
San Juan Power Plant
Shiprock
The Hogback
San Juan River
Morgan Lake
Four Corners Power Plant
Navajo Nation
Chaco River

Appendix B

APPENDIX B

Well Impact Studies – 2005, 2006, 2007

APPENDIX B

WELL IMPACT STUDIES

This appendix includes several water resources studies that were completed, including:

- Final Well Impact Report for the Desert Rock Energy Project, dated September 2005;
- Revision No. 1 to the Final Well Impact Report, dated October 2006, which incorporates new geologic and hydrogeologic data;
- Revision No. 2 to the Final Well Impact Report, dated February 2007, which presents revisions to the model inputs;
- Water Quality Comparison Report – A Comparison of 2006 Burnham Chapter Water Well Data to Historical Morrison Formation Water Well Data; and
- Water Quality Comparison Report – A Comparison of 2006 Sanostee Chapter Water Well Data to Historical Morrison Formation Water Well Data.

FINAL WELL IMPACT REPORT

DESERT ROCK ENERGY PROJECT
FOUR CORNERS AREA,
NEW MEXICO

SITHE GLOBAL POWER, LLC.

Prepared by
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September 23, 2005

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af/yr	cre-feet per year
b	saturated aquifer thickness
cm/sec	centimeters per second
bgs	below ground surface
ft^2	feet squared
ft/d	feet per day
ft/ft	feet per foot
ft^2/d	feet squared per day
gpd	gallons per day
gpd/ft	gallons per day per foot
gpd/ft^2	gallons per day per square foot
gpm	gallons per minute
K	hydraulic conductivity
K_h/K_v	horizontal to vertical conductivity ratio
NNDWR	Navajo Nation Department of Water Resources
NTUA	Navajo Tribe Utilities Authority
URS	URS Corporation
Sithe	Sithe Global Power, LLC.
T	Transmissivity
USGS	U.S. Geological Survey

1.0 INTRODUCTION

This report provides the results of a well impact study conducted by URS Corporation (URS) on behalf of Sithe Global Power, LLC (Sithe) for the proposed Desert Rock Energy Project power plant in Northwestern New Mexico. The Desert Rock Energy Project is a joint venture between Sithe and Diné Power Authority to develop and construct a coal-fired electric-power-generating plant and associated facilities. Sithe is a privately held, independent power company based in Houston, Texas. Diné Power Authority was established by the Navajo Nation Council to promote the Navajo Nation's development of energy resources.

The study area evaluated for this study encompasses approximately 1,420 square miles of the San Juan Basin in the northwestern portion of New Mexico south of Shiprock and Farmington (Figure 1). This well impact study is intended to estimate the availability and impact associated with the withdrawal of groundwater to meet the projected 40-year consumption demands of the Desert Rock Energy Project from a series of simulated wells constructed in the Morrison Aquifer. The average annual water consumption demand of the Desert Rock Energy Project is estimated to be 4,950 acre-feet per year (af/yr), or 3,070 gallons per minute (gpm), of continuous flow for a period of 40 consecutive years. Based on our evaluation of the hydrogeologic characteristics of the Morrison Aquifer in the study area and the results of our well impact analysis, URS estimates that ten (10) new production wells could meet this demand.

*Please note that the well locations simulated in this report are arbitrary locations based upon limited hydrologic and geologic data in the area. In addition, permitting and land ownership issue***s** *were not factored into the well locations used in our simulations. Final well locations will be determined conjunctively with personnel that may include but not be limited to: Navajo Nation and local Chapter representatives, Dine Power Authority, Sithe, URS, Bureau of Land Management, Bureau of Indian Affairs, Navajo Nation Department of Water Resources, and others as identified necessary by the Navajo Nation and other Desert Rock Energy project team members.*

2.0 STATEMENT OF PURPOSE AND SCOPE

The purpose of this study is to demonstrate that: (1) sufficient groundwater resources are physically available in the Morrison Aquifer for the proposed water uses at the Desert Rock Energy Project for the next 40 years, and; (2) withdrawal of the proposed water from the Morrison Aquifer from a newly constructed well field will not adversely impact the production capabilities of pre-existing and adjacent Navajo Nation wells constructed in the same aquifer. This report describes elements of demand, supply, and impact associated with the anticipated groundwater withdrawals.

Water demand volumes used in our well impact analysis were provided by Sithe (2005). The groundwater supply portion of this study includes an evaluation of hydrogeologic conditions to assess the local groundwater resource availability in the Morrison Aquifer. The impact portion of this study was estimated using the U.S. Geological Survey's (USGS) MODFLOW-96 (Harbaugh and McDonald 1996), which models groundwater systems in 3-dimesnions. The MODFLOW-96 code is widely accepted in the hydrogeologic professional community as a valid numerical model to simulate groundwater flow. The graphical interface Groundwater Vistas® (Rumbaugh and Rumbaugh 1996) was used to generate the drawdown impact contours included in this report. Initially, a more simplified 2-dimensional model was constructed to evaluate withdrawal impacts using the computer code THWELLS© (Van der Heijde 1992). However, due to the complexity of the Morrison Aquifer system and the limitations of the THWELLS© program in simulating such an aquifer, the impacts predicted using the more sophisticated MODFLOW-96 code made more hydrological sense and are therefore the ones presented in this impact report.

3.0 PROJECTED GROUNDWATER DEMAND

The average water demand for the Desert Rock Energy Project for the first 40 years of operation is calculated to be 4,950 af/yr (equivalent to 3,070 gpm of continuous flow) (Sithe 2005). This is the volume used in our well impact modeling analysis. Based upon the simulated location of the well field and the aquifer parameters of the Morrison Formation obtained from the hydrogeologic data reviewed, our analysis assumes this volume will require the construction of ten (10) new production wells, each producing 307 gpm.

4.0 ELEMENTS OF GROUNDWATER SUPPLY

4.1 REGIONAL HYDROGEOLOGIC CONDITIONS

The study area is located in the northwestern portion of the San Juan Basin in Northwestern New Mexico (Figure 1). The San Juan Basin lies on the eastern edge of the Colorado Plateau and extends from northwestern New Mexico into portions of northwestern Arizona along the New Mexico/Arizona border, southeastern Colorado, and the southeastern most corner of Utah. The San Juan basin is approximately 140 miles wide by 200 miles long, and covers a total area of 21,600 square miles (Dam et al. 1990) (Figure 1).

The San Juan basin is a northwest-treading asymmetrical structural depression that formed during the Laramide Orogeny (Late Cretaceous-early Tertiary) at the eastern edge of the Colorado Plateau. Structural boundaries of the basin consist of large, elongate, dormal uplifts; low, marginal platform; and abrupt monoclines (Kelley 1951). The most distinctive structural feature in the study area is the Hogback monocline (see Figure 2), which forms a sharp boundary between the marginal platforms and the central basin. The interior of the basin contains a thick sequence of sedimentary rocks from Cambrian to Tertiary in age, but primarily Pennsylvanian through Tertiary. These rocks consist primarily of stacked sequences of sandstone, siltstone, mudstone, limestone, and shale. A generalized stratigraphic sequence of the San Juan basin is included in Figure 2. These rock sequences dip from the basin margins toward the center of the basin. Older sedimentary rocks crop out around the basin margins and are successively overlain by younger sedimentary sequences toward the basin center. The maximum stratigraphic thickness of sedimentary rocks in the basin is over 14,000 feet (as recorded in an oil well) at the center of the basin east of the Hogback monocline (Fassett and Hinds 1971).

The primary source of groundwater in the San Juan Basin is derived from wells completed within surficial valley-fill deposits of Quaternary age and sandstones of Tertiary, Cretaceous, Jurassic, and Triassic age (Stone et al. 1983). Groundwater in the sandstone sequences is generally under confined conditions, resulting in an artesian flow from wells completed in these units.

4.2 LOCAL HYDROGEOLOGIC CONDITIONS

Groundwater in the study area is encountered primarily at or near land surface under artesian conditions (see Figure 3). Artesian flow from a well occurs when it penetrates an aquifer that is overlain by an impermeable or semi-impermeable unit, such as shale. Under pressure (or confined/semi-confined conditions), that water will rise to the well's *potentiometer surface* without the use of a pump. *Potentiometer surface* is defined as the surface representative of the level to which water will rise in a well cased to the aquifer (Fetter 1988). Figure 3 provides contours of the potentiometric surface of waters in the Morrison Formation for the study area.

There are three distinct geologic units that supply the majority of groundwater to existing wells completed in the study area (NNDWR 2005). With increasing depth these include: the Gallup Sandstone, the Dakota Sandstone, and the Morrison Formation. Aside from Quaternary surficial valley-fill deposits, the Morrison Formation has been identified in numerous hydrologic studies as the primary groundwater-bearing unit in the San Juan Basin (Dam et al. 1990). Within the Morrison Formation, the Westwater Canyon Member (a coarse sequence of sandstone, conglomeritic sandstone, and mudstone) is considered the most productive unit (Stone, et al., 1983) (Dam et al. 1990). According to NNDWR (2005) records, wells screened within these three geologic units produce the majority of their water from the Morrison Formation (see Figure 1 and Table 3).

A geologic cross-section extending from south to north across the simulated well field area is provided as Figure 4. The location of that cross section is depicted on Figure 1. Lithologic data provided from NNDWR (2005) was used to compile the cross section (see Table 3). A contour map depicting the approximate depth to the top of the Morrison Formation and the approximate thickness of the Morrison Formation are provided as Figures 5 and 6, respectively. Depth to top of the Morrison Formation in the simulated well field area is between 1,000 and 1,500 feet below ground surface (bgs) (Figure 5), with an estimated thickness ranging from 900 to 1,000 feet (Figure 6). Depth to the Morrison Formation near the proposed Desert Rock Project generating facility deepens steeply from west to east as it crosses the western edge of the Hogback monocline (see Figure 5). The Westwater Canyon Member in the simulated well field area is estimated to be 200 to 300 feet thick (see Figure 4 and Table 3).

The Morrison Formation was selected as the target aquifer for this well impact analysis because: (1) it has a relatively higher water-bearing potential than the overlying formations in the study area, and; (2) withdral of groundwater from the Morrison Formation will result in the least amount of drawdown to existing wells in the study area. This is because the majority of those wells derive their production from confined geologic units above the Morrison Formation (i.e., the Gallup Sandstone and the Dakota Sandstone) (see Table 3).

Recharge to the Morrison Aquifer is derived from precipitation infiltration, streamflow infiltration along outcrop areas, and from downward leakage (Dam et al 1990). As will be discussed later, our modeling analysis takes into account downward leakage from the semi-confining geologic unit above the Morrison sediments, but it does not account for recharge from precipitation or streamflow infiltration. Simulating these recharge components would require a much more rigorous and time consuming modeling effort.

4.3 EXISTING WELLS

Existing wells in the study area are presented in Figure 1 and listed in Tables 1 and 2. Wells shown include those registered with the New Mexico Office of the State Engineer (2005) (wells in red) and wells with records maintained by the Navajo Nation Department of Water Resources (NNDWR) (2005) (wells in blue). Also depicted on Figure 1 is the relative contribution of Morrison Aquifer-derived groundwater to wells completed in portions of the Morrison Formation (where data available). Well inventory tables showing construction and well use information are included as Tables 1 and 2[1].

4.4 AQUIFER CHARACTERISTICS

The transmissivity (T) of an aquifer describes its ability to transmit groundwater to a pumping well. The T value is dependent upon the hydraulic conductivity (K) and the saturated thickness (b) of the aquifer, and is defined by the relationship $T = Kb$. Transmissivity is expressed in gallons per day per foot (gpd/ft), or square feet per day (ft^2/d). Hydraulic conductivity is expressed in units of gallons per day per square foot (gpd/ft^2), or feet per day (ft/d).

The most reliable estimates of aquifer transmissivity and hydraulic conductivity are derived from well aquifer test data. In the study area however, aquifer test data is limited. In addition, much of the aquifer test data comes from wells that are screened in multiple aquifers and not exclusively the Morrison Formation. Given available test data, the transmissivity of the Morrison Formation within the study area ranges from 2 ft^2/d to 95 ft^2/d, and K values range from 0.025 to 0.39 ft/d (Stone et al. 1983; Riser et al. 1984; Dam et al 1990). A map showing the approximate distribution of transmissivity values for the Morrison Aquifer in the study area is presented in Figure 7.

To further evaluate T and K values, URS analyzed data from a step test and a 15-hour constant rate aquifer test conducted in September 2002 at the "Sanostee Wash Well." This well is screened in multiple aquifers, which produce water from the Morrison Formation, the Dakota Sandstone, and the Gallup Sandstone (NNDWR, 2005), with its primary water production coming from the Morrison Formation. This well is located just north of the Little River on the Sanostee Chapter, as shown on Figure 7. Our analysis of the recovery test data resulted in a T

[1] For ease of reference, the well identifiers on the well location map (Figure 1) match those on the well inventory tables.

value of 69 ft^2/d, and a K value of 0.345 ft/day (K=T/b) (see Figure 8) (Theis 1935). Although this well is not screened exclusively in the Morrison Formation, the calculated T and K values fall within the published values obtained from other well test data for wells constructed in the Morrison Aquifer, thus providing a useful comparison. For our modeling analysis, we assumed a more conservative value of 0.2 ft/d. This value was computed by taking the median published values from numerous aquifer tests for well completed in the Morrison Aquifer (Dam et al 1990).

As previously discussed, our modeling analysis accounts for downward leakage of the semi-confining geologic unit above the Morrison Formation. The variable required to compute downward leakage in our modeling analysis is the hydraulic conductivity (K) of the confining unit above the Morrison Formation. In the study area this is the Mancos Shale (see Figure 4). Since there are no available measured K values for the Mancos Shale, published values were relied upon. Estimates of hydraulic conductivity (K) for shale range from $2.6e\text{-}^{3}$ to $1.16e\text{-}^{10}$ centimeters per second (cm/sec), or 7.37 to $3.9e\text{-}^{7}$ ft/d (Spitz and Moreno 1996). A conservative value of $2e\text{-}^{5}$ cm/sec, or 0.0567 ft/day, was used in our modeling analysis.

As shown in Figure 6, the aquifer thickness (b) of the Morrison Formation in the study area ranges from 750 feet to just over 1,000 feet thick, and from 900 to 1,000 feet in the simulated well field area used in our modeling analysis (Stone et al. 1983; Dam et al 1990; NNDWR 2005).

4.5 WATER QUALITY

Although not a component that affects our modeling analysis, quality of groundwater produced from the Morrison Formation is of concern in regards to the intake assumptions made for design of the Desert Rock Energy Project. Due to very limited water quality data for waters produced from the Morison Formation in the study area, URS and Sithe personnel collected water quality samples from three wells screened within in the Morrison Formation on May 11, 2005. Those sampled included wells 12K-320, 12T-633, and 12T-655. Two of the three wells sampled (12T-633 and 12T-655) are domestic drinking water wells owned and operated by Navajo Tribe Utilities Authority (NTUA) and are located on the Sanostee Navajo Chapter. The third well sampled (12K-320) is a stock irrigation well owned and maintained by NTUA, located approximately 10 miles north of the Sanostee Navajo Chapter (NNDWR 2005) (see Figure 1). The analytical results from that sampling effort are summarized in Table 4. Copies of all laboratory analytical data are provided in Appendix A. Generally speaking the water sampled is of good quality. No analytes tested for were detected above Federal Primary or Secondary Drinking Water standards.

5.0 IMPACT ANALYSIS

5.1 MODEL ASSUMPTIONS

The groundwater model code selected for this study was the USGS's MODFLOW-96 (Harbaugh and McDonald 1996) with the advanced graphical interface Groundwater Vistas® (Rumbaugh and Rumbaugh 1996). The MODFLOW-96 code is widely accepted in the hydrogeologic professional community as a valid numerical model to simulate groundwater flow in three dimensions. Initially, a more simplified two-dimensional model code called THWELLS© (Van der Heijde 1992) was evaluated for this study, but due to the program's code limitations for the modeled aquifer system the results obtained from that analysis were considered less hydrologically sensible as those predicted using MODFLOW-96.

5.2 MODEL INPUT

The input parameters used in our MODFLOW-96 simulation include the following:

- A total model domain area of 144 square miles, with a total of 280 columns, 279 rows, and 78,120 model calculation cells. The model domain area was intentionally set very large to reduce the impact of the modeled boundaries on the area of interest (the well field).

- Grid spacing ranged from 100 ft^2 in the simulated well field area to 500 ft^2 elsewhere.

- Two flat model layers.

    - Layer 1 (the upper model layer) represents the Mancos Shale and represents the upper semi-confining geologic unit located stratigraphically above the Morrison Formation (see Figure 4). An average thickness of 650 feet was used for model layer 1 (see Figure 4).

    - Layer 2 (the lower model layer) represents the Morrison Formation, which is the target aquifer for this study. The Morrison Formation is located stratigraphically beneath the Mancos Shale (see Figure 4). A uniform thickness of 1,000 feet was used (see Figures 4 and 6).

- A hydraulic conductivity (K) of 0.0567 ft/day for model layer 1 (see Section 4.4). The horizontal to vertical conductivity ratio (K_h/K_v) was set conservatively at 10:1 based upon published values for shale (Spitz and Moreno 1996).

- A hydraulic conductivity (K) of 0.2 ft/day for model layer 2 (see Section 4.4). The horizontal to vertical conductivity ratio (K_h/K_v) was set conservatively at 10:1 based upon published values for sandstone (Spitz and Moreno 1996).

- A storage coefficient for both layer 1 and 2 of 0.00011(unitless). This value resents the median published values from nine wells tested in the Morrison Aquifer (Dam et al. 1990).

- A specific yield for layer 1 of 0.03 (unitless) (Spitz and Moreno 1996).

- A specific yield for layer 2 of 0.2 (unitless) (Spitz and Moreno 1996).

- A well field consisting of ten (10) equally spaced pumping wells located west of Highway 491 and south of Table Mesa, as shown on Figures 9 and 10. Wells were placed equally apart at ¼ mile spacing.

- The simulated wells are screened entirely and exclusively in model layer 2.

- Each simulated well pumps at a continuous rate of 442,080 gallons per day (gpd), or 307 gpm, for a period of 14,600 consecutive days, or 40 years. This equals the total annualized project demand of 4,950 af/yr (Sithe 2005), or 3,070 gpm.

- A uniform model layer 1 thickness of 650 feet (see Figure 4).

- A uniform model layer 2 thickness of 1,000 feet (see Figure 6).

- A specified head boundary was set along the northern and southern model boundaries according to a calculated hydraulic gradient of 0.0038 ft/ft. This value was derived using the potentiometric surface contour map compiled for the Morrison Aquifer (Figure 3)[2].

- No flow boundaries were set along the western and eastern model boundaries to simulate groundwater flow from south to north.

5.3 MODEL PREDICTIONS

Drawdown predictions following 20 years and 40 years of continuous pumping are graphically presented in Figures 9 and 10, respectively. Based upon the input assumptions presented in

[2] Regional groundwater declines in the Morrison aquifer were not factored into the specified head boundaries due to insufficient water level data in the study area.

Section 5.2, the maximum cumulative 20-year and 40-year impact resulting from the annual projected withdrawal of 4,950 af/yr, or 3,070 gpm, is predicted to be approximately 800 feet and 1,000 feet, respectively. The maximum drawdown predicted occurs at the center of the simulated pumping wells and decreases with distance from the well centers. *Note: Assuming the potentiometric surface of waters in the Morrison formation is roughly equivalent to the land surface elevation (see Figure 3), the model predicted drawdown presented in Figures 9 and 10 represents the decline in the potentiometric surface relative from land surface.*

The wells with predicted drawdown impacts equal to or greater than 50 feet after 20 years of continuous pumping include wells 12T-646 and 12K-320 (see Figure 9). The predicted potentiometric surface decline at these two wells is approximately 50 feet and 350 feet, respectively. The wells with predicted drawdown impacts equal to or greater than 50 feet after 40 years of continuous pumping include wells 12T-654, 12T-646, and 12K-320 (see Figure 10). The predicted potentiometric surface decline at these three wells is approximately 75, 90, and 450 feet. According to NNDWR (2005) records, well 12K-320 derives it production from the Dakota Sandstone and the Morrison Formation, with its primary production coming from the later (see Figure 1 and Table 3). Therefore, the predicted impact from our modeling analysis over simulates impact on the potentiometric surface at this well. Records on water production volumes relative to geologic formations were not available for wells 12T-654 and 12T-646. Assuming all water production from these two wells is derived from the Morrison Formation, the model predicted drawdown represents a worst-case scenario in terms of potentiometric surface impacts, based on the limited data available for this analysis.

6.0 CONCLUSIONS

Given the assumptions presented herein, our modeling analysis indicates that sufficient local groundwater resources are available from the Morrison Aquifer (at the modeled location) to meet the projected withdrawal demands of 4,950 af/yr, or 3,069 gpm, for the proposed Desert Rock Energy Project for the next 40 years. Our MODFLOW-96 analysis predicts that three existing wells could experience more than 50 feet of potentiometric surface declines after 40 years of pumping from the simulated well field. The wells with over 50 feet of predicted potentiometric surface declines include wells 12T-654, 12T-646, and 12K-320. The well with most predicted impact is stock irrigation well 12K-320, which is an artesian flowing well used to water livestock in the area (NNDWR 2005). Because well 12K-320 reportedly derives most of its water from the Morrison Formation (see Figure 1 and Table 3), it is possible that the anticipated withdrawals for the Desert Rock Energy Project will cause this well to stop flowing at the surface. The effect on the other two wells is uncertain because it is not know which aquifer(s) these wells derive their water from (see Figure 1 and Table 3).

It should be noted that very conservative aquifer parameters were used in our modeling analysis, thus representing what we believe should represent a worst-case scenario. In addition, very limited aquifer test data were available from wells screened exclusively and entirely in the Morrison Aquifer for the study area and in particular the area of the simulated well field. Also, the modeling analysis does not account for recharge from precipitation infiltration or streamflow infiltration along outcrop areas, therefore the modeled potentiometric surface declines may be over-predicted.

7.0 RECOMMENDATIONS

Based upon the results of this well impact study, URS makes the following recommendations:

1. Due to the limited aquifer test data from wells screened solely in the Morrison Aquifer in the vicinity of the simulated well field area, Sithe should consider drilling and constructing one large diameter production well and at a minimum, one adjacent smaller diameter monitor well. Testing would include evaluating local lithology (drill cuttings and geophysical logging) to identify the most productive zones (i.e., secondary flow from fracture zones), long-term aquifer production potentials (from aquifer testing data), and zonal water quality of varying formations (from zonal sampling).

2. The test data obtained from the drilling and testing of the new production well and monitor well should be used to refine the modeling analysis. In addition to modifying aquifer parameters, wells may be added, removed, repositioned, or modified (i.e., pump rates, screen interval, etc.) in the model. Predictions from the revised model would be more indicative of potentiometric surface drawdown of the Morrison Aquifer than the currently modeling analysis suggests.

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FIGURES

SITHE GLOBAL POWER, LLC - DESERT ROCK ENERGY PROJECT

Figure 1

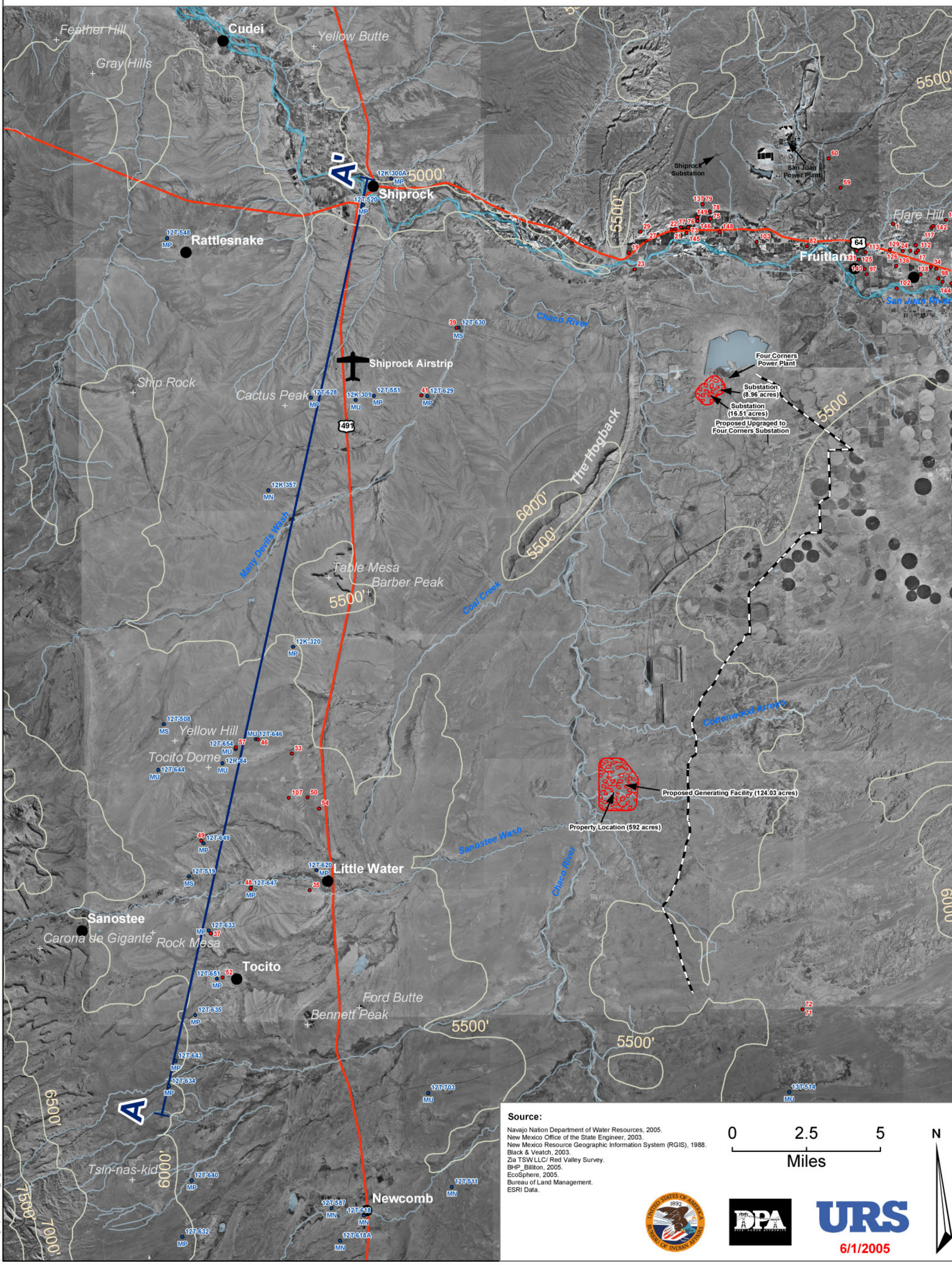
Site Reference and Well Location Map

Legend

- Rivers/Streams
- Roads
- Elevation Contours
  Contour Interval = 500 feet
- A A' Cross Section A-A'

Well Locations

- 33 New Mexico Office of the State Engineer Registered Well Location
- 12K-320 Navajo Nation Department of Water Resources Registered Well Location
- MP Indicates well produces primary volume of groundwater from the Morrison Formation
- MS Indicates well produces secondary volume of groundwater from the Morrison Formation
- MN Indicates well produces no significant volume of groundwater from the Morrison Formation
- MU Indicates well produces unknown volume of groundwater from the Morrison Formation



Source:

Navajo Nation Department of Water Resources, 2005.
New Mexico Office of the State Engineer, 2003.
New Mexico Resource Geographic Information System (RGIS), 1988.
Black & Veatch, 2003.
Zia TSW LLC/ Red Valley Survey.
BHP_Billiton, 2005.
EcoSphere, 2005.
Bureau of Land Management.
ESRI Data.

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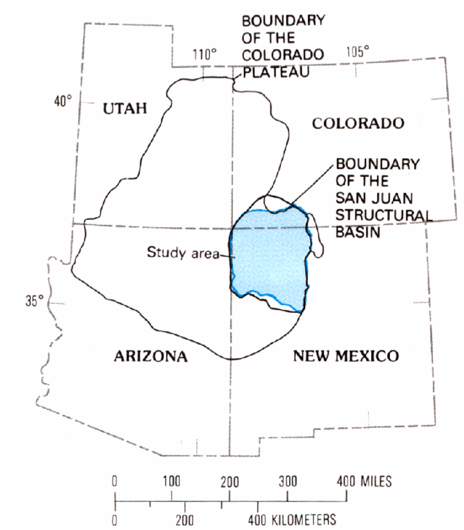
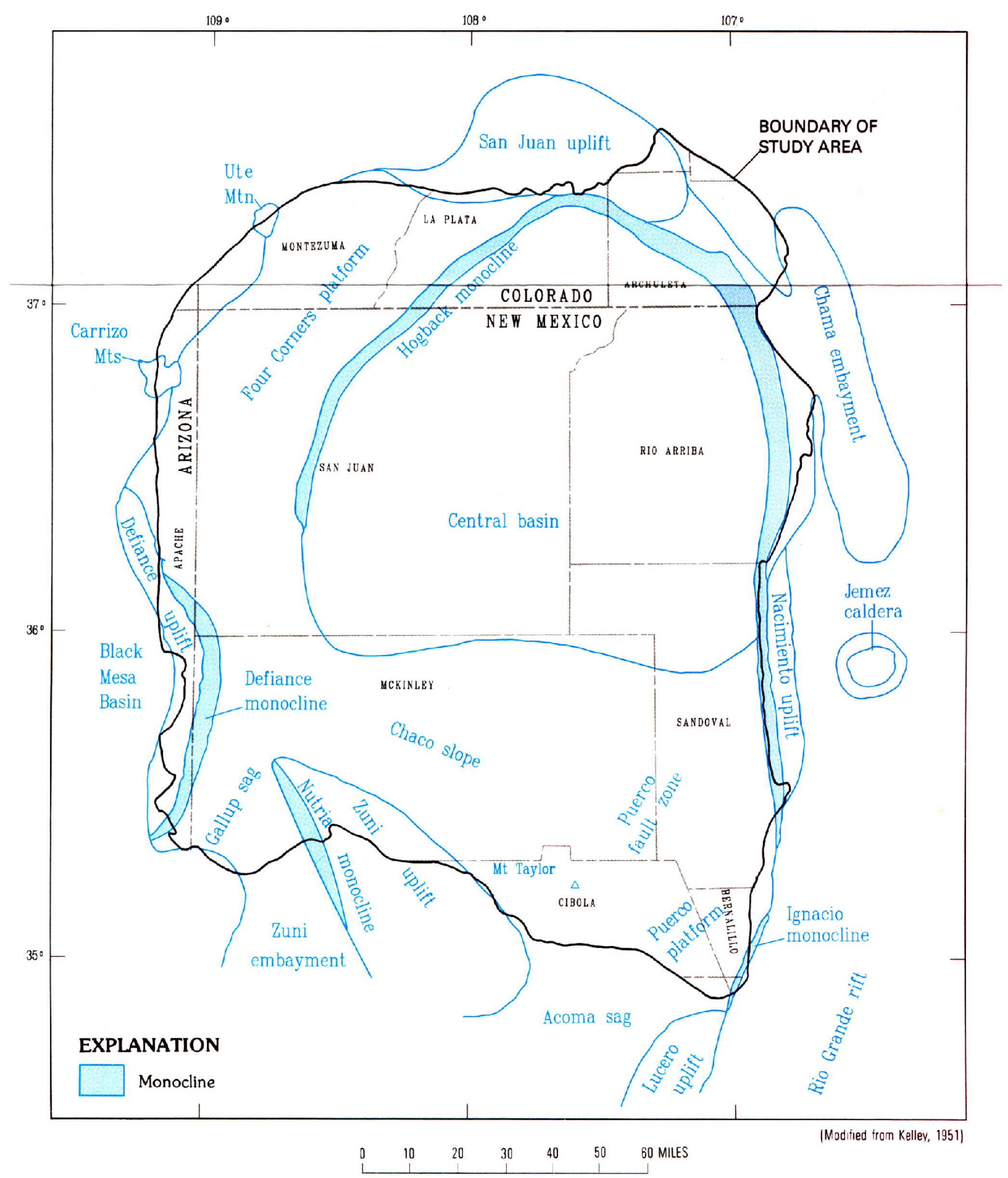
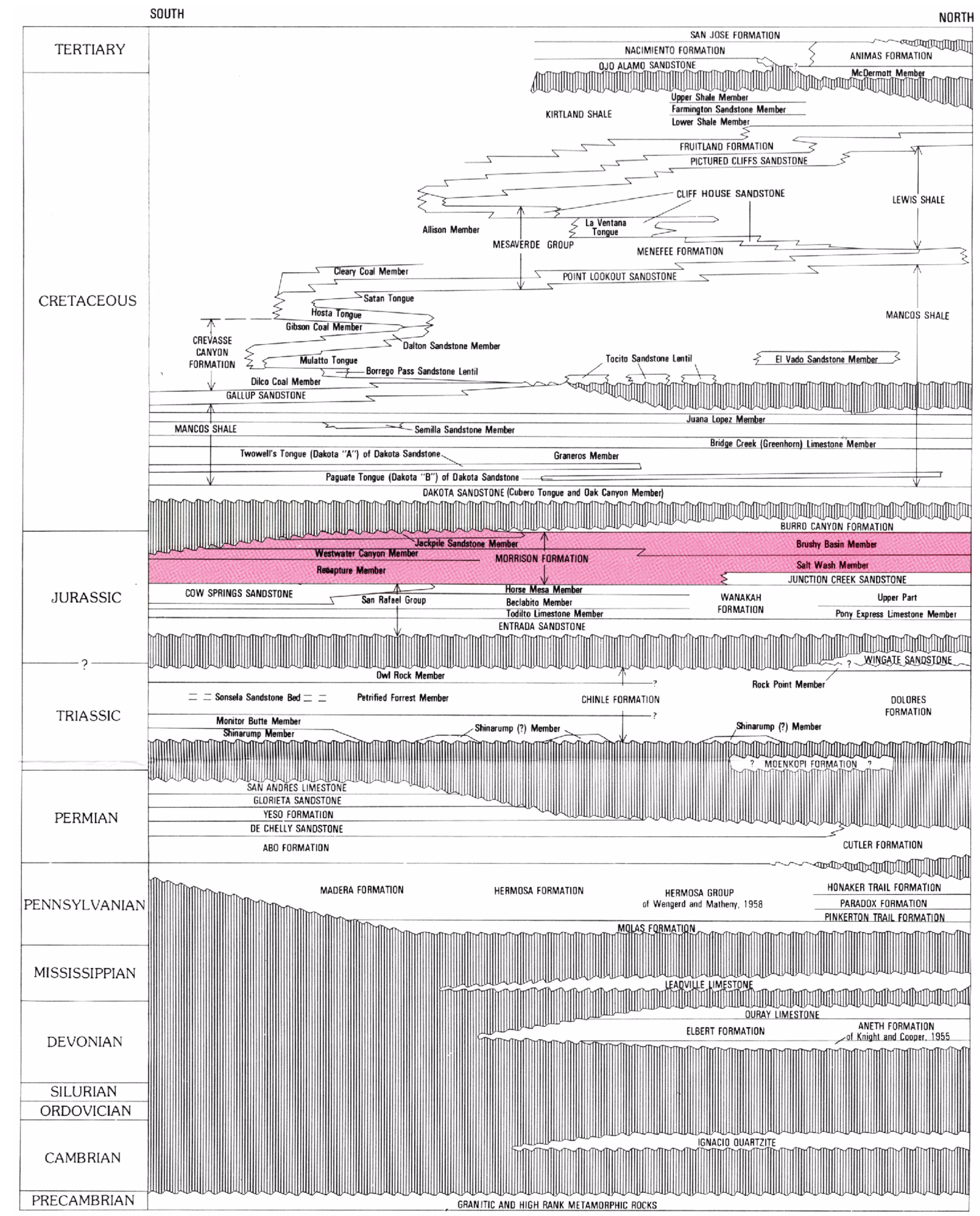
SITHE GLOBAL POWER, LLC - DESERT ROCK ENERGY PROJECT







Time- and rock-stratigraphic framework and nomenclature.

Source:
USGS, 1990.
Dam et. al.

Regional Stratigraphy and Major Structural Features of the San Juan Basin

Figure 2

N

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SITHE GLOBAL POWER, LLC - DESERT ROCK ENERGY PROJECT

Legend

Rivers/Streams

Roads

Elevation Contours
Contour Interval = 500 feet

5500 Line of equal altitude of Potentiometric surface in the Morrison Formation in feet amsl (dashed where infered)

Well Locations

33 New Mexico Office of the State Engineer Registered Well Location

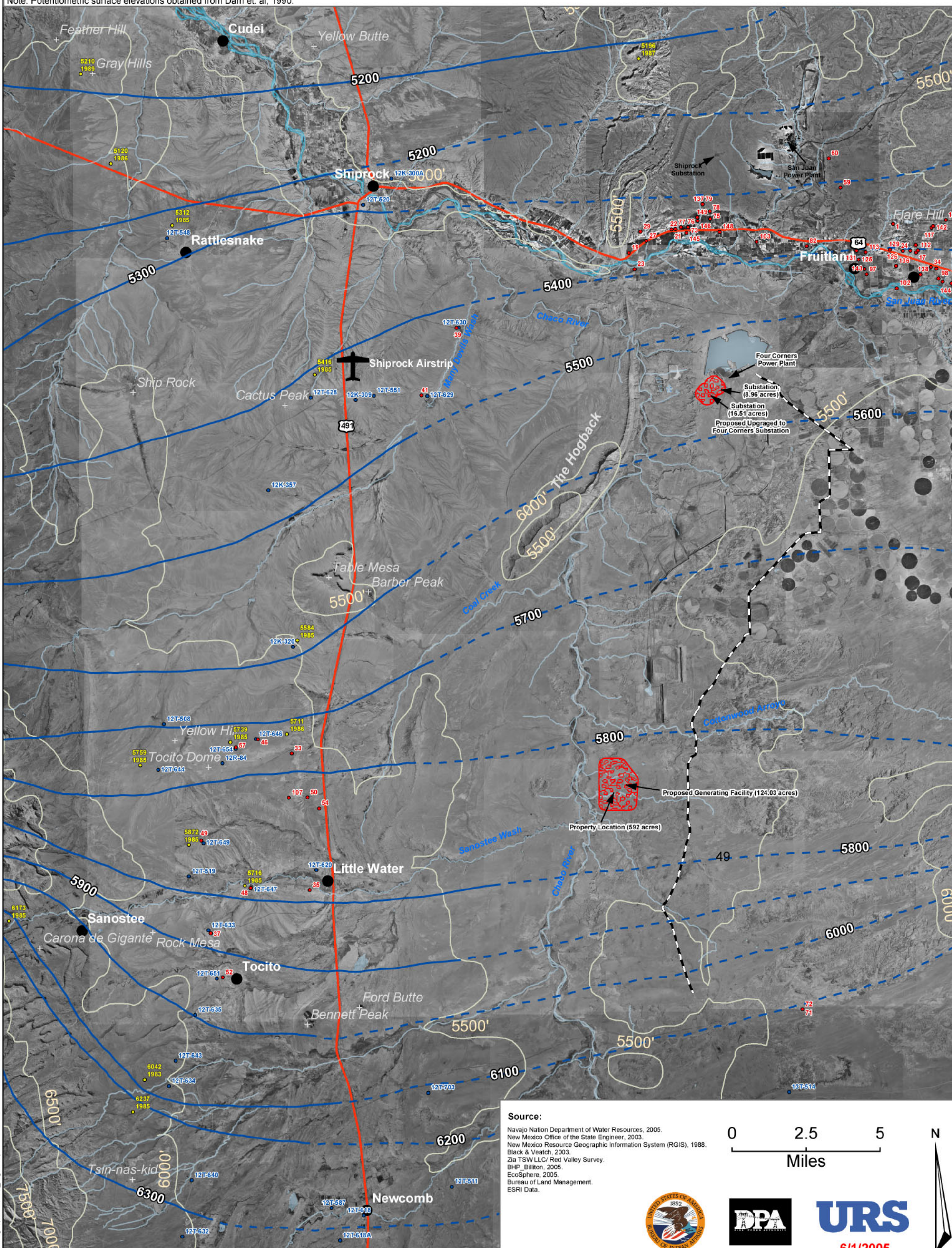
12K-320 Navajo Nation Department of Water Resources Registered Well Location

5716 (1985) Elevation of Potentiometric surface (feet amsl) (year data collected)

Figure 3

Approximate Attitude of Potentiometric Surface of Waters in the Morrison Formation

Note: Potentiometric surface elevations obtained from Dam et. al, 1990.



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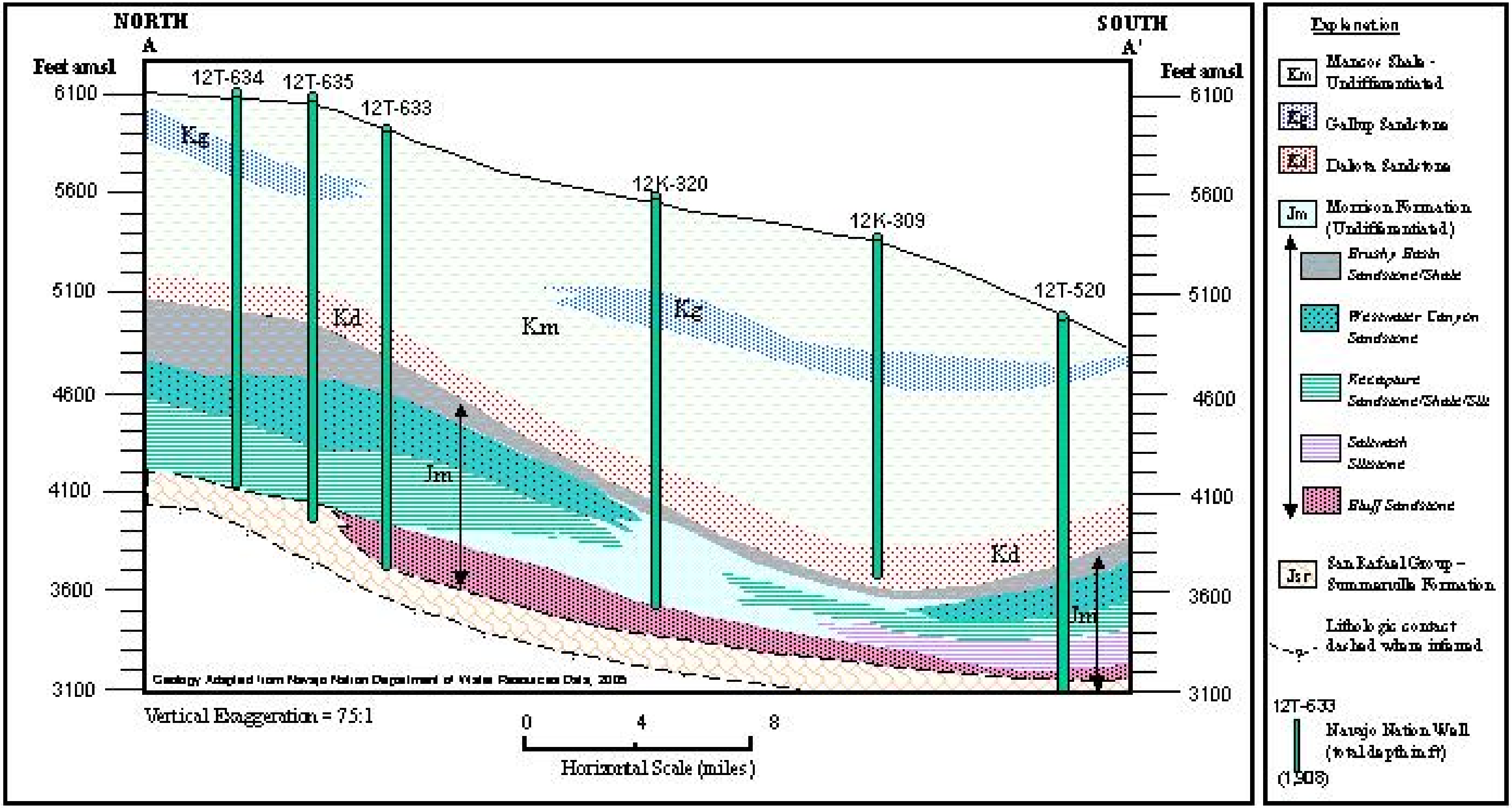


Cross Section A-A'. A north-south transect adjacent to Highway 491, San Juan River Basin, NW New Mexico

Figure 4

Generalized Geologic Cross Section A-A'
Desert Rock Energy Project
Well Impact Study
New Mexico

URS

SITHE GLOBAL POWER, LLC - DESERT ROCK ENERGY PROJECT

Figure 5

Approximate Depth to Top of Morrison Formation

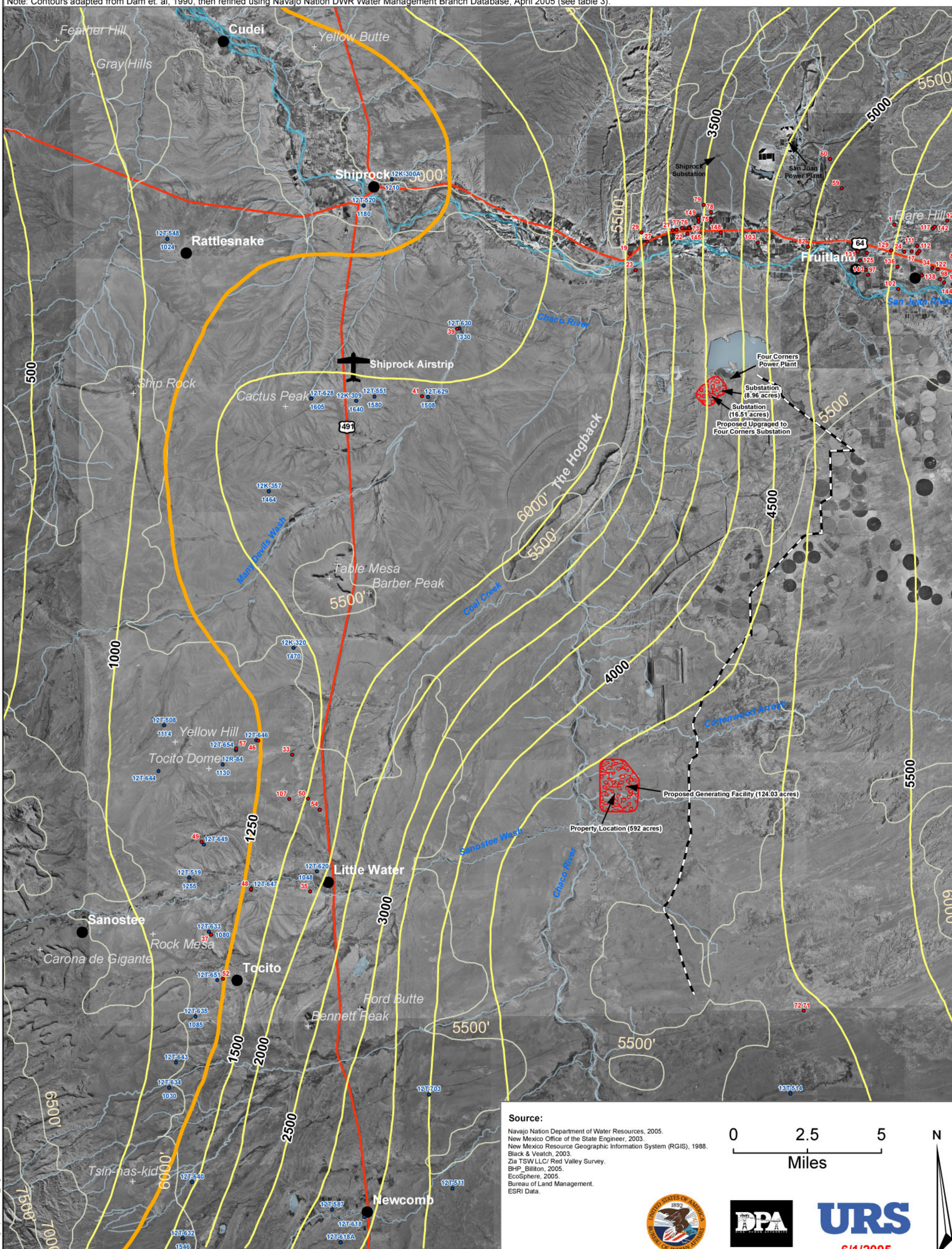
Legend

- Rivers/Streams
- Roads
- Elevation Contours
  Contour Interval = 500 feet
- 2000 — Line of approximate equal depth to top of Morrison Formation (feet bgs)
  Contour Interval = 500 feet
- 1250 — Additional contour line showing approximate depth to top of Morrison Formation (feet bgs) across simulated well field area

Well Locations

- 33 — New Mexico Office of the State Engineer Registered Well Location
- 12K-320 / 1470 — Navajo Nation Department of Water Resources Registered Well Location showing depth to top of Morrison Formation in feet bgs

Note: Contours adapted from Dam et. al, 1990, then refined using Navajo Nation DWR Water Management Branch Database, April 2005 (see table 3).



Source:

Navajo Nation Department of Water Resources, 2005.
New Mexico Office of the State Engineer, 2003.
New Mexico Resource Geographic Information System (RGIS), 1988.
Black & Veatch, 2003.
Zia TSW LLC/ Red Valley Survey.
BHP_Billiton, 2005.
EcoSphere, 2005.
Bureau of Land Management.
ESRI Data.

URS

6/1/2005

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Figure 6
Approximate Thickness of the Morrison Formation

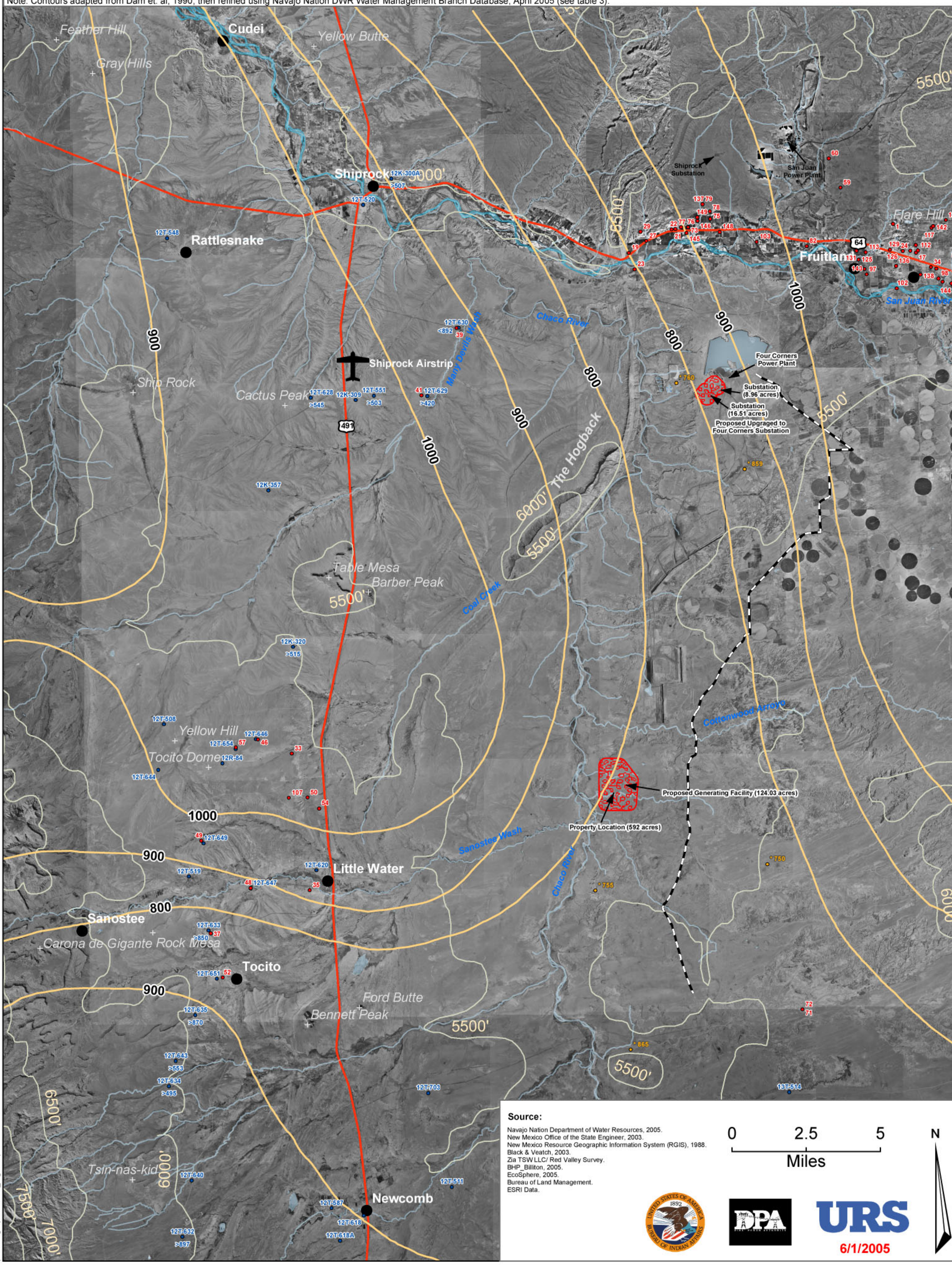
Legend

- Rivers/Streams
- Roads
- Elevation Contours
  Contour Interval = 500 feet
- 1000 Line of equal approximate thickness of the Morrison Formation in feet.
  Contour Interval = 100 feet

Registered Well Locations

- 33 New Mexico Office of the State Engineer Registered Well Location
- 12K-320 >850 Navajo Nation Department of Water Resources Registered Well Location showing thickness of Morrison Formation in feet
- 760 Well from Stone et. al., 1983 showing thickness of Morrison Formation in feet

Note: Contours adapted from Dam et. al, 1990, then refined using Navajo Nation DWR Water Management Branch Database, April 2005 (see table 3).



Source:
Navajo Nation Department of Water Resources, 2005.
New Mexico Office of the State Engineer, 2003.
New Mexico Resource Geographic Information System (RGIS), 1988.
Black & Veatch, 2003.
Zia TSW LLC/ Red Valley Survey.
BHP_Billiton, 2005.
EcoSphere, 2005.
Bureau of Land Management.
ESRI Data.

URS
6/1/2005

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SITHE GLOBAL POWER, LLC - DESERT ROCK ENERGY PROJECT

Figure 7
Approximate Transmissivity Array of Wells Constructed in the Morrison Formation

Legend

- Rivers/Streams
- Roads
- Elevation Contours
  Contour Interval = 500 feet
- Approximate boundary between transmissivity zones (dashed where infered)

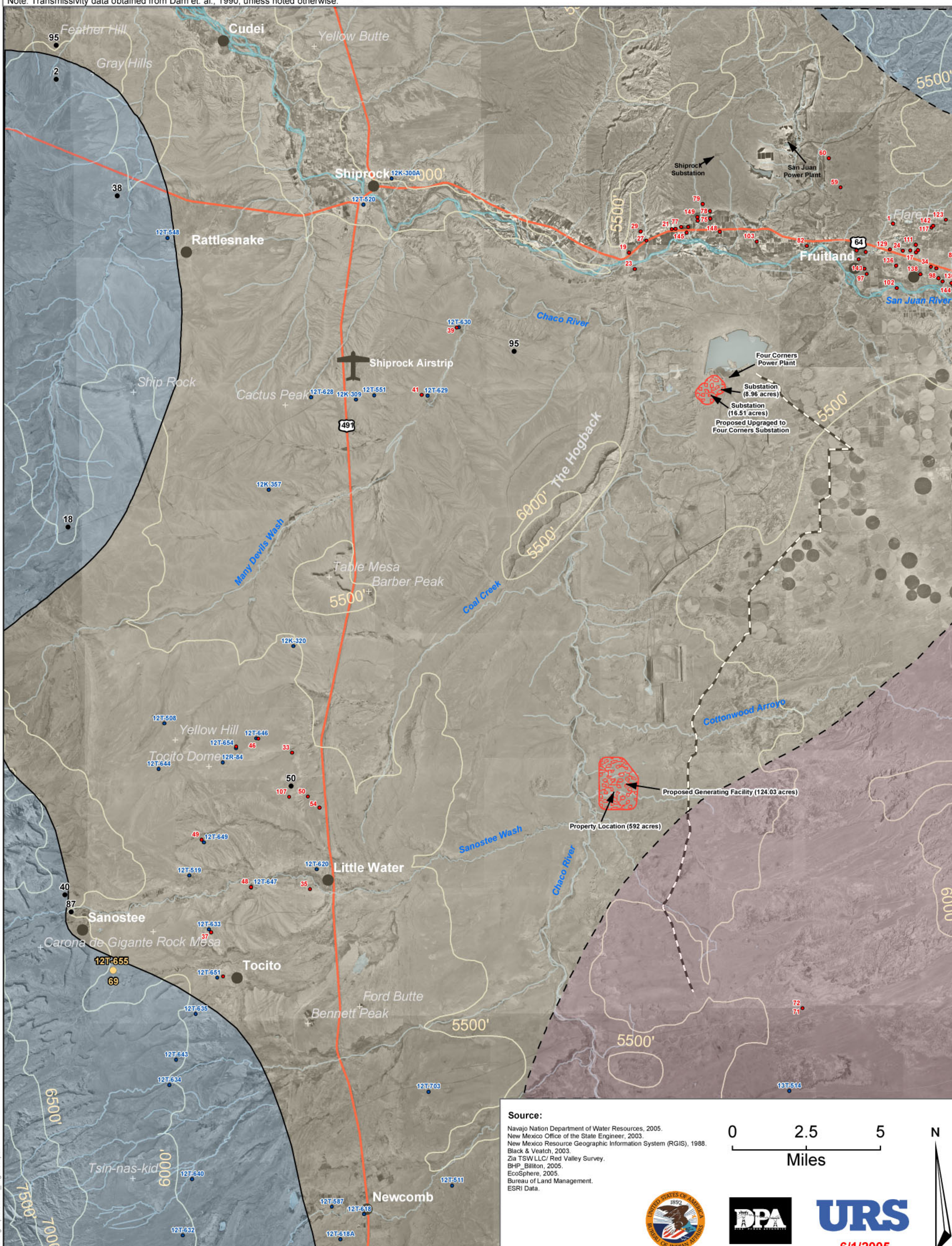
Well Locations

- 33 — New Mexico Office of the State Engineer Registered Well Location
- 12K-320 — Navajo Nation Department of Water Resources Registered Well Location
- 40 — Well showing transmissivity value in ft^2/day
- 12T-655 / 69 — Sanostee Wash Well showing calculated transmissivity value in ft^2/day from aquifer test conducted in September 2002.

Transmissivity in ft^2/day

- < 50
- 50-100
- 100-150

Note: Transmissivity data obtained from Dam et. al., 1990, unless noted otherwise.



Source:

Navajo Nation Department of Water Resources, 2005.
New Mexico Office of the State Engineer, 2003.
New Mexico Resource Geographic Information System (RGIS), 1988.
Black & Veatch, 2003.
Zia TSW LLC/ Red Valley Survey.
BHP_Billiton, 2005.
EcoSphere, 2005.
Bureau of Land Management.
ESRI Data.

0 2.5 5
Miles

N

URS

6/1/2005

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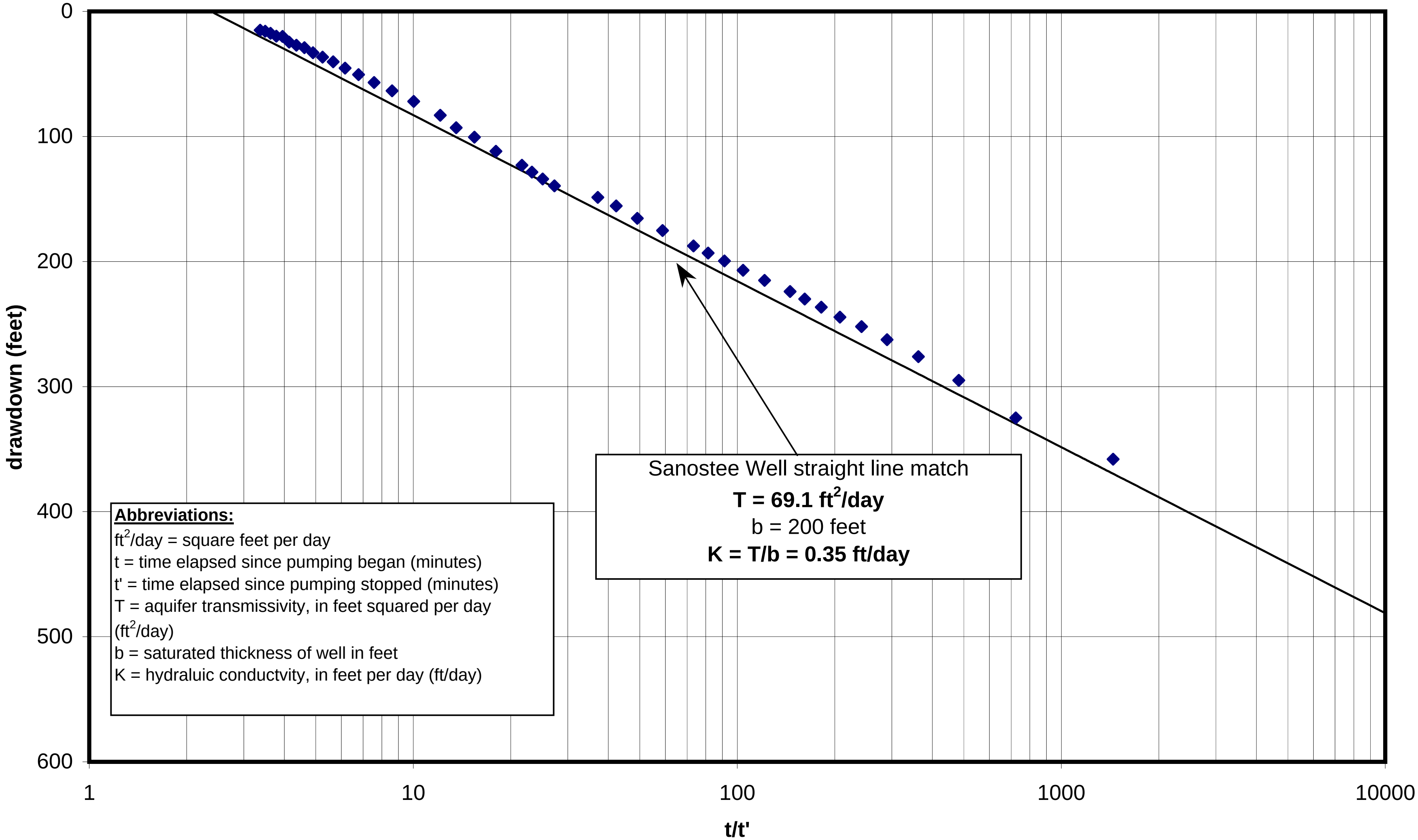
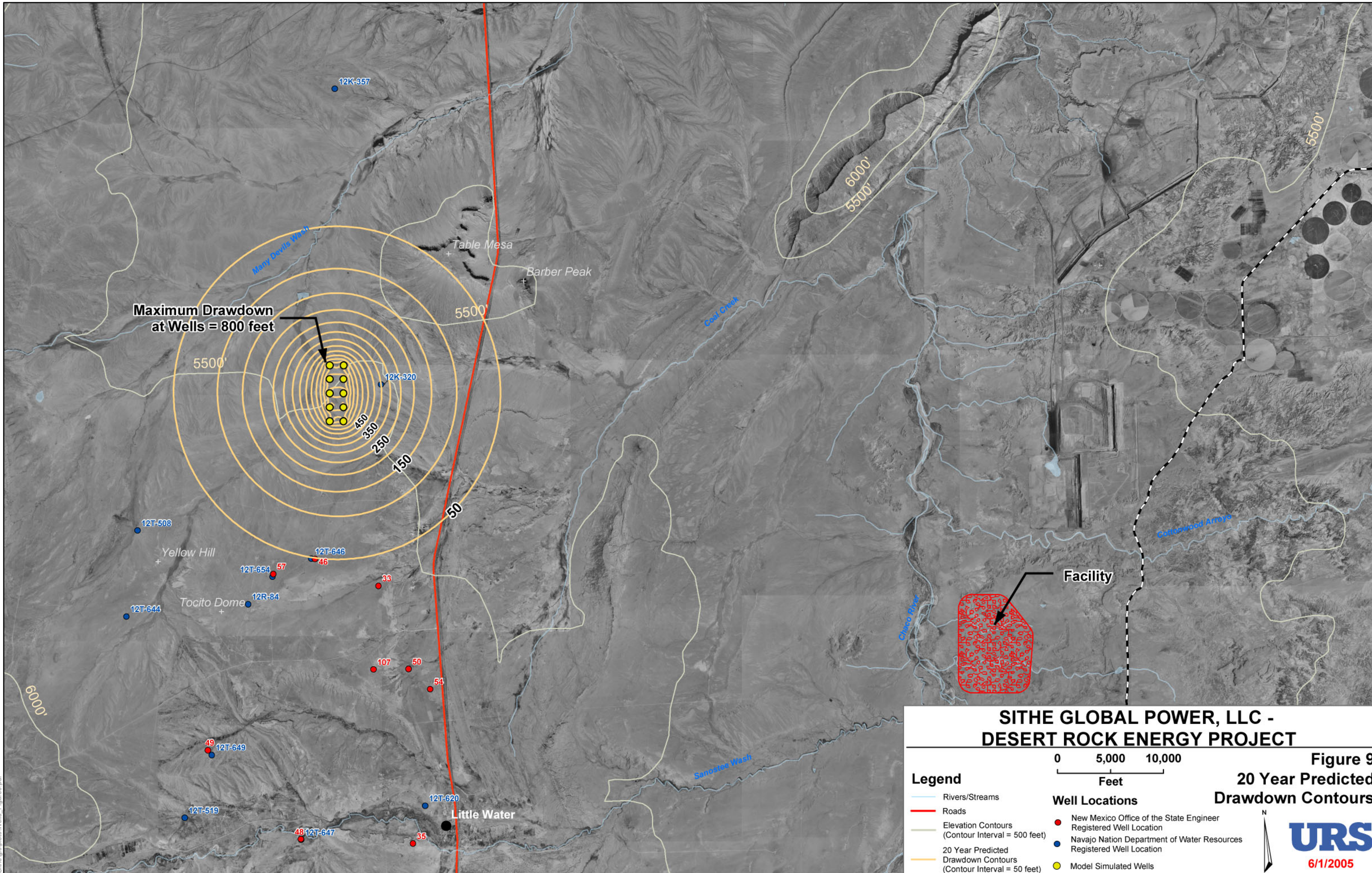
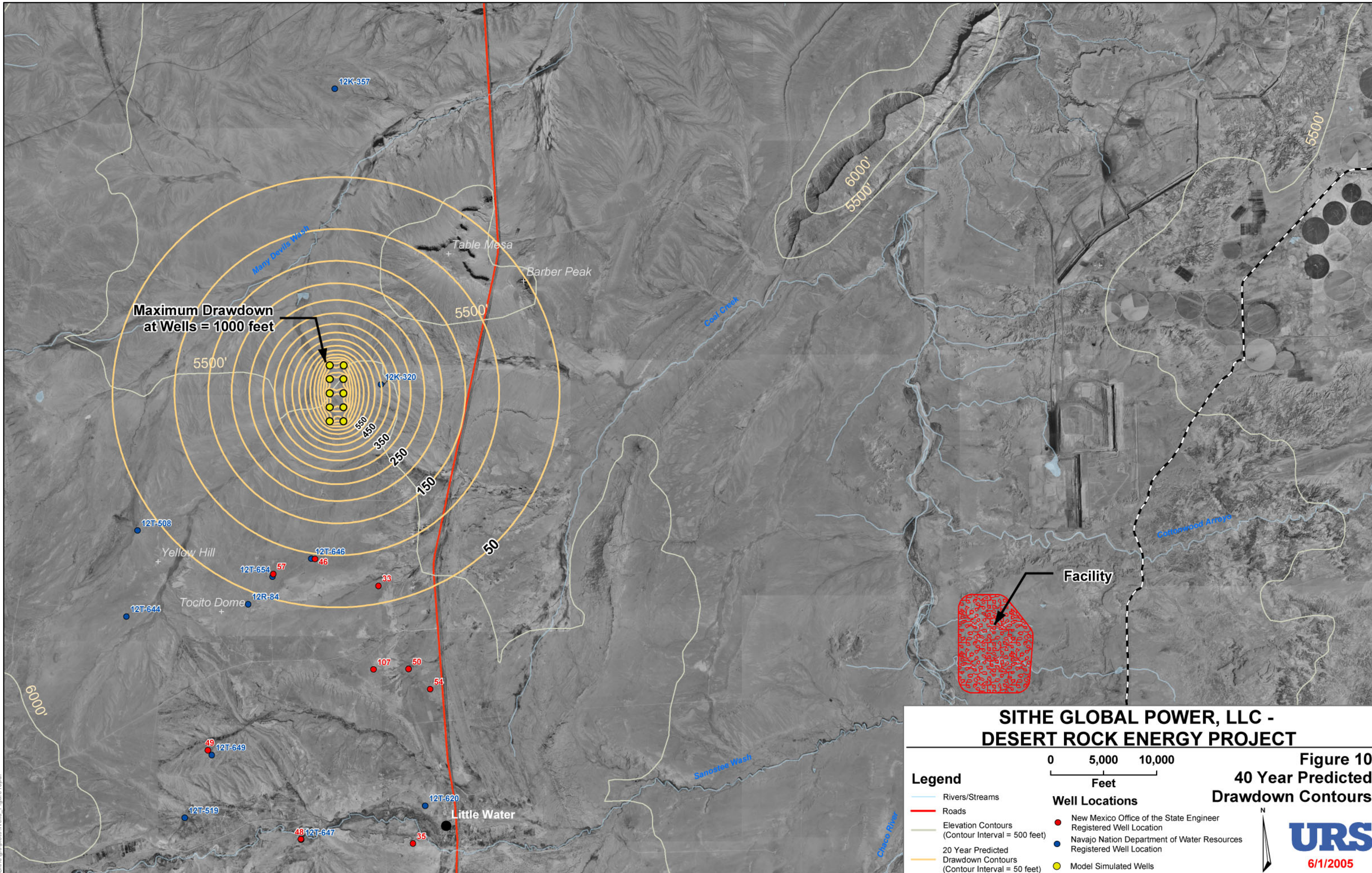


Figure 8
Theis (1935) Residual Drawdown Solution for 15-Hour Recovery Test Data Sanostee Wash Well
September 17-18, 2002
Desert Rock Energy Project New Mexico


SITHE GLOBAL POWER, LLC -
DESERT ROCK ENERGY PROJECT
Figure 9
20 Year Predicted
Drawdown Contours
0
5,000
10,000
Feet
Legend
Rivers/Streams
Roads
Elevation Contours
(Contour Interval = 500 feet)
20 Year Predicted
Drawdown Contours
(Contour Interval = 50 feet)
Well Locations
New Mexico Office of the State Engineer
Registered Well Location
Navajo Nation Department of Water Resources
Registered Well Location
Model Simulated Wells
N
URS
6/1/2005
Maximum Drawdown
at Wells = 800 feet
Facility
Table Mesa
Barber Peak
Yellow Hill
Tocito Dome
Little Water
Many Devils Wash
Coal Creek
Chaco River
Cottonwood Arroyo
Sanostee Wash
5500'
6000'
450
350
250
150
50
12K-357
12K-320
12T-508
12T-646
12T-654
12R-84
12T-644
12T-649
12T-519
12T-620
12T-647
57
46
33
107
50
54
49
48
35


SITHE GLOBAL POWER, LLC -
DESERT ROCK ENERGY PROJECT
Figure 10
40 Year Predicted
Drawdown Contours
Legend
Rivers/Streams
Roads
Elevation Contours
(Contour Interval = 500 feet)
20 Year Predicted
Drawdown Contours
(Contour Interval = 50 feet)
0
5,000
10,000
Feet
Well Locations
New Mexico Office of the State Engineer
Registered Well Location
Navajo Nation Department of Water Resources
Registered Well Location
Model Simulated Wells
N
URS
6/1/2005
Maximum Drawdown
at Wells = 1000 feet
Facility
Table Mesa
Barber Peak
Yellow Hill
Tocito Dome
Little Water
Many Devils Wash
Coal Creek
Cottonwood Arroyo
Sanostee Wash
Chaco River
5500'
6000'
550
450
350
250
150
50
12K-357
12K-320
12T-508
12T-646
12T-654
12R-84
12T-644
12T-649
12T-620
12T-519
12T-647
57
46
33
107
50
54
49
48
35

TABLES

Table 1
Well Inventory - Navajo Nation Department of Water Resources
Desert Rock Energy Project
New Mexico

