NM1 - 52

GENERAL CORRESPONDENCE

YEAR(S):

2009

Jones, Brad A., EMNRD

From: Jones, Brad A., EMNRD
Sent: Thursday, September 17, 2009 10:31 AM
To: 'lawearth@earthlink.net'
Cc: 'Michael Hermann'; 'Keith Gordon'
Subject: RE: SSI West Corehole Locations

Larry,

The Oil Conservation Division (OCD) has reviewed the drilling plan, dated September 8, 2009, and the revision, submitted today via email, and determined that the proposal is adequate to proceed with the site investigation. It should be understood that any area that is proposed for activities (landfarming, evaporation ponds, treatment facilities, waste stabilization, etc...) permitted under 19.15.36 NMAC must be properly assessed for siting prior to the submittal of the application. Please provide directions and maps to the proposed site and a confirmed start time and date for the drilling activities. If you have any questions regarding this matter, please do not hesitate to contact me.

Brad

Brad A. Jones
Environmental Engineer
Environmental Bureau
NM Oil Conservation Division
1220 S. St. Francis Drive
Santa Fe, New Mexico 87505
E-mail: brad.a.jones@state.nm.us
Office: (505) 476-3487
Fax: (505) 476-3462

From: lawearth [mailto:lawearth@earthlink.net]
Sent: Thursday, September 17, 2009 9:30 AM
To: Jones, Brad A., EMNRD
Cc: 'Michael Hermann'; 'Keith Gordon'
Subject: SSI West Corehole Locations

Hi Brad – attached is a map of the supplemental borings showing the proposed locations of core holes CH-3 and CH-4.

Keith has a meeting regarding this site at 10am today. If there is any chance that you could complete your approval e-mail before then, it would be greatly appreciated.

Thank you very much for your assistance. Please let me know if you have any questions.

Larry M. Coons, P.E., P.Hg., D.E.E.
Project Director
Gordon Environmental Inc.
Phone: 505-294-7227
Fax: 505-294-7712
Mobile: 505-379-9539

Jones, Brad A., EMNRD

From: lawearth [lawearth@earthlink.net]
Sent: Tuesday, September 15, 2009 3:09 PM
To: Jones, Brad A., EMNRD
Cc: 'Keith Gordon'; WBCSW@aol.com
Subject: Sundance West Site Additional South Cores
Attachments: More Cores LMC 9-15-09.pdf

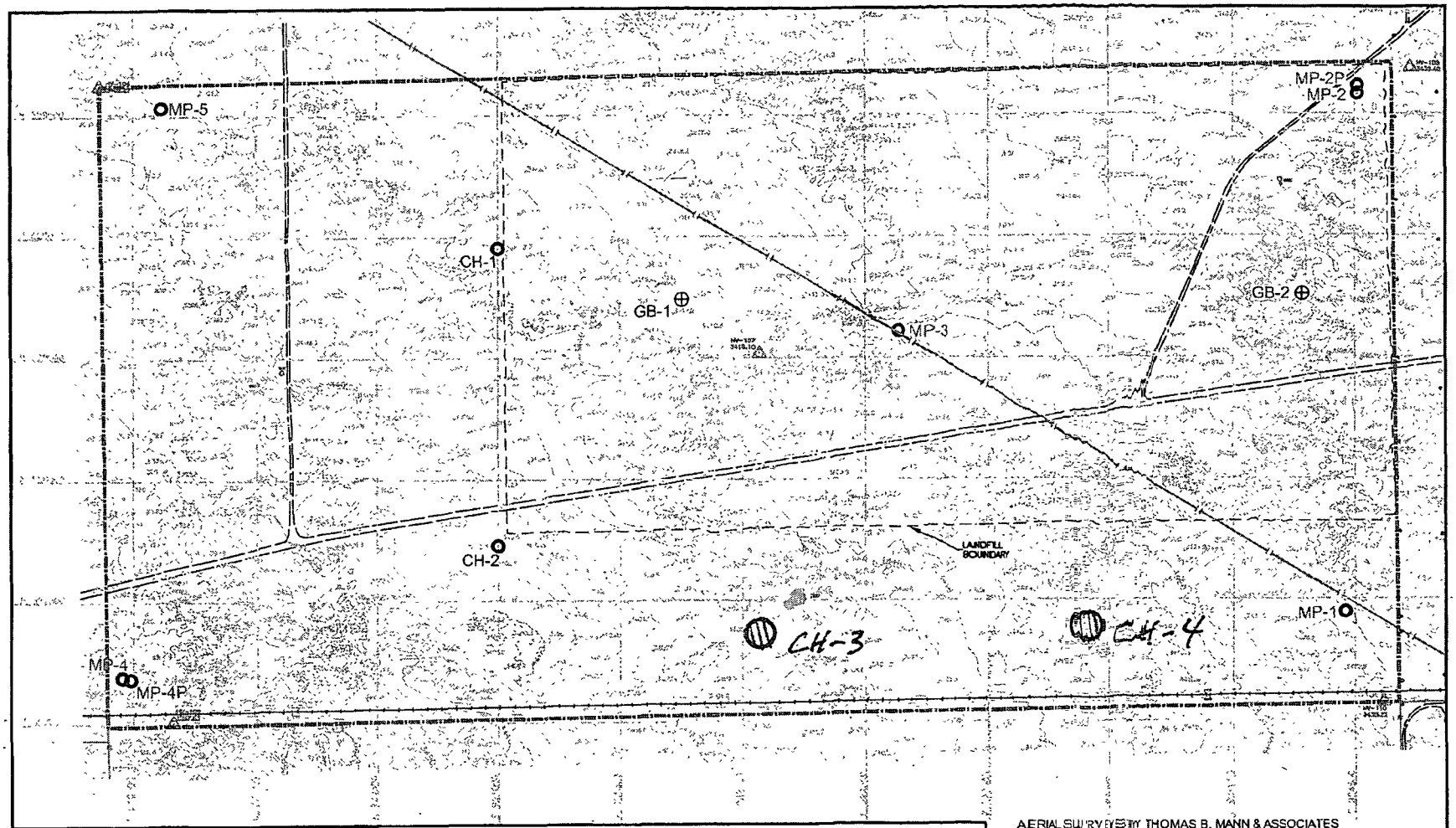
Brad – in follow-up to the phone message I left this afternoon; attached is Fig 4 from the Supplemental Drilling Plan for SSI West that has two additional proposed coreholes located south of the landfill footprint, but within the property boundary.

In anticipation of possibly constructing basins (as part of the site operations) that require a 50-foot separation distance to groundwater per Part 36, the coreholes would be continuous to look for groundwater to a depth of 75 to 80 feet below existing grade (allowing for basins that could be ~20 to 30 feet deep). The same caveat would apply to these coreholes, which is; if groundwater is found, monitoring wells would be constructed at those locations and the water would be sampled.

When you come into the office tomorrow, please let me know if the two additional coreholes as shown would suffice to demonstrate the requirements of Part 36 for separation to groundwater for any operational basins south of the landfill.

Thanks very much for your consideration,

Larry M. Coons, P.E., P.Hg., D.E.E.
Project Director
Gordon Environmental Inc.
Phone: 505-294-7227
Fax: 505-294-7712
Mobile: 505-379-9539



LEGEND

- LANDFILL BOUNDARY
- FENCE
- SECTION, 1/4 SECTION LINE
- UNPAVED ROAD
- POST
- POWER POLE
- LIGHT POLE
- MISC./UNIDENTIFIED OBJECT
- RAILROAD TRACK
- PIPE CULVERT
- BOX CULVERT
- STORAGE TANK
- CONCRETE SLAB
- EXISTING WATER SUPPLY PIPELINE
- SPOT ELEVATION
- INTERMEDIATE CONTOUR
- INDEX CONTOUR
- INTERMEDIATE DEPRESSION
- INDEX DEPRESSION
- PROJECT BOUNDARY
- CONTROL POINT
- GRID LINE/LABEL
- GB-1 PROPOSED GEOTECHNICAL BOREHOLE LOCATION
- CH-1 PROPOSED CORE HOLE LOCATION
- MP-1 EXISTING BOREHOLE LOCATION
- MP-2P EXISTING MONITORING WELL LOCATION

NORTH

0' 300' 600'

AERIAL SURVEY BY THOMAS B. MANN & ASSOCIATES
AERIAL MAPPING SERVICES
5115 COPPERNEL, ALBUQUERQUE, NM 87108
DATE OF PHOTOGRAPHY 10-01-08

LOCATIONS OF SUPPLEMENTAL GEOTECHNICAL BORINGS AND CORE HOLES

SUNDANCE WEST
SUNDANCE SERVICES INC.
LEDA COUNTY, NEW MEXICO

Gordon Environmental, Inc.
Consulting Engineers
213 S Camino del Pueblo
Bernalillo, New Mexico, USA
Phone 505-867-6990
Fax: 505-867-6991

DATE: 08/24/09	ICAD: MP BOREHOLES W GEOTECH BORINGS.dwg	PROJECT # 530.01.01
DRAWN BY: MLH	REVIEWED BY: IKG	FIGURE 4
APPROVED BY: IKG	ikg@gordonenvironmental.com	

Drawing:P:\acad 2003\530.01.01\FIGURES\MP BOREHOLES W GEOTECH BORINGS.dwg
Date/Time:Sep 15, 2009-14:10:41

Jones, Brad A., EMNRD

From: lawearth [lawearth@earthlink.net]
Sent: Thursday, September 17, 2009 9:30 AM
To: Jones, Brad A., EMNRD
Cc: 'Michael Hermann'; 'Keith Gordon'
Subject: SSI West Corehole Locations
Attachments: More Cores LMC 9-15-09.pdf

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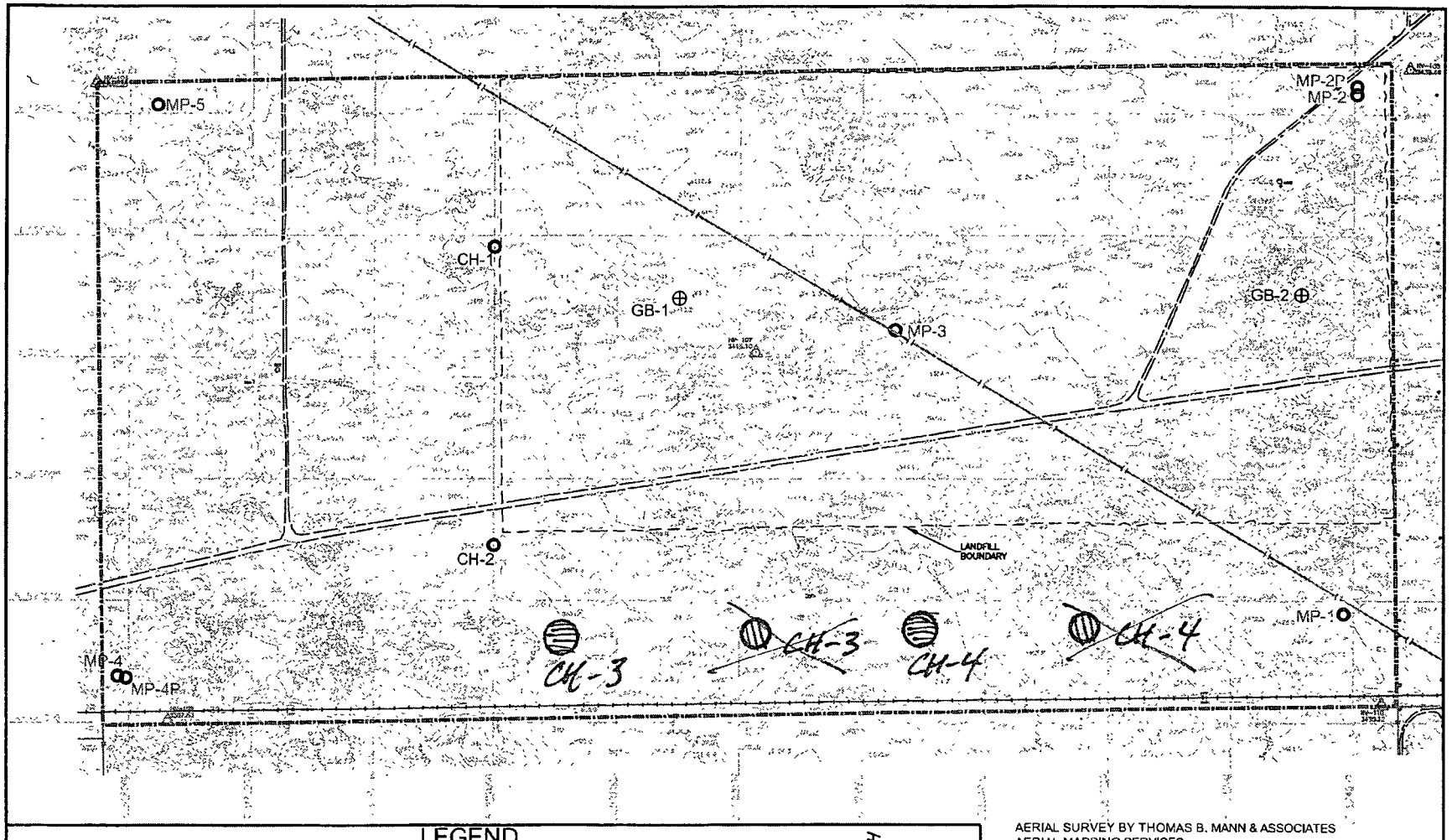
Keith has a meeting regarding this site at 10am today. If there is any chance that you could complete your approval e-mail before then, it would be greatly appreciated.

Thank you very much for your assistance. Please let me know if you have any questions.

Larry M. Coons, P.E., P.Hg., D.E.E.
Project Director
Gordon Environmental Inc.
Phone: 505-294-7227
Fax: 505-294-7712
Mobile: 505-379-9539



LEGEND

- LANDFILL BOUNDARY
- FENCE
- SECTION, 1/4 SECTION LINE
- UNPAVED ROAD
- POST
- POWER POLE
- LIGHT POLE
- MISC./UNIDENTIFIED OBJECT
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- GB-1 ⊕ PROPOSED GEOTECHNICAL BOREHOLE LOCATION
- CH-1 O PROPOSED CORE HOLE LOCATION
- MP-1 O EXISTING BOREHOLE LOCATION
- MP-2P O EXISTING MONITORING WELL LOCATION

NORTH

0' 300' 600'

AERIAL SURVEY BY THOMAS B. MANN & ASSOCIATES
AERIAL MAPPING SERVICES
5115 COPPER NE, ALBUQUERQUE, NM 87108
DATE OF PHOTOGRAPHY 10-01-08

LOCATIONS OF SUPPLEMENTAL GEOTECHNICAL BORINGS AND CORE HOLES

SUNDANCE WEST
SUNDANCE SERVICES INC.
LEA COUNTY, NEW MEXICO

Gordon Environmental, Inc.
Consulting Engineers
213 S. Camino del Pueblo
Bernalillo, New Mexico, USA
Phone: 505-867-6990
Fax: 505-867-6991

DATE 08/24/09	CAD: MP BOREHOLES W GEOTECH BORINGS dwg	PROJECT #: 530.01.01
DRAWN BY MLH	REVIEWED BY IKG	FIGURE 4
APPROVED BY: IKG	gel@gordonenvironmental.com	

Drawing P:\acad 2003\530.01.01\FIGURES\MP BOREHOLES W GEOTECH BORINGS.dwg
Date/Time Sep 15, 2009-14:10:41

SUPPLEMENTAL DRILLING PLAN

SUNDANCE SERVICES, INC.
LEA COUNTY, NEW MEXICO

SEPTEMBER 2009

SUBMITTED TO:
New Mexico Energy, Minerals and Natural Resources Department
Oil Conservation Division
1220 S. St. Francis Drive
Santa Fe, New Mexico 87505
Phone: (505) 476-3440

PREPARED FOR:
Sundance Services, Inc.
P.O. Box 1737
Eunice, NM 88231

PREPARED BY:
Gordon Environmental, Inc.
213 South Camino del Pueblo
Bernalillo, New Mexico 87004
Phone: (505) 867-6990

Gordon Environmental, Inc.
Consulting Engineers

(505) 867-6990
(505) 867-6991 Fax

GORDON ENVIRONMENTAL, INC.

Consulting Engineers

213 S. Camino del Pueblo
Bernalillo, New Mexico 87004

September 8, 2009

Mr. Brad Jones
New Mexico Energy, Minerals and Natural Resources Department
Oil Conservation Division
1220 S. St. Francis Drive
Santa Fe, NM 87505

RE: Sundance Services Inc. – Sundance West Surface Waste Management Facility
Supplemental Drilling Plan [530.01.01/02]

Dear Mr. Jones:

We are please to submit the enclosed Supplemental Drilling Plan for your review and approval. We appreciate your input and feel we have incorporated all of your comments and suggestions.

Please contact us with any questions or comments, or if you require additional information. We look forward to working with the OCD during the supplemental drilling work at Sundance.

Very truly yours,

Gordon Environmental, Inc.

Larry M. Coons, P.E.
Project Director

I. Keith Gordon, P.E.
Principal

Attachment:

Supplemental Drilling Plan – Sundance Services, Inc., Lea County, New Mexico, September 2009

P:\FILES\530.01.01\Drilling\SSI-SupDrillingCvrLtr.doc

SUPPLEMENTAL DRILLING PLAN
Sundance Services, Inc.
September 2009

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LIST OF ATTACHMENTS

Attachment No.	Title
A	DRAFT COMPLETION REPORT – DRILLING, SAMPLING, AND MONITORING WELL INSTALLATION – SUNDANCE SERVICES, INC., LEA COUNTY, NEW MEXICO – JUNE 2009
B	DRAFT PERMIT SECTION OUTLINE – GEOLOGY AND HYDROGEOLOGY - SUNDANCE WEST, SUNDANCE SERVICES, INC., LEA COUNTY, NEW MEXICO – OCD PART 36 LANDFILL

1.0 PROJECT SUMMARY

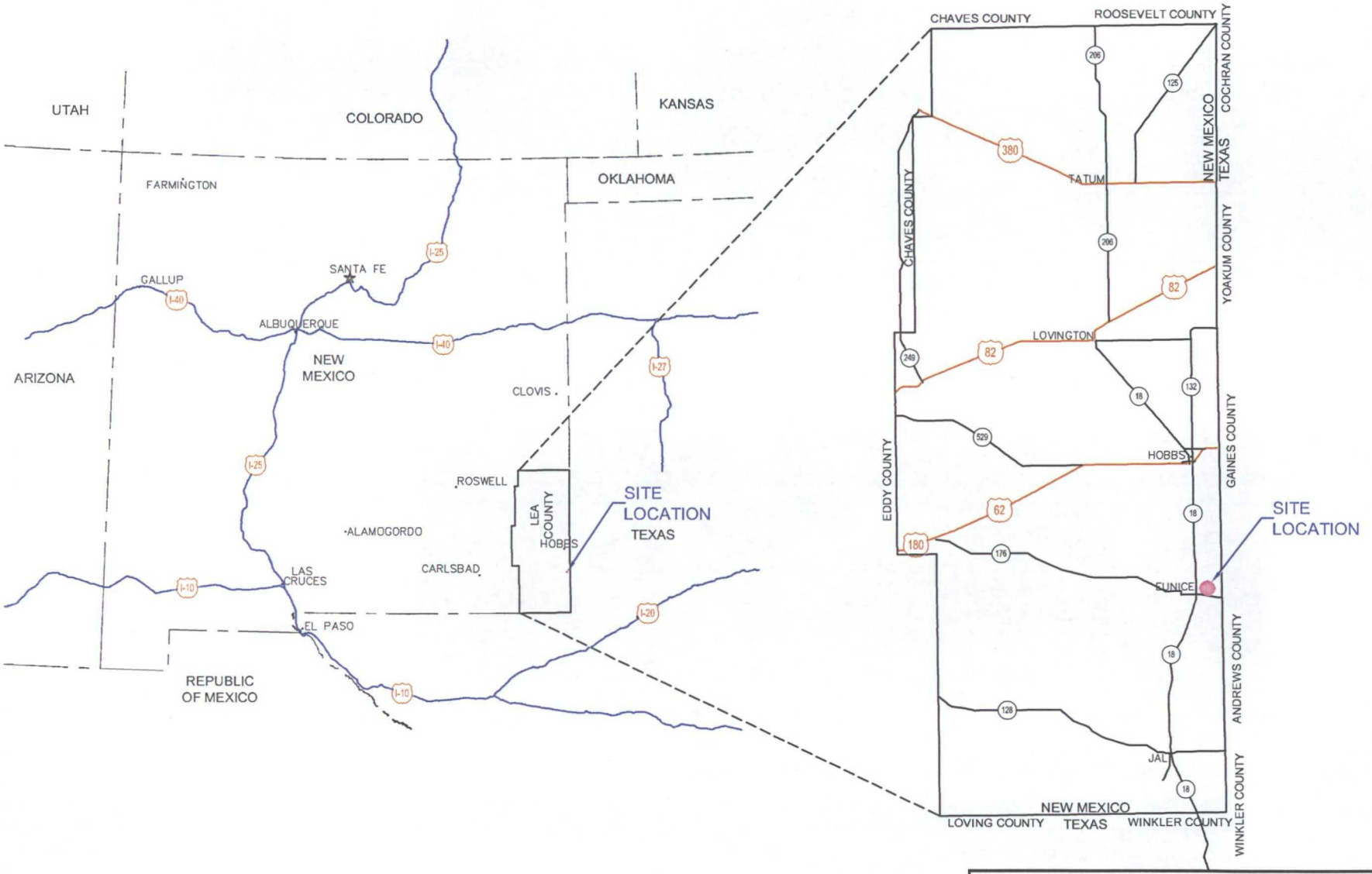
1.1 Project Description

Sundance Services, Inc. (SSI) is planning the installation of a new "surface waste management facility" meeting the siting, design, and operating requirements of §19.15.36 NMAC [New Mexico Energy, Minerals and Natural Resources Department; administered by the Oil Conservation Division (OCD)]. The new facility i.e., "Sundance West" has been the subject of a preliminary subsurface investigation (**Attachment A**); and discussions and meetings with OCD (i.e., plenary session of 07/01/09).

The proposed facility is located approximately four miles east of Eunice, N.M., on 320 acres of vacant land owned by Wallach, et.al and leased by SSI (**Figure 1**). The "Vicinity Map" (**Figure 2**) shows the location of "Sundance West" with respect to other local facilities which have been the subject to extensive siting investigations. The proposed facility is located on undeveloped land immediately west of current SSI operations, and is otherwise surrounded by vacant land. Oil and gas exploration and extraction activities are not conducted on-site, but are concentrated to the west of the site (**Figure 3**).

Existing site conditions have been documented via aerial photogrammetry; and a site topograph is provided as **Figure 4**. Also included on **Figure 4** are the locations of existing boring/wells; proposed corings and geotechnical borings; and the preliminary landfill footprint of 155 ± acres on the 320 ± acre site. There is an existing right-of-way for a 14" diameter water supply line shown on **Figure 4** that provides water from Eunice to the LES project that may be relocated in the future.

The Sundance West site is proposed as an OCD Landfill pursuant to the "Part 36" surface waste management facility standards. SSI will submit an Application for Permit to OCD in compliance with the regulations for siting, design, and operations of surface waste management facilities for oil and gas wastes [19.15.36.NMAC]. The Application for Permit will address the requirements of the regulations for site-specific geological and hydrological characterization [19.15.36.8.C(15) NMAC and 19.15.36.13.A NMAC]. There are ancillary operations proposed for the remaining 165 acres that will be further detailed in the Application for Permit.



