	10.0	175.18	-	-	-	-
N-91*	19.0	224.46	-	0.05	-	-
N-91*	28.0	371.86	-	0.29	-	-
N-92*	2.0	NS	NS	NS	NS	NS
N-92*	5.0	32.27	-	<0.01	-	-
N-92*	10.0	182.28	-	-	-	-
N-92*	15.0	177.95	-	-	-	-
N-92*	27.0	NS	NS	NS	NS	NS
N-93*	2.0	12.57	-	-	-	-
N-93*	5.0	99.53	-	-	-	-
N-93*	10.0	101.71	-	-	-	-
N-93*	15.0	160.50	-	-	-	-
N-93*	18.0	NS	NS	NS	NS	NS
N-94*	2.0	1.52	-	-	-	-
N-94*	5.0	5.34	-	-	-	-
N-94*	20.0	-	-	-	-	-
N-95*	2.0	0.72	-	-	-	-
N-95*	5.0	1.04	-	-	-	-
N-95*	10.0	2.63	-	-	-	-
N-95*	15.0	3.29	-	-	-	-
N-95*	18.0	10.34	-	<0.01	-	-
N-96*	2.0	5.70	-	-	-	-
N-96*	5.0	14.71	-	-	-	-
N-96*	10.0	20.08	-	-	-	-
N-96*	15.0	21.82	-	-	-	-
N-96*	18.0	-	-	-	-	-
N-97*	2.0	7.49	-	-	-	-
N-97*	5.0	11.62	-	-	-	-
N-97*	10.0	98.10	-	-	-	-
N-97*	15.0	150.50	-	-	-	-

NS = No Sample

* Analyzed on 3400 GC

SAMPLE ID	DEPTH (FT.)	1,1,1-TCA PPM (V/V)	TCE PPM (V/V)	PCE PPM (V/V)	$CHCl_3$ PPM (V/V)	CCl_4 PPM (V/V)
N-97*	20.0	158.23	-	-	-	-
N-98	2.0	32.49	-	-	-	-
N-98	4.0	18.67	-	-	-	-
N-98	9.0	31.06	-	-	-	-
N-98	14.0	1.52	-	-	-	-
N-98*	26.5	150.79	-	-	-	-
N-99	1.0	2.99	-	-	-	-
N-99*	5.0	12.94	-	-	-	-
N-99	10.0	0.60	-	0.03	-	-
N-99	14.0	0.47	-	0.03	-	-
N-99*	25.0	11.38	-	0.03	-	-
N-99*	35.0	19.00	-	0.07	-	-
N-100	2.0	12.93	-	0.02	-	-
N-100	5.0	18.34	-	0.03	-	-
N-100	9.0	SD	SD	SD	SD	SD
N-100	14.0	21.51	-	0.13	-	-
N-100	35.0	0.17	-	-	-	-
N-101	1.0	0.24	-	0.03	-	-
N-101	4.0	0.23	-	0.04	-	-
N-101	9.0	1.00	-	0.09	-	-
N-101	14.0	1.17	-	0.14	-	-
N-101	25.0	5.09	-	0.45	<0.01	-
N-102*	2.0	0.05	-	-	-	-
N-102*	5.0	0.50	-	-	-	-
N-102*	10.0	0.06	-	-	-	-
N-102*	15.0	0.49	-	-	-	-
N-102*	20.0	3.30	-	0.03	-	-
N-103*	2.0	0.13	-	-	-	-
N-103*	5.0	0.81	-	-	-	-
N-103*	10.0	1.26	-	-	-	-
N-103*	15.0	4.17	-	-	-	-
N-103*	20.0	5.07	-	-	-	-
N-105*	1.0	<0.01	-	-	-	-
N-105*	5.0	0.19	-	0.01	-	-
N-105*	10.0	0.11	-	<0.01	-	-
N-105*	15.0	0.79	-	0.03	-	-
N-105*	20.0	0.93	-	0.02	-	-
N-105*	35.0	1.13	-	0.10	-	-
N-106	2.0	0.23	-	0.08	-	-
N-106	4.5	0.60	-	0.15	-	-

SD = Sample Destroyed
* Analyzed on 3400 GC

SAMPLE ID	DEPTH (FT.)	1,1,1-TCA PPM (V/V)	TCE PPM (V/V)	PCE PPM (V/V)	$CHCl_3$ PPM (V/V)	CCl_4 PPM (V/V)
N-106	9.0	.91	-	0.21	-	-
N-106	14.0	1.51	-	0.37	-	-
N-107	1.0	1.81	-	0.25	-	-
N-107	4.0	2.15	-	0.29	-	-
N-107	9.0	5.55	-	0.61	-	-
N-107	27.0	21.32	-	-	-	-
N-108	1.0	0.06	-	0.09	-	-
N-108	4.0	0.36	-	-	-	-
N-108	9.0	0.65	-	0.63	-	-
N-108	14.0	1.27	-	0.86	-	-
N-108	30.0	3.80	-	2.08	-	-
N-109	1.0	0.11	-	0.05	-	-
N-109	4.0	0.05	-	0.02	-	-
N-109	9.0	1.21	-	0.35	-	-
N-109	14.0	2.71	0.47	1.10	-	-
N-111	2.0	-	-	-	-	-
N-111	4.5	0.11	-	0.04	-	-
N-111	9.0	0.08	-	0.03	-	-
N-111	14.0	0.21	-	0.08	-	-
N-111	31.5	0.28	-	0.13	-	-
N-112	2.0	0.06	-	0.02	-	-
N-112	4.0	0.20	-	0.10	-	-
N-112	9.0	0.40	-	0.19	-	-
N-112	14.0	0.52	-	0.24	-	-
N-114	1.5	0.03	-	0.02	-	-
N-114	4.5	0.13	-	0.09	-	-
N-114	9.0	0.28	-	0.17	-	-
N-114	14.0	0.49	-	0.31	-	-
N-114	34.0	0.25	-	0.19	-	-
N-115*	2.0	-	-	-	-	-
N-115*	5.0	0.04	-	0.02	-	-
N-115*	15.0	0.02	-	0.04	-	-
N-115*	33.0	0.05	-	0.10	-	-
N-116*	2.0	-	-	0.02	-	-
N-116*	5.0	-	-	0.03	-	-
N-116*	10.0	0.06	-	-	-	-
N-116*	15.0	0.01	-	0.05	-	-
N-116*	35.0	NS	NS	NS	NS	NS
N-117	1.0	0.23	-	-	-	-
N-117	4.5	0.01	-	-	-	-

NS = No Sample
* Analyzed on 3400 GC

SAMPLE ID	DEPTH (FT.)	1,1,1-TCA PPM (V/V)	TCE PPM (V/V)	PCE PPM (V/V)	$CHCl_3$ PPM (V/V)	CCl_4 PPM (V/V)
N-117	9.0	1.66	-	-	-	-
N-117	31.0	3.64	-	0.03	-	-
N-118	2.0	-	-	-	-	-
N-118	4.0	-	-	-	-	-
N-118	9.0	-	-	-	-	-
N-118	14.0	0.06	-	-	-	-
N-120	1.0	-	-	-	-	-
N-120	4.0	-	-	-	-	-
N-120	9.0	-	-	-	-	-
N-120	14.0	-	-	-	-	-
N-121*	2.0	-	-	-	-	-
N-121*	5.0	-	-	-	-	-
N-121*	10.0	-	-	-	-	-
N-121*	15.0	-	-	-	-	-
N-122*	1.0	-	-	-	-	-
N-122*	5.0	-	-	-	-	-
N-122*	10.0	-	-	-	-	-
N-123	2.0	-	-	-	-	-
N-123	4.5	-	-	-	-	-
N-123	9.0	-	-	-	-	-
N-123	14.0	-	-	-	-	-
N-124*	1.0	1.32	-	-	-	-
N-124*	5.0	5.23	-	-	-	-
N-124*	10.0	8.91	-	-	-	-
N-124*	15.0	17.52	-	-	-	-
N-124*	30.0	19.64	-	-	-	-
N-126	2.0	0.05	-	-	-	-
N-126	5.0	0.25	-	-	-	-
N-126	9.0	1.70	-	-	-	-
N-126	14.0	2.50	-	-	-	-
N-126	20.0	3.08	-	-	-	-
N-126	29.0	1.07	-	-	-	-
N-127	2.0	-	-	-	-	-
N-127	5.0	-	-	-	-	-
N-127	9.0	-	-	-	-	-
N-127	14.0	-	-	-	-	-
N-127	28.0	-	-	-	-	-
N-129*	1.0	0.61	-	-	-	-
N-129*	5.0	0.08	-	-	-	-
N-129*	10.0	0.48	-	-	-	-

* Analyzed on 3400 GC

SAMPLE ID	DEPTH (FT.)	1,1,1-TCA PPM (V/V)	TCE PPM (V/V)	PCE PPM (V/V)	$CHCl_3$ PPM (V/V)	CCl_4 PPM (V/V)
N-129*	15.0	0.77	-	0.99	-	-
N-130*	1.0	0.07	-	0.03	-	-
N-130*	5.0	0.63	-	0.23	-	-
N-130*	10.0	0.97	-	0.34	-	-
N-130*	15.0	2.56	-	0.77	-	-
N-131	2.0	0.10	-	0.05	-	-
N-131	4.0	0.34	-	0.17	-	-
N-131	9.0	0.06	-	0.04	-	-
N-131	14.0	0.73	-	0.45	0.08	-

* Analyzed on 3400 GC

Off-Site

Roswell, New Mexico
4-4-90 to 5-1-90

SAMPLE ID	DEPTH (FT.)	TCA PPM	TCE PPM	PCE PPM
SG9-200	2	0	0	0
	5	<.01	0	0
	10	0	0	0
SG9-203	2	0	0	0
	5	<.01	0	0
	10	0	0	0
	15	0	0	0
SG9-211	2	<.01	0	0
	5	<.01	0	0
	10	0.02	0	<.01
	14.5	<.01	0	<.01
	25.5	0	0	0
SG9-213	2	0	0	0
	5	0.11	0	<.01
	9.5	0.10	0	<.01
	25.5	0	0	0
SG9-214	2	<.01	0	0
	5	<.01	0	0
	9.5	0.02	0	<.01
	14	0.04	0	<.01
	19	0.06	0	<.01
	29	0	0	0
SG9-222	2	0	0	0
	5	<.01	0	0
	10	0.01	0	<.01
	14.5	0.02	0	<.01
	19.5	0.05	0	<.01
	30	0.11	0	<.01
	35	0	0	0

SAMPLE ID	DEPTH (FT.)	TCA PPM	TCE PPM	PCE PPM
SG9-223	2	<.01	0	<.01
	5	0	0	0
	10	<.01	0	<.01
	15	0.02	0	<.01
	26	0.02	0	<.01
SG9-225	2	0	0	0
	5	<.01	0	<.01
	10	0	0	<.01
	14.5	0	0	<.01
	24	<.01	0	<.01
SG9-231	2	<.01	0	<.01
	4.5	<.01	0	<.01
	9.5	<.01	0	0
	14.5	<.01	0	<.01
	19.5	<.01	<.01	<.01
SG9-234	2	0	0	0
	5	0	0	0
	10	0	0	0
	15	0	0	0
	20	0	0	0
SG9-235	1	0	0	0
	4	0	0	0
	9	0	0	0
	14	0	0	0
	26	0	0	0
SG9-236	2	0	0	0
	10	0	0	0
	15	0	0	0
	20	0	0	0
	25	NS	NS	NS
SG9-237	1	0	0	0
	4.5	0	0	0
	9	0	0	0
	14	0	0	0
SG9-238	1	0	0	0
	4.5	0	0	<.01
	9	0	0	0
	14	0	0	0
	19.5	0	0	<.01

Table 2, Page 15

SAMPLE ID	DEPTH (FT.)	TCA PPM	TCE PPM	PCE PPM
SG9-239	2	<.01	0	<.01
	5	<.01	0	0
	9.5	0	0	0
	14	0	0	0
SG9-244	2	0	0	0
	4.5	0	0	0
	9	<.01	0	<.01
SG9-245	2	0	0	0
	5	0	0	0
	10	0	0	0
	25	0	0	0
SG9-301	1	<.01	0.01	<.01
	5	0.12	0	0.05
	10	0.14	0	0.05
	15	0.17	0	0.06
	20	0.17	0	0.06
	25	0.27	0	0.09
	30	<.01	<.01	<.01
SG9-303	2	0	0	0
	5	0	0	0
	15	0	0	0
	20	0	0	0
	30	0	0	0
	35	0	0	0
	40	0	0	0.01
SG9-308	2	0	0	0
	5	0	0	0
	10	0	0	0
	15	0	0	0
	20	NS	NS	NS
SG9-309	2	0	0	0
	5	0	0	0
	10	0	0	0
SG9-310	2	<.01	0	<.01
	5	0.19	0	0.10
	10	0.18	0.08	0
SG9-312	1	0.12	0	0.03
	5	0.43	0	0.17
	10	0.85	0	0.19

SAMPLE ID	DEPTH (FT.)	TCA PPM	TCE PPM	PCE PPM
SG9-314	2	0	0	<.01
	5	<.01	0	<.01
	10	<.01	0	<.01
	20	0.16	0	0.06
	25	NS	NS	NS
SG9-316	2	0.08	0	0.03
	4	0.30	0	0.09
	9	0.43	0	0.10
SG9-317	2	0	0	0
	4	0	0	0
	10	<.01	0	<.01
	15	0	0	<.01
	20	<.01	0	<.01
SG9-320	2	0.33	0	0.07
	5	1.37	0	0.33
	10	2.2	0	0.47
	15	NS	NS	NS
SG9-322	2	0.01	0	0.010.01
	5	0.01	0	0.01
	9	0.02	0	<.01
	14.5	0.02	0	<.01
	26	0	0	0
SG9-324	1	0	0	0.31
	5	1.3	0	0.92
	19	3.1	<.01	1.0
	30	3.0	<.01	0
SG9-325	2	0	0	0
	5	0	0	0
	10	0	0	0
	20	0	0	0
SG9-326	2	0	0	0
	5	0	0	0
	10	0	0	0
	15	0	0	0
	20	0	0	0
SG9-328	1	0.14	0	0.02
	4	1.14	0	0.18
	9	2.5	0.01	0.4
	14	2.0	0.01	0.35

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SAMPLE ID	DEPTH (FT.)	TCA PPM	TCE PPM	PCE PPM
SG9-330	1	0.13	0	0.05
	4	0.74	0	0.24
	15	2.0	0	0.65
	20	2.8	<.01	0.97
	40	1.6	0	0.47
SG9-331	1	0.11	0	0.02
	5	3.7	<.01	0.48
	9	4.82	<.01	0.90
	14	5.93	<.01	1.08
	25	NS	NS	NS
SG9-332	2	0.27	0	0.04
	4	0.50	0	0.09
	9.5	0.82	0	0.09
	14	1.51	0	0.19
	20	5.2	0	1.02
	40	NS	NS	NS
SG9-333	1.5	0.01	<.01	<.01
	5	0.09	<.01	<.01
	9	0.19	0	0.01
	14	0.22	0	0.01
	24	NS	NS	NS
SG9-334	2	<.01	0	0
	5	0	0	0
	9	0	0	0
	14.5	NS	NS	NS
SG9-337	2	0.10	0	<.01
	5	1.24	0	0.06
	15	3.25	0	0.15
	25	6.92	0	0.39
	30	7.65	0	0.43
SG9-338	2	0	0	0
	5	0.13	0	<.01
	10	0.50	0	<.01
	15	NS	NS	NS
SG9-339	2	0.26	0	0.02
	5	0.98	0	0.07
	10	3.02	0	0.14
	20	9.95	0	0.38

SAMPLE ID	DEPTH (FT.)	TCA PPM	TCE PPM	PCE PPM
SG9-340	2	0.13	0	<.01
	5	0.44	0	0.02
	10	0.71	0	0.03
	20	3.93	0	0.12
	30	NS	NS	NS
SG9-341	2	0	0	0
	5	0	0	0
	9	0	0	0
	15	NS	NS	NS
SG9-342	2	0	0	<.01
	5	0	0	<.01
	9	<.01	0	<.01
	14	<.01	0	<.01
SG9-344	2	0	0	0
	4	0	0	0
	24.5	0	0	0.02
SG9-345	1	0	0	0
	5	0.10	0	<.01
	9	0.15	0	0.01
	19	1.3	0	0.02
	35	0	0	0.03
SG9-346	2	0.11	0	<.01
	5	0.73	0	0
	10	1.31	0	<.01
	25	1.74	0	<.01
SG9-347	2	5.8	<.01	0
	5.5	65.2	0	0.01
	9.5	29.1	0	0
SG9-348	2	4.13	0	0
	5	18.4	0.03	0.01
	10	102.4	0.21	0.09
	25	99.4	0.30	0.12
SG9-349	2	34.12	0	0
	5	142.0	0	0
	10	226.8	0	0
	15	2212.0	0.77	0.26
	20	2053.0	0.54	0.45
SG9-351	5	9.08	0	0.02
	10	8.23	0	0.02
	20	6.63	0	0.02
	30	NS	NS	NS

SAMPLE ID	DEPTH (FT.)	TCA PPM	TCE PPM	PCE PPM
SG9-352	2	<.01	0	<.01
	5	0.02	0	<.01
	10	0.02	0	<.01
SG9-353	2	<.01	<.01	<.01
	5	<.01	0	<.01
	10	0.02	<.01	0.02
	15	0.01	0	0.01
SG9-354	2	0	0	0
	5	0	0	0
	15	0	0	0
	20	0	0	0
SG9-355	2	0.08	0	0
	5	0.03	0	0
	10	0.04	0	<.01
	35	0.01	0	0.02
SG9-357	2	0.06	0	0
	5	0.45	0	0
	10	0.71	0	0
	15	1.43	0	0
SG9-359	2	5.5	<.01	<.01
	4	7.6	<.01	<.01
	9	11.3	<.01	<.01
	15	10.26	<.01	<.01
	19.5	80.45	<.01	<.01
	24	81.31	<.01	<.01
	35	86.56	<.01	<.01
SG9-360	2	2.99	0	<.01
	5	53.24	0.03	0.04
	15	73.22	0.08	0.10
	20	83.46	0.11	0.18
	25	85.12	0.12	0.19
	30	NS	NS	NS
	35	86.41	0.12	0.27
SG9-361	5	33.21	0	0.01
	15	46.99	0	0.08
SG9-362	2	<.01	0	<.01
	5	<.01	0	<.01
	10	0	0	0

SAMPLE ID	DEPTH (FT.)	TCA PPM	TCE PPM	PCE PPM
SG9-363	2	<.01	0	<.01
	5	<.01	0	<.01
	10	0	0	<.01
	15	0	0	<.01
SG9-364	2	0	0	0
	5	0	0	0
	10	NS	NS	NS
SG9-366	2	0	0	0
	5	0	0	0
	15	0	0	0
	20	0	0	0
SG9-368	2	0.48	0.01	<.01
	4	4.10	<.01	<.01
	9	7.5	0.03	<.01
	14	36.4	0.27	0.03
	19	0.74	0.20	0.03
SG9-369	2	0.41	0	0
	5	4.56	0	0.10
	10	31.90	0	0.20
	20	<.01	0	0
SG9-370	2	0.20	0	0
	5	0.15	0	<.01
	10	2.16	0	<.01
	15	2.16	0	<.01
	20	0.48	0	0
SG9-371	2	<.01	<.01	<.01
	5	0	<.01	<.01
	10	<.01	<.01	<.01
	15	<.01	<.01	<.01
SG9-372	2	<.01	0	<.01
	5	<.01	0	<.01
	10	<.01	0	<.01
SG9-373	2	0	0	0
	5	0	0	0
	10	0	0	0
	30	0	0	0

SAMPLE ID	DEPTH (FT.)	TCA PPM	TCE PPM	PCE PPM
SG9-374	2	0.32	0	0
	4	1.0	0	0
	9	2.4	0	<.01
	20	2.0	0	<.01
SG9-375	2	0.11	0	<.01
	5	0.34	0	<.01
	10	0.43	0.04	0
	30	0.98	0	<.01
SG9-376	2	<.01	<.01	<.01
	5	<.01	<.01	<.01
	10	0	0	0
	15	0	0	0
SG9-377	2	<.01	0	<.01
	5	0	0	<.01
	9	<.01	0	<.01
SG9-381	2	0.09	0	0
	5	0	0	0
	10	<.01	0	0
SG9-382	2	0	0	0.01
	5	0	0	0
	10	0	0	0
SG9-383	2	0	0	0
	5	0	0	0
	10	0	0	0
	14	0	0	0
	19.5	0.01	0	<.01
SG9-387	2	0	0	0
	5	<.01	0	0
	10	0	0	0

TABLE 2

PHASE 2

						SUMMARY OF ON-SITE CORE SAMPLE ANALYTICAL RESULTS								
								Roswell, New Mexico						
Core Hole No.		SB9-1	SB9-1					SB9-2	SB9-2	SB9-2	SB9-2			
Sample Depth		3-6.5	14-17		Blank # 1	Blank # 2		3.5-7.5	9-12	14-16	17-18.5		Blank #3	Blank #4
Sample ID		S9-01,1-8	S9-02,1-8		Equipment	Trip		S9-03,1-8	S9-04,1-8	S9-05,1-8	S9-06,1-8		Equipment	Trip
TPH	mg/kg	<20	<20	mg/l	<1	6	mg/kg	40	80	80	<20	mg/l	<1	<1
Methanol	mg/l	<1	<1	mg/l	<1	<1	mg/l	<1	<1	<1	<1	mg/l	<1	<1
Methylene Chloride	ug/kg	12	20	ug/l	<5	<5	ug/kg	12	10	16	11	ug/l	<5	<5
Acetone	ug/kg	<9	<12	ug/l	45	<10	ug/kg	<11	<11	<14	<10	ug/l	<10*	14
Carbon Disulfide	ug/kg	<5	<6	ug/l	<5	<5	ug/kg	<6	<6	<7	<5	ug/l	<5	<5
Trichlorofluoromethane	ug/kg	<5	Not Tested	ug/l	<5	<5	ug/kg	<6	<6	<7	<5	ug/l	<5	<5
Ethyl Ether	ug/kg	<5	Not Tested	ug/l	<5	<5	ug/kg	<6	<6	<7	<5	ug/l	<5	<5
Freon (TF)	ug/kg	12B	Not Tested	ug/l	<5	<5	ug/kg	57*	96*	70*	37*	ug/l	<5	<5
2-Butanone	ug/kg	<9	<12	ug/l	<10	<10	ug/kg	<11	<11	<14	<10	ug/l	<10	<10
1,1,1-Trichloroethane	ug/kg	<5	<6	ug/l	<5	<5	ug/kg	<6	<6	<7	<5	ug/l	<5	<5
Carbon Tetrachloride	ug/kg	<5	<6	ug/l	<5	<5	ug/kg	<6	<6	<7	<5	ug/l	<5	<5
Cyclohexanone	ug/kg	<5	Not Tested	ug/l	<5	<5	ug/kg	<6	<6	<7	<5	ug/l	<5	<5
Ethyl Acetate	ug/kg	<5	Not Tested	ug/l	<5	<5	ug/kg	<6	<6	<7	<5	ug/l	<5	<5
Isobutyl Alcohol	ug/kg	<180	Not Tested	ug/l	<200	<200	ug/kg	<230	<220	<270	<190	ug/l	<200	<200
2-Ethoxyethanol	ug/kg	<9	Not Tested	ug/l	<10	<10	ug/kg	<11	<11	<14	<10	ug/l	<10	<10
n-Butyl Alcohol	ug/kg	<90	Not Tested	ug/l	<100	<100	ug/kg	<110	<110	<140	<97	ug/l	<100	<100
Trichloroethene	ug/kg	<5	<6	ug/l	<5	<5	ug/kg	<6	<6	<7	<5	ug/l	<5	<5
1,1,2-Trichloroethane	ug/kg	<5	<6	ug/l	<5	<5	ug/kg	<6	<6	<7	<5	ug/l	<5	<5
Benzene	ug/kg	<5	<6	ug/l	<5	<5	ug/kg	<6	<6	<7	<5	ug/l	<5	<5
4 Methyl 2 Pentanone	ug/kg	<9	<12	ug/l	<10	<10	ug/kg	<11	<11	<14	<10	ug/l	<10	<10
Tetrachloroethane	ug/kg	<5	<6	ug/l	<5	<5	ug/kg	<6	<6	<7	<5	ug/l	<5	<5
Toluene	ug/kg	<5	<6	ug/l	<5	<5	ug/kg	<6	<6	<7	<5	ug/l	<5	<5
Chlorobenzene	ug/kg	<5	<6	ug/l	<5	<5	ug/kg	<6	<6	<7	<5	ug/l	<5	<5
Ethylbenzene	ug/kg	<5	<6	ug/l	<5	<5	ug/kg	<6	<6	<7	<5	ug/l	<5	<5
Xylene (total)	ug/kg	<5	<6	ug/l	<5	<5	ug/kg	<6	<6	<7	<5	ug/l	<5	<5
Pyridine	ug/kg	<340	<420	ug/l	<40	<40	ug/kg	<340	<340	<340	<340	ug/l	<40	<40
1,3-Dichlorobenzene	ug/kg	<340	<420	ug/l	<40	<40	ug/kg	<340	<340	<340	<340	ug/l	<40	<40
1,4-Dichlorobenzene	ug/kg	<340	<420	ug/l	<40	<40	ug/kg	<340	<340	<340	<340	ug/l	<40	<40
1,2-Dichlorobenzene	ug/kg	<340	<420	ug/l	<40	<40	ug/kg	<340	<340	<340	<340	ug/l	<40	<40
2-Methylphenol	ug/kg	<340	<420	ug/l	<40	<40	ug/kg	<340	<340	<340	<340	ug/l	<40	<40
3-Methylphenol	ug/kg	<340	<420	ug/l	<40	<40	ug/kg	<340	<340	<340	<340	ug/l	<40	<40
4-Methylphenol	ug/kg	<340	<420	ug/l	<40	<40	ug/kg	<340	<340	<340	<340	ug/l	<40	<40
Nitrobenzene	ug/kg	<340	<420	ug/l	<40	<40	ug/kg	<340	<340	<340	<340	ug/l	<40	<40
Silver, total	mg/l	0.0005UW	0.0005UW	mg/l	0.0005U	0.0005U	mg/l	<.0005	<.0005	<.0005	<.0005	mg/l	<.0005	<.0005
Arsenic, total	mg/l	0.004B	0.004BW	mg/l	0.003U	0.003U	mg/l	.005BW	.004B	<.003	.003B	mg/l	<.003	<.003
Barium, total	mg/l	0.38	0.12B	mg/l	0.05U	0.05U	mg/l	0.38	1.28	1.01	1.11	mg/l	<.05	<.05
Cadmium, total	mg/l	.0005UW	.0005U	mg/l	0.0005U	0.0005U	mg/l	.0006BW	.0007BW	.0008BW	.0006BW	mg/l	<.0005W	<.0005W
Chromium, total	mg/l	.006B	.006U	mg/l	0.009B	0.006B	mg/l	<.006	0.006	<.006	.007B	mg/l	<.006	<.006
Mercury, total	mg/l	.0002U	.0002U	mg/l	0.0002U	0.0002U	mg/l	<.0002	<.0002	<.0002	<.0002	mg/l	<.0002	<.0002
Lead, total	mg/l	.002B	.002UW	mg/l	0.007	0.003	mg/l	.002B	0.004	0.002B	0.003	mg/l	<.002W	<.002
Selenium,total	mg/l	.003UW	.003UW	mg/l	0.003U	0.003U	mg/l	<.003W	<.003W	<.003W	<.003W	mg/l	<.003W	<.003W

TABLE 2 (CONT)

						SUMMARY OF ON-SITE CORE SAMPLE ANALYTICAL RESULTS											
								Roswell, New Mexico									
Core Hole No.		SB9-3	SB9-3	SB9-3					SB9-4	SB9-4	SB9-4	SB9-4	SB9-5	SB9-5	SB9-5	SB9-5
Sample Depth		3-5'	16-18.5'	20-23'		Blank #5			8-13'	14-16'	18-21'	25-27'	4-9'	10-13'	15-17.5'	18-20'
Sample ID		S9-07,3-8	S9-08,1-8*	S9-09,1-4,7-8*		(Equipment)			S9-10,3-8*	S9-11,1-8*	S9-12,1-8*	S9-13,1-8*	S9-14,1-8*	S9-15,1-8	S9-16,1,3-5,7-8	S9-17,1,3,7,8
TPH	mg/kg	<20	<20	110	mg/l	<1		mg/kg	120	70	70	260	<20	100	<20	<20
Methanol	mg/l	<5	<1	<1	mg/l	<1		mg/l	<5 mg/kg	<1	<1	<1	<1	<1	<1	<1
Methylene Chloride	ug/kg	18*	7*	9*	ug/l	<5		ug/kg	6*	12*	<6*	<18*	<6*	<8*	8*	51*
Acetone	ug/kg	25	<11	<14	ug/l	57*		ug/kg	<11	<20	<12	<36	<12	<15	<10	<11
Carbon Disulfide	ug/kg	<5	<6	<7	ug/l	<5		ug/kg	<6	<10	<6	<18	<6	<8	<5	<6
Trichlorofluoromethane	ug/kg	<5	<6	<7	ug/l	<5		ug/kg	<6	<10	<6	<18	<6	<8	<5	<6
Ethyl Ether	ug/kg	<5	<6	<7	ug/l	<5		ug/kg	<6	<10	<6	<18	<6	<8	<5	<6
Freon (TF)	ug/kg	54*	8	14*	ug/l	<5		ug/kg	6*	11	<6	<18	<6	12	9*	16*
2-Butanone	ug/kg	<10	<11	<14	ug/l	120		ug/kg	<11	<20	<12	<36	<12	<15	<10	<11
1,1,1-Trichloroethane	ug/kg	<5	<6	<7	ug/l	<5		ug/kg	<6	<10	<6	<18	<6	<8	<5	<6
Carbon Tetrachloride	ug/kg	<5	<6	<7	ug/l	<5		ug/kg	<6	<10	<6	<18	<6	<8	<5	<6
Cyclohexanone	ug/kg	<5	<6	<7	ug/l	<5		ug/kg	<6	<10	<6	<18	<6	<8	<5	<6
Ethyl Acetate	ug/kg	<5	<6	<7	ug/l	<5		ug/kg	<6	<10	<6	<18	<6	<8	<5	<6
Isobutyl Alcohol	ug/kg	<190	<230	<280	ug/l	<200		ug/kg	<220	<400	<240	<720	<240	<310	<200	<220
2-Ethoxyethanol	ug/kg	<10	<11	<14	ug/l	<10		ug/kg	<11	<20	<20	<36	<12	<15	<10	<11
n-Butyl Alcohol	ug/kg	<97	<110	<140	ug/l	<100		ug/kg	<110	<200	<120	<360	<120	<150	<100	<110
Trichloroethene	ug/kg	<5	<6	<7	ug/l	<5		ug/kg	<6	<10	<6	<18	<6	<8	<5	<6
1,1,2-Trichloroethane	ug/kg	<5	<6	<7	ug/l	<5		ug/kg	<6	<10	<6	<18	<6	<8	<5	<6
Benzene	ug/kg	<5	<6	<7	ug/l	<5		ug/kg	<6	<10	<6	<18	<6	<8	<5	<6
4 Methyl 2 Pentanone	ug/kg	<10	<11	<14	ug/l	<10		ug/kg	<11	<20	<12	<36	<12	<15	<10	<11
Tetrachloroethane	ug/kg	<5	<6	<7	ug/l	<5		ug/kg	<6	<10	<6	<18	<6	<8	<5	<6
Toluene	ug/kg	<5	<6	<7	ug/l	<5		ug/kg	<6	<10	<6	<18	<6	<8	<5	<6
Chlorobenzene	ug/kg	<5	<6	<7	ug/l	<5		ug/kg	<6	<10	<6	<18	<6	<8	<5	<6
Ethylbenzene	ug/kg	<5	<6	<7	ug/l	<5		ug/kg	<6	<10	<6	<18	<6	<8	<5	<6
Xylene (total)	ug/kg	<5	<6	<7	ug/l	<5		ug/kg	<6	<6	<6	<18	<6	<8	<5	<6
Pyridine	ug/kg	<350	<340	<340	ug/l	<40		ug/kg	<330	<370	<350	<340	<340	<340	<340	<370
1,3-Dichlorobenzene	ug/kg	<350	<340	<340	ug/l	<40		ug/kg	<330	<370	<350	<340	<340	<340	<340	<370
1,4-Dichlorobenzene	ug/kg	<350	<340	<340	ug/l	<40		ug/kg	<330	<370	<350	<340	<340	<340	<340	<370
1,2-Dichlorobenzene	ug/kg	<350	<340	<340	ug/l	<40		ug/kg	<330	<370	<350	<340	<340	<340	<340	<370
2-Methylphenol	ug/kg	<350	<340	<340	ug/l	<40		ug/kg	<330	<370	<350	<340	<340	<340	<340	<370
3-Methylphenol	ug/kg	<350	<340	<340	ug/l	<40		ug/kg	<330	<370	<350	<340	<340	<340	<340	<370
4-Methylphenol	ug/kg	<350	<340	<340	ug/l	<40		ug/kg	<330	<370	<350	<340	<340	<340	<340	<370
Nitrobenzene	ug/kg	<350	<340	<340	ug/l	<40		ug/kg	<330	<370	<350	<340	<340	<340	<340	<370
Silver, total	mg/l	<.0005	<.0005	<.0005	mg/l	<.0006		mg/l	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005W	<.0005W
Arsenic, total	mg/l	0.01	<.003	<.003	mg/l	<.003		mg/l	.009B	<.003	<.003	<.003	.005B	<.003W	<.003W	<.003
Barium, total	mg/l	0.24	0.39	1.3	mg/l	<.05		mg/l	0.91	0.83	0.9	.17B	0.53	0.77	1.03	1.06
Cadmium, total	mg/l	.0008BW	.0009BW	<.0005W	mg/l	<.0005		mg/l	<.0005W	<.0005W	.0013BW	.0006BW	<.0005W	<.0005W	<.0005W	<.0005
Chromium, total	mg/l	<.006	.008B	.006B	mg/l	<.006		mg/l	<.006	<.006	<.006	<.006	<.006	<.006	<.006	<.006
Mercury, total	mg/l	<.0002	<.0002	<.0002	mg/l	<.0002		mg/l	<.0002	<.0002	<.0002	<.0002	<.0002	<.0002	<.0002	<.0002
Lead, total	mg/l	0.003	.002B	.002B	mg/l	0.003		mg/l	0.003	.002B	0.003	.002B	.002B	0.003	0.007	<.002N
Selenium,total	mg/l	<.003W	<.003W	<.003W	mg/l	<.003W		mg/l	<.003	<.003	<.003	<.003W	<.003W	<.003W	<.0003W	<.003WN

TABLE 2 (CONT)

						SUMMARY OF ON-SITE CORE SAMPLE ANALYTICAL RESULTS										
								Roswell, New Mexico								
Core Hole No.		SB9-5	SB9-5	SB9-5						SB9-6	SB9-6	SB9-6	SB9-6		SB9-6	SB9-6
Sample Depth		20-22.5'	20-22.5'	20-22.5'		Blank #6	Blank #7			6-11'	18-20'	20-23'	26-28'		26-28'	26-28'
Sample ID		S9-18,1-4,7	Tube #3	Tube #4		Equipment	Trip			S9-20,1-8	S9-21,3-5,8	S9-22,1-8	9-23,1,3,4,7		Tube #5	Tube #6
TPH	mg/kg	<20	<20	<20	mg/l	<1	<1		mg/kg	<20	<20	120	<20	mg/kg	<20	<20
Methanol	mg/l	<1	<1	<1	mg/l	<1	<1		mg/l	<1	<1	<10	<10	mg/kg	<50	<50
Methylene Chloride	ug/kg	8*	7*	10*	ug/l	<5	<5		ug/kg	15	12	8*	<5	ug/kg	16	8*
Acetone	ug/kg	47	26	13	ug/l	<10*	<10		ug/kg	<12	<11	20	<10	ug/kg	<10	<14
Carbon Disulfide	ug/kg	<6	<6	<6	ug/l	<5	<5		ug/kg	<6	<5	<5	<5	ug/kg	<5	<7
Trichlorofluoromethane	ug/kg	<6	<6	<6	ug/l	<5	<5		ug/kg	<6	<5	<5	<5	ug/kg	<5	<7
Ethyl Ether	ug/kg	<6	<6	<6	ug/l	<5	<5		ug/kg	<6	<5	<5	<5	ug/kg	<5	<7
Freon (TF)	ug/kg	16*	15*	16*	ug/l	<5	<5		ug/kg	8	7	26*	11	ug/kg	6	23*
2-Butanone	ug/kg	<13	<11	<12	ug/l	<10	<10		ug/kg	<12	<11	<10	<10	ug/kg	<10	<14
1,1,1-Trichloroethane	ug/kg	<6	<6	<6	ug/l	<5	<5		ug/kg	<6	<5	12	<5	ug/kg	<5	<7
Carbon Tetrachloride	ug/kg	<6	<6	<6	ug/l	<5	<5		ug/kg	<6	<5	<5	<5	ug/kg	<5	<7
Cyclohexanone	ug/kg	<6	<6	<6	ug/l	<5	<5		ug/kg	<6	<5	<5	<5	ug/kg	<5	<7
Ethyl Acetate	ug/kg	<6	<6	<6	ug/l	<5	<5		ug/kg	<6	<5	<5	<5	ug/kg	<5	<7
Isobutyl Alcohol	ug/kg	<250	<230	<230	ug/l	<200	<200		ug/kg	<250	<210	<210	<200	ug/kg	<200	<280
2-Ethoxyethanol	ug/kg	<13	<11	12	ug/l	<10	<10		ug/kg	12	<11	<10	<10	ug/kg	<10	<14
n-Butyl Alcohol	ug/kg	<130	<110	<120	ug/l	<100	<100		ug/kg	<120	<110	<100	<100	ug/kg	<100	<140
Trichloroethene	ug/kg	<6	<6	<6	ug/l	<5	<5		ug/kg	<6	<5	<5	<5	ug/kg	<5	<7
1,1,2-Trichloroethane	ug/kg	<6	<6	<6	ug/l	<5	<5		ug/kg	<6	<5	<5	<5	ug/kg	<5	<7
Benzene	ug/kg	<6	<6	<6	ug/l	<5	<5		ug/kg	<6	<5	<5	<5	ug/kg	<5	<7
4 Methyl 2 Pentanone	ug/kg	<13	<11	<12	ug/l	<10	<10		ug/kg	<12	<11	<10	<10	ug/kg	<10	<14
Tetrachloroethene	ug/kg	<6	<6	<6	ug/l	<5	<5		ug/kg	<6	<5	<5	<5	ug/kg	<5	<7
Toluene	ug/kg	<6	<6	<6	ug/l	<5	<5		ug/kg	<6	<5	<5	<5	ug/kg	<5	<7
Chlorobenzene	ug/kg	<6	<6	<6	ug/l	<5	<5		ug/kg	<6	<5	<5	<5	ug/kg	<5	<7
Ethylbenzene	ug/kg	<6	<6	<6	ug/l	<5	<5		ug/kg	<6	<5	<5	<5	ug/kg	<5	<7
Xylene (total)	ug/kg	<6	<6	<6	ug/l	<5	<5		ug/kg	<6	<5	<5	<5	ug/kg	<5	<7
Pyridine	ug/kg	<420	<370	<380	ug/l	<40	<40		ug/kg	<330	<350	<390	<340	ug/kg	<340	<430
1,3-Dichlorobenzene	ug/kg	<420	<370	<380	ug/l	<40	<40		ug/kg	<330	<350	<390	<340	ug/kg	<340	<430
1,4-Dichlorobenzene	ug/kg	<420	<370	<380	ug/l	<40	<40		ug/kg	<330	<350	<390	<340	ug/kg	<340	<430
1,2-Dichlorobenzene	ug/kg	<420	<370	<380	ug/l	<40	<40		ug/kg	<330	<350	<390	<340	ug/kg	<340	<430
2-Methylphenol	ug/kg	<420	<370	<380	ug/l	<40	<40		ug/kg	<330	<350	<390	<340	ug/kg	<340	<430
3-Methylphenol	ug/kg	<420	<370	<380	ug/l	<40	<40		ug/kg	<330	<350	<390	<340	ug/kg	<340	<430
4-Methylphenol	ug/kg	<420	<370	<380	ug/l	<40	<40		ug/kg	<330	<350	<390	<340	ug/kg	<340	<430
Nitrobenzene	ug/kg	<420	<370	<380	ug/l	<40	<40		ug/kg	<330	<350	<390	<340	ug/kg	<340	<430
Silver, total	mg/l	.0022BW	<.0005W	<.0005	mg/l	<.0005	<.0005		mg/l	<.0005W	<.0005	.0026B	<.0005W	mg/l	<.0005W	<.0005
Arsenic, total	mg/l	.003B	.006B	.004B	mg/l	<.003	<.003		mg/l	.004B	<.003W	<.003	<.003W	mg/l	<.003	.009B
Barium, total	mg/l	1.12	0.27	0.62	mg/l	<.05	<.05		mg/l	0.63	1.21	0.7	1.22	mg/l	1.3	.010B
Cadmium, total	mg/l	.0005BW	.0005BW	.0010BW	mg/l	<.0005W	<.0005W		mg/l	.0010BW	<.0005	<.0005	.0006B	mg/l	.0012B	.0008B
Chromium, total	mg/l	<.006	<.006	<.006	mg/l	<.006	<.006		mg/l	<.006	<.006	0.011	.006B	mg/l	0.007B	0.011
Mercury, total	mg/l	<.0002	<.0002	<.0002	mg/l	<.0002	<.0002		mg/l	<.0002	<.0002	<.0002	<.0002	mg/l	<.0002	<.0002
Lead, total	mg/l	<.002N	<.002WN	<.002WN	mg/l	0.004	0.003		mg/l	<.002WN	<.002WN	<.002W	.008W	mg/l	.002W	<.002
Selenium, total	mg/l	.005BN	<.003N	<.003W	mg/l	<.003	<.003		mg/l	<.003WN	<.003N	<.003	<.003	mg/l	<.003	<.003

TABLE 2 (CONT)

						SUMMARY OF ON-SITE CORE SAMPLE ANALYTICAL RESULTS										
								Roswell, New Mexico								
Core Hole No.						SB9-7	SB9-7	SB9-7	SB9-7	SB9-7	SB9-7	SB9-7	SB9-7			
Sample Depth		Blank #10	Blank #11			8-12	21.5-24	25.5-28	29-32	29-32	35-37	35-37	35-37		Blank #12	Blank #13
Sample ID		Equipment	Trip			S9-24.1-8	S9-25.1-8	S9-26.1-8	S9-27.3-8	Tube #7	S9-28.3-8	Tube #8	Tube #9		Field	Equipment
TPH	mg/l	<4	<4		mg/kg	1100	2000	2500	11000	5000	4600	13000	30000	mg/l	<4	<4
Methanol	mg/l	<50	<50		mg/l	<1	<1	<1	<1	<1	<1	<1	<1	mg/l	<10	<10
Methylene Chloride	ug/l	<5	<5		ug/kg	17*	12*	71*	<1300	<1300	740	<640	<670	ug/l	<5	<5
Acetone	ug/l	10	10		ug/kg	28	61	270	<2600	<2600	<1300	<1300	<1300	ug/l	<10	<10
Carbon Disulfide	ug/l	<5	<5		ug/kg	<6	<5	<29	<1300	<1300	<640	<640	<670	ug/l	<5	<5
Trichlorofluoromethane	ug/l	<5	<5		ug/kg	<6	<5	<29	<1300	<1300	<640	<640	<670	ug/l	<5	<5
Ethyl Ether	ug/l	<5	<5		ug/kg	<6	<5	<29	<1300	<1300	<640	<640	<670	ug/l	<5	<5
Freon (TF)	ug/l	7*	5*		ug/kg	18	46	89	3700	5100	<640	<640	<670	ug/l	8*	7*
2-Butanone	ug/l	46	<10		ug/kg	<11	13	68	<2600	<2600	<1300	<1300	<1300	ug/l	<10	<10
1,1,1-Trichloroethane	ug/l	<5	<5		ug/kg	<6	<5	<29	<1300	<1300	<640	<640	2000	ug/l	<5	<5
Carbon Tetrachloride	ug/l	<5	<5		ug/kg	<6	<5	<29	<1300	<1300	<640	<640	<670	ug/l	<5	<5
Cyclohexanone	ug/l	<5	<5		ug/kg	<6	<5	<29	<1300	<1300	<640	<640	<670	ug/l	<5	<5
Ethyl Acetate	ug/l	<5	<5		ug/kg	<6	<5	<29	<1300	<1300	<640	<640	<670	ug/l	<5	<5
Isobutyl Alcohol	ug/l	<200	<200		ug/kg	<230	<210	<1200	<51000	<53000	<26000	<26000	<27000	ug/l	<200	<200
2-Ethoxyethanol	ug/l	<10	<10		ug/kg	<11	<10	<59	<2600	<2600	<1300	<1300	<1300	ug/l	<10	<10
n-Butyl Alcohol	ug/l	<100	<100		ug/kg	<110	<100	<590	<26000	<26000	<13000	<13000	<13000	ug/l	<100	<100
Trichloroethene	ug/l	<5	<5		ug/kg	<6	<5	<29	<1300	<1300	<640	<640	<670	ug/l	<5	<5
1,1,2-Trichloroethane	ug/l	<5	<5		ug/kg	<6	<5	<29	<1300	<1300	<640	<640	<670	ug/l	<5	<5
Benzene	ug/l	<5	<5		ug/kg	<6	<5	<29	<1300	<1300	<640	<640	<670	ug/l	<5	<5
4 Methyl 2 Pentanone	ug/l	<10	<10		ug/kg	<11	<10	<59	<2600	<2600	<1300	<1300	<1300	ug/l	<10	<10
Tetrachloroethane	ug/l	<5	<5		ug/kg	<6	<5	<29	<1300	<1300	740	<640	2100	ug/l	<5	<5
Toluene	ug/l	<5	<5		ug/kg	<6	<5	<29	<1300	<1300	<640	<640	<670	ug/l	<5	<5
Chlorobenzene	ug/l	<5	<5		ug/kg	<6	<5	<29	<1300	<1300	<640	<640	<670	ug/l	<5	<5
Ethylbenzene	ug/l	<5	<5		ug/kg	41	57	110	980	720	2300	1600	2800	ug/l	<5	<5
Xylene (total)	ug/l	<5	<5		ug/kg	76	17	870	2600	1800	4800	4200	6500	ug/l	<5	<5
Pyridine	ug/l	<40	<87		ug/kg	<370	<340	<390	<340	<350	<340	<340	<21000	ug/l	<40	<40
1,3-Dichlorobenzene	ug/l	<40	<87		ug/kg	<370	<340	<390	<340	<350	<340	<340	<21000	ug/l	<40	<40
1,4-Dichlorobenzene	ug/l	<40	<87		ug/kg	<370	<340	<390	<340	<350	<340	<340	<21000	ug/l	<40	<40
1,2-Dichlorobenzene	ug/l	<40	<87		ug/kg	<370	<340	<390	<340	<350	<340	<340	<21000	ug/l	<40	<40
2-Methylphenol	ug/l	<40	<87		ug/kg	<370	<340	<390	<340	<350	<340	<340	<21000	ug/l	<40	<40
3-Methylphenol	ug/l	<40	<87		ug/kg	<370	<340	<390	<340	<350	<340	<340	<21000	ug/l	<40	<40
4-Methylphenol	ug/l	<40	<87		ug/kg	<370	<340	<390	<340	<350	<340	<340	<21000	ug/l	<40	<40
Nitrobenzene	ug/l	<40	<87		ug/kg	<370	<340	<390	<340	<350	<340	<340	<21000	ug/l	<40	<40
Silver, total	mg/l	<.0005	<.0005		mg/l	<.0005	<.0005WN	<.0005WN	<.0005WN	<.0005WN	<.0005WN	<.0005WN	<.0005WN	mg/l	.0005W	<.0005
Arsenic, total	mg/l	<.003	<.003		mg/l	<.003	0.004B	<.003W	.006B	.006B	.008B	.005B	.004BW	mg/l	<.003	<.003
Barium, total	mg/l	<.05	<.05		mg/l	0.75	2.22	1.81	3.59	1.81	1.72	1.84	3.12	mg/l	<.05	<.05
Cadmium, total	mg/l	.0010B	.0011BW		mg/l	.0005B	.0010B	<.0005	.0011BW	.0012BW	.0007BW	.0006BW	.0006BW	mg/l	<.0005	.0006B
Chromium, total	mg/l	<.006	<.006		mg/l	.007B	<.006	.009B	.009B	.006B	.007B	<.006	0.01	mg/l	.007B	<.006
Mercury, total	mg/l	<.0002	<.0002		mg/l	<.0002	<.0002	<.0002	<.0002	<.0002	<.0002	<.0002	<.0002	mg/l	<.0002	<.0002
Lead, total	mg/l	<.002B	<.002W		mg/l	.003BWN	<.002WN	<.002WN	<.002WN	<.002N	<.002NW	<.002WN	<.002WN	mg/l	<.002S	.002BS
Selenium,total	mg/l	<.003W	<.003		mg/l	<.003	<.003W	<.003WN	<.003	<.003W	<.003N	<.003N	<.003WN	mg/l	<.003	<.003W

TABLE 2 (CONT)

SUMMARY OF ON-SITE CORE SAMPLE ANALYTICAL RESULTS

Roswell, New Mexico

Core Hole No.				
Sample Depth		Blank #14	Blank #15	Blank #16
Sample ID		Trip	Trip	Dist. Water
TPH	mg/l	<4	<1	<1
Methanol	mg/l	<1	<1	<1
Methylene Chloride	ug/l	<5	<5	<5
Acetone	ug/l	<10	<10	23
Carbon Disulfide	ug/l	<5	<5	<5
Trichlorofluoromethane	ug/l	<5	<5	<5
Ethyl Ether	ug/l	<5	<5	<5
Freon (TF)	ug/l	9*	7*	6*
2-Butanone	ug/l	<10	<10	150
1,1,1-Trichloroethane	ug/l	<5	<5	<5
Carbon Tetrachloride	ug/l	<5	<5	<5
Cyclohexanone	ug/l	<5	<5	<5
Ethyl Acetate	ug/l	<5	<5	<5
Isobutyl Alcohol	ug/l	<200	<200	<200
2-Ethoxyethanol	ug/l	<10	<10	<10
n-Butyl Alcohol	ug/l	<100	<100	<100
Trichloroethene	ug/l	<5	<5	<5
1,1,2-Trichloroethane	ug/l	<5	<5	<5
Benzene	ug/l	<5	<5	<5
4 Methyl 2 Pentanone	ug/l	<10	<10	<10
Tetrachloroethane	ug/l	<5	<5	<5
Toluene	ug/l	<5	<5	<5
Chlorobenzene	ug/l	<5	<5	<5
Ethylbenzene	ug/l	<5	<5	<5
Xylene (total)	ug/l	<5	<5	<5
Pyridine	ug/l	<40	<40	<40
1,3-Dichlorobenzene	ug/l	<40	<40	<40
1,4-Dichlorobenzene	ug/l	<40	<40	<40
1,2-Dichlorobenzene	ug/l	<40	<40	<40
2-Methylphenol	ug/l	<40	<40	<40
3-Methylphenol	ug/l	<40	<40	<40
4-Methylphenol	ug/l	<40	<40	<40
Nitrobenzene	ug/l	<40	<40	<40
Silver, total	mg/l	<.0005N	<.0005	<.0005
Arsenic, total	mg/l	<.003	<.003W	<.003
Barium, total	mg/l	<.05	<.05	<.05
Cadmium, total	mg/l	<.0005W	<.0005	<.0005
Chromium, total	mg/l	<.006	<.006	<.006
Mercury, total	mg/l	<.0002	<.0002	<.0002
Lead, total	mg/l	.004SN	<.002WN	<.002N
Selenium,total	mg/l	<.003	<.003N	<.003N

TABLE 3

PHASE 3

					SUMMARY OF OFF-SITE CORE SAMPLE ANALYTICAL RESULTS													
					Roswell, New Mexico													
Core Hole No.		P9-OS-213	P9-OS-213	P9-OS-213	P9-OS-213	P9-OS-213	P9-OS-213	P9-OS-213	P9-OS-238	P9-OS-238	P9-OS-238	P9-OS-238	P9-OS-349	P9-OS-349	P9-OS-349	P9-OS-349		P9-OS-349
Sample Depth		(5)	(10)	(15)	(20)	(23)	(29-30)	(31.5-32)	(5)	(10)	(15)	(20)	(5)	(10)	(20)	(25)		(25) Duplicate
		Soil	Soil	Soil	Soil	Soil	Rock	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil		Soil/Water
TPH	mg/kg	<20	<20	<20	<20	<20	<20	<20	70	120	<20	60	<20	100	<20	100		
Methanol	mg/l	<5	<5	<5	<5	<5	<1	<5	<20	<5	<10	<20	<1	<5	<1	<10	ug/l	
Methylene Chloride	ug/kg	9	<6	<7	7	<5	<5	<6	<5	<5	<5	<5	6*	9*	<5*	10	ug/l	<5
Acetone	ug/kg	32*	35*	59*	33*	29*	22*	39*	29*	22*	17*	19*	<11	<11	<11	<11	ug/l	<10
Carbon Disulfide	ug/kg	<6	<6	<5	<6	<5	<5	<6	<5	<5	<5	<5	<5	<6	<5	<5	ug/l	<5
Trichlorofluoromethane	ug/kg	<6	<6	<5	<6	<5	<5	<6	<5	<5	<5	<5	<5	<6	<5	<5	ug/l	<5
Ethyl Ether	ug/kg	<6	<6	<5	<6	<5	<5	<6	<5	<5	<5	<5	<5	<6	<5	<5	ug/l	<5
Freon (TF)	ug/kg	<6	<6	<5	<6	<5	<5	<6	<5	<5	<5	<5	26*	18*	45*	21	ug/l	35*
2-Butanone	ug/kg	<12	<12	<10	<13	<10	<10	<12	<10	<10	<10	<10	<11	<11	<11	<11	ug/l	<10
1,1,1-Trichloroethane	ug/kg	<6	<6	<5	<6	<5	<5	<6	<5	<5	<5	<5	<5	<6	<5	<5	ug/l	36
Carbon Tetrachloride	ug/kg	<6	<6	<5	<6	<5	<5	<6	<5	<5	<5	<5	<5	<6	<5	<5	ug/l	<5
Cyclohexanone	ug/kg	<6	<6	<5	<6	<5	<5	<6	<5	<5	<5	<5	<5	<6	<5	<5	ug/l	<5
Ethyl Acetate	ug/kg	<6	<6	<5	<6	<5	<5	<6	<5	<5	<5	<5	<5	<6	<5	<5	ug/l	<5
Isobutyl Alcohol	ug/kg	<230	<230	<210	<260	<200	<200	<250	<200	<210	<210	<210	<220	<220	<210	<220	ug/l	<200
2-Ethoxyethanol	ug/kg	<12	<12	<10	<13	<10	<10	<12	<10	<10	<10	<10	<11	<11	<11	<11	ug/l	<10
n-Butyl Alcohol	ug/kg	<120	<120	<100	<130	<100	<100	<120	<100	<100	<100	<100	<110	<110	<110	<110	ug/l	<100
Trichloroethene	ug/kg	<6	<6	<5	<6	<5	<5	<6	<5	<5	<5	<5	<5	<6	<5	<5	ug/l	<5
1,1,2-Trichloroethane	ug/kg	<6	<6	<5	<6	<5	<5	<6	<5	<5	<5	<5	<5	<6	<5	<5	ug/l	<5
Benzene	ug/kg	<6	<6	<5	<6	<5	<5	<6	<5	<5	<5	<5	<5	<6	<5	<5	ug/l	<5
2 Methyl 4 Pentanone	ug/kg	<12	<12	<10	<13	<10	<10	<12	<10	<10	<10	<10	<11	<11	<11	<11	ug/l	<10
Tetrachloroethane	ug/kg	<6	<6	<5	<6	<5	<5	<6	<5	<5	<5	<5	<5	<6	<5	<5	ug/l	<5
Toluene	ug/kg	<6	<6	<5	<6	<5	<5	<6	<5	<5	<5	<5	<5	<6	<5	<5	ug/l	8
Chlorobenzene	ug/kg	<6	<6	<5	<6	<5	<5	<6	<5	<5	<5	<5	<5	<6	<5	<5	ug/l	<5
Ethylbenzene	ug/kg	<6	<6	<5	<6	<5	<5	<6	<5	<5	<5	<5	<5	<6	<5	<5	ug/l	<5
Xylene (total)	ug/kg	<6	<6	<5	<6	<5	<5	<6	<5	<5	<5	<5	<5	<6	<5	<5	ug/l	<5
Pyridine	ug/kg	<380	<380	<340	<420	<340	<330	<410	<340	<340	<340	<340	<350	<370	<350	Not Tested	ug/l	<350
1,3-Dichlorobenzene	ug/kg	<380	<380	<340	<420	<340	<330	<410	<340	<340	<340	<340	<350	<370	<350	Not Tested	ug/l	<350
1,4-Dichlorobenzene	ug/kg	<380	<380	<340	<420	<340	<330	<410	<340	<340	<340	<340	<350	<370	<350	Not Tested	ug/l	<350
1,2-Dichlorobenzene	ug/kg	<380	<380	<340	<420	<340	<330	<410	<340	<340	<340	<340	<350	<370	<350	Not Tested	ug/l	<350
2-Methylphenol	ug/kg	<380	<380	<340	<420	<340	<330	<410	<340	<340	<340	<340	<350	<370	<350	Not Tested	ug/l	<350
3-Methylphenol	ug/kg	<380	<380	<340	<420	<340	<330	<410	<340	<340	<340	<340	<350	<370	<350	Not Tested	ug/l	<350
4-Methylphenol	ug/kg	<380	<380	<340	<420	<340	<330	<410	<340	<340	<340	<340	<350	<370	<350	Not Tested	ug/l	<350
Nitrobenzene	ug/kg	<380	<380	<340	<420	<340	<330	<410	<340	<340	<340	<340	<350	<370	<350	Not Tested	ug/l	<350
Silver, total	mg/l	<0.0006	<.0006	<.0006	<.0006	<.0006	<.0006	<.0006	<.0006	<.0006	<.0006	<.0006	<.0006	<.0006	<.0006	Not Tested	mg/l	<.0006
Arsenic, total	mg/l	0.008	.007B	.004B	<.003W	<.003	<.003W	.004B	.004BW	<.003	.003B	.003B	.007B	.005B	<.003	Not Tested	mg/l	<.003
Barium, total	mg/l	1.34	.15B	0.22	1.05	1.64	2.03	0.68	1.01	0.39	0.33	<.06	1.21	0.4	0.77	Not Tested	mg/l	0.96
Cadmium, total	mg/l	<.0008BW	<.0006	<.0006	<.0006W	<.0006W	<.0006BW	.0011BW	.0009BW	<.0006	.0009B	<.0006	.0009BW	<.0006	<.0006	Not Tested	mg/l	.0009BW
Chromium, total	mg/l	<.007	<.007	<.007	<.007	<.007	<.007	<.007	0.011	.007B	0.01	0.01	0.012	0.013	.009B	Not Tested	mg/l	.007B
Mercury, total	mg/l	<.0002	<.0002	<.0002	<.0002	<.0002	<.0002	<.0002	<.0002	<.0002	<.0002	<.0002	<.0002	<.0002	<.0002	Not Tested	mg/l	<.0002
Lead, total	mg/l	<.002W	<.002	<.002W	<.002W	<.002W	0.004	.003B	.003N	.007N	.005N	.005WN	0.012	.011S	0.004	Not Tested	mg/l	0.009
Selenium,total	mg/l	<.003W	<.01W	<.003	<.003W	<.003W	<.01	<.003W	<.003W	<.003W	<.003W	<.02	<.003	<.01W	<.003W	Not Tested	mg/l	<.003W

TABLE 3 (CONT)

						SUMMARY OF OFF-SITE CORE SAMPLE ANALYTICAL RESULTS									
							Roswell, New Mexico								
Core Hole No.		P9-OS-349	P9-OS-349	P9-OS-349	P9-OS-377	P9-OS-377	P9-OS-377	P9-OS-377	P9-OS-377	P9-OS-377		P9-OS-377	Field	Field	Trip
Sample Depth		(30)	(35)	(40)	(5)	(10)	(15)	(20)	(25)	(30)		(30) Duplicate	Blank	Blank	Blank
		Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil		Soil/Water			
TPH	mg/kg	<20	<20	<20	200	<20	<20	<20	<20	<20	mg/l	Not Tested	<1	<1	<1
Methanol	mg/l	<5	<1	<5	<5	<1	<1	<5	<1	<5	mg/l	Not Tested	<1	<1	<1
Methylene Chloride	ug/kg	<7	15	8	<6	<6	11	7	36	23	ug/l	20	22*	<5	23*
Acetone	ug/kg	<14	<14	<10	34*	27*	27*	37*	<12	<13	ug/l	43*	<10	<10	<10
Carbon Disulfide	ug/kg	<7	<7	<5	<6	<6	<6	<7	<6	<7	ug/l	<5	<5	<5	<5
Trichlorofluoromethane	ug/kg	<7	<7	<5	<6	<6	<6	<7	<6	<7	ug/l	<5	<5	6	<5
Ethyl Ether	ug/kg	<7	<7	<5	<6	<6	<6	<7	<6	<7	ug/l	<5	<5	<5	<5
Freon (TF)	ug/kg	45*	39	40	<6	<6	<6	<7	46	69	ug/l	<5	<5	<5	<5
2-Butanone	ug/kg	<14	<14	<10	<11	<12	<12	<13	<12	<13	ug/l	160	<10	<10	<10
1,1,1-Trichloroethane	ug/kg	<7	<7	<5	<6	<6	<6	<7	<6	<7	ug/l	<5	<5	<5	<5
Carbon Tetrachloride	ug/kg	<7	<7	<5	<6	<6	<6	<7	<6	<7	ug/l	<5	<5	<5	<5
Cyclohexanone	ug/kg	<7	<7	<5	<6	<6	<6	<7	<6	<7	ug/l	<5	<5	<5	<5
Ethyl Acetate	ug/kg	<7	<7	<5	<6	<6	<6	<7	<6	<7	ug/l	<5	<5	<5	<5
Isobutyl Alcohol	ug/kg	<290	<270	<200	<220	<240	<240	<270	<250	<260	ug/l	<200	<200	<200	<200
2-Ethoxyethanol	ug/kg	<14	<14	<10	<11	<12	<12	<13	<12	<13	ug/l	<10	<10	<10	<10
n-Butyl Alcohol	ug/kg	<140	<140	<100	<110	<120	<120	<130	<120	<130	ug/l	<100	<100	<100	<100
Trichloroethene	ug/kg	<7	<7	<5	<6	<6	<6	<7	<6	<7	ug/l	<5	<5	<5	<5
1,1,2-Trichloroethane	ug/kg	<7	<7	<5	<6	<6	<6	<7	<6	<7	ug/l	<5	<5	<5	<5
Benzene	ug/kg	<7	<7	<5	<6	<6	<6	<7	<6	<7	ug/l	<5	<5	<5	<5
2 Methyl 4 Pentanone	ug/kg	<14	<14	<10	<11	<12	<12	<13	<12	<13	ug/l	<10	<10	<10	<10
Tetrachloroethane	ug/kg	<7	<7	<5	<6	<6	<6	<7	<6	<7	ug/l	<5	<5	<5	<5
Toluene	ug/kg	<7	<7	<5	<6	<6	<6	<7	<6	<7	ug/l	<5	<5	<5	<5
Chlorobenzene	ug/kg	<7	<7	<5	<6	<6	<6	<7	<6	<7	ug/l	<5	<5	<5	<5
Ethylbenzene	ug/kg	<7	<7	<5	<6	<6	<6	<7	<6	<7	ug/l	<5	<5	<5	<5
Xylene (total)	ug/kg	<7	<7	<5	<6	<6	<6	<7	<6	<7	ug/l	<5	<5	<5	<5
Pyridine	ug/kg	<480	<450	<390	<370	<400	<400	<440	<410	Not Tested	ug/l	<430	<10	<10	<10
1,3-Dichlorobenzene	ug/kg	<480	<450	<390	<370	<400	<400	<440	<410	Not Tested	ug/l	<430	<10	<10	<10
1,4-Dichlorobenzene	ug/kg	<480	<450	<390	<370	<400	<400	<440	<410	Not Tested	ug/l	<430	<10	<10	<10
1,2-Dichlorobenzene	ug/kg	<480	<450	<390	<370	<400	<400	<440	<410	Not Tested	ug/l	<430	<10	<10	<10
2-Methylphenol	ug/kg	<480	<450	<390	<370	<400	<400	<440	<410	Not Tested	ug/l	<430	<10	<10	<10
3-Methylphenol	ug/kg	<480	<450	<390	<370	<400	<400	<440	<410	Not Tested	ug/l	<430	<10	<10	<10
4-Methylphenol	ug/kg	<480	<450	<390	<370	<400	<400	<440	<410	Not Tested	ug/l	<430	<10	<10	<10
Nitrobenzene	ug/kg	<480	<450	<390	<370	<400	<400	<440	<410	Not Tested	ug/l	<430	<10	<10	<10
Silver, total	mg/l	<.0006	<.0006	<.0006	<.0006	<.0006	<.0006	<.0006W	<.0006	<.0006	mg/l	<.0006	<.0006	<.0006	<.0006
Arsenic, total	mg/l	<.003	<.003	0.005B	.004B	0.01	<.003	.003B	.006B	0.011	mg/l	0.011	<.003	<.003	<.003
Barium, total	mg/l	1.46	1.36	0.23	1.05	.19B	.15B	.16B	.06B	0.32	mg/l	0.32	<.06	<.06	<.06
Cadmium, total	mg/l	<.0006	<.0006W	0.0013BW	<.0006W	.0018BW	.003B	.0010B	.0009B	<.0006	mg/l	<0.0006	<.0006W	<.0006W	<.0006W
Chromium, total	mg/l	.009B	0.011	<.007	.009B	.007B	0.011	0.011	<.007	<.007	mg/l	<0.007	<0.007	<0.007	<0.007
Mercury, total	mg/l	<.0002	<.0002	<.0002	<.0002	<.0002	<.0002	<.0002	<.0002	<.0002	mg/l	<.0002	<.0002	<.0002	<.0002
Lead, total	mg/l	0.007	0.005	<.002W	0.003	0.004	0.009	.003BW	<.002W	<.002	mg/l	<.002W	.003B	.003B	.002BW
Selenium,total	mg/l	<.003W	<.003W	<.003W	<.003W	<.01W	<.003W	<.01W	<.02	<.003	mg/l	<.003	<.003W	<.003	<.003W

TABLE 4

PHASE 4

SUMMARY OF OFF-SITE CORE SAMPLE ANALYTICAL RESULTS - TWINNED SOIL-GAS/CORE HOLE LOCATIONS Roswell, New Mexico											
Core Hole No.		SG-09-91	SG-09-91	SG-09-91	SG-09-91	SG-09-91	SG-09-91	SG-09-91	SG-09-91	SG-09-91	SG-09-91
Sample Depth		(2-3')	(4-9')	(9-14')	(14-19')	(20-22')	(22-25')	(25-27')	(27-29')	(29-31')	(31-33')
		Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
F-list Alcohols											
Isobutanol	mg/kg	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
n-Butanol	mg/kg	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Methanol	mg/kg	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
F-list Semi-Vol.											
M-Cresol	mg/kg	<.133	<.133	<.133	<.133	<.133	<.133	<.133	<.133	<.133	<.133
O-Cresol	mg/kg	<.1	<.1	<.1	<.1	<.1	<.1	<.1	<.1	<.1	<.1
P-Cresol	mg/kg	<.2	<.2	<.2	<.2	<.2	<.2	<.2	<.2	<.2	<.2
1,2-Dichlorobenzene	mg/kg	<.033	<.033	<.033	<.033	<.033	<.033	<.033	<.033	<.033	<.033
Nitrobenzene	mg/kg	<.033	<.033	<.033	<.033	<.033	<.033	<.033	<.033	<.033	<.033
Pyridine	mg/kg	<.633	<.633	<.633	<.633	<.633	<.633	<.633	<.633	<.633	<.633
Cyclohexanone	mg/kg	<.167	<.167	<.167	<.167	<.167	<.167	<.167	<.167	<.167	<.167
F-List Volatiles											
Acetone	mg/kg	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
Carbon Disulfide	mg/kg	<.4	<.4	<.4	<.4	<.4	<.4	<.4	<.4	<.4	<.4
Carbon Tetrachloride	mg/kg	<.2	<.2	<.2	<.2	<.2	<.2	<.2	<.2	<.2	<.2
Chlorobenzene	mg/kg	<.2	<.2	<.2	<.2	<.2	<.2	<.2	<.2	<.2	<.2
Ethyl acetate	mg/kg	<.6	<.6	<.6	<.6	<.6	<.6	<.6	<.6	<.6	<.6
Ethylbenzene	mg/kg	<.4	<.4	<.4	<.4	<.4	<.4	<.4	<.4	<.4	<.4
Ethylether	mg/kg	<.4	<.4	<.4	<.4	<.4	<.4	<.4	<.4	<.4	<.4
Methylene Chloride	mg/kg	<.4	<.4	<.4	<.4	<.4	<.4	<.4	<.4	<.4	<.4
Methyl ethyl ketone	mg/kg	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Methyl isobutyl ketone	mg/kg	<.6	<.6	<.6	<.6	<.6	<.6	<.6	<.6	<.6	<.6
Tetrachloroethylene	mg/kg	<.2	<.2	<.2	<.2	<.2	<.2	<.2	<.2	<.2	<.2
Toluene	mg/kg	<.2	<.2	<.2	<.2	<.2	<.2	<.2	<.2	<.2	<.2
1,1,1-Trichloroethane	mg/kg	<.2	<.2	<.2	<.2	<.2	<.2	<.2	<.2	<.2	<.2
Trichloroethylene	mg/kg	<.4	<.4	<.4	<.4	<.4	<.4	<.4	<.4	<.4	<.4
Trichlorofluoromethane	mg/kg	<.2	<.2	<.2	<.2	<.2	<.2	<.2	<.2	<.2	<.2
1,1,2-Trichlorotrifluoroethan	mg/kg	<.4	<.4	<.4	<.4	<.4	<.4	<.4	<.4	<.4	<.4
Xylenes (total)	mg/kg	<.4	<.4	<.4	<.4	<.4	<.4	<.4	<.4	<.4	<.4
Total Recoverable HC	mg/kg	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
Arsenic	mg/l	<.1	<.1	<.1	<.1	<.1	<.1	<.1	<.1	<.1	<.1
Barium	mg/l	1.18	0.36	1.34	1.17	1.75	1.86	1.86	2.4	1.67	1.51
Cadmium	mg/l	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01
Chromium	mg/l	0	<.02	<.02	<.02	<.02	<.02	<.02	<.02	<.02	<.02
Lead	mg/l	<.05	<.05	<.05	<.05	<.05	<.05	<.05	<.05	<.05	<.05
Mercury	mg/l	<.02	<.02	<.02	<.02	<.02	<.02	<.02	<.02	<.02	<.02
Silver	mg/l	0.33	0.06	<.01	<.01	<.01	<.01	<.01	0.07	<.01	<.01
Selenium	mg/l	<.10	<.10	<.10	<.10	<.10	<.10	<.10	<.10	<.10	<.10

TABLE 4 (CONT)

			SUMMARY OF OFF-SITE CORE SAMPLE ANALYTICAL RESULTS - TWINNED SOIL-GAS/CORE HOLE LOCATIONS											
							Roswell, New Mexico							
Core Hole No.		SG-09-331	SG-09-331	SG-09-331	SG-09-331	SG-09-331	SG-09-331	SG-09-331	SG-09-331	SG-09-331	SG-09-331	SG-09-331	SG-09-331	SG-09-331
Sample Depth		(0-3 feet)	(4-8 feet)	(8-13 feet)	(14-18 feet)	(19-21 feet)	(22-24 feet)	(25-27 feet)	(28-30 feet)	(30-32 feet)	(32-34 feet)	(34-36 feet)	(36-38 feet)	(38-40 feet)
		Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
F-List Alcohols in Water														
n-Butanol	mg/kg	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Isobutanol	mg/kg	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Methanol	mg/kg	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
F-List Semivolatiles in Water														
m-Cresol (3-Methylphenol)	mg/kg	<.133	<.133	<.133	<.133	<.133	<.133	<.133	<.133	<.133	<.133	<.133	<.133	<.133
o-Cresol (2-Methylphenol)	mg/kg	<.1	<.1	<.1	<.1	<.1	<.1	<.1	<.1	<.1	<.1	<.1	<.1	<.1
p-Cresol (4-Methylphenol)	mg/kg	<.2	<.2	<.2	<.2	<.2	<.2	<.2	<.2	<.2	<.2	<.2	<.2	<.2
1,2-Dichlorobenzene	mg/kg	<.033	<.033	<.033	<.033	<.033	<.033	<.033	<.033	<.033	<.033	<.033	<.033	<.033
Nitrobenzene	mg/kg	<.033	<.033	<.033	<.033	<.033	<.033	<.033	<.033	<.033	<.033	<.033	<.033	<.033
Pyridine	mg/kg	<.633	<.633	<.633	<.633	<.633	<.633	<.633	<.633	<.633	<.633	<.633	<.633	<.633
Cyclohexanone	mg/kg	<.167	<.167	<.167	<.167	<.167	<.167	<.167	<.167	<.167	<.167	<.167	<.167	<.167
Toxicity Characteristic Leaching		done	done	done	done	done	done	done	done	done	done	done	done	done
F-List Volatiles														
Acetone	mg/kg	<2	<.9	<.9	<.9	<.9	<.9	<2	<2	<2	<2	<2	<2	<.9
Carbon disulfide	mg/kg	<.4	<.2	<.2	<.2	<.2	<.2	<.4	<.4	<.4	<.4	<.4	<.4	<.2
Carbon tetrachloride	mg/kg	<.2	<.1	<.1	<.1	<.1	<.1	<.2	<.2	<.2	<.2	<.2	<.2	<.1
Chlorobenzene	mg/kg	<.2	<.1	<.1	<.1	<.1	<.1	<.2	<.2	<.2	<.2	<.2	<.2	<.1
Ethyl acetate	mg/kg	<.6	<.3	<.3	<.3	<.3	<.3	<.6	<.6	<.6	<.6	<.6	<.6	<.3
Ethylbenzene	mg/kg	<.4	<.2	<.2	<.2	<.2	<.2	<.4	<.4	<.4	<.4	<.4	<.4	<.2
Ethyl ether	mg/kg	<.4	<.2	<.2	<.2	<.2	<.2	<.4	<.4	<.4	<.4	<.4	<.4	<.2
Methylene chloride	mg/kg	<.4	<.2	<.2	<.2	<.2	<.2	<.4	<.4	<.4	<.4	<.4	<.4	<.2
Methyl ethyl ketone (2-Butanone)	mg/kg	<1	<.6	<.6	<.6	<.6	<.6	<1	<1	<1	<1	<1	<1	<.6
Methyl isobutyl ketone (4Me2C5one	mg/kg	<.6	<.3	<.3	<.3	<.3	<.3	<.6	<.6	<.6	<.6	<.6	<.6	<.3
Tetrachloroethylene	mg/kg	<.2	<.1	<.1	<.1	<.1	<.1	<.2	<.2	<.2	<.2	<.2	<.2	<.1
Toluene	mg/kg	<.6	<.3	<.3	<.3	<.3	<.3	<.6	<.6	<.6	<.6	<.6	<.6	<.3
1,1,1-Trichloroethane	mg/kg	<.6	<.3	<.3	<.3	<.3	<.3	<.6	<.6	<.6	<.6	<.6	<.6	<.3
Trichloroethylene	mg/kg	<.4	<.2	<.2	<.2	<.2	<.2	<.4	<.4	<.4	<.4	<.4	<.4	<.2
Trichlorofluoromethane	mg/kg	<.2	<.1	<.1	<.1	<.1	<.1	<.2	<.2	<.2	<.2	<.2	<.2	<.1
1,1,2-Trichlorotrifluoroethane	mg/kg	<.4	<.2	<.2	<.2	<.2	<.2	<.4	<.4	<.4	<.4	<.4	<.4	<.2
Xylenes (total)	mg/kg	<.4	<.2	<.2	<.2	<.2	<.2	<.4	<.4	<.4	<.4	<.4	<.4	<.2
Total Recoverable Hydrocarbons	mg/kg	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
Arsenic (As), TCLP Extraction	mg/l	<.1	<.1	<.1	<.1	<.1	<.1	<.1	<.1	<.1	<.1	<.1	<.1	<.1
Barium (Bas), TCLP Extraction	mg/l	2.65	1.03	1.58	0.61	2.19	0.5	1.1	0.64	1.78	0.93	2.31	1.9	1.28
Cadmium (Cd), TCLP Extraction	mg/l	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01
Chromium (Cr), TCLP Extraction	mg/l	<.02	<.02	<.02	<.02	<.02	<.02	<.02	<.02	<.02	<.02	<.02	<.02	<.02
Lead (Pb), TCLP Extraction	mg/l	<.05	<.05	<.05	<.05	<.05	<.05	<.05	<.05	<.05	<.05	<.05	<.05	<.05
Mercury (Hg), TCLP Extraction	mg/l	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001
Silver (Ag), TCLP Extraction	mg/l	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01
Selenium (Se), TCLP Extraction	mg/l	<.10	<.10	<.10	<.10	<.10	<.10	<.10	<.10	<.10	<.10	<.10	<.10	<.10