MAP WELL NO.	WELL ID	OPERATOR	USE	FINISH DATE	TOTAL WELL DEPTH (feet)	DEPTH TO WATER (feet bgs)	CASING DIAMETER 1 (inches)	DEPTH (ft bgs)	CASING DIAMETER 2 (inches)	DEPTH (ft bgs)	CASING DIAMETER 3 (inches)	DEPTH (ft bgs)	CASING DIAMETER 4 (inches)	DEPTH (ft bgs)	DEPTH INTERVAL (ft bgs)	WELL CASING	DEPTH INTERVAL (ft bgs)	WELL CASING	DEPTH INTERVAL (ft bgs)	WELL CASING	DEPTH INTERVAL (ft bgs)	WELL CASING	DEPTH INTERVAL (ft bgs)	WELL CASING
12K-300A	12K-300A	UNKNOWN	UNK	Sep-28	2170	N/A	12.50	0-92	10.00	0-503	8.25	0-1270	6.63	0-1693	1492-1529	Screen	1574-1668	Screen	1693-1717	Blank				
12K-309	12K-309	UNKNOWN	UNK	Sep-40	1640	N/A	8.25	0-40	7.00	40-829	5.00	829-1456	4.00	1456-1570	1570-1640	Blank								
12K-320	12K-320	TRIBE O&M	DOM	Aug-60	1992	ART	10.00	0-826	8.62	826-1340	6.62	1332-1400	6.62	1349-1800	1745-1992	Screen								
12K-357	12K-357	TRIBE O&M	LIV	Jul-57	1464	ART	9.63	0-909	13.75	0-60.5					909-1464	Blank								
12R-84	12R-84	TRIBE O&M	DOM	N/A	1430	75	2.00	N/A	8.00	0-1136					1136-1430	Blank								
12T-508	12T-508	TRIBE O&M	DOM	Jul-59	1172	ART	8.63	0-950	10.00	0-212					950-1172	Blank								
12T-511	12T-511	UNKNOWN	LIV	Oct-59	4274	ART	4.50	0-2000							773-779	Screen	903-909	Screen	1680-1686	Screen	1699-1711	Screen	1781-1799	Screen
12T-519	12T-519	TRIBE O&M	LIV	Oct-60	1287	N/A	8.62	0-271	7.50	270-1035					1035-1287	Blank								
12T-520	12T-520	TRIBE O&M	DOM	Feb-61	1850	ART	16.00	0-46	12.00	0-530	9.62	0-1339	7.00	844-1482	1482-1777	Blank								
12T-548	12T-548	TRIBE O&M	LIV	Mar-27	2013	ART	6.62	0-1062	5.19	1062-1733					1733-2013	Blank								
12T-551	12T-551	TRIBE O&M	LIV	Jul-63	7833	ART	9.62	0-1637							1637-1950	Blank								
12T-587	12T-587	NTUA	DOM	Feb-67	1140	N/A	8.62	0-1140							782-821	Screen	840-850	Screen	900-940	Screen	1080-1090	Screen	1114-1128	Screen
12T-618	12T-618	NTUA	DOM	May-05	1440	N/A	8.62	N/A																
12T-618A	12T-618A	TRIBE O&M	LIV	Jan-81	1447	ART	16.00	0-67	12.62	0-742	8.62	790-1447			720-740	Screen	800-940	Screen	1040-1060	Screen	1180-1210	Screen	1250-1320	Screen
12T-620	12T-620	TRIBE O&M	LIV	Sep-77	2034	ART	2.38	0-1200							1200-2034	Blank								
12T-628	12T-628	TRIBE O&M	DOM	Dec-78	2597	ART	8.62	0-109	2.38	109-1827					1827-2597	Blank								
12T-629	12T-629	TRIBE O&M	LIV	Nov-77	2520	ART	2.38	0-1764							1764-2511	Blank								
12T-630	12T-630	TRIBE O&M	LIV	Nov-77	2300	ART	2.38	0-1512							1512-2300	Blank								
12T-632	12T-632	TRIBE O&M	LIV	Oct-77	2518	ART	6.63	0-200	2.00	0-1750					1743-2518	Blank								
12T-633	12T-633	NTUA	MUN	Oct-77	2125	ART	2.38	0-1512	6.62	0-17					1512-2125	Blank								
12T-634	12T-634	TRIBE O&M	DOM	Nov-77	1908	ART	6.62	0-200	2.37	0-1407					1407-1908	Blank								
12T-635	12T-635	TRIBE O&M	LIV	Oct-77	2108	N/A	6.62	0-35	2.37	35-1176					1176-2108	Blank								
12T-640	12T-640	TRIBE O&M	LIV	Dec-77	2349	N/A	2.00	0-1491	6.25	0-120					1491-2349	Blank								
12T-643	12T-643	TRIBE O&M	DOM	Jul-78	1632	N/A	2.37	0-1323	6.60	2-101					1323-1632	Blank								
12T-644	12T-644	TRIBE O&M	LIV	Jul-78	1912	0	2.00	0-1386							1386-1912	Blank								
12T-646	12T-646	TRIBE O&M	UNK	Jul-78	1748	N/A	2.38	0-1281	6.62	0-79					1281-1748	Blank								
12T-647	12T-647	TRIBE O&M	LIV	Aug-78	1912	46	2.37	0-1407	6.88	0-85					1407-1912	Blank								
12T-649	12T-649	TRIBE O&M	LIV	Aug-78	2047	N/A	2.75	0-1595	6.62	0-96					1575-2047	Blank								
12T-651	12T-651	TRIBE O&M	LIV	Aug-78	1691	N/A	6.62	0-96	2.37	96-1281					1281-1691	Blank								
12T-654	12T-654	TRIBE O&M	UNK	Sep-78	1656	0	2.38	0-1302	6.63	0-92					1302-1656	Blank								
12T-703	12T-703	TRIBE O&M	LIV	N/A	1940	N/A	N/A	0-1940							180-460	Screen	830-940	Screen	1140-1400	Screen	1520-1940	Screen		
13K-207	13K-207	TRIBE O&M	LIV	Sep-52	1165	429	6.00	0-885							885-1120	Blank								
13P-522	13P-522	TRIBE O&M	DOM	Aug-73	5250	N/A	20.00	0-100	5.50	0-5000					5000-5250	Blank								
13T-514	13T-514	TRIBE O&M	DOM	Oct-68	1368	263	6.62	0-1337	10.75	0-42					450-460	Screen	484-498	Screen	660-666	Screen	1040-1042	Screen	1337-1368	Blank
BRNHM WSW1	BRNHM WSW1	EPNG	LIV	Aug-73	5250	702	20.00	0-100	5.50	0-5000					5000-5250	Blank								

Data Source: Navajo Nation Department of Water Resource, Water Management Branch Well Database-April 2005

Abbreviations:
ART = Artesian (flow encountered above ground surface)
ft bgs = feet below ground surface
N/A = Not Available

Use Codes:
DOM Domestic
LIV Livestock
MUN Municipal

Table 2
Well Inventory - New Mexico Office of the State Engineer
Desert Rock Energy Project
New Mexico

MAP WELL NO.	WELL ID	OPERATOR	USE	TWS	RNG	SEC	Q	Q2	Q3	FINISH DATE	TOTAL WELL DEPTH (ft bgs)	DEPTH TO WATER (ft bgs)
1	SJ 00027	N/A	NOT	29N	15W	1	1	2	3	10/17/1950	1005	ART
17	SJ 00226	N/A	DOM	29N	14W	7	1	1	3	5/20/1977	100	50
19	SJ 00248	N/A	DOM	29N	16W	4	3	4	3	4/23/1977	35	10
21	SJ 00257	N/A	DOM	29N	16W	3	2	2	3	4/25/1978	32	20
22	SJ 00258	N/A	SAN	29N	16W	3	2	2	4	4/26/1978	34	20
23	SJ 00264	N/A	STK	29N	16W	9	0	0		5/2/1977	35	10
24	SJ 00291	N/A	DOM	29N	15W	12	2	1		8/11/1977	0	110
27	SJ 00357	N/A	DOM	29N	16W	4	4	2	2	6/22/1977	45	29
29	SJ 00373	N/A	DOM	29N	16W	4	2	0		6/25/1977	55	30
30	SJ 00376	N/A	DOM	29N	14W	8	4	4	4	8/19/1977	80	50
31	SJ 00417	N/A	DOM	29N	14W	17	2	3	1	8/4/1977	38	7
32	SJ 00418	N/A	DOM	29N	14W	17	2	3	1	8/11/1977	35	7
33	SJ 00437	N/A	DOM	26N	18W	10	2	1	1	8/18/1977	2063	ART
34	SJ 00451	N/A	DOM	29N	14W	7	4	1	3	9/7/1977	39	24
35	SJ 00465	N/A	DOM	26N	18W	35	3	1	3	9/8/1977	2034	ART
37	SJ 00477	N/A	STK	25N	18W	7	2	1	2	9/16/1977	2125	ART
39	SJ 00521	N/A	STK	29N	17W	21	1	4	2	11/2/1977	2300	ART
41	SJ 00522	N/A	STK	29N	17W	23	3	1	2	11/3/1977	2520	ART
46	SJ 00754	N/A	STK	26N	18W	4	3	2	2	7/26/1978	1748	ART
48	SJ 00778	N/A	STK	26N	18W	33	3	1	1	8/3/1978	1912	ART
49	SJ 00780	N/A	STK	26N	18W	19	3	4	4	8/3/1978	2047	ART
50	SJ 00781	N/A	STK	26N	18W	14	3	1	1	8/7/1978	1728	ART
52	SJ 00782	N/A	STK	25N	18W	17	3	1	1	8/8/1978	1691	ART
54	SJ 00783	N/A	STK	26N	18W	14	3	4	4	8/5/1978	2211	ART
56	SJ 00788	N/A	DOM	29N	14W	8	4	4		5/2/1979	100	70
57	SJ 00793	N/A	STK	26N	18W	5	4	3	2	9/4/1978	1656	ART
59	SJ 00815	N/A	MON	30N	15W	27	4	3	3	10/17/1978	231	ART
60	SJ 00815	N/A	MON	30N	15W	22	3	3	4	10/14/1978	240	ART
71	SJ 00846	N/A	MON	25N	15W	28	2	1		4/11/1979	593	50
72	SJ 00846	N/A	MON	25N	15W	28	2	1		4/26/1979	593	50
73	SJ 00861	N/A	DOM	29N	16W	2	1	2		3/31/1947	21	10
74	SJ 00862	N/A	DOM	29N	16W	2	1	1		2/28/1970	257	25
75	SJ 00863	N/A	DOM	30N	16W	36	3	3		5/31/1945	45	35
76	SJ 00864	N/A	DOM	29N	16W	2	1	2		3/31/1974	21	10
77	SJ 00865	N/A	DOM	29N	16W	2	1	1		8/31/1960	45	30
78	SJ 00866	N/A	IRR	30N	16W	36	3	1		3/31/1974	90	60
79	SJ 00876	N/A	DOM	30N	16W	35	2	4		6/30/1979	77	57
82	SJ 00931	N/A	DOM	29N	15W	4	3	4		4/25/1979	44	22
84	SJ 00944	N/A	DOM	30N	14W	3	1	3		6/6/1979	61	5
85	SJ 00947	N/A	DOM	29N	14W	8	0	0		5/18/1979	370	275
97	SJ 01016	N/A	DOM	29N	15W	11	3	4		7/22/1979	25	4
98	SJ 01034	N/A	DOM	29N	14W	18	2	2	1	11/12/1979	28	16
100	SJ 01136	N/A	DOM	29N	15W	12	2	2		3/26/1980	150	40
102	SJ 01223	N/A	DOM	29N	15W	13	2	4		7/21/1980	30	12
103	SJ 01237	N/A	DOM	29N	15W	6	4	1	4	8/7/1980	30	14
106	SJ 01259	N/A	DOM	29N	14W	17	1	0		9/9/1980	31	3
107	SJ 01266	N/A	STK	26N	18W	15	3	2	2	8/25/1980	N/A	N/A
111	SJ 01407	N/A	DOM	29N	14W	6	3	3	3	7/5/1981	70	52
112	SJ 01568	N/A	DOM	29N	14W	7	1	1		5/24/1982	72	30
113	SJ 01569	N/A	SAN	29N	15W	11	1	2		5/27/1982	60	45
117	SJ 01883	N/A	DOM	29N	14W	6	2	3		9/5/1984	75	30
119	SJ 02010	N/A	DOM	29N	15W	11	1	3		11/9/1985	25	9
122	SJ 02036	N/A	DOM	29N	14W	7	4	0		4/22/1986	62	15
123	SJ 02055	N/A	DOM	29N	14W	5	1	1		5/12/1987	150	90
125	SJ 02063	N/A	DOM	29N	15W	11	1	3		6/17/1986	26	ART
126	SJ 02071	N/A	DOM	29N	15W	12	1	1	2	10/30/1986	51	32
129	SJ 02081	N/A	DOM	29N	15W	12	1	1	2	11/11/1986	42	30

Table 2
Well Inventory - New Mexico Office of the State Engineer
Desert Rock Energy Project
New Mexico

MAP WELL NO.	WELL ID	OPERATOR	USE	TWS	RNG	SEC	Q	Q2	Q3	FINISH DATE	TOTAL WELL DEPTH (ft bgs)	DEPTH TO WATER (ft bgs)
130	SJ 02143	N/A	DOM	29N	14W	17	1	2	4	1/29/1988	36	26
131	SJ 02165	N/A	DOM	29N	15W	11	1	1	1	3/5/1988	40	25
136	SJ 02375	N/A	DOM	29N	15W	12	3	2		1/18/1993	38	8
137	SJ 02392	N/A	PUB	30N	16W	35	2	4		8/10/1992	133	ART
138	SJ 02639	N/A	DOM	29N	14W	7	3	3	4	6/14/1995	18	6
141	SJ 02790	N/A	DOM	29N	14W	18	2	2	4	N/A	40	ART
142	SJ 02927	N/A	DOM	29N	14W	6	2	3	2	5/3/1999	150	ART
143	SJ 02976	N/A	DOM	29N	15W	11	3	2	3	1/24/2000	29	8
144	SJ 02999	N/A	DOM	29N	14W	17	1	4	1	8/22/2000	42	28
145	SJ 03012	N/A	DOM	29N	16W	2	1	4	1	6/22/2000	27	12
146	SJ 03015	N/A	DOM	30N	16W	35	4	3	4	6/22/2000	43	17
147	SJ 03074	N/A	DOM	29N	14W	9	1	3	1	N/A	70	ART
148	SJ 03139	N/A	DOM	29N	16W	1	1	4	2	N/A	45	ART
149	SJ 03232	N/A	DOM	30N	16W	35	4	3	2	N/A	40	ART

Data Source: New Mexico Office of the State Engineer, Water Administration and Technical Engineering Resource System (W.A.T.E.R.S.) GIS Database, updated 3/17/03

Note: Duplicate wells, and wells with no completion date or a completion depth are excluded from this table and the well location map.

Footnotes:

ART = Artesian (flow encountered above ground surface)
ft bgs = feet below ground surface
N/A = Not Available

Use Codes:

DOM Domestic one household
IRR Irrigation
MON Monitoring well
NOT No use of right or pod
PUB Construction of public works
SAN Sanitary in conjuction with a commercial use
STK Livestock watering

Table 3
Well Geologic Units Summary
Desert Rock Energy Project
New Mexico

Well No.	Common Formation Name	Lithology	Depth to Top of unit (ft bgs)	Depth to Bottom of unit (ft bgs)	Unit Thickness (feet)	Contribution to Well Production[A]	Thickness of Morrison Formation (feet)[B]	Thickness of Westwater Canyon Member (feet)[B]
12K-300A	DAKOTA	SANDSTONE	1080	1210	**130**	S		
	MORRISON	SANDSTONE/SHALE	1210	1717	**507**	P	**>507**	**NE**
12K-309	MANCOS	SHALE	0	662	**662**	N		
	GALLUP	SANDSTONE	662	698	**36**	N		
	MANCOS	SHALE	698	1502	**804**	N		
	DAKOTA	SANDSTONE/SHALE	1502	NR	**??**	P	**NE**	**NE**
12K-320	MANCOS	SHALE	0	460	**460**	N		
	GALLUP	SANDSTONE	460	540	**80**	N		
	MANCOS	SHALE	540	1300	**760**	N		
	DAKOTA	SANDSTONE/SHALE	1300	1470	**170**	S		
	BRUSHY BASIN	SANDSTONE/SHALE	1470	1530	**60**	P		
	MORRISON	SANDSTONE/SHALE	1530	1985	**455**	P		
	BLUFF	SANDSTONE	1985	NR	**??**	N	**>515**	**NE**
12K-357	DAKOTA	SANDSTONE	1370	NR		P	**NE**	**NE**
12R-84	DAKOTA	SANDSTONE	880	1130	**250**	U		
	MORRISON	SANDSTONE/SHALE	1130	NR	**??**	U	**UTC**	**NE**
12T-508	MANCOS	SHALE	20	100	**80**	N		
	GALLUP	SANDSTONE	100	185	**85**	N		
	MANCOS		185	955	**770**	N		
	DAKOTA	SANDSTONE	955	1114	**159**	P		
	BRUSHY BASIN	SANDSTONE/SHALE	1114	NR	**??**	S	**UTC**	**NE**

See page 8 for Explanations

Table 3
Well Geologic Units Summary
Desert Rock Energy Project
New Mexico

Well No.	Common Formation Name	Lithology	Depth to Top of unit (ft bgs)	Depth to Bottom of unit (ft bgs)	Unit Thickness (feet)	Contribution to Well Production[A]	Thickness of Morrison Formation (feet)[B]	Thickness of Westwater Canyon Member (feet)[B]
12T-511	ALLUVIUM	SAND/GRAVEL	0	20	**20**	N	**NE**	**NE**
	MENEFEE	SANDSTONE/SHALE	20	2006	**1986**	P		
	POINT LOOKOUT	SANDSTONE/SHALE	2006	2275	**269**	N		
	MANCOS UPPER	SHALE	2275	3175	**900**	N		
	GALLUP	SANDSTONE	3175	3382	**207**	N		
	MANCOS LOWER	SHALE	3382	4112	**730**	N		
	DAKOTA	SANDSTONE/SHALE	4112	NR	**??**	N		
12T-519	DAKOTA	SANDSTONE	1025	1255	**230**	P	**UTC**	**NE**
	MORRISON	SANDSTONE/SHALE	1255	NR	**??**	S		
12T-520	ALLUVIUM	SAND/GRAVEL	0	30	**30**	N	**615**	**143**
	MANCOS UPPER	SHALE	30	248	**218**	N		
	GALLUP	SANDSTONE	248	330	**82**	N		
	MANCOS LOWER	SHALE	330	895	**565**	N		
		SHALE	895	1015	**120**	N		
	DAKOTA	SANDSTONE/SHALE	1015	1180	**165**	N		
	BRUSHY BASIN	MUDSTONE	1180	1342	**162**	N		
	WESTWATER CANYON	SANDSTONE	1342	1485	**143**	S		
	RECAPTURE	SILTSTONE	1485	1610	**125**	S		
	SALTWASH	SILTSTONE	1610	1760	**150**	P		
	BLUFF	SANDSTONE	1760	1795	**35**	U		
	SUMMERVILLE	SANDSTONE/SHALE	1795	NR	**??**	N		

See page 8 for Explanations

Table 3
Well Geologic Units Summary
Desert Rock Energy Project
New Mexico

Well No.	Common Formation Name	Lithology	Depth to Top of unit (ft bgs)	Depth to Bottom of unit (ft bgs)	Unit Thickness (feet)	Contribution to Well Production[A]	Thickness of Morrison Formation (feet)[B]	Thickness of Westwater Canyon Member (feet)[B]
12T-548	MANCOS	SHALE	710	821	**111**	N		
	DAKOTA	SANDSTONE	821	1024	**203**	P		
	MORRISON	SANDSTONE/SHALE	1024	NR	**??**	P	**UTC**	**NE**
12T-551	MANCOS	SHALE	0	1410	**1410**	N		
	DAKOTA	SANDSTONE	1410	1580	**170**	N		
	BRUSHY BASIN	SANDSTONE/SHALE	1580	1785	**205**	N		
	WESTWATER CANYON	SANDSTONE	1785	2083	**298**	P		
	RECAPTURE	SILTSTONE	2083	NR	**??**	N	**>503**	**298**
12T-587	MENEFEE	SANDSTONE/SHALE	0	1052	**1052**	P		
	POINT LOOKOUT	SANDSTONE/SHALE	1052	NR	**??**	S	**NE**	**NE**
12T-618A	MENEFEE	SANDSTONE/SHALE	0	1274	**1274**	S		
	POINT LOOKOUT	SANDSTONE/SHALE	1274	NR	**??**	P	**NE**	**NE**
12T-620	MANCOS	SHALE	5	800	**795**	N		
	DAKOTA	SANDSTONE/SHALE	800	1040	**240**	N		
	BRUSHY BASIN	SANDSTONE/SHALE	1040	1175	**135**	N		
	WESTWATER CANYON	SANDSTONE	1175	1390	**215**	P		
	RECAPTURE	SANDSTONE/SHALE	1390	1960	**570**	S	**>920**	**215**

See page 8 for Explanations

Table 3
Well Geologic Units Summary
Desert Rock Energy Project
New Mexico

Well No.	Common Formation Name	Lithology	Depth to Top of unit (ft bgs)	Depth to Bottom of unit (ft bgs)	Unit Thickness (feet)	Contribution to Well Production[A]	Thickness of Morrison Formation (feet)[B]	Thickness of Westwater Canyon Member (feet)[B]
12T-628	MANCOS UPPER	SHALE	0	615	**615**	N	**>545**	**340**
	GALLUP	SANDSTONE/SHALE	615	785	**170**	N		
	MANCOS LOWER	SHALE	785	1460	**675**	N		
	DAKOTA	SANDSTONE/SHALE	1460	1605	**145**	N		
	BRUSHY BASIN	SANDSTONE/SHALE	1605	1810	**205**	N		
	WESTWATER CANYON	SANDSTONE	1810	2150	**340**	P		
	RECAPTURE	SANDSTONE/SHALE	2150	NR	**??**	S		
12T-629	MANCOS UPPER	SHALE	0	460	**460**	N	**>420**	**218**
	GALLUP	SANDSTONE/SHALE	460	720	**260**	N		
	MANCOS LOWER	SHALE	720	1290	**570**	N		
	DAKOTA	SANDSTONE/SHALE	1290	1508	**218**	N		
	BRUSHY BASIN	SANDSTONE/SHALE	1508	1710	**202**	S		
	WESTWATER CANYON	SANDSTONE	1710	1928	**218**	P		
	RECAPTURE	SANDSTONE/SHALE	1928	NR	**??**	S		

See page 8 for Explanations

Table 3
Well Geologic Units Summary
Desert Rock Energy Project
New Mexico

Well No.	Common Formation Name	Lithology	Depth to Top of unit (ft bgs)	Depth to Bottom of unit (ft bgs)	Unit Thickness (feet)	Contribution to Well Production[A]	Thickness of Morrison Formation (feet)[B]	Thickness of Westwater Canyon Member (feet)[B]
12T-630	MANCOS UPPER	SHALE	0	250	**250**	N		
	GALLUP	SANDSTONE/SHALE	250	470	**220**	N		
	MANCOS LOWER	SHALE	470	1070	**600**	N		
	DAKOTA	SANDSTONE	1070	1330	**260**	N		
	BRUSHY BASIN	SANDSTONE/SHALE	1330	1478	**148**	N		
	WESTWATER CANYON	SANDSTONE	1478	1745	**267**	S		
	RECAPTURE	SANDSTONE/SHALE	1745	2124	**379**	S		
	SALTWASH	SANDSTONE/SHALE	2124	2222	**98**	S		
	BLUFF	SANDSTONE	2222	NR	**??**	S	**>892**	**267**
12T-632	MANCOS UPPER	SHALE	0	418	**418**	N		
	GALLUP	SANDSTONE	418	570	**152**	N		
	MANCOS LOWER	SHALE	570	1370	**800**	N		
	DAKOTA	SANDSTONE	1370	1546	**176**	N		
	BRUSHY BASIN	SANDSTONE/SHALE	1546	1890	**344**	S		
	WESTWATER CANYON	SANDSTONE	1890	2100	**210**	P		
	RECAPTURE	SANDSTONE/SHALE	2100	2443	**343**	S		
	BLUFF	SANDSTONE	2443	NR	**??**	U	**>897**	**210**

See page 8 for Explanations

Table 3
Well Geologic Units Summary
Desert Rock Energy Project
New Mexico

Well No.	Common Formation Name	Lithology	Depth to Top of unit (ft bgs)	Depth to Bottom of unit (ft bgs)	Unit Thickness (feet)	Contribution to Well Production[A]	Thickness of Morrison Formation (feet)[B]	Thickness of Westwater Canyon Member (feet)[B]
12T-633	GALLUP	SANDSTONE	0	59	**59**	N	**>850**	**277**
	MANCOS LOWER	SHALE	59	895	**836**	N		
	DAKOTA	SANDSTONE	895	1080	**185**	N		
	BRUSHY BASIN	SANDSTONE/SHALE	1080	1270	**190**	S		
	WESTWATER CANYON	SANDSTONE	1270	1547	**277**	P		
	RECAPTURE	SANDSTONE/SHALE	1547	1930	**383**	S		
	BLUFF	SANDSTONE	1930	NR	**??**	S		
12T-634	MANCOS LOWER	SHALE	375	918	**543**	N	**>495**	**150**
	DAKOTA	SANDSTONE	918	1030	**112**	N		
	BRUSHY BASIN	SANDSTONE/SHALE	1030	1375	**345**	N		
	WESTWATER CANYON	SANDSTONE	1375	1525	**150**	P		
	RECAPTURE	SANDSTONE/SHALE	1525	NR	**??**	S		

See page 8 for Explanations

Table 3
Well Geologic Units Summary
Desert Rock Energy Project
New Mexico

Well No.	Common Formation Name	Lithology	Depth to Top of unit (ft bgs)	Depth to Bottom of unit (ft bgs)	Unit Thickness (feet)	Contribution to Well Production[A]	Thickness of Morrison Formation (feet)[B]	Thickness of Westwater Canyon Member (feet)[B]
12T-635	GALLUP	SANDSTONE	335	440	**105**	N		
	MANCOS LOWER	SHALE	440	905	**465**	N		
	DAKOTA	SANDSTONE/SHALE	905	1085	**180**	N		
	BRUSHY BASIN	SANDSTONE/SHALE	1085	1350	**265**	S		
	WESTWATER CANYON	SANDSTONE	1350	1670	**320**	P		
	RECAPTURE	SANDSTONE/SHALE	1670	1955	**285**	S		
	SUMMERVILLE	SANDSTONE/SHALE	1955	NR	**??**	S	**870**	**320**
12T-640	MORRISON	SANDSTONE/SHALE	1487	NR	**??**	P	**UTC**	**NE**
12T-643	MANCOS LOWER	SHALE	0	840	**840**	N		
	DAKOTA	SANDSTONE	840	1040	**200**	N		
	MORRISON	SANDSTONE/SHALE	1065	NR	**??**	P		
	WESTWATER CANYON	SANDSTONE	1345	1618	**273**	P	**>553**	**273**
12T-647	MORRISON	SANDSTONE/SHALE	1323	NR	**??**	P	**UTC**	**NE**
12T-649	MANCOS	SHALE	0	230	**230**	N		
	GALLUP	SANDSTONE	230	450	**220**	N		
	MANCOS LOWER	SHALE	450	1134	**684**	N		
	DAKOTA	SANDSTONE	1134	1354	**220**	N		
	MORRISON	SANDSTONE/SHALE	1354	NR	**??**	P	**UTC**	**NE**

See page 8 for Explanations

Table 3
Well Geologic Units Summary
Desert Rock Energy Project
New Mexico

Well No.	Common Formation Name	Lithology	Depth to Top of unit (ft bgs)	Depth to Bottom of unit (ft bgs)	Unit Thickness (feet)	Contribution to Well Production[A]	Thickness of Morrison Formation (feet)[B]	Thickness of Westwater Canyon Member (feet)[B]
12T-651	MORRISON	SANDSTONE/SHALE	1060	1691	**631**	P	**UTC**	**NE**

Data Source: Navajo Nation Department of Water Resource, Water Management Branch Well Database-April 2005

Abbreviations:

NR = Not Recorded

ft bgs = feet below ground surface

Footnotes:

[A]Contribution to Well Production: P = Primary; S = Secondary; N = None

[B]Thickness of Morrison Formation: NE = Formation Not Encountered; UTC = Unable to calculate

[C]Thickness of Westwater Canyon Membern: NE = Member Not Encountered; UTC = Unable to calculate

Table 4

Water Quality Data from Wells Sampled on May 11, 2005

Desert Rock Energy Project New Mexico

General Chemistry

Sample ID	pH	Temperature (° C)	TDS (mg/L)	Turbidity (NTU)	Conductivity (µmhos/cm)	Nitrite (mg/L)	Nitrate (mg/L)	Chloride (mg/L)	Fluoride (mg/L)	Sulfate (mg/L)
12K-655	8.1	21.8	160	< 0.02	270	< 0.020	< 0.50	4.5	< 0.50	6.6
12K-633	9	21.5	170	< 0.02	280	< 0.020	< 0.50	< 2.5	< 0.50	3.4
12K-320	9.3	21.5	300	< 0.02	500	< 0.020	< 0.50	4.5	< 0.50	52

Metals

Sample ID	Aluminum (mg/L)	Antimony (mg/L)	Arsenic (mg/L)	Barium (mg/L)	Boron (mg/L)	Cadmium (mg/L)	Calcium (mg/L)	Chromium (mg/L)	Cobalt (mg/L)	Copper (mg/L)
12K-655	< 0.10	< 0.0030	< 0.0040	0.14	< 0.10	< 0.0030	20	< 0.010	< 0.010	0.29
12K-633	< 0.10	< 0.0030	< 0.0040	0.014	< 0.10	< 0.0030	1.3	< 0.010	< 0.010	< 0.010
12K-320	< 0.10	< 0.0030	< 0.0040	0.036	< 0.10	< 0.0030	1.1	< 0.010	< 0.010	< 0.010

Radiochemical Activity

Sample ID	Gross Alpha Activity Method 600 / 00-02 (pCi/L)	Radium 226 Activity Method 903.1 (pCi/L)	Radium 228 Activity Method 904 (pCi/L)	Total Radium (pCi/L)
12K-655	9.8 +/- 1.5	< 0.3	< 0.4	< 0.4
12K-633	12. +/- 1.7	< 0.3	< 0.3	< 0.3
12K-320	0.9 +/- 0.4	----	----	----

Explanation:

TDS = Total Dissolved Solids

< = below laboratory reporting limits

mg/L = milligrams per Liter

µmhos/cm = micromhos per centimeter

Table 4
Water Quality Data from Wells Sampled on May 11, 2005
Desert Rock Energy Project New Mexico

General Chemistry (continued)

Sample ID	Alkalinity (mg/L)			
	Bicarbonate	Carbonate	Hydroxide	Total
12K-655	140	< 20	< 20	140
12K-633	89	50	< 20	140
12K-320	100	97	< 20	200

Metals (continued)

Sample ID	Iron (mg/L)	Lead (mg/L)	Magnesium (mg/L)	Nickel (mg/L)	Potassium (mg/L)	Selenium (mg/L)	Silica (mg/L)	Silver (mg/L)	Sodium (mg/L)	Thallium (mg/L)
12K-655	< 0.10	0.0095	4	< 0.010	2.8	< 0.0030	19	< 0.0050	34	< 0.0020
12K-633	< 0.10	< 0.0030	< 1.0	< 0.010	< 2.0	< 0.0030	16	< 0.0050	68	< 0.0020
12K-320	< 0.10	< 0.0030	< 1.0	< 0.010	< 2.0	< 0.0030	18	< 0.0050	110	< 0.0020

APPENDIX A

LABORATORY ANALYTICAL DATA FOR SAMPLES COLLECTED ON MAY 11, 2005

TRANSWEST
GEOCHEM

June 13, 2005

Chris Courtney
URS Corporation
7720 N. 16th St.
Suite 100
Phoenix, AZ 85020

RE: Desert Rock Energy/23444264.33202
Work Order No.: 0505165

Dear Chris,
Transwest Geochem, Inc. received 3 samples on 5/12/2005 11:20:00 AM for the analyses presented in the following report.

The Case Narrative of this report addresses any Quality Control and/or Quality Assurance issues associated with this Work Order.

If you have any questions regarding these test results, please feel free to call us at (602) 437-0330.

Sincerely,

Carlene McCutcheon

Carlene McCutcheon
Project Manager

ADHS License No. AZM133/AZ0133

3725 E. Atlanta Ave. • Suite 2 • Phoenix, Arizona 85040 • (602) 437-0330 • 1-800-927-5183 • Fax (602) 437-0660
3860 S. Palo Verde Rd. • Suite 301 • Tucson, Arizona 85714 • (520) 573-1061 • Fax (520) 573-1063

Date Printed: 13-Jun-05

Client: URS Corporation
Work Order: 0505165
Project Name: Desert Rock Energy
Project Number: 23444264.33202

Case Narrative

All method blanks, laboratory spikes, and/or matrix spikes met quality control objectives for the parameters associated with this Work Order except as detailed below or on the Data Qualifier page of this report. Data Qualifiers used in this report are in accordance with ADEQ Arizona Data Qualifiers, Revision 2.0 11/26/2003.

Data qualifiers ("flags") contained within this analytical report have been issued to explain a quality control deficiency, and do not affect the quality (validity) of the data unless noted otherwise in the case narrative.

3725 E. Atlanta Ave. • Suite 2 • Phoenix, Arizona 85040 • (602) 437-0330 • 1-800-927-5183 • Fax (602) 437-0660
3860 S. Palo Verde Rd. • Suite 301 • Tucson, Arizona 85714 • (520) 573-1061 • Fax (520) 573-1063

TRANSWEST GEOCHEM

Date Printed 09-Jun-05

License No. AZM133/AZ0133

CLIENT:	URS Corporation
Project Name:	Desert Rock Energy
Project Number:	23444264.33202
Work Order:	0505165
Date Received:	12-May-05

Case Narrative
Data Qualifiers

One or more of the following data qualifiers may be associated with your analytical and/or quality control data.

H3	Sample was received and analyzed past holding time.
D2	Sample required dilution due to high concentration of target analyte.

TRANSWEST GEOCHEM

Date Printed 12-Jun-05
License No. AZM133/AZ0133

CLIENT: URS Corporation
Project Name: Desert Rock Energy
Project Number: 23444264.33202
Work Order: 0505165
Date Received: 12-May-05

Work Order Sample Summary

Client Sample ID	Lab Sample ID	Test Code	Collection Date
12T-655	0505165-01A	EPA120.1	5/11/2005 2:00:00 PM
		EPA150.1	5/11/2005 2:00:00 PM
		EPA180.1	5/11/2005 2:00:00 PM
		EPA300	5/11/2005 2:00:00 PM
		SM 2540 C	5/11/2005 2:00:00 PM
		SM 4500-NO2 B	5/11/2005 2:00:00 PM
		SM2320 B	5/11/2005 2:00:00 PM
	0505165-01B	EPA353.2	5/11/2005 2:00:00 PM
	0505165-01C	EPA200.7	5/11/2005 2:00:00 PM
		EPA200.9	5/11/2005 2:00:00 PM
	0505165-01D		5/11/2005 2:00:00 PM
	0505165-01E		5/11/2005 2:00:00 PM
		EPA901.1	5/11/2005 2:00:00 PM
12T-633	0505165-02A	EPA120.1	5/11/2005 2:30:00 PM
		EPA150.1	5/11/2005 2:30:00 PM
		EPA180.1	5/11/2005 2:30:00 PM
		EPA300	5/11/2005 2:30:00 PM
		SM 2540 C	5/11/2005 2:30:00 PM
		SM 4500-NO2 B	5/11/2005 2:30:00 PM
		SM2320 B	5/11/2005 2:30:00 PM
	0505165-02B	EPA353.2	5/11/2005 2:30:00 PM
	0505165-02C	EPA200.7	5/11/2005 2:30:00 PM
		EPA200.9	5/11/2005 2:30:00 PM
	0505165-02D		5/11/2005 2:30:00 PM
	0505165-02E		5/11/2005 2:30:00 PM
		EPA901.1	5/11/2005 2:30:00 PM
12K-320	0505165-03A	EPA120.1	5/11/2005 3:10:00 PM
		EPA150.1	5/11/2005 3:10:00 PM
		EPA180.1	5/11/2005 3:10:00 PM
		EPA300	5/11/2005 3:10:00 PM
		SM 2540 C	5/11/2005 3:10:00 PM
		SM 4500-NO2 B	5/11/2005 3:10:00 PM
		SM2320 B	5/11/2005 3:10:00 PM
	0505165-03B	EPA353.2	5/11/2005 3:10:00 PM

CLIENT:	URS Corporation
Project Name:	Desert Rock Energy
Project Number:	23444264.33202
Work Order:	0505165
Date Received:	12-May-05

Work Order Sample Summary

Client Sample ID	Lab Sample ID	Test Code	Collection Date
12K-320	0505165-03C	EPA200.7	5/11/2005 3:10:00 PM
		EPA200.9	5/11/2005 3:10:00 PM
	0505165-03D		5/11/2005 3:10:00 PM
	0505165-03E		5/11/2005 3:10:00 PM

Date Printed 09-Jun-05
License No. AZM133/AZ0133

CLIENT:	URS Corporation
Project Name:	Desert Rock Energy
Project Number:	23444264.33202
Work Order:	0505165
Date Received:	12-May-05

Definitions

Analytical Spike (AS)	The AS is a known amount of a target analyte added to a sample after it has been distilled, digested, or extracted and is ready for analysis. The AS is generally performed if the MS has failed. It is used to indicate interference that arises from sample distillation, digestion, or extraction as opposed to interference that is innate to the matrix.
Continuing Curve Verification (CCV)	The CCV is also referred to as a curve check. This is a standard analyzed at specified intervals during an analysis. The CCV verifies the stability and accuracy of the calibration curve. There are specific CCV recovery acceptance criteria for each method.
Dilution Factor (DF)	The DF is an indication of how much a sample had to be diluted in order to quantitate it on a standard curve. The DF is indicated in the reported sample result. The sample PQL increases as the dilution increases.
Internal Standard (IS)	The IS is a compound that is similar to the organic compound of interest in terms of chemical composition but is unique in that it is rare in the environment. The same concentration of IS is added to every sample for some organic methods.
Laboratory Control Sample (LCS)	The LCS is also referred to as a blank spike. The LCS is an addition of a known amount of a target analyte (from the same source as calibration standards or spikes) to an aliquot of deionized water or other appropriate clean matrix. The LCS is processed through the entire method procedure in the same manner as samples.
Matrix Spike (MS)	The MS is a known amount of a target analyte added to a sample. The MS is processed through the entire method procedure in the same manner as samples.
Method Blank (MB)	The MB is an aliquot of deionized water or other appropriate clean matrix that is thought to be free of the analyte in question. The MB is processed through the entire extraction or analysis procedure and is used to indicate contamination in the lab.
Method Detection Limit (MDL)	The MDL is the lowest level of detection of which a method is capable.
Practical Quantitation Limit (PQL)	The PQL is the lowest value at which Transwest Geochem can detect an analyte in matrix with a high degree of confidence. The PQL will increase as the DF increases. The PQL is greater than or equal to the MDL.
Relative Percent Difference (RPD)	The RPD is a measure of precision (the ability to obtain the same result on re-analysis of the same sample). It is calculated using the result of a sample, MS, LCS, or LCSV and its associated duplicate result.
Secondary Source QC Sample (LCSV)	The LCSV is also referred to as a second source laboratory control sample. It is the same type of standard as a calibration or spiking standard but is obtained from a different source. The LCSV is an indication of the primary standard quality, method performance, and instrument performance.
Surrogate	A surrogate compound is similar to the organic compound of interest in terms of chemical composition but is unique in that it is rare in the environment. When surrogates are used, they are added to every sample, blank and standard. Surrogate recovery is used as an indication of extraction and/or analytical success.
Trip Blank (TB)	The TB is a portion of deionized water preserved in the same manner as the samples. The TB travels from the lab, to the field, and then back to the lab with the samples from the field. The TB serves as an indication of contamination introduced during sample transportation.

Date Printed 09-Jun-05

License No. AZM133/AZ0133

CLIENT: URS Corporation
Project Name: Desert Rock Energy
Project Number: 23444264.33202
Work Order: 0505165
Date Received: 12-May-05

References

Transwest Geochem, Inc. uses the methods outlined in the following references:

Code of Federal Regulations, 40CFR, Part 136, Appendix A, 1998.

Standard Methods for the Examination of Water and Wastewater, 19th Edition, 1995.

Methods for Chemical Analysis of Water and Wastes, EPA-600/4-79-020, Revised March 1983.

Methods for the Determination of Inorganic Substances in Environmental Samples, EPA/600/R-93/100, Revised August 1993.

Methods for the Determination of Metals in Environmental Samples, Supplement 1: EPA/600/R-94/111, Revised May 1994.

Methods for the Determination of Organic Compounds in Drinking Water, EPA/600/4-88/039, Revised July, 1991; EPA-600/4-90/020, Supplement I, July 1990; EPA-600/R-92/129; Supplement II, August 1992; EPA-600/R-95/131, Supplement III, August 1995.

Hach, Water Analysis Handbook, 3rd Edition, 1997.

Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, SW846, 3rd Edition, 1986 including Update I, July 1992; Update IIA, August 1993; Update II; September 1994; Update IIB, January 1995; Update III, December 1996

Bureau of Laboratory Services, State of Arizona Department of Health Services Method 418.1AZ: TPH in Soil, September 1994.

Bureau of Laboratory Services, State of Arizona Department of Health Services Method 8015AZ.R1, September 1998. (Comment: C6-C10 GRO reported by this method is not to be used in compliance situations)

ASTM MethodD4982, Annual Book of ASTM Standards, Volumes 11.01 and 11.02, 1995

The Determination of Polychlorinated Biphenyls in Transformer Fluid and Waste Oils, EPA-600 4-81-045, September 1982.

TRANSWEST GEOCHEM

Date Printed 12-Jun-05
License No. AZM133/AZ0133

CLIENT: URS Corporation
Work Order: 0505165
Lab ID: 0505165-01
Project Name: Desert Rock Energy
Project Number: 23444264.33202

Client Sample ID: 12T-655
Collection Date: 5/11/2005 2:00:00 PM
Matrix: Groundwater

Analyte	Result	PQL	Qual	Units	DF	Test Code	Date Prepared	Date Analyzed	Analyst	Batch ID
Specific Conductance	**270**	1.0		µmhos/cm	1.0	EPA120.1	N/A	5/13/05	SO	COND_W-5/13/2005
pH	**8.1**	N/A	H3	--	1.0	EPA150.1	N/A	5/13/05 11:30	SO	PH_W-5/13/2005
Temperature °C.	**21.8**	N/A		--	1.0	EPA150.1	N/A	5/13/05 11:30	SO	PH_W-5/13/2005
Turbidity	<0.02	0.02		NTU	1.0	EPA180.1	N/A	5/13/05 7:55	SO	TURB_W-5/13/2005
Chloride	**4.5**	2.5		mg/L	1.0	EPA300	N/A	5/19/05	TL	IC-5/19/2005
Fluoride	<0.50	0.50		mg/L	1.0	EPA300	N/A	5/19/05	TL	IC-5/19/2005
Sulfate	**6.6**	3.0		mg/L	1.0	EPA300	N/A	5/19/05	TL	IC-5/19/2005
Nitrate (As N)	<0.50	0.50		mg/L	1.0	EPA353.2	N/A	5/25/05	TL	NO3_W-5/25/2005
Total Dissolved Solids	**160**	10		mg/L	1.0	SM 2540 C	N/A	5/16/05	BJK	TDS_DW-5/17/2005
Nitrite (As N)	<0.020	0.020		mg/L	1.0	SM 4500-NO2 B	N/A	5/13/05 9:49	KMB	NO2_DW-5/13/2005
Alkalinity, Bicarbonate (As C	**140**	20		mg/L	1.0	SM2320 B	N/A	5/18/05	KMB	ALK_W-5/18/2005
Alkalinity, Carbonate (As CaCO3)	<20	20		mg/L	1.0	SM2320 B	N/A	5/18/05	KMB	ALK_W-5/18/2005
Alkalinity, Hydroxide (As CaCO3)	<20	20		mg/L	1.0	SM2320 B	N/A	5/18/05	KMB	ALK_W-5/18/2005
Alkalinity, Total (As CaCO3)	**140**	20		mg/L	1.0	SM2320 B	N/A	5/18/05	KMB	ALK_W-5/18/2005
Aluminum	<0.10	0.10		mg/L	1.0	EPA200.7	5/16/05	5/16/05 15:35	JM	9415
Barium	**0.14**	0.010		mg/L	1.0	EPA200.7	5/16/05	5/16/05 15:35	JM	9415
Boron	<0.10	0.10		mg/L	1.0	EPA200.7	5/16/05	5/16/05 15:35	JM	9415
Cadmium	<0.0030	0.0030		mg/L	1.0	EPA200.7	5/16/05	5/17/05 11:11	JM	9415
Calcium	**20**	1.0		mg/L	1.0	EPA200.7	5/16/05	5/16/05 15:35	JM	9415
Chromium	<0.010	0.010		mg/L	1.0	EPA200.7	5/16/05	5/16/05 15:35	JM	9415
Cobalt	<0.010	0.010		mg/L	1.0	EPA200.7	5/16/05	5/16/05 15:35	JM	9415
Copper	**0.29**	0.010		mg/L	1.0	EPA200.7	5/16/05	5/16/05 15:35	JM	9415
Iron	<0.10	0.10		mg/L	1.0	EPA200.7	5/16/05	5/16/05 15:35	JM	9415
Magnesium	**4.0**	1.0		mg/L	1.0	EPA200.7	5/16/05	5/16/05 15:35	JM	9415
Nickel	<0.010	0.010		mg/L	1.0	EPA200.7	5/16/05	5/16/05 15:35	JM	9415
Potassium	**2.8**	2.0		mg/L	1.0	EPA200.7	5/16/05	5/16/05 15:35	JM	9415
Silica	**19**	0.43		mg/L	1.0	EPA200.7	5/16/05	5/16/05 15:35	JM	9415
Silver	<0.0050	0.0050		mg/L	1.0	EPA200.7	5/16/05	5/16/05 15:35	JM	9415
Sodium	**34**	2.0		mg/L	1.0	EPA200.7	5/16/05	5/16/05 15:35	JM	9415
Antimony	<0.0030	0.0030		mg/L	1.0	EPA200.9	N/A	5/16/05	KMB	20095/16/05
Arsenic	<0.0040	0.0040		mg/L	1.0	EPA200.9	N/A	5/23/05	KMB	20095/23/2005

TRANSWEST GEOCHEM

Date Printed 12-Jun-05

License No. AZM133/AZ0133

CLIENT: URS Corporation
Work Order: 0505165
Lab ID: 0505165-01
Project Name: Desert Rock Energy
Project Number: 23444264.33202

Client Sample ID: 12T-655
Collection Date: 5/11/2005 2:00:00 PM
Matrix: Groundwater

Analyte	Result	PQL	Qual	Units	DF	Test Code	Date Prepared	Date Analyzed	Analyst	Batch ID
Lead	**0.0095**	0.0030		mg/L	1.0	EPA200.9	N/A	5/18/05	KMB	20095/18/2005
Selenium	<0.0030	0.0030		mg/L	1.0	EPA200.9	N/A	5/17/05	KMB	2009_5/17/2005
Thallium	<0.0020	0.0020		mg/L	1.0	EPA200.9	N/A	5/26/05	KMB	200.9_TL-5/26/2005

TRANSWEST GEOCHEM

Date Printed 12-Jun-05
License No. AZM133/AZ0133

CLIENT: URS Corporation
Work Order: 0505165
Lab ID: 0505165-02
Project Name: Desert Rock Energy
Project Number: 23444264.33202

Client Sample ID: 12T-633
Collection Date: 5/11/2005 2:30:00 PM
Matrix: Groundwater

Analyte	Result	PQL	Qual	Units	DF	Test Code	Date Prepared	Date Analyzed	Analyst	Batch ID
Specific Conductance	**280**	1.0		µmhos/cm	1.0	EPA120.1	N/A	5/13/05	SO	COND_W-5/13/2005
pH	**9.0**	N/A	H3	--	1.0	EPA150.1	N/A	5/13/05 11:30	SO	PH_W-5/13/2005
Temperature °C.	**21.5**	N/A		--	1.0	EPA150.1	N/A	5/13/05 11:30	SO	PH_W-5/13/2005
Turbidity	<0.02	0.02		NTU	1.0	EPA180.1	N/A	5/13/05 7:55	SO	TURB_W-5/13/2005
Chloride	<2.5	2.5		mg/L	1.0	EPA300	N/A	5/19/05	TL	IC-5/19/2005
Fluoride	<0.50	0.50		mg/L	1.0	EPA300	N/A	5/19/05	TL	IC-5/19/2005
Sulfate	**3.4**	3.0		mg/L	1.0	EPA300	N/A	5/19/05	TL	IC-5/19/2005
Nitrate (As N)	<0.50	0.50		mg/L	1.0	EPA353.2	N/A	5/25/05	TL	NO3_W-5/25/2005
Total Dissolved Solids	**170**	10		mg/L	1.0	SM 2540 C	N/A	5/16/05	BJK	TDS_DW-5/17/2005
Nitrite (As N)	<0.020	0.020		mg/L	1.0	SM 4500-NO2 B	N/A	5/13/05 9:49	KMB	NO2_DW-5/13/2005
Alkalinity, Bicarbonate (As C	**89**	20		mg/L	1.0	SM2320 B	N/A	5/18/05	KMB	ALK_W-5/18/2005
Alkalinity, Carbonate (As Ca	**50**	20		mg/L	1.0	SM2320 B	N/A	5/18/05	KMB	ALK_W-5/18/2005
Alkalinity, Hydroxide (As CaCO3)	<20	20		mg/L	1.0	SM2320 B	N/A	5/18/05	KMB	ALK_W-5/18/2005
Alkalinity, Total (As CaCO3)	**140**	20		mg/L	1.0	SM2320 B	N/A	5/18/05	KMB	ALK_W-5/18/2005
Aluminum	<0.10	0.10		mg/L	1.0	EPA200.7	5/16/05	5/16/05 15:39	JM	9415
Barium	**0.014**	0.010		mg/L	1.0	EPA200.7	5/16/05	5/16/05 15:39	JM	9415
Boron	<0.10	0.10		mg/L	1.0	EPA200.7	5/16/05	5/16/05 15:39	JM	9415
Cadmium	<0.0030	0.0030		mg/L	1.0	EPA200.7	5/16/05	5/17/05 11:14	JM	9415
Calcium	**1.3**	1.0		mg/L	1.0	EPA200.7	5/16/05	5/16/05 15:39	JM	9415
Chromium	<0.010	0.010		mg/L	1.0	EPA200.7	5/16/05	5/16/05 15:39	JM	9415
Cobalt	<0.010	0.010		mg/L	1.0	EPA200.7	5/16/05	5/16/05 15:39	JM	9415
Copper	<0.010	0.010		mg/L	1.0	EPA200.7	5/16/05	5/16/05 15:39	JM	9415
Iron	<0.10	0.10		mg/L	1.0	EPA200.7	5/16/05	5/16/05 15:39	JM	9415
Magnesium	<1.0	1.0		mg/L	1.0	EPA200.7	5/16/05	5/16/05 15:39	JM	9415
Nickel	<0.010	0.010		mg/L	1.0	EPA200.7	5/16/05	5/16/05 15:39	JM	9415
Potassium	<2.0	2.0		mg/L	1.0	EPA200.7	5/16/05	5/16/05 15:39	JM	9415
Silica	**16**	0.43		mg/L	1.0	EPA200.7	5/16/05	5/16/05 15:39	JM	9415
Silver	<0.0050	0.0050		mg/L	1.0	EPA200.7	5/16/05	5/16/05 15:39	JM	9415
Sodium	**68**	2.0		mg/L	1.0	EPA200.7	5/16/05	5/16/05 15:39	JM	9415
Antimony	<0.0030	0.0030		mg/L	1.0	EPA200.9	N/A	5/16/05	KMB	20095/16/05
Arsenic	<0.0040	0.0040		mg/L	1.0	EPA200.9	N/A	5/23/05	KMB	20095/23/2005

TRANSWEST GEOCHEM

Date Printed 12-Jun-05

License No. AZM133/AZ0133

CLIENT: URS Corporation

Work Order: 0505165

Lab ID: 0505165-02

Project Name: Desert Rock Energy

Project Number: 23444264.33202

Client Sample ID: 12T-633

Collection Date: 5/11/2005 2:30:00 PM

Matrix: Groundwater

Analyte	Result	PQL	Qual	Units	DF	Test Code	Date Prepared	Date Analyzed	Analyst	Batch ID
Lead	<0.0030	0.0030		mg/L	1.0	EPA200.9	N/A	5/18/05	KMB	20095/18/2005
Selenium	<0.0030	0.0030		mg/L	1.0	EPA200.9	N/A	5/17/05	KMB	2009_5/17/2005
Thallium	<0.0020	0.0020		mg/L	1.0	EPA200.9	N/A	5/26/05	KMB	200.9_TL-5/26/2005

TRANSWEST GEOCHEM

Date Printed 12-Jun-05
License No. AZM133/AZ0133

CLIENT: URS Corporation
Work Order: 0505165
Lab ID: 0505165-03
Project Name: Desert Rock Energy
Project Number: 23444264.33202

Client Sample ID: 12K-320
Collection Date: 5/11/2005 3:10:00 PM
Matrix: Groundwater

Analyte	Result	PQL	Qual	Units	DF	Test Code	Date Prepared	Date Analyzed	Analyst	Batch ID
Specific Conductance	**500**	1.0		µmhos/cm	1.0	EPA120.1	N/A	5/13/05	SO	COND_W-5/13/2005
pH	**9.3**	N/A	H3	--	1.0	EPA150.1	N/A	5/13/05 11:30	SO	PH_W-5/13/2005
Temperature °C.	**21.5**	N/A		--	1.0	EPA150.1	N/A	5/13/05 11:30	SO	PH_W-5/13/2005
Turbidity	<0.02	0.02		NTU	1.0	EPA180.1	N/A	5/13/05 7:55	SO	TURB_W-5/13/2005
Chloride	**4.5**	2.5		mg/L	1.0	EPA300	N/A	5/19/05	TL	IC-5/19/2005
Fluoride	<0.50	0.50		mg/L	1.0	EPA300	N/A	5/19/05	TL	IC-5/19/2005
Sulfate	**52**	3.0		mg/L	1.0	EPA300	N/A	5/19/05	TL	IC-5/19/2005
Nitrate (As N)	<0.50	0.50		mg/L	1.0	EPA353.2	N/A	5/25/05	TL	NO3_W-5/25/2005
Total Dissolved Solids	**300**	10		mg/L	1.0	SM 2540 C	N/A	5/16/05	BJK	TDS_DW-5/17/2005
Nitrite (As N)	<0.020	0.020		mg/L	1.0	SM 4500-NO2 B	N/A	5/13/05 9:49	KMB	NO2_DW-5/13/2005
Alkalinity, Bicarbonate (As C	**100**	20		mg/L	1.0	SM2320 B	N/A	5/18/05	KMB	ALK_W-5/18/2005
Alkalinity, Carbonate (As Ca	**97**	20		mg/L	1.0	SM2320 B	N/A	5/18/05	KMB	ALK_W-5/18/2005
Alkalinity, Hydroxide (As CaCO3)	<20	20		mg/L	1.0	SM2320 B	N/A	5/18/05	KMB	ALK_W-5/18/2005
Alkalinity, Total (As CaCO3)	**200**	20		mg/L	1.0	SM2320 B	N/A	5/18/05	KMB	ALK_W-5/18/2005
Aluminum	<0.10	0.10		mg/L	1.0	EPA200.7	5/16/05	5/16/05 15:42	JM	9415
Barium	**0.036**	0.010		mg/L	1.0	EPA200.7	5/16/05	5/16/05 15:42	JM	9415
Boron	<0.10	0.10		mg/L	1.0	EPA200.7	5/16/05	5/16/05 15:42	JM	9415
Cadmium	<0.0030	0.0030		mg/L	1.0	EPA200.7	5/16/05	5/17/05 11:18	JM	9415
Calcium	**1.1**	1.0		mg/L	1.0	EPA200.7	5/16/05	5/16/05 15:42	JM	9415
Chromium	<0.010	0.010		mg/L	1.0	EPA200.7	5/16/05	5/16/05 15:42	JM	9415
Cobalt	<0.010	0.010		mg/L	1.0	EPA200.7	5/16/05	5/16/05 15:42	JM	9415
Copper	<0.010	0.010		mg/L	1.0	EPA200.7	5/16/05	5/16/05 15:42	JM	9415
Iron	<0.10	0.10		mg/L	1.0	EPA200.7	5/16/05	5/16/05 15:42	JM	9415
Magnesium	<1.0	1.0		mg/L	1.0	EPA200.7	5/16/05	5/16/05 15:42	JM	9415
Nickel	<0.010	0.010		mg/L	1.0	EPA200.7	5/16/05	5/16/05 15:42	JM	9415
Potassium	<2.0	2.0		mg/L	1.0	EPA200.7	5/16/05	5/16/05 15:42	JM	9415
Silica	**18**	0.43		mg/L	1.0	EPA200.7	5/16/05	5/16/05 15:42	JM	9415
Silver	<0.0050	0.0050		mg/L	1.0	EPA200.7	5/16/05	5/16/05 15:42	JM	9415
Sodium	**110**	10	D2	mg/L	5.0	EPA200.7	5/16/05	5/16/05 17:51	JM	9415
Antimony	<0.0030	0.0030		mg/L	1.0	EPA200.9	N/A	5/16/05	KMB	20095/16/05
Arsenic	<0.0040	0.0040		mg/L	1.0	EPA200.9	N/A	5/23/05	KMB	20095/23/2005

TRANSWEST GEOCHEM

Date Printed 12-Jun-05

License No. AZM133/AZ0133

CLIENT: URS Corporation
Work Order: 0505165
Lab ID: 0505165-03
Project Name: Desert Rock Energy
Project Number: 23444264.33202

Client Sample ID: 12K-320
Collection Date: 5/11/2005 3:10:00 PM
Matrix: Groundwater

Analyte	Result	PQL	Qual	Units	DF	Test Code	Date Prepared	Date Analyzed	Analyst	Batch ID
Lead	<0.0030	0.0030		mg/L	1.0	EPA200.9	N/A	5/18/05	KMB	20095/18/2005
Selenium	<0.0030	0.0030		mg/L	1.0	EPA200.9	N/A	5/17/05	KMB	2009_5/17/2005
Thallium	<0.0020	0.0020		mg/L	1.0	EPA200.9	N/A	5/26/05	KMB	200.9_TL-5/26/2005

Date: 09-Jun-05

License No. AZM133/AZ0133

CLIENT: URS Corporation
Work Order: 0505165
Project: Desert Rock Energy/23444264.33202

QC SUMMARY REPORT

Method Blank

Analyte	Result	PQL	Qual	Units	DF	Test Code	Date Prepared	Date Analyzed	Analyst	Batch ID
Chloride	<2.5	2.5		mg/L	1	EPA300	N/A	5/19/05	TL	IC-5/19/2005
Fluoride	<0.50	0.50		mg/L	1	EPA300	N/A	5/19/05	TL	IC-5/19/2005
Sulfate	<3.0	3.0		mg/L	1	EPA300	N/A	5/19/05	TL	IC-5/19/2005
Nitrate (As N)	<0.50	0.50		mg/L	1	EPA353.2	N/A	5/25/05	TL	NO3_W-5/25/2005
Nitrate-Nitrite (As N)	<0.50	0.50		mg/L	1	EPA353.2	N/A	5/25/05	TL	NO3_W-5/25/2005
Total Dissolved Solids	<10	10		mg/L	1	SM 2540 C	N/A	5/16/05	BJK	TDS_DW-5/17/2005
Nitrite (As N)	<0.020	0.020		mg/L	1	SM 4500-NO2 B	N/A	5/13/05 9:49	KMB	NO2_DW-5/13/2005
Alkalinity, Bicarbonate (As CaCO3)	<20	20		mg/L	1	SM2320 B	N/A	5/18/05	KMB	ALK_W-5/18/2005
Alkalinity, Carbonate (As CaCO3)	<20	20		mg/L	1	SM2320 B	N/A	5/18/05	KMB	ALK_W-5/18/2005
Alkalinity, Hydroxide (As CaCO3)	<20	20		mg/L	1	SM2320 B	N/A	5/18/05	KMB	ALK_W-5/18/2005
Alkalinity, Total (As CaCO3)	<20	20		mg/L	1	SM2320 B	N/A	5/18/05	KMB	ALK_W-5/18/2005
Aluminum	<0.10	0.10		mg/L	1	EPA200.7	5/16/05	5/16/05 15:17	JM	9415
Barium	<0.010	0.010		mg/L	1	EPA200.7	5/16/05	5/16/05 15:17	JM	9415
Boron	<0.10	0.10		mg/L	1	EPA200.7	5/16/05	5/16/05 15:17	JM	9415
Calcium	<1.0	1.0		mg/L	1	EPA200.7	5/16/05	5/16/05 15:17	JM	9415
Chromium	<0.010	0.010		mg/L	1	EPA200.7	5/16/05	5/16/05 15:17	JM	9415
Cobalt	<0.010	0.010		mg/L	1	EPA200.7	5/16/05	5/16/05 15:17	JM	9415
Copper	<0.010	0.010		mg/L	1	EPA200.7	5/16/05	5/16/05 15:17	JM	9415
Iron	<0.10	0.10		mg/L	1	EPA200.7	5/16/05	5/16/05 15:17	JM	9415
Magnesium	<1.0	1.0		mg/L	1	EPA200.7	5/16/05	5/16/05 15:17	JM	9415
Nickel	<0.010	0.010		mg/L	1	EPA200.7	5/16/05	5/16/05 15:17	JM	9415
Potassium	<2.0	2.0		mg/L	1	EPA200.7	5/16/05	5/16/05 15:17	JM	9415
Silica	<0.43	0.43		mg/L	1	EPA200.7	5/16/05	5/16/05 15:17	JM	9415
Silver	<0.0050	0.0050		mg/L	1	EPA200.7	5/16/05	5/16/05 15:17	JM	9415
Sodium	<2.0	2.0		mg/L	1	EPA200.7	5/16/05	5/16/05 15:17	JM	9415
Cadmium	<0.0030	0.0030		mg/L	1	EPA200.7	5/16/05	5/17/05 10:53	JM	9415
Antimony	<0.0030	0.0030		mg/L	1	EPA200.9	N/A	5/16/05	KMB	20095/16/05
Selenium	<0.0030	0.0030		mg/L	1	EPA200.9	N/A	5/17/05	KMB	2009_5/17/2005
Lead	<0.0030	0.0030		mg/L	1	EPA200.9	N/A	5/18/05	KMB	20095/18/2005
Arsenic	<0.0040	0.0040		mg/L	1	EPA200.9	N/A	5/23/05	KMB	20095/23/2005
Thallium	<0.0020	0.0020		mg/L	1	EPA200.9	N/A	5/26/05	KMB	200.9_TL-5/26/2005

Date: 09-Jun-05

License No. AZM133/AZ0133

CLIENT: URS Corporation
Work Order: 0505165
Project: Desert Rock Energy/23444264.33202

QC SUMMARY REPORT

Sample Duplicate

Analyte	Result	PQL	Units	RPD Ref Val	% RPD	RPD Limit	Test Code	Date Prepared	Date Analyzed	Analyst	Qual
Sample ID: **0505117-03AD**	Batch ID: COND_W-5/13/2005										
Client ID:											
Specific Conductance	4260	1.0	µmhos/cm	4280	0%	1	EPA120.1	N/A	5/12/05	SO	
Sample ID: **0505165-03AD**	Batch ID: COND_W-5/13/2005										
Client ID: **12K-320**											
Specific Conductance	502.0	1.0	µmhos/cm	502.0	0%	1	EPA120.1	N/A	5/13/05	SO	
Sample ID: **0505187-01BD**	Batch ID: NO3_W-5/25/2005										
Client ID:											
Nitrate-Nitrite (As N)	3.536	0.50	mg/L	3.540	0%	8	EPA353.2	N/A	5/25/05	TL	
Sample ID: **0505254-02AD**	Batch ID: NO3_W-5/25/2005										
Client ID:											
Nitrate-Nitrite (As N)	<0.50	0.50	mg/L	<0.50	0%	8	EPA353.2	N/A	5/25/05	TL	
Sample ID: **0505165-03AD**	Batch ID: PH_W-5/13/2005										
Client ID: **12K-320**											
Temperature °C.	21.40	N/A	--	21.50	0%	20	EPA150.1	N/A	5/13/05 11:30	SO	
pH	9.306	N/A	--	9.297	0%	20	EPA150.1	N/A	5/13/05 11:30	SO	
Sample ID: **0505165-01AD**	Batch ID: TDS_DW-5/17/2005										
Client ID: **12K-655**											
Total Dissolved Solids	154.0	10	mg/L	156.0	1%	14	SM 2540 C	N/A	5/16/05	BJK	
Sample ID: **0505165-03AD**	Batch ID: TURB_W-5/13/2005										
Client ID: **12K-320**											
Turbidity	<0.02	0.02	NTU	<0.02	0%	4	EPA180.1	N/A	5/13/05 7:55	SO	

TRANSWEST GEOCHEM

Date: 12-Jun-05

License No. AZM133/AZ0133

CLIENT: URS Corporation
Work Order: 0505165
Project: Desert Rock Energy/23444264.33202

QC SUMMARY REPORT

Sample Matrix Spike Duplicate

Analyte	Result	PQL	SPK value	SPK Ref Val	% Rec	Low Limit	High Limit	RPD Ref Val	% RPD	RPD Limit	Qual
Sample ID: 0505165-02A-MSD — Batch ID: IC-5/19/2005 — Test Code: EPA300 — Date Analyzed: 05/19/05 00:00											
Client ID: 12T-633 — Units mg/L — Date Prepared: N/A											
Chloride	24.88	2.5	25.00		100%	80	113	25.2	1%	6	
Fluoride	4.957	0.50	5.000		99%	80	113	5.016	1%	5	
Sulfate	31.04	3.0	30.00	3.445	92%	80	111	31.34	1%	6	
Sample ID: 0505165-02A-MS — Batch ID: IC-5/19/2005 — Test Code: EPA300 — Date Analyzed: 05/19/05 00:00											
Client ID: 12T-633 — Units mg/L — Date Prepared: N/A											
Chloride	25.20	2.5	25.00		101%	80	113				
Fluoride	5.016	0.50	5.000		100%	80	113				
Sulfate	31.34	3.0	30.00	3.445	93%	80	111				
Sample ID: 0505187-01BS — Batch ID: NO3_W-5/25/2005 — Test Code: EPA353.2 — Date Analyzed: 05/25/05 00:00											
Client ID: — Units mg/L — Date Prepared: N/A											
Nitrate-Nitrite (As N)	13.86	1.0	10.00	3.492	104%	90	110				
Sample ID: 0505254-02AS — Batch ID: NO3_W-5/25/2005 — Test Code: EPA353.2 — Date Analyzed: 05/25/05 00:00											
Client ID: — Units mg/L — Date Prepared: N/A											
Nitrate-Nitrite (As N)	5.043	0.50	5.000		101%	90	110				
Sample ID: 0505165-01A-MSD — Batch ID: NO2_DW-5/13/2005 — Test Code: SM 4500-NO2 B — Date Analyzed: 05/13/05 09:49											
Client ID: 12T-655 — Units mg/L — Date Prepared: N/A											
Nitrite (As N)	0.09540	0.020	0.1000		95%	63	130	0.1	5%	6	
Sample ID: 0505165-01A-MS — Batch ID: NO2_DW-5/13/2005 — Test Code: SM 4500-NO2 B — Date Analyzed: 05/13/05 09:49											
Client ID: 12T-655 — Units mg/L — Date Prepared: N/A											
Nitrite (As N)	0.1000	0.020	0.1000		100%	63	130				
Sample ID: 0505094-01ASD — Batch ID: ALK_W-5/18/2005 — Test Code: SM2320 B — Date Analyzed: 05/18/05 00:00											
Client ID: — Units mg/L — Date Prepared: N/A											
Alkalinity, Total (As CaCO3)	281.0	20	167.0	135.7	87%	69	117	277.1	1%	3	
Sample ID: 0505094-01AS — Batch ID: ALK_W-5/18/2005 — Test Code: SM2320 B — Date Analyzed: 05/18/05 00:00											
Client ID: — Units mg/L — Date Prepared: N/A											
Alkalinity, Total (As CaCO3)	277.1	20	167.0	135.7	85%	69	117				

TRANSWEST GEOCHEM

Date: 12-Jun-05

License No. AZM133/AZ0133

CLIENT: URS Corporation
Work Order: 0505165
Project: Desert Rock Energy/23444264.33202

QC SUMMARY REPORT

Sample Matrix Spike

Sample ID: **0505165-03C-MS** Batch ID: 9415 Test Code: EPA200.7 Date Analyzed: 05/16/05 15:46
Client ID: **12K-320** Units mg/L Date Prepared: 5/16/05

Analyte	Result	PQL	SPK value	SPK Ref Val	% Rec	Low Limit	High Limit	RPD Ref Val	% RPD	RPD Limit	Qual
Aluminum	12.36	0.10	11.00		112%	70	130				
Barium	1.118	0.010	1.000	0.03648	108%	70	130				
Boron	1.106	0.10	1.000		111%	70	130				
Calcium	29.63	1.0	26.00	1.075	110%	70	130				
Chromium	1.030	0.010	1.000		103%	70	130				
Cobalt	1.109	0.010	1.000		111%	70	130				
Copper	0.9563	0.010	1.000		96%	70	130				
Iron	0.9642	0.10	1.000		96%	70	130				
Magnesium	27.83	1.0	26.00		107%	70	130				
Nickel	1.057	0.010	1.000		106%	70	130				
Silica	29.55	0.43	10.70	18.29	105%	70	130				
Silver	0.08005	0.0050	0.07500		107%	70	130				

Sample ID: **0505165-03C-MSD** Batch ID: 9415 Test Code: EPA200.7 Date Analyzed: 05/16/05 15:49
Client ID: **12K-320** Units mg/L Date Prepared: 5/16/05

Analyte	Result	PQL	SPK value	SPK Ref Val	% Rec	Low Limit	High Limit	RPD Ref Val	% RPD	RPD Limit	Qual
Aluminum	12.88	0.10	11.00		117%	70	130	12.36	4%	12	
Barium	1.153	0.010	1.000	0.03648	112%	70	130	1.118	3%	9	
Boron	1.154	0.10	1.000		115%	70	130	1.106	4%	12	
Calcium	30.69	1.0	26.00	1.075	114%	70	130	29.63	4%	7	
Chromium	1.075	0.010	1.000		108%	70	130	1.03	4%	7	
Cobalt	1.160	0.010	1.000		116%	70	130	1.109	4%	7	
Copper	0.9826	0.010	1.000		98%	70	130	0.9563	3%	8	
Iron	1.018	0.10	1.000		102%	70	130	0.9642	5%	12	
Magnesium	28.82	1.0	26.00		111%	70	130	27.83	3%	8	
Nickel	1.096	0.010	1.000		110%	70	130	1.057	4%	7	
Silica	30.72	0.43	10.70	18.29	116%	70	130	29.55	4%	13	
Silver	0.08189	0.0050	0.07500		109%	70	130	0.08005	2%	15	

Sample ID: **0505119-04B-MS** Batch ID: 9415 Test Code: EPA200.7 Date Analyzed: 05/16/05 16:36
Client ID: Units mg/L Date Prepared: 5/16/05

Analyte	Result	PQL	SPK value	SPK Ref Val	% Rec	Low Limit	High Limit	RPD Ref Val	% RPD	RPD Limit	Qual
Chromium	1.049	0.010	1.000		105%	70	130				

Sample ID: **0505119-04B-MSD** Batch ID: 9415 Test Code: EPA200.7 Date Analyzed: 05/16/05 16:40
Client ID: Units mg/L Date Prepared: 5/16/05

Analyte	Result	PQL	SPK value	SPK Ref Val	% Rec	Low Limit	High Limit	RPD Ref Val	% RPD	RPD Limit	Qual
Chromium	1.088	0.010	1.000		109%	70	130	1.049	4%	7	

Sample ID: **0505165-03C-MS** Batch ID: 9415 Test Code: EPA200.7 Date Analyzed: 05/16/05 17:55
Client ID: **12K-320** Units mg/L Date Prepared: 5/16/05

Analyte	Result	PQL	SPK value	SPK Ref Val	% Rec	Low Limit	High Limit	RPD Ref Val	% RPD	RPD Limit	Qual
Potassium	27.59	10	25.00		110%	70	130				
Sodium	136.6	10	25.00	113.4	93%	70	130				

TRANSWEST GEOCHEM

Date: 12-Jun-05
License No. AZM133/AZ0133

CLIENT: URS Corporation
Work Order: 0505165
Project: Desert Rock Energy/23444264.33202