NORTH

NOT TO SCALE

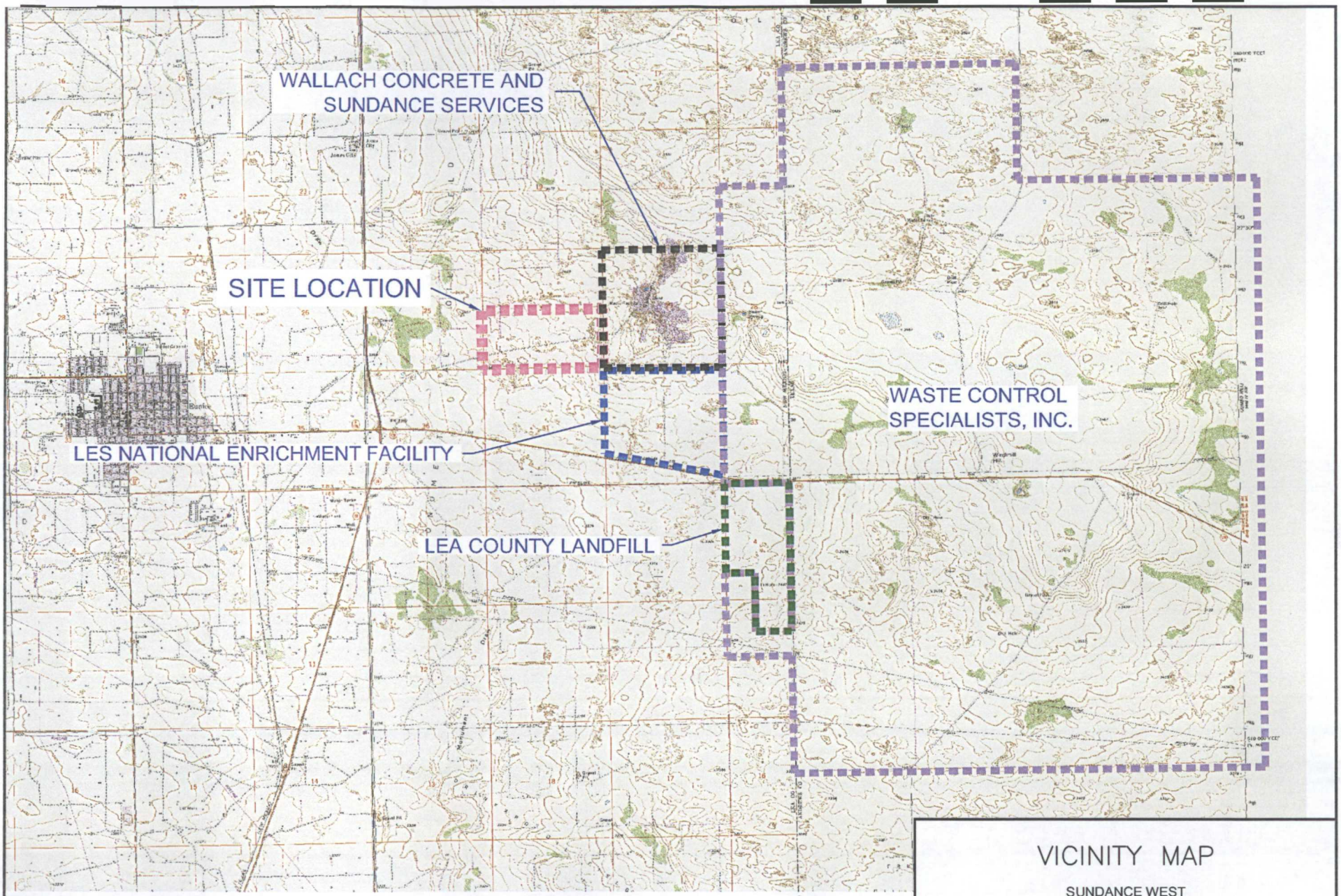
SITE LOCATION MAP

SUNDANCE WEST
SUNDANCE SERVICES INC.
LEA COUNTY, NEW MEXICO

Gordon Environmental, Inc.
Consulting Engineers
213 S. Camino del Pueblo
Bernalillo, New Mexico, USA
Phone: 505-867-6990
Fax: 505-867-6991

DATE: 08/24/09	CAD: SITE LOCATION MAP GIS.dwg	PROJECT #: 530.01.01
DRAWN BY: MLH	REVIEWED BY: DRT	FIGURE 1
APPROVED BY: IKG	gei@gordonenvironmental.com	

Drawing:P:\acad 2003\530.01.01\FIGURES\SITE LOC MAP GIS.dwg
Date/Time:Aug. 24, 2009-09:18:59



VICINITY MAP

SUNDANCE WEST
SUNDANCE SERVICES INC.
LEA COUNTY, NEW MEXICO

MAP BASE:
EUNICE N. MEX. 1969, PHOTOREVISED 1979 AND
EUNICE NE, TEX.-N. MEX. 1969, PHOTOREVISED 1979,
1:24000, USGS 7.5 MIN. SERIES TOPOGRAPHIC QUADRANGLES

NORTH

0' 3000' 6000'

Gordon Environmental, Inc.
Consulting Engineers
213 S. Camino del Pueblo
Bernalillo, New Mexico, USA
Phone: 505-867-6990
Fax: 505-867-6991

DATE: 08/24/09	CAD: VICINITY MAP GIS.dwg	PROJECT #: 530.01.01
DRAWN BY: MLH	REVIEWED BY: DRT	FIGURE 2
APPROVED BY: IKG	gei@gordonenvironmental.com	

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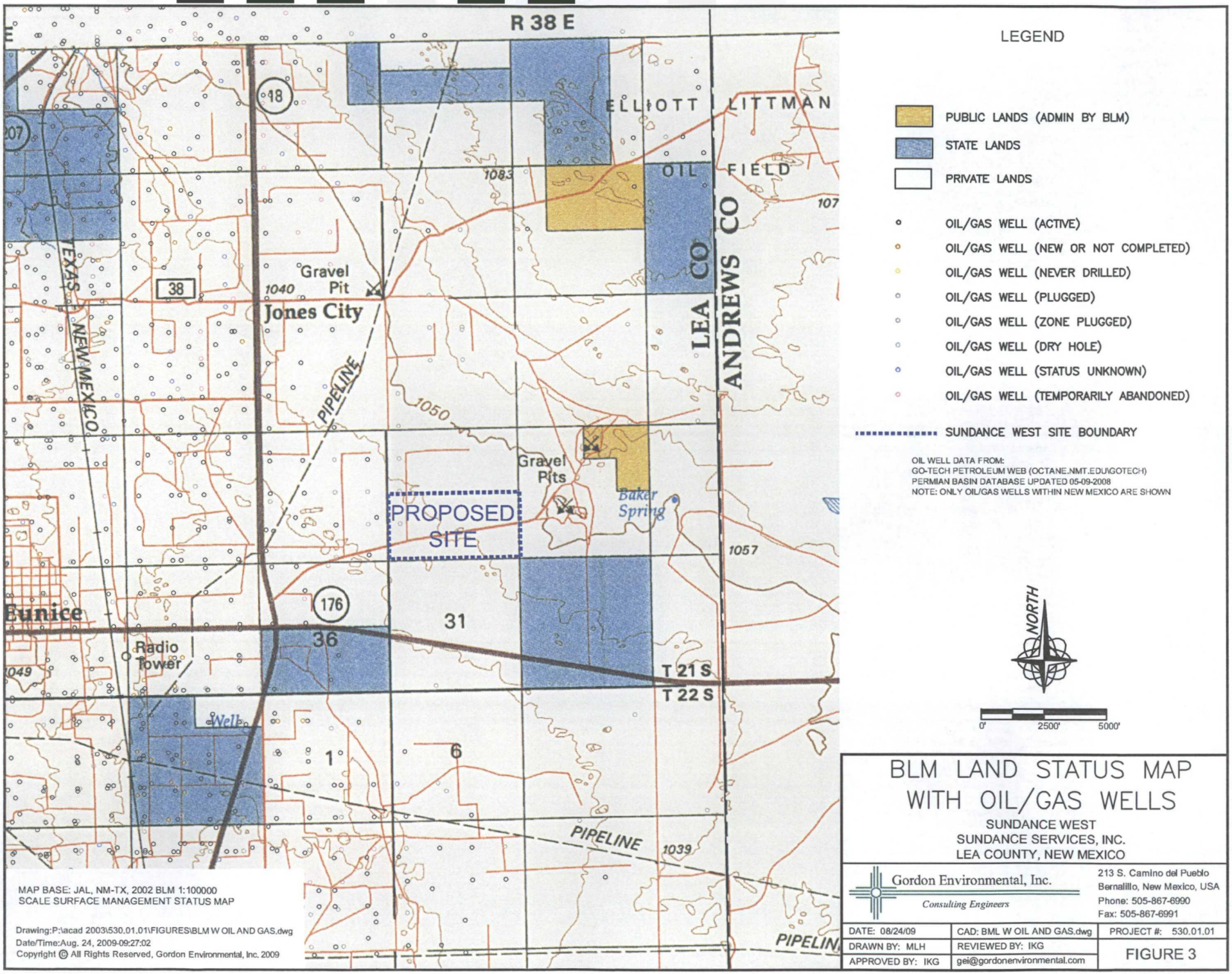


MAP BASE: JAL, NM-TX, 2002 BLM 1:100000
SCALE SURFACE MANAGEMENT STATUS MAP

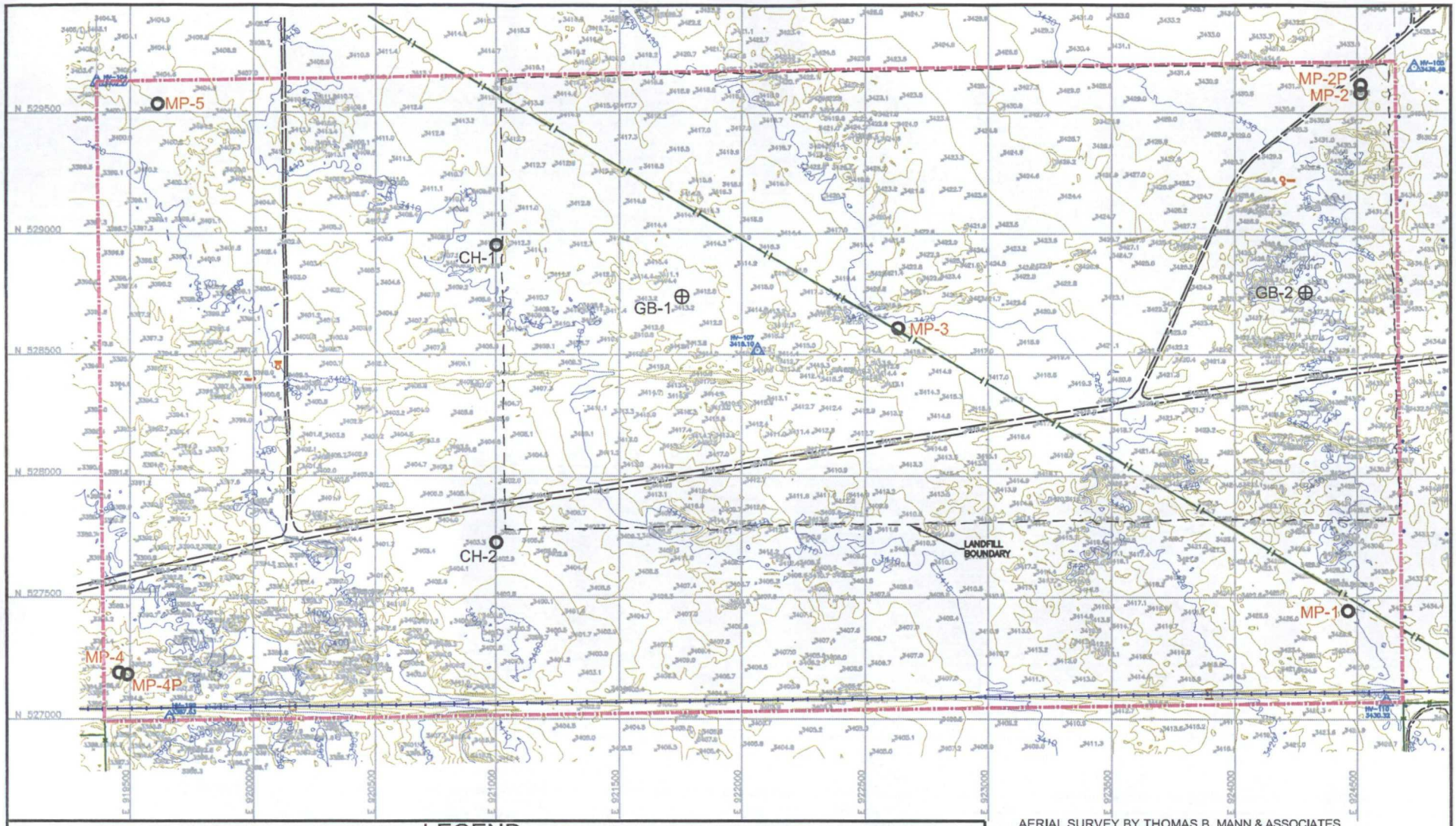
Drawing:P:\acad 2003\530.01.01\FIGURES\BLM W OIL AND GAS.dwg
Date/Time:Aug. 24, 2009-09:27:02

BLM LAND STATUS MAP WITH OIL/GAS WELLS

SUNDANCE WEST
SUNDANCE SERVICES, INC.
LEA COUNTY, NEW MEXICO

Gordon Environmental, Inc.
Consulting Engineers
213 S. Camino del Pueblo
Bernalillo, New Mexico, USA
Phone: 505-867-6990
Fax: 505-867-6991

DATE: 08/24/09	CAD: BML W OIL AND GAS.dwg	PROJECT #: 530.01.01
DRAWN BY: MLH	REVIEWED BY: IKG	FIGURE 3
APPROVED BY: IKG	gei@gordonenvironmental.com	



LEGEND

- LANDFILL BOUNDARY
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- UNPAVED ROAD
- POST
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- MISC./UNIDENTIFIED OBJECT
- RAILROAD TRACK
- PIPE CULVERT
- BOX CULVERT
- STORAGE TANK
- CONCRETE SLAB

- EXISTING WATER SUPPLY PIPELINE
- × 5835.1 — SPOT ELEVATION
- 3460 — INTERMEDIATE CONTOUR
- 3440 — INDEX CONTOUR
- INTERMEDIATE DEPRESSION
- INDEX DEPRESSION
- PROJECT BOUNDARY
- CONTROL POINT
- N 529000 — GRID LINE/LABEL
- GB-1 — PROPOSED GEOTECHNICAL BOREHOLE LOCATION
- CH-1 — PROPOSED CORE HOLE LOCATION
- MP-1 — EXISTING BOREHOLE LOCATION
- MP-2P — EXISTING MONITORING WELL LOCATION

NORTH

0' 300' 600'

AERIAL SURVEY BY THOMAS B. MANN & ASSOCIATES
AERIAL MAPPING SERVICES
5115 COPPER NE, ALBUQUERQUE, NM 87108
DATE OF PHOTOGRAPHY 10-01-08

LOCATIONS OF SUPPLEMENTAL GEOTECHNICAL BORINGS AND CORE HOLES

SUNDANCE WEST
SUNDANCE SERVICES INC.
LEA COUNTY, NEW MEXICO

Gordon Environmental, Inc.
Consulting Engineers
213 S. Camino del Pueblo
Bernalillo, New Mexico, USA
Phone: 505-867-6990
Fax: 505-867-6991

DATE: 08/24/09	CAD: MP BOREHOLES W GEOTECH BORINGS.dwg	PROJECT #: 530.01.01
DRAWN BY: MLH	REVIEWED BY: IKG	FIGURE 4
APPROVED BY: IKG	gei@gordonenvironmental.com	

Drawing:P:\acad 2003\530.01.01\FIGURES\MP BOREHOLES W GEOTECH BORINGS.dwg
Date/Time:Aug. 24, 2009-11:50:51

1.2 Supplemental Drilling Plan Objectives

This Supplemental Drilling Plan (Supplemental Plan) describes the proposed boring and testing program to evaluate the subsurface conditions at the proposed SSI West site in compliance with the requirements of 19.15.36.8.C(15) NMAC and 19.15.36.13.A NMAC. The work proposed herein supplements the information obtained from the initial investigation conducted at the site in April 2009 and discussed with OCD on 07/01/09. The Completion Report for the initial site investigation is included as **Attachment A**; and Section 2.2 summarizes the data collected as part of the initial investigation. The purpose of this Supplemental Plan is to complete the development of the site-specific geological, geotechnical, and hydrogeological database for the proposed HDSWF site; and to outline the rationale and approach by which hydrogeologic and geotechnical information will be collected to confirm site conditions.

2.0 GEOLOGY AND HYDROGEOLOGY

2.1 Local Hydrogeologic Summary

The geology and hydrology in the subject area has been studied extensively in conjunction with permitting and licensing of nearby waste disposal facilities including the Waste Control Specialists (WCS) site and Lea County Landfill (LCLF); and the National Enrichment Facility (NEF) located immediately to the southeast of the subject area; and a draft Part 61 License Application for a Low-Level Radioactive Waste Disposal Facility for WCS. **Figure 2** is a vicinity map showing the locations of nearby waste management facilities subject to intense hydrogeologic investigations. This brief summary of the regional geology and hydrology is derived from the information contained in the permitting documents associated with the nearby disposal facilities.

The proposed SSI West site is within the Southern High Plains physiographic province, characterized by mildly deformed Triassic and Permian sedimentary rocks capped by the late Miocene-Pliocene Ogallala Formation. The local site region is underlain primarily by the Late Tertiary/Quaternary-aged pedogenic caprock caliche that developed on all pre-Quaternary formations on the southern High Plains. Young windblown sands of the

Blackwater Draw Formation (BDF) overlie the caprock caliche. Unconsolidated to semi-consolidated sands and gravels of the Ogallala, Antlers, and Gatuña Formations (locally referred to as OAG) lie between the caprock and underlying red beds of the Dockum Group (Chinle Formation).

Figure 5 is an aerial image showing the main physiographic features in the local region of the proposed SSI West site. The local region and proposed SSI West site lie on an alluvial fan deposit. The fan deposit (**Figure 5**) is the result of the drainage off the western edge of the Llano Estacado during a long span of geologic time beginning at least in the Pliocene Epoch of the Tertiary (2 to 3 millions of years ago). Drainage of the western Llano upland surface (over the Caprock Escarpment) from several large playas was strong during the several humid climatic phases of the late Tertiary and Pleistocene. The catchment area of this drainage reaches from the Llano edge eastward to the Rattlesnake Ridge divide. The fan is a complex of several stages of deposition, corresponding to climatic phases. The base of the fan represents the most extensive phase of deposition, probably related to a long and intense humid period late in the Pliocene. Drainage during subsequent decreasingly humid pluvial periods of the Pleistocene-generated smaller fan deposits on the surface of the Pliocene fan. These account for local steepening of the gentle upper surface of the composite fan. The drainage that built the fan shaped the terrain along the entire margin between the Llano and the Pecos River valley in the site region, which has changed little since the last Pleistocene pluvial period.

The alluvial fan is a thickened irregular conical body of alluvium of the type common in arid regions of the American Southwest. It consisted of sufficient volumes of sediment to push Monument Draw to the west and to narrow its valley. Its upper surface is covered by the reddish brown BDF of late Pleistocene age. The BDF is mostly dune and windblown sand with differentially developed horizons of a soft caliche and soil. The BDF is widely used for road surfacing throughout the region and there are many light colored areas on the upper surface of the fan where caliche has been harvested for that purpose.

PHYSIOGRAPHY OF THE SSI WEST SITE AREA

SUNDANCE WEST
SUNDANCE SERVICES INC.
LEA COUNTY, NEW MEXICO

Gordon Environmental, Inc.
Consulting Engineers
213 S. Camino del Pueblo
Bernalillo, New Mexico, USA
Phone: 505-867-6990
Fax: 505-867-6991

DATE: 08/18/09	CAD: BAKER SPRINGS-CAPROCK 01.dwg	PROJECT #: 530.01.01
DRAWN BY: MLH	REVIEWED BY: IKG	FIGURE 5
APPROVED BY: IKG	gei@gordonenvironmental.com	

Drawing:P:\acad 2003\530.01.01\FIGURES\BAKER SPRINGS-CAPROCK 01.dwg
Date/Time:Aug. 18, 2009-11:41:14

The main body of the fan is made up of alluvial material that is difficult to assign to any of the regional stratigraphic units because of its origin by transport off the Llano by largely ephemeral drainage during a complex series of climatic regimes. Gravel, in a complex distributary channel system, and sand and silt with various degrees of caliche and soil development; are predominant. In general, the energy of transport diminished as runoff moved down the gentle westerly fan slope, away from the scarp and the average grain-size of the alluvium decreases. The distribution of alluvium is very complex in such bodies and is difficult to predict.

The geohydrology of alluvial fans is largely controlled by the distribution of grain-size of the alluvium and by the distribution of caliche and soil developed during the alternating humid and arid climatic phases characteristic of the history of the region. The fan within the local region of the proposed SSI West site lies on an eroded surface of the Chinle Formation claystone (Chinle) at its eastern origin where it meets the Llano margin and may extend over the thickened OAG at its western terminus near Monument Draw.

The presence of any perched water within the OAG fan is no longer related to the drainage originating on the edge of the Llano. The upper surface of the fan (BDF) is permeable, and the rainfall on the fan surface infiltrates the very permeable alluvium generating only ephemeral local runoff. Perched water originates as the result of retardation of downward percolation of rainwater that infiltrates the fan surface in patterns that reflect the fan micro-topography and the surface grain-size distribution of the alluvium. The three-dimensional fan permeability reflects the depositional and soil formation histories of the fan.

Buried surfaces of caliche formation and soil formation can locally control groundwater movement Alluvial grain-size is related to the distribution of energy of transport at the time of deposition. Energy of transportation has shifted across the fan surface in complex patterns in response to the climatic cycles during fan building over a period of more than two million years. Local areas of near-surface perched water may be evident in the distribution of phreatophytic plants on the fan surface. Also, there may be local accumulations of perched water within the fan that are not reflected by plant distribution.

The permanent regional groundwater surface lies at a depth of at least 1,100 to 1,200 feet in the Santa Rosa Formation of the Dockum Group. Above this depth, the Chinle Formation consists predominantly of siltstones and mudstones having hydraulic conductivities in the range of 10^{-8} to 10^{-9} centimeters per second.

2.2 Summary of Initial Data Collection at SSI West Site

Attachment A, the Completion Report for Drilling, Sampling, and Monitoring Well Installation; provides the details of the initial data collection at the proposed SSI West site. In summary, five soil borings (MP-1 through MP-5) were drilled at the locations shown on **Figure 4.** Two additional soil borings were drilled adjacent to MP-2 and MP-4 (MP-2P and MP-4P, respectively) in order to install shallow groundwater monitoring wells near these locations. Borings MP-1 through MP-5 were drilled at locations within the site area to characterize the shallow geology and hydrogeology to depths up to 150 feet below existing site grade. The focus was to determine the potential presence of groundwater within 100' of the anticipated landfill invert elevation of approximately 50' below ground surface.

Wells MP-2P and MP-4P were completed subsequent to drilling and sampling borings MP-1 through MP-5 to monitor thin, isolated zone(s) of free water perched on top of, and/or within, the upper (Chinle). Borings MP-1 through MP-5 were drilled using a single, portable CME 75 drill rig capable of using both hollow-stem auger (HSA) and air rotary methods. HSA was used in the upper 25 to 50 feet of the borings until claystone/siltstone of the Chinle was encountered. The Chinle was drilled to a total depth of 150 feet in each boring using air rotary. The drilling methods employed were very effective at identifying the subsurface materials encountered, as well as the thin, isolated zones of saturation as described below.

As documented in **Attachment A**, the shallow stratigraphy consists of very fine to medium-textured sand from the surface to the top of the Chinle. This layer is the OAG as described in Section 2.1, and may contain variable silt. The upper few inches to few feet typically consists of reddish brown fine sand (BDF). Variable thickness of caliche and/or caliche-cemented sand is typical at depths of approximately 10 feet below the surface. The Chinle redbeds below the unconsolidated sand are typically claystone to siltstone, with very isolated thin zones of very

fine-to fine textured sand/sandstone. The materials encountered in all of the borings are consistent with the regional stratigraphy as presented in Section 2.1. All materials encountered in borings MP-1 through MP-5 were dry to slightly moist; with the exception of moist to wet sand at a depth of 21 to 26 feet below the surface in boring MP-2 (see boring log in Attachment C of **Attachment A**); and moist fine sand intervals at 47 to 48 feet, and 56 to 58 feet below the surface in boring MP-4 (see boring log in Attachment C of **Attachment A**).

Following drilling of the MP borings, shallow monitoring wells MP-2P and MP-4P were constructed at the locations shown on **Figure 4** to monitor any isolated zone(s) of saturation on top of and/or within the upper Chinle at those locations. The wells were constructed in response to moist/wet zones encountered, as described in Section 4.1 of **Attachment A**; and illustrated on the boring logs in Attachment C of **Attachment A**. Table 2 in **Attachment A** is a summary of the as-built conditions for wells MP-2P and MP-4P, including the history of recorded water levels in the two wells.

Subsequent to the initial field investigation, wells MP-2P and MP-4P were bailed on June 24 and 25, 2009. On June 24, only 0.2 feet of water was measured in well MP-2P, and only 1.5 inches of water could be bailed (one time) from the well. The well did not recover, and only a very small amount of water was in the bottom cap of the well when measured on June 25. On June 24, a total of 15 liters (4 gallons) was bailed from well MP-4P and samples were collected for laboratory analysis as required in 19.15.36.8.C(15)(b)NMAC. Approximately 15 hours after bailing (on June 25), the water level in MP-4P had recovered to within 94 percent of the pre-bailing static water level. The bailing and sampling conducted on June 24 and 25, 2009 indicates the following:

- The small amount of fluids in well MP-2P are likely not natural formation water; but a small amount of anthropogenic water either added during well construction to hydrate the bentonite pellets on the well annulus, and/or from activities associated with the Wallach gravel quarry operation to the east.
- The minor amount of water produced from well MP-4P is likely natural formation (non-anthropogenic) water.

Figure 6 includes two geological sections across the proposed SSI West site constructed from the data collected during the initial site investigation. From the same data, **Figure 7** is an isopleth map showing the elevation of the top of the Chinle. From five data points (MP-1 through 5), the attitude of the Chinle has been calculated using AutoCAD to dip gently (less than 1 degree) to the west-southwest, generally consistent with the surface topography. The attitude of the top of the Chinle and overlying stratigraphy are consistent with the local regional conditions described in Section 2.1.