TABLE 4 (CONT)

			SUMMARY OF OFF-SITE CORE SAMPLE ANALYTICAL RESULTS - TWINNED SOIL-GAS/CORE HOLE LOCATIONS											
							Roswell, New Mexico							
Core Hole No.		SG-09-331	SG-09-331	SG-09-337	SG-09-337	SG-09-337	SG-09-337	SG-09-337	SG-09-337	SG-09-337	SG-09-337	SG-09-358	SG-09-358	SG-09-358
Sample Depth		(40-42 feet)	(42-43 feet)	(0-3 feet)	(3-8 feet)	(8-13 feet)	(13-18 feet)	(18-23 feet)	(18-23 feet)	(23-28 feet)	(28-33 feet)	(0-5 feet)	(5-9 feet)	(10-15 feet)
		Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
F-List Alcohols in Water														
n-Butanol	mg/kg	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Isobutanol	mg/kg	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Methanol	mg/kg	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
F-List Semivolatiles in Water														
m-Cresol (3-Methylphenol)	mg/kg	<.133	<.133	<.133	<.133	<.133	<.133	<.133	<.133	<.133	<.133	<.133	<.133	<.133
o-Cresol (2-Methylphenol)	mg/kg	<.1	<.1	<.1	<.1	<.1	<.1	<.1	<.1	<.1	<.1	<.1	<.1	<.1
p-Cresol (4-Methylphenol)	mg/kg	<.2	<.2	<.2	<.2	<.2	<.2	<.2	<.2	<.2	<.2	<.2	<.2	<.2
1,2-Dichlorobenzene	mg/kg	<.033	<.033	<.033	<.033	<.033	<.033	<.033	<.033	<.033	<.033	<.033	<.033	<.033
Nitrobenzene	mg/kg	<.033	<.033	<.033	<.033	<.033	<.033	<.033	<.033	<.033	<.033	<.033	<.033	<.033
Pyridine	mg/kg	<.633	<.633	<.633	<.633	<.633	<.633	<.633	<.633	<.633	<.633	<.633	<.633	<.633
Cyclohexanone	mg/kg	<.167	<.167	<.167	<.167	<.167	<.167	<.167	<.167	<.167	<.167	<.167	<.167	<.167
Toxicity Characteristic Leaching		done	done	done	done	done	done	done	done	done	done	done	done	done
F-List Volatiles														
Acetone	mg/kg	<.9	<.9	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
Carbon disulfide	mg/kg	<.2	<.2	<.4	<.4	<.4	<.4	<.4	<.4	<.4	<.4	<.4	<.4	<.4
Carbon tetrachloride	mg/kg	<.1	<.1	<.2	<.2	<.2	<.2	<.2	<.2	<.2	<.2	<.2	<.2	<.2
Chlorobenzene	mg/kg	<.1	<.1	<.2	<.2	<.2	<.2	<.2	<.2	<.2	<.2	<.2	<.2	<.2
Ethyl acetate	mg/kg	<.3	<.3	<.6	<.6	<.6	<.6	<.6	<.6	<.6	<.6	<.6	<.6	<.6
Ethylbenzene	mg/kg	<.2	<.2	<.4	<.4	<.4	<.4	<.4	<.4	<.4	<.4	<.4	<.4	<.4
Ethyl ether	mg/kg	<.2	<.2	<.4	<.4	<.4	<.4	<.4	<.4	<.4	<.4	<.4	<.4	<.4
Methylene chloride	mg/kg	<.2	<.2	<.4	<.4	<.4	<.4	<.4	<.4	<.4	<.4	<.4	<.4	<.4
Methyl ethyl ketone (2-Butanone)	mg/kg	<.6	<.6	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Methyl isobutyl ketone (4Me2C5one	mg/kg	<.3	<.3	<.6	<.6	<.6	<.6	<.6	<.6	<.6	<.6	<.6	<.6	<.6
Tetrachloroethylene	mg/kg	<.1	<.1	<.2	<.2	<.2	<.2	<.2	<.2	<.2	<.2	<.2	<.2	<.2
Toluene	mg/kg	<.3	<.3	<.6	<.6	<.6	<.6	<.6	<.6	<.6	<.6	<.6	<.6	<.6
1,1,1-Trichloroethane	mg/kg	<.3	<.3	<.6	<.6	<.6	<.6	<.6	<.6	<.6	<.6	<.6	<.6	<.6
Trichloroethylene	mg/kg	<.2	<.2	<.4	<.4	<.4	<.4	<.4	<.4	<.4	<.4	<.4	<.4	<.4
Trichlorofluoromethane	mg/kg	<.1	<.1	<.2	<.2	<.2	<.2	<.2	<.2	<.2	<.2	<.2	<.2	<.2
1,1,2-Trichlorotrifluoroethane	mg/kg	<.2	<.2	<.4	<.4	<.4	<.4	<.4	<.4	<.4	<.4	<.4	<.4	<.4
Xylenes (total)	mg/kg	<.2	<.2	<.4	<.4	<.4	<.4	<.4	<.4	<.4	<.4	<.4	<.4	<.4
Total Recoverable Hydrocarbons	mg/kg	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50			
Arsenic (As), TCLP Extraction	mg/l	<.1	<.1	<.1	<.1	<.1	<.1	<.1	<.1	<.1	<.1	<.1	<.1	<.1
Barium (Bas), TCLP Extraction	mg/l	1.63	1.1	1.33	0.91	0.56	2.01	<.01	2.18	0.45	0.4	1.05	0.89	0.52
Cadmium (Cd), TCLP Extraction	mg/l	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01
Chromium (Cr), TCLP Extraction	mg/l	<.02	<.02	<.02	<.02	<.02	<.02	<.02	<.02	<.02	<.02	<.02	<.02	<.02
Lead (Pb), TCLP Extraction	mg/l	<.05	<.05	<.05	<.05	<.05	<.05	<.05	<.05	<.05	<.05	<.05	<.05	<.05
Mercury (Hg), TCLP Extraction	mg/l	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001
Silver (Ag), TCLP Extraction	mg/l	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01	0.03	<.01
Selenium (Se), TCLP Extraction	mg/l	<.10	<.10	<.10	<.10	<.10	<.10	<.10	<.10	<.10	<.10	<.10	<.10	<.10

TABLE 4 (CONT)

		SUMMARY OF OFF-SITE CORE SAMPLE ANALYTICAL RESULTS - TWINNED SOIL-GAS/CORE HOLE LOCATIONS												
		Roswell, New Mexico												
Core Hole No.		SG-09-358	SG-09-358	SG-09-358	SG-09-358	SG-09-358	SG-09-360	SG-09-360	SG-09-360	SG-09-360	SG-09-360	SG-09-360	SG-09-360	SG-09-360
Sample Depth		(18-20 feet)	(21-25 feet)	(26-30 feet)	(26-30 feet)	(26-30 feet)	(0-3 feet)	(3-8 feet)	(8-14 feet)	(14-18 feet)	(18-25 feet)	(18-25 feet)	(25-29 feet)	(29-30 feet)
		Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
F-List Alcohols in Water														
n-Butanol	mg/kg	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Isobutanol	mg/kg	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Methanol	mg/kg	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
F-List Semivolatiles in Water														
m-Cresol (3-Methylphenol)	mg/kg	<.133	<.133	<.133	<.133	<.133	<.133	<.133	<.133	<.133	<.133	<.133	<.133	<.133
o-Cresol (2-Methylphenol)	mg/kg	<.1	<.1	<.1	<.1	<.1	<.1	<.1	<.1	<.1	<.1	<.1	<.1	<.1
p-Cresol (4-Methylphenol)	mg/kg	<.2	<.2	<.2	<.2	<.2	<.2	<.2	<.2	<.2	<.2	<.2	<.2	<.2
1,2-Dichlorobenzene	mg/kg	<.033	<.033	<.033	<.033	<.033	<.033	<.033	<.033	<.033	<.033	<.033	<.033	<.033
Nitrobenzene	mg/kg	<.033	<.033	<.033	<.033	<.033	<.033	<.033	<.033	<.033	<.033	<.033	<.033	<.033
Pyridine	mg/kg	<.633	<.633	<.633	<.633	<.633	<.633	<.633	<.633	<.633	<.633	<.633	<.633	<.633
Cyclohexanone	mg/kg	<.167	<.167	<.167	<.167	<.167	<.167	<.167	<.167	<.167	<.167	<.167	<.167	<.167
Toxicity Characteristic Leaching		done	done	done	done	done	done	done	done	done	done	done	done	done
F-List Volatiles														
Acetone	mg/kg	<2	<2	<2	<2	<2	<.9	<2	<2	<2	<2	<2	<2	<2
Carbon disulfide	mg/kg	<.4	<.4	<.4	<.4	<.4	<.2	<.4	<.4	<.4	<.4	<.4	<.4	<.4
Carbon tetrachloride	mg/kg	<.2	<.2	<.2	<.2	<.2	<.1	<.2	<.2	<.2	<.2	<.2	<.2	<.2
Chlorobenzene	mg/kg	<.2	<.2	<.2	<.2	<.2	<.1	<.2	<.2	<.2	<.2	<.2	<.2	<.2
Ethyl acetate	mg/kg	<.6	<.6	<.6	<.6	<.6	<.3	<.6	<.6	<.6	<.6	<.6	<.6	<.6
Ethylbenzene	mg/kg	<.4	<.4	<.4	<.4	<.4	<.2	<.4	<.4	<.4	<.4	<.4	<.4	<.4
Ethyl ether	mg/kg	<.4	<.4	<.4	<.4	<.4	<.2	<.4	<.4	<.4	<.4	<.4	<.4	<.4
Methylene chloride	mg/kg	<.4	<.4	<.4	<.4	<.4	<.2	<.4	<.4	<.4	<.4	<.4	<.4	<.4
Methyl ethyl ketone (2-Butanone)	mg/kg	<1	<1	<1	<1	<1	<.6	<1	<1	<1	<1	<1	<1	<1
Methyl isobutyl ketone (4Me2C5one	mg/kg	<.6	<.6	<.6	<.6	<.6	<.3	<.6	<.6	<.6	<.6	<.6	<.6	<.6
Tetrachloroethylene	mg/kg	<.2	<.2	<.2	<.2	<.2	<.1	<.2	<.2	<.2	<.2	<.2	<.2	<.2
Toluene	mg/kg	<.6	<.6	<.6	<.6	<.6	<.3	<.6	<.6	<.6	<.6	<.6	<.6	<.6
1,1,1-Trichloroethane	mg/kg	<.6	<.6	<.6	<.6	<.6	<.3	<.6	<.6	<.6	<.6	<.6	<.6	<.6
Trichloroethylene	mg/kg	<.4	<.4	<.4	<.4	<.4	<.2	<.4	<.4	<.4	<.4	<.4	<.4	<.4
Trichlorofluoromethane	mg/kg	<.2	<.2	<.2	<.2	<.2	<.1	<.2	<.2	<.2	<.2	<.2	<.2	<.2
1,1,2-Trichlorotrifluoroethane	mg/kg	<.4	<.4	<.4	<.4	<.4	<.2	<.4	<.4	<.4	<.4	<.4	<.4	<.4
Xylenes (total)	mg/kg	<.4	<.4	<.4	<.4	<.4	<.2	<.4	<.4	<.4	<.4	<.4	<.4	<.4
Total Recoverable Hydrocarbons	mg/kg	Not Tested	Not Tested	<50	Not Tested	<50	<50	<50	<50	<50	<50	<50	<50	<50
Arsenic (As), TCLP Extraction	mg/l	<.1	<.1	<.1	<.1	<.1	<.1	<.1	<.1	<.1	<.1	<.1	<.1	<.1
Barium (Bas), TCLP Extraction	mg/l	0.51	1.55	0.67	0.91	0.67	1.81	1.21	0.2	0.69	0.41	2.47	1.38	2.03
Cadmium (Cd), TCLP Extraction	mg/l	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01
Chromium (Cr), TCLP Extraction	mg/l	<.02	<.02	<.02	<.02	<.02	<.02	<.02	<.02	<.02	<.02	<.02	<.02	<.02
Lead (Pb), TCLP Extraction	mg/l	<.05	<.05	<.05	<.05	<.05	<.05	<.05	<.05	<.05	<.05	<.05	<.05	<.05
Mercury (Hg), TCLP Extraction	mg/l	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001
Silver (Ag), TCLP Extraction	mg/l	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01	0.18	<.01	<.01	<.01	<.01
Selenium (Se), TCLP Extraction	mg/l	<.10	<.10	<.10	<.10	<.10	<.10	<.10	<.10	<.10	<.10	<.10	<.10	<.10

TABLE 4 (CONT)

SUMMARY OF OFF-SITE CORE SAMPLE ANALYTICAL RESULTS - TWINNED SOIL-GAS/CORE HOLE LOCATIONS

Roswell, New Mexico

Core Hole No.		SG-09-360	SG-09-370	SG-09-370	SG-09-370	SG-09-370	SG-09-370
Sample Depth		(30-34.5 feet)	(0-4 feet)	(5-9 feet)	(10-14 feet)	(15-19 feet)	(20-24 feet)
		Soil	Soil	Soil	Soil	Soil	Soil
F-List Alcohols in Water							
n-Butanol	mg/kg	<1	<1	<1	<1	<1	<1
Isobutanol	mg/kg	ND	<1	<1	<1	<1	<1
Methanol	mg/kg	<1	<1	<1	<1	<1	<1
F-List Semivolatiles in Water							
m-Cresol (3-Methylphenol)	mg/kg	<.133	<.133	<.133	<.133	<.133	<.133
o-Cresol (2-Methylphenol)	mg/kg	<.1	<.1	<.1	<.1	<.1	<.1
p-Cresol (4-Methylphenol)	mg/kg	<.2	<.2	<.2	<.2	<.2	<.2
1,2-Dichlorobenzene	mg/kg	<.033	<.033	<.033	<.033	<.033	<.033
Nitrobenzene	mg/kg	<.033	<.033	<.033	<.033	<.033	<.033
Pyridine	mg/kg	<.633	<.633	<.633	<.633	<.633	<.633
Cyclohexanone	mg/kg	<.167	<.167	<.167	<.167	<.167	<.167
Toxicity Characteristic Leaching		done	done	done	done	done	done
F-List Volatiles							
Acetone	mg/kg	<2	<2	<2	<2	<2	<2
Carbon disulfide	mg/kg	<.4	<.4	<.4	<.4	<.4	<.4
Carbon tetrachloride	mg/kg	<.2	<.2	<.2	<.2	<.2	<.2
Chlorobenzene	mg/kg	<.2	<.2	<.2	<.2	<.2	<.2
Ethyl acetate	mg/kg	<.6	<.6	<.6	<.6	<.6	<.6
Ethylbenzene	mg/kg	<.4	<.4	<.4	<.4	<.4	<.4
Ethyl ether	mg/kg	<.4	<.4	<.4	<.4	<.4	<.4
Methylene chloride	mg/kg	<.4	<.4	<.4	<.4	<.4	<.4
Methyl ethyl ketone (2-Butanone)	mg/kg	<1	<1	<1	<1	<1	<1
Methyl isobutyl ketone (4Me2C5one	mg/kg	<.6	<.6	<.6	<.6	<.6	<.6
Tetrachloroethylene	mg/kg	<.2	<.2	<.2	<.2	<.2	<.2
Toluene	mg/kg	<.6	<.6	<.6	<.6	<.6	<.6
1,1,1-Trichloroethane	mg/kg	<.6	<.6	<.6	<.6	<.6	<.6
Trichloroethylene	mg/kg	<.4	<.4	<.4	<.4	<.4	<.4
Trichlorofluoromethane	mg/kg	<.2	<.2	<.2	<.2	<.2	<.2
1,1,2-Trichlorotrifluoroethane	mg/kg	<.4	<.4	<.4	<.4	<.4	<.4
Xylenes (total)	mg/kg	<.4	<.4	<.4	<.4	<.4	<.4
Total Recoverable Hydrocarbons	mg/kg	<50	<50	<50	<50	<50	<50
Arsenic (As), TCLP Extraction	mg/l	<.1	<.1	<.1	<.1	<.1	<.1
Barium (Bas), TCLP Extraction	mg/l	1.5	1.69	0.54	0.31	1.34	1.96
Cadmium (Cd), TCLP Extraction	mg/l	<.01	<.01	<.01	<.01	<.01	<.01
Chromium (Cr), TCLP Extraction	mg/l	<.02	<.02	<.02	<.02	<.02	<.02
Lead (Pb), TCLP Extraction	mg/l	<.05	<.05	<.05	<.05	<.05	<.05
Mercury (Hg), TCLP Extraction	mg/l	<.001	<.001	<.001	<.001	<.001	<.001
Silver (Ag), TCLP Extraction	mg/l	<.01	<.01	<.01	<.01	0.03	0.05
Selenium (Se), TCLP Extraction	mg/l	<.10	<.10	<.10	<.10	<.10	<.10

TABLE 4 (CONT)

		SUMMARY OF OFF-SITE CORE SAMPLE ANALYTICAL RESULTS - TWINNED SOIL-GAS/CORE HOLE LOCATIONS																
		Roswell, New Mexico																
Sample ID		Blank #331	Blank #331	Blank #331	Blank #331	Blank #337	Blank #337	Blank #337	Blank #337	Blank #358	Blank #358	Blank #358	Blank #360	Blank #360	Blank #360	Blank #360	Blank #370	Blank #370
		EQ	TR	FD	TR	EQ	FD	TR	TR	FD	TR	EQ	EQ	TR	FD	TR	TR	EQ
		Water	Water	Water	Water	Water	Water	Water	Water	Water	Water	Water	Water	Water	Water	Water	Water	Water
F-List Alcohols In Water																		
n-Butanol	mg/l	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Isobutanol	mg/l	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Methanol	mg/l	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
F-List Semivolatiles In Water																		
m-Cresol (3-Methylphenol)	ug/l	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<.0133	<4	<4	<4	<4
o-Cresol (2-Methylphenol)	ug/l	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<.01	<3	<3	<3	<3
p-Cresol (4-Methylphenol)	ug/l	<6	<6	<6	<6	<6	<6	<6	<6	<6	<6	<6	<6	<.02	<6	<6	<6	<6
1,2-Dichlorobenzene	ug/l	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<.033	<1	<1	<1	<1
Nitrobenzene	ug/l	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<.033	<1	<1	<1	<1
Pyridine	ug/l	<19	<19	<19	<19	<19	<19	<19	<19	<19	<19	<19	<19	<.633	<19	<19	<19	<19
Cyclohexanone	ug/l	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<.167	<5	<5	<5	<5
Toxicity Characteristic Leaching		done	done	done	done	done	done	done	done	done	done	done	done	done	done	done	done	done
F-List Volatiles																		
Acetone	ug/l	<17	<17	<17	<17	<17	<17	<17	<17	<17	<17	<17	<17	<17	<17	<17	<17	<17
Carbon disulfide	ug/l	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3
Carbon tetrachloride	ug/l	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
Chlorobenzene	ug/l	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
Ethyl acetate	ug/l	<6	<6	<6	<6	<6	<6	<6	<6	<6	<6	<6	<6	<6	<6	<6	<6	<6
Ethylbenzene	ug/l	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3
Ethyl ether	ug/l	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4
Methylene chloride	ug/l	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4
Methyl ethyl ketone (2-Butanone)	ug/l	<12	<12	<12	<12	<12	<12	<12	<12	<12	<12	<12	<12	<12	<12	<12	<12	<12
Methyl isobutyl ketone (4Me2C5one	ug/l	<6	<6	<6	<6	<6	<6	<6	<6	<6	<6	<6	<6	<6	<6	<6	<6	<6
Tetrachloroethylene	ug/l	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
Toluene	ug/l	<2	<2	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
1,1,1-Trichloroethane	ug/l	<2	<2	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Trichloroethylene	ug/l	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4
Trichlorofluoromethane	ug/l	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
1,1,2-Trichlorotrifluoroethane	ug/l	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4
Xylenes (total)	ug/l	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3
Total Recoverable Hydrocarbons	mg/l	<1	<1	<1	1.6	<1		<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Arsenic (As), TCLP Extraction	mg/l	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Barium (Ba), TCLP Extraction	mg/l	0.03	0.4	1.78	0.93	0.43	0.39	0.36	0.39	0.49	0.47	0.38	0.21	0.44	0.37	0.43	0.49	0.4
Cadmium (Cd), TCLP Extraction	mg/l	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01
Chromium (Cr), TCLP Extraction	mg/l	<.02	<.02	<.02	<.02	<.02	<.02	<.02	<.02	<.02	<.02	<.02	<.02	<.02	<.02	<.02	<.02	<.02
Lead (Pb), TCLP Extraction	mg/l	<.05	<.05	<.05	<.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	<.05	<.05	<.05	0.43	0.05	0.05
Mercury (Hg), TCLP Extraction	mg/l	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001
Silver (Ag), TCLP Extraction	mg/l	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01	0.34	<.01	<.01	<.01	<.01	<.01	<.01
Selenium (Se), TCLP Extraction	mg/l	<.10	<.10	<.10	<.10	<.10	<.10	<.10	<.10	<.10	<.10	<.10	<.10	<.10	<.10	<.10	<.10	<.10

TABLE 4 (CONT)

SUMMARY OF OFF-SITE SAMPLE ANALYTICAL RESULTS - TWINNED SOIL-GAS/CORE HOLE LOCATIONS							
Roswell, New Mexico							
Sample ID			Blank #091	Blank #091	Blank #091	Blank #091	Blank #091
			TR	FD	EQ	TR	FD
			Water	Water	Water	Water	Water
F-list Alcohols							
Isobutanol	mg/l		<1	<1	<1	<1	<1
n-Butanol	mg/l		<1	<1	<1	<1	<1
Methanol	mg/l		<1	<1	<1	<1	4
F-list Semi-Vol							
M-Cresol	ug/l		Not Tested	Not Tested	<4	Not Tested	Not Tested
O-Cresol	ug/l		Not Tested	Not Tested	<3	Not Tested	Not Tested
P-Cresol	ug/l		Not Tested	Not Tested	<6	Not Tested	Not Tested
1,2-Dichlorobenzene	ug/l		Not Tested	Not Tested	<1	Not Tested	Not Tested
Nitrobenzene	ug/l		Not Tested	Not Tested	<1	Not Tested	Not Tested
Pyridine	ug/l		Not Tested	Not Tested	<19	Not Tested	Not Tested
Cyclohexanone	ug/l		Not Tested	Not Tested	<5	Not Tested	Not Tested
F-List Volatiles							
Acetone	ug/l		<17	<17	<17	<17	<17
Carbon Disulfide	ug/l		<3	<3	<3	<3	<3
Carbon Tetrachloride	ug/l		<2	<2	<2	<2	<2
Chlorobenzene	ug/l		<2	<2	<2	<2	<2
Ethyl acetate	ug/l		<6	<6	<6	<6	<6
Ethylbenzene	ug/l		<3	<3	<3	<3	<3
Ethylether	ug/l		<4	<4	<4	<4	<4
Methylene Chloride	ug/l		<4	<4	<4	<4	<4
Methyl ethyl ketone	ug/l		<25	<25	<12	<25	<25
Methyl isobutyl ketone	ug/l		<6	<6	<6	<6	<6
Tetrachloroethylene	ug/l		<2	<2	<2	<2	<2
Toluene	ug/l		<4	<4	<2	<4	<4
1,1,1-Trichloroethane	ug/l		<4	<4	<2	<4	<4
Trichloroethylene	ug/l		<4	<4	<4	<4	<4
Trichlorofluoromethane	ug/l		<2	<2	<2	<2	<2
1,1,2-Trichlorotrifluoroethan	ug/l		<4	<4	<4	<4	<4
Xylenes (total)	ug/l		<3	<3	<3	<3	<3
Total Recoverable HC	mg/l		Not Tested	Not Tested	<1	Not Tested	Not Tested
Arsenic	mg/l		Not Tested	Not Tested	<.1	Not Tested	Not Tested
Barium	mg/l		Not Tested	Not Tested	0.1	Not Tested	Not Tested
Cadmium	mg/l		Not Tested	Not Tested	<.01	Not Tested	Not Tested
Chromium	mg/l		Not Tested	Not Tested	<.02	Not Tested	Not Tested
Lead	mg/l		Not Tested	Not Tested	<.05	Not Tested	Not Tested
Mercury	mg/l		Not Tested	Not Tested	<.02	Not Tested	Not Tested
Silver	mg/l		Not Tested	Not Tested	0.07	Not Tested	Not Tested
[illegible]	[illegible]		Not Tested	Not Tested	<.10	Not Tested	Not Tested

Page 1
Received: 07/23/91

REPORT
07/31/91 10:36:55

Work Order # 91-07-257

REPORT TO: ENRON/TRANSWESTERN PIPELINE
6381 N. MAIN STREET
P.O. BOX 1717
ROSWELL, NM 88202-1717
ATTEN: LARRY CAMPBELL

PREPARED BY: Assaigai Analytical Labs
7300 Jefferson NE
Albuquerque, NM 87109
ATTEN: SYED RIZVI
PHONE: (505)345-8964

Syed Rizvi
CERTIFIED BY

CONTACT: LAB MANAGER

CLIENT: ENR03 SAMPLES: 12
COMPANY: ENRON/TRANSWESTERN PIPELINE
FACILITY: ROSWELL, NEW MEXICO
ENR03

QUESTIONS ABOUT THIS REPORT SHOULD BE ADDRESSED TO:
LABORATORY OPERATIONS MANAGER/ASSAIGAI ANALYTICAL
7300 JEFFERSON N.E., ALBUQUERQUE, N.M. 87109

WORK ID: STATION #9 7784
TAKEN: 7/22/91
TRANS: FEDERAL EXPRESS
TYPE: SOIL
P.O. #:
INVOICE: under separate cover

SAMPLE IDENTIFICATION

01	PIT 2 SAMPLE 001
02	PIT 2 SAMPLE 002
03	PIT 2 26.0-26.2
04	PIT 2 29.1-29.3
05	PIT 2 39.8-39.9
06	PIT 2 44.1-44.3
07	PIT 2 57.5-57.8
08	PIT 2 69.9-70.1
09	
10	
11	PIT 3 BH-2 25.0-25.2
12	PIT 3 BH-1 30.7-30.9

TEST CODES and NAMES used on this workorder

8010_S	PURGEABLE HALOCARBONS-SOIL
8020	AROMATIC VOLATILE ORGANICS
TRPH	TOTAL REC PET HYDROCARBONS

Member: American Council of Independent Laboratories, Inc.

Received: 07/23/91

REPORT
Results by Sample

Work Order # 91-07-257

SAMPLE ID **PIT 2 SAMPLE 001** FRACTION **01A** TEST CODE **8010_S** NAME **PURGEABLE HALOCARBONS-SOIL**
Date & Time Collected **07/22/91** Category ________

PARAMETER	RESULT	LIMIT
BROMODICHLOROMETHANE	<0.1	0.1
BROMOFORM	<0.1	0.1
BROMOMETHANE	<0.1	0.1
CARBON TETRACHLORIDE	<0.1	0.1
CHLOROBENZENE	<0.1	0.1
CHLOROETHANE	<0.1	0.1
CHLOROFORM	<0.1	0.1
2-CHLOROETHYL VINYL ETHER	<0.1	0.1
CHLOROMETHANE	<0.1	0.1
DIBROMOCHLOROMETHANE	<0.1	0.1
1,2-DICHLOROBENZENE	<0.1	0.1
1,3-DICHLOROBENZENE	<0.1	0.1
1,4-DICHLOROBENZENE	<0.1	0.1
DICHLORODIFLUOROMETHANE	<0.1	0.1
1,1-DICHLOROETHANE	<0.1	0.1
1,2-DICHLOROETHANE	<0.1	0.1
1,1-DICHLOROETHENE	<0.1	0.1
trans-1,2-DICHLOROETHENE	<0.1	0.1
1,2-DICHLOROPROPANE	<0.1	0.1
cis-1,3-DICHLOROPROPENE	<0.1	0.1
1,1,2,2-TETRACHLOROETHANE	<0.1	0.1
trans-1,3-DICHLOROPROPENE	<0.1	0.1
METHYLENE CHLORIDE	<0.1	0.1
1,1,1-TRICHLOROETHANE	<0.1	0.1
1,1,2-TRICHLOROETHANE	<0.1	0.1
TETRACHLOROETHENE	<0.1	0.1
TRICHLOROFLUOROMETHANE	<0.1	0.1
TRICHLOROETHENE	<0.1	0.1
VINYL CHLORIDE	<0.1	0.1

Received: 07/23/91

REPORT
Results by Sample

Work Order # 91-07-257
Continued From Above

SAMPLE ID **PIT 2 SAMPLE 001**

FRACTION **01A** TEST CODE **8010 S** NAME **PURGEABLE HALOCARBONS-SOIL**
Date & Time Collected **07/22/91** Category ______

Notes and Definitions for this Report:

EXTRACTED 07/29/91
DATE RUN 07/29/91
ANALYST D/R
UNITS MG/KG

Received: 07/23/91

REPORT
Results by Sample

Work Order # 91-07-257

SAMPLE ID **PIT 2 SAMPLE 002**

FRACTION **02A** TEST CODE **8010_S** NAME **PURGEABLE HALOCARBONS-SOIL**
Date & Time Collected **07/22/91** Category ______

PARAMETER	RESULT	LIMIT
BROMODICHLOROMETHANE	<0.1	0.1
BROMOFORM	<0.1	0.1
BROMOMETHANE	<0.1	0.1
CARBON TETRACHLORIDE	<0.1	0.1
CHLOROBENZENE	<0.1	0.1
CHLOROETHANE	<0.1	0.1
CHLOROFORM	<0.1	0.1
2-CHLOROETHYL VINYL ETHER	<0.1	0.1
CHLOROMETHANE	<0.1	0.1
DIBROMOCHLOROMETHANE	<0.1	0.1
1,2-DICHLOROBENZENE	<0.1	0.1
1,3-DICHLOROBENZENE	<0.1	0.1
1,4-DICHLOROBENZENE	<0.1	0.1
DICHLORODIFLUOROMETHANE	<0.1	0.1
1,1-DICHLOROETHANE	<0.1	0.1
1,2-DICHLOROETHANE	<0.1	0.1
1,1-DICHLOROETHENE	<0.1	0.1
trans-1,2-DICHLOROETHENE	<0.1	0.1
1,2-DICHLOROPROPANE	<0.1	0.1
cis-1,3-DICHLOROPROPENE	<0.1	0.1
1,1,2,2-TETRACHLOROETHANE	<0.1	0.1
trans-1,3-DICHLOROPROPENE	<0.1	0.1
METHYLENE CHLORIDE	<0.1	0.1
1,1,1-TRICHLOROETHANE	0.37	0.1
1,1,2-TRICHLOROETHANE	<0.1	0.1
TETRACHLOROETHENE	0.65	0.1
TRICHLOROFLUOROMETHANE	<0.1	0.1
TRICHLOROETHENE	<0.1	0.1
VINYL CHLORIDE	<0.1	0.1

[redacted]
ANALYTICAL LABORATORIES, INC. • 7300 Jefferson, N.E. • Albuquerque, New Mexico 87109

Received: 07/23/91

REPORT
Results by Sample

Work Order # 91-07-257
Continued From Above

SAMPLE ID **PIT 2 SAMPLE 002**

FRACTION **02A** TEST CODE **8010_S** NAME **PURGEABLE HALOCARBONS-SOIL**
Date & Time Collected **07/22/91** Category ________

Notes and Definitions for this Report:

EXTRACTED 07/29/91
DATE RUN 07/29/91
ANALYST D/R
UNITS MG/KG

Member: American Council of Independent Laboratories, Inc.

Received: 07/23/91

REPORT
Results by Sample

Work Order # 91-07-257

SAMPLE ID **PIT 2 26.0-26.2** FRACTION **03A** TEST CODE **8010 S** NAME **PURGEABLE HALOCARBONS-SOIL**
Date & Time Collected **07/22/91** Category ______

PARAMETER	RESULT	LIMIT
BROMODICHLOROMETHANE	<0.1	0.1
BROMOFORM	<0.1	0.1
BROMOMETHANE	<0.1	0.1
CARBON TETRACHLORIDE	<0.1	0.1
CHLOROBENZENE	<0.1	0.1
CHLOROETHANE	<0.1	0.1
CHLOROFORM	<0.1	0.1
2-CHLOROETHYL VINYL ETHER	<0.1	0.1
CHLOROMETHANE	<0.1	0.1
DIBROMOCHLOROMETHANE	<0.1	0.1
1,2-DICHLOROBENZENE	<0.1	0.1
1,3-DICHLOROBENZENE	<0.1	0.1
1,4-DICHLOROBENZENE	<0.1	0.1
DICHLORODIFLUOROMETHANE	<0.1	0.1
1,1-DICHLOROETHANE	<0.1	0.1
1,2-DICHLOROETHANE	<0.1	0.1
1,1-DICHLOROETHENE	<0.1	0.1
trans-1,2-DICHLOROETHENE	<0.1	0.1
1,2-DICHLOROPROPANE	<0.1	0.1
cis-1,3-DICHLOROPROPENE	<0.1	0.1
1,1,2,2-TETRACHLOROETHANE	<0.1	0.1
trans-1,3-DICHLOROPROPENE	<0.1	0.1
METHYLENE CHLORIDE	<0.1	0.1
1,1,1-TRICHLOROETHANE	<0.1	0.1
1,1,2-TRICHLOROETHANE	<0.1	0.1
TETRACHLOROETHENE	<0.1	0.1
TRICHLOROFLUOROMETHANE	<0.1	0.1
TRICHLOROETHENE	<0.1	0.1
VINYL CHLORIDE	<0.1	0.1

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REPORT
Results by Sample

Work Order # 91-07-257
Continued From Above

Received: 07/23/91

SAMPLE ID **PIT 2 26.0-26.2**

FRACTION **03A** TEST CODE **8010 S** NAME **PURGEABLE HALOCARBONS-SOIL**

Date & Time Collected **07/22/91** Category ______

Notes and Definitions for this Report:

EXTRACTED 07/29/91
DATE RUN 07/29/91
ANALYST D/R
UNITS MG/KG

Received: 07/23/91

REPORT
Results by Sample

Work Order # 91-07-257

SAMPLE ID **PIT 2 29.1-29.3** FRACTION **04A** TEST CODE **8010_S** NAME **PURGEABLE HALOCARBONS-SOIL**
Date & Time Collected **07/22/91** Category ______

PARAMETER	RESULT	LIMIT
BROMODICHLOROMETHANE	<0.1	0.1
BROMOFORM	<0.1	0.1
BROMOMETHANE	<0.1	0.1
CARBON TETRACHLORIDE	<0.1	0.1
CHLOROBENZENE	<0.1	0.1
CHLOROETHANE	<0.1	0.1
CHLOROFORM	<0.1	0.1
2-CHLOROETHYL VINYL ETHER	<0.1	0.1
CHLOROMETHANE	<0.1	0.1
DIBROMOCHLOROMETHANE	<0.1	0.1
1,2-DICHLOROBENZENE	<0.1	0.1
1,3-DICHLOROBENZENE	<0.1	0.1
1,4-DICHLOROBENZENE	<0.1	0.1
DICHLORODIFLUOROMETHANE	<0.1	0.1
1,1-DICHLOROETHANE	<0.1	0.1
1,2-DICHLOROETHANE	<0.1	0.1
1,1-DICHLOROETHENE	<0.1	0.1
trans-1,2-DICHLOROETHENE	<0.1	0.1
1,2-DICHLOROPROPANE	<0.1	0.1
cis-1,3-DICHLOROPROPENE	<0.1	0.1
1,1,2,2-TETRACHLOROETHANE	<0.1	0.1
trans-1,3-DICHLOROPROPENE	<0.1	0.1
METHYLENE CHLORIDE	<0.1	0.1
1,1,1-TRICHLOROETHANE	<0.1	0.1
1,1,2-TRICHLOROETHANE	<0.1	0.1
TETRACHLOROETHENE	<0.1	0.1
TRICHLOROFLUOROMETHANE	<0.1	0.1
TRICHLOROETHENE	<0.1	0.1
VINYL CHLORIDE	<0.1	0.1

Received: 07/23/91 Results by Sample Continued From Above

SAMPLE ID PIT 2 29.1-29.3 FRACTION 04A TEST CODE 8010 S NAME PURGEABLE HALOCARBONS-SOIL
Date & Time Collected 07/22/91 Category

Notes and Definitions for this Report:

EXTRACTED 07/29/91
DATE RUN 07/29/91
ANALYST D/R
UNITS MG/KG

Received: 07/23/91

REPORT
Results by Sample

Work Order # 91-07-257

SAMPLE ID **PIT 2 39.8-39.9** FRACTION **05A** TEST CODE **8010_S** NAME **PURGEABLE HALOCARBONS-SOIL**
Date & Time Collected **07/22/91** Category ______

PARAMETER	RESULT	LIMIT
BROMODICHLOROMETHANE	<0.1	0.1
BROMOFORM	<0.1	0.1
BROMOMETHANE	<0.1	0.1
CARBON TETRACHLORIDE	<0.1	0.1
CHLOROBENZENE	<0.1	0.1
CHLOROETHANE	<0.1	0.1
CHLOROFORM	<0.1	0.1
2-CHLOROETHYL VINYL ETHER	<0.1	0.1
CHLOROMETHANE	<0.1	0.1
DIBROMOCHLOROMETHANE	<0.1	0.1
1,2-DICHLOROBENZENE	<0.1	0.1
1,3-DICHLOROBENZENE	<0.1	0.1
1,4-DICHLOROBENZENE	<0.1	0.1
DICHLORODIFLUOROMETHANE	<0.1	0.1
1,1-DICHLOROETHANE	<0.1	0.1
1,2-DICHLOROETHANE	<0.1	0.1
1,1-DICHLOROETHENE	<0.1	0.1
trans-1,2-DICHLOROETHENE	<0.1	0.1
1,2-DICHLOROPROPANE	<0.1	0.1
cis-1,3-DICHLOROPROPENE	<0.1	0.1
1,1,2,2-TETRACHLOROETHANE	<0.1	0.1
trans-1,3-DICHLOROPROPENE	<0.1	0.1
METHYLENE CHLORIDE	<0.1	0.1
1,1,1-TRICHLOROETHANE	<0.1	0.1
1,1,2-TRICHLOROETHANE	<0.1	0.1
TETRACHLOROETHENE	<0.1	0.1
TRICHLOROFLUOROMETHANE	<0.1	0.1
TRICHLOROETHENE	<0.1	0.1
VINYL CHLORIDE	<0.1	0.1

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Received: 07/23/91

REPORT
Results by Sample

Work Order # 91-07-257
Continued From Above

SAMPLE ID **PIT 2 39.8-39.9** FRACTION **05A** TEST CODE **8010_S** NAME **PURGEABLE HALOCARBONS-SOIL**
Date & Time Collected **07/22/91** Category ______

Notes and Definitions for this Report:

EXTRACTED 07/29/91
DATE RUN 07/29/91
ANALYST D/R
UNITS MG/KG

REPORT
Results by Sample

Work Order # 91-07-257

SAMPLE ID **PIT 2 44.1-44.3** FRACTION **06A** TEST CODE **8010 S** NAME **PURGEABLE HALOCARBONS-SOIL**
Date & Time Collected **07/22/91** Category ______

PARAMETER	RESULT	LIMIT
BROMODICHLOROMETHANE	<0.1	0.1
BROMOFORM	<0.1	0.1
BROMOMETHANE	<0.1	0.1
CARBON TETRACHLORIDE	<0.1	0.1
CHLOROBENZENE	<0.1	0.1
CHLOROETHANE	<0.1	0.1
CHLOROFORM	<0.1	0.1
2-CHLOROETHYL VINYL ETHER	<0.1	0.1
CHLOROMETHANE	<0.1	0.1
DIBROMOCHLOROMETHANE	<0.1	0.1
1,2-DICHLOROBENZENE	<0.1	0.1
1,3-DICHLOROBENZENE	<0.1	0.1
1,4-DICHLOROBENZENE	<0.1	0.1
DICHLORODIFLUOROMETHANE	<0.1	0.1
1,1-DICHLOROETHANE	<0.1	0.1
1,2-DICHLOROETHANE	<0.1	0.1
1,1-DICHLOROETHENE	<0.1	0.1
trans-1,2-DICHLOROETHENE	<0.1	0.1
1,2-DICHLOROPROPANE	<0.1	0.1
cis-1,3-DICHLOROPROPENE	<0.1	0.1
1,1,2,2-TETRACHLOROETHANE	<0.1	0.1
trans-1,3-DICHLOROPROPENE	<0.1	0.1
METHYLENE CHLORIDE	<0.1	0.1
1,1,1-TRICHLOROETHANE	<0.1	0.1
1,1,2-TRICHLOROETHANE	<0.1	0.1
TETRACHLOROETHENE	<0.1	0.1
TRICHLOROFLUOROMETHANE	<0.1	0.1
TRICHLOROETHENE	<0.1	0.1
VINYL CHLORIDE	<0.1	0.1

REPORT
Results by Sample

Work Order # 91-07-257
Continued From Above

SAMPLE ID **PIT 2 44.1-44.3** FRACTION **06A** TEST CODE **8010_S** NAME **PURGEABLE HALOCARBONS-SOIL**
Date & Time Collected **07/22/91** Category ______

Notes and Definitions for this Report:

EXTRACTED 07/29/91
DATE RUN 07/29/91
ANALYST D/R
UNITS MG/KG

REPORT
Results by Sample

Work Order # 91-07-257

SAMPLE ID **PIT 2 44.1-44.3** FRACTION **06A** TEST CODE **8020** NAME **AROMATIC VOLATILE ORGANICS**
Date & Time Collected **07/22/91** Category ____

PARAMETER	RESULT	DET LIMIT
BENZENE	<0.1	0.1
CHLOROBENZENE	<0.1	0.1
1,4-DICHLOROBENZENE	<0.1	0.1
1,3-DICHLOROBENZENE	<0.1	0.1
1,2-DICHLOROBENZENE	<0.1	0.1
ETHYL BENZENE	<0.1	0.1
TOLUENE	<0.1	0.1
XYLENES	<0.1	0.1

Notes and Definitions for this Report:

EXTRACTED 07/29/91
DATE RUN 07/29/91
ANALYST D/R
UNITS MG/KG

REPORT
Results by Sample

Work Order # 91-07-257

Received: 07/23/91

SAMPLE ID **PIT 2 57.5-57.8** FRACTION **07A** TEST CODE **8010_S** NAME **PURGEABLE HALOCARBONS-SOIL**
Date & Time Collected **07/22/91** Category ________

PARAMETER	RESULT	LIMIT
BROMODICHLOROMETHANE	<0.1	0.1
BROMOFORM	<0.1	0.1
BROMOMETHANE	<0.1	0.1
CARBON TETRACHLORIDE	<0.1	0.1
CHLOROBENZENE	<0.1	0.1
CHLOROETHANE	<0.1	0.1
CHLOROFORM	<0.1	0.1
2-CHLOROETHYL VINYL ETHER	<0.1	0.1
CHLOROMETHANE	<0.1	0.1
DIBROMOCHLOROMETHANE	<0.1	0.1
1,2-DICHLOROBENZENE	<0.1	0.1
1,3-DICHLOROBENZENE	<0.1	0.1
1,4-DICHLOROBENZENE	<0.1	0.1
DICHLORODIFLUOROMETHANE	<0.1	0.1
1,1-DICHLOROETHANE	<0.1	0.1
1,2-DICHLOROETHANE	<0.1	0.1
1,1-DICHLOROETHENE	<0.1	0.1
trans-1,2-DICHLOROETHENE	<0.1	0.1
1,2-DICHLOROPROPANE	<0.1	0.1
cis-1,3-DICHLOROPROPENE	<0.1	0.1
1,1,2,2-TETRACHLOROETHANE	<0.1	0.1
trans-1,3-DICHLOROPROPENE	<0.1	0.1
METHYLENE CHLORIDE	<0.1	0.1
1,1,1-TRICHLOROETHANE	<0.1	0.1
1,1,2-TRICHLOROETHANE	<0.1	0.1
TETRACHLOROETHENE	<0.1	0.1
TRICHLOROFLUOROMETHANE	<0.1	0.1
TRICHLOROETHENE	<0.1	0.1
VINYL CHLORIDE	<0.1	0.1

REPORT
Results by Sample

Work Order # 91-07-257
Continued From Above

SAMPLE ID **PIT 2 57.5-57.8**

FRACTION **07A** TEST CODE **8010_S** NAME **PURGEABLE HALOCARBONS-SOIL**
Date & Time Collected **07/22/91** Category ______

Notes and Definitions for this Report:

EXTRACTED 07/29/91
DATE RUN 07/30/91
ANALYST D/R
UNITS MG/KG

Received: 07/23/91 **Results by Sample**

SAMPLE ID **PIT 2 69.9-70.1** FRACTION **08A** TEST CODE **8010 8** NAME **PURGEABLE HALOCARBONS-SOIL**
Date & Time Collected **07/22/91** Category ______

PARAMETER	RESULT	LIMIT
BROMODICHLOROMETHANE	<0.1	0.1
BROMOFORM	<0.1	0.1
BROMOMETHANE	<0.1	0.1
CARBON TETRACHLORIDE	<0.1	0.1
CHLOROBENZENE	<0.1	0.1
CHLOROETHANE	<0.1	0.1
CHLOROFORM	<0.1	0.1
2-CHLOROETHYL VINYL ETHER	<0.1	0.1
CHLOROMETHANE	<0.1	0.1
DIBROMOCHLOROMETHANE	<0.1	0.1
1,2-DICHLOROBENZENE	<0.1	0.1
1,3-DICHLOROBENZENE	<0.1	0.1
1,4-DICHLOROBENZENE	<0.1	0.1
DICHLORODIFLUOROMETHANE	<0.1	0.1
1,1-DICHLOROETHANE	<0.1	0.1
1,2-DICHLOROETHANE	<0.1	0.1
1,1-DICHLOROETHENE	<0.1	0.1
trans-1,2-DICHLOROETHENE	<0.1	0.1
1,2-DICHLOROPROPANE	<0.1	0.1
cis-1,3-DICHLOROPROPENE	<0.1	0.1
1,1,2,2-TETRACHLOROETHANE	<0.1	0.1
trans-1,3-DICHLOROPROPENE	<0.1	0.1
METHYLENE CHLORIDE	<0.1	0.1
1,1,1-TRICHLOROETHANE	<0.1	0.1
1,1,2-TRICHLOROETHANE	<0.1	0.1
TETRACHLOROETHENE	<0.1	0.1
TRICHLOROFLUOROMETHANE	<0.1	0.1
TRICHLOROETHENE	<0.1	0.1
VINYL CHLORIDE	<0.1	0.1

Received: 07/23/91

REPORT
Results by Sample

Work Order # 91-07-257
Continued From Above

SAMPLE ID **PIT 2 69.9-70.1**

FRACTION **08A** TEST CODE **8010_S** NAME **PURGEABLE HALOCARBONS-SOIL**
Date & Time Collected **07/22/91** Category ____________

Notes and Definitions for this Report:

EXTRACTED 07/29/91
DATE RUN 07/30/91
ANALYST D/R
UNITS MG/KG

2 through 4 as it relates to the red clay surface and the estimated zone for TRPH.

Bibliography

The following bibliographic sources document the methods utilized in performing laboratory analyses for the investigation. Specific laboratory tests performed are indicated in parentheses.

USEPA SW-846 Method #8010 - Test Methods for Evaluating Solid Waste: Physical/Chemical Methods, SW-846, 3rd Edition, 1986. (Test 8010 for purgeable halocarbons).

USEPA SW-846 Method #8020 - Test Methods for Evaluating Solid Waste: Physical/Chemical Methods, SW-846, 3rd Edition, 1986. (Test 8020 for aromatic volatile organics).

USEPA Method #602/8020 - Test Methods for Evaluating Solid Waste: Physical/Chemical Methods, SW-846, 3rd Edition 1986 - Guidelines Establishing Test Procedures for the Analysis of Pollutants under the Clean Water Act 40 CFR Part 139, October 1984 (Test 8020 for BTEX).

USEPA Method #418.1 - Methods for Chemical Analysis of Water and Wastes, EPA 600/4-79-020, revised March 1983. (Test 418.1 for TRPH).

Received: 07/18/91

REPORT 07/31/91 14:28:41

Work Order # 91-07-215

REPORT TO: ENRON/TRANSWESTERN PIPELINE
6381 N. MAIN STREET
P.O. BOX 1717
ROSWELL, NM 88202-1717

ATTEN: LARRY CAMPBELL

PREPARED BY: Assaigai Analytical Labs
7300 Jefferson NE
Albuquerque, NM 87109

ATTEN: SYED RIZVI
PHONE: (505)345-8964

Syed Rizvi
CERTIFIED BY

CONTACT: LAB_MANAGER

CLIENT: ENR03 SAMPLES: 10
COMPANY: ENRON/TRANSWESTERN PIPELINE
FACILITY: ROSWELL, NEW MEXICO
ENR03

QUESTIONS ABOUT THIS REPORT SHOULD BE ADDRESSED TO:
LABORATORY OPERATIONS MANAGER/ASSAIGAI ANALYTICAL
7300 JEFFERSON N.E., ALBUQUERQUE, N.M. 87109

WORK ID: STATION 9 7752
TAKEN:
TRANS: FED X NEXT DAY
TYPE: SOIL
P.O. #:
INVOICE: under separate cover

SAMPLE IDENTIFICATION

01	
02	
03	PIT I 2.8-3.0
04	PIT I 9.2-9.4
05	PIT I 13.5-13.7
06	PIT I 18.8 - 19.0
07	PIT I 26.8 - 27.0
08	PIT I 30.6-30.8
09	PIT I 41.6 - 41.8
10	PIT I 43.5-43.7

TEST CODES and NAMES used on this workorder

8010_S	PURGEABLE HALOCARBONS-SOIL
8020	AROMATIC VOLATILE ORGANICS
BTEX	BENZENE,TOLUENE,EBENZ,XYLE
TRPH	TOTAL REC PET HYDROCARBONS

Received: 07/18/91

REPORT
Results by Sample

Work Order # 91-07-215

SAMPLE ID **PIT I 2.8-3.0** FRACTION **03A** TEST CODE **8010 S** NAME **PURGEABLE HALOCARBONS-SOIL**
Date & Time Collected **not specified** Category

PARAMETER	RESULT	LIMIT
BROMODICHLOROMETHANE	<0.1	0.1
BROMOFORM	<0.1	0.1
BROMOMETHANE	<0.1	0.1
CARBON TETRACHLORIDE	<0.1	0.1
CHLOROBENZENE	<0.1	0.1
CHLOROETHANE	<0.1	0.1
CHLOROFORM	<0.1	0.1
2-CHLOROETHYL VINYL ETHER	<0.1	0.1
CHLOROMETHANE	<0.1	0.1
DIBROMOCHLOROMETHANE	<0.1	0.1
1,2-DICHLOROBENZENE	<0.1	0.1
1,3-DICHLOROBENZENE	<0.1	0.1
1,4-DICHLOROBENZENE	<0.1	0.1
DICHLORODIFLUOROMETHANE	<0.1	0.1
1,1-DICHLOROETHANE	<0.1	0.1
1,2-DICHLOROETHANE	<0.1	0.1
1,1-DICHLOROETHENE	<0.1	0.1
trans-1,2-DICHLOROETHENE	<0.1	0.1
1,2-DICHLOROPROPANE	<0.1	0.1
cis-1,3-DICHLOROPROPENE	<0.1	0.1
1,1,2,2-TETRACHLOROETHANE	<0.1	0.1
trans-1,3-DICHLOROPROPENE	<0.1	0.1
METHYLENE CHLORIDE	<0.1	0.1
1,1,1-TRICHLOROETHANE	3.2	0.1
1,1,2-TRICHLOROETHANE	<0.1	0.1
TETRACHLOROETHENE	<0.1	0.1
TRICHLOROFLUOROMETHANE	<0.1	0.1
TRICHLOROETHENE	<0.1	0.1
VINYL CHLORIDE	<0.1	0.1

Received: 07/18/91

REPORT
Results by Sample

Work Order # 91-07-215
Continued From Above

SAMPLE ID **PIT I 2.8-3.0**

FRACTION **03A** TEST CODE **8010 S** NAME **PURGEABLE HALOCARBONS-SOIL**
Date & Time Collected **not specified** Category

Notes and Definitions for this Report:

EXTRACTED 07/23/91
DATE RUN 07/23/91
ANALYST D/R
UNITS MG/KG

Received: 07/18/91

REPORT
Results by Sample

Work Order # 91-07-215

SAMPLE ID **PIT I 9.2-9.4** FRACTION **04A** TEST CODE **8010 S** NAME **PURGEABLE HALOCARBONS-SOIL**
Date & Time Collected **not specified** Category ______

PARAMETER	RESULT	LIMIT
BROMODICHLOROMETHANE	<0.1	0.1
BROMOFORM	<0.1	0.1
BROMOMETHANE	<0.1	0.1
CARBON TETRACHLORIDE	<0.1	0.1
CHLOROBENZENE	<0.1	0.1
CHLOROETHANE	<0.1	0.1
CHLOROFORM	<0.1	0.1
2-CHLOROETHYL VINYL ETHER	<0.1	0.1
CHLOROMETHANE	<0.1	0.1
DIBROMOCHLOROMETHANE	<0.1	0.1
1,2-DICHLOROBENZENE	<0.1	0.1
1,3-DICHLOROBENZENE	<0.1	01.
1,4-DICHLOROBENZENE	<0.1	0.1
DICHLORODIFLUOROMETHANE	<0.1	0.1
1,1-DICHLOROETHANE	<0.1	0.1
1,2-DICHLOROETHANE	<0.1	0.1
1,1-DICHLOROETHENE	<0.1	0.1
trans-1,2-DICHLOROETHENE	<0.1	0.1
1,2-DICHLOROPROPANE	<0.1	0.1
cis-1,3-DICHLOROPROPENE	<0.1	0.1
1,1,2,2-TETRACHLOROETHANE	<0.1	0.1
trans-1,3-DICHLOROPROPENE	<0.1	0.1
METHYLENE CHLORIDE	<0.1	0.1
1,1,1-TRICHLOROETHANE	19	0.1
1,1,2-TRICHLOROETHANE	<0.1	0.1
TETRACHLOROETHENE	0.26	0.1
TRICHLOROFLUOROMETHANE	<0.1	0.1
TRICHLOROETHENE	<0.1	0.1
VINYL CHLORIDE	<0.1	0.1

Received: 07/18/91

REPORT
Results by Sample

Work Order # 91-07-215
Continued From Above

SAMPLE ID **PIT I 9.2-9.4** FRACTION **04A** TEST CODE **8010 S** NAME **PURGEABLE HALOCARBONS-SOIL**
Date & Time Collected **not specified** Category ______

Notes and Definitions for this Report:

EXTRACTED 07/23/91
DATE RUN 07/23/91
ANALYST D/R
UNITS MG/KG

Member: American Council of Independent Laboratories, Inc.

[redacted]

ANALYTICAL LABORATORIES, INC. • 7300 Jefferson, N.E. • Albuquerque, New Mexico 87109

Received: 07/18/91

REPORT
Results by Sample

Work Order # 91-07-215

SAMPLE ID **PIT I 13.5-13.7** FRACTION **05A** TEST CODE **8010_S** NAME **PURGEABLE HALOCARBONS-SOIL**
Date & Time Collected **not specified** Category ______

PARAMETER	RESULT	LIMIT
BROMODICHLOROMETHANE	<0.1	0.1
BROMOFORM	<0.1	0.1
BROMOMETHANE	<0.1	0.1
CARBON TETRACHLORIDE	<0.1	0.1
CHLOROBENZENE	<0.1	0.1
CHLOROETHANE	<0.1	0.1
CHLOROFORM	0.20	0.1
2-CHLOROETHYL VINYL ETHER	<0.1	0.1
CHLOROMETHANE	<0.1	0.1
DIBROMOCHLOROMETHANE	<0.1	0.1
1,2-DICHLOROBENZENE	<0.1	0.1
1,3-DICHLOROBENZENE	<0.1	0.1
1,4-DICHLOROBENZENE	<0.1	0.1
DICHLORODIFLUOROMETHANE	<0.1	0.1
1,1-DICHLOROETHANE	0.59	0.1
1,2-DICHLOROETHANE	<0.1	0.1
1,1-DICHLOROETHENE	<0.1	0.1
trans-1,2-DICHLOROETHENE	<0.1	0.1
1,2-DICHLOROPROPANE	<0.1	0.1
cis-1,3-DICHLOROPROPENE	<0.1	0.1
1,1,2,2-TETRACHLOROETHANE	<0.1	0.1
trans-1,3-DICHLOROPROPENE	<0.1	0.1
METHYLENE CHLORIDE	<0.1	0.1
1,1,1-TRICHLOROETHANE	18	0.1
1,1,2-TRICHLOROETHANE	<0.1	0.1
TETRACHLOROETHENE	0.33	0.1
TRICHLOROFLUOROMETHANE	<0.1	0.1
TRICHLOROETHENE	<0.1	0.1
VINYL CHLORIDE	<0.1	0.1

SAMPLE ID **PIT I 13.5-13.7**

FRACTION **05A** TEST CODE **8010 S** NAME **PURGEABLE HALOCARBONS-SOIL**
Date & Time Collected **not specified** Category ____________

Notes and Definitions for this Report:

EXTRACTED 07/23/91
DATE RUN 07/23/91
ANALYST D/R
UNITS MG/KG

Received: 07/18/91

REPORT
Results by Sample

Work Order # 91-07-215

SAMPLE ID **PIT I 18.8 - 19.0** FRACTION **06A** TEST CODE **8010 S** NAME **PURGEABLE HALOCARBONS-SOIL**
Date & Time Collected **not specified** Category

PARAMETER	RESULT	LIMIT
BROMODICHLOROMETHANE	<0.1	0.1
BROMOFORM	<0.1	0.1
BROMOMETHANE	<0.1	0.1
CARBON TETRACHLORIDE	<0.1	0.1
CHLOROBENZENE	<0.1	0.1
CHLOROETHANE	<0.1	0.1
CHLOROFORM	<0.1	0.1
2-CHLOROETHYL VINYL ETHER	<0.1	0.1
CHLOROMETHANE	<0.1	0.1
DIBROMOCHLOROMETHANE	<0.1	0.1
1,2-DICHLOROBENZENE	<0.1	0.1
1,3-DICHLOROBENZENE	<0.1	0.1
1,4-DICHLOROBENZENE	<0.1	0.1
DICHLORODIFLUOROMETHANE	<0.1	0.1
1,1-DICHLOROETHANE	<0.1	0.1
1,2-DICHLOROETHANE	<0.1	0.1
1,1-DICHLOROETHENE	<0.1	0.1
trans-1,2-DICHLOROETHENE	<0.1	0.1
1,2-DICHLOROPROPANE	<0.1	0.1
cis-1,3-DICHLOROPROPENE	<0.1	0.1
1,1,2,2-TETRACHLOROETHANE	<0.1	0.1
trans-1,3-DICHLOROPROPENE	<0.1	0.1
METHYLENE CHLORIDE	<0.1	0.1
1,1,1-TRICHLOROETHANE	0.33	0.1
1,1,2-TRICHLOROETHANE	<0.1	0.1
TETRACHLOROETHENE	0.87	0.1
TRICHLOROFLUOROMETHANE	<0.1	0.1
TRICHLOROETHENE	<0.1	0.1
VINYL CHLORIDE	<0.1	0.1

Received: 07/18/91

REPORT
Results by Sample

Work Order # 91-07-215
Continued From Above

SAMPLE ID **PIT I 18.8 - 19.0** FRACTION **06A** TEST CODE **8010 S** NAME **PURGEABLE HALOCARBONS-SOIL**
Date & Time Collected **not specified** Category ______

Notes and Definitions for this Report:

EXTRACTED 07/23/91
DATE RUN 07/23/91
ANALYST D/R
UNITS MG/KG

Member: American Council of Independent Laboratories, Inc.

Received: 07/18/91

REPORT
Results by Sample

Work Order # 91-07-215

SAMPLE ID PIT I 26.8 - 27.0 FRACTION 07A TEST CODE 8010_S NAME PURGEABLE HALOCARBONS-SOIL
Date & Time Collected not specified Category ______

PARAMETER	RESULT	LIMIT
BROMODICHLOROMETHANE	<0.1	0.1
BROMOFORM	<0.1	0.1
BROMOMETHANE	<0.1	0.1
CARBON TETRACHLORIDE	<0.1	0.1
CHLOROBENZENE	<0.1	0.1
CHLOROETHANE	<0.1	0.1
CHLOROFORM	<0.1	0.1
2-CHLOROETHYL VINYL ETHER	<0.1	0.1
CHLOROMETHANE	<0.1	0.1
DIBROMOCHLOROMETHANE	<0.1	0.1
1,2-DICHLOROBENZENE	<0.1	0.1
1,3-DICHLOROBENZENE	<0.1	0.1
1,4-DICHLOROBENZENE	<0.1	0.1
DICHLORODIFLUOROMETHANE	<0.1	0.1
1,1-DICHLOROETHANE	<0.1	0.1
1,2-DICHLOROETHANE	<0.1	0.1
1,1-DICHLOROETHENE	<0.1	0.1
trans-1,2-DICHLOROETHENE	<0.1	0.1
1,2-DICHLOROPROPANE	<0.1	0.1
cis-1,3-DICHLOROPROPENE	<0.1	0.1
1,1,2,2-TETRACHLOROETHANE	<0.1	0.1
trans-1,3-DICHLOROPROPENE	<0.1	0.1
METHYLENE CHLORIDE	<0.1	0.1
1,1,1-TRICHLOROETHANE	<0.1	0.1
1,1,2-TRICHLOROETHANE	<0.1	0.1
TETRACHLOROETHENE	0.16	0.1
TRICHLOROFLUOROMETHANE	<0.1	0.1
TRICHLOROETHENE	<0.1	0.1
VINYL CHLORIDE	<0.1	0.1

REPORT
Results by Sample

Work Order # 91-07-215
Continued From Above

SAMPLE ID **PIT I 26.8 - 27.0**

FRACTION **07A** TEST CODE **8010 S** NAME **PURGEABLE HALOCARBONS-SOIL**
Date & Time Collected **not specified** Category

Notes and Definitions for this Report:

EXTRACTED 07/23/91
DATE RUN 07/23/91
ANALYST D/R
UNITS MG/KG

Received: 07/18/91

REPORT
Results by Sample

Work Order # 91-07-215

SAMPLE ID **PIT I 30.6-30.8** FRACTION **08A** TEST CODE **8010 S** NAME **PURGEABLE HALOCARBONS-SOIL**
Date & Time Collected **not specified** Category ______

PARAMETER	RESULT	LIMIT
BROMODICHLOROMETHANE	<0.1	0.1
BROMOFORM	<0.1	0.1
BROMOMETHANE	<0.1	0.1
CARBON TETRACHLORIDE	<0.1	0.1
CHLOROBENZENE	<0.1	0.1
CHLOROETHANE	<0.1	0.1
CHLOROFORM	<0.1	0.1
2-CHLOROETHYL VINYL ETHER	<0.1	0.1
CHLOROMETHANE	<0.1	0.1
DIBROMOCHLOROMETHANE	<0.1	0.1
1,2-DICHLOROBENZENE	<0.1	0.1
1,3-DICHLOROBENZENE	<0.1	0.1
1,4-DICHLOROBENZENE	<0.1	0.1
DICHLORODIFLUOROMETHANE	<0.1	0.1
1,1-DICHLOROETHANE	<0.1	0.1
1,2-DICHLOROETHANE	<0.1	0.1
1,1-DICHLOROETHENE	<0.1	0.1
trans-1,2-DICHLOROETHENE	<0.1	0.1
1,2-DICHLOROPROPANE	<0.1	0.1
cis-1,3-DICHLOROPROPENE	<0.1	0.1
1,1,2,2-TETRACHLOROETHANE	<0.1	0.1
trans-1,3-DICHLOROPROPENE	<0.1	0.1
METHYLENE CHLORIDE	<0.1	0.1
1,1,1-TRICHLOROETHANE	<0.1	0.1
1,1,2-TRICHLOROETHANE	<0.1	0.1
TETRACHLOROETHENE	<0.1	0.1
TRICHLOROFLUOROMETHANE	<0.1	0.1
TRICHLOROETHENE	<0.1	0.1
VINYL CHLORIDE	<0.1	0.1

SAMPLE ID **PIT I 30.6-30.8**

FRACTION **08A** TEST CODE **8010 S** NAME **PURGEABLE HALOCARBONS-SOIL**
Date & Time Collected **not specified** Category ____

Notes and Definitions for this Report:

EXTRACTED 07/23/91
DATE RUN 07/23/91
ANALYST D/R
UNITS MG/KG

Received: 07/18/91

REPORT
Results by Sample

Work Order # 91-07-215

SAMPLE ID **PIT I 41.6 - 41.8** FRACTION **09A** TEST CODE **8010_S** NAME **PURGEABLE HALOCARBONS-SOIL**
Date & Time Collected **not specified** Category ______

PARAMETER	RESULT	LIMIT
BROMODICHLOROMETHANE	<0.1	0.1
BROMOFORM	<0.1	0.1
BROMOMETHANE	<0.1	0.1
CARBON TETRACHLORIDE	<0.1	0.1
CHLOROBENZENE	<0.1	0.1
CHLOROETHANE	<0.1	0.1
CHLOROFORM	<0.1	0.1
2-CHLOROETHYL VINYL ETHER	<0.1	0.1
CHLOROMETHANE	<0.1	0.1
DIBROMOCHLOROMETHANE	<0.1	0.1
1,2-DICHLOROBENZENE	<0.1	0.1
1,3-DICHLOROBENZENE	<0.1	0.1
1,4-DICHLOROBENZENE	<0.1	0.1
DICHLORODIFLUOROMETHANE	<0.1	0.1
1,1-DICHLOROETHANE	<0.1	0.1
1,2-DICHLOROETHANE	<0.1	0.1
1,1-DICHLOROETHENE	<0.1	0.1
trans-1,2-DICHLOROETHENE	<0.1	0.1
1,2-DICHLOROPROPANE	<0.1	0.1
cis-1,3-DICHLOROPROPENE	<0.1	0.1
1,1,2,2-TETRACHLOROETHANE	<0.1	0.1
trans-1,3-DICHLOROPROPENE	<0.1	0.1
METHYLENE CHLORIDE	<0.1	0.1
1,1,1-TRICHLOROETHANE	<0.1	0.1
1,1,2-TRICHLOROETHANE	<0.1	0.1
TETRACHLOROETHENE	<0.1	0.1
TRICHLOROFLUOROMETHANE	<0.1	0.1
TRICHLOROETHENE	<0.1	0.1
VINYL CHLORIDE	<0.1	0.1

REPORT
Results by Sample

Work Order # 91-07-215
Continued From Above

SAMPLE ID **PIT I 41.6 - 41.8**

FRACTION **09A** TEST CODE **8010 S** NAME **PURGEABLE HALOCARBONS-SOIL**
Date & Time Collected **not specified** Category

Notes and Definitions for this Report:

EXTRACTED 07/23/91
DATE RUN 07/23/91
ANALYST D/R
UNITS MG/KG

Received: 07/18/91

REPORT
Results by Sample

Work Order # 91-07-215

SAMPLE ID **PIT I 41.6 - 41.8** FRACTION **09A** TEST CODE **8020** NAME **AROMATIC VOLATILE ORGANICS**
Date & Time Collected **not specified** Category ________

PARAMETER	RESULT	DET LIMIT
BENZENE	<0.1	0.1
CHLOROBENZENE	<0.1	0.1
1,4-DICHLOROBENZENE	<0.1	0.1
1,3-DICHLOROBENZENE	<0.1	0.1
1,2-DICHLOROBENZENE	<0.1	0.1
ETHYL BENZENE	<0.1	0.1
TOLUENE	<0.1	0.1
XYLENES	<0.1	0.1

Notes and Definitions for this Report:

EXTRACTED 07/23/91
DATE RUN 07/23/91
ANALYST DD
UNITS MG/KG

REPORT
Results by Sample

Work Order # 91-07-215

SAMPLE ID **PIT I 43.5-43.7** FRACTION **10A** TEST CODE **8010 S** NAME **PURGEABLE HALOCARBONS-SOIL**
Date & Time Collected **not specified** Category ______

PARAMETER	RESULT	LIMIT
BROMODICHLOROMETHANE	<0.1	0.1
BROMOFORM	<0.1	0.1
BROMOMETHANE	<0.1	0.1
CARBON TETRACHLORIDE	<0.1	0.1
CHLOROBENZENE	<0.1	0.1
CHLOROETHANE	<0.1	0.1
CHLOROFORM	<0.1	0.1
2-CHLOROETHYL VINYL ETHER	<0.1	0.1
CHLOROMETHANE	<0.1	0.1
DIBROMOCHLOROMETHANE	<0.1	0.1
1,2-DICHLOROBENZENE	<0.1	0.1
1,3-DICHLOROBENZENE	<0.1	0.1
1,4-DICHLOROBENZENE	<0.1	0.1
DICHLORODIFLUOROMETHANE	<0.1	0.1
1,1-DICHLOROETHANE	<0.1	0.1
1,2-DICHLOROETHANE	<0.1	0.1
1,1-DICHLOROETHENE	<0.1	0.1
trans-1,2-DICHLOROETHENE	<0.1	0.1
1,2-DICHLOROPROPANE	<0.1	0.1
cis-1,3-DICHLOROPROPENE	<0.1	0.1
1,1,2,2-TETRACHLOROETHANE	<0.1	0.1
trans-1,3-DICHLOROPROPENE	<0.1	0.1
METHYLENE CHLORIDE	<0.1	0.1
1,1,1-TRICHLOROETHANE	<0.1	0.1
1,1,2-TRICHLOROETHANE	<0.1	0.1
TETRACHLOROETHENE	<0.1	0.1
TRICHLOROFLUOROMETHANE	<0.1	0.1
TRICHLOROETHENE	<0.1	0.1
VINYL CHLORIDE	<0.1	0.1

Received: 07/18/91

REPORT
Results by Sample

Work Order # 91-07-215
Continued From Above

SAMPLE ID **PIT I 43.5-43.7**

FRACTION **10A** TEST CODE **8010 S** NAME **PURGEABLE HALOCARBONS-SOIL**
Date & Time Collected **not specified** Category ______

Notes and Definitions for this Report:

EXTRACTED 07/23/91
DATE RUN 07/23/91
ANALYST D/R
UNITS MG/KG

[redacted]
ANALYTICAL LABORATORIES, INC. • 7300 Jefferson, N.E. • Albuquerque, New Mexico 87109

Received: 07/18/91

REPORT
Results by Sample

Work Order # 91-07-215

SAMPLE ID **PIT I 43.5-43.7** FRACTION **10A** TEST CODE **8020** NAME **AROMATIC VOLATILE ORGANICS**
Date & Time Collected **not specified** Category ______

PARAMETER	RESULT	DET LIMIT
BENZENE	<0.1	0.1
CHLOROBENZENE	<0.1	0.1
1,4-DICHLOROBENZENE	<0.1	0.1
1,3-DICHLOROBENZENE	<0.1	0.1
1,2-DICHLOROBENZENE	<0.1	0.1
ETHYL BENZENE	<0.1	0.1
TOLUENE	<0.1	0.1
XYLENES	<0.1	0.1

Notes and Definitions for this Report:

EXTRACTED 07/23/91
DATE RUN 07/23/91
ANALYST DD
UNITS MG/KG

ASSAIGAI ANALYTICAL LABORATORIES

WORK ORDER 7752

☐ HAZARDOUS ☐ NON-HAZARDOUS	DATE RECEIVED 7/18/91	ESTIMATED COST
CUSTOMER P.O. NUMBER	TIME RECEIVED 9:15	DUE DATE 8/1/91

ACCOUNT INFORMATION

CUSTOMER'S NAME Enron / Transwestern Pipeline	CONTACT Larry Campbell
ADDRESS	PHONE NUMBER
CITY / STATE / ZIP Roswell	

PARTY RESPONSIBLE FOR PAYMENT IF OTHER THAN ABOVE / ACCOUNT STATUS

NAME	CONTACT	PAYMENT REC'D. ____
ADDRESS	PHONE NUMBER	OPEN ACCOUNT X
CITY / STATE / ZIP		CASH ____
		CHECK NUMBER ____

SPECIAL BILLING INSTRUCTIONS

SAMPLE INFORMATION

TYPE OF SAMPLE	NO. OF SAMPLES	*TURN AROUND TIME	SAMPLE IDENTIFICATION AND / OR SAMPLE SITE
☐ WATER ☒ SOIL ☐ OIL ☐ SLUDGE ☐ OTHER	10 NO. OF CONTAINERS 10	☐ REGULAR (10 WKG DAYS) ☐ RUSH (3 DAYS) ☐ EMERGENCY (STAT) *(SUBJECT TO WORK LOG)	Station 9 - Gas Tank Station 9 - Pit 1

SAMPLE DELIVERED BY Jerry Next Day Air SIGNATURE DATE 7/18/91

ANALYSIS REQUEST

WORK DESCRIPTION

TPH, BTEX 8010 8020 Soil Conc.

SPECIAL INSTRUCTIONS

BILLING: ☐ PICKUP ☐ MAIL

LOGGED IN BY

7300 Jefferson NE • Albuquerque, New Mexico 87109 • (505) 345-8964 • FAX (505) 345-7259

CUSTOMER

TRANSWESTERN PIPELINE COMPANY

CHAIN OF CUSTODY

District: ROSWELL   Date: 7-17-91

Sample Location Valve or Receiver No.	Vol. Collect. During Flush	Sampler
STATION 9 - GAS TANK		
STATION 9 - PIT 1		

SAMPLE ID NUMBER	SOLVENT USED	SAMPLE ICED	ANALYSES REQUESTED
GAS TANK COMPOSITE			
0-1.6, 2.8-4.2, 7.8-9.2		YES	TPH, BTEX
GAS TANK 16.0-16.3		YES	TPH, BTEX
PIT 1 2.8-3.0		YES	8010
PIT 1 9.2-9.4		YES	8010
PIT 1 13.5-13.7		YES	8010
PIT 1 18.8-19.0		YES	8010
PIT 1 26.8-27.0		YES	8010
PIT 1 30.6-30.8		YES	8010
PIT 1 41.6-41.8		YES	8010 8020
PIT 1 43.5-43.7		YES	8010, 8020

Relinquished By EARL CHANLEY / TW PL CO.   Date 7-17-91
Relinquished To FED-X   Date 7-17-91

Relinquished By FED-X   Date
Relinquished To ASSAGAI LAB   Date

Relinquished By   Date
Relinquished To   Date

Relinquished By   Date
Relinquished By   Date

Laboratory: ASSAIGAI LABS
Received: [signature]   Date 7/18/91

* MAIL TEST RESULTS TO: LARRY CAMPBELL
P.O. BOX 1717
ROSWELL N.M. 88202-1717

505-625-8022

TRANSWESTERN PIPELINE COMPANY

CHAIN OF CUSTODY

District: ROSWELL   Date: 7-17-91

Sample Location Valve or Receiver No.	Vol. Collect. During Flush	Sampler
STATION 9 - GAS TANK		
STATION 9 - PIT 1		

SAMPLE ID NUMBER	SOLVENT USED	SAMPLE ICED	ANALYSES REQUESTED
GAS TANK COMPOSITE			
[illegible]		YES	TPH BTEX
GAS TANK [illegible] - 16.3		YES	TPH BTEX
PIT 1 2.8 - 3.0		YES	8010
PIT 1 [illegible]		YES	8010
PIT 1 [illegible]		YES	8010
PIT 1 [illegible] - 19.0		YES	8010
PIT 1 [illegible] - 27.0		YES	8010
PIT 1 [illegible]		YES	8010
PIT 1 41.6 - [illegible]		YES	8010 8020
PIT 1 43.5 - 43.7		YES	8010, 8020

Relinquished By EARL CHANLEY / TW PL CO.   Date 7-17-91
Relinquished To FED-X   Date [illegible]

Relinquished By FED-X   Date
Relinquished To [illegible] LAB   Date

Relinquished By   Date
Relinquished To   Date

Relinquished By   Date
Relinquished By   Date

Laboratory: [illegible]
Received: [illegible]   Date [illegible]

* [illegible] TEST RESULTS TO LARRY CAMPBELL [illegible]

[illegible]

Received: 07/23/91

REPORT
Results by Sample

Work Order # 91-07-257

SAMPLE ID **PIT 2 69.9-70.1** FRACTION **08A** TEST CODE **8020** NAME **AROMATIC VOLATILE ORGANICS**

Date & Time Collected **07/22/91** Category ______

PARAMETER	RESULT	DET LIMIT
BENZENE	<0.1	0.1
CHLOROBENZENE	<0.1	0.1
1,4-DICHLOROBENZENE	<0.1	0.1
1,3-DICHLOROBENZENE	<0.1	0.1
1,2-DICHLOROBENZENE	<0.1	0.1
ETHYL BENZENE	<0.1	0.1
TOLUENE	<0.1	0.1
XYLENES	<0.1	0.1

Notes and Definitions for this Report:

EXTRACTED 07/29/91
DATE RUN 07/30/91
ANALYST D/R
UNITS MG/KG

Member: American Council of Independent Laboratories, Inc.