QC SUMMARY REPORT
Sample Matrix Spike Duplicate

Sample ID: 0505165-03C-MSD | Batch ID: 9415 | Test Code: EPA200.7 | Date Analyzed: 05/16/05 17:59
Client ID: 12K-320 | Units mg/L | Date Prepared: 5/16/05

Analyte	Result	PQL	SPK value	SPK Ref Val	% Rec	Low Limit	High Limit	RPD Ref Val	% RPD	RPD Limit	Qual
Potassium	27.93	10	25.00		112%	70	130	27.59	1%	13	
Sodium	137.3	10	25.00	113.4	96%	70	130	136.6	1%	8	

Sample ID: 0505165-03C-MS | Batch ID: 9415 | Test Code: EPA200.7 | Date Analyzed: 05/17/05 11:21
Client ID: 12K-320 | Units mg/L | Date Prepared: 5/16/05

Analyte	Result	PQL	SPK value	SPK Ref Val	% Rec	Low Limit	High Limit	RPD Ref Val	% RPD	RPD Limit	Qual
Cadmium	1.103	0.0030	1.000		110%	70	130				

Sample ID: 0505165-03C-MSD | Batch ID: 9415 | Test Code: EPA200.7 | Date Analyzed: 05/17/05 11:25
Client ID: 12K-320 | Units mg/L | Date Prepared: 5/16/05

Analyte	Result	PQL	SPK value	SPK Ref Val	% Rec	Low Limit	High Limit	RPD Ref Val	% RPD	RPD Limit	Qual
Cadmium	1.075	0.0030	1.000		108%	70	130	1.103	3%	7	

Sample ID: 0505165-01C-MSD | Batch ID: 20095/16/05 | Test Code: EPA200.9 | Date Analyzed: 05/16/05 00:00
Client ID: 12T-655 | Units mg/L | Date Prepared: N/A

Analyte	Result	PQL	SPK value	SPK Ref Val	% Rec	Low Limit	High Limit	RPD Ref Val	% RPD	RPD Limit	Qual
Antimony	0.01310	0.0030	0.01500		87%	70	130	0.01283	2%	14	

Sample ID: 0505165-01C-MS | Batch ID: 20095/16/05 | Test Code: EPA200.9 | Date Analyzed: 05/16/05 00:00
Client ID: 12T-655 | Units mg/L | Date Prepared: N/A

Analyte	Result	PQL	SPK value	SPK Ref Val	% Rec	Low Limit	High Limit	RPD Ref Val	% RPD	RPD Limit	Qual
Antimony	0.01283	0.0030	0.01500		86%	70	130				

Sample ID: 0505165-03C-MSD | Batch ID: 2009_5/17/2005 | Test Code: EPA200.9 | Date Analyzed: 05/17/05 00:00
Client ID: 12K-320 | Units mg/L | Date Prepared: N/A

Analyte	Result	PQL	SPK value	SPK Ref Val	% Rec	Low Limit	High Limit	RPD Ref Val	% RPD	RPD Limit	Qual
Selenium	0.01369	0.0030	0.01500		91%	70	130	0.0129	6%	17	

Sample ID: 0505165-03C-MS | Batch ID: 2009_5/17/2005 | Test Code: EPA200.9 | Date Analyzed: 05/17/05 00:00
Client ID: 12K-320 | Units mg/L | Date Prepared: N/A

Analyte	Result	PQL	SPK value	SPK Ref Val	% Rec	Low Limit	High Limit	RPD Ref Val	% RPD	RPD Limit	Qual
Selenium	0.01290	0.0030	0.01500		86%	70	130				

Sample ID: 0505165-03C-MSD | Batch ID: 20095/18/2005 | Test Code: EPA200.9 | Date Analyzed: 05/18/05 00:00
Client ID: 12K-320 | Units mg/L | Date Prepared: N/A

Analyte	Result	PQL	SPK value	SPK Ref Val	% Rec	Low Limit	High Limit	RPD Ref Val	% RPD	RPD Limit	Qual
Lead	0.01384	0.0030	0.01500		92%	70	130	0.01384	0%	13	

Sample ID: 0505165-03C-MS | Batch ID: 20095/18/2005 | Test Code: EPA200.9 | Date Analyzed: 05/18/05 00:00
Client ID: 12K-320 | Units mg/L | Date Prepared: N/A

Analyte	Result	PQL	SPK value	SPK Ref Val	% Rec	Low Limit	High Limit	RPD Ref Val	% RPD	RPD Limit	Qual
Lead	0.01384	0.0030	0.01500		92%	70	130				

Sample ID: 0505165-03C-MSD | Batch ID: 20095/23/2005 | Test Code: EPA200.9 | Date Analyzed: 05/23/05 00:00
Client ID: 12K-320 | Units mg/L | Date Prepared: N/A

Analyte	Result	PQL	SPK value	SPK Ref Val	% Rec	Low Limit	High Limit	RPD Ref Val	% RPD	RPD Limit	Qual
Arsenic	0.01874	0.0040	0.01500		125%	70	130	0.01855	1%	9	

Sample ID: 0505165-03C-MS | Batch ID: 20095/23/2005 | Test Code: EPA200.9 | Date Analyzed: 05/23/05 00:00
Client ID: 12K-320 | Units mg/L | Date Prepared: N/A

Analyte	Result	PQL	SPK value	SPK Ref Val	% Rec	Low Limit	High Limit	RPD Ref Val	% RPD	RPD Limit	Qual
Arsenic	0.01855	0.0040	0.01500		124%	70	130				

TRANSWEST GEOCHEM

Date: 12-Jun-05

License No. AZM133/AZ0133

CLIENT: URS Corporation
Work Order: 0505165
Project: Desert Rock Energy/23444264.33202

QC SUMMARY REPORT

Sample Matrix Spike

Analyte	Result	PQL	SPK value	SPK Ref Val	% Rec	Low Limit	High Limit	RPD Ref Val	% RPD	RPD Limit	Qual
Sample ID: 0505165-01C-MS Client ID: **12T-655**	Batch ID: 200.9_TL-5/26/2005				Test Code: EPA200.9 Units mg/L			Date Analyzed: 05/26/05 00:00 Date Prepared: N/A			
Thallium	0.01697	0.0020	0.01500		113%	70	130				
Sample ID: 0505165-01C-MSD Client ID: **12T-655**	Batch ID: 200.9_TL-5/26/2005				Test Code: EPA200.9 Units mg/L			Date Analyzed: 05/26/05 00:00 Date Prepared: N/A			
Thallium	0.01714	0.0020	0.01500		114%	70	130	0.01697	1%	16	

Date: 09-Jun-05

License No. AZM133/AZ0133

CLIENT: URS Corporation
Work Order: 0505165
Project: Desert Rock Energy/23444264.33202

QC SUMMARY REPORT

Blank Spike

Analyte	Result	PQL	SPK value	SPK Ref Val	% Rec	Low Limit	High Limit	RPD Ref Val	% RPD	RPD Limit	Qual
Sample ID: LCS	Batch ID: IC-5/19/2005				Test Code: EPA300 Units: mg/L			Date Analyzed: 05/19/05 00:00 Date Prepared: N/A			
Chloride	23.40	2.5	25.00		94%	90	110				
Fluoride	4.834	0.50	5.000		97%	90	110				
Sulfate	28.89	3.0	30.00		96%	90	110				
Sample ID: LCS	Batch ID: NO3_W-5/25/2005				Test Code: EPA353.2 Units: mg/L			Date Analyzed: 05/25/05 00:00 Date Prepared: N/A			
Nitrate-Nitrite (As N)	5.190	0.50	5.000		104%	90	110				
Sample ID: LCS	Batch ID: NO2_DW-5/13/2005				Test Code: SM 4500-NO2 B Units: mg/L			Date Analyzed: 05/13/05 09:49 Date Prepared: N/A			
Nitrite (As N)	0.09630	0.020	0.1000		96%	91	112				
Sample ID: LCS	Batch ID: ALK_W-5/18/2005				Test Code: SM2320 B Units: mg/L			Date Analyzed: 05/18/05 00:00 Date Prepared: N/A			
Alkalinity, Total (As CaCO3)	166.7	20	167.0		100%	96	103				
Sample ID: LCS-9415	Batch ID: 9415				Test Code: EPA200.7 Units: mg/L			Date Analyzed: 05/16/05 15:21 Date Prepared: 5/16/05			
Aluminum	11.93	0.10	11.00		108%	85	115				
Barium	1.095	0.010	1.000		110%	85	115				
Boron	1.062	0.10	1.000		106%	85	115				
Calcium	27.45	1.0	26.00		106%	85	115				
Chromium	1.004	0.010	1.000		100%	85	115				
Cobalt	1.076	0.010	1.000		108%	85	115				
Copper	0.9450	0.010	1.000		95%	85	115				
Iron	0.9543	0.10	1.000		95%	85	115				
Magnesium	26.99	1.0	26.00		104%	85	115				
Nickel	1.021	0.010	1.000		102%	85	115				
Potassium	27.08	2.0	25.00		108%	85	115				
Silica	11.19	0.43	10.70		105%	85	115				
Silver	0.07838	0.0050	0.07500		105%	85	115				
Sodium	26.51	2.0	25.00		106%	85	115				

TRANSWEST GEOCHEM

Date: 09-Jun-05

License No. AZM133/AZ0133

CLIENT: URS Corporation
Work Order: 0505165
Project: Desert Rock Energy/23444264.33202

QC SUMMARY REPORT

Blank Spike Duplicate

Analyte	Result	PQL	SPK value	SPK Ref Val	% Rec	Low Limit	High Limit	RPD Ref Val	% RPD	RPD Limit	Qual
Sample ID: LCSD-9415	Batch ID: 9415				Test Code: EPA200.7 Units: mg/L			Date Analyzed: 05/16/05 15:24 Date Prepared: 5/16/05			
Aluminum	12.05	0.10	11.00		110%	85	115	11.93	1%	6	
Barium	1.099	0.010	1.000		110%	85	115	1.095	0%	6	
Boron	1.071	0.10	1.000		107%	85	115	1.062	1%	7	
Calcium	27.80	1.0	26.00		107%	85	115	27.45	1%	7	
Chromium	1.012	0.010	1.000		101%	85	115	1.004	1%	7	
Cobalt	1.082	0.010	1.000		108%	85	115	1.076	1%	7	
Copper	0.9533	0.010	1.000		95%	85	115	0.945	1%	7	
Iron	0.9661	0.10	1.000		97%	85	115	0.9543	1%	8	
Magnesium	27.32	1.0	26.00		105%	85	115	26.99	1%	6	
Nickel	1.036	0.010	1.000		104%	85	115	1.021	1%	7	
Potassium	27.57	2.0	25.00		110%	85	115	27.08	2%	7	
Silica	11.29	0.43	10.70		106%	85	115	11.19	1%	6	
Silver	0.07871	0.0050	0.07500		105%	85	115	0.07838	0%	7	
Sodium	26.51	2.0	25.00		106%	85	115	26.51	0%	7	
Sample ID: LCS-9415	Batch ID: 9415				Test Code: EPA200.7 Units: mg/L			Date Analyzed: 05/17/05 10:56 Date Prepared: 5/16/05			
Cadmium	1.059	0.0030	1.000		106%	85	115				
Sample ID: LCSD-9415	Batch ID: 9415				Test Code: EPA200.7 Units: mg/L			Date Analyzed: 05/17/05 11:00 Date Prepared: 5/16/05			
Cadmium	1.062	0.0030	1.000		106%	85	115	1.059	0%	7	
Sample ID: LCS	Batch ID: 20095/16/05				Test Code: EPA200.9 Units: mg/L			Date Analyzed: 05/16/05 00:00 Date Prepared: N/A			
Antimony	0.01504	0.0030	0.01500		100%	85	115				
Sample ID: LCS	Batch ID: 2009_5/17/2005				Test Code: EPA200.9 Units: mg/L			Date Analyzed: 05/17/05 00:00 Date Prepared: N/A			
Selenium	0.01634	0.0030	0.01500		109%	85	115				
Sample ID: LCS	Batch ID: 20095/18/2005				Test Code: EPA200.9 Units: mg/L			Date Analyzed: 05/18/05 00:00 Date Prepared: N/A			
Lead	0.01563	0.0030	0.01500		104%	85	115				
Sample ID: LCS	Batch ID: 20095/23/2005				Test Code: EPA200.9 Units: mg/L			Date Analyzed: 05/23/05 00:00 Date Prepared: N/A			
Arsenic	0.01468	0.0040	0.01500		98%	85	115				
Sample ID: LCS	Batch ID: 200.9_TL-5/26/2005				Test Code: EPA200.9 Units: mg/L			Date Analyzed: 05/26/05 00:00 Date Prepared: N/A			
Thallium	0.01626	0.0020	0.01500		108%	85	115				

TRANSWEST
GEOCHEM

June 13, 2005

Chris Courtney
URS Corporation
7720 N. 16th St.
Suite 100
Phoenix, AZ 85020

Re: Desert Rock Energy/23444264.33202
Work Order No.: 0505165

Dear Chris,

Attached is the original Report of Analysis from Radiation Safety Engineering, Inc. (AZ0462) for the samples received on 5/12/2005 11:20:00 AM. The following analysis was performed:

Radiochemical Activity in Water (pCi/L) – Gross Alpha

If you have any questions regarding the results, please call me. We appreciate your business and thank you for choosing Transwest Geochem.

Sincerely,

Carlene McCutcheon
Carlene McCutcheon
Project Manager

ADHS License No. AZM133/AZ0133

Radiation Safety Engineering, Inc.

3245 N. WASHINGTON ST. • CHANDLER, ARIZONA 85225-1121 (480) 897-9459
Website: www.radsafe.com FAX (480) 892-5446

Radiochemical Activity in Water (pCi/L)

Transwest Geochem
3725 E. Atlanta Avenue
Suite 2
Phoenix, AZ 85040-2960

Sample Received: May 12, 2005
Analysis Completed: May 25, 2005

Sample ID	Gross Alpha Activity Method 600/00-02 (pCi/L)	Radium 226 Activity Method 903.1 (pCi/L)	Radium 228 Activity Method 904 (pCi/L)	Total Radium (pCi/L)
12T-655	9.8 ± 1.5	< 0.3	< 0.4	<0.4
12T-633	12. ± 1.7	< 0.3	< 0.3	<0.3
12K-320	0.9 ± 0.4	----	----	----

Robert L. Metzger, Ph.D., C.H.P.

Arizona Department of Environmental Quality

Drinking Water Additional Radiochemical Analysis Report

Samples To Be Taken At POE Only

System ID ______ System Name ______

05/11/2005 2:00 Carlene McCutcheon

Sample Date | Sample Time | Owner/Contact Person

POE# ______ Owner/Contact Fax Number ______

COMPLIANCE SAMPLE TYPE

- ☐ Reduced Monitoring — Date Q1 Collected ______
- ☐ Quarterly — Date Q2 Collected ______
- ☐ Composite of four quarterly samples — Date Q3 Collected ______
- Date Q4 Collected ______

*****RADIOCHEMICAL ANALYSIS*****

>>>To be filled out by laboratory personnel<<<

Analysis Method	MCL	Reporting Limit	Contaminant Name	Cont. Code	Analyses Run Date	Result	Exceed MCL
	15 pCi/L		Adjusted Gross Alpha	4000			
600/00-02		3 pCi/L	Gross Alpha	4002	05/18/2005	9.8±1.5	
7500 - Rn			Radon	4004			
00-07	30 μg/L	(reserved)	Combined Uranium	4006			
			Uranium 234	4007			
			Uranium 235	4008			
			Uranium 238	4009			
	5 pCi/L	1 pCi/L	Combined Radium (226,228)	4010	05/19/2005	<0.4	
903.1		1 pCi/L	Radium 226	4020	05/19/2005	< 0.3	
904.0		1 pCi/L	Radium 228	4030	05/16/2005	< 0.4	

*****LABORATORY INFORMATION*****

>>>To be filled out by laboratory personnel<<<

Specimen Number: 12T-655

Lab ID Number: AZ0462 Lab Name: Radiation Safety Engineering, Inc.

Comments: 24813 Authorized Signature: Robert L. Metzger

Date Public Water System Notified: ______

DWAR 6: 2003

Arizona Department of Environmental Quality

Drinking Water Additional Radiochemical Analysis Report

Samples To Be Taken At POE Only

System ID:

System Name:

Sample Date: 05/11/2005

Sample Time: 02:30

Owner/Contact Person: Carlene McCutcheon

Owner/Contact Fax Number: 602-437-0660

POE#:

COMPLIANCE SAMPLE TYPE

- ☐ Reduced Monitoring
- ☐ Quarterly
- ☐ Composite of four quarterly samples

Date Q1 Collected ________

Date Q2 Collected ________

Date Q3 Collected ________

Date Q4 Collected ________

*****RADIOCHEMICAL ANALYSIS*****

>>>To be filled out by laboratory personnel<<<

Analysis Method	MCL	Reporting Limit	Contaminant Name	Cont. Code	Analyses Run Date	Result	Exceed MCL
	15 pCi/L		Adjusted Gross Alpha	4000			
600/00-02		3 pCi/L	Gross Alpha	4002	05/18/2005	12.±1.7	
7500 - Rn			Radon	4004			
00-07	30 μg/L	(reserved)	Combined Uranium	4006			
			Uranium 234	4007			
			Uranium 235	4008			
			Uranium 238	4009			
	5 pCi/L	1 pCi/L	Combined Radium (226,228)	4010	05/19/2005	<0.3	
903.1		1 pCi/L	Radium 226	4020	05/19/2005	< 0.3	
904.0		1 pCi/L	Radium 228	4030	05/19/2005	< 0.3	

*****LABORATORY INFORMATION*****

>>>To be filled out by laboratory personnel<<<

Specimen Number: 12T-633

Lab ID Number: AZ0462 Lab Name: Radiation Safety Engineering, Inc.

Comments: 24814 Authorized Signature: Robert 2. Metzger

Date Public Water System Notified: ________

DWAR 6: 2003

Arizona Department of Environmental Quality
Drinking Water Additional Radiochemical Analysis Report
Samples To Be Taken At POE Only

System ID

System Name

05/11/2005 03:10 Carlene McCutcheon

Sample Date | Sample Time | Owner/Contact Person

602-437-0660

POE#

Owner/Contact Fax Number

COMPLIANCE SAMPLE TYPE

- ☐ Reduced Monitoring
- ☐ Quarterly
- ☐ Composite of four quarterly samples

Date Q1 Collected ______

Date Q2 Collected ______

Date Q3 Collected ______

Date Q4 Collected ______

*****RADIOCHEMICAL ANALYSIS*****
>>>To be filled out by laboratory personnel<<<

Analysis Method	MCL	Reporting Limit	Contaminant Name	Cont. Code	Analyses Run Date	Result	Exceed MCL
	15 pCi/L		Adjusted Gross Alpha	4000			
600/00-02		3 pCi/L	Gross Alpha	4002	05/18/2005	0.9±0.4	
7500 - Rn			Radon	4004			
00-07	30 µg/L	(reserved)	Combined Uranium	4006			
			Uranium 234	4007			
			Uranium 235	4008			
			Uranium 238	4009			
	5 pCi/L	1 pCi/L	Combined Radium (226,228)	4010			
903.1		1 pCi/L	Radium 226	4020			
904.0		1 pCi/L	Radium 228	4030			

*****LABORATORY INFORMATION*****
>>>To be filled out by laboratory personnel<<<

Specimen Number: 12K-320

Lab ID Number: AZ0462 Lab Name: Radiation Safety Engineering, Inc.

Comments: 24815 Authorized Signature: [signature]

Date Public Water System Notified: ______

DWAR 6: 2003

Radiation Safety Engineering, Inc

3245 North Washington Street
Chandler, AZ 85225
5/25/2005

Quality Assurance Report
Work Order: 0505165

Standards

Analysis	Ratio of O/E (O/E ± 2σ)	Acceptable limits
Alpha	0.99	0.85 – 1.15
Beta	NA	0.85 - 1.15
Uranium	NA	0.85 - 1.15
Radon	NA	0.85 – 1.15
Radium-226	0.95	0.85 - 1.15
Radium-228	1.12	0.85 - 1.15
Strontium	NA	0.85 – 1.15
Tritium	NA	0.85 – 1.15

Blanks

Analysis	Observed	Expected	Acceptable
Alpha	<0.2	< 1.0	< 1.0
Beta	NA	< 3.0	< 3.0
Uranium	NA	< 0.8	< 0.8
Radon	NA	< 150	< 200
Radium-226	<0.5	< 0.7	< 0.9
Radium-228	<0.5	< 0.7	< 0.9
Strontium	NA	< 0.8	< 0.9
Tritium	NA	< 400	< 500

NA Not applicable.

Robert L. Metzger
Robert L. Metzger, Ph.D., C.H.P.

TRANSWEST GEOCHEM

CHAIN-OF-CUSTODY

Carlene McCutcheon
3725 E. Atlanta Avenue
Suite 2
Phoenix, AZ 85040
TEL: (602) 437-0330
FAX: (602) 437-0660

Work Order: 0505165

Project: Desert Rock Energy 23444264.33202

Subcontractor:
Radiation Safety
3245 N. Washington Street
Chandler, AZ 85225-1121
TEL: (480) 897-9459
FAX: (480) 892-5446

12-May-05

Client Sample ID	TGI ID	Matrix	Collection Date	Containers	Requested Tests: GROSS ALPHA						
12T-655	01E	Drinking Water	5/11/2005 2:00:00 PM	1	1	24813					
12T-633	02E	Drinking Water	5/11/2005 2:30:00 PM	1	1	24814					
12K-320	03E	Drinking Water	5/11/2005 3:10:00 PM	1	1	24815					

Comments: After analysis, the samples do not need to be returned and can be disposed per your standard laboratory practices. Please provide a QC report, including Method Blank data.

Sample Receipt		
Temperature:	Ambient / Cold	Ice:
Received Intact:		Absent / Present
Custody Seals:		Wet / Blue
Total No. of Containers:		° C.

		Date/Time			Date/Time
Relinquished by:	Katina [illegible]	5/12/05 @ 1502	**Received by:**	P Porguett	5/12/05 15:06
Relinquished by:			**Received by:**		

TRANSWEST GEOCHEM

June 13, 2005

Chris Courtney
URS Corporation
7720 N. 16th St.
Suite 100
Phoenix, AZ 85020

Re: Desert Rock Energy/23444264.33202
Work Order No.: 0505165

Dear Chris,

Attached is the original Report of Analysis from Aquatic Consulting & Testing, Inc. (AZ0003) for the samples received on 5/12/2005 11:20:00 AM. The following analysis was performed:

Method No. SM 2520 B - Salinity

If you have any questions regarding the results, please call me. We appreciate your business and thank you for choosing Transwest Geochem.

Sincerely,

Carlene McCutcheon

Carlene McCutcheon
Project Manager

ADHS License No. AZM133/AZ0133

3725 E. Atlanta Ave. • Suite 2 • Phoenix, Arizona 85040 • (602) 437-0330 • 1-800-927-5183 • Fax (602) 437-0660
3860 S. Palo Verde Rd. • Suite 301 • Tucson, Arizona 85714 • (520) 573-1061 • Fax (520) 573-1063

AQUATIC CONSULTING & TESTING, INC.

1525 W. University Drive, Suite 106
P.O. Box 1510
Tempe, Arizona 85281
Phone: (480) 921-8044 • FAX: (480) 921-0049

Lic. No. AZ0003

LABORATORY REPORT

Client: Transwest Geochem, Inc.
3725 E. Atlanta Avenue, #2
Phoenix, AZ 85040

Date Submitted: 05/12/05
Date Reported: 06/08/05

Attn: Carlene McCutcheon

RESULTS

Client ID: 0505165-01D
ACT Lab No.: BM05028
Sample Type: Groundwater
Sample Time: 05/11/05 14:00

Parameter	Analysis Date Start	Analysis Date End	Method No.	Result	Unit
Conductivity	05/20/05	05/20/05	120.1	255.	umho/cm @ 25 C
Salinity	05/20/05	05/20/05	SM 2520 B	0.2	ppt

Client ID: 0505165-02D
ACT Lab No.: BM05029
Sample Type: Groundwater
Sample Time: 05/11/05 14:30

Parameter	Analysis Date Start	Analysis Date End	Method No.	Result	Unit
Conductivity	05/20/05	05/20/05	120.1	269.	umho/cm @ 25 C
Salinity	05/20/05	05/20/05	SM 2520 B	0.2	ppt

Client ID: 0505165-03D
ACT Lab No.: BM05030
Sample Type: Groundwater
Sample Time: 05/11/05 15:10

Parameter	Analysis Date Start	Analysis Date End	Method No.	Result	Unit
Conductivity	05/20/05	05/20/05	120.1	492.	umho/cm @ 25 C
Salinity	05/20/05	05/20/05	SM 2520 B	0.3	ppt

Reviewed by: Frederick A. Amalfi

Frederick A. Amalfi, Ph.D.
Laboratory Director

QC Report

QC Parameter	Sample Result	Method Blank Result	QCS % Rec	Duplicate Result	Duplicate RPD	Spike Result	Spike % Rec
Batch ID: COND-27765 QC ID: BM05390 Samples: BM05028 BM05029 BM05030							
Conductivity	1130.			1120.	0.889		

CHAIN-OF-CUSTODY

TRANSWEST GEOCHEM

Carlene McCutcheon
3725 E. Atlanta Avenue
Suite 2
Phoenix, AZ 85040
TEL: (602) 437-0330
FAX: (602) 437-0660

Work Order: 0505165

Project: Desert Rock Energy 23444264.33202

Subcontractor:
Aquatic Consulting & Testing, Inc
1525 W. University Drive Suite 106
Tempe, AZ 85281
TEL: (480) 921-8044
FAX: (480) 921-0049

12-May-05

Client Sample ID	TGI ID	Matrix	Collection Date	Containers	Requested Tests: SUBCONTRACT						
12T-655	01D	Groundwater	5/11/2005 2:00:00 PM	1	1		BM05028				
12T-633	02D	Groundwater	5/11/2005 2:30:00 PM	1	1			BM05029			
12K-320	03D	Groundwater	5/11/2005 3:10:00 PM	1	1			BM05030			

Salinity

Comments: After analysis, the samples do not need to be returned and can be disposed per your standard laboratory practices. Please provide a QC report, including Method Blank data.

Sample Receipt		
Temperature:	Ambient / Cold	Ice:
Received Intact:	Yes	Absent / Present
Custody Seals:	NA	Wet / Blue
Total No. of Containers:	3	4 °C.

		Date/Time			Date/Time
Relinquished by:	Katina Quinn	5/12/05 @ 16:08	**Received by:**	A Yarl	5·12·05 1608
Relinquished by:			**Received by:**		

TRANSWEST GEOCHEM

3725 E. Atlanta Ave., Ste 2
Phoenix, Arizona 85040
Phone: (602) 437-0330
Fax: (602) 437-0660

3860 S. Palo Verde Rd., Ste. 301
Tucson, Arizona 85714
Phone: (520) 573-1061
Fax: (520) 573-1063

Chain of Custody

TGI Work Order No: 0505165

Date 5/11/05 Page 1 of 1

Project Manager:	Richard Knox
Client Name:	Site Global Power, LLC
Address:	
City, State ZIP:	
Phone:	
Fax:	

Bill to:	URS Corp., Attn: Chris Courtney
Company:	URS Corp.
Address:	7720 N. 16th Street, Suite 100
City, State ZIP:	Phoenix, AZ
Phone:	480-363-1309
Fax:	480-371-1615

P.O. No.:	23444264.33202
Project Name:	Desert Rock Energy
Project Number:	23444264.33202

SAMPLE RECEIPT

Temperature:	4.3			Ice:
Received Intact:	Yes	No	N/A	Absent / Present
Custody Seals:	Yes	No	N/A	Wet / Blue
Total No. of Containers:	15			

ANALYSIS REQUEST

Sample Identification	Matrix	Date Sampled	Time Sampled	Lab ID	No. of Containers	TPH, 8015AZR.1	BTEX (8021B)	Volatile Organics GCMS (624/8260AZ)	SDWA Volatiles, (524.2)	Semi-Volatile Organics GCMS (625/8270)	Organochlorine Pesticides (608/8081)	PCB's, (8082)	PAH, EPA 8310	8 RCRA Metals	Chloride, Fluoride	Nitrate	Nitrite, pH	TDS, turbidity	Cond., Alkalinity	200.7*	Sulfate	Salinity	Rad Chem		Comments
12T-655	GW	5/11/05	14:00	1	5										X	X	X	X	X	X	X	X	X		* Al, Sb, AS
12T-633	GW	5/11/05	14:30	2	5										X	X	X	X	X	X	X	X	X		Ba, B, Cd
12K-320	GW	5/11/05	15:10	3	5										X	X	X	X	X	X	X	X	X		Ca, Cr, Co
																									Cu, Fe, Pb
																									K, Mg, Na
																									Ni, Se, AG,
																									Si

pH
<2, <2
<2, <2
7, <2

	Relinquished by: (Signature)	(Print Name)	Received by: (Signature)	(Print Name)	Date/Time
1	[signature]	Chris Courtney			
2		Fedex	Carey L Cole	Carey L Cole	5/12/05 1120
3					

FINAL WELL IMPACT REPORT –
REVISION NO. 1

DESERT ROCK ENERGY PROJECT
FOUR CORNERS AREA,
NEW MEXICO

SITHE GLOBAL POWER. LLC.

Prepared by
Chris J. Courtney, R.G., P.G.
Miller Brooks Environmental, Inc.
Job No. 684-0001-0001

October 5, 2006

DRAFT

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LIST OF ACRONYMS

af/yr	acre-feet per year
b	saturated aquifer thickness
cm/sec	centimeters per second
bgs	below ground surface
ft^2	feet squared
ft/d	feet per day
ft/ft	feet per foot
ft^2/d	feet squared per day
gpd	gallons per day
gpd/ft	gallons per day per foot
gpd/ft^2	gallons per day per square foot
gpm	gallons per minute
K	hydraulic conductivity
K_h/K_v	horizontal to vertical conductivity ratio
NNDWR	Navajo Nation Department of Water Resources
NTUA	Navajo Tribe Utilities Authority
URS	URS Corporation
Sithe	Sithe Global Power, LLC.
Sy	Specific Yield
T	Transmissivity
USGS	U.S. Geological Survey

1.0 INTRODUCTION BACKGROUND

Miller Brooks Environmental, Inc. (Miller Brooks) has prepared this report on behalf of Sithe Global Power, LLC (Sithe) for the proposed Desert Rock Power Plant located in the Four Corners Area New Mexico (see Figure 1). This report is based upon a previous study conducted by URS Corporation (URS) in 2005, the results of which are summarized in the report titled *Final Well Impact Report* (2005). This report was prepared to incorporate new geologic and hydrogeologic data within the study area that were not included in the previous study by URS (2005). New data evaluated from the New Mexico Energy, Minerals, and Natural Resources Department (EMNRD) OCD Image Database included 31 oil/gas test well logs obtained by the United States Department of the Interior (EMNRD, 2006). The logs were evaluated to more accurately approximate the depth to the top of and thickness of the Morrison Formation, which is the primary water-bearing formation identified for the withdrawal of groundwater for the Desert Rock Power Plant (URS, 2005).

Miller Brooks also assessed and reconstructed the previous groundwater flow model created by URS (2005) to incorporate the new oil/gas test well data. Other revisions to the model included expansion of the model domain, re-layering and re-contouring the model layers, inserting an additional model layer, modifying aquifer input parameters, and simulating two new alternative well field locations per our revised well field placement recommendation memorandum to Sithe (Miller Brooks, 2006). A series of model simulations were then completed to provide more accurate predictions of impacts associated with the withdrawal of groundwater from the proposed water well fields (see Figure 1).

New and/or revised figures, tables and appendices prepared by Miller Brooks and contained within this report include the following:

<u>New and/or Revised Figures</u>

Figure 1	Site Reference and Well Location Map, Desert Rock Energy Project Study Area
Figure 5	Geologic Cross Section B-B’
Figure 6	Geologic Cross Section C-C’
Figure 7	Geologic Cross Section D-D’
Figure 8	Approximate Depth to Top of the Morrison Formation
Figure 9	Approximate Thickness of the Morrison Formation
Figure 12	Model Boundary Map
Figure 13	Vertical Model Layering – Cross Section A-A’
Figure 14	Vertical Model Layering – Cross Section B-B’

Figure 15	Arial Distribution of Horizontal Conductivity – Model Layer 3
Figure 16	20-Year Predicted Drawdown Impact Map – Proponent's Preferred Alternative Water Well Field B, "Location 1"
Figure 17	40-Year Predicted Drawdown Impact Map – Proponent's Preferred Alternative Water Well Field B, "Location 1"
Figure 18	20-Year Predicted Drawdown Impact Map – Proponent's Preferred Alternative Water Well Field B, "Location 2"
Figure 19	40-Year Predicted Drawdown Impact Map – Proponent's Preferred Alternative Water Well Field B, "Location 2"

New Tables

Table 2	Well Inventory – United States Department of the Interior
Table 5	Geologic Units Summary for Oil and Gas Test Wells Logged by the United States Department of the Interior (Used for Preparing Cross Sections B-B', C-C', and D-D')

New Appendix

Appendix A	Study Area Oil and Gas Test Well Logs, United States Department of the Interior

2.0 STATEMENT OF PURPOSE AND SCOPE

The purpose of this study is to demonstrate that: (1) sufficient groundwater resources appear physically available in the Morrison Formation for the proposed water uses at the proposed Desert Rock Power Plant and (2) to predict the impact, or drawdown, associated with the withdrawal of groundwater from new production wells completed within the Morrison Formation for the life cycle of the plant (40 years). This report describes elements of demand, supply, and impacts associated with the anticipated groundwater withdrawal.

The area evaluated for this study encompasses approximately 1,420 square miles of the San Juan Basin in the northwestern portion of New Mexico, south of Shiprock and Farmington (Figure 1). The average annual water consumption demand of the proposed Desert Rock Power Plant is estimated at 4,950 acre-feet per year (af/yr), or 3,070 gallons per minute (gpm), of continuous flow for a period of 40 consecutive years (Sithe, 2005). The groundwater supply portion of this study includes an evaluation of hydrogeologic conditions to assess the local groundwater resource availability within the Morrison Formation. The impact portion of this study was estimated using the U.S. Geological Survey's (USGS) MODFLOW-96 (Harbaugh and McDonald, 1996), which models groundwater systems in 3-dimension. The MODFLOW-96 code is widely accepted in the hydrogeologic professional community as a valid numerical model to simulate groundwater flow. The graphical interface Groundwater Vistas® (Rumbaugh and Rumbaugh, 1996) was used to generate the drawdown impact contours included in this report. Modifications made by Miller Brooks to the previous groundwater flow model (URS, 2005), as well as the new model drawdown predictions, are also included in this report.

3.0 PROJECTED GROUNDWATER DEMAND

The average water demand for the Desert Rock Energy Project for the first 40 years of operation is calculated to be 4,950 af/yr (equivalent to 3,070 gpm of continuous flow) (Sithe, 2005). This is the volume used in our well impact modeling simulations for the revised well locations, labeled: *Proponent's Preferred Water Well Field B "Location 1,"* and *Proponent's Preferred Water Well Field B "Location 2,"* on the attached Figure 1. Both well field locations were evaluated independently in the revised groundwater flow model and assumed a total of ten new production wells, each pumping at a rate of 307 gpm. This is consistent with the number of wells and flow rate used during the previous modeling analysis (URS, 2005).

4.0 ELEMENTS OF GROUNDWATER SUPPLY

4.1 REGIONAL HYDROGEOLOGIC CONDITIONS

The study area is located in the northwestern portion of the San Juan Basin in Northwestern New Mexico. A map showing the regional geology and major structural features of the San Juan Basin is provided as Figure 2. The San Juan Basin lies on the eastern edge of the Colorado Plateau and extends from northwestern New Mexico into portions of northeastern Arizona along the New Mexico/Arizona border, southwestern Colorado, and the southeastern most corner of Utah. The San Juan Basin is approximately 140 miles wide by 200 miles long, and covers a total area of 21,600 square miles (Dam, et al., 1990) (Figure 2).

The San Juan Basin is a northwest-treading asymmetrical structural depression that formed during the Laramide Orogeny (Late Cretaceous-Early Tertiary) at the eastern edge of the Colorado Plateau. Structural boundaries of the basin consist of large, elongate, domal uplifts; low, marginal platforms; and abrupt monoclines (Kelley, 1951). The most distinctive structural feature in the study area is the Hogback Monocline (see Figure 2), which forms a sharp boundary between the marginal platforms and the central basin. The interior of the basin contains a thick sequence of sedimentary rocks from Cambrian to Tertiary in age, but primarily Pennsylvanian through Tertiary in age. These rocks consist primarily of stacked sequences of sandstone, siltstone, mudstone, limestone, and shale. A generalized stratigraphic sequence of the San Juan Basin is included in Figure 2. These rock sequences dip from the basin margins toward the center of the basin. Older sedimentary rocks outcrop around the basin margins and are successively overlain by younger sedimentary sequences toward the basin center. The maximum stratigraphic thickness of sedimentary rocks in the basin is over 14,000 feet (as recorded in an oil well) at the center of the basin, east of the Hogback Monocline (Fassett and Hinds, 1971).

To illustrate subsurface geology of the project study area, four geologic cross sections are provided as Figures 4 through 7. Cross sections A-A' (Figure 4) (URS, 2005) and B-B' (Figure 5) trend north-south across the project area. Both of these cross sections illustrate the relatively flat subsurface layering of geologic deposits in the project study area. However, as illustrated in the west-east trending cross sections C-C' (Figure 6) and D-D' (Figure 7), the geologic sequences dip steeply downward to the east side of the Hogback Monocline as a result of the structural deformation caused by the monocline.

The primary source of groundwater in the San Juan Basin is derived from wells completed within surficial valley-fill deposits of Quaternary age and sandstones of Tertiary, Cretaceous, Jurassic, and Triassic age (Stone, et al., 1983). Although in less quantities, groundwater is also encountered and has been used historically for uranium mining operations in the San Juan Basin from wells completed in the Morrison Formation and the overlying Dakota Sandstone (Stone, et al., 1983). Groundwater from these two formations also supplies a significant portion of water to drinking water wells in the study area that are owned by the Navajo Nation Department of Water Resources (NNDWR, 2005). Groundwater in sandstone sequences in the San Juan Basin is generally under confined conditions, resulting in an artesian flow from wells completed in these units.

4.2 LOCAL HYDROGEOLOGIC CONDITIONS

Groundwater in the study area is encountered primarily at or near the land surface, under artesian conditions (see Figure 3). Artesian flow from a well occurs when it penetrates an aquifer that is overlain by an impermeable or semi-impermeable unit, such as shale. Under pressure (or confined/semi-confined conditions), that water will rise to the well's *potentiometric surface* without the use of a pump. *Potentiometric surface* is defined as the surface representative of the level to which water will rise in a well cased in the aquifer (Fetter, 1988). Figure 3 provides contours of the potentiometric surface of waters in the Morrison Formation within the study area.

There are three distinct geologic units that supply the majority of groundwater to existing wells completed in the study area (NNDWR, 2005). With increasing depth these include: the Gallup Sandstone, the Dakota Sandstone, and the Morrison Formation. According to NNDWR (2005) records, NNDWR wells located in the study area that are screened within these three geologic units produce the majority of their water from the Morrison Formation (see Figure 1 and Table 4). Within the Morrison Formation, the Westwater Canyon Member (a coarse sequence of sandstone, conglomeritic sandstone, and mudstone) is considered the most productive unit (Stone, et al., 1983) (Dam, et al., 1990).

A revised structural contour map depicting the approximate depth to the top of the Morrison Formation and the approximate thickness of the Morrison Formation are provided as Figures 8 and 9, respectively. The revised maps were generated by incorporating lithologic data from oil/gas test well logs recorded with the United States Department of the Interior (EMNRD, 2006). Copies of those logs are included as Appendix A. Miller Brooks evaluated a total of 31 oil/gas test well logs, 25 of which encountered and/or recorded penetrating (or being drilled through) the bottom of the Morrison Formation.

Based upon the revised contouring, the depth to the top of the Morrison Formation in the study area is between 1,000 and 6,000 feet below ground surface (bgs) (Figure 8), with a relatively uniform estimated thickness ranging from 850 to 1,050 feet (Figure 9). The depth to the Morrison Formation near the proposed Desert Rock Power Plant increases steeply from west to east as it crosses the western edge of the Hogback Monocline (see Figures 6, 7 and 8).

The Morrison Formation was selected as the target aquifer for this well impact analysis because: (1) it has a relatively higher water-bearing potential than the overlying formations in the study area, and (2) withdrawal of groundwater from the Morrison Formation should minimize drawdown to existing wells in the study area. In addition, groundwater within the Morrison Formation is confined to semi-confined by the overlying Mancos Shale, which has a relatively low permeability. Therefore, impacts to wells completed in geologic units above the Mancos Shale (i.e., in the Gallup Sandstone) should be impacted much less than wells completed in geologic units below the Mancos Shale (i.e., the Dakota Sandstone and the Morrison Formation). However, actual drawdown impacts associated with withdrawing groundwater from the proposed well field for the Desert Rock Power Plant cannot be precisely approximated until a test well has been constructed and appropriately tested.

Recharge to the Morrison Aquifer is derived from precipitation infiltration, streamflow infiltration along outcrop areas, and from downward leakage (Dam, et al., 1990). The revised modeling analysis (as well as the previous model constructed by URS, 2005) takes into account downward leakage from the semi-confining geologic unit above the Morrison sediments (see Section 5.2 for more detail).

4.3 EXISITNG WELLS

Existing wells in the study area are presented in Figure 1. Wells shown include those registered with the New Mexico Office of the State Engineer (2005) (wells in red), wells with records maintained by the NNDWR (2005) (wells in blue), and oil/gas test wells recorded by the United States Department of the Interior and maintained by the New Mexico EMNRD (2006) (wells in green). The logs of the new wells evaluated by Miller Brooks in this revised report (oil/gas test wells) are included for reference in Appendix A. Also depicted on Figure 1 is the relative contribution of Morrison Aquifer-derived groundwater to wells completed in portions of the Morrison Formation (where data are available) for wells maintained and recorded by the NNDWR. Well inventory tables showing construction and well use information for wells in the study area are included as Tables 1 through 3. Geologic information compiled from logs kept for NNDWR wells and the oil/gas test wells evaluated in this study are included as Tables 4 and 5, respectively.

4.4 AQUIFER CHARACTERISTICS

The transmissivity (T) of an aquifer describes its ability to transmit groundwater to a pumping well. The T value is dependent upon the hydraulic conductivity (K) and the saturated thickness (b) of the aquifer, and is defined by the relationship T = Kb. Transmissivity is expressed in gallons per day per foot (gpd/ft), or square feet per day (ft^2/d). Hydraulic conductivity is expressed in units of gallons per day per square foot (gpd/ft^2), or feet per day (ft/d).

The most reliable estimates of aquifer transmissivity and hydraulic conductivity are derived from well aquifer test data. In the study area however, aquifer test data are limited. In addition, much of the aquifer test data come from wells that are screened in multiple aquifers and not exclusively the Morrison Formation. Given available historic test data, transmissivity of the Morrison Formation in the study area ranges from 2 to 95 ft^2/d. The K values in the Morrison Formation in the study area range from 0.025 to 0.39 ft/d (Stone, et al., 1983; Riser, et al., 1984; Dam, et al., 1990). A map showing the approximate distribution of transmissivity values for the Morrison Aquifer in the study area is presented in Figure 10.

As documented in the previous *Final Well Impact Report* (URS, 2005), to further evaluate T and K values, URS analyzed data from a step test and a 15-hour constant rate aquifer test conducted in September 2002 at the "Sanostee Wash Well." This well is screened in multiple aquifers, which produce water from the Morrison Formation, the Dakota Sandstone, and the Gallup Sandstone (NNDWR, 2005), with its primary water production coming from the Morrison Formation. This well is located just north of the Little River on the Sanostee Chapter, as shown on Figure 7. Our analysis of the recovery test data resulted in a T value of 69 ft^2/d, and a K value of 0.345 ft/day (K=T/b) (see Figure 11) (Theis, 1935). Although this well is not screened exclusively in the Morrison Formation, the calculated T and K values fall within the published values obtained from other well test data for wells constructed in the Morrison Aquifer, thus providing a useful comparison.

As shown in Figure 6, the revised aquifer thickness (b) of the Morrison Formation in the study area ranges from 850 feet to just over 1,050 feet, and 950 to 1,050 feet in the Proponent's Preferred Alternative Water Well Field B, "Location 1" and "Location 2" analysis (Stone, et al. 1983; Dam, et al., 1990; NNDWR, 2005) (see Figure 9). As previously discussed in Section 1.0, the approximate thickness of the Morrison Formation for this study was revised by incorporating data from oil/gas test well logs (see Table 3 and Appendix A).

4.5 WATER QUALITY

Data collected from numerous oil/gas test wells throughout the San Juan Basin between 1948 and 1986 (kept in the NWIS and Petroleum Information Corporation's databases) were complied and evaluated by Dam, et al., (1990). The number of samples collected, along with the minimum, maximum, and median value for selected chemical constituents from those wells is provided as Table 5. As can be seen in Table 5, water chemistry (for the constituents listed) in the Morrison Formation is quite variable.

To further evaluate water quality in the Desert Rock Energy Project study area, on May 11, 2005, URS and Sithe personnel collected water quality samples from three wells that are documented as producing water from the Morrison Formation (NNDWR, 2005). Wells sampled included 12K-320, 12T-633, and 12T-655 (see Figure 1). Two of the three wells sampled (12T-633 and 12T-655) are domestic drinking water wells owned and operated by the Navajo Tribe Utilities Authority (NTUA) and are located on the Sanostee Navajo Chapter. The third well sampled (12K-320) is a stock irrigation well owned and maintained by NTUA, located approximately ten miles north of the Sanostee Navajo Chapter (NNDWR, 2005) (see Figure 1). The analytical results from that sampling effort are summarized in Table 4. Copies of all laboratory analytical data are provided in Appendix B. Generally speaking, the water sampled is of good quality. No analytes tested were detected above Federal Primary or Secondary Drinking Water standards, and the water appears to be of acceptable quality (for the constituents tested) for use at the proposed Desert Rock Power Plant.

5.0 IMPACT ANALYSIS

5.1 MODEL ASSUMPTIONS

The groundwater model code selected for this study was the USGS's MODFLOW-96 (Harbaugh and McDonald, 1996), with the advanced graphical interface Groundwater Vistas® (Rumbaugh and Rumbaugh, 1996). The MODFLOW-96 code is widely accepted in the hydrogeologic professional community as a valid numerical model to simulate groundwater flow in three dimensions. The graphical interface Groundwater Vistas® (Rumbaugh and Rumbaugh, 1996) was used to generate the drawdown impact contours included in this report. To provide a more accurate simulation of subsurface geology, Miller Brooks utilized the computer program Surfer® (Version 8.0) to digitize and import the bottom elevations of Model Layers 1, 2 and 3. Figure 12 provides a model boundary map, and Figures 13 and 14 depict the revised model in cross section (3-dimensional) view.

The following modifications were made to the previous groundwater flow model (URS, 2005) for this revised well impact report.

- The model domain area was moved to the east, to encompass the Proponent's Preferred Alternative Water Well Field B, "Location 1" and "Location 2" (see Figure 12).
- The total model domain area was increased from 144 square miles with a total of 280 columns, 279 rows, and 78,120 model calculation cells, to 384 square miles with a total of 300 columns, 322 rows, and 289,800 model calculation cells (see Figure 12).
- Grid spacing ranged from 247.5 by 165 feet in the simulated well field area to 990 by 660 feet elsewhere. The previous model (URS, 2005) grid spacing ranged from 100 ft^2 in the simulated well field area to 500 ft^2 elsewhere.
- One additional model layer was added to the revised model for a total of three model layers. The previous model (URS, 2005) had only two model layers. The layers in the revised model represent the following geologic units:
    - Layer 1 (the upper model layer) represents the Mancos Shale and all other geologic units above it. Because the Mancos Shale is relatively thick in the study area (~ 800 feet) and has a relatively low permeability, modeling the geologic units above it would likely have no appreciable

impact on the drawdown simulations for this study and therefore units above the Mancos Shale were not modeled as separate units. Layer 1 was modeled as a semi-confined layer, unchanged from the previous model (URS, 2005). The bottom of Layer 1 was contoured in the revised model as a variable thickness unit, according to the new cross sections included in this report (see Figures 5 through 7). The bottom of Model Layer 1 was computed by taking the revised approximate depth to the top of the Morrison Formation (see Figure 8) and adding the Model Layer 2 uniform thickness (220 feet) to it (see next two bullet items for more). Figures 13 and 14 show a cross section view of the model layers. The previous model (URS, 2005) set a uniform thickness for Layer 1 at 650 feet and was modeled with a flat bottom.

- Layer 2 represents the Dakota Sandstone, which lies above the Morrison Formation in the model domain area (see Figures 5 through 7). This layer was added to the revised model because the Dakota Sandstone has a much higher permeability than the overlying Mancos Shale and also supplies some groundwater to many of the neighboring NNDWR wells (see Table 4) located west of Highway 491. Therefore, Miller Brooks felt it was prudent to simulate the Dakota Sandstone in the revised model, to more accurately predict drawdown from the proposed well fields. Model Layer 2 was assigned a uniform thickness of 200 feet and is based upon the revised cross sections (Figures 5 through 7).

- Layer 3 (the bottom model layer) represents the Morrison Formation, the target water-bearing unit for this study. The Morrison Formation lies beneath the Mancos Shale and the Dakota Sandstone and ranges in thickness in the model domain area from 950 to 1,050 feet (see Figure 9). The previous model (URS, 2005) set a uniform thickness of 1,000 feet for the Morrison Formation (previously Model Layer 2) (URS, 2005) and modeled it with a flat bottom. In the revised model, Miller Brooks digitized and imported the bottom elevation of Model Layer 3 by taking the revised approximate depth to the top of the Morrison Formation (see Figure 8) and adding it to the approximate thickness of the Morrison Formation (see Figure 9) in the model domain area, to derive a variable bottom elevation of Model Layer 3 (see Figures 13 and 14 for model cross section views).

➢ Model Layer 1 – The hydraulic conductivity (K) and horizontal to vertical conductivity ratio (K_h/K_v) of 0.0567 ft/day and 10:1 were unchanged from the previous model (URS, 2005). These values were obtained from the most conservative published values for shale (Spitz and Moreno, 1996), as site-specific values for this unit were unavailable.

- Model Layer 2 – The K value and K_h/K_v ratio were set at 0.3225 ft/day and 2:1, respectively. The K value was obtained by taking the average thickness of the Dakota Sandstone unit (200 feet) and dividing it by the average T value in the model domain area (64.5 ft^2/day). The average T value and K_h/K_v ratio were obtained from the most conservative published values for a medium- to fine-grained sandstone (Spitz and Moreno, 1996), felt to be most representative of the Dakota Sandstone.
- Model Layer 3 – The distinct K "zones" equaling 0.075 and 0.175 ft/day, were input into the model per the K array shown in Figure 15. The K values were obtained by taking median thickness of the Morrison Formation (1,000 feet) and dividing it by the median T values in the model domain area (75 ft^2/day and 125 ft^2/day) (see Figure 10 for T array). The K_h/K_v ratio was changed from a 10:1 to 2:1 ratio based upon our reevaluation of published values for a medium to fine grained sandstone (Spitz and Moreno, 1996).
- The storage coefficient for Layers 1 through 3 was set at 0.00011 (unitless). This value represents the median published values from nine wells tested in the Morrison Aquifer (Dam, et al., 1990), and is unchanged from the previous model values for Layers 1 and 2 (URS, 2005).
- The specific yield (Sy) for Model Layers 1, 2 and 3 were set at 0.03, 0.24 and 0.24 (unitless), respectively. The Sy value from the previous model (URS, 2005) was unchanged for Model Layer 1. The Sy value for Model Layer 3 (Layer 2 in the previous model) was changed from 0.2 to 0.24 (unitless). All values were selected from published values for corresponding geologic units (Spitz and Moreno, 1996).
- Two well fields consisting of 10 equally spaced pumping wells, identified as Proponent's Preferred Alternative Water Well Field B, "Location 1" and "Location 2" (see Figure 12) were input into the revised model. The previous model simulated one well field with 10 equally spaced pumping wells located west of Highway 491 and south of Table Mesa (URS, 2005). Well spacing was unchanged at 0.25 mile.
- The simulated wells are screened entirely and exclusively in the Morrison Formation (Model Layer 3 in the revised model, Model Layer 2 in the previous model). This remains unchanged from the previous model (URS, 2005).
- Each simulated well pumps at a continuous rate of 442,080 gallons per day (gpd), or 307 gpm, for a period of 14,600 consecutive days, or 40 years. This equals the total annualized project demand of 4,950 af/yr (Sithe, 2005), or 3,070 gpm. This rate remains unchanged from the previous model (URS, 2005). Each well field ("Location

1" and "Location 2") was run independently in the revised model to evaluate the impact at both locations separately.

- A specified head boundary was set along the northern and southern model boundaries according to the potentiometric surface contour map compiled for the Morrison Aquifer (Figure 3)[1]. This remains unchanged from the previous model (URS, 2005).
- No boundaries were set along the western and eastern model boundaries to allow the model to create its own east-west flow gradient. The previous model (URS, 2005) had set no flow boundaries along the western and eastern model to prevent an east-west gradient influence on the model. The updated boundary condition should allow for a more realistic simulation of groundwater flow in the modeled area.
- The revised model does not simulate recharge from perennial flow along the reach of the Chaco River in the model area, due to a lack of stream flow gauge data. This remains unchanged from the previous model (URS, 2005).

5.2 MODEL PREDICTIONS

Drawdown predictions following 20 years and 40 years of continuous pumping are graphically presented in Figures 16 through 19 for well field "Location 1" and "Location 2." The drawdown predictions for both locations are as follows:

Proponent's Preferred Alternative Water Well Field B, "Location 1"

Based upon the input assumptions presented in Section 5.1, the maximum cumulative 20-year and 40-year impact resulting from the annual projected withdrawal of 4,950 af/yr, or 3,070 gpm, for "Location 1" is predicted to be 1,425 and 1,520 feet, respectively (see Figures 16 and 17). The maximum drawdown predicted occurs at the center of the simulated pumping wells and decreases with distance from the well centers. The model-predicted 50-foot impact radius extends approximately 4.25 and 6.0 miles, respectively, from the center of the simulated well field (see Figures16 and 17). According to available well set data, there are no water production wells located within the model-predicted 50-foot drawdown contour. The model-predicted drawdown presented in Figures 16 and 17 represents the decline in the potentiometric surface, relative from the land surface.

[1] Regional groundwater declines in the Morrison aquifer were not factored into the specified head boundaries due to insufficient water level data in the study area.

Proponent's Preferred Alternative Water Well Field B, "Location 2"

Based upon the input assumptions presented in Section 5.1, the maximum cumulative 20-year and 40-year impact resulting from the annual projected withdrawal of 4,950 af/yr, or 3,070 gpm, for "Location 2" is predicted to be 1,540 and 1,655 feet, respectively (see Figures 18 and 19). The maximum drawdown predicted occurs at the center of the simulated pumping wells and decreases with distance from the well centers. The model-predicted 50-foot impact radius extends approximately 4.0 and 6.1 miles, respectively, from the center of the simulated well field (see Figures18 and 19). According to available well set data, there are no water production wells located within the model-predicted 50-foot drawdown contour. The model-predicted drawdown presented in Figures 18 and 19 represents the decline in the potentiometric surface relative from the land surface.

6.0 CONCLUSIONS

Our conclusions from this revised well impact study are as follows:

1. Given the assumptions presented herein, our revised modeling analyses predicts a maximum decline in potentiometric surface of 1,655 feet (at Well Field B, “Location 2”) after 40 years of continuous pumping at the Desert Rock Power Plant’s estimated demand requirements (4,950 af/yr, or 3,070 gpm).

Because groundwater occurs under confined conditions, resulting in artesian flow from wells, and the depth to the Morrison Formation is approximately 4,500 feet in both of the modeled well field areas (Well Field B, “Location 1” and “Location 2”) (Figure 8), a decline in potentiometric surface of 1,655 feet bgs is unlikely to de-water the Morrison Formation.

2. Assuming the modeling simulations are representative of actual subsurface conditions, the results of our modeling analysis would indicate that sufficient local groundwater resources are available from the Morrison Aquifer (at the modeled locations) to meet the projected withdrawal demands for the proposed Desert Rock Power Plant for the next 40 years.

The revised model, consistent with the previous version (URS, 2005), incorporates conservative aquifer parameters, thus representing what we believe should represent a worst-case scenario. Our revised analysis also simulates more realistic subsurface conditions than the previous model (URS, 2005) by contouring the major geologic units in the study area using available oil/gas well test data (see Appendix A), and by simulating more realistic groundwater flow boundary conditions. In addition, the revised model includes the addition of one new model layer (Layer 2, which represents the Dakota Sandstone). This new model layer is of significance because the Dakota Sandstone contributes water production to many of the surrounding NNDWR wells (see Table 5).

3. The revised model predicts that there should be no loss greater than 50 feet in the potentiometric surface to existing water production wells in the study area (wells included in Figure 1) after 40 years of continuous pumping from either one of the simulated well fields at the Desert Rock Power Plant’s estimated demand requirements (4,950 af/yr, or 3,070 gpm).

7.0 RECOMMENDATIONS

Based upon the results of this revised well impact study, Miller Brooks makes the following recommendations:

1. Due to the limited aquifer test data from wells screened solely in the Morrison Aquifer in the vicinity of the simulated well fields, Miller Brooks recommends drilling and constructing one large-diameter production well and at a minimum, one adjacent smaller diameter monitor well. Testing would include evaluating local lithology (drill cuttings and geophysical logging) to identify the most productive zones (i.e., secondary flow from fracture zones), long-term aquifer production potentials (from aquifer testing data), and zonal water quality of varying formations (from zonal sampling). The preferred location for well test drilling was previously identified as Proponent's Preferred Alternative Water Well Field B, "Location 1" (Miller Brooks, 2006).

2. The test data obtained from the drilling and testing of the new production well and monitor well should be used to further refine the modeling analysis. In addition to modifying aquifer parameters, wells may be added, removed, repositioned, or modified (i.e., pump rates, screen interval, etc.) in the model. Predictions from the revised model would be more indicative of potentiometric surface drawdown of the Morrison Aquifer than the previous modeling analysis suggests.

3. Water quality data from the current seeps and springs (sampling is currently underway by URS and others) should be compared to available water quality data from the Morrison Formation to determine if there is a geochemical connect or disconnect between spring water and water derived from the Morrison Formation. These data will help determine whether or not there is a hydrologic connection between surface water (seeps and springs) and water derived from the Morrison Formation in the study area.

8.0 REFERENCES

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TABLES

Table 1
Well Inventory - Navajo Nation Department of Water Resources
Desert Rock Energy Project
New Mexico

MAP WELL NO.	WELL ID	OPERATOR	USE	FINISH DATE	TOTAL WELL DEPTH (feet)	DEPTH TO WATER (feet bgs)	CASING DIAMETER 1 (inches)	DEPTH (ft bgs)	CASING DIAMETER 2 (inches)	DEPTH (ft bgs)	CASING DIAMETER 3 (inches)	DEPTH (ft bgs)	CASING DIAMETER 4 (inches)	DEPTH (ft bgs)	DEPTH INTERVAL (ft bgs)	WELL CASING	DEPTH INTERVAL (ft bgs)	WELL CASING	DEPTH INTERVAL (ft bgs)	WELL CASING	DEPTH INTERVAL (ft bgs)	WELL CASING	DEPTH INTERVAL (ft bgs)	WELL CASING
12K-300A	12K-300A	UNKNOWN	UNK	Sep-28	2170	N/A	12.50	0-92	10.00	0-503	8.25	0-1270	6.63	0-1693	1492-1529	Screen	1574-1668	Screen	1693-1717	Blank				
12K-309	12K-309	UNKNOWN	UNK	Sep-40	1640	N/A	8.25	0-40	7.00	40-829	5.00	829-1456	4.00	1456-1570	1570-1640	Blank								
12K-320	12K-320	TRIBE O&M	DOM	Aug-60	1992	ART	10.00	0-826	8.62	826-1340	6.62	1332-1400	6.62	1349-1800	1745-1992	Screen								
12K-357	12K-357	TRIBE O&M	LIV	Jul-57	1464	ART	9.63	0-909	13.75	0-60.5					909-1464	Blank								
12R-84	12R-84	TRIBE O&M	DOM	N/A	1430	75	2.00	N/A	8.00	0-1136					1136-1430	Blank								
12T-508	12T-508	TRIBE O&M	DOM	Jul-59	1172	ART	8.63	0-950	10.00	0-212					950-1172	Blank								
12T-511	12T-511	UNKNOWN	LIV	Oct-59	4274	ART	4.50	0-2000							773-779	Screen	903-909	Screen	1680-1686	Screen	1699-1711	Screen	1781-1799	Screen
12T-519	12T-519	TRIBE O&M	LIV	Oct-60	1287	N/A	8.62	0-271	7.50	270-1035					1035-1287	Blank								
12T-520	12T-520	TRIBE O&M	DOM	Feb-61	1850	ART	16.00	0-46	12.00	0-530	9.62	0-1339	7.00	844-1482	1482-1777	Blank								
12T-548	12T-548	TRIBE O&M	LIV	Mar-27	2013	ART	6.62	0-1062	5.19	1062-1733					1733-2013	Blank								
12T-551	12T-551	TRIBE O&M	LIV	Jul-63	7833	ART	9.62	0-1637							1637-1950	Blank								
12T-587	12T-587	NTUA	DOM	Feb-67	1140	N/A	8.62	0-1140							782-821	Screen	840-850	Screen	900-940	Screen	1080-1090	Screen	1114-1128	Screen
12T-618	12T-618	NTUA	DOM	May-05	1440	N/A	8.62	N/A																
12T-618A	12T-618A	TRIBE O&M	LIV	Jan-81	1447	ART	16.00	0-67	12.62	0-742	8.62	790-1447			720-740	Screen	800-940	Screen	1040-1060	Screen	1180-1210	Screen	1250-1320	Screen
12T-620	12T-620	TRIBE O&M	LIV	Sep-77	2034	ART	2.38	0-1200							1200-2034	Blank								
12T-628	12T-628	TRIBE O&M	DOM	Dec-78	2597	ART	8.62	0-109	2.38	109-1827					1827-2597	Blank								
12T-629	12T-629	TRIBE O&M	LIV	Nov-77	2520	ART	2.38	0-1764							1764-2511	Blank								
12T-630	12T-630	TRIBE O&M	LIV	Nov-77	2300	ART	2.38	0-1512							1512-2300	Blank								
12T-632	12T-632	TRIBE O&M	LIV	Oct-77	2518	ART	6.63	0-200	2.00	0-1750					1743-2518	Blank								
12T-633	12T-633	NTUA	MUN	Oct-77	2125	ART	2.38	0-1512	6.62	0-17					1512-2125	Blank								
12T-634	12T-634	TRIBE O&M	DOM	Nov-77	1908	ART	6.62	0-200	2.37	0-1407					1407-1908	Blank								
12T-635	12T-635	TRIBE O&M	LIV	Oct-77	2108	N/A	6.62	0-35	2.37	35-1176					1176-2108	Blank								
12T-640	12T-640	TRIBE O&M	LIV	Dec-77	2349	N/A	2.00	0-1491	6.25	0-120					1491-2349	Blank								
12T-643	12T-643	TRIBE O&M	DOM	Jul-78	1632	N/A	2.37	0-1323	6.60	2-101					1323-1632	Blank								
12T-644	12T-644	TRIBE O&M	LIV	Jul-78	1912	0	2.00	0-1386							1386-1912	Blank								
12T-646	12T-646	TRIBE O&M	UNK	Jul-78	1748	N/A	2.38	0-1281	6.62	0-79					1281-1748	Blank								
12T-647	12T-647	TRIBE O&M	LIV	Aug-78	1912	46	2.37	0-1407	6.88	0-85					1407-1912	Blank								
12T-649	12T-649	TRIBE O&M	LIV	Aug-78	2047	N/A	2.75	0-1595	6.62	0-96					1575-2047	Blank								
12T-651	12T-651	TRIBE O&M	LIV	Aug-78	1691	N/A	6.62	0-96	2.37	96-1281					1281-1691	Blank								
12T-654	12T-654	TRIBE O&M	UNK	Sep-78	1656	0	2.38	0-1302	6.63	0-92					1302-1656	Blank								
12T-703	12T-703	TRIBE O&M	LIV	N/A	1940	N/A	N/A	0-1940							180-460	Screen	830-940	Screen	1140-1400	Screen	1520-1940	Screen		
13K-207	13K-207	TRIBE O&M	LIV	Sep-52	1165	429	6.00	0-885							885-1120	Blank								
13P-522	13P-522	TRIBE O&M	DOM	Aug-73	5250	N/A	20.00	0-100	5.50	0-5000					5000-5250	Blank								
13T-514	13T-514	TRIBE O&M	DOM	Oct-68	1368	263	6.62	0-1337	10.75	0-42					450-460	Screen	484-498	Screen	660-666	Screen	1040-1042	Screen	1337-1368	Blank
BRNHM WSW1	BRNHM WSW1	EPNG	LIV	Aug-73	5250	702	20.00	0-100	5.50	0-5000					5000-5250	Blank								

Data Source: Navajo Nation Department of Water Resource, Water Management Branch Well Database-April 2005

Table adapted from the *Final Well Impact Report* (URS, 2005)

Abbreviations:
ART = Artesian (flow encountered above ground surface)
ft bgs = feet below ground surface
N/A = Not Available

Use Codes:
DOM Domestic
LIV Livestock
MUN Municipal

Table 2
Well Inventory - U.S. Department of the Interior
Desert Rock Energy Project, New Mexico

MAP WELL NO.	WELL ID	OPERATOR	USE	TWS	RNG	SEC	Q	Q2	Q3	FINISH DATE	TOTAL WELL DEPTH (ft bgs)	DEPTH TO Morrison (ft bgs)	Thickness of Morrison (ft)
9241	I-149-Ind-9241	N/A	EXP	25N	15W	28				3/23/1955	10020	4540	938
9239	I-149-Ind-9239	N/A	EXP	25N	16W	4				6/12/1957	10100	4703	929
6375	14-20-0603-6375	N/A	EXP	28N	16W	27				9/7/1961	3956	NE	NE
2023	14-20-0603-2203	N/A	EXP	29N	15W	18				11/27/1963	11133	4838	874
512	14-20-603-512	N/A	EXP	26N	19W	30				1/15/1957	7136	910	1062
8103	14-20-0603-8103	N/A	EXP	26N	18W	27				6/5/1974	6355	970	1030
2070	14-20-603-2070	N/A	EXP	26N	17W	11				12/22/1957	4830	4750	UTC
736	14-20-603-736	N/A	EXP	26N	15W	14				11/16/1956	5388	5386	UTC
741	14-20-603-741	N/A	EXP	26N	14W	34				11/23/1962	11282	5938	924
7267	14-20-0603-7267	N/A	EXP	28N	19W	27				7/27/1963	7715	1215	857
1043	14-20-603-1043	N/A	EXP	28N	17W	27				12/21/1956	1690	1677	UTC
6367	14-20-603-6367	N/A	EXP	27N	16W	9				1/17/1962	4737	NE	NE
2203	14-20-603-2203	N/A	EXP	27N	14W	4				11/27/1961	5887	5835	UTC
8461	I-149-Ind-8461	N/A	EXP	28N	17W	34				10/18/1955	1692	1672	UTC
57	I-89-Ind-57	N/A	EXP	27N	17W	3				11/29/1961	7114	1552	1063
58	I-89-Ind-58	N/A	EXP	29N	16W	19				6/16/1958	7036	960	1055
8185	I-149-Ind-8185	N/A	EXP	29N	17W	12				9/15/1954	7215	1088	1047
5035	14-20-603-5035	N/A	EXP	26N	18W	17				12/26/1963	6694	993	952
5019	14-60-603-5019	N/A	EXP	26N	18W	9				6/22/1966	6500	1075	1025
5263	14-20-603-5263	N/A	EXP	26N	16W	36				8/7/1963	4820	4808	UTC
2165	14-20-603-2165	N/A	EXP	24N	17W	1				5/21/1962	4335	4308	UTC
2079	14-20-603-2079	N/A	EXP	27N	15W	12				5/17/1962	5020	NE	NE
6378	14-20-603-6378	N/A	EXP	28N	16W	13				4/16/1964	4360	NE	NE
2013	14-20-603-2013	N/A	EXP	28N	15W	23				7/27/1962	4716	NE	NE
2206	14-20-603-2206	N/A	EXP	28N	14W	22				6/9/1959	5904	5884	UTC
2024	14-20-603-2024	N/A	EXP	29N	16W	23				10/13/1964	4212	4160	UTC
5024	14-20-603-5024	N/A	EXP	29N	17W	31				6/12/1980	7300	1546	1068
2173	14-20-603-2173	N/A	EXP	24N	14W	6				10/14/1957	5311	5243	UTC
6723	I-149-Ind-6723	N/A	EXP	29N	17W	25				8/10/1956	7300	1225	1073
2202	14-20-603-2202	N/A	EXP	24N	17W	5				3/1/1959	3815	NE	NE
744	14-20-603-744	N/A	EXP	25N	14W	3				4/22/1960	5913	5908	UTC

Data Source: New Mexico Energy, Minerals, and Natural Resources Department OCD Image Database, 2006.

Note: Duplicate wells, and wells with no completion date or a completion depth are excluded from this table and the well location map.