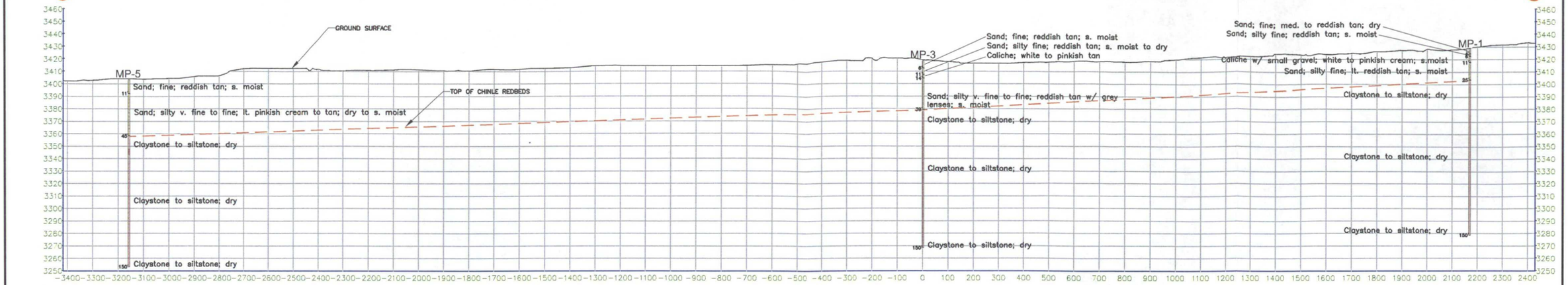
3.0 SUPPLEMENTAL DRILLING PLAN

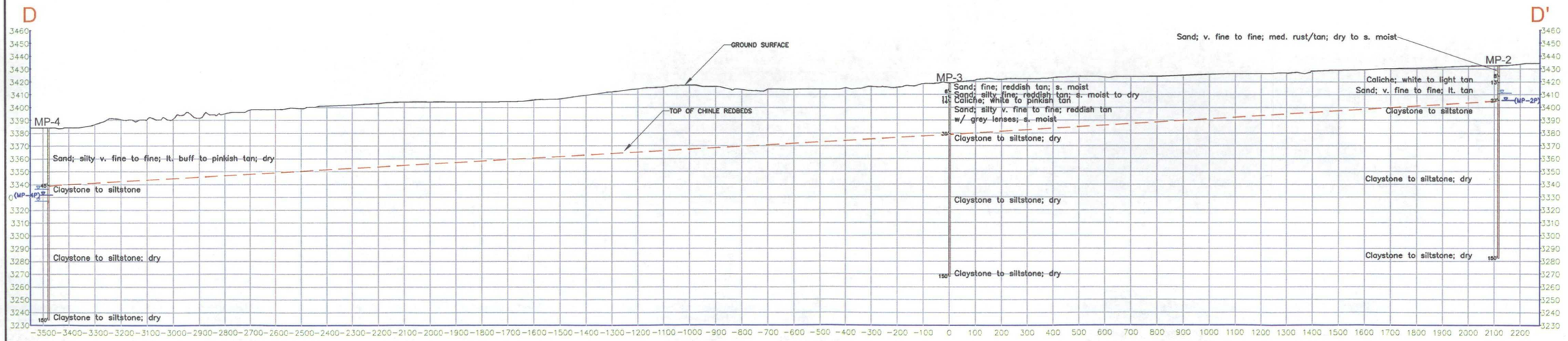
The Supplemental Plan proposed herein was developed after consultation with OCD in Santa Fe on July 1, 2009. Data obtained from the implementation of this proposed Supplemental Plan will assist in characterization of the site geology and hydrogeology; as well as provide geotechnical information for use in the design and assessment of the proposed SSI West facility. The data will also be instrumental in defining the need for groundwater monitoring.

Because of the extensive thickness of the Chinle beneath the site (see Section 2.1), and the vast amount of supporting regional geologic data; deep borings into the Chinle are not required to characterize the site geology and hydrogeology below the depths proposed in the following sections. This methodology is consistent with planned shallow monitoring of the vadose zone immediately above the Chinle, and no deep groundwater monitoring is proposed for the SSI West facility.

3.1 Geotechnical Borings

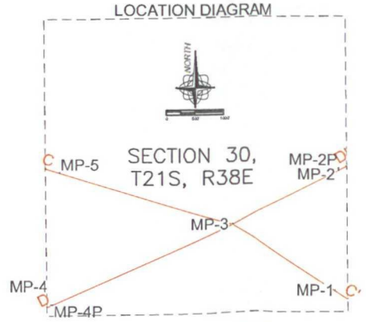
Two geotechnical borings (GB-1 and GB-2) will be advanced to estimated total depths of 50 to 60 feet below the existing surface, respectively; at the approximate locations shown on **Figure 4.** The borings will be used to collect geotechnical information for facility design and to address the soil testing requirements of 19.15.36.8.C(15)(g) NMAC, specifically – *porosity, permeability, conductivity, compaction ratios, and swelling characteristics for the sediments on which the contaminated soils will be placed.* The borings will also serve to determine if any saturation exists above the Chinle at those locations. If saturation exists, the boring(s) will be converted to monitoring well(s).

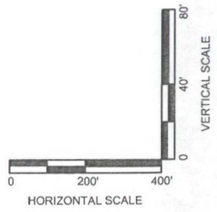




KEY
WATER ENCOUNTERED DURING DRILLING
WATER LEVEL AFTER COMPLETION (NOTE: FROM MP-2P AND MP-4P WATER LEVELS)

LOCATION DIAGRAM





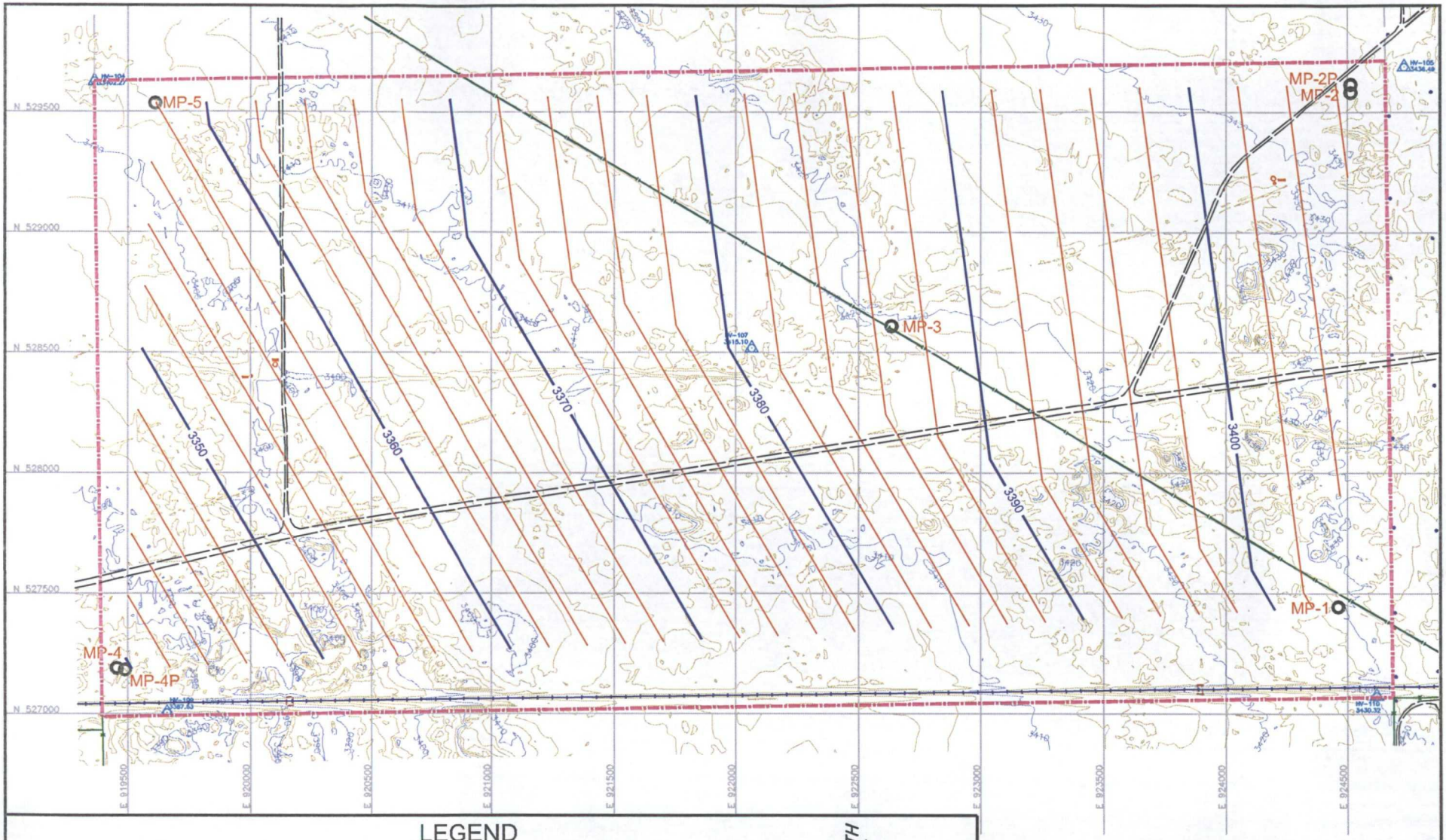
GEOLOGICAL CROSS SECTIONS

SUNDANCE WEST
SUNDANCE SERVICES INC.
LEA COUNTY, NEW MEXICO

Gordon Environmental, Inc.
Consulting Engineers
213 S. Camino del Pueblo
Bernalillo, New Mexico, USA
Phone: 505-867-6990
Fax: 505-867-6991

DATE: 08/24/09	CAD: CROSS-SECTIONS MP VE5.dwg	PROJECT #: 530.01.01
DRAWN BY: MLH	REVIEWED BY: MJC	FIGURE 6
APPROVED BY: IKG	gei@gordonenvironmental.com	

Drawing:P:\acad 2003\530.01.01\FIGURES\C3D MODELS\CROSS SECTIONS MP VE5.dwg
Date/Time:Aug. 24, 2009-09:30:11



LEGEND

- FENCE
- SECTION, 1/4 SECTION LINE
- UNPAVED ROAD
- POST
- POWER POLE
- LIGHT POLE
- MISC./UNIDENTIFIED OBJECT
- RAILROAD TRACK
- PIPE CULVERT
- BOX CULVERT
- STORAGE TANK
- CONCRETE SLAB
- PIPELINE
- INTERMEDIATE CONTOUR
- INDEX CONTOUR
- INTERMEDIATE DEPRESSION
- INDEX DEPRESSION
- PROJECT BOUNDARY
- CONTROL POINT
- GRID LINE/LABEL
- CHINLE REDBEDS 10' CONTOUR
- CHINLE REDBEDS 2' CONTOUR
- MP-1 MP BOREHOLE LOCATION
- MP-2P MP MONITORING WELL LOCATION

NORTH

0' 300' 600'

TOP OF CHINLE REDBED CONTOURS

SUNDANCE WEST
SUNDANCE SERVICES INC.
LEA COUNTY, NEW MEXICO

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213 S. Camino del Pueblo
Bernalillo, New Mexico, USA
Phone: 505-867-6990
Fax: 505-867-6991

DATE: 08/17/09	CAD: MP BOREHOLES CHINLE TOP.dwg	PROJECT #: 530.01.01
DRAWN BY: MLH	REVIEWED BY: IKG	FIGURE 7
APPROVED BY: IKG	gei@gordonenvironmental.com	

Drawing:P:\acad 2003\530.01.01\FIGURES\MP BOREHOLES CHINLE TOP.dwg
Date/Time:Aug. 17, 2009-14:43:35

The proposed geotechnical borings will be drilled using a portable CME 75 hollow-stem auger drill rig. During drilling activities, GEI field staff will be on-site to collect soil samples retrieved either by using a standard split-spoon sampler or a brass ring sampler, depending upon the laboratory test to be conducted on the samples. Samples will be collected at five-foot intervals. Collected samples will be used for subsequent visual classification and selected laboratory analyses. **Table 1** identifies the proposed laboratory testing specifications for the samples. Depending upon the total depth of the borings, the number of tests conducted may vary as shown in **Table 1**. After geotechnical samples have been collected, the boring will be decommissioned by pumping a 2% to 5% bentonite grout into the annular space via tremmie pipe. This grout will be pumped to the bottom of the borehole and injected until it reaches the ground surface to eliminate a potential conduit for fluid migration.

Table 1
Summary of Proposed Sampling and Laboratory Testing
Sundance Services, Inc. West Facillity

Geotechnical Boring		No. of Laboratory Tests							
ID	Total Depth	Dry Sieve Analysis	Atterberg Limits	K_{sat}	Classification (USCS)	Moisture Content	Dry Density	Standard Proctor Density	Swell/ Consolidation
GB-1	50-60	3-4	3-4	1-2	3-4	3-4	1-2	1-2	1-2
GB-2	30-35	2-3	2-3	1	2-3	2-3	1	1	1

Note: standard penetration tests (blow counts) will be recorded at each sampling interval
Porosity is calculated from the dry density and moisture content determination from an undisturbed brass ring sample

3.2 Continuous Cores

In addition to the geotechnical soil borings, two continuous core holes (CH-1 and CH-2) are proposed at the approximate locations shown on **Figure 4,** as requested by OCD. The locations of the core holes and drilling/sampling method were selected after consultation with the OCD. Each core hole will be drilled to a total depth of 150 feet below existing site grade to characterize the subsurface geology and determine if groundwater is present. The locations of CH-1 and CH-2 are coincident with the estimated eastern extent of the landfill invert of the proposed facility. The same CME 75 drill rig proposed to drill geotechnical borings GB-1 and GB-2 (see Section 3.1) will be used to drill core holes CH-1 and CH-2.

After drilling and sample collection from CH-1 and CH-2, the core holes will be decommissioned by pumping a 2% to 5% bentonite grout into the annular space via tremmie pipe. This grout will be pumped to the bottom of each hole and injected until it reaches the ground surface to eliminate a potential conduit for fluid migration.

3.3 Monitoring Wells

In the event that subsurface water is encountered in GB-1 and/or GB-2, and/or CH-1 and CH-2; monitoring well(s) will be installed at those location(s) immediately adjacent to the respective decommissioned borehole/core hole(s) to characterize groundwater. Any well(s) would be drilled using the same methods and design utilized during the initial investigation (see **Attachment A**). Similar to the methodology employed during the initial investigation, any water encountered in supplemental well(s) will be characterized as to its quantity and quality by water level measurements; bailing; and sampling (as appropriate).

3.4 Additional Borings/Core Holes

Depending upon the results of the supplemental work proposed herein; additional borings and/or core holes may be warranted to characterize the site, particularly the west to southwest portion (i.e., in the vicinity of the CH-1 and CH-2; and MP-4 and MP-4P). Any additional work beyond what has been proposed herein would be conducted after consultation with the OCD.

3.5 Subsurface Investigation Results

The results of the proposed supplemental investigation, comprised of this drilling and testing program, will be correlated with the initial site investigation (**Attachment A**) and extensive regional database. It will serve as the basis for the engineering design of the facility and characterization of the site geology and hydrology as required under 19.15.36.8.C.15 NMAC and 19.15.36.8.C.15 NMAC. Upon completion of the supplemental investigation, a Completion Report will be prepared and submitted to the OCD for review.

The completion reports and assessment of the information will be incorporated into a formal Geology and Hydrogeology section, which will be an integral part of the SSI Permit Application submitted to OCD. **Attachment B** is a draft outline of the proposed Geology and Hydrogeology section of the SSI Permit Application.

SUPPLEMENTAL DRILLING PLAN

SUNDANCE SERVICES, INC.
LEA COUNTY, NEW MEXICO

ATTACHMENT A

Draft Completion Report – Drilling, Sampling, and Monitoring Well Installation – Sundance Services, Inc., Lea County, New Mexico – June 2009

DRAFT

COMPLETION REPORT
DRILLING, SAMPLING, AND MONITORING WELL INSTALLATION

SUNDANCE SERVICES, INC.
LEA COUNTY, NEW MEXICO

JUNE 2009

SUBMITTED TO:
New Mexico Energy, Minerals and Natural Resources Department
Oil Conservation Division
1220 S. St. Francis Drive
Santa Fe, New Mexico 87505
Phone: (505) 476-3440

PREPARED FOR:
Sundance Services, Inc.
P.O. Box 1737
Eunice, NM 88231

PREPARED BY:
Gordon Environmental, Inc.
213 South Camino del Pueblo
Bernalillo, New Mexico 87004
Phone: (505) 867-6990

Gordon Environmental, Inc.
Consulting Engineers

COMPLETION REPORT
DRILLING, SAMPLING, AND MONITORING WELL INSTALLATION

SUNDANCE SERVICES, INC.
LEA COUNTY, NEW MEXICO

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B	OFFICE OF THE STATE ENGINEER WELL RECORDS AND LOGS
C	BORING LOGS FOR BORINGS MP-1 THROUGH MP-5
D	BORING LOGS FOR BORINGS MP-2P AND MP-4P

COMPLETION REPORT
DRILLING, SAMPLING, AND MONITORING WELL INSTALLATION

SUNDANCE SERVICES, INC.
LEA COUNTY, NEW MEXICO

1.0 INTRODUCTION

Gordon Environmental, Inc. (GEI), on behalf of Sundance Services, Inc. (SSI), has overseen the drilling of seven borings; and installation of two groundwater monitoring wells at the proposed SSI West Site near Eunice in southeastern New Mexico. Rodgers Environmental Services, Inc. (Rodgers) of Albuquerque, New Mexico was contracted by GEI to complete the following services for this project:

- Drill five borings using a combination of hollow stem auger (HSA) and air rotary drilling methods (borings MP-1 through MP-5).
- Drill two additional borings using HSA drilling methods, and install groundwater monitoring wells at those locations (MP-2P and MP-4P).

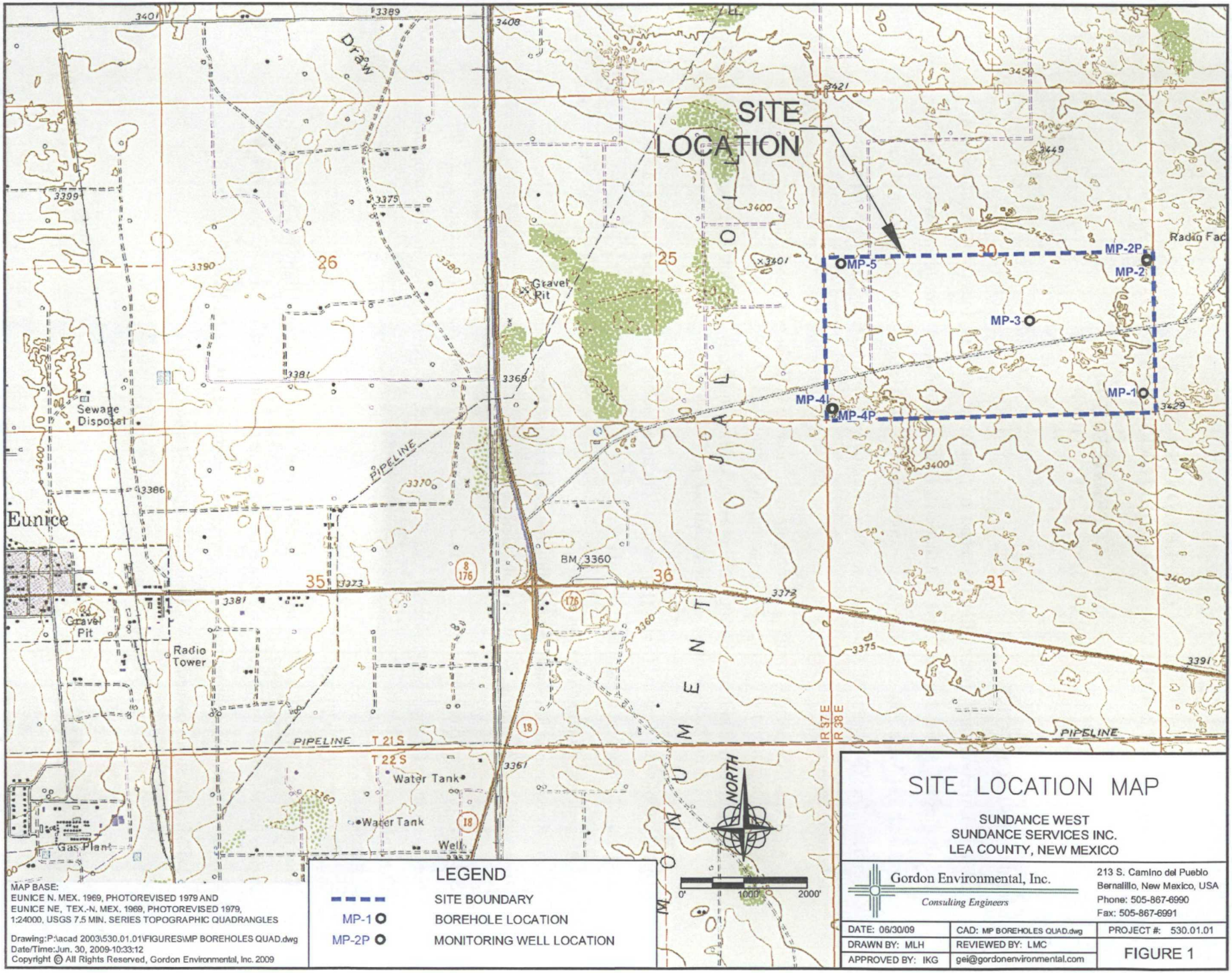
This Completion Report (Report) provides documentation of the project and as-built conditions. The Report includes:

- a description and location of the site
- background information regarding the need and purpose for the work
- drilling, sampling, and well construction

Selected photographs of the work are included in **Attachment A**. Also included are the permits granted from the Office of the State Engineer, approving the drilling program (**Attachment B**).

2.0 SITE LOCATION

The proposed SSI West facility is located one mile north of Highway N.M. 234; approximately four miles east of Eunice in Lea County, southeastern New Mexico (**Figure 1**). The site area is approximately 320 acres and comprises the S ½, Sec 30, T21S, R38E, NMPM. The site is owned by Wallach et al., and is leased by SSI.



SITE LOCATION MAP

SUNDANCE WEST
SUNDANCE SERVICES INC.
LEA COUNTY, NEW MEXICO

MAP BASE:
EUNICE N. MEX. 1969, PHOTOREVISED 1979 AND
EUNICE NE, TEX.-N. MEX. 1969, PHOTOREVISED 1979,
1:24000, USGS 7.5 MIN. SERIES TOPOGRAPHIC QUADRANGLES

Drawing:P:\acad 2003\530.01.01\FIGURES\MP BOREHOLES QUAD.dwg
Date/Time:Jun. 30, 2009-10:33:12

LEGEND

- SITE BOUNDARY
- MP-1 BOREHOLE LOCATION
- MP-2P MONITORING WELL LOCATION

Gordon Environmental, Inc.
Consulting Engineers
213 S. Camino del Pueblo
Bernalillo, New Mexico, USA
Phone: 505-867-6990
Fax: 505-867-6991

DATE: 06/30/09	CAD: MP BOREHOLES QUAD.dwg	PROJECT #: 530.01.01
DRAWN BY: MLH	REVIEWED BY: LMC	FIGURE 1
APPROVED BY: IKG	gei@gordonenvironmental.com	

3.0 BACKGROUND

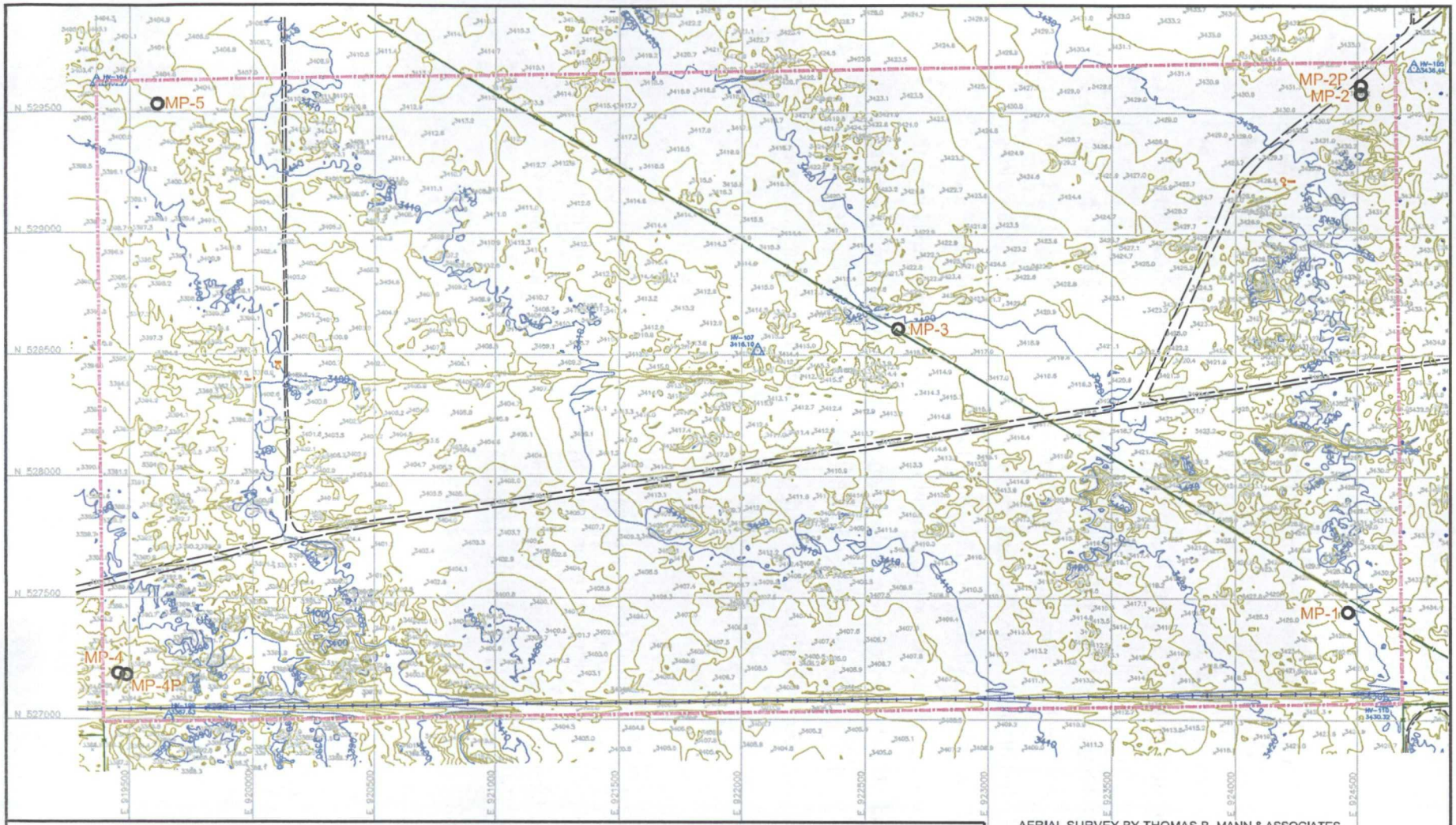
In accordance with the requirements set forth in 19.15.36.8.C(15) NMAC; this Report documents the field program to collect site-specific geological and hydrological data for the proposed facility. The primary purpose of the investigation was to confirm the depth-to-groundwater was suitable to meet the 100' vertical setback for an OCD Part 36 Landfill.