Received: 07/23/91

REPORT
Results by Sample

Work Order # 91-07-257

SAMPLE ID **PIT 3 BH-2 25.0-25.2** FRACTION **11A** TEST CODE **8010_S** NAME **PURGEABLE HALOCARBONS-SOIL**
Date & Time Collected **07/22/91** Category

PARAMETER	RESULT	LIMIT
BROMODICHLOROMETHANE	<0.1	0.1
BROMOFORM	<0.1	0.1
BROMOMETHANE	<0.1	0.1
CARBON TETRACHLORIDE	<0.1	0.1
CHLOROBENZENE	<0.1	0.1
CHLOROETHANE	<0.1	0.1
CHLOROFORM	<0.1	0.1
2-CHLOROETHYL VINYL ETHER	<0.1	0.1
CHLOROMETHANE	<0.1	0.1
DIBROMOCHLOROMETHANE	<0.1	0.1
1,2-DICHLOROBENZENE	<0.1	0.1
1,3-DICHLOROBENZENE	<0.1	0.1
1,4-DICHLOROBENZENE	<0.1	0.1
DICHLORODIFLUOROMETHANE	<0.1	0.1
1,1-DICHLOROETHANE	<0.1	0.1
1,2-DICHLOROETHANE	<0.1	0.1
1,1-DICHLOROETHENE	<0.1	0.1
trans-1,2-DICHLOROETHENE	<0.1	0.1
1,2-DICHLOROPROPANE	<0.1	0.1
cis-1,3-DICHLOROPROPENE	<0.1	0.1
1,1,2,2-TETRACHLOROETHANE	<0.1	0.1
trans-1,3-DICHLOROPROPENE	<0.1	0.1
METHYLENE CHLORIDE	<0.1	0.1
1,1,1-TRICHLOROETHANE	<0.1	0.1
1,1,2-TRICHLOROETHANE	<0.1	0.1
TETRACHLOROETHENE	<0.1	0.1
TRICHLOROFLUOROMETHANE	<0.1	0.1
TRICHLOROETHENE	<0.1	0.1
VINYL CHLORIDE	<0.1	0.1

REPORT
Results by Sample

Work Order # 91-07-257
Continued From Above

SAMPLE ID **PIT 3 BH-2 25.0-25.2** FRACTION **11A** TEST CODE **8010 S** NAME **PURGEABLE HALOCARBONS-SOIL**
Date & Time Collected **07/22/91** Category ______

Notes and Definitions for this Report:

EXTRACTED 07/29/91
DATE RUN 07/30/91
ANALYST D/R
UNITS MG/KG

Received: 07/23/91

REPORT
Results by Sample

Work Order # 91-07-257

SAMPLE ID **PIT 3 BH-2 25.0-25.2** FRACTION **11A** TEST CODE **8020** NAME **AROMATIC VOLATILE ORGANICS**
Date & Time Collected **07/22/91** Category ______

PARAMETER	RESULT	DET LIMIT
BENZENE	<0.1	0.1
CHLOROBENZENE	<0.1	0.1
1,4-DICHLOROBENZENE	<0.1	0.1
1,3-DICHLOROBENZENE	<0.1	0.1
1,2-DICHLOROBENZENE	<0.1	0.1
ETHYL BENZENE	<0.1	0.1
TOLUENE	<0.1	0.1
XYLENES	<0.1	0.1

Notes and Definitions for this Report:

EXTRACTED 07/29/91
DATE RUN 07/30/91
ANALYST D/R
UNITS MG/KG

Received: 07/23/91

REPORT
Results by Sample

Work Order # 91-07-257

SAMPLE ID **PIT 3 BH-1 30.7-30.9** FRACTION **12A** TEST CODE **8010 S** NAME **PURGEABLE HALOCARBONS-SOIL**
Date & Time Collected **07/22/91** Category ______

PARAMETER	RESULT	LIMIT
BROMODICHLOROMETHANE	<0.1	0.1
BROMOFORM	<0.1	0.1
BROMOMETHANE	<0.1	0.1
CARBON TETRACHLORIDE	<0.1	0.1
CHLOROBENZENE	<0.1	0.1
CHLOROETHANE	<0.1	0.1
CHLOROFORM	<0.1	0.1
2-CHLOROETHYL VINYL ETHER	<0.1	0.1
CHLOROMETHANE	<0.1	0.1
DIBROMOCHLOROMETHANE	<0.1	0.1
1,2-DICHLOROBENZENE	<0.1	0.1
1,3-DICHLOROBENZENE	<0.1	0.1
1,4-DICHLOROBENZENE	<0.1	0.1
DICHLORODIFLUOROMETHANE	<0.1	0.1
1,1-DICHLOROETHANE	<0.1	0.1
1,2-DICHLOROETHANE	<0.1	0.1
1,1-DICHLOROETHENE	<0.1	0.1
trans-1,2-DICHLOROETHENE	<0.1	0.1
1,2-DICHLOROPROPANE	<0.1	0.1
cis-1,3-DICHLOROPROPENE	<0.1	0.1
1,1,2,2-TETRACHLOROETHANE	<0.1	0.1
trans-1,3-DICHLOROPROPENE	<0.1	0.1
METHYLENE CHLORIDE	<0.1	0.1
1,1,1-TRICHLOROETHANE	<0.1	0.1
1,1,2-TRICHLOROETHANE	<0.1	0.1
TETRACHLOROETHENE	<0.1	0.1
TRICHLOROFLUOROMETHANE	<0.1	0.1
TRICHLOROETHENE	<0.1	0.1
VINYL CHLORIDE	<0.1	0.1

Received: 07/23/91

REPORT
Results by Sample

Work Order # 91-07-257
Continued From Above

SAMPLE ID **PIT 3 BH-1 30.7-30.9** FRACTION **12A** TEST CODE **8010 8** NAME **PURGEABLE HALOCARBONS-SOIL**
Date & Time Collected **07/22/91** Category ____________

Notes and Definitions for this Report:

EXTRACTED 07/29/91
DATE RUN 07/30/91
ANALYST D/R
UNITS MG/KG

SAMPLE ID **PIT 3 BH-1 30.7-30.9** FRACTION **12A** TEST CODE **8020** NAME **AROMATIC VOLATILE ORGANICS**
Date & Time Collected **07/22/91** Category ____________

PARAMETER	RESULT	DET LIMIT
BENZENE	<0.1	0.1
CHLOROBENZENE	<0.1	0.1
1,4-DICHLOROBENZENE	<0.1	0.1
1,3-DICHLOROBENZENE	<0.1	0.1
1,2-DICHLOROBENZENE	<0.1	0.1
ETHYL BENZENE	<0.1	0.1
TOLUENE	<0.1	0.1
XYLENES	<0.1	0.1

Notes and Definitions for this Report:

EXTRACTED 07/29/91
DATE RUN 07/30/91
ANALYST D/R
UNITS MG/KG

ASSAIGAI ANALYTICAL LABORATORIES

WORK ORDER 7784

☐ HAZARDOUS ☐ NON-HAZARDOUS	DATE RECEIVED 7/23/91	ESTIMATED COST
CUSTOMER P.O. NUMBER	TIME RECEIVED 4:30	DUE DATE 8/6/91

ACCOUNT INFORMATION

CUSTOMER'S NAME [illegible] / ENRON	CONTACT [illegible]
ADDRESS	PHONE NUMBER
CITY / STATE / ZIP	

PARTY RESPONSIBLE FOR PAYMENT IF OTHER THAN ABOVE

NAME	CONTACT
ADDRESS	PHONE NUMBER
CITY / STATE / ZIP	

SPECIAL BILLING INSTRUCTIONS

ACCOUNT STATUS

PAYMENT REC'D. ____
OPEN ACCOUNT X
CASH ____
CHECK NUMBER ____

SAMPLE INFORMATION

TYPE OF SAMPLE	NO. OF SAMPLES	*TURN AROUND TIME	SAMPLE IDENTIFICATION AND / OR SAMPLE SITE
☐ WATER ☒ SOIL ☐ OIL ☐ SLUDGE ☐ OTHER	12 NO. OF CONTAINERS 12	☒ REGULAR (10 WKG DAYS) ☐ RUSH (3 DAYS) ☐ EMERGENCY (STAT) *(SUBJECT TO WORK LOG)	Station #9.

SAMPLE DELIVERED BY: FedX Next Day Air SIGNATURE DATE 7/23/91

ANALYSIS REQUEST

WORK DESCRIPTION

8010 8020 TPH

SPECIAL INSTRUCTIONS

BILLING: ☐ PICKUP ☐ MAIL

LOGGED IN BY [illegible signature]

TRANSWESTERN PIPELINE COMPANY

CHAIN OF CUSTODY

District: ROSWELL Date: 7-22-91

Sample Location Valve or Receiver No.	Vol. Collect. During Flush	Sampler
STATION 9 -		METRIC CORP.

SAMPLE ID NUMBER	SOLVENT USED	SAMPLE ICED	ANALYSES REQUESTED
PIT 2 SAMPLE 001		YES	8010
PIT 2 SAMPLE 002		YES	8010
PIT 2 26.0 - 26.2		YES	8010
PIT 2 29.1 - 29.3		YES	8010
PIT 2 39.8 - 39.9		YES	8010
PIT 2 44.1 - 44.3		YES	8010 - 8020
PIT 2 57.5 - 57.8		YES	8010
PIT 2 69.9 - 70.1		YES	8010 - 8020
DIESEL TANK 4.3-4.5		YES	TPH
DIESEL TANK 7.8-7.9		YES	TPH
PIT 3 BH-2 25.0-25.2		YES	8010 - 8020
PIT 3 BH-1 30.7-30.9		YES	8010 - 8020

Relinquished By EARL CHANLEY - TWPLC Date 7-22-91
Relinquished To FED-X Date 7-22-91

Relinquished By________ Date______
Relinquished To________ Date______

Relinquished By________ Date______
Relinquished To________ Date______

Relinquished By________ Date______
Relinquished By________ Date______

Laboratory: ASSAGAI LABS
Received: [signature] Date 7/23/91

* MAIL RESULTS TO: LARRY CAMPBELL
P.O. BOX 1717
ROSWELL NM. 88202-1717

(505-625-8022)

Received: 07/24/91

REPORT 07/31/91 14:20:37

Work Order # 91-07-276

REPORT TO	ENRON/TRANSWESTERN PIPELINE 6381 N. MAIN STREET P.O. BOX 1717 ROSWELL, NM 88202-1717	PREPARED BY	Assaigai Analytical Labs 7300 Jefferson NE Albuquerque, NM 87109
ATTEN	LARRY CAMPBELL	ATTEN	SYED RIZVI
		PHONE	(505)345-8964

Syed Rizvi
CERTIFIED BY

CONTACT LAB_MANAGER

CLIENT ENR03 SAMPLES 6
COMPANY ENRON/TRANSWESTERN PIPELINE
FACILITY ROSWELL, NEW MEXICO
ENR03

QUESTIONS ABOUT THIS REPORT SHOULD BE ADDRESSED TO:
LABORATORY OPERATIONS MANAGER/ASSAIGAI ANALYTICAL
7300 JEFFERSON N.E.,ALBUQUERQUE,N.M. 87109

WORK ID STATION #9 7799
TAKEN
TRANS FED X
TYPE SOIL
P.O. #
INVOICE under separate cover

SAMPLE IDENTIFICATION

01	SG 91 28.6 - 28.8
02	SG 86 13.5 - 13.7
03	SG 86 18.7 - 18.9
04	SG 86 24.9 - 25.1
05	SG 86 35.0 - 35.2
06	SG 86 40.5 - 40.7

TEST CODES and NAMES used on this workorder

8010_S	PURGEABLE HALOCARBONS-SOIL
8020	AROMATIC VOLATILE ORGANICS

[redacted]

Received: 07/24/91

REPORT

Results by Sample

Work Order # 91-07-276

SAMPLE ID SG 91 28.6 - 28.8   FRACTION 01A   TEST CODE 8010 S   NAME PURGEABLE HALOCARBONS-SOIL

Date & Time Collected not specified   Category

PARAMETER	RESULT	LIMIT
BROMODICHLOROMETHANE	<0.1	0.1
BROMOFORM	<0.1	0.1
BROMOMETHANE	<0.1	0.1
CARBON TETRACHLORIDE	<0.1	0.1
CHLOROBENZENE	<0.1	0.1
CHLOROETHANE	<0.1	0.1
CHLOROFORM	<0.1	0.1
2-CHLOROETHYL VINYL ETHER	<0.1	0.1
CHLOROMETHANE	<0.1	0.1
DIBROMOCHLOROMETHANE	<0.1	0.1
1,2-DICHLOROBENZENE	<0.1	0.1
1,3-DICHLOROBENZENE	<0.1	0.1
1,4-DICHLOROBENZENE	<0.1	0.1
DICHLORODIFLUOROMETHANE	<0.1	0.1
1,1-DICHLOROETHANE	<0.1	0.1
1,2-DICHLOROETHANE	<0.1	0.1
1,1-DICHLOROETHENE	<0.1	0.1
trans-1,2-DICHLOROETHENE	<0.1	0.1
1,2-DICHLOROPROPANE	<0.1	0.1
cis-1,3-DICHLOROPROPENE	<0.1	0.1
1,1,2,2-TETRACHLOROETHANE	<0.1	0.1
trans-1,3-DICHLOROPROPENE	<0.1	0.1
METHYLENE CHLORIDE	<0.1	0.1
1,1,1-TRICHLOROETHANE	<0.1	0.1
1,1,2-TRICHLOROETHANE	<0.1	0.1
TETRACHLOROETHENE	<0.1	0.1
TRICHLOROFLUOROMETHANE	<0.1	0.1
TRICHLOROETHENE	<0.1	0.1
VINYL CHLORIDE	<0.1	0.1

SAMPLE ID **SG 91 28.6 - 28.8**

FRACTION **01A** TEST CODE **8010 S** NAME **PURGEABLE HALOCARBONS-SOIL**
Date & Time Collected **not specified** Category ________

Notes and Definitions for this Report:

EXTRACTED 07/30/91
DATE RUN 07/30/91
ANALYST D/R
UNITS MG/KG

Received: 07/24/91

Results by Sample

SAMPLE ID **SG 91 28.6 - 28.8** FRACTION **01A** TEST CODE **8020** NAME **AROMATIC VOLATILE ORGANICS**

Date & Time Collected **not specified** Category

PARAMETER	RESULT	DET LIMIT
BENZENE	<0.1	0.1
CHLOROBENZENE	<0.1	0.1
1,4-DICHLOROBENZENE	<0.1	0.1
1,3-DICHLOROBENZENE	<0.1	0.1
1,2-DICHLOROBENZENE	<0.1	0.1
ETHYL BENZENE	<0.1	0.1
TOLUENE	<0.1	0.1
XYLENES	<0.1	0.1

Notes and Definitions for this Report:

EXTRACTED 07/30/91
DATE RUN 07/30/91
ANALYST D/R
UNITS MG/KG

Received: 07/24/91

Results by Sample

SAMPLE ID **SG 86 13.5 - 13.7** FRACTION **02A** TEST CODE **8010 S** NAME **PURGEABLE HALOCARBONS-SOIL**

Date & Time Collected **not specified** Category ______

PARAMETER	RESULT	LIMIT
BROMODICHLOROMETHANE	<0.1	0.1
BROMOFORM	<0.1	0.1
BROMOMETHANE	<0.1	0.1
CARBON TETRACHLORIDE	<0.1	0.1
CHLOROBENZENE	<0.1	0.1
CHLOROETHANE	<0.1	0.1
CHLOROFORM	<0.1	0.1
2-CHLOROETHYL VINYL ETHER	<0.1	0.1
CHLOROMETHANE	<0.1	0.1
DIBROMOCHLOROMETHANE	<0.1	0.1
1,2-DICHLOROBENZENE	<0.1	0.1
1,3-DICHLOROBENZENE	<0.1	0.1
1,4-DICHLOROBENZENE	<0.1	0.1
DICHLORODIFLUOROMETHANE	<0.1	0.1
1,1-DICHLOROETHANE	<0.1	0.1
1,2-DICHLOROETHANE	<0.1	0.1
1,1-DICHLOROETHENE	<0.1	0.1
trans-1,2-DICHLOROETHENE	<0.1	0.1
1,2-DICHLOROPROPANE	<0.1	0.1
cis-1,3-DICHLOROPROPENE	<0.1	0.1
1,1,2,2-TETRACHLOROETHANE	<0.1	0.1
trans-1,3-DICHLOROPROPENE	<0.1	0.1
METHYLENE CHLORIDE	<0.1	0.1
1,1,1-TRICHLOROETHANE	0.24	0.1
1,1,2-TRICHLOROETHANE	<0.1	0.1
TETRACHLOROETHENE	1.9	0.1
TRICHLOROFLUOROMETHANE	<0.1	0.1
TRICHLOROETHENE	<0.1	0.1
VINYL CHLORIDE	<0.1	0.1

SAMPLE ID SG 86 13.5 - 13.7 FRACTION 02A TEST CODE 8010_S NAME PURGEABLE HALOCARBONS-SOIL
Date & Time Collected not specified Category ________

Notes and Definitions for this Report:

EXTRACTED 07/30/91
DATE RUN 07/30/91
ANALYST D/R
UNITS MG/KG

REPORT
Results by Sample

Work Order # 91-07-276

SAMPLE ID **SG 86 18.7 - 18.9** FRACTION **03A** TEST CODE **8010 S** NAME **PURGEABLE HALOCARBONS-SOIL**
Date & Time Collected **not specified** Category ______

PARAMETER	RESULT	LIMIT
BROMODICHLOROMETHANE	<0.1	0.1
BROMOFORM	<0.1	0.1
BROMOMETHANE	<0.1	0.1
CARBON TETRACHLORIDE	<0.1	0.1
CHLOROBENZENE	<0.1	0.1
CHLOROETHANE	<0.1	0.1
CHLOROFORM	<0.1	0.1
2-CHLOROETHYL VINYL ETHER	<0.1	0.1
CHLOROMETHANE	<0.1	0.1
DIBROMOCHLOROMETHANE	<0.1	0.1
1,2-DICHLOROBENZENE	<0.1	0.1
1,3-DICHLOROBENZENE	<0.1	0.1
1,4-DICHLOROBENZENE	<0.1	0.1
DICHLORODIFLUOROMETHANE	<0.1	0.1
1,1-DICHLOROETHANE	<0.1	0.1
1,2-DICHLOROETHANE	<0.1	0.1
1,1-DICHLOROETHENE	<0.1	0.1
trans-1,2-DICHLOROETHENE	<0.1	0.1
1,2-DICHLOROPROPANE	<0.1	0.1
cis-1,3-DICHLOROPROPENE	<0.1	0.1
1,1,2,2-TETRACHLOROETHANE	<0.1	0.1
trans-1,3-DICHLOROPROPENE	<0.1	0.1
METHYLENE CHLORIDE	<0.1	0.1
1,1,1-TRICHLOROETHANE	<0.1	0.1
1,1,2-TRICHLOROETHANE	<0.1	0.1
TETRACHLOROETHENE	0.23	0.1
TRICHLOROFLUOROMETHANE	<0.1	0.1
TRICHLOROETHENE	<0.1	0.1
VINYL CHLORIDE	<0.1	0.1

REPORT
Results by Sample

Work Order # 91-07-276
Continued From Above

SAMPLE ID **SG 86 18.7 - 18.9**

FRACTION **03A** TEST CODE **8010 S** NAME **PURGEABLE HALOCARBONS-SOIL**
Date & Time Collected **not specified** Category ____________

Notes and Definitions for this Report:

EXTRACTED 07/30/91
DATE RUN 07/30/91
ANALYST D/R
UNITS MG/KG

SAMPLE ID SG 86 24.9 - 25.1 FRACTION 04A TEST CODE 8010 S NAME PURGEABLE HALOCARBONS-SOIL
Date & Time Collected not specified Category

PARAMETER	RESULT	LIMIT
BROMODICHLOROMETHANE	<0.1	0.1
BROMOFORM	<0.1	0.1
BROMOMETHANE	<0.1	0.1
CARBON TETRACHLORIDE	<0.1	0.1
CHLOROBENZENE	<0.1	0.1
CHLOROETHANE	<0.1	0.1
CHLOROFORM	<0.1	0.1
2-CHLOROETHYL VINYL ETHER	<0.1	0.1
CHLOROMETHANE	<0.1	0.1
DIBROMOCHLOROMETHANE	<0.1	0.1
1,2-DICHLOROBENZENE	<0.1	0.1
1,3-DICHLOROBENZENE	<0.1	0.1
1,4-DICHLOROBENZENE	<0.1	0.1
DICHLORODIFLUOROMETHANE	<0.1	0.1
1,1-DICHLOROETHANE	<0.1	0.1
1,2-DICHLOROETHANE	<0.1	0.1
1,1-DICHLOROETHENE	<0.1	0.1
trans-1,2-DICHLOROETHENE	<0.1	0.1
1,2-DICHLOROPROPANE	<0.1	0.1
cis-1,3-DICHLOROPROPENE	<0.1	0.1
1,1,2,2-TETRACHLOROETHANE	<0.1	0.1
trans-1,3-DICHLOROPROPENE	<0.1	0.1
METHYLENE CHLORIDE	<0.1	0.1
1,1,1-TRICHLOROETHANE	<0.1	0.1
1,1,2-TRICHLOROETHANE	<0.1	0.1
TETRACHLOROETHENE	<0.1	0.1
TRICHLOROFLUOROMETHANE	<0.1	0.1
TRICHLOROETHENE	<0.1	0.1
VINYL CHLORIDE	<0.1	0.1

[redacted]

Received: 07/24/91

REPORT
Results by Sample

Work Order # 91-07-276
Continued From Above

SAMPLE ID **SG 86 24.9 - 25.1**

FRACTION **04A** TEST CODE **8010 S** NAME **PURGEABLE HALOCARBONS-SOIL**
Date & Time Collected **not specified** Category ______

Notes and Definitions for this Report:

EXTRACTED 07/30/91
DATE RUN 07/30/91
ANALYST D/R
UNITS MG/KG

SAMPLE ID **SG 86 35.0 - 35.2** FRACTION **05A** TEST CODE **8010 S** NAME **PURGEABLE HALOCARBONS-SOIL**
Date & Time Collected **not specified** Category ____________

PARAMETER	RESULT	LIMIT
BROMODICHLOROMETHANE	<0.1	0.1
BROMOFORM	<0.1	0.1
BROMOMETHANE	<0.1	0.1
CARBON TETRACHLORIDE	<0.1	0.1
CHLOROBENZENE	<0.1	0.1
CHLOROETHANE	<0.1	0.1
CHLOROFORM	<0.1	0.1
2-CHLOROETHYL VINYL ETHER	<0.1	0.1
CHLOROMETHANE	<0.1	0.1
DIBROMOCHLOROMETHANE	<0.1	0.1
1,2-DICHLOROBENZENE	<0.1	0.1
1,3-DICHLOROBENZENE	<0.1	0.1
1,4-DICHLOROBENZENE	<0.1	0.1
DICHLORODIFLUOROMETHANE	<0.1	0.1
1,1-DICHLOROETHANE	<0.1	0.1
1,2-DICHLOROETHANE	<0.1	0.1
1,1-DICHLOROETHENE	<0.1	0.1
trans-1,2-DICHLOROETHENE	<0.1	0.1
1,2-DICHLOROPROPANE	<0.1	0.1
cis-1,3-DICHLOROPROPENE	<0.1	0.1
1,1,2,2-TETRACHLOROETHANE	<0.1	0.1
trans-1,3-DICHLOROPROPENE	<0.1	0.1
METHYLENE CHLORIDE	<0.1	0.1
1,1,1-TRICHLOROETHANE	<0.1	0.1
1,1,2-TRICHLOROETHANE	<0.1	0.1
TETRACHLOROETHENE	<0.1	0.1
TRICHLOROFLUOROMETHANE	<0.1	0.1
TRICHLOROETHENE	<0.1	0.1
VINYL CHLORIDE	<0.1	0.1

SAMPLE ID **SG 86 35.0 - 35.2** FRACTION **05A** TEST CODE **8010 S** NAME **PURGEABLE HALOCARBONS-SOIL**
Date & Time Collected **not specified** Category ____

Notes and Definitions for this Report:

EXTRACTED 07/30/91
DATE RUN 07/30/91
ANALYST D/R
UNITS MG/KG

[redacted]

Page 13
Received: 07/24/91

REPORT
Results by Sample

Work Order # 91-07-276

SAMPLE ID **SG 86 40.5 - 40.7** FRACTION **06A** TEST CODE **8010 S** NAME **PURGEABLE HALOCARBONS-SOIL**
Date & Time Collected **not specified** Category ______

PARAMETER	RESULT	LIMIT
BROMODICHLOROMETHANE	<0.1	0.1
BROMOFORM	<0.1	0.1
BROMOMETHANE	<0.1	0.1
CARBON TETRACHLORIDE	<0.1	0.1
CHLOROBENZENE	<0.1	0.1
CHLOROETHANE	<0.1	0.1
CHLOROFORM	<0.1	0.1
2-CHLOROETHYL VINYL ETHER	<0.1	0.1
CHLOROMETHANE	<0.1	0.1
DIBROMOCHLOROMETHANE	<0.1	0.1
1,2-DICHLOROBENZENE	<0.1	0.1
1,3-DICHLOROBENZENE	<0.1	0.1
1,4-DICHLOROBENZENE	<0.1	0.1
DICHLORODIFLUOROMETHANE	<0.1	0.1
1,1-DICHLOROETHANE	<0.1	0.1
1,2-DICHLOROETHANE	<0.1	0.1
1,1-DICHLOROETHENE	<0.1	0.1
trans-1,2-DICHLOROETHENE	<0.1	0.1
1,2-DICHLOROPROPANE	<0.1	0.1
cis-1,3-DICHLOROPROPENE	<0.1	0.1
1,1,2,2-TETRACHLOROETHANE	<0.1	0.1
trans-1,3-DICHLOROPROPENE	<0.1	0.1
METHYLENE CHLORIDE	<0.1	0.1
1,1,1-TRICHLOROETHANE	<0.1	0.1
1,1,2-TRICHLOROETHANE	<0.1	0.1
TETRACHLOROETHENE	<0.1	0.1
TRICHLOROFLUOROMETHANE	<0.1	0.1
TRICHLOROETHENE	<0.1	0.1
VINYL CHLORIDE	<0.1	0.1

SAMPLE ID **SG 86 40.5 - 40.7** FRACTION **06A** TEST CODE **8010 S** NAME **PURGEABLE HALOCARBONS-SOIL**
Date & Time Collected **not specified** Category ______

Notes and Definitions for this Report:

EXTRACTED 07/30/91
DATE RUN 07/30/91
ANALYST D/R
UNITS MG/KG

Received: 07/24/91

REPORT

Results by Sample

Work Order # 91-07-276

SAMPLE ID SG 86 40.5 - 40.7 FRACTION 06A TEST CODE 8020 NAME AROMATIC VOLATILE ORGANICS

Date & Time Collected not specified Category ______

PARAMETER	RESULT	DET LIMIT
BENZENE	<0.1	0.1
CHLOROBENZENE	<0.1	0.1
1,4-DICHLOROBENZENE	<0.1	0.1
1,3-DICHLOROBENZENE	<0.1	0.1
1,2-DICHLOROBENZENE	<0.1	0.1
ETHYL BENZENE	<0.1	0.1
TOLUENE	<0.1	0.1
XYLENES	<0.1	0.1

Notes and Definitions for this Report:

EXTRACTED 07/30/91
DATE RUN 07/30/91
ANALYST D/R
UNITS MG/KG

TRANSWESTERN PIPELINE COMPANY

CHAIN OF CUSTODY

District: ROSWELL   Date: 7-23-91

Sample Location Valve or Receiver No.	Vol. Collect. During Flush	Sampler
STATION 9		METRIC CORP.

SAMPLE ID NUMBER	SOLVENT USED	SAMPLE ICED	ANALYSES REQUESTED
SG 91 28.6-28.8		YES	8010 - 8020
SG 86 13.5-13.7		YES	8010
SG 86 18.7-18.9		YES	8010
SG 86 24.9-25.1		YES	8010
SG 86 35.0-35.2		YES	8010
SG 86 40.5-40.7		YES	8010 - 8020

Relinquished By EARL CHANLEY / TWPLC   Date 7-23-91
Relinquished To FED-X   Date 7-23-91

Relinquished By ____   Date ____
Relinquished To ____   Date ____

Relinquished By ____   Date ____
Relinquished To ____   Date ____

Relinquished By ____   Date ____
Relinquished By ____   Date ____

Laboratory: Assaigai LABS
Received: CJ King   Date 7/24/91

* MAIL RESULTS TO: LARRY CAMPBELL   (505-625-8022)
P.O. BOX 1717
ROSWELL N.M. 88202-1717

ASSAIGAI ANALYTICAL LABORATORIES

WORK ORDER
7799

☐ HAZARDOUS ☐ NON-HAZARDOUS	DATE RECEIVED 7/24/91	ESTIMATED COST
CUSTOMER P.O. NUMBER	TIME RECEIVED 9:25	DUE DATE 8/7/91

ACCOUNT INFORMATION

CUSTOMER'S NAME [illegible]/Transwestern	CONTACT [illegible]
ADDRESS	PHONE NUMBER
CITY / STATE / ZIP	

PARTY RESPONSIBLE FOR PAYMENT IF OTHER THAN ABOVE		ACCOUNT STATUS
NAME	CONTACT	PAYMENT REC'D. ____
ADDRESS	PHONE NUMBER	OPEN ACCOUNT ✓
CITY / STATE / ZIP		CASH ____
		CHECK NUMBER ____

SPECIAL BILLING INSTRUCTIONS

SAMPLE INFORMATION

TYPE OF SAMPLE	NO. OF SAMPLES	*TURN AROUND TIME	SAMPLE IDENTIFICATION AND / OR SAMPLE SITE
☐ WATER ☑ SOIL ☐ OIL ☐ SLUDGE ☐ OTHER	6 NO. OF CONTAINERS 6	☑ REGULAR (10 WKG DAYS) ☐ RUSH (3 DAYS) ☐ EMERGENCY (STAT) *(SUBJECT TO WORK LOG)	Station 9

SAMPLE DELIVERED BY | SIGNATURE [illegible] | DATE 7/24/91

ANALYSIS REQUEST

WORK DESCRIPTION

8010, 8020

SPECIAL INSTRUCTIONS

BILLING: ☐ PICKUP ☐ MAIL | LOGGED IN BY [illegible]

7300 Jefferson NE • Albuquerque, New Mexico 87109 • (505) 345-8964 • FAX (505) 345-7259

eceived: 07/30/91

REPORT
08/09/91 10:27:50

Work Order # 91-07-330

REPORT TO ENRON/TRANSWESTERN PIPELINE
6381 N. MAIN STREET
P.O. BOX 1717
ROSWELL, NM 88202-1717
ATTEN LARRY CAMPBELL

PREPARED BY Assaigai Analytical Labs
7300 Jefferson NE
Albuquerque, NM 87109
ATTEN SYED RIZVI
PHONE (505)345-8964

Syed Rizvi
CERTIFIED BY

CONTACT LAB MANAGER

CLIENT ENR03 SAMPLES 22
COMPANY ENRON/TRANSWESTERN PIPELINE
ACILITY ROSWELL, NEW MEXICO
ENR03

QUESTIONS ABOUT THIS REPORT SHOULD BE ADDRESSED TO:
LABORATORY OPERATIONS MANAGER/ASSAIGAI ANALYTICAL
7300 JEFFERSON N.E.,ALBUQUERQUE,N.M. 87109

WORK ID STATION 9-O.S. YARD 7848
TAKEN 7/29/91
TRANS FEDERAL EXPRESS
TYPE SOIL
P.O. #
INVOICE under separate cover

SAMPLE IDENTIFICATION

1 OSBH3
2 SG349 0-1.8
3 SG349 2.9-4.6
4 SG349 9.0-10.0
5 SG349 14.0-14.8
6 SG349 20.3-21.3
7 SG349 25.3-26.3
8 SG349 29.7-30.4
9 SG360 0.0-2.5
0 SG360 4.0-5.0
1 SG360 9.0-9.9
2 SG360 14.0-14.7
3 SG360 19.0-20.0
4 SG360 24.0-25.0
5 SG360 29.0-29.4

TEST CODES and NAMES used on this workorder

8010_S PURGEABLE HALOCARBONS-SOIL
8020 AROMATIC VOLATILE ORGANICS

 REPORT Work Order # 91-07-330
eceived: 07/30/91 08/09/91 10:27:50

	SAMPLE IDENTIFICATION
6	SG361 0-2.5
7	SG361 4.0-5.0
8	SG361 9.0-10.0
9	SG361 16.0-16.4
0	SG361 19.5-19.8
1	SG361 24.0-25.0
2	SG361 38.9-39.3

eceived: 07/30/91

REPORT
Results by Sample

Work Order # 91-07-330

AMPLE ID OSBH3 FRACTION 01A TEST CODE 8010_S NAME PURGEABLE HALOCARBONS-SOIL
Date & Time Collected 07/29/91 Category

PARAMETER	RESULT	LIMIT
BROMODICHLOROMETHANE	<0.1	0.1
BROMOFORM	<0.1	0.1
BROMOMETHANE	<0.1	0.1
CARBON TETRACHLORIDE	<0.1	0.1
CHLOROBENZENE	<0.1	0.1
CHLOROETHANE	<0.1	0.1
CHLOROFORM	<0.1	0.1
2-CHLOROETHYL VINYL ETHER	<0.1	0.1
CHLOROMETHANE	<0.1	0.1
DIBROMOCHLOROMETHANE	<0.1	0.1
1,2-DICHLOROBENZENE	<0.1	0.1
1,3-DICHLOROBENZENE	<0.1	0.1
1,4-DICHLOROBENZENE	<0.1	0.1
DICHLORODIFLUOROMETHANE	<0.1	0.1
1,1-DICHLOROETHANE	<0.1	0.1
1,2-DICHLOROETHANE	<0.1	0.1
1,1-DICHLOROETHENE	<0.1	0.1
trans-1,2-DICHLOROETHENE	<0.1	0.1
1,2-DICHLOROPROPANE	<0.1	0.1
cis-1,3-DICHLOROPROPENE	<0.1	0.1
1,1,2,2-TETRACHLOROETHANE	<0.1	0.1
trans-1,3-DICHLOROPROPENE	<0.1	0.1
METHYLENE CHLORIDE	<0.1	0.1
1,1,1-TRICHLOROETHANE	<0.1	0.1
1,1,2-TRICHLOROETHANE	<0.1	0.1
TETRACHLOROETHENE	<0.1	0.1
TRICHLOROFLUOROMETHANE	<0.1	0.1
TRICHLOROETHENE	<0.1	0.1
VINYL CHLORIDE	<0.1	0.1

NALYTICAL LABORATORIES, INC. • 7300 Jefferson, N.E. • Albuquerque, New Mexico 87109

eceived: 07/30/91

REPORT
Results by Sample

Work Order # 91-07-330
Continued From Above

AMPLE ID OSBH3

FRACTION 01A TEST CODE 8010_S NAME PURGEABLE HALOCARBONS-SOIL
Date & Time Collected 07/29/91 Category ______

Notes and Definitions for this Report:

EXTRACTED 08/05/91
DATE RUN 08/05/91
ANALYST D/R
UNITS MG/KG

eceived: 07/30/91

REPORT
Results by Sample

Work Order # 91-07-330

AMPLE ID OSBH3

FRACTION 01A   TEST CODE 8020   NAME AROMATIC VOLATILE ORGANICS

Date & Time Collected 07/29/91   Category ______

PARAMETER	RESULT	DET LIMIT
BENZENE	<0.1	0.1
CHLOROBENZENE	<0.1	0.1
1,4-DICHLOROBENZENE	<0.1	0.1
1,3-DICHLOROBENZENE	<0.1	0.1
1,2-DICHLOROBENZENE	<0.1	0.1
ETHYL BENZENE	<0.1	0.1
TOLUENE	<0.1	0.1
XYLENES	<0.1	0.1

Notes and Definitions for this Report:

EXTRACTED 08/05/91
DATE RUN 08/05/91
ANALYST D/R
UNITS MG/KG

eceived: 07/30/91

REPORT
Results by Sample

Work Order # 91-07-330

AMPLE ID SG349 0-1.8 FRACTION 02A TEST CODE 8010 S NAME PURGEABLE HALOCARBONS-SOIL
Date & Time Collected 07/29/91 Category

PARAMETER	RESULT	LIMIT
BROMODICHLOROMETHANE	<0.1	0.1
BROMOFORM	<0.1	0.1
BROMOMETHANE	<0.1	0.1
CARBON TETRACHLORIDE	<0.1	0.1
CHLOROBENZENE	<0.1	0.1
CHLOROETHANE	<0.1	0.1
CHLOROFORM	<0.1	0.1
2-CHLOROETHYL VINYL ETHER	<0.1	0.1
CHLOROMETHANE	<0.1	0.1
DIBROMOCHLOROMETHANE	<0.1	0.1
1,2-DICHLOROBENZENE	<0.1	0.1
1,3-DICHLOROBENZENE	<0.1	0.1
1,4-DICHLOROBENZENE	<0.1	0.1
DICHLORODIFLUOROMETHANE	<0.1	0.1
1,1-DICHLOROETHANE	<0.1	0.1
1,2-DICHLOROETHANE	<0.1	0.1
1,1-DICHLOROETHENE	<0.1	0.1
trans-1,2-DICHLOROETHENE	<0.1	0.1
1,2-DICHLOROPROPANE	<0.1	0.1
cis-1,3-DICHLOROPROPENE	<0.1	0.1
1,1,2,2-TETRACHLOROETHANE	<0.1	0.1
trans-1,3-DICHLOROPROPENE	<0.1	0.1
METHYLENE CHLORIDE	<0.1	0.1
1,1,1-TRICHLOROETHANE	<0.1	0.1
1,1,2-TRICHLOROETHANE	<0.1	0.1
TETRACHLOROETHENE	<0.1	0.1
TRICHLOROFLUOROMETHANE	<0.1	0.1
TRICHLOROETHENE	<0.1	0.1
VINYL CHLORIDE	<0.1	0.1

eceived: 07/30/91

REPORT
Results by Sample

Work Order # 91-07-330
Continued From Above

AMPLE ID SG349 0-1.8 FRACTION 02A TEST CODE 8010_S NAME PURGEABLE HALOCARBONS-SOIL
Date & Time Collected 07/29/91 Category ______

Notes and Definitions for this Report:

EXTRACTED 08/05/91
DATE RUN 08/05/91
ANALYST D/R
UNITS MG/KG

eceived: 07/30/91

REPORT
Results by Sample

Work Order # 91-07-330

AMPLE ID SG349 2.9-4.6 FRACTION 03A TEST CODE 8010 S NAME PURGEABLE HALOCARBONS-SOIL
Date & Time Collected 07/29/91 Category ______

PARAMETER	RESULT	LIMIT
BROMODICHLOROMETHANE	<0.1	0.1
BROMOFORM	<0.1	0.1
BROMOMETHANE	<0.1	0.1
CARBON TETRACHLORIDE	<0.1	0.1
CHLOROBENZENE	<0.1	0.1
CHLOROETHANE	<0.1	0.1
CHLOROFORM	<0.1	0.1
2-CHLOROETHYL VINYL ETHER	<0.1	0.1
CHLOROMETHANE	<0.1	0.1
DIBROMOCHLOROMETHANE	<0.1	0.1
1,2-DICHLOROBENZENE	<0.1	0.1
1,3-DICHLOROBENZENE	<0.1	0.1
1,4-DICHLOROBENZENE	<0.1	0.1
DICHLORODIFLUOROMETHANE	<0.1	0.1
1,1-DICHLOROETHANE	<0.1	0.1
1,2-DICHLOROETHANE	<0.1	0.1
1,1-DICHLOROETHENE	<0.1	0.1
trans-1,2-DICHLOROETHENE	<0.1	0.1
1,2-DICHLOROPROPANE	<0.1	0.1
cis-1,3-DICHLOROPROPENE	<0.1	0.1
1,1,2,2-TETRACHLOROETHANE	<0.1	0.1
trans-1,3-DICHLOROPROPENE	<0.1	0.1
METHYLENE CHLORIDE	<0.1	0.1
1,1,1-TRICHLOROETHANE	<0.1	0.1
1,1,2-TRICHLOROETHANE	<0.1	0.1
TETRACHLOROETHENE	<0.1	0.1
TRICHLOROFLUOROMETHANE	<0.1	0.1
TRICHLOROETHENE	<0.1	0.1
VINYL CHLORIDE	<0.1	0.1

REPORT
Results by Sample

Work Order # 91-07-330
Continued From Above

AMPLE ID **SG349 2.9-4.6**   FRACTION **03A**   TEST CODE **8010_S**   NAME **PURGEABLE HALOCARBONS-SOIL**
Date & Time Collected **07/29/91**   Category ______

Notes and Definitions for this Report:

EXTRACTED 08/05/91
DATE RUN 08/05/91
ANALYST D/R
UNITS MG/KG

eceived: 07/30/91

REPORT
Results by Sample

Work Order # 91-07-330
Continued From Above

AMPLE ID SG361 9.0-10.0 FRACTION 18A TEST CODE 8010_S NAME PURGEABLE HALOCARBONS-SOIL
Date & Time Collected 07/29/91 Category ______

Notes and Definitions for this Report:

EXTRACTED 08/06/91
DATE RUN 08/06/91
ANALYST D/R
UNITS MG/KG

eceived: 07/30/91

REPORT
Results by Sample

Work Order # 91-07-330

AMPLE ID SG349 9.0-10.0 FRACTION 04A TEST CODE 8010_S NAME PURGEABLE HALOCARBONS-SOIL
Date & Time Collected 07/29/91 Category

PARAMETER	RESULT	LIMIT
BROMODICHLOROMETHANE	<0.1	0.1
BROMOFORM	<0.1	0.1
BROMOMETHANE	<0.1	0.1
CARBON TETRACHLORIDE	<0.1	0.1
CHLOROBENZENE	<0.1	0.1
CHLOROETHANE	<0.1	0.1
CHLOROFORM	<0.1	0.1
2-CHLOROETHYL VINYL ETHER	<0.1	0.1
CHLOROMETHANE	<0.1	0.1
DIBROMOCHLOROMETHANE	<0.1	0.1
1,2-DICHLOROBENZENE	<0.1	0.1
1,3-DICHLOROBENZENE	<0.1	0.1
1,4-DICHLOROBENZENE	<0.1	0.1
DICHLORODIFLUOROMETHANE	<0.1	0.1
1,1-DICHLOROETHANE	<0.1	0.1
1,2-DICHLOROETHANE	<0.1	0.1
1,1-DICHLOROETHENE	<0.1	0.1
trans-1,2-DICHLOROETHENE	<0.1	0.1
1,2-DICHLOROPROPANE	<0.1	0.1
cis-1,3-DICHLOROPROPENE	<0.1	0.1
1,1,2,2-TETRACHLOROETHANE	<0.1	0.1
trans-1,3-DICHLOROPROPENE	<0.1	0.1
METHYLENE CHLORIDE	<0.1	0.1
1,1,1-TRICHLOROETHANE	<0.1	0.1
1,1,2-TRICHLOROETHANE	<0.1	0.1
TETRACHLOROETHENE	<0.1	0.1
TRICHLOROFLUOROMETHANE	<0.1	0.1
TRICHLOROETHENE	<0.1	0.1
VINYL CHLORIDE	<0.1	0.1

ALYTICAL LABORATORIES, INC. • 7300 Jefferson, N.E. • Albuquerque, New Mexico 87109

eceived: 07/30/91

REPORT
Results by Sample

Work Order # 91-07-330
Continued From Above

AMPLE ID **SG349 9.0-10.0** FRACTION **04A** TEST CODE **8010 S** NAME **PURGEABLE HALOCARBONS-SOIL**
Date & Time Collected **07/29/91** Category

Notes and Definitions for this Report:

EXTRACTED 08/05/91
DATE RUN 08/05/91
ANALYST D/R
UNITS MG/KG

age 12
ceived: 07/30/91

REPORT
Results by Sample

Work Order # 91-07-330

AMPLE ID SG349 14.0-14.8 FRACTION 05A TEST CODE 8010 S NAME PURGEABLE HALOCARBONS-SOIL
Date & Time Collected 07/29/91 Category

PARAMETER	RESULT	LIMIT
BROMODICHLOROMETHANE	<0.1	0.1
BROMOFORM	<0.1	0.1
BROMOMETHANE	<0.1	0.1
CARBON TETRACHLORIDE	<0.1	0.1
CHLOROBENZENE	<0.1	0.1
CHLOROETHANE	<0.1	0.1
CHLOROFORM	<0.1	0.1
2-CHLOROETHYL VINYL ETHER	<0.1	0.1
CHLOROMETHANE	<0.1	0.1
DIBROMOCHLOROMETHANE	<0.1	0.1
1,2-DICHLOROBENZENE	<0.1	0.1
1,3-DICHLOROBENZENE	<0.1	0.1
1,4-DICHLOROBENZENE	<0.1	0.1
DICHLORODIFLUOROMETHANE	<0.1	0.1
1,1-DICHLOROETHANE	<0.1	0.1
1,2-DICHLOROETHANE	<0.1	0.1
1,1-DICHLOROETHENE	<0.1	0.1
trans-1,2-DICHLOROETHENE	<0.1	0.1
1,2-DICHLOROPROPANE	<0.1	0.1
cis-1,3-DICHLOROPROPENE	<0.1	0.1
1,1,2,2-TETRACHLOROETHANE	<0.1	0.1
trans-1,3-DICHLOROPROPENE	<0.1	0.1
METHYLENE CHLORIDE	<0.1	0.1
1,1,1-TRICHLOROETHANE	<0.1	0.1
1,1,2-TRICHLOROETHANE	<0.1	0.1
TETRACHLOROETHENE	<0.1	0.1
TRICHLOROFLUOROMETHANE	<0.1	0.1
TRICHLOROETHENE	<0.1	0.1
VINYL CHLORIDE	<0.1	0.1

ceived: 07/30/91

REPORT
Results by Sample

Work Order # 91-07-330
Continued From Above

AMPLE ID **SG349 14.0-14.8** FRACTION **05A** TEST CODE **8010_S** NAME **PURGEABLE HALOCARBONS-SOIL**
Date & Time Collected **07/29/91** Category ____________

Notes and Definitions for this Report:

EXTRACTED 08/05/91
DATE RUN 08/05/91
ANALYST D/R
UNITS MG/KG

eceived: 07/30/91

REPORT
Results by Sample

Work Order # 91-07-330

AMPLE ID **SG349 20.3-21.3** FRACTION **06A** TEST CODE **8010 S** NAME **PURGEABLE HALOCARBONS-SOIL**
Date & Time Collected **07/29/91** Category

PARAMETER	RESULT	LIMIT
BROMODICHLOROMETHANE	<0.1	0.1
BROMOFORM	<0.1	0.1
BROMOMETHANE	<0.1	0.1
CARBON TETRACHLORIDE	<0.1	0.1
CHLOROBENZENE	<0.1	0.1
CHLOROETHANE	<0.1	0.1
CHLOROFORM	<0.1	0.1
2-CHLOROETHYL VINYL ETHER	<0.1	0.1
CHLOROMETHANE	<0.1	0.1
DIBROMOCHLOROMETHANE	<0.1	0.1
1,2-DICHLOROBENZENE	<0.1	0.1
1,3-DICHLOROBENZENE	<0.1	0.1
1,4-DICHLOROBENZENE	<0.1	0.1
DICHLORODIFLUOROMETHANE	<0.1	0.1
1,1-DICHLOROETHANE	<0.1	0.1
1,2-DICHLOROETHANE	<0.1	0.1
1,1-DICHLOROETHENE	<0.1	0.1
trans-1,2-DICHLOROETHENE	<0.1	0.1
1,2-DICHLOROPROPANE	<0.1	0.1
cis-1,3-DICHLOROPROPENE	<0.1	0.1
1,1,2,2-TETRACHLOROETHANE	<0.1	0.1
trans-1,3-DICHLOROPROPENE	<0.1	0.1
METHYLENE CHLORIDE	<0.1	0.1
1,1,1-TRICHLOROETHANE	<0.1	0.1
1,1,2-TRICHLOROETHANE	<0.1	0.1
TETRACHLOROETHENE	<0.1	0.1
TRICHLOROFLUOROMETHANE	<0.1	0.1
TRICHLOROETHENE	<0.1	0.1
VINYL CHLORIDE	<0.1	0.1

ALYTICAL LABORATORIES, INC. • 7300 Jefferson, N.E. • Albuquerque, New Mexico 87109

ceived: 07/30/91

REPORT
Results by Sample

Work Order # 91-07-330
Continued From Above

MPLE ID SG349 20.3-21.3 FRACTION 06A TEST CODE 8010_S NAME PURGEABLE HALOCARBONS-SOIL
Date & Time Collected 07/29/91 Category ______

Notes and Definitions for this Report:

EXTRACTED 08/05/91
DATE RUN 08/05/91
ANALYST D/R
UNITS MG/KG

ge 16 — REPORT — Work Order # 91-07-330

ceived: 07/30/91 — Results by Sample

MPLE ID **8G349 25.3-26.3** FRACTION **07A** TEST CODE **8010 S** NAME **PURGEABLE HALOCARBONS-SOIL**

Date & Time Collected **07/29/91** Category ______

PARAMETER	RESULT	LIMIT
BROMODICHLOROMETHANE	<0.1	0.1
BROMOFORM	<0.1	0.1
BROMOMETHANE	<0.1	0.1
CARBON TETRACHLORIDE	<0.1	0.1
CHLOROBENZENE	<0.1	0.1
CHLOROETHANE	<0.1	0.1
CHLOROFORM	<0.1	0.1
2-CHLOROETHYL VINYL ETHER	<0.1	0.1
CHLOROMETHANE	<0.1	0.1
DIBROMOCHLOROMETHANE	<0.1	0.1
1,2-DICHLOROBENZENE	<0.1	0.1
1,3-DICHLOROBENZENE	<0.1	0.1
1,4-DICHLOROBENZENE	<0.1	0.1
DICHLORODIFLUOROMETHANE	<0.1	0.1
1,1-DICHLOROETHANE	<0.1	0.1
1,2-DICHLOROETHANE	<0.1	0.1
1,1-DICHLOROETHENE	<0.1	0.1
trans-1,2-DICHLOROETHENE	<0.1	0.1
1,2-DICHLOROPROPANE	<0.1	0.1
cis-1,3-DICHLOROPROPENE	<0.1	0.1
1,1,2,2-TETRACHLOROETHANE	<0.1	0.1
trans-1,3-DICHLOROPROPENE	<0.1	0.1
METHYLENE CHLORIDE	<0.1	0.1
1,1,1-TRICHLOROETHANE	<0.1	0.1
1,1,2-TRICHLOROETHANE	<0.1	0.1
TETRACHLOROETHENE	<0.1	0.1
TRICHLOROFLUOROMETHANE	<0.1	0.1
TRICHLOROETHENE	<0.1	0.1
VINYL CHLORIDE	<0.1	0.1

AMPLE ID SG349 25.3-26.3

FRACTION 07A TEST CODE 8010_S NAME PURGEABLE HALOCARBONS-SOIL
Date & Time Collected 07/29/91 Category ______

Notes and Definitions for this Report:

EXTRACTED 08/05/91
DATE RUN 08/05/91
ANALYST D/R
UNITS MG/KG

ALYTICAL LABORATORIES, INC. • 7300 Jefferson, N.E. • Albuquerque, New Mexico 87109

ceived: 07/30/91

REPORT
Results by Sample

Work Order # 91-07-330

MPLE ID **SG349 29.7-30.4** FRACTION **08A** TEST CODE **8010_S** NAME **PURGEABLE HALOCARBONS-SOIL**
Date & Time Collected **07/29/91** Category

PARAMETER	RESULT	LIMIT
BROMODICHLOROMETHANE	<0.1	0.1
BROMOFORM	<0.1	0.1
BROMOMETHANE	<0.1	0.1
CARBON TETRACHLORIDE	<0.1	0.1
CHLOROBENZENE	<0.1	0.1
CHLOROETHANE	<0.1	0.1
CHLOROFORM	<0.1	0.1
2-CHLOROETHYL VINYL ETHER	<0.1	0.1
CHLOROMETHANE	<0.1	0.1
DIBROMOCHLOROMETHANE	<0.1	0.1
1,2-DICHLOROBENZENE	<0.1	0.1
1,3-DICHLOROBENZENE	<0.1	0.1
1,4-DICHLOROBENZENE	<0.1	0.1
DICHLORODIFLUOROMETHANE	<0.1	0.1
1,1-DICHLOROETHANE	<0.1	0.1
1,2-DICHLOROETHANE	<0.1	0.1
1,1-DICHLOROETHENE	<0.1	0.1
trans-1,2-DICHLOROETHENE	<0.1	0.1
1,2-DICHLOROPROPANE	<0.1	0.1
cis-1,3-DICHLOROPROPENE	<0.1	0.1
1,1,2,2-TETRACHLOROETHANE	<0.1	0.1
trans-1,3-DICHLOROPROPENE	<0.1	0.1
METHYLENE CHLORIDE	<0.1	0.1
1,1,1-TRICHLOROETHANE	<0.1	0.1
1,1,2-TRICHLOROETHANE	<0.1	0.1
TETRACHLOROETHENE	<0.1	0.1
TRICHLOROFLUOROMETHANE	<0.1	0.1
TRICHLOROETHENE	<0.1	0.1
VINYL CHLORIDE	<0.1	0.1

ALYTICAL LABORATORIES, INC. • 7300 Jefferson, N.E. • Albuquerque, New Mexico 87109

ceived: 07/30/91

REPORT
Results by Sample

Work Order # 91-07-330
Continued From Above

MPLE ID **SG349 29.7-30.4** FRACTION **08A** TEST CODE **8010_S** NAME **PURGEABLE HALOCARBONS-SOIL**
Date & Time Collected **07/29/91** Category ______

Notes and Definitions for this Report:

EXTRACTED 08/05/91
DATE RUN 08/05/91
ANALYST D/R
UNITS MG/KG

REPORT
Results by Sample

Work Order # 91-07-330

MPLE ID **SG349 29.7-30.4**

FRACTION **08A** TEST CODE **8020** NAME **AROMATIC VOLATILE ORGANICS**

Date & Time Collected **07/29/91** Category ______

PARAMETER	RESULT	DET LIMIT
BENZENE	<0.1	0.1
CHLOROBENZENE	<0.1	0.1
1,4-DICHLOROBENZENE	<0.1	0.1
1,3-DICHLOROBENZENE	<0.1	0.1
1,2-DICHLOROBENZENE	<0.1	0.1
ETHYL BENZENE	<0.1	0.1
TOLUENE	<0.1	0.1
XYLENES	<0.1	0.1

Notes and Definitions for this Report:

EXTRACTED 08/05/91
DATE RUN 08/05/91
ANALYST D/R
UNITS MG/KG

ALYTICAL LABORATORIES, INC. • 7300 Jefferson, N.E. • Albuquerque, New Mexico 87109

iceived: 07/30/91

REPORT
Results by Sample

Work Order # 91-07-330

MPLE ID **SG360 0.0-2.5** FRACTION **09A** TEST CODE **8010 S** NAME **PURGEABLE HALOCARBONS-SOIL**
Date & Time Collected **07/29/91** Category

PARAMETER	RESULT	LIMIT
BROMODICHLOROMETHANE	<0.1	0.1
BROMOFORM	<0.1	0.1
BROMOMETHANE	<0.1	0.1
CARBON TETRACHLORIDE	<0.1	0.1
CHLOROBENZENE	<0.1	0.1
CHLOROETHANE	<0.1	0.1
CHLOROFORM	<0.1	0.1
2-CHLOROETHYL VINYL ETHER	<0.1	0.1
CHLOROMETHANE	<0.1	0.1
DIBROMOCHLOROMETHANE	<0.1	0.1
1,2-DICHLOROBENZENE	<0.1	0.1
1,3-DICHLOROBENZENE	<0.1	0.1
1,4-DICHLOROBENZENE	<0.1	0.1
DICHLORODIFLUOROMETHANE	<0.1	0.1
1,1-DICHLOROETHANE	<0.1	0.1
1,2-DICHLOROETHANE	<0.1	0.1
1,1-DICHLOROETHENE	<0.1	0.1
trans-1,2-DICHLOROETHENE	<0.1	0.1
1,2-DICHLOROPROPANE	<0.1	0.1
cis-1,3-DICHLOROPROPENE	<0.1	0.1
1,1,2,2-TETRACHLOROETHANE	<0.1	0.1
trans-1,3-DICHLOROPROPENE	<0.1	0.1
METHYLENE CHLORIDE	<0.1	0.1
1,1,1-TRICHLOROETHANE	<0.1	0.1
1,1,2-TRICHLOROETHANE	<0.1	0.1
TETRACHLOROETHENE	<0.1	0.1
TRICHLOROFLUOROMETHANE	<0.1	0.1
TRICHLOROETHENE	<0.1	0.1
VINYL CHLORIDE	<0.1	0.1

ıge 22
ıceived: 07/30/91

REPORT
Results by Sample

Work Order # 91-07-330
Continued From Above

\MPLE ID **SG360 0.0-2.5**

FRACTION **09A** TEST CODE **8010 S** NAME **PURGEABLE HALOCARBONS-SOIL**
Date & Time Collected **07/29/91** Category

Notes and Definitions for this Report:

EXTRACTED 08/05/91
DATE RUN 08/05/91
ANALYST D/R
UNITS MG/KG

:ceived: 07/30/91

REPORT
Results by Sample

Work Order # 91-07-330

AMPLE ID 8G360 4.0-5.0 FRACTION 10A TEST CODE 8010 S NAME PURGEABLE HALOCARBONS-SOIL
Date & Time Collected 07/29/91 Category ______

PARAMETER	RESULT	LIMIT
BROMODICHLOROMETHANE	<0.1	0.1
BROMOFORM	<0.1	0.1
BROMOMETHANE	<0.1	0.1
CARBON TETRACHLORIDE	<0.1	0.1
CHLOROBENZENE	<0.1	0.1
CHLOROETHANE	<0.1	0.1
CHLOROFORM	<0.1	0.1
2-CHLOROETHYL VINYL ETHER	<0.1	0.1
CHLOROMETHANE	<0.1	0.1
DIBROMOCHLOROMETHANE	<0.1	0.1
1,2-DICHLOROBENZENE	<0.1	0.1
1,3-DICHLOROBENZENE	<0.1	0.1
1,4-DICHLOROBENZENE	<0.1	0.1
DICHLORODIFLUOROMETHANE	<0.1	0.1
1,1-DICHLOROETHANE	<0.1	0.1
1,2-DICHLOROETHANE	<0.1	0.1
1,1-DICHLOROETHENE	<0.1	0.1
trans-1,2-DICHLOROETHENE	<0.1	0.1
1,2-DICHLOROPROPANE	<0.1	0.1
cis-1,3-DICHLOROPROPENE	<0.1	0.1
1,1,2,2-TETRACHLOROETHANE	<0.1	0.1
trans-1,3-DICHLOROPROPENE	<0.1	0.1
METHYLENE CHLORIDE	<0.1	0.1
1,1,1-TRICHLOROETHANE	<0.1	0.1
1,1,2-TRICHLOROETHANE	<0.1	0.1
TETRACHLOROETHENE	<0.1	0.1
TRICHLOROFLUOROMETHANE	<0.1	0.1
TRICHLOROETHENE	<0.1	0.1
VINYL CHLORIDE	<0.1	0.1

ceived: 07/30/91

REPORT
Results by Sample

Work Order # 91-07-330
Continued From Above

MPLE ID SG360 4.0-5.0

FRACTION 10A TEST CODE 8010_S NAME PURGEABLE HALOCARBONS-SOIL
Date & Time Collected 07/29/91 Category ______

Notes and Definitions for this Report:

EXTRACTED 08/05/91
DATE RUN 08/05/91
ANALYST D/R
UNITS MG/KG

Received: 07/26/91

REPORT
Results by Sample

Work Order # 91-07-299
Continued From Above

SAMPLE ID **08BH2 22.5 - 22.6**

FRACTION **04A** TEST CODE **8010 S** NAME **PURGEABLE HALOCARBONS-SOIL**
Date & Time Collected **not specified** Category ______

Notes and Definitions for this Report:

EXTRACTED 08/01/91
DATE RUN 08/01/91
ANALYST D/R
UNITS MG/KG

Received: 07/26/91

REPORT
Results by Sample

Work Order # 91-07-299

SAMPLE ID OSBH2 31.1 - 31.3 FRACTION 05A TEST CODE 8010 S NAME PURGEABLE HALOCARBONS-SOIL
Date & Time Collected not specified Category ______

PARAMETER	RESULT	LIMIT
BROMODICHLOROMETHANE	<0.1	0.1
BROMOFORM	<0.1	0.1
BROMOMETHANE	<0.1	0.1
CARBON TETRACHLORIDE	<0.1	0.1
CHLOROBENZENE	<0.1	0.1
CHLOROETHANE	<0.1	0.1
CHLOROFORM	<0.1	0.1
2-CHLOROETHYL VINYL ETHER	<0.1	0.1
CHLOROMETHANE	<0.1	0.1
DIBROMOCHLOROMETHANE	<0.1	0.1
1,2-DICHLOROBENZENE	<0.1	0.1
1,3-DICHLOROBENZENE	<0.1	0.1
1,4-DICHLOROBENZENE	<0.1	0.1
DICHLORODIFLUOROMETHANE	<0.1	0.1
1,1-DICHLOROETHANE	<0.1	0.1
1,2-DICHLOROETHANE	<0.1	0.1
1,1-DICHLOROETHENE	<0.1	0.1
trans-1,2-DICHLOROETHENE	<0.1	0.1
1,2-DICHLOROPROPANE	<0.1	0.1
cis-1,3-DICHLOROPROPENE	<0.1	0.1
1,1,2,2-TETRACHLOROETHANE	<0.1	0.1
trans-1,3-DICHLOROPROPENE	<0.1	0.1
METHYLENE CHLORIDE	<0.1	0.1
1,1,1-TRICHLOROETHANE	<0.1	0.1
1,1,2-TRICHLOROETHANE	<0.1	0.1
TETRACHLOROETHENE	<0.1	0.1
TRICHLOROFLUOROMETHANE	<0.1	0.1
TRICHLOROETHENE	<0.1	0.1
VINYL CHLORIDE	<0.1	0.1

Received: 07/26/91

REPORT
Results by Sample

Work Order # 91-07-299
Continued From Above

SAMPLE ID **OSBH2 31.1 - 31.3**

FRACTION **05A** TEST CODE **8010 S** NAME **PURGEABLE HALOCARBONS-SOIL**
Date & Time Collected **not specified** Category ____________

Notes and Definitions for this Report:

EXTRACTED 08/01/91
DATE RUN 08/01/91
ANALYST D/R
UNITS MG/KG

Received: 07/26/91 Results by Sample

SAMPLE ID OSBH2 41.8 - 42.0 FRACTION 06A TEST CODE 8010 S NAME PURGEABLE HALOCARBONS-SOIL

Date & Time Collected not specified Category

PARAMETER	RESULT	LIMIT
BROMODICHLOROMETHANE	<0.1	0.1
BROMOFORM	<0.1	0.1
BROMOMETHANE	<0.1	0.1
CARBON TETRACHLORIDE	<0.1	0.1
CHLOROBENZENE	<0.1	0.1
CHLOROETHANE	<0.1	0.1
CHLOROFORM	<0.1	0.1
2-CHLOROETHYL VINYL ETHER	<0.1	0.1
CHLOROMETHANE	<0.1	0.1
DIBROMOCHLOROMETHANE	<0.1	0.1
1,2-DICHLOROBENZENE	<0.1	0.1
1,3-DICHLOROBENZENE	<0.1	0.1
1,4-DICHLOROBENZENE	<0.1	0.1
DICHLORODIFLUOROMETHANE	<0.1	0.1
1,1-DICHLOROETHANE	<0.1	0.1
1,2-DICHLOROETHANE	<0.1	0.1
1,1-DICHLOROETHENE	<0.1	0.1
trans-1,2-DICHLOROETHENE	<0.1	0.1
1,2-DICHLOROPROPANE	<0.1	0.1
cis-1,3-DICHLOROPROPENE	<0.1	0.1
1,1,2,2-TETRACHLOROETHANE	<0.1	0.1
trans-1,3-DICHLOROPROPENE	<0.1	0.1
METHYLENE CHLORIDE	<0.1	0.1
1,1,1-TRICHLOROETHANE	<0.1	0.1
1,1,2-TRICHLOROETHANE	<0.1	0.1
TETRACHLOROETHENE	<0.1	0.1
TRICHLOROFLUOROMETHANE	<0.1	0.1
TRICHLOROETHENE	<0.1	0.1
VINYL CHLORIDE	<0.1	0.1

REPORT
Results by Sample

Work Order # 91-07-299
Continued From Above

SAMPLE ID **OSBH2 41.8 - 42.0**

FRACTION **06A** TEST CODE **8010 S** NAME **PURGEABLE HALOCARBONS-SOIL**
Date & Time Collected **not specified** Category ______

Notes and Definitions for this Report:

EXTRACTED 08/01/91
DATE RUN 08/01/91
ANALYST D/R
UNITS MG/KG

Received: 07/26/91

REPORT
Results by Sample

Work Order # 91-07-299

SAMPLE ID **OSBH2 55.2 - 55.4** FRACTION **07A** TEST CODE **8010 S** NAME **PURGEABLE HALOCARBONS-SOIL**
Date & Time Collected **not specified** Category ________

PARAMETER	RESULT	LIMIT
BROMODICHLOROMETHANE	<0.1	0.1
BROMOFORM	<0.1	0.1
BROMOMETHANE	<0.1	0.1
CARBON TETRACHLORIDE	<0.1	0.1
CHLOROBENZENE	<0.1	0.1
CHLOROETHANE	<0.1	0.1
CHLOROFORM	<0.1	0.1
2-CHLOROETHYL VINYL ETHER	<0.1	0.1
CHLOROMETHANE	<0.1	0.1
DIBROMOCHLOROMETHANE	<0.1	0.1
1,2-DICHLOROBENZENE	<0.1	0.1
1,3-DICHLOROBENZENE	<0.1	0.1
1,4-DICHLOROBENZENE	<0.1	0.1
DICHLORODIFLUOROMETHANE	<0.1	0.1
1,1-DICHLOROETHANE	<0.1	0.1
1,2-DICHLOROETHANE	<0.1	0.1
1,1-DICHLOROETHENE	<0.1	0.1
trans-1,2-DICHLOROETHENE	<0.1	0.1
1,2-DICHLOROPROPANE	<0.1	0.1
cis-1,3-DICHLOROPROPENE	<0.1	0.1
1,1,2,2-TETRACHLOROETHANE	<0.1	0.1
trans-1,3-DICHLOROPROPENE	<0.1	0.1
METHYLENE CHLORIDE	<0.1	0.1
1,1,1-TRICHLOROETHANE	<0.1	0.1
1,1,2-TRICHLOROETHANE	<0.1	0.1
TETRACHLOROETHENE	<0.1	0.1
TRICHLOROFLUOROMETHANE	<0.1	0.1
TRICHLOROETHENE	<0.1	0.1
VINYL CHLORIDE	<0.1	0.1

SAMPLE ID OSBH2 55.2 - 55.4

FRACTION 07A TEST CODE 8010 S NAME PURGEABLE HALOCARBONS-SOIL
Date & Time Collected not specified Category ________

Notes and Definitions for this Report:

EXTRACTED 08/01/91
DATE RUN 08/01/91
ANALYST D/R
UNITS MG/KG

Received: 07/26/91

REPORT
Results by Sample

Work Order # 91-07-299

SAMPLE ID **OSBH2 69.0 - 69.2** FRACTION **08A** TEST CODE **8010 S** NAME **PURGEABLE HALOCARBONS-SOIL**
Date & Time Collected **not specified** Category ______

PARAMETER	RESULT	LIMIT
BROMODICHLOROMETHANE	<0.1	0.1
BROMOFORM	<0.1	0.1
BROMOMETHANE	<0.1	0.1
CARBON TETRACHLORIDE	<0.1	0.1
CHLOROBENZENE	<0.1	0.1
CHLOROETHANE	<0.1	0.1
CHLOROFORM	<0.1	0.1
2-CHLOROETHYL VINYL ETHER	<0.1	0.1
CHLOROMETHANE	<0.1	0.1
DIBROMOCHLOROMETHANE	<0.1	0.1
1,2-DICHLOROBENZENE	<0.1	0.1
1,3-DICHLOROBENZENE	<0.1	0.1
1,4-DICHLOROBENZENE	<0.1	0.1
DICHLORODIFLUOROMETHANE	<0.1	0.1
1,1-DICHLOROETHANE	<0.1	0.1
1,2-DICHLOROETHANE	<0.1	0.1
1,1-DICHLOROETHENE	<0.1	0.1
trans-1,2-DICHLOROETHENE	<0.1	0.1
1,2-DICHLOROPROPANE	<0.1	0.1
cis-1,3-DICHLOROPROPENE	<0.1	0.1
1,1,2,2-TETRACHLOROETHANE	<0.1	0.1
trans-1,3-DICHLOROPROPENE	<0.1	0.1
METHYLENE CHLORIDE	<0.1	0.1
1,1,1-TRICHLOROETHANE	<0.1	0.1
1,1,2-TRICHLOROETHANE	<0.1	0.1
TETRACHLOROETHENE	<0.1	0.1
TRICHLOROFLUOROMETHANE	<0.1	0.1
TRICHLOROETHENE	<0.1	0.1
VINYL CHLORIDE	<0.1	0.1

REPORT
Results by Sample

Work Order # 91-07-299
Continued From Above

SAMPLE ID **OSBH2 69.0 - 69.2**

FRACTION **08A** TEST CODE **8010 S** NAME **PURGEABLE HALOCARBONS-SOIL**
Date & Time Collected **not specified** Category ______

Notes and Definitions for this Report:

EXTRACTED 08/01/91
DATE RUN 08/01/91
ANALYST D/R
UNITS MG/KG

TRANSWESTERN PIPELINE COMPANY

CHAIN OF CUSTODY

District: ROSWELL

Date: 7-25-91

Sample Location Valve or Receiver No.	Vol. Collect. During Flush	Sampler
STATION 9		METRIC CORP.

SAMPLE ID NUMBER	SOLVENT USED	SAMPLE ICED	ANALYSES REQUESTED
OSBH1 18.9-19.1		YES	8010
OSBH1 35.3-35.5		YES	8010
OSBH2 9.9-10.1		YES	8010
OSBH2 22.5-22.6		YES	8010
OSBH2 31.1-31.3		YES	8010
OSBH2 41.8-42.0		YES	8010
OSBH2 55.2-55.4		YES	8010
OSBH2 69.0-69.2		YES	8010

Relinquished By EARL CHANLEY / TWPLCO. Date 7-25-91
Relinquished To FED-X Date 7-25-91

Relinquished By ______ Date ______
Relinquished To ______ Date ______

Relinquished By ______ Date ______
Relinquished To ______ Date ______

Relinquished By ______ Date ______
Relinquished By ______ Date ______

Laboratory: ______
Received: ______ Date ______

MAIL RESULTS TO: LARRY CAMPBELL (505-625-8022)
P.O. BOX 1717
ROSWELL NM 88202-1717

ASSAIGAI ANALYTICAL LABORATORIES

WORK ORDER
7821

☐ HAZARDOUS ☐ NON-HAZARDOUS	DATE RECEIVED 7/26/91	ESTIMATED COST
CUSTOMER P.O. NUMBER	TIME RECEIVED 9 30	DUE DATE 8/?/91

ACCOUNT INFORMATION

CUSTOMER'S NAME	CONTACT
ADDRESS	PHONE NUMBER
CITY / STATE / ZIP Roswell	

PARTY RESPONSIBLE FOR PAYMENT IF OTHER THAN ABOVE

NAME	CONTACT
ADDRESS	PHONE NUMBER
CITY / STATE / ZIP	

ACCOUNT STATUS

PAYMENT REC'D. ____
OPEN ACCOUNT ____
CASH ____
CHECK NUMBER ____

SPECIAL BILLING INSTRUCTIONS

SAMPLE INFORMATION

TYPE OF SAMPLE	NO. OF SAMPLES	*TURN AROUND TIME	SAMPLE IDENTIFICATION AND / OR SAMPLE SITE
☐ WATER ☒ SOIL ☐ OIL ☐ SLUDGE ☐ OTHER	8 NO. OF CONTAINERS 8	☒ REGULAR (10 WKG DAYS) ☐ RUSH (3 DAYS) ☐ EMERGENCY (STAT) *(SUBJECT TO WORK LOG)	Station 9

SAMPLE DELIVERED BY FEDX SIGNATURE DATE 7/?/91

ANALYSIS REQUEST

WORK DESCRIPTION
Soil

SPECIAL INSTRUCTIONS

BILLING: ☐ PICKUP ☐ MAIL

LOGGED IN BY

7300 Jefferson NE • Albuquerque, New Mexico 87109 • (505) 345-8964 • FAX (505) 345-7259

Received: 07/23/91

REPORT
Results by Sample

Work Order # 91-07-257

SAMPLE ID **PIT 3 BH-1 30.7-30.9** FRACTION **12A** TEST CODE **8010_S** NAME **PURGEABLE HALOCARBONS-SOIL**
Date & Time Collected **07/22/91** Category ______

PARAMETER	RESULT	LIMIT
BROMODICHLOROMETHANE	<0.1	0.1
BROMOFORM	<0.1	0.1
BROMOMETHANE	<0.1	0.1
CARBON TETRACHLORIDE	<0.1	0.1
CHLOROBENZENE	<0.1	0.1
CHLOROETHANE	<0.1	0.1
CHLOROFORM	<0.1	0.1
2-CHLOROETHYL VINYL ETHER	<0.1	0.1
CHLOROMETHANE	<0.1	0.1
DIBROMOCHLOROMETHANE	<0.1	0.1
1,2-DICHLOROBENZENE	<0.1	0.1
1,3-DICHLOROBENZENE	<0.1	0.1
1,4-DICHLOROBENZENE	<0.1	0.1
DICHLORODIFLUOROMETHANE	<0.1	0.1
1,1-DICHLOROETHANE	<0.1	0.1
1,2-DICHLOROETHANE	<0.1	0.1
1,1-DICHLOROETHENE	<0.1	0.1
trans-1,2-DICHLOROETHENE	<0.1	0.1
1,2-DICHLOROPROPANE	<0.1	0.1
cis-1,3-DICHLOROPROPENE	<0.1	0.1
1,1,2,2-TETRACHLOROETHANE	<0.1	0.1
trans-1,3-DICHLOROPROPENE	<0.1	0.1
METHYLENE CHLORIDE	<0.1	0.1
1,1,1-TRICHLOROETHANE	<0.1	0.1
1,1,2-TRICHLOROETHANE	<0.1	0.1
TETRACHLOROETHENE	<0.1	0.1
TRICHLOROFLUOROMETHANE	<0.1	0.1
TRICHLOROETHENE	<0.1	0.1
VINYL CHLORIDE	<0.1	0.1

Received: 07/23/91

REPORT
Results by Sample

Work Order # 91-07-257
Continued From Above

SAMPLE ID PIT 3 BH-1 30.7-30.9 FRACTION 12A TEST CODE 8010_S NAME PURGEABLE HALOCARBONS-SOIL
Date & Time Collected 07/22/91 Category ______

Notes and Definitions for this Report:

EXTRACTED 07/29/91
DATE RUN 07/30/91
ANALYST D/R
UNITS MG/KG

Received: 07/23/91

REPORT
Results by Sample

Work Order # 91-07-257

SAMPLE ID **PIT 3 BH-1 30.7-30.9** FRACTION **12A** TEST CODE **8020** NAME **AROMATIC VOLATILE ORGANICS**
Date & Time Collected **07/22/91** Category ____

PARAMETER	RESULT	DET LIMIT
BENZENE	<0.1	0.1
CHLOROBENZENE	<0.1	0.1
1,4-DICHLOROBENZENE	<0.1	0.1
1,3-DICHLOROBENZENE	<0.1	0.1
1,2-DICHLOROBENZENE	<0.1	0.1
ETHYL BENZENE	<0.1	0.1
TOLUENE	<0.1	0.1
XYLENES	<0.1	0.1

Notes and Definitions for this Report:

EXTRACTED 07/29/91
DATE RUN 07/30/91
ANALYST D/R
UNITS MG/KG

ASSAIGAI ANALYTICAL LABORATORIES

WORK ORDER 7784

☐ HAZARDOUS ☐ NON-HAZARDOUS	DATE RECEIVED 7/3/91	ESTIMATED COST
CUSTOMER P.O. NUMBER	TIME RECEIVED 4:50	DUE DATE 7/16/91

ACCOUNT INFORMATION

CUSTOMER'S NAME Transwestern Pipeline / ENRON	CONTACT Larry Campbell
ADDRESS	PHONE NUMBER
CITY / STATE / ZIP	

PARTY RESPONSIBLE FOR PAYMENT IF OTHER THAN ABOVE

		ACCOUNT STATUS
NAME	CONTACT	PAYMENT REC'D. ____
ADDRESS	PHONE NUMBER	OPEN ACCOUNT ✓
CITY / STATE / ZIP		CASH ____
		CHECK NUMBER ____

SPECIAL BILLING INSTRUCTIONS

SAMPLE INFORMATION

TYPE OF SAMPLE	NO. OF SAMPLES	*TURN AROUND TIME	SAMPLE IDENTIFICATION AND / OR SAMPLE SITE
☐ WATER ☒ SOIL ☐ OIL ☐ SLUDGE ☐ OTHER	12 NO. OF CONTAINERS 12	☒ REGULAR (10 WKG DAYS) ☐ RUSH (3 DAYS) ☐ EMERGENCY (STAT) *(SUBJECT TO WORK LOG)	Station #9.