Table adapted from the *Final Well Impact Report* (URS, 2005)

Footnotes:

ft bgs = feet below ground surface

NE = Not Encountered

UTC = Unable to Calculate

Use Codes:

EXP Exploration Wells

Table 3
Well Inventory - New Mexico Office of the State Engineer
Desert Rock Energy Project, New Mexico

MAP WELL NO.	WELL ID	OPERATOR	USE	TWS	RNG	SEC	Q	Q2	Q3	FINISH DATE	TOTAL WELL DEPTH (ft bgs)	DEPTH TO WATER (ft bgs)
1	SJ 00027	N/A	NOT	29N	15W	1	1	2	3	10/17/1950	1005	ART
17	SJ 00226	N/A	DOM	29N	14W	7	1	1	3	5/20/1977	100	50
19	SJ 00248	N/A	DOM	29N	16W	4	3	4	3	4/23/1977	35	10
21	SJ 00257	N/A	DOM	29N	16W	3	2	2	3	4/25/1978	32	20
22	SJ 00258	N/A	SAN	29N	16W	3	2	2	4	4/26/1978	34	20
23	SJ 00264	N/A	STK	29N	16W	9	0	0		5/2/1977	35	10
24	SJ 00291	N/A	DOM	29N	15W	12	2	1		8/11/1977	0	110
27	SJ 00357	N/A	DOM	29N	16W	4	4	2	2	6/22/1977	45	29
29	SJ 00373	N/A	DOM	29N	16W	4	2	0		6/25/1977	55	30
30	SJ 00376	N/A	DOM	29N	14W	8	4	4	4	8/19/1977	80	50
31	SJ 00417	N/A	DOM	29N	14W	17	2	3	1	8/4/1977	38	7
32	SJ 00418	N/A	DOM	29N	14W	17	2	3	1	8/11/1977	35	7
33	SJ 00437	N/A	DOM	26N	18W	10	2	1	1	8/18/1977	2063	ART
34	SJ 00451	N/A	DOM	29N	14W	7	4	1	3	9/7/1977	39	24
35	SJ 00465	N/A	DOM	26N	18W	35	3	1	3	9/8/1977	2034	ART
37	SJ 00477	N/A	STK	25N	18W	7	2	1	2	9/16/1977	2125	ART
39	SJ 00521	N/A	STK	29N	17W	21	1	4	2	11/2/1977	2300	ART
41	SJ 00522	N/A	STK	29N	17W	23	3	1	2	11/3/1977	2520	ART
46	SJ 00754	N/A	STK	26N	18W	4	3	2	2	7/26/1978	1748	ART
48	SJ 00778	N/A	STK	26N	18W	33	3	1	1	8/3/1978	1912	ART
49	SJ 00780	N/A	STK	26N	18W	19	3	4	4	8/3/1978	2047	ART
50	SJ 00781	N/A	STK	26N	18W	14	3	1	1	8/7/1978	1728	ART
52	SJ 00782	N/A	STK	25N	18W	17	3	1	1	8/8/1978	1691	ART
54	SJ 00783	N/A	STK	26N	18W	14	3	4	4	8/5/1978	2211	ART
56	SJ 00788	N/A	DOM	29N	14W	8	4	4		5/2/1979	100	70
57	SJ 00793	N/A	STK	26N	18W	5	4	3	2	9/4/1978	1656	ART
59	SJ 00815	N/A	MON	30N	15W	27	4	3	3	10/17/1978	231	ART
60	SJ 00815	N/A	MON	30N	15W	22	3	3	4	10/14/1978	240	ART
71	SJ 00846	N/A	MON	25N	15W	28	2	1		4/11/1979	593	50
72	SJ 00846	N/A	MON	25N	15W	28	2	1		4/26/1979	593	50
73	SJ 00861	N/A	DOM	29N	16W	2	1	2		3/31/1947	21	10
74	SJ 00862	N/A	DOM	29N	16W	2	1	1		2/28/1970	257	25
75	SJ 00863	N/A	DOM	30N	16W	36	3	3		5/31/1945	45	35
76	SJ 00864	N/A	DOM	29N	16W	2	1	2		3/31/1974	21	10
77	SJ 00865	N/A	DOM	29N	16W	2	1	1		8/31/1960	45	30
78	SJ 00866	N/A	IRR	30N	16W	36	3	1		3/31/1974	90	60
79	SJ 00876	N/A	DOM	30N	16W	35	2	4		6/30/1979	77	57
82	SJ 00931	N/A	DOM	29N	15W	4	3	4		4/25/1979	44	22
84	SJ 00944	N/A	DOM	30N	14W	3	1	3		6/6/1979	61	5
85	SJ 00947	N/A	DOM	29N	14W	8	0	0		5/18/1979	370	275
97	SJ 01016	N/A	DOM	29N	15W	11	3	4		7/22/1979	25	4
98	SJ 01034	N/A	DOM	29N	14W	18	2	2	1	11/12/1979	28	16
100	SJ 01136	N/A	DOM	29N	15W	12	2	2		3/26/1980	150	40
102	SJ 01223	N/A	DOM	29N	15W	13	2	4		7/21/1980	30	12
103	SJ 01237	N/A	DOM	29N	15W	6	4	1	4	8/7/1980	30	14
106	SJ 01259	N/A	DOM	29N	14W	17	1	0		9/9/1980	31	3
107	SJ 01266	N/A	STK	26N	18W	15	3	2	2	8/25/1980	N/A	N/A
111	SJ 01407	N/A	DOM	29N	14W	6	3	3	3	7/5/1981	70	52
112	SJ 01568	N/A	DOM	29N	14W	7	1	1		5/24/1982	72	30
113	SJ 01569	N/A	SAN	29N	15W	11	1	2		5/27/1982	60	45
117	SJ 01883	N/A	DOM	29N	14W	6	2	3		9/5/1984	75	30
119	SJ 02010	N/A	DOM	29N	15W	11	1	3		11/9/1985	25	9
122	SJ 02036	N/A	DOM	29N	14W	7	4	0		4/22/1986	62	15
123	SJ 02055	N/A	DOM	29N	14W	5	1	1		5/12/1987	150	90
125	SJ 02063	N/A	DOM	29N	15W	11	1	3		6/17/1986	26	ART
126	SJ 02071	N/A	DOM	29N	15W	12	1	1	2	10/30/1986	51	32
129	SJ 02081	N/A	DOM	29N	15W	12	1	1	2	11/11/1986	42	30
130	SJ 02143	N/A	DOM	29N	14W	17	1	2	4	1/29/1988	36	26

Table 3
Well Inventory - New Mexico Office of the State Engineer
Desert Rock Energy Project, New Mexico

MAP WELL NO.	WELL ID	OPERATOR	USE	TWS	RNG	SEC	Q	Q2	Q3	FINISH DATE	TOTAL WELL DEPTH (ft bgs)	DEPTH TO WATER (ft bgs)
131	SJ 02165	N/A	DOM	29N	15W	11	1	1	1	3/5/1988	40	25
136	SJ 02375	N/A	DOM	29N	15W	12	3	2		1/18/1993	38	8
137	SJ 02392	N/A	PUB	30N	16W	35	2	4		8/10/1992	133	ART
138	SJ 02639	N/A	DOM	29N	14W	7	3	3	4	6/14/1995	18	6
141	SJ 02790	N/A	DOM	29N	14W	18	2	2	4	N/A	40	ART
142	SJ 02927	N/A	DOM	29N	14W	6	2	3	2	5/3/1999	150	ART
143	SJ 02976	N/A	DOM	29N	15W	11	3	2	3	1/24/2000	29	8
144	SJ 02999	N/A	DOM	29N	14W	17	1	4	1	8/22/2000	42	28
145	SJ 03012	N/A	DOM	29N	16W	2	1	4	1	6/22/2000	27	12
146	SJ 03015	N/A	DOM	30N	16W	35	4	3	4	6/22/2000	43	17
147	SJ 03074	N/A	DOM	29N	14W	9	1	3	1	N/A	70	ART
148	SJ 03139	N/A	DOM	29N	16W	1	1	4	2	N/A	45	ART
149	SJ 03232	N/A	DOM	30N	16W	35	4	3	2	N/A	40	ART

Data Source: New Mexico Office of the State Engineer, Water Administration and Technical Engineering Resource System (W.A.T.E.R.S.) GIS Database, updated 3/17/03

Note: Duplicate wells, and wells with no completion date or a completion depth are excluded from this table and the well location map.

Table adapted from the *Final Well Impact Report* (URS, 2005)

Footnotes:

ART = Artesian (flow encountered above ground surface)
ft bgs = feet below ground surface
N/A = Not Available

Use Codes:

DOM Domestic one household
IRR Irrigation
MON Monitoring well
NOT No use of right or pod
PUB Construction of public works
SAN Sanitary in conjuction with a commercial use
STK Livestock watering

Table 4
Geologic Units Summary for Water Wells Logged by the Navajo Nation Department of Water Resources
(Used for Preparing Cross Section A-A')
Desert Rock Energy Project, New Mexico

Well No.	Common Formation Name	Lithology	Depth to Top of unit (ft bgs)	Depth to Bottom of unit (ft bgs)	Unit Thickness (feet)	Contribution to Well Production[A]	Thickness of Morrison Formation (feet)[B]	Thickness of Westwater Canyon Member (feet)[B]
12K-300A	DAKOTA	SANDSTONE	1080	1210	**130**	S		
	MORRISON	SANDSTONE/SHALE	1210	1717	**507**	P	**>507**	**NE**
12K-309	MANCOS	SHALE	0	662	**662**	N		
	GALLUP	SANDSTONE	662	698	**36**	N		
	MANCOS	SHALE	698	1502	**804**	N		
	DAKOTA	SANDSTONE/SHALE	1502	NR	**??**	P	**NE**	**NE**
12K-320	MANCOS	SHALE	0	460	**460**	N		
	GALLUP	SANDSTONE	460	540	**80**	N		
	MANCOS	SHALE	540	1300	**760**	N		
	DAKOTA	SANDSTONE/SHALE	1300	1470	**170**	S		
	BRUSHY BASIN	SANDSTONE/SHALE	1470	1530	**60**	P		
	MORRISON	SANDSTONE/SHALE	1530	1985	**455**	P		
	BLUFF	SANDSTONE	1985	NR	**??**	N	**>515**	**NE**
12K-357	DAKOTA	SANDSTONE	1370	NR		P	**NE**	**NE**
12R-84	DAKOTA	SANDSTONE	880	1130	**250**	U		
	MORRISON	SANDSTONE/SHALE	1130	NR	**??**	U	**UTC**	**NE**
12T-508	MANCOS	SHALE	20	100	**80**	N		
	GALLUP	SANDSTONE	100	185	**85**	N		
	MANCOS		185	955	**770**	N		
	DAKOTA	SANDSTONE	955	1114	**159**	P		
	BRUSHY BASIN	SANDSTONE/SHALE	1114	NR	**??**	S	**UTC**	**NE**

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Table 4
Geologic Units Summary for Water Wells Logged by the Navajo Nation Department of Water Resources
(Used for Preparing Cross Section A-A')
Desert Rock Energy Project, New Mexico

Well No.	Common Formation Name	Lithology	Depth to Top of unit (ft bgs)	Depth to Bottom of unit (ft bgs)	Unit Thickness (feet)	Contribution to Well Production[A]	Thickness of Morrison Formation (feet)[B]	Thickness of Westwater Canyon Member (feet)[B]
12T-511	ALLUVIUM	SAND/GRAVEL	0	20	**20**	N		
	MENEFEE	SANDSTONE/SHALE	20	2006	**1986**	P		
	POINT LOOKOUT	SANDSTONE/SHALE	2006	2275	**269**	N		
	MANCOS UPPER	SHALE	2275	3175	**900**	N		
	GALLUP	SANDSTONE	3175	3382	**207**	N		
	MANCOS LOWER	SHALE	3382	4112	**730**	N		
	DAKOTA	SANDSTONE/SHALE	4112	NR	**??**	N	**NE**	**NE**
12T-519	DAKOTA	SANDSTONE	1025	1255	**230**	P		
	MORRISON	SANDSTONE/SHALE	1255	NR	**??**	S	**UTC**	**NE**
12T-520	ALLUVIUM	SAND/GRAVEL	0	30	**30**	N		
	MANCOS UPPER	SHALE	30	248	**218**	N		
	GALLUP	SANDSTONE	248	330	**82**	N		
	MANCOS LOWER	SHALE	330	895	**565**	N		
		SHALE	895	1015	**120**	N		
	DAKOTA	SANDSTONE/SHALE	1015	1180	**165**	N		
	BRUSHY BASIN	MUDSTONE	1180	1342	**162**	N		
	WESTWATER CANYON	SANDSTONE	1342	1485	**143**	S		
	RECAPTURE	SILTSTONE	1485	1610	**125**	S		
	SALTWASH	SILTSTONE	1610	1760	**150**	P		
	BLUFF	SANDSTONE	1760	1795	**35**	U		
	SUMMERVILLE	SANDSTONE/SHALE	1795	NR	**??**	N	**615**	**143**
	MANCOS	SHALE	710	821	**111**	N		

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Table 4
Geologic Units Summary for Water Wells Logged by the Navajo Nation Department of Water Resources
(Used for Preparing Cross Section A-A')
Desert Rock Energy Project, New Mexico

Well No.	Common Formation Name	Lithology	Depth to Top of unit (ft bgs)	Depth to Bottom of unit (ft bgs)	Unit Thickness (feet)	Contribution to Well Production[A]	Thickness of Morrison Formation (feet)[B]	Thickness of Westwater Canyon Member (feet)[B]
12T-548	DAKOTA	SANDSTONE	821	1024	**203**	P		
	MORRISON	SANDSTONE/SHALE	1024	NR	**??**	P	**UTC**	**NE**
12T-551	MANCOS	SHALE	0	1410	**1410**	N		
	DAKOTA	SANDSTONE	1410	1580	**170**	N		
	BRUSHY BASIN	SANDSTONE/SHALE	1580	1785	**205**	N		
	WESTWATER CANYON	SANDSTONE	1785	2083	**298**	P		
	RECAPTURE	SILTSTONE	2083	NR	**??**	N	**>503**	**298**
12T-587	MENEFEE	SANDSTONE/SHALE	0	1052	**1052**	P		
	POINT LOOKOUT	SANDSTONE/SHALE	1052	NR	**??**	S	**NE**	**NE**
12T-618A	MENEFEE	SANDSTONE/SHALE	0	1274	**1274**	S		
	POINT LOOKOUT	SANDSTONE/SHALE	1274	NR	**??**	P	**NE**	**NE**
12T-620	MANCOS	SHALE	5	800	**795**	N		
	DAKOTA	SANDSTONE/SHALE	800	1040	**240**	N		
	BRUSHY BASIN	SANDSTONE/SHALE	1040	1175	**135**	N		
	WESTWATER CANYON	SANDSTONE	1175	1390	**215**	P		
	RECAPTURE	SANDSTONE/SHALE	1390	1960	**570**	S	**>920**	**215**

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Table 4
Geologic Units Summary for Water Wells Logged by the Navajo Nation Department of Water Resources
(Used for Preparing Cross Section A-A')
Desert Rock Energy Project, New Mexico

Well No.	Common Formation Name	Lithology	Depth to Top of unit (ft bgs)	Depth to Bottom of unit (ft bgs)	Unit Thickness (feet)	Contribution to Well Production[A]	Thickness of Morrison Formation (feet)[B]	Thickness of Westwater Canyon Member (feet)[B]
12T-628	MANCOS UPPER	SHALE	0	615	**615**	N		
	GALLUP	SANDSTONE/SHALE	615	785	**170**	N		
	MANCOS LOWER	SHALE	785	1460	**675**	N		
	DAKOTA	SANDSTONE/SHALE	1460	1605	**145**	N		
	BRUSHY BASIN	SANDSTONE/SHALE	1605	1810	**205**	N		
	WESTWATER CANYON	SANDSTONE	1810	2150	**340**	P		
	RECAPTURE	SANDSTONE/SHALE	2150	NR	**??**	S	**>545**	**340**
12T-629	MANCOS UPPER	SHALE	0	460	**460**	N		
	GALLUP	SANDSTONE/SHALE	460	720	**260**	N		
	MANCOS LOWER	SHALE	720	1290	**570**	N		
	DAKOTA	SANDSTONE/SHALE	1290	1508	**218**	N		
	BRUSHY BASIN	SANDSTONE/SHALE	1508	1710	**202**	S		
	WESTWATER CANYON	SANDSTONE	1710	1928	**218**	P		
	RECAPTURE	SANDSTONE/SHALE	1928	NR	**??**	S	**>420**	**218**

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Table 4
Geologic Units Summary for Water Wells Logged by the Navajo Nation Department of Water Resources
(Used for Preparing Cross Section A-A')
Desert Rock Energy Project, New Mexico

Well No.	Common Formation Name	Lithology	Depth to Top of unit (ft bgs)	Depth to Bottom of unit (ft bgs)	Unit Thickness (feet)	Contribution to Well Production[A]	Thickness of Morrison Formation (feet)[B]	Thickness of Westwater Canyon Member (feet)[B]
12T-630	MANCOS UPPER	SHALE	0	250	**250**	N		
	GALLUP	SANDSTONE/SHALE	250	470	**220**	N		
	MANCOS LOWER	SHALE	470	1070	**600**	N		
	DAKOTA	SANDSTONE	1070	1330	**260**	N		
	BRUSHY BASIN	SANDSTONE/SHALE	1330	1478	**148**	N		
	WESTWATER CANYON	SANDSTONE	1478	1745	**267**	S		
	RECAPTURE	SANDSTONE/SHALE	1745	2124	**379**	S		
	SALTWASH	SANDSTONE/SHALE	2124	2222	**98**	S		
	BLUFF	SANDSTONE	2222	NR	**??**	S	**>892**	**267**
12T-632	MANCOS UPPER	SHALE	0	418	**418**	N		
	GALLUP	SANDSTONE	418	570	**152**	N		
	MANCOS LOWER	SHALE	570	1370	**800**	N		
	DAKOTA	SANDSTONE	1370	1546	**176**	N		
	BRUSHY BASIN	SANDSTONE/SHALE	1546	1890	**344**	S		
	WESTWATER CANYON	SANDSTONE	1890	2100	**210**	P		
	RECAPTURE	SANDSTONE/SHALE	2100	2443	**343**	S		
	BLUFF	SANDSTONE	2443	NR	**??**	U	**>897**	**210**

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Table 4
Geologic Units Summary for Water Wells Logged by the Navajo Nation Department of Water Resources
(Used for Preparing Cross Section A-A')
Desert Rock Energy Project, New Mexico

Well No.	Common Formation Name	Lithology	Depth to Top of unit (ft bgs)	Depth to Bottom of unit (ft bgs)	Unit Thickness (feet)	Contribution to Well Production[A]	Thickness of Morrison Formation (feet)[B]	Thickness of Westwater Canyon Member (feet)[B]
12T-633	GALLUP	SANDSTONE	0	59	**59**	N	**>850**	**277**
	MANCOS LOWER	SHALE	59	895	**836**	N		
	DAKOTA	SANDSTONE	895	1080	**185**	N		
	BRUSHY BASIN	SANDSTONE/SHALE	1080	1270	**190**	S		
	WESTWATER CANYON	SANDSTONE	1270	1547	**277**	P		
	RECAPTURE	SANDSTONE/SHALE	1547	1930	**383**	S		
	BLUFF	SANDSTONE	1930	NR	**??**	S		
12T-634	MANCOS LOWER	SHALE	375	918	**543**	N	**>495**	**150**
	DAKOTA	SANDSTONE	918	1030	**112**	N		
	BRUSHY BASIN	SANDSTONE/SHALE	1030	1375	**345**	N		
	WESTWATER CANYON	SANDSTONE	1375	1525	**150**	P		
	RECAPTURE	SANDSTONE/SHALE	1525	NR	**??**	S		

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Table 4
Geologic Units Summary for Water Wells Logged by the Navajo Nation Department of Water Resources
(Used for Preparing Cross Section A-A')
Desert Rock Energy Project, New Mexico

Well No.	Common Formation Name	Lithology	Depth to Top of unit (ft bgs)	Depth to Bottom of unit (ft bgs)	Unit Thickness (feet)	Contribution to Well Production[A]	Thickness of Morrison Formation (feet)[B]	Thickness of Westwater Canyon Member (feet)[B]
12T-635	GALLUP	SANDSTONE	335	440	**105**	N		
	MANCOS LOWER	SHALE	440	905	**465**	N		
	DAKOTA	SANDSTONE/SHALE	905	1085	**180**	N		
	BRUSHY BASIN	SANDSTONE/SHALE	1085	1350	**265**	S		
	WESTWATER CANYON	SANDSTONE	1350	1670	**320**	P		
	RECAPTURE	SANDSTONE/SHALE	1670	1955	**285**	S		
	SUMMERVILLE	SANDSTONE/SHALE	1955	NR	**??**	S	**870**	**320**
12T-640	MORRISON	SANDSTONE/SHALE	1487	NR	**??**	P	**UTC**	**NE**
12T-643	MANCOS LOWER	SHALE	0	840	**840**	N		
	DAKOTA	SANDSTONE	840	1040	**200**	N		
	MORRISON	SANDSTONE/SHALE	1065	NR	**??**	P		
	WESTWATER CANYON	SANDSTONE	1345	1618	**273**	P	**>553**	**273**
12T-647	MORRISON	SANDSTONE/SHALE	1323	NR	**??**	P	**UTC**	**NE**
12T-649	MANCOS	SHALE	0	230	**230**	N		
	GALLUP	SANDSTONE	230	450	**220**	N		
	MANCOS LOWER	SHALE	450	1134	**684**	N		
	DAKOTA	SANDSTONE	1134	1354	**220**	N		
	MORRISON	SANDSTONE/SHALE	1354	NR	**??**	P	**UTC**	**NE**

See page 8 for Explanations

Table 4
Geologic Units Summary for Water Wells Logged by the Navajo Nation Department of Water Resources
(Used for Preparing Cross Section A-A')
Desert Rock Energy Project, New Mexico

Well No.	Common Formation Name	Lithology	Depth to Top of unit (ft bgs)	Depth to Bottom of unit (ft bgs)	Unit Thickness (feet)	Contribution to Well Production[A]	Thickness of Morrison Formation (feet)[B]	Thickness of Westwater Canyon Member (feet)[B]
12T-651	MORRISON	SANDSTONE/SHALE	1060	1691	**631**	P	**UTC**	**NE**

Data Source: Navajo Nation Department of Water Resource, Water Management Branch Well Database-April 2005

Table adapted from the *Final Well Impact Report* (URS, 2005)

Abbreviations:

NR = Not Recorded

ft bgs = feet below ground surface

Footnotes:

[A]Contribution to Well Production: P = Primary; S = Secondary; N = None

[B]Thickness of Morrison Formation: NE = Formation Not Encountered; UTC = Unable to calculate

[C]Thickness of Westwater Canyon Membern: NE = Member Not Encountered; UTC = Unable to calculate

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Table 5
Geologic Units Summary for Oil and Gas Test Wells Logged by the United States Department of the Interior
(Used for Preparing Cross Sections B-B', C-C', and D-D')
Desert Rock Energy Project, New Mexico

Well No.	Common Formation Name	Lithology	Depth to Top of unit (ft bgs)	Depth to Bottom of unit (ft bgs)	Unit Thickness (feet)	Contribution to Well Production[A]	Thickness of Morrison Formation (feet)[B]
9241	LEWIS	SHALE	0	100	**100**	N	938
	CLIFFHOUSE	SANDSTONE	100	540	**440**	N	
	MENEFEE	SANDSTONE/SHALE	540	2348	**1808**	N	
	POINT LOOKOUT	SANDSTONE	2348	2518	**170**	N	
	MANCOS	SHALE	2518	3520	**1002**	N	
	GALLUP	SANDSTONE	3520	3885	**365**	N	
	SANASTEE	SANDSTONE/SHALE	3885	3962	**77**	N	
	LOWER MANCOS	SHALE	3962	4220	**258**	N	
	GREENHORN	LIMESTONE	4220	4282	**62**	N	
	GRANEROS	SHALE	4282	4320	**38**	N	
	DAKOTA	SANDSTONE	4320	4540	**220**	S	
	MORRISON	**SANDSTONE/SHALE**	**4540**	**5478**	**938**	**P**	
	TODILITO	LIMESTONE	5478	5496	**18**	N	
	ENTRADA	SANDSTONE	5496	5600	**104**	N	
	CHINLE	SHALE	5600	6717	**1117**	N	
	SHINARUMP	CONGLOMERATE	6717	6870	**153**	N	
	MOENKOPI		6870	7045	**175**	N	
	DECHELLY	SANDSTONE	7045	7585	**540**	N	
	CUTLER		7585	8750	**1165**	N	
	RICE		8750	8950	**200**	N	
	HERMOSA		8950	9625	**675**	N	
	MOLAS		9625	9686	**61**	N	
	LEADVILLE	LIMESTONE	9686	9776	**90**	N	
	ELBERT		9776	10020	**244**	N	

See page 8 for Explanations

Table 5

Geologic Units Summary for Oil and Gas Test Wells Logged by the United States Department of the Interior

(Used for Preparing Cross Sections B-B', C-C', and D-D')

Desert Rock Energy Project, New Mexico

Well No.	Common Formation Name	Lithology	Depth to Top of unit (ft bgs)	Depth to Bottom of unit (ft bgs)	Unit Thickness (feet)	Contribution to Well Production[A]	Thickness of Morrison Formation (feet)[B]
9239	FRUITLAND	SHALE	0	**??**	**??**	N	929
	PICTURED CLIFFS	SANDSTONE	**??**	**??**	**??**	N	
	CLIFFHOUSE	SANDSTONE	**??**	**??**	**??**	N	
	MENEFEE	SANDSTONE/SHALE	**??**	2517	**??**	N	
	POINT LOOKOUT	SANDSTONE	2517	2667	**150**	N	
	MANCOS	SHALE	2667	4367	**1700**	N	
	GREENHORN	LIMESTONE	4367	4470	**103**	N	
	DAKOTA	SANDSTONE	4470	4703	**233**	S	
	MORRISON	**SANDSTONE/SHALE**	**4703**	**5632**	**929**	**P**	
	TODILITO	LIMESTONE	5632	5650	**18**	N	
	ENTRADA	SANDSTONE	5650	5820	**170**	N	
	WINGATE	SANDSTONE	5820	6280	**460**	N	
	CHINLE	SHALE	6180	7064	**884**	N	
	SHINARUMP		7064	7162	**98**	N	
	MOENKOPI		7162	7180	**18**	N	
	DECHELLY	SANDSTONE	7180	7663	**483**	N	
	CUTLER		7663	8860	**1197**	N	
	HERMOSA		8860	9846	**986**	N	
	MOLAS		9846	9990	**144**	N	
	LEADVILLE	LIMESTONE	9990	10100	**110**	N	
6375		SHALE	0	493	**493**	N	NE
	MESA VERDE GROUP	SANDSTONE/SHALE	493	2522	**2029**	N	
	MANCOS	SHALE	2522	3626	**1104**	N	
	GALLUP	SANDSTONE/SHALE	3626	3785	**159**	N	
	SANASTEE	SANDSTONE	3785	> 3956	**>171**	N	

See page 8 for Explanations

Table 5
Geologic Units Summary for Oil and Gas Test Wells Logged by the United States Department of the Interior
(Used for Preparing Cross Sections B-B', C-C', and D-D')
Desert Rock Energy Project, New Mexico

Well No.	Common Formation Name	Lithology	Depth to Top of unit (ft bgs)	Depth to Bottom of unit (ft bgs)	Unit Thickness (feet)	Contribution to Well Production[A]	Thickness of Morrison Formation (feet)[B]
2023	MENEFEE	SANDSTONE/SHALE	1522	2510	**988**	N	
	POINT LOOKOUT	SANDSTONE	2510	2858	**348**	N	
	MANCOS	SHALE	2858	3787	**929**	N	
	GALLUP	SANDSTONE	3787	4192	**405**	N	
	SANASTEE		4192	4666	**474**	N	
	DAKOTA	SANDSTONE	4666	4838	**172**	S	
	MORRISON	**SANDSTONE/SHALE**	**4838**	**5712**	**874**	**P**	
	SUMMERVILLE		5712	5825	**113**	N	
	ENTRADA	SANDSTONE	5825	5953	**128**	N	
	WINGATE	SANDSTONE	5953	6270	**317**	N	
	CHINLE	SHALE	6270	7153	**883**	N	
	MOENKOPI		7153	7304	**151**	N	
	DECHELLY	SANDSTONE	7304	7740	**436**	N	
	ORGAN ROCK		7740	9058	**1318**	N	
	HERMOSA		9058	9810	**752**	N	
	PARADOX		9810	10640	**830**	N	
	MOLAS		10640	10750	**110**	N	
	LEADVILLE	LIMESTONE	10750	10904	**154**	N	
	OURAY	LIMESTONE	10904	10946	**42**	N	
	ELBERT		10946	11060	**114**	N	
	MCCRACKEN		11060	11133	**73**	N	
	GRANITE WASH		11133	**??**	**??**	N	**874**

See page 8 for Explanations

Table 5
Geologic Units Summary for Oil and Gas Test Wells Logged by the United States Department of the Interior
(Used for Preparing Cross Sections B-B', C-C', and D-D')
Desert Rock Energy Project, New Mexico

Well No.	Common Formation Name	Lithology	Depth to Top of unit (ft bgs)	Depth to Bottom of unit (ft bgs)	Unit Thickness (feet)	Contribution to Well Production[A]	Thickness of Morrison Formation (feet)[B]
512	DAKOTA	SANDSTONE	748	910	**162**	S	
	MORRISON	**SANDSTONE/SHALE**	**910**	**1992**	**1082**	**P**	
	TODILITO	LIMESTONE	1992	2018	**26**	N	
	ENTRADA	SANDSTONE	2018	2754	**736**	N	
	CHINLE	SHALE	2754	3772	**1018**	N	
	COCONINO	SANDSTONE	3772	5560	**1788**	N	
	HERMOSA		5560	6409	**849**	N	
	MOLAS		6409	6463	**54**	N	
	LEADVILLE	LIMESTONE	6463	6762	**299**	N	**1082**
8103	DAKOTA	SANDSTONE	748	970	**222**	S	
	MORRISON	**SANDSTONE/SHALE**	**970**	**2000**	**1030**	**P**	
	TODILITO	LIMESTONE	2000	2021	**21**	N	
	ENTRADA	SANDSTONE	2021	**??**	**??**	N	
	DECHELLY	SANDSTONE	3673	4293	**620**	N	
	ORGAN ROCK		4293	5450	**1157**	N	
	HONAKER TRAIL		5450	5897	**447**	N	
	ISMAY		5897	6007	**110**	N	
	DESERT CREEK		6007	6103	**96**	N	
	AKAH		6103	6178	**75**	N	
	BARKER CREEK		6178	??	**??**	N	**1030**

Table 5
Geologic Units Summary for Oil and Gas Test Wells Logged by the United States Department of the Interior
(Used for Preparing Cross Sections B-B', C-C', and D-D')
Desert Rock Energy Project, New Mexico

Well No.	Common Formation Name	Lithology	Depth to Top of unit (ft bgs)	Depth to Bottom of unit (ft bgs)	Unit Thickness (feet)	Contribution to Well Production[A]	Thickness of Morrison Formation (feet)[B]
2070	MESA VERDE GROUP	SANDSTONE/SHALE	0	2672	**2672**	N	
	UPPER MANCOS	SHALE	2672	3601	**929**	N	
	GALLUP	SANDSTONE	3601	3800	**199**	N	
	MIDDLE MANCOS	SHALE	3800	4021	**221**	N	
	SANASTEE	SANDSTONE/SHALE	4021	4061	**40**	N	
	LOWER MANCOS	SHALE	4061	4433	**372**	N	
	GREENHORN	LIMESTONE	4433	4490	**57**	N	
	GRANEROS	SHALE	4490	4532	**42**	N	
	DAKOTA	SANDSTONE	4532	4750	**218**	S	
	MORRISON	**SANDSTONE/SHALE**	**4750**	**> 4830**	**> 80**	**P**	**> 80**
736	PICTURED CLIFFS	SANDSTONE	704	820	**116**	N	
	LEWIS	SHALE	820	1000	**180**	N	
	CLIFFHOUSE/MENEFEE	SANDSTONE/SHALE	1000	3180	**2180**	N	
	POINT LOOKOUT	SANDSTONE	3180	3330	**150**	N	
	MANCOS	SHALE	3330	4264	**934**	N	
	GALLUP	SANDSTONE	4264	4658	**394**	N	
	SANASTEE	SANDSTONE/SHALE	4658	5122	**464**	N	
	DAKOTA	SANDSTONE	5122	5385	**263**	S	
	MORRISON	**SANDSTONE/SHALE**	**5386**	**5388**	**>2**	**P**	**>2**

See page 8 for Explanations

Table 5

Geologic Units Summary for Oil and Gas Test Wells Logged by the United States Department of the Interior

(Used for Preparing Cross Sections B-B', C-C', and D-D')

Desert Rock Energy Project, New Mexico

Well No.	Common Formation Name	Lithology	Depth to Top of unit (ft bgs)	Depth to Bottom of unit (ft bgs)	Unit Thickness (feet)	Contribution to Well Production[A]	Thickness of Morrison Formation (feet)[B]
741	POINT LOOKOUT	SANDSTONE	3678	3818	**140**	N	924
	MANCOS	SHALE	3818	4758	**940**	N	
	GALLUP	SANDSTONE	4758	5178	**420**	N	
	SANASTEE	SANDSTONE/SHALE	5178	5560	**382**	N	
	GREENHORN	LIMESTONE	5560	5614	**54**	N	
	GRANEROS	SHALE	5614	5646	**32**	N	
	DAKOTA	SANDSTONE	5646	5938	**292**	S	
	MORRISON	**SANDSTONE/SHALE**	**5938**	**6862**	**924**	**P**	
	TODILITO	LIMESTONE	6862	6890	**28**	N	
	ENTRADA	SANDSTONE	6890	7018	**128**	N	
	CHINLE	SHALE	7018	8034	**1016**	N	
	SHINARUMP	CONGLOMERATE	8034	8068	**34**	N	
	MOENKOPI		8068	8274	**206**	N	
	DECHELLY	SANDSTONE	8274	8613	**339**	N	
	CEDAR MESA		8613	9848	**1235**	N	
	HERMOSA		9848	11055	**1207**	N	
	MOLAS		11055	11136	**81**	N	
	LEADVILLE	LIMESTONE	11136	11250	**114**	N	
	IGNACIO	QUARTZITE	11250	??	**??**	N	

See page 8 for Explanations

Table 5
Geologic Units Summary for Oil and Gas Test Wells Logged by the United States Department of the Interior
(Used for Preparing Cross Sections B-B', C-C', and D-D')
Desert Rock Energy Project, New Mexico

Well No.	Common Formation Name	Lithology	Depth to Top of unit (ft bgs)	Depth to Bottom of unit (ft bgs)	Unit Thickness (feet)	Contribution to Well Production[A]	Thickness of Morrison Formation (feet)[B]
7267	UPPER MANCOS	SHALE	0	200	**200**	N	
	GALLUP	SANDSTONE	200	??	**??**	N	
	LOWER MANCOS	SHALE	??	952	**??**	N	
	GREENHORN	LIMESTONE	952	1020	**68**	N	
	GRANEROS	SHALE	1020	1068	**48**	N	
	DAKOTA	SANDSTONE	1068	1215	**147**	S	
	MORRISON	**SANDSTONE/SHALE**	**1215**	**2072**	**857**	**P**	
	SUMMERVILLE		2072	2270	**198**	N	
	TODILITO	LIMESTONE	2270	2287	**17**	N	
	ENTRADA	SANDSTONE	2287	??	**??**	N	
	CHINLE	SHALE	??	3696	**??**	N	
	MOSS BACK		3696	3731	**35**	N	
	SHINARUMP	CONGLOMERATE	3731	3948	**217**	N	
	DECHELLY	SANDSTONE	3948	4443	**495**	N	
	ORGAN ROCK		4443	5742	**1299**	N	
	HERMOSA		5742	6471	**729**	N	
	PARADOX		6471	6973	**502**	N	
	MOLAS		6973	7096	**123**	N	
	LEADVILLE	LIMESTONE	7096	7292	**196**	N	
	ELBERT		7292	??	**??**	N	**857**
1043	MANCOS	SHALE	0	645	**645**	N	
	GALLUP	SANDSTONE	645	995	**350**	N	
	SONASTEE	SANDSTONE/SHALE	995	1360	**365**	N	
	GREENHORN	LIMESTONE	1360	1475	**115**	N	
	DAKOTA	SANDSTONE	1475	1677	**202**	S	
	MORRISON	**SANDSTONE/SHALE**	**1677**	**>1690**	**>13**	**P**	**>13**

See page 8 for Explanations

Table 5

Geologic Units Summary for Oil and Gas Test Wells Logged by the United States Department of the Interior

(Used for Preparing Cross Sections B-B', C-C', and D-D')

Desert Rock Energy Project, New Mexico

Well No.	Common Formation Name	Lithology	Depth to Top of unit (ft bgs)	Depth to Bottom of unit (ft bgs)	Unit Thickness (feet)	Contribution to Well Production[A]	Thickness of Morrison Formation (feet)[B]
6367	UNDESIGNATED		0	780	**780**	N	NE
	CHACRA		780	1125	**345**	N	
	CLIFF HOUSE	SANDSTONE	1125	1348	**223**	N	
	MENEFEE	SHALE	1348	2555	**1207**	N	
	POINT LOOKOUT	SANDSTONE	2555	2736	**181**	N	
	MANCOS	SHALE	2736	3622	**886**	N	
	GALLUP	SANDSTONE	3622	3810	**188**	N	
	BISTI SAND	SAND	3810	4132	**322**	N	
	SANASTEE	SANDSTONE/SHALE	4132	4518	**386**	N	
	GREENHORN	LIMESTONE	4518	4578	**60**	N	
	GRANEROS	SHALE	4578	4617	**39**	N	
	DAKOTA	SANDSTONE	4617	4737	**>120**	S	
2203	PICTURED CLIFFS	SANDSTONE	1020	1270	**250**	N	>52
	LEWIS	SHALE	1270	1859	**589**	N	
	CLIFF HOUSE	SANDSTONE	1859	??	**??**	N	
	MENEFEE	SHALE	??	3575	**??**	N	
	POINT LOOKOUT	SANDSTONE	3575	3835	**260**	N	
	MANCOS	SHALE	3835	5648	**1813**	N	
	DAKOTA	SANDSTONE	5648	**5835**	**187**	S	
	MORRISON	**SANDSTONE/SHALE**	**5835**	**>5887**	**>52**	**P**	

Data Source: U.S. Department of Interior Oil/Gast Test wells, New Mexico EMNRD OCD Image Database, 2006

Abbreviations:

NR = Not Recorded

ft bgs = feet below ground surface

Footnotes:

[A]Contribution to Well Production: P = Primary; S = Secondary; N = None

[B]Thickness of Morrison Formation: NE = Formation Not Encountered

See page 8 for Explanations

Table 6

General Water Chemistry of Groundwater Produced from the Morrison Formation in the San Juan Basin

Desert Rock Energy Project, New Mexico

Sample ID	Number of Samples	Minimum	Maximum	Medium
Specific Conductance (us/cm)	52	300	6000	876
pH (standard units)	42	6.6	9.4	8.2
Temperature (degrees Celcius)	39	6	76	23
Calcium	56	0.8	550	14
Magnesium	53	0.1	62	3.7
Sodium	57	43	1,400	140
Potassium	56	0.1	24	2
Alkalinity (total as calcium carbonate)	56	10	670	200
Sulfate	52	6	3,200	160
Chloride	57	1.1	1,200	8.9
Flouride	50	0.2	7.7	0.6
Dissolved Solids (sun of constituents)	52	116	5,000	614
Nitrate (as nitrogen)	21	0.1	4.5	0.4
Arsenic	19	0.01	0.21	0.02
Iron	41	0.03	20	0.6
Manganese	21	0.01	19	0.1
Selenium	17	0.01	0.02	0.01
Radium-226	17	0.07	110	0.62

Explanation:
us/cm = microsiemens per centimeter at 25 degrees Celcius
Dissolved constituents are reported in milligrams per liter unless noted otherwise
Radium-226 is reported in picocuries per liter

Table 7

Water Quality Data from Sanostee Tribe Water Wells Sampled on May 11, 2005

Desert Rock Energy Project, New Mexico

General Chemistry

Sample ID	pH	Temperature (° C)	TDS (mg/L)	Turbidity (NTU)	Conductivity (µmhos/cm)	Nitrite (mg/L)	Nitrate (mg/L)	Chloride (mg/L)	Fluoride (mg/L)	Sulfate (mg/L)
12K-655	8.1	21.8	160	< 0.02	270	< 0.020	< 0.50	4.5	< 0.50	6.6
12K-633	9	21.5	170	< 0.02	280	< 0.020	< 0.50	< 2.5	< 0.50	3.4
12K-320	9.3	21.5	300	< 0.02	500	< 0.020	< 0.50	4.5	< 0.50	52

Metals

Sample ID	Aluminum (mg/L)	Antimony (mg/L)	Arsenic (mg/L)	Barium (mg/L)	Boron (mg/L)	Cadmium (mg/L)	Calcium (mg/L)	Chromium (mg/L)	Cobalt (mg/L)	Copper (mg/L)
12K-655	< 0.10	< 0.0030	< 0.0040	0.14	< 0.10	< 0.0030	20	< 0.010	< 0.010	0.29
12K-633	< 0.10	< 0.0030	< 0.0040	0.014	< 0.10	< 0.0030	1.3	< 0.010	< 0.010	< 0.010
12K-320	< 0.10	< 0.0030	< 0.0040	0.036	< 0.10	< 0.0030	1.1	< 0.010	< 0.010	< 0.010

Radiochemical Activity

Sample ID	Gross Alpha Activity Method 600 / 00-02 (pCi/L)	Radium 226 Activity Method 903.1 (pCi/L)	Radium 228 Activity Method 904 (pCi/L)	Total Radium (pCi/L)
12K-655	9.8 +/- 1.5	< 0.3	< 0.4	< 0.4
12K-633	12. +/- 1.7	< 0.3	< 0.3	< 0.3
12K-320	0.9 +/- 0.4	----	----	----

Table adapted from the *Final Well Impact Report* (URS, 2005)

<u>Explanation:</u>
TDS = Total Dissolved Solids
< = below laboratory reporting limits
mg/L = milligrams per Liter
µmhos/cm = micromhos per centimeter

Table 7

Water Quality Data from Sanostee Tribe Water Wells Sampled on May 11, 2005

Desert Rock Energy Project, New Mexico

General Chemistry (continued)

Sample ID	Alkalinity (mg/L)			
	Bicarbonate	Carbonate	Hydroxide	Total
12K-655	140	< 20	< 20	140
12K-633	89	50	< 20	140
12K-320	100	97	< 20	200

Metals (continued)

Sample ID	Iron (mg/L)	Lead (mg/L)	Magnesium (mg/L)	Nickel (mg/L)	Potassium (mg/L)	Selenium (mg/L)	Silica (mg/L)	Silver (mg/L)	Sodium (mg/L)	Thallium (mg/L)
12K-655	< 0.10	0.0095	4	< 0.010	2.8	< 0.0030	19	< 0.0050	34	< 0.0020
12K-633	< 0.10	< 0.0030	< 1.0	< 0.010	< 2.0	< 0.0030	16	< 0.0050	68	< 0.0020
12K-320	< 0.10	< 0.0030	< 1.0	< 0.010	< 2.0	< 0.0030	18	< 0.0050	110	< 0.0020

Table 8
Groundwater Modeling Input Data for Revised and Original Models
Desert Rock Energy Project, New Mexico

Revised Model Input

Layer	Geologic Unit	Thickness (ft)	Notes	K (ft/day)	Kh/KV ratio	Storage coeff.	SY (l)
1	Mancos Shale	variable	Leaky upper aquitard	0.0567	10 to 1	0.00011	0.03
2	Dakota Sandstone	200	aquifer	0.3225	2 to 1	0.00011	0.24
3	Sandstone (Morrison Fm)	1000	aquifer	K1 = 0.075, K2 = 0.125	2 to 1	0.00011	0.24
# Wells	**Pump Rate (gpm)**	**Time pumping (days)**	**Well Spacing**	**Screen Interval**			
10	307	7300 (stress period 1)	1/4 mile	All of layer 3			
	total = 3070	14600 (stress period 2)		1000 feet			
Head Boundary (type)	**gradient**						
Specified Head	0.0014 ft/ft						
Model area	**# columns**	**# rows**	**# cells**	**min cell size**	**max cell size**		
24x16 miles	300	322	96600 per layer	247.5 x 165 ft	990 x 660 ft		

Original Model Input (URS 2005)

Layer	Geologic Unit	Thickness (ft)	Notes	K (ft/day)	Kh/KV ratio	Storage coeff.	SY (l)
1	Mancos Shale	650	Leaky upper aquitard	0.0567	10 to 1	0.00011	0.03
2	Sandstone (Morrison Fm)	1000	aquifer	0.2	10 to 1	0.00011	0.2
# Wells	**Pump Rate (gpm)**	**Time pumping (days)**	**Well Spacing**	**Screen Interval**			
10	307	14600	1/4 mile	All of layer 2			
Head Boundary (type)	**gradient**						
Specified Head	0.0038 ft/ft						
Model area	**# columns**	**# rows**	**# cells**	**min cell size**	**max cell size**		
12X12 miles	280	279	78120	100 X 100 feet	500 X 500 ft		

APPENIDX A

STUDY AREA OIL AND GAS TEST WELLS, UNITED STATES DEPARTMENT OF THE INTERIOR

T25N R16W

Form 9-330

Budget Bureau No. 42-R-355.3.
Approval expires 12-31-55.

Indian Agency Navajo Triba

Lease Number I-149-Ind-9241

Lease or Permit to Prospect

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

RECEIVED
MAR 1955
U. S. GEOLOGICAL SURVEY
FARMINGTON, N. M.

28							

LOCATE WELL CORRECTLY

LOG OF OIL OR GAS WELL

Company Gulf Oil Corporation Address Box 2578, Salt Lake City, Utah

Lessor or Tract Navajo Field Wildcat State New Mexico

Well No. 1 Sec. 28 T. 25N R. 16W Meridian NMPM County San Juan

Location 1650 ft. S. of S Line and 1650 ft. E. of E Line of Section 28 Elevation 542[illegible] (Derrick floor relative to sea level)

The information given herewith is a complete and correct record of the well and all work done thereon so far as can be determined from all available records.

Signed [illegible]

Date March 23, 1955 Title Ass't. Area Supt. of Pro[illegible]

The summary on this page is for the condition of the well at above date.

Commenced drilling October 13, 1954 Finished drilling February 28, 195[illegible]

OIL OR GAS SANDS OR ZONES

(Denote gas by G)

No. 1, from NONE to

No. 2, from to

No. 3, from to

No. 4, from to

No. 5, from to

No. 6, from to

IMPORTANT WATER SANDS

No. 1, from 4535' to 5000'

No. 2, from 4320' to 4400'

No. 3, from 3520' to 3682'

No. 4, from to

CASING RECORD

Size casing	Weight per foot	Threads per inch	Make	Amount	Kind of shoe	Cut and pulled from	Perforated From—	Perforated To—	Purpo[se]
13-3/8" OD	48#	8	S.S.	970'	HOWCO	-	-	-	Surf[ace]
9-5/8" OD	43.5#	8	S.S.	1715'	HOWCO	-	-	-	Inter[mediate]
9-5/8" OD	40#	8	S.S.	7109'	HOWCO	1775'	-	-	[illegible]

MUDDING AND CEMENTING RECORD

Size casing	Where set	Number sacks of cement	Method used	Mud gravity	Amount of mud used
13-3/8" OD	985'	1050	HOWCO	9.5#/gal.	150 bbls.
9-5/8" OD	6838'	175	HOWCO	10.6#/gal.	660 bbls.

FOLD

PLUGS AND ADAPTERS

Heaving plug—Material ______ Length ______ Depth set ______

Adapters—Material ______ Size ______

SHOOTING RECORD

Size	Shell used	Explosive used	Quantity	Date	Depth shot	Depth cleaned out

TOOLS USED

Rotary tools were used from 0' feet to ~~10,020'~~ feet, and from ______ feet to ______

Cable tools were used from — feet to ______ feet, and from ______ feet to ______

DATES

______, 19______ Abandoned ~~Put to producing~~ ~~March 5~~, 1

The production for the first 24 hours was ______ barrels of fluid of which ______% was oil; ______ emulsion; ______% water; and ______% sediment. Gravity, °Bé. ______

If gas well, cu. ft. per 24 hours ______ Gallons gasoline per 1,000 cu. ft. of gas ______

Rock pressure, lbs. per sq. in. ______

EMPLOYEES

~~Creekmore Drilling Company~~, ~~Driller~~ Drilling ~~Contractor~~ ______, D

______, Driller ______, D

FORMATION RECORD

FROM—	TO—	TOTAL FEET	FORMATION
0	100	100'	Lewis Shale
100	540	440'	Cliffhouse
540	2348	1808'	Menefee
2348	2518	170'	Point Lookout
2518	3520	1002'	Mancos
3520	3885	365'	Gallup
3885	3962	77'	Sanastee
3962	4220	358'	Lower Mancos
4220	4282	62'	Greenhorn
4282	4320	38'	Graneros
4320	4540	220'	Dakota
4540	5478	938'	Morrison
5478	5496	18'	Todilto

[OVER]

9 5/8" OD | 883' | 175 | | | |

FORMATION RECORD—Continued

FROM—	TO—	TOTAL FEET	FORMATION
5496	5600	104'	Entrada
5600	6717	1117'	Chinle
6717	6870	153'	Shinarump
6670	7045	175'	Moenkopi
7045	7585	540'	DeChelly
7585	8750	1165	Cutler
8750	8950	200'	Rico
8950	9625	675'	Hermosa
9625	9686	61'	Molas
9686	9776	90'	Leadville
9776	10,020	244'	Elbert

HISTORY OF OIL OR GAS WELL

10—48094-8 U.S. GOVERNMENT PRINTING OFFICE

It is of the greatest importance to have a complete history of the well. Please state in detail the dates of redrilling, together with the reasons for the work and its results. If there were any changes made in the casing, state fully, and if any casing was "sidetracked" or left in the well, give its size and location. If the well has been dynamited, give date, size, position, and number of shots. If plugs or bridges were put in to test for water, state kind of material used, position, and results of pumping or bailing.

T 25N R16W

NMOCC

Form 9-330

Budget Bureau No. 42-R-355.3.
Approval expires 12-31-55.

U. S. LAND OFFICE Navajo Tribal
SERIAL NUMBER I-149-IND-9239
LEASE OR PERMIT TO PROSPECT

	x						

LOCATE WELL CORRECTLY

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

RECEIVED
JUN 18 1957
OIL CON. COM.

LOG OF OIL OR GAS WELL

Company Pan American Petroleum Corporation Address Box 487, Farmington, New Mexico

Lessor or Tract Stanolind-Gulf Navajo Field Wildcat State New Mexico

Well No. 1 Sec. 4 T. 25-N R. 16-W Meridian N.M.P.M. County San Juan

Location 415 ft. N. of N Line and 940 ft. W. of W Line of Section 4 Elevation 5473 (Derrick floor relative to sea level)

The information given herewith is a complete and correct record of the well and all work done thereon so far as can be determined from all available records.

Signed [signature]

Date June 12, 1957 Title Field Superintendent

The summary on this page is for the condition of the well at above date.

Commenced drilling February 2, 1957 Finished drilling May 8, 1957

OIL OR GAS SANDS OR ZONES
(Denote gas by G)

No. 1, from .... to .... No. 4, from .... to ....

No. 2, from .... to .... No. 5, from .... to ....

No. 3, from .... to .... No. 6, from .... to ....

IMPORTANT WATER SANDS

No. 1, from .... to .... No. 3, from .... to ....

No. 2, from .... to .... No. 4, from .... to ....

CASING RECORD

Size casing	Weight per foot	Threads per inch	Make	Amount	Kind of shoe	Cut and pulled from	Perforated From—	Perforated To—	Purpose
13-3/8"	36#	Slip Joint	Armco	507	Guide				Surface
[illegible]	[illegible]	[illegible]	National	[illegible]	Guide				[illegible]

MUDDING AND CEMENTING RECORD

Size casing	Where set	Number sacks of cement	Method used	Mud gravity	Amount of mud used
13-3/8	517	550	Halliburton 2 Plug		
[illegible]	[illegible]	1000	Halliburton 2 Plug		

FOLD

PLUGS AND ADAPTERS

Heaving plug—Material .... Length .... Depth set ....

Adapters—Material .... Size ....

SHOOTING RECORD

Size	Shell used	Explosive used	Quantity	Date	Depth shot	Depth cleaned out

TOOLS USED

Rotary tools were used from 0 feet to 10,100 feet, and from .... feet to .... fee

Cable tools were used from .... feet to .... feet, and from .... feet to .... fee

DATES

May 8 ...., 19 57 Put to producing Dry hole ...., 19.....

The production for the first 24 hours was .... barrels of fluid of which ......% was oil; ......%

emulsion; ......% water; and ......% sediment. Gravity, °Bé. ....

If gas well, cu. ft. per 24 hours .... Gallons gasoline per 1,000 cu. ft. of gas ....

Rock pressure, lbs. per sq. in. ....

EMPLOYEES

J. M. Turner, Driller Gene Lindsey, Drille

Bob R. Bowling, Driller Jerry Holt, Drille

FORMATION RECORD

FROM—	TO—	TOTAL FEET	FORMATION
0	2517	2517	Fruitland shales, Pictured Cliffs sand, C & Menefee sand & shale.
2517	2667	150	Point Lookout
2667	4367	1700	Mancos
4367	4470	103	Greenhorn
4470	4703	233	Dakota
4703	5632	929	Morrison
5632	5650	18	Todilto
5650	5820	170	Entrada
5820	6180	360	Wingate
6180	7064	884	Chinle
7064	7162	98	Shinarump
7162	7180	18	Moenkopi
7180	7663	483	De Chelly
7663	8860	1197	Cutler
8860	9846	986	Hermosa
9846	9990	144	Molas
9990	10100	110	Mississippian

[OVER] 16—43094-3

T28N R16W

Form 9-330

Budget Bureau No. 42-R-355.3.
Approval expires 12-31-55 Navajo Agency

U. S. LAND OFFICE Window Rock, A

SERIAL NUMBER Contract No. 14-20-0603-6375

LEASE OR PERMIT TO PROSPECT Allottee: Navajo Tribe

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

LOCATE WELL CORRECTLY

LOG OF OIL OR GAS WELL AMENDED

Company Union Oil Company of California Address 619 W. Texas Avenue, Midland, Texas

Lessor or Tract Navajo Tribal Tract 11 Field Wildcat State New Mexico

Well No. 1-27 Sec. 27 T. 28-N R. 16-W Meridian N. M. P. M. County San Juan

Location 1980 ft. N/S of N Line and 1980 ft. E/W of W Line of Section 27 Elevation 5127' (Derrick floor relative to sea level)

The information given herewith is a complete and correct record of the well and all work done thereon so far as can be determined from all available records.

Signed ____________

Date September 7, 1961 Title Production Clerk

The summary on this page is for the condition of the well at above date.

Commenced drilling August 24, 1961 Finished drilling September 3, 1961

OIL OR GAS SANDS OR ZONES

(Denote gas by G)

No. 1, from N to ____ No. 4, from ____ to ____

No. 2, from O N to ____ No. 5, from ____ to ____

No. 3, from E to ____ No. 6, from ____ to ____

IMPORTANT WATER SANDS

No. 1, from None to ____ No. 3, from ____ to ____

No. 2, from ____ to ____ No. 4, from ____ to ____

CASING RECORD

Size casing	Weight per foot	Threads per inch	Make	Amount	Kind of shoe	Cut and pulled from	Perforated From—	Perforated To—	Purpose
8-5/8"	24	8RT	CF&I	188.47	End Cut & beveled.	None	-	-	Surface

MUDDING AND CEMENTING RECORD

Size casing	Where set	Number sacks of cement	Method used	Mud gravity	Amount of mud used
8-5/8	200.60	125 w/4% gel.	P & P	-	-

MARK

FOLD

PLUGS AND ADAPTERS

Heaving plug—Material .... Length .... Depth set ....

Adapters—Material ..-.. Size ..-..

SHOOTING RECORD

Size	Shell used	Explosive used	Quantity	Date	Depth shot	Depth cleaned out
-						
-						
-						

TOOLS USED

Rotary tools were used from 0 feet to 3956 feet, and from - feet to - feet

Cable tools were used from - feet to - feet, and from - feet to - feet

DATES

........, 19...... Put to producing P & A ...., 19......

The production for the first 24 hours was - barrels of fluid of which - % was oil; - % emulsion; - % water; and - % sediment. Gravity, °Bé. -

If gas well, cu. ft. per 24 hours - Gallons gasoline per 1,000 cu. ft. of gas ....

Rock pressure, lbs. per sq. in. -

EMPLOYEES

Contract Tools, Driller ...., Driller

........, Driller ...., Driller

FORMATION RECORD

FROM—	TO—	TOTAL FEET	FORMATION
0	493	493	Shale
493	2522	2029	Sand-Top of Mesa Verde 493'
2522	3626	1104	Shale-Top of Mancos 2522'
3626	3785	159	Inter-bedded sand and shale-Top of Gallop 3626'
3785	3956	171	Shale-Top of Sanastee 3951'
			Formation record prepared from Electric logs.

This amended from is being filed to correct size casing under Mudding and Cementing Record from 11" to 8-5/8".

[OVER] 16—43094-3

MARK

T 29 N R 15 W

CONFIDENTIAL

Form approved.
Budget Bureau No. 42-R355.4.

Form 9-330

RCB

U. S. LAND OFFICE ______

SERIAL NUMBER 14-20-0603-6377

LEASE OR PERMIT TO PROSPECT 7023

	X						

LOCATE WELL CORRECTLY

RECEIVED
MAY 4 1964
OIL CON. COM.
DIST. 3

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

LOG OF OIL OR GAS WELL

Company Humble Oil & Refining Company Address P. O. Box 3082, Durango, Colorado

Lessor or Tract Navajo Tract 2 Field South Waterflow State New Mexico

Well No. 1 Sec. 18 T. 29N R. 15W Meridian N.M.P.M. County San Juan

Location 990 ft. {N. / S.} of S Line and 981 ft. {E. / W.} of W Line of Section 18 Elevation 5347'
(Derrick floor relative to sea level)

The information given herewith is a complete and correct record of the well and all work done thereon so far as can be determined from all available records.

Signed COPY (ORIGINAL SIGNED) B. M. BRADLEY B. M. Bradley

Date November 27, 1963 Title District Production Supr.

The summary on this page is for the condition of the well at above date.

Commenced drilling July 11, 1963 Finished drilling * July 28, 1963

OIL OR GAS SANDS OR ZONES

(Denote gas by G)

No. 1, from 3787' to 4192' No. 4, from ______ to ______

No. 2, from ______ to ______ No. 5, from ______ to ______

No. 3, from ______ to ______ No. 6, from ______ to ______

IMPORTANT WATER SANDS

No. 1, from ______ to ______ No. 3, from ______ to ______

No. 2, from ______ to ______ No. 4, from ______ to ______

CASING RECORD

Size casing	Weight per foot	Threads per inch	Make	Amount	Kind of shoe	Cut and pulled from	Perforated From—	Perforated To—	Purpose
13-3/8"	[illegible]	8rd	[illegible]	[illegible]					Surface
9-5/8"	[illegible]	8rd	[illegible]	[illegible]	[illegible]				[illegible]
7"	23#	8rd	J-55	698'	Guide				Producti
7"	20#	8rd	J-55	[illegible]	[illegible]				Producti

MUDDING AND CEMENTING RECORD

Size casing	Where set	Number sacks of cement	Method used	Mud gravity	Amount of mud used
13-3/8"	99'	75			
9-5/8"	1510'	1000			
7"	4279'	150			

ARK

FOLD

PLUGS AND ADAPTERS

Heaving plug—Material .... Length .... Depth set ....

Adapters—Material .... Size ....

SHOOTING RECORD

Size	Shell used	Explosive used	Quantity	Date	Depth shot	Depth cleaned out

TOOLS USED

Rotary tools were used from 0 feet to 4838 feet, and from .... feet to .... feet

Cable tools were used from .... feet to .... feet, and from .... feet to .... feet

DATES

~~Shut-in November 1~~, 1963 Put to producing ...., 19....

The production for the first 24 hours was 20 barrels of fluid of which 75 % was oil; ....% emulsion; 25 % water; and ....% sediment. Gravity, °Bé. ....

If gas well, cu. ft. per 24 hours 894,000 Gallons gasoline per 1,000 cu. ft. of gas ....

Rock pressure, lbs. per sq. in. ....

EMPLOYEES

................, Driller ...., Driller

................, Driller ...., Driller

FORMATION RECORD

FROM—	TO—	TOTAL FEET	FORMATION
* Pure Oil Company assumed operations at 9:15 P.M. 7-28-63 at 4838'. The interval from 4838' to TD will be reported by Pure Oil Company.			
1522	2510	988	Menefee
2510	2858	348	Point Lookout
2858	3787	929	Mancos
3787	4192	405	Gallup
4192	4666	474	Sanostee
4666	4838	172	Dakota
4838			Top of Morrison

(OVER)

16—43094-5

7' | 1,770' | 350

C O N F I D E N T I A L

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

Allottee Window Rock, Arizona
Tribe Navajo
Lease No. 14-20-603-2023

LESSEE'S MONTHLY REPORT OF OPERATIONS

State New Mexico *County* San Juan *Field* Wildcat

The following is a correct report of operations and production (including drilling and producing wells) for the month of September *19*63

Agent's Address P. O. Box 1611, Casper, Wyoming *Company* THE PURE OIL COMPANY

Signed R. E. [signature]

Phone 234-1565 *Agent's title* District Office Manager

SEC. AND ¼ OF ¼	TWP.	RANGE	WELL NO.	Days Prdcd.	Barrels of Oil	Gravity	Cu. ft. of Gas (in thousands)	Gallons of Gasoline Recovered	Bbls. water (If none, so state)	REMARKS (If drilling, depth; if shut down, cause; date and result of test for gasoline content of gas)
SW SW Sec. 18 Navajo Tract 2, Well No. 1	29N	15W	1	-0-	-0-	-	-0-	-	None	Drilled 10,585' to 10,888'. DST No. 5 - 10,786' - 10,888' - Miss. Tool open 2 hrs. & 36 minutes. Opened

with a very weak blow, increasing to fair blow. Recovered 4,185' of fluid - 560' of gas cut drilling mud, 3,625' of highly gas cut salt water. Salt water weighed 8.75 lbs. per gallon. Surface valve was partially plugged while testing. Pressures: IH 5141; ICI 5377/30 minutes; IF 1100/6 minutes; FF 2612; FCI 5077/30 minutes; FH 5099; Bottom hole temp. 250°.

Drilled to 11,165 T.D. Drilling completed at 11:30 a.m. 9-10-63. Ran electric logs to T.D.

LOG TOPS:

Menefee	1,522' (+3821)	Moenkopi	7,153' (-1810)
Point Lookout	2,510' (+2833)	De Chelly	7,304' (-1961)
Mancos	2,858' (+2485)	Organ Rock	7,740' (-2397)
Gallup	3,787' (+1556)	Hermosa	9,058' (-3715)
Sanastee	4,192' (+1151)	Paradox "A"	9,810' (-4467)
Dakota	4,666' (+ 677)	Molas	10,640' (-5297)
Morrison	4,838' (+ 505)	Miss.	10,750' (-5407)
Summerville	5,712' (- 369)	Ouray	10,904' (-5561)
Entrada	5,825' (- 482)	Elbert	10,946' (-5603)
Wingate	5,953' (- 610)	McCracken	11,060' (-5717)
Chinle	6,270' (- 927)	Granite Wash	11,133' (-5790)

CONTINUED ON PAGE 2

NOTE.—There were No runs or sales of oil; No M. cu. ft. of gas sold; No runs or sales of gasoline during the month. (Write "no" where applicable.)

NOTE.—Report on this form is required for each calendar month, regardless of the status of operations, and must be filed in duplicate with the supervisor by the 6th of the succeeding month, unless otherwise directed by the supervisor.

Use as C-103

C O N F I D E N T I A L

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

Allottee Window Rock, Ariz.
Tribe Navajo
Lease No. 14-20-603-2023

LESSEE'S MONTHLY REPORT OF OPERATIONS

State New Mexico County San Juan Field Wildcat

The following is a correct report of operations and production (including drilling and producing wells) for the month of August 1963

Agent's Address P. O. Box 1611, Casper, Wyoming
Company THE PURE OIL COMPANY
Signed R. E. Davis
Phone 234-1565
Agent's title District Office Manager

SEC. AND ¼ of ¼	TWP.	RANGE	WELL NO.	Days Prdcd.	Barrels of Oil	Gravity	Cu. ft. of Gas (in thousands)	Gallons of Gasoline Recovered	Bbls. water (If none, so state)	REMARKS (If drilling, depth; if shut down, cause; date and result of test for gasoline content of gas)
SW SW Sec. 18 Navajo Tract 2, Well No. 1	29N	15W	1	-0-	-0-	-	-0-	-	None	Drilled 5,808' to 10,073'. DST NO. 2 - 9984' - 10,073'- Ismay Section of Paradox. Tool open 30 minutes. Opened with a very weak

blow, decreasing to zero in 10 minutes. Recovered 764' of drilling fluid, no gas, no oil. Pressures: IH & FH 4879; ISI 36/30 minutes; IF 22/5 minutes; FF 27/30 minutes; FSI 40/30 minutes; Bottom hole temp. 240°. Drilled to 10,216'. DST NO. 3 - 10,181'-10,216' - Paradox. Tool opened with weak blow, gradually increased to fair blow throughout test. Tool open a total of 95 minutes, 90 minutes testing. Recovered 1,071' of drilling fluid of which 900' was highly gas cut (high pressure but low volume gas pocket). Pressures: IH 4919; FH 4876; ISI 473/30 min.; FSI 495/30 min.; IF 215; FF 430; Bottom hole temp. 230. Drilled to 10,371'. DST NO. 4 - 10,284' - 10,371' - Paradox. Tool open 30 minutes. Opened with a very weak blow. Recovered 60' of drilling fluid. Pressures: IH 5041; ISI 134/30 min.; IF & FF 90; FSI 112/30 min.; FH 4998; Bottom hole temp. 190°. Drilled to 10,585' - INCOMPLETE.

SAMPLE TOPS:

Summerville	5,712' (- 369)
Todilto	5,815' (- 472)
Entrada	5,825' (- 482)
Wingate	5,955' (- 612)
Organ Rock	7,740' (-2391)
De Chelly	7,320' (-1977)
Hermosa	9,030' (-3687)
Ismay	9,800' (-4457)

C O N F I D E N T I A L

RECEIVED
SEP 23 1963
OIL CON. COM.
DIST. 3

NOTE.—There were No runs or sales of oil; No M. cu. ft. of gas sold; No runs or sales of gasoline during the month. (Write "no" where applicable.)

NOTE.—Report on this form is required for each calendar month, regardless of the status of operations, and must be filed in duplicate with the supervisor by the 6th of the succeeding month, unless otherwise directed by the supervisor.

Form 9-330

Budget Bureau No. 42-R-355.2
Approval expires 12-31-44.

U. S. Land Office Navajo
Serial Number 14-20-603-[illegible]
Gulf Lease or Permit to Prospect 67,579

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

T26N R19W

LOG OF OIL OR GAS WELL

LOCATE WELL CORRECTLY

Company Humble Oil & Refining Company Address Box 2180, Houston 1, Texas / Box 1264, Farmington, N. M.

Lessor or Tract Navajo Tribe of Indians "D" Field Beautiful Mt. W/C State New Mexico

Well No. 1 Sec. 30 T. 26N R. 19W Meridian .... County San Juan

Location 790 ft. {N./S.} of N Line and 790 ft. {E./W.} of E Line of Section 30 Elevation 6470
(Derrick floor relative to sea level)

The information given herewith is a complete and correct record of the well and all work done thereon so far as can be determined from all available records.

Signed .... Russell M. Lilly

Date January 15, 1957 Title District Superintendent

The summary on this page is for the condition of the well at above date.

Commenced drilling October 17, 1956 Finished drilling January 6, 1957.

OIL OR GAS SANDS OR ZONES
(Denote gas by G)

No. 1, from None to .... No. 4, from .... to ....
No. 2, from .... to .... No. 5, from .... to ....
No. 3, from .... to .... No. 6, from .... to ....

IMPORTANT WATER SANDS

No. 1, from 748 Dakota to .... No. 3, from 2010 Entrada to ....
No. 2, from 910 Morrison to .... No. 4, from .... to ....

CASING RECORD

Size casing	Weight per foot	Threads per inch	Make	Amount	Kind of shoe	Cut and pulled from	Perforated From—	To—	Purpose
13-3/8"	48	8R	[illegible]	391.26	Larkin				
9-5/8"	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				

RECEIVED JAN 1957 [illegible]

MUDDING AND CEMENTING RECORD

Size casing	Where set	Number sacks of cement	Method used	Mud gravity	Amount of mud used
13-3/8"	404'	500	Hall.	10.3#	
9-5/8"	2750	1000	Hall.	10.2#	

PLUGS AND ADAPTERS

Heaving plug—Material - Length .... Depth set ....
Adapters—Material .... Size ....

SHOOTING RECORD

Size	Shell used	Explosive used	Quantity	Date	Depth shot	Depth cleaned out
		None				

TOOLS USED

Rotary tools were used from 0 feet to 5396 feet, and from .... feet to .... feet
Cable tools were used from .... feet to .... feet, and from .... feet to .... feet

DATES

........, 19.... Put to producing Plugged & abandoned as dry hole 1-6-57, 19....

The production for the first 24 hours was .... barrels of fluid of which ....% was oil; ....% emulsion; ....% water; and ....% sediment. Gravity, °Bé. ....

If gas well, cu. ft. per 24 hours .... Gallons gasoline per 1,000 cu. ft. of gas ....

Rock pressure, lbs. per sq. in. ....

EMPLOYEES

[illegible] Clayton, Driller [illegible] Glover, Driller
[illegible] Martin, Driller ...., Driller

FORMATION RECORD

FROM—	TO—	TOTAL FEET	FORMATION	
0	130	130	Boulders	
130	[illegible]	[illegible]	Sand & shale	Dakota 748'
878	[illegible]	[illegible]	Sand, shale & chert	Morrison 910'
[illegible]	[illegible]	[illegible]	Sand & shale	
1700	2090	[illegible]	Sand, shale & chert	Todilto 1978'
2090	[illegible]	[illegible]	Sand, shale, & lime	Entrada 2010'
[illegible]	[illegible]	[illegible]	Sand, shale & lime	
[illegible]	[illegible]	[illegible]	Sand & shale	
[illegible]	[illegible]	[illegible]	Shale	
[illegible]	[illegible]	[illegible]	Sand & shale	
[illegible]	[illegible]	[illegible]	Sand, shale & chert	
2700	[illegible]	[illegible]	Sand & shale	Chinle 2754'
[illegible]	[illegible]	[illegible]	Sandstone & shale	
[illegible]	[illegible]	[illegible]	Shale	Coconino 3772'
[illegible]	[illegible]	[illegible]	Sand & shale	
[illegible]	[illegible]	[illegible]	Sand	
[illegible]	[illegible]	[illegible]	Sand & shale	
[illegible]	[illegible]	[illegible]	Sand & lime	
[illegible]	[illegible]	[illegible]	Sand, lime & shale	
[illegible]	[illegible]	[illegible]	Sand & shale	
[illegible]	[illegible]	[illegible]	Shale	
[illegible]	[illegible]	[illegible]	Clay & shale	
[illegible]	[illegible]	[illegible]	Sand & shale	
[illegible]	[illegible]	20	Sandstone	
5162	5219	57	Sand, lime & shale	
[illegible]	5397	178	Sand & shale	

5322'

FORMATION RECORD—Continued

FROM—	TO—	TOTAL FEET	FORMATION	
5777	5830	53	Shale	
5830	5871	41	Anhydrite & shale	
5871	5973	102	Shale	Hermosa 5560'
5973	6058	85	Lime & shale	
6058	6076	18	Shale	
6076	6111	35	Lime & chert	
6111	6134	23	Sand, shale, lime & chert	
6134	6251	117	Lime, chert & shale	
6251	6274	23	Lime & shale	
6274	6285	11	Lime & chert	
6285	6304	19	Lime, shale & chert	
6304	6445	141	Lime & shale	
6445	6482	37	Sand & lime	
6482	6512	30	Core 1 & 2	
6512	6521	9	Sand & lime	
6521	6527	6	Core 3	
6527	6600	73	Lime & shale	
6600	6642	42	Lime, shale & chert	Molas 6609' (?)
6642	6704	[illegible]	Lime & shale	Leadville 6663'
6704	[illegible]	[illegible]	Core 4	
[illegible]	[illegible]	[illegible]	Lime & chert	
[illegible]	[illegible]	[illegible]	Lime & shale	
[illegible]	6693	100	Core 6,7 & 8	
6693	6698	5	Lime & shale	
6698	6735	37	Lime, shale & chert	
6735	6770	35	Lime	McCracken 6762'
6770	6792	22	Lime & shale	
6792	6826	34	Lime & sand	
6826	6901	75	Sand & shale	Aneth 6836' (?)
6901	6921	20	Lime & shale	Ophir 6908' (?)
6921	6945	24	Lime, shale & dolomite & chert	
6945	6952	7	Dolomite	Tintic 6942'
6952	6981	29	Chert & Dolomite	
6981	7057	76	Sand Quartzite	PreCambrian 7004'
7057	7090	33	Sand & dolomite	
7090	7136	46	Sand & lime	
7136	7196 TD	60	Core 9	

HISTORY OF OIL OR GAS WELL

It is of the greatest importance to have a complete history of the well. Please state in detail the dates of drilling, together with the reasons for the work and its results. If there were any changes made in the casing, state fully, and if any casing was "sidetracked" or left in the well, give its size and location. If the well has been dynamited, give date, size, position, and number of shots. If plugs or bridges were put in to test for water, state kind of material used, position, and results of pumping or bailing.

LOG OF OIL OR GAS WELL

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

Noble Oil & Refining Company
Navajo Tribe of Indians "D" No. 1

WELL HISTORY

This well was drilled to a total depth of 7136' and plugged and abandoned as a dry hole on January 6, 1957.

Set 13-3/8" casing at 406' w/500 sacks neat cement. Cement circulated.

Core No. 1 from [illegible] to [illegible] - recovered 18' - 3' gray finely crystalline limestone, tight, NS; 1' light green sandy limestone, tight NS; 14' maroon, green, and red fine grained sandstone, fair porosity, looks wet, no taste, odor or show.

Set 9-5/8" casing at 2700' w/900 sacks 8% gel and 100 sacks neat cement. Cement circulated. Drilled to 6182' and started testing.

Core No. 2 from 6182 to 6194.5 - recovered 12.5' white, fine grained hard calcareous sandstone. No visible porosity. Scattered pinpoints of bleeding oil. Thin zones of stain, odor and fluorescence along fractures and bedding planes between 6184 - 6186. Good odor, stain and fluorescence in bottom 1-1/2'. Very slightly bleeding oil & gas along fractures. Gas may be inert.

DST #1 from 6172 to 6195 w/1" TC & 3/4" BC. TO 36 minutes. Opened w/weak blow - died in 7 minutes. By-passed tool - reopened tool - few bubbles and died. Recovered 10' very slight oil cut mud. IH & FH 3480#. Min. & Max. FP 30#. BUP after 30 minutes - 30#. Test satisfactor

Core No. 3 from 6195 to 6212 - recovered 10' - 3' white dolomitic fine grained sandstone w/slight stain, odor and fluorescence; 7' grey fine crystalline hard dolomite, no shows.

Core No. 4 from 6221 to 6227 - recovered 6' - 1' gray, hard, finely crystalline dolomite; 2' dark grey soft shale; 3' hard green shale w/patches of tan limestone.

DST #2 from 6192 to 6227 w/Johnston tool & 1" TC & 3/4" BC. TO 30 min. Very weak blwo for 8 minutes & died. IH 3495#, FH 3300#, min. & max. FP 70#. BUP 70# after 30 min. Recovere 10' very slightly oil & gas cut drlg. mud. Test satisfactory.