Five soil borings (MP-1 through MP-5) were drilled at the locations shown on **Figure 2.** Two additional soil borings were drilled adjacent to MP-2 and MP-4 (MP-2P and MP-4P, respectively) in order to install shallow groundwater monitoring wells near these locations (**Figure 2**). Borings MP-1 through MP-5 were drilled at locations within the site area to characterize the shallow geology and hydrogeology to depths up to 150 feet below existing site grade. Wells MP-2P and MP-4P were completed subsequent to drilling and sampling borings MP-1 through MP-5 to monitor thin, isolated zone(s) of free water perched on top of, and/or within, the upper Chinle Formation (Chinle) as described herein. **Section 4** presents a detailed description of the drilling, sampling, and well installation.

3.1 Local Hydorgeological Studies

The local hydrogeology and geotechnical conditions have been studied more intensively than any other locale that we are familiar with. There are four projects within 1.5 miles that have each implemented subsurface investigations in response to regulatory siting requirements:

1. Waste Control Specialists, Inc. (TCEQ, NRC, USEPA)
2. Lea County Landfill (NMED)
3. LES Nuclear Enrichment Facility (NRC)
4. Sundance Services, Inc. (OCD)



LEGEND

- FENCE
- SECTION, 1/4 SECTION LINE
- UNPAVED ROAD
- POST
- POWER POLE
- LIGHT POLE
- MISC./UNIDENTIFIED OBJECT
- RAILROAD TRACK
- PIPE CULVERT
- BOX CULVERT
- STORAGE TANK
- CONCRETE SLAB
- PIPELINE
- × 5835.1 — SPOT ELEVATION
- 3460 — INTERMEDIATE CONTOUR
- INDEX CONTOUR
- INTERMEDIATE DEPRESSION
- 3440 — INDEX DEPRESSION
- PROJECT BOUNDARY
- CONTROL POINT
- N 529000 — GRID LINE/LABEL
- MP-1 — MP BOREHOLE LOCATION
- MP-2P — MP MONITORING WELL LOCATION

NORTH

0' 300' 600'

AERIAL SURVEY BY THOMAS B. MANN & ASSOCIATES
AERIAL MAPPING SERVICES
5115 COPPER NE, ALBUQUERQUE, NM 87108
DATE OF PHOTOGRAPHY 10-01-08

BORINGS AND MONITORING WELL LOCATIONS

SUNDANCE WEST
SUNDANCE SERVICES INC.
LEA COUNTY, NEW MEXICO

Gordon Environmental, Inc.
Consulting Engineers
213 S. Camino del Pueblo
Bernalillo, New Mexico, USA
Phone: 505-867-6990
Fax: 505-867-6991

DATE: 06/30/09	CAD: MP BOREHOLES.dwg	PROJECT #: 530.01.01
DRAWN BY: MLH	REVIEWED BY: IKG	FIGURE 2
APPROVED BY: IKG	gei@gordonenvironmental.com	

Drawing:P:\acad 2003\530.01.01\FIGURES\MP BOREHOLES.dwg
Date/Time:Jun. 30, 2009-10:42:11

4.0 DRILLING, SAMPLING, AND WELL INSTALLATION

This section provides a summary of the work performed and details of the as-built conditions. **Attachment B** includes the *Well Record & Log* submitted by Rodgers to the New Mexico Office of the State Engineer (OSE) for each of the borings and wells. **Table 1** provides surveyed coordinates for the borings and wells.

Table 1
Summary of Surveyed Coordinates for Borings and Monitoring Wells

Boring	MP-1	MP-2	MP-3	MP-4	MP-5	MP-2P	MP-4P
Northing [1]	527446.10	529582.26	528611.24	527183.88	529535.82	529615.38	527183.88
Easting [1]	924459.82	924510.78	922630.93	919459.02	919611.93	924510.99	919489.02
Elevation[1]							
Ground Surface[2]	3428.30	3432.2	3417.99	3384	3402.93	3433.58	3384.62
Concrete Pad[2]	NA	NA	NA	NA	NA	3433.58	3384.62
Top of Steel Casing	NA	NA	NA	NA	NA	3436.51	3387.56
Top of PVC Casing[3]	NA	NA	NA	NA	NA	3435.90	3387.09

Notes:
Survey by Pettigrew & Associates, Hobbs, New Mexico
N/A – Not applicable; borings MP-1 through MP-5 were plugged and abaondoned
[1]NAVD88
[2]Ground surface elevation approximately equal to elevation of concrete pad
[3]Measuring point for groundwater static water levels

4.1 Borings MP-1 through MP-5

Borings MP-1 through MP-5 were drilled using a single, portable CME 75 drill rig capable of using both hollow-stem auger (HSA) and air rotary methods. HSA was used in the upper 25 to 50 feet of the borings until claystone/siltstone of the Chinle was encountered. The Chinle was drilled to a total depth of 150 feet in each boring using air rotary.

Drilling began on April 16, 2009; and concluded on April 23, 2009. Samples of drill cuttings were collected at five-foot intervals for visual and physical classification of the subsurface materials (**Attachment A**). During HSA drilling, split spoon samples were also collected at selected intervals for visual classification and laboratory analysis for geotechnical properties. **Attachment C** includes the boring logs for borings MP-1 through MP-5.

As illustrated in the boring logs in **Attachment C**, the shallow stratigraphy consists of very fine to medium-textured sand from the surface to the top of the Chinle. This layer is referred to as the Ogalalla/Antlers/Gatuña (OAG) formation in other local studies (Section 3.1). The sand may contain variable silt. Variable thickness of caliche and/or caliche-cemented sand is typical at depths of approximately 10 feet below the surface. The Chinle redbeds below the unconsolidated sand are typically claystone to siltstone, with very isolated thin zones of very fine-to fine textured sand/sandstone. All materials encountered in borings MP-1 through MP-5 were dry to slightly moist with the exception of moist to wet sand at a depth of 21 to 26 feet below the surface in boring MP-2 (see boring log in **Attachment C**); and moist fine sand intervals at 47 to 48 feet, and 56 to 58 feet below the surface in boring MP-4 (see boring log in **Attachment C**). The following section describes installation of wells MP-2P and MP-4P in response to the isolated wet zones encountered in borings MP-2 and MP-4, respectively. Borings MP-1 through MP-5 were plugged and abandoned using cement-bentonite grout slurry (see well records in **Attachment B**).

4.2 Perched Monitoring Wells MP-2P and MP-4P

Following drilling of the MP borings (see **Section 4.1**), shallow monitoring wells MP-2P and MP-4P were constructed at the locations shown on **Figure 2** to monitor any isolated zone(s) of saturation on top of and/or within the upper Chinle at those locations. The wells were constructed in response to moist/wet zones encountered in borings MP-2 and MP-4, respectively, as described in **Section 4.1** and illustrated on the boring logs (see **Attachment C**).

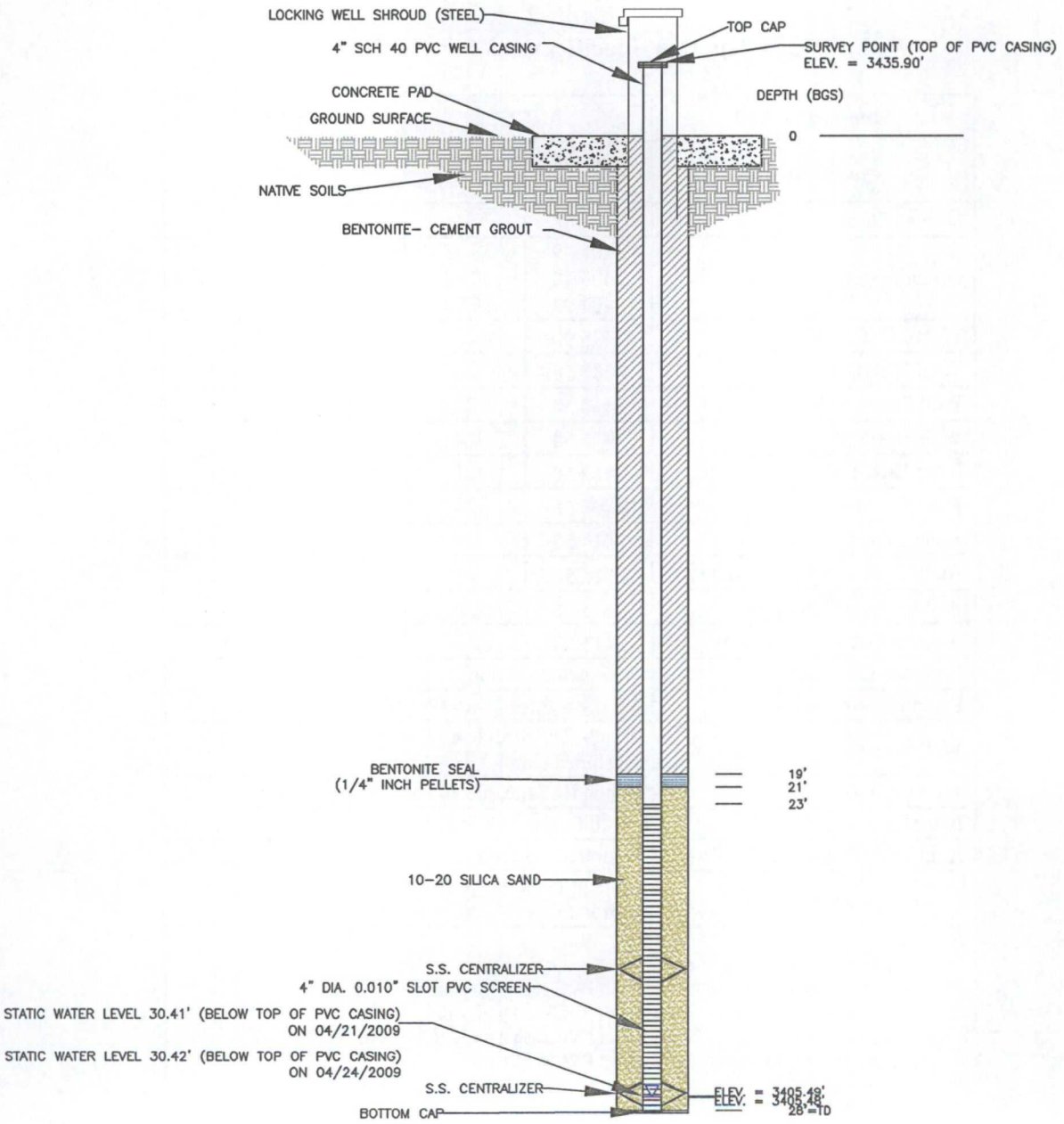
Each well was constructed with an adequate length of screen and annular sand pack to capture any free water within the zones where moist/wet materials were encountered. **Attachment D** includes the boring logs for borings MP-2P and MP-4P. **Figures 3** and **4** are the as-built construction schematics for monitoring wells MP-2P and MP-4P, respectively. **Table 2** summarizes the as-built construction specifications for MP-2P and MP-4P. **Table 2** also summarizes depth to groundwater measurements after the wells were installed.

Table 2
As-built Construction Specifications for Monitoring Wells

Monitoring Well	MP-2P		MP-4P	
Specifications	***Elevation (fmsl)***	***Depth (fbgs)***	***Elevation (fmsl)***	***Depth (fbgs)***
Ground Surface [1]	3433.58	-	3384.62	-
Groundwater	3405.49 3405.48 3404.92	30.41[a] 30.42[b] 30.98[c]	3331.99 3332.24	55.10[d] 54.85[c]
Top of PVC Casing	3435.90	+2.32	3387.09	+2.47
Total Well Depth	3405.58	28	3324.62	60
Well Screen Top	3410.58	23	3334.62	50
Well Screen Bottom	3405.58	28	3324.62	60
Filter Pack Top	3412.58	21	3336.62	48
Filter Pack Bottom	3405.58	28	3324.62	60
Annular Bentonite Seal Top	3414.58	19	3338.62	46
Annular Bentonite Seal Bottom	3412.58	21	3336.62	48
Annular Grout Seal Top	3433.58	0	3384.62	0
Annular Grout Seal Bottom	3414.58	19	3338.62	46
Borehole Diameter	7.25 inches (minimum)			
Length of Well Screen	MP-2P = 5 feet; MP-4P = 10 feet			
Well Screen	4-inch ID Schedule 40 PVC pipe, with 0.010 inch machined slots			
Well Casing	4-inch ID Schedule 40 PVC pipe, flush-threaded			
Filter Pack Material	10/20 Colorado silica sand			
Annular Bentonite Seal	Hydrated, coated bentonite pellets			
Annular Grout Seal	Cement-bentonite grout containing 2% to 5% bentonite			

NOTES:
[1]equals approximate elevation of concrete pad
[a]depth to groundwater measured below top of PVC casing on April 21, 2009
[b]depth to groundwater measured below top of PVC casing on April 22, 2009
[c]depth to groundwater measured below top of PVC casing on June 24, 2009
[d]depth to groundwater measured below top of PVC casing on May 1, 2009
fmsl = feet above mean sea level
fbgs = feet below ground surface ("+" indicates feet above ground surface)

MP-2P DATE OF INSTALLATION: 04/20/2009



NOTE: DRAWING NOT TO SCALE

MP-2P WELL COMPLETION SCHEMATIC

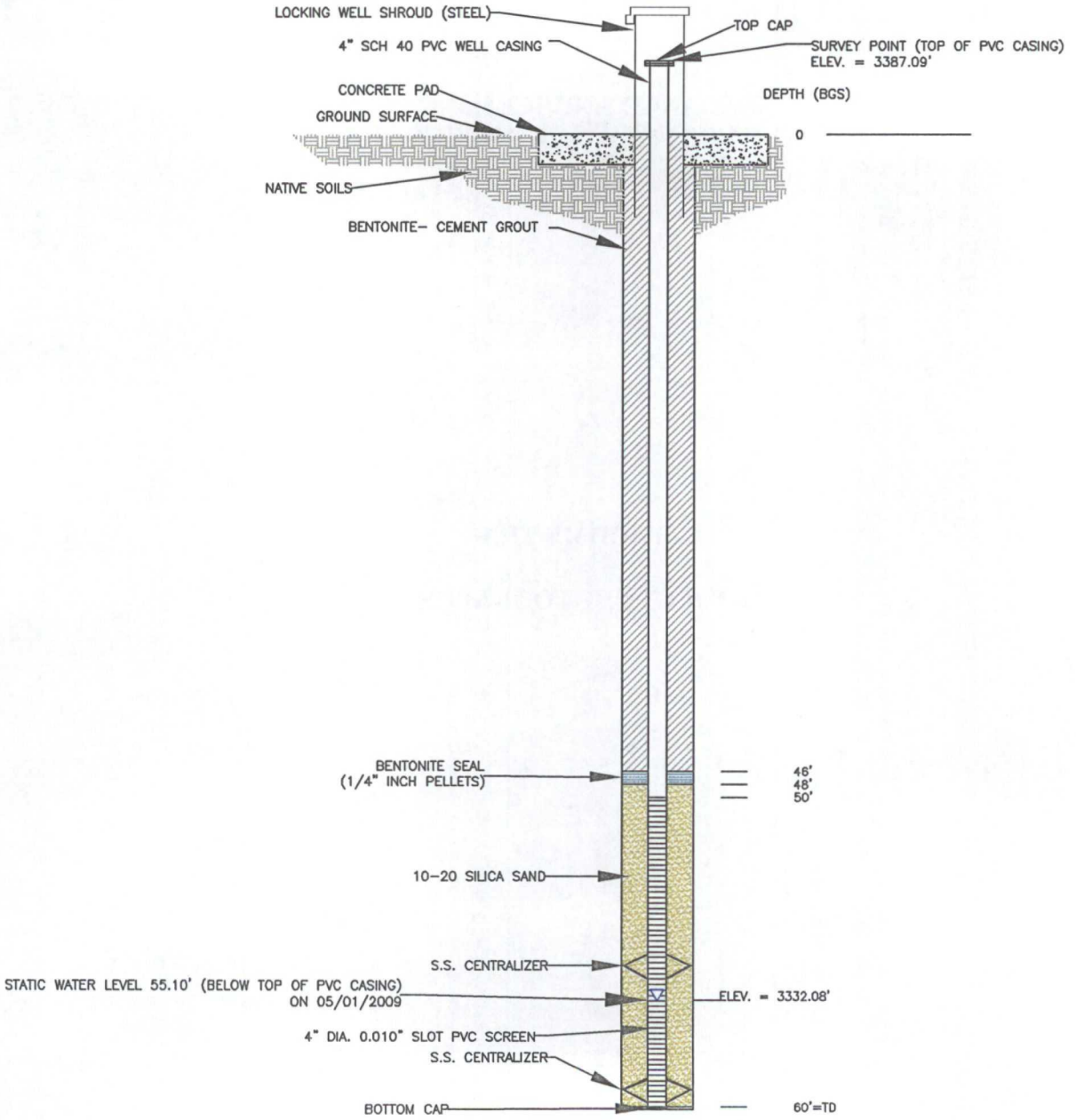
SUNDANCE WEST
SUNDANCE SERVICES INC.
LEA COUNTY, NEW MEXICO

Gordon Environmental, Inc.
Consulting Engineers
213 S. Camino del Pueblo
Bernalillo, New Mexico, USA
Phone: 505-867-6990
Fax: 505-867-6991

DATE: 06/30/09	CAD: WELL COMPLETION SCHEMATIC MP2P.dwg	PROJECT #: 530.01.01
DRAWN BY: MLH	REVIEWED BY: LMC	FIGURE 3
APPROVED BY: IKG	gei@gordonenvironmental.com	

Drawing:P:\acad 2003\530.01.01\FIGURES\WELL COMPLETION SCHEMATIC MP2P.dwg
Date/Time:Jun. 30, 2009-10:51:02

MP-4P DATE OF INSTALLATION: 04/24/2009



NOTE: DRAWING NOT TO SCALE

MP-4P WELL COMPLETION SCHEMATIC

SUNDANCE WEST
SUNDANCE SERVICES INC.
LEA COUNTY, NEW MEXICO

Gordon Environmental, Inc.
Consulting Engineers
213 S. Camino del Pueblo
Bernalillo, New Mexico, USA
Phone: 505-867-6990
Fax: 505-867-6991

DATE: 06/30/09	CAD: WELL COMPLETION SCHEMATIC MP4P.dwg	PROJECT #: 530.01.01
DRAWN BY: MLH	REVIEWED BY: LMC	FIGURE 4
APPROVED BY: IKG	gei@gordonenvironmental.com	

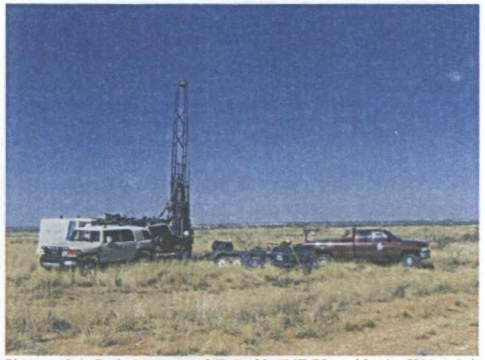
Drawing:P:\acad 2003\530.01.01\FIGURES\WELL COMPLETION SCHEMATIC MP4P.dwg
Date/Time:Jun. 30, 2009-11:05:08

COMPLETION REPORT
DRILLING, SAMPLING, AND MONITORING WELL INSTALLATION

SUNDANCE SERVICES, INC.
LEA COUNTY, NEW MEXICO

ATTACHMENT A

PROJECT PHOTOGRAPHS



Photograph 1. Rodgers set up on MP-1 with CME-75 combination HSA and air rotary drill rig and related equipment.

Photograph 2. HSA drilling MP-1.

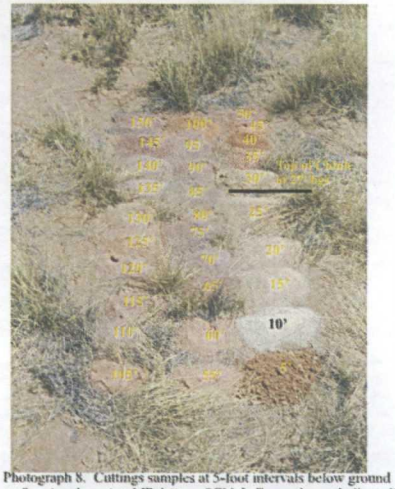
Photograph 3. Split spoon sample; top of Chinle Formation at 27'.

Photograph 4. HSA drilling top of Chinle Formation at MP-1.

Photograph 5. Converting from HSA drilling to air rotary at MP-1 (also typical of other boring locations).

Photograph 6. Converting to air rotary drilling at MP-1 (also typical of other boring locations).

Photograph 7. Air rotary drilling Chinle Formation at MP-1.



Photograph 8. Cuttings samples at 5-foot intervals below ground surface (as shown) at MP-1 (top of Chinle Formation as indicated).

GORDON ENVIRONMENTAL, INC.

Consulting Engineers

213 S. Camino del Pueblo
Bernalillo, New Mexico 87004

(505) 867-6990
(505) 867-6991 Fax

SUNDANCE WEST
SUNDANCE SERVICES, INC.
LEA COUNTY, NEW MEXICO

ATTACHMENT A
PHOTOGRAPHS 1 THROUGH 8
Completion Report

DATE:	BY:	SCALE:
29 JUN 09	LMC	NA

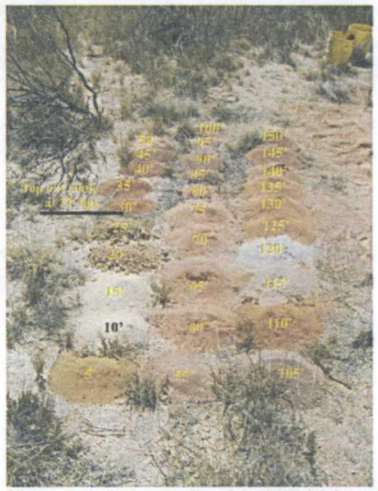
FILE: *E:\GEI\Sundance\West Area\Photos1.cdr*

Photograph 9. Rodgers set up on MP-2 with CME-75 combination HSA and air rotary drill rig and related equipment.

Photograph 10. HSA drilling caliche in boring MP-2.

Photograph 11. Split spoon sample; top of Chinle Formation at 27'.

Photograph 12. Air rotary drilling dry Chinle Formation at MP-2.



Photograph 13. Cuttings samples at 5-foot intervals below ground surface (as shown) at MP-2 (top of Chinle Formation as indicated).

Photograph14. Air rotary drilling dry Chinle Formation at MP-3.

Photograph 15. Rodgers set up on MP-3 with CME-75 combination HSA and air rotary drill rig and related equipment.

Photograph 16. Cuttings samples at 5-foot intervals below ground surface (as shown) at MP-3 (top of Chinle Formation as indicated).

GORDON ENVIRONMENTAL, INC.

Consulting Engineers

213 S. Camino del Pueblo
Bernalillo, New Mexico 87004

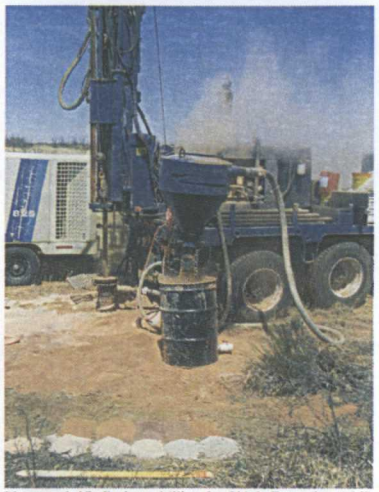
(505) 867-6990
(505) 867-6991 Fax

SUNDANCE WEST
SUNDANCE SERVICES, INC.
LEA COUNTY, NEW MEXICO

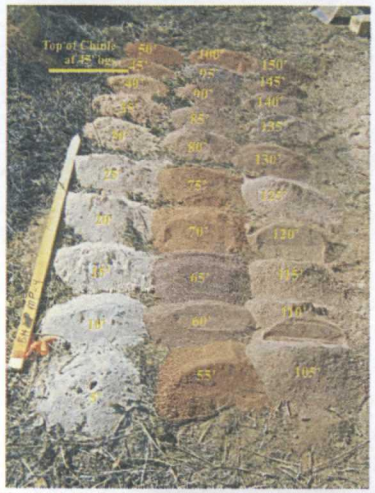
ATTACHMENT A
PHOTOGRAPHS 9 THROUGH 16
Completion Report

DATE:	BY:	SCALE:
29 JUN 09	LMC	NA

FILE: *E:\GEI\Sundance\West Area\Photos2.cdr*

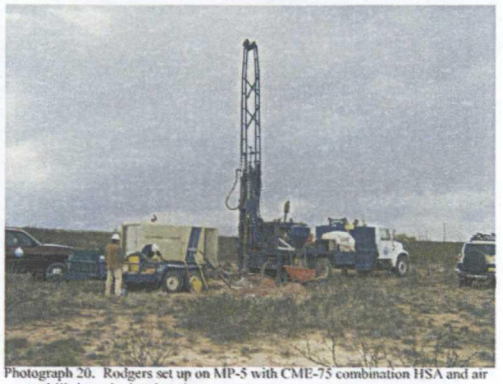


Photograph 17. Rodgers drilling dry Chinle Formation at MP-4 using air rotary.