SAMPLE DELIVERED BY	SIGNATURE	DATE
FedX Next Day Air		7/2/91

ANALYSIS REQUEST

WORK DESCRIPTION

8010 8020 TPH

SPECIAL INSTRUCTIONS

BILLING: ☐ PICKUP ☐ MAIL

LOGGED IN BY [signature]

7300 Jefferson NE • Albuquerque, New Mexico 87109 • (505) 345-8964 • FAX (505) 345-7259

TRANSWESTERN PIPELINE COMPANY

CHAIN OF CUSTODY

District: ROSWELL

Date: 7-22-91

Sample Location Valve or Receiver No.	Vol. Collect. During Flush	Sampler
STATION 9 -		METRIC CORP.

SAMPLE ID NUMBER	SOLVENT USED	SAMPLE ICED	ANALYSES REQUESTED
PIT 2 SAMPLE 001		YES	8010
PIT 2 SAMPLE 002		YES	8010
PIT 2 26.0-26.2		YES	8010
PIT 2 29.1-29.3		YES	8010
PIT 2 39.8-39.9		YES	8010
PIT 2 44.1-44.3		YES	8010 - 8020
PIT 2 57.5-57.8		YES	8010
PIT 2 69.9-70.1		YES	8010 - 8020
DIESEL TANK 4.3-4.5		YES	TPH
DIESEL TANK 7.8-7.9		YES	TPH
PIT 3 BH-2 25.0-25.2		YES	8010-8020
PIT 3 BH-1 30.7-30.9		YES	8010-8020

Relinquished By EARL CHANLEY - TWPLC Date 7-22-91
Relinquished To FED-X Date 7-22-91

Relinquished By ____________________ Date ________
Relinquished To ____________________ Date ________

Relinquished By ____________________ Date ________
Relinquished To ____________________ Date ________

Relinquished By ____________________ Date ________
Relinquished By ____________________ Date ________

Laboratory: ASSAGAI LABS
Received: [signature] Date 7/23/91

* MAIL RESULTS TO: LARRY CAMPBELL
P.O. BOX 1717
ROSWELL NM 88202-1717

(505-625-8022)

Received: 07/24/91

REPORT 07/31/91 14:20:37

Work Order # 91-07-276

REPORT TO	ENRON/TRANSWESTERN PIPELINE 6381 N. MAIN STREET P.O. BOX 1717 ROSWELL, NM 88202-1717	PREPARED BY	Assaigai Analytical Labs 7300 Jefferson NE Albuquerque, NM 87109
ATTEN	LARRY CAMPBELL	ATTEN	SYED RIZVI
		PHONE	(505)345-8964

Syed Rizvi
CERTIFIED BY

CONTACT LAB_MANAGER

CLIENT	ENR03 SAMPLES 6
COMPANY	ENRON/TRANSWESTERN PIPELINE
FACILITY	ROSWELL, NEW MEXICO ENR03

QUESTIONS ABOUT THIS REPORT SHOULD BE ADDRESSED TO:
LABORATORY OPERATIONS MANAGER/ASSAIGAI ANALYTICAL
7300 JEFFERSON N.E.,ALBUQUERQUE,N.M. 87109

WORK ID	STATION #9 7799
TAKEN	
TRANS	FED X
TYPE	SOIL
P.O. #	
INVOICE	under separate cover

SAMPLE IDENTIFICATION

01	SG 91 28.6 - 28.8
02	SG 86 13.5 - 13.7
03	SG 86 18.7 - 18.9
04	SG 86 24.9 - 25.1
05	SG 86 35.0 - 35.2
06	SG 86 40.5 - 40.7

TEST CODES and NAMES used on this workorder

8010_S	PURGEABLE HALOCARBONS-SOIL
8020	AROMATIC VOLATILE ORGANICS

Received: 07/24/91

REPORT
Results by Sample

Work Order # 91-07-276

SAMPLE ID **SG 91 28.6 - 28.8** FRACTION **01A** TEST CODE **8010 S** NAME **PURGEABLE HALOCARBONS-SOIL**
Date & Time Collected **not specified** Category ______

PARAMETER	RESULT	LIMIT
BROMODICHLOROMETHANE	<0.1	0.1
BROMOFORM	<0.1	0.1
BROMOMETHANE	<0.1	0.1
CARBON TETRACHLORIDE	<0.1	0.1
CHLOROBENZENE	<0.1	0.1
CHLOROETHANE	<0.1	0.1
CHLOROFORM	<0.1	0.1
2-CHLOROETHYL VINYL ETHER	<0.1	0.1
CHLOROMETHANE	<0.1	0.1
DIBROMOCHLOROMETHANE	<0.1	0.1
1,2-DICHLOROBENZENE	<0.1	0.1
1,3-DICHLOROBENZENE	<0.1	0.1
1,4-DICHLOROBENZENE	<0.1	0.1
DICHLORODIFLUOROMETHANE	<0.1	0.1
1,1-DICHLOROETHANE	<0.1	0.1
1,2-DICHLOROETHANE	<0.1	0.1
1,1-DICHLOROETHENE	<0.1	0.1
trans-1,2-DICHLOROETHENE	<0.1	0.1
1,2-DICHLOROPROPANE	<0.1	0.1
cis-1,3-DICHLOROPROPENE	<0.1	0.1
1,1,2,2-TETRACHLOROETHANE	<0.1	0.1
trans-1,3-DICHLOROPROPENE	<0.1	0.1
METHYLENE CHLORIDE	<0.1	0.1
1,1,1-TRICHLOROETHANE	<0.1	0.1
1,1,2-TRICHLOROETHANE	<0.1	0.1
TETRACHLOROETHENE	<0.1	0.1
TRICHLOROFLUOROMETHANE	<0.1	0.1
TRICHLOROETHENE	<0.1	0.1
VINYL CHLORIDE	<0.1	0.1

Received: 07/24/91

REPORT
Results by Sample

Work Order # 91-07-276
Continued From Above

SAMPLE ID SG 91 28.6 - 28.8

FRACTION 01A TEST CODE 8010 S NAME PURGEABLE HALOCARBONS-SOIL
Date & Time Collected not specified Category ____________

Notes and Definitions for this Report:

EXTRACTED 07/30/91
DATE RUN 07/30/91
ANALYST D/R
UNITS MG/KG

Received: 07/23/91

REPORT
Results by Sample

Work Order # 91-07-257

SAMPLE ID **PIT 3 BH-1 30.7-30.9** FRACTION **12A** TEST CODE **8010 S** NAME **PURGEABLE HALOCARBONS-SOIL**
Date & Time Collected **07/22/91** Category

PARAMETER	RESULT	LIMIT
BROMODICHLOROMETHANE	<0.1	0.1
BROMOFORM	<0.1	0.1
BROMOMETHANE	<0.1	0.1
CARBON TETRACHLORIDE	<0.1	0.1
CHLOROBENZENE	<0.1	0.1
CHLOROETHANE	<0.1	0.1
CHLOROFORM	<0.1	0.1
2-CHLOROETHYL VINYL ETHER	<0.1	0.1
CHLOROMETHANE	<0.1	0.1
DIBROMOCHLOROMETHANE	<0.1	0.1
1,2-DICHLOROBENZENE	<0.1	0.1
1,3-DICHLOROBENZENE	<0.1	0.1
1,4-DICHLOROBENZENE	<0.1	0.1
DICHLORODIFLUOROMETHANE	<0.1	0.1
1,1-DICHLOROETHANE	<0.1	0.1
1,2-DICHLOROETHANE	<0.1	0.1
1,1-DICHLOROETHENE	<0.1	0.1
trans-1,2-DICHLOROETHENE	<0.1	0.1
1,2-DICHLOROPROPANE	<0.1	0.1
cis-1,3-DICHLOROPROPENE	<0.1	0.1
1,1,2,2-TETRACHLOROETHANE	<0.1	0.1
trans-1,3-DICHLOROPROPENE	<0.1	0.1
METHYLENE CHLORIDE	<0.1	0.1
1,1,1-TRICHLOROETHANE	<0.1	0.1
1,1,2-TRICHLOROETHANE	<0.1	0.1
TETRACHLOROETHENE	<0.1	0.1
TRICHLOROFLUOROMETHANE	<0.1	0.1
TRICHLOROETHENE	<0.1	0.1
VINYL CHLORIDE	<0.1	0.1

Received: 07/23/91

REPORT
Results by Sample

Work Order # 91-07-257
Continued From Above

SAMPLE ID **PIT 3 BH-1 30.7-30.9** FRACTION **12A** TEST CODE **8010_S** NAME **PURGEABLE HALOCARBONS-SOIL**
Date & Time Collected **07/22/91** Category ______

Notes and Definitions for this Report:

EXTRACTED 07/29/91
DATE RUN 07/30/91
ANALYST D/R
UNITS MG/KG

Received: 07/23/91

REPORT
Results by Sample

Work Order # 91-07-257

SAMPLE ID **PIT 3 BH-1 30.7-30.9** FRACTION **12A** TEST CODE **8020** NAME **AROMATIC VOLATILE ORGANICS**
Date & Time Collected **07/22/91** Category ______

PARAMETER	RESULT	DET LIMIT
BENZENE	<0.1	0.1
CHLOROBENZENE	<0.1	0.1
1,4-DICHLOROBENZENE	<0.1	0.1
1,3-DICHLOROBENZENE	<0.1	0.1
1,2-DICHLOROBENZENE	<0.1	0.1
ETHYL BENZENE	<0.1	0.1
TOLUENE	<0.1	0.1
XYLENES	<0.1	0.1

Notes and Definitions for this Report:

EXTRACTED 07/29/91
DATE RUN 07/30/91
ANALYST D/R
UNITS MG/KG

ASSAIGAI ANALYTICAL LABORATORIES

WORK ORDER 7784

☐ HAZARDOUS ☐ NON-HAZARDOUS	DATE RECEIVED 7/23/91	ESTIMATED COST
CUSTOMER P.O. NUMBER	TIME RECEIVED 9:30	DUE DATE 8/6/91

ACCOUNT INFORMATION

CUSTOMER'S NAME	CONTACT
ADDRESS	PHONE NUMBER
CITY / STATE / ZIP	

PARTY RESPONSIBLE FOR PAYMENT IF OTHER THAN ABOVE

NAME	CONTACT
ADDRESS	PHONE NUMBER
CITY / STATE / ZIP	

ACCOUNT STATUS

PAYMENT REC'D. ____
OPEN ACCOUNT ✓
CASH ____
CHECK NUMBER ____

SPECIAL BILLING INSTRUCTIONS

SAMPLE INFORMATION

TYPE OF SAMPLE	NO. OF SAMPLES	*TURN AROUND TIME	SAMPLE IDENTIFICATION AND / OR SAMPLE SITE
☐ WATER ☒ SOIL ☐ OIL ☐ SLUDGE ☐ OTHER	12 NO. OF CONTAINERS 12	☒ REGULAR (10 WKG DAYS) ☐ RUSH (3 DAYS) ☐ EMERGENCY (STAT) *(SUBJECT TO WORK LOG)	Station #9.

SAMPLE DELIVERED BY	SIGNATURE	DATE
Fed X Next Day Air		7/22/91

ANALYSIS REQUEST

WORK DESCRIPTION

8010 8020 TPH

SPECIAL INSTRUCTIONS

BILLING: ☐ PICKUP ☐ MAIL

LOGGED IN BY

7300 Jefferson NE • Albuquerque, New Mexico 87109 • (505) 345-8964 • FAX (505) 345-7259

TRANSWESTERN PIPELINE COMPANY

CHAIN OF CUSTODY

District: ROSWELL   Date: 7-22-91

Sample Location Valve or Receiver No.	Vol. Collect. During Flush	Sampler
STATION 9 -		METRIC CORP.

SAMPLE ID NUMBER	SOLVENT USED	SAMPLE ICED	ANALYSES REQUESTED
PIT 2 Sample 001		YES	8010
PIT 2 SAMPLE 002		YES	8010
PIT 2 26.0 - 26.2		YES	8010
PIT 2 29.1 - 29.3		YES	8010
PIT 2 39.4 - 39.5		YES	8010
PIT 2 44.1 - 44.3		YES	8010 - 8020
PIT 2 57.5 - 57.8		YES	8010
PIT 2 69.9 - 70.1		YES	8010 - 8020
DIESEL TANK 4.3-4.5		YES	TPH
DIESEL TANK 7.8 - 7.9		YES	TPH
PIT 3 BH-2 25.0-25.2		YES	8010 -8020
PIT 3 BH-1 30.7 - 30.9		YES	8010 - 8020

Relinquished By EARL CHANLEY - TWPLC   Date 7-22-91
Relinquished To FED-X   Date 7-22-91

Relinquished By ____   Date ____
Relinquished To ____   Date ____

Relinquished By ____   Date ____
Relinquished To ____   Date ____

Relinquished By ____   Date ____
Relinquished By ____   Date ____

Laboratory: ASSAGAI LABS
Received: [signature]   Date 7/23/91

* MAIL RESULTS TO: LARRY CAMPBELL
P.O. Box 1717
ROSWELL NM 88202-1717

(505-625-8022)

Received: 07/24/91

REPORT
07/31/91 14:20:37

Work Order # 91-07-276

REPORT TO: ENRON/TRANSWESTERN PIPELINE
6381 N. MAIN STREET
P.O. BOX 1717
ROSWELL, NM 88202-1717
ATTEN: LARRY CAMPBELL

PREPARED BY: Assaigai Analytical Labs
7300 Jefferson NE
Albuquerque, NM 87109
ATTEN: SYED RIZVI
PHONE: (505)345-8964

Syed Rizvi
CERTIFIED BY

CONTACT: LAB_MANAGER

CLIENT: ENR03 SAMPLES: 6
COMPANY: ENRON/TRANSWESTERN PIPELINE
FACILITY: ROSWELL, NEW MEXICO
ENR03

QUESTIONS ABOUT THIS REPORT SHOULD BE ADDRESSED TO:
LABORATORY OPERATIONS MANAGER/ASSAIGAI ANALYTICAL
7300 JEFFERSON N.E.,ALBUQUERQUE,N.M. 87109

WORK ID: STATION #9 7799
TAKEN:
TRANS: FED X
TYPE: SOIL
P.O. #:
INVOICE: under separate cover

SAMPLE IDENTIFICATION

01	SG 91	28.6 - 28.8
02	SG 86	13.5 - 13.7
03	SG 86	18.7 - 18.9
04	SG 86	24.9 - 25.1
05	SG 86	35.0 - 35.2
06	SG 86	40.5 - 40.7

TEST CODES and NAMES used on this workorder

8010_S	PURGEABLE HALOCARBONS-SOIL
8020	AROMATIC VOLATILE ORGANICS

Member: American Council of Independent Laboratories, Inc.

Received: 07/24/91

REPORT
Results by Sample

Work Order # 91-07-276

SAMPLE ID SG 91 28.6 - 28.8 FRACTION 01A TEST CODE 8010_S NAME PURGEABLE HALOCARBONS-SOIL
Date & Time Collected not specified Category

PARAMETER	RESULT	LIMIT
BROMODICHLOROMETHANE	<0.1	0.1
BROMOFORM	<0.1	0.1
BROMOMETHANE	<0.1	0.1
CARBON TETRACHLORIDE	<0.1	0.1
CHLOROBENZENE	<0.1	0.1
CHLOROETHANE	<0.1	0.1
CHLOROFORM	<0.1	0.1
2-CHLOROETHYL VINYL ETHER	<0.1	0.1
CHLOROMETHANE	<0.1	0.1
DIBROMOCHLOROMETHANE	<0.1	0.1
1,2-DICHLOROBENZENE	<0.1	0.1
1,3-DICHLOROBENZENE	<0.1	0.1
1,4-DICHLOROBENZENE	<0.1	0.1
DICHLORODIFLUOROMETHANE	<0.1	0.1
1,1-DICHLOROETHANE	<0.1	0.1
1,2-DICHLOROETHANE	<0.1	0.1
1,1-DICHLOROETHENE	<0.1	0.1
trans-1,2-DICHLOROETHENE	<0.1	0.1
1,2-DICHLOROPROPANE	<0.1	0.1
cis-1,3-DICHLOROPROPENE	<0.1	0.1
1,1,2,2-TETRACHLOROETHANE	<0.1	0.1
trans-1,3-DICHLOROPROPENE	<0.1	0.1
METHYLENE CHLORIDE	<0.1	0.1
1,1,1-TRICHLOROETHANE	<0.1	0.1
1,1,2-TRICHLOROETHANE	<0.1	0.1
TETRACHLOROETHENE	<0.1	0.1
TRICHLOROFLUOROMETHANE	<0.1	0.1
TRICHLOROETHENE	<0.1	0.1
VINYL CHLORIDE	<0.1	0.1

Received: 07/24/91

REPORT
Results by Sample

Work Order # 91-07-276
Continued From Above

SAMPLE ID **SG 91 28.6 - 28.8**

FRACTION **01A** TEST CODE **8010 S** NAME **PURGEABLE HALOCARBONS-SOIL**
Date & Time Collected **not specified** Category ______

Notes and Definitions for this Report:

EXTRACTED 07/30/91
DATE RUN 07/30/91
ANALYST D/R
UNITS MG/KG

REPORT
Results by Sample

Work Order # 91-07-276

SAMPLE ID SG 91 28.6 - 28.8 FRACTION 01A TEST CODE 8020 NAME AROMATIC VOLATILE ORGANICS
Date & Time Collected not specified Category ______

PARAMETER	RESULT	DET LIMIT
BENZENE	<0.1	0.1
CHLOROBENZENE	<0.1	0.1
1,4-DICHLOROBENZENE	<0.1	0.1
1,3-DICHLOROBENZENE	<0.1	0.1
1,2-DICHLOROBENZENE	<0.1	0.1
ETHYL BENZENE	<0.1	0.1
TOLUENE	<0.1	0.1
XYLENES	<0.1	0.1

Notes and Definitions for this Report:

EXTRACTED 07/30/91
DATE RUN 07/30/91
ANALYST D/R
UNITS MG/KG

Received: 07/24/91

REPORT
Results by Sample

Work Order # 91-07-276

SAMPLE ID **SG 86 13.5 - 13.7**   FRACTION **02A**   TEST CODE **8010 S**   NAME **PURGEABLE HALOCARBONS-SOIL**
Date & Time Collected **not specified**   Category ______

PARAMETER	RESULT	LIMIT
BROMODICHLOROMETHANE	<0.1	0.1
BROMOFORM	<0.1	0.1
BROMOMETHANE	<0.1	0.1
CARBON TETRACHLORIDE	<0.1	0.1
CHLOROBENZENE	<0.1	0.1
CHLOROETHANE	<0.1	0.1
CHLOROFORM	<0.1	0.1
2-CHLOROETHYL VINYL ETHER	<0.1	0.1
CHLOROMETHANE	<0.1	0.1
DIBROMOCHLOROMETHANE	<0.1	0.1
1,2-DICHLOROBENZENE	<0.1	0.1
1,3-DICHLOROBENZENE	<0.1	0.1
1,4-DICHLOROBENZENE	<0.1	0.1
DICHLORODIFLUOROMETHANE	<0.1	0.1
1,1-DICHLOROETHANE	<0.1	0.1
1,2-DICHLOROETHANE	<0.1	0.1
1,1-DICHLOROETHENE	<0.1	0.1
trans-1,2-DICHLOROETHENE	<0.1	0.1
1,2-DICHLOROPROPANE	<0.1	0.1
cis-1,3-DICHLOROPROPENE	<0.1	0.1
1,1,2,2-TETRACHLOROETHANE	<0.1	0.1
trans-1,3-DICHLOROPROPENE	<0.1	0.1
METHYLENE CHLORIDE	<0.1	0.1
1,1,1-TRICHLOROETHANE	0.24	0.1
1,1,2-TRICHLOROETHANE	<0.1	0.1
TETRACHLOROETHENE	1.9	0.1
TRICHLOROFLUOROMETHANE	<0.1	0.1
TRICHLOROETHENE	<0.1	0.1
VINYL CHLORIDE	<0.1	0.1

Received: 07/24/91

REPORT
Results by Sample

Work Order # 91-07-276
Continued From Above

SAMPLE ID **SG 86 13.5 - 13.7**

FRACTION **02A** TEST CODE **8010 S** NAME **PURGEABLE HALOCARBONS-SOIL**
Date & Time Collected **not specified** Category ____

Notes and Definitions for this Report:

EXTRACTED 07/30/91
DATE RUN 07/30/91
ANALYST D/R
UNITS MG/KG

Received: 07/24/91

REPORT
Results by Sample

Work Order # 91-07-276

SAMPLE ID **SG 86 18.7 - 18.9** FRACTION **03A** TEST CODE **8010_S** NAME **PURGEABLE HALOCARBONS-SOIL**
Date & Time Collected **not specified** Category ______

PARAMETER	RESULT	LIMIT
BROMODICHLOROMETHANE	<0.1	0.1
BROMOFORM	<0.1	0.1
BROMOMETHANE	<0.1	0.1
CARBON TETRACHLORIDE	<0.1	0.1
CHLOROBENZENE	<0.1	0.1
CHLOROETHANE	<0.1	0.1
CHLOROFORM	<0.1	0.1
2-CHLOROETHYL VINYL ETHER	<0.1	0.1
CHLOROMETHANE	<0.1	0.1
DIBROMOCHLOROMETHANE	<0.1	0.1
1,2-DICHLOROBENZENE	<0.1	0.1
1,3-DICHLOROBENZENE	<0.1	0.1
1,4-DICHLOROBENZENE	<0.1	0.1
DICHLORODIFLUOROMETHANE	<0.1	0.1
1,1-DICHLOROETHANE	<0.1	0.1
1,2-DICHLOROETHANE	<0.1	0.1
1,1-DICHLOROETHENE	<0.1	0.1
trans-1,2-DICHLOROETHENE	<0.1	0.1
1,2-DICHLOROPROPANE	<0.1	0.1
cis-1,3-DICHLOROPROPENE	<0.1	0.1
1,1,2,2-TETRACHLOROETHANE	<0.1	0.1
trans-1,3-DICHLOROPROPENE	<0.1	0.1
METHYLENE CHLORIDE	<0.1	0.1
1,1,1-TRICHLOROETHANE	<0.1	0.1
1,1,2-TRICHLOROETHANE	<0.1	0.1
TETRACHLOROETHENE	0.23	0.1
TRICHLOROFLUOROMETHANE	<0.1	0.1
TRICHLOROETHENE	<0.1	0.1
VINYL CHLORIDE	<0.1	0.1

Received: 07/24/91

REPORT
Results by Sample

Work Order # 91-07-276
Continued From Above

SAMPLE ID SG 86 18.7 - 18.9

FRACTION 03A TEST CODE 8010 S NAME PURGEABLE HALOCARBONS-SOIL
Date & Time Collected not specified Category ____________

Notes and Definitions for this Report:

EXTRACTED 07/30/91
DATE RUN 07/30/91
ANALYST D/R
UNITS MG/KG

SAMPLE ID **SG 86 24.9 - 25.1** FRACTION **04A** TEST CODE **8010 S** NAME **PURGEABLE HALOCARBONS-SOIL**
Date & Time Collected **not specified** Category ______

PARAMETER	RESULT	LIMIT
BROMODICHLOROMETHANE	<0.1	0.1
BROMOFORM	<0.1	0.1
BROMOMETHANE	<0.1	0.1
CARBON TETRACHLORIDE	<0.1	0.1
CHLOROBENZENE	<0.1	0.1
CHLOROETHANE	<0.1	0.1
CHLOROFORM	<0.1	0.1
2-CHLOROETHYL VINYL ETHER	<0.1	0.1
CHLOROMETHANE	<0.1	0.1
DIBROMOCHLOROMETHANE	<0.1	0.1
1,2-DICHLOROBENZENE	<0.1	0.1
1,3-DICHLOROBENZENE	<0.1	0.1
1,4-DICHLOROBENZENE	<0.1	0.1
DICHLORODIFLUOROMETHANE	<0.1	0.1
1,1-DICHLOROETHANE	<0.1	0.1
1,2-DICHLOROETHANE	<0.1	0.1
1,1-DICHLOROETHENE	<0.1	0.1
trans-1,2-DICHLOROETHENE	<0.1	0.1
1,2-DICHLOROPROPANE	<0.1	0.1
cis-1,3-DICHLOROPROPENE	<0.1	0.1
1,1,2,2-TETRACHLOROETHANE	<0.1	0.1
trans-1,3-DICHLOROPROPENE	<0.1	0.1
METHYLENE CHLORIDE	<0.1	0.1
1,1,1-TRICHLOROETHANE	<0.1	0.1
1,1,2-TRICHLOROETHANE	<0.1	0.1
TETRACHLOROETHENE	<0.1	0.1
TRICHLOROFLUOROMETHANE	<0.1	0.1
TRICHLOROETHENE	<0.1	0.1
VINYL CHLORIDE	<0.1	0.1

REPORT
Results by Sample

Work Order # 91-07-276
Continued From Above

SAMPLE ID **SG 86 24.9 - 25.1**

FRACTION **04A** TEST CODE **8010 S** NAME **PURGEABLE HALOCARBONS-SOIL**
Date & Time Collected **not specified** Category ______

Notes and Definitions for this Report:

EXTRACTED 07/30/91
DATE RUN 07/30/91
ANALYST D/R
UNITS MG/KG

Received: 07/24/91

REPORT
Results by Sample

Work Order # 91-07-276

SAMPLE ID **SG 86 35.0 - 35.2** FRACTION **05A** TEST CODE **8010 S** NAME **PURGEABLE HALOCARBONS-SOIL**
Date & Time Collected **not specified** Category ____________

PARAMETER	RESULT	LIMIT
BROMODICHLOROMETHANE	<0.1	0.1
BROMOFORM	<0.1	0.1
BROMOMETHANE	<0.1	0.1
CARBON TETRACHLORIDE	<0.1	0.1
CHLOROBENZENE	<0.1	0.1
CHLOROETHANE	<0.1	0.1
CHLOROFORM	<0.1	0.1
2-CHLOROETHYL VINYL ETHER	<0.1	0.1
CHLOROMETHANE	<0.1	0.1
DIBROMOCHLOROMETHANE	<0.1	0.1
1,2-DICHLOROBENZENE	<0.1	0.1
1,3-DICHLOROBENZENE	<0.1	0.1
1,4-DICHLOROBENZENE	<0.1	0.1
DICHLORODIFLUOROMETHANE	<0.1	0.1
1,1-DICHLOROETHANE	<0.1	0.1
1,2-DICHLOROETHANE	<0.1	0.1
1,1-DICHLOROETHENE	<0.1	0.1
trans-1,2-DICHLOROETHENE	<0.1	0.1
1,2-DICHLOROPROPANE	<0.1	0.1
cis-1,3-DICHLOROPROPENE	<0.1	0.1
1,1,2,2-TETRACHLOROETHANE	<0.1	0.1
trans-1,3-DICHLOROPROPENE	<0.1	0.1
METHYLENE CHLORIDE	<0.1	0.1
1,1,1-TRICHLOROETHANE	<0.1	0.1
1,1,2-TRICHLOROETHANE	<0.1	0.1
TETRACHLOROETHENE	<0.1	0.1
TRICHLOROFLUOROMETHANE	<0.1	0.1
TRICHLOROETHENE	<0.1	0.1
VINYL CHLORIDE	<0.1	0.1

Assaigai Analytical Labs
7300 Jefferson NE
Albuquerque, NM 87109

Attn: SYED RIZVI
Phone: (505)345-8964

ENRON/TRANSWESTERN PIPELINE
6381 N. MAIN STREET
P.O. BOX 1717
ROSWELL, NM 88202-1717
Attn: LARRY CAMPBELL
Invoice Number:

Order #: 91-08-024
Date: 08/16/91 14:31
Work ID: STATION 9 - O.S. YARD 7885
Date Received: 08/02/91
Date Completed: 08/16/91

SAMPLE IDENTIFICATION

Sample Number	Sample Description	Sample Number	Sample Description
01	OSBH3 44.1-44.3	02	OSBH3 54.8 - 55.0
03	OSBH4 27.5 - 27.7	04	OSBH5 14.0 - 14.2
05	OSBH5 19.6 - 19.9	06	OSBH5 23.4 - 23.6
07	OSBH6 13.6 - 13.8	08	OSBH6 47.0 - 47.2
09	OSBH6 52.6 - 52.8	10	OSBH6 70.0 - 71.0
11	OSBH7 22.1 - 22.3		

QUESTIONS ABOUT THIS REPORT SHOULD BE ADDRESSED TO:
LABORATORY OPERATIONS MANAGER/ASSAIGAI ANALYTICAL
7300 JEFFERSON N.E.,ALBUQUERQUE,N.M. 87109

Certified By
SYED N. RIZVI

TEST RESULTS BY SAMPLE

Sample: 01A , OSBH3 44.1-44.3 **Collected:**

Test Description	Result	Limit	Units	Analyzed	By
PURGEABLE HALOCARBONS-SOIL		0.1			
BROMODICHLOROMETHANE	<0.1	0.1	MG/KG	08/14/91	D/R
BROMOFORM	<0.1	0.1	MG/KG	08/14/91	D/R
BROMOMETHANE	<0.1	0.1	MG/KG	08/14/91	D/R
CARBON TETRACHLORIDE	<0.1	0.1	MG/KG	08/14/91	D/R
CHLOROBENZENE	<0.1	0.1	MG/KG	08/14/91	D/R
CHLOROETHANE	<0.1	0.1	MG/KG	08/14/91	D/R
CHLOROFORM	<0.1	0.1	MG/KG	08/14/91	D/R
2-CHLOROETHYL VINYL ETHER	<0.1	0.1	MG/KG	08/14/91	D/R
CHLOROMETHANE	<0.1	0.1	MG/KG	08/14/91	D/R
DIBROMOCHLOROMETHANE	<0.1	0.1	MG/KG	08/14/91	D/R
1,2-DICHLOROBENZENE	<0.1	0.1	MG/KG	08/14/91	D/R
1,3-DICHLOROBENZENE	<0.1	0.1	MG/KG	08/14/91	D/R
1,4-DICHLOROBENZENE	<0.1	0.1	MG/KG	08/14/91	D/R
DICHLORODIFLUOROMETHANE	<0.1	0.1	MG/KG	08/14/91	D/R
1,1-DICHLOROETHANE	<0.1	0.1	MG/KG	08/14/91	D/R
1,2-DICHLOROETHANE	<0.1	0.1	MG/KG	08/14/91	D/R
1,1-DICHLOROETHENE	<0.1	0.1	MG/KG	08/14/91	D/R
trans-1,2-DICHLOROETHENE	<0.1	0.1	MG/KG	08/14/91	D/R
1,2-DICHLOROPROPANE	<0.1	0.1	MG/KG	08/14/91	D/R
cis-1,3-DICHLOROPROPENE	<0.1	0.1	MG/KG	08/14/91	D/R
1,1,2,2-TETRACHLOROETHANE	<0.1	0.1	MG/KG	08/14/91	D/R
trans-1,3-DICHLOROPROPENE	<0.1	0.1	MG/KG	08/14/91	D/R

Test Description	Result	Limit	Units	Analyzed	By
METHYLENE CHLORIDE	<0.1	0.1	MG/KG	08/14/91	D/R
1,1,1-TRICHLOROETHANE	<0.1	0.1	MG/KG	08/14/91	D/R
1,1,2-TRICHLOROETHANE	<0.1	0.1	MG/KG	08/14/91	D/R
TETRACHLOROETHENE	<0.1	0.1	MG/KG	08/14/91	D/R
TRICHLOROFLUOROMETHANE	<0.1	0.1	MG/KG	08/14/91	D/R
TRICHLOROETHENE	<0.1	0.1	MG/KG	08/14/91	D/R
VINYL CHLORIDE	<0.1	0.1	MG/KG	08/14/91	D/R

Sample: 02A OSBH3 54.8 - 55.0 **Collected:**

Test Description	Result	Limit	Units	Analyzed	By
AROMATIC VOLATILE ORGANICS		0.1			
BENZENE	<0.1	0.1	MG/KG	08/14/91	D/R
CHLOROBENZENE	<0.1	0.1	MG/KG	08/14/91	D/R
1,4-DICHLOROBENZENE	<0.1	0.1	MG/KG	08/14/91	D/R
1,3-DICHLOROBENZENE	<0.1	0.1	MG/KG	08/14/91	D/R
1,2-DICHLOROBENZENE	<0.1	0.1	MG/KG	08/14/91	D/R
ETHYL BENZENE	<0.1	0.1	MG/KG	08/14/91	D/R
TOLUENE	<0.1	0.1	MG/KG	08/14/91	D/R
XYLENES	<0.1	0.1	MG/KG	08/14/91	D/R
PURGEABLE HALOCARBONS-SOIL		0.1			
BROMODICHLOROMETHANE	<0.1	0.1	MG/KG	08/14/91	D/R
BROMOFORM	<0.1	0.1	MG/KG	08/14/91	D/R
BROMOMETHANE	<0.1	0.1	MG/KG	08/14/91	D/R
CARBON TETRACHLORIDE	<0.1	0.1	MG/KG	08/14/91	D/R
CHLOROBENZENE	<0.1	0.1	MG/KG	08/14/91	D/R

Test Description	Result	Limit	Units	Analyzed	By
CHLOROETHANE	<0.1	0.1	MG/KG	08/14/91	D/R
CHLOROFORM	<0.1	0.1	MG/KG	08/14/91	D/R
2-CHLOROETHYL VINYL ETHER	<0.1	0.1	MG/KG	08/14/91	D/R
CHLOROMETHANE	<0.1	0.1	MG/KG	08/14/91	D/R
DIBROMOCHLOROMETHANE	<0.1	0.1	MG/KG	08/14/91	D/R
1,2-DICHLOROBENZENE	<0.1	0.1	MG/KG	08/14/91	D/R
1,3-DICHLOROBENZENE	<0.1	0.1	MG/KG	08/14/91	D/R
1,4-DICHLOROBENZENE	<0.1	0.1	MG/KG	08/14/91	D/R
DICHLORODIFLUOROMETHANE	<0.1	0.1	MG/KG	08/14/91	D/R
1,1-DICHLOROETHANE	<0.1	0.1	MG/KG	08/14/91	D/R
1,2-DICHLOROETHANE	<0.1	0.1	MG/KG	08/14/91	D/R
1,1-DICHLOROETHENE	<0.1	0.1	MG/KG	08/14/91	D/R
trans-1,2-DICHLOROETHENE	<0.1	0.1	MG/KG	08/14/91	D/R
1,2-DICHLOROPROPANE	<0.1	0.1	MG/KG	08/14/91	D/R
cis-1,3-DICHLOROPROPENE	<0.1	0.1	MG/KG	08/14/91	D/R
1,1,2,2-TETRACHLOROETHANE	<0.1	0.1	MG/KG	08/14/91	D/R
trans-1,3-DICHLOROPROPENE	<0.1	0.1	MG/KG	08/14/91	D/R
METHYLENE CHLORIDE	<0.1	0.1	MG/KG	08/14/91	D/R
1,1,1-TRICHLOROETHANE	<0.1	0.1	MG/KG	08/14/91	D/R
1,1,2-TRICHLOROETHANE	<0.1	0.1	MG/KG	08/14/91	D/R
TETRACHLOROETHENE	<0.1	0.1	MG/KG	08/14/91	D/R
TRICHLOROFLUOROMETHANE	<0.1	0.1	MG/KG	08/14/91	D/R
TRICHLOROETHENE	<0.1	0.1	MG/KG	08/14/91	D/R
VINYL CHLORIDE	<0.1	0.1	MG/KG	08/14/91	D/R

Sample: 03A OSBH4 27.5 - 27.7 Collected:

Test Description	Result	Limit	Units	Analyzed	By
AROMATIC VOLATILE ORGANICS		0.1			
BENZENE	<0.1	0.1	MG/KG	08/14/91	D/R
CHLOROBENZENE	<0.1	0.1	MG/KG	08/14/91	D/R
1,4-DICHLOROBENZENE	<0.1	0.1	MG/KG	08/14/91	D/R
1,3-DICHLOROBENZENE	<0.1	0.1	MG/KG	08/14/91	D/R
1,2-DICHLOROBENZENE	<0.1	0.1	MG/KG	08/14/91	D/R
ETHYL BENZENE	<0.1	0.1	MG/KG	08/14/91	D/R
TOLUENE	<0.1	0.1	MG/KG	08/14/91	D/R
XYLENES	<0.1	0.1	MG/KG	08/14/91	D/R
PURGEABLE HALOCARBONS-SOIL		0.1			
BROMODICHLOROMETHANE	<0.1	0.1	MG/KG	08/14/91	D/R
BROMOFORM	<0.1	0.1	MG/KG	08/14/91	D/R
BROMOMETHANE	<0.1	0.1	MG/KG	08/14/91	D/R
CARBON TETRACHLORIDE	<0.1	0.1	MG/KG	08/14/91	D/R
CHLOROBENZENE	<0.1	0.1	MG/KG	08/14/91	D/R
CHLOROETHANE	<0.1	0.1	MG/KG	08/14/91	D/R
CHLOROFORM	<0.1	0.1	MG/KG	08/14/91	D/R
2-CHLOROETHYL VINYL ETHER	<0.1	0.1	MG/KG	08/14/91	D/R
CHLOROMETHANE	<0.1	0.1	MG/KG	08/14/91	D/R
DIBROMOCHLOROMETHANE	<0.1	0.1	MG/KG	08/14/91	D/R
1,2-DICHLOROBENZENE	<0.1	0.1	MG/KG	08/14/91	D/R
1,3-DICHLOROBENZENE	<0.1	0.1	MG/KG	08/14/91	D/R
1,4-DICHLOROBENZENE	<0.1	0.1	MG/KG	08/14/91	D/R
DICHLORODIFLUOROMETHANE	<0.1	0.1	MG/KG	08/14/91	D/R
1,1-DICHLOROETHANE	<0.1	0.1	MG/KG	08/14/91	D/R

Test Description	Result	Limit	Units	Analyzed	By
1,2-DICHLOROETHANE	<0.1	0.1	MG/KG	08/14/91	D/R
1,1-DICHLOROETHENE	<0.1	0.1	MG/KG	08/14/91	D/R
trans-1,2-DICHLOROETHENE	<0.1	0.1	MG/KG	08/14/91	D/R
1,2-DICHLOROPROPANE	<0.1	0.1	MG/KG	08/14/91	D/R
cis-1,3-DICHLOROPROPENE	<0.1	0.1	MG/KG	08/14/91	D/R
1,1,2,2-TETRACHLOROETHANE	<0.1	0.1	MG/KG	08/14/91	D/R
trans-1,3-DICHLOROPROPENE	<0.1	0.1	MG/KG	08/14/91	D/R
METHYLENE CHLORIDE	<0.1	0.1	MG/KG	08/14/91	D/R
1,1,1-TRICHLOROETHANE	<0.1	0.1	MG/KG	08/14/91	D/R
1,1,2-TRICHLOROETHANE	<0.1	0.1	MG/KG	08/14/91	D/R
TETRACHLOROETHENE	<0.1	0.1	MG/KG	08/14/91	D/R
TRICHLOROFLUOROMETHANE	<0.1	0.1	MG/KG	08/14/91	D/R
TRICHLOROETHENE	<0.1	0.1	MG/KG	08/14/91	D/R
VINYL CHLORIDE	<0.1	0.1	MG/KG	08/14/91	D/R

Sample: 04A OSBH5 14.0 - 14.2 Collected:

Test Description	Result	Limit	Units	Analyzed	By
PURGEABLE HALOCARBONS-SOIL		0.1			
BROMODICHLOROMETHANE	<0.1	0.1	MG/KG	08/14/91	D/R
BROMOFORM	<0.1	0.1	MG/KG	08/14/91	D/R
BROMOMETHANE	<0.1	0.1	MG/KG	08/14/91	D/R
CARBON TETRACHLORIDE	<0.1	0.1	MG/KG	08/14/91	D/R
CHLOROBENZENE	<0.1	0.1	MG/KG	08/14/91	D/R
CHLOROETHANE	<0.1	0.1	MG/KG	08/14/91	D/R
CHLOROFORM	<0.1	0.1	MG/KG	08/14/91	D/R

Test Description	Result	Limit	Units	Analyzed	By
2-CHLOROETHYL VINYL ETHER	<0.1	0.1	MG/KG	08/14/91	D/R
CHLOROMETHANE	<0.1	0.1	MG/KG	08/14/91	D/R
DIBROMOCHLOROMETHANE	<0.1	0.1	MG/KG	08/14/91	D/R
1,2-DICHLOROBENZENE	<0.1	0.1	MG/KG	08/14/91	D/R
1,3-DICHLOROBENZENE	<0.1	0.1	MG/KG	08/14/91	D/R
1,4-DICHLOROBENZENE	<0.1	0.1	MG/KG	08/14/91	D/R
DICHLORODIFLUOROMETHANE	<0.1	0.1	MG/KG	08/14/91	D/R
1,1-DICHLOROETHANE	<0.1	0.1	MG/KG	08/14/91	D/R
1,2-DICHLOROETHANE	<0.1	0.1	MG/KG	08/14/91	D/R
1,1-DICHLOROETHENE	<0.1	0.1	MG/KG	08/14/91	D/R
trans-1,2-DICHLOROETHENE	<0.1	0.1	MG/KG	08/14/91	D/R
1,2-DICHLOROPROPANE	<0.1	0.1	MG/KG	08/14/91	D/R
cis-1,3-DICHLOROPROPENE	<0.1	0.1	MG/KG	08/14/91	D/R
1,1,2,2-TETRACHLOROETHANE	<0.1	0.1	MG/KG	08/14/91	D/R
trans-1,3-DICHLOROPROPENE	<0.1	0.1	MG/KG	08/14/91	D/R
METHYLENE CHLORIDE	<0.1	0.1	MG/KG	08/14/91	D/R
1,1,1-TRICHLOROETHANE	<0.1	0.1	MG/KG	08/14/91	D/R
1,1,2-TRICHLOROETHANE	<0.1	0.1	MG/KG	08/14/91	D/R
TETRACHLOROETHENE	<0.1	0.1	MG/KG	08/14/91	D/R
TRICHLOROFLUOROMETHANE	<0.1	0.1	MG/KG	08/14/91	D/R
TRICHLOROETHENE	<0.1	0.1	MG/KG	08/14/91	D/R
VINYL CHLORIDE	<0.1	0.1	MG/KG	08/14/91	D/R

Sample: 05A OSBH5 19.6 - 19.9 Collected:

Test Description	Result	Limit	Units	Analyzed	By
PURGEABLE HALOCARBONS-SOIL		0.1			
BROMODICHLOROMETHANE	<0.1	0.1	MG/KG	08/14/91	D/R
BROMOFORM	<0.1	0.1	MG/KG	08/14/91	D/R
BROMOMETHANE	<0.1	0.1	MG/KG	08/14/91	D/R
CARBON TETRACHLORIDE	<0.1	0.1	MG/KG	08/14/91	D/R
CHLOROBENZENE	<0.1	0.1	MG/KG	08/14/91	D/R
CHLOROETHANE	<0.1	0.1	MG/KG	08/14/91	D/R
CHLOROFORM	<0.1	0.1	MG/KG	08/14/91	D/R
2-CHLOROETHYL VINYL ETHER	<0.1	0.1	MG/KG	08/14/91	D/R
CHLOROMETHANE	<0.1	0.1	MG/KG	08/14/91	D/R
DIBROMOCHLOROMETHANE	<0.1	0.1	MG/KG	08/14/91	D/R
1,2-DICHLOROBENZENE	<0.1	0.1	MG/KG	08/14/91	D/R
1,3-DICHLOROBENZENE	<0.1	0.1	MG/KG	08/14/91	D/R
1,4-DICHLOROBENZENE	<0.1	0.1	MG/KG	08/14/91	D/R
DICHLORODIFLUOROMETHANE	<0.1	0.1	MG/KG	08/14/91	D/R
1,1-DICHLOROETHANE	<0.1	0.1	MG/KG	08/14/91	D/R
1,2-DICHLOROETHANE	<0.1	0.1	MG/KG	08/14/91	D/R
1,1-DICHLOROETHENE	<0.1	0.1	MG/KG	08/14/91	D/R
trans-1,2-DICHLOROETHENE	<0.1	0.1	MG/KG	08/14/91	D/R
1,2-DICHLOROPROPANE	<0.1	0.1	MG/KG	08/14/91	D/R
cis-1,3-DICHLOROPROPENE	<0.1	0.1	MG/KG	08/14/91	D/R
1,1,2,2-TETRACHLOROETHANE	<0.1	0.1	MG/KG	08/14/91	D/R
trans-1,3-DICHLOROPROPENE	<0.1	0.1	MG/KG	08/14/91	D/R
METHYLENE CHLORIDE	<0.1	0.1	MG/KG	08/14/91	D/R
1,1,1-TRICHLOROETHANE	<0.1	0.1	MG/KG	08/14/91	D/R

Test Description	Result	Limit	Units	Analyzed	By
1,1,2-TRICHLOROETHANE	<0.1	0.1	MG/KG	08/14/91	D/R
TETRACHLOROETHENE	<0.1	0.1	MG/KG	08/14/91	D/R
TRICHLOROFLUOROMETHANE	<0.1	0.1	MG/KG	08/14/91	D/R
TRICHLOROETHENE	<0.1	0.1	MG/KG	08/14/91	D/R
VINYL CHLORIDE	<0.1	0.1	MG/KG	08/14/91	D/R

Sample: 06A OSBH5 23.4 - 23.6 Collected:

Test Description	Result	Limit	Units	Analyzed	By
AROMATIC VOLATILE ORGANICS		0.1			
BENZENE	<0.1	0.1	MG/KG	08/14/91	D/R
CHLOROBENZENE	<0.1	0.1	MG/KG	08/14/91	D/R
1,4-DICHLOROBENZENE	<0.1	0.1	MG/KG	08/14/91	D/R
1,3-DICHLOROBENZENE	<0.1	0.1	MG/KG	08/14/91	D/R
1,2-DICHLOROBENZENE	<0.1	0.1	MG/KG	08/14/91	D/R
ETHYL BENZENE	<0.1	0.1	MG/KG	08/14/91	D/R
TOLUENE	<0.1	0.1	MG/KG	08/14/91	D/R
XYLENES	<0.1	0.1	MG/KG	08/14/91	D/R
PURGEABLE HALOCARBONS-SOIL		0.1			
BROMODICHLOROMETHANE	<0.1	0.1	MG/KG	08/14/91	D/R
BROMOFORM	<0.1	0.1	MG/KG	08/14/91	D/R
BROMOMETHANE	<0.1	0.1	MG/KG	08/14/91	D/R
CARBON TETRACHLORIDE	<0.1	0.1	MG/KG	08/14/91	D/R
CHLOROBENZENE	<0.1	0.1	MG/KG	08/14/91	D/R
CHLOROETHANE	<0.1	0.1	MG/KG	08/14/91	D/R
CHLOROFORM	<0.1	0.1	MG/KG	08/14/91	D/R

Test Description	Result	Limit	Units	Analyzed	By
2-CHLOROETHYL VINYL ETHER	<0.1	0.1	MG/KG	08/14/91	D/R
CHLOROMETHANE	<0.1	0.1	MG/KG	08/14/91	D/R
DIBROMOCHLOROMETHANE	<0.1	0.1	MG/KG	08/14/91	D/R
1,2-DICHLOROBENZENE	<0.1	0.1	MG/KG	08/14/91	D/R
1,3-DICHLOROBENZENE	<0.1	0.1	MG/KG	08/14/91	D/R
1,4-DICHLOROBENZENE	<0.1	0.1	MG/KG	08/14/91	D/R
DICHLORODIFLUOROMETHANE	<0.1	0.1	MG/KG	08/14/91	D/R
1,1-DICHLOROETHANE	<0.1	0.1	MG/KG	08/14/91	D/R
1,2-DICHLOROETHANE	<0.1	0.1	MG/KG	08/14/91	D/R
1,1-DICHLOROETHENE	<0.1	0.1	MG/KG	08/14/91	D/R
trans-1,2-DICHLOROETHENE	<0.1	0.1	MG/KG	08/14/91	D/R
1,2-DICHLOROPROPANE	<0.1	0.1	MG/KG	08/14/91	D/R
cis-1,3-DICHLOROPROPENE	<0.1	0.1	MG/KG	08/14/91	D/R
1,1,2,2-TETRACHLOROETHANE	<0.1	0.1	MG/KG	08/14/91	D/R
trans-1,3-DICHLOROPROPENE	<0.1	0.1	MG/KG	08/14/91	D/R
METHYLENE CHLORIDE	<0.1	0.1	MG/KG	08/14/91	D/R
1,1,1-TRICHLOROETHANE	<0.1	0.1	MG/KG	08/14/91	D/R
1,1,2-TRICHLOROETHANE	<0.1	0.1	MG/KG	08/14/91	D/R
TETRACHLOROETHENE	<0.1	0.1	MG/KG	08/14/91	D/R
TRICHLOROFLUOROMETHANE	<0.1	0.1	MG/KG	08/14/91	D/R
TRICHLOROETHENE	<0.1	0.1	MG/KG	08/14/91	D/R
VINYL CHLORIDE	<0.1	0.1	MG/KG	08/14/91	D/R

Sample: 07A OSBH6 13.6 - 13.8 Collected:

Test Description	Result	Limit	Units	Analyzed	By
PURGEABLE HALOCARBONS-SOIL		0.1			
BROMODICHLOROMETHANE	<0.1	0.1	MG/KG	08/14/91	D/R
BROMOFORM	<0.1	0.1	MG/KG	08/14/91	D/R
BROMOMETHANE	<0.1	0.1	MG/KG	08/14/91	D/R
CARBON TETRACHLORIDE	<0.1	0.1	MG/KG	08/14/91	D/R
CHLOROBENZENE	<0.1	0.1	MG/KG	08/14/91	D/R
CHLOROETHANE	<0.1	0.1	MG/KG	08/14/91	D/R
CHLOROFORM	<0.1	0.1	MG/KG	08/14/91	D/R
2-CHLOROETHYL VINYL ETHER	<0.1	0.1	MG/KG	08/14/91	D/R
CHLOROMETHANE	<0.1	0.1	MG/KG	08/14/91	D/R
DIBROMOCHLOROMETHANE	<0.1	0.1	MG/KG	08/14/91	D/R
1,2-DICHLOROBENZENE	<0.1	0.1	MG/KG	08/14/91	D/R
1,3-DICHLOROBENZENE	<0.1	0.1	MG/KG	08/14/91	D/R
1,4-DICHLOROBENZENE	<0.1	0.1	MG/KG	08/14/91	D/R
DICHLORODIFLUOROMETHANE	<0.1	0.1	MG/KG	08/14/91	D/R
1,1-DICHLOROETHANE	<0.1	0.1	MG/KG	08/14/91	D/R
1,2-DICHLOROETHANE	<0.1	0.1	MG/KG	08/14/91	D/R
1,1-DICHLOROETHENE	<0.1	0.1	MG/KG	08/14/91	D/R
trans-1,2-DICHLOROETHENE	<0.1	0.1	MG/KG	08/14/91	D/R
1,2-DICHLOROPROPANE	<0.1	0.1	MG/KG	08/14/91	D/R
cis-1,3-DICHLOROPROPENE	<0.1	0.1	MG/KG	08/14/91	D/R
1,1,2,2-TETRACHLOROETHANE	<0.1	0.1	MG/KG	08/14/91	D/R
trans-1,3-DICHLOROPROPENE	<0.1	0.1	MG/KG	08/14/91	D/R
METHYLENE CHLORIDE	<0.1	0.1	MG/KG	08/14/91	D/R
1,1,1-TRICHLOROETHANE	<0.1	0.1	MG/KG	08/14/91	D/R

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Received: 07/30/91

REPORT
Results by Sample

Work Order # 91-07-330

SAMPLE ID **SG360 9.0-9.9** FRACTION **11A** TEST CODE **8010_S** NAME **PURGEABLE HALOCARBONS-SOIL**
Date & Time Collected **07/29/91** Category ____

PARAMETER	RESULT	LIMIT
BROMODICHLOROMETHANE	<0.1	0.1
BROMOFORM	<0.1	0.1
BROMOMETHANE	<0.1	0.1
CARBON TETRACHLORIDE	<0.1	0.1
CHLOROBENZENE	<0.1	0.1
CHLOROETHANE	<0.1	0.1
CHLOROFORM	<0.1	0.1
2-CHLOROETHYL VINYL ETHER	<0.1	0.1
CHLOROMETHANE	<0.1	0.1
DIBROMOCHLOROMETHANE	<0.1	0.1
1,2-DICHLOROBENZENE	<0.1	0.1
1,3-DICHLOROBENZENE	<0.1	0.1
1,4-DICHLOROBENZENE	<0.1	0.1
DICHLORODIFLUOROMETHANE	<0.1	0.1
1,1-DICHLOROETHANE	<0.1	0.1
1,2-DICHLOROETHANE	<0.1	0.1
1,1-DICHLOROETHENE	<0.1	0.1
trans-1,2-DICHLOROETHENE	<0.1	0.1
1,2-DICHLOROPROPANE	<0.1	0.1
cis-1,3-DICHLOROPROPENE	<0.1	0.1
1,1,2,2-TETRACHLOROETHANE	<0.1	0.1
trans-1,3-DICHLOROPROPENE	<0.1	0.1
METHYLENE CHLORIDE	<0.1	0.1
1,1,1-TRICHLOROETHANE	<0.1	0.1
1,1,2-TRICHLOROETHANE	<0.1	0.1
TETRACHLOROETHENE	<0.1	0.1
TRICHLOROFLUOROMETHANE	<0.1	0.1
TRICHLOROETHENE	<0.1	0.1
VINYL CHLORIDE	<0.1	0.1

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Received: 07/30/91

REPORT
Results by Sample

Work Order # 91-07-330
Continued From Above

SAMPLE ID **SG360 9.0-9.9**

FRACTION **11A** TEST CODE **8010 S** NAME **PURGEABLE HALOCARBONS-SOIL**
Date & Time Collected **07/29/91** Category ____________

Notes and Definitions for this Report:

EXTRACTED 08/05/91
DATE RUN 08/05/91
ANALYST D/R
UNITS MG/KG

Received: 07/30/91

REPORT
Results by Sample

Work Order # 91-07-330

SAMPLE ID **SG360 14.0-14.7**

FRACTION **12A** TEST CODE **8010 S** NAME **PURGEABLE HALOCARBONS-SOIL**
Date & Time Collected **07/29/91** Category

PARAMETER	RESULT	LIMIT
BROMODICHLOROMETHANE	<0.1	0.1
BROMOFORM	<0.1	0.1
BROMOMETHANE	<0.1	0.1
CARBON TETRACHLORIDE	<0.1	0.1
CHLOROBENZENE	<0.1	0.1
CHLOROETHANE	<0.1	0.1
CHLOROFORM	<0.1	0.1
2-CHLOROETHYL VINYL ETHER	<0.1	0.1
CHLOROMETHANE	<0.1	0.1
DIBROMOCHLOROMETHANE	<0.1	0.1
1,2-DICHLOROBENZENE	<0.1	0.1
1,3-DICHLOROBENZENE	<0.1	0.1
1,4-DICHLOROBENZENE	<0.1	0.1
DICHLORODIFLUOROMETHANE	<0.1	0.1
1,1-DICHLOROETHANE	<0.1	0.1
1,2-DICHLOROETHANE	<0.1	0.1
1,1-DICHLOROETHENE	<0.1	0.1
trans-1,2-DICHLOROETHENE	<0.1	0.1
1,2-DICHLOROPROPANE	<0.1	0.1
cis-1,3-DICHLOROPROPENE	<0.1	0.1
1,1,2,2-TETRACHLOROETHANE	<0.1	0.1
trans-1,3-DICHLOROPROPENE	<0.1	0.1
METHYLENE CHLORIDE	<0.1	0.1
1,1,1-TRICHLOROETHANE	<0.1	0.1
1,1,2-TRICHLOROETHANE	<0.1	0.1
TETRACHLOROETHENE	<0.1	0.1
TRICHLOROFLUOROMETHANE	<0.1	0.1
TRICHLOROETHENE	<0.1	0.1
VINYL CHLORIDE	<0.1	0.1

Received: 07/30/91

REPORT
Results by Sample

Work Order # 91-07-330
Continued From Above

SAMPLE ID **SG360 14.0-14.7** FRACTION **12A** TEST CODE **8010 S** NAME **PURGEABLE HALOCARBONS-SOIL**
Date & Time Collected **07/29/91** Category ____

Notes and Definitions for this Report:

EXTRACTED 08/06/91
DATE RUN 08/06/91
ANALYST D/R
UNITS MG/KG

Received: 07/30/91

REPORT
Results by Sample

Work Order # 91-07-330

SAMPLE ID SG360 19.0-20.0 FRACTION 13A TEST CODE 8010_S NAME PURGEABLE HALOCARBONS-SOIL
Date & Time Collected 07/29/91 Category

PARAMETER	RESULT	LIMIT
BROMODICHLOROMETHANE	<0.1	0.1
BROMOFORM	<0.1	0.1
BROMOMETHANE	<0.1	0.1
CARBON TETRACHLORIDE	<0.1	0.1
CHLOROBENZENE	<0.1	0.1
CHLOROETHANE	<0.1	0.1
CHLOROFORM	<0.1	0.1
2-CHLOROETHYL VINYL ETHER	<0.1	0.1
CHLOROMETHANE	<0.1	0.1
DIBROMOCHLOROMETHANE	<0.1	0.1
1,2-DICHLOROBENZENE	<0.1	0.1
1,3-DICHLOROBENZENE	<0.1	0.1
1,4-DICHLOROBENZENE	<0.1	0.1
DICHLORODIFLUOROMETHANE	<0.1	0.1
1,1-DICHLOROETHANE	<0.1	0.1
1,2-DICHLOROETHANE	<0.1	0.1
1,1-DICHLOROETHENE	<0.1	0.1
trans-1,2-DICHLOROETHENE	<0.1	0.1
1,2-DICHLOROPROPANE	<0.1	0.1
cis-1,3-DICHLOROPROPENE	<0.1	0.1
1,1,2,2-TETRACHLOROETHANE	<0.1	0.1
trans-1,3-DICHLOROPROPENE	<0.1	0.1
METHYLENE CHLORIDE	<0.1	0.1
1,1,1-TRICHLOROETHANE	<0.1	0.1
1,1,2-TRICHLOROETHANE	<0.1	0.1
TETRACHLOROETHENE	<0.1	0.1
TRICHLOROFLUOROMETHANE	<0.1	0.1
TRICHLOROETHENE	<0.1	0.1
VINYL CHLORIDE	<0.1	0.1

Received: 07/30/91

REPORT
Results by Sample

Work Order # 91-07-330
Continued From Above

SAMPLE ID **SG360 19.0-20.0**

FRACTION **13A** TEST CODE **8010_S** NAME **PURGEABLE HALOCARBONS-SOIL**
Date & Time Collected **07/29/91** Category ______

Notes and Definitions for this Report:

EXTRACTED 08/06/91
DATE RUN 08/06/91
ANALYST D/R
UNITS MG/KG

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Received: 07/30/91

REPORT
Results by Sample

Work Order # 91-07-330

SAMPLE ID **SG360 24.0-25.0** FRACTION **14A** TEST CODE **8010_S** NAME **PURGEABLE HALOCARBONS-SOIL**

Date & Time Collected **07/29/91** Category ______

PARAMETER	RESULT	LIMIT
BROMODICHLOROMETHANE	<0.1	0.1
BROMOFORM	<0.1	0.1
BROMOMETHANE	<0.1	0.1
CARBON TETRACHLORIDE	<0.1	0.1
CHLOROBENZENE	<0.1	0.1
CHLOROETHANE	<0.1	0.1
CHLOROFORM	<0.1	0.1
2-CHLOROETHYL VINYL ETHER	<0.1	0.1
CHLOROMETHANE	<0.1	0.1
DIBROMOCHLOROMETHANE	<0.1	0.1
1,2-DICHLOROBENZENE	<0.1	0.1
1,3-DICHLOROBENZENE	<0.1	0.1
1,4-DICHLOROBENZENE	<0.1	0.1
DICHLORODIFLUOROMETHANE	<0.1	0.1
1,1-DICHLOROETHANE	<0.1	0.1
1,2-DICHLOROETHANE	<0.1	0.1
1,1-DICHLOROETHENE	<0.1	0.1
trans-1,2-DICHLOROETHENE	<0.1	0.1
1,2-DICHLOROPROPANE	<0.1	0.1
cis-1,3-DICHLOROPROPENE	<0.1	0.1
1,1,2,2-TETRACHLOROETHANE	<0.1	0.1
trans-1,3-DICHLOROPROPENE	<0.1	0.1
METHYLENE CHLORIDE	<0.1	0.1
1,1,1-TRICHLOROETHANE	<0.1	0.1
1,1,2-TRICHLOROETHANE	<0.1	0.1
TETRACHLOROETHENE	<0.1	0.1
TRICHLOROFLUOROMETHANE	<0.1	0.1
TRICHLOROETHENE	<0.1	0.1
VINYL CHLORIDE	<0.1	0.1

Received: 07/30/91

REPORT
Results by Sample

Work Order # 91-07-330
Continued From Above

SAMPLE ID **SG360 24.0-25.0** FRACTION **14A** TEST CODE **8010 S** NAME **PURGEABLE HALOCARBONS-SOIL**
Date & Time Collected **07/29/91** Category ____

Notes and Definitions for this Report:

EXTRACTED 08/06/91
DATE RUN 08/06/91
ANALYST D/R
UNITS MG/KG

REPORT
Results by Sample

Work Order # 91-07-330

AMPLE ID SG360 29.0-29.4 FRACTION 15A TEST CODE 8010_S NAME PURGEABLE HALOCARBONS-SOIL

Date & Time Collected 07/29/91 Category ______

PARAMETER	RESULT	LIMIT
BROMODICHLOROMETHANE	<0.1	0.1
BROMOFORM	<0.1	0.1
BROMOMETHANE	<0.1	0.1
CARBON TETRACHLORIDE	<0.1	0.1
CHLOROBENZENE	<0.1	0.1
CHLOROETHANE	<0.1	0.1
CHLOROFORM	<0.1	0.1
2-CHLOROETHYL VINYL ETHER	<0.1	0.1
CHLOROMETHANE	<0.1	0.1
DIBROMOCHLOROMETHANE	<0.1	0.1
1,2-DICHLOROBENZENE	<0.1	0.1
1,3-DICHLOROBENZENE	<0.1	0.1
1,4-DICHLOROBENZENE	<0.1	0.1
DICHLORODIFLUOROMETHANE	<0.1	0.1
1,1-DICHLOROETHANE	<0.1	0.1
1,2-DICHLOROETHANE	<0.1	0.1
1,1-DICHLOROETHENE	<0.1	0.1
trans-1,2-DICHLOROETHENE	<0.1	0.1
1,2-DICHLOROPROPANE	<0.1	0.1
cis-1,3-DICHLOROPROPENE	<0.1	0.1
1,1,2,2-TETRACHLOROETHANE	<0.1	0.1
trans-1,3-DICHLOROPROPENE	<0.1	0.1
METHYLENE CHLORIDE	<0.1	0.1
1,1,1-TRICHLOROETHANE	<0.1	0.1
1,1,2-TRICHLOROETHANE	<0.1	0.1
TETRACHLOROETHENE	<0.1	0.1
TRICHLOROFLUOROMETHANE	<0.1	0.1
TRICHLOROETHENE	<0.1	0.1
VINYL CHLORIDE	<0.1	0.1

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Received: 07/30/91

REPORT
Results by Sample

Work Order # 91-07-330
Continued From Above

SAMPLE ID SG360 29.0-29.4

FRACTION 15A TEST CODE 8010 S NAME PURGEABLE HALOCARBONS-SOIL
Date & Time Collected 07/29/91 Category ____________

Notes and Definitions for this Report:

EXTRACTED 08/06/91
DATE RUN 08/06/91
ANALYST D/R
UNITS MG/KG

Received: 07/30/91

REPORT
Results by Sample

Work Order # 91-07-330

SAMPLE ID SG361 0-2.5 FRACTION 16A TEST CODE 8010 S NAME PURGEABLE HALOCARBONS-SOIL
Date & Time Collected 07/29/91 Category

PARAMETER	RESULT	LIMIT
BROMODICHLOROMETHANE	<0.1	0.1
BROMOFORM	<0.1	0.1
BROMOMETHANE	<0.1	0.1
CARBON TETRACHLORIDE	<0.1	0.1
CHLOROBENZENE	<0.1	0.1
CHLOROETHANE	<0.1	0.1
CHLOROFORM	<0.1	0.1
2-CHLOROETHYL VINYL ETHER	<0.1	0.1
CHLOROMETHANE	<0.1	0.1
DIBROMOCHLOROMETHANE	<0.1	0.1
1,2-DICHLOROBENZENE	<0.1	0.1
1,3-DICHLOROBENZENE	<0.1	0.1
1,4-DICHLOROBENZENE	<0.1	0.1
DICHLORODIFLUOROMETHANE	<0.1	0.1
1,1-DICHLOROETHANE	<0.1	0.1
1,2-DICHLOROETHANE	<0.1	0.1
1,1-DICHLOROETHENE	<0.1	0.1
trans-1,2-DICHLOROETHENE	<0.1	0.1
1,2-DICHLOROPROPANE	<0.1	0.1
cis-1,3-DICHLOROPROPENE	<0.1	0.1
1,1,2,2-TETRACHLOROETHANE	<0.1	0.1
trans-1,3-DICHLOROPROPENE	<0.1	0.1
METHYLENE CHLORIDE	<0.1	0.1
1,1,1-TRICHLOROETHANE	<0.1	0.1
1,1,2-TRICHLOROETHANE	<0.1	0.1
TETRACHLOROETHENE	<0.1	0.1
TRICHLOROFLUOROMETHANE	<0.1	0.1
TRICHLOROETHENE	<0.1	0.1
VINYL CHLORIDE	<0.1	0.1

SAMPLE ID SG361 0-2.5 FRACTION 16A TEST CODE 8010 S NAME PURGEABLE HALOCARBONS-SOIL
Date & Time Collected 07/29/91 Category

Notes and Definitions for this Report:

EXTRACTED 08/06/91
DATE RUN 08/06/91
ANALYST D/R
UNITS MG/KG

ANALYTICAL LABORATORIES, INC. • 7300 Jefferson, N.E. • Albuquerque, New Mexico 87109

Received: 07/30/91

REPORT
Results by Sample

Work Order # 91-07-330

SAMPLE ID SG361 4.0-5.0   FRACTION 17A   TEST CODE 8010_S   NAME PURGEABLE HALOCARBONS-SOIL

Date & Time Collected 07/29/91   Category

PARAMETER	RESULT	LIMIT
BROMODICHLOROMETHANE	<0.1	0.1
BROMOFORM	<0.1	0.1
BROMOMETHANE	<0.1	0.1
CARBON TETRACHLORIDE	<0.1	0.1
CHLOROBENZENE	<0.1	0.1
CHLOROETHANE	<0.1	0.1
CHLOROFORM	<0.1	0.1
2-CHLOROETHYL VINYL ETHER	<0.1	0.1
CHLOROMETHANE	<0.1	0.1
DIBROMOCHLOROMETHANE	<0.1	0.1
1,2-DICHLOROBENZENE	<0.1	0.1
1,3-DICHLOROBENZENE	<0.1	0.1
1,4-DICHLOROBENZENE	<0.1	0.1
DICHLORODIFLUOROMETHANE	<0.1	0.1
1,1-DICHLOROETHANE	<0.1	0.1
1,2-DICHLOROETHANE	<0.1	0.1
1,1-DICHLOROETHENE	<0.1	0.1
trans-1,2-DICHLOROETHENE	<0.1	0.1
1,2-DICHLOROPROPANE	<0.1	0.1
cis-1,3-DICHLOROPROPENE	<0.1	0.1
1,1,2,2-TETRACHLOROETHANE	<0.1	0.1
trans-1,3-DICHLOROPROPENE	<0.1	0.1
METHYLENE CHLORIDE	<0.1	0.1
1,1,1-TRICHLOROETHANE	<0.1	0.1
1,1,2-TRICHLOROETHANE	<0.1	0.1
TETRACHLOROETHENE	<0.1	0.1
TRICHLOROFLUOROMETHANE	<0.1	0.1
TRICHLOROETHENE	<0.1	0.1
VINYL CHLORIDE	<0.1	0.1

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eceived: 07/30/91

REPORT
Results by Sample

Work Order # 91-07-330
Continued From Above

AMPLE ID SG361 4.0-5.0

FRACTION 17A TEST CODE 8010 S NAME PURGEABLE HALOCARBONS-SOIL
Date & Time Collected 07/29/91 Category ________

Notes and Definitions for this Report:

EXTRACTED 08/06/91
DATE RUN 08/06/91
ANALYST D/R
UNITS MG/KG

'age 39 | REPORT | Work Order # 91-07-330
Received: 07/30/91 | Results by Sample

SAMPLE ID 8G361 9.0-10.0   FRACTION 18A   TEST CODE 8010_8   NAME PURGEABLE HALOCARBONS-SOIL
Date & Time Collected 07/29/91   Category

PARAMETER	RESULT	LIMIT
BROMODICHLOROMETHANE	<0.1	0.1
BROMOFORM	<0.1	0.1
BROMOMETHANE	<0.1	0.1
CARBON TETRACHLORIDE	<0.1	0.1
CHLOROBENZENE	<0.1	0.1
CHLOROETHANE	<0.1	0.1
CHLOROFORM	<0.1	0.1
2-CHLOROETHYL VINYL ETHER	<0.1	0.1
CHLOROMETHANE	<0.1	0.1
DIBROMOCHLOROMETHANE	<0.1	0.1
1,2-DICHLOROBENZENE	<0.1	0.1
1,3-DICHLOROBENZENE	<0.1	0.1
1,4-DICHLOROBENZENE	<0.1	0.1
DICHLORODIFLUOROMETHANE	<0.1	0.1
1,1-DICHLOROETHANE	<0.1	0.1
1,2-DICHLOROETHANE	<0.1	0.1
1,1-DICHLOROETHENE	<0.1	0.1
trans-1,2-DICHLOROETHENE	<0.1	0.1
1,2-DICHLOROPROPANE	<0.1	0.1
cis-1,3-DICHLOROPROPENE	<0.1	0.1
1,1,2,2-TETRACHLOROETHANE	<0.1	0.1
trans-1,3-DICHLOROPROPENE	<0.1	0.1
METHYLENE CHLORIDE	<0.1	0.1
1,1,1-TRICHLOROETHANE	<0.1	0.1
1,1,2-TRICHLOROETHANE	<0.1	0.1
TETRACHLOROETHENE	<0.1	0.1
TRICHLOROFLUOROMETHANE	<0.1	0.1
TRICHLOROETHENE	<0.1	0.1
VINYL CHLORIDE	<0.1	0.1

Page 41 REPORT Work Order # 91-07-330
Received: 07/30/91 Results by Sample

SAMPLE ID 8G361 16.0-16.4 FRACTION 19A TEST CODE 8010_S NAME PURGEABLE HALOCARBONS-SOIL
Date & Time Collected 07/29/91 Category ______

PARAMETER	RESULT	LIMIT
BROMODICHLOROMETHANE	<0.1	0.1
BROMOFORM	<0.1	0.1
BROMOMETHANE	<0.1	0.1
CARBON TETRACHLORIDE	<0.1	0.1
CHLOROBENZENE	<0.1	0.1
CHLOROETHANE	<0.1	0.1
CHLOROFORM	<0.1	0.1
2-CHLOROETHYL VINYL ETHER	<0.1	0.1
CHLOROMETHANE	<0.1	0.1
DIBROMOCHLOROMETHANE	<0.1	0.1
1,2-DICHLOROBENZENE	<0.1	0.1
1,3-DICHLOROBENZENE	<0.1	0.1
1,4-DICHLOROBENZENE	<0.1	0.1
DICHLORODIFLUOROMETHANE	<0.1	0.1
1,1-DICHLOROETHANE	<0.1	0.1
1,2-DICHLOROETHANE	<0.1	0.1
1,1-DICHLOROETHENE	<0.1	0.1
trans-1,2-DICHLOROETHENE	<0.1	0.1
1,2-DICHLOROPROPANE	<0.1	0.1
cis-1,3-DICHLOROPROPENE	<0.1	0.1
1,1,2,2-TETRACHLOROETHANE	<0.1	0.1
trans-1,3-DICHLOROPROPENE	<0.1	0.1
METHYLENE CHLORIDE	<0.1	0.1
1,1,1-TRICHLOROETHANE	<0.1	0.1
1,1,2-TRICHLOROETHANE	<0.1	0.1
TETRACHLOROETHENE	<0.1	0.1
TRICHLOROFLUOROMETHANE	<0.1	0.1
TRICHLOROETHENE	<0.1	0.1
VINYL CHLORIDE	<0.1	0.1

SAMPLE ID SG361 16.0-16.4 FRACTION 19A TEST CODE 8010_S NAME PURGEABLE HALOCARBONS-SOIL
Date & Time Collected 07/29/91 Category ____________

Notes and Definitions for this Report:

EXTRACTED 08/06/91
DATE RUN 08/06/91
ANALYST D/R
UNITS MG/KG

Received: 07/30/91

REPORT
Results by Sample

Work Order # 91-07-330

SAMPLE ID SG361 19.5-19.8 FRACTION 20A TEST CODE 8010_S NAME PURGEABLE HALOCARBONS-SOIL
Date & Time Collected 07/29/91 Category ______