DST #3 6215 to 6329 w/Johnston tool & 1" TC & 3/4" BC. TO 30 min. Very weak blow, then died in 23 min. IH 3300#, FH 3300#, min. & max FP 210#. BUP 210# after 30 min. Recovered 32' very slightly oil & gas cut mud. Bottom hole temp. 172°. Test satisfactory.

Core No. 5 from 6504 to 6514 - recovered 10' - 4' grey medium crystalline limestone w/numerous fractures filled w/red shale, scattered patches of red shale; 6' gray medium crystalline limestone and red shale, about 50% red shale in patches, looks brecciated, but all fractures filled w/red shale. One large calcite lined ½ vug.

DST # 4 from 6484 to 6514 w/1" TC & 3/4" BC. TO 55 min. Weak blow for 45 min. & died. IH 3480#, FH 3470#, min. FP 50#, max FP 70#. BU after 30 min. 70#. Test satisfactory.

Core No. 6 from 6593 to 6614 - recovered 21' - 17' maroon and green waxy shale; 4' gray-green medium crystalline dolomite w/a few small patches of black and green shale.

Core No. 7 from 6614 to 6644 - recovered 29' - 3' gray-green medium to coarsely crystalline dolomite; 6' light gray, very finely crystalline dolomite, few tight fractures; 4' light gray coarsely crystalline dolomite, few tight fractures; 6' gray, finely crystalline, sandy dolomite; 2' grey dense dolomite; 6' green and maroon dolomitic shale; 2' grey-green dense dolomite.

Core No. 8 from 6644 to 6693 - recovered 38'. - 13' maroon shale w/streaks of gray-green shaley dolomite, few fractures 20 to 30 degree dips; 4' gray-green brecciated sandy dolomite red shale in fractures; 17' gray-green sandy finely crystalline dolomite, locally brecciated. One vug and numerous fractures in lower part, few gas bubbles; 3' red shale and very sandy dolomite - 20 to 30 degree dips; 1' white shalky sandy limestone badly ground up by core bbl.

DST #5 from 6650 to 6693 w/Johnston tool, 1" TC & 3/4" BC. TO 30 min. Opened w/very weak blow for 6 min. & died. IH & FH 3640#. Min. & Max FP 0#. BUP 0# after 30 min. Rec. 7' drlg. mud. Test satisfactory.

Ran dipmeter survey and velocity survey at 7032'.

Core #9 from 7116 to 7136 - recovered 20' - dark green chlorite gneiss (metamorphic rock). Numerous tight fractures filled w/calcite.

Ran ES, Gamma Ray, Neutron & Microlog surveys.

Received verbal approval to plug and abandon 1-4-57. Set plugs as follows:
From 6820 to 6720 w/75 sks. neat cmt., from 6520 to 6350 w/100 sks cmt., from 5650 to 5550 w/75 sks cmt., from 3800 to 3700 w/75 sks. cmt., from 2800 to 2650 w/100 sks. cmt.

Set top plug at 25' to surface w/10 sacks neat cement.

Well plugged and abandoned.

T26N R18W

Release

CONFIDENTIAL

Form 9-330 (Rev. 5-63)

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

SUBMIT IN DUPLICATE* (See other instructions on reverse side)

Form approved. Budget Bureau No. 42-R355.5.

WELL COMPLETION OR RECOMPLETION REPORT AND LOG *

5. LEASE DESIGNATION AND SERIAL NO.: 14-20-0603-8103

6. IF INDIAN, ALLOTTEE OR TRIBE NAME:

1a. TYPE OF WELL: OIL WELL [X] GAS WELL [ ] DRY [ ] Other

b. TYPE OF COMPLETION: NEW WELL [X] WORK OVER [ ] DEEPEN [ ] PLUG BACK [ ] DIFF. RESVR. [ ] Other

7. UNIT AGREEMENT NAME:

8. FARM OR LEASE NAME: Navajo Tribe "AR"

2. NAME OF OPERATOR: Texaco Inc. Attention: T. Bliss

9. WELL NO.: 6

3. ADDRESS OF OPERATOR: P. O. Box 2100, Denver, Colorado 80201

10. FIELD AND POOL, OR WILDCAT: Tocito Dome

4. LOCATION OF WELL (*Report location clearly and in accordance with any State requirements*)*
At surface: SW¼ SE¼ Sec. 27
At top prod. interval reported below: 660' FSL & 1980' FEL, Sec. 27
At total depth

11. SEC., T., R., M., OR BLOCK AND SURVEY OR AREA: Sec. 27 T26N-R18W

14. PERMIT NO. | DATE ISSUED

12. COUNTY OR PARISH: San Juan | 13. STATE: New Mex.

15. DATE SPUDDED: 3-18-74 | 16. DATE T.D. REACHED: 4-6-74 | 17. DATE COMPL. (*Ready to prod.*): 4-18-74 | 18. ELEVATIONS (DF, RKB, RT, GR, ETC.)*: 5622' KB | 19. ELEV. CASINGHEAD: 5610' GR

20. TOTAL DEPTH, MD & TVD: 6355' | 21. PLUG, BACK T.D., MD & TVD: 6326' | 22. IF MULTIPLE COMPL., HOW MANY*: -- | 23. INTERVALS DRILLED BY → ROTARY TOOLS: Surface to TD | CABLE TOOLS: --

24. PRODUCING INTERVAL(S), OF THIS COMPLETION—TOP, BOTTOM, NAME (MD AND TVD)*: Barker Creek Top 6178' Bottom TD

25. WAS DIRECTIONAL SURVEY MADE: No

26. TYPE ELECTRIC AND OTHER LOGS RUN: IES, BHC-Sonic-GR

27. WAS WELL CORED: Yes

28. CASING RECORD (*Report all strings set in well*)

CASING SIZE	WEIGHT, LB./FT.	DEPTH SET (MD)	HOLE SIZE	CEMENTING RECORD	AMOUNT PULLED
13-3/8"	54.5#	60'	17-1/2"	75 sacks	
9-5/8"	36#	1594'	12-1/4"	700 sacks	
7"	23 & 26#	6354'	8-3/4"	300 sacks	

29. LINER RECORD

SIZE	TOP (MD)	BOTTOM (MD)	SACKS CEMENT*	SCREEN (MD)
NONE				

30. TUBING RECORD

SIZE	DEPTH SET (MD)	PACKER SET (MD)
2-7/8"		

31. PERFORATION RECORD (*Interval, size and number*): SEE ATTACHED

32. ACID, SHOT, FRACTURE, CEMENT SQUEEZE, ETC.

DEPTH INTERVAL (MD)	AMOUNT AND KIND OF MATERIAL USED
SEE	ATTACHED

RECEIVED JUN 10 1974 OIL CON. COM. DIST. 3

33.* PRODUCTION

DATE FIRST PRODUCTION: 4-18-74 | PRODUCTION METHOD (*Flowing, gas lift, pumping—size and type of pump*): Flowing | WELL STATUS (*Producing or shut-in*): Producing

DATE OF TEST	HOURS TESTED	CHOKE SIZE	PROD'N. FOR TEST PERIOD	OIL—BBL.	GAS—MCF.	WATER—BBL.	GAS-OIL RATIO
4-27-74	24	18/64"	→	107	85	110	790

FLOW. TUBING PRESS.	CASING PRESSURE	CALCULATED 24-HOUR RATE	OIL—BBL.	GAS—MCF.	WATER—BBL.	OIL GRAVITY-API (CORR.)
265	--	→	--	--	--	45.0

34. DISPOSITION OF GAS (*Sold, used for fuel, vented, etc.*): Sold | TEST WITNESSED BY: W. L. Wilson

35. LIST OF ATTACHMENTS

36. I hereby certify that the foregoing and attached information is complete and correct as determined from all available records

SIGNED Jimmie Bliss TITLE District Superintendent DATE June 5, 1974

*(See Instructions and Spaces for Additional Data on Reverse Side)

USGS (3) Farmington OGCC (2) Aztec TB ARM CGH The Navajo Tribe

INSTRUCTIONS

General: This form is designed for submitting a complete and correct well completion report and log on all types of lands and leases to either a Federal agency or a State agency, or both, pursuant to applicable Federal and/or State laws and regulations. Any necessary special instructions concerning the use of this form and the number of copies to be submitted, particularly with regard to local, area, or regional procedures and practices, either are shown below or will be issued by, or may be obtained from, the local Federal and/or State office. See instructions on items 22 and 24, and 33, below regarding separate reports for separate completions.

If not filed prior to the time this summary record is submitted, copies of all currently available logs (drillers, geologists, sample and core analysis, all types electric, etc.), formation and pressure tests, and directional surveys, should be attached hereto, to the extent required by applicable Federal and/or State laws and regulations. All attachments should be listed on this form, see item 35.

Item 4: If there are no applicable State requirements, locations on Federal or Indian land should be described in accordance with Federal requirements. Consult local State or Federal office for specific instructions.

Item 18: Indicate which elevation is used as reference (where not otherwise shown) for depth measurements given in other spaces on this form and in any attachments.

Items 22 and 24: If this well is completed for separate production from more than one interval zone (multiple completion), so state in item 22, and in item 24 show the producing interval, or intervals, top(s), bottom(s) and name(s) (if any) for only the interval reported in item 33. Submit a separate report (page) on this form, adequately identified, for each additional interval to be separately produced, showing the additional data pertinent to such interval.

Item 29: *"Sacks Cement":* Attached supplemental records for this well should show the details of any multiple stage cementing and the location of the cementing tool.

Item 33: Submit a separate completion report on this form for each interval to be separately produced. (See instruction for items 22 and 24 above.)

37. SUMMARY OF POROUS ZONES:
SHOW ALL IMPORTANT ZONES OF POROSITY AND CONTENTS THEREOF; CORED INTERVALS; AND ALL DRILL-STEM TESTS, INCLUDING DEPTH INTERVAL TESTED, CUSHION USED, TIME TOOL OPEN, FLOWING AND SHUT-IN PRESSURES, AND RECOVERIES

FORMATION	TOP	BOTTOM	DESCRIPTION, CONTENTS, ETC.
			OIL CON. COM. DIST. 3

38. GEOLOGIC MARKERS

NAME	TOP MEAS. DEPTH	TOP TRUE VERT. DEPTH

NAVAJO TRIBE "AR" NO. 6

WELL COMPLETION HISTORY

4-13-74 Ran tubing and bit, tagged cement at 6326' PBTD. Pulled tubing and bit, ran packer. Perforated Barker Creek interval 6288-92' 2 JSPF through tubing with magnet stand off gun.

4-14-74 Spotted acid across perfs 6288-92', let soak 1 hr with packer set at 6247'. Acidized with 700 gal 15% NE HCl acid, maximum pressure 2600# @ 3 BPM, minimum pressure 1500# @ 1 BPM. ISIP 1000#, 5 minutes SI - zero. Swab tested.

4-16-74 Perforated thru tubing with magnetic stand off gun 2 JSPF Barker Creek intervals 6214-17, 6234-46 & 6250-61'.

4-17-74 Set packer at 6121'. Ran 500 gal unibead TDA plug and spotted 300 gal 15% NE HCl acid across perfs 6214-92'. Acidized with 4000 gal 28% NE HCl acid in 3 stages using 2 - 400 gal TDA plugs. Maximum rate 12 BPM @ 4000 psi, minimum rate 10 BPM @ 3400 psi. ISIP 900#, 5 minutes SI - zero. Swab tested.

4-18-74 Tubing pressure 250# after 14 hrs SI. Ran swab 3 times and well started flowing. Flowed 150 BFO & 157 BLW in 10 hrs.

4-27-74 IP: Flowed 24 hrs. 107 BO & 110 BW, GOR 790, TP 265 psi. 18/64" choke. Gravity 45.0 @ 60°.

ELECTRIC LOG TOPS

4867

Dakota	74[illegible]	Honaker Trail	5450'
Morrison	970[illegible]	Ismay	5897'
Todilto	2000'	Desert Creek	6007'
Entrada	2021'	Akah	6103'
DeChelly	3673'	Barker Creek	6178'
Organ Rock	429[illegible]		

DSTs

No DSTs were taken

CORES

Core No. 1	Barker Creek 6195-6236'	Cut 41'	Recovered 41'
Core No. 2	Barker Creek 6236-6296'	Cut 60'	Recovered 60'

NAVAJO TRIBE "AN" NO. [illegible]

WELL COMPLETION HISTORY

4-13-74 Ran tubing and bit, tagged cement at 6326' PBTD. Pulled tubing and bit, ran packer. Perforated Barker Creek interval 6288-92' 2 JSPF through tubing with magnet stand off gun.

4-14-74 Spotted acid across perfs 6288-92', let soak 1 hr with packer set at 6247'. Acidized with 700 gal 15% NE HCl acid, maximum pressure 2600# @ 3 BPM, minimum pressure 1500# @ 1 BPM. ISIP 1000#, 5 minutes SI - zero. Swab tested.

4-[illegible]-74 Perforated thru tubing with magnetic stand off gun 2 JSPF Barker Creek intervals 6214-17', 6224-46 & 6250-61'.

4-17-74 Set packer at 6121'. Ran 500 gal unibead TDA plug and spotted 300 gal 15% NE HCl acid across perfs 6214-92'. Acidized with 4000 gal 28% NE HCl acid in 3 stages using 2 - 400 gal TDA plugs. Maximum rate 12 BPM @ 4000 psi, minimum rate 10 BPM @ 3400 psi. ISIP 900#, 5 minutes SI - zero. Swab tested.

4-18-74 Tubing pressure 250# after 14 hrs SI. Ran swab 3 times and well started flowing. Flowed 150 BPO & 157 BLW in 10 hrs.

4-27-74 IP: Flowed 24 hrs. 107 BO & 110 BW, GOR 7[illegible], TP 265 psi. 18/64" choke. Gravity 45.0 @ 60°.

ELECTRIC LOG TOPS

Dakota	748'	Honaker Trail	54[illegible]'
Morrison	970'	Ismay	5897'
Todilto	2000'	Desert Creek	6097'
Entrada	2021'	Akah	61[illegible]3'
DeChelly	3672'	Barker Creek	6170'
Organ Rock	4293'		

DSTs

No DSTs were taken

CORES

Core No. 1 Barker Creek 6195-6236' Cut 41' Recovered 41'
Core No. 2 Barker Creek 6236-6296' Cut 60' Recovered 60'

T 26N R17W

Budget Bureau No. 42-R-355.3.
Approval expires 12-31-55.

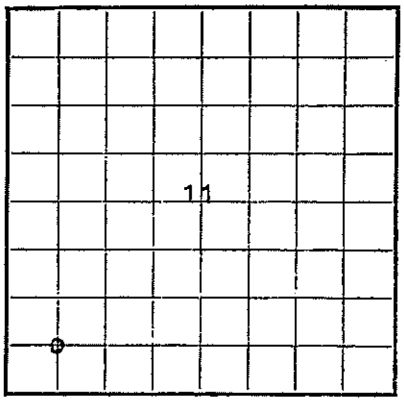
Form 9-330

U. S. LAND OFFICE WINDOW ROCK,
SERIAL NUMBER 14-20-603-2070
LEASE OR PERMIT TO PROSPECT

RECEIVED
FEB 14 1958
OIL CON. COM.
DIST. 3

State

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY



LOCATE WELL CORRECTLY

LOG OF OIL OR GAS WELL

Company DAVIS OIL COMPANY Address 202 MIDLAND SAVINGS BLDG., DENVER,

Lessor or Tract CONOCO-NAVAJO Field WILDCAT State NEW MEXICO

Well No. 1 Sec. 11 T. 26N R. ~~16W~~ 17 Meridian N.M.P.M. County SAN JUAN

Location 660 ft. {N. / S.} of S Line and 660 ft. {E. / W.} of W Line of SW/4 SEC. 11 Elevation 5473 (Derrick floor relative to sea level)

The information given herewith is a complete and correct record of the well and all work done thereon so far as can be determined from all available records.

Signed CRAIG C. RAMSEY Craig C. Ramsey

Date DEC. 22, 1957 Title ASST. DIV. GEOLOGIST

The summary on this page is for the condition of the well at above date.

Commenced drilling 11-25-, 19 57 Finished drilling 12-13, 19 57

OIL OR GAS SANDS OR ZONES

(Denote gas by G)

No. 1, from NONE to No. 4, from to

No. 2, from to No. 5, from to

No. 3, from to No. 6, from to

IMPORTANT WATER SANDS

No. 1, from 535 to 760 No. 3, from 3700 to 3800

No. 2, from 2450 to 2672 No. 4, from 4532 to 4750

CASING RECORD

Size casing	Weight per foot	Threads per inch	Make	Amount	Kind of shoe	Cut and pulled from	Perforated From—	Perforated To—	Purpose
8 5/8"				139'					SURFACE

MUDDING AND CEMENTING RECORD

Size casing	Where set	Number sacks of cement	Method used	Mud gravity	Amount of mud used
8 5/8"	153' KB	100 SX. 2% CACL2	PUMP	WATER	
	SEE PLUGGING DATA ON BACK				

FOLD

PLUGS AND ADAPTERS

Heaving plug—Material ________ Length ________ Depth set ________

Adapters—Material ________ Size ________

SHOOTING RECORD

Size	Shell used	Explosive used	Quantity	Date	Depth shot	Depth cleaned out

TOOLS USED

Rotary tools were used from 0 feet to 4830 feet, and from ________ feet to ________ feet

Cable tools were used from ________ feet to ________ feet, and from ________ feet to ________ feet

DATES

________, 19____ Put to producing ________, 19____

The production for the first 24 hours was ________ barrels of fluid of which ____% was oil; ____% emulsion; ____% water; and ____% sediment. Gravity, °Bé. ________

If gas well, cu. ft. per 24 hours ________ Gallons gasoline per 1,000 cu. ft. of gas ________

Rock pressure, lbs. per sq. in. ________

EMPLOYEES

C. C. LINSCOMBE, ~~Driller~~ TOOLPUSHER — ROY TOURNEY, Driller

N. L. HERRON, Driller — FLOYD TEANMER, Driller

FORMATION RECORD

FROM—	TO—	TOTAL FEET	FORMATION
0	2672	2672	MESAVERDE - SAND, FINE TO MEDIUM GRAINED, PARTLY CLAY FILLED, WATER WET, INTERBEDDE SHALE, GREY TO DARK GREY
2801 - U. Mancos 2672	3601	929	U. MANCOS, DARY GREY SHALE.
3601	3800	199	GALLUP SD., LT. GREY, FINE TO MEDIUM GRAIN POROUS, WATER WET
3800	4021	221	M. MANCOS SHALE DARK GREY - BLACK
4021	4061	40	SANASTEE ~~SHALE~~ Silt GREY, DIRTY, TITE.
4061	4433	372	L. MANCOS SHALE BLACK, HARD, SPLINTERY
4433	4490	57	GREENHORN, SHALE GREY, PARTLY CALC. W/SOME ~~LOOSE~~ DENSE BROWN ARGILLACEOUS, DENSE.
4490	4532	42	GRANARAS, SHALE GREY, SLIGHTLY SILTY
4532	4750	218	DAKOTA SD. WHITE, FINE TO MEDIUM GRAINED SILTY, LOW TO GOOD POROSITY, WATER WET W/ BEDDED GRAY SHALE
4750	4830 TD	80	MORRISON, SHALE GREEN, SILACEOUS /~~SKKXX~~, HARD W/INTE BEDDED SAND, MED. TO COARSE GRAIN, VERY POROUS, WATER WET.

(OVER) 16—43094-8

FORMATION RECORD—Continued

FROM—	TO—	TOTAL FEET	FORMATION

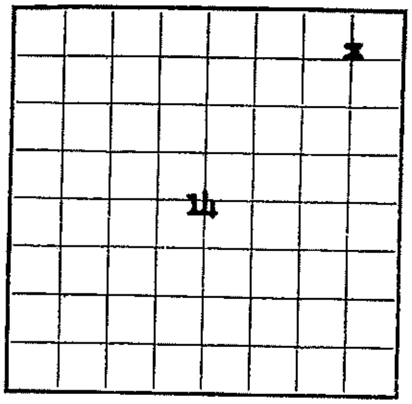
R SEE PLUGGING DATA ON BACK

T26N R15W

Form 9-330

Budget Bureau No. 42-R355.4.
Approval expires 12-31-60.

U. S. Land Office Window R
Serial Number 14-20-603-736
Lease or Permit to Prospect



LOCATE WELL CORRECTLY

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

LOG OF OIL OR GAS WELL

Company Shell Oil Company Address 33 Richards St., Salt Lake Cit
Lessor or Tract Tribal Land Field Wildcat State New Mexico
Well No. Burpham 1 Sec. 14 T. 26N R. 15W Meridian NMPM County San Juan
Location 560 ft. S. of N. Line and 660 ft. W. of E. Line of Section 14 Elevation 5663
(Derrick floor relative to

The information given herewith is a complete and correct record of the well and all work done th so far as can be determined from all available records.

Signed B. W. Shepard
B. W. Shepard

Date November 16, 1956 Title Exploitation Engineer

The summary on this page is for the condition of the well at above date.

Commenced drilling October 26, 1956 Finished drilling November 15, 19

OIL OR GAS SANDS OR ZONES

(*Denote gas by G*)

None

No. 1, from .... to .... No. 4, from .... to ....
No. 2, from .... to .... No. 5, from .... to ....
No. 3, from .... to .... No. 6, from .... to ....

IMPORTANT WATER SANDS

None

No. 1, from .... to .... No. 3, from .... to ....
No. 2, from .... to .... No. 4, from .... to ....

RECEIVED
DEC 27 1956
OIL CON. COM.
DIST. 3

CASING RECORD

Size casing	Weight per foot	Threads per inch	Make	Amount	Kind of shoe	Cut and pulled from	Perforated From—	Perforated To—	Purp
8-5/8"	32#	8	-	218	Baker	-	-	-	Surf

MUDDING AND CEMENTING RECORD

Size casing	Where set	Number sacks of cement	Method used	Mud gravity	Amount of mud used
8-5/8"	218	130	Displacement	-	-

FOLD

PLUGS AND ADAPTERS

Heaving Plug—Material Cement Length See attached Depth set

Adapters—Material Size

SHOOTING RECORD

Size	Shell used	Explosive used	Quantity	Date	Depth shot	Depth cleaned out
			None			

TOOLS USED

Rotary tools were used from 0 feet to 5388 feet, and from - feet to - feet

Cable tools were used from - feet to - feet, and from - feet to - feet

DATES

Abandoned as a "dry hole"
November 16, 19 56

Put to producing , 19

The production for the first 24 hours was barrels of fluid of which % was oil; % emulsion; % water; and % sediment.

Gravity, °Bé.

If gas well, cu. ft. per 24 hours

Gallons gasoline per 1,000 cu. ft. of gas

Rock pressure, lbs. per sq. in.

EMPLOYEES

A. E. Jones, Driller

D. L. Brazill, Driller

J. Boggs, Driller

, Driller

FORMATION RECORD

FROM—	TO—	TOTAL FEET	FORMATION	
704	820	116	Pictured Cliffs	4959
820	1000	180	Lewis	4843
1000	3180	2180	Cliff House	4663
3180	3330	150	Point Lookout	2483
3330	4264	934	Mancos	2333
4264	4658	394	Gallup	1399
4658	5122	464	Sanastee	1005
5122	5386	264	Dakota	541
5386	-		Morrison	277

[OVER] 10—43094-4

Form 9-330

RECEIVED
NOV 26 1962
U. S. GEOLOGICAL SURVEY
FARMINGTON, NEW MEXICO

Budget Bureau No. 42-R355.4.
Approval expires 12-31-60.

U. S. LAND OFFICE Navajo Tribal
SERIAL NUMBER 14-20-603-741
LEASE OR PERMIT TO PROSPECT

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

NOV 28 1962
OIL CON. COM.
DIST. 3

	Sec. 34						
	•	#1					

LOCATE WELL CORRECTLY

LOG OF OIL OR GAS WELL

Company Skelly Oil Company Address Box 38 - Hobbs, New Mexico

Lessor or Tract Navajo "O" Field Wildcat State New Mexico

Well No. 1 Sec. 34 T. 26N R. 14W Meridian N.M.P.M. County San Juan

Location 990 ft. {N. / S.} of S Line and 1650 ft. {E. / W.} of W Line of Section 34 Elevation 6282' D.F.
(Derrick floor relative to sea level)

The information given herewith is a complete and correct record of the well and all work done thereon so far as can be determined from all available records.

Signed (ORIGINAL SIGNED) H. E. Ash

Date November 21, 1962 Title Dist. Supt.

The summary on this page is for the condition of the well at above date.

Commenced drilling August 19, 19 62. Finished drilling October 6, 19 62.

1 26 N R14W

OIL OR GAS SANDS OR ZONES
(Denote gas by G)

No. 1, from Dry Hole to Dry Hole No. 4, from to

No. 2, from to No. 5, from to

No. 3, from to No. 6, from to

IMPORTANT WATER SANDS

No. 1, from to No. 3, from to

No. 2, from to No. 4, from to

CASING RECORD

Size casing	Weight per foot	Threads per inch	Make	Amount	Kind of shoe	Cut and pulled from	Perforated From—	Perforated To—	Purpose
10-3/4"	40.5#	8-R	J-55	1228'	Guide	—	—	—	Surface

MUDDING AND CEMENTING RECORD

Size casing	Where set	Number sacks of cement	Method used	Mud gravity	Amount of mud used
10-3/4"	1246'	700	Pump & Plug	—	—

FOLD | MARK

PLUGS AND ADAPTERS

Heaving plug—Material Length Depth set

Adapters—Material Size

SHOOTING RECORD

Size	Shell used	Explosive used	Quantity	Date	Depth shot	Depth cleaned out
No Treatments						

TOOLS USED

Rotary tools were used from 0 feet to 11,282 feet, and from feet to feet

Cable tools were used from feet to feet, and from feet to feet

DATES

, 19 Put to producing Dry Hole , 19

The production for the first 24 hours was barrels of fluid of which % was oil; % emulsion; % water; and % sediment. Gravity, °Bé.

If gas well, cu. ft. per 24 hours Gallons gasoline per 1,000 cu. ft. of gas

Rock pressure, lbs. per sq. in.

EMPLOYEES

D. W. Myers, Driller T. C. Rowland, Driller

A. H. Ehler, Driller , Driller

FORMATION RECORD

FROM—	TO—	TOTAL FEET	FORMATION
0	3678	3678	Sand & Shale
3678	3818	140	Sand & Shale Top Point Lookout 3678'
3818	4758	940	Sand & Shale Top Mancos 3818'
4758	4842	84	Sand & Shale Top Upper Gallup 4758'
4842	5178	336	Sand & Shale Top Lower Gallup 4842'
5178	5560	382	Sand & Shale Top Sanastee 5178'
5560	5614	54	Sand & Shale Top Greenhorn 5560'
5614	5646	32	Sand & Shale Top Graneros 5614'
5646	5690	44	Sand & Shale Top Dakota 1 5646'
5690	5782	92	Sand & Shale Top Dakota 2 5690'
5782	5902	120	Sand & Shale Top Dakota 3 5782'
5902	5938	36	Sand & Shale Top Dakota 4 5902'
5938	6862	924	Sand & Shale Top Morrison 5938'
6862	6890	28	Sand & Shale Top Todilto 6862'
6890	7018	128	Sand & Shale Top Entrada 6890'
7018	8034	1016	Sand & Shale Top Chinle 7018'
8034	8068	34	Sand & Shale Top Shinarump 8034'
8068	8274	206	Sand & Shale Top Moenkopi 8068'
8274	8613	339	Sand & Shale Top DeChelly 8274'
8613	9848	1235	Sand & Shale Top Cedar Mesa 8613'
9848	11,055	1207	Sand & Shale Top Upper Hermosa 9848'
11,055	11,136	81	Sand & Shale Top Molas 11,055'
11,136	11,250	114	Sand & Shale Top Mississippian 11,136'
11,250	11,282	32	Sand & Shale Top Cambrian Ignacio 11,250'
	11,282	Total Depth	Geological Tops By Schlumberger Induction Electrical Log.

[OVER]

Elevation Formation Tops

2604' - Pt. Lookout
2464' - Mancos
1524 - Gallup
1104 - Sanostee

FORMATION RECORD—Continued

FROM—	TO—	TOTAL FEET	FORMATION

CORE NO. 1 - 10,738 - 10,770' - (32') - Recovered 14'; Top 5½' - Limestone - medium gray, dense fossils, fractures filled with shale & calcite with some dead oil. Next 4½'- Shale-black rotten with some fossils. Next 1½'-Limestone-medium gray to brown with medium grain crystalline with few fossils and few vugs filled with dead oil. Some bleeding gas, from vugs. Next 1/2'-Sandstone-white coarse grained hard & tight. No porosity or show. Next 1'-Limestone-Dark grey & dense with few fossils and trace of vugs with some bleeding gas. Next 1/2'-Sandstone-White coarse grained hard & tight. No porosity or show. Next 1/2'-Limestone-Dark gray dense with small hairline fractures filled with calcite and some dead oil. Core Lab's analysis of 4' of core from 10,748-10,752':

	Perm.	Porosity	Oil	Water
10,748-49' (limest)	0.01	.7	0	57%
10,749-50' (do)	0.01	.8	0	75%
10,750-51' (do)	0.01	.7	0	85%
10,751-52' (Sd.stone)	0.01	1.9	0	89%

Had no show of live oil in core.

CORE NO. 2 - 11,077 - 11,108' - (31') - Recovered 11-1/2'

6'- Limestone & Shale - Mottled gray, green, purple, Maroon, fossiliferous orange chert.

1'- Shale - Dark grayish & purple.

1'- Limestone - Gray, green, dense to medium crystalline chert, fossiliferous, hard & tight.

1'- Limestone & Shale - Mottled - same as above.

2-1/2' Limestone - Gray, green, dense, hard & tight. No fossils with some dark grey chert.

CORE NO. 3 - 11,128 - 11,132' - (4') - Recovered 3-3/4';

3-3/4' - Shale - Brownish marrow & orange chert with fractures filled with calcite. No show of oil or gas.

DRILL STEM TEST NO. 1 - 11,140 - 11,282';

3/8" BHC, 1" THC. 2000' Water blanket. Tool open 3 hrs. with very slight air blow after 12 min. which lasted 15 min. & died with no further blow through test. Recovered 2000' water blanket, 330 heavy gas cut mud & 395' gas cut muddy salt water. Gas in mud tested 1.5% Methane & no Helium. ISIP 4890# FSIP 4675#. IFP 1095#, FFP 1160#, H.P. in 5590#, out 5845#.

DRILL STEM TEST NO. 2 - 10,546 - 10,756';

3/8" BHC, 1" THC. Using straddle packer and 1500' water blanket. Tool open 1-1/2 min. with very slight air blow & upper packer failed. Pulled 4-1/2" OD drill pipe & recovered 1500' water blanket & 550' mud with no shows.

DRILL STEM TEST NO. 3 - 10,515 - 10,823';

3/8" BHC, 1" THC. 1500' water blanket & 4-1/2" OD drill pipe. Opened tool for 1 hour & had fair blow of air immediately which decreased to a very light air blow at end of first hour. Closed tool for 1 hr. ISIP. Reopened tool for 3 hrs. with no air flow for 45 min. then had a strong air blow for remainder of 3 hr. test. Recovered 1500' water blanket, 150' water, 90' muddy water & 180' medium gas cut mud. 1 hr. ISIP 1590#, 1 hr. FSIP 1390#. IFP 880#, FFP 905#. H.P. in and out 5195#.

DRILL STEM TEST NO. 4 - 2310 - 2603';

3/4" BHC, 1" THC. 4-1/2" OD drill pipe & no water blanket. Testing zone for water for Navajo Tribe. Tool open 1 hr. with fair air blow throughout test. No fluid to surface. Took 30 min. shut in pressure test. Pulled tool and recovered 270' mud with no shows of water, gas or oil. IFP 90#, no final flow pressure recorded. 30 min. SI pressure 660# H.P. in & out 1190#.

No commercial quantities of oil or gas was encountered in any zone of this well. The well was plugged & abandoned according to the Rules and Regulations of the New Mexico Oil Conservation Commission and the United States Geological Survey.

Spotted cement plugs as follows:

11,282'	- 10,823'	-	180 sacks cement
10,773'	- 10,675'	-	55 sacks cement
9,900'	- 9,800'	-	55 sacks cement
8,325'	- 8,225'	-	55 sacks cement
6,900'	- 6,800'	-	55 sacks cement
5,700'	- 5,600'	-	55 sacks cement
4,900'	- 4,800'	-	55 sacks cement

HISTORY OF OIL OR GAS WELL

It is of the greatest importance to have a complete history of the well. Please state in detail the dates of redrilling, together with the reasons for the work and its results. If there were any changes made in the casing, state fully, and if any casing was "sidetracked" or left in the well, give its size and location. If the well has been dynamited, give date, size, position, and number of shots. If plugs or bridges were put in to test for water, state kind of material used, position, and results of pumping or bailing.

2,750'	- 2,603'	-	100 sacks cement
1,450'	- 1,300'	-	75 sacks cement
TOTAL		-	685 sacks cement

Ran 15 sacks cement cap and installed 4" pipe marker. All intervals not filled with cement plug were filled with heavy mud laden fluid. Plugging operations were completed on October 16, 1962.

Verbal approval to plug and abandon this well were secured from Mr. Richard Krahl.

Form 9-330

Budget Bureau No. 42-R355.4.
Approval expires 12-31-60.

Indian Agency – Window Rock,
U. S. LAND OFFICE ... Ariz.

SERIAL NUMBER 14-20-0603-7267

LEASE OR PERMIT TO PROSPECT ....
Navajo Tract #32

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

LOCATE WELL CORRECTLY

LOG OF OIL OR GAS WELL

Company Amerada Petroleum Corporation Address Box 1469, Durango, Colorado

Lessor or Tract Federal Gov't. (Navajo) Field Wildcat-S. Dike Area State New Mexico

Well No. 1 Sec. 27 T. 28N R. 19W Meridian NMPM County San Juan

Location 660 ft. {N./S.} of N Line and 660 ft. {E./W.} of E Line of Sec. 27 Elevation 5515'

The information given herewith is a complete and correct record of the well and all work done thereon so far as can be determined from all available records.

Signed [signature] D. V. Furse

Date July 27, 1963 Title Foreman

The summary on this page is for the condition of the well at above date.

Commenced drilling May 17, 1963 Finished drilling July 8, 1963

OIL OR GAS SANDS OR ZONES
(Denote gas by G)

No. 1, from None to .... No. 4, from .... to ....

No. 2, from .... to .... No. 5, from .... to ....

No. 3, from .... to .... No. 6, from .... to ....

IMPORTANT WATER SANDS

No. 1, from None encountered to .... No. 3, from .... to ....

No. 2, from .... to .... No. 4, from .... to ....

CASING RECORD

Size casing	Weight per foot	Threads per inch	Make	Amount	Kind of shoe	Cut and pulled from	Perforated From–	Perforated To–	Purpose
9-5/8"	32.30	8-RT	H-40	1288'	Baker				

MUDDING AND CEMENTING RECORD

Size casing	Where set	Number sacks of cement	Method used	Mud gravity	Amount of mud used
9-5/8"	1288'	750	Halliburton – Cement Circulated		

PLUGS AND ADAPTERS

Heaving plug—Material See Back P/Plug Record Length .... Depth set ....

Adapters—Material .... Size ....

SHOOTING RECORD

Size	Shell used	Explosive used	Quantity	Date	Depth shot	Depth cleaned out
		None				

TOOLS USED

Rotary tools were used from 0 feet to 7715 feet, and from .... feet to .... feet

Cable tools were used from .... feet to .... feet, and from .... feet to .... feet

DATES

None, 19.... Put to producing No P&A, 19....

The production for the first 24 hours was .... barrels of fluid of which ....% was oil; ....% emulsion; ....% water; and ....% sediment. Gravity, °Bé. ....

If gas well, cu. ft. per 24 hours .... Gallons gasoline per 1,000 cu. ft. of gas ....

Rock pressure, lbs. per sq. in. ....

EMPLOYEES

..... Salbrook, Driller H. J. Hickey, Driller

E. A. Davis, Driller ..... Hickel, Driller

FORMATION RECORD

FROM–	TO–	TOTAL FEET	FORMATION
0'	160'	160'	Shale
160'	2189'	2029'	Sand & shale
2189'	4046'	1857'	Sand, shale & lime
4046'	5036'	990'	Sand, shale & chert
5036'	5778'	742'	Sand, shale & anhydrite
5778'	6026'	248'	Shale, lime & anhydrite
6026'	6669'	643'	Sand, shale & lime
6669'	6904'	235'	Sand & lime
6904'	7126'	222'	Sand, lime & chert
7126'	7255'	129'	Lime & dolomite
7255'	7429'	174'	Lime, dolomite & shale
7429'	7464'	35'	Sand, lime & chert
7464'	7694'	230'	Sand, shale & lime
7694'	7715'	21'	Sand, shale & granite

NO CORES TAKEN

Drill Stem Test #1 – from 6408' to 6542', Paradox A & B Zone, 1 hr. & 25 min. test, 4½ D.P. w/Hyd. Jars & Circ. Sub. No water cushion, 3/4" btm. and 1/2" top openings, perfs. from 6538' to 6542' and 6430' to 6410'. Opened tool and had good blow of air immediately for 10 min., decreased and died in 25 min. Closed tool for 1½ hr. B.H.P. Recovered 140' slightly gas-cut mud and 3940' mud. No Shows, except for questionable traces of gas. IHP 3245#, FHP 3220#, IFP 1170#, FFP 2105#, 30 Min. B.H.P. 2455#, 1 hr. B.H.P. 2565#, 90 Min. B.H.P. 2645#

(Continued on back)

[OVER]

FOLD | MARK

T28N
R19W

FORMATION RECORD—Continued

FROM—	TO—	TOTAL FEET	FORMATION

Drill Stem Test #2 - From 6745' to 6900', Paradox C Zone, 1 hr. test, 4" D.F. w/Hyd. Jars & Circ. Sub, no water cushion, 3/4" btm. and 1/4" top opening, 30' of perfs.. Opened tool and had very weak blow of air for 2 Min.. Closed tool for 1½ hr. S.I.B.H.P., recovered 45' drlg. mud, no show of oil, gas or water. IHP 348?, FHP 3462#, IFP 9#, FFP 11#, 30 Min. S.I.B.H.P. 15#, 60 Min. 17#, 90 Min. 23#

Drill Stem Test #3 - From 7100' to 7134', Mississippi Zone, 4 hr. test, 4" D.P., no water cushion, 5/8" btm. opening & 1" top opening. Opened tool and had good blow of air immediately, continued to blow for 4 hrs., no flamable gas to surface. Order seemed to change after 20 Min.. Vol. 23,569 Cu/ft. per day. Closed tool for 90 Min. B.H.P.. trace of blow continued for 90 Min.. Recovered 100' slightly gas or air-cut mud, no trace of oil or water. IHP 3655#, FHP 3598#, IFP 97.5# FFP 97.5#, 30 min. S.I.B.H.P. 2446#, 60 Min. 2879#, 90 Min. 2907#

Drill Stem Test #4 - From 7174' to 7236', Mississippi Zone, 4 hr. test, 4" D.P., no water cushion, 1" top opening & 3/4" btm. opening. Opened tool and had weak blow of air immediately, increased to fair blow in 10 Min., continued same for 2 hrs. 58 Min.. Started flowing drlg. mud & salt water for remainder of test. Closed tool for 90 Min. B.H.P.. Recovered 7145' of salt water. No Shows. IHP 3704#, FHP 3661#, IFP 436#, FFP 3426#, 30 Min. S.I.B.H.P., 60 Min. S.I.B.H.P. & 90 Min. S.I.B.H.P. 3487#

PLUG AND ABANDON

7-7-63 - 7715' Total Depth: Plug and abandon, spotted cement plugs in well as follows:
45 Sacks cement from 7600' to 7715' - 115' Plug
95 " " " 7050' " 7250' - 200' "
50 " " " 6300' " 6450' - 150' "
40 " " " 5700' " 5800' - 100' "
40 " " " 3900' " 4000' - 100' "
40 " " " 2450' " 2550' - 100' "
Plugged top of 9-5/8" surface casing w/10 sacks cement. Hole is filled with heavy rotary mud between plugs. Installed Federal dry hole marker and abandon well.

SCHLUMBERGER TOPS:

Lower Gallup	200'	+5317	Shinarump	3731'	+1786'
Greenhorn	952'	+4565'	De Chelly	3948'	+1569'
Graneros	1020'	+4497'	Organ Rock	4443'	+1074'
Dakota	1068'	+4449'	Upper Hermosa	5742'	- 225'
Morrison	1215'	+4302'	Paradox	6392'	- 875'
Summerville	2072'	+3445'	Paradox "C"	6471'	- 954'
Todilto	2270'	+3247'	Molas	6973'	-1456'
Entrada	2287'	+3230'	Mississippian	7096'	-1579'
Ross Rack	3696'	+1821'	Devonian-Elbert	7292'	-1775'

GEOLOGICAL SAMPLE TOP:

Precambrian (Granite) 7665' -2148'

16—43094-3 U.S. GOVERNMENT PRINTING OFFICE

HISTORY OF OIL OR GAS WELL

It is of the greatest importance to have a complete history of the well. Please state in detail the dates of redrilling, together with the reasons for the work and its results. If there were any changes made in the casing, state fully, and if any casing was "sidetracked" or left in the well, give its size and location. If the well has been dynamited, give date, size, position, and number of shots. If plugs or bridges were put in to test for water, state kind of material used, position, and results of pumping or bailing.

T28N R17W

Form 9-330

Budget Bureau No. 42-R355.4.
Approval expires 12-31-60.

U. S. LAND OFFICE Farmington

SERIAL NUMBER 14-20-603-1043

LEASE OR PERMIT TO PROSPECT Nava

RECEIVED
DEC 30 1958
OIL CON. COM.
DIST. 3

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

RECEIVED
DEC 29 1958
U. S. GEOLOGICAL SURVEY
FARMINGTON, NEW MEX.

						x	

LOCATE WELL CORRECTLY

LOG OF OIL OR GAS WELL

Company Union Mid-Continent Oil Company Address P. O. Box 128, Hobbs, New Mexico

Lessor or Tract N.M. Navajo Field Wildcat State New Mexico

Well No. 2 Sec. 27 T. 28N R. 17W Meridian NMPM County San Juan

Location 330 ft. {N. S.} of N Line and 990 ft. {E. W.} of E Line of Sec. 27 Elevation 5331 (Derrick floor relative to sea level)

The information given herewith is a complete and correct record of the well and all work done thereon so far as can be determined from all available records.

Signed [signature]

Date 12-21-58 Title Area Engineer

The summary on this page is for the condition of the well at above date.

Commenced drilling 12-3, 19 58 Finished drilling 12-7, 19 58

OIL OR GAS SANDS OR ZONES

(Denote gas by G)

No. 1, from None to ____ No. 4, from ____ to ____

No. 2, from ____ to ____ No. 5, from ____ to ____

No. 3, from ____ to ____ No. 6, from ____ to ____

IMPORTANT WATER SANDS

No. 1, from ____ to ____ No. 3, from ____ to ____

No. 2, from ____ to ____ No. 4, from ____ to ____

CASING RECORD

Size casing	Weight per foot	Threads per inch	Make	Amount	Kind of shoe	Cut and pulled from	Perforated From—	Perforated To—	Purpose
8 5/8	24	8		105	Guide				surface

MUDDING AND CEMENTING RECORD

Size casing	Where set	Number sacks of cement	Method used	Mud gravity	Amount of mud used
8 5/8	105	50 sx	Pump		Circulated

RK

FOLD

PLUGS AND ADAPTERS

Heaving plug—Material .... Length .... Depth set ....

Adapters—Material .... Size ....

SHOOTING RECORD

Size	Shell used	Explosive used	Quantity	Date	Depth shot	Depth cleaned out

TOOLS USED

Rotary tools were used from ....0.... feet to ....1690.... feet, and from .... feet to .... feet

Cable tools were used from .... feet to .... feet, and from .... feet to .... feet

DATES

............................, 19...... Put to producing ....Dry Hole...................., 19......

The production for the first 24 hours was .... barrels of fluid of which ....% was oil; ....% emulsion; ......% water; and ......% sediment. Gravity, °Bé. ....

If gas well, cu. ft. per 24 hours .... Gallons gasoline per 1,000 cu. ft. of gas ....

Rock pressure, lbs. per sq. in. ....

EMPLOYEES

...., Driller ...., Driller

...., Driller ...., Driller

FORMATION RECORD

FROM—	TO—	TOTAL FEET	FORMATION
110	150	40	Sand
150	220	70	Shale
220	330	110	Sand
330	400	70	Shale
400	470	70	Sand
470	630	160	Shale
630	860	230	Sand
860	970	110	Shale
970	1030	60	Sand, Calcareous
1030	1380	350	Shale
1380	1440	60	Shale w/streaks Lime
1440	1480	40	Shale
1480	1580	100	Sand
1580	1615	35	Shale
1615	1650	35	Sand
1650	1690	40	Shale

[illegible]	645
Sonnsatee	995
Greenhorn	1380
Dakota	1475
Morrison	1677

4886

[OVER]

10—43094-4

RK

T 27N R16 W

RECEIVED

Budget Bureau No. 42-R355.4.
Approval expires 12-31-60.

Form 9-330

U. S. LAND OFFICE
SERIAL NUMBER
LEASE OR PERMIT TO PROSPECT Nav-14-20-603-6367

					x		
			9				

LOCATE WELL CORRECTLY

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

LOG OF OIL OR GAS WELL

Company Humble Oil & Refining Company Address Box 3082, Durango, Colorado

Lessor or Tract Navajo 16 Tract Field Wildcat State New Mexico

Well No. 1 Sec. 9 T. 27N R. 16W Meridian N.M.P.M. County San Juan

Location 660 ft. {N. / S.} of N Line and 1880 ft. {E. / W.} of E Line of Section 9 Elevation 5281 (Derrick floor relative to sea level)

The information given herewith is a complete and correct record of the well and all work done thereon so far as can be determined from all available records.

Signed COPY (ORIGINAL SIGNED) B. M. BRADLEY B. M. Bradley

Date January 17, 1962 Title Dist. Prod. Supt.

The summary on this page is for the condition of the well at above date.

Commenced drilling November 13, 1961 Finished drilling December 7, 1961

OIL OR GAS SANDS OR ZONES

(Denote gas by G)

No. 1, from - to No. 4, from to

No. 2, from to No. 5, from to

No. 3, from to No. 6, from to

IMPORTANT WATER SANDS

No. 1, from - to No. 3, from to

No. 2, from to No. 4, from to

CASING RECORD

Size casing	Weight per foot	Threads per inch	Make	Amount	Kind of shoe	Cut and pulled from	Perforated From—	Perforated To—	Purpose
8-5/8	24#	8	J-55	209'	Baker	-	-	-	-

MUDDING AND CEMENTING RECORD

Size casing	Where set	Number sacks of cement	Method used	Mud gravity	Amount of mud used
8-5/8	217'	150			

MARK

FOLD

PLUGS AND ADAPTERS

Heaving plug—Material - Length Depth set

Adapters—Material - Size

SHOOTING RECORD

Size	Shell used	Explosive used	Quantity	Date	Depth shot	Depth cleaned out

TOOLS USED

Rotary tools were used from 0 feet to 4737' feet, and from - feet to - feet

Cable tools were used from - feet to - feet, and from feet to feet

DATES

D & A December 7, 19 61   Put to producing - , 19 -

The production for the first 24 hours was - barrels of fluid of which - % was oil; - % emulsion; - % water; and - % sediment.   Gravity, °Bé. -

If gas well, cu. ft. per 24 hours -   Gallons gasoline per 1,000 cu. ft. of gas -

Rock pressure, lbs. per sq. in. -

EMPLOYEES

, Driller   , Driller

, Driller   , Driller

FORMATION RECORD

FROM—	TO—	TOTAL FEET	FORMATION
0	780	780	Undesignated
780	1125	345	Chacra
1125	1348	223	Cliff house
1348	2555	1207	Menefee
2555	2736	181	Pt. Lookout
2736	3622	886	Mancos
3622	3810	188	Gallup
3810	4132	322	Bisti sand
4132	4518	386	Sanastee
4518	4578	60	Greenhorn
4578	4617	39	Graneros
4617	4737 TD	120	Dakota

[OVER]   16—48094-4

8-5/8	217'	150				

MARK

Form 9-330

Budget Bureau No. 42-R355.4.
Approval expires 12-31-60.

RECEIVED
DEC 6 1961
OIL CON. COM.
DIST. 3

U. S. LAND OFFICE Navajo Tribe of Indians

LEASE OR PERMIT TO PROSPECT Contract No. 14-20-603-2303

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

(A)

LOCATE WELL CORRECTLY

LOG OF OIL OR GAS WELL

Company Gulf Oil Corporation Address P. O. Box 1971, Casper, Wyoming

Lessor or Tract Gulf Seven Ojo Navajo Field Wildcat State New Mexico

Well No. 1 Sec. 4 T. 27N R. 14W Meridian NMPM County San Juan

Location 1980 ft. N. of S. Line and 660 ft. E. of W. Line of Section 4 Elevation 5793'

The information given herewith is a complete and correct record of the well and all work done thereon so far as can be determined from all available records.

Signed

Date November 27, 1961 Title Area Production Manager

The summary on this page is for the condition of the well at above date.

Commenced drilling 9-12-61, 19 Finished drilling 9-24-61, 19

OIL OR GAS SANDS OR ZONES

(Denote gas by G)

No. 1, from None to No. 4, from to

No. 2, from to No. 5, from to

No. 3, from to No. 6, from to

IMPORTANT WATER SANDS

No. 1, from None Tested to No. 3, from to

No. 2, from to No. 4, from to

CASING RECORD

Size casing	Weight per foot	Threads per inch	Make	Amount	Kind of shoe	Cut and pulled from	Perforated From—	Perforated To—	Purpose
8-5/8"	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				Surface

MUDDING AND CEMENTING RECORD

Size casing	Where set	Number sacks of cement	Method used	Mud gravity	Amount of mud used
8-5/8"	231'	175 (2% cc)	Pump & Plug		

FOLD MARK

PLUGS AND ADAPTERS

Heaving plug—Material Length Depth set

Adapters—Material Size

SHOOTING RECORD

Size	Shell used	Explosive used	Quantity	Date	Depth shot	Depth cleaned out

TOOLS USED

Rotary tools were used from surface feet to TD feet, and from feet to feet

Cable tools were used from feet to feet, and from feet to feet

DATES

, 19 Put to producing 9-28-61, 19
PLUGGED & ABANDONED

The production for the first 24 hours was barrels of fluid of which % was oil; % emulsion; % water; and % sediment. Gravity, °Bé.

If gas well, cu. ft. per 24 hours Gallons gasoline per 1,000 cu. ft. of gas

Rock pressure, lbs. per sq. in.

EMPLOYEES

Driller Driller

Driller Driller

FORMATION RECORD

FROM—	TO—	TOTAL FEET	FORMATION
0	1020'	1020'	Shale and sand
1020'	1310'	290'	Sand and shale
1310'	1860'	550'	Shale with sand zones
1860'	2360'	500'	Sand with shale
2360'	5650'	1815'	Shale locally sandy, with shaly sand
[illegible]	[illegible]	207'	Sand and shale

Electric Log Tops

Pictured Cliffs 1020'
Lewis Shale 1270'
Cliff House 1850'
Point Lookout 3570'
Mancos Shale 3835'
[illegible] 5648'
[illegible] 5835'

5835

FORMATION RECORD—Continued

FROM—	TO—	TOTAL FEET	FORMATION

CORE RECORD

Core No. 1, 5057' to 5117', cored and recovered 60'.

26' silt, shale & sandstone, interlaminated
8' shale
11' [illegible] and sandstone, interlaminated
[illegible] shale
[illegible] limestone, breccia
[illegible]
No shows gas or oil

DRILL STEM TEST RECORD

Drill Stem Test No. 1, could not get tool in hole because of bridges.

Drill Stem Test No. 2, 5636' to 5692', [illegible] packers failed at bottom.

Drill Stem Test No. 3, 5625' to 5671', [illegible] packer at 5630'. Tool opened with strong blow for 5 minutes. Shut in 30 minutes. Opened tool, had strong blow for 1 minute, lost mud. Pressures: Initial Hydrostatic 2910 psi, Initial Shut in 2245 psi, Initial Flow 445 psi. Pressures may not be accurate on account of [illegible].

Drill Stem Test No. 4, 5595' to 5665', three 6-3/4" packers, 3/4" sub-surface choke. Perfs. at 5660' to 5620'. Initial flow 5 minutes, initial shut in 45 minutes, tool open 55 minutes, final shut in 1 hour. Tool open with weak blow, dead in 37 minutes. No gas to surface. Recovered 660' drilling mud of which 600' [illegible]. Pressures: Initial Shut in 2370 psi, Initial Flow 235 psi, Final Flow 300 psi, Final Shut in 1965 psi, Initial Hydrostatic 2820 psi, Final Hydrostatic 2795 psi, Bottom Hole Temperature 176°.

HISTORY OF OIL OR GAS WELL

It is of the greatest importance to have a complete history of the well. Please state in detail the dates of redrilling, together with the reasons for the work and its results. If there were any changes made in the casing, state fully, and if any casing was "sidetracked" or left in the well, give its size and location. If the well has been dynamited, give date, size, position, and number of shots. If plugs or bridges were put in to test for water, state kind of material used, position, and results of pumping or bailing.

T28N R17W

Form 9-330

Budget Bureau No. 42-R355.2.
Approval expires 12-31-52.

VA 375
NO CARD

U. S. LAND OFFICE NAV. TRIBAL
SERIAL NUMBER I-149-IND-8461
LEASE OR PERMIT TO PROSPECT

RECEIVED
NOV 25 1955
OIL CON. COM.
DIST. 3

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

RECEIVED
OCT 2 1955
U. S. GEOLOGICAL SURVEY
FARMINGTON, NEW MEX.

LOCATE WELL CORRECTLY

LOG OF OIL OR GAS WELL

Company Continental Oil Company Address P. O. Box 1121, Durango, Colo.

Lessor or Tract Navajo Tribal Field No. Table Mesa State New Mexico

Well No. 1 Sec. 34 T. 28N R. 17W Meridian N.M.P.M. County San Juan

Location 1019 ft. {N./S.} of N Line and 1659 ft. {E./W.} of E Line of Sec. 34 Elevation 5354
(Derrick floor relative to sea level)

The information given herewith is a complete and correct record of the well and all work done thereon so far as can be determined from all available records.

Signed Kenneth L. Smith

Date October 18, 1955 Title Geologist

The summary on this page is for the condition of the well at above date.

Commenced drilling April 1, 1955 Finished drilling April 13, 1955

OIL OR GAS SANDS OR ZONES

(Denote gas by G)

No. 1, from 1497 to 1517 (oil & water) No. 4, from to

No. 2, from to No. 5, from to

No. 3, from to No. 6, from to

IMPORTANT WATER SANDS

No. 1, from 585 to 735 No. 3, from to

No. 2, from 1517 to 1672 No. 4, from to

CASING RECORD

Size casing	Weight per foot	Threads per inch	Make	Amount	Kind of shoe	Cut and pulled from	Perforated From—	Perforated To—	Purpose

MUDDING AND CEMENTING RECORD

Size casing	Where set	Number sacks of cement	Method used	Mud gravity	Amount of mud used
Set plug 1575 to 1400 w/30 sax					
Set plug 400 to 300 w/16 sax					
Set plug at surface w/10 sax					

MARK

FOLD

PLUGS AND ADAPTERS

Heaving plug—Material ______ Length ______ Depth set ______

Adapters—Material ______ Size ______

SHOOTING RECORD

Size	Shell used	Explosive used	Quantity	Date	Depth shot	Depth cleaned out

TOOLS USED

Rotary tools were used from Surface feet to 1692 feet, and from ______ feet to ______ feet

Cable tools were used from ______ feet to ______ feet, and from ______ feet to ______ feet

DATES

______, 19___ Put to producing ______, 19___

The production for the first 24 hours was ______ barrels of fluid of which ___% was oil; ___% emulsion; ___% water; and ___% sediment. Gravity, °Bé. ______

If gas well, cu. ft. per 24 hours ______ Gallons gasoline per 1,000 cu. ft. of gas ______

Rock pressure, lbs. per sq. in. ______

EMPLOYEES

W. L. Durr, Company Tool Pusher, Rig VA 4, Driller ______, Driller

______, Driller ______, Driller

FORMATION RECORD

FROM—	TO—	TOTAL FEET	FORMATION
Surf.	1497	1497	Mancos shale
1497	1672	175	Dakota formation
1672	1692	20	Morrison formation

Total Depth 1692' - Plugged & Abandoned

[OVER]

16—43094-2

MA

FORMATION RECORD—Continued

Set plug at surface w/10 sax

Form 9-330

Budget Bureau No. 42-R355.2.
Approval expires 12-31-52.

VA 375
NC CARD

U. S. Land Office NAV. TRIBAL
Serial Number I-149-IND-8461
Lease or Permit to Prospect ....

RECEIVED
NOV 25 1955
OIL CON. COM.
DIST. 3

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

RECEIVED
OCT 2 1955
U. S. GEOLOGICAL SURVEY

LOCATE WELL CORRECTLY

LOG OF OIL OR GAS WELL

Company Continental Oil Company Address P. O. Box 1121, Durango, Colo.
Lessor or Tract Navajo Tribal Field No. Table Mesa State New Mexico
Well No. 1 Sec. 34 T. 28N R. 17W Meridian N.M.P.M. County San Juan
Location 1019 ft. {N./S.} of N. Line and 1659 ft. {E./W.} of E. Line of Sec. 34 Elevation 5354
(Derrick floor relative to sea level)

The information given herewith is a complete and correct record of the well and all work done thereon so far as can be determined from all available records.

Signed Kenneth P. Smith

Date October 18, 1955 Title Geologist

The summary on this page is for the condition of the well at above date.

Commenced drilling April 1, 19 55 Finished drilling April 13, 19 55

OIL OR GAS SANDS OR ZONES

(Denote gas by G)

No. 1, from 1497 to 1517 (oil & water) No. 4, from .... to ....
No. 2, from .... to .... No. 5, from .... to ....
No. 3, from .... to .... No. 6, from .... to ....

IMPORTANT WATER SANDS

No. 1, from 585 to 735 No. 3, from .... to ....
No. 2, from 1517 to 1672 No. 4, from .... to ....

CASING RECORD

Size casing	Weight per foot	Threads per inch	Make	Amount	Kind of shoe	Cut and pulled from	Perforated From—	Perforated To—	Purpose

MUDDING AND CEMENTING RECORD

Size casing	Where set	Number sacks of cement	Method used	Mud gravity	Amount of mud used
Set plug 1575 to 1400 w/30 sax					
Set plug 400 to 300 w/16 sax					
Set plug at surface w/10 sax					

PLUGS AND ADAPTERS

Heaving plug—Material .... Length .... Depth set ....
Adapters—Material .... Size ....

SHOOTING RECORD

Size	Shell used	Explosive used	Quantity	Date	Depth shot	Depth cleaned out

TOOLS USED

Rotary tools were used from Surface feet to 1692 feet, and from .... feet to .... feet
Cable tools were used from .... feet to .... feet, and from .... feet to .... feet

DATES

........, 19...... Put to producing ...., 19......

The production for the first 24 hours was .... barrels of fluid of which ......% was oil; ......% emulsion; ......% water; and ......% sediment. Gravity, °Bé. ....

If gas well, cu. ft. per 24 hours .... Gallons gasoline per 1,000 cu. ft. of gas ....

Rock pressure, lbs. per sq. in. ....

EMPLOYEES

W. L. Durr, Company Tool Pusher, Rig VA 4, Driller ...., Driller
........, Driller ...., Driller

FORMATION RECORD

FROM—	TO—	TOTAL FEET	FORMATION
Surf.	1497	1497	Mancos shale
1497	1672	175	Dakota formation
1672	1692	20	Morrison formation
	Total Depth 1692'		- Plugged & Abandoned

[OVER] 16—43094-2

Budget Bureau No. 42-R356.2.
Approval expires 12-31-60.

Form 9-330

U. S. Land Office ....
Serial Number ....
Lease or Permit to Prospect ....

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

LOG OF OIL OR GAS WELL

LOCATE WELL CORRECTLY

Company .... Address ....
Lessor or Tract .... Field .... State ....
Well No. .... Sec. .... T. .... R. .... Meridian .... County ....
Location .... ft. $\frac{N}{S}$ of .... Line and .... ft. $\frac{E}{W}$ of .... Line of .... Elevation ....

The information given herewith is a complete and correct record of the well and all work done thereon so far as can be determined from all available records.

Signed ....

Date .... Title ....

The summary on this page is for the condition of the well at above date.

Commenced drilling ...., 19.... Finished drilling ...., 19....

OIL OR GAS SANDS OR ZONES

(Denote gas by G)

No. 1, from .... to .... No. 4, from .... to ....
No. 2, from .... to .... No. 5, from .... to ....
No. 3, from .... to .... No. 6, from .... to ....

IMPORTANT WATER SANDS

No. 1, from .... to .... No. 3, from .... to ....
No. 2, from .... to .... No. 4, from .... to ....

CASING RECORD

Size casing	Weight per foot	Threads per inch	Make	Amount	Kind of shoe	Cut and pulled from	Perforated From–	Perforated To–	Purpose

It is of the greatest importance to have a complete history of the well. Please state in detail the dates of redrilling, together with the reasons for the work and its results. If there were any changes made in the casing, state fully, and if any casing was "sidetracked" or left in the well, give its size and location. If the well has been dynamited, give date, size, position, and number of shots. If plugs or bridges were put in to test for water, state kind of material used, position, and results of pumping or bailing.

HISTORY OF OIL OR GAS WELL

MUDDING AND CEMENTING RECORD

Size casing	Where set	Number sacks of cement	Method used	Mud gravity	Amount of mud used

PLUGS AND ADAPTERS

Heaving plug—Material .... Length .... Depth set ....
Adapters—Material .... Size ....

SHOOTING RECORD

Size	Shell used	Explosive used	Quantity	Date	Depth shot	Depth cleaned out

TOOLS USED

Rotary tools were used from .... feet to .... feet, and from .... feet to .... feet
Cable tools were used from .... feet to .... feet, and from .... feet to .... feet

DATES

.........., 19.... Put to producing ...., 19....

The production for the first 24 hours was .... barrels of fluid of which ....% was oil; ....% emulsion; ....% water; and ....% sediment. Gravity, °Bé. ....

If gas well, cu. ft. per 24 hours .... Gallons gasoline per 1,000 cu. ft. of gas ....

Rock pressure, lbs. per sq. in. ....

EMPLOYEES

.........., Driller ...., Driller
.........., Driller ...., Driller

FORMATION RECORD

FROM—	TO—	TOTAL FEET	FORMATION

FROM—	TO—	TOTAL FEET	FORMATION

T27N R17W

Form 9-330

Budget Bureau No. 42-R355.4.
Approval expires 12-31-60.

		N					
		Section 3					

LOCATE WELL CORRECTLY

Navajo Tribe
Lease No. 1-89-IND-57

U. S. LAND OFFICE ....
SERIAL NUMBER ....
LEASE OR PERMIT TO PROSPECT ....

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

LOG OF OIL OR GAS WELL

Company Continental Oil Company Address P. O. Box 3312, Durango, Colorado

Lessor or Tract Navajo Field Table Mesa State New Mexico

Well No. 18 Sec. 3 T. 27N R. 17W Meridian NMPM County San Juan

Location 1980 ft. {N./S.} of N Line and 1980 ft. {E./W.} of W Line of Sec. 3 Elevation 5360' (Derrick floor relative to sea level)

The information given herewith is a complete and correct record of the well and all work done thereon so far as can be determined from all available records.

Signed Original Signed By: H. D. HALEY

Date November 29, 1961 Title District Superintendent

The summary on this page is for the condition of the well at above date.

Commenced drilling March 27, 1961 Finished drilling May 10, 1961

OIL OR GAS SANDS OR ZONES

(Denote gas by G)

No. 1, from [illegible] to [illegible] No. 4, from .... to ....

No. 2, from 6975 to 7031 (G) No. 5, from .... to ....

No. 3, from [illegible] to [illegible] (G) No. 6, from .... to ....

IMPORTANT WATER SANDS

No. 1, from [illegible] to [illegible] No. 3, from .... to ....

No. 2, from .... to .... No. 4, from .... to ....

RECEIVED NOV 30 1961 OIL CON. COM. DIST. 3

CASING RECORD

Size casing	Weight per foot	Threads per inch	Make	Amount	Kind of shoe	Cut and pulled from	Perforated From—	Perforated To—	Purpose
13 3/8"	[illegible]	8 RD	H-40	[illegible]					Surface
8 5/8"	[illegible]	8 RD	J-55	5012'	[illegible]				Intermediate
5 1/2"	[illegible]	8 RD	J-55	[illegible]	[illegible]				Production
5 1/2"	15.5#	8 RD	J-55	[illegible]					
5 1/2"	17#	8 RD	J-55	2495'	—		7097	7113	

MUDDING AND CEMENTING RECORD

Size casing	Where set	Number sacks of cement	Method used	Mud gravity	Amount of mud used
13 3/8"	503' RB	375	Displacement		
8 5/8"	5000' RB	400	Displacement		
5 1/2"	7113' RB	200	Displacement		

MARK

FOLD

PLUGS AND ADAPTERS

Heaving plug—Material .... Length .... Depth set ....

Adapters—Material .... Size ....

SHOOTING RECORD

Size	Shell used	Explosive used	Quantity	Date	Depth shot	Depth cleaned out

TOOLS USED

Rotary tools were used from 0 feet to 7114 feet, and from .... feet to .... feet

Cable tools were used from .... feet to .... feet, and from .... feet to .... feet

DATES

November 29, 19 61   Put to ~~producing~~ Testing May 29, 19 61

The ~~production~~ test for the first 24 hours was 333 barrels of ~~fluid of which~~ condensate ...... % was oil; ...... % emulsion; ...... % water; and ...... % sediment.   Gravity, ~~°Bé.~~ °API 71.6

If gas well, cu. ft. per 24 hours 21,500 (CAOF) Gallons gasoline per 1,000 cu. ft. of gas ....

Rock pressure, lbs. per sq. in. 3731

EMPLOYEES

............, Driller   Contractor: Aspen Drilling Company, Driller

............, Driller   ...., Driller

FORMATION RECORD

FROM—	TO—	TOTAL FEET	FORMATION
1280	1387	107	Greenhorn
1387	1552	165	Dakota
1552	2615	1063	Morrison
2615	2637	22	Todilto
2637	2733	96	Entrada
2733	2785	52	Carmel
2785	3248	463	Navajo
3248	3886	638	Chinle
3836	4034	148	Shinarump
4034	4121	87	Moenkopi
4121	4715	594	De Chelly
4715	6035	1320	Organ Rock
6035	6641	606	Hermosa
6641	6672	31	Paradox
6672	7114	442	Paradox Limestone

[OVER]   16—43094-4

USGS(3) NMOCC(2) RSW HOLLY HDH

Form 9-330

Budget Bureau No. 42-R-355.2.
Approval expires 12-31-44.

U. S. LAND OFFICE Navajo Tribal
SERIAL NUMBER I-89-IND-58
LEASE OR PERMIT TO PROSPECT ....

						X	

LOCATE WELL CORRECTLY

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

LOG OF OIL OR GAS WELL

T29N R16W

Company Pan American Petroleum Corporation Address Box 487, Farmington, New Mexico

Lessor or Tract USG Section 19 Field Hogback-Pennsylvanian State New Mexico

Well No. 17 Sec. 19 T. 29N R. 16W Meridian N.M.P.M. County San Juan

Location 1850 ft. {N./S.} of S. Line and 790 ft. {E./W.} of E. Line of Section 19 Elevation 5104.
(Derrick floor relative to sea level)

The information given herewith is a complete and correct record of the well and all work done thereon so far as can be determined from all available records.

Signed .... L. ......

Date June 16, 1958 Title Field Superintendent

The summary on this page is for the condition of the well at above date.

Commenced drilling February 3, 1957 Finished drilling December 24, 1957

OIL OR GAS SANDS OR ZONES
(Denote gas by G)

No. 1, from 6396 to 6426 G No. 4, from 6936 to 7036 G

No. 2, from 6530 to 6570 G No. 5, from .... to ....

No. 3, from 6643 to 6659 No. 6, from .... to ....

IMPORTANT WATER SANDS

No. 1, from .... to .... No. 3, from .... to ....

No. 2, from .... to .... No. 4, from .... to ....

CASING RECORD

Size casing	Weight per foot	Threads per inch	Make	Amount	Kind of shoe	Cut and pulled from	Perforated From—	Perforated To—	Purpose
13-3/8	35.6	Slip Joint	Armco	237	Guide				Surface
9-5/8	32.3	8RT	National	2137	Guide				Intermediate
7	20	8RT	National	5645	Guide				Oil String
5	15	8RT	CF&I	1558	Guide				Liner

MUDDING AND CEMENTING RECORD

Size casing	Where set	Number sacks of cement	Method used	Mud gravity	Amount of mud used
13-3/8	251	250 sacks Halliburton 2 Plug			
9-5/8	2157	625 sacks Halliburton 2 Plug			
7	5613	475 sacks Halliburton 2 Plug			
5	7035	210 sacks Halliburton 2 Plug			

PLUGS AND ADAPTERS

Heaving plug—Material .... Length .... Depth set ....

Adapters—Material .... Size ....

SHOOTING RECORD

Size	Shell used	Explosive used	Quantity	Date	Depth shot	Depth cleaned out

*Connected well to U. S. Bureau of Mines Helium Plant, Shiprock, New Mexico, on January 27, 1958, to complete testing of well while furnishing supply of helium-bearing natural gas to plant.

TOOLS USED

Rotary tools were used from 0 feet to 7036 feet, and from .... feet to .... feet

Cable tools were used from .... feet to .... feet, and from .... feet to .... feet

DATES

Completed as condensate producing gas well January 30, 1958 Put to producing January 27, 1958*

The production for the first 24 hours was 118 barrels of fluid of which 66.1% was oil; ....% emulsion; 33.9% water; and ....% sediment. Gravity, °Bé. 62.6°

If gas well, cu. ft. per 24 hours 3,400,000 Gallons gasoline per 1,000 cu. ft. of gas ....

Rock pressure, lbs. per sq. in. 2400 (Shut-in casing pressure.)

EMPLOYEES

Joe Kennedy, Driller J. S. Riley, Driller

Clyde Waggoner, Driller Leo Beck, Driller

FORMATION RECORD

FROM—	TO—	TOTAL FEET	FORMATION
645	754	109	Greenhorn
754	960	206	Dakota
960	2015	1055	Morrison
2015	2044	29	Todilto
2044	3620	1576	Entrada
3620	3737	117	Shinarump
3737	3978	241	DeChelly
3978	5173	1195	Cutler
5173	5340	167	Rico
5340	5979	639	Hermosa
5979	6809	830	Paradox
6809	6938	129	Molas
6938	7036	98	Mississippian

[OVER]

16—43094-4

FORMATION RECORD—Continued

FROM—	TO—	TOTAL FEET	FORMATION

HISTORY OF OIL OR GAS WELL

It is of the greatest importance to have a complete history of the well. Please state in detail the dates of redrilling, together with the reasons for the work and its results. If there were any changes made in the casing, state fully, and if any casing was "sidetracked" or left in the well, give its size and location. If the well has been dynamited, give date, size, position, and number of shots. If plugs or bridges were put in to test for water, state kind of material used, position, and results of pumping or bailing.

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

HISTORY OF OIL OR GAS WELL

USG Section 19 Well No. 17 was spudded on September 20, 1957, and on September 21, 1957, 13-3/8" casing was set at 251 feet with 125 sacks of 8% gel and followed by 125 sacks of cement. After waiting on cement for 24 hours, casing and water shut-off were tested with 500 pounds pressure for thirty minutes, which held with no drop in pressure.

9-5/8" casing was set at 2157' with 500 sacks 4% gel cement and followed by 125 sacks neat cement. After waiting on cement for thirty-six hours, casing and water shut-off were tested with 1000 pounds pressure for thirty minutes which held with no drop in pressure.

7" casing was landed at 5613' and cemented with 400 sacks 6% gel cement and followed by 75 sacks neat cement. After waiting on cement for 72 hours, 7" casing was tested with 1100 pounds for thirty minutes, which held with no drop in pressure.

A 5" 15 pound liner was run with Baash-Ross pack-off type liner hanger and set at 5486-7035' with 210 sacks of cement. After waiting on cement, casing was tested with 1100 pounds pressure for thirty minutes, which held with no drop in pressure.