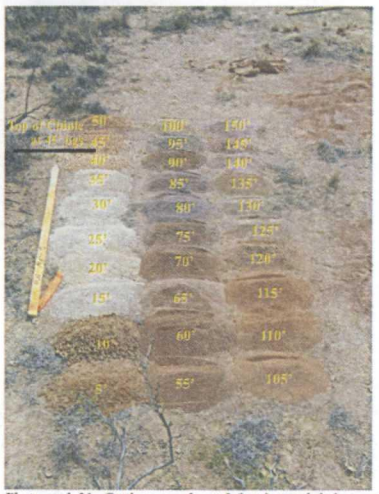


Photograph 18. Cuttings samples at 5-foot intervals below ground surface (as shown) at MP-4 (top of Chinle Formation as indicated).

Photograph 19. Rodgers set up on MP-4 with CME-75 combination HSA and air rotary drill rig and related equipment.



Photograph 20. Rodgers set up on MP-5 with CME-75 combination HSA and air rotary drill rig and related equipment.



Photograph 21. Cuttings samples at 5-foot intervals below ground surface (as shown) at MP-5 (top of Chinle Formation as indicated).

Photograph 22. Boring MP-5 plugged using cement-bentonite grout slurry (also typical of other borings).

Photograph 23. Well MP-2P (plugged boring MP-2 in background).

Photograph 24. Well MP-4P (railroad tracks in background).

GORDON ENVIRONMENTAL, INC.

Consulting Engineers

2115 S. Camino del Pueblo
Bernalillo, New Mexico 87004

(505) 867-6990
(505) 867-6991 Fax

SUNDANCE WEST
SUNDANCE SERVICES, INC.
LEA COUNTY, NEW MEXICO

ATTACHMENT A
PHOTOGRAPHS 17 THROUGH 24
Completion Report

DATE:	BY:	SCALE:
29 JUN 09	LMC	NA

FILE: *E:\GE\Sundance\West Area\Photos3.cdr*

COMPLETION REPORT
DRILLING, SAMPLING, AND MONITORING WELL INSTALLATION

SUNDANCE SERVICES, INC.
LEA COUNTY, NEW MEXICO

ATTACHMENT B

OFFICE OF THE STATE ENGINEER WELL RECORDS AND LOGS

STATE OF NEW MEXICO
OFFICE OF THE STATE ENGINEER
ROSWELL

John R. D'Antonio, Jr., P.E.
State Engineer

1900 West Second Street
Roswell, NM 88201
Phone: (575) 622-6521
Fax: (575) 623-8559

April 10, 2009

Sundance Services, Inc.
% Larry M. Coons, P.E.
Gordon Environmental, Inc.
213 S. Camino del Pueblo
Bernalillo, NM 87004

RE: Monitoring Wells – CP-1014; CP-1015; CP-1016; CP-1017; CP-1018; CP-1019

Greetings:

Enclosed is your copy of the Monitoring Well permits, which have been approved subject to the conditions set forth on the approval page thereof.

In accordance with Condition C, a well record shall be filed in this office twenty days after completion of drilling. The well record is proof of completion of well. IT IS YOUR RESPONSIBILITY TO ASSURE THAT THE WELL LOG IS FILED WITHIN 20 DAYS OF DRILLING OF THE WELL.

These permits will expire on or before 04/30/2010, unless the wells have been drilled and the well logs filed in this office.

Sincerely,

for Andy Morley, Staff Manager
(575) 622-6521, ext 113

Enclosure

cc: Santa Fe Office

NEW MEXICO STATE ENGINEER
PERMIT TO MONITOR

SPECIFIC CONDITIONS OF APPROVAL

4 No water shall be appropriated and beneficially used under this permit.

B The well shall be drilled by a driller licensed in the State of New Mexico in accordance with Section 72-12-12 New Mexico Statutes Annotated.

C Driller's well record must be filed with the State Engineer within 20 days after the well is drilled or driven. Well record forms will be provided by the State Engineer upon request.

No water shall be diverted from this well except for testing purposes which shall not exceed ten (10) cumulative days unless a permit to use water from this well is acquired from the Office of the State Engineer.

Should the permittee change the purpose of use to other than monitoring purposes, an application shall be acquired from the Office of the State Engineer.

The proposed well shall be drilled at least 660 feet from all wells of other ownership.

The well shall be constructed, maintained, and operated that each water shall be confined to the aquifer in which it is encountered.

LOG The Point of Diversion CP-1015 must be completed and the Well Log filed on or before 04/30/2010.

ACTION OF STATE ENGINEER

Notice of Intention Rcvd:		Date Rcvd. Corrected:	
Formal Application Rcvd:	04/01/2009	Pub. Of Notice Ordered:	
Date Returned – Correction:		Affidavit of Pub. Filed:	

This application is approved provided it is not exercised to the detriment of any others having existing rights, and is not contrary to the conservation of water in New Mexico nor detrimental to the public welfare of the state; and further subject to the specific conditions listed previously.

Witness my hand and seal this 9 day of April A.D., 2009.

John R. D'Antonio, Jr., P.E., State Engineer

By: _____
Kenneth M. Fresquez, District II Manager

File Number: _____
(For OSE Use Only)

NEW MEXICO OFFICE OF THE STATE ENGINEER
APPLICATION FOR PERMIT
TO DRILL AN EXPLORATORY WELL

1. APPLICANT:

Name: Sundance Services, Inc. Work Phone: 575-394-2511
Contact: Mr Joe Carrillo, Plant Manager Home Phone: _____
Address: 1001 6th Street
City: Eunice State: NM Zip: 88231

2. LOCATION OF WELL (A, B, C, or D required, E or F if known): MP-1

A. SE 1/4 SE 1/4 SE 1/4 Section: 30 Township: 21S Range: 38E N.M.P.M.
in Lea County County.

B. X = _____ feet, Y = _____ feet, N.M. Coordinate System
_____ Zone in the _____ Grant.
U.S.G.S. Quad Map _____

C. Latitude: 32 d 26 m 38.0 s Longitude: 103 d 5 m 29.1 s

D. East 679416 (m), North 3591242 (m), UTM Zone 13, NAD __ (27 or (83))

E. Tract No. _____, Map No. _____ of the _____ Hydrographic Survey

F. Lot No. _____, Block No. _____ of Unit/Tract _____ of the
_____ Subdivision recorded in _____ County.

G. Other: _____

H. Give State Engineer File Number of existing well: _____

I. On land owned by (required): Sundance Services, Inc. (through lease authorization)

3. WELL INFORMATION:

Approximate depth 125 feet; Outside diameter of casing 2 inches.
Name of well driller and driller license number Rodgers - NMWD 225

4. ADDITIONAL STATEMENT OR EXPLANATIONS:

To evaluate subsurface groundwater

STATE ENGINEER OFFICE
ROSWELL, NEW MEXICO
2009 APR -1 A 10:58

Do Not Write Below This Line

File Number: CP-1015 Trn Number: 428013
Form: wr-07

File Number: _____
(For OSE Use Only)

NEW MEXICO OFFICE OF THE STATE ENGINEER
APPLICATION FOR PERMIT
TO DRILL AN EXPLORATORY WELL

ACKNOWLEDGEMENT

(I, We) Joe Carrillo for Sundance Services, Inc. affirm that the
(Please Print)
foregoing statements are true to the best of my knowledge and belief.

_____ _____
Applicant Signature Applicant Signature

ACTION OF STATE ENGINEER

This application is approved/[redacted] provided it is not exercised to the detriment of any others having existing rights, and is not contrary to the conservation of water in New Mexico nor detrimental to the public welfare, and further subject to the following conditions: _____

see attached conditions of approval

Witness my hand and seal this 9 day of April, 20 09

John R. D'Antonio, Jr., P.E. State Engineer

By: _____
Kenneth M. Fresquez, District II Manager

STATE ENGINEER OFFICE
ROSWELL, NEW MEXICO
2009 APR -7 A 10:57

Do Not Write Below This Line

File Number: CP-1015 Trn Number: 428013
Form: wr-07

MP-1

Locator Tool Report

General Information:

Application ID:32 Date: 04-02-2009 Time: 09:39:32

WR File Number: CP
Purpose: POINT OF DIVERSION

Applicant First Name: SUNDANCE
Applicant Last Name: SERVICES

GW Basin: CAPITAN
County: LEA

Critical Management Area Name(s): NONE
Special Condition Area Name(s): NONE
Land Grant Name: NON GRANT

PLSS Description (New Mexico Principal Meridian):

NE 1/4 of SE 1/4 of SE 1/4 of SE 1/4 of Section 30, Township 21S, Range 38E.

Coordinate System Details:

Geographic Coordinates:

Latitude:	32 Degrees	26 Minutes	38.0 Seconds	N
Longitude:	103 Degrees	5 Minutes	29.1 Seconds	W

Universal Transverse Mercator Zone: 13N

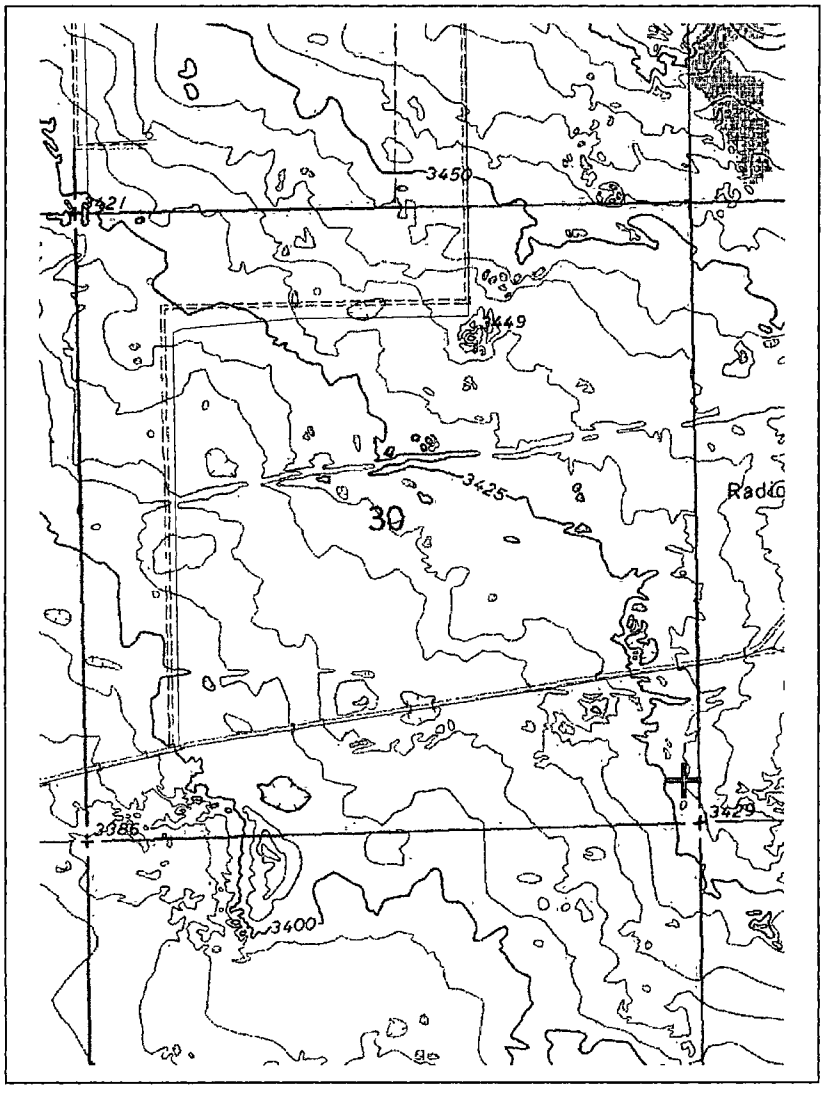
NAD 1983(92) (Meters)	N: 3,591,242	E: 679,416
NAD 1983(92) (Survey Feet)	N: 11,782,267	E: 2,229,052
NAD 1927 (Meters)	N: 3,591,067	E: 679,376
NAD 1927 (Survey Feet)	N: 11,781,691	E: 2,228,919

State Plane Coordinate System Zone: New Mexico East

NAD 1983(92) (Meters)	N: 160,765	E: 281,777
NAD 1983(92) (Survey Feet)	N: 527,444	E: 924,464
NAD 1927 (Meters)	N: 160,774	E: 269,136
NAD 1927 (Survey Feet)	N: 527,472	E: 882,990

NEW MEXICO OFFICE OF STATE ENGINEER

Locator Tool Report



WR File Number: CP Scale: 1:17,702

Northing/Easting: UTM83(92) (Meter): N: 3,591,242 E: 679,416

Northing/Easting: SPCS83(92) (Feet): N: 527,444 E: 924,464

GW Basin: Capitan

Print Date: 04/02/2009

STATE OF NEW MEXICO
OFFICE OF THE STATE ENGINEER
ROSWELL

John R. D'Antonio, Jr., P.E.
State Engineer

1900 West Second Street
Roswell, NM 88201
Phone: (575) 622-6521
Fax: (575) 623-8559

April 10, 2009

Sundance Services, Inc.
% Larry M. Coons, P.E.
Gordon Environmental, Inc.
213 S. Camino del Pueblo
Bernalillo, NM 87004

RE: Monitoring Wells – CP-1014; CP-1015; CP-1016; CP-1017; CP-1018; CP-1019

Greetings:

Enclosed is your copy of the Monitoring Well permits, which have been approved subject to the conditions set forth on the approval page thereof.

In accordance with Condition C, a well record shall be filed in this office twenty days after completion of drilling. The well record is proof of completion of well. IT IS YOUR RESPONSIBILITY TO ASSURE THAT THE WELL LOG IS FILED WITHIN 20 DAYS OF DRILLING OF THE WELL.

These permits will expire on or before 04/30/2010, unless the wells have been drilled and the well logs filed in this office.

Sincerely,

for Andy Morley, Staff Manager
(575) 622-6521, ext 113

Enclosure

cc: Santa Fe Office

NEW MEXICO STATE ENGINEER
PERMIT TO MONITOR

SPECIFIC CONDITIONS OF APPROVAL

4 No water shall be appropriated and beneficially used under this permit.

B The well shall be drilled by a driller licensed in the State of New Mexico in accordance with Section 72-12-12 New Mexico Statutes Annotated.

C Driller's well record must be filed with the State Engineer within 20 days after the well is drilled or driven. Well record forms will be provided by the State Engineer upon request.

No water shall be diverted from this well except for testing purposes which shall not exceed ten (10) cumulative days unless a permit to use water from this well is acquired from the Office of the State Engineer.

Should the permittee change the purpose of use to other than monitoring purposes, an application shall be acquired from the Office of the State Engineer.

The proposed well shall be drilled at least 660 feet from all wells of other ownership.

The well shall be constructed, maintained, and operated that each water shall be confined to the aquifer in which it is encountered.

LOG The Point of Diversion CP-1016 must be completed and the Well Log filed on or before 04/30/2010.

ACTION OF STATE ENGINEER

Notice of Intention Rcvd:		Date Rcvd. Corrected:	
Formal Application Rcvd:	04/01/2009	Pub. Of Notice Ordered:	
Date Returned – Correction:		Affidavit of Pub. Filed:	

This application is approved provided it is not exercised to the detriment of any others having existing rights, and is not contrary to the conservation of water in New Mexico nor detrimental to the public welfare of the state; and further subject to the specific conditions listed previously.

Witness my hand and seal this 9 day of April A.D., 2009.

John R. D'Antonio, Jr., P.E., State Engineer

By: _____
Kenneth M. Fresquez, District II Manager

File Number: _____
(For OSE Use Only)

NEW MEXICO OFFICE OF THE STATE ENGINEER
APPLICATION FOR PERMIT
TO DRILL AN EXPLORATORY WELL

1. APPLICANT:

Name: Sundance Services, Inc. Work Phone: 575-394-2511
Contact: Mr. Joe Carrillo, Plant Manager Home Phone: _____
Address: 1001 6th Street
City: Eunice State: NM Zip: 88231

2. LOCATION OF WELL (A, B, C, or D required, E or F if known): MP-2

A. NE 1/4 NE 1/4 SE 1/4 Section: 30 Township: 21S Range: 38E N.M.P.M.
in Lea County County.

B. X = _____ feet, Y = _____ feet, N.M. Coordinate System
_____ Zone in the _____ Grant.
U.S.G.S. Quad Map _____

C. Latitude: 32 d 26 m 59.5 s Longitude: 103 d 5 m 28.6 s

D. East _____ (m), North _____ (m), UTM Zone 13, NAD __ (27 or 83)

E. Tract No. _____, Map No. _____ of the _____ Hydrographic Survey

F. Lot No. _____, Block No. _____ of Unit/Tract _____ of the
_____ Subdivision recorded in _____ County.

G. Other: _____

H. Give State Engineer File Number of existing well: _____

I. On land owned by (required): Sundance Services, Inc. (through lease authorization)

3. WELL INFORMATION:

Approximate depth 125 feet; Outside diameter of casing 2 inches.
Name of well driller and driller license number Rodgers - NMWD 225

4. ADDITIONAL STATEMENT OR EXPLANATIONS:

To evaluate subsurface groundwater

STATE ENGINEER OFFICE
ROSWELL, NEW MEXICO
2009 APR -7 A 10:57

Do Not Write Below This Line

File Number: CP-1016 Trn Number: 428017
Form: wr-07

File Number: _____
(For OSE Use Only)

NEW MEXICO OFFICE OF THE STATE ENGINEER
APPLICATION FOR PERMIT
TO DRILL AN EXPLORATORY WELL

ACKNOWLEDGEMENT

(I, We) Joe Carrillo for Sundance Services, Inc. affirm that the
(Please Print)
foregoing statements are true to the best of my knowledge and belief.

_____ Joe Carrillo .
Applicant Signature Applicant Signature

ACTION OF STATE ENGINEER

This application is approved~~XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX~~ provided it is not exercised to the detriment of any others having existing rights, and is not contrary to the conservation of water in New Mexico nor detrimental to the public welfare, and further subject to the following conditions: _____

see attached conditions of approval

Witness my hand and seal this 9 day of April, 20 09

John R. D'Antonio, Jr., P.E. State Engineer

By: Judy Mosley
Kenneth M. Fresquez, District II Manager

STATE ENGINEER OFFICE
ROSWELL, NEW MEXICO
2009 APR -7 A 10 57

Do Not Write Below This Line

File Number: CP-1016 Trn Number: 428017
Form: wr-07

MP-2

Locator Tool Report

General Information:

Application ID: 28 Date: 04-02-2009 Time: 10:42:31

WR File Number: CP
Purpose: POINT OF DIVERSION

Applicant First Name: SUNDANCE
Applicant Last Name: SERVICES

GW Basin: CAPITAN
County: LEA

Critical Management Area Name(s): NONE
Special Condition Area Name(s): NONE
Land Grant Name: NON GRANT

PLSS Description (New Mexico Principal Meridian):

NE 1/4 of NE 1/4 of NE 1/4 of SE 1/4 of Section 30, Township 21S, Range 38E.

Coordinate System Details:

Geographic Coordinates:

Latitude:	32 Degrees	26 Minutes	59.5 Seconds	N
Longitude:	103 Degrees	5 Minutes	28.6 Seconds	W

Universal Transverse Mercator Zone: 13N

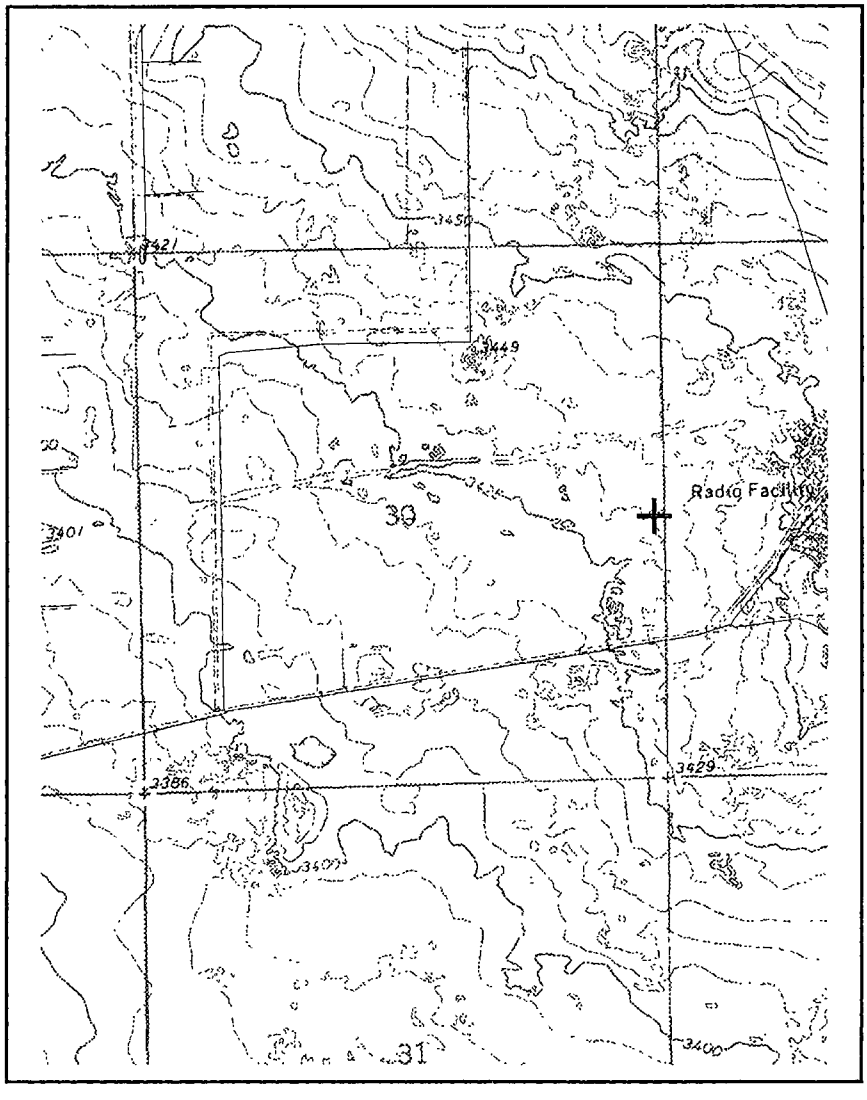
NAD 1983(92) (Meters)	N: 3,591,905	E: 679,418
NAD 1983(92) (Survey Feet)	N: 11,784,441	E: 2,229,057
NAD 1927 (Meters)	N: 3,591,729	E: 679,378
NAD 1927 (Survey Feet)	N: 11,783,865	E: 2,228,925

State Plane Coordinate System Zone: New Mexico East

NAD 1983(92) (Meters)	N: 161,428	E: 281,783
NAD 1983(92) (Survey Feet)	N: 529,618	E: 924,483
NAD 1927 (Meters)	N: 161,436	E: 269,142
NAD 1927 (Survey Feet)	N: 529,646	E: 883,009

NEW MEXICO OFFICE OF STATE ENGINEER

Locator Tool Report



WR File Number: CP Scale: 1:20,678

Northing/Easting: UTM83(92) (Meter): N: 3,591,905 E: 679,418

Northing/Easting: SPCS83(92) (Feet): N: 529,618 E: 924,483

GW Basin: Capitan

Print Date: 04/02/2009

STATE OF NEW MEXICO
OFFICE OF THE STATE ENGINEER
ROSWELL

John R. D'Antonio, Jr., P.E.
State Engineer

1900 West Second Street
Roswell, NM 88201
Phone: (575) 622-6521
Fax: (575) 623-8559

April 10, 2009

Sundance Services, Inc.
% Larry M. Coons, P.E.
Gordon Environmental, Inc.
213 S. Camino del Pueblo
Bernalillo, NM 87004

RE: Monitoring Wells – CP-1014; CP-1015; CP-1016; CP-1017; CP-1018; CP-1019

Greetings:

Enclosed is your copy of the Monitoring Well permits, which have been approved subject to the conditions set forth on the approval page thereof.

In accordance with Condition C, a well record shall be filed in this office twenty days after completion of drilling. The well record is proof of completion of well. IT IS YOUR RESPONSIBILITY TO ASSURE THAT THE WELL LOG IS FILED WITHIN 20 DAYS OF DRILLING OF THE WELL.

These permits will expire on or before 04/30/2010, unless the wells have been drilled and the well logs filed in this office.

Sincerely,

for Andy Morley, Staff Manager
(575) 622-6521, ext 113

Enclosure

cc: Santa Fe Office

NEW MEXICO STATE ENGINEER
PERMIT TO MONITOR

SPECIFIC CONDITIONS OF APPROVAL

4 No water shall be appropriated and beneficially used under this permit.

B The well shall be drilled by a driller licensed in the State of New Mexico in accordance with Section 72-12-12 New Mexico Statutes Annotated.

C Driller's well record must be filed with the State Engineer within 20 days after the well is drilled or driven. Well record forms will be provided by the State Engineer upon request.

No water shall be diverted from this well except for testing purposes which shall not exceed ten (10) cumulative days unless a permit to use water from this well is acquired from the Office of the State Engineer.

Should the permittee change the purpose of use to other than monitoring purposes, an application shall be acquired from the Office of the State Engineer.

The proposed well shall be drilled at least 660 feet from all wells of other ownership.

The well shall be constructed, maintained, and operated that each water shall be confined to the aquifer in which it is encountered.

LOG The Point of Diversion CP-1017 must be completed and the Well Log filed on or before 04/30/2010.

ACTION OF STATE ENGINEER

Notice of Intention Rcvd:		Date Rcvd. Corrected:	
Formal Application Rcvd:	04/01/2009	Pub. Of Notice Ordered:	
Date Returned – Correction:		Affidavit of Pub. Filed:	

This application is approved provided it is not exercised to the detriment of any others having existing rights, and is not contrary to the conservation of water in New Mexico nor detrimental to the public welfare of the state; and further subject to the specific conditions listed previously.