PARAMETER	RESULT	LIMIT
BROMODICHLOROMETHANE	<0.1	0.1
BROMOFORM	<0.1	0.1
BROMOMETHANE	<0.1	0.1
CARBON TETRACHLORIDE	<0.1	0.1
CHLOROBENZENE	<0.1	0.1
CHLOROETHANE	<0.1	0.1
CHLOROFORM	<0.1	0.1
2-CHLOROETHYL VINYL ETHER	<0.1	0.1
CHLOROMETHANE	<0.1	0.1
DIBROMOCHLOROMETHANE	<0.1	0.1
1,2-DICHLOROBENZENE	<0.1	0.1
1,3-DICHLOROBENZENE	<0.1	0.1
1,4-DICHLOROBENZENE	<0.1	0.1
DICHLORODIFLUOROMETHANE	<0.1	0.1
1,1-DICHLOROETHANE	<0.1	0.1
1,2-DICHLOROETHANE	<0.1	0.1
1,1-DICHLOROETHENE	<0.1	0.1
trans-1,2-DICHLOROETHENE	<0.1	0.1
1,2-DICHLOROPROPANE	<0.1	0.1
cis-1,3-DICHLOROPROPENE	<0.1	0.1
1,1,2,2-TETRACHLOROETHANE	<0.1	0.1
trans-1,3-DICHLOROPROPENE	<0.1	0.1
METHYLENE CHLORIDE	<0.1	0.1
1,1,1-TRICHLOROETHANE	<0.1	0.1
1,1,2-TRICHLOROETHANE	<0.1	0.1
TETRACHLOROETHENE	<0.1	0.1
TRICHLOROFLUOROMETHANE	<0.1	0.1
TRICHLOROETHENE	<0.1	0.1
VINYL CHLORIDE	<0.1	0.1

Received: 07/30/91

REPORT
Results by Sample

Work Order # 91-07-330
Continued From Above

SAMPLE ID **SG361 19.5-19.8** FRACTION **20A** TEST CODE **8010 S** NAME **PURGEABLE HALOCARBONS-SOIL**
Date & Time Collected **07/29/91** Category ______

Notes and Definitions for this Report:

EXTRACTED 08/06/91
DATE RUN 08/06/91
ANALYST D/R
UNITS MG/KG

Received: 07/30/91

REPORT
Results by Sample

Work Order # 91-07-330

SAMPLE ID SG361 24.0-25.0   FRACTION 21A   TEST CODE 8010 S   NAME PURGEABLE HALOCARBONS-SOIL
Date & Time Collected 07/29/91   Category ____________

PARAMETER	RESULT	LIMIT
BROMODICHLOROMETHANE	<0.1	0.1
BROMOFORM	<0.1	0.1
BROMOMETHANE	<0.1	0.1
CARBON TETRACHLORIDE	<0.1	0.1
CHLOROBENZENE	<0.1	0.1
CHLOROETHANE	<0.1	0.1
CHLOROFORM	<0.1	0.1
2-CHLOROETHYL VINYL ETHER	<0.1	0.1
CHLOROMETHANE	<0.1	0.1
DIBROMOCHLOROMETHANE	<0.1	0.1
1,2-DICHLOROBENZENE	<0.1	0.1
1,3-DICHLOROBENZENE	<0.1	0.1
1,4-DICHLOROBENZENE	<0.1	0.1
DICHLORODIFLUOROMETHANE	<0.1	0.1
1,1-DICHLOROETHANE	<0.1	0.1
1,2-DICHLOROETHANE	<0.1	0.1
1,1-DICHLOROETHENE	<0.1	0.1
trans-1,2-DICHLOROETHENE	<0.1	0.1
1,2-DICHLOROPROPANE	<0.1	0.1
cis-1,3-DICHLOROPROPENE	<0.1	0.1
1,1,2,2-TETRACHLOROETHANE	<0.1	0.1
trans-1,3-DICHLOROPROPENE	<0.1	0.1
METHYLENE CHLORIDE	<0.1	0.1
1,1,1-TRICHLOROETHANE	<0.1	0.1
1,1,2-TRICHLOROETHANE	<0.1	0.1
TETRACHLOROETHENE	<0.1	0.1
TRICHLOROFLUOROMETHANE	<0.1	0.1
TRICHLOROETHENE	<0.1	0.1
VINYL CHLORIDE	<0.1	0.1

Received: 07/30/91

REPORT
Results by Sample

Work Order # 91-07-330
Continued From Above

SAMPLE ID SG361 24.0-25.0

FRACTION 21A TEST CODE 8010_S NAME PURGEABLE HALOCARBONS-SOIL
Date & Time Collected 07/29/91 Category

Notes and Definitions for this Report:

EXTRACTED 08/06/91
DATE RUN 08/06/91
ANALYST D/R
UNITS MG/KG

[redacted]ICA[redacted]RATO[redacted]INC. • 7300 Jefferson, N.E. • Albuquerque, New Mexico 87109

Received: 07/30/91

REPORT
Results by Sample

Work Order # 91-07-330

SAMPLE ID **SG361 38.9-39.3** FRACTION **22A** TEST CODE **8010_S** NAME **PURGEABLE HALOCARBONS-SOIL**
Date & Time Collected **07/29/91** Category ______

PARAMETER	RESULT	LIMIT
BROMODICHLOROMETHANE	<0.1	0.1
BROMOFORM	<0.1	0.1
BROMOMETHANE	<0.1	0.1
CARBON TETRACHLORIDE	<0.1	0.1
CHLOROBENZENE	<0.1	0.1
CHLOROETHANE	<0.1	0.1
CHLOROFORM	<0.1	0.1
2-CHLOROETHYL VINYL ETHER	<0.1	0.1
CHLOROMETHANE	<0.1	0.1
DIBROMOCHLOROMETHANE	<0.1	0.1
1,2-DICHLOROBENZENE	<0.1	0.1
1,3-DICHLOROBENZENE	<0.1	0.1
1,4-DICHLOROBENZENE	<0.1	0.1
DICHLORODIFLUOROMETHANE	<0.1	0.1
1,1-DICHLOROETHANE	<0.1	0.1
1,2-DICHLOROETHANE	<0.1	0.1
1,1-DICHLOROETHENE	<0.1	0.1
trans-1,2-DICHLOROETHENE	<0.1	0.1
1,2-DICHLOROPROPANE	<0.1	0.1
cis-1,3-DICHLOROPROPENE	<0.1	0.1
1,1,2,2-TETRACHLOROETHANE	<0.1	0.1
trans-1,3-DICHLOROPROPENE	<0.1	0.1
METHYLENE CHLORIDE	<0.1	0.1
1,1,1-TRICHLOROETHANE	<0.1	0.1
1,1,2-TRICHLOROETHANE	<0.1	0.1
TETRACHLOROETHENE	<0.1	0.1
TRICHLOROFLUOROMETHANE	<0.1	0.1
TRICHLOROETHENE	<0.1	0.1
VINYL CHLORIDE	<0.1	0.1

SAMPLE ID SG361 38.9-39.3

FRACTION 22A TEST CODE 8010_S NAME PURGEABLE HALOCARBONS-SOIL
Date & Time Collected 07/29/91 Category ______

Notes and Definitions for this Report:

EXTRACTED 08/06/91
DATE RUN 08/06/91
ANALYST D/R
UNITS MG/KG

TRANSWESTERN PIPELINE COMPANY

CHAIN OF CUSTODY

District: ROSWELL　　　　　　Date: 7-29-91

Sample Location Valve or Receiver No.	Vol. Collect. During Flush	Sampler
STATION 9 - O.S YARD		DIKTRIC CORP

SAMPLE ID NUMBER	SOLVENT USED	SAMPLE ICED	ANALYSES REQUESTED
OSRH3		YES	8010, 8020
SG349 0-1.8		YES	8010, [illegible]
SG349 2.9-4.6		YES	8010
SG349 9.0-10.0		YES	8010
SG349 14.0-14.8		YES	8010
SG349 20.3-21.3		YES	8010
SG349 25.3-26.3		YES	8010
SG349 29.7-30.4		YES	8010, 8020
SG360 0.0-2.5		YES	8010
SG360 4.0-5.0		YES	8010
SG360 9.0-9.9		YES	8010

Relinquished By EARL CHANLEY - TWPL CO.　　Date 7-29-91
Relinquished To FED-X　　Date 7-29-91

Relinquished By ______　　Date ______
Relinquished To ______　　Date ______

Relinquished By ______　　Date ______
Relinquished To ______　　Date ______

Relinquished By ______　　Date ______
Relinquished By ______　　Date ______

Laboratory: ASSAIGAI LABS
Received: [signature] BURCK　　Date 7/30/91

MAIL RESULTS TO: LARRY CAMPBELL　　(505-625-8022)
P.O. BOX 1717
ROSWELL N. MEX. 88202-1717

REPORT 08/05/91 09:26:18

Work Order # 91-07-299

Received: 07/26/91

REPORT TO: ENRON/TRANSWESTERN PIPELINE
6381 N. MAIN STREET
P.O. BOX 1717
ROSWELL, NM 88202-1717
ATTEN: LARRY CAMPBELL

PREPARED BY: Assaigai Analytical Labs
7300 Jefferson NE
Albuquerque, NM 87109
ATTEN: SYED RIZVI
PHONE: (505)345-8964

Syed Rizvi
CERTIFIED BY

CONTACT: LAB_MANAGER

CLIENT: ENR03 SAMPLES: 8
COMPANY: ENRON/TRANSWESTERN PIPELINE
FACILITY: ROSWELL, NEW MEXICO
ENR03

QUESTIONS ABOUT THIS REPORT SHOULD BE ADDRESSED TO:
LABORATORY OPERATIONS MANAGER/ASSAIGAI ANALYTICAL
7300 JEFFERSON N.E.,ALBUQUERQUE,N.M. 87109

WORK ID: STATION 9 7821
TAKEN:
TRANS: FED X
TYPE: SOIL
P.O. #:
INVOICE: under separate cover

SAMPLE IDENTIFICATION

01	OSBH1 18.9 - 19.1
02	OSBH1 34.3 - 34.5
03	OSBH2 9.9 - 10.1
04	OSBH2 22.5 - 22.6
05	OSBH2 31.1 - 31.3
06	OSBH2 41.8 - 42.0
07	OSBH2 55.2 - 55.4
08	OSBH2 69.0 - 69.2

TEST CODES and NAMES used on this workorder

8010_S PURGEABLE HALOCARBONS-SOIL

Received: 07/26/91

REPORT
Results by Sample

Work Order # 91-07-299

SAMPLE ID **OSBH1 18.9 - 19.1** FRACTION **01A** TEST CODE **8010 S** NAME **PURGEABLE HALOCARBONS-SOIL**
Date & Time Collected **not specified** Category ______

PARAMETER	RESULT	LIMIT
BROMODICHLOROMETHANE	<0.1	0.1
BROMOFORM	<0.1	0.1
BROMOMETHANE	<0.1	0.1
CARBON TETRACHLORIDE	<0.1	0.1
CHLOROBENZENE	<0.1	0.1
CHLOROETHANE	<0.1	0.1
CHLOROFORM	<0.1	0.1
2-CHLOROETHYL VINYL ETHER	<0.1	0.1
CHLOROMETHANE	<0.1	0.1
DIBROMOCHLOROMETHANE	<0.1	0.1
1,2-DICHLOROBENZENE	<0.1	0.1
1,3-DICHLOROBENZENE	<0.1	0.1
1,4-DICHLOROBENZENE	<0.1	0.1
DICHLORODIFLUOROMETHANE	<0.1	0.1
1,1-DICHLOROETHANE	<0.1	0.1
1,2-DICHLOROETHANE	<0.1	0.1
1,1-DICHLOROETHENE	<0.1	0.1
trans-1,2-DICHLOROETHENE	<0.1	0.1
1,2-DICHLOROPROPANE	<0.1	0.1
cis-1,3-DICHLOROPROPENE	<0.1	0.1
1,1,2,2-TETRACHLOROETHANE	<0.1	0.1
trans-1,3-DICHLOROPROPENE	<0.1	0.1
METHYLENE CHLORIDE	<0.1	0.1
1,1,1-TRICHLOROETHANE	<0.1	0.1
1,1,2-TRICHLOROETHANE	<0.1	0.1
TETRACHLOROETHENE	<0.1	0.1
TRICHLOROFLUOROMETHANE	<0.1	0.1
TRICHLOROETHENE	<0.1	0.1
VINYL CHLORIDE	<0.1	0.1

REPORT
Results by Sample

Work Order # 91-07-299
Continued From Above

SAMPLE ID **OSBH1 18.9 - 19.1**

FRACTION **01A** TEST CODE **8010 S** NAME **PURGEABLE HALOCARBONS-SOIL**
Date & Time Collected **not specified** Category ______

Notes and Definitions for this Report:

EXTRACTED 08/01/91
DATE RUN 08/01/91
ANALYST D/R
UNITS MG/KG

Received: 07/26/91

REPORT
Results by Sample

Work Order # 91-07-299

SAMPLE ID **OSBH1 34.3 - 34.5** FRACTION **02A** TEST CODE **8010 S** NAME **PURGEABLE HALOCARBONS-SOIL**
Date & Time Collected **not specified** Category ______

PARAMETER	RESULT	LIMIT
BROMODICHLOROMETHANE	<0.1	0.1
BROMOFORM	<0.1	0.1
BROMOMETHANE	<0.1	0.1
CARBON TETRACHLORIDE	<0.1	0.1
CHLOROBENZENE	<0.1	0.1
CHLOROETHANE	<0.1	0.1
CHLOROFORM	<0.1	0.1
2-CHLOROETHYL VINYL ETHER	<0.1	0.1
CHLOROMETHANE	<0.1	0.1
DIBROMOCHLOROMETHANE	<0.1	0.1
1,2-DICHLOROBENZENE	<0.1	0.1
1,3-DICHLOROBENZENE	<0.1	0.1
1,4-DICHLOROBENZENE	<0.1	0.1
DICHLORODIFLUOROMETHANE	<0.1	0.1
1,1-DICHLOROETHANE	<0.1	0.1
1,2-DICHLOROETHANE	<0.1	0.1
1,1-DICHLOROETHENE	<0.1	0.1
trans-1,2-DICHLOROETHENE	<0.1	0.1
1,2-DICHLOROPROPANE	<0.1	0.1
cis-1,3-DICHLOROPROPENE	<0.1	0.1
1,1,2,2-TETRACHLOROETHANE	<0.1	0.1
trans-1,3-DICHLOROPROPENE	<0.1	0.1
METHYLENE CHLORIDE	<0.1	0.1
1,1,1-TRICHLOROETHANE	<0.1	0.1
1,1,2-TRICHLOROETHANE	<0.1	0.1
TETRACHLOROETHENE	<0.1	0.1
TRICHLOROFLUOROMETHANE	<0.1	0.1
TRICHLOROETHENE	<0.1	0.1
VINYL CHLORIDE	<0.1	0.1

Received: 07/26/91

REPORT
Results by Sample

Work Order # 91-07-299
Continued From Above

SAMPLE ID **OSBH1 34.3 - 34.5**

FRACTION **02A** TEST CODE **8010 S** NAME **PURGEABLE HALOCARBONS-SOIL**
Date & Time Collected **not specified** Category ______

Notes and Definitions for this Report:

EXTRACTED 08/01/91
DATE RUN 08/01/91
ANALYST D/R
UNITS MG/KG

REPORT
Results by Sample

Work Order # 91-07-299

SAMPLE ID **OSBH2 9.9 - 10.1** FRACTION **03A** TEST CODE **8010 S** NAME **PURGEABLE HALOCARBONS-SOIL**
Date & Time Collected **not specified** Category ____________

PARAMETER	RESULT	LIMIT
BROMODICHLOROMETHANE	<0.1	0.1
BROMOFORM	<0.1	0.1
BROMOMETHANE	<0.1	0.1
CARBON TETRACHLORIDE	<0.1	0.1
CHLOROBENZENE	<0.1	0.1
CHLOROETHANE	<0.1	0.1
CHLOROFORM	<0.1	0.1
2-CHLOROETHYL VINYL ETHER	<0.1	0.1
CHLOROMETHANE	<0.1	0.1
DIBROMOCHLOROMETHANE	<0.1	0.1
1,2-DICHLOROBENZENE	<0.1	0.1
1,3-DICHLOROBENZENE	<0.1	0.1
1,4-DICHLOROBENZENE	<0.1	0.1
DICHLORODIFLUOROMETHANE	<0.1	0.1
1,1-DICHLOROETHANE	<0.1	0.1
1,2-DICHLOROETHANE	<0.1	0.1
1,1-DICHLOROETHENE	<0.1	0.1
trans-1,2-DICHLOROETHENE	<0.1	0.1
1,2-DICHLOROPROPANE	<0.1	0.1
cis-1,3-DICHLOROPROPENE	<0.1	0.1
1,1,2,2-TETRACHLOROETHANE	<0.1	0.1
trans-1,3-DICHLOROPROPENE	<0.1	0.1
METHYLENE CHLORIDE	<0.1	0.1
1,1,1-TRICHLOROETHANE	<0.1	0.1
1,1,2-TRICHLOROETHANE	<0.1	0.1
TETRACHLOROETHENE	<0.1	0.1
TRICHLOROFLUOROMETHANE	<0.1	0.1
TRICHLOROETHENE	<0.1	0.1
VINYL CHLORIDE	<0.1	0.1

Received: 07/26/91

REPORT
Results by Sample

Work Order # 91-07-299
Continued From Above

SAMPLE ID **OSBH2 9.9 - 10.1**

FRACTION **03A** TEST CODE **8010 S** NAME **PURGEABLE HALOCARBONS-SOIL**
Date & Time Collected **not specified** Category ____________

Notes and Definitions for this Report:

EXTRACTED 08/01/91
DATE RUN 08/01/91
ANALYST D/R
UNITS MG/KG

Member: American Council of Independent Laboratories, Inc.

Received: 07/26/91

REPORT
Results by Sample

Work Order # 91-07-299

SAMPLE ID **OSBH2 22.5 - 22.6** FRACTION **04A** TEST CODE **8010 S** NAME **PURGEABLE HALOCARBONS-SOIL**
Date & Time Collected **not specified** Category

PARAMETER	RESULT	LIMIT
BROMODICHLOROMETHANE	<0.1	0.1
BROMOFORM	<0.1	0.1
BROMOMETHANE	<0.1	0.1
CARBON TETRACHLORIDE	<0.1	0.1
CHLOROBENZENE	<0.1	0.1
CHLOROETHANE	<0.1	0.1
CHLOROFORM	<0.1	0.1
2-CHLOROETHYL VINYL ETHER	<0.1	0.1
CHLOROMETHANE	<0.1	0.1
DIBROMOCHLOROMETHANE	<0.1	0.1
1,2-DICHLOROBENZENE	<0.1	0.1
1,3-DICHLOROBENZENE	<0.1	0.1
1,4-DICHLOROBENZENE	<0.1	0.1
DICHLORODIFLUOROMETHANE	<0.1	0.1
1,1-DICHLOROETHANE	<0.1	0.1
1,2-DICHLOROETHANE	<0.1	0.1
1,1-DICHLOROETHENE	<0.1	0.1
trans-1,2-DICHLOROETHENE	<0.1	0.1
1,2-DICHLOROPROPANE	<0.1	0.1
cis-1,3-DICHLOROPROPENE	<0.1	0.1
1,1,2,2-TETRACHLOROETHANE	<0.1	0.1
trans-1,3-DICHLOROPROPENE	<0.1	0.1
METHYLENE CHLORIDE	<0.1	0.1
1,1,1-TRICHLOROETHANE	<0.1	0.1
1,1,2-TRICHLOROETHANE	<0.1	0.1
TETRACHLOROETHENE	<0.1	0.1
TRICHLOROFLUOROMETHANE	<0.1	0.1
TRICHLOROETHENE	<0.1	0.1
VINYL CHLORIDE	<0.1	0.1

Test Description	Result	Limit	Units	Analyzed	By
1,1,2-TRICHLOROETHANE	<0.1	0.1	MG/KG	08/14/91	D/R
TETRACHLOROETHENE	<0.1	0.1	MG/KG	08/14/91	D/R
TRICHLOROFLUOROMETHANE	<0.1	0.1	MG/KG	08/14/91	D/R
TRICHLOROETHENE	<0.1	0.1	MG/KG	08/14/91	D/R
VINYL CHLORIDE	<0.1	0.1	MG/KG	08/14/91	D/R

Sample: 08A OSBH6 47.0 - 47.2 Collected:

Test Description	Result	Limit	Units	Analyzed	By
PURGEABLE HALOCARBONS-SOIL		0.1			
BROMODICHLOROMETHANE	<0.1	0.1	MG/KG	08/14/91	D/R
BROMOFORM	<0.1	0.1	MG/KG	08/14/91	D/R
BROMOMETHANE	<0.1	0.1	MG/KG	08/14/91	D/R
CARBON TETRACHLORIDE	<0.1	0.1	MG/KG	08/14/91	D/R
CHLOROBENZENE	<0.1	0.1	MG/KG	08/14/91	D/R
CHLOROETHANE	<0.1	0.1	MG/KG	08/14/91	D/R
CHLOROFORM	<0.1	0.1	MG/KG	08/14/91	D/R
2-CHLOROETHYL VINYL ETHER	<0.1	0.1	MG/KG	08/14/91	D/R
CHLOROMETHANE	<0.1	0.1	MG/KG	08/14/91	D/R
DIBROMOCHLOROMETHANE	<0.1	0.1	MG/KG	08/14/91	D/R
1,2-DICHLOROBENZENE	<0.1	0.1	MG/KG	08/14/91	D/R
1,3-DICHLOROBENZENE	<0.1	0.1	MG/KG	08/14/91	D/R
1,4-DICHLOROBENZENE	<0.1	0.1	MG/KG	08/14/91	D/R
DICHLORODIFLUOROMETHANE	<0.1	0.1	MG/KG	08/14/91	D/R
1,1-DICHLOROETHANE	<0.1	0.1	MG/KG	08/14/91	D/R
1,2-DICHLOROETHANE	<0.1	0.1	MG/KG	08/14/91	D/R

Test Description	Result	Limit	Units	Analyzed	By
1,1-DICHLOROETHENE	<0.1	0.1	MG/KG	08/14/91	D/R
trans-1,2-DICHLOROETHENE	<0.1	0.1	MG/KG	08/14/91	D/R
1,2-DICHLOROPROPANE	<0.1	0.1	MG/KG	08/14/91	D/R
cis-1,3-DICHLOROPROPENE	<0.1	0.1	MG/KG	08/14/91	D/R
1,1,2,2-TETRACHLOROETHANE	<0.1	0.1	MG/KG	08/14/91	D/R
trans-1,3-DICHLOROPROPENE	<0.1	0.1	MG/KG	08/14/91	D/R
METHYLENE CHLORIDE	<0.1	0.1	MG/KG	08/14/91	D/R
1,1,1-TRICHLOROETHANE	<0.1	0.1	MG/KG	08/14/91	D/R
1,1,2-TRICHLOROETHANE	<0.1	0.1	MG/KG	08/14/91	D/R
TETRACHLOROETHENE	<0.1	0.1	MG/KG	08/14/91	D/R
TRICHLOROFLUOROMETHANE	<0.1	0.1	MG/KG	08/14/91	D/R
TRICHLOROETHENE	<0.1	0.1	MG/KG	08/14/91	D/R
VINYL CHLORIDE	<0.1	0.1	MG/KG	08/14/91	D/R

Sample: 09A OSBH6 52.6 - 52.8 Collected:

Test Description	Result	Limit	Units	Analyzed	By
PURGEABLE HALOCARBONS-SOIL		0.1			
BROMODICHLOROMETHANE	<0.1	0.1	MG/KG	08/14/91	D/R
BROMOFORM	<0.1	0.1	MG/KG	08/14/91	D/R
BROMOMETHANE	<0.1	0.1	MG/KG	08/14/91	D/R
CARBON TETRACHLORIDE	<0.1	0.1	MG/KG	08/14/91	D/R
CHLOROBENZENE	<0.1	0.1	MG/KG	08/14/91	D/R
CHLOROETHANE	<0.1	0.1	MG/KG	08/14/91	D/R
CHLOROFORM	<0.1	0.1	MG/KG	08/14/91	D/R
2-CHLOROETHYL VINYL ETHER	<0.1	0.1	MG/KG	08/14/91	D/R

Test Description	Result	Limit	Units	Analyzed	By
CHLOROMETHANE	<0.1	0.1	MG/KG	08/14/91	D/R
DIBROMOCHLOROMETHANE	<0.1	0.1	MG/KG	08/14/91	D/R
1,2-DICHLOROBENZENE	<0.1	0.1	MG/KG	08/14/91	D/R
1,3-DICHLOROBENZENE	<0.1	0.1	MG/KG	08/14/91	D/R
1,4-DICHLOROBENZENE	<0.1	0.1	MG/KG	08/14/91	D/R
DICHLORODIFLUOROMETHANE	<0.1	0.1	MG/KG	08/14/91	D/R
1,1-DICHLOROETHANE	<0.1	0.1	MG/KG	08/14/91	D/R
1,2-DICHLOROETHANE	<0.1	0.1	MG/KG	08/14/91	D/R
1,1-DICHLOROETHENE	<0.1	0.1	MG/KG	08/14/91	D/R
trans-1,2-DICHLOROETHENE	<0.1	0.1	MG/KG	08/14/91	D/R
1,2-DICHLOROPROPANE	<0.1	0.1	MG/KG	08/14/91	D/R
cis-1,3-DICHLOROPROPENE	<0.1	0.1	MG/KG	08/14/91	D/R
1,1,2,2-TETRACHLOROETHANE	<0.1	0.1	MG/KG	08/14/91	D/R
trans-1,3-DICHLOROPROPENE	<0.1	0.1	MG/KG	08/14/91	D/R
METHYLENE CHLORIDE	<0.1	0.1	MG/KG	08/14/91	D/R
1,1,1-TRICHLOROETHANE	<0.1	0.1	MG/KG	08/14/91	D/R
1,1,2-TRICHLOROETHANE	<0.1	0.1	MG/KG	08/14/91	D/R
TETRACHLOROETHENE	<0.1	0.1	MG/KG	08/14/91	D/R
TRICHLOROFLUOROMETHANE	<0.1	0.1	MG/KG	08/14/91	D/R
TRICHLOROETHENE	<0.1	0.1	MG/KG	08/14/91	D/R
VINYL CHLORIDE	<0.1	0.1	MG/KG	08/14/91	D/R

Sample: 10A OSBH6 70.0 - 71.0 Collected:

Test Description	Result	Limit	Units	Analyzed	By
AROMATIC VOLATILE ORGANICS		0.1			

Test Description	Result	Limit	Units	Analyzed	By
BENZENE	<0.1	0.1	MG/KG	08/14/91	D/R
CHLOROBENZENE	<0.1	0.1	MG/KG	08/14/91	D/R
1,4-DICHLOROBENZENE	<0.1	0.1	MG/KG	08/14/91	D/R
1,3-DICHLOROBENZENE	<0.1	0.1	MG/KG	08/14/91	D/R
1,2-DICHLOROBENZENE	<0.1	0.1	MG/KG	08/14/91	D/R
ETHYL BENZENE	<0.1	0.1	MG/KG	08/14/91	D/R
TOLUENE	<0.1	0.1	MG/KG	08/14/91	D/R
XYLENES	<0.1	0.1	MG/KG	08/14/91	D/R
PURGEABLE HALOCARBONS-SOIL		0.1			
BROMODICHLOROMETHANE	<0.1	0.1	MG/KG	08/14/91	D/R
BROMOFORM	<0.1	0.1	MG/KG	08/14/91	D/R
BROMOMETHANE	<0.1	0.1	MG/KG	08/14/91	D/R
CARBON TETRACHLORIDE	<0.1	0.1	MG/KG	08/14/91	D/R
CHLOROBENZENE	<0.1	0.1	MG/KG	08/14/91	D/R
CHLOROETHANE	<0.1	0.1	MG/KG	08/14/91	D/R
CHLOROFORM	<0.1	0.1	MG/KG	08/14/91	D/R
2-CHLOROETHYL VINYL ETHER	<0.1	0.1	MG/KG	08/14/91	D/R
CHLOROMETHANE	<0.1	0.1	MG/KG	08/14/91	D/R
DIBROMOCHLOROMETHANE	<0.1	0.1	MG/KG	08/14/91	D/R
1,2-DICHLOROBENZENE	<0.1	0.1	MG/KG	08/14/91	D/R
1,3-DICHLOROBENZENE	<0.1	0.1	MG/KG	08/14/91	D/R
1,4-DICHLOROBENZENE	<0.1	0.1	MG/KG	08/14/91	D/R
DICHLORODIFLUOROMETHANE	<0.1	0.1	MG/KG	08/14/91	D/R
1,1-DICHLOROETHANE	<0.1	0.1	MG/KG	08/14/91	D/R
1,2-DICHLOROETHANE	<0.1	0.1	MG/KG	08/14/91	D/R
1,1-DICHLOROETHENE	<0.1	0.1	MG/KG	08/14/91	D/R
trans-1,2-DICHLOROETHENE	<0.1	0.1	MG/KG	08/14/91	D/R
1,2-DICHLOROPROPANE	<0.1	0.1	MG/KG	08/14/91	D/R

Test Description	Result	Limit	Units	Analyzed	By
cis-1,3-DICHLOROPROPENE	<0.1	0.1	MG/KG	08/14/91	D/R
1,1,2,2-TETRACHLOROETHANE	<0.1	0.1	MG/KG	08/14/91	D/R
trans-1,3-DICHLOROPROPENE	<0.1	0.1	MG/KG	08/14/91	D/R
METHYLENE CHLORIDE	<0.1	0.1	MG/KG	08/14/91	D/R
1,1,1-TRICHLOROETHANE	<0.1	0.1	MG/KG	08/14/91	D/R
1,1,2-TRICHLOROETHANE	<0.1	0.1	MG/KG	08/14/91	D/R
TETRACHLOROETHENE	<0.1	0.1	MG/KG	08/14/91	D/R
TRICHLOROFLUOROMETHANE	<0.1	0.1	MG/KG	08/14/91	D/R
TRICHLOROETHENE	<0.1	0.1	MG/KG	08/14/91	D/R
VINYL CHLORIDE	<0.1	0.1	MG/KG	08/14/91	D/R

Sample: 11A OSBH7 22.1 - 22.3 **Collected:**

Test Description	Result	Limit	Units	Analyzed	By
AROMATIC VOLATILE ORGANICS		0.1			
BENZENE	<0.1	0.1	MG/KG	08/14/91	D/R
CHLOROBENZENE	<0.1	0.1	MG/KG	08/14/91	D/R
1,4-DICHLOROBENZENE	<0.1	0.1	MG/KG	08/14/91	D/R
1,3-DICHLOROBENZENE	<0.1	0.1	MG/KG	08/14/91	D/R
1,2-DICHLOROBENZENE	<0.1	0.1	MG/KG	08/14/91	D/R
ETHYL BENZENE	<0.1	0.1	MG/KG	08/14/91	D/R
TOLUENE	<0.1	0.1	MG/KG	08/14/91	D/R
XYLENES	<0.1	0.1	MG/KG	08/14/91	D/R
PURGEABLE HALOCARBONS-SOIL		0.1			
BROMODICHLOROMETHANE	<0.1	0.1	MG/KG	08/14/91	D/R
BROMOFORM	<0.1	0.1	MG/KG	08/14/91	D/R

Test Description	Result	Limit	Units	Analyzed	By
BROMOMETHANE	<0.1	0.1	MG/KG	08/14/91	D/R
CARBON TETRACHLORIDE	<0.1	0.1	MG/KG	08/14/91	D/R
CHLOROBENZENE	<0.1	0.1	MG/KG	08/14/91	D/R
CHLOROETHANE	<0.1	0.1	MG/KG	08/14/91	D/R
CHLOROFORM	<0.1	0.1	MG/KG	08/14/91	D/R
2-CHLOROETHYL VINYL ETHER	<0.1	0.1	MG/KG	08/14/91	D/R
CHLOROMETHANE	<0.1	0.1	MG/KG	08/14/91	D/R
DIBROMOCHLOROMETHANE	<0.1	0.1	MG/KG	08/14/91	D/R
1,2-DICHLOROBENZENE	<0.1	0.1	MG/KG	08/14/91	D/R
1,3-DICHLOROBENZENE	<0.1	0.1	MG/KG	08/14/91	D/R
1,4-DICHLOROBENZENE	<0.1	0.1	MG/KG	08/14/91	D/R
DICHLORODIFLUOROMETHANE	<0.1	0.1	MG/KG	08/14/91	D/R
1,1-DICHLOROETHANE	<0.1	0.1	MG/KG	08/14/91	D/R
1,2-DICHLOROETHANE	<0.1	0.1	MG/KG	08/14/91	D/R
1,1-DICHLOROETHENE	<0.1	0.1	MG/KG	08/14/91	D/R
trans-1,2-DICHLOROETHENE	<0.1	0.1	MG/KG	08/14/91	D/R
1,2-DICHLOROPROPANE	<0.1	0.1	MG/KG	08/14/91	D/R
cis-1,3-DICHLOROPROPENE	<0.1	0.1	MG/KG	08/14/91	D/R
1,1,2,2-TETRACHLOROETHANE	<0.1	0.1	MG/KG	08/14/91	D/R
trans-1,3-DICHLOROPROPENE	<0.1	0.1	MG/KG	08/14/91	D/R
METHYLENE CHLORIDE	<0.1	0.1	MG/KG	08/14/91	D/R
1,1,1-TRICHLOROETHANE	<0.1	0.1	MG/KG	08/14/91	D/R
1,1,2-TRICHLOROETHANE	<0.1	0.1	MG/KG	08/14/91	D/R
TETRACHLOROETHENE	<0.1	0.1	MG/KG	08/14/91	D/R
TRICHLOROFLUOROMETHANE	<0.1	0.1	MG/KG	08/14/91	D/R
TRICHLOROETHENE	<0.1	0.1	MG/KG	08/14/91	D/R
VINYL CHLORIDE	<0.1	0.1	MG/KG	08/14/91	D/R

TEST METHODOLOGIES

8010_S = USEPA SW-846 METHOD # 8010

8020 = USEPA SW-846 METHOD # 8020

TRANSWESTERN PIPELINE COMPANY

CHAIN OF CUSTODY

District: ROSWELL   Date: 8-1-91

Sample Location Valve or Receiver No.	Vol. Collect. During Flush	Sampler
STATION 9 - O.S. YARD		METRIC CORP

SAMPLE ID NUMBER	SOLVENT USED	SAMPLE ICED	ANALYSES REQUESTED
OSBH3 44.1-44.3		YES	8010
OSBH3 54.8-55.0		YES	8010 - 8020
OSBH4 27.5-27.7		YES	8010 - 8020
OSBH5 14.0-14.2		YES	8010
OSBH5 19.6-19.9		YES	8010
OSBH5 28.4-28.6		YES	8010 - 8020
OSBH6 13.6-13.8		YES	8010
OSBH6 47.0-47.2		YES	8010
OSBH6 52.6-52.8		YES	8010
OSBH6 70.8-71.0		YES	8010 - 8020
OSBH7 22.1-22.3		YES	8010 - 8020

Relinquished By EARL CHANLEY - TWPL CO.   Date 8-1-91
Relinquished To FED-X   Date 8-1-91

Relinquished By ________   Date ________
Relinquished To ________   Date ________

Relinquished By ________   Date ________
Relinquished To ________   Date ________

Relinquished By ________   Date ________
Relinquished By ________   Date ________

Laboratory: Assaigai Labs.
Received: [signature]   Date 8/2/91

ASSAIGAI ANALYTICAL LABORATORIES

WORK ORDER 7885

☐ HAZARDOUS ☐ NON-HAZARDOUS	DATE RECEIVED 8/2/91	ESTIMATED COST
CUSTOMER P.O. NUMBER	TIME RECEIVED 10:00	DUE DATE 8/16/91

ACCOUNT INFORMATION

CUSTOMER'S NAME Enron / Transwestern	CONTACT Kevin Campbell
ADDRESS	PHONE NUMBER
CITY / STATE / ZIP	

PARTY RESPONSIBLE FOR PAYMENT IF OTHER THAN ABOVE

NAME	CONTACT
ADDRESS	PHONE NUMBER
CITY / STATE / ZIP	

ACCOUNT STATUS

PAYMENT REC'D. ______
OPEN ACCOUNT ✓
CASH ______
CHECK NUMBER ______

SPECIAL BILLING INSTRUCTIONS

SAMPLE INFORMATION

TYPE OF SAMPLE	NO. OF SAMPLES	*TURN AROUND TIME	SAMPLE IDENTIFICATION AND / OR SAMPLE SITE
☐ WATER ☒ SOIL ☐ OIL ☐ SLUDGE ☐ OTHER	11 NO. OF CONTAINERS 11	☒ REGULAR (10 WKG DAYS) ☐ RUSH (3 DAYS) ☐ EMERGENCY (STAT) *(SUBJECT TO WORK LOG)	Station 9 - O.S. Yard.

SAMPLE DELIVERED BY Fed X SIGNATURE DATE 8/2/91

ANALYSIS REQUEST

WORK DESCRIPTION

8010

8020

SPECIAL INSTRUCTIONS

BILLING: ☐ PICKUP ☐ MAIL LOGGED IN BY

7300 Jefferson NE • Albuquerque, New Mexico 87109 • (505) 345-8964 • FAX (505) 345-7259

CUSTOMER

Assaigai Analytical Labs
7300 Jefferson NE
Albuquerque, NM 87109

Attn: SYED RIZVI
Phone: (505)345-8964

ENRON/TRANSWESTERN PIPELINE
6381 N. MAIN STREET
P.O. BOX 1717
ROSWELL, NM 88202-1717
Attn: LARRY CAMPBELL
Invoice Number:

Order #: 91-08-048
Date: 08/20/91 14:21
Work ID: STA 9 O.S.YARD 7908
Date Received: 08/06/91
Date Completed: 08/20/91

SAMPLE IDENTIFICATION

Sample Number	Sample Description	Sample Number	Sample Description
01	OSBH7 33.5 - 33.7	02	OSBH7 37.0 - 37.2
03	OSHB8 4.6 - 4.9	04	OSBH8 33.9 - 34.1
05	OSBH8 49.7 - 49.9	06	OSBH9 4.5 - 4.9
07	OSBH9 32.0 - 32.5	08	OSBH9 49.5 - 49.7

QUESTIONS ABOUT THIS REPORT SHOULD BE ADDRESSED TO:
LABORATORY OPERATIONS MANAGER/ASSAIGAI ANALYTICAL
7300 JEFFERSON N.E.,ALBUQUERQUE,N.M. 87109

Certified By
SYED N. RIZVI

TEST RESULTS BY SAMPLE

Sample: 01A　OSBH7　33.5 - 33.7　　Collected:

Test Description	Result	Limit	Units	Analyzed	By
PURGEABLE HALOCARBONS-SOIL		0.1			
BROMODICHLOROMETHANE	<0.1	0.1	MG/KG	08/15/91	SR
BROMOFORM	<0.1	0.1	MG/KG	08/15/91	SR
BROMOMETHANE	<0.1	0.1	MG/KG	08/15/91	SR
CARBON TETRACHLORIDE	<0.1	0.1	MG/KG	08/15/91	SR
CHLOROBENZENE	<0.1	0.1	MG/KG	08/15/91	SR
CHLOROETHANE	<0.1	0.1	MG/KG	08/15/91	SR
CHLOROFORM	<0.1	0.1	MG/KG	08/15/91	SR
2-CHLOROETHYL VINYL ETHER	<0.1	0.1	MG/KG	08/15/91	SR
CHLOROMETHANE	<0.1	0.1	MG/KG	08/15/91	SR
DIBROMOCHLOROMETHANE	<0.1	0.1	MG/KG	08/15/91	SR
1,2-DICHLOROBENZENE	<0.1	0.1	MG/KG	08/15/91	SR
1,3-DICHLOROBENZENE	<0.1	0.1	MG/KG	08/15/91	SR
1,4-DICHLOROBENZENE	<0.1	0.1	MG/KG	08/15/91	SR
DICHLORODIFLUOROMETHANE	<0.1	0.1	MG/KG	08/15/91	SR
1,1-DICHLOROETHANE	<0.1	0.1	MG/KG	08/15/91	SR
1,2-DICHLOROETHANE	<0.1	0.1	MG/KG	08/15/91	SR
1,1-DICHLOROETHENE	<0.1	0.1	MG/KG	08/15/91	SR
trans-1,2-DICHLOROETHENE	<0.1	0.1	MG/KG	08/15/91	SR
1,2-DICHLOROPROPANE	<0.1	0.1	MG/KG	08/15/91	SR
cis-1,3-DICHLOROPROPENE	<0.1	0.1	MG/KG	08/15/91	SR
1,1,2,2-TETRACHLOROETHANE	<0.1	0.1	MG/KG	08/15/91	SR
trans-1,3-DICHLOROPROPENE	<0.1	0.1	MG/KG	08/15/91	SR

Test Description	Result	Limit	Units	Analyzed	By
METHYLENE CHLORIDE	<0.1	0.1	MG/KG	08/15/91	SR
1,1,1-TRICHLOROETHANE	<0.1	0.1	MG/KG	08/15/91	SR
1,1,2-TRICHLOROETHANE	<0.1	0.1	MG/KG	08/15/91	SR
TETRACHLOROETHENE	<0.1	0.1	MG/KG	08/15/91	SR
TRICHLOROFLUOROMETHANE	<0.1	0.1	MG/KG	08/15/91	SR
TRICHLOROETHENE	<0.1	0.1	MG/KG	08/15/91	SR
VINYL CHLORIDE	<0.1	0.1	MG/KG	08/15/91	SR

Sample: 02A OSBH7 37.0 - 37.2 Collected:

Test Description	Result	Limit	Units	Analyzed	By
AROMATIC VOLATILE ORGANICS		0.1			
BENZENE	<0.1	0.1	MG/KG	08/15/91	SR
CHLOROBENZENE	<0.1	0.1	MG/KG	08/15/91	SR
1,4-DICHLOROBENZENE	<0.1	0.1	MG/KG	08/15/91	SR
1,3-DICHLOROBENZENE	<0.1	0.1	MG/KG	08/15/91	SR
1,2-DICHLOROBENZENE	<0.1	0.1	MG/KG	08/15/91	SR
ETHYL BENZENE	0.19	0.1	MG/KG	08/15/91	SR
TOLUENE	<0.1	0.1	MG/KG	08/15/91	SR
XYLENES	0.44	0.1	MG/KG	08/15/91	SR
PURGEABLE HALOCARBONS-SOIL		0.1			
BROMODICHLOROMETHANE	<0.1	0.1	MG/KG	08/15/91	SR
BROMOFORM	<0.1	0.1	MG/KG	08/15/91	SR
BROMOMETHANE	<0.1	0.1	MG/KG	08/15/91	SR
CARBON TETRACHLORIDE	<0.1	0.1	MG/KG	08/15/91	SR
CHLOROBENZENE	<0.1	0.1	MG/KG	08/15/91	SR

Test Description	Result	Limit	Units	Analyzed	By
CHLOROETHANE	<0.1	0.1	MG/KG	08/15/91	SR
CHLOROFORM	<0.1	0.1	MG/KG	08/15/91	SR
2-CHLOROETHYL VINYL ETHER	<0.1	0.1	MG/KG	08/15/91	SR
CHLOROMETHANE	<0.1	0.1	MG/KG	08/15/91	SR
DIBROMOCHLOROMETHANE	<0.1	0.1	MG/KG	08/15/91	SR
1,2-DICHLOROBENZENE	<0.1	0.1	MG/KG	08/15/91	SR
1,3-DICHLOROBENZENE	<0.1	0.1	MG/KG	08/15/91	SR
1,4-DICHLOROBENZENE	<0.1	0.1	MG/KG	08/15/91	SR
DICHLORODIFLUOROMETHANE	<0.1	0.1	MG/KG	08/15/91	SR
1,1-DICHLOROETHANE	<0.1	0.1	MG/KG	08/15/91	SR
1,2-DICHLOROETHANE	<0.1	0.1	MG/KG	08/15/91	SR
1,1-DICHLOROETHENE	<0.1	0.1	MG/KG	08/15/91	SR
trans-1,2-DICHLOROETHENE	<0.1	0.1	MG/KG	08/15/91	SR
1,2-DICHLOROPROPANE	<0.1	0.1	MG/KG	08/15/91	SR
cis-1,3-DICHLOROPROPENE	<0.1	0.1	MG/KG	08/15/91	SR
1,1,2,2-TETRACHLOROETHANE	<0.1	0.1	MG/KG	08/15/91	SR
trans-1,3-DICHLOROPROPENE	<0.1	0.1	MG/KG	08/15/91	SR
METHYLENE CHLORIDE	<0.1	0.1	MG/KG	08/15/91	SR
1,1,1-TRICHLOROETHANE	<0.1	0.1	MG/KG	08/15/91	SR
1,1,2-TRICHLOROETHANE	<0.1	0.1	MG/KG	08/15/91	SR
TETRACHLOROETHENE	0.17	0.1	MG/KG	08/15/91	SR
TRICHLOROFLUOROMETHANE	<0.1	0.1	MG/KG	08/15/91	SR
TRICHLOROETHENE	<0.1	0.1	MG/KG	08/15/91	SR
VINYL CHLORIDE	<0.1	0.1	MG/KG	08/15/91	SR

Sample: 03A OSHB8 4.6 - 4.9 Collected:

Test Description	Result	Limit	Units	Analyzed	By
PURGEABLE HALOCARBONS-SOIL		0.1			
BROMODICHLOROMETHANE	<0.1	0.1	MG/KG	08/15/91	SR
BROMOFORM	<0.1	0.1	MG/KG	08/15/91	SR
BROMOMETHANE	<0.1	0.1	MG/KG	08/15/91	SR
CARBON TETRACHLORIDE	<0.1	0.1	MG/KG	08/15/91	SR
CHLOROBENZENE	<0.1	0.1	MG/KG	08/15/91	SR
CHLOROETHANE	<0.1	0.1	MG/KG	08/15/91	SR
CHLOROFORM	<0.1	0.1	MG/KG	08/15/91	SR
2-CHLOROETHYL VINYL ETHER	<0.1	0.1	MG/KG	08/15/91	SR
CHLOROMETHANE	<0.1	0.1	MG/KG	08/15/91	SR
DIBROMOCHLOROMETHANE	<0.1	0.1	MG/KG	08/15/91	SR
1,2-DICHLOROBENZENE	<0.1	0.1	MG/KG	08/15/91	SR
1,3-DICHLOROBENZENE	<0.1	0.1	MG/KG	08/15/91	SR
1,4-DICHLOROBENZENE	<0.1	0.1	MG/KG	08/15/91	SR
DICHLORODIFLUOROMETHANE	<0.1	0.1	MG/KG	08/15/91	SR
1,1-DICHLOROETHANE	<0.1	0.1	MG/KG	08/15/91	SR
1,2-DICHLOROETHANE	<0.1	0.1	MG/KG	08/15/91	SR
1,1-DICHLOROETHENE	<0.1	0.1	MG/KG	08/15/91	SR
trans-1,2-DICHLOROETHENE	<0.1	0.1	MG/KG	08/15/91	SR
1,2-DICHLOROPROPANE	<0.1	0.1	MG/KG	08/15/91	SR
cis-1,3-DICHLOROPROPENE	<0.1	0.1	MG/KG	08/15/91	SR
1,1,2,2-TETRACHLOROETHANE	<0.1	0.1	MG/KG	08/15/91	SR
trans-1,3-DICHLOROPROPENE	<0.1	0.1	MG/KG	08/15/91	SR
METHYLENE CHLORIDE	<0.1	0.1	MG/KG	08/15/91	SR
1,1,1-TRICHLOROETHANE	<0.1	0.1	MG/KG	08/15/91	SR

Test Description	Result	Limit	Units	Analyzed	By
1,1,2-TRICHLOROETHANE	<0.1	0.1	MG/KG	08/15/91	SR
TETRACHLOROETHENE	<0.1	0.1	MG/KG	08/15/91	SR
TRICHLOROFLUOROMETHANE	<0.1	0.1	MG/KG	08/15/91	SR
TRICHLOROETHENE	<0.1	0.1	MG/KG	08/15/91	SR
VINYL CHLORIDE	<0.1	0.1	MG/KG	08/15/91	SR

Sample: 04A OSBH8 33.9 - 34.1 Collected:

Test Description	Result	Limit	Units	Analyzed	By
PURGEABLE HALOCARBONS-SOIL		0.1			
BROMODICHLOROMETHANE	<0.1	0.1	MG/KG	08/15/91	SR
BROMOFORM	<0.1	0.1	MG/KG	08/15/91	SR
BROMOMETHANE	<0.1	0.1	MG/KG	08/15/91	SR
CARBON TETRACHLORIDE	<0.1	0.1	MG/KG	08/15/91	SR
CHLOROBENZENE	0.12	0.1	MG/KG	08/15/91	SR
CHLOROETHANE	<0.1	0.1	MG/KG	08/15/91	SR
CHLOROFORM	<0.1	0.1	MG/KG	08/15/91	SR
2-CHLOROETHYL VINYL ETHER	<0.1	0.1	MG/KG	08/15/91	SR
CHLOROMETHANE	<0.1	0.1	MG/KG	08/15/91	SR
DIBROMOCHLOROMETHANE	<0.1	0.1	MG/KG	08/15/91	SR
1,2-DICHLOROBENZENE	<0.1	0.1	MG/KG	08/15/91	SR
1,3-DICHLOROBENZENE	<0.1	0.1	MG/KG	08/15/91	SR
1,4-DICHLOROBENZENE	<0.1	0.1	MG/KG	08/15/91	SR
DICHLORODIFLUOROMETHANE	<0.1	0.1	MG/KG	08/15/91	SR
1,1-DICHLOROETHANE	<0.1	0.1	MG/KG	08/15/91	SR
1,2-DICHLOROETHANE	<0.1	0.1	MG/KG	08/15/91	SR

Test Description	Result	Limit	Units	Analyzed	By
1,1-DICHLOROETHENE	<0.1	0.1	MG/KG	08/15/91	SR
trans-1,2-DICHLOROETHENE	<0.1	0.1	MG/KG	08/15/91	SR
1,2-DICHLOROPROPANE	<0.1	0.1	MG/KG	08/15/91	SR
cis-1,3-DICHLOROPROPENE	<0.1	0.1	MG/KG	08/15/91	SR
1,1,2,2-TETRACHLOROETHANE	<0.1	0.1	MG/KG	08/15/91	SR
trans-1,3-DICHLOROPROPENE	<0.1	0.1	MG/KG	08/15/91	SR
METHYLENE CHLORIDE	<0.1	0.1	MG/KG	08/15/91	SR
1,1,1-TRICHLOROETHANE	<0.1	0.1	MG/KG	08/15/91	SR
1,1,2-TRICHLOROETHANE	<0.1	0.1	MG/KG	08/15/91	SR
TETRACHLOROETHENE	0.16	0.1	MG/KG	08/15/91	SR
TRICHLOROFLUOROMETHANE	<0.1	0.1	MG/KG	08/15/91	SR
TRICHLOROETHENE	<0.1	0.1	MG/KG	08/15/91	SR
VINYL CHLORIDE	<0.1	0.1	MG/KG	08/15/91	SR

Sample: 05A OSBH8 49.7 - 49.9 Collected:

Test Description	Result	Limit	Units	Analyzed	By
AROMATIC VOLATILE ORGANICS		0.1			
BENZENE	<0.1	0.1	MG/KG	08/15/91	SR
CHLOROBENZENE	<0.1	0.1	MG/KG	08/15/91	SR
1,4-DICHLOROBENZENE	<0.1	0.1	MG/KG	08/15/91	SR
1,3-DICHLOROBENZENE	<0.1	0.1	MG/KG	08/15/91	SR
1,2-DICHLOROBENZENE	<0.1	0.1	MG/KG	08/15/91	SR
ETHYL BENZENE	0.14	0.1	MG/KG	08/15/91	SR
TOLUENE	<0.1	0.1	MG/KG	08/15/91	SR
XYLENES	0.3	0.1	MG/KG	08/15/91	SR

Test Description	Result	Limit	Units	Analyzed	By
PURGEABLE HALOCARBONS-SOIL		0.1			
BROMODICHLOROMETHANE	<0.1	0.1	MG/KG	08/15/91	SR
BROMOFORM	<0.1	0.1	MG/KG	08/15/91	SR
BROMOMETHANE	<0.1	0.1	MG/KG	08/15/91	SR
CARBON TETRACHLORIDE	<0.1	0.1	MG/KG	08/15/91	SR
CHLOROBENZENE	<0.1	0.1	MG/KG	08/15/91	SR
CHLOROETHANE	<0.1	0.1	MG/KG	08/15/91	SR
CHLOROFORM	<0.1	0.1	MG/KG	08/15/91	SR
2-CHLOROETHYL VINYL ETHER	<0.1	0.1	MG/KG	08/15/91	SR
CHLOROMETHANE	<0.1	0.1	MG/KG	08/15/91	SR
DIBROMOCHLOROMETHANE	<0.1	0.1	MG/KG	08/15/91	SR
1,2-DICHLOROBENZENE	<0.1	0.1	MG/KG	08/15/91	SR
1,3-DICHLOROBENZENE	<0.1	0.1	MG/KG	08/15/91	SR
1,4-DICHLOROBENZENE	<0.1	0.1	MG/KG	08/15/91	SR
DICHLORODIFLUOROMETHANE	<0.1	0.1	MG/KG	08/15/91	SR
1,1-DICHLOROETHANE	<0.1	0.1	MG/KG	08/15/91	SR
1,2-DICHLOROETHANE	<0.1	0.1	MG/KG	08/15/91	SR
1,1-DICHLOROETHENE	<0.1	0.1	MG/KG	08/15/91	SR
trans-1,2-DICHLOROETHENE	<0.1	0.1	MG/KG	08/15/91	SR
1,2-DICHLOROPROPANE	<0.1	0.1	MG/KG	08/15/91	SR
cis-1,3-DICHLOROPROPENE	<0.1	0.1	MG/KG	08/15/91	SR
1,1,2,2-TETRACHLOROETHANE	<0.1	0.1	MG/KG	08/15/91	SR
trans-1,3-DICHLOROPROPENE	<0.1	0.1	MG/KG	08/15/91	SR
METHYLENE CHLORIDE	<0.1	0.1	MG/KG	08/15/91	SR
1,1,1-TRICHLOROETHANE	<0.1	0.1	MG/KG	08/15/91	SR
1,1,2-TRICHLOROETHANE	<0.1	0.1	MG/KG	08/15/91	SR
TETRACHLOROETHENE	<0.1	0.1	MG/KG	08/15/91	SR
TRICHLOROFLUOROMETHANE	<0.1	0.1	MG/KG	08/15/91	SR
TRICHLOROETHENE	<0.1	0.1	MG/KG	08/15/91	SR
VINYL CHLORIDE	<0.1	0.1	MG/KG	08/15/91	SR

[redacted]

Sample: 06A OSBH9 4.5 - 4.9 Collected:

Test Description	Result	Limit	Units	Analyzed	By
PURGEABLE HALOCARBONS-SOIL		0.1			
BROMODICHLOROMETHANE	<0.1	0.1	MG/KG	08/15/91	SR
BROMOFORM	<0.1	0.1	MG/KG	08/15/91	SR
BROMOMETHANE	<0.1	0.1	MG/KG	08/15/91	SR
CARBON TETRACHLORIDE	<0.1	0.1	MG/KG	08/15/91	SR
CHLOROBENZENE	<0.1	0.1	MG/KG	08/15/91	SR
CHLOROETHANE	<0.1	0.1	MG/KG	08/15/91	SR
CHLOROFORM	<0.1	0.1	MG/KG	08/15/91	SR
2-CHLOROETHYL VINYL ETHER	<0.1	0.1	MG/KG	08/15/91	SR
CHLOROMETHANE	<0.1	0.1	MG/KG	08/15/91	SR
DIBROMOCHLOROMETHANE	<0.1	0.1	MG/KG	08/15/91	SR
1,2-DICHLOROBENZENE	<0.1	0.1	MG/KG	08/15/91	SR
1,3-DICHLOROBENZENE	<0.1	0.1	MG/KG	08/15/91	SR
1,4-DICHLOROBENZENE	<0.1	0.1	MG/KG	08/15/91	SR
DICHLORODIFLUOROMETHANE	<0.1	0.1	MG/KG	08/15/91	SR
1,1-DICHLOROETHANE	<0.1	0.1	MG/KG	08/15/91	SR
1,2-DICHLOROETHANE	<0.1	0.1	MG/KG	08/15/91	SR
1,1-DICHLOROETHENE	<0.1	0.1	MG/KG	08/15/91	SR
trans-1,2-DICHLOROETHENE	<0.1	0.1	MG/KG	08/15/91	SR
1,2-DICHLOROPROPANE	<0.1	0.1	MG/KG	08/15/91	SR
cis-1,3-DICHLOROPROPENE	<0.1	0.1	MG/KG	08/15/91	SR
1,1,2,2-TETRACHLOROETHANE	<0.1	0.1	MG/KG	08/15/91	SR
trans-1,3-DICHLOROPROPENE	<0.1	0.1	MG/KG	08/15/91	SR
METHYLENE CHLORIDE	<0.1	0.1	MG/KG	08/15/91	SR
1,1,1-TRICHLOROETHANE	<0.1	0.1	MG/KG	08/15/91	SR

Test Description	Result	Limit	Units	Analyzed	By
1,1,2-TRICHLOROETHANE	<0.1	0.1	MG/KG	08/15/91	SR
TETRACHLOROETHENE	<0.1	0.1	MG/KG	08/15/91	SR
TRICHLOROFLUOROMETHANE	<0.1	0.1	MG/KG	08/15/91	SR
TRICHLOROETHENE	<0.1	0.1	MG/KG	08/15/91	SR
VINYL CHLORIDE	<0.1	0.1	MG/KG	08/15/91	SR

Sample: 07A OSBH9 32.0 - 32.5 Collected:

Test Description	Result	Limit	Units	Analyzed	By
PURGEABLE HALOCARBONS-SOIL		0.1			
BROMODICHLOROMETHANE	<0.1	0.1	MG/KG	08/15/91	SR
BROMOFORM	<0.1	0.1	MG/KG	08/15/91	SR
BROMOMETHANE	<0.1	0.1	MG/KG	08/15/91	SR
CARBON TETRACHLORIDE	<0.1	0.1	MG/KG	08/15/91	SR
CHLOROBENZENE	<0.1	0.1	MG/KG	08/15/91	SR
CHLOROETHANE	<0.1	0.1	MG/KG	08/15/91	SR
CHLOROFORM	<0.1	0.1	MG/KG	08/15/91	SR
2-CHLOROETHYL VINYL ETHER	<0.1	0.1	MG/KG	08/15/91	SR
CHLOROMETHANE	<0.1	0.1	MG/KG	08/15/91	SR
DIBROMOCHLOROMETHANE	<0.1	0.1	MG/KG	08/15/91	SR
1,2-DICHLOROBENZENE	<0.1	0.1	MG/KG	08/15/91	SR
1,3-DICHLOROBENZENE	<0.1	0.1	MG/KG	08/15/91	SR
1,4-DICHLOROBENZENE	<0.1	0.1	MG/KG	08/15/91	SR
DICHLORODIFLUOROMETHANE	<0.1	0.1	MG/KG	08/15/91	SR
1,1-DICHLOROETHANE	<0.1	0.1	MG/KG	08/15/91	SR
1,2-DICHLOROETHANE	<0.1	0.1	MG/KG	08/15/91	SR

Test Description	Result	Limit	Units	Analyzed	By
1,1-DICHLOROETHENE	<0.1	0.1	MG/KG	08/15/91	SR
trans-1,2-DICHLOROETHENE	<0.1	0.1	MG/KG	08/15/91	SR
1,2-DICHLOROPROPANE	<0.1	0.1	MG/KG	08/15/91	SR
cis-1,3-DICHLOROPROPENE	<0.1	0.1	MG/KG	08/15/91	SR
1,1,2,2-TETRACHLOROETHANE	<0.1	0.1	MG/KG	08/15/91	SR
trans-1,3-DICHLOROPROPENE	<0.1	0.1	MG/KG	08/15/91	SR
METHYLENE CHLORIDE	<0.1	0.1	MG/KG	08/15/91	SR
1,1,1-TRICHLOROETHANE	<0.1	0.1	MG/KG	08/15/91	SR
1,1,2-TRICHLOROETHANE	<0.1	0.1	MG/KG	08/15/91	SR
TETRACHLOROETHENE	<0.1	0.1	MG/KG	08/15/91	SR
TRICHLOROFLUOROMETHANE	<0.1	0.1	MG/KG	08/15/91	SR
TRICHLOROETHENE	<0.1	0.1	MG/KG	08/15/91	SR
VINYL CHLORIDE	<0.1	0.1	MG/KG	08/15/91	SR

Sample: 08A OSBH9 49.5 - 49.7 Collected:

Test Description	Result	Limit	Units	Analyzed	By
AROMATIC VOLATILE ORGANICS		0.1			
BENZENE	<0.1	0.1	MG/KG	08/15/91	SR
CHLOROBENZENE	<0.1	0.1	MG/KG	08/15/91	SR
1,4-DICHLOROBENZENE	<0.1	0.1	MG/KG	08/15/91	SR
1,3-DICHLOROBENZENE	<0.1	0.1	MG/KG	08/15/91	SR
1,2-DICHLOROBENZENE	<0.1	0.1	MG/KG	08/15/91	SR
ETHYL BENZENE	<0.1	0.1	MG/KG	08/15/91	SR
TOLUENE	<0.1	0.1	MG/KG	08/15/91	SR
XYLENES	<0.1	0.1	MG/KG	08/15/91	SR

Test Description	Result	Limit	Units	Analyzed	By
PURGEABLE HALOCARBONS-SOIL		0.1			
BROMODICHLOROMETHANE	<0.1	0.1	MG/KG	08/15/91	SR
BROMOFORM	<0.1	0.1	MG/KG	08/15/91	SR
BROMOMETHANE	<0.1	0.1	MG/KG	08/15/91	SR
CARBON TETRACHLORIDE	<0.1	0.1	MG/KG	08/15/91	SR
CHLOROBENZENE	<0.1	0.1	MG/KG	08/15/91	SR
CHLOROETHANE	<0.1	0.1	MG/KG	08/15/91	SR
CHLOROFORM	<0.1	0.1	MG/KG	08/15/91	SR
2-CHLOROETHYL VINYL ETHER	<0.1	0.1	MG/KG	08/15/91	SR
CHLOROMETHANE	<0.1	0.1	MG/KG	08/15/91	SR
DIBROMOCHLOROMETHANE	<0.1	0.1	MG/KG	08/15/91	SR
1,2-DICHLOROBENZENE	<0.1	0.1	MG/KG	08/15/91	SR
1,3-DICHLOROBENZENE	<0.1	0.1	MG/KG	08/15/91	SR
1,4-DICHLOROBENZENE	<0.1	0.1	MG/KG	08/15/91	SR
DICHLORODIFLUOROMETHANE	<0.1	0.1	MG/KG	08/15/91	SR
1,1-DICHLOROETHANE	<0.1	0.1	MG/KG	08/15/91	SR
1,2-DICHLOROETHANE	<0.1	0.1	MG/KG	08/15/91	SR
1,1-DICHLOROETHENE	<0.1	0.1	MG/KG	08/15/91	SR
trans-1,2-DICHLOROETHENE	<0.1	0.1	MG/KG	08/15/91	SR
1,2-DICHLOROPROPANE	<0.1	0.1	MG/KG	08/15/91	SR
cis-1,3-DICHLOROPROPENE	<0.1	0.1	MG/KG	08/15/91	SR
1,1,2,2-TETRACHLOROETHANE	<0.1	0.1	MG/KG	08/15/91	SR
trans-1,3-DICHLOROPROPENE	<0.1	0.1	MG/KG	08/15/91	SR
METHYLENE CHLORIDE	<0.1	0.1	MG/KG	08/15/91	SR
1,1,1-TRICHLOROETHANE	<0.1	0.1	MG/KG	08/15/91	SR
1,1,2-TRICHLOROETHANE	<0.1	0.1	MG/KG	08/15/91	SR
TETRACHLOROETHENE	<0.1	0.1	MG/KG	08/15/91	SR
TRICHLOROFLUOROMETHANE	<0.1	0.1	MG/KG	08/15/91	SR
TRICHLOROETHENE	<0.1	0.1	MG/KG	08/15/91	SR
VINYL CHLORIDE	<0.1	0.1	MG/KG	08/15/91	SR

TEST METHODOLOGIES

8010_S = USEPA SW-846 METHOD # 8010

8020 = USEPA SW-846 METHOD # 8020

ASSAIGAI ANALYTICAL LABORATORIES

WORK ORDER
7908

☐ HAZARDOUS ☐ NON-HAZARDOUS	DATE RECEIVED 8/6/91	ESTIMATED COST
CUSTOMER P.O. NUMBER	TIME RECEIVED 10:00	DUE DATE 8/30/91

ACCOUNT INFORMATION

CUSTOMER'S NAME [illegible]	CONTACT [illegible] Campbell
ADDRESS	PHONE NUMBER 675-8022
CITY / STATE / ZIP [illegible]	

PARTY RESPONSIBLE FOR PAYMENT IF OTHER THAN ABOVE

NAME	CONTACT
ADDRESS	PHONE NUMBER
CITY / STATE / ZIP	

SPECIAL BILLING INSTRUCTIONS

ACCOUNT STATUS

PAYMENT REC'D. ____
OPEN ACCOUNT ✓
CASH ____
CHECK NUMBER ____

SAMPLE INFORMATION

TYPE OF SAMPLE	NO. OF SAMPLES	*TURN AROUND TIME	SAMPLE IDENTIFICATION AND / OR SAMPLE SITE
☐ WATER ☑ SOIL ☐ OIL ☐ SLUDGE ☐ OTHER	6 NO. OF CONTAINERS 7	☑ REGULAR (10 WKG DAYS) ☐ RUSH (3 DAYS) ☐ EMERGENCY (STAT) *(SUBJECT TO WORK LOG)	STA 9 O S YARD

SAMPLE DELIVERED BY [illegible] SIGNATURE DATE 8/6/91

ANALYSIS REQUEST

WORK DESCRIPTION

610.5, 8020

SPECIAL INSTRUCTIONS

BILLING: ☐ PICKUP ☐ MAIL

LOGGED IN BY [illegible]

7300 Jefferson NE • Albuquerque, New Mexico 87109 • (505) 345-8964 • FAX (505) 345-7259

CUSTOMER

TRANSWESTERN PIPELINE COMPANY

CHAIN OF CUSTODY

District: ROSWELL   Date: 8-5-91

Sample Location Valve or Receiver No.	Vol. Collect. During Flush	Sampler
STAT. 9 - O.S. YARD		METRIC

SAMPLE ID NUMBER	SOLVENT USED	SAMPLE ICED	ANALYSES REQUESTED
OSBH7 33.5-33.7		YES	8010
OSBH7 37.0-37.2		YES	8010, 8020
OSBH8 4.6-4.9		YES	8010
OSBH8 33.9-34.1		YES	8010
OSBH8 49.7-49.9		YES	8010, 8020
OSBH9 4.5-4.9		YES	8010
OSBH9 32.0-32.5		YES	8010
OSBH9 49.5-49.7		YES	8010, 8020

Relinquished By EARL CHANLEY / TWPL   Date 8-5-91
Relinquished To FED-X   Date 8-5-91

Relinquished By ________   Date ________
Relinquished To ________   Date ________

Relinquished By ________   Date ________
Relinquished To ________   Date ________

Relinquished By ________   Date ________
Relinquished By ________   Date ________

Laboratory: ASSAIGAI LABS
Received: [signature]   Date 8/6/91

APPENDIX C

LABORATORY RESULTS
AND
TOTAL RECOVERABLE PETROLEUM HYDROCARBONS

Assaigai Analytical Labs
7300 Jefferson NE
Albuquerque, NM 87109

Attn: SYED RIZVI
Phone: (505)345-8964

ENRON/TRANSWESTERN PIPELINE
6381 N. MAIN STREET
P.O. BOX 1717
ROSWELL, NM 88202-1717
Attn: LARRY CAMPBELL
Invoice Number: 911774

Order #: 91-08-239
Date: 09/05/91 12:15
Work ID: STATION 9 7752
Date Received: 08/22/91
Date Completed: 09/05/91

****
* REFERENCE WO#: 91-07-215 *
****

SAMPLE IDENTIFICATION

Sample Number	Sample Description	Sample Number	Sample Description
03	PIT I 2.8 - 3.0	04	PIT I 9.2 - 9.4
05	PIT I 13.5 - 13.7	06	PIT I 18.8 - 19.0
07	PIT I 26.8 - 27.0	08	PIT I 30.6 - 30.8
09	PIT I 41.6 - 41.8	10	PIT I 43.5 - 43.7

QUESTIONS ABOUT THIS REPORT SHOULD BE ADDRESSED TO:
LABORATORY OPERATIONS MANAGER/ASSAIGAI ANALYTICAL
7300 JEFFERSON N.E.,ALBUQUERQUE,N.M. 87109

Certified By
SYED N. RIZVI

REGULAR TEST RESULTS BY TEST

TOTAL REC PET HYDROCARBONS **Minimum: 5.0** **Maximum: 100**
Method: EPA 418.1

Sample	Sample Description	Result	Units	Extracted	Analyzed	By
03A	PIT I 2.8 - 3.0	25,000	MG/KG	08/30/91	09/05/91	PV
04A	PIT I 9.2 - 9.4	39,000	MG/KG	08/30/91	09/05/91	PV
05A	PIT I 13.5 - 13.7	55,000	MG/KG	08/30/91	09/05/91	PV
06A	PIT I 18.8 - 19.0	20,000	MG/KG	08/30/91	09/05/91	PV
07A	PIT I 26.8 - 27.0	11,000	MG/KG	08/30/91	09/05/91	PV
08A	PIT I 30.6 - 30.8	16	MG/KG	08/30/91	09/05/91	PV
09A	PIT I 41.6 - 41.8	16	MG/KG	08/30/91	09/05/91	PV
10A	PIT I 43.5 - 43.7	56	MG/KG	08/30/91	09/05/91	PV

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ENRON/TRANSWESTERN PIPELINE
6381 N. MAIN STREET
P.O. BOX 1717
ROSWELL, NM 88202-1717
Attn: LARRY CAMPBELL
Invoice Number: 911769

Order #: 91-08-240
Date: 09/03/91 13:53
Work ID: STATION #9 7784
Date Received: 08/22/91
Date Completed: 09/03/91
REFERENCE WO#: 91-07-257

SAMPLE IDENTIFICATION

Sample Number	Sample Description	Sample Number	Sample Description
01	PIT 2 SAMPLE 001	02	PIT 2 SAMPLE 002
03	PIT 2 26.0 - 26.2	04	PIT 2 29.1 - 29.3
05	PIT 2 39.8 - 39.9	06	PIT 2 44.1 - 44.3
07	PIT 2 57.5 - 57.8	08	PIT 2 69.9 - 70.1
09		10	
11	PIT 3 BH-2 25.0 - 25.2	12	PIT 3 BH-1 30.7 - 30.9

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Certified By
SYED N. RIZVI

REGULAR TEST RESULTS BY TEST

TOTAL REC PET HYDROCARBONS **Minimum: 5.0** **Maximum: 100**
Method: EPA 418.1

Sample	Sample Description	Result	Units	Extracted	Analyzed	By
01A	PIT 2 SAMPLE 001	<5.0	MG/KG	08/30/91	09/03/91	PV
02A	PIT 2 SAMPLE 002	13,000	MG/KG	08/30/91	09/03/91	PV
~~03A~~	~~PIT 2 26.0 - 26.2~~	~~170~~	~~MG/KG~~	~~08/30/91~~	~~09/03/91~~	~~PV~~
04A	PIT 2 29.1 - 29.3	<5.0	MG/KG	08/30/91	09/03/91	PV
05A	PIT 2 39.8 - 39.9	2600	MG/KG	08/30/91	09/03/91	PV
06A	PIT 2 44.1 - 44.3	44	MG/KG	08/30/91	09/03/91	PV
07A	PIT 2 57.5 - 57.8	250	MG/KG	08/30/91	09/03/91	PV
08A	PIT 2 69.9 - 70.1	<5.0	MG/KG	08/30/91	09/03/91	PV
09A						
10A						
11A	PIT 3 BH-2 25.0 - 25.2	<5.0	MG/KG	08/30/91	09/03/91	PV
12A	PIT 3 BH-1 30.7 - 30.9	<5.0	MG/KG	08/30/91	09/03/91	PV

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P.O. BOX 1717
ROSWELL, NM 88202-1717
Attn: LARRY CAMPBELL
Invoice Number: 911768

Order #: 91-08-241
Date: 09/03/91 13:52
Work ID: STATION #9 7799
Date Received: 08/22/91
Date Completed: 09/03/91
REFERENCE WO#: 91-07-276

SAMPLE IDENTIFICATION

Sample Number	Sample Description	Sample Number	Sample Description
01	SG 91 28.6 - 28.8	02	SG 86 13.5 - 13.7
03	SG 86 18.7 - 18.9	04	SG 86 24.9 - 25.1
05	SG 86 35.0 - 35.2	06	SG 86 40.5 - 40.7

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REGULAR TEST RESULTS BY TEST

TOTAL REC PET HYDROCARBONS **Minimum: 5.0** **Maximum: 100**
Method: EPA 418.1

Sample	Sample Description	Result	Units	Extracted	Analyzed	By
01A	SG 91 28.6 - 28.8	<5.0	MG/KG	08/30/91	09/03/91	PV
02A	SG 86 13.5 - 13.7	18,000	MG/KG	08/30/91	09/03/91	PV
03A	SG 86 18.7 - 18.9	5200	MG/KG	08/30/91	09/03/91	PV
04A	SG 86 24.9 - 25.1	<5.0	MG/KG	08/30/91	09/03/91	PV
05A	SG 86 35.0 - 35.2	8.0	MG/KG	08/30/91	09/03/91	PV
06A	SG 86 40.5 - 40.7	<5.0	MG/KG	08/30/91	09/03/91	PV

[redacted]

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ENRON/TRANSWESTERN PIPELINE
6381 N. MAIN STREET
P.O. BOX 1717
ROSWELL, NM 88202-1717
Attn: LARRY CAMPBELL
Invoice Number: 911773

Order #: 91-08-246
Date: 09/05/91 12:13
Work ID: STATION #9 O.S. YARD 7848
Date Received: 08/22/91
Date Completed: 09/05/91

****
* REFERENCE WO#: 91-07-330 *
****

SAMPLE IDENTIFICATION

Sample Number	Sample Description	Sample Number	Sample Description
01	OSBH3	02	SG349 0-1.8
03	SG349 2.9-4.6	04	SG349 9.0-10.0
05	SG349 14.0-14.8	06	SG349 20.3-21.3
07	SG349 25.3-26.3	08	SG349 29.7-30.4
09	SG360 0.0-2.5	10	SG360 4.0-5.0
11	SG360 9.0-9.9	12	SG360 14.0-14.7
13	SG360 19.0-20.0	14	SG360 24.0-25.0
15	SG360 29.0-29.4	16	SG361 0-2.5
17	SG361 4.0-5.0	18	SG361 9.0-10.0

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SAMPLE IDENTIFICATION

Sample Number	Sample Description	Sample Number	Sample Description
19	SG361 16.0-16.4	20	SG361 19.5-19.8
21	SG361 24.0-25.0	22	SG361 38.9-39.3

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SYED N. RIZVI

REGULAR TEST RESULTS BY TEST

TOTAL REC PET HYDROCARBONS   Minimum: 5.0   Maximum: 100
Method: EPA 418.1

Sample	Sample Description	Result	Units	Extracted	Analyzed	By
01A	OSBH3	<5.0	MG/KG	08/30/91	09/04/91	PV
02A	SG349 0-1.8	<5.0	MG/KG	08/30/91	09/05/91	PV
03A	SG349 2.9-4.6	<5.0	MG/KG	08/30/91	09/05/91	PV
04A	SG349 9.0-10.0	<5.0	MG/KG	08/30/91	09/04/91	PV
05A	SG349 14.0-14.8	<5.0	MG/KG	08/30/91	09/04/91	PV
06A	SG349 20.3-21.3	<5.0	MG/KG	08/30/91	09/04/91	PV
07A	SG349 25.3-26.3	<5.0	MG/KG	08/30/91	09/04/91	PV
08A	SG349 29.7-30.4	8.0	MG/KG	08/30/91	09/04/91	PV
09A	SG360 0.0-2.5	<5.0	MG/KG	08/30/91	09/04/91	PV
10A	SG360 4.0-5.0	<5.0	MG/KG	08/30/91	09/04/91	PV
11A	SG360 9.0-9.9	<5.0	MG/KG	08/30/91	09/04/91	PV
12A	SG360 14.0-14.7	8.0	MG/KG	08/30/91	09/04/91	PV
13A	SG360 19.0-20.0	<5.0	MG/KG	08/30/91	09/04/91	PV
14A	SG360 24.0-25.0	<5.0	MG/KG	08/30/91	09/04/91	PV
15A	SG360 29.0-29.4	20	MG/KG	08/30/91	09/04/91	PV
16A	SG361 0-2.5	<5.0	MG/KG	08/30/91	09/04/91	PV
17A	SG361 4.0-5.0	<5.0	MG/KG	08/30/91	09/04/91	PV
18A	SG361 9.0-10.0	<5.0	MG/KG	08/30/91	09/04/91	PV
19A	SG361 16.0-16.4	<5.0	MG/KG	08/30/91	09/04/91	PV
20A	SG361 19.5-19.8	<5.0	MG/KG	08/30/91	09/04/91	PV
21A	SG361 24.0-25.0	<5.0	MG/KG	08/30/91	09/04/91	PV
22A	SG361 38.9-39.3	<5.0	MG/KG	08/30/91	09/04/91	PV