Perforated with four shots per foot 6530-6570 and 6643-6659. Spotted acid over perforations and set packer at 6490'. Acidized with 1500 gallons 15% regular acid. Breakdown pressure 1250 psi, treating pressure 1500 psi, injection rate 2 barrels per minute. Tested 6450 MCFPD, 32 BOPH, 17 BWPH. Set packer at 6459' and squeezed both sets perforations with 150 sacks cement. Re-squeezed with 150 sacks cement to 4400 psi. Drilled solid cement to 6663 and cleaned out to plug back depth 6700'. Re-Perforated with four shots per foot 6643-6659'. Spotted acid and set packer at 6612. Acidized with 500 gallons 15% acid. Breakdown pressure 2900 psi, treating pressure 1600 psi, injection rate two barrels per minute. Tested 2620 MCFPD, 60 BARRELS oil per hour, no water. Re-perforated with 4 shots per foot 6530-6570. Set retrievable bridge plug 6620'. Spotted acid and set packer at 6472'. Acidized with 1000 gallons 15% acid. Breakdown pressure 1700 psi, treating pressure 1900 psi, injection rate 3-1/2 barrels per minute. Tested 5100 MCFPD, 25 barrels oil per hour, 3-1/2 barrels water per hour. Set magnesium bridge plug 6620 and packer at 6510 and squeezed zone with 200 sacks cement to 4500 psi. Drilled solid cement 6517-6610. Re-perforated with two shots per foot 6530-6570. Spotted acid and set packer at 6506'. Acidized with 500 gallons 15% regular. Breakdown pressure 3000 psi, treating pressure 1700 psi, injection rate two barrels per minute. Tested 2910 MCFPD, 1-1/2 barrels oil per hour, 1/3 barrels water per hour. Perforated four shots per foot 6396-6426'. Set retrievable bridge plug 6470'. Spotted acid and set packer 6374'. Acidized with 1000 gallons 15% regular. Breakdown pressure 2000 psi, treating pressure 1600 psi, injection rate 2-1/3 barrels per minute. Tested 8050 MCFPD, 4-1/3 barrels oil per hour, 1 barrel water per hour. Drilled cement and magnesium bridge plug and cleaned out to plug back depth. Set Baker Model D production packer at 6619' with 2-3/8" tubing landed at 6619' and side door choke nipple above packer. Installed side door choke and flowed thru tubing to test zone 6643-6659. Tested 757 MCFPD, 14 barrels oil per hour, 2 barrels water per hour. Closed casing pressure steady at 2400 psi indicating packer holding. Acidized zone with 500 gallons 15% regular and tested 2980 MCFPD, 69 barrels oil per hour, no water. Closed casing pressure steady at 2400 showing effective separation of upper zones from lower zone. Connected well to pipeline to test upper zones 6396-6426 and 6530-6570. Tested well into pipeline 3400 MCFPD, 98 barrels oil per day, 50 barrels water per day and completed as condensate-producing gas well January 30, 1958. Blanked off lower oil-bearing zone 6643-6659 and equipped well to produce upper perforations 6396-6426 and 6530-6570 through tubing string to supply helium-bearing gas to U. S. Bureau of Mines [illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

Form 9-330

Budget Bureau No. 42-R-355.2.
Approval expires 12-31-55.

U. S. LAND OFFICE Navajo Tribal
SERIAL NUMBER I-149-IND-8185
LEASE OR PERMIT TO PROSPECT

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

RECEIVED

COPY

LOG OF OIL OR GAS WELL

LOCATE WELL CORRECTLY

Company Stanolind Oil and Gas Company Address Box 591, Tulsa, Oklahoma
Lessor or Tract Novajo Tribal Field Wildcat State New Mexico
Well No. 1 Sec. 12 T. 29N R. 17W Meridian NMPM County San Juan
Location 790 ft. {N./S.} of N Line and 1090 ft. {E./W.} of W Line of Section 12 Elevation 5150 (Derrick floor relative to sea level)

The information given herewith is a complete and correct record of the well and all work done thereon so far as can be determined from all available records.

Signed L. D. Spurrier [signature]

Date September 15, 1954 Title Field Superintendent

The summary on this page is for the condition of the well at above date.

Commenced drilling April 11, 1954 Finished drilling July 27, 1954

OIL OR GAS SANDS OR ZONES
(Denote gas by G)

No. 1, from .... to .... No. 4, from .... to ....
No. 2, from .... to .... No. 5, from .... to ....
No. 3, from .... to .... No. 6, from .... to ....

IMPORTANT WATER SANDS

No. 1, from 878 to 986 No. 3, from .... to ....
No. 2, from 2165 to 2190 No. 4, from .... to ....

CASING RECORD

Size casing	Weight per foot	Threads per inch	Make	Amount	Kind of shoe	Cut and pulled from	Perforated From—	Perforated To—	Purpose
13-3/8"	48	8	Nat'l	298	Guide				
9-5/8"	32.3	[illegible]	[illegible]	[illegible]	Guide				
7"	23	8	Smith	6419	Guide	2200			

MUDDING AND CEMENTING RECORD

Size casing	Where set	Number sacks of cement	Method used	Mud gravity	Amount of mud used
13-3/8"	300	325	Displacement		
9-5/8"	2166	565	Displacement		
7"	6382	150	Displacement		

FOLD | MARK

PLUGS AND ADAPTERS

Heaving plug—Material .... Length .... Depth set ....
Adapters—Material .... Size ....

SHOOTING RECORD

Size	Shell used	Explosive used	Quantity	Date	Depth shot	Depth cleaned out

TOOLS USED

Rotary tools were used from 0 feet to 7215 feet, and from .... feet to .... feet
Cable tools were used from .... feet to .... feet, and from .... feet to .... feet

DATES

August 23, 1954 Put to producing ...., 19....

The production for the first 24 hours was .... barrels of fluid of which ....% was oil; ....% emulsion; ....% water; and ....% sediment. Gravity, °Bé. ....

If gas well, cu. ft. per 24 hours .... Gallons gasoline per 1,000 cu. ft. of gas ....

Rock pressure, lbs. per sq. in. ....

EMPLOYEES

J. D. Starr, Driller B. L. Strickland, Driller
C. E. Grubb, Driller ...., Driller

FORMATION RECORD

FROM—	TO—	TOTAL FEET	FORMATION
0	878	878	Sand and shale
878	1088	210	Dakota - Sand and shale
1088	2135	1047	Morrison - Sand and shale
2135	2180	45	~~Tocito~~ Todilto - Sand
2180	2268	88	Entrada - Sand and shale
2268	3742	1474	Sand and shale
3742	3858	116	Shinarump - Sand and conglomerate
3858	5120	1262	Sand and shale
5120	5375	255	Cutler - Sand and shale
5375	5380	5	Rico - shaly sand and lime
5380	7146	1766	Pennsylvanian - Shale and lime
7146	7215	69	Mississippian - Lime

COPY

(OVER)

R17W

T29N ~~[illegible]~~

FORMATION RECORD—Continued

FROM—	TO—	TOTAL FEET	FORMATION

HISTORY OF OIL OR GAS WELL

It is of the greatest importance to have a complete history of the well. Please state in detail the dates of redrilling, together with the reasons for the work and its results. If there were any changes made in the casing, state fully, and if any casing was "sidetracked" or left in the well, give its size and location. If the well has been dynamited, give date, size, position, and number of shots. If plugs or bridges were put in to test for water, state kind of material used, position, and results of pumping or bailing.

MUDDING AND CEMENTING RECORD

PLUGS AND ADAPTERS

SHOOTING RECORD

TOOLS USED

DATES

EMPLOYEES

FORMATION RECORD

CASING RECORD

IMPORTANT WATER SANDS

OIL OR GAS SANDS OR ZONES

LOG OF OIL OR GAS WELL

UNITED STATES

DEPARTMENT OF THE INTERIOR

GEOLOGICAL SURVEY

COPY

U. S. G. S. FORM 9-330

LOG OF OIL OR GAS WELL

NAVAJO TRIBAL WELL NO. 1

HISTORY OF OIL OR GAS WELL

Well was spudded April 11, 1954, and drilled to total depth of 7215'. Sixteen drill stem tests were run covering all possible productive zones. No commercial shows of oil or gas were encountered. Casing was run as follows: 13-3/8" casing set at 300' with 125 sacks cement plus 8% gel plus 200 sacks neat cement; 7" casing set at 6382' with 50 sacks cement plus 6% gel plus 50 cubic feet strata-crete plus 50 sacks neat Cement. Drill stem tests were run as follows: DST #1, 875-925' Dakota, recovered 435' drilling mud and 360' water cut mud. DST #2, 933-986' Dakota, recovered 880' heavily sulphur cut drilling mud. DST #3, 2165-2190' Entrada, failed. DST #4, 2165-2190', recovered 210' drilling mud and 900' fresh water. DST #5, 3780-3798' Shinarump, recovered 5' slightly gas cut drilling mud. DST #6, 5628-5655' Pennsylvanian, recovered 30' drilling mud. DST #7, 5754-5865' Pennsylvanian, recovered 15' drilling mud. DST #8, 6382-6409' Pennsylvanian, failed. DST #9, 6382-6409', recovered 45' slightly gas cut mud. DST #10, 6382-6460' Pennsylvanian, recovered 160' slightly gas cut mud. DST #11, 6530-6593' Pennsylvanian, failed. DST #12, 6532-6593' recovered 50' drilling mud. DST #13, 6588-6661' Pennsylvanian, flowed gas at rate of 60 MCFPD and recovered 90' slightly gas cut mud, 90' heavily gas cut mud, and 90' heavily salt water and gas cut mud. DST #14, 6715-6770' Pennsylvanian, recovered 6' slightly gas cut drilling mud. DST #15, 6770-6897' Pennsylvanian, flowed slat water at rate of 30 barrels per hour with slight show of distillate; gas volume was too small to measure and was non-inflammable. DST #16, 7164-7215' Mississippian, flowed salt water at rate of 13 barrels per hour. Well was plugged back from total depth to 6650' with cement and the interval 6600-6650' acidized with 5000 gallons 15% acid. Following this treatment well flowed at rate 2280 MCFPD low BTU gas, 4 barrels distillate per day and 74 barrels salt water per day. Well was plugged back to 6570' with cement and interval 6382-6570' was acidized with 5000 gallons 15% acid. Following this treatment the well swabbed 6 barrels of salt water per hour with no shows of oil or gas.

Well was permanently plugged and abandoned as follows:

1) plugged hole with solid cement from 7215-6570'.
2) spotted 50 sacks cement plug on bottom.
3) 7" casing was shot off at 3964' but unable to pull casing, 7" casing was shot free at 2200' and 2200' of 7" casing was recovered.
4) plugged with solid cement from 4100-3800'.
5) shot off 9-5/8" casing at 400' and 400' of 9-5/8" casing was recovered.
6) plugged hole with solid cement from 450-250' and spotted a 10-sack cement plug at surface in 13-3/8" casing, August 23, 1954.
7) hole filled with 12pound mud at following intervals: from top of cement in bottom of hole to 4100', 3800-450', and from 250' to bottom of 10-sack surface plug.
8) erected 4' pipe marker and restored ground level to original contours as per regulations.

Form 9-330

Budget Bureau No. 42-R356.4.
Approval expires 12-31-60.

U. S. LAND OFFICE Navajo Tribal
SERIAL NUMBER
LEASE OR PERMIT TO PROSPECT

RECEIVED
DEC 27 1963
U. S. GEOLOGICAL SURVEY
FARMINGTON, NEW MEXICO

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

LOCATE WELL CORRECTLY

LOG OF OIL OR GAS WELL

T26N
R18W

Company Pan American Petroleum Corporation Address Box 480, Farmington, New Mexico
Lessor or Tract Navajo Tribal "N" Field Wildcat State New Mexico
Well No. 1 Sec. 17 T. 26N R. 18W Meridian N.M.P.M. County San Juan
Location 790 ft. {N. / S.} of S Line and 790 ft. {E. / W.} of W Line of Section 17 Elevation 5048

The information given herewith is a complete and correct record of the well and all work done thereon so far as can be determined from all available records. Fred H. Nabors, District Engineer

Signed

Date December 26, 1963 Title

The summary on this page is for the condition of the well at above date.

Commenced drilling January 22, 19 63. Finished drilling March 31, 19 63.

OIL OR GAS SANDS OR ZONES
(Denote gas by G)

No. 1, from 6392 to 6410 (G) No. 4, from to
No. 2, from 6338 to 6355 (G) No. 5, from to
No. 3, from to No. 6, from to

IMPORTANT WATER SANDS

No. 1, from to No. 3, from to
No. 2, from to No. 4, from to

CASING RECORD

Size casing	Weight per foot	Threads per inch	Make	Amount	Kind of shoe	Cut and pulled from	Perforated From—	Perforated To—	Purpose
13-3/8"	48#	8RT	H-40	380	Cotton				Surface
9-5/8"	36#	8RT	H-40	3527	Guide				Intermediate
5-1/2"	15.5#	8RT	J-55	6680	Guide				Oil String

MUDDING AND CEMENTING RECORD

Size casing	Where set	Number sacks of cement	Method used	Mud gravity	Amount of mud used
13-3/8"	391	500	HJ 1 plug		
9-5/8"	3509	700	HJ 2 plug		
5-1/2"	6653	660	HJ 2 plug		

FOLD MARK

PLUGS AND ADAPTERS

Heaving plug—Material Length Depth set
Adapters—Material Size

SHOOTING RECORD

Size	Shell used	Explosive used	Quantity	Date	Depth shot	Depth cleaned out

TOOLS USED

Rotary tools were used from 0 feet to 6694 feet, and from feet to feet
Cable tools were used from feet to feet, and from feet to feet

DATES

Completed as shut-in gas well April 12, 19 63 Put to producing Shut-in April 12, 19 63

The production for the first 24 hours was barrels of fluid of which % was oil; % emulsion; % water; and % sediment. Gravity, °Bé.

If gas well, cu. ft. per 24 hours 10,500 Gallons gasoline per 1,000 cu. ft. of gas

Rock pressure, lbs. per sq. in. 2550 # (SIC)

EMPLOYEES

Stilks Friddy, Driller
F. W. McDonald, Driller
R. D. Davis, Driller
K. D. Boggs, Driller

FORMATION RECORD

FROM—	TO—	TOTAL FEET	FORMATION
0	359	359	Surface sn & sh
359	793	134	Dakota
793	1945	952	Morrison
1945	2115	170	Bluff
2115	2136	21	Todilto
2136	2890	754	Entrada
2890	3800	910	Chinle
3800	4400	600	DeChelly
4400	4994	594	Cutler
4994	5700	706	Pennsylvanian
5700	6156	456	Ismay
6156	6318	162	Parker Creek
6318	6521	203	Lower Hermosa
6521	6546	25	Molas
6546	6599	53	Mississippian Karst
6599	6694	95	Mississippian Massive

5035

(OVER)

16—43094-4

Form 9-331 b
(April 1952)

X			

Budget Bureau No. 42-R359.4.
Approval expires 12-31-60.

(SUBMIT IN TRIPLICATE)

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

Indian Agency Navajo
Tribal

Allottee

Lease No. 14-20-603-5035

SUNDRY NOTICES AND REPORTS ON WELLS

NOTICE OF INTENTION TO DRILL	X	SUBSEQUENT REPORT OF WATER SHUT-OFF	
NOTICE OF INTENTION TO CHANGE PLANS		SUBSEQUENT REPORT OF SHOOTING OR ACIDIZING	
NOTICE OF INTENTION TO TEST WATER SHUT-OFF		SUBSEQUENT REPORT OF ALTERING CASING	
NOTICE OF INTENTION TO REDRILL OR REPAIR WELL		SUBSEQUENT REPORT OF REDRILLING OR REPAIR	
NOTICE OF INTENTION TO SHOOT OR ACIDIZE		SUBSEQUENT REPORT OF ABANDONMENT	
NOTICE OF INTENTION TO PULL OR ALTER CASING		SUPPLEMENTARY WELL HISTORY	
NOTICE OF INTENTION TO ABANDON WELL			

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U. S. GEOLOGICAL SURVEY
FARMINGTON, NEW MEXICO

(INDICATE ABOVE BY CHECK MARK NATURE OF REPORT, NOTICE, OR OTHER DATA)

Navajo Tribal "H"   Farmington, New Mexico   December 31, 1962

Well No. 1 is located 790 ft. from [S] line and 790 ft. from [W] line of sec. 17

SW/4 SW/4 Section 17 (¼ Sec. and Sec. No.)   T-26N (Twp.)   R-18W (Range)   N.M.P.M. (Meridian)

Wildcat (Field)   San Juan (County or Subdivision)   New Mexico (State or Territory)

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OIL CON. COM.
DIST. 3

The elevation of the derrick floor above sea level is .... ft. (To be reported later)

DETAILS OF WORK

(State names of and expected depths to objective sands; show sizes, weights, and lengths of proposed casings; indicate mudding jobs, cementing points, and all other important proposed work)

We propose to drill the Navajo Tribal "H" No. 1 as a 6800' Mississippian test with casing program as follows:

DEPTH	SIZE	CEMENT	REMARKS
400'	13-3/8	450	Circulate
4850'	9-5/8	375	To be run if necessary to control water flows and/or lost circulation.
6800'	4-½ or 5½	300	Cement to cover uppermost productive pays.

Stimulation will be determined after reaching total depth.
Copies of logs run will be submitted.

I understand that this plan of work must receive approval in writing by the Geological Survey before operations may be commenced.

Company Pan American Petroleum Corporation

Address P. O. Box 480

Farmington, New Mexico

Attn: L. O. Speer, Jr.

By F. H. [illegible]

Title Petroleum Engineer

U. S. GOVERNMENT PRINTING OFFICE 16—8437b-8

FORM C-128
REVISED 5/1/57

NEW MEXICO OIL CONSERVATION COMMISSION

Well Location and Acreage Dedication Plat

SECTION A.

Date December 31, 1962

Operator Pan American Petroleum Corporation Lease Navajo Tribal "N"

Well No. 1 Unit Letter M Section 17 Township 26 North Range 18 West NMPM

Located 790 Feet From South Line, 790 Feet From West Line

County San Juan G. L. Elevation To report later Dedicated Acreage 160 Acres

Name of Producing Formation Mississippian Pool Wildcat

1. Is the Operator the only owner' in the dedicated acreage outlined on the plat below? Yes X No

2. If the answer to question One is "No," have the interests of all the owners been consolidated by communitization agreement or otherwise? Yes ...... No........ If answer is "Yes," Type of Consolidation

3. If the answer to question Two is "No," list all the owners and their respective interests below:

OWNER	LAND DESCRIPTION

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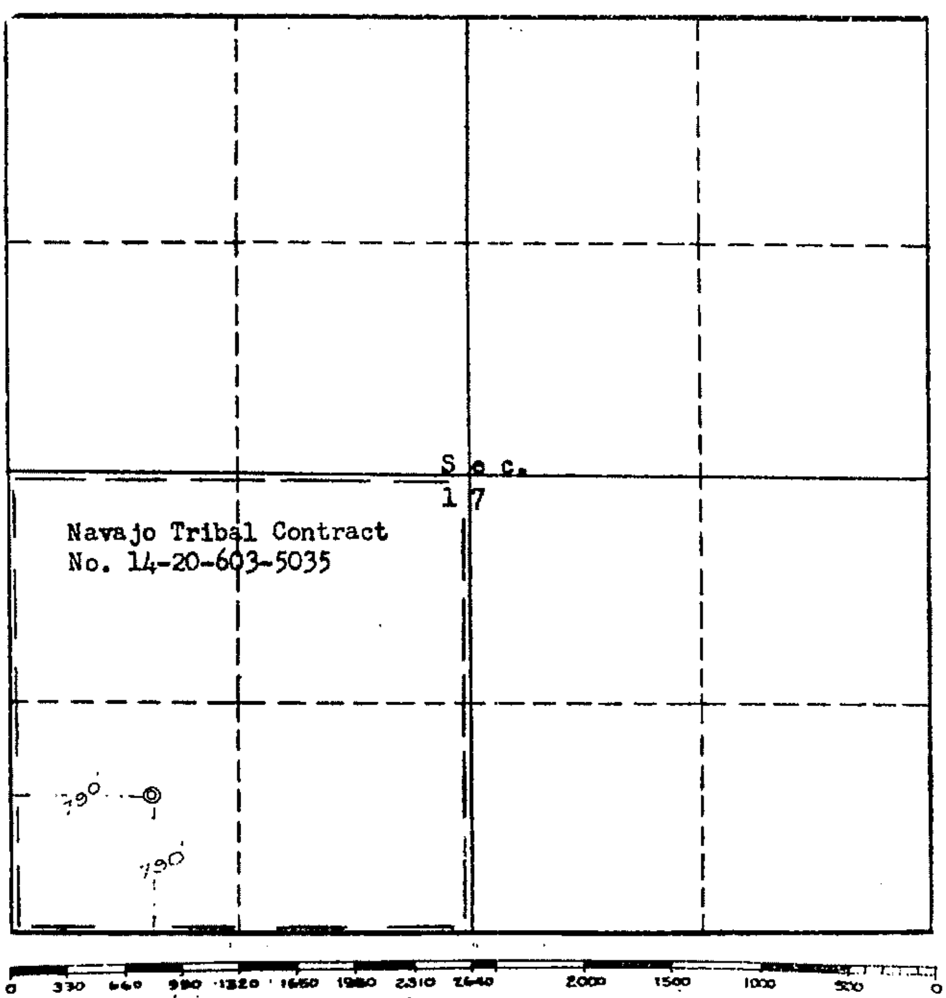
3

SECTION B.



This is to certify that the information in Section A above is true and complete to the best of my knowledge and belief.

Pan American Petroleum Corp.
(OPERATOR)

F. H. Hollingsworth
F. H. Hollingsworth
(REPRESENTATIVE)

Box 480, Farmington, New Mex.
(ADDRESS)

This is to certify that the well location shown on the plat in Section B was plotted from field notes of actual surveys made by me or under my supervision and that the same is true and correct to the best of my knowledge and belief.

Date Surveyed Dec. 21, 1962

~~Four States Engineering Co.~~
FARMINGTON, NEW MEXICO

[signature]
REGISTERED ENGINEER OR LAND SURVEYOR

Certificate No. 3602

T26N R18W

Form 9-331 C (May 1963) File Cards + Later

SUBMIT IN TRIPLICATE* (Other instructions on reverse side)

Form approved. Budget Bureau No. 42-R1425.

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

APPLICATION FOR PERMIT TO DRILL, DEEPEN, OR PLUG BACK

1a. TYPE OF WORK: DRILL ☒ DEEPEN ☐ PLUG BACK ☐

b. TYPE OF WELL: OIL WELL ☒ GAS WELL ☐ OTHER; SINGLE ZONE ☐ MULTIPLE ZONE ☐

2. NAME OF OPERATOR: MOBIL OIL CORPORATION

3. ADDRESS OF OPERATOR: P. O. Box 1652, Casper, Wyoming 82601

4. LOCATION OF WELL (Report location clearly and in accordance with any State requirements.*)
At surface 660' East of West line & 660' north of south line Sec. 9, T26N, R18W, San Juan County, New Mexico
At proposed prod. zone

5. LEASE DESIGNATION AND SERIAL NO.

6. IF INDIAN, ALLOTTEE OR TRIBE NAME: Navajo - Contract #14-20-603-5019

7. UNIT AGREEMENT NAME

8. FARM OR LEASE NAME: ~~[illegible]~~ Navajo

CHANGE OK

9. WELL NO. 1

10. FIELD AND POOL, OR WILDCAT: Pennsylvanian D Tocito Dome - ~~[illegible]~~

11. SEC., T., R., M., OR BLK. AND SURVEY OR AREA: SW SW

12. COUNTY OR PARISH: San Juan

13. STATE: New Mexico

14. DISTANCE IN MILES AND DIRECTION FROM NEAREST TOWN OR POST OFFICE*

15. DISTANCE FROM PROPOSED* LOCATION TO NEAREST PROPERTY OR LEASE LINE, FT. (Also to nearest drlg. unit line, if any): 660'

16. NO. OF ACRES IN LEASE: 2240

17. NO. OF ACRES ASSIGNED TO THIS WELL: 160

18. DISTANCE FROM PROPOSED LOCATION* TO NEAREST WELL, DRILLING, COMPLETED, OR APPLIED FOR, ON THIS LEASE, FT.: None

19. PROPOSED DEPTH: 6500'

20. ROTARY OR CABLE TOOLS: Rotary

21. ELEVATIONS (Show whether DF, RT, GR, etc.): GR. 5750 ~~[illegible]~~

22. APPROX. DATE WORK WILL START*: 6-22-66

23. PROPOSED CASING AND CEMENTING PROGRAM

SIZE OF HOLE	SIZE OF CASING	WEIGHT PER FOOT	SETTING DEPTH	QUANTITY OF CEMENT
~~17"~~	~~13-3/8"~~		~~100'~~	~~150 sacks~~
~~10-3/4"~~	~~8-5/8"~~		~~1600'~~	~~500 sacks~~
7-7/8"	5-1/2"		6500'	300 sacks

We propose to drill this development well to an estimated total depth of 6500' in a test of the Paradox "E" Formation in the Tocito Dome Field. One 60' Core & 1 DST are proposed for the Paradox "E" zone. Proposed logging program: IES & GR-sonic-caliper from csg shoe to T.D. Estimated formation tops:

Gallup Sand	0'	Dechelly	3750'
Mancos	150'	Cutler	4300'
Dakota	850'	Hermosa	5500'
Morrison	1075'	5th Shale	6345'
Entrada	2100'	"E" Zone	6355'
Wingate	2200'	"F" Zone	6415'
Chinle	2750'	T.D.	6500'
Shinarump	3450'		
Moenkopi	3510'		

RECEIVED JUN 17 1966 OIL CON. COM. DIST. 3

IN ABOVE SPACE DESCRIBE PROPOSED PROGRAM: If proposal is to deepen or plug back, give data on present productive zone and proposed new productive zone. If proposal is to drill or deepen directionally, give pertinent data on subsurface locations and measured and true vertical depths. Give blowout preventer program, if any.

24.
SIGNED Original Signed By J. M. McLaughlin J. M. McLaughlin TITLE Producing Manager DATE 6/13/66

(This space for Federal or State office use)

PERMIT NO. ________ APPROVAL DATE ________

APPROVED BY [signature] TITLE SUPERVISOR DIST. #3 DATE JUN 17 1966

CONDITIONS OF APPROVAL, IF ANY:

*See Instructions On Reverse Side

Instructions

General: This form is designed for submitting proposals to perform certain well operations, as indicated, on all types of lands and leases for appropriate action by either a Federal or a State agency, or both, pursuant to applicable Federal and/or State laws and regulations. Any necessary special instructions concerning the use of this form and the number of copies to be submitted, particularly with regard to local, area, or regional procedures and practices, either are shown below or will be issued by, or may be obtained from, the local Federal and/or State office.

Item 1: If the proposal is to redrill to the same reservoir at a different subsurface location or to a new reservoir, use this form with appropriate notations. Consult applicable State or Federal regulations concerning subsequent work proposals or reports on the well.

Item 4: If there are no applicable State requirements, locations on Federal or Indian land should be described in accordance with Federal requirements. Consult local State or Federal office for specific instructions.

Item 14: Needed only when location of well cannot readily be found by road from the land or lease description. A plat, or plats, separate or on this reverse side, showing the roads to, and the surveyed location of, the well, and any other required information, should be furnished when required by Federal or State agency offices.

Items 15 and 18: If well is to be, or has been directionally drilled, give distances for subsurface location of hole in any present or objective production zone.

Item 22: Consult applicable Federal or State regulations, or appropriate officials, concerning approval of the proposal before operations are started.

☆ U.S. GOVERNMENT PRINTING OFFICE : 1963—O-711-396

CHANGE
OK

NEW MEXICO OIL CONSERVATION COMMISSION
WELL LOCATION AND ACREAGE DEDICATION PLAT

Form C-102
Supersedes C-128
Effective 1-1-65

All distances must be from the outer boundaries of the Section.

Operator: Mobil Oil ~~[illegible]~~ Corporation			Lease: Navajo, ~~[illegible]~~ No. 14-20-603-5019		Well No.: 1
Unit Letter: M	Section: 9	Township: 26 North	Range: 18 West	County: San Juan	
Actual Footage Location of Well: 660 feet from the South line and 660 feet from the West line					
Ground Level Elev: 5750	Producing Formation: Pennsyl. ~~Paradox "B"~~ D		Pool: Tocito ~~Field~~ Dome		Dedicated Acreage: 160 Acres

1. Outline the acreage dedicated to the subject well by colored pencil or hachure marks on the plat below.

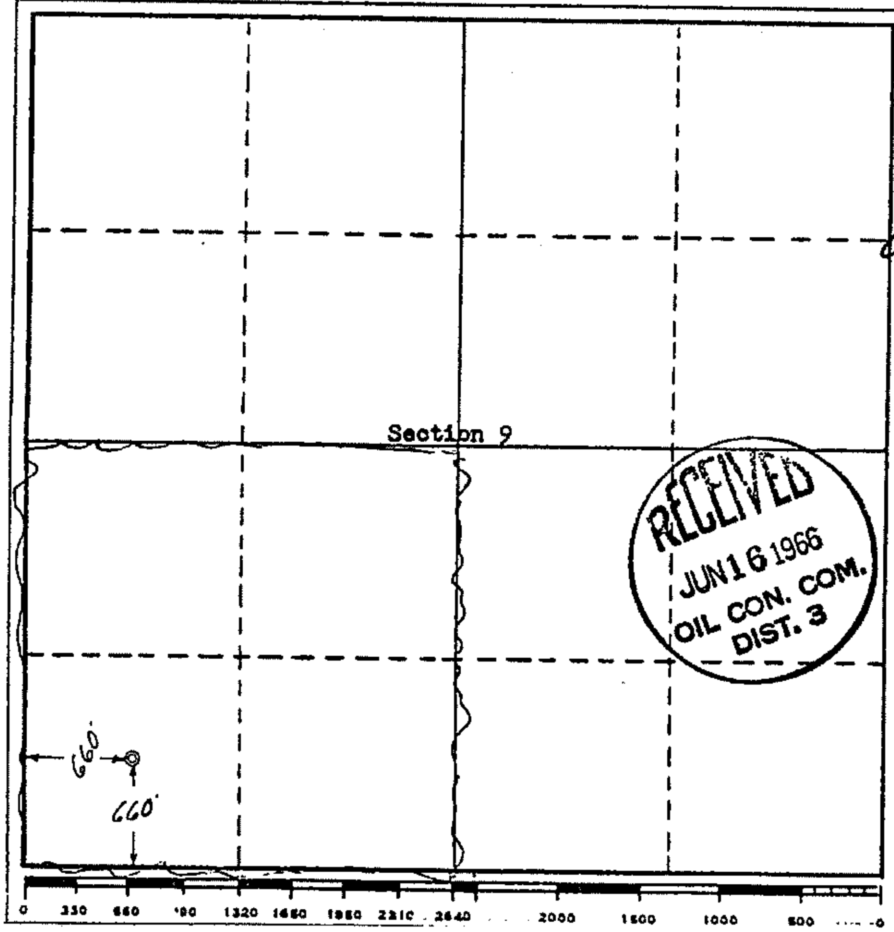
2. If more than one lease is dedicated to the well, outline each and identify the ownership thereof (both as to working interest and royalty).

3. If more than one lease of different ownership is dedicated to the well, have the interests of all owners been consolidated by communitization, unitization, force-pooling, etc?

☐ Yes ☐ No If answer is "yes," type of consolidation ______________

If answer is "no," list the owners and tract descriptions which have actually been consolidated. (Use reverse side of this form if necessary.)______________

No allowable will be assigned to the well until all interests have been consolidated (by communitization, unitization, forced-pooling, or otherwise) or until a non-standard unit, eliminating such interests, has been approved by the Commission.



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JUN 16 1966
OIL CON. COM.
DIST. 3

CERTIFICATION

I hereby certify that the information contained herein is true and complete to the best of my knowledge and belief.

Name: J. M. McLaughlin

Position: Producing Manager

Company: Mobil Oil Corporation

Date:

I hereby certify that the well location shown on this plat was plotted from field notes of actual surveys made by me or under my supervision, and that the same is true and correct to the best of my knowledge and belief.

Date Surveyed: June 9, 1966

Registered Professional Engineer and/or Land Surveyor

Certificate No. 3084

T26N R16W

Form 9-330

Budget Bureau No. 42-R355.4.
Approval expires 12-31-60.

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AUG 12 1963
OIL CON. COM.
DIST. 3

U. S. LAND OFFICE

SERIAL NUMBER

LEASE OR PERMIT TO PROSPECT
Navajo Tribe 14-20-603
#5263

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

RECEI

LOCATE WELL CORRECTLY

LOG OF OIL OR GAS WELL

Company The Pure Oil Company Address P. O. Box 1338, Moab, Utah

Lessor or Tract Navajo Tract 3 Field Wildcat State New Mexico

Well No. 1 Sec. 36 T. 26N R. 16W Meridian NMPM County San Juan

Location 990 ft. {N. / S.} of N Line and 990 ft. {E. / W.} of W Line of Section 36 Elevation KB 5[illegible]
(Derrick floor relative to [illegible])

The information given herewith is a complete and correct record of the well and all work done the[reon]
so far as can be determined from all available records.

Signed [signature]

Date August 7, 1963 Title District Office Manage[r]

The summary on this page is for the condition of the well at above date.

Commenced drilling July 16, 1963 Finished drilling July 29, 19[63]

OIL OR GAS SANDS OR ZONES

(Denote gas by G)

No. 1, from Dry Hole to No. 4, from to

No. 2, from to No. 5, from to

No. 3, from to No. 6, from to

IMPORTANT WATER SANDS

No. 1, from None to No. 3, from to

No. 2, from to No. 4, from to

CASING RECORD

Size casing	Weight per foot	Threads per inch	Make	Amount	Kind of shoe	Cut and pulled from	Perforated From—	Perforated To—	Purpo[se]
9-5/8"	36#	8 Rd.	[illegible]	201'	Larkin Float Pattern		Cemented to surface		

MUDDING AND CEMENTING RECORD

Size casing	Where set	Number sacks of cement	Method used	Mud gravity	Amount of mud used
9-5/8"	188'	125 sax regular neat w/ 2% Calcium Chloride	Halliburton		

ARK

FOLD

PLUGS AND ADAPTERS

Heaving plug—Material ______ Length ______ Depth set ______

Adapters—Material ______ Size ______

SHOOTING RECORD

Size	Shell used	Explosive used	Quantity	Date	Depth shot	Depth cleaned out

TOOLS USED

Rotary tools were used from ______ feet to ______ feet, and from ______ feet to ______

Cable tools were used from 0 feet to 4820 feet, and from - feet to -

DATES

~~Dry Hole~~ July 29, 19 63 Put to producing ______, 19

The production for the first 24 hours was -0- barrels of fluid of which ______% was oil; ______ emulsion; ______% water; and ______% sediment. Gravity, °Bé. ______

If gas well, cu. ft. per 24 hours ______ Gallons gasoline per 1,000 cu. ft. of gas ______

Rock pressure, lbs. per sq. in. ______

EMPLOYEES

______, Driller ______, Dr

Loffland Bros. Company, Driller ______, Dr

FORMATION RECORD

FROM—	TO—	TOTAL FEET	FORMATION
0'	3580'	3580'	Sand and Shale
3580'	3782'	202'	Sand, Shale and Silt
3782'	3842'	60'	Core No. 1 - See Reverse
3842'	4235'	393'	Sand, Shale and Silt
4235'	4588'	353'	Sand and Shale
4588'	4632'	44'	Core No. 2 - See Reverse
4632'	4820' T.D.	188'	Sand and Shale

[OVER] 16—48094

FORMATION RECORD—Continued

10—43094-2 U. S. GOVERNMENT PRINTING OFFICE

HISTORY OF OIL OR GAS WELL

It is of the greatest importance to have a complete history of the well. Please state in detail the dates of redrilling, together with the reasons for the work and its results. If there were any changes made in the casing, state fully, and if any casing was "sidetracked" or left in the well, give its size and location. If the well has been dynamited, give date, size, position, and number of shots. If plugs or bridges were put in to test for water, state kind of material used, position, and results of pumping or bailing.

LOG TOPS:

Point Lookout	2715'(+2714)
Mancos	2805'(+2624)
Gallup	3560'(+1869)
Sanastee	4100'(+1329)
Green Horn	4490'(+ 939)
Graneros	4550'(+ 879)
Dakota	4586'(+ 843)
Morrison	4808'(+ 621)
T.D.	4819'(+ 610)

Well P & A 7-29-63 as follows:

Plug No. 1 - 4600'-4400' - 200' - 90 sax reg. cement
Plug No. 2 - 3850'-3750' - 100' - 45 sax reg. cement
Plug No. 3 - 1750'-1650' - 100' - 45 sax reg. cement

10 sax reg. cement in top of surface casing. Left 10.1# mud between cement plugs. Installed dry hole marker in accordance with U.S.G.S. regulations.

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

Allottee Navajo Tribe
Tribe Navajo
Lease No. 14-20-603-537

LESSEE'S MONTHLY REPORT OF OPERATIONS

State New Mexico County San Juan Field Wildcat

The following is a correct report of operations and production (including drilling and producing wells) for month of July 19 63

Agent's Address P. O. Box 1338 Company THE PURE OIL COMPANY
Moab, Utah Signed J B Strong
Phone 253-3581 Agent's title Senior District Clerk

Sec. and ¼ of ¼	Twp.	Range	Well No.	Days Prdcd.	Barrels of Oil	Gravity	Cu. ft. of Gas (in thousands)	Gallons of Gasoline Recovered	Bbls. water (If none, so state)	Remarks (If drilling, depth; if shut down, cause; date and result of test for gasoline content of gas)
NW NW Sec. 36 Navajo Tract 3, Well No. 1	26N	16W	1	-0-	-0-	-	-0-	-	None	Location: 990' and 990' FWL. Elevations: GR KB 5428'. Spud 7:00 P.M. 7-16-

Drilled 12-1/4" hole to 188' and reamed to 13-3/4". Set 7 jts. of 9-5/8" OD casing at 188'. Halliburton cemented with 125 sax regular Neat cement with cium chloride. Circulated cement to surface. Plug down at 9:30 A.M. 7-17-6 Drilled to 3782'. Core No. 1 - 3782'-3842' - Cut and recovered 60'. Drille 4588'. Core No. 2 - 4588'-4632'. Cut 44', recovered 43'. Attempted DST No 4585'-4632'. Test failed. Drilled to 4640'. Attempted DST No. 2 - 4588'-4 Test failed. DST No. 3 - 4596'-4640'. Tool open 1 hour. Opened with a ver blow, decreased to zero in 45 minutes. No gas. Recovered 350' of drilling Pressures: IH & FH 2446; 15 minute ICI 160; IF 9, FF 15; 15 minute FCI 102; Hole Temp. 150 degrees. Drilled to 4820' T.D. Drilling completed at 1:30 A 7-29-63. Ran electric logs to T.D. Well P & A 7-29-63 as follows:

Plug #1 - 4600' - 4400' - 200' - 90 sax regular cement
Plug #2 - 3850' - 3750' - 100' - 45 sax regular cement
Plug #3 - 1750' - 1650' - 100' - 45 sax regular cement
10 sax regular cement in top of surface casing. Left 10.1# mud betwe cement plugs. Installed dry hole marker in accordance with U.S.G.S. regulat Rig released at 9:45 P.M. 7-29-63. FINAL

Log Tops:

Point Lookout	2715'	(+2714)
Mancos	2805'	(+2624)
Gallup	3560'	(+1869)
Sanastee	4100'	(+1329)
Green Horn	4490'	(+ 939)
Graneros	4550'	(+ 879)
Dakota	4586'	(+ 843)
Morrison	4808'	(+ 621)
T.D.	4819'	(+ 610)

RECEIV
AUG 1 9 1
OIL CON. C
DIST. 3

NOTE.—There were No runs or sales of oil; No M. cu. ft. of gas s

T24 R17W

Form approved.
Budget Bureau No. 42-R359.4.

Form 9-331 b
(April 1952)

	1		
	X		

(SUBMIT IN TRIPLICATE)

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

Indian Agency Navajo

Allottee

Lease No. 14-20-603-2165

SUNDRY NOTICES AND REPORTS ON WELLS

NOTICE OF INTENTION TO DRILL		SUBSEQUENT REPORT OF WATER SHUT-OFF	
NOTICE OF INTENTION TO CHANGE PLANS		SUBSEQUENT REPORT OF SHOOTING OR ACIDIZING	
NOTICE OF INTENTION TO TEST WATER SHUT-OFF		SUBSEQUENT REPORT OF ALTERING CASING	
NOTICE OF INTENTION TO REDRILL OR REPAIR WELL		SUBSEQUENT REPORT OF REDRILLING OR REPAIR	
NOTICE OF INTENTION TO SHOOT OR ACIDIZE		SUBSEQUENT REPORT OF ABANDONMENT	X
NOTICE OF INTENTION TO PULL OR ALTER CASING		SUPPLEMENTARY WELL HISTORY	
NOTICE OF INTENTION TO ABANDON WELL			

(INDICATE ABOVE BY CHECK MARK NATURE OF REPORT, NOTICE, OR OTHER DATA)

May 21, 1962

South Chaco
Well No. 1 is located 660 ft. from {N/S} line and 1980 ft. from {E/W} line of sec. 1

SW/4 Sec. 1 (¼ Sec. and Sec. No.) T24N (Twp.) R17W (Range) NMPM (Meridian)

Wildcat (Field) San Juan County (County or Subdivision) New Mexico (State or Territory)

The elevation of the derrick floor above sea level is 5395 ft.

DETAILS OF WORK

(State names of and expected depths to objective sands; show sizes, weights, and lengths of proposed casings; indicate mudding jobs, cementing points, and all other important proposed work)

Drilled to a TD of 4335'. Ran Gamma Ray Sonic and IES logs.

Log tops:
- Mancos 2315'
- Gallup 3132'
- Sanostee 3660'
- Greenhorn 4060'
- Graneros 4130'
- Dakota 4172'
- Morrison 4308'

DST #1 Gallup - 3289' to 3400' SI 15 minutes, open 2 hours, SI 30 minutes. Good blow throughout, fresh water to surface in 35 minute minutes. Flowed at rate of 28 bbls./hour. IHH 1829, FHH 1800, ISI 1725, FSI 1695, IF 831, FF 1471. (over)

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MAY 22 1962
OIL CON. COM.
DIST. 3

I understand that this plan of work must receive approval in writing by the Geological Survey before operations may be commenced.

Company Continental Oil Company

Address Box 3312

Durango, Colorado

By R E Jones

Title Asst. District Supt.

DETAILS OF WORK - Continued

DST #2 Dakota - 4166' to 4208'. SI 15 minutes, open 60 minutes, SI 60 minutes. Recovered 120' of slightly gas cut mud. IHH 2313 FHH 2298, ISI 2115, FSI 2024, IF 59, FF 80.

DST #3 Dakota - 4167' to 4260'. SI 15 minutes, open 2 1/2 hours, SI 60 minutes. Recovered 230' of 8.9# to 9.3#/gal. water cut dri ling mud. IHH 2313, FHH 2298, ISI 2100, IF 59, FF 133, FSI 1977.

Commercial production was not encountered. Spotted 70 sack cemen plug from TD to 4110'. Spotted 36 sack cement plug from 3785' t 3660'.

Turned well over to Navajo Indian Agency for completion in the Gallup as a water supply well.

Ran 97 joints of 5 1/2" O.D., 14# and 17#, J-55 casing w/Baker Model "A" open hole pack-off shoe, metal petal basket, baffel col & four centralizers. Landed casing @ 3131' KB and cemented w/240 sacks cement w/4% gel followed w/100 sacks regular cement. WOC.

T 27 N R 15 W

Form 9-330

Budget Bureau No. 42-R356.4.
Approval expires 12-31-60.

RECEIVED
JUN 14 1962
OIL CON. COM.
DIST. 3

U. S. LAND OFFICE Navajo

SERIAL NUMBER 14-20-603-2079

LEASE OR PERMIT TO PROSPECT

12

LOCATE WELL CORRECTLY

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

LOG OF OIL OR GAS WELL

Company Shell Oil Company Address P.O. Box 1200, Farmington, N.M.

Lessor or Tract Tribal Lands Field Wildcat State New Mexico

Well No. 44-12 Sec. 12 T. 27N R. 15W Meridian N.M.P.M. County San Juan

Location 630 ft. {N. S.} of S Line and 590 ft. {E. W.} of E Line of Section 12 Elevation 5739
(Derrick floor relative to sea level)

The information given herewith is a complete and correct record of the well and all work done thereon so far as can be determined from all available records.

Original signed by
Signed U. E. DOZIER, JR.
for R. D. English

Date Title Division Exploitation Engi

The summary on this page is for the condition of the well at above date.

Commenced drilling May 17, 1962 Finished drilling May 30, 1962

OIL OR GAS SANDS OR ZONES

(Denote gas by G)

No. 1, from None to No. 4, from to

No. 2, from to No. 5, from to

No. 3, from to No. 6, from to

IMPORTANT WATER SANDS

No. 1, from None to No. 3, from to

No. 2, from to No. 4, from to

CASING RECORD

Size casing	Weight per foot	Threads per inch	Make	Amount	Kind of shoe	Cut and pulled from	Perforated From—	Perforated To—	Purpose
8-5/8	32	8	St & C	314.56'	[illegible]				Surface

MUDDING AND CEMENTING RECORD

Size casing	Where set	Number sacks of cement	Method used	Mud gravity	Amount of mud used
8-5/8	329	250	Displacement	-	-

FOLD

PLUGS AND ADAPTERS

Heaving plug—Material .... Length .... Depth set ....

Adapters—Material .... Size ....

SHOOTING RECORD

Size	Shell used	Explosive used	Quantity	Date	Depth shot	Depth cleaned out

TOOLS USED

Rotary tools were used from .... feet to .... feet, and from .... feet to .... feet

Cable tools were used from 0 feet to 5020 feet, and from .... feet to .... feet

DATES

.................................., 19...... Put to producing ...., 19......

The production for the first 24 hours was .... barrels of fluid of which Abandoned 5-30 % was oil; 62 % emulsion; ......% water; and ......% sediment. Gravity, °Bé. ....

If gas well, cu. ft. per 24 hours .... Gallons gasoline per 1,000 cu. ft. of gas ....

Rock pressure, lbs. per sq. in. ....

EMPLOYEES

...., Driller ...., Driller

...., Driller Great Western Drilling Company, Driller

FORMATION RECORD

FROM—	TO—	TOTAL FEET	FORMATION
0	948	948	Kirtland-Fruitland
948	1070	122	Pictured Cliffs
1070	1705	635	Lewis
1705	3482	1777	Allison Menefee
3482	3655	173	Point Lookout
3655	4740	1085	Mancos
4740			Gallup

[OVER] 16—43094-4

8-5/8	329	250	Displacement	-	-

ARK

T28N R16W

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

Allottee Navajo Tribe
Tribe Navajo
Lease No. 14-20-0603-6378

LESSEE'S MONTHLY REPORT OF OPERATIONS

State New Mexico *County* San Juan *Field* Wildcat

The following is a correct report of operations and production (including drilling and producing wells) for the month of March *19*64

Agent's Address P. O. Box 1611, Casper, Wyoming
Company The Pure Oil Company
Signed R. E. Davis
Phone 234-1565
Agent's title District Office Manager

Sec. and ¼ of ¼	Twp.	Range	Well No.	Days Prdcd.	Barrels of Oil	Gravity	Cu. ft. of Gas (in thousands)	Gallons of Gasoline Recovered	Bbls. water (If none, so state)	Remarks (If drilling, depth; if shut down, cause; date and result of test for gasoline content of gas)
NE NE Sec. 13	28N	16W	1	-0-	-0-					

Pure-Sun Navajo Tract 9, Well No. 1

Location: 660' FNL and 660' FEL. L & S elevations: GR 5417'; KB 5428'. Spudded 3-22-64. Drilled to 252'. Set 7 jts. of 9-5/8" OD 36# J-55 casing line pipe at 248'. Cemented with 200 sax regular cement with 2% calcium chloride. Good returns. Drilled to 4,234'. Cored to 4,292'. Drilled to 4,360' TD. Drilling completed 3-29-64. Ran electric logs.

LOG TOPS:

Chacra	760'	(+4668)
Cliff House	1,436'	(+3992)
Pt. Lookout	2,532'	(+2896)
Mancos	2,842'	(+2586)
Upper Gallup	3,785'	(+1643)
Upper Gallup Sand	3,982'-3,990'	(+1446-+1438)
Lower Gallup	4,085'	(+1343)
Sanastee	4,235'	(+1193)

Well P & A 3-29-64 as follows:

Plug No. 1 - 4,290' - 4,190' - 100' - 30 sax regular cement
Plug No. 2 - 4,040' - 3,990' - 50' - 30 sax regular cement
Plug No. 3 - 2,900' - 2,800' - 100' - 40 sax regular cement
Plug No. 4 - 810' - 710' - 100' - 30 sax regular cement
Plug No. 5 - 28' - 0' - 28' - 10 sax regular cement

Left 9.4# mud between cement plugs. Installed dry hole marker in accordance with U.S.G.S. regulations. Rig released at 3:00 p.m. 3-29-64. FINAL

CONFIDENTIAL

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APR 22 1964
OIL CON. COM.
DIST. 3

NOTE.—There were No runs or sales of oil; No M. cu. ft. of gas sold;

Form 9-330

Budget Bureau No. 42-R355.4.
Approval expires 12-31-60.

Navajo Tribe
U. S. LAND OFFICE

SERIAL NUMBER 14-20-0603-6378

LEASE OR PERMIT TO PROSPECT

RECEIVED
APR 2? 1964
OIL CON. COM.
DIST. ?

LOCATE WELL CORRECTLY

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

LOG OF OIL OR GAS WELL

Company The Pure Oil Company Address P. O. Box 1611, Casper, Wyoming

Lessor or Tract Pure-Sun Navajo Tract 9 Field Wildcat State New Mexico

Well No. 1 Sec. 13 T. 28N. R. 16W Meridian NMPM County San Juan

Location 660 ft. ~~N.~~ / S. of N Line and 660 ft. ~~E.~~ / W. of E Line of Section 13 Elevation 5428 K
(Derrick floor relative to sea level)

The information given herewith is a complete and correct record of the well and all work done thereon so far as can be determined from all available records.

Signed

Date April 16, 1964 Title District Office Manager

The summary on this page is for the condition of the well at above date.

Commenced drilling March 22, 1964 Finished drilling March 29, 1964

OIL OR GAS SANDS OR ZONES

(*Denote gas by G*)

No. 1, from None to No. 4, from to

No. 2, from to No. 5, from to

No. 3, from to No. 6, from to

IMPORTANT WATER SANDS

No. 1, from None to No. 3, from to

No. 2, from to No. 4, from to

CASING RECORD

Size casing	Weight per foot	Threads per inch	Make	Amount	Kind of shoe	Cut and pulled from	Perforated From—	Perforated To—	Purpose
9-5/8"	36#	8 Rd.		232.81'	Guide	-0-			Surface

MUDDING AND CEMENTING RECORD

Size casing	Where set	Number sacks of cement	Method used	Mud gravity	Amount of mud used
9-5/8"	248	200 sax reg.	Pump		

MARK

FOLD

PLUGS AND ADAPTERS

Heaving plug—Material .... Length .... Depth set ....

Adapters—Material .... Size ....

SHOOTING RECORD

Size	Shell used	Explosive used	Quantity	Date	Depth shot	Depth cleaned out

TOOLS USED

Rotary tools were used from ...0... feet to ...4360... feet, and from .... feet to .... feet

Cable tools were used from .... feet to .... feet, and from .... feet to .... feet

DATES

.................................., 19..... Put to producing ...Dry Hole..................., 19.....

The production for the first 24 hours was ...-0-... barrels of fluid of which ....% was oil; ....% emulsion; .....% water; and .....% sediment. Gravity, °Bé. ....

If gas well, cu. ft. per 24 hours .... Gallons gasoline per 1,000 cu. ft. of gas ....

Rock pressure, lbs. per sq. in. ....

EMPLOYEES

Exeter Drilling Company.........., Driller ...., Driller

.................................., Driller ...., Driller

FORMATION RECORD

FROM—	TO—	TOTAL FEET	FORMATION
0	2750	2750	Sand & shale
2750	4234	1484	Shale
4234	4292	58	Core No. 1
4292	4360	68	Shale

Core No. 1 - 4234' - 4292' - Cut 58' - Rec. 55-1/2'

2' - Shale, dark gray with thin, fine gray sandstone laminations, tight.
7' - Sandstone, gray, very thin grained, tight with very thin shale laminations.
23' - Shale, dark gray, with numerous thin sandstone laminations.
23-1/2'- Shale, dark gray with occasional thin sand laminations.

[OVER]

16—48094-4

9-5/8"	248	200 sax reg.	Pump		

MARK

T 28 N R 15 W

Form 9-330

Form approved.
Budget Bureau No. 42-R355.4.

U. S. Land Office Navajo Tribal
Serial Number 14-20-603-2013
Lease or Permit to Prospect
Navajo "N"

RECEIVED
AUG 2 1962
OIL CON. COM.
DIST. 3

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

Section 23

#1

LOCATE WELL CORRECTLY

LOG OF OIL OR GAS WELL

Company Skelly Oil Company Address Box 38 - Hobbs, New Mexico

Lessor or Tract Navajo "N" Field Gallup (Wildcat) State New Mexico

Well No. 1 Sec. 23 T. 28N R. 15W Meridian N.M.P.M. County San Juan

Location 660 ft. S. of S Line and 1980 ft. W. of W Line of section 23 Elevation 5585' (Derrick floor relative to sea level)

The information given herewith is a complete and correct record of the well and all work done thereon so far as can be determined from all available records.

Signed J. E. Cab

Date July 27, 1962 Title Dist. Supt.

The summary on this page is for the condition of the well at above date.

Commenced drilling April 20, 1962 Finished drilling April 29, 1962

OIL OR GAS SANDS OR ZONES

(Denote gas by G)

No. 1, from 4550 to 4564 (G) No. 4, from to

No. 2, from to No. 5, from to

No. 3, from to No. 6, from to

IMPORTANT WATER SANDS

No. 1, from to No. 3, from to

No. 2, from to No. 4, from to

CASING RECORD

Size casing	Weight per foot	Threads per inch	Make	Amount	Kind of shoe	Cut and pulled from	Perforated From—	Perforated To—	Purpose
8-5/8"	32#	8-R	H-40	261'	Guide	—	—	—	Surface
4-1/2"	10.5 & 9.5	8-R	J-55	4703'	Float	—	4550	4564	Production

MUDDING AND CEMENTING RECORD

Size casing	Where set	Number sacks of cement	Method used	Mud gravity	Amount of mud used
8-5/8"	261'	250	Pump & Plug	—	—
4-1/2"	4715'	150	Pump & Plug	—	—

ARK

FOLD

PLUGS AND ADAPTERS

Heaving plug—Material .... Length .... Depth set ....

Adapters—Material .... Size ....

SHOOTING RECORD

Size	Shell used	Explosive used	Quantity	Date	Depth shot	Depth cleaned out
~~Treated through 4-1/2" OD casing perfs. 4550-4564' with 23,352 gals. oil & 25,000# 20/40 sand.~~						

TOOLS USED

Rotary tools were used from 0 feet to 4716 feet, and from .... feet to .... fe

Cable tools were used from .... feet to .... feet, and from .... feet to .... fe

DATES

............, 19...... Put to producing ...., 19....

The production for the first 24 hours was .... barrels of fluid of which ......% was oil; ......

emulsion; ......% water; and ......% sediment. Gravity, °Bé. ....

If gas well, cu. ft. per 24 hours 534 Gallons gasoline per 1,000 cu. ft. of gas ....

Rock pressure, lbs. per sq. in. ....

EMPLOYEES

Adams, Driller Speaker, Drill

Babcock, Driller ...., Drill

FORMATION RECORD

FROM—	TO—	TOTAL FEET	FORMATION
0	517	517	Sand & shale - XXXXXXXXXXXXXXXXX
517	2067	1550	Sand & shale - Top Pictured Cliffs - 517'
2067	3377	1310	Sand & shale - Top Mesaverde - 2067'
3377	4293	916	Sand & shale - Top Mancos - 3377'
4293	4390	97	Sand & shale - Top Gallup - 4293'
4390	4580	190	Sand & shale - Top Middle Gallup - 4390'
4580	4716	136	Sand & shale - Top Lower Gallup - 4580'
	4716 Total Depth		
	4677 Plugged Back Total Depth		
			Geological tops by Schlumberger Electric I

(OVER) 16—43094-5

AR 4-1/2" 4715 190 Pump & Plug — —

Form 9-330

Budget Bureau No. 42-R356.4.
Approval expires 12-31-60.

U. S. LAND OFFICE ....
SERIAL NUMBER ....
LEASE OR PERMIT TO PROSPECT Navajo Tribal 14-20-603-2206

22

LOCATE WELL CORRECTLY

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

LOG OF OIL OR GAS WELL

Company Gulf Oil Corporation Address Production Department P. O. Box 3313, Durango, Colorado

Lessor or Tract Amarillo-Navajo Field Unnamed State New Mexico

Well No. 2 Sec. 22 T. 28N R. 14W Meridian NMPM County San Juan

Location 660 ft. N./S. of N Line and 660 ft. E./W. of E Line of Section Elevation 5690.5' KB

The information given herewith is a complete and correct record of the well and all work done thereon so far as can be determined from all available records.

Signed W. O. Mitchell

Date 6-9-59 Title Area Production Supt.

The summary on this page is for the condition of the well at above date.

Commenced drilling 4-8-59, 19..... Finished drilling 5-1-59, 19.....

T 28 N
R 14 W

OIL OR GAS SANDS OR ZONES

(Denote gas by G)

No. 1, from 5140' to 5160' No. 4, from .... to ....

No. 2, from .... to .... No. 5, from .... to ....

No. 3, from .... to .... No. 6, from .... to ....

IMPORTANT WATER SANDS

No. 1, from None to .... No. 3, from .... to ....

No. 2, from .... to .... No. 4, from .... to ....

CASING RECORD

Size casing	Weight per foot	Threads per inch	Make	Amount	Kind of shoe	Cut and pulled from	Perforated From—	Perforated To—	Purpose
8-5/8"	24	8RT	SS	297	Guide		-	-	Surface
5-1/2"	14	8RT	SS	5904	Float		5140	5160	Production

MUDDING AND CEMENTING RECORD

Size casing	Where set	Number sacks of cement	Method used	Mud gravity	Amount of mud used
8-5/8"	310'	190	Pump and plug.		
5-1/2"	5904'	147	Pump and plug.		

PLUGS AND ADAPTERS

Heaving plug—Material .... Length .... Depth set ....

Adapters—Material Baker Type "K" CI cement retainer Size set at 5800'.

SHOOTING RECORD

Size	Shell used	Explosive used	Quantity	Date	Depth shot	Depth cleaned out
None						

TOOLS USED

Rotary tools were used from Surface feet to TD 5904' feet, and from .... feet to .... feet PBTD 5800'.

Cable tools were used from for completion feet to .... feet, and from .... feet to .... feet

DATES

.........., 19..... Put to producing 6-6, 19 59.

The production for the first 24 hours was 52 barrels of fluid of which 100 % was oil; - % emulsion; - % water; and - % sediment. Gravity, °Bé. 38.8

If gas well, cu. ft. per 24 hours .... Gallons gasoline per 1,000 cu. ft. of gas ....

Rock pressure, lbs. per sq. in. ....

EMPLOYEES

Exeter Drlg Co. - RT, Driller ...., Driller

Rota Cone Oil Field Operating Co. - CT, Driller ...., Driller

FORMATION RECORD

FROM—	TO—	TOTAL FEET	FORMATION
			E-LOG TOPS
1030	1946	916	Pictured Cliffs
1946	3627	1681	Cliffhouse
3627	3855	228	Pt. Lookout
3855	4745	890	Mancos
4745	5210	465	Gallup
5210	5582	372	Sanastee
5582	5640	58	Greenhorn
5640	5690	50	Graneros
5690	5884	194	Dakota
5884	5904 TD	20	Morrison

AT THE END OF COMPLETE DRILLER'S LOG, ADD GEOLOGIC TOPS. STATE WHETHER FROM EL OR SAMPLES.

(OVER)

Core No. 1, 5082'-5142', recovered 37' shale
2' sand w/...
1' shale
1' sand w/sh stringers
1' shale
2' sand, ...
Bleeding oil 5105'-5112' and 5116'-5123'

Core No. 2, 5142'-5182', recovered 1' sand, slight bleeding oil
17' sand, shale w/occasional sh partings
22' shale

Core No. 3, 5682'-5708', recovered 3' interbedded sd and sh
7' sand, no show
2' siltstone

Core No. 4, 5708'-5710', recovered 2' siltstone

Core No. 5, 5710'-5746', recovered 36' sand, no show

Core No. 6, 5746'-5805', recovered 59' siltstone and sand, no shows.

Core No. 7, 5806'-5833', recovered 26.5' sh, siltstone and sd, no shows.

Core No. 8, 5833'-5878', recovered 47' sh, sd and conglomerate, no shows.

DST No. 1, 5074'-5182', mis-run, unable to get tool to bottom.

DST No. 1-A, 5074'-5182', open 2 hrs, recovered 840' heavily gas cut mud
60' heavily oil and gas cut mud.
No free oil

DST No. 2, 5680'-5805', mis-run, unable to get tool to bottom.

DST No. 3, 5687'-5806', open 1½ hrs, recovered 270' mud of which bottom 50' very slightly gas cut.

DST No. 4, 5806'-5904', open 1½ hrs, recovered 260' gas cut mud
60' gas and salt water cut mud.

It is of the greatest importance to have a complete history of the well. Please state in detail the dates of redrilling, together with the reasons for the work and its results. If there were any changes made in the casing, state fully, and if any casing was "sidetracked" or left in the well, give its size and location. If the well has been dynamited, give date, size, position, and number of shots. If plugs or bridges were put in to test for water, state kind of material used, position, and results of pumping or bailing.

HISTORY OF OIL OR GAS WELL

COMPLETION AND TESTING

Perforated Dakota, 5848-5882' w/2 bullets and 2 jets/ft- treated w/500 gals mud acid, fractured w/35,000 gallons water, 35,000# sand.

After recovering 778 bbls load water in 5 days, swabbed and flowed 80 bbls load water in 12 hrs, slight amount of gas following swab. Casing pressure dropped from 900# (overnight buildup) to 375# and remained throughout while swabbing from 5800'.

Squeezed perfs 5848'-5882' w/25 sx cement.
Set Baker Type K Cl cement retainer at 5800'.

Perforated Gallup, 5140'-5160', w/2 bullets and 2 jets/ft- treated w/750 gals mud, acid, fractured w/25,000 gallons oil, 25,000# sand.

FROM—	TO—	TOTAL FEET	FORMATION

FORMATION RECORD—Continued

T29N R16W

Form 9-331 C
(May 1963)

SUBMIT IN TRIPLICATE*
(Other instructions on reverse side)

Form approved.
Budget Bureau No. 42-R1425.

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

APPLICATION FOR PERMIT TO DRILL, DEEPEN, OR PLUG BACK

1a. TYPE OF WORK
DRILL [X] DEEPEN [ ] PLUG BACK [ ]

b. TYPE OF WELL
OIL WELL [X] GAS WELL [ ] OTHER SINGLE ZONE [ ] MULTIPLE ZONE [ ]

2. NAME OF OPERATOR
Zoller and Danneberg

3. ADDRESS OF OPERATOR
219 Patterson Building - Denver, Colorado 80202

4. LOCATION OF WELL (Report location clearly and in accordance with any State requirements.*)
At surface
1980' FNL x 990' FEL Sec.23-29N-16W,NMPM
At proposed prod. zone
same

5. LEASE DESIGNATION AND SERIAL NO.
14-20-603-2024

6. IF INDIAN, ALLOTTEE OR TRIBE NAME
Navajo

7. UNIT AGREEMENT NAME

8. FARM OR LEASE NAME
Navajo 2024

9. WELL NO.
#1

10. FIELD AND POOL, OR WILDCAT
Wildcat

11. SEC., T., R., M., OR BLK. AND SURVEY OR AREA
Sec.23-29N-16W,NMPM

14. DISTANCE IN MILES AND DIRECTION FROM NEAREST TOWN OR POST OFFICE*
5 miles west of Fruitland, New Mexico

12. COUNTY OR PARISH
San Juan

13. STATE
New Mexico

15. DISTANCE FROM PROPOSED* LOCATION TO NEAREST PROPERTY OR LEASE LINE, FT. (Also to nearest drlg. unit line, if any)
990'

16. NO. OF ACRES IN LEASE
2560

17. NO. OF ACRES ASSIGNED TO THIS WELL
40

18. DISTANCE FROM PROPOSED LOCATION* TO NEAREST WELL, DRILLING, COMPLETED, OR APPLIED FOR, ON THIS LEASE, FT.
none

19. PROPOSED DEPTH
4100'(Gallup)

20. ROTARY OR CABLE TOOLS
Rotary

21. ELEVATIONS (Show whether DF, RT, GR, etc.)
5340 GR

22. APPROX. DATE WORK WILL START*
October 13, 1964

23. PROPOSED CASING AND CEMENTING PROGRAM

SIZE OF HOLE	SIZE OF CASING	WEIGHT PER FOOT	SETTING DEPTH	QUANTITY OF CEMENT

It is intended to drill a 4100' Gallup Sanastee test in the following manner: Drill 11" hole to 150' and cement 8-5/8" casing with 70 sax. Drill 7-7/8" hole to total depth with mud. If commercial production is encountered, cement 4-½" casing and fluid frac with chemicals. Put well on production.

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FARMINGTON, N. M.

IN ABOVE SPACE DESCRIBE PROPOSED PROGRAM: If proposal is to deepen or plug back, give data on present productive zone and proposed new productive zone. If proposal is to drill or deepen directionally, give pertinent data on subsurface locations and measured and true vertical depths. Give blowout preventer program, if any.

24.
MIAMI OIL PRODUCERS, INC.
SIGNED By: Howard L. Kennedy TITLE Agent for Zoller and Danneberg DATE 10-12-64

(This space for Federal or State office use)

PERMIT NO. ______ APPROVAL DATE ______

APPROVED BY ______ TITLE ______
CONDITIONS OF APPROVAL, IF ANY:

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OIL CON. COM.

*See Instructions On Reverse Side

Instructions

General: This form is designed for submitting proposals to perform certain well operations, as indicated, on all types of lands and leases for appropriate action by either a Federal or a State agency, or both, pursuant to applicable Federal and/or State laws and regulations. Any necessary special instructions concerning the use of this form and the number of copies to be submitted, particularly with regard to local, area, or regional procedures and practices, either are shown below or will be issued by, or may be obtained from, the local Federal and/or State office.

Item 1: If the proposal is to redrill to the same reservoir at a different subsurface location or to a new reservoir, use this form with appropriate notations. Consult applicable State or Federal regulations concerning subsequent work proposals or reports on the well.

Item 4: If there are no applicable State requirements, locations on Federal or Indian land should be described in accordance with Federal requirements. Consult local State or Federal office for specific instructions.

Item 14: Needed only when location of well cannot readily be found by road from the land or lease description. A plat, or plats, separate or on this reverse side, showing the roads to, and the surveyed location of, the well, and any other required information, should be furnished when required by Federal or State agency offices.

Items 15 and 18: If well is to be, or has been directionally drilled, give distances for subsurface location of hole in any present or objective production zone.

Item 22: Consult applicable Federal or State regulations, or appropriate officials, concerning approval of the proposal before operations are started.

☆ U.S. GOVERNMENT PRINTING OFFICE : 1963—O-711-396

Form C-128 (6-57)

NEW MEXICO OIL CONSERVATION COMMISSION

Well Location and Acreage Dedication Plat

Date October 12, 1964

Section A.

Operator ZOLLER AND DANNEBERG ~~[illegible]~~ Lease Navajo 14-20-603-2024

Well No. 1 Unit Letter H Section 23 Township 29 NORTH Range 16 WEST NMPM

Located 1980 Feet From NORTH Line, 990 Feet From EAST Line

County SAN JUAN G. L. Elevation 5340.0 Dedicated Acreage 40 Acres.

Name of Producing Formation Gallup Pool Wildcat

1. Is the Operator the only owner in the dedicated acreage outlined on the plat below?
   Yes X No ____
2. If the answer to question one is "no", have the interests of all the owners been consolidated by communitization agreement or otherwise? Yes ____ No ____ If answer is "yes", Type of Consolidation.
3. If the answer to question two is "no", list all the owners and their respective interests below:

Owner	Land Description

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OIL CON. COM.
DIST. 3

Section B.

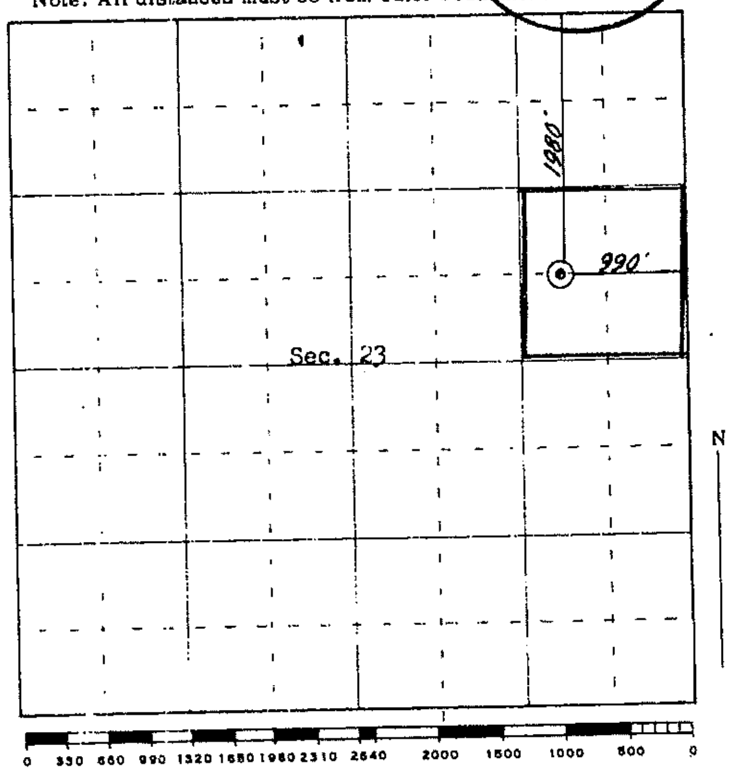
This is to certify that the information in Section A above is true and complete to the best of my knowledge and belief.

ZOLLER AND DANNEBERG
MIAMI OIL ~~PRODUCERS~~, INC.
By: ____
(Representative)

219 Patterson Building
(Address)

Denver, Colorado 80202

Note: All distances must be from outer boundaries of section



Scale 4 inches equal 1 mile

Ref: GLO plat dated 31 August 1882

(Seal)

Farmington, New Mexico

This is to certify that the above plat was prepared from field notes of actual surveys made by me or under my supervision and that the same are true and correct to the best of my knowledge and belief.

Date Surveyed September 17, 1964

Registered Professional Engineer and/or Land Surveyor
James P. Leese, N. Mex. Reg. No. 1463
San Juan Engineering Company

November 1[illegible], 19[illegible]: [illegible] barrels [illegible]

November 11-1[illegible], 19[illegible]: [illegible] . [illegible] pump.

November 18, 19[illegible]: [illegible] to gauge on water.

November 1[illegible], 19[illegible]: Pumped [illegible] hrs.

November 20, 19[illegible]: Pumped [illegible] hrs.

Bit Record

BIT #	SIZE	MAKE	TYPE	[illegible]	[illegible]
Surf.	11"	Reed	[illegible]	[illegible]	5
1	7-7/8"	[illegible]	[illegible]	[illegible]	[illegible]
2	7-7/8"	[illegible]	[illegible]	[illegible]	[illegible]
3	7-7/8"	[illegible]	[illegible]	[illegible]	[illegible]
4	7-7/8"	[illegible]	[illegible]	[illegible]	[illegible]
5	7-7/8"	[illegible]	[illegible]	[illegible]	[illegible]
6	7-7/8'	[illegible]	[illegible]	[illegible]	[illegible]
7	7-7/8"	Reed	[illegible]	[illegible]	[illegible]
8	7-7/8"	[illegible]	[illegible]	[illegible]	[illegible]
9	7-7/8"	[illegible]	[illegible]	[illegible]	[illegible]
10	7-7/8"	[illegible]	[illegible]	[illegible]	[illegible]

E-Log Formation Tops

Lewis - Surface	Lower Gallup - 40[illegible]'([illegible])
Mesa Verde - [illegible]'(+4527)	Gallup Sand - 40[illegible]'([illegible])
Point Lookout 2[illegible]16'(-2851)	[illegible] - 41[illegible]'([illegible])
Mancos - 274[illegible]'([illegible])	T.D. - 4[illegible]'

Discussion

The Miami Oil Producers, Inc. Navajo 2-24 [illegible] found 22' of sand in the Gallup with 12' of effective porosity from 4101-12'. Average porosity was 11% with water saturation averaging 70%. Log analysis indicated high water saturation which is typical of the South Waterflow area. Based on the results of the drillstem test it was decided to run pipe.

A detailed study with recommendations for additional drilling has already been submitted on the area.