Witness my hand and seal this 9 day of April A.D., 2009.

John R. D'Antonio, Jr., P.E., State Engineer

By: Andy Mork
Kenneth M. Fresquez, District II Manager

File Number: _____
(For OSE Use Only)

NEW MEXICO OFFICE OF THE STATE ENGINEER
APPLICATION FOR PERMIT
TO DRILL AN EXPLORATORY WELL

1. APPLICANT:

Name: Sundance Services, Inc. Work Phone: 575-394-2511
Contact: Mr. Joe Carrillo, Plant Manager Home Phone: _____
Address: 1001 6th Street
City: Eunice State: NM Zip: 88231

2. LOCATION OF WELL (A, B, C, or D required, E or F if known): MP-3

A. NE 1/4 NW 1/4 SE 1/4 Section: 30 Township: 21S Range: 38E N.M.P.M.
in Lea County County.

B. X = _____ feet, Y = _____ feet, N.M. Coordinate System
_____ Zone in the _____ Grant.
U.S.G.S. Quad Map _____

C. Latitude: 32 d 26 m 49.8 s Longitude: 103 d 5 m 51.7 s

D. East 678820 (m), North 3591594 (m), UTM Zone 13, NAD __ (27 or (83))

E. Tract No. _____, Map No. _____ of the _____ Hydrographic Survey

F. Lot No. _____, Block No. _____ of Unit/Tract _____ of the
_____ Subdivision recorded in _____ County.

G. Other: _____

H. Give State Engineer File Number of existing well: _____

I. On land owned by (required): Sundance Services, Inc. (through lease authorization)

3. WELL INFORMATION:

Approximate depth 125 feet; Outside diameter of casing 2 inches
Name of well driller and driller license number Rodgers - NMWD 225

STATE ENGINEER OFFICE
ROSWELL, NEW MEXICO
2009 APR -1 A 10:57

4. ADDITIONAL STATEMENT OR EXPLANATIONS:

To evaluate subsurface groundwater.

Do Not Write Below This Line

File Number: CP-1017 Trn Number: 428019
Form: wr-07

File Number: _____
(For OSE Use Only)

NEW MEXICO OFFICE OF THE STATE ENGINEER
APPLICATION FOR PERMIT
TO DRILL AN EXPLORATORY WELL

ACKNOWLEDGEMENT

(I, We) Joe Carrillo for Sundance Services, Inc. affirm that the
(Please Print)
foregoing statements are true to the best ~~of~~ my knowledge and belief.

_____ _____.
Applicant Signature Applicant Signature

ACTION OF STATE ENGINEER

This application is approved~~xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx~~ provided it is not exercised to the detriment of any others having existing rights, and is not contrary to the conservation of water in New Mexico nor detrimental to the public welfare, and further subject to the following conditions: _____

see attached conditions of approval

Witness my hand and seal this 9 day of April, 20 09

~~John R. D'Antonio, Jr., P.E.~~ State Engineer

By: _____
Kenneth M. Fresquez, District II Manager

STATE ENGINEER OFFICE
ROSWELL, NEW MEXICO
2009 APR -1 A 10: 58

Do Not Write Below This Line

File Number: CP-1017 Trn Number: 428019
Form: wr-07

MP-3

Locator Tool Report

General Information:

Application ID: 28 Date: 04-02-2009 Time: 10:44:33

WR File Number: CP
Purpose: POINT OF DIVERSION

Applicant First Name: SUNDANCE
Applicant Last Name: SERVICES

GW Basin: CAPITAN
County: LEA

Critical Management Area Name(s): NONE
Special Condition Area Name(s): NONE
Land Grant Name: NON GRANT

PLSS Description (New Mexico Principal Meridian):

NE 1/4 of SW 1/4 of NW 1/4 of SE 1/4 of Section 30, Township 21S, Range 38E.

Coordinate System Details:

Geographic Coordinates:

Latitude:	32 Degrees	26 Minutes	49.8 Seconds	N
Longitude:	103 Degrees	5 Minutes	51.7 Seconds	W

Universal Transverse Mercator Zone: 13N

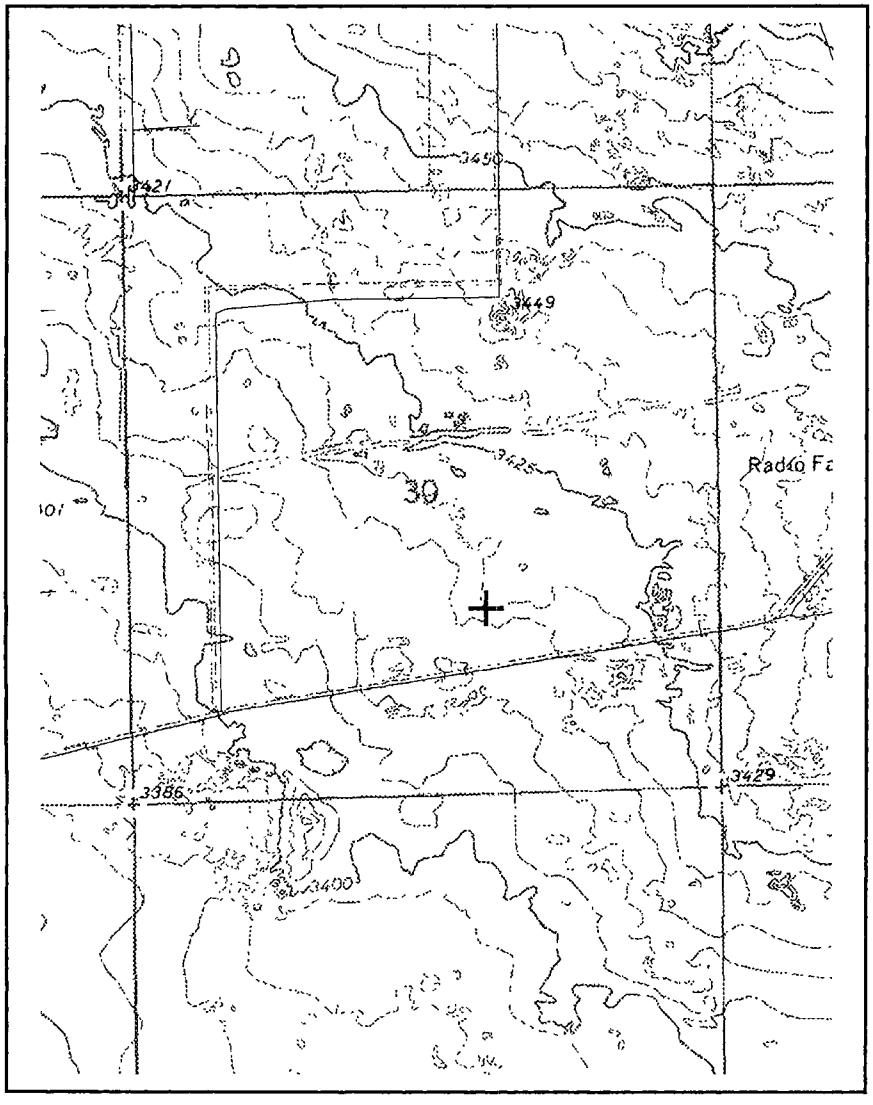
NAD 1983(92) (Meters)	N: 3,591,594	E: 678,820
NAD 1983(92) (Survey Feet)	N: 11,783,423	E: 2,227,094
NAD 1927 (Meters)	N: 3,591,419	E: 678,779
NAD 1927 (Survey Feet)	N: 11,782,846	E: 2,226,961

State Plane Coordinate System Zone: New Mexico East

NAD 1983(92) (Meters)	N: 161,121	E: 281,183
NAD 1983(92) (Survey Feet)	N: 528,612	E: 922,513
NAD 1927 (Meters)	N: 161,130	E: 268,541
NAD 1927 (Survey Feet)	N: 528,640	E: 881,039

NEW MEXICO OFFICE OF STATE ENGINEER

Locator Tool Report



WR File Number: CP Scale: 1:18,520

Northing/Easting: UTM83(92) (Meter): N: 3,591,594 E: 678,820

Northing/Easting: SPCS83(92) (Feet): N: 528,612 E: 922,513

GW Basin: Capitan

Print Date: 04/02/2009

STATE OF NEW MEXICO
OFFICE OF THE STATE ENGINEER
ROSWELL

John R. D'Antonio, Jr., P.E.
State Engineer

1900 West Second Street
Roswell, NM 88201
Phone: (575) 622-6521
Fax: (575) 623-8559

April 10, 2009

Sundance Services, Inc.
% Larry M. Coons, P.E.
Gordon Environmental, Inc.
213 S. Camino del Pueblo
Bernalillo, NM 87004

RE: Monitoring Wells – CP-1014; CP-1015; CP-1016; CP-1017; CP-1018; CP-1019

Greetings:

Enclosed is your copy of the Monitoring Well permits, which have been approved subject to the conditions set forth on the approval page thereof.

In accordance with Condition C, a well record shall be filed in this office twenty days after completion of drilling. The well record is proof of completion of well. IT IS YOUR RESPONSIBILITY TO ASSURE THAT THE WELL LOG IS FILED WITHIN 20 DAYS OF DRILLING OF THE WELL.

These permits will expire on or before 04/30/2010, unless the wells have been drilled and the well logs filed in this office.

Sincerely,

for Andy Morley, Staff Manager
(575) 622-6521, ext 113

Enclosure

cc: Santa Fe Office

NEW MEXICO STATE ENGINEER
PERMIT TO MONITOR

SPECIFIC CONDITIONS OF APPROVAL

4 No water shall be appropriated and beneficially used under this permit.

B The well shall be drilled by a driller licensed in the State of New Mexico in accordance with Section 72-12-12 New Mexico Statutes Annotated.

C Driller's well record must be filed with the State Engineer within 20 days after the well is drilled or driven. Well record forms will be provided by the State Engineer upon request.

No water shall be diverted from this well except for testing purposes which shall not exceed ten (10) cumulative days unless a permit to use water from this well is acquired from the Office of the State Engineer.

Should the permittee change the purpose of use to other than monitoring purposes, an application shall be acquired from the Office of the State Engineer.

The proposed well shall be drilled at least 660 feet from all wells of other ownership.

The well shall be constructed, maintained, and operated that each water shall be confined to the aquifer in which it is encountered.

LOG The Point of Diversion CP-1018 must be completed and the Well Log filed on or before 04/30/2010.

ACTION OF STATE ENGINEER

Notice of Intention Rcvd:		Date Rcvd. Corrected:	
Formal Application Rcvd:	04/01/2009	Pub. Of Notice Ordered:	
Date Returned – Correction:		Affidavit of Pub. Filed:	

This application is approved provided it is not exercised to the detriment of any others having existing rights, and is not contrary to the conservation of water in New Mexico nor detrimental to the public welfare of the state; and further subject to the specific conditions listed previously.

Witness my hand and seal this 9 day of April A.D., 2009.

John R. D'Antonio, Jr., P.E., State Engineer

By: _____
Kenneth M. Fresquez, District II Manager

File Number: _____
(For OSE Use Only)

NEW MEXICO OFFICE OF THE STATE ENGINEER
APPLICATION FOR PERMIT
TO DRILL AN EXPLORATORY WELL

1. APPLICANT:

Name: Sundance Services, Inc. Work Phone: 575-394-2511
Contact: Mr. Joe Carrillo, Plant Manager Home Phone: _____
Address: 1001 6th Street
City: Eunice State: NM Zip: 88231

2. LOCATION OF WELL (A, B, C, or D required, E or F if known): MP-4

A. SW 1/4 SW 1/4 SW 1/4 Section: 30 Township: 21S Range: 38E N.M.P.M.
in Lea County County.

B. X = _____ feet, Y = _____ feet, N.M. Coordinate System
_____ Zone in the _____ Grant.
U.S.G.S. Quad Map _____

C. Latitude: 32 d 26 m 37.4 s Longitude: 103 d 6 m 26.2 s

D. East 677925 (m), North 3591197 (m), UTM Zone 13, NAD __ (27 or (83))

E. Tract No. _____, Map No. _____ of the _____ Hydrographic Survey

F. Lot No. _____, Block No. _____ of Unit/Tract _____ of the
_____ Subdivision recorded in _____ County.

G. Other: _____

H. Give State Engineer File Number of existing well: _____

I. On land owned by (required): Sundance Services, Inc. (through lease authorization)

3. WELL INFORMATION:

Approximate depth 125 feet; Outside diameter of casing 2 inches.
Name of well driller and driller license number Rodgers - NMWD 225

4. ADDITIONAL STATEMENT OR EXPLANATIONS:

To evaluate subsurface groundwater.

STATE ENGINEER OFFICE
ROSWELL, NEW MEXICO
2009 APR -1 A 10:58

Do Not Write Below This Line

File Number: CP-1018 Trn Number: 428022
Form: wr-07 page 1 of 2

File Number: _____
(For OSE Use Only)

NEW MEXICO OFFICE OF THE STATE ENGINEER
APPLICATION FOR PERMIT
TO DRILL AN EXPLORATORY WELL

ACKNOWLEDGEMENT

(I, We) Joe Carrillo for Sundance Services, Inc. affirm that the
(Please Print)
foregoing statements are true to the best of my knowledge and belief.

Applicant Signature Applicant Signature

ACTION OF STATE ENGINEER

This application is approved ~~xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx~~ provided it is not exercised to the detriment of any others having existing rights, and is not contrary to the conservation of water in New Mexico nor detrimental to the public welfare, and further subject to the following conditions: _____

see attached conditions of approval

Witness my hand and seal this 9 day of April, 20 09

John R. D'Antonio, Jr., P.E. State Engineer

By: _____
Kenneth M. Fresquez, District II Manager

STATE ENGINEER OFFICE
ROSWELL, NEW MEXICO
2009 APR -1 A 10:58

Do Not Write Below This Line

File Number: CP-1018 Trn Number: 428022

MP-4

Locator Tool Report

General Information:

Application ID: 28 Date: 04-02-2009 Time: 10:47:21

WR File Number: CP
Purpose: POINT OF DIVERSION

Applicant First Name: SUNDANCE
Applicant Last Name: SERVICES

GW Basin: CAPITAN
County: LEA

Critical Management Area Name(s): NONE
Special Condition Area Name(s): NONE
Land Grant Name: NON GRANT

PLSS Description (New Mexico Principal Meridian):

NW 1/4 of SW 1/4 of SW 1/4 of SW 1/4 of Section 30, Township 21S, Range 38E.

Coordinate System Details:

Geographic Coordinates:

Latitude:	32 Degrees	26 Minutes	37.4 Seconds	N
Longitude:	103 Degrees	6 Minutes	26.2 Seconds	W

Universal Transverse Mercator Zone: 13N

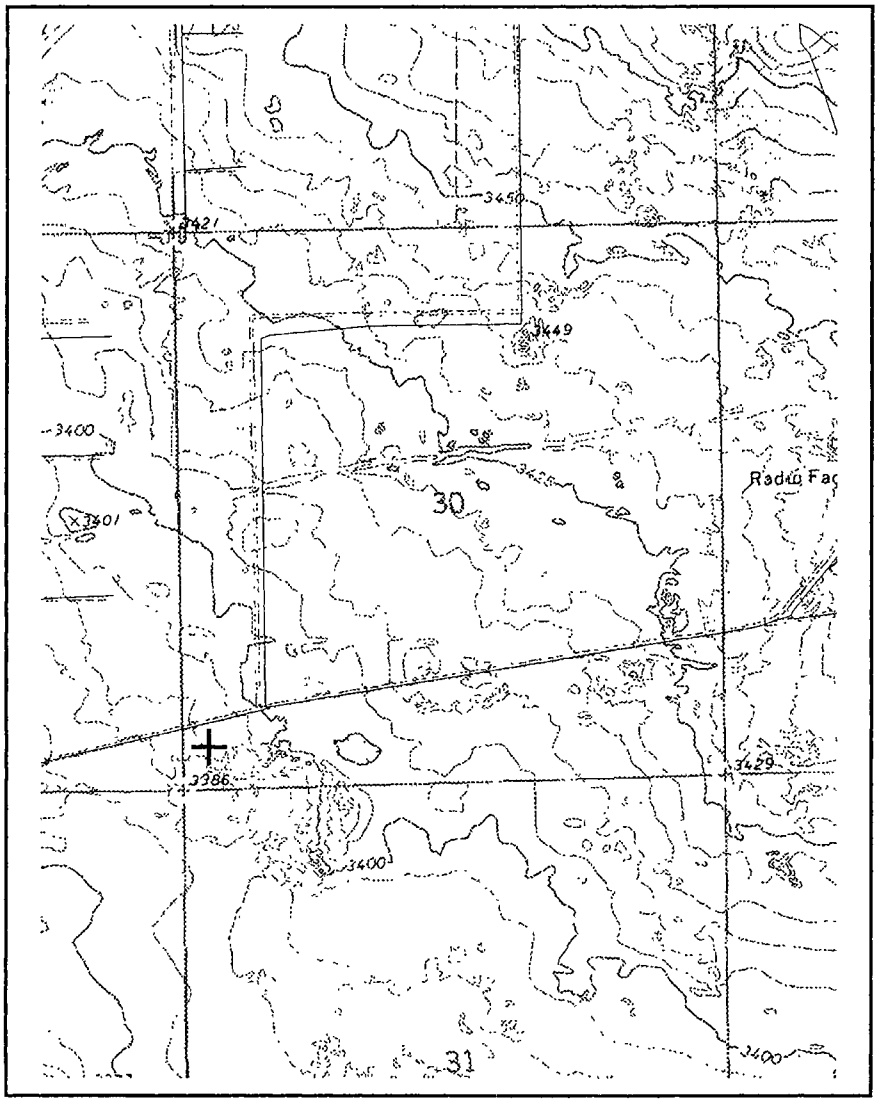
NAD 1983(92) (Meters)	N: 3,591,197	E: 677,925
NAD 1983(92) (Survey Feet)	N: 11,782,118	E: 2,224,160
NAD 1927 (Meters)	N: 3,591,021	E: 677,885
NAD 1927 (Survey Feet)	N: 11,781,542	E: 2,224,027

State Plane Coordinate System Zone: New Mexico East

NAD 1983(92) (Meters)	N: 160,729	E: 280,286
NAD 1983(92) (Survey Feet)	N: 527,326	E: 919,571
NAD 1927 (Meters)	N: 160,738	E: 267,644
NAD 1927 (Survey Feet)	N: 527,354	E: 878,097

NEW MEXICO OFFICE OF STATE ENGINEER

Locator Tool Report



WR File Number: CP Scale: 1:20,224

Northing/Easting: UTM83(92) (Meter): N: 3,591,197 E: 677,925

Northing/Easting: SPCS83(92) (Feet): N: 527,326 E: 919,571

GW Basin: Capitan

Print Date: 04/02/2009

STATE OF NEW MEXICO
OFFICE OF THE STATE ENGINEER
ROSWELL

John R. D'Antonio, Jr., P.E.
State Engineer

1900 West Second Street
Roswell, NM 88201
Phone: (575) 622-6521
Fax: (575) 623-8559

April 10, 2009

Sundance Services, Inc.
% Larry M. Coons, P.E.
Gordon Environmental, Inc.
213 S. Camino del Pueblo
Bernalillo, NM 87004

RE: Monitoring Wells – CP-1014; CP-1015; CP-1016; CP-1017; CP-1018; CP-1019

Greetings:

Enclosed is your copy of the Monitoring Well permits, which have been approved subject to the conditions set forth on the approval page thereof.

In accordance with Condition C, a well record shall be filed in this office twenty days after completion of drilling. The well record is proof of completion of well. IT IS YOUR RESPONSIBILITY TO ASSURE THAT THE WELL LOG IS FILED WITHIN 20 DAYS OF DRILLING OF THE WELL.

These permits will expire on or before 04/30/2010, unless the wells have been drilled and the well logs filed in this office.

Sincerely,

for Andy Morley, Staff Manager
(575) 622-6521, ext 113

Enclosure

cc: Santa Fe Office

NEW MEXICO STATE ENGINEER
PERMIT TO MONITOR

SPECIFIC CONDITIONS OF APPROVAL

4 No water shall be appropriated and beneficially used under this permit.

B The well shall be drilled by a driller licensed in the State of New Mexico in accordance with Section 72-12-12 New Mexico Statutes Annotated.

C Driller's well record must be filed with the State Engineer within 20 days after the well is drilled or driven. Well record forms will be provided by the State Engineer upon request.

No water shall be diverted from this well except for testing purposes which shall not exceed ten (10) cumulative days unless a permit to use water from this well is acquired from the Office of the State Engineer.

Should the permittee change the purpose of use to other than monitoring purposes, an application shall be acquired from the Office of the State Engineer.

The proposed well shall be drilled at least 660 feet from all wells of other ownership.

The well shall be constructed, maintained, and operated that each water shall be confined to the aquifer in which it is encountered.

LOG The Point of Diversion CP-1019 must be completed and the Well Log filed on or before 04/30/2010.

ACTION OF STATE ENGINEER

Notice of Intention Rcvd:		Date Rcvd. Corrected:	
Formal Application Rcvd:	04/01/2009	Pub. Of Notice Ordered:	
Date Returned – Correction:		Affidavit of Pub. Filed:	

This application is approved provided it is not exercised to the detriment of any others having existing rights, and is not contrary to the conservation of water in New Mexico nor detrimental to the public welfare of the state; and further subject to the specific conditions listed previously.

Witness my hand and seal this 9 day of April A.D., 2009.

John R. D'Antonio, Jr., P.E., State Engineer

By: _____
Kenneth M. Presquez, District II Manager

File Number: _____
(For OSE Use Only)

NEW MEXICO OFFICE OF THE STATE ENGINEER
APPLICATION FOR PERMIT
TO DRILL AN EXPLORATORY WELL

1. APPLICANT:

Name: Sundance Services, Inc. Work Phone: 575-394-2511
Contact: Mr. Joe Carrillo, Plant Manager Home Phone: _____
Address: 1001 6th Street
City: Eunice State: NM Zip: 88231

2. LOCATION OF WELL (A, B, C, or D required, E or F if known): MP-5

A. SW 1/4 SW 1/4 NW 1/4 Section: 30 Township: 21S Range: 38E N.M.P.M.
in Lea County County.

B. X = _____ feet, Y = _____ feet, N.M. Coordinate System
_____ Zone in the _____ Grant.
U.S.G.S. Quad Map _____

C. Latitude: 32 d 26 m 59.7 s Longitude: 103 d 6 m 25.6 s

D. East 677928 (m), North 3591884 (m), UTM Zone 13, NAD __ (27 or 83)

E. Tract No. _____, Map No. _____ of the _____ Hydrographic Survey

F. Lot No. _____, Block No. _____ of Unit/Tract _____ of the
_____ Subdivision recorded in _____ County.

G. Other: _____

H. Give State Engineer File Number of existing well: _____

I. On land owned by (required): Sundance Services, Inc. (through lease authorization)

3. WELL INFORMATION:

Approximate depth 125 feet; Outside diameter of casing 2 inches.
Name of well driller and driller license number Rodgers - NMWD 225

4. ADDITIONAL STATEMENT OR EXPLANATIONS:

To evaluate subsurface groundwater

STATE ENGINEER OFFICE
ROSWELL, NEW MEXICO
2009 APR -1 A 10:58

Do Not Write Below This Line

File Number: CP-1019 Trn Number: 428023
Form: wr-07

File Number: _____
(For OSE Use Only)

NEW MEXICO OFFICE OF THE STATE ENGINEER
APPLICATION FOR PERMIT
TO DRILL AN EXPLORATORY WELL

ACKNOWLEDGEMENT

(I, We) Joe Carrillo for Sundance Services, Inc. affirm that the
(Please Print)
foregoing statements are true to the best of my knowledge and belief.

Applicant Signature Applicant Signature

ACTION OF STATE ENGINEER

This application is approved ~~xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx~~ provided it is not exercised to the detriment of any others having existing rights, and is not contrary to the conservation of water in New Mexico nor detrimental to the public welfare, and further subject to the following conditions: _____

see attached conditions of approval

Witness my hand and seal this 9 day of April, 20 09

John R. D'Antonio, Jr., P.E., State Engineer

By: _____
Kenneth M. Fresquez, District II Manager

STATE ENGINEER OFFICE
ROSWELL, NEW MEXICO
2009 APR -1 A 10:58

Do Not Write Below This Line

File Number: CP-1019 Trn Number: 428023

Form: wr-07 page 2 of 2

MP-5

Locator Tool Report

General Information:

Application ID: 28 Date: 04-02-2009 Time: 10:49:12

WR File Number: CP
Purpose: POINT OF DIVERSION

Applicant First Name: SUNDANCE
Applicant Last Name: SERVICES

GW Basin: CAPITAN
County: LEA

Critical Management Area Name(s): NONE
Special Condition Area Name(s): NONE
Land Grant Name: NON GRANT

PLSS Description (New Mexico Principal Meridian):

SW 1/4 of SW 1/4 of SW 1/4 of NW 1/4 of Section 30, Township 21S, Range 38E.