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ENRON/TRANSWESTERN PIPELINE
6381 N. MAIN STREET
P.O. BOX 1717
ROSWELL, NM 88202-1717
Attn: LARRY CAMPBELL
Invoice Number: 911790

Order #: 91-08-245
Date: 09/06/91 08:52
Work ID: STATION #9 7821
Date Received: 08/22/91
Date Completed: 09/06/91

****
* REFERENCE WO#: 91-07-299 *
****

SAMPLE IDENTIFICATION

Sample Number	Sample Description	Sample Number	Sample Description
01	OSBH1 18.9 - 19.1	02	OSBH1 34.3 - 34.5
03	OSBH2 9.9 - 10.1	04	OSBH2 22.5 - 22.6
05	OSBH2 31.1 - 31.3	06	OSBH2 41.8 - 42.0
07	OSBH2 55.2 - 55.4	08	OSBH2 69.0 - 69.2

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7300 JEFFERSON N.E.,ALBUQUERQUE,N.M. 87109

Certified By
SYED N. RIZVI

REGULAR TEST RESULTS BY TEST

TOTAL REC PET HYDROCARBONS Minimum: 5.0 Maximum: 100
Method: EPA 418.1

Sample	Sample Description	Result	Units	Extracted	Analyzed	By
01A	OSBH1 18.9 - 19.1	12	MG/KG	08/28/91	09/04/91	PV
02A	OSBH1 34.3 - 34.5	<5.0	MG/KG	08/28/91	09/04/91	PV
03A	OSBH2 9.9 - 10.1	<5.0	MG/KG	08/28/91	09/04/91	PV
04A	OSBH2 22.5 - 22.6	<5.0	MG/KG	08/28/91	09/04/91	PV
05A	OSBH2 31.1 - 31.3	68	MG/KG	08/28/91	09/04/91	PV
06A	OSBH2 41.8 - 42.0	24	MG/KG	08/28/91	09/04/91	PV
07A	OSBH2 55.2 - 55.4	16	MG/KG	08/30/91	09/05/91	PV
08A	OSBH2 69.0 - 69.2	16	MG/KG	08/30/91	09/05/91	PV

[redacted] TIC [redacted] RAT [redacted] NC. [redacted] Yer [redacted] Alb [redacted] New [redacted] 710 [redacted]

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ENRON/TRANSWESTERN PIPELINE
6381 N. MAIN STREET
P.O. BOX 1717
ROSWELL, NM 88202-1717
Attn: LARRY CAMPBELL
Invoice Number: 911791

Order #: 91-08-247
Date: 09/06/91 09:01
Work ID: STATION 9 O.S. YARD 7885
Date Received: 08/22/91
Date Completed: 09/05/91

****
* REFERENCE WO#: 91-08-024 *
****

SAMPLE IDENTIFICATION

Sample Number	Sample Description	Sample Number	Sample Description
01	OSBH3 44.1-44.3	02	OSBH3 54.8-55.0
03	OSBH4 27.5-27.7	04	OSBH5 14.0-14.2
05	OSBH5 19.6-19.9	06	OSBH5 23.4-23.6
07	OSBH6 13.6-13.8	08	OSBH6 47.0-47.2
09	OSBH6 52.6-52.8	10	OSBH6 70.0-71.0
11	OSBH7 22.1-22.3		

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LABORATORY OPERATIONS MANAGER/ASSAIGAI ANALYTICAL
7300 JEFFERSON N.E.,ALBUQUERQUE,N.M. 87109

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SYED N. RIZVI

REGULAR TEST RESULTS BY TEST

TOTAL REC PET HYDROCARBONS **Minimum: 5.0** **Maximum: 100**
Method: EPA 418.1

Sample	Sample Description	Result	Units	Extracted	Analyzed	By
01A	OSBH3 44.1-44.3	16	MG/KG	08/29/91	09/03/91	PV
02A	OSBH3 54.8-55.0	16	MG/KG	08/29/91	09/03/91	PV
03A	OSBH4 27.5-27.7	<5.0	MG/KG	08/29/91	09/03/91	PV
04A	OSBH5 14.0-14.2	<5.0	MG/KG	08/29/91	09/03/91	PV
05A	OSBH5 19.6-19.9	16	MG/KG	08/29/91	09/03/91	PV
06A	OSBH5 23.4-23.6	12	MG/KG	08/29/91	09/03/91	PV
07A	OSBH6 13.6-13.8	12	MG/KG	08/29/91	09/03/91	PV
08A	OSBH6 47.0-47.2	<5.0	MG/KG	08/29/91	09/03/91	PV
09A	OSBH6 52.6-52.8	<5.0	MG/KG	08/29/91	09/03/91	PV
10A	OSBH6 70.0-71.0	<5.0	MG/KG	08/29/91	09/03/91	PV
11A	OSBH7 22.1-22.3	<5.0	MG/KG	08/29/91	09/03/91	PV

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P.O. BOX 1717
ROSWELL, NM 88202-1717
Attn: LARRY CAMPBELL
Invoice Number: 911792

Order #: 91-08-248
Date: 09/06/91 09:02
Work ID: STATION 9 O.S. YARD 7908
Date Received: 08/22/91
Date Completed: 09/05/91

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* REFERENCE WO#: 91-08-048 *
****

SAMPLE IDENTIFICATION

Sample Number	Sample Description	Sample Number	Sample Description
01	OSBH7 33.5-33.7	02	OSBH7 37.0-37.2
03	OSHB8 4.6-4.9	04	OSBH8 33.9-34.1
05	OSBH8 49.7-49.9	06	OSBH9 4.5-4.9
07	OSBH9 32.0-32.5	08	OSBH9 47.5-49.7

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7300 JEFFERSON N.E.,ALBUQUERQUE,N.M. 87109

Certified By
SYED N. RIZVI

REGULAR TEST RESULTS BY TEST

TOTAL REC PET HYDROCARBONS **Minimum: 5.0** **Maximum: 100**
Method: EPA 418.1

Sample	Sample Description		Result	Units	Extracted	Analyzed	By
01A	OSBH7	33.5-33.7	<5.0	MG/KG	08/28/91	09/04/91	PV
02A	OSBH7	37.0-37.2	12	MG/KG	08/28/91	09/04/91	PV
03A	OSHB8	4.6-4.9	12	MG/KG	08/28/91	09/04/91	PV
04A	OSBH8	33.9-34.1	<5.0	MG/KG	08/28/91	09/04/91	PV
05A	OSBH8	49.7-49.9	12	MG/KG	08/28/91	09/04/91	PV
06A	OSBH9	4.5-4.9	8.0	MG/KG	08/28/91	09/04/91	PV
07A	OSBH9	32.0-32.5	150	MG/KG	08/28/91	09/04/91	PV
08A	OSBH9	47.5-49.7	8.0	MG/KG	08/28/91	09/04/91	PV

Test Description	Result	Limit	Units	Analyzed	By
TOTAL REC PET HYDROCARBONS	8.0	5.0	MG/KG	11/19/91	PV

TABLE 2

SUMMARY OF ANALYTICAL RESULTS FOR PURGEABLE HALOCARBON OCCURRENCE
AT ROSWELL COMPRESSOR STATION

PARAMETER	SAMPLE NUMBER										
	Pit 1 1.8'-3.0'	Pit 1 9.2'-9.4'	Pit 1 13.5'-13.7'	Pit 1 18.8'-19.0'	Pit 1 26.8'-27.0'	Pit 1 30.6'-30.8'	Pit 1 41.6'-41.8'	Pit 1 43.5'-43.7'	Pit 2 001 (18.7'-18.9')	Pit 2 002	Pit 2 26.0'-26.2'
<u>Purgeable Halocarbon Compounds (mg/kg) Method 8010</u>											
1,1,1-Trichloroethane	3.2	19	18	0.33	BDL	BDL	BDL	BDL	BDL	0.37	BDL
Tetrachloroethene	BDL	0.26	0.33	0.87	0.16	BDL	BDL	BDL	BDL	0.65	BDL
Chloroform	BDL	BDL	0.20	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
1,1-Dichloroethane	BDL	BDL	0.59	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL

PARAMETER	SAMPLE NUMBER								
	Pit 2 29.1'-29.3'	Pit 2 39.8'-39.9'	Pit 2 44.1'-44.3'	Pit 2 57.5'-57.8'	Pit 2 69.0'-70.1'	Pit 3, BH-1 30.7'-30.9'	Pit 3, BH-2 25.0'-25.2	SG 86 13.5'-13.7'	SG 86 18.7'-18.9'
<u>Purgeable Halocarbon Compounds (mg/kg) Method 8010</u>									
1,1,1-Trichloroethane	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0.24	BDL
Tetrachloroethene	BDL	BDL	BDL	BDL	BDL	BDL	BDL	1.9	0.23

TABLE 2 (Continued)

SUMMARY OF ANALYTICAL RESULTS FOR PURGEABLE HALOCARBON OCCURRENCE
AT ROSWELL COMPRESSOR STATION

PARAMETER	SAMPLE NUMBER									
	SG 86 24.9'-25.1'	SG 86 35.0'-35.2'	SG 86 40.5'-40.7'	SG 91 28.6'-28.8'	SG 349 0.0'-1.8'	SG 349 2.9'-4.6'	SG 349 9.0'-10.0'	SG 349 14.0'-14.8'	SG 349 20.3'-21.3'	SG 349 5.3'-26.3'
Purgeable Halocarbon Compounds (mg/kg) Method 8010	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL

PARAMETER	SAMPLE NUMBER								
	SG 349 29.7'-30.4'	SG 360 0.0'-2.5'	SG 360 4.0'-5.0'	SG 360 9.0'-9.9'	SG 360 14.0'-14.7'	SG 360 19.0'-20.0'	SG 360 24.0'-25.0'	SG 360 29.0'-29.4'	SG 361 0.0'-2.5'
Purgeable Halocarbon Compounds (mg/kg) Method 8010	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL

PARAMETER	SAMPLE NUMBER									
	SG 361 4.0'-5.0'	SG 361 9.0'-10.0'	SG 361 16.0'-16.4'	SG 361 19.5'-19.8'	SG 361 24.0'-25.0'	SG 361 38.0'-39.3'	OS BH-1 18.9'-19.1'	OS BH-1 34.3'-34.5'	OS BH-2 9.9'-10.1'	OS BH-2 22.5'-22.6'
Purgeable Halocarbon Compounds (mg/kg) Method 8010	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL

TABLE 2 (Continued)

SUMMARY OF ANALYTICAL RESULTS FOR PURGEABLE HALOCARBON OCCURRENCE
AT ROSWELL COMPRESSOR STATION

PARAMETER	SAMPLE NUMBER							
	OS BH-2 31.1'-31.3'	OS BH-2 41.8'-42.0'	OS BH-2 55.2'-55.4'	OS BH-2 69.0'-69.2'	OS BH-3 21.0'-21.2'	OS BH-3 44.1'-44.3'	OS BH-3 54.7'-55.0'	OS BH-4 27.5'-27.7'
<u>Purgeable Halocarbon Compounds (mg/kg) Method 8010</u>	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL

PARAMETER	SAMPLE NUMBER								
	OS BH-5 14.0'-14.2'	OS BH-5 19.6'-19.9'	OS BH-5 23.4'-23.6'	OS BH-6 13.6'-13.8'	OS BH-6 47.0'-47.2'	OS BH-6 52.6'-52.8'	OS BH-6 70.0'-71.0'	OS BH-7 22.1'-22.3'	OS BH-7 33.5'-33.7'
<u>Purgeable Halocarbon Compounds (mg/kg) Method 8010</u>	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL

PARAMETER	SAMPLE NUMBER						
	OS BH-7 37.0'-37.2'	OS BH-8 4.6'-4.9'	OS BH-8 33.9'-34.1'	OS BH-8 49.7'-49.9'	OS BH-9 4.5'-4.9'	OS BH-9 32.0'-32.5'	OS BH-9 49.5'-49.7'
<u>Purgeable Halocarbon Compounds (mg/kg) Method 8010</u>							
Tetrachloroethene	0.17	BDL	0.16	BDL	BDL	BDL	BDL
Clorobenzene	BDL	BDL	0.12	BDL	BDL	BDL	BDL

DBL = below detection limit of 0.1 mg/kg.

TABLE 4

SUMMARY OF ANALYTICAL RESULTS FOR
TOTAL RECOVERABLE PETROLEUM HYDROCARBON OCCURRENCE
AT ROSWELL COMPRESSOR STATION

PARAMETER	SAMPLE NUMBER									
	Pit 1 2.8'-3.0'	Pit 1 9.2'-9.4'	Pit 1 13.5'-13.7'	Pit 1 18.8'-19.0'	Pit 1 26.8'-27.0'	Pit 1 30.6'-30.8'	Pit 1 41.6'-41.8'	Pit 1 43.5'-43.7'	Pit 2 001 (18.7'-18.9')	Pit 2 002
Total Recoverable Petroleum Hydrocarbons (mg/kg) Method 418.1	25,000	39,000	55,000	20,000	11,000	16	16	56	BDL	13,000

PARAMETER	SAMPLE NUMBER							
	Pit 2 26.0'-26.2'	Pit 2 29.1'-29.3'	Pit 2 39.8'-39.9'	Pit 2 44.1'-44.3'	Pit 2 57.5'-57.8'	Pit 2 69.9'-70.1'	Pit 3, BH-1 30.7'-30.9'	Pit 3, BH-2 25.0'-25.2'
Total Recoverable Petroleum Hydrocarbons (mg/kg) Method 418.1	170	BDL	2600	44	250	BDL	BDL	BDL

PARAMETER	SAMPLE NUMBER									
	SG 86 13.5'-13.7'	SG 86 18.7'-18.9'	SG 86 24.9'-25.1'	SG 86 35.0'-35.2'	SG 86 40.5'-40.7'	SG 91 28.6'-28.8'	SG 349 0.0'-1.8'	SG 349 2.9'-4.6'	SG 349 9.0'-10.0'	SG 349 14.0'-14.8'
Total Recoverable Petroleum Hydrocarbons (mg/kg) Method 418.1	18,000	5200	BDL	8.0	BDL	BDL	BDL	BDL	BDL	BDL

TABLE 4 (Continued)

SUMMARY OF ANALYTICAL RESULTS FOR
TOTAL RECOVERABLE PETROLEUM HYDROCARBON OCCURRENCE
AT ROSWELL COMPRESSOR STATION

PARAMETER	SAMPLE NUMBER								
	SG 349 20.3'-21.3'	SG 349 25.3'-26.3'	SG 349 29.7'-30.4'	SG 349 0.0'-2.5'	SG 360 4.0'-5.0'	SG 360 9.0'-9.9'	SG 360 14.0'-14.7'	SG 360 19.0'-20.0'	SG 360 24.0'-25.0'
Total Recoverable Petroleum Hydrocarbons (mg/kg) Method 418.1	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL

PARAMETER	SAMPLE NUMBER								
	SG 360 29.0'-29.4'	SG 361 0.0'-2.5'	SG 361 4.0'-5.0'	SG 361 9.0'-10.0'	SG 361 16.0'-16.4'	SG 361 19.5'-19.8'	SG 361 24.0'-25.0'	SG 361 38.9'-39.3'	OS BH-1 18.9'-19.1'
Total Recoverable Petroleum Hydrocarbons (mg/kg) Method 418.1	2.0	BDL	BDL	BDL	BDL	BDL	BDL	BDL	12

PARAMETER	SAMPLE NUMBER							
	OS BH-1 34.3'-34.5'	OS BH-2 9.9'-10.1'	OS BH-2 22.5'-22.6'	OS BH-2 31.1'-31.3'	OS BH-2 41.8'-42.0'	OS BH-2 55.2'-55.4'	OS BH-2 69.0'-69.2'	OS BH-3 21.0'-21.2'
Total Recoverable Petroleum Hydrocarbons (mg/kg) Method 418.1	BDL	BDL	BDL	68	24	16	16	BDL

TABLE 4 (Continued)

SUMMARY OF ANALYTICAL RESULTS FOR
TOTAL RECOVERABLE PETROLEUM HYDROCARBON OCCURRENCE
AT ROSWELL COMPRESSOR STATION

PARAMETER	SAMPLE NUMBER							
	OS BH-3 44.1'-44.3'	OS BH-3 54.8'-55.0'	OS BH-4 27.5'-27.2'	OS BH-5 14.0'-14.2'	OS BH-5 19.6'-19.9'	OS BH-5 23.4'-23.6'	OS BH-6 13.6'-13.8'	OS BH-6 47.0'-47.2'
Total Recoverable Petroleum Hydrocarbons (mg/kg) Method 418.1	16	16	BDL	BDL	16	12	12	BDL

PARAMETER	SAMPLE NUMBER						
	OS BH-6 52.6'-52.8'	OS BH-6 70.0'-71.0'	OS BH-7 22.1'-22.3'	OS BH-7 33.5'-33.7'	OS BH-7 37.0'-37.2'	OS BH-8 4.6'-4.9'	OS BH-8 33.9'-34.1'
Total Recoverable Petroleum Hydrocarbons (mg/kg) Method 418.1	BDL	BDL	BDL	BDL	12	12	BDL

PARAMETER	SAMPLE NUMBER					
	OS BH-8 49.7'-49.9'	OS BH-9 4.5'-4.9'	OS BH-9 32.0'-32.5'	OS BH-9 47.5'-49.7'	BH-10 37.3'-37.6'	BH-11 36.3'-36.7'
Total Recoverable Petroleum Hydrocarbons (mg/kg) Method 418.1	12	8	150	8	BDL	8

BDL = below detection limit of 5.0 mg/kg.

FROM. HALLIBURTON NUS CLEAR LAKE LAB 10-19-92 10:43AM ; 10.19.1992 10:42 P. 2

CHAIN OF CUSTODY

HALLIBURTON NUS
Environmental Corporation

GEMINI AVENUE, CLEAR LAKE CITY
STON, TEXAS 77058-2798
189-4810

REPORT TO		INVOICE TO		
COMPANY Transwestern		COMPANY		CHECK BOX IF INVOICE TO ADDRESS AND REPORT TO ADDRESS ARE SAME
ADDRESS 6381 N. Main		ADDRESS		
CITY Roswell STATE NM ZIP 88201		CITY STATE ZIP		P.O. # 6250 DA
ATT. PHONE #		ATT. PHONE #		RELEASE #

ECT NAME/SITE NAME: Park Ten monitor well Resample

CLIENT COMMENTS: Attn. D. Meyers for analytical parameters

HALLIBURTON NUS COMMENTS & SAMPLE #'S: Ty. J. Altieri

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service or work performed by HALLIBURTON NUS ENVIRONMENTAL CORPORATION is expressly subject to the following provision and HALLIBURTON NUS does not agree to any provision that is in conflict.

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DATE	TIME	COMPOSITE	GRAB	SAMPLE SOURCE & DESCRIPTION	NUMBER CONTAINERS	VOAS (2 sets)	gallon glass	metals	REMARKS
9/17	1405		X	monitor well "Hill"	8	X	X	X	Ice applied to samples yes no

RELINQUISHED BY SIGN: [signature] DATE/TIME: 9-21-92 15:20 RECEIVED BY SIGN: [signature] RELINQUISHED BY

APPENDIX E

ANALYTICAL LABORATORY REPORTS

HALLIBURTON NUS
Environmental Corporation
Environmental Laboratories

5350 Campbells Run Road
Pittsburgh, PA 15205

900 Gemini Avenue
Houston, TX 77058

October 01, 1992
Report No.: 00020808
Section A Page 1

LABORATORY ANALYSIS REPORT

CLIENT NAME: ENRON GAS PIPELINE/TRANSWESTERN
ADDRESS: P.O. BOX 1717
ROSWELL, NM 88201-
ATTENTION: LARRY CAMPBELL

NUS CLIENT NO: 0065 0044
WORK ORDER NO: 55880
VENDOR NO:

SAMPLE ID: STATION 9 - PIT
NUS SAMPLE NO: H0219130
P.O. NO.: E51201

DATE SAMPLED: 21-SEP-92
DATE RECEIVED: 22-SEP-92
APPROVED BY: L Beyer

LN	TEST CODE	DETERMINATION	RESULT	UNIT
1	OSVIXW	APPENDIX IX SEMIVOLATILES IN WATER		
		1,2,4-Trichlorobenzene	< 33	ug/L
		1,2-Dichlorobenzene	< 33	ug/L
		1,3-Dichlorobenzene	< 33	ug/L
		1,4-Dichlorobenzene	< 33	ug/L
		2,4,5-Trichlorophenol	< 66	ug/L
		2,4,6-Trichlorophenol	< 33	ug/L
		2,4-Dichlorophenol	< 33	ug/L
		2,4-Dimethylphenol	< 33	ug/L
		2,4-Dinitrophenol	< 160	ug/L
		2,4-Dinitrotoluene	< 33	ug/L
		2,6-Dinitrotoluene	< 33	ug/L
		2-Chloronaphthalene	< 33	ug/L
		2-Chlorophenol	< 33	ug/L
		2-Methylnaphthalene	51	ug/L
		2-Methylphenol (o-Cresol)	< 33	ug/L
		2-Nitroaniline	< 160	ug/L
		2-Nitrophenol	< 33	ug/L
		3,3'-Dichlorobenzidine	< 66	ug/L
		3-Methylphenol	< 33	ug/L
		3-Nitroaniline	< 160	ug/L
		4,6-Dinitro-2-methylphenol	< 160	ug/L
		4-Bromophenyl phenyl ether	< 33	ug/L
		4-Chloro-3-methylphenol	< 33	ug/L
		4-Chloroaniline	< 33	ug/L
		4-Chlorophenyl phenyl ether	< 33	ug/L
		4-Methylphenol	250	ug/L
		4-Nitroaniline	< 160	ug/L
		4-Nitrophenol	< 160	ug/L
		Acenaphthene	< 33	ug/L
		Acenaphthylene	< 33	ug/L

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Section A Page 2

LABORATORY ANALYSIS REPORT

CLIENT NAME: ENRON GAS PIPELINE/TRANSWESTERN
SAMPLE ID: STATION 9 - PIT
NUS SAMPLE NO: H0219130

LN	TEST CODE	DETERMINATION	RESULT	UNITS
		Acetophenone	< 33	ug/L
		Aniline	< 33	ug/L
		Anthracene	< 33	ug/L
		Benzidine	< 160	ug/L
		Benzo(a)anthracene	< 33	ug/L
		Benzo(a)pyrene	< 33	ug/L
		Benzo(b)fluoranthene	< 33	ug/L
		Benzo(ghi)perylene	< 33	ug/L
		Benzo(k)fluoranthene	< 33	ug/L
		Benzoic Acid	< 160	ug/L
		Benzyl alcohol	< 33	ug/L
		Benzyl butyl phthalate	< 33	ug/L
		Bis(2-Chloroethoxy)methane	< 33	ug/L
		Bis(2-Chloroethyl)ether	< 33	ug/L
		Bis(2-Chloroisopropyl)ether	< 33	ug/L
		Bis(2-Ethylhexyl)phthalate	< 33	ug/L
		Chrysene	< 33	ug/L
		Di-n-buthyl phthalate	< 33	ug/L
		Di-n-octyl phthalate	< 33	ug/L
		Dibenzofuran	< 33	ug/L
		Diethyl phthalate	< 33	ug/L
		Dimethyl phthalate	< 33	ug/L
		Fluoranthene	< 33	ug/L
		Fluorene	< 33	ug/L
		Hexachlorobenzene	< 33	ug/L
		Hexachlorobutadiene	< 33	ug/L
		Hexachlorocyclopentadiene	< 33	ug/L
		Hexachloroethane	< 33	ug/L
		Indeno(1,2,3-cd)pyrene	< 33	ug/L
		Isophorone	< 33	ug/L
		N-Nitrosodimethylamine	< 33	ug/L
		N-Nitrosodiphenylamine	< 33	ug/L
		Naphthalene	34	ug/L
		Nitrobenzene	< 33	ug/L
		Pentachlorophenol	< 160	ug/L
		Phenanthrene	< 33	ug/L
		Phenol	< 33	ug/L
		Pyrene	< 33	ug/L
		Pyridine	< 66	ug/L

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Section A Page 3

LABORATORY ANALYSIS REPORT

CLIENT NAME: ENRON GAS PIPELINE/TRANSWESTERN
SAMPLE ID: STATION 9 - PIT
NUS SAMPLE NO: H0219130

LN	TEST CODE	DETERMINATION	RESULT	UNITS
		n-Nitroso-di-n-propylamine	< 33	ug/L
3	OVIXW	APPENDIX IX VOLATILES IN WATER		
		1,1,1-Trichloroethane	180	ug/L
		1,1,2,2-Tetrachloroethane	< 30	ug/L
		1,1,2-Trichloroethane	< 30	ug/L
		1,1-Dichloroethane	560	ug/L
		1,1-Dichloroethene	< 30	ug/L
		1,2,3-Trichloropropane	< 30	ug/L
		1,2-Dichloroethane	< 30	ug/L
		1,2-Dichloropropane	< 30	ug/L
		1,4-Dichloro-2-butene	< 60	ug/L
		2-Butanone (MEK)	220	ug/L
		2-Chloroethylvinyl Ether	< 60	ug/L
		2-Hexanone	< 60	ug/L
		4-Methyl-2-Pentanone (MIBK)	< 60	ug/L
		Acetone	< 60	ug/L
		Acrolein	< 600	ug/L
		Acrylonitrile	< 600	ug/L
		Benzene	370	ug/L
		Bromodichloromethane	< 30	ug/L
		Bromoform	< 30	ug/L
		Bromomethane	< 60	ug/L
		Carbon disulfide	< 30	ug/L
		Carbon tetrachloride	< 30	ug/L
		Chlorobenzene	< 30	ug/L
		Chlorodibromomethane	< 30	ug/L
		Chloroethane	< 60	ug/L
		Chloroform	< 30	ug/L
		Chloromethane	< 60	ug/L
		Dibromomethane	< 30	ug/L
		Dichlorodifluoromethane	< 120	ug/L
		Ethanol	*	ug/L
		Ethyl methacrylate	< 60	ug/L
		Ethylbenzene	110	ug/L
		Iodomethane (Methyl iodide)	< 60	ug/L
		Methylene chloride	< 30	ug/L
		P/M Xylene	820	ug/L
		Styrene	< 30	ug/L
		Tetrachloroethene	< 30	ug/L

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LABORATORY ANALYSIS REPORT

CLIENT NAME: ENRON GAS PIPELINE/TRANSWESTERN
SAMPLE ID: STATION 9 - PIT
NUS SAMPLE NO: H0219130

LN	TEST CODE	DETERMINATION	RESULT	UNITS
		Toluene	61	ug/L
		Trichloroethene	< 30	ug/L
		Trichlorofluoromethane	< 30	ug/L
		Vinyl acetate	< 60	ug/L
		Vinyl chloride	< 60	ug/L
		cis-1,2-Dichloroethene	< 30	ug/L
		cis-1,3-Dichloropropene	< 30	ug/L
		o-Xylene	120	ug/L
		trans-1,2-Dichloroethene	< 30	ug/L
		trans-1,3-Dichloropropene	< 30	ug/L
5	AASW	Arsenic, Total (As)	0.19	mg/L
6	ABAW	Barium, Total (Ba)	4.4	mg/L
7	ACDW	Cadmium, Total (Cd)	< 0.005	mg/L
8	ACRW	Chromium, Total (Cr)	0.01	mg/L
9	AHGW	Mercury, Total (Hg)	< 0.0002	mg/L
10	AAGW	Silver, Total (Ag)	< 0.01	mg/L
11	APBW	Lead, Total (Pb)	< 0.05	mg/L
12	ASEW	Selenium, Total (Se)	< 0.003	mg/L
13	I685	Petroleum Hydrocarbons	37	mg/L

COMMENTS: * This analyte was not detected by a computerized search of the chromatogram.

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Report No.: 00020808
Section 8 Page 1

QUALITY CONTROL REPORT
SUPPLEMENTAL INFORMATION

			SAMPLE PREPARATION			SAMPLE ANALYSIS				
.N	TEST CODE	PREP BATCH	LR-METHOD	DATE/TIME	ANALYST	LR-METHOD	DATE/TIME	ANALYST	ANLS BATCH	INSTRUMENT

AMPLE ID: STATION 9 - PIT NUS SAMPLE NO: H0219130

.N	TEST CODE	PREP BATCH	LR-METHOD	DATE/TIME	ANALYST	LR-METHOD	DATE/TIME	ANALYST	ANLS BATCH	INSTRUMENT
	OSVIXW	26261	19-3520	23-SEP-92 0400	RDQ	19-8270	25-SEP-92 1205	GMW	26145	GCMST
	OVIXW	26366	NA			19-8240	25-SEP-92 1615	GBF	26278	GCMS9
	AASW	26313	19-7060	23-SEP-92 0930	TM	19-7060	24-SEP-92 2224	CMG		405MET
	ABAW	26312	19-3010			19-6010	24-SEP-92 1215	JSP		400MET
	ACDW	26312	19-3010	23-SEP-92 0900	TM	19-7130	24-SEP-92 1942	PBA		300MET
	ACRW	26312	19-3010			19-6010	24-SEP-92 1405	JSP		400MET
	AHGW	26333	NA			19-7470	24-SEP-92 1000	RAS		124WAT
0	AAGW	26313	19-7060			19-7760	26-SEP-92 1004	CMG		300MET
1	APBW	26312	19-3010			19-6010	24-SEP-92 1405	JSP		400MET
2	ASEW	26313	19-7740			19-7740	24-SEP-92 1837	CMG		305MET
3	I685	26286	02-418.1			02-418.1	22-SEP-92 1159	LJH		302WAT

R Method Literature Reference
2 EPA-Methods for Chemical Analysis of Water & Wastes, 1984.
9 EPA-Test Methods for Evaluating Solid Waste, 3rd ed, Nov. 1986

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October 01, 1992
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QUALITY CONTROL REPORT
SURROGATE STANDARD RECOVERY

LN	TEST CODE	SURROGATE COMPOUND	PERCENT RECOVERY	ACCEPTANCE LIMITS	REF LN
SAMPLE ID:	STATION 9 - PIT		NUS SAMPLE NO:	H0219130	
2	$BNAW	GC/MS BNA SURROGATES			1
		2,4,6-Tribromophenol	83	-	
		2-Fluorobiphenyl	87	-	
		2-Fluorophenol	28	-	
		Nitrobenzene-d5	53	-	
		Phenol-d5	28	-	
		p-Terphenyl-d14	53	-	
4	$VOAW	GC/MS VOLATILES SURROGATES			3
		1,2-Dichloroethane-d4	102	-	
		4-Bromofluorobenzene	109	-	
		Toluene-d8	98	-	

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Report No.: 00020808
Section D Page 1

QUALITY CONTROL REPORT
LABORATORY CONTROL SAMPLE RECOVERY

TEST CODE	DETERMINATION	PERCENT RECOVERY	ACCEPTANCE LIMITS
BATCH: 26286	SAMPLE ID: Lab Control Sample		NUS SAMPLE NO: H0219864
I685	Petroleum Hydrocarbons	94.0	-
I685	Petroleum Hydrocarbons	94.0	-
BATCH: 26312	SAMPLE ID: Lab Control Sample		NUS SAMPLE NO: H0219893
ABAW	Barium, Total (Ba)	90.0	-
ACDW	Cadmium, Total (Cd)	106.0	-
ACRW	Chromium, Total (Cr)	95.0	-
APBW	Lead, Total (Pb)	96.0	-
BATCH: 26313	SAMPLE ID: Lab Control Sample		NUS SAMPLE NO: H0219895
AAGW	Silver, Total (Ag)	105.0	-
AASW	Arsenic, Total (As)	115.0	-
ASEW	Selenium, Total (Se)	110.0	-
BATCH: 26333	SAMPLE ID: Lab Control Sample		NUS SAMPLE NO: H0219924
AHGW	Mercury, Total (Hg)	95.0	-

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October 01, 1992
Report No.: 00020808

QUALITY CONTROL REPORT
METHOD BLANK DATA

BATCH: 26261 SAMPLE ID: Method Blank NUS SAMPLE NO: H0219836

TEST CODE	Determination	RESULT	UNITS
OSVIXW	APPENDIX IX SEMIVOLATILES IN WATER		
	Di-n-buthyl phthalate	< 10	ug/L
	Di-n-octyl phthalate	< 10	ug/L
	Dibenzofuran	< 10	ug/L
	Diethyl phthalate	< 10	ug/L
	Dimethyl phthalate	< 10	ug/L
	Fluoranthene	< 10	ug/L
	Fluorene	< 10	ug/L
	Hexachlorobenzene	< 10	ug/L
	Hexachlorobutadiene	< 10	ug/L
	Hexachlorocyclopentadiene	< 10	ug/L
	Hexachloroethane	< 10	ug/L
	Indeno(1,2,3-cd)pyrene	< 10	ug/L
	1,2,4-Trichlorobenzene	< 10	ug/L
	1,2-Dichlorobenzene	< 10	ug/L
	1,3-Dichlorobenzene	< 10	ug/L
	1,4-Dichlorobenzene	< 10	ug/L
	2,4,5-Trichlorophenol	< 50	ug/L
	2,4,6-Trichlorophenol	< 10	ug/L
	2,4-Dichlorophenol	< 10	ug/L
	2,4-Dimethylphenol	< 10	ug/L
	2,4-Dinitrophenol	< 50	ug/L
	2,4-Dinitrotoluene	< 10	ug/L
	2,6-Dinitrotoluene	< 10	ug/L
	2-Chloronaphthalene	< 10	ug/L
	2-Chlorophenol	< 10	ug/L
	2-Methylnaphthalene	< 10	ug/L
	2-Methylphenol (o-Cresol)	< 10	ug/L
	2-Nitroaniline	< 50	ug/L
	2-Nitrophenol	< 10	ug/L
	4-Methylphenol	< 10	ug/L
	3,3'-Dichlorobenzidine	< 20	ug/L
	3-Nitroaniline	< 50	ug/L
	4,6-Dinitro-2-methylphenol	< 50	ug/L
	4-Bromophenyl phenyl ether	< 10	ug/L
	4-Chloro-3-methylphenol	< 10	ug/L
	Isophorone	< 10	ug/L
	N-Nitrosodimethylamine	< 10	ug/L
	N-Nitrosodiphenylamine	< 10	ug/L
	Naphthalene	< 10	ug/L

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QUALITY CONTROL REPORT
METHOD BLANK DATA

TEST CODE	Determination	RESULT	UNITS
	Nitrobenzene	< 10	ug/L
	Pentachlorophenol	< 50	ug/L
	Phenanthrene	< 10	ug/L
	Phenol	< 10	ug/L
	Pyrene	< 10	ug/L
	Pyridine	< 20	ug/L
	n-Nitroso-di-n-propylamine	< 10	ug/L
	3-Methylphenol	< 10	ug/L
	4-Chloroaniline	< 10	ug/L
	4-Chlorophenyl phenyl ether	< 10	ug/L
	4-Nitroaniline	< 50	ug/L
	4-Nitrophenol	< 50	ug/L
	Acenaphthene	< 10	ug/L
	Acenaphthylene	< 10	ug/L
	Acetophenone	< 10	ug/L
	Aniline	< 10	ug/L
	Anthracene	< 10	ug/L
	Benzidine	< 50	ug/L
	Benzo(a)anthracene	< 10	ug/L
	Benzo(a)pyrene	< 10	ug/L
	Benzo(b)fluoranthene	< 10	ug/L
	Benzo(ghi)perylene	< 10	ug/L
	Benzo(k)fluoranthene	< 10	ug/L
	Benzoic Acid	< 50	ug/L
	Benzyl alcohol	< 10	ug/L
	Benzyl butyl phthalate	< 10	ug/L
	Bis(2-Chloroethoxy)methane	< 10	ug/L
	Bis(2-Chloroethyl)ether	< 10	ug/L
	Bis(2-Chloroisopropyl)ether	< 10	ug/L
	Bis(2-Ethylhexyl)phthalate	< 10	ug/L
	Chrysene	< 10	ug/L

BATCH: 26286 SAMPLE ID: Method Blank NUS SAMPLE NO: H0219865

TEST CODE	Determination	RESULT	UNITS
I685	Petroleum Hydrocarbons	< 0.2	mg/L
I685	Petroleum Hydrocarbons	< 0.2	mg/L

BATCH: 26312 SAMPLE ID: Method Blank NUS SAMPLE NO: H0219894

TEST CODE	Determination	RESULT	UNITS
ABAW	Barium, Total (Ba)	< 0.1	mg/L
ACDW	Cadmium, Total (Cd)	< 0.005	mg/L
ACRW	Chromium, Total (Cr)	< 0.01	mg/L
APBW	Lead, Total (Pb)	< 0.05	mg/L

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	TEST CODE	Determination	RESULT	UNITS
BATCH: 26313	SAMPLE ID:	Method Blank	NUS SAMPLE NO:	H0219896
	AAGW	Silver, Total (Ag)	< 0.01	mg/L
	AASW	Arsenic, Total (As)	< 0.003	mg/L
	ASEW	Selenium, Total (Se)	< 0.003	mg/L
BATCH: 26366	SAMPLE ID:	Method Blank	NUS SAMPLE NO:	H0219963
	OVIXW	APPENDIX IX VOLATILES IN WATER		
		1,1,1-Trichloroethane	< 5	ug/L
		1,1,2,2-Tetrachloroethane	< 5	ug/L
		1,1,2-Trichloroethane	< 5	ug/L
		1,1-Dichloroethane	< 5	ug/L
		1,1-Dichloroethene	< 5	ug/L
		1,2,3-Trichloropropane	< 5	ug/L
		1,2-Dichloroethane	< 5	ug/L
		1,2-Dichloropropane	< 5	ug/L
		1,4-Dichloro-2-butene	< 10	ug/L
		2-Butanone (MEK)	< 10	ug/L
		2-Chloroethylvinyl Ether	< 10	ug/L
		2-Hexanone	< 10	ug/L
		4-Methyl-2-Pentanone (MIBK)	< 10	ug/L
		Acetone	< 10	ug/L
		Acrolein	< 100	ug/L
		Acrylonitrile	< 100	ug/L
		Benzene	< 5	ug/L
		Bromodichloromethane	< 5	ug/L
		Bromoform	< 5	ug/L
		Bromomethane	< 10	ug/L
		Carbon disulfide	< 5	ug/L
		Carbon tetrachloride	< 5	ug/L
		Chlorobenzene	< 5	ug/L
		Chlorodibromomethane	< 5	ug/L
		Chloroethane	< 10	ug/L
		Chloroform	< 5	ug/L
		Chloromethane	< 10	ug/L
		Dibromomethane	< 5	ug/L
		Dichlorodifluoromethane	< 20	ug/L
		Ethanol	*	ug/L
		Ethyl methacrylate	< 10	ug/L
		Ethylbenzene	< 5	ug/L
		Iodomethane (Methyl iodide)	< 10	ug/L

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QUALITY CONTROL REPORT
METHOD BLANK DATA

TEST CODE	Determination	RESULT	UNITS
	Methylene chloride	< 5	ug/L
	P/M Xylene	< 5	ug/L
	Styrene	< 5	ug/L
	Tetrachloroethene	< 5	ug/L
	Toluene	< 5	ug/L
	Trichloroethene	< 5	ug/L
	Trichlorofluoromethane	< 5	ug/L
	Vinyl acetate	< 10	ug/L
	Vinyl chloride	< 10	ug/L
	cis-1,2-Dichloroethene	< 5	ug/L
	cis-1,3-Dichloropropene	< 5	ug/L
	o-Xylene	< 5	ug/L
	trans-1,2-Dichloroethene	< 5	ug/L
	trans-1,3-Dichloropropene	< 5	ug/L

* This analyte was not detected by a computerized search of the chromatogram.

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QUALITY CONTROL REPORT
DUPLICATE AND MATRIX SPIKE DATA

BATCH: 26313 NUS SAMPLE NO: H0219130

TEST	DETERMINATION	ORIGINAL RESULT	DUPLICATE RESULT	UNITS	RANGE / RPD	UNITS	MS RESULT	MS % RCVRY
AASW	Arsenic, Total (As)	0.19	0.20	mg/L	5.1	mg/L	0.20	— *

* The concentration of the analyte prevented accurate determination of the matrix spike recovery.

TEST	DETERMINATION	ORIGINAL RESULT	DUPLICATE RESULT	UNITS	RANGE / RPD	UNITS	MS RESULT	MS % RCVRY
AAGW	Silver, Total (Ag)	< 0.01	< 0.01	mg/L	—	mg/L	0.04	20.C

* Recovery of the spike indicates the presence of a matrix interference. This should be considered in evaluating the data.

TEST	DETERMINATION	ORIGINAL RESULT	DUPLICATE RESULT	UNITS	RANGE / RPD	UNITS	MS RESULT	MS % RCVRY
ASEW	Selenium, Total (Se)	< 0.003	< 0.003	mg/L	—	mg/L	< 0.003*	—

* Recovery of the spike indicates the presence of a matrix interference. This should be considered in evaluating the data.

BATCH: 26312 NUS SAMPLE NO: H0219127

TEST	DETERMINATION	ORIGINAL RESULT	DUPLICATE RESULT	UNITS	RANGE / RPD	UNITS	MS RESULT	MS % RCVRY
ABAW	Barium, Total (Ba)	< 0.1	< 0.1	mg/L	—	mg/L	1.9	95.0
ACDW	Cadmium, Total (Cd)	< 0.005	< 0.005	mg/L	—	mg/L	0.027 *	54.0

* Recovery of the spike indicates the presence of a matrix interference. This should be considered in evaluating the data.

TEST	DETERMINATION	ORIGINAL RESULT	DUPLICATE RESULT	UNITS	RANGE / RPD	UNITS	MS RESULT	MS % RCVRY
ACRW	Chromium, Total (Cr)	0.01	0.01	mg/L	0.0	mg/L	0.20	95.0
APBW	Lead, Total (Pb)	< 0.05	< 0.05	mg/L	—	mg/L	0.48	96.0

BATCH: 26333 NUS SAMPLE NO: H0219127

TEST	DETERMINATION	ORIGINAL RESULT	DUPLICATE RESULT	UNITS	RANGE / RPD	UNITS	MS RESULT	MS % RCVRY
AHGW	Mercury, Total (Hg)	< 0.0002	< 0.0002	mg/L	—	mg/L	0.0037	92.5

TABLE 3-1

TOTAL PETROLEUM HYDROCARBONS
SOIL ANALYTICAL DATA IN mg/kg
TRANSWESTERN COMPRESSOR STATION NO. 9
ROSWELL, NEW MEXICO

BORING NO.	DEPTH (FT)	TPH
SB-5	19-21	< 20
SB-5	64-66	< 20
SB-1C	25-26	< 20

TABLE 3-2

GROUNDWATER
ANALYTICAL DATA IN μG/L
TRANSWESTERN COMPRESSOR STATION NO. 9
ROSWELL, NEW MEXICO

ANALYTE	MW-3	MW-5
1,1,1-Trichloroethane	< 5	< 5
1,1,2,2-Tetrachloroethane	< 5	< 5
1,1,2-Trichloroethane	< 5	< 5
1,1-Dichloroethane	< 5	< 5
1,1-Dichloroethene	< 5	< 5
1,2-Dichloroethane	< 5	< 5
1,2-Dichloroethene (total)	< 5	< 5
1,2-Dichloropropane	< 5	< 5
2-Chloroethylvinylether	< 10	< 10
Acrolein	< 100	< 100
Acrylonitrile	< 100	< 100
Benzene	< 5	< 5
Bromoform	< 5	< 5
Bromomethane	< 10	< 10
Carbon tetrachloride	< 5	< 5
Chlorobenzene	< 5	< 5
Chlorodibromomethane	< 5	< 5
Chloroethane	< 10	< 10
Chloroform	< 5	< 5
Chloromethane	< 10	< 10
Dichlorobromomethane	< 5	< 5

TABLE 3-2 (Continued)
GROUNDWATER
ANALYTICAL DATA IN μG/L
TRANSWESTERN COMPRESSOR STATION NO. 9
ROSWELL, NEW MEXICO

ANALYTE	MW-3	MW-5
Ethylbenzene	< 5	< 5
Methylene chloride	< 5	< 5
Tetrachloroethene	< 5	< 5
Toluene	< 5	< 5
Trichloroethene	< 5	< 5
Vinyl chloride	< 10	< 10
cis-1,3-Dichloropropene	< 5	< 5
trans-1,3-Dichloropropene	< 5	< 5
Solids, Dissolved at 180C mg/l	3,400	3,800
Petroleum Hydrocarbons mg/l	< 0.2	< 0.2

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LABORATORY ANALYSIS REPORT

CLIENT NAME: TRANSWESTERN PIPELINE COMPANY
ADDRESS: P.O. BOX 1717
ROSWELL, NM 88202-1717
ATTENTION: LARRY CAMPBELL

LSG CLIENT NO: 0734 0002
PACE PROJECT: H07340002
PACE CLIENT: 620562

SAMPLE ID: MW-3
LSG SAMPLE NO: H0235758
P.O. NO.: VERBAL

DATE SAMPLED: 30-APR-93
DATE RECEIVED: 03-MAY-93
APPROVED BY: L Beyer

LN	TEST CODE	DETERMINATION	RESULT	UNIT
1	OVPPW	Volatiles in Water		
		1,1,1-Trichloroethane	< 5	ug/L
		1,1,2,2-Tetrachloroethane	< 5	ug/L
		1,1,2-Trichloroethane	< 5	ug/L
		1,1-Dichloroethane	< 5	ug/L
		1,1-Dichloroethene	< 5	ug/L
		1,2-Dichloroethane	< 5	ug/L
		1,2-Dichloroethene (total)	< 5	ug/L
		1,2-Dichloropropane	< 5	ug/L
		2-Chloroethylvinylether	< 10	ug/L
		Acrolein	< 100	ug/L
		Acrylonitrile	< 100	ug/L
		Benzene	< 5	ug/L
		Bromoform	< 5	ug/L
		Bromomethane	< 10	ug/L
		Carbon tetrachloride	< 5	ug/L
		Chlorobenzene	< 5	ug/L
		Chlorodibromomethane	< 5	ug/L
		Chloroethane	< 10	ug/L
		Chloroform	< 5	ug/L
		Chloromethane	< 10	ug/L
		Dichlorobromomethane	< 5	ug/L
		Ethylbenzere	< 5	ug/L
		Methylene chloride	< 5	ug/L
		Tetrachloroethene	< 5	ug/L
		Toluene	< 5	ug/L
		Trichloroethene	< 5	ug/L
		Vinyl chloride	< 10	ug/L
		cis-1,3-Dichloropropene	< 5	ug/L
		trans-1,3-Dichloropropene	< 5	ug/L

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LABORATORY ANALYSIS REPORT

CLIENT NAME: TRANSWESTERN PIPELINE COMPANY
SAMPLE ID: MW-3
LSG SAMPLE NO: H0235758

LN	TEST CODE	DETERMINATION	RESULT	UNITS
3	1590	Solids, Dissolved at 180C	3,400	mg/L
4	1685	Petroleum Hydrocarbons	< 0.2	mg/L

COMMENTS:

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LABORATORY ANALYSIS REPORT

CLIENT NAME: TRANSWESTERN PIPELINE COMPANY
ADDRESS: P.O. BOX 1717
ROSWELL, NM 88202-1717
ATTENTION: LARRY CAMPBELL

LSG CLIENT NO: 0734 0002
PACE PROJECT: H07340002
PACE CLIENT: 620562

SAMPLE ID: MW-5
LSG SAMPLE NO: H0235759
P.O. NO.: E51209/ROSWELL

DATE SAMPLED: 30-APR-93
DATE RECEIVED: 03-MAY-93
APPROVED BY: L Beyer

LN	TEST CODE	DETERMINATION	RESULT	UNITS
1	OVPPW	Volatiles in Water		
		1,1,1-Trichloroethane	< 5	ug/L
		1,1,2,2-Tetrachloroethane	< 5	ug/L
		1,1,2-Trichloroethane	< 5	ug/L
		1,1-Dichloroethane	< 5	ug/L
		1,1-Dichloroethene	< 5	ug/L
		1,2-Dichloroethane	< 5	ug/L
		1,2-Dichloroethene (total)	< 5	ug/L
		1,2-Dichloropropane	< 5	ug/L
		2-Chloroethylvinylether	< 10	ug/L
		Acrolein	< 100	ug/L
		Acrylonitrile	< 100	ug/L
		Benzene	< 5	ug/L
		Bromoform	< 5	ug/L
		Bromomethane	< 10	ug/L
		Carbon tetrachloride	< 5	ug/L
		Chlorobenzene	< 5	ug/L
		Chlorodibromomethane	< 5	ug/L
		Chloroethane	< 10	ug/L
		Chloroform	< 5	ug/L
		Chloromethane	< 10	ug/L
		Dichlorobromomethane	< 5	ug/L
		Ethylbenzene	< 5	ug/L
		Methylene chloride	< 5	ug/L
		Tetrachloroethene	< 5	ug/L
		Toluene	< 5	ug/L
		Trichloroethene	< 5	ug/L
		Vinyl chloride	< 10	ug/L
		cis-1,3-Dichloropropene	< 5	ug/L
		trans-1,3-Dichloropropene	< 5	ug/L
3	1590	Solids, Dissolved at 180C	3,800	mg/L
4	1685	Petroleum Hydrocarbons	< 0.2	mg/L

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LABORATORY ANALYSIS REPORT

CLIENT NAME: TRANSWESTERN PIPELINE COMPANY
SAMPLE ID: MW-5
LSG SAMPLE NO: H0235759

LN	TEST CODE	DETERMINATION	RESULT	UNITS

COMMENTS:

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LABORATORY ANALYSIS REPORT

CLIENT NAME: TRANSWESTERN PIPELINE COMPANY
ADDRESS: P.O. BOX 1717
ROSWELL, NM 88202-1717
ATTENTION: LARRY CAMPBELL

LSG CLIENT NO: 0734 0002
PACE PROJECT: H07340002
PACE CLIENT: 620562

SAMPLE ID: SB-5-1921
LSG SAMPLE NO: H0235760
P.O. NO.: E51209/ROSWELL

DATE SAMPLED: 29-APR-93
DATE RECEIVED: 03-MAY-93
APPROVED BY: L Beyer

LN	TEST CODE	DETERMINATION	RESULT	UNITS
1	I685S	Petroleum Hydrocarbons	< 20	mg/kg

COMMENTS:

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LABORATORY ANALYSIS REPORT

CLIENT NAME: TRANSWESTERN PIPELINE COMPANY
ADDRESS: P.O. BOX 1717
ROSWELL, NM 88202-1717
ATTENTION: LARRY CAMPBELL

LSG CLIENT NO: 0734 0002
PACE PROJECT: H07340002
PACE CLIENT: 620562

SAMPLE ID: SB-5-6466
LSG SAMPLE NO: H0235761
P.O. NO.: E51209/ROSWELL

DATE SAMPLED: 29-APR-93
DATE RECEIVED: 03-MAY-93
APPROVED BY: L Beyer

LN	TEST CODE	DETERMINATION	RESULT	UNITS
1	I685S	Petroleum Hydrocarbons	< 20	mg/kg

COMMENTS:

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LABORATORY ANALYSIS REPORT

CLIENT NAME: TRANSWESTERN PIPELINE COMPANY
ADDRESS: P.O. BOX 1717
ROSWELL, NM 88202-1717
ATTENTION: LARRY CAMPBELL

LSG CLIENT NO: 0734 0002
PACE PROJECT: H07340002
PACE CLIENT: 620562

SAMPLE ID: SB1C-2526
LSG SAMPLE NO: H0235762
P.O. NO.: E51209/ROSWELL

DATE SAMPLED: 29-APR-93
DATE RECEIVED: 03-MAY-93
APPROVED BY: L Beyer

LN	TEST CODE	DETERMINATION	RESULT	UNITS
1	1685S	Petroleum Hydrocarbons	< 20	mg/kg

COMMENTS:

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QUALITY CONTROL REPORT
SUPPLEMENTAL INFORMATION

LN	TEST CODE	BATCH	SAMPLE PREPARATION LR-METHOD	SAMPLE PREPARATION DATE/TIME	SAMPLE PREPARATION ANALYST	SAMPLE ANALYSIS LR-METHOD	SAMPLE ANALYSIS DATE/TIME	ANALYST	ANLS BATCH	INSTRUMENT

SAMPLE ID: MW-3 LSG SAMPLE NO: H0235758

LN	TEST CODE	BATCH	LR-METHOD	DATE/TIME	ANALYST	LR-METHOD	DATE/TIME	ANALYST	ANLS BATCH	INSTRUMENT
1	OVPPW	30795	NA			05-624	06-MAY-93 2037	J P	30724	GCMSR
3	I590	30720	NA			02-160.1	03-MAY-93 2300	D P	0	005WAT
4	I685	30692	02-418.1			02-418.1	04-MAY-93 700	Rac	0	302WAT

LR Method Literature Reference
02 EPA-Methods for Chemical Analysis of Water & Wastes, 1984.
05 EPA-40 CFR 136, October 26, 1984.

SAMPLE ID: MW-5 LSG SAMPLE NO: H0235759

LN	TEST CODE	BATCH	LR-METHOD	DATE/TIME	ANALYST	LR-METHOD	DATE/TIME	ANALYST	ANLS BATCH	INSTRUMENT
1	OVPPW	30795	NA			05-624	06-MAY-93 2107	J P	30724	GCMSR
3	I590	30720	NA			02-160.1	03-MAY-93 2300	D P	0	005WAT
4	I685	30692	02-418.1			02-418.1	04-MAY-93 700	Rac	0	302WAT

LR Method Literature Reference
02 EPA-Methods for Chemical Analysis of Water & Wastes, 1984.
05 EPA-40 CFR 136, October 26, 1984.

SAMPLE ID: SB-5-1921 LSG SAMPLE NO: H0235760

LN	TEST CODE	BATCH	LR-METHOD	DATE/TIME	ANALYST	LR-METHOD	DATE/TIME	ANALYST	ANLS BATCH	INSTRUMENT
1	I685S	30691	19-3550			02-418.1	04-MAY-93 700	Rac	0	302WAT

LR Method Literature Reference
02 EPA-Methods for Chemical Analysis of Water & Wastes, 1984.
19 EPA-Test Methods for Evaluating Solid Waste, 3rd ed, Nov. 1986

SAMPLE ID: SB-5-6466 LSG SAMPLE NO: H0235761

LN	TEST CODE	BATCH	LR-METHOD	DATE/TIME	ANALYST	LR-METHOD	DATE/TIME	ANALYST	ANLS BATCH	INSTRUMENT
1	I685S	30691	19-3550			02-418.1	04-MAY-93 700	Rac	0	302WAT

LR Method Literature Reference

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QUALITY CONTROL REPORT
SUPPLEMENTAL INFORMATION

			SAMPLE PREPARATION			SAMPLE ANALYSIS				
LN	TEST CODE	BATCH	LR-METHOD	DATE/TIME	ANALYST	LR-METHOD	DATE/TIME	ANALYST	ANLS BATCH	INSTRUMENT

LR Method Literature Reference

02 EPA-Methods for Chemical Analysis of Water & Wastes, 1984.
19 EPA-Test Methods for Evaluating Solid Waste, 3rd ed, Nov. 1986

SAMPLE ID: SB1C-2526 LSG SAMPLE NO: H0235762

LN	TEST CODE	BATCH	LR-METHOD	DATE/TIME	ANALYST	LR-METHOD	DATE/TIME	ANALYST	ANLS BATCH	INSTRUMENT
1	I685S	30691	19-3550			02-418.1	04-MAY-93 700	Rac	0	302WAT

LR Method Literature Reference
02 EPA-Methods for Chemical Analysis of Water & Wastes, 1984.
19 EPA-Test Methods for Evaluating Solid Waste, 3rd ed, Nov. 1986

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QUALITY CONTROL REPORT
SURROGATE STANDARD RECOVERY

LN	TEST CODE	SURROGATE COMPOUND	PERCENT RECOVERY	ACCEPTANCE LIMITS	REF LN
SAMPLE ID:	MW-3		LSG SAMPLE NO:	H0235758	
2	$VOAW	GC/MS Volatiles Surrogates			1
		1,2-Dichloroethane-d4	107	-	
		4-Bromofluorobenzene	107	-	
		Toluene-d8	99	-	
SAMPLE ID:	MW-5		LSG SAMPLE NO:	H0235759	
2	$VOAW	GC/MS Volatiles Surrogates			1
		1,2-Dichloroethane-d4	108	-	
		4-Bromofluorobenzene	106	-	
		Toluene-d8	96	-	

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QUALITY CONTROL REPORT
LABORATORY CONTROL SAMPLE RECOVERY

TEST CODE	DETERMINATION	PERCENT RECOVERY	ACCEPTANCE LIMITS
BATCH: 30691	SAMPLE ID: Lab Control Sample		LSG SAMPLE NO: H0236448
1685S	Petroleum Hydrocarbons	102.0	-
BATCH: 30692	SAMPLE ID: Lab Control Sample		LSG SAMPLE NO: H0236450
1685	Petroleum Hydrocarbons	104.0	-

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QUALITY CONTROL REPORT
METHOD BLANK DATA

TEST CODE	Determination	RESULT	UNITS
BATCH: 30691	SAMPLE ID: Method Blank	LSG SAMPLE NO: H0236449	
1685S	Petroleum Hydrocarbons	< 20	mg/kg
BATCH: 30692	SAMPLE ID: Method Blank	LSG SAMPLE NO: H0236451	
1685	Petroleum Hydrocarbons	< 0.2	mg/L
BATCH: 30720	SAMPLE ID: Method Blank	LSG SAMPLE NO: H0236491	
1590	Solids, Dissolved at 180C	< 10	mg/L
BATCH: 30795	SAMPLE ID: Method Blank	LSG SAMPLE NO: H0237606	
OVPPW	Volatiles in Water		
	1,1,1-Trichloroethane	< 5	ug/L
	1,1,2,2-Tetrachloroethane	< 5	ug/L
	1,1,2-Trichloroethane	< 5	ug/L
	1,1-Dichloroethane	< 5	ug/L
	1,1-Dichloroethene	< 5	ug/L
	1,2-Dichloroethane	< 5	ug/L
	1,2-Dichloroethene (total)	< 5	ug/L
	1,2-Dichloropropane	< 5	ug/L
	1,3-Dichloropropylene	< 5	ug/L
	2-Chloroethylvinylether	< 10	ug/L
	Acrolein	< 100	ug/L
	Acrylonitrile	< 100	ug/L
	Benzene	< 2	ug/L
	Bromoform	< 5	ug/L
	Bromomethane	< 10	ug/L
	Carbon tetrachloride	< 5	ug/L
	Chlorobenzene	< 2	ug/L
	Chlorodibromomethane	< 5	ug/L
	Chloroethane	< 10	ug/L
	Chloroform	< 5	ug/L
	Chloromethane	< 10	ug/L
	Dichlorobromomethane	< 5	ug/L
	Ethylbenzene	< 5	ug/L
	Methylene chloride	< 5	ug/L
	Tetrachloroethene	< 5	ug/L
	Toluene	< 2	ug/L
	Trichloroethene	< 5	ug/L

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QUALITY CONTROL REPORT
METHOD BLANK DATA

TEST CODE	Determination	RESULT	UNITS
	Vinyl chloride	< 10	ug/L
	cis-1,3-Dichloropropene	< 5	ug/L
	trans-1,3-Dichloropropene	< 5	ug/L

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QUALITY CONTROL REPORT
DUPLICATE AND MATRIX SPIKE DATA

PREP BATCH: 30720 | LSG SAMPLE NO: H0235758

TEST	DETERMINATION	ORIGINAL RESULT	DUPLICATE RESULT	UNITS	RANGE / RPD	UNITS	MS RESULT	MS % RCVRY
1590	Solids, Dissolved at 180C	3,400	3,400	mg/L	0.0	mg/L		

PREP BATCH: 30691 | LSG SAMPLE NO: H0235762

TEST	DETERMINATION	ORIGINAL RESULT	DUPLICATE RESULT	UNITS	RANGE / RPD	UNITS	MS RESULT	MS % RCVRY
1685S	Petroleum Hydrocarbons	< 20	< 20	mg/kg	---	mg/kg	360	111.0

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REPORT OF LABORATORY ANALYSIS

May 12, 1993
Report No.: 00024452
Section H Page 1

QUALITY CONTROL REPORT
MATRIX SPIKE AND MATRIX SPIKE DUPLICATE DATA

ANLS BATCH: 30724

LSG SAMPLE NO: H0235403

TEST	DETERMINATION	MS RESULT	MSD RESULT	UNITS	RPD	MS PCT RECOVERY	MSD PCT RECOVERY
OVPPW	1,1-Dichloroethene	51.9	43.1	ug/L	18.7	104	86
OVPPW	Benzene	50.8	46.3	ug/L	9.29	102	93
OVPPW	Chlorobenzene	49.0	46.3	ug/L	5.75	98	93
OVPPW	Toluene	49.5	45.3	ug/L	8.81	99	91
OVPPW	Trichloroethene	49.9	44.5	ug/L	11.5	100	89

900 Gemini Avenue
Houston, TX 77058
TEL: 713-488-1810

PACE INCORPORATED
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Copy: S. Richard B&R Env.

CHAIN-OF-CUSTODY RECORD
Analytical Request

Client: TRANSWESTERN PIPELINE CO.
Address: PO BOX 1717
ROSWELL, NM 88202-1717
Phone: (505) 625-8022

Report To: LARRY CAMPBELL
Bill To: SAME
P.O. # / Billing Reference
Project Name / No. ROSWELL / 5T72

Pace Client No.
Pace Project Manager
Pace Project No.
*Requested Due Date:

Sampled By (PRINT): S. SUSANNE RICHARD
Sampler Signature: [signature]
Date Sampled: 4-30-93 (29)

Analyses Request: TPH, TDS, VOC 8240

ITEM NO.	SAMPLE DESCRIPTION	TIME	MATRIX	PACE NO.	NO. OF CONTAINERS	UNPRESERVED	H_2SO_4	HNO_3	VOA			TPH	TDS	VOC 8240	REMARKS
1	MW-3	1310	LIQUID		4	1	1		2			1	1	2	CLEAN?
2	MW-5	1555	LIQUID		4	1	1		2			1	1	2	CLEAN?
3	SB-5-1921	1330	SOIL		1	1						1			
4	SB 5-76466	1445	SOIL		1	1						1			
5	SB1C-762526	1347	SOIL		1	1						1			
6															
7															
8															

COOLER NOS.	BAILERS	SHIPMENT METHOD OUT / DATE	RETURNED / DATE

ITEM NUMBER	RELINQUISHED BY / AFFILIATION	ACCEPTED BY / AFFILIATION	DATE	TIME
	Susanne Richard	[signature] / PACE	5/3	0930

Additional Comments

2

SEE REVERSE SIDE FOR INSTRUCTIONS

NET NATIONAL ENVIRONMENTAL TESTING, INC.®

Dallas Division
1548 Valwood Parkway
Suite 118
Carrollton, TX 75006
Tel: (214) 406-8100
Fax: (214) 484-2969

ANALYTICAL REPORT

James Robinson
CYPRESS ENGINEERING SERVICES
16300 KATY FWY., STE. 105
HOUSTON, TX 77094

04/06/1994
Job No.: 94.01407

Page: 1

Project Name: TPC ROSWELL; OPL MIVIDA

Date Received: 03/25/1994

223790 TPC ROSWELL MW-3
Taken: 02/23/1994 11:00

Arsenic, ICP	<0.03	mg/L
Arsenic, Dissolved, ICP	<0.03	mg/L
Barium, ICP	0.09	mg/L
Barium, Dissolved, ICP	0.02	mg/L
Cadmium, ICP	<0.01	mg/L
Cadmium, Dissolved, ICP	<0.01	mg/L
Chromium, ICP	<0.01	mg/L
Chromium, Dissolved, ICP	<0.01	mg/L
Lead, ICP	0.04	mg/L
Lead, Dissolved, ICP	<0.03	mg/L
Mercury, CVAA	<0.0002	mg/L
Mercury, Dissolved, CVAA	<0.0002	mg/L
Selenium, ICP	<0.04	mg/L
Selenium, Dissolved, ICP	<0.04	mg/L
Silver, ICP	<0.01	mg/L
Silver, Dissolved, ICP	<0.01	mg/L

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ANALYTICAL REPORT

James Robinson
CYPRESS ENGINEERING SERVICES
16300 KATY FWY., STE. 105
HOUSTON, TX 77094

04/06/1994
Job No.: 94.01407

Page: 2

Project Name: TPC ROSWELL; OPL MIVIDA

Date Received: 03/25/1994

223791 TPC ROSWELL MW-5
Taken: 02/23/1994 11:00

Arsenic, ICP	<0.03	mg/L
Arsenic, Dissolved, ICP	<0.03	mg/L
Barium, ICP	0.38	mg/L
Barium, Dissolved, ICP	0.01	mg/L
Cadmium, ICP	<0.01	mg/L
Cadmium, Dissolved, ICP	<0.01	mg/L
Chromium, ICP	0.03	mg/L
Chromium, Dissolved, ICP	<0.01	mg/L
Lead, ICP	0.04	mg/L
Lead, Dissolved, ICP	<0.03	mg/L
Mercury, CVAA	<0.0002	mg/L
Mercury, Dissolved, CVAA	<0.0002	mg/L
Selenium, ICP	<0.04	mg/L
Selenium, Dissolved, ICP	<0.04	mg/L
Silver, ICP	<0.01	mg/L
Silver, Dissolved, ICP	<0.01	mg/L

Jerry E. Pressley, Jr.
Project Manager
Dallas Division

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STANDARD QUALITY CONTROL REPORT

JOB NUMBER: 94.01407

PARAMETER	ANALYST	DATE ANALYZED	METHOD	CCV RESULT	CCV TRUE CONCENTRATION	% REC.
TPH - Nonaqueous	dwr	03/28/1994	E-418.1	87	90	97
Arsenic, ICP	cbw	03/30/1994	E-200.7	1.09	1.00	109
Barium, ICP	cbw	03/30/1994	E-200.7	1.01	1.00	101
Cadmium, ICP	cbw	03/30/1994	E-200.7	1.06	1.00	106
Chromium, ICP	cbw	03/30/1994	E-200.7	1.02	1.00	102
Lead, ICP	cbw	03/30/1994	E-200.7	1.06	1.00	106
Mercury, CVAA	dwt	03/30/1994	E-245.1	0.517	0.500	103
Selenium, ICP	cbw	03/30/1994	E-200.7	1.05	1.00	105
Silver, ICP	cbw	03/30/1994	E-200.7	1.02	1.00	102

Method References and Codes

E-100 through 493: "Methods for Chemical Analysis of Water & Wastes", U.S. EPA, 600/4-79-020, rev. 1983.

E-601 through 625: "Guidelines Establishing Test Procedures for the Analysis of Pollutants", U.S. EPA, 40CFR, Part 136, rev. 1990.

S-1000 through 9999: "Test Methods for Evaluating Solid Waste", U.S. EPA SW-846, 3rd Edition, 1986.

A: "Standard Methods for the Examination of Water and Wastewater", 16th Edition, APHA, 1985.

SM: "Standard Methods for the Examination of Water and Wastewater", 17th Edition, APHA, 1989.

D: ASTM Method

M: Method has been modified

*: Other Reference

CCV - Continuing Calibration Verification

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QUALITY CONTROL REPORT
BLANKS

JOB NUMBER: 94.01407

PARAMETER	DATE ANALYZED	BLANK	UNITS	REPORTING LIMIT
TPH - Nonaqueous	03/28/1994	<10	ug/g	10
Arsenic, ICP	03/30/1994	<0.03	mg/L	0.03
Barium, ICP	03/30/1994	<0.01	mg/L	0.01
Cadmium, ICP	03/30/1994	<0.01	mg/L	0.01
Chromium, ICP	03/30/1994	<0.01	mg/L	0.01
Lead, ICP	03/30/1994	<0.03	mg/L	0.03
Mercury, CVAA	03/30/1994	<0.0002	mg/L	0.0002
Selenium, ICP	03/30/1994	<0.04	mg/L	0.04
Silver, ICP	03/30/1994	<0.01	mg/L	0.01

Advisory Control Limits for Blanks

Metals/Wet Chemistry/Conventionals/GC - All compounds should be less than the Reporting Limit.

GC/MS Semi-Volatiles - All compounds should be less than the Reporting Limit except for phthalates which should be less than 5 times the Reporting Limit.

GC/MS Volatiles - Toluene, Methylene chloride, Acetone and Chloroform should be less than 5 times the Reporting Limit. All other volatile compounds should be less than the Reporting Limit.

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STANDARD QUALITY CONTROL REPORT

JOB NUMBER: 94.01407

PARAMETER	ANALYST	DATE ANALYZED	METHOD	CCV RESULT	CCV TRUE CONCENTRATION	% REC.
TPH - Nonaqueous	dwr	03/28/1994	E-418.1	87	90	97
Arsenic, ICP	cbw	03/30/1994	E-200.7	1.09	1.00	109
Barium, ICP	cbw	03/30/1994	E-200.7	1.01	1.00	101
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Chromium, ICP	cbw	03/30/1994	E-200.7	1.02	1.00	102
Lead, ICP	cbw	03/30/1994	E-200.7	1.06	1.00	106
Mercury, CVAA	dwt	03/30/1994	E-245.1	0.517	0.500	103
Selenium, ICP	cbw	03/30/1994	E-200.7	1.05	1.00	105
Silver, ICP	cbw	03/30/1994	E-200.7	1.02	1.00	102

Method References and Codes

E-100 through 493: "Methods for Chemical Analysis of Water & Wastes", U.S. EPA, 600/4-79-020, rev. 1983.

E-601 through 625: "Guidelines Establishing Test Procedures for the Analysis of Pollutants", U.S. EPA, 40CFR, Part 136, rev. 1990.

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SM: "Standard Methods for the Examination of Water and Wastewater", 17th Edition, APHA, 1989.

D: ASTM Method

M: Method has been modified

*: Other Reference

CCV - Continuing Calibration Verification

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QUALITY CONTROL REPORT
BLANKS

JOB NUMBER: 94.01407

PARAMETER	DATE ANALYZED	BLANK	UNITS	REPORTING LIMIT
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Arsenic, ICP	03/30/1994	<0.03	mg/L	0.03
Barium, ICP	03/30/1994	<0.01	mg/L	0.01
Cadmium, ICP	03/30/1994	<0.01	mg/L	0.01
Chromium, ICP	03/30/1994	<0.01	mg/L	0.01
Lead, ICP	03/30/1994	<0.03	mg/L	0.03
Mercury, CVAA	03/30/1994	<0.0002	mg/L	0.0002
Selenium, ICP	03/30/1994	<0.04	mg/L	0.04
Silver, ICP	03/30/1994	<0.01	mg/L	0.01

Advisory Control Limits for Blanks

Metals/Wet Chemistry/Conventionals/GC - All compounds should be less than the Reporting Limit.

GC/MS Semi-Volatiles - All compounds should be less than the Reporting Limit except for phthalates which should be less than 5 times the Reporting Limit.

GC/MS Volatiles - Toluene, Methylene chloride, Acetone and Chloroform should be less than 5 times the Reporting Limit. All other volatile compounds should be less than the Reporting Limit.

APPENDIX F

DBS&A STANDARD OPERATING PROCEDURES

Section 13.3.1

Drilling Operations

water quality in the area of drilling. However, potential problems created by the use of water-based drilling fluids need to be kept in mind. These problems include: (1) fluid infiltration/flushing of the intended monitoring zone; (2) well development difficulties (particularly where an artificial filter pack has been installed); (3) chemical, biological and physical reactivity of the drilling fluid with indigenous fluids in the ground; and (4) introduction of halomethanes into the ground water.

3.2.1 Drilling Fluid Properties

The drilling subcontractor is responsible for checking and adjusting the properties (weight and viscosity) of the drilling fluid. The proper weight of the drilling fluid is needed to maintain stability of the borehole, and the proper viscosity controls the ability of the drilling fluid to remove cuttings from the borehole. However, the DBS&A Technical Representative should always make sure that the drilling contractor periodically checks the properties of the drilling fluid.

One simple and common way to measure the viscosity of the drilling fluid is a Marsh Funnel. With the use of a Marsh Funnel, a known volume of drilling fluid is allowed to drain from a special funnel into a cup; the flow time is recorded and calibrated against the time required for an equal volume of water to drain from the funnel [approx. 26 seconds @ 70° F (21.1° C)].

Table 13.3.1-3 describes typical additive concentrations, resulting viscosities, and required uphole velocities for major types of drilling fluids used in various aquifer materials. Table 13.3.1-4 charts drilling fluid weight adjustments with barite or water.

3.2.2 Guidelines for Solving Specific Drilling Fluid Problems (Driscoll, 1986)

The drilling subcontractor is responsible for any drilling fluid problems. However, the DBS&A Technical Representative and Field Representative should be aware of and recognize the problems that may arise. Below are some guidelines for solving specific drilling fluid problems which may be helpful to the DBS&A Technical Representative:

PROBLEM: Inadequate cuttings have been removed from the borehole.

RECOMMENDED ACTION:

1. Clays and polymeric solids in potable water
   a. Increase uphole velocity of the drilling fluid.
   b. Increase viscosity of the drilling fluid by adding more colloidal material.
   c. Increase density of the drilling fluid by adding weighting material (Tables 13.3.1-3 and 13.3.1-4).
   d. Reduce penetration rate to limit cuttings load.
2. Air
   a. Increase uphole velocity of fluid system by adding air or water.
   b. Add surfactant to produce foam or to increase concentration of surfactant.
   c. Decrease air injection rate if air is breaking through the foam mix and preventing formation of stable foam.

d. Decrease water content of the foam system.

PROBLEM: The rate at which cuttings will drop out is too low because the inadvertent addition of native clays during drilling has produced excessive viscosity in the drilling fluid.

RECOMMENDED ACTION:

1. Add potable water to dilute the drilling fluid (Table 13.3.1-4).
2. Add commercial thinner to reduce the attractive forces between clay colloids.
3. If using clay additives, convert to a polymeric system.
4. Separate the solids from a clay-additive system with a shale shaker or shale shakers and desanders connected in series. A shale shaker or desander may be unnecessary when a polymeric system is being used.
5. Redesign or clean the pit system to increase rate of cuttings settlement.

PROBLEM: Gel strength becomes too great because of strong flocculation, high concentration of solids, or contamination from evaporite deposits or cement. (Excessive gel-strength problems do not occur with polymeric colloids.)

RECOMMENDED ACTION:

1. Add potable water to dilute the drilling fluid.
2. Add polyphosphate or commercial thinner to reduce electrical charges between clay colloids.
3. Use desander or shale shaker to remove solids from a clay-additive system.
4. Lower the pH.

PROBLEM: Excessive fluid loss into the formation causes thick filter cakes that can produce tight places in the hole, development problems, formation (clay) sloughing, and misinterpretation of electric or gamma-ray logs.

RECOMMENDED ACTION:

1. Increase viscosity by adding bentonite or polymeric colloids to any water-based system.
2. Add commercial viscosifiers such as CMC or HEC.
3. Reduce density of the drilling fluid.
4. Prevent drastic changes in downhole pressures and maintain downhole pressures at a minimum. Suggestions include (Bariod):
   a. Raise and lower the drill string slowly.
   b. Drill through any tight section; do not spud.
   c. Begin rotation of the drill pipe, and then start the pump at a low rate and gradually increase the rate.
   d. Operate the pump at the lowest rate that will assure adequate cooling of the bit and removal of cuttings from the bit face.

e. Prevent balling at the bit; do not drill soft formations so fast that the annulus becomes overloaded and pressure builds up.

PROBLEM: Lost circulation in permeable formations, faulted and jointed rock, solution cavities in dolomite and limestone, or fractures created by excessive borehole pressures in semiconsolidated or well consolidated rock can all create problems.