Howard [illegible]. Kennedy
Geologist
November [illegible], 1964

T29N R17W

Form 9-330
(Rev. 5-63)

CORRECTED REPORT

UNITED STATES DEPARTMENT OF THE INTERIOR GEOLOGICAL SURVEY

SUBMIT IN DUPLICATE* (See other instructions on reverse side)

Form approved. Budget Bureau No. 42-R355.5

WELL COMPLETION OR RECOMPLETION REPORT AND LOG*

5. LEASE DESIGNATION AND SERIAL NO.: Navajo 14-20-603-5024

6. IF INDIAN, ALLOTTEE OR TRIBE NAME: Navajo Tribal

7. UNIT AGREEMENT NAME: NA

8. FARM OR LEASE NAME: Navajo Tract 20-31

9. WELL NO.: 31

10. FIELD AND POOL, OR WILDCAT: Pajarito Penn "D"

11. SEC., T., R., M., OR BLOCK AND SURVEY OR AREA: Sec. 31, T 29 N - R 1

12. COUNTY OR PARISH: San Juan

13. STATE: NM

1a. TYPE OF WELL: OIL WELL [X] GAS WELL [ ] DRY [ ] Other

b. TYPE OF COMPLETION: NEW WELL [X] WORK OVER [ ] DEEP-EN [ ] PLUG BACK [ ] DIFF. RESVR. [ ] Other

2. NAME OF OPERATOR: Vista Resources, Inc.

3. ADDRESS OF OPERATOR: 237 Eubank Blvd. N.E. Suite B, Albuquerque, NM 87123

4. LOCATION OF WELL (Report location clearly and in accordance with any State requirements)*

At surface: 660' FNL 1980' FEL Section 31, T 29 N - R 17 W San Juan County, NM

At top prod. interval reported below: Same as Above

At total depth: Same as Above

14. PERMIT NO.: E.A. Schmidt — DATE ISSUED: 5/17/78

15. DATE SPUDDED	16. DATE T.D. REACHED	17. DATE COMPL. (Ready to prod.)	18. ELEVATIONS (DF, RKB, RT, GR, ETC.)*	19. ELEV. CASINGHEAD
3/1/80	4/5/80	6/12/80	5179 GL 5195 KB	5179

20. TOTAL DEPTH, MD & TVD	21. PLUG, BACK T.D., MD & TVD	22. IF MULTIPLE COMPL., HOW MANY*	23. INTERVALS DRILLED BY	ROTARY TOOLS	CABLE TOOLS
7300	7248	NA	→	0-TD	None

24. PRODUCING INTERVAL(S), OF THIS COMPLETION—TOP, BOTTOM, NAME (MD AND TVD)*: 7195-7197 Paradox (Penn.)

25. WAS DIRECTIONAL SURVEY MADE: No

26. TYPE ELECTRIC AND OTHER LOGS RUN: DIL/GR, CNL/FDC/GR/Cal.

27. WAS WELL CORED: No

28. CASING RECORD (Report all strings set in well)

CASING SIZE	WEIGHT, LB./FT.	DEPTH SET (MD)	HOLE SIZE	CEMENTING RECORD	AMOUNT PULLED
13 3/8"	48	202' KB	17 1/2"	Circulated	None
9 5/8"	36	2569' KB	12 1/4"	Circulated	None
7"	26 & 23	6499' KB	8 3/4"	75 sx Cl B + 2% CC	None

29. LINER RECORD

SIZE	TOP (MD)	BOTTOM (MD)	SACKS CEMENT*	SCREEN (MD)
4 1/2"	6325' KB	7289' KB	75	None

30. TUBING RECORD

SIZE	DEPTH SET (MD)	PACKER SET (MD)
2 7/8"	7151	7019

31. PERFORATION RECORD (Interval, size and number)

a) 7195-7197'
b) 0.4"
c) 5 holes

32. ACID, SHOT, FRACTURE, CEMENT SQUEEZE, ETC.

DEPTH INTERVAL (MD)	AMOUNT AND KIND OF MATERIAL USED
7195-7197	500 gal 15% HCl

33.* PRODUCTION

DATE FIRST PRODUCTION	PRODUCTION METHOD (Flowing, gas lift, pumping—size and type of pump)	WELL STATUS (Producing or shut-in)
6/12/80	Flowing	Testing

DATE OF TEST	HOURS TESTED	CHOKE SIZE	PROD'N. FOR TEST PERIOD	OIL—BBL.	GAS—MCF.	WATER—BBL.	GAS-OIL RATIO
6/26/80	24	21/64"	→	10	TSTM	902	TSTM

FLOW. TUBING PRESS.	CASING PRESSURE	CALCULATED 24-HOUR RATE	OIL—BBL.	GAS—MCF.	WATER—BBL.	OIL GRAVITY-API (CORR.)
210 psig	200 psig	→	10	TSTM	902	46

34. DISPOSITION OF GAS (Sold, used for fuel, vented, etc.): Used for disposal engine.

TEST WITNESSED BY: Fred McDaniel

35. LIST OF ATTACHMENTS: Drilling & Completion Report. Logs

36. I hereby certify that the foregoing and attached information is complete and correct as determined from all available records

SIGNED C.D. Gritz TITLE Secretary-Treasurer DATE 8/13/80

*(See Instructions and Spaces for Additional Data on Reverse Side)

NMOCC

INSTRUCTIONS

General: This form is designed for submitting a complete and correct well completion report and log on all types of lands and leases to either a Federal agency or a State agency, or both, pursuant to applicable Federal and/or State laws and regulations. Any necessary special instructions concerning the use of this form and the number of copies to be submitted, particularly with regard to local, area, or regional procedures and practices, either are shown below or will be issued by, or may be obtained from, the local Federal and/or State office. See instructions on items 22 and 24, and 33, below regarding separate reports for separate completions.

If not filed prior to the time this summary record is submitted, copies of all currently available logs (drillers, geologists, sample and core analysis, all types electric, etc.), formation and pressure tests, and directional surveys, should be attached hereto, to the extent required by applicable Federal and/or State laws and regulations. All attachments should be listed on this form, see item 35.

Item 4: If there are no applicable State requirements, locations on Federal or Indian land should be described in accordance with Federal requirements. Consult local State or Federal office for specific instructions.

Item 18: Indicate which elevation is used as reference (where not otherwise shown) for depth measurements given in other spaces on this form and in any attachments.

Items 22 and 24: If this well is completed for separate production from more than one interval zone (multiple completion), so state in item 22, and in item 24 show the producing interval, or intervals, top(s), bottom(s) and name(s) (if any) for only the interval reported in item 33. Submit a separate report (page) on this form, adequately identified, for each additional interval to be separately produced, showing the additional data pertinent to such interval.

Item 29: *"Sacks Cement":* Attached supplemental records for this well should show the details of any multiple stage cementing and the location of the cementing tool.

Item 33: Submit a separate completion report on this form for each interval to be separately produced. (See instruction for items 22 and 24 above.)

37. SUMMARY OF POROUS ZONES:
SHOW ALL IMPORTANT ZONES OF POROSITY AND CONTENTS THEREOF; CORED INTERVALS; AND ALL DRILL-STEM TESTS, INCLUDING DEPTH INTERVAL TESTED, CUSHION USED, TIME TOOL OPEN, FLOWING AND SHUT-IN PRESSURES, AND RECOVERIES

FORMATION	TOP	BOTTOM	DESCRIPTION, CONTENTS, ETC.
rrison	1546	2614	Very high porosity water zones
Chelly	4645	4688	Water Zone
rmosa	6550	6720	Lost Circulation Zones
radox	7195	7197	Water w/oil

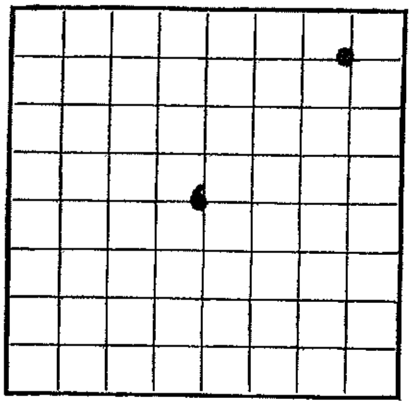
38. GEOLOGIC MARKERS

NAME	TOP: MEAS. DEPTH	TOP: TRUE VERT. DEPTH
Dakota	1327	
Morrison	1546	
Todilto	2614	
Entrada	2640	
Shinarump	4057	
De Chelly	4202	
Organ Rock	4688	
Upper Hermosa	6046	
Paradox	6692	

T 24 N R 14 W

Form 9-330

Budget Bureau No. 42-R-355.3.
Approval expires 12-31-55.



LOCATE WELL CORRECTLY

U. S. Land Office Gallup, New [illegible]

Serial Number 14-20-603-2173

Lease or Permit to Prospect

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

LOG OF OIL OR GAS WELL

Company Davis Oil Company Address 802 Midland Savings Bldg., Denver

Lessor or Tract #1 Perry Navajo Field Wildcat State New Mexico

Well No. 1 Sec. 6 T. 24N R. 14W Meridian NMPM County San Juan

Location 660 ft. {N. / S.} of N Line and 660 / 810 ft. {E. / W.} of E Line of NE/4 Sec. 6 Elevation 5933
(Derrick floor relative to sea level)

The information given herewith is a complete and correct record of the well and all work done thereon so far as can be determined from all available records.

Signed Craig Ramsey

Date 10/14/57 Title Ass't Division Geologist

The summary on this page is for the condition of the well at above date.

Commenced drilling 9/2/57, 19__ Finished drilling 9/26/57

RECEIVED
OCT 18 1957
OIL CON. COM.
DIST. 3

OIL OR GAS SANDS OR ZONES
(*Denote gas by G*)

No. 1, from None to ____ No. 4, from ____ to ____

No. 2, from ____ to ____ No. 5, from ____ to ____

No. 3, from ____ to ____ No. 6, from ____ to ____

IMPORTANT WATER SANDS

No. 1, from 648 to [illegible] No. 3, from 4139 to 4302

No. 2, from 930 to 3170 ([illegible]) No. 4, from 5029 to 5294

CASING RECORD

Size casing	Weight per foot	Threads per inch	Make	Amount	Kind of shoe	Cut and pulled from	Perforated From—	Perforated To—	Purpose
9 5/8"				169'					Surface

MUDDING AND CEMENTING RECORD

Size casing	Where set	Number sacks of cement	Method used	Mud gravity	Amount of mud used
9 5/8"	169	100 sx 2% $CaCl_2$			
	(See reverse for plugging data)				

MARK

FOLD

PLUGS AND ADAPTERS

Heaving plug—Material ______ Length ______ Depth set ______

Adapters—Material ______ Size ______

SHOOTING RECORD

Size	Shell used	Explosive used	Quantity	Date	Depth shot	Depth cleaned out

TOOLS USED

Rotary tools were used from ______ feet to ______ feet, and from ______ feet to ______ fee

Cable tools were used from 0 feet to 5311 feet, and from ______ feet to ______ fee

DATES

Abandoned 9-26, 1957 Put to producing ______, 19____

The production for the first 24 hours was ______ barrels of fluid of which ______% was oil; ______% emulsion; ______% water; and ______% sediment. Gravity, °Bé. ______

If gas well, cu. ft. per 24 hours ______ Gallons gasoline per 1,000 cu. ft. of gas ______

Rock pressure, lbs. per sq. in. ______

EMPLOYEES

CROMWELL, Driller ______, Driller

DOLLAR, Driller S. LEBEAU, Driller

FORMATION RECORD

B. PHILLIPS

FROM—	TO—	TOTAL FEET	FORMATION
0	648	648	SHALE, GREEN, GREY, SANDY
648	670	22	PICTURED CLIFFS, SAND, FINE-MED GR., WATER WE
670	930	260	LEWIS SHALE, SHALE, GREEN, GREY
930	3170	2240	MESAVERDE - SAND, GREY, FINE-MED GR., WATER WET, INTERBEDDED W/GREY SHALE
3170	4139	969	UPPER MANCOS - SHALE, GREY
4139	4302	163	GALLUP - SAND, LITE GREY, WHITE; FINE-MED GRAINED, WATER WET
4302	4558	256	MIDDLE MANCOS - SHALE, DARK GREY
4558	4600	42	SANASTEE - SILT, GREY, HARD, TITE
4600	4938	338	LOWER MANCOS - SHALE, DARK GREY, HARD, SPLINTERY
4938	4995	57	GREENHORN - LIMY, SHALE
4995	5029	34	GRANEROS - SHALE, DARK GREY
5029	5243	214	DAKOTA - SAND, LITE GREY, WHITE, FINE-MED GRAINED W. W., ALTERNATED W/SHALE, DARK GREY
5243	5311(TD)	68	MORRISON - SHALE, GREEN, SILTY W/ONE SAND (5225-43), BUFF, MED-COARSE, W.W.

DESCRIPTIONS ADJUSTED TO SCHLUMBERGER DEPTHS

RAM " " , E.S. AND MICROLOGS

[OVER]

16—43094-3

FORMATION RECORD—Continued

Form 9-330

RECEIVED

AUG 17 1956

U. S. GEOLOGICAL SURVEY
FARMINGTON, NEW MEX.

Budget Bureau No. 42-R-355.1.
Approval expires 12-31-60.

U. S. Land Office Window Rock
Serial Number Navajo Tribal
Lease or Permit to Prospect I-149-Ind.6723

RECEIVED
SEP 26 1956
OIL CON. COM.
DIST. 3

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

T29N R17W

LOCATE WELL CORRECTLY

LOG OF OIL OR GAS WELL

Company M. M. Garrett .... Address Box 1206, Farmington

Lessor or Tract Navajo Tribal .... Field WC .... State New Mexico

Well No. 1 .... Sec. 25 T. 29N. R. 17W. Meridian NMPM .... County San Juan

Location 660 ft. N./S. of N. Line and 1980 ft. E./W. of W. Line of Section 25 .... Elevation 5182 (Derrick floor relative to sea level)

The information given herewith is a complete and correct record of the well and all work done thereon so far as can be determined from all available records.

Signed J. H. G. Esc.

Date August 10, 1956 .... Title Agent

The summary on this page is for the condition of the well at above date.

Commenced drilling May 23, 1956. Finished drilling July 25, 1956.

OIL OR GAS SANDS OR ZONES

(Denote gas by G)

No. 1, from .... to .... No. 4, from .... to ....

No. 2, from .... to .... No. 5, from .... to ....

No. 3, from .... to .... No. 6, from .... to ....

IMPORTANT WATER SANDS

No. 1, from 1025 .... to 1225 .... No. 3, from 2300 .... to 4200 ....

No. 2, from 2225 .... to 2299 .... No. 4, from .... to ....

CASING RECORD

Size casing	Weight per foot	Threads per inch	Make	Amount	Kind of shoe	Cut and pulled from	Perforated From—	Perforated To—	Purpose
13 3/8	48	8	New	199	None	None	-	-	Surface
8 5/8	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

MUDDING AND CEMENTING RECORD

Size casing	Where set	Number sacks of cement	Method used	Mud gravity	Amount of mud used
13 3/8	199	375	Pump Plug	12 #	Cem. to Surface
8 5/8	2298	250	Pump Plug	8.9	495' Fill up

PLUGS AND ADAPTERS

Heaving plug—Material .... Length .... Depth set ....

Adapters—Material .... Size ....

SHOOTING RECORD

Size	Shell used	Explosive used	Quantity	Date	Depth shot	Depth cleaned out

TOOLS USED

Rotary tools were used from .... feet to .... feet, and from .... feet to .... feet

Cable tools were used from .... feet to .... feet, and from .... feet to .... feet

DATES

........, 19...... Put to producing ...., 19......

The production for the first 24 hours was .... barrels of fluid of which ......% was oil; ......% emulsion; ......% water; and ......% sediment. Gravity, °Bé. ....

If gas well, cu. ft. per 24 hours .... Gallons gasoline per 1,000 cu. ft. of gas ....

Rock pressure, lbs. per sq. in. ....

EMPLOYEES

Elmer Williams ...., Driller Woodrow Green ...., Driller

Jim Williams ...., Driller R. Jackson ...., Driller

FORMATION RECORD

FROM—	TO—	TOTAL FEET	FORMATION
0	1025	1025	Shale
1025	1225	200	Sand
1255	2292	1067	Sand & Shale
2292	2299	7	Lime
2299	5590	3291	Sand & Shale
5590	5735	145	Shale & Lime
5735	7205	1470	Lime
7205	7300	95	Shale
7300	7515 TD	215	Lime

El. Log Tops

Dakota	1025
Morrison	1225
Todilto	2298
Entrada	2299
Chinlee	3100
Shinarump	3950
Cutler	4345
Rico	5590
Hermosa	5735
Molas	7205
Leadville	7300

[OVER]

16—43094-4

FOLD | MARK

FORMATION RECORD—Continued

FROM—	TO—	TOTAL FEET	FORMATION

HISTORY OF OIL OR GAS WELL

It is of the greatest importance to have a complete history of the well. Please state in detail the dates of redrilling, together with the reasons for the work and its results. If there were any changes made in the casing, state fully, and if any casing was "sidetracked" or left in the well, give its size and location. If the well has been dynamited, give date, size, position, and number of shots. If plugs or bridges were put in to test for water, state kind of material used, position, and results of pumping or bailing.

August 8, 1956 Finish Plugging

Cement 7210-7310
Cement 5650-5750
Cement 2225-2375
Cement 375-400
Cement 0-15

T24N R17W

Form 9-330 Sec 5

Budget Bureau No. 42-R355.4.
Approval expires 12-31-60.

U. S. LAND OFFICE Navajo
SERIAL NUMBER 14-20-603-2202
LEASE OR PERMIT TO PROSPECT

RECEIVED MAR 9 1959 OIL CON. COM. DIST. 3

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

MAR 6 1959

LOCATE WELL CORRECTLY

LOG OF OIL OR GAS WELL

Company James H. Lawrence Address 2344 E. 16th St., Farmington, N.

Lessor or Tract James H. Lawrence - Navajo Field Wildcat State N. M.

Well No. 1 Sec. 5 T. 24N R. 17W Meridian NMPM County San Juan

Location 990 ft. {N./S.} of N Line and 990 ft. {E./W.} of E Line of N NE 1/4 Elevation 5716 (Derrick floor relative) 5707

The information given herewith is a complete and correct record of the well and all work done thereon so far as can be determined from all available records.

Signed James A. Abercrombie

Date 3-1-59 Title Secretary-Treasurer Lawrence Drilling Co., I

The summary on this page is for the condition of the well at above date.

Commenced drilling 12-4-58, 19 Finished drilling 12-21-58, 19

OIL OR GAS SANDS OR ZONES

(*Denote gas by G*)

No. 1, from to No. 4, from to

No. 2, from to No. 5, from to

No. 3, from to No. 6, from to

IMPORTANT WATER SANDS

No. 1, from to No. 3, from to

No. 2, from to No. 4, from to

CASING RECORD

Size casing	Weight per foot	Threads per inch	Make	Amount	Kind of shoe	Cut and pulled from	Perforated From—	Perforated To—	Purpose
8 5/8"	24#	8 rd	J-55	97'					Surfac

MUDDING AND CEMENTING RECORD

Size casing	Where set	Number sacks of cement	Method used	Mud gravity	Amount of mud used
8 5/8"	97'	100 sax	Pump truck		

MARK

PLUGS AND ADAPTERS

Heaving plug—Material .... Length .... Depth set ....

Adapters—Material.................................... Size ....

SHOOTING RECORD

Size	Shell used	Explosive used	Quantity	Date	Depth shot	Depth cleaned out

TOOLS USED

Rotary tools were used from ....0..... feet to ....3815'... feet, and from .... feet to .... feet

Cable tools were used from .... feet to .... feet, and from .... feet to .... feet

DATES

...., 19........ Put to producing ...., 19....

The production for the first 24 hours was .... barrels of fluid of which ....% was oil; ....% emulsion; ......% water; and ......% sediment. Gravity, °Bé. ....

If gas well, cu. ft. per 24 hours .... Gallons gasoline per 1,000 cu. ft. of gas ....

Rock pressure, lbs. per sq. in. ....

EMPLOYEES

..........Virgil D. Price.................., Driller ....O. P. [illegible]walt...................., Driller

...., Driller ...., Driller

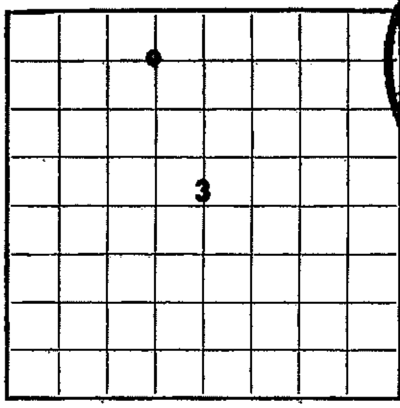
FORMATION RECORD

FROM—	TO—	TOTAL FEET	FORMATION
0	170'	170	Cliff House
170'	~~[illegible]~~' 2409'	~~[illegible]~~' 2239'	Menefee
2409'	2660'	251'	Point Lookout
2660	3511'	851'	Upper Mancos
3511'	3775'	264'	Gallup
3775'	3815' TD		Lower Mancos

[OVER] 16—43094-4

T25N R14W

Form 9-330



LOCATE WELL CORRECTLY

Budget Bureau No. 42-R355.4.
Approval expires 12-31-60.

U. S. LAND OFFICE

SERIAL NUMBER Nav. Agency Con
No. 14-20-603-744

LEASE OR PERMIT TO PROSPECT

/

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

LOG OF OIL OR GAS WELL

Company Gulf Oil Corporation Address P. O. Box 1346

Lessor or Tract Pinabete Navajo Field WC State New Mexico

Well No. 1 Sec. 3 T. 25N R. 14W Meridian NMPM County San Juan

Location 660 ft. {N./S.} of N Line and 1980 ft. {E./W.} of W Line of Section 3 Elevation 6272
(Derrick floor relative to sea lev

The information given herewith is a complete and correct record of the well and all work done thereo so far as can be determined from all available records.

Signed

Date April 22, 1960 Title Area Production Manager

The summary on this page is for the condition of the well at above date.

Commenced drilling March 22, 19 60 Finished drilling April 10, 19 60

OIL OR GAS SANDS OR ZONES

(*Denote gas by G*)

No. 1, from NONE TESTED to No. 4, from to

No. 2, from to No. 5, from to

No. 3, from to No. 6, from to

IMPORTANT WATER SANDS

No. 1, from NONE TESTED to No. 3, from to

No. 2, from to No. 4, from to

CASING RECORD

Size casing	Weight per foot	Threads per inch	Make	Amount	Kind of shoe	Cut and pulled from	Perforated From—	Perforated To—	Purpose
8-5/8	24#	8RT	SS	298.62'	Baker				

MUDDING AND CEMENTING RECORD

Size casing	Where set	Number sacks of cement	Method used	Mud gravity	Amount of mud used
8-5/8	310.62	200			

IARK

FOLD

PLUGS AND ADAPTERS

Heaving plug—Material .... Length .... Depth set ....

Adapters—Material .... Size ....

SHOOTING RECORD

Size	Shell used	Explosive used	Quantity	Date	Depth shot	Depth cleaned out

TOOLS USED

Rotary tools were used from Surface feet to 5913 feet, and from .... feet to .... fe

Cable tools were used from .... feet to .... feet, and from .... feet to .... fe

DATES

............................, 19...... ~~Put to producing~~ XXXXXXXXXXXXXX D&A April 18 ...., 19..(

The production for the first 24 hours was .... barrels of fluid of which ....% was oil; ....

emulsion; ......% water; and ......% sediment. Gravity, °Bé. ....

If gas well, cu. ft. per 24 hours .... Gallons gasoline per 1,000 cu. ft. of gas ....

Rock pressure, lbs. per sq. in. ....

EMPLOYEES

Arapahoe Drilling Co, ContractorsXXXX Driller ...., Dril

............................, Driller ...., Dril

FORMATION RECORD

FROM—	TO—	TOTAL FEET	FORMATION
			ELECTRIC LOG TOPS
			Pictured Cliffs 2233'
			Lewis Shale 2275'
			Cliff House 2366'
			Menefee 2533'
			Pt. Lookout 3637'
			Mancos 3803'
			Sanostee 5186'
			Greenhorn 5550'
			Dakota 5636'
			Morrison 5908'
			TD 5913'

[OVER] 16—43094

APPENDIX B

LABORATORY ANALYTICAL DATA FOR SAMPLES COLLECTED FROM SANOSTEE TRIBE WELLS ON MAY 11, 2005

TRANSWEST
GEOCHEM

June 13, 2005

Chris Courtney
URS Corporation
7720 N. 16th St.
Suite 100
Phoenix, AZ 85020

RE: Desert Rock Energy/23444264.33202

Work Order No.: 0505165

Dear Chris,

Transwest Geochem, Inc. received 3 samples on 5/12/2005 11:20:00 AM for the analyses presented in the following report.

The Case Narrative of this report addresses any Quality Control and/or Quality Assurance issues associated with this Work Order.

If you have any questions regarding these test results, please feel free to call us at (602) 437-0330.

Sincerely,

Carlene McCutcheon

Carlene McCutcheon
Project Manager

ADHS License No. AZM133/AZ0133

Client:	URS Corporation
Work Order:	0505165
Project Name:	Desert Rock Energy
Project Number:	23444264.33202

Date Printed: 13-Jun-05

Case Narrative

All method blanks, laboratory spikes, and/or matrix spikes met quality control objectives for the parameters associated with this Work Order except as detailed below or on the Data Qualifier page of this report. Data Qualifiers used in this report are in accordance with ADEQ Arizona Data Qualifiers, Revision 2.0 11/26/2003.

Data qualifiers ("flags") contained within this analytical report have been issued to explain a quality control deficiency, and do not affect the quality (validity) of the data unless noted otherwise in the case narrative.

3725 E. Atlanta Ave. • Suite 2 • Phoenix, Arizona 85040 • (602) 437-0330 • 1-800-927-5183 • Fax (602) 437-0660
3860 S. Palo Verde Rd. • Suite 301 • Tucson, Arizona 85714 • (520) 573-1061 • Fax (520) 573-1063

TRANSWEST GEOCHEM

Date Printed 09-Jun-05
License No. AZM133/AZ0133

CLIENT:	URS Corporation
Project Name:	Desert Rock Energy
Project Number:	23444264.33202
Work Order:	0505165
Date Received:	12-May-05

Case Narrative
Data Qualifiers

One or more of the following data qualifiers may be associated with your analytical and/or quality control data.

H3	Sample was received and analyzed past holding time.
D2	Sample required dilution due to high concentration of target analyte.

TRANSWEST GEOCHEM

Date Printed 12-Jun-05

License No. AZM133/AZ0133

CLIENT: URS Corporation

Project Name: Desert Rock Energy

Project Number: 23444264.33202

Work Order: 0505165

Date Received: 12-May-05

Work Order Sample Summary

Client Sample ID	Lab Sample ID	Test Code	Collection Date
12T-655	0505165-01A	EPA120.1	5/11/2005 2:00:00 PM
		EPA150.1	5/11/2005 2:00:00 PM
		EPA180.1	5/11/2005 2:00:00 PM
		EPA300	5/11/2005 2:00:00 PM
		SM 2540 C	5/11/2005 2:00:00 PM
		SM 4500-NO2 B	5/11/2005 2:00:00 PM
		SM2320 B	5/11/2005 2:00:00 PM
	0505165-01B	EPA353.2	5/11/2005 2:00:00 PM
	0505165-01C	EPA200.7	5/11/2005 2:00:00 PM
		EPA200.9	5/11/2005 2:00:00 PM
	0505165-01D		5/11/2005 2:00:00 PM
	0505165-01E		5/11/2005 2:00:00 PM
		EPA901.1	5/11/2005 2:00:00 PM
12T-633	0505165-02A	EPA120.1	5/11/2005 2:30:00 PM
		EPA150.1	5/11/2005 2:30:00 PM
		EPA180.1	5/11/2005 2:30:00 PM
		EPA300	5/11/2005 2:30:00 PM
		SM 2540 C	5/11/2005 2:30:00 PM
		SM 4500-NO2 B	5/11/2005 2:30:00 PM
		SM2320 B	5/11/2005 2:30:00 PM
	0505165-02B	EPA353.2	5/11/2005 2:30:00 PM
	0505165-02C	EPA200.7	5/11/2005 2:30:00 PM
		EPA200.9	5/11/2005 2:30:00 PM
	0505165-02D		5/11/2005 2:30:00 PM
	0505165-02E		5/11/2005 2:30:00 PM
		EPA901.1	5/11/2005 2:30:00 PM
12K-320	0505165-03A	EPA120.1	5/11/2005 3:10:00 PM
		EPA150.1	5/11/2005 3:10:00 PM
		EPA180.1	5/11/2005 3:10:00 PM
		EPA300	5/11/2005 3:10:00 PM
		SM 2540 C	5/11/2005 3:10:00 PM
		SM 4500-NO2 B	5/11/2005 3:10:00 PM
		SM2320 B	5/11/2005 3:10:00 PM
	0505165-03B	EPA353.2	5/11/2005 3:10:00 PM

CLIENT:	URS Corporation	
Project Name:	Desert Rock Energy	**Work Order Sample Summary**
Project Number:	23444264.33202	
Work Order:	0505165	
Date Received:	12-May-05	

Client Sample ID	Lab Sample ID	Test Code	Collection Date
12K-320	0505165-03C	EPA200.7	5/11/2005 3:10:00 PM
		EPA200.9	5/11/2005 3:10:00 PM
	0505165-03D		5/11/2005 3:10:00 PM
	0505165-03E		5/11/2005 3:10:00 PM

TRANSWEST GEOCHEM

Date Printed 09-Jun-05

License No. AZM133/AZ0133

CLIENT:	URS Corporation
Project Name:	Desert Rock Energy
Project Number:	23444264.33202
Work Order:	0505165
Date Received:	12-May-05

Definitions

Analytical Spike (AS)	The AS is a known amount of a target analyte added to a sample after it has been distilled, digested, or extracted and is ready for analysis. The AS is generally performed if the MS has failed. It is used to indicate interference that arises from sample distillation, digestion, or extraction as opposed to interference that is innate to the matrix.
Continuing Curve Verification (CCV)	The CCV is also referred to as a curve check. This is a standard analyzed at specified intervals during an analysis. The CCV verifies the stability and accuracy of the calibration curve. There are specific CCV recovery acceptance criteria for each method.
Dilution Factor (DF)	The DF is an indication of how much a sample had to be diluted in order to quantitate it on a standard curve. The DF is indicated in the reported sample result. The sample PQL increases as the dilution increases.
Internal Standard (IS)	The IS is a compound that is similar to the organic compound of interest in terms of chemical composition but is unique in that it is rare in the environment. The same concentration of IS is added to every sample for some organic methods.
Laboratory Control Sample (LCS)	The LCS is also referred to as a blank spike. The LCS is an addition of a known amount of a target analyte (from the same source as calibration standards or spikes) to an aliquot of deionized water or other appropriate clean matrix. The LCS is processed through the entire method procedure in the same manner as samples.
Matrix Spike (MS)	The MS is a known amount of a target analyte added to a sample. The MS is processed through the entire method procedure in the same manner as samples.
Method Blank (MB)	The MB is an aliquot of deionized water or other appropriate clean matrix that is thought to be free of the analyte in question. The MB is processed through the entire extraction or analysis procedure and is used to indicate contamination in the lab.
Method Detection Limit (MDL)	The MDL is the lowest level of detection of which a method is capable.
Practical Quantitation Limit (PQL)	The PQL is the lowest value at which Transwest Geochem can detect an analyte in matrix with a high degree of confidence. The PQL will increase as the DF increases. The PQL is greater than or equal to the MDL.
Relative Percent Difference (RPD)	The RPD is a measure of precision (the ability to obtain the same result on re-analysis of the same sample). It is calculated using the result of a sample, MS, LCS, or LCSV and its associated duplicate result.
Secondary Source QC Sample (LCSV)	The LCSV is also referred to as a second source laboratory control sample. It is the same type of standard as a calibration or spiking standard but is obtained from a different source. The LCSV is an indication of the primary standard quality, method performance, and instrument performance.
Surrogate	A surrogate compound is similar to the organic compound of interest in terms of chemical composition but is unique in that it is rare in the environment. When surrogates are used, they are added to every sample, blank and standard. Surrogate recovery is used as an indication of extraction and/or analytical success.
Trip Blank (TB)	The TB is a portion of deionized water preserved in the same manner as the samples. The TB travels from the lab, to the field, and then back to the lab with the samples from the field. The TB serves as an indication of contamination introduced during sample transportation.

CLIENT:	URS Corporation
Project Name:	Desert Rock Energy
Project Number:	23444264.33202
Work Order:	0505165
Date Received:	12-May-05

References

Transwest Geochem, Inc. uses the methods outlined in the following references:

Code of Federal Regulations, 40CFR, Part 136, Appendix A, 1998.

Standard Methods for the Examination of Water and Wastewater, 19th Edition, 1995.

Methods for Chemical Analysis of Water and Wastes, EPA-600/4-79-020, Revised March 1983.

Methods for the Determination of Inorganic Substances in Environmental Samples, EPA/600/R-93/100, Revised August 1993.

Methods for the Determination of Metals in Environmental Samples, Supplement 1: EPA/600/R-94/111, Revised May 1994.

Methods for the Determination of Organic Compounds in Drinking Water, EPA/600/4-88/039, Revised July, 1991; EPA-600/4-90/020, Supplement I, July 1990; EPA-600/R-92/129; Supplement II, August 1992; EPA-600/R-95/131, Supplement III, August 1995.

Hach, Water Analysis Handbook, 3rd Edition, 1997.

Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, SW846, 3rd Edition, 1986 including Update I, July 1992; Update IIA, August 1993; Update II; September 1994; Update IIB, January 1995; Update III, December 1996

Bureau of Laboratory Services, State of Arizona Department of Health Services Method 418.1AZ: TPH in Soil, September 1994.

Bureau of Laboratory Services, State of Arizona Department of Health Services Method 8015AZ.R1, September 1998. (Comment: C6-C10 GRO reported by this method is not to be used in compliance situations)

ASTM MethodD4982, Annual Book of ASTM Standards, Volumes 11.01 and 11.02, 1995

The Determination of Polychlorinated Biphenyls in Transformer Fluid and Waste Oils, EPA-600 4-81-045, September 1982.

TRANSWEST GEOCHEM

Date Printed 12-Jun-05
License No. AZM133/AZ0133

CLIENT: URS Corporation
Work Order: 0505165
Lab ID: 0505165-01
Project Name: Desert Rock Energy
Project Number: 23444264.33202

Client Sample ID: 12T-655
Collection Date: 5/11/2005 2:00:00 PM
Matrix: Groundwater

Analyte	Result	PQL	Qual	Units	DF	Test Code	Date Prepared	Date Analyzed	Analyst	Batch ID
Specific Conductance	**270**	1.0		µmhos/cm	1.0	EPA120.1	N/A	5/13/05	SO	COND_W-5/13/2005
pH	**8.1**	N/A	H3	--	1.0	EPA150.1	N/A	5/13/05 11:30	SO	PH_W-5/13/2005
Temperature °C.	**21.8**	N/A		--	1.0	EPA150.1	N/A	5/13/05 11:30	SO	PH_W-5/13/2005
Turbidity	<0.02	0.02		NTU	1.0	EPA180.1	N/A	5/13/05 7:55	SO	TURB_W-5/13/2005
Chloride	**4.5**	2.5		mg/L	1.0	EPA300	N/A	5/19/05	TL	IC-5/19/2005
Fluoride	<0.50	0.50		mg/L	1.0	EPA300	N/A	5/19/05	TL	IC-5/19/2005
Sulfate	**6.6**	3.0		mg/L	1.0	EPA300	N/A	5/19/05	TL	IC-5/19/2005
Nitrate (As N)	<0.50	0.50		mg/L	1.0	EPA353.2	N/A	5/25/05	TL	NO3_W-5/25/2005
Total Dissolved Solids	**160**	10		mg/L	1.0	SM 2540 C	N/A	5/16/05	BJK	TDS_DW-5/17/2005
Nitrite (As N)	<0.020	0.020		mg/L	1.0	SM 4500-NO2 B	N/A	5/13/05 9:49	KMB	NO2_DW-5/13/2005
Alkalinity, Bicarbonate (As C	**140**	20		mg/L	1.0	SM2320 B	N/A	5/18/05	KMB	ALK_W-5/18/2005
Alkalinity, Carbonate (As CaCO3)	<20	20		mg/L	1.0	SM2320 B	N/A	5/18/05	KMB	ALK_W-5/18/2005
Alkalinity, Hydroxide (As CaCO3)	<20	20		mg/L	1.0	SM2320 B	N/A	5/18/05	KMB	ALK_W-5/18/2005
Alkalinity, Total (As CaCO3)	**140**	20		mg/L	1.0	SM2320 B	N/A	5/18/05	KMB	ALK_W-5/18/2005
Aluminum	<0.10	0.10		mg/L	1.0	EPA200.7	5/16/05	5/16/05 15:35	JM	9415
Barium	**0.14**	0.010		mg/L	1.0	EPA200.7	5/16/05	5/16/05 15:35	JM	9415
Boron	<0.10	0.10		mg/L	1.0	EPA200.7	5/16/05	5/16/05 15:35	JM	9415
Cadmium	<0.0030	0.0030		mg/L	1.0	EPA200.7	5/16/05	5/17/05 11:11	JM	9415
Calcium	**20**	1.0		mg/L	1.0	EPA200.7	5/16/05	5/16/05 15:35	JM	9415
Chromium	<0.010	0.010		mg/L	1.0	EPA200.7	5/16/05	5/16/05 15:35	JM	9415
Cobalt	<0.010	0.010		mg/L	1.0	EPA200.7	5/16/05	5/16/05 15:35	JM	9415
Copper	**0.29**	0.010		mg/L	1.0	EPA200.7	5/16/05	5/16/05 15:35	JM	9415
Iron	<0.10	0.10		mg/L	1.0	EPA200.7	5/16/05	5/16/05 15:35	JM	9415
Magnesium	**4.0**	1.0		mg/L	1.0	EPA200.7	5/16/05	5/16/05 15:35	JM	9415
Nickel	<0.010	0.010		mg/L	1.0	EPA200.7	5/16/05	5/16/05 15:35	JM	9415
Potassium	**2.8**	2.0		mg/L	1.0	EPA200.7	5/16/05	5/16/05 15:35	JM	9415
Silica	**19**	0.43		mg/L	1.0	EPA200.7	5/16/05	5/16/05 15:35	JM	9415
Silver	<0.0050	0.0050		mg/L	1.0	EPA200.7	5/16/05	5/16/05 15:35	JM	9415
Sodium	**34**	2.0		mg/L	1.0	EPA200.7	5/16/05	5/16/05 15:35	JM	9415
Antimony	<0.0030	0.0030		mg/L	1.0	EPA200.9	N/A	5/16/05	KMB	20095/16/05
Arsenic	<0.0040	0.0040		mg/L	1.0	EPA200.9	N/A	5/23/05	KMB	20095/23/2005

TRANSWEST GEOCHEM

Date Printed 12-Jun-05

License No. AZM133/AZ0133

CLIENT: URS Corporation
Work Order: 0505165
Lab ID: 0505165-01
Project Name: Desert Rock Energy
Project Number: 23444264.33202

Client Sample ID: 12T-655
Collection Date: 5/11/2005 2:00:00 PM
Matrix: Groundwater

Analyte	Result	PQL	Qual	Units	DF	Test Code	Date Prepared	Date Analyzed	Analyst	Batch ID
Lead	0.0095	0.0030		mg/L	1.0	EPA200.9	N/A	5/18/05	KMB	20095/18/2005
Selenium	<0.0030	0.0030		mg/L	1.0	EPA200.9	N/A	5/17/05	KMB	2009_5/17/2005
Thallium	<0.0020	0.0020		mg/L	1.0	EPA200.9	N/A	5/26/05	KMB	200.9_TL-5/26/2005

TRANSWEST GEOCHEM

Date Printed 12-Jun-05

License No. AZM133/AZ0133

CLIENT: URS Corporation
Work Order: 0505165
Lab ID: 0505165-02
Project Name: Desert Rock Energy
Project Number: 23444264.33202

Client Sample ID: 12T-633
Collection Date: 5/11/2005 2:30:00 PM
Matrix: Groundwater

Analyte	Result	PQL	Qual	Units	DF	Test Code	Date Prepared	Date Analyzed	Analyst	Batch ID
Specific Conductance	**280**	1.0		µmhos/cm	1.0	EPA120.1	N/A	5/13/05	SO	COND_W-5/13/2005
pH	**9.0**	N/A	H3	--	1.0	EPA150.1	N/A	5/13/05 11:30	SO	PH_W-5/13/2005
Temperature °C.	**21.5**	N/A		--	1.0	EPA150.1	N/A	5/13/05 11:30	SO	PH_W-5/13/2005
Turbidity	<0.02	0.02		NTU	1.0	EPA180.1	N/A	5/13/05 7:55	SO	TURB_W-5/13/2005
Chloride	<2.5	2.5		mg/L	1.0	EPA300	N/A	5/19/05	TL	IC-5/19/2005
Fluoride	<0.50	0.50		mg/L	1.0	EPA300	N/A	5/19/05	TL	IC-5/19/2005
Sulfate	**3.4**	3.0		mg/L	1.0	EPA300	N/A	5/19/05	TL	IC-5/19/2005
Nitrate (As N)	<0.50	0.50		mg/L	1.0	EPA353.2	N/A	5/25/05	TL	NO3_W-5/25/2005
Total Dissolved Solids	**170**	10		mg/L	1.0	SM 2540 C	N/A	5/16/05	BJK	TDS_DW-5/17/2005
Nitrite (As N)	<0.020	0.020		mg/L	1.0	SM 4500-NO2 B	N/A	5/13/05 9:49	KMB	NO2_DW-5/13/2005
Alkalinity, Bicarbonate (As C	**89**	20		mg/L	1.0	SM2320 B	N/A	5/18/05	KMB	ALK_W-5/18/2005
Alkalinity, Carbonate (As Ca	**50**	20		mg/L	1.0	SM2320 B	N/A	5/18/05	KMB	ALK_W-5/18/2005
Alkalinity, Hydroxide (As CaCO3)	<20	20		mg/L	1.0	SM2320 B	N/A	5/18/05	KMB	ALK_W-5/18/2005
Alkalinity, Total (As CaCO3)	**140**	20		mg/L	1.0	SM2320 B	N/A	5/18/05	KMB	ALK_W-5/18/2005
Aluminum	<0.10	0.10		mg/L	1.0	EPA200.7	5/16/05	5/16/05 15:39	JM	9415
Barium	**0.014**	0.010		mg/L	1.0	EPA200.7	5/16/05	5/16/05 15:39	JM	9415
Boron	<0.10	0.10		mg/L	1.0	EPA200.7	5/16/05	5/16/05 15:39	JM	9415
Cadmium	<0.0030	0.0030		mg/L	1.0	EPA200.7	5/16/05	5/17/05 11:14	JM	9415
Calcium	**1.3**	1.0		mg/L	1.0	EPA200.7	5/16/05	5/16/05 15:39	JM	9415
Chromium	<0.010	0.010		mg/L	1.0	EPA200.7	5/16/05	5/16/05 15:39	JM	9415
Cobalt	<0.010	0.010		mg/L	1.0	EPA200.7	5/16/05	5/16/05 15:39	JM	9415
Copper	<0.010	0.010		mg/L	1.0	EPA200.7	5/16/05	5/16/05 15:39	JM	9415
Iron	<0.10	0.10		mg/L	1.0	EPA200.7	5/16/05	5/16/05 15:39	JM	9415
Magnesium	<1.0	1.0		mg/L	1.0	EPA200.7	5/16/05	5/16/05 15:39	JM	9415
Nickel	<0.010	0.010		mg/L	1.0	EPA200.7	5/16/05	5/16/05 15:39	JM	9415
Potassium	<2.0	2.0		mg/L	1.0	EPA200.7	5/16/05	5/16/05 15:39	JM	9415
Silica	**16**	0.43		mg/L	1.0	EPA200.7	5/16/05	5/16/05 15:39	JM	9415
Silver	<0.0050	0.0050		mg/L	1.0	EPA200.7	5/16/05	5/16/05 15:39	JM	9415
Sodium	**68**	2.0		mg/L	1.0	EPA200.7	5/16/05	5/16/05 15:39	JM	9415
Antimony	<0.0030	0.0030		mg/L	1.0	EPA200.9	N/A	5/16/05	KMB	20095/16/05
Arsenic	<0.0040	0.0040		mg/L	1.0	EPA200.9	N/A	5/23/05	KMB	20095/23/2005

TRANSWEST GEOCHEM

Date Printed 12-Jun-05

License No. AZM133/AZ0133

CLIENT: URS Corporation
Work Order: 0505165
Lab ID: 0505165-02
Project Name: Desert Rock Energy
Project Number: 23444264.33202

Client Sample ID: 12T-633
Collection Date: 5/11/2005 2:30:00 PM
Matrix: Groundwater

Analyte	Result	PQL	Qual	Units	DF	Test Code	Date Prepared	Date Analyzed	Analyst	Batch ID
Lead	<0.0030	0.0030		mg/L	1.0	EPA200.9	N/A	5/18/05	KMB	20095/18/2005
Selenium	<0.0030	0.0030		mg/L	1.0	EPA200.9	N/A	5/17/05	KMB	2009_5/17/2005
Thallium	<0.0020	0.0020		mg/L	1.0	EPA200.9	N/A	5/26/05	KMB	200.9_TL-5/26/2005

TRANSWEST GEOCHEM

Date Printed 12-Jun-05

License No. AZM133/AZ0133

CLIENT:	URS Corporation	**Client Sample ID:**	12K-320
Work Order:	0505165	**Collection Date:**	5/11/2005 3:10:00 PM
Lab ID:	0505165-03	**Matrix:**	Groundwater
Project Name:	Desert Rock Energy		
Project Number:	23444264.33202		

Analyte	Result	PQL	Qual	Units	DF	Test Code	Date Prepared	Date Analyzed	Analyst	Batch ID
Specific Conductance	500	1.0		µmhos/cm	1.0	EPA120.1	N/A	5/13/05	SO	COND_W-5/13/2005
pH	9.3	N/A	H3	--	1.0	EPA150.1	N/A	5/13/05 11:30	SO	PH_W-5/13/2005
Temperature °C.	21.5	N/A		--	1.0	EPA150.1	N/A	5/13/05 11:30	SO	PH_W-5/13/2005
Turbidity	<0.02	0.02		NTU	1.0	EPA180.1	N/A	5/13/05 7:55	SO	TURB_W-5/13/2005
Chloride	4.5	2.5		mg/L	1.0	EPA300	N/A	5/19/05	TL	IC-5/19/2005
Fluoride	<0.50	0.50		mg/L	1.0	EPA300	N/A	5/19/05	TL	IC-5/19/2005
Sulfate	52	3.0		mg/L	1.0	EPA300	N/A	5/19/05	TL	IC-5/19/2005
Nitrate (As N)	<0.50	0.50		mg/L	1.0	EPA353.2	N/A	5/25/05	TL	NO3_W-5/25/2005
Total Dissolved Solids	300	10		mg/L	1.0	SM 2540 C	N/A	5/16/05	BJK	TDS_DW-5/17/2005
Nitrite (As N)	<0.020	0.020		mg/L	1.0	SM 4500-NO2 B	N/A	5/13/05 9:49	KMB	NO2_DW-5/13/2005
Alkalinity, Bicarbonate (As C	100	20		mg/L	1.0	SM2320 B	N/A	5/18/05	KMB	ALK_W-5/18/2005
Alkalinity, Carbonate (As Ca	97	20		mg/L	1.0	SM2320 B	N/A	5/18/05	KMB	ALK_W-5/18/2005
Alkalinity, Hydroxide (As CaCO3)	<20	20		mg/L	1.0	SM2320 B	N/A	5/18/05	KMB	ALK_W-5/18/2005
Alkalinity, Total (As CaCO3)	200	20		mg/L	1.0	SM2320 B	N/A	5/18/05	KMB	ALK_W-5/18/2005
Aluminum	<0.10	0.10		mg/L	1.0	EPA200.7	5/16/05	5/16/05 15:42	JM	9415
Barium	0.036	0.010		mg/L	1.0	EPA200.7	5/16/05	5/16/05 15:42	JM	9415
Boron	<0.10	0.10		mg/L	1.0	EPA200.7	5/16/05	5/16/05 15:42	JM	9415
Cadmium	<0.0030	0.0030		mg/L	1.0	EPA200.7	5/16/05	5/17/05 11:18	JM	9415
Calcium	1.1	1.0		mg/L	1.0	EPA200.7	5/16/05	5/16/05 15:42	JM	9415
Chromium	<0.010	0.010		mg/L	1.0	EPA200.7	5/16/05	5/16/05 15:42	JM	9415
Cobalt	<0.010	0.010		mg/L	1.0	EPA200.7	5/16/05	5/16/05 15:42	JM	9415
Copper	<0.010	0.010		mg/L	1.0	EPA200.7	5/16/05	5/16/05 15:42	JM	9415
Iron	<0.10	0.10		mg/L	1.0	EPA200.7	5/16/05	5/16/05 15:42	JM	9415
Magnesium	<1.0	1.0		mg/L	1.0	EPA200.7	5/16/05	5/16/05 15:42	JM	9415
Nickel	<0.010	0.010		mg/L	1.0	EPA200.7	5/16/05	5/16/05 15:42	JM	9415
Potassium	<2.0	2.0		mg/L	1.0	EPA200.7	5/16/05	5/16/05 15:42	JM	9415
Silica	18	0.43		mg/L	1.0	EPA200.7	5/16/05	5/16/05 15:42	JM	9415
Silver	<0.0050	0.0050		mg/L	1.0	EPA200.7	5/16/05	5/16/05 15:42	JM	9415
Sodium	110	10	D2	mg/L	5.0	EPA200.7	5/16/05	5/16/05 17:51	JM	9415
Antimony	<0.0030	0.0030		mg/L	1.0	EPA200.9	N/A	5/16/05	KMB	20095/16/05
Arsenic	<0.0040	0.0040		mg/L	1.0	EPA200.9	N/A	5/23/05	KMB	20095/23/2005

TRANSWEST GEOCHEM

Date Printed 12-Jun-05

License No. AZM133/AZ0133

CLIENT: URS Corporation
Work Order: 0505165
Lab ID: 0505165-03
Project Name: Desert Rock Energy
Project Number: 23444264.33202

Client Sample ID: 12K-320
Collection Date: 5/11/2005 3:10:00 PM
Matrix: Groundwater

Analyte	Result	PQL	Qual	Units	DF	Test Code	Date Prepared	Date Analyzed	Analyst	Batch ID
Lead	<0.0030	0.0030		mg/L	1.0	EPA200.9	N/A	5/18/05	KMB	20095/18/2005
Selenium	<0.0030	0.0030		mg/L	1.0	EPA200.9	N/A	5/17/05	KMB	2009_5/17/2005
Thallium	<0.0020	0.0020		mg/L	1.0	EPA200.9	N/A	5/26/05	KMB	200.9_TL-5/26/2005

Date: 09-Jun-05

License No. AZM133/AZ0133

TRANSWEST GEOCHEM

CLIENT: URS Corporation
Work Order: 0505165
Project: Desert Rock Energy/23444264.33202

QC SUMMARY REPORT

Method Blank

Analyte	Result	PQL	Qual	Units	DF	Test Code	Date Prepared	Date Analyzed	Analyst	Batch ID
Chloride	<2.5	2.5		mg/L	1	EPA300	N/A	5/19/05	TL	IC-5/19/2005
Fluoride	<0.50	0.50		mg/L	1	EPA300	N/A	5/19/05	TL	IC-5/19/2005
Sulfate	<3.0	3.0		mg/L	1	EPA300	N/A	5/19/05	TL	IC-5/19/2005
Nitrate (As N)	<0.50	0.50		mg/L	1	EPA353.2	N/A	5/25/05	TL	NO3_W-5/25/2005
Nitrate-Nitrite (As N)	<0.50	0.50		mg/L	1	EPA353.2	N/A	5/25/05	TL	NO3_W-5/25/2005
Total Dissolved Solids	<10	10		mg/L	1	SM 2540 C	N/A	5/16/05	BJK	TDS_DW-5/17/2005
Nitrite (As N)	<0.020	0.020		mg/L	1	SM 4500-NO2 B	N/A	5/13/05 9:49	KMB	NO2_DW-5/13/2005
Alkalinity, Bicarbonate (As CaCO3)	<20	20		mg/L	1	SM2320 B	N/A	5/18/05	KMB	ALK_W-5/18/2005
Alkalinity, Carbonate (As CaCO3)	<20	20		mg/L	1	SM2320 B	N/A	5/18/05	KMB	ALK_W-5/18/2005
Alkalinity, Hydroxide (As CaCO3)	<20	20		mg/L	1	SM2320 B	N/A	5/18/05	KMB	ALK_W-5/18/2005
Alkalinity, Total (As CaCO3)	<20	20		mg/L	1	SM2320 B	N/A	5/18/05	KMB	ALK_W-5/18/2005
Aluminum	<0.10	0.10		mg/L	1	EPA200.7	5/16/05	5/16/05 15:17	JM	9415
Barium	<0.010	0.010		mg/L	1	EPA200.7	5/16/05	5/16/05 15:17	JM	9415
Boron	<0.10	0.10		mg/L	1	EPA200.7	5/16/05	5/16/05 15:17	JM	9415
Calcium	<1.0	1.0		mg/L	1	EPA200.7	5/16/05	5/16/05 15:17	JM	9415
Chromium	<0.010	0.010		mg/L	1	EPA200.7	5/16/05	5/16/05 15:17	JM	9415
Cobalt	<0.010	0.010		mg/L	1	EPA200.7	5/16/05	5/16/05 15:17	JM	9415
Copper	<0.010	0.010		mg/L	1	EPA200.7	5/16/05	5/16/05 15:17	JM	9415
Iron	<0.10	0.10		mg/L	1	EPA200.7	5/16/05	5/16/05 15:17	JM	9415
Magnesium	<1.0	1.0		mg/L	1	EPA200.7	5/16/05	5/16/05 15:17	JM	9415
Nickel	<0.010	0.010		mg/L	1	EPA200.7	5/16/05	5/16/05 15:17	JM	9415
Potassium	<2.0	2.0		mg/L	1	EPA200.7	5/16/05	5/16/05 15:17	JM	9415
Silica	<0.43	0.43		mg/L	1	EPA200.7	5/16/05	5/16/05 15:17	JM	9415
Silver	<0.0050	0.0050		mg/L	1	EPA200.7	5/16/05	5/16/05 15:17	JM	9415
Sodium	<2.0	2.0		mg/L	1	EPA200.7	5/16/05	5/16/05 15:17	JM	9415
Cadmium	<0.0030	0.0030		mg/L	1	EPA200.7	5/16/05	5/17/05 10:53	JM	9415
Antimony	<0.0030	0.0030		mg/L	1	EPA200.9	N/A	5/16/05	KMB	20095/16/05
Selenium	<0.0030	0.0030		mg/L	1	EPA200.9	N/A	5/17/05	KMB	2009_5/17/2005
Lead	<0.0030	0.0030		mg/L	1	EPA200.9	N/A	5/18/05	KMB	20095/18/2005
Arsenic	<0.0040	0.0040		mg/L	1	EPA200.9	N/A	5/23/05	KMB	20095/23/2005
Thallium	<0.0020	0.0020		mg/L	1	EPA200.9	N/A	5/26/05	KMB	200.9_TL-5/26/2005

TRANSWEST GEOCHEM

Date: 09-Jun-05

License No. AZM133/AZ0133

CLIENT: URS Corporation
Work Order: 0505165
Project: Desert Rock Energy/23444264.33202

QC SUMMARY REPORT

Sample Duplicate

Analyte	Result	PQL	Units	RPD Ref Val	% RPD	RPD Limit	Test Code	Date Prepared	Date Analyzed	Analyst	Qual
Sample ID: **0505117-03AD** Batch ID: COND_W-5/13/2005 Client ID:											
Specific Conductance	4260	1.0	µmhos/cm	4280	0%	1	EPA120.1	N/A	5/12/05	SO	
Sample ID: **0505165-03AD** Batch ID: COND_W-5/13/2005 Client ID: **12K-320**											
Specific Conductance	502.0	1.0	µmhos/cm	502.0	0%	1	EPA120.1	N/A	5/13/05	SO	
Sample ID: **0505187-01BD** Batch ID: NO3_W-5/25/2005 Client ID:											
Nitrate-Nitrite (As N)	3.536	0.50	mg/L	3.540	0%	8	EPA353.2	N/A	5/25/05	TL	
Sample ID: **0505254-02AD** Batch ID: NO3_W-5/25/2005 Client ID:											
Nitrate-Nitrite (As N)	<0.50	0.50	mg/L	<0.50	0%	8	EPA353.2	N/A	5/25/05	TL	
Sample ID: **0505165-03AD** Batch ID: PH_W-5/13/2005 Client ID: **12K-320**											
Temperature °C.	21.40	N/A	–	21.50	0%	20	EPA150.1	N/A	5/13/05 11:30	SO	
pH	9.306	N/A	–	9.297	0%	20	EPA150.1	N/A	5/13/05 11:30	SO	
Sample ID: **0505165-01AD** Batch ID: TDS_DW-5/17/2005 Client ID: **12K-655**											
Total Dissolved Solids	154.0	10	mg/L	156.0	1%	14	SM 2540 C	N/A	5/16/05	BJK	
Sample ID: **0505165-03AD** Batch ID: TURB_W-5/13/2005 Client ID: **12K-320**											
Turbidity	<0.02	0.02	NTU	<0.02	0%	4	EPA180.1	N/A	5/13/05 7:55	SO	

TRANSWEST GEOCHEM

Date: 12-Jun-05

License No. AZM133/AZ0133

CLIENT: URS Corporation
Work Order: 0505165
Project: Desert Rock Energy/23444264.33202

QC SUMMARY REPORT

Sample Matrix Spike Duplicate

Analyte	Result	PQL	SPK value	SPK Ref Val	% Rec	Low Limit	High Limit	RPD Ref Val	% RPD	RPD Limit	Qual
Sample ID: 0505165-02A-MSD	Batch ID: IC-5/19/2005			Test Code: EPA300				Date Analyzed: 05/19/05 00:00			
Client ID: 12T-633				Units mg/L				Date Prepared: N/A			
Chloride	24.88	2.5	25.00		100%	80	113	25.2	1%	6	
Fluoride	4.957	0.50	5.000		99%	80	113	5.016	1%	5	
Sulfate	31.04	3.0	30.00	3.445	92%	80	111	31.34	1%	6	
Sample ID: 0505165-02A-MS	Batch ID: IC-5/19/2005			Test Code: EPA300				Date Analyzed: 05/19/05 00:00			
Client ID: 12T-633				Units mg/L				Date Prepared: N/A			
Chloride	25.20	2.5	25.00		101%	80	113				
Fluoride	5.016	0.50	5.000		100%	80	113				
Sulfate	31.34	3.0	30.00	3.445	93%	80	111				
Sample ID: 0505187-01BS	Batch ID: NO3_W-5/25/2005			Test Code: EPA353.2				Date Analyzed: 05/25/05 00:00			
Client ID:				Units mg/L				Date Prepared: N/A			
Nitrate-Nitrite (As N)	13.86	1.0	10.00	3.492	104%	90	110				
Sample ID: 0505254-02AS	Batch ID: NO3_W-5/25/2005			Test Code: EPA353.2				Date Analyzed: 05/25/05 00:00			
Client ID:				Units mg/L				Date Prepared: N/A			
Nitrate-Nitrite (As N)	5.043	0.50	5.000		101%	90	110				
Sample ID: 0505165-01A-MSD	Batch ID: NO2_DW-5/13/2005			Test Code: SM 4500-NO2 B				Date Analyzed: 05/13/05 09:49			
Client ID: 12T-655				Units mg/L				Date Prepared: N/A			
Nitrite (As N)	0.09540	0.020	0.1000		95%	63	130	0.1	5%	6	
Sample ID: 0505165-01A-MS	Batch ID: NO2_DW-5/13/2005			Test Code: SM 4500-NO2 B				Date Analyzed: 05/13/05 09:49			
Client ID: 12T-655				Units mg/L				Date Prepared: N/A			
Nitrite (As N)	0.1000	0.020	0.1000		100%	63	130				
Sample ID: 0505094-01ASD	Batch ID: ALK_W-5/18/2005			Test Code: SM2320 B				Date Analyzed: 05/18/05 00:00			
Client ID:				Units mg/L				Date Prepared: N/A			
Alkalinity, Total (As CaCO3)	281.0	20	167.0	135.7	87%	69	117	277.1	1%	3	
Sample ID: 0505094-01AS	Batch ID: ALK_W-5/18/2005			Test Code: SM2320 B				Date Analyzed: 05/18/05 00:00			
Client ID:				Units mg/L				Date Prepared: N/A			
Alkalinity, Total (As CaCO3)	277.1	20	167.0	135.7	85%	69	117				

TRANSWEST GEOCHEM

Date: 12-Jun-05

License No. AZM133/AZ0133

CLIENT: URS Corporation

Work Order: 0505165

Project: Desert Rock Energy/23444264.33202

QC SUMMARY REPORT

Sample Matrix Spike

Analyte	Result	PQL	SPK value	SPK Ref Val	% Rec	Low Limit	High Limit	RPD Ref Val	% RPD	RPD Limit	Qual
Sample ID: 0505165-03C-MS	**Batch ID: 9415**			**Test Code: EPA200.7**				**Date Analyzed: 05/16/05 15:46**			
Client ID: 12K-320				**Units mg/L**				**Date Prepared: 5/16/05**			
Aluminum	12.36	0.10	11.00		112%	70	130				
Barium	1.118	0.010	1.000	0.03648	108%	70	130				
Boron	1.106	0.10	1.000		111%	70	130				
Calcium	29.63	1.0	26.00	1.075	110%	70	130				
Chromium	1.030	0.010	1.000		103%	70	130				
Cobalt	1.109	0.010	1.000		111%	70	130				
Copper	0.9563	0.010	1.000		96%	70	130				
Iron	0.9642	0.10	1.000		96%	70	130				
Magnesium	27.83	1.0	26.00		107%	70	130				
Nickel	1.057	0.010	1.000		106%	70	130				
Silica	29.55	0.43	10.70	18.29	105%	70	130				
Silver	0.08005	0.0050	0.07500		107%	70	130				
Sample ID: 0505165-03C-MSD	**Batch ID: 9415**			**Test Code: EPA200.7**				**Date Analyzed: 05/16/05 15:49**			
Client ID: 12K-320				**Units mg/L**				**Date Prepared: 5/16/05**			
Aluminum	12.88	0.10	11.00		117%	70	130	12.36	4%	12	
Barium	1.153	0.010	1.000	0.03648	112%	70	130	1.118	3%	9	
Boron	1.154	0.10	1.000		115%	70	130	1.106	4%	12	
Calcium	30.69	1.0	26.00	1.075	114%	70	130	29.63	4%	7	
Chromium	1.075	0.010	1.000		108%	70	130	1.03	4%	7	
Cobalt	1.160	0.010	1.000		116%	70	130	1.109	4%	7	
Copper	0.9826	0.010	1.000		98%	70	130	0.9563	3%	8	
Iron	1.018	0.10	1.000		102%	70	130	0.9642	5%	12	
Magnesium	28.82	1.0	26.00		111%	70	130	27.83	3%	8	
Nickel	1.096	0.010	1.000		110%	70	130	1.057	4%	7	
Silica	30.72	0.43	10.70	18.29	116%	70	130	29.55	4%	13	
Silver	0.08189	0.0050	0.07500		109%	70	130	0.08005	2%	15	
Sample ID: 0505119-04B-MS	**Batch ID: 9415**			**Test Code: EPA200.7**				**Date Analyzed: 05/16/05 16:36**			
Client ID:				**Units mg/L**				**Date Prepared: 5/16/05**			
Chromium	1.049	0.010	1.000		105%	70	130				
Sample ID: 0505119-04B-MSD	**Batch ID: 9415**			**Test Code: EPA200.7**				**Date Analyzed: 05/16/05 16:40**			
Client ID:				**Units mg/L**				**Date Prepared: 5/16/05**			
Chromium	1.088	0.010	1.000		109%	70	130	1.049	4%	7	
Sample ID: 0505165-03C-MS	**Batch ID: 9415**			**Test Code: EPA200.7**				**Date Analyzed: 05/16/05 17:55**			
Client ID: 12K-320				**Units mg/L**				**Date Prepared: 5/16/05**			
Potassium	27.59	10	25.00		110%	70	130				
Sodium	136.6	10	25.00	113.4	93%	70	130				

TRANSWEST GEOCHEM

Date: 12-Jun-05

License No. AZM133/AZ0133

CLIENT: URS Corporation
Work Order: 0505165
Project: Desert Rock Energy/23444264.33202

QC SUMMARY REPORT

Sample Matrix Spike Duplicate

Analyte	Result	PQL	SPK value	SPK Ref Val	% Rec	Low Limit	High Limit	RPD Ref Val	% RPD	RPD Limit	Qual
Sample ID: 0505165-03C-MSD	Batch ID: 9415			Test Code: EPA200.7				Date Analyzed: 05/16/05 17:59			
Client ID: 12K-320				Units mg/L				Date Prepared: 5/16/05			
Potassium	27.93	10	25.00		112%	70	130	27.59	1%	13	
Sodium	137.3	10	25.00	113.4	96%	70	130	136.6	1%	8	
Sample ID: 0505165-03C-MS	Batch ID: 9415			Test Code: EPA200.7				Date Analyzed: 05/17/05 11:21			
Client ID: 12K-320				Units mg/L				Date Prepared: 5/16/05			
Cadmium	1.103	0.0030	1.000		110%	70	130				
Sample ID: 0505165-03C-MSD	Batch ID: 9415			Test Code: EPA200.7				Date Analyzed: 05/17/05 11:25			
Client ID: 12K-320				Units mg/L				Date Prepared: 5/16/05			
Cadmium	1.075	0.0030	1.000		108%	70	130	1.103	3%	7	
Sample ID: 0505165-01C-MSD	Batch ID: 20095/16/05			Test Code: EPA200.9				Date Analyzed: 05/16/05 00:00			
Client ID: 12T-655				Units mg/L				Date Prepared: N/A			
Antimony	0.01310	0.0030	0.01500		87%	70	130	0.01283	2%	14	
Sample ID: 0505165-01C-MS	Batch ID: 20095/16/05			Test Code: EPA200.9				Date Analyzed: 05/16/05 00:00			
Client ID: 12T-655				Units mg/L				Date Prepared: N/A			
Antimony	0.01283	0.0030	0.01500		86%	70	130				
Sample ID: 0505165-03C-MSD	Batch ID: 2009_5/17/2005			Test Code: EPA200.9				Date Analyzed: 05/17/05 00:00			
Client ID: 12K-320				Units mg/L				Date Prepared: N/A			
Selenium	0.01369	0.0030	0.01500		91%	70	130	0.0129	6%	17	
Sample ID: 0505165-03C-MS	Batch ID: 2009_5/17/2005			Test Code: EPA200.9				Date Analyzed: 05/17/05 00:00			
Client ID: 12K-320				Units mg/L				Date Prepared: N/A			
Selenium	0.01290	0.0030	0.01500		86%	70	130				
Sample ID: 0505165-03C-MSD	Batch ID: 20095/18/2005			Test Code: EPA200.9				Date Analyzed: 05/18/05 00:00			
Client ID: 12K-320				Units mg/L				Date Prepared: N/A			
Lead	0.01384	0.0030	0.01500		92%	70	130	0.01384	0%	13	
Sample ID: 0505165-03C-MS	Batch ID: 20095/18/2005			Test Code: EPA200.9				Date Analyzed: 05/18/05 00:00			
Client ID: 12K-320				Units mg/L				Date Prepared: N/A			
Lead	0.01384	0.0030	0.01500		92%	70	130				
Sample ID: 0505165-03C-MSD	Batch ID: 20095/23/2005			Test Code: EPA200.9				Date Analyzed: 05/23/05 00:00			
Client ID: 12K-320				Units mg/L				Date Prepared: N/A			
Arsenic	0.01874	0.0040	0.01500		125%	70	130	0.01855	1%	9	
Sample ID: 0505165-03C-MS	Batch ID: 20095/23/2005			Test Code: EPA200.9				Date Analyzed: 05/23/05 00:00			
Client ID: 12K-320				Units mg/L				Date Prepared: N/A			
Arsenic	0.01855	0.0040	0.01500		124%	70	130				

TRANSWEST GEOCHEM

Date: 12-Jun-05

License No. AZM133/AZ0133

CLIENT: URS Corporation
Work Order: 0505165
Project: Desert Rock Energy/23444264.33202

QC SUMMARY REPORT

Sample Matrix Spike

Analyte	Result	PQL	SPK value	SPK Ref Val	% Rec	Low Limit	High Limit	RPD Ref Val	% RPD	RPD Limit	Qual
Sample ID: 0505165-01C-MS	Batch ID: 200.9_TL-5/26/2005			Test Code: EPA200.9				Date Analyzed: 05/26/05 00:00			
Client ID: 12T-655				Units mg/L				Date Prepared: N/A			
Thallium	0.01697	0.0020	0.01500		113%	70	130				
Sample ID: 0505165-01C-MSD	Batch ID: 200.9_TL-5/26/2005			Test Code: EPA200.9				Date Analyzed: 05/26/05 00:00			
Client ID: 12T-655				Units mg/L				Date Prepared: N/A			
Thallium	0.01714	0.0020	0.01500		114%	70	130	0.01697	1%	16	

Date: 09-Jun-05

License No. AZM133/AZ0133

CLIENT: URS Corporation
Work Order: 0505165
Project: Desert Rock Energy/23444264.33202

QC SUMMARY REPORT

Blank Spike

Analyte	Result	PQL	SPK value	SPK Ref Val	% Rec	Low Limit	High Limit	RPD Ref Val	% RPD	RPD Limit	Qual
Sample ID: LCS	Batch ID: IC-5/19/2005				Test Code: EPA300			Date Analyzed: 05/19/05 00:00			
					Units: mg/L			Date Prepared: N/A			
Chloride	23.40	2.5	25.00		94%	90	110				
Fluoride	4.834	0.50	5.000		97%	90	110				
Sulfate	28.89	3.0	30.00		96%	90	110				
Sample ID: LCS	Batch ID: NO3_W-5/25/2005				Test Code: EPA353.2			Date Analyzed: 05/25/05 00:00			
					Units: mg/L			Date Prepared: N/A			
Nitrate-Nitrite (As N)	5.190	0.50	5.000		104%	90	110				
Sample ID: LCS	Batch ID: NO2_DW-5/13/2005				Test Code: SM 4500-NO2 B			Date Analyzed: 05/13/05 09:49			
					Units: mg/L			Date Prepared: N/A			
Nitrite (As N)	0.09630	0.020	0.1000		96%	91	112				
Sample ID: LCS	Batch ID: ALK_W-5/18/2005				Test Code: SM2320 B			Date Analyzed: 05/18/05 00:00			
					Units: mg/L			Date Prepared: N/A			
Alkalinity, Total (As CaCO3)	166.7	20	167.0		100%	96	103				
Sample ID: LCS-9415	Batch ID: 9415				Test Code: EPA200.7			Date Analyzed: 05/16/05 15:21			
					Units: mg/L			Date Prepared: 5/16/05			
Aluminum	11.93	0.10	11.00		108%	85	115				
Barium	1.095	0.010	1.000		110%	85	115				
Boron	1.062	0.10	1.000		106%	85	115				
Calcium	27.45	1.0	26.00		106%	85	115				
Chromium	1.004	0.010	1.000		100%	85	115				
Cobalt	1.076	0.010	1.000		108%	85	115				
Copper	0.9450	0.010	1.000		95%	85	115				
Iron	0.9543	0.10	1.000		95%	85	115				
Magnesium	26.99	1.0	26.00		104%	85	115				
Nickel	1.021	0.010	1.000		102%	85	115				
Potassium	27.08	2.0	25.00		108%	85	115				
Silica	11.19	0.43	10.70		105%	85	115				
Silver	0.07838	0.0050	0.07500		105%	85	115				
Sodium	26.51	2.0	25.00		106%	85	115				

Date: 09-Jun-05

License No. AZM133/AZ0133

CLIENT: URS Corporation
Work Order: 0505165
Project: Desert Rock Energy/23444264.33202

QC SUMMARY REPORT

Blank Spike Duplicate

Analyte	Result	PQL	SPK value	SPK Ref Val	% Rec	Low Limit	High Limit	RPD Ref Val	% RPD	RPD Limit	Qual
Sample ID: LCSD-9415	Batch ID: 9415			Test Code: EPA200.7				Date Analyzed: 05/16/05 15:24			
				Units: mg/L				Date Prepared: 5/16/05			
Aluminum	12.05	0.10	11.00		110%	85	115	11.93	1%	6	
Barium	1.099	0.010	1.000		110%	85	115	1.095	0%	6	
Boron	1.071	0.10	1.000		107%	85	115	1.062	1%	7	
Calcium	27.80	1.0	26.00		107%	85	115	27.45	1%	7	
Chromium	1.012	0.010	1.000		101%	85	115	1.004	1%	7	
Cobalt	1.082	0.010	1.000		108%	85	115	1.076	1%	7	
Copper	0.9533	0.010	1.000		95%	85	115	0.945	1%	7	
Iron	0.9661	0.10	1.000		97%	85	115	0.9543	1%	8	
Magnesium	27.32	1.0	26.00		105%	85	115	26.99	1%	6	
Nickel	1.036	0.010	1.000		104%	85	115	1.021	1%	7	
Potassium	27.57	2.0	25.00		110%	85	115	27.08	2%	7	
Silica	11.29	0.43	10.70		106%	85	115	11.19	1%	6	
Silver	0.07871	0.0050	0.07500		105%	85	115	0.07838	0%	7	
Sodium	26.51	2.0	25.00		106%	85	115	26.51	0%	7	
Sample ID: LCS-9415	Batch ID: 9415			Test Code: EPA200.7				Date Analyzed: 05/17/05 10:56			
				Units: mg/L				Date Prepared: 5/16/05			
Cadmium	1.059	0.0030	1.000		106%	85	115				
Sample ID: LCSD-9415	Batch ID: 9415			Test Code: EPA200.7				Date Analyzed: 05/17/05 11:00			
				Units: mg/L				Date Prepared: 5/16/05			
Cadmium	1.062	0.0030	1.000		106%	85	115	1.059	0%	7	
Sample ID: LCS	Batch ID: 20095/16/05			Test Code: EPA200.9				Date Analyzed: 05/16/05 00:00			
				Units: mg/L				Date Prepared: N/A			
Antimony	0.01504	0.0030	0.01500		100%	85	115				
Sample ID: LCS	Batch ID: 2009_5/17/2005			Test Code: EPA200.9				Date Analyzed: 05/17/05 00:00			
				Units: mg/L				Date Prepared: N/A			
Selenium	0.01634	0.0030	0.01500		109%	85	115				
Sample ID: LCS	Batch ID: 20095/18/2005			Test Code: EPA200.9				Date Analyzed: 05/18/05 00:00			
				Units: mg/L				Date Prepared: N/A			
Lead	0.01563	0.0030	0.01500		104%	85	115				
Sample ID: LCS	Batch ID: 20095/23/2005			Test Code: EPA200.9				Date Analyzed: 05/23/05 00:00			
				Units: mg/L				Date Prepared: N/A			
Arsenic	0.01468	0.0040	0.01500		98%	85	115				
Sample ID: LCS	Batch ID: 200.9_TL-5/26/2005			Test Code: EPA200.9				Date Analyzed: 05/26/05 00:00			
				Units: mg/L				Date Prepared: N/A			
Thallium	0.01626	0.0020	0.01500		108%	85	115				

TRANSWEST GEOCHEM

June 13, 2005

Chris Courtney
URS Corporation
7720 N. 16th St.
Suite 100
Phoenix, AZ 85020

Re: Desert Rock Energy/23444264.33202
Work Order No.: 0505165

Dear Chris,

Attached is the original Report of Analysis from Radiation Safety Engineering, Inc. (AZ0462) for the samples received on 5/12/2005 11:20:00 AM. The following analysis was performed:

Radiochemical Activity in Water (pCi/L) – Gross Alpha

If you have any questions regarding the results, please call me. We appreciate your business and thank you for choosing Transwest Geochem.