Coordinate System Details:

Geographic Coordinates:

Latitude:	32 Degrees	26 Minutes	59.7 Seconds	N
Longitude:	103 Degrees	6 Minutes	25.6 Seconds	W

Universal Transverse Mercator Zone: 13N

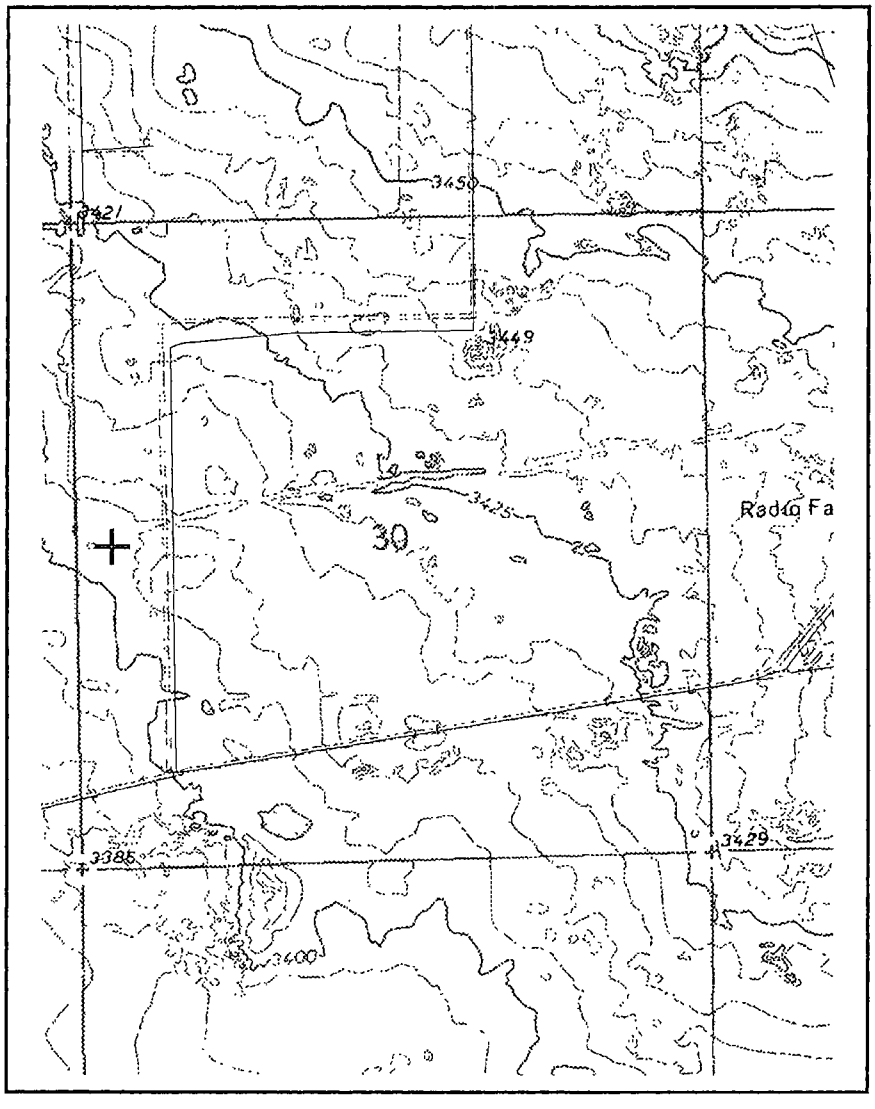
NAD 1983(92) (Meters)	N: 3,591,884	E: 677,928
NAD 1983(92) (Survey Feet)	N: 11,784,374	E: 2,224,170
NAD 1927 (Meters)	N: 3,591,709	E: 677,888
NAD 1927 (Survey Feet)	N: 11,783,798	E: 2,224,037

State Plane Coordinate System Zone: New Mexico East

NAD 1983(92) (Meters)	N: 161,417	E: 280,293
NAD 1983(92) (Survey Feet)	N: 529,582	E: 919,595
NAD 1927 (Meters)	N: 161,425	E: 267,652
NAD 1927 (Survey Feet)	N: 529,610	E: 878,121

NEW MEXICO OFFICE OF STATE ENGINEER

Locator Tool Report



WR File Number: CP Scale: 1:17,314

Northing/Easting: UTM83(92) (Meter): N: 3,591,884 E: 677,928

Northing/Easting: SPCS83(92) (Feet): N: 529,582 E: 919,595

GW Basin: Capitan

Print Date. 04/02/2009

WELL RECORD & LOG

OFFICE OF THE STATE ENGINEER

www.ose.state.nm.us

1. GENERAL AND WELL LOCATION

POD NUMBER (WELL NUMBER)		OSE FILE NUMBER(S)		
		CP 1015		
WELL OWNER NAME(S)		PHONE (OPTIONAL)		
Sundance Services, Inc. Contact: Mr. Joe Carrillo, Plant Manager		575-394-2511		
WELL OWNER MAILING ADDRESS		CITY	STATE	ZIP
1001 6th Street		Eunice	NM	88231

WELL LOCATION (FROM GPS)		DEGREES	MINUTES	SECONDS	
	LATITUDE	32	26	38.00	N
	LONGITUDE	103	5	29.10	W

* ACCURACY REQUIRED: ONE TENTH OF A SECOND

* DATUM REQUIRED: WGS 84

DESCRIPTION RELATING WELL LOCATION TO STREET ADDRESS AND COMMON LANDMARKS

2. OPTIONAL

(2.5 ACRE)	(10 ACRE)	(40 ACRE)	(160 ACRE)	SECTION	TOWNSHIP		RANGE	
NE ¼	SE ¼	SE ¼	SE ¼	30	21	☐ NORTH ☑ SOUTH	38	☑ EAST ☐ WEST

SUBDIVISION NAME	LOT NUMBER	BLOCK NUMBER	UNIT/TRACT
in Lea County			

HYDROGRAPHIC SURVEY	MAP NUMBER	TRACT NUMBER

3. DRILLING INFORMATION

LICENSE NUMBER	NAME OF LICENSED DRILLER	NAME OF WELL DRILLING COMPANY
WD225	John Aguirre	Rodgers & Co., Inc.

DRILLING STARTED	DRILLING ENDED	DEPTH OF COMPLETED WELL (FT)	BORE HOLE DEPTH (FT)	DEPTH WATER FIRST ENCOUNTERED (FT)
4/16/09	4/20/09		150	

COMPLETED WELL IS ☐ ARTESIAN ☐ DRY HOLE ☐ SHALLOW (UNCONFINED) — STATIC WATER LEVEL IN COMPLETED WELL (FT)

DRILLING FLUID: ☐ AIR ☐ MUD ☐ ADDITIVES – SPECIFY:

DRILLING METHOD: ☐ ROTARY ☐ HAMMER ☐ CABLE TOOL ☑ OTHER – SPECIFY: Hollow stem auger and air rotary

DEPTH (FT) FROM	DEPTH (FT) TO	BORE HOLE DIA. (IN)	CASING MATERIAL	CONNECTION TYPE (CASING)	INSIDE DIA CASING (IN)	CASING WALL THICKNESS (IN)	SLOT SIZE (IN)

4. WATER BEARING STRATA

DEPTH (FT) FROM	DEPTH (FT) TO	THICKNESS (FT)	FORMATION DESCRIPTION OF PRINCIPAL WATER-BEARING STRATA (INCLUDE WATER-BEARING CAVITIES OR FRACTURE ZONES)	YIELD (GPM)

METHOD USED TO ESTIMATE YIELD OF WATER-BEARING STRATA	TOTAL ESTIMATED WELL YIELD (GPM)

FOR OSE INTERNAL USE — WELL RECORD & LOG (Version 6/9/08)

FILE NUMBER	POD NUMBER	TRN NUMBER
LOCATION		PAGE 1 OF 2

5. SEAL AND PUMP

TYPE OF PUMP: ☐ SUBMERSIBLE ☐ JET ☐ NO PUMP – WELL NOT EQUIPPED
☐ TURBINE ☐ CYLINDER ☐ OTHER – SPECIFY:

ANNULAR SEAL AND GRAVEL PACK	DEPTH (FT) FROM	DEPTH (FT) TO	BORE HOLE DIA. (IN)	MATERIAL TYPE AND SIZE	AMOUNT (CUBIC FT)	METHOD OF PLACEMENT

6. GEOLOGIC LOG OF WELL

DEPTH (FT) FROM	DEPTH (FT) TO	THICKNESS (FT)	COLOR AND TYPE OF MATERIAL ENCOUNTERED (INCLUDE WATER-BEARING CAVITIES OR FRACTURE ZONES)	WATER BEARING?
0	4	4	Sand; fine; med. to reddish tan; dry	☐ YES ☐ NO
4	6	2	Sand; silty fine; reddish tan; s. moist	☐ YES ☐ NO
6	11	5	Caliche w/small gravel; white to pinkish cream; s. moist	☐ YES ☐ NO
11	25	14	Sand; silty fine; lt. reddish tan; s. moist	☐ YES ☐ NO
25	150	125	Claystone to siltstone; dry	☐ YES ☐ NO
				☐ YES ☐ NO
				☐ YES ☐ NO
				☐ YES ☐ NO
				☐ YES ☐ NO
				☐ YES ☐ NO
				☐ YES ☐ NO
				☐ YES ☐ NO
				☐ YES ☐ NO
				☐ YES ☐ NO
				☐ YES ☐ NO
				☐ YES ☐ NO
				☐ YES ☐ NO

ATTACH ADDITIONAL PAGES AS NEEDED TO FULLY DESCRIBE THE GEOLOGIC LOG OF THE WELL

7. TEST & ADDITIONAL INFO

WELL TEST
METHOD: ☐ BAILER ☐ PUMP ☐ AIR LIFT ☐ OTHER – SPECIFY:
TEST RESULTS - ATTACH A COPY OF DATA COLLECTED DURING WELL TESTING, INCLUDING START TIME, END TIME, AND A TABLE SHOWING DISCHARGE AND DRAWDOWN OVER THE TESTING PERIOD.

ADDITIONAL STATEMENTS OR EXPLANATIONS.
MP-1. Well grouted back to total depth. No water encountered.

8. SIGNATURE

THE UNDERSIGNED HEREBY CERTIFIES THAT, TO THE BEST OF HIS OR HER KNOWLEDGE AND BELIEF, THE FOREGOING IS A TRUE AND CORRECT RECORD OF THE ABOVE DESCRIBED HOLE AND THAT HE OR SHE WILL FILE THIS WELL RECORD WITH THE STATE ENGINEER AND THE PERMIT HOLDER WITHIN 20 DAYS AFTER COMPLETION OF WELL DRILLING:

05/20/09

SIGNATURE OF DRILLER — DATE

WELL RECORD & LOG

OFFICE OF THE STATE ENGINEER

www.ose.state.nm.us

1. GENERAL AND WELL LOCATION

POD NUMBER (WELL NUMBER)	OSE FILE NUMBER(S)
	CP 1016
WELL OWNER NAME(S)	PHONE (OPTIONAL)
Sundance Services, Inc.; Contact Mr. Joe Carrillo, Plant Manager	545-394-2511
WELL OWNER MAILING ADDRESS	CITY / STATE / ZIP
1001 6th Street	Eunice / NM / 88231

WELL LOCATION (FROM GPS)		DEGREES	MINUTES	SECONDS	
	LATITUDE	32	26	59.50	N
	LONGITUDE	103	5	28.60	W

* ACCURACY REQUIRED, ONE TENTH OF A SECOND

* DATUM REQUIRED: WGS 84

DESCRIPTION RELATING WELL LOCATION TO STREET ADDRESS AND COMMON LANDMARKS

2. OPTIONAL

(2.5 ACRE)	(10 ACRE)	(40 ACRE)	(160 ACRE)	SECTION	TOWNSHIP	RANGE
NE ¼	NE ¼	NE ¼	SE ¼	30	21 ☐ NORTH ☑ SOUTH	38 ☑ EAST ☐ WEST

SUBDIVISION NAME	LOT NUMBER	BLOCK NUMBER	UNIT/TRACT
in Lea County			

HYDROGRAPHIC SURVEY	MAP NUMBER	TRACT NUMBER

3. DRILLING INFORMATION

LICENSE NUMBER	NAME OF LICENSED DRILLER	NAME OF WELL DRILLING COMPANY
WD225	John Aguirre	Rodgers & Co., Inc.

DRILLING STARTED	DRILLING ENDED	DEPTH OF COMPLETED WELL (FT)	BORE HOLE DEPTH (FT)	DEPTH WATER FIRST ENCOUNTERED (FT)
4/19/09	4/19/09	28	28	Unknown

COMPLETED WELL IS: ☐ ARTESIAN ☐ DRY HOLE ☑ SHALLOW (UNCONFINED)

STATIC WATER LEVEL IN COMPLETED WELL (FT): N/A

DRILLING FLUID: ☐ AIR ☐ MUD ☐ ADDITIVES – SPECIFY:

DRILLING METHOD: ☐ ROTARY ☐ HAMMER ☐ CABLE TOOL ☑ OTHER – SPECIFY: Hollow stem auger

DEPTH (FT) FROM	DEPTH (FT) TO	BORE HOLE DIA. (IN)	CASING MATERIAL	CONNECTION TYPE (CASING)	INSIDE DIA. CASING (IN)	CASING WALL THICKNESS (IN)	SLOT SIZE (IN)
0	23	7.25	PVC casing	Flush thread joint	2	Sch 40 PVC	
23	28	7.25	PVC screen	Flush thread joint	2	Sch 40 PVC	0.010

4. WATER BEARING STRATA

DEPTH (FT) FROM	DEPTH (FT) TO	THICKNESS (FT)	FORMATION DESCRIPTION OF PRINCIPAL WATER-BEARING STRATA (INCLUDE WATER-BEARING CAVITIES OR FRACTURE ZONES)	YIELD (GPM)
13	27	14	Sand; v. fine to fine; lt. tan	
27	28	1	Claystone to siltstone; dry	

METHOD USED TO ESTIMATE YIELD OF WATER-BEARING STRATA	TOTAL ESTIMATED WELL YIELD (GPM)
N/A	N/A

FOR OSE INTERNAL USE

WELL RECORD & LOG (Version 6/9/08)

FILE NUMBER	POD NUMBER	TRN NUMBER
LOCATION		PAGE 1 OF 2

5. SEAL AND PUMP

TYPE OF PUMP: ☐ SUBMERSIBLE ☐ JET ☑ NO PUMP – WELL NOT EQUIPPED ☐ TURBINE ☐ CYLINDER ☐ OTHER – SPECIFY:

ANNULAR SEAL AND GRAVEL PACK	DEPTH (FT) FROM	DEPTH (FT) TO	BORE HOLE DIA. (IN)	MATERIAL TYPE AND SIZE	AMOUNT (CUBIC FT)	METHOD OF PLACEMENT
	0	19	7.25	Cement/bentointe	4.9	Tremie
	19	21	7.25	Bentonite pellets	.5	Tremie
	21	28	7.25	10/20 silica sand	1.8	Tremie

6. GEOLOGIC LOG OF WELL

DEPTH (FT) FROM	DEPTH (FT) TO	THICKNESS (FT)	COLOR AND TYPE OF MATERIAL ENCOUNTERED (INCLUDE WATER-BEARING CAVITIES OR FRACTURE ZONES)	WATER BEARING?
0	8	8	Sand; v. fine to fine; med. rust/tan; dry to s. moist	☐ YES ☐ NO
8	13	5	Caliche; white to light tan	☐ YES ☐ NO
13	27	14	Sand; v. fine to fine; lt. tan	☐ YES ☐ NO
27	28	1	Claystone to siltstone; dry	☐ YES ☐ NO
				☐ YES ☐ NO
				☐ YES ☐ NO
				☐ YES ☐ NO
				☐ YES ☐ NO
				☐ YES ☐ NO
				☐ YES ☐ NO
				☐ YES ☐ NO
				☐ YES ☐ NO
				☐ YES ☐ NO
				☐ YES ☐ NO
				☐ YES ☐ NO
				☐ YES ☐ NO

ATTACH ADDITIONAL PAGES AS NEEDED TO FULLY DESCRIBE THE GEOLOGIC LOG OF THE WELL

7. TEST & ADDITIONAL INFO

WELL TEST — METHOD: ☐ BAILER ☐ PUMP ☐ AIR LIFT ☐ OTHER – SPECIFY:

TEST RESULTS - ATTACH A COPY OF DATA COLLECTED DURING WELL TESTING, INCLUDING START TIME, END TIME, AND A TABLE SHOWING DISCHARGE AND DRAWDOWN OVER THE TESTING PERIOD.

ADDITIONAL STATEMENTS OR EXPLANATIONS.

MP-2.

8. SIGNATURE

THE UNDERSIGNED HEREBY CERTIFIES THAT, TO THE BEST OF HIS OR HER KNOWLEDGE AND BELIEF, THE FOREGOING IS A TRUE AND CORRECT RECORD OF THE ABOVE DESCRIBED HOLE AND THAT HE OR SHE WILL FILE THIS WELL RECORD WITH THE STATE ENGINEER AND THE PERMIT HOLDER WITHIN 20 DAYS AFTER COMPLETION OF WELL DRILLING:

SIGNATURE OF DRILLER — DATE: 05/20/09

FOR OSE INTERNAL USE — WELL RECORD & LOG (Version 6/9/08)

FILE NUMBER	POD NUMBER	TRN NUMBER
LOCATION		PAGE 2 OF 2

WELL RECORD & LOG

OFFICE OF THE STATE ENGINEER

www.ose.state.nm.us

1. GENERAL AND WELL LOCATION

POD NUMBER (WELL NUMBER)				OSE FILE NUMBER(S)		
				CP 1017		
WELL OWNER NAME(S)				PHONE (OPTIONAL)		
Sundance Services, Inc.; Contact: Mr. Joe Carrillo, Plant Manager				545-394-2511		
WELL OWNER MAILING ADDRESS				CITY	STATE	ZIP
1001 6th Street				Eunice	NM	88231
WELL LOCATION (FROM GPS)		DEGREES	MINUTES	SECONDS	* ACCURACY REQUIRED: ONE TENTH OF A SECOND	
	LATITUDE	32	26	49.80 N	* DATUM REQUIRED: WGS 84	
	LONGITUDE	103	5	51.70 W		
DESCRIPTION RELATING WELL LOCATION TO STREET ADDRESS AND COMMON LANDMARKS						

2. OPTIONAL

(2.5 ACRE)	(10 ACRE)	(40 ACRE)	(160 ACRE)	SECTION	TOWNSHIP	RANGE
NE ¼	SW ¼	NW ¼	SE ¼	30	21 ☐ NORTH ☑ SOUTH	38 ☑ EAST ☐ WEST

SUBDIVISION NAME	LOT NUMBER	BLOCK NUMBER	UNIT/TRACT
in Lea County			
HYDROGRAPHIC SURVEY		MAP NUMBER	TRACT NUMBER

3. DRILLING INFORMATION

LICENSE NUMBER	NAME OF LICENSED DRILLER	NAME OF WELL DRILLING COMPANY
WD225	John Aguirre	Rodgers & Co., Inc.

DRILLING STARTED	DRILLING ENDED	DEPTH OF COMPLETED WELL (FT)	BORE HOLE DEPTH (FT)	DEPTH WATER FIRST ENCOUNTERED (FT)
4/20/09	4/21/09		150	

COMPLETED WELL IS: ☐ ARTESIAN ☐ DRY HOLE ☐ SHALLOW (UNCONFINED) — STATIC WATER LEVEL IN COMPLETED WELL (FT)

DRILLING FLUID: ☐ AIR ☐ MUD ☐ ADDITIVES – SPECIFY:

DRILLING METHOD: ☐ ROTARY ☐ HAMMER ☐ CABLE TOOL ☐ OTHER – SPECIFY:

DEPTH (FT) FROM	DEPTH (FT) TO	BORE HOLE DIA. (IN)	CASING MATERIAL	CONNECTION TYPE (CASING)	INSIDE DIA. CASING (IN)	CASING WALL THICKNESS (IN)	SLOT SIZE (IN)

4. WATER BEARING STRATA

DEPTH (FT) FROM	DEPTH (FT) TO	THICKNESS (FT)	FORMATION DESCRIPTION OF PRINCIPAL WATER-BEARING STRATA (INCLUDE WATER-BEARING CAVITIES OR FRACTURE ZONES)	YIELD (GPM)

METHOD USED TO ESTIMATE YIELD OF WATER-BEARING STRATA	TOTAL ESTIMATED WELL YIELD (GPM)

FOR OSE INTERNAL USE — WELL RECORD & LOG (Version 6/9/08)

FILE NUMBER	POD NUMBER	TRN NUMBER
LOCATION		PAGE 1 OF 2

5. SEAL AND PUMP

TYPE OF PUMP: ☐ SUBMERSIBLE ☐ JET ☐ NO PUMP – WELL NOT EQUIPPED
☐ TURBINE ☐ CYLINDER ☐ OTHER – SPECIFY:

ANNULAR SEAL AND GRAVEL PACK	DEPTH (FT) FROM	DEPTH (FT) TO	BORE HOLE DIA (IN)	MATERIAL TYPE AND SIZE	AMOUNT (CUBIC FT)	METHOD OF PLACEMENT

6. GEOLOGIC LOG OF WELL

DEPTH (FT) FROM	DEPTH (FT) TO	THICKNESS (FT)	COLOR AND TYPE OF MATERIAL ENCOUNTERED (INCLUDE WATER-BEARING CAVITIES OR FRACTURE ZONES)	WATER BEARING?
0	6	6	Sand; fine; reddish tan; s. moist	☐ YES ☐ NO
6	11	5	Sand; silty fine; reddish tan; s. moist to dry	☐ YES ☐ NO
11	14	3	Caliche; white to pinkish tan	☐ YES ☐ NO
14	39	25	Sand; silty v. fine to fine; reddish tan w/grey lenses; s. moist	☐ YES ☐ NO
39	150	111	Claystone to siltstone; dry	☐ YES ☐ NO
				☐ YES ☐ NO
				☐ YES ☐ NO
				☐ YES ☐ NO
				☐ YES ☐ NO
				☐ YES ☐ NO
				☐ YES ☐ NO
				☐ YES ☐ NO
				☐ YES ☐ NO
				☐ YES ☐ NO
				☐ YES ☐ NO
				☐ YES ☐ NO
				☐ YES ☐ NO

ATTACH ADDITIONAL PAGES AS NEEDED TO FULLY DESCRIBE THE GEOLOGIC LOG OF THE WELL

7. TEST & ADDITIONAL INFO

WELL TEST — METHOD: ☐ BAILER ☐ PUMP ☐ AIR LIFT ☐ OTHER – SPECIFY:

TEST RESULTS - ATTACH A COPY OF DATA COLLECTED DURING WELL TESTING, INCLUDING START TIME, END TIME, AND A TABLE SHOWING DISCHARGE AND DRAWDOWN OVER THE TESTING PERIOD.

ADDITIONAL STATEMENTS OR EXPLANATIONS:

MP-3. Well grouted back to total depth; no water encountered.

8. SIGNATURE

THE UNDERSIGNED HEREBY CERTIFIES THAT, TO THE BEST OF HIS OR HER KNOWLEDGE AND BELIEF, THE FOREGOING IS A TRUE AND CORRECT RECORD OF THE ABOVE DESCRIBED HOLE AND THAT HE OR SHE WILL FILE THIS WELL RECORD WITH THE STATE ENGINEER AND THE PERMIT HOLDER WITHIN 20 DAYS AFTER COMPLETION OF WELL DRILLING.

SIGNATURE OF DRILLER — DATE: 05/20/09

FOR OSE INTERNAL USE — WELL RECORD & LOG (Version 6/9/08)

FILE NUMBER	POD NUMBER	TRN NUMBER
LOCATION		PAGE 2 OF 2

WELL RECORD & LOG

OFFICE OF THE STATE ENGINEER

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1. GENERAL AND WELL LOCATION

POD NUMBER (WELL NUMBER)				OSE FILE NUMBER(S)		
				CP 1018		
WELL OWNER NAME(S)				PHONE (OPTIONAL)		
Sundance Services, Inc.; Contact: Mr. Joe Carrillo, Plant Manager				575-394-2511		
WELL OWNER MAILING ADDRESS				CITY	STATE	ZIP
1001 6th Street				Eunice	NM	88231
WELL LOCATION (FROM GPS)		DEGREES	MINUTES	SECONDS	* ACCURACY REQUIRED: ONE TENTH OF A SECOND	
	LATITUDE	32	26	37.40 N	* DATUM REQUIRED: WGS 84	
	LONGITUDE	103	6	26.20 W		
DESCRIPTION RELATING WELL LOCATION TO STREET ADDRESS AND COMMON LANDMARKS						

2. OPTIONAL

(2.5 ACRE)	(10 ACRE)	(40 ACRE)	(160 ACRE)	SECTION	TOWNSHIP	RANGE
NW ¼	SW ¼	SW ¼	SW ¼	30	21 ☐ NORTH ☑ SOUTH	38 ☑ EAST ☐ WEST

SUBDIVISION NAME	LOT NUMBER	BLOCK NUMBER	UNIT/TRACT
in Lea County			
HYDROGRAPHIC SURVEY		MAP NUMBER	TRACT NUMBER

3. DRILLING INFORMATION

LICENSE NUMBER	NAME OF LICENSED DRILLER	NAME OF WELL DRILLING COMPANY
WD225	John Aguirre	Rodgers & Co., Inc.