RECOMMENDED ACTION:

1. Reduce the density of the drilling fluid system.
2. Switch from a clay-additive drilling fluid system to an air-foam fluid, or add surfactant to a dry-air system.
3. Gel natural polymeric fluids at the point of fluid loss.
4. Use commercial sealing materials.
5. Drill remainder of the hole with a cable tool rig.
6. Case off, then resume rotary drilling.
7. Fill the borehole with clean sand to the point above lost circulation. Let the material stand in borehole overnight. Resume drilling, using low pump pressure.

PROBLEM: Confined pressures in the formation can contribute to a problem.

RECOMMENDED ACTION:

1. Increase density by adding heavy mineral additives such as barite to drilling fluid systems made with clay additives (Table 13.3.1-4). To suspend barite, the minimum Marsh funnel viscosity must equal four times the final (desired) drilling fluid weight (in lb/gal).

2. Increase density by adding a salt solution to polymeric drilling fluid systems.

PROBLEM: Hydration (swelling and dispersion), pore pressures, and overburden pressure can cause shale sloughing.

RECOMMENDED ACTION:

1. Use polymeric additive to isolate water from shale.
2. Maintain constant fluid pressures in the borehole.
3. Minimize uphole velocities.
4. Avoid pressure surges caused by raising or lowering drill rods rapidly.
5. Add 3 to 4 percent potassium chloride (KCl) to water-based systems.
6. Raise the pH of the drilling fluid to stiffen the clay.

PROBLEM: Contaminants are present. Contaminants usually consist of cement, soluble salts, and gases (hydrogen sulfide and carbon dioxide). Cement in the hole can cause polymeric drilling fluids to break down, thereby increasing fluid losses. Salts may cause drilling fluids with clay additives to separate into liquid and solid fractions. Gases in water may affect the physical condition of the drilling fluid.

RECOMMENDED ACTION:

1. For cement problems:
   a. Maintain the pH for natural polymeric drilling fluids at 7 or lower.
   b. Add commercial chemicals such as sodium acid pyrophosphate to drilling fluids with clay additives to restore original viscosity.
2. For salt problems:
   a. Change the clay additive from montmorillonite to attapulgite.
   b. Change to a natural polymeric drilling fluid additive.
3. For gas problems:
   a. Add a corrosion inhibitor.

PROBLEM: Drilling at air temperatures significantly below freezing, causing freeze-up of the recirculation system.

RECOMMENDED ACTION:

1. Add sodium chloride (NaCl) or calcium chloride ($CaCl_2$) to a natural polymeric drilling fluid. Salt must not be added to a drilling fluid made with bentonite.

3.3 Drilling Equipment

DBS&A Form Nos. 116 6/93 and 117 6/93, attached to this SOG, are checklists used for the preparation of drilling programs. These two checklists should be used as communication guides between DBS&A and the drilling subcontractor. They should be completed and checked prior to the field stage of the drilling program by both DBS&A and the drilling subcontractor. Form No. 116 6/93 summarizes important phone contacts, length of job, type of rig, underground utility survey, geologic material, sampling, disposal of cuttings, wells and soil borings, grouting, and health and safety issues. Form No. 117 6/93 identifies the drilling equipment and support vehicles that are needed for the drilling program.

3.4 Guidelines to Follow During Drilling Activities

1. A drilling method should be selected that will cause minimal disturbance to the subsurface materials and will not contaminate the subsurface and ground water (40 CFR 265.91(c)).

2. The drilling contractor is responsible for decontaminating the drilling equipment before it is transported onto the project site (ASTM D 5088-90).

3. A decontamination procedure should be followed before use and between borehole locations to prevent cross contamination of wells where contamination has been detected

or is suspected from the site characterization work that precedes the drilling activities (ASTM D 5088-90).

4. The drilling contractor shall be responsible for securing any and all boring or well drilling permits required by state or local authorities and for complying with any and all state or local regulations with regard to the submission of well logs, samples, etc.

5. The drilling contractor shall be responsible for complying with any and all (to include placement) regulations with regard to drilling safety and underground utility detection.

6. Air systems shall not be used for drilling, well installation, well development, or sampling without prior approval by the Project Manager. When used, air systems shall include an air line oil filter, frequently replaced, to remove essentially all oil residue from the air compressor. The use of any air system shall be fully described in the drillers log to include equipment description, manufacturer(s), model(s), air pressures used, frequency of oil filter change and evaluation of air line filtering.

7. When air is used as the drilling fluid, shrouds, canopies, bluooey lines, or directional pipes should be used to contain and direct the drill cuttings away from the drill crew.

8. Any water that is used during the drilling and installation of a well should be of a known chemical source and verified not to alter or impact the chemistry of the ground water of the operation of the well.

9. When using commercially available mud or additives for the drilling fluid, DBS&A Technical Representatives and Field Representative should make sure that the mud or additives to not alter or affect the chemistry of the ground water or the operation of the well.

10. During rotary drilling, the use of portable recirculation tanks is required. No dug sumps (lined or unlined) are allowed without prior approval by the Project Manager.

11. No dyes, tracers, or other substances shall be used or otherwise introduced into borings, wells, lysimeters, grout, backfill, ground water, or surface water unless specifically approved by the Technical Project Manager.

12. For wells over 100-feet deep, plumbness and alignment should be checked at preselected intervals during the drilling of the boreholes by the driller and verified by the DBS&A Field Representative.

13. Any contaminated materials (soil and/or water) should be collected and disposed of in an approved waste disposal container or facility.

14. Soil descriptions, collection of samples, field monitoring, and other pertinent information shall be recorded on the Boring Log Form during drilling operations. The Boring Log

Form, soil logging procedures, and instructions for completing the Boring Log Form are included in Section 13.3.2 of the Operations Manual

4. ATTACHMENTS

- Table 13.3.1-1, Drilling Methods for Monitor Wells
- Table 13.3.1-2, Relative Performance of Different Drilling Methods in Various Types of Geologic Formations
- Table 13.3.1-3, Typical Additive Concentrations, Resulting Viscosities, and Required Uphole Velocities for Major Types of Drilling Fluids Used in Various Aquifer Materials
- Table 13.3.1-4, Drilling Fluid Weight Adjustment with Barite or Water
- Drilling Information Checklist (DBS&A Form No. 116)
- Drilling Equipment and Support Vehicle Checklist (DBS&A Form No. 117)

5. REFERENCES

Aller, L., T.W. Bennett, G. Hackett, R.J. Petty, J.H. Lehr, H. Sedoris, D.M. Nielson, and J.E. Denne. 1989. Handbook of Suggested Practices for the Design and Installation of Ground-Water Monitoring Well Design and Installation. National Well Water Association. Dublin, OH. 398 p.

Driscoll, F.G. 1986. Groundwater and Wells. Johnson Division. St. Paul, MN. 1089 p.

EPA. 1986. RCRA Ground-Water Monitoring Technical Enforcement Guidance Document, U.S. EPA. Washington, D.C. September. 208 p. and 3 Appendices.

Prepared by: [signature]

Reviewed by: [signature]
Quality Assurance Manager

Approved by: [signature]
Daniel B. Stephens

Reviewed by: [signature]
Systems Operations Manager

Table 13.3.1-1 Drilling Methods for Monitor Wells

Type	Advantages	Disadvantages
Hollow-stem auger	• No drilling fluid is used, eliminating contamination by drilling fluid additives • Formation waters can be sampled during drilling by using a screened auger or advancing a well point ahead of the augers • Formation samples taken by split-spoon or core-barrel methods are highly accurate • Natural gamma-ray logging can be done inside the augers • Hole caving can be overcome by setting the screen and casing before the augers are removed • Fast • Rigs are highly mobile and can reach most drilling sites • Usually less expensive than rotary or cable tool drilling	• Can be used only in unconsolidated materials • Limited to depths of 100 to 150 ft (30.5 to 45.7 m) • Possible problems in controlling heaving sands • May not be able to run a complete suite of geophysical logs
Direct rotary	• Can be used in both unconsolidated and consolidated formations • Capable of drilling to any depth • Core samples can be collected • A complete suite of geophysical logs can be obtained in the open hole • Casing is not required during drilling • Many options for well construction • Fast • Smaller rigs can reach most drilling sites • Relatively inexpensive	• Drilling fluid is required and contaminants are circulated with the fluid • Drilling fluid mixes with the formation water and invades the formation and is sometimes difficult to remove • Bentonitic fluids may absorb metals and may interfere with other parameters • Organic fluids may interfere with bacterial analyses and/or organic-related parameters • During drilling, no information can be obtained on the location of the water table and only limited information on water-producing zones • Formation samples may not be accurate

Table 13.3.1-1 Drilling Methods for Monitor Wells (continued)

Type	Advantages	Disadvantages
Air rotary	• No water-based drilling fluid is used, eliminating contaminantion by additives • Can be used in both unconsolidated and consolidated formations • Capable of drilling to any depth • Formation sampling is excellent in hard, dry formations • Formation water blown out of the hole makes it possible to determine when the first water-bearing zone is encountered • Field analysis of water blown from the hole can provide information regarding changes for some basic water-quality parameters such as chlorides • Fast	• Casing is required to keep the hole open when drilling in soft, caving formations below the water table • When more than one water-bearing zone is encountered and hydrostatic pressures are different, flow between zones occurs during the time drilling is being completed and before the borehole can be cased and grounted properly • Relatively more expensive than other methods • May not be economical for small jobs
Cable Tool	• Only small amounts of drilling fluid are required (generally water with no additives) • Can be used in both unconsolidated and consolidated formations; well suited for extremely permeable formations • Can drill to depths required for most monitoring wells • Highly representative formation samples can be obtained by an experienced driller • Changes in water level can be observed • Relative permeabilities for different zones can be determined by skilled drillers • A good seal between casing and formation is virtually assured if flush-jointed casing is used • Rigs can reach most drilling sites • Relatively inexpensive	• Minimum casing size is 4 in (102 mm) • Steel casing must be used • Cannot run a complete suite of geophysical logs • Usually a screen must be set before a water sample can be taken • Slow

(After Driscoll, 1987)

Table 13.3.1-2 Relative Performance of Different Drilling Methods in Various Types of Geologic Formations

Type of Formation	Cable Tool	Direct Rotary (with fluids)	Direct Rotary (with air)	Direct Rotary (Down-the-hole air hammer)	Direct Rotary (Drill-through casing hammer)	Reverse Rotary (with fluids)	Reverse Rotary (Dual Wall)	Hydraulic Percussion	Jetting	Driven	Auger
Dune sand	2	5	NR	NR	6	5*	6	5	5	3	1
Loose sand and gravel	2	5	NR	NR	6	5*	6	5	5	3	1
Quicksand	2	5	NR	NR	6	5*	6	5	5	NR	1
Loose boulders in alluvial fans or glacial drift	3-2	2-1	NR	NR	5	2-1	4	1	1	NR	1
Clay and silt	3	5	NR	NR	5	5	5	3	3	NR	3
Firm shale	5	5	NR	NR	5	5	5	3	NR	NR	2
Sticky shale	3	5	NR	NR	5	3	5	3	NR	NR	2
Brittle shale	5	5	NR	NR	5	5	5	3	NR	NR	NA
Sandstone-poorly cemented	3	4	NR	NR	NA	4	5	4	NR	NR	NA

*Assuming sufficient hydrostatic pressure is available to contain active sand (under high confining pressures)

NR = Not recommended
NA = Not applicable

Rate of Penetration:

1	Impossible	4	Medium
2	Difficult	5	Rapid
3	Slow	6	Very rapid

(After Driscoll, 1987)

Table 13.3.1-2 Relative Performance of Different Drilling Methods in Various Types of Geologic Formations (continued)

Type of Formation	Cable Tool	Direct Rotary (with fluids)	Direct Rotary (with air)	Direct Rotary (Down-the-hole air hammer)	Direct Rotary (Drill-through casing hammer)	Reverse Rotary (with fluids)	Reverse Rotary (Dual Wall)	Hydraulic Percussion	Jetting	Driven	Auger
Sandstone-well cemented	3	3	5	NR	NA	3	5	3	NR	NR	NA
Chert nodules	5	3	3	NR	NA	3	3	5	NR	NR	NA
Limestone	5	5	5	6	NA	5	5	5	NR	NR	NA
Limestone with chert nodules	5	3	5	6	NA	3	3	5	NR	NR	NA
Limestone with small cracks or fractures	5	3	5	6	NA	2	5	5	NR	NR	NA
Limestone, cavernous	5	3-1	2	5	NA	1	5	1	NR	NR	NA
Dolomite	5	5	5	6	NA	5	5	5	NR	NR	NA

*Assuming sufficient hydrostatic pressure is available to contain active sand (under high confining pressures)

NR = Not recommended
NA = Not applicable

Rate of Penetration:

1	Impossible	4	Medium
2	Difficult	5	Rapid
3	Slow	6	Very rapid

(After Driscoll, 1987)

Table 13.3.1-2 Relative Performance of Different Drilling Methods in Various Types of Geologic Formations (continued)

Type of Formation	Cable Tool	Direct Rotary (with fluids)	Direct Rotary (with air)	Direct Rotary (Down-the-hole air hammer)	Direct Rotary (Drill-through casing hammer)	Reverse Rotary (with fluids)	Reverse Rotary (Dual Wall)	Hydraulic Percussion	Jetting	Driven	Auger
Basalts, thin layers in sedimentary rocks	5	3	5	6	NA	3	5	5	NR	NR	NA
Basalts-thick layers	3	3	4	5	NA	3	4	3	NR	NR	NA
Basalts-highly fractured (lost circulation zones)	3	1	3	3	NA	1	4	1	NR	NR	NA
Metamorphic rocks	3	3	4	5	NA	3	4	3	NR	NR	NA
Granite	3	3	5	5	NA	3	4	3	NR	NR	NA

*Assuming sufficient hydrostatic pressure is available to contain active sand (under high confining pressures)

NR = Not recommended
NA = Not applicable

Rate of Penetration:

1	Impossible	4	Medium
2	Difficult	5	Rapid
3	Slow	6	Very rapid

(After Driscoll, 1987)

Table 13.3.1-3 Typical Additive Concentrations, Resulting Viscosities, and Required Uphole Velocities for Major Types of Drilling Fluids Used in Various Aquifer Materials

Base Fluid	Additive/Concentration	Marsh Funnel Viscosity (seconds)	Annular Uphole Velocity (ft/min)	Observations
Water	None	26 ± 0.5	100 - 120	For normal drilling (sand, silt, and clay)
Water	Clay (High-Grade Bentonite)			Increases viscosity (lifting capacity) of water significantly
	15-25 lb/100 gal	35 - 55	80 - 120	For normal drilling conditions (sand, silt, and clay)
	25-40 lb/100 gal	55 - 70	80 - 120	For gravel and other coarse-grained, poorly consolidated formations
	35-45 lb/100 gal	65 - 75	80 - 120	For excessive fluid losses
Water	Polymer (Natural)			Increases viscosity (lifting capacity) of water significantly
	4.0 lb/100 gal	35 - 55	80 - 120	For normal drilling conditions (sand, silt, and clay)
	6.1 lb/100 gal	65 - 75	80 - 120	For gravel and other coarse-grained, poorly consolidated formations
	6.5 lb/100 gal	75 - 85	80 - 120	For excessive fluid losses
				Cuttings should be removed from the annulus before the pump is shut down, because polymeric drilling fluids have very little gel strength
Air	None	N/A	3,000-5,000	Fast drilling and adequate cleaning of medium to fine cuttings, but may be dust problems at the surface
			4,500-6,000	This range of annular uphole velocities is required for the dual-wall method of drilling
Air	Water (Air Mist) 0.25-2 gpm	N/A	3,000-5,000	Controls dust at the surface and is suitable for formations that have limited entry of water

Table 13.3.1-3 Typical Additive Concentrations, Resulting Viscosities, and Required Uphole Velocities for Major Types of Drilling Fluids Used in Various Aquifer Materials (continued)

Base Fluid	Additive/ Concentration	Marsh Funnel Viscosity (seconds)	Annular Uphole Velocity (ft/min)	Observations
Air	Surfactant/Water (Air-Foam)	N/A	50-1,000	Extends the lifting capacity of the compressor
	1-2 qt/100 gal (0.25-0.5% surfactant)			For light drilling; small water inflow; also for sticky clay, wet sand, fine gravel, hard rock; few drilling problems
	2-3 qt/100 gal (0.5-0.75% surfactant)			For average drilling conditions; larger diameter, deeper holes; large cuttings; increasing volumes of water inflow; excellent hole cleaning
	3-4 qt/100 gal (0.75-1% surfactant)			For difficult drilling; deep, large-diameter holes; large, heavy cuttings; sticky and incompetent formations; large water inflows
				Injection rates of surfactant/water mixture: Unconsolidated formations 3-10 gpm Fractured rock 3-7 gpm Solid rock 3-5 gpm
Air	Surfactant/Colloids/Water (Stiff Foam)	N/A	50-100	Greatly extends lifting capacity of the compressor
	3-5 qt/100 gal (0.75-1% surfactant) plus 3-6 lb polymer/100 gal or 30-50 lb bentonite/100 gal			For difficult drilling; deep, large-diameter holes; large, heavy cuttings; sticky and incompetent formations; large water inflows
	4-8 qt/100 gal (1-2% surfactant) plus 3-6 lb polymer/100 gal or 30-50 lb bentonite/100 gal			For extremely difficult drilling; large, deep holes; lost dirculation; incompentent formations; excessive water inflows

(Compiled by Driscoll, 1984)

Table 13.3.1-4 Drilling Fluid Weight Adjustment with Barite or Water

Initial drilling fluid weight, lb/gal	Desired drilling fluid weight, lb/gal											
	9.5	10.0	10.5	11.0	11.5	12.0	12.5	13.0	13.5	1.0	14.5	15.0
9.0	69	140	214	293	371	457	545	638	733	833	940	1050
9.5		69	143	219	298	381	467	557	650	750	855	964
10.0	43		71	145	221	305	390	479	569	667	769	876
10.5	85	30		74	148	229	312	398	488	583	683	788
11.0	128	60	23		74	152	233	319	407	500	598	700
11.5	171	90	46	19		76	157	240	326	417	512	614
12.0	214	120	69	37	16		79	160	245	333	426	526
12.5	256	150	92	56	32	14		81	162	250	343	438
13.0	299	180	115	75	48	27	12		81	167	257	350
13.5	342	210	138	94	63	41	24	11		83	171	264
14.0	385	240	161	112	78	54	36	21	10		86	176
14.5	427	270	185	131	95	68	48	32	19	9		88
15.0	470	300	208	150	110	82	60	43	29	18	8	

The lower left half of this table shows the number of gallons of water which must be added to 100 gal of drilling fluid to produce desired weight reductions. To use this portion of the table, locate the initial drilling fluid weight in the vertical column at the left, then locate the desired drilling fluid weight in the upper horizontal row. The number of gal of water to be added per 100 gal of drilling fluid is read directly across from the initial weight and directly below the desired weight. For example, to reduce an 11 lb/gal drilling fluid to a 9.5 lb/gal drilling fluid, 128 gal of water must be added for every 100 gal of drilling fluid in the system.

The upper right half of this table shows the number of pounds of barite which must be added to 100 gal of drilling fluid to produce desired weight increases. To use this portion of the table, locate the initial drilling fluid weight in the vertical column to the left, then locate the desired drilling fluid weight in the upper horizontal row. The number of pounds of barite to be added per 100 gal of drilling fluid is read directly across from the initial weight and directly below the desired weight. For example, to raise a 9 lb/gal drilling fluid to 10 lb/gal, 140 lb of barite must be added per 100 gal of drilling fluid in the system.

(After Petroleum Extension Service, 1969)

DANIEL B. STEPHENS & ASSOCIATES, INC.

Drilling Information Checklist

Project No. ______________ DBS&A Project Manager ______________

DBS&A Technical Representative ______________ DBS&A Field Representative(s) ______________

Drilling Company ______________

Drilling Company Contact ______________ Phone No. ______________

Date and Time for Work to Begin ______________

Estimated Work Days to Complete Job ______________ Access Agreements ______________

Drilling Rig ______________ Driller and Assistant(s) ______________

☐ Hollow Stem Auger ☐ Air/Mud Rotary ☐ Cable Tool ☐ Dual-Tube Air Percussion ☐ Coring Rig

Blu-Stake (NM call 1-800-321-2537 for most utilities) Contacted By ______________

One Week Authorization No. ______________ Date. ______________

Underdetection Services (Private Co.) ______________

Client Contact ______________ Phone No. ______________

Job Site ______________ Phone No. ______________

Location ______________

Surface ☐ Asphalt ☐ Concrete ☐ Dirt ☐ In Roadway

Geologic Material ______________

Sampling Device ☐ Splitspoon ☐ Thin-walled Tube ☐ 140 lb. Hammer (SPT) ☐ Coring

Sampling Length ☐ 12" ☐ 18" ☐ 24" With Rings ☐ 3" ☐ 6"

Sampling Interval(s) ______________

Disposal of Cuttings ☐ Drummed ☐ Leave On-site

Contain Decontamination Water ______________

Hole Diameter	No. of Borings	Total Footage	Maximum Depth	
Well Diameter	**No. of Wells**	**Total Footage**	**Depth to Water**	**Screen Length/Slot Size**

Grouting ☐ Place Bentonite Seal ☐ Grout to Surface ☐ Backfill

Mixed On-site by Drilling Co. ______________ Cement Truck Delivers Grout ______________

Poured from Surface Through Drill Pipe ______________

Pumped Through Tremie Pipe ______________

Water On-site ☐ Yes ☐ No Electricity ☐ Yes ☐ No

Level of Protection ☐ A ☐ B ☐ C ☐ D Health & Safety Plan By ______________

Potential Contaminants ______________ Other Hazards ______________

DBS&A Form No. 116 6/93

DANIEL B. STEPHENS & ASSOCIATES, INC.

Drilling Equipment and Support Vehicle Checklist

Project No. ______________________ DBS&A Project Manager ______________________

DBS&A Technical Representative ______________________ DBS&A Field Representative(s) ______________________

Drilling Company ______________________

Drilling Company Contact ______________________ Phone No. ______________________

Date and Time for Work to Begin ______________________

Material	Size	Quantity	Equipment Supplier*
Drill Bit			
Rotary Drilling Pipe			
Hollow Stem Auger (O.D. x I.D: 10"x6.25" or 8"x4.25" + Total Footage)			
Dual-Tube Pipe (O.D. / I.D)			
Water Tank			
Steam Cleaner			
Decontamination Trailer to Contain Water from Steam Cleaning			
Drums			
Tank to Mix Grout			
Tremie Pipe			
Grout Pump			
Wooden Plugs (Flowing Sand)			
Welder			
Concrete Saw (Other Subcontractor)			
Development Rig (Bailers, Surge Block, Pump)			
Plastic Sheeting			
Sampler (Length and Type)			
Core Catchers			
Rings - Brass			
Rings - Stainless Steel			
Endcaps			
Teflon Liners			
Tagline (Length and Type)			

DBS&A Form No. 117 Rev. 12/93

*DBS&A or Other (specify)

Section 13.3.2

Soils Logging, Sampling, Handling, and Shipping for Geotechnical and Chemical Analyses

1. PURPOSE

The following SOP describes the appropriate procedures for the logging, sampling, handling, and shipping of soil during soil boring investigations. Sampling methodologies and shipping requirements are provided for collection of geotechnical, physical, and chemical soil samples.

2. SCOPE

This procedure is applicable to all DBS&A employees and subcontractors who are engaged in soil boring activities. It provides the minimum logging requirements, sampling protocols, and shipping requirements for soil boring investigations. The appropriate form for logging soil is included in this SOP as Attachment 1, Soil Boring Log (DBS&A Form No. 080). A soils classification chart is included as Attachment 2. Tables 13.3.2-1 and 13.3.2-2 provide handling and transport, and volume requirements for soil physical analysis samples, respectively.

3. PROCEDURES

3.1 Soils Logging

Soil descriptions and other pertinent information will be recorded on the Soil Boring Log form during boring operations. The Soil Boring Form contains a header for recording the boring specifics and a log for describing and classifying soil and tracking soil sampling. Soils will be identified and described in accordance with ASTM D 2488, Standard Practice for Description and Identification of Soil (Visual-Manual Practice). Table 13.3.2-3 provides a list of equipment that may be required for soils logging, sampling, handling, and shipping.

3.1.1 Completing the Header

Most of the header is self-explanatory. On the first page of the log, it is important to complete the entire header. If subsequent forms are necessary, complete the page number, the site, the client, the person logging the soil, the boring number, and the date. On the first page, sketch a location map for the boring, referencing it to known features or landmarks. When specifying the drilling method and drill rig, note the diameter of the drill bit or augers.

3.1.2 Completing the Boring Log

PID/FID - record head space measurements made with the PID/FID in this column in the appropriate depth interval from which the sample was collected.

Blow Counts - if driving a split-barrel sampling device with a hammer, record the number of hammer "blows" per 6 inches of penetration. Ensure that the driller marks the 6 inch intervals on the drill stem prior to hammering the split-barrel.

Sampling Device - specify the sampling device (i.e., split-barrel, split-barrel with brass or stainless steel rings, Shelby tube); specify the inside diameter of the sampling device.

Sample Interval - specify the sampling interval (starting and finishing) by placing an "X" across the appropriate depth interval in this column.

Sample Recovery - state, in tenths of feet, the amount of sample which is recovered.

Sample Number - record the designated sample number in this column.

Depth (Feet) - complete this column in 5-foot intervals to keep a running tally of the depth of the borehole.

USCS Symbol - provide the USCS symbol for the soil be described; draw a solid contact line at the appropriate depth to signify changes in soil type.

Soil Description - describe the soil in the format listed on the boring log; for non-cohesive soils, estimate the grain distribution, gradation, and grain shape; for cohesive soils, note the plasticity and clay consistency; if possible, a soil classification and geotechnical gauge and a color chart should be used to aid in describing soil.

3.2 Soil Sampling

Soil samples will typically be collected for geotechnical, physical, or chemical analysis. Geotechnical samples will be collected with a split-barrel sampler lined with brass rings or in the case of cohesive soils to be analyzed for compressive strength, a thin-walled tube sampler. Chemical samples will be collected with an unlined split-barrel sampler or a ring-lined split-barrel sampler. Regardless of which sampling device is employed, care should be taken to minimize slough in the borehole. Slow withdrawal of the drill bit prior to sampling will minimize slough. When drilling below the water table, ensure that the water level in the borehole (or within driven casing) is maintained at or above the water table elevation.

3.2.1 Geotechnical/Physical Properties Samples

Geotechnical and/or physical properties samples will be collected with either a ring-lined split-barrel sampler or a thin-walled Shelby tube. If possible, use a ring-lined sampler for physical properties analysis. For triaxial and unconfined compression tests, either a ring-lined sampler or a thin-walled tube sampler may be employed. For cohesive soils, the thin-walled tube sampler should be used for obtaining the least disturbed samples. In non-cohesive soils, a ring-lined sampler is required because of poor sample recovery experienced with a thin-walled sampler.

3.2.1.1 Ring-lined Split-Barrel Sampler (ASTM D 3350)

1. Assemble the sampler with the specified rings. For physical properties analysis, the typical ring is 3 inches in length and constructed of brass. Ring requirements will be specified in the Field Sampling Plan (FSP).

2. Attach the sampler to the drill stem and carefully lower it to the bottom of the borehole.

3. Hydraulically push the sampler into the soil in a rapid, continuous manner to a length not to exceed that of the sampler. In dense, non-cohesive soils, the sampler may have to be driven. If so, record the blow counts.

4. Carefully disassemble the sampler to minimize soil disturbance. Trim the individual rings flush with a clean knife, and place plastic caps over the ring ends. Use the soil in one of the rings for field classification. Secure the caps with tape and label the ring, including the vertical orientation.

5. The samples can be shipped in a dry cooler. If the possibility exists the samples will be handled roughly, pack them with shipping material in the cooler.

3.2.1.2 Thin-Walled Tube Sampler (ASTM D 1587)

1. Attach the sampling tube to the drill stem and carefully lower to the bottom of the borehole.

2. Rapidly and continuously hydraulically push the Shelby tube a distance of 5 to 10 times the tube diameter in non-cohesive soils and 10 to 15 times the diameter in cohesive soils. In dense, non-cohesive soils it is permissible to drive the sampler. Record the blow counts. It is permissible to "twist" the drill stem to shear the sample bottom prior to retrieval.

3. Carefully withdraw the sampler from the formation to minimize disturbance.

4. The sample can be shipped either unextruded or after extrusion at the site.

   Unextruded - Measure the length of the sample in the tube. Remove any slough from the top of the tube. Remove at least 1 inch of soil from the bottom of the tube for field classification. Seal the top and bottom of the tube with plastic caps and secure with tape.

   Extruded - Following extrusion, select a 12- to 15-inch segment of the sample which appears least disturbed. Carefully cut the ends with a clean knife, and immediately wrap the sample in cellophane wrap, then aluminum foil. Place the sample in a plastic tube, and cap the ends. Describe the soil with the remainder of the sample. Describe the prepared interval to the extent practicable. ***DO NOT*** cut or disturb the interval to be submitted to the laboratory.

5. The samples can be shipped in a similar manner as described in 3.2.1.1(5) above.

3.2.2 Soil Chemistry Samples

Soil chemistry samples can be collected with either the split-barrel sampler or with the ring-lined split-barrel sampler. The primary difference in the two methods is the preparation of the samples. In the case of samples obtained from the split-barrel, the soil must be transferred to soil containers (typically glass jars). In the case of the ring-lined sampler, the rings will be either stainless steel or brass which are capped with

Teflon-lined caps. The rings are labeled, secured with toluene-free tape, and submitted directly for analysis. Exact sample methods, volumes, containers, preservation, and chain of custody procedures will be outlined in the FSP. In general, for soil matrix samples, EPA SW-846 (EPA, 1986) methods will be specified. Both the split barrel sampler and the ring-lined sampler are hydraulically pushed or driven in the same manner described in 3.2.1.1(2-3) above.

3.2.2.1 Split-Barrel Samples (ASTM D 1586)

1. Upon retrieval of the sample, carefully open the split-barrel. Trim the sample with a decontaminated, sharp stainless-steel knife. Note the general soil type.

2. As quickly as possible, collect samples for volatile organic and semi-volatile organic analysis. Be sure that headspace is minimized in the volatile organic analysis samples. Collect field duplicates and specify that the laboratory perform matrix spike/matrix spike duplicates from the same interval as the sample. Place the samples in certified clean glass jars with Teflon-lined caps.

3. Collect samples for other required analyses. If the FSP specifies mixing the split barrel sample prior to filling additional sample containers, do so in a stainless-steel mixing bowl. Sample volumes and containers will be specified in the FSP.

4. Label the samples in accordance with the FSP. At a minimum, this will include: (1) the sample number; (2) boring number and interval (if different from the sample number); (3) time and date; and (4) required analysis. If chain of custody seals are required, secure them across the container lid.

5. Place the sample containers in "ziplock" bags and place on ice. Prior to shipment, the sample containers must be wrapped in bubble-pack, or other suitable packing material.

6. Fully describe the soil sample.

7. Log the sample information in the field log book for later transfer to the Chain-of-Custody Form (DBS&A Form No. 095), which is included as Attachment 3 in this SOP.

3.2.2.2 Ring-Lined Split-Barrel Samples (ASTM D 3350)

1. Upon retrieval of the sampler, carefully open the split-barrel. Trim the ends of the rings with a clean stainless-steel knife. Cap the rings with Teflon-lined caps and seal with toluene-free tape.

2. Using one or more of the rings (if possible), and soil trimmed from the ring ends, describe and log the soil.

3. Follow the steps described in 3.2.2.1(5-7) above. Packing material is optional for the ring samples.

3.3 Sample Shipment

Proper shipment of samples is critical for ensuring that reliable analytical results are obtained. In the case of geotechnical or physical properties analysis samples, this involves protecting the samples against excessive impacts which may disturb the samples. For soil chemical analyses, it is important to protect the samples from breakage if they were collected in glass jars. In addition, most chemical methods call for the samples being maintained at a constant 4°C.

3.3.1 Geotechnical and Physical Properties Samples

Shipping requirements for geotechnical and physical properties samples are listed in Table 13.3.2-2. In general, samples should be shipped in a dry cooler. If the cooler is not being hand-carried to the laboratory (i.e., shipped by overnight carrier) the samples should be protected with packing material to prevent sample disturbance. Plastic bubble-wrap, shredded paper, foam "peanuts", and vermiculite provide adequate sample protection when properly used. It is important to provide packing materials between all samples, such that samples do not come in contact. When shipping samples, it important to enclose a chain-of-custody form in the cooler as specified in the FSP.

3.3.2 Soil Chemistry Samples

Soil chemistry samples collected in glass containers must be protected from breakage. Individually wrapping the sample containers in plastic bubble-wrap provides excellent protection. After wrapping the samples in bubble-wrap, they should be placed in sealed "zip-lock" bags. Brass or stainless-steel ring samples need only be placed in sealed "zip-lock" bags. If the FSP calls for chain-of-custody seals to be placed on individual samples, place them across the jar lid or plastic ring cap. Chain-of-custody forms should be filled out in accordance with the FSP, placed in a "ziplock" bag, and taped to the inside of the cooler lid. It is important to use an ample volume of ice in order to maintain the required temperature of 4°C. Chain of custody seals will be placed across the front and back of the cooler lid such that they will be broken in the event of tampering. The cooler lid should be firmly taped shut with several layers of shipping tape encircling the ends of the cooler. Finally, for chemical analyses, *always* ship the samples by overnight carrier.

4.0 REFERENCES

ASTM D 1586-84 Standard Method for Penetration Test and Split-Barrel Sampling of Soils

ASTM D 1587-83 Standard Practice for Thin-Walled Tube Sampling of Soils

ASTM D 2488-90 Practice for Description and Identification of Soils (Visual-Manual)

ASTM D 3350-84 Standard Practice for Ring-Lined Barrel Sampling of Soils

U.S. EPA, 1986, Test Methods for Evaluation of Solid Wastes, SW-846, 3rd Ed.

5.0 ATTACHMENTS

1. Boring Log (DBS&A Form No. 080 3/92)
2. Unified Soil Classification System Chart (DBS&A Form No. 049)
   - Table 13.3.2-1, Soil Physical Sample Handling and Transport
   - Table 13.3.2-2, Soil Physical Sample Volume Requirements
   - Table 13.3.2-3, Soil Sampling Field Equipment List
3. Chain-of-Custody Form (DBS&A Form No. 95)

Prepared by: ______________________

Approved by: ______________________
Daniel B. Stephens

Reviewed by: ______________________
Quality Assurance Manager

Reviewed by: ______________________
Systems Operations Manager

DANIEL B. STEPHENS & ASSOCIATES, INC.

Boring Log

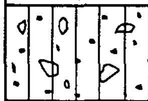
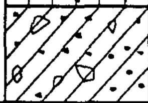
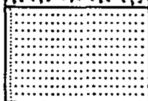
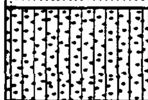
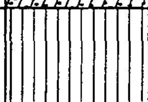
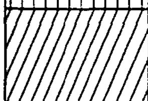
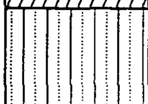
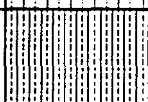
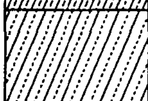
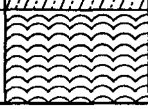
Page____of____

Site		Location Map
Logged by	Client/Project #	
Boring Number	Drilling Co.	
Drilling Method	Drill Rig	
Date Started	Date Completed	

PID/FID Reading	Blow Counts	Sampling Device	Sample Recovery	Sample Interval	Sample Number	USCS Symbol	Depth (feet)	Soil Description/Remarks Soil type, color, texture, grain size, sorting, roundness, plasticity, consistency, moisture content

DBS&A Form No. 080 3/92

USCS GROUP SYMBOLS

MAJOR DIVISIONS			GRAPH SYMBOL	LETTER SYMBOL	TYPICAL DESCRIPTIONS
Course Grained Soils More than 50% of Material is Larger than Silt (No. 200 Sieve Size)	Gravel and Gravelly Soils More than 50% of Course Fraction Retained on No. 4 Sieve	Clean Gravels (little or no fines <5%)		GW	Well-graded gravels, gravel-sand mixtures. Little or no fines.
				GP	Poorly-graded gravels. Gravel-sand mixtures. Little or no fines.
		Gravels with Fines (appreciable amount of fines >15%)		GM	Silty gravels. Gravel-sand-silt mixtures.
				GC	Clayey gravels. Gravel-sand-clay mixtures.
	Sand and Sandy Soils More than 50% of Course Fraction Passing No. 4 Sieve	Clean Sand (little or no fines <5%)		SW	Well-graded sands. Gravelly sands. Little or no fines.
				SP	Poorly-graded sands. Gravelly sands. Little or no fines.
		Sands with Fines (appreciable amount of fines >15%)		SM	Silty sands. Sand-silt mixtures.
				SC	Clayey sands. Sand-clay mixtures.
Fine Grained Soils More than 50% of Material is Smaller than Silt (No. 200 Sieve Size)	Silts and Clays	Liquid Limit Less than 50		ML	Inorganic silts and very fine sands. Rock flour. Silty or clayey fine sands or clayey silts with slight plasticity.
				CL	Inorganic clays of low to medium plasticity. Gravelly clays. Sandy clays, silty clays, lean clays.
				OL	Organic silts and organic silty clays or low plasticity.
	Silts and Clays	Liquid Limit Greater than 50		MH	Inorganic silts. Micaceous or diatomaceous fine sand or silty soils.
				CH	Inorganic clays of high plasticity. Fat clays.
				OH	Organic clays of medium to high plasticity. Organic silts.
Highly Organic				PT	Peat, humus, swamp soils with high organic content.

DBS&A Form No. 049 4/91

TABLE 13.3.2-1. SOIL PHYSICAL ANALYSIS SAMPLE REQUIREMENTS AND TRANSPORT

PHYSICAL PROPERTY TEST	SAMPLE REQUIREMENT	SHIPPING REQUIREMENT
Soil Moisture	2.5" O.D. x 3" long ring or in double plastic bag with air removed	Dry cooler
Hydraulic Conductivity	2.5" O.D. x 3" sealed ring	Dry cooler
Moisture Retention (Ψ-Θ)	2.5" O.D. x 3" sealed ring	Dry cooler with packing material
Air Permeability	2.5" O.D. x 3" sealed ring	Dry cooler with packing material
Bulk Density	2.5" O.D. x 3" sealed or waxed ring	Dry cooler with packing material
Porosity	2.5" O.D. x 3" sealed ring	Dry cooler with packing material
Specific Gravity	2.5" O.D. x 3" sealed ring or plastic bag for bulk sample	Dry cooler
Particle Size	2.5" O.D. x 3" sealed ring; plastic bag for gravelly soil	Dry cooler
Atterberg Limits	2.5" O.D. x 3" sealed ring or plastic bag	Dry cooler preferred
Proctor Tests	5 gallon plastic bucket or large plastic bags	No shipping requirements
Compression Tests	Unextruded in thin-walled tube; extruded wrapped in cellophane wrap and placed in plastic tube; or 2.5" O.D. x 6" sealed ring	Dry cooler with packing material

TABLE 13.3.2-2. SOIL PHYSICAL SAMPLE VOLUME REQUIREMENTS

SAMPLE REQUIREMENTS FOR ADDITIONAL TESTS	PRIMARY TEST REQUESTED											
	Moisture Content (volumetric)	Hydraulic Conductivity K_{sat}	Hydraulic Conductivity K_{unsat}	Moisture Retention Ψ - Θ	Air Permeability K_{air}	Bulk Density	Porosity (Calculated)	Porosity (Air Pycnometer)	Particle Density	Particle Size Analysis	Atterberg Limits	Compaction (Proctor) Test
Moisture Content (Volumetric)		Same Sample	(3) Same Sample	Same Sample	Same Sample	Same Sample	Same Sample	Same Sample	(1) Same Sample	(1) Same Sample	Extra Sample	Extra Sample
Hydraulic Conductivity	Same Sample		(3) Same Sample	Same Sample	Same Sample	Same Sample	Same Sample	Same Sample	(1) Same Sample	(1) Same Sample	Extra Sample	Extra Sample
Hydraulic Conductivity	(3) Same Sample	Same Sample		Same Sample	Same Sample	Same Sample	Same Sample	Same Sample	(1) Same Sample	(1) Same Sample	Extra Sample	Extra Sample
Moisture Retention	Same Sample	Same Sample	(3) Same Sample		Same Sample	Same Sample	Same Sample	Same Sample	(1) Same Sample	(1) Same Sample	Extra Sample	Extra Sample
Air Permeability	Same Sample	Same Sample	(4) Same Sample	Same Sample		Same Sample	Same Sample	Same Sample	(1) Same Sample	(1) Same Sample	Extra Sample	Extra Sample
Bulk Density	Same Sample	Same Sample	(4) Same Sample	Same Sample	Same Sample		(5) Same Sample	Same Sample	(1) Same Sample	(1) Same Sample	Extra Sample	Extra Sample
Porosity (Calculated)	Same Sample	Same Sample	(4) Same Sample	Same Sample	Same Sample	Same Sample		Same Sample	(1) Same Sample	(1) Same Sample	Extra Sample	Extra Sample
Porosity (Air)	Same Sample	Same Sample	(4) Same Sample	Same Sample	Same Sample	Same Sample	Same Sample		(1) Same Sample	(1) Same Sample	Extra Sample	Extra Sample
Particle Density	Same Sample	Same Sample	Same Sample	Same Sample	Same Sample	Same Sample	(6) Same Sample	Same Sample		Same Sample	Same Sample	Extra Sample
Particle Size Analysis	(2) Extra Sample	(2) Extra Sample	(2) Extra Sample	(2) Extra Sample	(2) Extra Sample	(2) Extra Sample	(2) Extra Sample	(2) Extra Sample	(2) Extra Sample		Extra Sample	Extra Sample
Atterberg Limits	Extra Sample	Extra Sample	Extra Sample	Extra Sample	Extra Sample	Extra Sample	Extra Sample	Extra Sample	Same Sample	Extra Sample		Extra Sample
Compaction (Proctor)	Extra Sample	Extra Sample	Extra Sample	Extra Sample	Extra Sample	Extra Sample	Extra Sample	Extra Sample	Extra Sample	Extra Sample	Extra Sample	

(1) Same sample may be run for this additional test provided sample is in a sample ring and meets the sample size requirements for the additional test.

(2) Same sample may be used if sample meets sample size requirements for additional test (is there sufficient sample; usually only fine-grained samples will meet this requirement).

(3) Required for all unsaturated hydraulic conductivity calculations except column imbibition method.

(4) Same sample may be used except for column imbibition test.

(5) Additional test required to perform calculations of primary test.

(6) Additional test preferred for best results of primary test.

TABLE 13.3.2-3. SOIL SAMPLING FIELD EQUIPMENT LIST

ITEM	DESCRIPTION
1. Soil Kit	Geologic hammer Electrical and solvent-free tape Flagging tape Assorted sharpies Munsel Soil Color Chart Grain size chart USCS Soil Classification Guide Carpenter's rule (6 feet marked in tenths) Spatulas Dilute Hydrochloride acid
2. Boring Log forms and clip board	
3. Field book	
4. Meters:	Photoionization Detector MX25 explosivity meter Water level meter Flame Ionization Detector or methane meter Geiger-Mueller radiation meter
5. Tagline:	Fiberglass with weight taped OR Steel tape with steel weight and no tape to attach weight
6. 300-foot fiberglass tape	
7. Latex gloves (2 or more boxes)	
8. Health and Safety kits:	Earplugs Hard hat Steel-toed boots Safety glasses Tyvek, Respirator
9. Coolers:	One for food only 3 or more for samples

TABLE 13.3.2-3. SOILS SAMPLING FIELD EQUIPMENT LIST (CONTINUED)

ITEM	DESCRIPTION
10. Decontamination:	3 plastic tubs Plastic brushes Liquinox Distilled water, 10-15 gallons minimum Paper towels Garbage bags (large/small)
11. Soil sample containers:	Brass rings (for soil physical properties) Stainless steel rings (for organic chem analyses) Teflon liners (for organic chem analyses) Plastic endcaps Sealing tape and/or purifier wax Glass jars (4 or 8 oz for chemical analyses) Quart and gallon ziplock bags

DANIEL B. STEPHENS & ASSOCIATES, INC.

Chain of Custody

To:

______________________ Date ____________ Project No. ____________

______________________ Client ____________

______________________ Relinquished by ____________

Sent by: ☐ Fed Ex ☐ DHL ☐ Other ____________

Purpose of Shipment ____________

Possible Contaminants ____________

Item No.	Sample No.	Analysis to be Done	Sample Container	Comments

Date Received ____________ by ____________
Company Representative

Received the above articles in good condition

Except as noted ____________

DBS&A Form No. 095 5/92

Section 13.4

Well Design, Installation, and Abandonment

1. PURPOSE

This section provides standard operating procedures (SOPs) and standard operating guidelines (SOGs) for the design, installation, and abandonment of wells.

2. SCOPE

The SOPs and SOGs included in this section are applicable to all DBS&A employees, and its contractors and subcontractors, for the conduct of all activities listed in this section. **All SOPs and SOGs described in this section are proprietary in nature and shall not be copied or reproduced, or distributed to any person or organization not employed by DBS&A, without the expressed written approval of the Systems Operations Manager or President of DBS&A.** The scope of the procedures described in this section include the following:

13.4.1 Monitor Well Design and Installation
13.4.2 Extraction Well Design and Installation
13.4.3 Well Development
13.4.4 Well and Boring Abandonment
13.4.5 Well Grouting

3. PROCEDURES

These SOPs and SOGs shall be reviewed and updated at least once annually by the Systems Operations Manager (SOM), or person(s) designated by the SOM. Revisions and additions to these SOPs and SOGs shall be made as needed to assure consistency with industry standards and the collection of high quality data in the field. Requests for revisions shall be made on Form No. 127 in accordance with the procedure described in Section 0.2 of the DBS&A Operations Manual. Form No. 043 of Section 2.2 shall be used in requesting, authorizing, and documenting any SOP/SOG, or part of any SOP/SOG, copied or distributed for uses described in Section 13.4 of the Operations Manual. All or parts of the SOPs/SOGs described in this section may be reproduced and used in DBS&A reports, proposals, and work plans with the verbal consent of either the SOM or President of DBS&A. The SOM shall be responsible for filing and maintaining requests made on Form Nos. 127 and 043.

Prepared by: _______________

Reviewed by: _______________
Quality Assurance Manager

Approved by: _______________
Daniel B. Stephens

Reviewed by: _______________
Systems Operations Manager

Section 13.4.1

Monitor Well Design and Installation

1. PURPOSE

This section provides standard operating guidelines (SOGs) for monitor well design and installation.

2. SCOPE

The SOGs included in this section are applicable to all DBS&A employees, and its contractors and subcontractors, for the conduct of all activities listed in this section. This procedure is applicable to all DBS&A employees and subcontractors who are engaged in monitor well design and installation activities. Tables 13.4.1-1 and 13.4.1-2 will aid in the selection of casing, screen and riser materials and bentonite or cement grouting materials. Figures 13.4.1-1 and 13.4.1-2 are respectively diagrams for typical shallow zone (single-cased) and deep zone (multi-cased) wells used at DBS&A. Attachment 1 to this SOG is a material supply list (Form No. 118, 6/93) and should be used in the preparation of monitor well design and installation activities. Also, a well completion record (Form No. 048) included as Attachment 2, which will be used to record well design and installation information in the field. The scope of the procedures described in this section include the following:

- Initial Site Characterization
- Monitor Well Design
- Monitor Well Installation

Standards for monitor well design and installation are described in ASTM D 5092-90 ("Standard Practice for Design and Installation of Ground Water Monitoring Wells in Aquifers"). Also, DBS&A technical representatives are required to follow all applicable state regulations pertaining to monitor well design and installation. Refer to Driscoll (1986), EPA (September 1986) or Aller et. al. (1989) for more detailed guidelines about the above subjects as they relate to the design and installation of monitor wells.

3. GUIDELINES

3.1 Initial Site Characterization (ASTM D 5092-90)

A conceptual hydrogeologic model that identifies potential flow paths and the target monitoring zone(s) should be developed prior to monitor well design and installation. The following steps for initial site characterization are recommended:

1. Conduct an initial visit to identify and locate aquifers and zones with the greatest potential to contain and transmit ground water and contaminants from the project area and study exposed soil and rocks within or near the project area for soil color and textural changes, landslides, faults, seeps, and springs.
2. Collect and review literature from previous investigations of the project area (i.e. topographic maps, aerial imagery, site ownership and utilization records, geologic and hydrogeologic maps

and reports, mineral resource surveys, water well logs, and personal information from local well drillers).

3. Develop a preliminary conceptual model of the project area using the information gathered during the initial site visit and literature search. Target specific aquifers and/or ground-water zones for additional characterization based on the known hydrogeology and potential contaminant characteristics (e.g., screen across water table for LNAPLs; include a sump for DNAPLs).

3.2 Monitor Well Materials and Design (ASTM D 5092-90)

The following materials and design are for typical shallow zone (single-cased) and deep zone (multi-cased) wells. Figure 13.4.1-1 is a diagram showing a typical design for a shallow zone (single-cased) well used at DBS&A. Figure 13.4.1-2 is a diagram showing a typical design for a deep zone (multi-cased) well used at DBS&A. Attachment 1 to this SOG is a material supply list (Form No. 118) for monitor well installation and should be completed and checked prior to the field stage of the drilling program by both DBS&A and the drilling subcontractor. Attachment 1 to this SOG should be used in conjunction with the "Drilling Information Checklist" and the "Drilling Equipment and Support Vehicles Checklist" (Form Nos. 116 and 117, Section 13.3.1 of the Operations Manual).

3.2.1 Water

Water used in the drilling process, to prepare grout mixtures and to decontaminate the well screen, riser, and annular sealant injection equipment, should be obtained from a source of known chemistry or should be characterized. The chemical analysis should confirm that the added water does not contain constituents that could compromise the integrity of the well installation or that may be potential contaminants.

3.2.2 Filter Pack

1. The grain-size distribution curve for the filter pack is selected by multiplying the 70% retained size of the finest formation sample by 3 or 4. Typically 10/20 silica sand is usually appropriate for the filter pack.

2. Do not select too fine a filter pack because this will reduce the yield of the well, causing longer sampling times.

3. Uniformity coefficients for filter pack materials should range from 1 to 3.

4. All filter pack material should be purchased from reputable suppliers who have properly cleaned and bagged the material.

5. To prevent downward migration of the bentonite or cement into the screen, the filter pack is extended at least 2 to 15 feet above the top of the screen.

6. The filter pack should not extend into an overlying water-bearing formation because this could permit downward vertical seepage in the pack and either dilute or add to the contamination of the water being monitored.

3.2.3 Well Screen

1. The well screen should be new, machine-slotted or continuous wrapped wire-wound, and composed of materials that are inert to the subsurface water being tested. Table 13.4.1-1 lists the advantages and disadvantages of several common screen materials.

2. The well screen material should be certified by the manufacturer as clean.

3. If not certified by the manufacturer as clean, the well screen should be steam cleaned or high-pressure water cleaned (if appropriate for the selected well screen materials) with water from a source of known chemistry immediately prior to installation.

4. The screen should be plugged at the bottom with the same material as the well screen.

5. The minimum nominal internal diameter of the well screen should be chosen based on the criteria that it will permit effective development and rapid sample recovery. In most instances, a minimal diameter of 2 inches (50 mm) is needed to allow for the introduction and withdrawal of sampling devices.

6. The slot size of the well screen should retain filter pack or natural formation along with permitting efficient development of the wells.

3.2.4 Riser

1. The riser should be new and composed of materials that are inert to the subsurface water being tested. Table 13.4.1-1 lists the advantages and disadvantages of riser materials.

2. The riser material should be certified by the manufacturer as clean.

3. If not certified by the manufacturer as clean, each section of the riser should be steam cleaned or high-pressure water cleaned (if appropriate for the selected material) using water from a source of known chemistry immediately prior to installation.

4. The minimal nominal internal diameter of the riser should be chosen based on the criteria that it will permit effective development and rapid sample recovery. In most instances, a minimum of 2 inches (50 mm) is needed to accommodate sampling devices.

5. Threaded joints are recommended. Alternatively, O-rings composed of materials that would not affect the subsurface water being sampled may be selected for use on flush joint threads.

3.2.5 Casing

1. The casing material should be new and composed of materials that are inert to the subsurface water being tested. Table 13.4.1-1 lists the advantages and disadvantages of casing materials. The exterior casing (temporary or permanent multi-cased wells) is generally constructed of steel although other appropriate materials may be used.

2. Where conditions warrant, the use of permanent casing installed to prevent communication between water-bearing zones is encouraged.

3. The casing material should be certified by the manufacturer as clean.

4. If not certified by the manufacturer as clean, the casing material should be steam cleaned or high-pressure water cleaned (if appropriate for the selected material) using water from a source of known chemistry immediately prior to installation.

5. The material type and minimum wall thickness of the casing should be adequate to withstand forces of installation.

6. All casing that is to remain as a permanent part of the installation (that is, multi-cased wells) should be new and cleaned of interior and exterior protective coatings.

7. The minimal nominal internal diameter of the riser should be chosen based on the criteria that it will permit effective development and rapid sample recovery. In most instances, a minimum of 2 inches (50 mm) is needed to accommodate sampling devices.

8. The diameter of the casing for filter packed wells should be selected so that a minimum annular space of 2 inches (50 mm) is maintained between the inside diameter of the casing and the outside diameter of the riser. In addition, the diameter of the casings in multi-cased wells should be selected so that a minimum annular space of 2 inches is maintained between the casing and the borehole (that is, a 2-inch diameter screen will require first setting a 6-inch (152-mm) diameter casing in a 10-inch (254-mm) diameter boring).

9. The ends of each casing section should be either flush-threaded or bevelled for welding.

3.2.6 Annular Sealants

The materials used to seal the annulus may be prepared as a slurry or used unmixed in a dry pellet, granular, or chip form. Sealants should be selected to be compatible with ambient geologic, hydrogeologic, and climatic conditions and any man-induced conditions anticipated to occur during the life of the well. Table 13.4.1-2 lists the advantages and disadvantages of using bentonite or cement as grouting material for monitor wells. The following guidelines for the bentonite seal and grout backfill should be considered:

1. A bentonite seal of at least 2 feet is placed above the filter pack. Bentonite should be powdered, granular, pelletized, or chipped sodium montmorillonite furnished in sacks or buckets from a commercial source and free of impurities which adversely impact the water quality in the well. The diameter of pellets or chips selected for monitoring well construction should be less than one fifth the width of the annular space into which they are placed to reduce the potential for bridging.

2. The grout backfill that is placed above the bentonite seal is ordinarily a liquid slurry consisting of either a bentonite (powder or granules, or both) base and water or a Portland cement base and water. A mixture of bentonite and Portland cement can be used for the grout backfill. Refer to ASTM D 5092-90 for standards in mixing and placing the grout backfill.

3.2.7 Annular Seal Equipment

Prior to use, the equipment used to inject the annular seals and filter pack should be steam cleaned or high-pressure water cleaned (if appropriate for the selected material) using water from a known chemical source. This procedure is performed to prevent the introduction of materials that may ultimately alter the water sample quality.

3.3 Monitor Well Installation (ASTM D 5092-90)

A well completion diagram (DBS&A Form No. 048, Attachment 2) should be completed as an on-going process during the installation of the monitor well. General steps for monitor well installation are as follows:

1. A stable borehole must be constructed prior to installing the monitor well casing, screen and riser (refer to Section 13.3.1 of the Operations Manual for drilling guidelines).

2. The well casing, screen, riser, and bottom plug materials should either be certified by the manufacturer as clean or cleaned with a steam cleaner or high-pressure water combined with a low-sudsing soap or detergent.

3. Working components of the drilling rig (drill pipe, subs, collars, belly, and all parts of the rig chasis near the borehole) should be cleaned as described in step no. 2.

4. All plastic screens and casing should be joined by threads and couplings or flush threads to prevent contamination from solvent glues.

5. The well screen and riser assembly can be lowered to the predetermined level and held into position by a ballast or hydraulic arms on the drilling rig. The assembly must be installed straight with the appropriate centralizers to allow for the introduction and withdrawal of sampling devices.

6. The riser should extend above grade and be capped temporarily to deter entrance of foreign materials during completion operations.

7. The volume of filter pack (gravel and/or silica sand) required to fill the annular space between the well screen and borehole should be estimated, measured during installation, and recorded on the well completion diagram during installation.

8. The filter pack is placed in the annulus from the bottom of the borehole up to 2 to 5 feet above the well screen.

9. If used, the temporary casing or hollow stem auger is withdrawn, usually in stipulated increments. Care should be taken to minimize lifting the riser with the withdrawal of the temporary casing/augers. To limit borehole collapse, the temporary casing or hollow stem auger is usually withdrawn until the lower most point on the temporary casing or hollow stem auger is at least 2 feet, but no more than 5 feet, above the filter pack for unconsolidated materials or at least 5 feet, but no more than 10 feet, for consolidated materials.

10. A bentonite pellet or a slurry seal is placed in the annulus between the borehole and the riser pipe on top of the filter pack. To be effective, the bentonite seal should extend above the filter pack a minimum of 2 feet, depending on local conditions.

11. Sufficient time should be allowed for the bentonite pellet seal to hydrate or the slurry annular seal to expand prior to grouting the remaining annulus. The volume and elevation of the bentonite seal material should be measured and recorded on the well completion diagram.

12. The volume and location of grout used to backfill the remaining annular space is recorded on the well completion diagram. An ample volume of grout should be premixed on site to compensate for unexpected losses.

13. Grout is introduced in one continuous operation until full strength grout flows out at the ground surface without evidence of drill cuttings or fluid.

14. The riser or casing or both should not be disturbed until the grout sets and cures for the amount of time necessary to prevent a break in the seal between the grout and riser, or grout and casing, or both.

15. Specific grouting procedures for single- and multi-cased wells are included in ASTM D 5092-90.

16. Well protection refers specifically to installations made at the ground surface to deter unauthorized entry to the monitor well and to prevent surface water from entering the annulus. Typically a concrete pad, protective shroud with a lock, and vented cap are placed on monitor wells constructed for DBS&A projects.

17. In areas where there is a high probability of damaging the well (high traffic, heavy equipment, poor visibility), it may be necessary to enhance the normal protection of the monitor well through the use of posts, markers, signs, etc.

18. Once the monitor well installation is complete, the well should be developed according to standards outlined in Section 13.4.3 of the Operations Manual.

19. The drilling subcontractor is required to file a well record with the State Engineer within 10 days after completion of the well.

4. ATTACHMENTS

- Table 13.4.1-1
- Table 13.4.1.2
- Figure 13.4.1-1
- Figure 13.4.1.2

1. Monitor Well Installation Supply List (DBS&A Form No. 118, 6/93)
2. Well Completion Record (DBS&A Form No. 048)

5. REFERENCES

Aller, L., T.W. Bennett, G. Hackett, R.J. Petty, J.H. Lehr, H. Sedoris, D.M. Nielson, and J.E. Denne. 1989. Handbook of Suggested Practices for the Design and Installation of Ground-Water Monitoring Well Design and Installation. National Well Water Association. Dublin, OH. 398 p.

Arizona Department of Water Resources. Undated. Well Construction and Licensing of Well Drillers, Handbook.

ASTM. 1990. Standard Practice for Design and Installation of Ground Water Monitoring Wells in Aquifers. Standard D 5092-90. Philadelphia, PA.

Driscoll, F.G. 1986. Groundwater and Wells. Johnson Division. St. Paul, MN. 1089 p.

EPA. 1986. RCRA Ground-Water Monitoring Technical Enforcement Guidance Document. U.S. EPA. Washington, D.C. September. 208 p. and 3 Appendices.

Prepared by: Natalyn K. Ala

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Quality Assurance Manager

Approved by: [signature]
Daniel B. Stephens

Reviewed by: [signature]
Systems Operations Manager

Table 13.4.1-1 Well Casing, Screen, and Riser Materials

Type	Advantages	Disadvantages
Stainless steel	• Least absorption of halogenated and aromatic hydrocarbons • High strength at a great range of temperatures • Excellent resistance to corrosion and oxidation • Readily available in all diameters and slot sizes	• Heavier than plastics • May corrode and leach some chromium in highly acidic waters • May act as a catalyst in some organic reactions • Screens are higher priced than plastic screens
PVC (Polyvinyl-chloride)	• Lightweight • Excellent chemical resistance to weak alkalies, alcohols, aliphatic hydrocarbons, and oils • Good chemical resistance to strong mineral acids, concentrated oxidizing acids, and strong alkalies • Readily available • Low priced compared to a stainless steel and Teflon	• Weaker, less rigid, and more temperature sensitive than metallic materials • May adsorb some constituents from ground water • May react with and leach some constituents from ground water • Poor chemical resistance to ketones, esters, and aromatic hydrocarbons
Teflon	• Good resistance to attack by most chemicals • Lightweight • High impact strength	• Screen slot openings may decrease in size over time • Tensile strength and wear resistance low compared to other engineering plastics • Expensive relative to other plastics and stainless steel
Mild steel	• Strong, rigid; temperature sensitivity not a problem • Readily available • Low priced relative to stainless steel and Teflon	• Heavier than plastics • May react with and leach some constituents into ground water • Not as chemically resistant as stainless steel

Table 13.4.1-1 Well Casing, Screen, and Riser Materials (Continued)

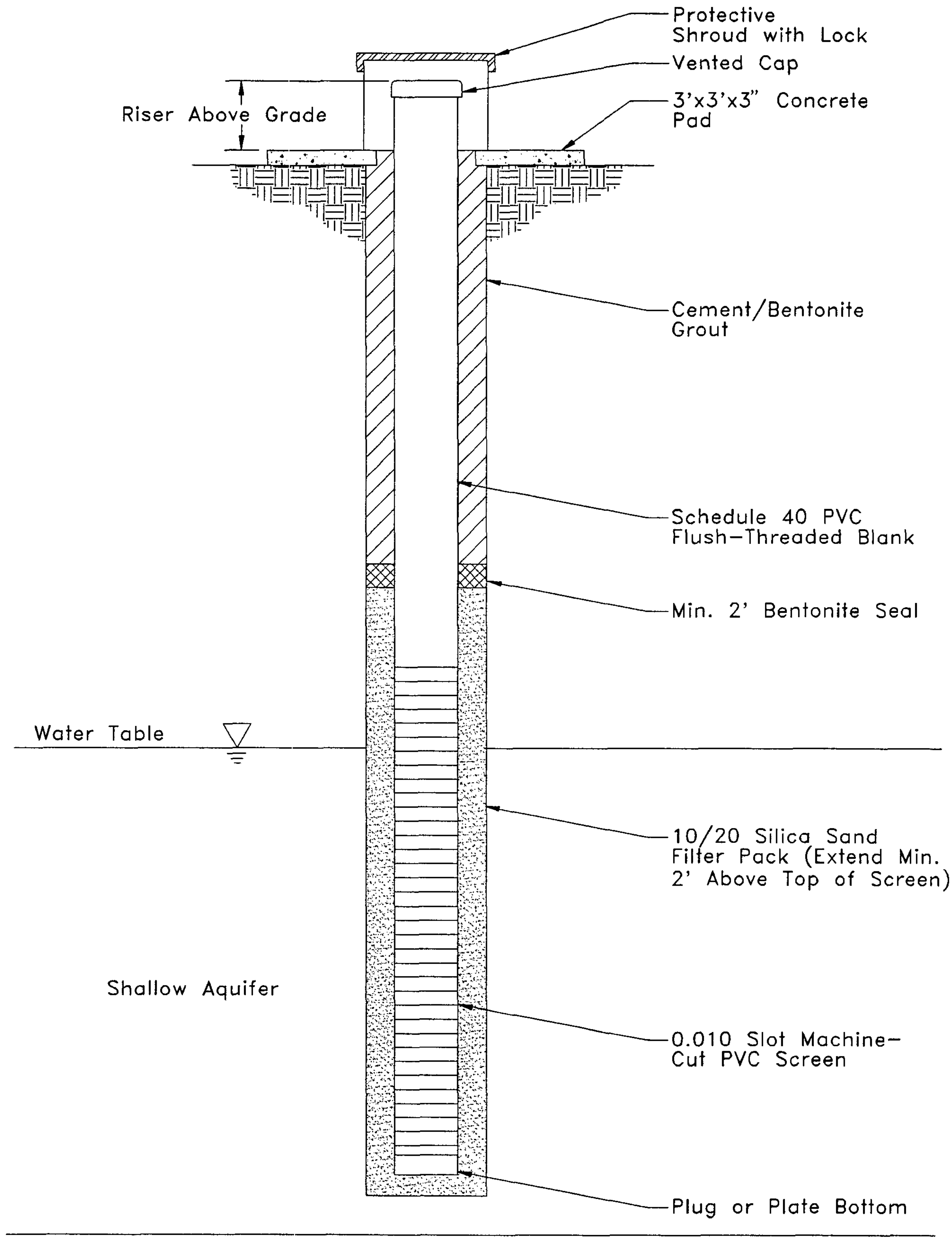
Type	Advantages	Disadvantages
Polypropylene	• Lightweight • Excellent chemical resistance to mineral acids • Good to excellent chemical resistance to alkalies, alcohols, ketones, and esters • Fair chemical resistance to concentrated oxidizing acids, aliphatic hydrocarbons, and aromatic hydrocarbons • Low priced compared to stainless steel and Teflon	• Weaker, less rigid, and more temperature sensitive than metallic materials • May react with and leach some constituents into ground water • Poor machinability--it cannot be slotted because it melts rather than cuts
Kynar	• Greater strength and water resistance than Teflon • Resistant to most chemicals and solvents • Lower priced than Teflon	• Not readily available • Poor chemical resistance to ketones, acetone

(After Driscoll, 1986)

Table 13.4.1-2. Grouting Materials for Monitoring Wells

Type	Advantages	Disadvantages
Bentonite	• Readily available • Inexpensive	• May produce chemical interference with water-quality analysis • May not provide a complete seal because: --There is a limit (14 percent) to the amount of solids that can be pumped in a slurry. Thus, there are few solids in the seal; should wait for liquid to bleed off so solids will settle --During installation, bentonite pellets may hydrate before reaching proper depth, thereby sticking to formation or casing and causing bridging --Cannot determine how effectively material has been placed --Cannot assure complete bond to casing
Cement	• Readily available • Inexpensive • Can use sand/or gravel filter • Possible to determine how well the cement has been placed by temperature logs or acoustic bond logs	• May cause chemical interferences with water-quality analysis • Requires mixer, pump, and tremie line; generally more cleanup than with bentonite • Shrinks when it sets; complete bond to formation and casing not assured

(After Driscoll, 1986)



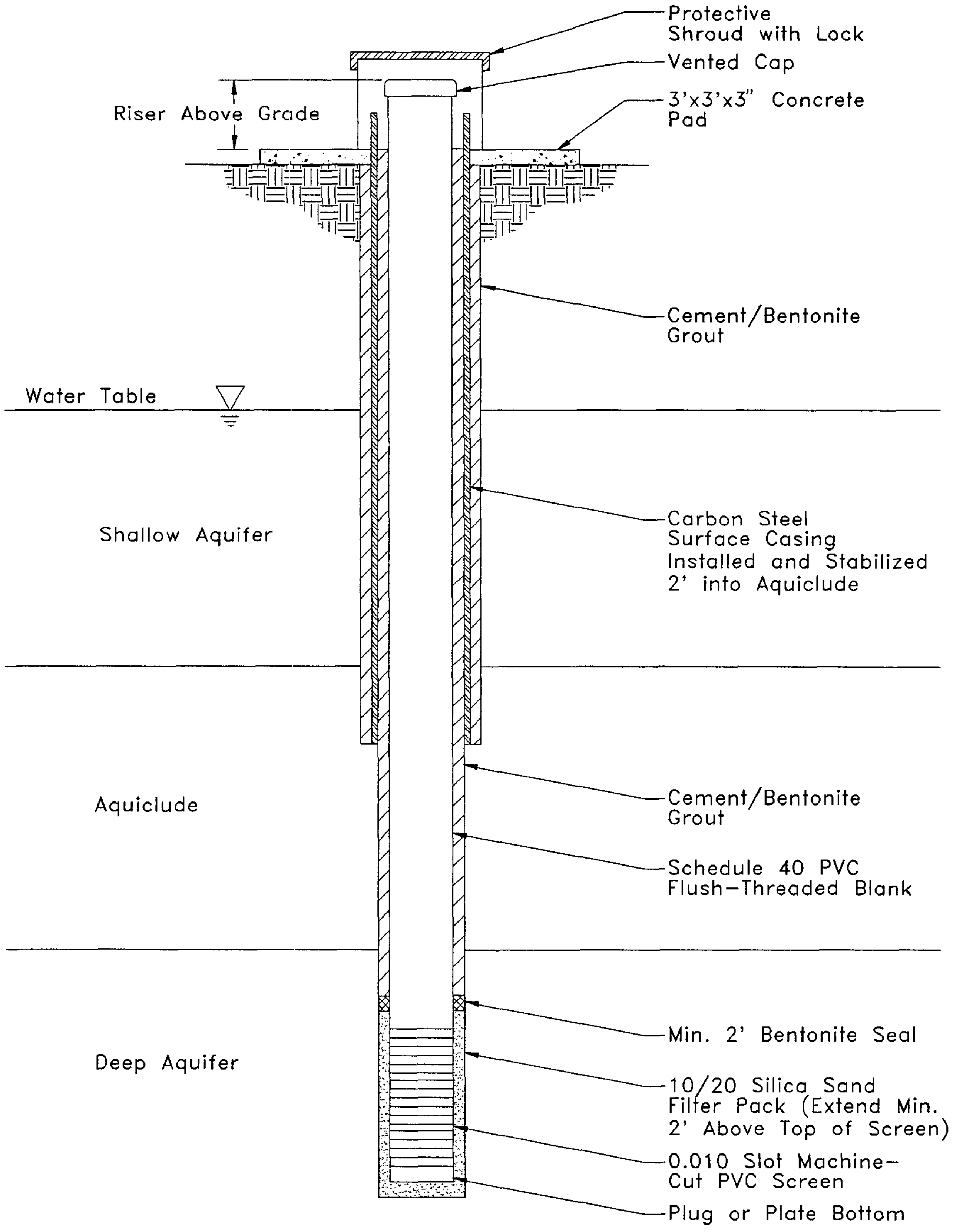
Not to Scale

TAA-RI/FS PHASE II

Typical Shallow Zone Monitor Well Design
Single-Cased Well

DANIEL B. STEPHENS & ASSOCIATES, INC.
10-93 3230

Figure 13.4.1-1



TAA-RI/FS PHASE II

Typical Deep Zone Monitor Well Design
Multi-Cased Well

Not to Scale

DANIEL B. STEPHENS & ASSOCIATES, INC.
10-93 3230

Figure 13.4.1-2

Monitor Well Installation Supply List

DANIEL B. STEPHENS & ASSOCIATES, INC.

Project No. ______________________ DBS&A Project Manager ______________________

DBS&A Technical Representative ______________________ DBS&A Field Representative(s) ______________________

Drilling Company ______________________

Drilling Company Contact ______________________ Phone No. ______________________

Date and Time for Work to Begin ______________________

Material	Size	Quantity	Equipment Supplier*
Sand			
Sand			
Pea Gravel			
Bentonite Powder			
Bentonite Pellets			
Bentonite Chips (Ca-montmorill. Slow, NA-montmorill. Fast Hydration)			
PVC (Flush-Threaded Schedule 40)			
PVC (Flush-Threaded Schedule 40)			
PVC (Flush-Threaded Schedule 40)			
PCV Screen Schedule 40 with Slot__________			
PCV Screen Schedule 40 with Slot__________			
PCV Screen Schedule 40 with Slot__________			
Stainless Steel Channel Pack			
Steel Conductor Casing			
Slip Caps			
Slip Caps			
Threaded Endcaps			
Threaded Endcaps			
Locking Caps			
Concrete			
Portland Cement			
Locking Well Vault			

DBS&A Form No. 118 6/93

*DBS&A or Other (specify)

DANIEL B. STEPHENS & ASSOCIATES, INC.

ENVIRONMENTAL SCIENTISTS AND ENGINEERS

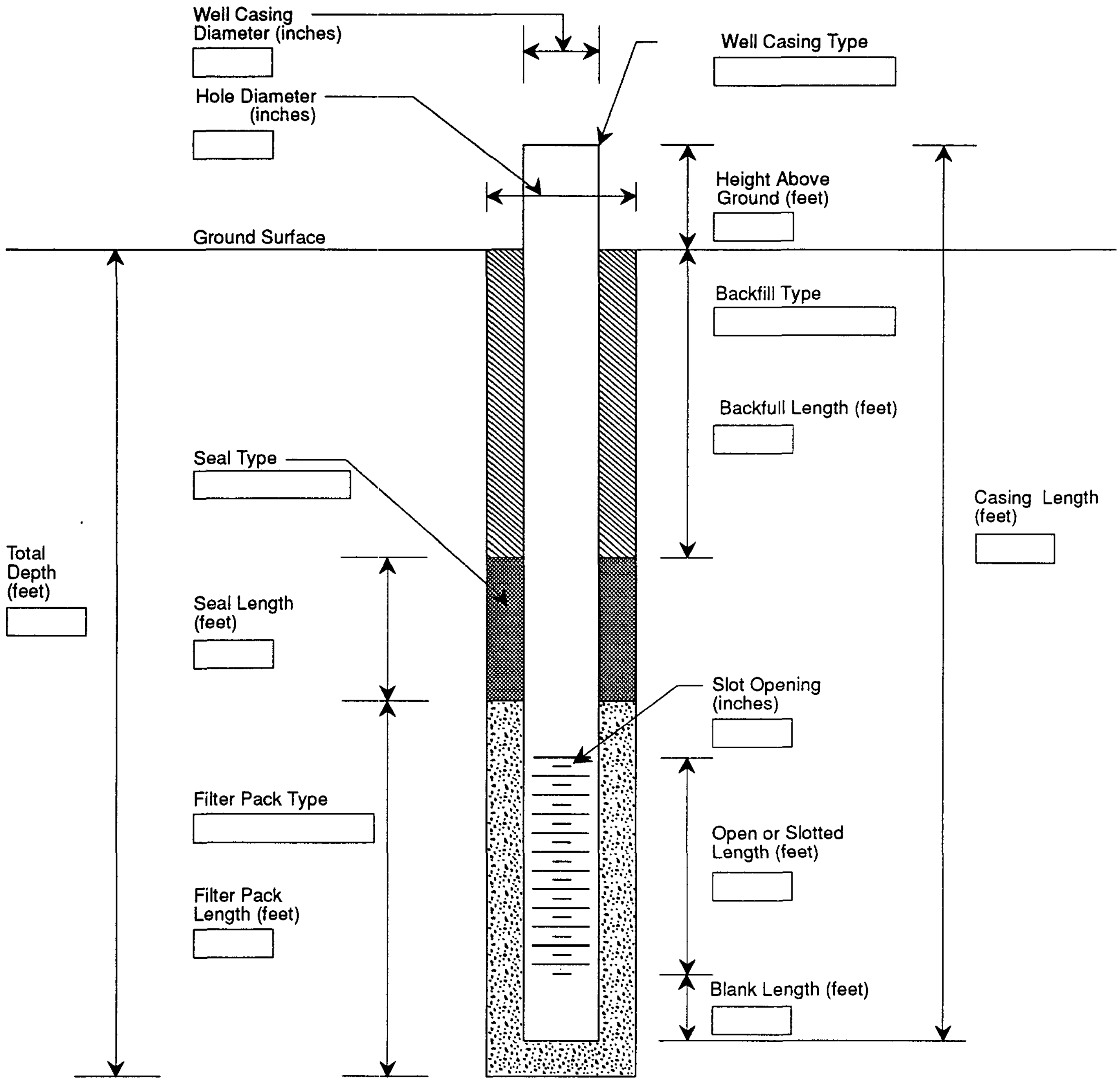
WELL COMPLETION RECORD

Client ______________________________ Project No. ______________

Well No. ____________ Site ______________________ Date Installed ______________

Formation of Completion ______________________________

DBS&A Personnel ______________________ Driller ______________________



Comments ______________________________

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Section 13.4.3

Well Development

1. PURPOSE

This section provides standard operating guidelines (SOGs) for well development.

2. SCOPE

This procedure is applicable to all DBS&A employees and subcontractors who are engaged in well development activities. Table 13.4.3-1 summarizes disadvantages and advantages for different well development methods. The scope of the procedures described in this section includes the following:

- Development Methods
- Duration of Well Development
- Well Recovery Test

Standards for well development are described in ASTM D 5092-90 ("Standard Practice for Design and Installation of Ground Water Monitoring Wells in Aquifers"). Refer to Driscoll (1986), EPA (September 1986) or Aller et al. (1989) for more detailed guidelines about well development.

3. GUIDELINES

Proper well development serves to 1) remove some finer grained material from the well screen and filter pack that may otherwise interfere with water quality analyses, 2) restore the ground-water properties disturbed during the drilling process, and 3) improve the hydraulic characteristics of the filter pack and hydraulic communication between the well and the hydrologic unit adjacent to the screened interval.

3.1 Development Methods (ASTM D 5092-90)

Methods of development most often used include mechanical surging and bailing or pumping, over-pumping, air-lift pumping, and well jetting. An important factor in any method is that the development work be started slowly and gently and be increased in vigor as the well is developed. most methods of well development require the application of sufficient energy to disturb the filter pack, thereby freeing the fines and allowing them to be drawn into the well. The coarser fractions then settle around and stabilize the screen. The well development method chosen should be documented in the field notebook. Table 13.4.3-1 summarizes the opinions of several references on well development methods and can be helpful in selecting an approximate method for development wells screened in varying hydrologic units.

3.1.1 Mechanical Surging

In this method, water is forced to flow into an out of the well screen by operating a plunger (or surge bock) or bailer up and down in the riser. A pump or bailer should then be used to remove the dislodged sediments following surging.

3.1.2 Over Pumping and Backwashing

The easiest, least expensive and most commonly employed technique of well deelopment is some form of pumping. With over pumping, the well is pumped at a rate considerably higher than it would be during normal operation. The fine-grain materials would be dislodged from the filter pack and surrounding strata influenced by the higher pumping rate. This method is usually conducted in conjunction with mechanical surging.

In the case where there is no backflow prevention valve installed, the pump can be alternately started and stopped. This is called backwashing. This starting and stopping allows the column of water that is intially picked up by the pump to be alternately dropped and raised up in a surging action. Each time the water column falls back into the well, an outward surge of water flows into the formation. This surge tends to loosen the bridging of the fine particles into and out of the well.

3.1.3 Air Lift Pumping

In this method, an air lift pump is operated by cycling the air pressure on and off for short periods of time. This operation will provide a surging action that will dislodge fine-grained particles. Applying a steady, low pressure will remove the fines that have been drawn into the well by the surging action. Efforts should be made (that is, through the use of a foot valve) to avoid pumping air into the filter pack and adjacent hydrologic unit because the air may lodge there and inhibit future sampling efforts and may alter ambient water chemistry. Furthermore, application of high air pressures should be avoided to prevent damage to small diameter PVC risers, screens, and filter packs.

3.1.4 Well Jetting

Another method of development involves jetting the well screen area with water while simultaneously air-lift pumping the well. However, the water added during this development procedure will alter the natural, ambient water quality and may be difficult to remove. Therefore, the water added should be obtained from a source with known chemistry. Water from the monitor well being developed may also be used if the suspended sediments are first removed.

3.2 Duration of Well Development (ASTM D 5092-90)

Well development should begin no sooner than 48 hours after the monitor well is completely installed and prior to water sampling. Development should be continued until representative water, free of the drilling fluids, cuttings, or other materials introduced during well construction is obtained. Representative water is assumed to have been obtained when pH, temperature, and specific conductivity readings stabilize and the water is visually clear of suspended solids. The minumum duration of well development will vary according to the method used to develop the well. The duration of well development and the pH, temperature, and specific conductivity readings should be recorded in the field notebook.

3.3 Well Recovery Test (ASTM D 5092-90)

A well recovery test can be performed immediately after and in conjunction with well development. The well recovery test not only provides an indication of well performnce but it may also provide data for determining the transmissivity of the screened hydrologic unit. Estimates of the hydraulic conductivity of the unit can then be determined. Readings should be taken at intervals suggested in Table 13.4.3-2 until the well has recovered to 90 percent of its static water level and recorded in the field notebook. Section 13.6 of the DBS&A Operations Manual describes methods for aquifer hydraulic testing specifically for establishing aquifer hydraulic parameters in greater detail.

Table 13.4.3-2 Suggested Recording Intervals for Well Recovery Tests

TIME SINCE STARTING TEST	TIME INTERVAL
0 to 15 min	1 min
15 to 50 min	5 min
50 to 100 min	10 min
100 to 300 min (5 hours)	30 min
300 to 1,440 min (24 hours)	60 min

4. ATTACHMENTS

- Table 13.4.3-1

5. REFERENCES

Aller, L., T.W. Bennett, G. Hackett, R.J. Petty, J.H. Lehr, H. Sedoris, D.M. Nielson, and J.E. Denne. 1989. Handbook of Suggested Practices for the Design and Installation of Ground-Water Monitoring Well Design and Installation. National Well Water Association. Dublin, OH. 398 p.

ASTM. 1990. Standard Practice for Design and Installation of Ground Water Monitoring Wells in Aquifers. Standard D 5092-90. Philadelphia, PA.

Driscoll, F.G. 1986. Groundwater and Wells. Johnson Division. St. Paul, MN. 1089 p.

EPA. 1986. RCRA Ground-Water Monitoring Technical Enforcement Guidance Document. U.S. EPA. Washington, D.C. September. 208 p. and 3 Appendices.

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Table 13.4.3-1. Summary of Well Development Methods

Reference	Over-pumping	Backwashing	Mechanical Surging		Well Jetting	Air-lift Pumping
			Surge Block	Bailer		
Gass (1986)	Works best in clean coarse formations and some consolidated rock; problems of water disposal and bridging	Breaks up bridging, low cost & simple; preferentially develops	Can be effective; size made for ≥ 2" well; preferential development where screen >5'; surge inside screen		Consolidated and unconsolidated application; opens fractures, develops discrete zones; disadvantage is external water needed	Replaces air surging; filter air
United States Environmental Protection Agency (1986)	Effective development requires flow reversal or surges to avoid bridges	Indirectly indicates method applicable; formation water should be used	Applicable; formation water should be used; in low-yield formation, outside water source can be used if analyzed to evaluate impact	Applicable		Air should not be used
Barcelona et al.** (1983)	Productive wells; surging by alternating pumping and allowing to equilibrate; hard to create sufficient entrance velocities; often used with airlift		Productive wells; use care to avoid casing and screen damage	Productive wells; more common than surge blocks but not as effective		
Scalf et al. (1981)		Suitable; periodic removal of lines	Suitable; common with cable-tool; not easily used on other rigs	Suitable; use sufficiently heavy bailer; advantage of removing fines; may be custom made for small diameters		Suitable

Table 13.4.3-1. Summary of Well Development Methods (Continued)

Reference	Over-pumping	Backwashing	Mechanical Surging		Well Jetting	Air-lift Pumping
			Surge Block	Bailer		
National Council of the Paper Industry for Air and Stream Improvement (1981)	Applicable; drawback of flow in one direction; smaller wells hard to pump if water level below suction		Applicable; caution against collapse of intake or plugging screen with clay		Methods introducing foreign materials should be avoided (i.e., compressed air or water jets)	
Everett (1980)	Development operation must cause flow reversal to avoid bridging; can alternate pump off and on		Suitable; periodic bailing to remove fines		High velocity jets of water generally most effective; discrete zones of development	
Keely and Boateng (1987 a and b)	Probably most desirable when surged; second series of evacuation/recovery cycles is recommended after resting the well for 24 hours; settlement and loosening of fines occurs after the first development attempt; not as vigorous as backwashing	Vigorous surging action may not be desirable due to disturbance of gravel pack	Method quite effective in loosening fines but may be inadvisable in that filter pack and fluids may be displaced to degree that damages value as a filtering media		Popular but less desirable; method different from water wells; water displaced by short downward bursts of high pressure injection; important not to jet air or water across screen because fines driven into screen cause irreversible blockage; may substantially displace native fluids	Air can become entrained behind screen and reduce permeability

* Schalia and Landick (1986) report on special 2' valved block
** For low hydraulic conductivity wells, flush water up annulus prior to sealing; afterwards pump
(Compiled by Aller et al, 1989)

Section 13.4.4

Well and Boring Abandonment

1. PURPOSE

This section provides standard operating guidelines (SOGs) for well and boring abandonment.

2. SCOPE

This procedure is applicable to all DBS&A employees and subcontractors who are engaged in well and boring abandonment activities. The scope of the procedures described in this section includes the following:

- Need for Sealing Wells and Restoration of Geological Conditions
- Sealing Requirements
- Records of Abandonment Procedures

Abandonment activities conducted by DBS&A personnel will follow all applicable state regulations pertaining to well and boring abandonment.

3. GUIDELINES

Abandoned wells need to be sealed carefully to prevent pollution of the ground water source, eliminate any physical hazard, conserve aquifer yield, maintain confined head conditions, and prevent poor-quality water of one aquifer from entering another. The purpose of sealing an abandoned well is to prevent any further disturbance to the pre-existing hydrogeologic conditions that exist within the subsurface. The plug should prevent vertical movement within the borehole and confine the water to the original zone of occurrence. Driscoll (1986), EPA (September 1986) or Aller et al. (1989) provide more detailed procedures and guidelines for abandonment of wells. The following subsections outline general procedures and guidelines for abandonment of test holes, partially completed wells, and completed wells.

3.1 Need for Sealing Wells and Restoration of Geological Conditions

Abandoned test holes, including test wells, uncompleted wells, and completed wells shall be sealed for the following reasons:

1. Eliminate physical hazard.
2. Prevent contamination of ground water.
3. Conserve yield and hydrostatic head of aquifers.
4. Prevent intermingling of desirable and undesirable waters.

The guiding principle to be followed by the contractor in the sealing of abandoned wells is the restoration, as far as feasible, of the controlling geological conditions that existed before the well was drilled or constructed.

3.2 Sealing Requirements

Sealing requirements are as follows:

1. A well shall be measured for depth before it is sealed to ensure freedom from obstructions that may interfere with effective sealing operations.

2. Removal of liner pipe from some wells may be necessary to ensure placement of an effective seal.

3. If the liner pipe cannot be readily removed, it shall be perforated to ensure the proper sealing required.

4. Concrete, cement grout, or neat cement shall be used as primary sealing materials and shall be placed from the bottom upward by methods that will avoid segregation or dilution of material.

3.3 Records of Abandonment Procedures

Complete, accurate information shall be recorded in the field notebook of the entire abandonment procedure to provide detailed records for possible future reference and to demonstrate to the government state or local agency that the hole was properly sealed. Particularly, the following should be recorded accurately:

1. The depth of each layer of all sealing and backfilling materials shall be recorded.

2. The quantity of sealing materials used shall be recorded. Measurements of static water levels and depths shall be recorded.

3. Any changes in the well made during the plugging, such as perforating casing, shall be recorded in detail.

The owner or well permit holder should notify the appropriate state or local agency of the abandonment.

4. REFERENCES

Aller, L., T.W. Bennett, G. Hackett, R.J. Petty, J.H. Lehr, H. Sedoris, D.M. Nielson, and J.E. Denne. 1989. Handbook of Suggested Practices for the Design and Installation of Ground-Water Monitoring Well Design and Installation. National Well Water Association. Dublin, OH. 398 p.

ASTM. 1990. Standard Practice for Design and Installation of Ground Water Monitoring Wells in Aquifers. Standard D 5092-90. Philadelphia, PA.

Driscoll, F.G. 1986. Groundwater and Wells. Johnson Division. St. Paul, MN. 1089 p.

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Section 13.5

Water Sampling

1. PURPOSE

The purpose of this standard operating procedure (SOP) is to present guidelines and procedures for collection, preservation, and shipment of water samples for laboratory chemical analysis. This SOP also outlines procedures for measurement of field water quality parameters during sample collection activities.

2. SCOPE

The SOPs included in this section are applicable to all DBS&A employees, and its contractors and subcontractors, for the conduct of all activities listed in this section. **All SOPs described in this section are proprietary in nature and shall not be copied or reproduced, or distributed to any person or organization not employed by DBS&A, without the expressed written approval of the Systems Operations Manager (SOM) or President of DBS&A.** The scope of the procedure described in this section includes the following:

13.5.1	Preparation for Water Sampling
13.5.2	Decontamination of Field Equipment
13.5.3	Measurement of Field Parameters
13.5.4	Collection of Ground-Water Samples
13.5.5	Collection of Surface Water Samples
13.5.6	Sample Preservation
13.5.7	Sample Filtration
13.5.8	Quality Assurance/Quality Control (QA/QC) Samples

This SOP includes guidelines for preparation for water sampling, collection of surface- and ground-water samples, sample preservation, chain of custody procedures, and quality assurance/quality control procedures. This SOP is applicable to the collection of surface- and ground-water samples to be analyzed for organic, inorganic and radionuclide constituents and for measurement of field parameters including temperature, conductivity, pH, alkalinity, oxidation/reduction potential (Eh), and dissolved oxygen.

3. PROCEDURES

These SOPs shall be reviewed and updated at least once annually by the Systems Operations Manager (SOM), or person(s) designated by the SOM. Revisions and additions to these SOPs shall be made as needed to assure consistency with industry standards and the collection of high quality data in the field. Requests for revisions shall be made on Form No. 127 in accordance with the procedure described in Section 0.2 of the DBS&A Operations Manual. The Proprietary Copy Request and Authorization Form (DBS&A Form No. 043) shall be used in requesting, authorizing, and documenting any SOP, or part of any SOP, copied or distributed for uses described in Section 13.5 of the Operations Manual. All or parts of the SOPs described in this section may be reproduced and used in DBS&A reports, proposals, and work plans with the verbal consent of either the SOM or President of DBS&A. The SOM shall be responsible for filing and maintaining requests made on Form Nos. 127 and 043.

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Section 13.5.1

Preparation for Water Sampling

1. PURPOSE

The following SOP defines activities to be completed prior to each sampling event. A checklist/summary of water sampling preparation activities is included as Attachment 1 to this SOP.

2. SCOPE

This procedure is applicable to all DBS&A employees and its contractors and subcontractors when preparing to sample water.

3. PROCEDURES

3.1 DBS&A Warehouse

Prior to any water sampling event, the water sampler shall requisition all necessary equipment and supplies by completing a DBS&A Field Equipment and Materials Load-Up Sheet (see Section 13.1.1 of the DBS&A Operations Manual) and giving it to the warehouse manager. The load-up sheet should be provided to the warehouse manager as much in advance as is possible, so that equipment and supply requisitions can be made.

All equipment to be used, with the exception of rental equipment, shall be calibrated and tested in the DBS&A warehouse by the warehouse manager prior to being sent to the field per the guidance prescribed in Section 13.1.1 of the DBS&A Operations Manual. Meter calibration shall be conducted in accordance with standard manufacturer recommended procedures using clean, fresh reagents. The warehouse manager shall ensure that all equipment is clean and in working order prior to leaving the DBS&A warehouse.

3.2 Analytical Laboratory

Prior to a water sampling event, the number and type of samples to be collected (field and quality assurance samples) shall be determined by the Project Manager (PM) or designated project Technical Representative (TR). The PM or project TR shall order appropriate sample containers (Section 13.1.1) from the analytical laboratory and shall inform the analytical laboratory of the expected arrival date of the samples, the analytes to be determined for each sample, and the required turnaround time. It is the water sampler's (Field Representative; FR) responsibility to confirm that all sample bottles have been received and are loaded for sampling. The duties and responsibilities of TRs and FRs are described in Section 13.2 of the DBS&A Operations Manual.

3.3 Site-Specific Instructions

The first time that a site is sampled, or the first time that any new location is sampled, the designated sample identification number shall be determined by the PM or TR prior to field sampling.

Prior to each water sampling event, the PM or TR shall compile a list of samples (including quality assurance samples) to be collected. The order in which the samples should be collected shall also be listed. In general, locations with the lowest concentrations of select analytes shall be sampled before wells with higher concentrations, so the potential for cross-contamination can be minimized. The PM or TR will also list any special procedures that are unique to the site or to the sampling event.

Before each sampling round, the PM or TR shall make all access arrangements with the client and/or property owners. The FR(s) will confirm that access arrangements have been made and should determine if additional on-site access procedures are required.

Prior to leaving for the field, FR(s) shall assemble and be familiar with materials that describe the general conditions of the site, the hydrogeology, well completion information, and objectives of the sampling program. The project health and safety plan shall also be consulted before initiation of the field program.

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Section 13.5.2

Decontamination of Field Equipment

1. PURPOSE

The following SOP defines activities required to decontaminate water sampling equipment in order to prevent cross-contamination of samples from different sampling locations.

2. SCOPE

This procedure is applicable to all DBS&A employees and its contractors and subcontractors involved in water sampling activities.

3. PROCEDURES

All non-disposable field equipment that may potentially come in contact with any water sample shall be decontaminated in order to minimize the potential for cross-contamination between sampling locations. Thorough decontamination of all sampling equipment shall be conducted in the warehouse before each sampling event. In addition, the FR shall decontaminate all equipment in the field as required to prevent cross-contamination of water samples (see Section 13.1.1 of the DBS&A Operations Manual). The procedures described in this section are specifically for field decontamination of sampling equipment.

For wells or surface waters to be sampled for inorganics and/or metals, or for locations outside of the area of known contamination, the following procedures shall be used:

1. Wash the equipment in a solution of non-phosphate detergent (Liquinox) and distilled/deionized water. All surfaces that may come in direct contact with the samples shall be washed. Use a clean Nalgene tub to contain the wash solution and a scrub brush to mechanically remove loose particles. Wear clean latex or plastic gloves during all washing and rinsing operations.

2. Rinse twice with distilled/deionized water.

3. Dry the equipment before use, to the extent practical.

If the sample is collected from a highly contaminated area or is to be analyzed for organics, follow steps 1 and 2, then rinse once more with organic-free water obtained from the laboratory or other supplier. Contain all wash solutions for proper disposal.

4. REFERENCES

- American Petroleum Institute. 1987. Manual of Sampling and Analytical Methods for Petroleum Hydrocarbons in Groundwater and Soil. API Publication No. 4449. American Petroleum Institute, Washington. DBS&A #3600/API.

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Section 13.5.3

Measurement of Field Parameters

1. PURPOSE

This section outlines procedures for field measurement of electrical conductivity, temperature, pH, alkalinity, oxidation/reduction potential (Eh), and dissolved oxygen (DO).

2. SCOPE

This procedure is applicable to all DBS&A employees and its contractors and subcontractors involved in water sampling activities. These parameters should be measured during monitor well purging prior to sampling. Surface water samples should also be characterized when they are collected.

3. PROCEDURES

3.1 Conductivity and Temperature

This SOP describes the procedure for determining the specific conductance (conductivity) and temperature of a water sample using the YSI Model 33 SCT Meter. Conductance, or conductivity, is a measure of the ease of flow of electric current, and is the inverse (reciprocal) of resistivity. The term specific conductance (SpC), sometimes referred to simply as "conductivity," is defined as the electrical conductance that would occur through the water between the faces of a 1-cm cube of the water. SpC is usually reported in units of µmhos/cm, which has recently been renamed microsiemens per centimeter (µS/cm). By measuring the specific conductance of a water sample in the field, one can estimate the total dissolved solids (TDS) concentration of the water using the approximate conversion TDS = 0.6 x SpC. Because the SpC of a water allows rapid determination of TDS (salinity), SpC is probably the single most useful water quality parameter.

The conductance of water containing dissolved ions increases with increasing temperature of the water. The temperature dependence varies for different waters and is dependent on the type and concentrations of dissolved ions, but an approximate rule of thumb is that SpC increases 2% per °C temperature increase. For quantitative comparison of SpC values measured on different water samples at different field temperatures, it is necessary to correct all values to the SpC at 25°C. For most qualitative work, however, this is unnecessary. Whether or not temperature corrections are to be applied, the SpC value as measured at field temperature should always be recorded in the field logbook (see Section 13.2.6 of the DBS&A Operations Manual), along with the temperature of the water sample at the time the measurement was made.

The following equipment is needed to measure SpC in the field:

- YSI Model 33 SCT Meter & probe
- Spare D-cell batteries
- Beaker for water sample
- Deionized water in squirt bottle
- KCl conductivity standard solution

The following procedure shall be used to measure SpC in the field:

1. Verify that the meter needle rests on zero prior to turning on the meter. If not, adjust it to zero using the set screw on the face of the meter movement.

2. Calibrate the meter by turning the *MODE* switch to *REDLINE* and adjusting the *REDLINE* control knob until the needle lines up with the small red line on the meter scale. (If unable to calibrate meter, replace the batteries.)

3. Plug in probe cable, and insert gray plastic probe into water sample. Allow at least one minute for temperature equilibration of probe.

4. Set *MODE* control to *TEMPERATURE* and record the temperature of the water sample in the field logbook. (Note that the temperature scale is at the bottom of the meter face and that the values decrease to the right)

5. Switch the *MODE* control to the conductivity setting that gives the maximum needle deflection without going offscale (X100, X10, or X1). Do not allow the probe to touch the sides or bottom of the beaker when making a measurement because this can result in a low reading.

6. Record the SpC value, remembering to multiply the meter reading by the appropriate factor if using the X10 or X100 settings.

7. Rinse the probe with deionized water prior to making another measurement or putting the instrument away.

Other information about the YSI Model 33 SCT Meter may be needed occasionally:

- The probe preferably should be stored in deionized water between uses during each day of field work. If the probe has been stored dry, it is recommended that it be soaked in deionized water at the start of the day prior to making any measurements. This is not absolutely essential, however.

- The *SALINITY* mode will not ordinarily be used unless dealing with brines or other samples with salinity of seawater or above. The *TEMPERATURE* potentiometer only functions in *SALINITY* mode; it does nothing when operating in SpC mode and cannot be used to correct SpC values to 25°C.

- To test probe operation, press the *CELL TEST* button while measuring the SpC of a water sample on the X10 or X100 scales. If the probe is functioning properly, the meter reading should not fall more than 2% when depressed. If the meter reading falls more than 2%, notify the equipment technician that the probe needs attention.

- The meter and probe should be periodically checked against a standard potassium chloride (KCl) solution to verify proper internal calibration. To do so, immerse the (clean) probe in the KCl standard, and record the temperature and SpC values as described above. Check that the SpC value is within

± 5% of the nominal SpC value for that particular KCl solution at that temperature. Record the observed value and the nominal value (from label on bottle) in the field logbook.

3.2 pH

This section describes the procedure for determining the pH of a water sample using the Orion Model 250A pH/mV meter with automatic temperature compensation. Calibration of the meter is performed at least daily using two buffer solutions that bracket the sample pH. A temperature sensor is included on the pH probe to make the minor correction from the sample temperature to 25°C. For information on manual temperature correction, refer to meter instruction manual. The Orion 250A can also be used in millivolt mode with a variety of ion selective electrodes (refer to ISE SOPs).

The following equipment is needed to measure pH in the field:

- Orion Model 250A pH meter
- Buffer solutions (pH 4.01, 7.00, 10.00)
- Spare 9-volt battery
- Beaker for water sample
- Deionized water in squirt bottle

The following procedure shall be used to measure pH in the field:

1. Plug the pH probe and thermistor (ATC) into the appropriate jacks of the meter.

2. Insert battery (if necessary), and press the power button to turn on the meter.

3. If the meter is not already in pH mode as indicated by the caret at the bottom of the display, press the mode button to select pH mode.

4. Rinse the probe with deionized water to remove any dried KCl salts, and slide the silicone rubber sleeve down to expose the electrolyte fill hole. Leave the hole uncovered during measurement, but do not allow the hole to be submerged in the sample.

5. Remove the plastic end cap on the probe, rinse the tip of the probe in deionized water, and insert the probe in the pH 7.0 buffer.

6. Press "2nd," then "Cal" to put the meter in calibration mode. The word "calibrate" should appear on the display, and the designation "P1" indicates that the meter is ready for the first buffer calibration.

7. Stir the probe gently in the pH 7.0 buffer solution. When the reading has stabilized, the meter will beep and the word "ready" will appear. Press "yes" to accept the reading and set the pH 7.0 calibration. "P2" will be displayed, indicating that the meter is ready for the second buffer solution.

8. Rinse the probe with deionized water, and insert it in the pH 4.0 buffer. (If the pH of the water sample is anticipated to be >7, then substitute the pH 10.0 buffer.)

9. When the meter indicates "ready," press "measure" to accept the pH 4.0 calibration. The slope of the calibration curve will be displayed briefly. Record the slope in the field logbook. The slope value should be within the range of 90 to 110. If not, repeat the calibration procedure. The meter will automatically exit the calibration mode, and the word "measure" will be displayed.

10. Rinse the probe and insert it into the water sample to be measured. Stir gently while waiting for the word "ready" to appear. Record the pH value in the field logbook.

11. If more measurements are to be made, rinse the probe and store temporarily in a beaker of deionized water. If finished for the day, turn the meter off, rinse the probe, disconnect the plugs, and store the probe with a few milliliters of the KCl electrode storage solution inside the black plastic end cap.

3.3 Alkalinity

This section describes the procedures for determining the total alkalinity in near-neutral pH, high-alkalinity water samples (most ground waters) using the Hach Test Kit. For information on the procedure for low-alkalinity samples or high pH samples (pH>8), refer to the Hach instruction sheet.

The following equipment is needed to determine total alkalinity in the field:

- Hach Alkalinity Test Kit

The following procedure shall be used to determine total alkalinity in the field:

1. Fill the small plastic test tube with the water to be tested.

2. Pour the contents of the test tube into the square glass bottle.

3. Add the contents of one foil packet containing the *Bromcresol Green/Methyl Red* color indicator. The water will turn a dark green.

4. Carefully begin adding the standard sulfuric acid titrant dropwise using the eye dropper, counting the number of drops added and swirling to mix the solution. Keep the eye dropper nearly vertical to maintain a constant drop volume.

5. When the solution begins to change from green to red, slow down. The titration is complete when the solution is a bright pink color.

6. Record the total number of drops added. Multiply the number of drops by 20 to obtain the total alkalinity, reported as mg/L of $CaCO_3$.

3.4 Oxidation-Reduction Potential (Eh)

This section describes the procedure for determining oxidation reduction potential of water in the field using an electrode.

The following equipment is needed to measure Eh in the field:

- Yellow Oxidation-Reduction Potential (ORP) Electrode
- Orion Model 250A pH/mV meter or YSI Model 3500 flow-thru cell meter
- Standard Zobell solution

The following procedure should be used to measure Eh in the field:

1. Plug the BNC connector into an Orion 250A pH/mV meter (or YSI 3500 meter).

2. Turn on the meter. If using the Orion 250A, use *MODE* key to set meter to "mV" mode (**not** *rel mV*). If using the YSI 3500, turn the black knob to "mV".

3. Check probe operation by immersing it in a disposable beaker with Zobell Solution. The reading should be ± 10 mV of that listed on the table with the Zobell Solution at the temperature of the solution (e.g., 231 mV at 25° C).

4. Rinse the probe and immerse it in the ground-water sample. Following stabilization, record the mV value, along with a ± estimate to indicate the stability of the meter. Also record the sample temperature.

3.5 Dissolved Oxygen (DO)

This section describes the procedure for determining the dissolved oxygen (DO) concentration using the YSI Model 57 DO meter. The meter is calibrated using the air calibration procedure, with corrections for ambient temperature and altitude/barometric pressure. Refer to the instruction manual for details of meter operation and replacement of the probe membrane.

The following equipment is needed to measure dissolved oxygen in the field:

- YSI Model 57 Dissolved Oxygen Meter
- Beaker for water sample
- Deionized water in squirt bottle
- Means of determining the approximate altitude of the site (topo map, altimeter, etc.)

The following procedure shall be used to measure dissolved oxygen in the field:

1. Turn the meter on approximately 15 minutes before measuring samples to allow the probe to polarize. The probe shall be kept in the clear plastic cover. Add a few drops of deionized water

to the small sponge inside the cover to maintain 100% relative humidity around the tip of the probe during storage.

2. Set the salinity knob to "fresh" for normal ground waters, or adjust to the appropriate salinity if brackish or saline waters are to be measured (as determined by specific conductance or previous laboratory analysis).

3. Set the zero on the meter by turning the switch to *ZERO* and adjusting the zero potentiometer until the needle falls on zero.

4. Set the red line on the meter by turning the switch to *RED LINE* and adjusting the appropriate potentiometer.

5. With the probe still in its cover, set the switch to *TEMPERATURE* and note the ambient air temperature displayed on the meter.

6. Determine the maximum (sea level) dissolved oxygen concentration (mg/L) possible for that temperature by referring to the table on the back of the DO meter (also in the instruction manual). Note this value in the field logbook.

7. Determine the approximate altitude of the site, and find the appropriate altitude correction factor on the table on the back of the meter (also in the instruction manual).

8. Multiply the saturated DO concentration determined in Step 5 by the altitude correction factor determined in Step 6. Note the value in the field logbook. This is the corrected saturated DO concentration (corrected for both temperature and altitude). Calibration should be periodically checked during the day as the temperature changes, and adjusted if necessary.

9. Switch the meter to the appropriate measurement scale for the corrected DO concentration determined in Step 7 (e.g., 0-10 mg/L scale), and use the *CALIBRATE* knob to air calibrate the meter by adjusting until the needle falls on the value determined in step 8. The meter is now ready to measure water samples.

10. Rinse the probe with deionized water, and insert it in the water sample and stir gently. Set the switch to *TEMPERATURE*, and record the reading in the field logbook.

11. Set the switch to the appropriate DO scale (e.g., 0-5 mg/L) to keep the needle on scale, and stir gently until a stable reading is obtained. It is important to be stirring the sample when the actual reading is taken. Record the value in the field logbook.

12. The probe may be stored temporarily in deionized water between measurements. When finished for the day, rinse the probe, and store with the dampened sponge in the plastic cap.

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Section 13.5.4

Collection of Ground-Water Samples

1. PURPOSE

The following SOP defines activities to be completed for the collection of ground-water samples.

2. SCOPE

This procedure is applicable to all DBS&A employees, its contractors and subcontractors, when collecting ground-water samples.

3. PROCEDURES

3.1 Wellhead Preparation

Prior to ground-water sample collection, the following wellhead protection activities shall be conducted:

1. Inspect the area around the well for wellhead integrity, cleanliness, and signs of possible contamination.

2. Spread a clean plastic sheet over the ground around the wellhead, where required.

3. Remove the cap on the wellhead. Note any obvious odors within the wellbore in the field logbook.

4. If possible, measure the static water level (see Section 13.6.1 of the DBS&A Operations Manual) prior to initiation of water sampling. Clean the steel tape or electrical sounder used for water level measurement after each use, as described in Section 13.5.2 of the Operations Manual, to avoid cross contamination.

5. If floating product (e.g., gasoline) is suspected at the site, conduct the following procedures:

    - Use a bailer to extract a sample from the surface of the water within the well, if possible.

    - After an initial visual inspection, slowly pour the fluid from the bailer into a small tub or container in order to check for a sheen or any other sign of free product. Note any obvious odors in the field logbook.

    - If free product is detected, use the bailer to remove as much free product as is possible from the wellbore. Lower the bailer into the water slowly in order to prevent mixing and volatilization. Contain all recovered product for proper disposal and note the quantity of product removed in the field logbook.

    - If the site has not been previously sampled, a sample of the free product may be desired. Consequently, place some of the product in an unpreserved 40-mL glass VOA vial, and store it away from the other samples. Confirm sample analysis with the project manager.

- After any free product has been removed from the wellbore, spread a fresh plastic sheet around the wellhead, and clean all contaminated equipment, or segregate it from the other equipment.

3.2 Well Purging

The purpose of purging the well prior to sampling is to remove stagnant water from the well bore so that a representative ground-water sample can be collected. The method of purging can have a pronounced effect on the quality of the ground-water sample. For example, rapid purging may increase sample turbidity and is, therefore, not recommended.

In general, positive displacement (bladder) pumps are preferred for most sampling situations. However, depending on the hydraulic conductivity of the aquifer to be sampled and the project objectives, wells may either be equipped with dedicated pumps or may need to be purged with bailers. Consequently, purging techniques may vary depending on the aquifer conditions, the presence or absence of a dedicated pump, and the proposed sample analytes.

The optimum amount of water to be purged from each well also varies between sites. According to Barcelona et al., 1985, pg. 47, "The number of well volumes to be pumped from a monitoring well prior to the collection of a water sample must be tailored to the hydraulic properties of the geologic materials being monitored, the well construction parameters, the desired pumping rate, and the sampling methodology to be employed."

Site-specific purging procedures shall be prepared for each site. The following purging procedure can be used as a general guideline:

1. Calculate the volume of water standing in the casing by using the formula:

   $$V = \pi r^2 L$$

   where
   r = the radius of the casing (remember to convert inches to feet)
   L = the length of the water column (total depth of well minus the static water level)

2. Purge the well at a rate equal to or greater than the sampling rate.

3. Measure applicable field parameters (see Section 13.5.3 of the Operations Manual) at the pump outlet at a minimum after each 0.5 casing volume is pumped. Purging is generally considered complete when the above parameters are approximately stable over at least one casing volume. Wherever possible, purge a minimum of three (3) casing volumes from each well.

4. In low permeability formations, it may not be possible to purge three casing volumes before the well goes dry. When the formation permeability is too low to allow for continuous purging, remove all of the standing water in the well by pumping or bailing. As soon as the well has recharged sufficiently, collect a sample so as to minimize volatilization in the wellbore.

5. Contain all fluid from obviously contaminated or potentially contaminated wells for later disposal. Anomalous values for the above field parameters, odor, visible sheen, or the presence of free product may be taken as signs of contamination. Results of previous water sampling events will be consulted when available.

6. Take careful notes in order to document all purging procedures. The notes shall include: date, time, name(s) of sampler(s), weather, purge rate, purge method, field parameters (at each time measured, with corresponding purge volume), visual observations, odor, and any other relevant information.

The following guidelines as outlined in pertinent references on water sampling can be used when developing site-specific purging procedures:

- Pg. 103 of the EPA RCRA Technical Enforcement Guidance Document (TEGD) states, "in low yield formations, water should be purged so that it is removed from the bottom of the well." (NWWA, 1986).

- Pg. 103 of the TEGD also states "Whenever a well is purged to dryness, a sample for field parameters should be collected as soon as the well has recovered sufficiently. A second measurement of field parameters should be made immediately after sampling. Do not pump a well to dryness if it causes formation water to cascade down the well." (Ibid).

- The inlet line of the sampling pump or the submersible pump should be placed near the bottom of the screen section, and pump approximately one well volume of water at the well's recovery rate, and then collect the sample from the discharge line (EPA 1977, pg. 211).

- According to Wehrmann (1984), "For high yielding monitoring wells which cannot be pumped to dryness, bailing without pre-pumping the well is not recommended; there is no absolute safeguard against contaminating the sample with stagnant water." The following procedures should be used:

  Place the inlet line of the sampling pump just below the surface of the well water, and pump three to five volumes of water at a rate equal to the well's recovery rate. This provides reasonable assurance that all stagnant water has been evacuated and that the sample will be representative of the groundwater body at that time.

- Wehrmann (1984) further states, "The rate at which wells are purged should be kept to a minimum. Purging rates should be lower than development rates so that well damage does not occur. Pumping at very low rates in effect, isolates the column of stagnant water in the well bore and negates the need for its removal, if the pump intake is placed at the top of, or in, the well screen. This approach can be very useful when disposal of purge water is a problem."

- If a well completed in a highly permeable formation is being purged, it may be useful to periodically move the intake of the purge pump during purging so that stagnant water does not remain in the well bore while fresh water comes in at only one level (Scalf et al., 1981, pg. 44).

3.3 Ground Water Sample Collection

The following procedure shall be used to collect ground-water samples:

1. If the well is not equipped with a sampling pump, use only teflon or stainless steel bailers for sampling. In order to minimize agitation and volatilization, bailers shall be equipped with bottom emptying devices when VOA samples are collected.

2. Whenever possible, collect ground-water samples first from wells that have the lowest potential concentrations of analytes of interest, and last from the wells with the highest suspected concentrations (i.e., clean → dirty). The specific sampling order will be detailed in the site-specific sampling plan.

3. Pumps equipped with Teflon tubing or disposable teflon bailers are generally recommended for collection of samples to be analyzed for volatile organics.

4. Select the appropriate sample container and preservative as described in Section 13.5.6.

5. After the well has been purged, collect water samples as soon as possible in order to reduce the possibility of volatilization within the wellbore. If a pump has been used for purging, lower the pump rate so that the sampling rate is lower than the purge rate. If volatile organic samples are to be collected, set the pump at the lowest possible setting. If possible, the sampling rate should be less than 100 ml per minute, or the minimum setting on the pump.

6. Collect samples in decreasing order of volatility, i.e. collect samples to be analyzed for volatile organic compounds (VOCs) first, followed by semi-volatile organic compounds, PCBs and pesticides, and inorganics. The preferred order of sampling according to the TEGD is VOCs, SVOCs, purgeable organic halogens (POX), total organic halogens (TOX), total organic carbon (TOC), extractable organics, total metals, dissolved metals, phenols, cyanide, sulfate and chloride, turbidity, nitrate and ammonia, and radionuclides.

7. Do not allow the outlet of the sampling pump discharge tubing to come into direct contact with the sample vial or the water within the vial.

8. Make sure that no air is entrapped in the sample vials to be analyzed for volatile organics. Take the sample by holding the vial at an angle so that aeration is minimized. Avoid touching the lip of the vial or the Teflon liner. If the sample cannot be transferred directly to the vial, (i.e. high production well) use a clean stainless steel cup to pour the water into the vial. Direct the water stream against the inside surface of the vial. Allow a convex meniscus to form across the mouth of the filled vial. Carefully cap the vial, then invert and tap the vial to insure that no entrapped air is present. If entrapped air is present, recollect the sample.

9. If filtering of any samples is required by the site specific sampling plan, use the filtering procedure described in Section 13.5.7.

10. Preserve the sample as indicated in Section 13.5.6. Whenever possible, use pre-preserved containers supplied by the analytical laboratory rather than adding preservatives in the field.

11. Measure field parameters as described in Section 13.5.3. Temperature, electrical conductivity, and pH generally will be measured at all locations. Alkalinity, dissolved oxygen, and Eh will be measured only as required by the site specific sampling plan.

12. If the sample is to be collected from a domestic well or location other than a monitoring well, it may be necessary to clean the sampling port prior to sample collection (e.g., an outside hose bib or an inside water facet). Flush the faucet/line by allowing it to run for a minimum of five minutes.

13. Collect samples from domestic wells downstream of water softeners or chlorinators or in-home filters that modify water quality. However, if the objective of the domestic sampling is to evaluate the ground water prior to treatment, the samples may be taken upstream of such devices.

14. Record all pertinent information in the field notebook. Data to be recorded include the date and time of sample collection, climatic conditions at the time of sampling, well sampling sequence, types of sample containers used, sample identification numbers, field parameter data, name(s) of collector(s), deviations from established sampling protocol (e.g., equipment malfunctions), purpose of sampling (e.g., surveillance, compliance), and collection of quality control samples.

4. REFERENCES

- Barcelona, Michael J., James P. Gibb, John A. Helfrich and Edward E. Garske. 1985. Practical Guide for Ground-Water Sampling. Prepared in cooperation with RSKERL, Ada, Oklahoma. SWS Contract Report 374. DBS&A #560/BAR/1985.

- EPA. 1977. Procedures Manual for Ground Water Monitoring at Solid Waste Disposal Facilities, Manual SW-611. DBS&A 560/EPA.

- NWWA. 1986. RCRA Ground Water Monitoring Technical Enforcement Guidance Document (TEGD). DBS&A #700/NWWA/1986.

- Scalf, Marion R., James F. McNabb, William J. Dunlap, Roger L. Cosby, and John S. Fryberger. 1981. Manual of Ground-Water Quality Sampling Procedures. Robert S. Kerr Environmental Research Lab, ORD, U.S. EPA, Ada Oklahoma. NWWA/EPA Series. DBS&A #1220/SCA/1991.

- Wehrmann, H. Allen. 1984. An Investigation of a Volatile Organic Chemical Plume in Northern Winnebago County, Illinois. SWS Contract Report 346. ENR Document No. 84/09. Illinois Department of Energy and Natural Resources, State Water Survey Division, Champaign, IL. DBS&A #940/WEH/1984.

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Section 13.5.5

Collection of Surface Water Samples

1. PURPOSE

The following SOP defines activities to be completed for the collection of surface water samples.

2. SCOPE

This procedure is applicable to all DBS&A employees and its contractors and subcontractors when collecting surface water samples.

3. PROCEDURES

A site-specific water sampling plan shall be prepared to define surface water sampling locations and procedures that are unique to each site. The following general procedure shall be followed for collection of surface water samples:

1. Select the water sampling location. Collect spring samples as close to the source as possible. Do not collect spring or stream samples from stagnant pools; collect these samples from free running locations if possible. The selection of the optimum sampling locations should be based on the objectives of the site-specific sampling plan.

2. Whenever possible, make a discharge measurement at the time of water sampling. If it is not possible to gauge the surface water discharge (see Section 13.9 of the DBS&A Operations Manual), make an estimate, and describe the procedure used to estimate the discharge in the field logbook.

3. Collect surface water samples as "grab" samples unless a depth integrated sampler or other procedure is required in the site specific sampling plan.

4. If the surface water is frozen, ice samples should not be taken in lieu of water samples.

5. Select the appropriate container as described in Section 13.5.6 of the Operations Manual.

6. For non-volatile analytes, dip a clean unpreserved container directly into the surface water, and partially fill the container. Swirl and rinse the container, and then discard the water.

7. Rinse the container two more times.

8. Fill the container with surface water.

9. Collect samples in decreasing order of volatility, i.e. collect samples to be analyzed for volatile organic compounds (VOCs) first, followed by semi-volatile organic compounds (SVOC), PCBs and pesticides, and inorganics. The preferred order of sampling according to the TEGD is VOCs, SVOCs, purgeable organic halogens (POX), total organic halogens (TOX), total organic carbon (TOC), extractable organics, total metals, dissolved metals, phenols, cyanide, sulfate and chloride, turbidity, nitrate and ammonia, and radionuclides.

10. Make sure that no air is entrapped in the sample vials to be analyzed for volatile organics. Take the sample by holding the vial at an angle so that aeration is minimized. Avoid touching the lip of the vial or the Teflon liner. If the sample cannot be collected directly from the water source, use a clean stainless steel cup. Direct the water stream against the inside surface of the vial. Allow a convex meniscus to form across the mouth of the filled vial. Carefully cap the vial, then invert and tap the vial to insure that no entrapped air is present. If entrapped air is present, recollect the sample.

11. If filtering of any samples is required by the site specific sampling plan, use the filtering procedure described in Section 13.5.7 of the Operations Manual.

12. Either add preservatives directly to the container as described in Section 13.5.6 of the Operations Manual, or transfer the sample to a pre-preserved container. If transferring the sample between containers, pour the water slowly from the glass bottle or cubitainer to the sample container.

13. Fill a clean beaker or other appropriate container with surface water for field parameter measurement as discussed in Section 13.5.3 of the Operations Manual. Temperature, electrical conductivity, and pH generally will be measured at all locations. Alkalinity, dissolved oxygen, and Eh will be measured only as required by the site-specific sampling plan.

14. Carefully document the surface water sampling location. Photographs of the sampling location should be taken from several locations if possible. Describe each photograph along with the photo number in the log book (e.g., photo #5-Upstream (south) view of location # SPG-014, taken from the west bank). Also include the time, date, and the name of the photographer in the log book, and transfer this information to the back of photograph when it is received. In addition, provide a detailed written description of the sample location in the log book.

15. Record all pertinent information in the field notebook. Data to be recorded include the date and time of collection, climatic conditions at the time of sampling, well sampling sequence, types of sample containers used, sample identification numbers, field parameter data, name(s) of collector(s), deviations from established sampling protocol (e.g., equipment malfunctions), purpose of sampling (e.g., surveillance, compliance), and collection of quality control samples. Also note any obvious stress to vegetation, which may be a result of contamination.

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Section 13.5.6

Sample Preservation

1. PURPOSE

The following SOP defines activities to be completed to properly preserve a water sample for shipment to an analytical laboratory for analysis.

2. SCOPE

This procedure is applicable to all DBS&A employees and its contractors and subcontractors when preserving water samples in the field.

3. PROCEDURES

Table 13.5.6-1 of this SOP lists recommended containers, preservatives, and holding times for individual analytes or analytical methods. The suggestions for sample storage and preservation presented are intended to serve as general guidelines. The analytical laboratories shall be consulted for the proper preservation and storage procedure for the analytical methods that will be used (e.g., this guideline recommends preservation of volatile organic samples with hydrochloric acid (HCl), but some laboratories require preservation with mercuric chloride).

Samples for volatile organics analysis (EPA 602, 624 or 8020) shall be collected in pre-cooled, pre-acidified, certified-clean 40 ml borosilicate vials with teflon septum caps supplied by the analytical laboratory. Samples to be analyzed for other constituents should be collected in appropriate containers as listed in Attachment 1 to this SOP.

4 ATTACHMENTS

- Table 13.5.6-1, Container/Preservative Reference Chart (5 sheets)

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TABLE 13.5.6-1. CONTAINER/PRESERVATIVE REFERENCE CHART
General/Inorganic Chemistry

Analysis	***Container***	***Preservative (Chill to 4°C)***	***Container***	***Holding Time (From Sampling Date)***	
	Water	**Water**	**Soil**	**Water**	**Soil**
Alkalinity	4 oz. Plastic	Unpreserved	N/A	14 days	N/A
Ammonia (NH_3)	4 oz. Plastic	.25 ml H_2SO_4[A]	4 oz. jar	28 days	28 days
BOD	16 oz. Plastic[B]	Unpreserved	N/A	48 hr.	N/A
Boron	4 oz. Plastic	Unpreserved	4 oz. jar	28 days	28 days
Bromide	16 oz. Plastic	Unpreserved	8 oz. jar	28 days	28 days
Chloride	4 oz. Plastic	Unpreserved	8 oz. jar	28 days	28 days
COD	4 oz. Plastic	.25 ml H_2SO_4[A]	4 oz. jar	28 days	28 days
Color	4 oz. Plastic	Unpreserved	N/A	48 hr.	N/A
Cyanide (total and/ or amenable)	4 oz. Plastic	2 ml 1.5N NaOH[B]	4 oz. jar	14 days	No Specified Time
Electrical Conductivity	4 oz. Plastic	Unpreserved	4 oz. jar	28 days	28 days
Flashpoint	8 oz. Amber Glass w/Septum[B]	Unpreserved	8 oz. jar	28 days	28 days
Fluoride	4 oz. Plastic	Unpreserved	4 oz. jar	28 days	28 days
Formaldehyde	1 L Glass	1% Methanol	4 oz. jar	28 days-Pres. 7 days-Unp.	28 days
General Minerals • General Minerals • NO_3 • Metals	 1 L Plastic 4 oz. Plastic 16 oz. Plastic	 Unpreserved .25 ml H_2SO_4[A] 1 ml HNO_3[A]	16 oz. jar	28 days	28 days
Gross Alpha/Beta	1 L Plastic	2 ml HNO_3[A]	4 oz. jar	6 mo.	6 mo.
Hardness	4 oz. Plastic	Unpreserved	N/A	28 days	N/A
Hexavalent Chromium (CR^{+6})	16 oz. Plastic	Unpreserved	4 oz. jar	24 hr.	28 days

A - Typical volume needed to bring the pH to <2
B - Headspace free
C - Typical volume needed to bring the pH to >12
D - Typical volume needed to bring the pH to >9

TABLE 13.5.6-1. CONTAINER/PRESERVATIVE REFERENCE CHART (CONTINUED)
General/Inorganic Chemistry

Analysis	***Container***	***Preservative (Chill to 4ºC)***	***Container***	***Holding Time (From Sampling Date)***	
	Water	Water	Soil	Water	Soil
Iodide	4 oz. Plastic	Unpreserved	4 oz. jar	24 hr.	28 days
Nitrate/Nitrite (NO_3/NO_2) • NO_3	 4 oz. Plastic 4 oz. Plastic	 .25 ml H_2SO_4[A] Unpreserved	 4 oz. jar 4 oz. jar	 28 days 48 hr.	 28 days 28 days
Odor	4 oz. Glass	Unpreserved	N/A	48 hr.	N/A
Oil & Grease	1 L Glass	2 ml H_2SO_4[A]	4 oz. jar	28 days	28 days
418.1 (TPH by IR)	1 L Glass	2 ml H_2SO_4[A]	4 oz. jar	28 days	28 days
pH	4 oz. Plastic	Unpreserved	4 oz. jar	immediately	14 days
Phenolics	4 oz. Amber Glass	.25 ml H_2SO_4[A]	4 oz. jar	28 days	28 days
Phosphorus • Total (P)	 4 oz./8 oz. Plastic	 .25 ml/.5 ml H_2SO_4[A]	 4 oz. jar	 28 days	 28 days
Phosphorus • Ortho (PO_4)	 4 oz./8 oz. Plastic (Filtered)	 Unpreserved	 4 oz. jar	 48 hr.	 28 days
Silica	4 oz. Plastic	Unpreserved	4 oz. jar	28 days	28 days
Solids (Residue) • Total dissolved • Total suspended • Total settleable • Total solids	 16 oz. Plastic 16 oz. Plastic 1 L Plastic 16 oz. Plastic	 Unpreserved Unpreserved Unpreserved Unpreserved	 N/A N/A N/A N/A	 7 days 7 days 48 hr. 7 days	 N/A N/A N/A N/A
Specific Gravity	4 oz. Plastic	Unpreserved	4 oz. jar	28 days	28 days
Sulfate	4 oz. Plastic	Unpreserved	4 oz. jar	28 days	28 days
Sulfide	4 oz. Plastic	6 drops-2N Zn acetate & 8 drops 6N NaOH[D]	N/A	7 days	N/A
Sulfite	4 oz. Plastic	1 ml EDTA	N/A	28 days-Pres. 6 hr.-Unp.	N/A

A - Typical volume needed to bring the pH to <2
B - Headspace free
C - Typical volume needed to bring the pH to >12
D - Typical volume needed to bring the pH to >9

TABLE 13.5.6-1. CONTAINER/PRESERVATIVE REFERENCE CHART (CONTINUED)
General/Inorganic Chemistry

Analysis	***Container***	***Preservative (Chill to 40°C)***	***Container***	***Holding Time (From Sampling Date)***	
	Water	**Water**	**Soil**	**Water**	**Soil**
Surfactants (MBAS)	1 L Plastic	Unpreserved	N/A	48 hr.	N/A
Total Coliform	8 oz. Glass or Polypropylene (Sterilized)	0.008% $Na_2S_2O_3$	N/A	6-8 hr.	N/A
TKN (Kjeldahl Nitrogen)	4 oz. Plastic	.25 ml H_2SO_4[A]	4 oz. jar	28 days	28 days
Total Organic Carbon (TOC)	4 oz. Amber Glass w/Septum[B]	.25 ml H_2SO_4[A]	4 oz. jar	28 days	28 days
Total Organic Halide (TOX)	8 oz. Amber Glass w/Septum[B]	.5 ml H_2SO_4[A]	4 oz. jar	7 days	No Specified Time
Total Radium	1 L Plastic	2 ml HNO_3[A,C]	4 oz. jar	6 mo.	6 mo.
Turbidity	4 oz. Plastic	Unpreserved	N/A	48 hr.	N/A

A - Typical volume needed to bring the pH to <2
B - Headspace free
C - Typical volume needed to bring the pH to >12
D - Typical volume needed to bring the pH to >9

TABLE 13.5.6-1. CONTAINER/PRESERVATIVE REFERENCE CHART (CONTINUED)
Organic Chemistry

Analysis	***Container*** *(Glass- and Teflon-lined caps only)*	***Preservative*** *(Chill to 40°C)*	***Container*** *(Glass- and Teflon-lined caps only - Chill to 40°C)*	***Holding Time*** *(From sampling date)*	
	Water	Water	Soil	Water	Soil
8010/8020 • 8010 • 8020 • BTXE	3X VOA[A] 3X VOA[A] 3X VOA[A] 3X VOA[A]	3 drops HCl[B] 3 drops HCl[B] 3 drops HCl[B] 3 drops HCl[B]	4 oz. jar 4 oz. jar 4 oz. jar 4 oz. jar	14 days-Pres., 7 days-Unp. 14 days 14 days-Pres., 7 days-Unp. 14 days-Pres., 7 days-Unp.	14 days until Analysis 14 days until Analysis 14 days until Analysis 14 days until Analysis
Modified 8015 (TPH) • Gasoline Range • Diesel Range	4 oz. Amber Glass w/Septum[A] 2X VOA 4 oz. Amber Glass w/Septum[A]	.25 ml HCl[B] 3 drops HCl[B] .25 ml HCl[B]	4 oz. jar 4 oz. jar 4 oz. jar	14 days until Analysis 14 days until Analysis 14 days until Extraction 40 days after Extraction until Analysis	14 days until Analysis 14 days until Analysis 14 days until Extraction 40 days after Extraction until Analysis
8240	2X VOA	3 drops HCl[B]	4 oz. jar	14 days-Pres., 7 days-Unp.	14 days until Analysis
EDB	1 L Glass	Unp.	8 oz. jar	28 days until Analysis	28 days until Analysis
8040	1 L Glass	Unp.	4 oz. jar	7 days until Extraction 40 days after Extraction until Analysis	14 days until Extraction 40 days after Extraction until Analysis
8080	2 x 1 L Glass	Unp.	4 oz. jar	7 days until Extraction 40 days after Extraction until Analysis	14 days until Extraction 40 days after Extraction until Analysis
8100/8310	1 L Amber Glass	Unp.	4 oz. jar	7 days until Extraction 40 days after Extraction until Analysis	14 days until Extraction 40 days after Extraction until Analysis
8140	1 L Glass	Unp.	4 oz. jar	7 days until Extraction 40 days after Extraction until Analysis	14 days until Extraction 40 days after Extraction until Analysis
8150	1 L Glass	Unp.	4 oz. jar	7 days until Extraction 40 days after Extraction until Analysis	14 days until Extraction 40 days after Extraction until Analysis
Modified 619	1 L Glass	Unp.	4 oz. jar	7 days until Extraction 40 days after Extraction until Analysis	14 days until Extraction 40 days after Extraction until Analysis
8270	2 x 1 L Glass	Unp.	4 oz. jar	7 days until Extraction 40 days after Extraction until Analysis	14 days until Extraction 40 days after Extraction until Analysis
Modified 632	1 L Glass	Unp.	4 oz. jar	7 days until Extraction 40 days after Extraction until Analysis	14 days until Extraction 40 days after Extraction until Analysis
TCLP • Volatiles (zero headspace extraction) • Non-Volatiles	N/A N/A	N/A N/A	4 oz. jar 16 oz. jar	N/A N/A	14 days until Extraction 14 days after Extraction until Analysis 14 days until TCLP Leaching

A - Headspace free
B - Typical amount to bring the pH to <2

TABLE 13.5.6-1. CONTAINER/PRESERVATIVE REFERENCE CHART (CONTINUED)
Metals

Analysis	*Container*	*Preservative*	*Holding Time (From Sampling Date)*
WATER			
Metals (1 or more metals)			
• Total	16 oz. Plastic	l-ml HNO_3[A]	6 mo. (28 days-Hg)
• Dissolved • Filtered in Field	16 oz. Plastic	l-ml HNO_3[A]	6 mo. (28 days-Hg)
• Not Filtered	16 oz. Plastic (Specify "To be lab filtered")	Unpreserved	6 mo. (28 days-Hg)
• Organic Lead	8 oz. Amber Glass (Glass Only) w/Septum (Headspace Free)	Unpreserved Chill to 4°C	14 days until Analysis (laboratory recommended)
• Hexavalent Chromium (Cr^{+6})	16 oz. Plastic	Unpreserved	24 hr.
SOIL			
Metals (1 or more metals)			
• Total	4 oz. jar		6 mo.
• Soluble			
• EP Toxicity	8 oz. jar		6 mo.
• WET	8 oz. jar		6 mo.
• TCLP (see also Organic Chemistry)	8 oz. jar		6 mo.
• Hexavalent Chromium (Cr^{+6})	4 oz. jar		28 days
• Organic Lead	4 oz. jar	Chill to 4°C	14 days until Analysis (laboratory recommended)

A - Typical amount to bring the pH to <2.

Section 13.5.7

Sample Filtration

1. PURPOSE

The following SOP defines activities to be completed to properly filter water samples in preparation for analysis by an analytical laboratory.

2. SCOPE

This procedure is applicable to all DBS&A employees and its contractors and subcontractors when filtering water samples.

3. PROCEDURES

Recent research indicates that if samples are obtained correctly, field filtration for metals may not be necessary (Puls and Powell, 1992). However, filtration of samples to be analyzed for dissolved metals may be required in some cases. If filtration is required, it shall be outlined in the site specific sampling plan.

If filtration is required, filter the samples in the field if possible. If field filtering is not possible, preserve the sample by chilling to 4°C (i.e. do not add acid), and immediately ship the sample via overnight delivery to the laboratory. Indicate on the chain of custody that laboratory filtration and preservation are required.

Vacuum filtration of ground water samples is not recommended (Barcelona et al., 1985, pg. 65). Samples to be analyzed for TOC, VOCs or other organic compounds should not be filtered. Filtration may be performed on samples collected for analysis of dissolved metals, however.

The following procedure shall be followed to filter samples in the field with the GeoPump:

1. Connect the GeoPump to an automobile cigarette lighter or outlet if electricity is available.

2. Replace the tubing for the GeoPump at the beginning of each sampling round. If the samples are collected in any order other than most contaminated to least contaminated, or if very high levels of contamination are suspected or observed, then replace the tubing between each sample or as necessary.

3. If the tubing is not replaced between each sample, flush the lines with Liquinox followed by at least three flushes with distilled water.

4. Collect an unfiltered water sample as discussed in Sections 13.5.4 and 13.5.5 of the DBS&A Operations Manual.

5. Place the intake line in the unfiltered sample.

6. Pump at least a few hundred milliliters of the sample through the GeoPump prior to sample collection in order to flush the line. Set the GeoPump at the lowest rate possible in order to minimize aeration. Dispose of this water appropriately.

7. Place a disposable 45 micron filter on the output line. Direct the output stream below the filter into the pre-acidified sample container, as outlined in Section 13.5.6 of the DBS&A Operations Manual

4. REFERENCES

- Barcelona, Michael J., James P. Gibb, John A. Helfrich and Edward E. Garske. 1985. Practical Guide for Ground-Water Sampling. Prepared in cooperation with RSKERL, Ada, Oklahoma. SWS Contract Report 374. DBS&A #560/BAR/1985.

- Puls, Robert W. and Robert M. Powell, R.S. Kerr Environmental Research Laboratory (RSKERL). 1992. Acquisition of Representative Ground Water Quality Samples for Metals. *Ground Water Monitoring Review, Summer 1992.*

Prepared by: ________________

Approved by: ________________
Daniel B. Stephens

Reviewed by: ________________
Quality Assurance Manager

Reviewed by: ________________
Systems Operations Manager

Section 13.5.8

Quality Assurance/ Quality Control (QA/QC)

1. PURPOSE

The following SOP defines activities to be completed to assure quality assurance and quality control for water samples collected in the field.

2. SCOPE

This procedure is applicable to all DBS&A employees and its contractors and subcontractors when collecting water samples in the field.

3. PROCEDURES

QA/QC samples include split samples, duplicates, blind duplicates, blind check standards, trip blanks, and equipment blanks. The specific QA/QC samples that will be collected during each sampling event shall be designated in the site sampling plan.

3.1 General QA/QC Guidelines

The following general guidelines shall be followed for collection of QA/QC samples:

1. Include a trip blank with each cooler that contains samples to be analyzed for volatile organic compounds (VOCs). Ideally, trip blanks will be prepared at the lab in advance and will be shipped with the sample bottle order. If trip blanks are prepared in the DBS&A warehouse or in the field, prepare well away from any areas of known or suspected contamination. Prepare the trip blanks by filling a pre-acidified 40-ml VOA vials with organic-free water.

2. Collect an equipment (rinsate) blank from any non-disposable equipment that comes in contact with the water to be sampled, such as non-dedicated pumps or bailers or field filtration devices. Collect the equipment blank by running or pouring deionized water through any portion of the device that normally comes in contact with the water sample or presents a potential for cross-contamination, including hoses, valves, etc. Equipment blanks generally are not required for disposable equipment which is certified clean by the manufacturer (e.g., disposable teflon bailers). The exact number and type of equipment blanks to be collected will be determined on a site-specific basis. Describe the process used to collect the equipment blank in the field log book (see Section 13.2.6 of the DBS&A Operations Manual).

3. Replicate samples consist of two aliquots of the same sample analyzed independently. Replicate samples are used to evaluate laboratory precision.

4. A duplicate consists of two separate samples from the same source, analyzed independently. Duplicates are used to evaluate laboratory precision, heterogeneity of the material, and precision of field sampling techniques.

5. Split samples are replicate samples divided into two portions, sent to different laboratories, and analyzed for the same parameters.

6. In some cases, blind check standards may be submitted to the analytical laboratory. These may be obtained commercially or prepared in advance in the DBS&A laboratory. Alternatively, a duplicate sample may be spiked in the field with a known quantity of the analyte(s) of concern.

3.2 Well Security

All monitor wells shall be securely locked following the completion of sampling.

3.3 Chain-of-Custody Procedures

Chain-of-custody (COC) documents shall be kept for all samples collected by DBS&A. The COC program includes proper labeling of the samples to prevent misidentification. The following general guidelines for sample handling and custody procedures will be followed:

1. As few people as possible should handle the samples.

2. Samples must be within a locked/secure area at all times when not within view of DBS&A personnel.

3. Use the COC form provided by the analytical laboratory that will be performing the analyses. A representative form is included as Attachment 1 to this SOP (DBS&A Form No. 095).

4. The FR is responsible for the custody of the samples until they are transferred to the analytical laboratory or until custody is transferred to another designated individual. If the sample is transferred to another DBS&A employee, both people should sign and date the "relinquished" and "received" sections of the form, respectively.

5. Include the following information on the COC form:

    - The date and time of sample collection
    - The exact identification of the sample
    - The type of sample (e.g., water, soil, fuel)
    - Any preservatives used
    - The number of containers for each sample
    - The job number and name
    - Whether or not the sample was filtered
    - The analytical methods to be used (e.g., EPA 8240)

6. Have a second member of the water sampling team check the chain of custody document to ensure that all data is correct and exactly matches the information on the sample bottle labels. Place the appropriate copies of the COC form(s) in a sealed plastic bag taped to the inside lid of the cooler containing the samples. If more than one cooler is being shipped, each cooler should have a separate COC form listing all samples in that cooler.

7. Whenever the sample leaves control of the sampling team (e.g., when shipped by common carrier) place a COC seal on the shipping container or individual sample bottles. Sign and date the COC seal. The purpose to the seal is to ensure that the samples have not been tampered with prior to receipt at the lab.

8. If samples are shipped to arrive on Friday afternoon, weekends, or holidays, special arrangements need to be made with the analytical laboratory to ensure that someone will be available for sample receipt, and that the holding times will be met.

4. ATTACHMENTS

1. Chain-of-Custody Form (DBS&A Form No. 095)

Prepared by: [signature]

Reviewed by: [signature]
Quality Assurance Manager

Approved by: [signature]
Daniel B. Stephens

Reviewed by: [signature]
Systems Operations Manager

DANIEL B. STEPHENS & ASSOCIATES, INC.

Chain of Custody

To:

__________ Date __________ Project No. __________

__________ Client __________

__________ Relinquished by __________

Sent by: ☐ Fed Ex ☐ DHL ☐ Other __________

Purpose of Shipment __________

Possible Contaminants __________

Item No.	Sample No.	Analysis to be Done	Sample Container	Comments

Date Received __________ by __________
Company Representative

Received the above articles in good condition

Except as noted __________

Section 13.6.1

Ground-Water Level Measurement

1. PURPOSE

The purpose of this procedure is to provide DBS&A personnel with the information necessary to collect accurate water-level data from ground-water wells. Water level measurements provide the fundamental data needed to determine aquifer characteristics; therefore, it is crucial that the appropriate methods are used to meet the data requirements of an aquifer investigation.

2. SCOPE

The following procedures are applicable to all DBS&A employees and subcontractors engaged in the measurement of ground-water levels in wells. Several methods are available for determining the depth to water (DTW); this SOP briefly describes methods used to measure water levels manually, and automatically with the help of data recorders. This information is intended to help DBS&A personnel determine the appropriate equipment to collect water levels for background trend analysis and aquifer tests.

3. PROCEDURES

Immediately following well construction (see Section 13.4.1 of the DBS&A Operations Manual), a measuring point shall be clearly labeled "MP" with a permanent marker at the top of the casing. The designated MP shall be located at a point which is unlikely to change in elevation during the life of the well. This will prevent repeated surveys to determine the reference elevation of the measuring point. If the MP does change, it shall be clearly re-marked and referenced to the original elevation or a new survey will be necessary. Water levels will be measured in accordance with ASTM D 4750, Standard Test Method for Determining Subsurface Liquid Levels in a Borehole or Monitoring Well (Observation Well).

The water level measurement (depth to water; DTW) shall be recorded on the Water Level Measurement Form included as Attachment 1 to this SOP (DBS&A Form No. 120). In addition, the following information shall be recorded on the form: the person making the measurement, the measuring device, the surveyed point from which the measurement is made, the time of day (military time), the date, the wellhead condition, and any measuring point (MP) changes.

Ground-water level data may also be recorded in the field log and on other applicable DBS&A forms including but not limited to those used for water sampling and drilling/soils logging.

The following subsections will describe the most commonly used techniques for obtaining water-level data in the field.

3.1 Steel Tape

Graduated steel tapes provide accurate measurements to within approximately 0.01 foot of the actual DTW for depths of 100 feet or less. The rigidity of the tape allows it to hang straight in the well. Steel tapes should generally not be used when many measurements must be made in rapid succession, such as during an aquifer test. Measurements with a steel tape are relatively time consuming.

When using a steel tape the lower 2 to 3 feet is wiped dry and coated with carpenters chalk or water finding paste before being lowered down the well. The tape is then lowered into the well to the estimated DTW. The tape should be held on a foot marker at the well-head measuring or reference point (MP). After removing the tape, the wetted end is read and subtracted from the previous reading; the difference is the actual DTW. If tape graduations are greater than 0.1 foot apart, a separate engineering tape or scale shall be used to accurately determine the wetted end measurement.

The steel tape should not stretch more than 0.05% under normal use and should not cause more than an 0.05-foot perceived rise in water level during measurement. If more than a 0.05-foot rise in water level occurs during measurement, a correction shall be made for the displacement. Steel tapes shall be calibrated against a surveyor's reference tape annually by the DBS&A Environmental Equipment Coordinator. Information from these calibrations shall be kept on hand at the DBS&A equipment supply facility.

The main disadvantage of the steel tape method is that the approximate depth to water must be known prior to the measurement. In addition, interferences such as cascading water, smearing, and/or evaporation may compromise the accuracy of the wetted-end measurement. However, steel tapes are relatively inexpensive and generally more durable than electrical instruments for measuring water levels.

3.2 Electrical Sounders

Electrical sounders operate by completing a circuit when the probe contacts the water level. Upon completion of the circuit a light, buzzer, or ammeter needle indicates that the probe is in contact with the water table. The probe is connected to a graduated tape, usually made from plastic and fiberglass. Batteries supply the necessary current through electrical wires contained in the graduated tape. Measurements are commonly made to within 0.01 foot with electrical sounders.

Electrical sounders are the most commonly used ground-water level measuring device on DBS&A projects. The major advantage of electrical sounders is that many measurements can be made rapidly and accurately without removing the probe from the well. Field personnel should position themselves near the MP so the DTW can be read at eye level. A second check reading should be taken before withdrawing the electric tape from the well. Most DBS&A sounders are marked every 0.02 foot.

The length of the electric line shall be calibrated annually with an engineers tape by the DBS&A Environmental Equipment Coordinator. Information from these calibrations shall be kept on hand at the DBS&A equipment supply facility.

Potential disadvantages of the electrical sounder devices include: the expense of an accurate sounder; inaccurate measurements that may be made due to stretching or kinking of the tape; electrical shorts that may be caused by broken or corroded wires; false readings due to cascading water; snagging of the sounder tip on pump columns and cables; or incomplete circuits due to low concentrations of total dissolved solids in the water.

3.3 Automated Water Level Measurements

To determine background water level trends, the most economic approach is to set up a continuous data recorder capable of making many measurements automatically. Driscoll (1986) discusses the application and installation of such systems in detail. The most common recorders produce a graphical chart or store the data electronically for future retrieval. Continuous water level records are quite useful for determining daily and seasonal fluctuations resulting from recharge and discharge periods, evapotranspiration and tidal stress, and during aquifer tests when there are not enough field personnel to collect all the necessary data. The following paragraphs briefly review equipment used with continuous recorders to measure water levels.

Automated pressure transducers are useful for collecting large quantities of water-level data rapidly during labor intensive aquifer tests. DBS&A owns an electronic data logging system consisting of a Campbell Scientific 21X data logger and DRUK pressure transducers which can be calibrated to output feet of water above the transducer. Refer to Section 13.6.4 of the Operations Manual for detailed information on using the system. The system can be programmed to collect data on arithmetic and logarithmic time scales. Measurements are accurate to approximately 0.01 foot providing there is no turbulence in the well.

Airline bubblers are commonly used by the U.S. Geological Survey for measuring stream stage and water levels in wells over periods of several years. Airline bubblers usually operate on nitrogen gas. The device works on the principal that the gas pressure required to push all the water out of the submerged portion of the tube equals the water pressure of a column of water equal to that height. Measurements are accurate to within 0.01 foot.

Float sensors can also be used to determine long term variation in background water levels. Float sensors consist of a tape or cable passing over a pulley with a float attached to one end and a counterweight attached to the other. The float follows the rise and fall of the water level. A graphic or electronic recorder is attached to the calibrated pulley to store the water level data. Float sensors work best in large diameter wells (4 inches or greater). The greatest disadvantage of this method is the potential for the float to stick on the side of the casing or jump the pulley resulting in a "stair stepping" record or no record at all. Measurements are accurate to 0.1 foot or greater depending on the precision of the recorder and pulley calibration.

4. ATTACHMENTS

1. Water Level Measurements (DBS&A Form No. 120)

5. REFERENCES

ASTM. 1990. Standard Practice for Design and Installation of Ground Water Monitoring Wells in Aquifers. Standard D 5092-90. Philadelphia, PA.

Driscoll, F.G. 1986. Groundwater and Wells. Johnson Division. St. Paul, MN. 1089 p.

Prepared by: Bob Marley

Approved by: Daniel B. Stephens

Reviewed by: Quality Assurance Manager

Reviewed by: Systems Operations Manager

DANIEL B. STEPHENS & ASSOCIATES, INC.

Water Level Measurements

Project Name ______________________________ Measurement Date ______________

Project Number ______________ Field Staff ______________________________

Measuring Points and Datum Used ______________________________

Observations ______________________________

Well Number	Time	Elevation of Measuring Point (feet, mean sea level)	Depth Below Measuring Point (feet)	Water Level Elevation (feet, mean sea level)

Signature ______________________________ Date ______________

Section 13.6.2

Slug Testing

1. PURPOSE

The following SOP describes procedures for performing various types of aquifer slug tests in the field.

2. SCOPE

The procedures listed below are applicable to all DBS&A employees, its contractors and subcontractors, for performing aquifer slug tests. The procedures for obtaining the necessary data in the field are described herein; the procedures for analyzing the data to calculate aquifer hydraulic properties are described in Section 14 of the DBS&A Operations Manual.

3. PROCEDURES

The procedures described below for performing slug tests are applicable to all aquifer types. Where a variation in methodology occurs with a particular aquifer type, it will be noted. These procedures are in accordance with ASTM D 4044-91, Standard Test Method (Field Procedure) for Instantaneous Change in Head (Slug Tests) for Determining Hydraulic Properties of Aquifers. Additional references which may be helpful in planning and performing slug tests are Groundwater and Wells (Driscoll, 1986), and Analysis and Evaluation of Pumping Test Data (Kruseman and de Ridder, 1992).

3.1 Slug Testing

The slug test method involves creating a sudden change in head in a well and measuring the resulting water level response. Head changes are induced by suddenly removing or adding a known quantity of water in the well. This can be accomplished by removing a bailer full of water from the water column, placing a mechanical slug into the water column, or increasing/decreasing the air pressure in the well casing. From these measurements, the aquifer's transmissivity or hydraulic conductivity can be determined. Various analytical techniques allow for the estimation of coefficient of storage but should be considered less reliable than the estimate of transmissivity.

Slug tests are an inexpensive and rapid method of obtaining estimates of aquifer properties. No pumping is required in the slug test and no piezometers are required to be monitored. The main limitation of this test is that this method is only capable of determining the characteristics of a small volume of aquifer material surrounding the well. This material may have been disturbed during well drilling and construction and, as a result, may have a large impact on the results of the test. Additionally, only slug withdrawal test methods should be used for unconfined aquifers.

3.1.1 Required Preliminary Hydrogeologic Information

All available information pertinent to the slug test should be reviewed prior to the start of the test. This information will aid in preparing design specifications for the test. This information includes aquifer properties, such as aquifer type (confined, unconfined, etc.), aquifer thickness, aquifer boundaries, and any previous estimates of hydraulic properties, if available. Information on well construction details are also needed prior to the test. This includes geologic logs, well construction logs, screen interval and size, sand pack interval and size, borehole diameter, and casing diameter.

3.1.2 Water Level Measurements

Water levels should be measured immediately prior to the test, and throughout the test until water levels in the test well reach approximately 95% of the pre-test level. Water level response during the slug test will be measured as described in Section 13.6.1 of the DBS&A Operations Manual. Because water levels are dropping fast immediately after slug emplacement, measurements should be taken at brief intervals during this time. As recovery continues, the intervals can be gradually lengthened. Readings collected during the slug test should be recorded on Form No. 124, Slug Test Measurements.

3.1.3 Slug Test by Water Withdrawal

Water can be rapidly removed from a test well with the use of a bailer. In this method, a bailer of known volume is lowered below the water level in the test well. After it has been determined that the water level in the control well has recovered to within 95% of static, the bailer is rapidly removed from the water column. Water level recovery within the well is then measured and recorded until the water level has recovered to 95% of the background level. The bailer should be of sufficient size to ensure a proper water level response during removal from the water column.

A submersible pump can also be used to rapidly withdraw water from the test well. The pump will need to remove a sufficient volume of water from the test well in a matter of seconds. Care should be taken to ensure that water does not backflow into the well when the pump is shut off.

3.1.4 Slug Test by Mechanical Slug Injection

A mechanical slug constructed of nonporous material with a density greater than water can be rapidly lowered into the water column of the test well creating a nearly instantaneous rise in water level. The resulting water level recovery is then measured and recorded in the test well until the water level reaches approximately 95% of the background level.

3.1.5 Slug Test by Air Injection

Slug withdrawal can be simulated by injecting air into a well which has an airtight cap. This is accomplished with the use of an air pressure pump and regulator. In this method, the well is pressurized by the injection of air into the airtight test well. The injection of air into the well causes the water level in the test well to drop. Once the water level has stabilized, the pressure is released creating a sudden change in head. Water level recovery will need to be measured with the use of a pressure transducer connected to a data logger. This method requires that the test well be screened in the saturated portion of the aquifer.

3.1.6 Slug Test by Vacuum Withdrawal

The injection of a slug can be simulated by applying a vacuum to an airtight test well. This method requires the use of a vacuum pump and regulator. In this method, a steady vacuum is applied to the test well which creates a rise in water level. After the water level in the test well has stabilized, the vacuum is released which creates a sudden change in head. The water level recovery is then measured with the use of a pressure transducer connected to a data logger. This method requires that the test well be screened entirely in the saturated portion of the aquifer.

4. ATTACHMENTS

1. Slug Test Measurements (DBS&A Form No. 124)

5. REFERENCES

Driscoll, F.G. 1986. Groundwater and Wells, Second Edition. Johnson Filtration Systems, Inc., St. Paul, Minnesota.

Kruseman, G.P. and N.A. de Ridder. 1992. Analysis and Evaluation of Pumping Test Data, Second Edition. International Institute of Land Reclamation and Improvement.

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Approved by: [signature]
Daniel B. Stephens

Reviewed by: [signature]
Systems Operations Manager

DANIEL B. STEPHENS & ASSOCIATES, INC.

Slug Test Measurements

Project Name ______________________ Test Date ______________

Project Number ______________ Field Staff ______________________

Well Number and Datum Used ______________________

Slug Type (material, volume, etc.) ______________________

Observations ______________________

Time	Depth Below Measuring Point (feet)	Change in Water Level (feet)

Signature ______________________ Date ______________

DBS&A Form No. 124 8/93