DRILLING STARTED	DRILLING ENDED	DEPTH OF COMPLETED WELL (FT)	BORE HOLE DEPTH (FT)	DEPTH WATER FIRST ENCOUNTERED (FT)
4/24/09	4/24/09	60	60	Unknown

COMPLETED WELL IS ☐ ARTESIAN ☐ DRY HOLE ☑ SHALLOW (UNCONFINED) — STATIC WATER LEVEL IN COMPLETED WELL (FT): N/A

DRILLING FLUID: ☐ AIR ☐ MUD ☐ ADDITIVES - SPECIFY:

DRILLING METHOD: ☐ ROTARY ☐ HAMMER ☐ CABLE TOOL ☑ OTHER - SPECIFY: Hollow stem auger

DEPTH (FT) FROM	DEPTH (FT) TO	BORE HOLE DIA (IN)	CASING MATERIAL	CONNECTION TYPE (CASING)	INSIDE DIA. CASING (IN)	CASING WALL THICKNESS (IN)	SLOT SIZE (IN)
0	50	10.75	PVC casing	Flush thread joint	2	Sch 40 PVC	
50	60	10.75	PVC screen	Flush thread joint	2	Sch 40 PVC	0.010

4. WATER BEARING STRATA

DEPTH (FT) FROM	DEPTH (FT) TO	THICKNESS (FT)	FORMATION DESCRIPTION OF PRINCIPAL WATER-BEARING STRATA (INCLUDE WATER-BEARING CAVITIES OR FRACTURE ZONES)	YIELD (GPM)
45	60	15	Claystone to siltstone; dry	

METHOD USED TO ESTIMATE YIELD OF WATER-BEARING STRATA	TOTAL ESTIMATED WELL YIELD (GPM)
N/A	N/A

5. SEAL AND PUMP

TYPE OF PUMP: ☐ SUBMERSIBLE ☐ JET ☑ NO PUMP – WELL NOT EQUIPPED ☐ TURBINE ☐ CYLINDER ☐ OTHER – SPECIFY:

ANNULAR SEAL AND GRAVEL PACK	DEPTH (FT) FROM	DEPTH (FT) TO	BORE HOLE DIA. (IN)	MATERIAL TYPE AND SIZE	AMOUNT (CUBIC FT)	METHOD OF PLACEMENT
	0	46	10.75	Cement/bentonite	27.5	Tremie
	46	48	10.75	Bentonite pellets	1.2	Tremie
	48	60	10.75	silica sand	7.2	Tremie

6. GEOLOGIC LOG OF WELL

DEPTH (FT) FROM	DEPTH (FT) TO	THICKNESS (FT)	COLOR AND TYPE OF MATERIAL ENCOUNTERED (INCLUDE WATER-BEARING CAVITIES OR FRACTURE ZONES)	WATER BEARING?
0	45	45	Sand; silty v. fine to fine; lt. buff to pinkish tan; dry	☐ YES ☐ NO
45	60	15	Claystone to siltstone; dry	☐ YES ☐ NO
				☐ YES ☐ NO
				☐ YES ☐ NO
				☐ YES ☐ NO
				☐ YES ☐ NO
				☐ YES ☐ NO
				☐ YES ☐ NO
				☐ YES ☐ NO
				☐ YES ☐ NO
				☐ YES ☐ NO
				☐ YES ☐ NO
				☐ YES ☐ NO
				☐ YES ☐ NO
				☐ YES ☐ NO
				☐ YES ☐ NO

ATTACH ADDITIONAL PAGES AS NEEDED TO FULLY DESCRIBE THE GEOLOGIC LOG OF THE WELL

7. TEST & ADDITIONAL INFO

WELL TEST — METHOD: ☐ BAILER ☐ PUMP ☐ AIR LIFT ☐ OTHER – SPECIFY:

TEST RESULTS - ATTACH A COPY OF DATA COLLECTED DURING WELL TESTING, INCLUDING START TIME, END TIME, AND A TABLE SHOWING DISCHARGE AND DRAWDOWN OVER THE TESTING PERIOD.

ADDITIONAL STATEMENTS OR EXPLANATIONS

MP-4.

8. SIGNATURE

THE UNDERSIGNED HEREBY CERTIFIES THAT, TO THE BEST OF HIS OR HER KNOWLEDGE AND BELIEF, THE FOREGOING IS A TRUE AND CORRECT RECORD OF THE ABOVE DESCRIBED HOLE AND THAT HE OR SHE WILL FILE THIS WELL RECORD WITH THE STATE ENGINEER AND THE PERMIT HOLDER WITHIN 20 DAYS AFTER COMPLETION OF WELL DRILLING:

05/20/09

SIGNATURE OF DRILLER — DATE

FOR OSE INTERNAL USE — WELL RECORD & LOG (Version 6/9/08)

FILE NUMBER	POD NUMBER	TRN NUMBER
LOCATION		PAGE 2 OF 2

COMPLETION REPORT
DRILLING, SAMPLING, AND MONITORING WELL INSTALLATION

SUNDANCE SERVICES, INC.
LEA COUNTY, NEW MEXICO

ATTACHMENT C

BORING LOGS FOR BORINGS MP-1 THROUGH MP-5

Gordon Environmental, Inc.
Consulting Engineers

Log of Borehole No.: MP–1 | Total Depth: 150' | Page 1 of 2 | File No.: 530.01.01/03

Client: SUNDANCE SERVICES INC.

Water Level Data	Location COORDS's and Elevation (NAVD88)	Borehole Information		
NA Ft. While Drilling (below ground surface)	N: 527446.10	Date Started: 04–16–09	Drilling Co.: RODGERS & CO.	GEI Rep.: LMC
NA Ft. at completion (below ground surface)	E: 924459.82	Date Comp: 04–17–09	Driller: JOHN	Drill Meth.: HSA 0–35' AR 35'–150'
water level data approximate	Elevation: 3428.30	Location: SUNDANCE SERVICES WEST SITE	Helper: JUAN	Sampling Meth.: SPLIT SPOON
	SURVEYED COORDS.			

Depth (ft. BGS)	Graphic Lithology	Soil/Lithology Description	Relative Moisture Content	Notes:
4'		Sand; fine; med. to reddish tan; dry		Soft
6'		Sand; silty fine; reddish tan; s. moist		Soft
11'		Caliche w/ small gravel; white to pinkish cream; s.moist		Soft
25'		Sand; silty fine; lt. reddish tan; s. moist		Caliche/caliche cementation @ 21' bgs
75'		Claystone to siltstone; dry Claystone to siltstone; dry (CONTINUED)		Chinle redbeds; color varies from red to tan to grey to yellow/rust

KEY

HSA = HOLLOW STEM AUGER SS = SPLIT SPOON AR = AIR ROTARY BGS = BELOW GROUND SURFACE

Drawing:\\server01\public\acad 2003\530.01.01\FIGURES\BORING LITH LOGS MP 1-5.dwg
Date/Time:Jun. 18, 2009-13:55:58

Gordon Environmental, Inc.
Consulting Engineers

Log of Borehole No.: MP-1 | Total Depth 150' | Page 2 of 2 | File No.: 530.01.01/03

Client: SUNDANCE SERVICES INC.

Water Level Data	Location COORDS's and Elevation (NAVD88)	Borehole Information		
NA Ft. While Drilling (below ground surface)	N: 527446.10	Date Started: 04-16-09	Drilling Co.: RODGERS & CO.	GEI Rep.: LMC
NA Ft. at completion (below ground surface)	E: 924459.82	Date Comp: 04-17-09	Driller: JOHN	Drill Meth.: HSA 0-35' AR 35'-150'
water level data approximate	Elevation: 3428.30 SURVEYED COORDS.	Location: SUNDANCE SERVICES WEST SITE	Helper: JUAN	Sampling Meth.: SPLIT SPOON

Depth (ft. BGS)	Graphic Lithology	Soil/Lithology Description	Relative Moisture Content	Notes:
75'		Claystone to siltstone; dry		Chinle redbeds; color varies from red to tan to grey to yellow/rust
150'		Claystone to siltstone; dry		

KEY

HSA = HOLLOW STEM AUGER SS = SPLIT SPOON AR = AIR ROTARY

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Date/Time:Jun. 18, 2009-13:58:51

Gordon Environmental, Inc.
Consulting Engineers

Log of Borehole No.: MP-2 | Total Depth: 150' | Page 1 of 2 | File No.: 530.01.01/03

Client: SUNDANCE SERVICES INC.

Water Level Data	Location COORDS's and Elevation (NAVD88)	Borehole Information		
21' Ft. While Drilling (below ground surface)	N: 529582.26	Date Started: 04-18-09	Drilling Co.: RODGERS & CO.	GEI Rep.: LMC
NA Ft. at completion (below ground surface)	E: 924510.78	Date Comp: 04-18-09	Driller: JOHN	Drill Meth.: HSA 0-30' AR 30'-150'
water level data approximate	Elevation: 3432.2	Location: SUNDANCE SERVICES WEST SITE	Helper: JUAN	Sampling Meth.: SPLIT SPOON
	APPROXIMATE COORDS.			

Depth (ft. BGS)	Graphic Lithology		Soil/Lithology Description		Relative Moisture Content	Notes:
			Sand; v. fine to fine; med. rust/tan; dry to s. moist			Soft Slightly indurated @ 8' bgs
8'			Caliche; white to light tan			
13'			Sand; v. fine to fine; lt. tan			Slightly indurated @ 16' bgs Gravel (1/4" dia) from 16-17' bgs
		▽ MOIST				Moist @ 21' bgs Wet lt. grey fine sand in ss @ 26' bgs
27'			Claystone to siltstone; dry			Chinle redbeds; color varies from red to tan to grey to yellow/rust
75'			Claystone to siltstone; dry (CONTINUED)			

KEY

▽ WATER ENCOUNTERED DURING DRILLING

HSA = HOLLOW STEM AUGER SS = SPLIT SPOON AR = AIR ROTARY

Drawing:P:\acad 2003\530.01.01\FIGURES\BORING LITH LOGS MP 1-5.dwg
Date/Time:Jun. 25, 2009-08:27:17

Gordon Environmental, Inc.
Consulting Engineers

Log of Borehole No.: MP–2 | Total Depth: 150' | Page 2 of 2 | File No.: 530.01.01/03

Client: SUNDANCE SERVICES INC.

Water Level Data	Location COORDS's and Elevation (NAVD88)	Borehole Information		
21 Ft. While Drilling (below ground surface)	N: 529582.26	Date Started: 04–18–09	Drilling Co.: RODGERS & CO.	GEI Rep.: LMC
NA Ft. at completion (below ground surface)	E: 924510.78	Date Comp: 04–18–09	Driller: JOHN	Drill Meth.: HSA 0–30' AR 30'–150'
water level data approximate	Elevation: 3432.2	Location: SUNDANCE SERVICES WEST SITE	Helper: JUAN	Sampling Meth.: SPLIT SPOON
	APPROXIMATE COORDS.			

Depth (ft. BGS)	Graphic Lithology		Soil/Lithology Description		Relative Moisture Content	Notes:
75'			Claystone to siltstone; dry			Chinle redbeds; color varies from red to tan to grey to yellow/rust
150'			Claystone to siltstone; dry			

KEY

▽ WATER ENCOUNTERED DURING DRILLING

HSA = HOLLOW STEM AUGER SS = SPLIT SPOON AR = AIR ROTARY

Drawing:P:\acad 2003\530.01.01\FIGURES\BORING LITH LOGS MP 1-5.dwg
Date/Time:Jun. 25, 2009-08:28:14

Gordon Environmental, Inc.
Consulting Engineers

Log of Borehole No.: MP-3 | Total Depth: 150' | Page 1 of 2 | File No.: 530.01.01/03

Client: SUNDANCE SERVICES INC.

Water Level Data	Location COORDS's and Elevation (NAVD88)	Borehole Information		
NA Ft. While Drilling (below ground surface)	N: 528611.24	Date Started: 04-21-09	Drilling Co.: RODGERS & CO.	GEI Rep.: LMC
NA Ft. at completion (below ground surface)	E: 922630.93	Date Comp: 04-21-09	Driller: JOHN	Drill Meth.: HSA 0-40' AR 40'-150'
water level data approximate	Elevation: 3417.99 SURVEYED COORDS.	Location: SUNDANCE SERVICES WEST SITE	Helper: JUAN	Sampling Meth.: SPLIT SPOON

Depth (ft. BGS)	Graphic Lithology	Soil/Lithology Description	Relative Moisture Content	Notes:
		Sand; fine; reddish tan; s. moist		Soft dune sand; well sorted
6'		Sand; silty fine; reddish tan; s. moist to dry		Gravel @ 8' bgs
11'		Caliche; white to pinkish tan		Variable hard and soft
14'		Sand; silty v. fine to fine; reddish tan w/ grey lenses; s. moist		Variable minor gravel
39'		Claystone to siltstone; dry		Chinle redbeds; color varies from red to tan to grey to yellow/rust
75'		Claystone to siltstone; dry (CONTINUED)		

KEY

HSA = HOLLOW STEM AUGER SS = SPLIT SPOON AR = AIR ROTARY

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Date/Time:Jun. 18, 2009-14:09:56

Gordon Environmental, Inc.
Consulting Engineers

Log of Borehole No.: MP-3 | Total Depth: 150' | Page 2 of 2 | File No.: 530.01.01/03

Client: SUNDANCE SERVICES INC.

Water Level Data	Location COORDS's and Elevation (NAVD88)	Borehole Information		
NA Ft. While Drilling (below ground surface)	N: 528611.24	Date Started: 04-21-09	Drilling Co.: RODGERS & CO.	GEI Rep.: LMC
NA Ft. at completion (below ground surface)	E: 922630.93	Date Comp: 04-21-09	Driller: JOHN	Drill Meth.: HSA 0-40' AR 40'-150'
water level data approximate	Elevation: 3417.99	Location: SUNDANCE SERVICES WEST SITE	Helper: JUAN	Sampling Meth.: SPLIT SPOON
	SURVEYED COORDS.			

Depth (ft. BGS)	Graphic Lithology		Soil/Lithology Description		Relative Moisture Content	Notes:
75'			Claystone to siltstone; dry			Chinle redbeds; color varies from red to tan to grey to yellow/rust
150'			Claystone to siltstone; dry			

KEY

HSA = HOLLOW STEM AUGER SS = SPLIT SPOON AR = AIR ROTARY

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Date/Time:Jun. 18, 2009-14:10:40

Gordon Environmental, Inc.
Consulting Engineers

Log of Borehole No.: MP-4 | Total Depth: 150' | Page 1 of 2 | File No.: 530.01.01/03

Client: SUNDANCE SERVICES INC.

Water Level Data	Location COORDS's and Elevation (NAVD88)	Borehole Information		
47&56 Ft. While Drilling (below ground surface)	N: 527183.88	Date Started: 04-22-09	Drilling Co.: RODGERS & CO.	GEI Rep.: LMC
NA Ft. at completion (below ground surface)	E: 919459.02	Date Comp: 04-22-09	Driller: JOHN	Drill Meth.: HSA 0-35' AR 35'-150'
water level data approximate	Elevation: 3384	Location: SUNDANCE SERVICES WEST SITE	Helper: JUAN	Sampling Meth.: SPLIT SPOON
	APPROXIMATE COORDS.			

Depth (ft. BGS)	Graphic Lithology	Soil/Lithology Description	Relative Moisture Content	Notes:
		Sand; silty v. fine to fine; lt. buff to pinkish tan; dry		Variable caliche/caliche cementation from 0 – 15' bgs
45'		Claystone to siltstone; dry		Chinle redbeds; color varies from red to tan to grey to yellow/rust Moist v. fine to fine sand zones from 47–48' and 56–58' bgs
75'		Claystone to siltstone; dry (CONTINUED)		

KEY

▽ WATER ENCOUNTERED DURING DRILLING

HSA = HOLLOW STEM AUGER SS = SPLIT SPOON AR = AIR ROTARY

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Gordon Environmental, Inc.
Consulting Engineers

Log of Borehole No.: MP–4 | Total Depth: 150' | Page 2 of 2 | File No.: 530.01.01/03

Client: SUNDANCE SERVICES INC.

Water Level Data	Location COORDS's and Elevation (NAVD88)	Borehole Information		
NA Ft. While Drilling (below ground surface)	N: 527183.88	Date Started: 04–22–09	Drilling Co.: RODGERS & CO.	GEI Rep.: LMC
NA Ft. at completion (below ground surface)	E: 919459.02	Date Comp: 04–22–09	Driller: JOHN	Drill Meth.: HSA 0–35' AR 35'–150'
water level data approximate	Elevation: 3384	Location: SUNDANCE SERVICES WEST SITE	Helper: JUAN	Sampling Meth.: SPLIT SPOON
	APPROXIMATE COORDINATES			

Depth (ft. BGS)	Graphic Lithology		Soil/Lithology Description		Relative Moisture Content	Notes:
75'			Claystone to siltstone; dry			Chinle redbeds; color varies from red to tan to grey to yellow/rust
150'			Claystone to siltstone; dry			

KEY

▽ WATER ENCOUNTERED DURING DRILLING

HSA = HOLLOW STEM AUGER SS = SPLIT SPOON AR = AIR ROTARY

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Gordon Environmental, Inc.
Consulting Engineers

Log of Borehole No.: MP-5 | Total Depth: 150' | Page 1 of 2 | File No.: 530.01.01/03

Client: SUNDANCE SERVICES INC.

Water Level Data	Location COORDS's and Elevation (NAVD88)	Borehole Information		
NA Ft. While Drilling (below ground surface)	N: 529535.82	Date Started: 04-23-09	Drilling Co.: RODGERS & CO.	GEI Rep.: LMC
NA Ft. at completion (below ground surface)	E: 919611.93	Date Comp: 04-23-09	Driller: JOHN	Drill Meth.: HSA 0-50' AR 50'-150'
water level data approximate	Elevation: 3402.93 SURVEYED COORDS.	Location: SUNDANCE SERVICES WEST SITE	Helper: JUAN	Sampling Meth.: SPLIT SPOON

Depth (ft. BGS)	Graphic Lithology	Soil/Lithology Description	Relative Moisture Content	Notes:
		Sand; fine; reddish tan; s. moist		Soft dune sand; well sorted Dry and s. indurated @ 8' bgs
11'		Sand; silty v. fine to fine; lt. pinkish cream to tan; dry to s. moist		Variable caliche/caliche cementation Gravel to 1" dia @ 35' bgs
45'		Claystone to siltstone; dry		Chinle redbeds; color varies from red to tan to grey to yellow/rust S. moist v. fine to fine sand zone from 55-60' bgs
75'		Claystone to siltstone; dry (CONTINUED)		

KEY

HSA = HOLLOW STEM AUGER SS = SPLIT SPOON AR = AIR ROTARY

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Gordon Environmental, Inc.
Consulting Engineers

Log of Borehole No.: MP–5 | Total Depth 150' | Page 2 of 2 | File No.: 530.01.01/03

Client: SUNDANCE SERVICES INC.

Water Level Data	Location COORDS's and Elevation (NAVD88)	Borehole Information		
NA Ft. While Drilling (below ground surface)	N: 529535.82	Date Started: 04–23–09	Drilling Co.: RODGERS & CO.	GEI Rep.: LMC
NA Ft. at completion (below ground surface)	E: 919611.93	Date Comp: 04–23–09	Driller: JOHN	Drill Meth.: HSA 0–50' AR 50'–150'
water level data approximate	Elevation: 3402.93	Location: SUNDANCE SERVICES WEST SITE	Helper: JUAN	Sampling Meth.: SPLIT SPOON
	SURVEYED COORDS.			

Depth (ft. BGS)	Graphic Lithology		Soil/Lithology Description		Relative Moisture Content	Notes:
75'			Claystone to siltstone; dry			Chinle redbeds; color varies from red to tan to grey to yellow/rust
150'			Claystone to siltstone; dry			

KEY

HSA = HOLLOW STEM AUGER SS = SPLIT SPOON AR = AIR ROTARY

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COMPLETION REPORT
DRILLING, SAMPLING, AND MONITORING WELL INSTALLATION

SUNDANCE SERVICES, INC.
LEA COUNTY, NEW MEXICO

ATTACHMENT D

BORING LOGS FOR BORINGS MP-2P AND MP-4P

Gordon Environmental, Inc.
Consulting Engineers

Log of Borehole No.: MP-2P | Total Depth: 28' | Page 1 of 1 | File No.: 530.01.01/03

Client: SUNDANCE SERVICES INC.

Water Level Data	Location COORDS's and Elevation (NAVD88)	Borehole Information		
21 Ft. While Drilling (below ground surface)	N: 529615.38	Date Started: 04-19-09	Drilling Co.: RODGERS & CO.	GEI Rep.: LMC
27.48 Ft. at completion (below ground surface)	E: 924510.99	Date Comp: 04-19-09	Driller: JOHN	Drill Meth.: HSA 0-28'
water level data approximate	Elevation: 3433.58 SURVEYED COORDS.	Location: SUNDANCE SERVICES WEST SITE	Helper: JUAN	Sampling Meth.: SPLIT SPOON

Depth (ft. BGS)	Graphic Lithology		Soil/Lithology Description		Relative Moisture Content	Notes:
			Sand; v. fine to fine; med. rust/tan; dry to s. moist			Soft Slightly indurated @ 8' bgs
8'			Caliche; white to light tan			
13'			Sand; v. fine to fine; lt. tan			Slightly indurated @ 16' bgs Gravel (1/4" dia) from 16-17' bgs
		▽ MOIST				Moist @ 21' bgs Wet lt. grey fine sand in ss @ 26' bgs
27'		▽▽ 27.48' BGS @4/21/09	Claystone to siltstone; dry			Chinle redbeds; color varies from red to tan to grey to yellow/rust
28'		27.49' BGS @4/24/09				

SURVEYED COORDINATES (5-2009)

BOREHOLE	NORTHING	EASTING	ELEVATION
MP-2P			
RIM	529615.38	924510.99	3436.51
CASING	529615.26	924510.78	3435.90
CONCRETE	529615.60	924511.41	3433.58

KEY

▽ WATER LEVEL AFTER COMPLETION ▽ WATER ENCOUNTERED DURING DRILLING

HSA = HOLLOW STEM AUGER SS = SPLIT SPOON AR = AIR ROTARY

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Gordon Environmental, Inc.
Consulting Engineers

Log of Borehole No.: MP-4P | Total Depth: 60' | Page 1 of 1 | File No.: 530.01.01/03

Client: SUNDANCE SERVICES INC.

Water Level Data	Location COORDS's and Elevation (NAVD88)	Borehole Information
NA Ft. While Drilling (below ground surface)	N: 527183.88	Date Started: 04-24-09
NA Ft. at completion (below ground surface)	E: 919489.02	Date Comp: 04-24-09
water level data approximate	Elevation: 3384.62	Location: SUNDANCE SERVICES WEST SITE
	SURVEYED COORDS.	Drilling Co.: RODGERS & CO.
		Driller: JOHN
		Helper: JUAN
		GEI Rep.: LMC
		Drill Meth.: HSA 0-60'
		Sampling Meth.: SPLIT SPOON

Depth (ft. BGS)	Graphic Lithology	Soil/Lithology Description	Relative Moisture Content	Notes:
		Sand; silty v. fine to fine; lt. buff to pinkish tan; dry		Variable caliche/caliche cementation from 0 – 15' bgs
45'		Claystone to siltstone; dry		Chinle redbeds; color varies from red to tan to grey to yellow/rust Moist v. fine to fine sand zones from 47–48' and 56–58' bgs
52.63'	▽ 5-01-09			
60'				

SURVEYED COORDINATES (5-2009)

BOREHOLE	NORTHING	EASTING	ELEVATION
MP-4P			
RIM	529615.38	924510.99	3387.56
CASING	529615.26	924510.78	3387.09
CONCRETE	529615.60	924511.41	3384.62

KEY

▽ WATER LEVEL AFTER COMPLETION ▽ WATER ENCOUNTERED DURING DRILLING

HSA = HOLLOW STEM AUGER SS = SPLIT SPOON AR = AIR ROTARY

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Date/Time:Jun. 25, 2009-08:15:32

SUPPLEMENTAL DRILLING PLAN

SUNDANCE SERVICES, INC.
LEA COUNTY, NEW MEXICO

ATTACHMENT B

Draft Permit Section Outline – Geology and Hydrogeology - Sundance West, Sundance Services, Inc., Lea County, New Mexico – OCD Part 36 Landfill

SUNDANCE WEST
SUNDANCE SERVICES, INC.
LEA COUNTY, NEW MEXICO

OCD PART 36 LANDFILL
GEOLOGY AND HYDROGEOLOGY

1. INTRODUCTION

a. Purpose and Scope (reference to 19.15.36.8.C.15 NMAC and 19.15.36.8.C.15 NMAC)

b. Location

c. Streams, Springs, Watercourses and Water Wells

   i. *19.15.36.8.C.15 (a) NMAC – a map showing names and location of streams, springs or other watercourses, and water wells within one mile of the site*

2. REGIONAL GEOLOGY AND HYDROGEOLOGY

a. Climate

b. Physiographic Setting

c. Structural Setting

d. Surface Geology and Stratigraphy

   i. *19.15.36.8.C.15 (e) NMAC – geologic cross sections*

e. Hydrogeology

   i. *19.15.36.8.C.15 NMAC (c) – depth to, formation name, type and thickness of the shallowest fresh water aquifer*
   ii. *19.15.36.8.C.15 NMAC (f) – potentiometric maps for the shallowest fresh water aquifer*

3. SITE GEOLOGY AND HYDROGEOLOGY

a. 2009 Site Investigation

b. Geotechnical Evaluation

   i. *19.15.36.8.C.15 (g) NMAC – porosity, permeability, conductivity, compaction ratios, and swelling characteristics for the sediments on which the contaminated soils will be placed*

c. Site Geology

   i. *19.15.36.8.C.15 NMAC (d) – soil types beneath the proposed surface waste management facility, including a lithologic description of soil and rock members from ground surface down to the top of the shallowest fresh water aquifer*
   ii. *19.15.36.8.C.15 (e) NMAC – geologic cross sections*

d. Site Hydrogeology

   i. *19.15.36.13.A NMAC – depth to groundwater – no landfill shall be located where groundwater is less than 100 feet below the lowest elevation of the design depth at which the operator will place oil field waste*
   ii. *19.15.36.8.C.15 (c) – depth to, formation name, type and thickness of the shallowest fresh water aquifer*
   iii. *19.15.36.8.C.15 (b) NMAC – laboratory analyses, performed by an independent commercial laboratory, for major cations and anions; BTEX; RCRA metals; and TDS of groundwater samples of the shallowest fresh water aquifer beneath the proposed site*