Sincerely,

Carlene McCutcheon

Carlene McCutcheon
Project Manager

ADHS License No. AZM133/AZ0133

3725 E. Atlanta Ave. • Suite 2 • Phoenix, Arizona 85040 • (602) 437-0330 • 1-800-927-5183 • Fax (602) 437-0660
3860 S. Palo Verde Rd. • Suite 301 • Tucson, Arizona 85714 • (520) 573-1061 • Fax (520) 573-1063

Radiation Safety Engineering, Inc.
3245 N. WASHINGTON ST. · CHANDLER, ARIZONA 85225-1121 (480) 897-9459
Website: www.radsafe.com FAX (480) 892-5446

Radiochemical Activity in Water (pCi/L)

Transwest Geochem
3725 E. Atlanta Avenue
Suite 2
Phoenix, AZ 85040-2960

Sample Received: May 12, 2005
Analysis Completed: May 25, 2005

Sample ID	Gross Alpha Activity Method 600/00-02 (pCi/L)	Radium 226 Activity Method 903.1 (pCi/L)	Radium 228 Activity Method 904 (pCi/L)	Total Radium (pCi/L)
12T-655	9.8 ± 1.5	< 0.3	< 0.4	<0.4
12T-633	12. ± 1.7	< 0.3	< 0.3	<0.3
12K-320	0.9 ± 0.4	----	----	----

Robert L. Metzger, Ph.D., C.H.P.

Arizona Department of Environmental Quality
Drinking Water Additional Radiochemical Analysis Report
Samples To Be Taken At POE Only

System ID ____ System Name ____

05/11/2005 2:00 Carlene McCutcheon

Sample Date ____ Sample Time ____ Owner/Contact Person ____

POE# ____ Owner/Contact Fax Number ____

COMPLIANCE SAMPLE TYPE

- ☐ Reduced Monitoring — Date Q1 Collected ____
- ☐ Quarterly — Date Q2 Collected ____
- ☐ Composite of four quarterly samples — Date Q3 Collected ____

Date Q4 Collected ____

*****RADIOCHEMICAL ANALYSIS*****
>>>To be filled out by laboratory personnel<<<

Analysis Method	MCL	Reporting Limit	Contaminant Name	Cont. Code	Analyses Run Date	Result	Exceed MCL
	15 pCi/L		Adjusted Gross Alpha	4000			
600/00-02		3 pCi/L	Gross Alpha	4002	05/18/2005	9.8±1.5	
7500 - Rn			Radon	4004			
00-07	30 µg/L	(reserved)	Combined Uranium	4006			
			Uranium 234	4007			
			Uranium 235	4008			
			Uranium 238	4009			
	5 pCi/L	1 pCi/L	Combined Radium (226,228)	4010	05/19/2005	<0.4	
903.1		1 pCi/L	Radium 226	4020	05/19/2005	< 0.3	
904.0		1 pCi/L	Radium 228	4030	05/16/2005	< 0.4	

*****LABORATORY INFORMATION*****
>>>To be filled out by laboratory personnel<<<

Specimen Number: 12T-655

Lab ID Number: AZ0462 Lab Name: Radiation Safety Engineering, Inc.

Comments: 24813 Authorized Signature: Robert L. Metzger

Date Public Water System Notified: ____

DWAR 6: 2003

Arizona Department of Environmental Quality
Drinking Water Additional Radiochemical Analysis Report
Samples To Be Taken At POE Only

System ID ______ System Name ______

05/11/2005 02:30 Carlene McCutcheon

Sample Date ______ Sample Time ______ Owner/Contact Person ______

602-437-0660

POE# ______ Owner/Contact Fax Number ______

COMPLIANCE SAMPLE TYPE

- ☐ Reduced Monitoring — Date Q1 Collected ______
- ☐ Quarterly — Date Q2 Collected ______
- ☐ Composite of four quarterly samples — Date Q3 Collected ______

Date Q4 Collected ______

*****RADIOCHEMICAL ANALYSIS*****

>>>To be filled out by laboratory personnel<<<

Analysis Method	MCL	Reporting Limit	Contaminant Name	Cont. Code	Analyses Run Date	Result	Exceed MCL
	15 pCi/L		Adjusted Gross Alpha	4000			
600/00-02		3 pCi/L	Gross Alpha	4002	05/18/2005	12.±1.7	
7500 - Rn			Radon	4004			
00-07	30 µg/L	(reserved)	Combined Uranium	4006			
			Uranium 234	4007			
			Uranium 235	4008			
			Uranium 238	4009			
	5 pCi/L	1 pCi/L	Combined Radium (226,228)	4010	05/19/2005	<0.3	
903.1		1 pCi/L	Radium 226	4020	05/19/2005	< 0.3	
904.0		1 pCi/L	Radium 228	4030	05/19/2005	< 0.3	

*****LABORATORY INFORMATION*****

>>>To be filled out by laboratory personnel<<<

Specimen Number: 12T-633

Lab ID Number: AZ0462 Lab Name: Radiation Safety Engineering, Inc.

Comments: 24814 Authorized Signature: [signature]

Date Public Water System Notified: ______

DWAR 6: 2003

Arizona Department of Environmental Quality
Drinking Water Additional Radiochemical Analysis Report
Samples To Be Taken At POE Only

System ID ______ System Name ______________________

05/11/2005 03:10 Carlene McCutcheon

Sample Date ______ Sample Time ______ Owner/Contact Person ______________

602-437-0660

POE# ______ Owner/Contact Fax Number ______________

COMPLIANCE SAMPLE TYPE

- ☐ Reduced Monitoring
- ☐ Quarterly
- ☐ Composite of four quarterly samples

Date Q1 Collected ______________

Date Q2 Collected ______________

Date Q3 Collected ______________

Date Q4 Collected ______________

******RADIOCHEMICAL ANALYSIS******

>>>To be filled out by laboratory personnel<<<

Analysis Method	MCL	Reporting Limit	Contaminant Name	Cont. Code	Analyses Run Date	Result	Exceed MCL
	15 pCi/L		Adjusted Gross Alpha	4000			
600/00-02		3 pCi/L	Gross Alpha	4002	05/18/2005	0.9±0.4	
7500 - Rn			Radon	4004			
00-07	30 µg/L	(reserved)	Combined Uranium	4006			
			Uranium 234	4007			
			Uranium 235	4008			
			Uranium 238	4009			
	5 pCi/L	1 pCi/L	Combined Radium (226,228)	4010			
903.1		1 pCi/L	Radium 226	4020			
904.0		1 pCi/L	Radium 228	4030			

******LABORATORY INFORMATION******

>>>To be filled out by laboratory personnel<<<

Specimen Number: 12K-320

Lab ID Number: AZ0462 Lab Name: Radiation Safety Engineering, Inc.

Comments: 24815 Authorized Signature: Robert L. Metzger

Date Public Water System Notified: ______________

DWAR 6: 2003

Radiation Safety Engineering, Inc

3245 North Washington Street
Chandler, AZ 85225
5/25/2005

Quality Assurance Report
Work Order: 0505165

Standards

Analysis	Ratio of O/E ($O/E \pm 2\sigma$)	Acceptable limits
Alpha	0.99	0.85 – 1.15
Beta	NA	0.85 - 1.15
Uranium	NA	0.85 - 1.15
Radon	NA	0.85 – 1.15
Radium-226	0.95	0.85 - 1.15
Radium-228	1.12	0.85 - 1.15
Strontium	NA	0.85 – 1.15
Tritium	NA	0.85 – 1.15

Blanks

Analysis	Observed	Expected	Acceptable
Alpha	<0.2	< 1.0	< 1.0
Beta	NA	< 3.0	< 3.0
Uranium	NA	< 0.8	< 0.8
Radon	NA	< 150	< 200
Radium-226	<0.5	< 0.7	< 0.9
Radium-228	<0.5	< 0.7	< 0.9
Strontium	NA	< 0.8	< 0.9
Tritium	NA	< 400	< 500

NA Not applicable.

Robert L. Metzger, Ph.D., C.H.P.

TRANSWEST GEOCHEM

CHAIN-OF-CUSTODY

Carlene McCutcheon
3725 E. Atlanta Avenue
Suite 2
Phoenix, AZ 85040
TEL: (602) 437-0330
FAX: (602) 437-0660

Work Order: 0505165

Project: Desert Rock Energy 23444264.33202

Subcontractor:
Radiation Safety
3245 N. Washington Street
Chandler, AZ 85225-1121
TEL: (480) 897-9459
FAX: (480) 892-5446

12-May-05

Client Sample ID	TGI ID	Matrix	Collection Date	Containers	Requested Tests: GROSS ALPHA						
12T-655	01E	Drinking Water	5/11/2005 2:00:00 PM	1	1	24813					
12T-633	02E	Drinking Water	5/11/2005 2:30:00 PM	1	1	24814					
12K-320	03E	Drinking Water	5/11/2005 3:10:00 PM	1	1	24815					

Comments: After analysis, the samples do not need to be returned and can be disposed per your standard laboratory practices. Please provide a QC report, including Method Blank data.

Sample Receipt		
Temperature:	Ambient / Cold	Ice:
Received Intact:		Absent / Present
Custody Seals:		Wet / Blue
Total No. of Containers:		° C.

		Date/Time			Date/Time
Relinquished by:	Katina [illegible]	5/12/05 @ 1502	Received by:	P Porquet	5/12/05 15:06
Relinquished by:			Received by:		

TRANSWEST GEOCHEM

June 13, 2005

Chris Courtney
URS Corporation
7720 N. 16th St.
Suite 100
Phoenix, AZ 85020

Re: Desert Rock Energy/23444264.33202
Work Order No.: 0505165

Dear Chris,

Attached is the original Report of Analysis from Aquatic Consulting & Testing, Inc. (AZ0003) for the samples received on 5/12/2005 11:20:00 AM. The following analysis was performed:

Method No. SM 2520 B - Salinity

If you have any questions regarding the results, please call me. We appreciate your business and thank you for choosing Transwest Geochem.

Sincerely,

Carlene McCutcheon

Carlene McCutcheon
Project Manager

ADHS License No. AZM133/AZ0133

3725 E. Atlanta Ave. • Suite 2 • Phoenix, Arizona 85040 • (602) 437-0330 • 1-800-927-5183 • Fax (602) 437-0660
3860 S. Palo Verde Rd. • Suite 301 • Tucson, Arizona 85714 • (520) 573-1061 • Fax (520) 573-1063

AQUATIC CONSULTING & TESTING, INC.

1525 W. University Drive, Suite 106
P.O. Box 1510
Tempe, Arizona 85281
Phone: (480) 921-8044 • FAX: (480) 921-0049

Lic. No. AZ0003

LABORATORY REPORT

Client: Transwest Geochem, Inc.
3725 E. Atlanta Avenue, #2
Phoenix, AZ 85040

Date Submitted: 05/12/05
Date Reported: 06/08/05

Attn: Carlene McCutcheon

RESULTS

Client ID: 0505165-01D
ACT Lab No.: BM05028
Sample Type: Groundwater
Sample Time: 05/11/05 14:00

Parameter	Analysis Date Start	Analysis Date End	Method No.	Result	Unit
Conductivity	05/20/05	05/20/05	120.1	255.	umho/cm @ 25 C
Salinity	05/20/05	05/20/05	SM 2520 B	0.2	ppt

Client ID: 0505165-02D
ACT Lab No.: BM05029
Sample Type: Groundwater
Sample Time: 05/11/05 14:30

Parameter	Analysis Date Start	Analysis Date End	Method No.	Result	Unit
Conductivity	05/20/05	05/20/05	120.1	269.	umho/cm @ 25 C
Salinity	05/20/05	05/20/05	SM 2520 B	0.2	ppt

Client ID: 0505165-03D
ACT Lab No.: BM05030
Sample Type: Groundwater
Sample Time: 05/11/05 15:10

Parameter	Analysis Date Start	Analysis Date End	Method No.	Result	Unit
Conductivity	05/20/05	05/20/05	120.1	492.	umho/cm @ 25 C
Salinity	05/20/05	05/20/05	SM 2520 B	0.3	ppt

Reviewed by: Frederick A. Amalfi
Frederick A. Amalfi, Ph.D.
Laboratory Director

QC Report

QC Parameter	Sample Result	Method Blank Result	QCS % Rec	Duplicate Result	Duplicate RPD	Spike Result	Spike % Rec
Batch ID: COND-27765 QC ID:	BM05390	Samples: BM05028 BM05029 BM05030					
Conductivity	1130.			1120.	0.889		

TRANSWEST GEOCHEM

CHAIN-OF-CUSTODY

Carlene McCutcheon
3725 E. Atlanta Avenue
Suite 2
Phoenix, AZ 85040
TEL: (602) 437-0330
FAX: (602) 437-0660

Work Order: 0505165

Project: Desert Rock Energy 23444264.33202

Subcontractor:
Aquatic Consulting & Testing, Inc
1525 W. University Drive Suite 106
Tempe, AZ 85281
TEL: (480) 921-8044
FAX: (480) 921-0049

12-May-05

Client Sample ID	TGI ID	Matrix	Collection Date	Containers	Requested Tests: SUBCONTRACT						
12T-655	01D	Groundwater	5/11/2005 2:00:00 PM	1	1		BM05028				
12T-633	02D	Groundwater	5/11/2005 2:30:00 PM	1	1			BM05029			
12K-320	03D	Groundwater	5/11/2005 3:10:00 PM	1	1			BM05030			

Salinity

Comments: After analysis, the samples do not need to be returned and can be disposed per your standard laboratory practices. Please provide a QC report, including Method Blank data.

Sample Receipt		
Temperature:	Ambient / Cold	Ice:
Received Intact:	Yes	Absent / Present
Custody Seals:	NA	Wet / Blue
Total No. of Containers:	3	1 °C.

		Date/Time			Date/Time
Relinquished by:	Katina Quinn	5/12/05 @ 16:08	Received by:	A Yard	5.12.05 1608
Relinquished by:			Received by:		

- 026

TRANSWEST GEOCHEM

3725 E. Atlanta Ave., Ste 2
Phoenix, Arizona 85040
Phone: (602) 437-0330
Fax: (602) 437-0660

3860 S. Palo Verde Rd., Ste. 301
Tucson, Arizona 85714
Phone: (520) 573-1061
Fax: (520) 573-1063

Chain of Custody

TGI Work Order No: 0505165
Date 5/11/05 Page 1 of 1

Project Manager:	Richard Knox
Client Name:	Site Global Power, LLC
Address:	
City, State ZIP:	
Phone:	Fax:

Bill to:	URS Corp., Attn: Chris Courtney
Company:	URS Corp.
Address:	7720 N. 16th Street, Suite 100
City, State ZIP:	Phoenix, AZ
Phone:	480-363-1309 Fax: 480-371-1615

P.O. No.:	23444264.33202
Project Name:	Desert Rock Energy
Project Number:	23444264.33202

SAMPLE RECEIPT

Temperature: 4.3				Ice:
Received Intact:	Yes	No	N/A	Absent / Present
Custody Seals:	Yes	No	N/A	Wet / Blue
Total No. of Containers:	15			

Sample Identification	Matrix	Date Sampled	Time Sampled	Lab ID	No. of Containers
12T-655	GW	5/11/05	14:00	1	5
12T-633	GW	5/11/05	14:30	2	5
12K-320	GW	5/11/05	15:10	3	5

ANALYSIS REQUEST

Sample Identification	TPH, 8015AZR.1	BTEX (8021B)	Volatile Organics GCMS (624/8260AZ)	SDWA Volatiles, (524.2)	Semi-Volatile Organics GCMS (625/8270)	Organochlorine Pesticides (608/8081)	PCB's, (8082)	PAH, EPA 8310	8 RCRA Metals	Chloride, Fluoride	Nitrate	Nitrite, pH	TDS, turbidity	Cond, Alkalinity	200.7 *	Sulfate	Salinity	Rad Chem		Comments
12T-655										X	X	X	X	X	X	X	X	X		* Al, Sb, As
12T-633										X	X	X	X	X	X	X	X	X		Ba, B, Cd
12K-320										X	X	X	X	X	X	X	X	X		Ca, Cr, Co
																				Cu, Fe, Pb
																				K, Mg, Na
																				Ni, Se, Ag,
																				Si

	Relinquished by: (Signature)	(Print Name)	Received by: (Signature)	(Print Name)	Date/Time
1	[signature]	Chris Courtney			
2		Fedex	Carey Cole	Carey Cole	5/12/05 1120
3					

White copy to TGI, Yellow copy for final report, Pink copy to sampler

Revised: 7/21/2004

February 5, 2007

Ms. Jennifer Pyne
URS Corporation
7720 N 16th Street, Suite 100
Phoenix, AZ 85020

Re: Final Well Impact Report – Revision No. 2
Desert Rock Energy Project, Four Corners Area, New Mexico
Miller Brooks Project Number 684-0001-0003

Dear Ms. Pyne:

Miller Brooks Environmental, Inc. (Miller Brooks) has prepared this letter report on behalf of Sithe Global Power, LLC (Sithe) for the proposed Desert Rock Power Plant located in the Four Corners Area, New Mexico (see Figure 1). This report is based upon a previous study conducted by URS Corporation (URS) in 2005 (URS, 2005) and a revised study conducted by Miller Brooks in 2006 (Miller Brooks, 2006). This report was prepared to incorporate additional revisions to the groundwater model requested by the U.S. Environmental Protection Agency (EPA) in a letter to URS dated November 16, 2006 (EPA, 2006) and comments made during a meeting held in Farmington, New Mexico on November 29, 2006. This report presents the model input revisions and resulting drawdown impacts related to those comments. The project background, hydrogeology, and aquifer characteristics used in this modeling study can be found in the previous well impact report (Miller Brooks 2006).

New tables and figures prepared by Miller Brooks and contained within this report include the following:

Table 1	Groundwater Modeling Input Data
Figure 1	North Well Field 20-Year Impact
Figure 2	North Well Field 40-Year Impact
Figure 3	South Well Field 20-Year Impact
Figure 4	South Well Field 40-Year Impact
Figure 5	Both Well Fields 20-Year Impact
Figure 6	Both Well Fields 40-Year Impact

Model Assumptions

The groundwater model code selected for this study is the U.S. Geological Survey's MODFLOW-96 (Harbaugh and McDonald, 1996), with the advanced graphical interface Groundwater Vistas® (Rumbaugh and Rumbaugh, 1996), which is consistent with the original model (URS 2005) and the first revision (Miller Brooks 2006). The

MODFLOW-96 code is widely accepted in the hydrogeologic professional community as a valid numerical model to simulate groundwater flow in three dimensions. The graphical interface Groundwater Vistas® was used to generate the drawdown impact contours included in this report. To provide a more accurate simulation of subsurface geology, Miller Brooks utilized the computer program Surfer® (Version 8.0) to digitize and import the bottom elevations of Model Layers 1, 2 and 3. Figure 1 provides a model boundary map.

The following summarizes the input parameters used in this modeling study. Table 1 provides details on the model input parameters for the original, first and second (current) revisions.

1.) The model domain area was increased from 384 square miles to 784 square miles to mitigate boundary on the drawdown contours and to incorporate the requested 10-foot drawdown contour.

2.) The model was expanded two miles in both north and south directions and six miles in both east and west directions (see Figure 1).

3.) The total model grid was increased from 300 columns, 322 rows, and 289,800 model cells to a total of 374 columns, 436 rows and 489,192 model calculation cells. The maximum and minimum grid spacing remained unchanged and ranged from 247.5 by 165 feet in the simulated well field area to 990 by 660 feet at the model boundaries.

4.) The bottom of Layer 1 was recontoured as a variable thickness unit, to extend the layer to the new model boundaries. Layer 1 (the upper model layer) represents the Mancos Shale and all other geologic units above it. Layer 1 was modeled as a semi-confined layer, unchanged from the previous model revision (Miller Brooks, 2006).

5.) The bottom of Layer 2 was recontoured using Surfer®. Layer 2 represents the Dakota Sandstone, which lies above the Morrison Formation in the model domain area. Layer 2 remained a uniform thickness of 200 feet, consistent with the previous model revision (Miller Brooks, 2006).

6.) The previous model revision (Miller Brooks, 2006) set a uniform thickness of 1,000 feet for the Morrison Formation (Layer 3) variable elevation (based upon the contour map) (Miller Brooks, 2006). Per EPA's request (EPA 2006), Miller Brooks reduced Layer 3 to a uniform thickness of 600 feet. The bottom elevation of Layer 3 was recontoured by taking the approximate depth to the top of the Morrison Formation and adding it to the revised approximate thickness of the Morrison Formation in the model domain area, to derive a variable bottom elevation that would also extend to the new model boundaries. *Note: Layer 3 (the bottom model layer) represents the Morrison Formation (the target water-bearing unit for this study). The Morrison Formation lies beneath the Mancos Shale and the Dakota Sandstone and ranges in thickness in the model domain area from 950 to 1,050 feet.*

7.) Model Layer 1 – The hydraulic conductivity (K) and horizontal-to-vertical conductivity ratio (K_h/K_v) of 0.0567 feet per day (ft/day) and 10:1 were unchanged from the previous model (Miller Brooks, 2006).

8.) Model Layer 2 – The K value remained unchanged at 0.3225 ft/day, but the K_h/K_v ratio was changed from 2:1 to 10:1 based upon our reevaluation of published values for a medium- to fine-grained sandstone (Spitz and Moreno, 1996) and comments provided by EPA (EPA, 2006).

9.) Model Layer 3 – The distinct K "zones" 0.075 and 0.175 ft/day remained unchanged from the previous model and were input into the model to extend to the new model boundaries. The K values were obtained by taking the median thickness of the Morrison Formation (1,000 feet) and dividing it by the median transmissivity (T) values in the model domain area (75 ft^2/day and 125 ft^2/day). The K_h/K_v ratio was changed from a 10:1 to a 2:1 ratio based upon our reevaluation of published values for a medium- to fine-grained sandstone (Spitz and Moreno, 1996) and comments provided by EPA (EPA, 2006).

10.) The storage coefficient for all Model Layers was set at 0.00011 (unitless). This value represents the median published values from nine wells tested in the Morrison Aquifer (Dam, et al., 1990) and is unchanged from the previous model revisions (Miller Brooks, 2006).

11.) The specific yield (Sy) for Model Layers 1, 2 and 3 was set at 0.03, 0.15, and 0.15 (unitless), respectively. The Sy value from the previous model revision (Miller Brooks, 2006) was unchanged for Model Layer 1. The Sy value for Model Layers 2 and 3 was changed from 0.24 to 0.15 (unitless) based on more conservative estimates and comments provided by EPA (EPA, 2006).

12.) The two well fields consisting of ten equally spaced pumping wells (identified as Proponent's Preferred Alternative Water Well Field B, "Location 1" and "Location 2") (see Figure 1) remained unchanged from the previous model revision. Well spacing was unchanged at 1/4 mile.

13.) The simulated wells remained screened entirely and exclusively in the Morrison Formation (Model Layer 3). Based upon the revised thickness of Layer 3 per EPA comments (EPA, 2006), the total screened interval in each pumping well was changes from 1,000 feet (Miller Brooks, 2006) to 600 feet.

14.) Each simulated well pumps at a continuous rate of 442,080 gallons per day (gpd), or 307 gallons per minute (gpm), for a period of 14,600 consecutive days, or 40 years. This equals the total annualized project demand of 4,950 af/yr (Sithe, 2005), or 3,070 gpm. This rate remains unchanged from the previous model (Miller Brooks, 2006). Each well field ("Location 1" and "Location 2") was run independently in the previous model to evaluate the impact at both locations separately. The same two runs were conducted in this revision in addition to a third run in which all 20 wells at both well fields were pumped at half the total rate (153.5 gpm) of a single well field configuration, resulting in the total demand of 3,070 gpm.

15.) A specified head boundary was set along the northern and southern model boundaries according to the potentiometric surface contour map compiled for the Morrison Aquifer. This remains unchanged from the previous model (Miller Brooks, 2006), with the exception that Miller Brooks had to extrapolate the constant head boundaries in all directions to accommodate the extended model boundaries (based upon the potentiometric surface map) (Miller Brooks, 2006).

16.) No boundaries were set along the western and eastern model boundaries to allow the model to create its own east-west flow gradient. This remains unchanged from the previous model revision (Miller Brooks, 2006).

17.) No recharge is simulated from perennial flow along the reach of the Chaco River due to a lack of stream flow gauge data. This remains unchanged from the previous model revision (Miller Brooks, 2006).

Model Predictions

Drawdown predictions following 20 years and 40 years of continuous pumping are graphically presented in Figures 1 through 6 for the South well field "Location 2", North well field "Location 1", and the dual North and South well field configuration. The drawdown predictions are as follows:

Proponent's Preferred Alternative Water Well Field B, North Well Field "Location 2"

Based upon the input assumptions presented herein, the maximum cumulative 20-year and 40-year impact resulting from the annual projected withdrawal of 4,950 af/yr, or 3,070 gpm, for "Location 2" is predicted to be 1,885 and 2,010 feet, respectively (see Figures 1 and 2). The maximum drawdown predicted occurs at the center of the simulated pumping wells and decreases with distance from the well centers. The model-predicted, 10-foot impact radius extends approximately 7.2 and 9.8 miles for the 20- and 40-year predictions, respectively, from the center of the simulated well field (see Figures 1 and 2). According to available well set data, there are no water production wells located within the model-predicted, 10-foot drawdown contour for either the 20- or 40-year predictions. Please note that the model-predicted drawdown presented in Figures 1 and 2 represents the decline in the potentiometric surface relative from the land surface.

Proponent's Preferred Alternative Water Well Field B, South Well Field "Location 1"

Based upon the input assumptions presented herein, the maximum cumulative 20-year and 40-year impact resulting from the annual projected withdrawal of 4,950 af/yr, or 3,070 gpm, for "Location 1" is predicted to be 1,920 and 2,020 feet, respectively (see Figures 3 and 4). The maximum drawdown predicted occurs at the center of the simulated pumping wells and decreases with distance from the well centers. The model-predicted, 10-foot impact radius extends approximately 7.5 and 10.1 miles, respectively, from the center of the simulated well field (see Figures 3 and 4). According to available well set data, there are no water production wells located within the model-predicted, 10-foot drawdown contour for either the 20- or 40-year predictions. The 40-year predicted, 10-foot drawdown contour overlaps two monitoring wells (wells 71 and 72; see Figure 4) registered with the New Mexico Office of the State Engineer. According to its well records, these are oil/gas test wells, not water production wells. The model-predicted drawdown presented in Figures 3 and 4 represents the decline in the potentiometric surface, relative from the land surface.

Proponent's Preferred Alternative Water Well Field B, Both Well Fields "Location 1" and "Location 2"

Based upon the input assumptions presented herein, the maximum cumulative 20-year and 40-year impact resulting from the annual projected withdrawal of 4,950 af/yr, or 3,070 gpm, for "Location 2" is predicted to be 960 and 1,020 feet, respectively (see Figures 5 and 6). The maximum drawdown predicted occurs at the center of the simulated pumping wells and decreases with distance from the well centers. The model-predicted, 10-foot impact radius extends approximately 7.0 miles from "Location 1" and 6.0 miles from "Location 2" after 20 years, and 8.0 miles from "Location 1" and 9.0 miles from "Location 2" after 40 years from the center of the simulated well fields (see Figures 5 and 6). According to available well set data, there are no water production wells located within the model-predicted, 10-foot drawdown contour for either the 20- or 40-year predictions. Please note that the model-predicted drawdown presented in Figures 5 and 6 represents the decline in the potentiometric surface relative from the land surface.

Conclusions

Our conclusions from this revised well impact study are as follows:

- Given the assumptions presented herein, our revised modeling analyses predicts a maximum decline in potentiometric surface of 2,020 feet (at Well Field B, "Location 2", see Figure 4) after 40 years of continuous pumping at the Desert Rock Power Plant's estimated demand requirements (4,950 af/yr, or 3,070 gpm). Because groundwater generally occurs under confined conditions within the study area (Dam, et. al, 1990), resulting in artesian flow from wells, and the depth to the Morrison Formation is approximately 4,500 feet in both of the modeled well field areas (Well Field B, "Location 1" and "Location 2"), a decline in potentiometric surface of 2,020 feet below ground surface is unlikely to de-water the Morrison Formation. Assuming the modeling simulations are representative of actual subsurface conditions, the results of this revised modeling analysis tends to suggest that sufficient local groundwater resources are available from the Morrison Aquifer (at the modeled locations) to meet the projected withdrawal demands for the proposed Desert Rock Power Plant for the next 40 years.

- This revised model, consistent with the previous version (Miller Brooks, 2006), incorporates conservative aquifer parameters, thus representing what we believe should represent a worst-case scenario. It also incorporates and addresses comments on the previous model revision by EPA (EPA, 2006). This revised model predicts that there should be no loss greater than 10 feet in the potentiometric surface to existing water production wells in the study area after 40 years of continuous pumping from either one or both of the simulated well fields at the Desert Rock Power Plant's estimated demand requirements (4,950 af/yr or 3,070 gpm) (see Figures 1 through 6).

Recommendations

Based upon the results of this revised well impact study, Miller Brooks makes the following recommendations:

1. Miller Brooks recommends incorporating geologic and hydrogeologic data (as applicable) from the new test wells currently being drilled at the project site into the revised model to better access drawdown impacts.

2. In addition to modifying aquifer parameters, wells may be added, removed, repositioned, or modified (i.e., pump rates, screen interval, etc.) in the model to assist the selected contractor with optimal well placements. This will help mitigate drawdown impacts associated with the new wells. Predictions from the revised model would be more indicative of potentiometric surface drawdown of the Morrison Aquifer than the previous modeling analyses have suggested.

References

Dam, W. L., Kernodle, J. M., Leavings, G. W., and Craig, S. D., 1990, Hydrogeology of the Morrison Formation in the San Juan Structural Basin, New Mexico, Colorado, Arizona, and Utah; U.S. Geological Survey Water Resources Hydrologic Investigations Atlas HA-720-J, Sheets 1 and 2.

Harbaugh, A. W. and McDonald, M.G., 1996, Users Documentation for MODFLOW-96 and Update to the U.S. Geological Survey Modular Finite Difference Ground-water Flow Model; Open File Report 96-485.

Miller Brooks Environmental, Inc., 2006, Final Well Impact Report; Desert Rock Energy Project, Four Corners Area, New Mexico, Prepared for Sithe Global Power, LLC, October 5, 2006.

Rumbaugh, J. and D. Rumbaugh, 1996. Guide to using Ground Water Vistas; 209 p.

Spitz, K. and Moreno, J., 1996, A Practical Guide to Groundwater and Solute Transport Modeling; John Wiley & Sons, New York.

URS Corporation, 2005, Final Well Impact Report, Desert Rock Energy Project, Four Corners Area, New Mexico, September 23, 2005.

U.S. Environmental Protection Agency, 2006, EPA Comments on the Desert Rock Energy Project PDEIS, 11/13/06

Please feel free to contact myself or Stephen Flora at 602-728-0577 with any questions or concerns regarding this report.

Sincerely,

Chris Courtney, RG
Associate Hydrogeologist

Stephen Flora, GIT
Project Hydrogeologist

Attachments
- Table 1 – Groundwater Modeling Input Data
- Figure 1 – North Well Field – 20 Year Impact
- Figure 2 – North Well Field – 40 Year Impact
- Figure 3 – South Well Field – 20 Year Impact
- Figure 4 – South Well Field – 40 Year Impact
- Figure 5 – Both Well Fields – 20 Year Impact
- Figure 6 – Both Well Fields – 40 Year Impact

cc: MBE Project Number 684-0001-0003

Table 1
Groundwater Modeling Input Data
Desert Rock Energy Project, New Mexico

Current Revision Model Input

Layers	Geologic Unit	Thickness (ft)	Notes	K (ft/day)	Kh/KV ratio	Storage coeff.	SY (I)
1	Mancos Shale	variable	Leaky upper aquitard	0.0567	10 to 1	0.00011	0.03
2	Dakota Sandstone	200	aquifer	0.3225	10 to 1	0.00011	0.15
3	Sandstone (Morrison Fm)	600	aquifer	K1 = 0.075, K2 = 0.125	10 to 1	0.00011	0.15

# Wells	Pump Rate (gpm)	Time pumping (days)	Well Spacing	Screen Interval	Model Run
10 north well field	**307/well 3070 total**	7,300/14,600	1/4 mile	All of layer 3 600 feet	1
10 south well field	**307/well 3070 total**	7,300/14,600	1/4 mile	All of layer 3 600 feet	2
20 (10 each well field)	**153.5/well 3070 total**	7,300/14,600	1/4 mile	All of layer 3 600 feet	3

Head Boundary (type)	Hydrualic gradient
Specified Head	0.0041 ft/ft

Model area	# columns	# rows	# cells	min cell size	max cell size
28x28 miles	374	436	163,064 per layer	247.5 x 165 ft	990 x 660 ft
784 square miles			489,192 total		

First Revision Model Input (Miller Brooks 2006)

Layer	Geologic Unit	Thickness (ft)	Notes	K (ft/day)	Kh/KV ratio	Storage coeff.	SY (I)
1	Mancos Shale	variable	Leaky upper aquitard	0.0567	10 to 1	0.00011	0.03
2	Dakota Sandstone	200	aquifer	0.3225	2 to 1	0.00011	0.24
3	Sandstone (Morrison Fm)	1000	aquifer	K1 = 0.075, K2 = 0.125	2 to 1	0.00011	0.24

# Wells	Pump Rate (gpm)	Time pumping (days)	Well Spacing	Screen Interval
10	307	7300 (stress period 1)	1/4 mile	All of layer 3
	total = 3070	14600 (stress period 2)		1000 feet

Head Boundary (type)	gradient
Specified Head	0.0048 ft/ft

Model area	# columns	# rows	# cells	min cell size	max cell size
24x16 miles	300	322	96600 per layer	247.5 x 165 ft	990 x 660 ft

Original Model Input (URS 2005)

Layer	Geologic Unit	Thickness (ft)	Notes	K (ft/day)	Kh/KV ratio	Storage coeff.	SY (I)
1	Mancos Shale	650	Leaky upper aquitard	0.0567	10 to 1	0.00011	0.03
2	Sandstone (Morrison Fm)	1000	aquifer	0.2	10 to 1	0.00011	0.2

# Wells	Pump Rate (gpm)	Time pumping (days)	Well Spacing	Screen Interval
10	307	14600	1/4 mile	All of layer 2

Head Boundary (type)	gradient
Specified Head	0.0038 ft/ft

Model area	# columns	# rows	# cells	min cell size	max cell size
12X12 miles	280	279	78120	100 X 100 feet	500 X 500 ft

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LEGEND

Rivers/Streams

Roads

Elevation Contours

Contour Interval = 500 feet

50 Drawdown Contour
CI = 5ft. (from 10ft.to 50ft.)
CI = 50ft. (from 100ft.
to maximum)

0 2.5 5
miles

WELL LOCATIONS

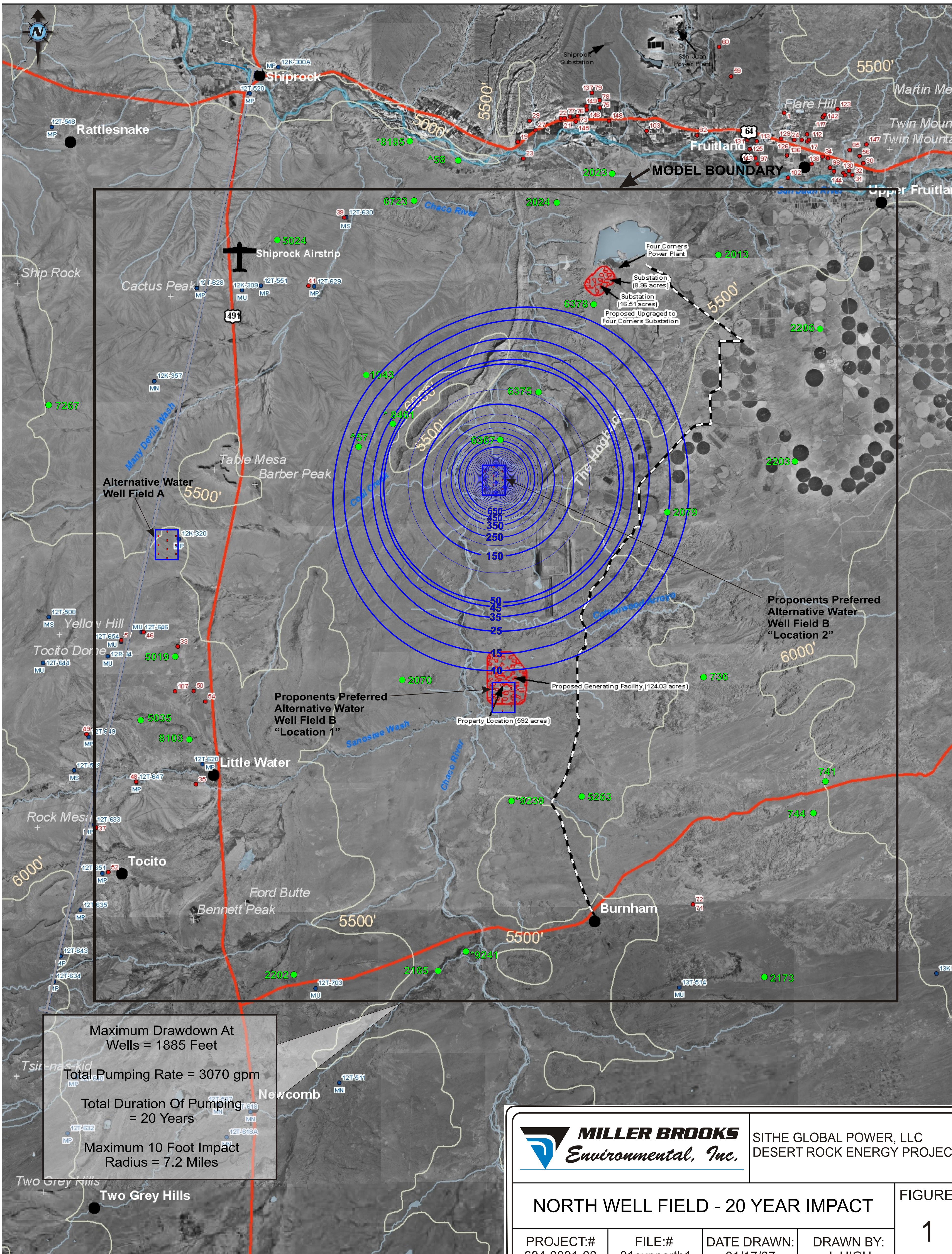
33 New Mexico Office of the State Engineer Registered Well Location

12K-320 Navajo Nation Department of Water Resources Registered Well Location

2013 U.S. Department of Interior Oil/Gas Test Well ID # 14-20-603-XXXX
* Indicates ID# I-149-Ind-XXXX
^ Indicates ID# I-89-Ind-XXXX

Data Source:
Navajo Nation Department of Water Resources, 2005.
New Mexico Office of the State Engineer, 2003.
New Mexico Resource Geographic Information System (RGIS), 1988.
Black & Veatch, 2003
Zia TSW LLC/Red Valley Survey.
BPH_Bilition, 2005.,EcoSphere, 2005.
Bureau of Land Management.,ESRI Data.
New Mexico Energy, Minerals, and Natural Resources Department (EMNRD) OCD Image Database, 2006.

Note: Input Data used with MODFOW-96 (Harbaugh and McDonald, 1996) and Groundwater Vistas (Rumbaugh 1996).



MILLER BROOKS Environmental, Inc.

SITHE GLOBAL POWER, LLC
DESERT ROCK ENERGY PROJECT

NORTH WELL FIELD - 20 YEAR IMPACT				FIGURE 1
PROJECT:# 684-0001-03	FILE:# 01expnorth1	DATE DRAWN: 01/17/07	DRAWN BY: J. HIGH	

SITHE GLOBAL POWER, LLC - DESERT ROCK ENERGY PROJECT

LEGEND

- Rivers/Streams
- Roads
- Elevation Contours
  Contour Interval = 500 feet
- 50 Drawdown Contour
  CI = 5ft. (from 10ft. To 50ft.)
  CI = 50ft. (from 100ft.
  to maximum).

0 2.5 5
miles

WELL LOCATIONS

- 33 New Mexico Office of the State Engineer Registered Well Location
- 12K-320 Navajo Nation Department of Water Resources Registered Well Location
- 2013 U.S. Department of Interior Oil/Gas Test Well
  ID # 14-20-603-XXXX
  * Indicates ID# I-149-Ind-XXXX
  ^ Indicates ID# I-89-Ind-XXXX

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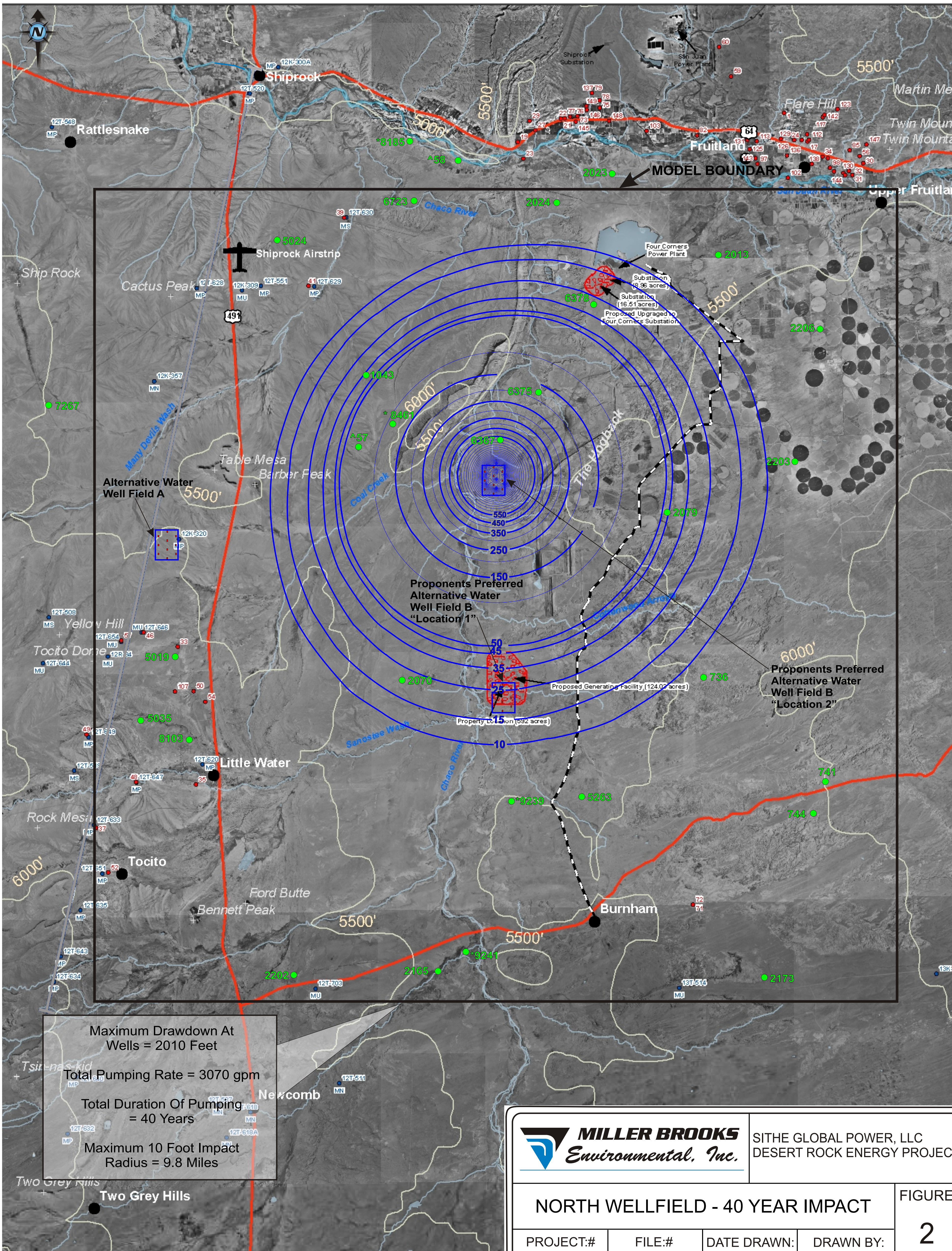
BPH_Bilition, 2005.,EcoSphere, 2005.
Bureau of Land Management.,ESRI Data.
New Mexico Energy, Minerals, and Natural Resources
Department (EMNRD) OCD Image Database, 2006.

Note: Input Data used with MODFOW-96 (Harbaugh and McDonald, 1996) and Groundwater Vistas (Rumbaugh 1996).



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DESERT ROCK ENERGY PROJECT

NORTH WELLFIELD - 40 YEAR IMPACT				FIGURE 2
PROJECT:# 684-0001-03	FILE:# 01expnorth2	DATE DRAWN: 01/17/07	DRAWN BY: J. HIGH	

SITHE GLOBAL POWER, LLC - DESERT ROCK ENERGY PROJECT

LEGEND

- Rivers/Streams
- Roads
- Elevation Contours
  Contour Interval = 500 feet
- 50 Drawdown Contour
  CI = 5ft. (from 10ft. to 50ft.)
  CI = 50ft. (from 100ft. to maximum).

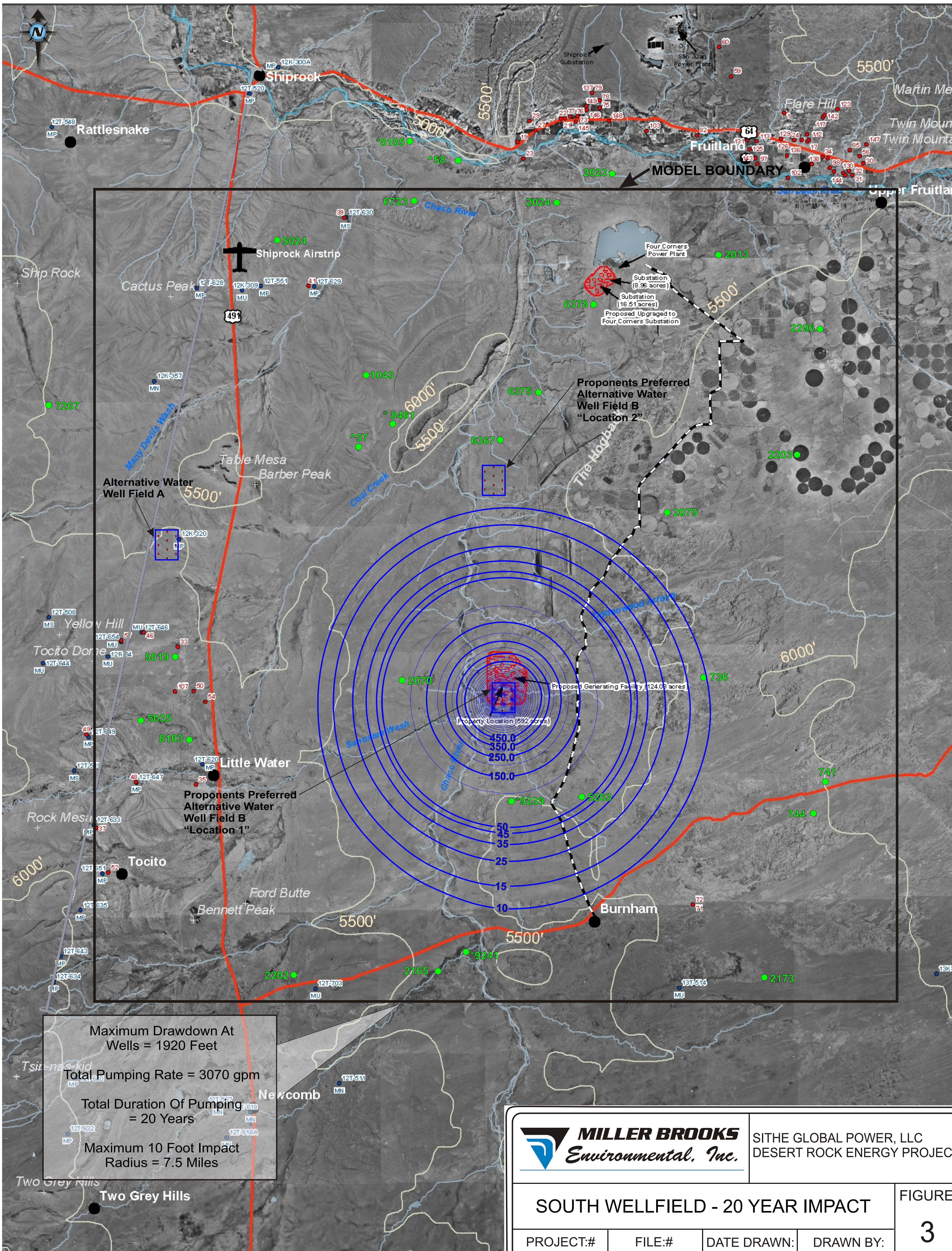
0 2.5 5
miles

WELL LOCATIONS

- 33 New Mexico Office of the State Engineer Registered Well Location
- 12K-320 Navajo Nation Department of Water Resources Registered Well Location
- 2013 U.S. Department of Interior Oil/Gas Test Well ID # 14-20-603-XXXX
  * Indicates ID# I-149-Ind-XXXX
  ^ Indicates ID# I-89-Ind-XXXX

Data Source:
Navajo Nation Department of Water Resources, 2005.
New Mexico Office of the State Engineer, 2003.
New Mexico Resource Geographic Information System (RGIS), 1988.
Black & Veatch, 2003
Zia TSW LLC/Red Valley Survey.
BPH_Bilition, 2005.,EcoSphere, 2005.
Bureau of Land Management.,ESRI Data.
New Mexico Energy, Minerals, and Natural Resources Department (EMNRD) OCD Image Database, 2006.

Note: Input Data used with MODFOW-96 (Harbaugh and McDonald, 1996) and Groundwater Vistas (Rumbaugh 1996).



MILLER BROOKS Environmental, Inc.

SITHE GLOBAL POWER, LLC
DESERT ROCK ENERGY PROJECT

SOUTH WELLFIELD - 20 YEAR IMPACT

FIGURE 3

PROJECT:#	FILE:#	DATE DRAWN:	DRAWN BY:
684-0001-03	01expnorth1a	10/17/07	J. HIGH

SITHE GLOBAL POWER, LLC - DESERT ROCK ENERGY PROJECT

LEGEND

- Rivers/Streams
- Roads
- Elevation Contours
  Contour Interval = 500 feet
- 50 Drawdown Contour
  CI = 5ft. (from 5ft. to 50ft.)
  CI = 50ft. (from 100ft.
  to maximum)

0 2.5 5
miles

WELL LOCATIONS

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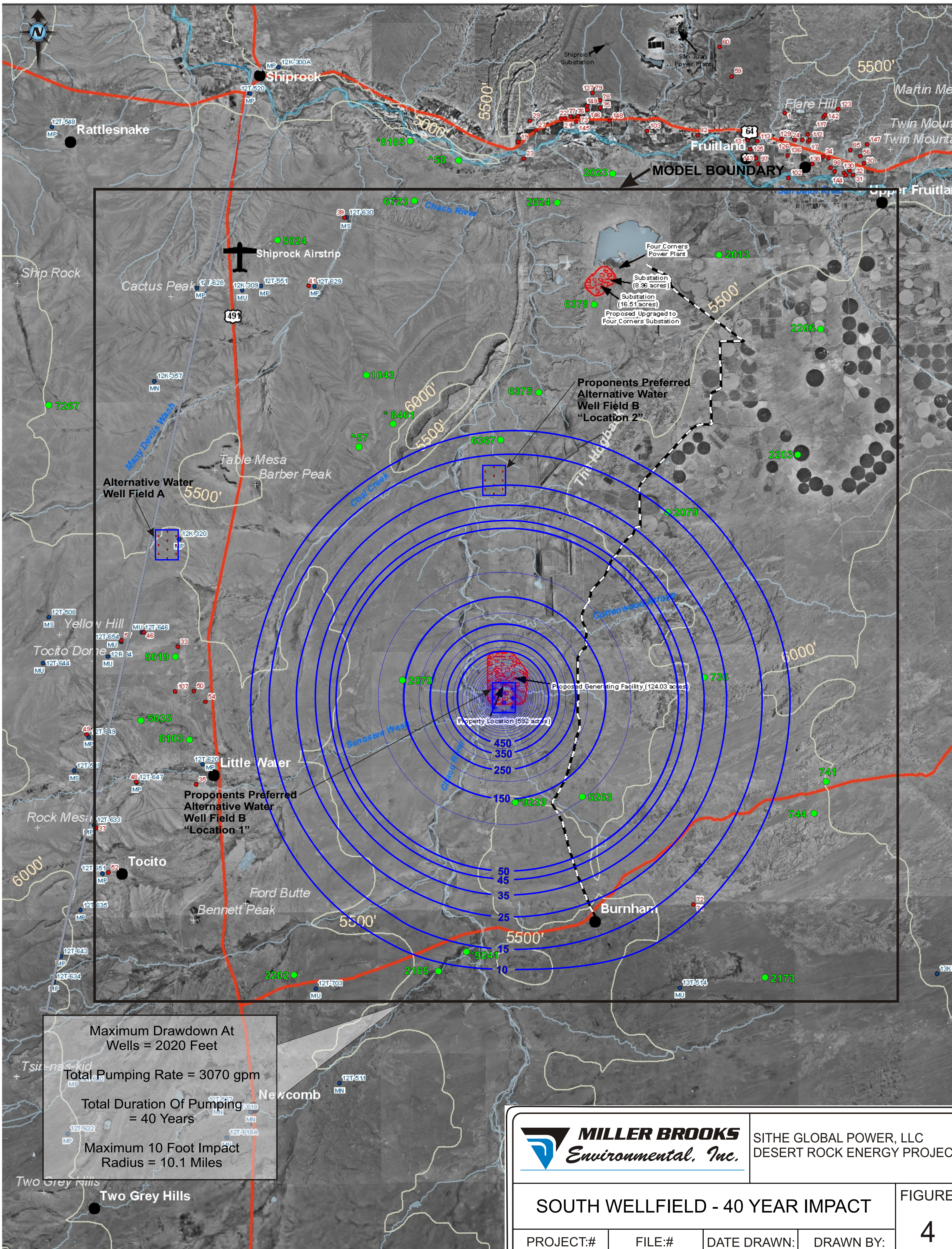
New Mexico Office of the State Engineer, 2003.
New Mexico Resource Geographic Information System (RGIS), 1988.
Black & Veatch, 2003
Zia TSW LLC/Red Valley Survey.
BPH_Bilition, 2005.,EcoSphere, 2005.
Bureau of Land Management.,ESRI Data.
New Mexico Energy, Minerals, and Natural Resources Department (EMNRD) OCD Image Database, 2006.

Note: Input Data used with MODFOW-96 (Harbaugh and McDonald, 1996) and Groundwater Vistas (Rumbaugh 1996).



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SITHE GLOBAL POWER, LLC
DESERT ROCK ENERGY PROJECT

SOUTH WELLFIELD - 40 YEAR IMPACT

FIGURE 4

PROJECT:#	FILE:#	DATE DRAWN:	DRAWN BY:
684-0001-03	01expnorth2a	01/17/07	J. HIGH

SITHE GLOBAL POWER, LLC - DESERT ROCK ENERGY PROJECT

LEGEND

- Rivers/Streams
- Roads
- Elevation Contours
  Contour Interval = 500 feet
- 50 Drawdown Contour
  CI = 5ft. (from 10ft.to 50ft.)
  CI = 50ft. (from 100ft.
  to maximum)

0 2.5 5
miles

WELL LOCATIONS

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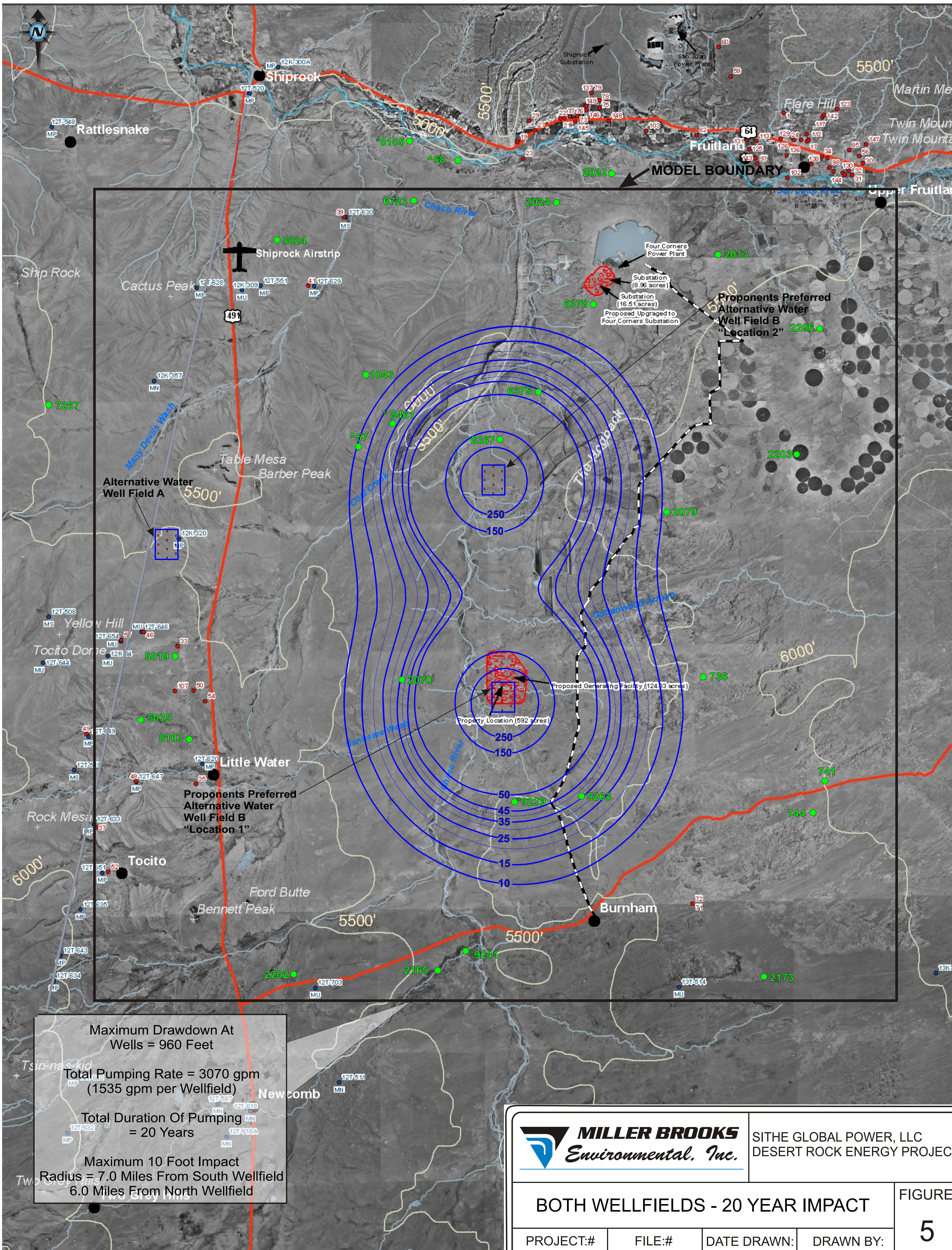
BPH_Bilition, 2005.,EcoSphere, 2005.
Bureau of Land Management.,ESRI Data.
New Mexico Energy, Minerals, and Natural Resources
Department (EMNRD) OCD Image Database, 2006.

Note: Input Data used with MODFOW-96 (Harbaugh and McDonald, 1996) and Groundwater Vistas (Rumbaugh 1996).



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SITHE GLOBAL POWER, LLC
DESERT ROCK ENERGY PROJECT

BOTH WELLFIELDS - 20 YEAR IMPACT

FIGURE 5

PROJECT:#	FILE:#	DATE DRAWN:	DRAWN BY:
684-0001-03	01expboth1	01/17/07	J. HIGH

SITHE GLOBAL POWER, LLC - DESERT ROCK ENERGY PROJECT

LEGEND

- Rivers/Streams
- Roads
- Elevation Contours
  Contour Interval = 500 feet
- Drawdown Contour
  CI = 5ft. (from 10ft.to 50ft.)
  CI = 50ft. (from 100ft.
  to maximum)

0 2.5 5
miles

WELL LOCATIONS

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  ID # 14-20-603-XXXX
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BPH_Bilition, 2005.,EcoSphere, 2005.
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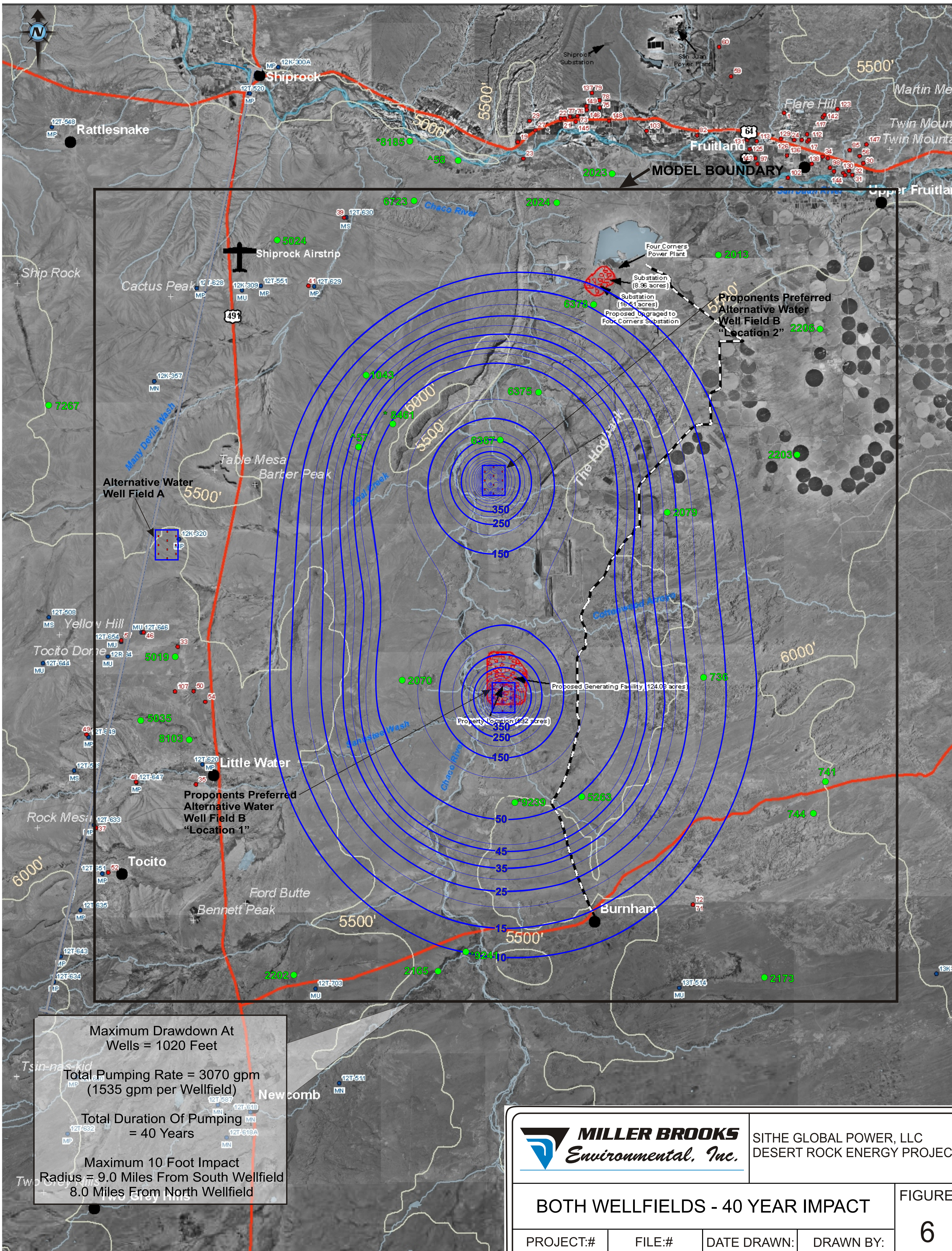
New Mexico Energy, Minerals, and Natural Resources Department (EMNRD) OCD Image Database, 2006.

Note: Input Data used with MODFOW-96 (Harbaugh and McDonald, 1996) and Groundwater Vistas (Rumbaugh 1996).



MILLER BROOKS Environmental, Inc.

SITHE GLOBAL POWER, LLC
DESERT ROCK ENERGY PROJECT

BOTH WELLFIELDS - 40 YEAR IMPACT				FIGURE 6
PROJECT:# 684-0001-03	FILE:# 01expboth2	DATE DRAWN: 01/17/07	DRAWN BY: J. HIGH	

January 30, 2007

Ms. Jennifer Pyne
URS Corporation
7720 N 16th Street, Suite 100
Phoenix, AZ 85020

Re: Water Quality Comparison Report – A Comparison of 2006 Burnham Chapter Water Well Data to Historical Morrison Formation Water Well Data
Desert Rock Energy Project, New Mexico

Miller Brooks Environmental, Inc. Project #0684-0001-0001

Dear Ms. Pyne:

Miller Brooks Environmental, Inc. (Miller Brooks) has prepared this report for URS Corporation (URS), per Sub-Task 5 of "Work Order No. 2" from URS dated August 31, 2006. This report presents the analytical results for water samples collected by Ecosphere Environmental Services (Ecosphere) in Farmington, New Mexico on November 1st, 7th, and 22nd, 2006 at six artesian wells located on Burnham Chapter land adjacent to the proposed Desert Rock Power Plant in the Four Corners Area, New Mexico. This report also compares that data to historical water quality data from samples collected in wells reported to have historically withdrawn groundwater from the Morrison Formation located in the Upper San Juan Basin (Dam et. al, 1990) in the vicinity of the Desert Rock project site (the study area).

PROJECT BACKGROUND

The study area (see Figure 1) is located in the northwestern portion of New Mexico, southeast of Shiprock and due south of Farmington. The proposed water supply for the Desert Rock Power Plant is from new production wells proposed for future construction. The proposed wells will be designed to withdraw groundwater exclusively from the Morrison Formation to mitigate drawdown in Navajo Nation water supply wells and seeps and springs which derive most, if not all, of their water supply for an upper confined aquifer (above the Morrison Formation). The locations of the six artesian wells sampled by Ecosphere used for comparison in this report are shown on Figure 1. Site descriptions, GPS locations and Ecosphere's field notes are included in Appendix 1.

The purpose of this report is to compare water chemistry from the six artesian wells sampled by Ecosphere to historical groundwater chemistry from samples collected in wells reported to have produced water from the Morrison Formation. The comparison is intended to draw a similarity or dissimilarity in the two water sources with respect to their geochemical "footprints." Although not part of this evaluation, the "footprint" could be evaluated to determine the degree of hydrologic "connectivity" between seeps- and springs-derived water and Morrison Formation-derived water. This information could be helpful in relating drawdown at the proposed well field(s) for the proposed Desert Rock Power Plant as it relates to potential drawdown of artesian wells in the study area.

Since there are few documented wells constructed and currently producing groundwater exclusively from the Morrison Formation in the study area (Miller Brooks, 2006), this report compares the artesian well data to historical water quality data for groundwater samples collected in wells reported to have withdrawn groundwater from the Morrison Formation (Dam, et. al, 1990). The historical data are a compilation of wells sampled between 1948 and 1986 (Dam, et. al, 1990) located within and outside of the study area but within the same geologic province (the Upper San Juan Basin). Due to a lack of well construction records, we cannot conclusively confirm if the Morrison Formation well data set used in this report represents groundwater produced exclusively from the Morrison Formation.

WATER QUALITY RESULTS

The water quality data presented in the report are discussed in the following four sections:

- General Chemistry
- Major Anions
- Major Cations
- Other Metals

For ease of reference, samples colleted by Ecosphere on November 1st, 7th, and 22nd, 2006 from the six artesian wells (Figure 1) will be referred tot as the "artesian wells." Samples collected from wells completed in the Morrison Formation (Dam, et. al., 1990) will be referred to as the "'Morrison Formation wells." Table 1 provides a summary of the water quality data referenced in this report. The laboratory analytical reports from Green Analytical Laboratories, Inc. for the six artesian wells sampled are included as Appendix 2.

This report compares the median values of concentrations (for the selected constituents) of the Morrison Formation well data set to the average values of the artesian well data set, presented in Table 1 as a "coefficient of variation" (in percent). In addition, we have prepared stiff plots of each artesian well sampled (Figure 2) and a comparative stiff plot using the median concentrations from the Morrison Formation well data set (Figure 3) and the average values from the artesian well data set. These stiff plots are intended to graphically demonstrate the similarity or dissimilarity in geochemistry of the two water sources.

General Chemistry

Specific Conductance (SC) and Total Dissolved Solids (TDS):

The average concentration of SC and TDS from the artesian wells sampled is 3,558 microsiemens per centimeter (μs/cm) and 2,489 milligrams per liter (mg/L), respectively (Table 1). The median concentration of SC and TDS from the Morrison Formation wells is 876 μs/cm and 614 mg/L, respectively. The calculated coefficient of variation in SC and TDS from the two water sources is 86 and 85 percent, respectively. The highest SC and TDS concentrations from the artesian wells sampled were at "well 01," with a concentration of 7,510 μs/cm and 6,100 mg/L, respectively.

Fluoride:

The average concentration of Fluoride from the artesian wells sampled is 2.07 mg/L (Table 1). The median concentration of Fluoride from the Morrison wells is 0.6 mg/L (Table 1). The calculated coefficient of variation in Fluoride from the two water sources is 78 percent.

Nitrate:

The average concentration of Nitrate from the artesian wells sampled is 0.78 mg/L. The median concentration of Nitrate from the Morrison wells is 0.4 mg/L (Table 1). The calculated coefficient of variation in Nitrate from the two water sources is 45 percent.

pH:

The average pH value from the artesian wells sampled is 8.21 (Table 1). The median pH value from the Morrison wells is 8.2 (Table 1). The calculated coefficient of variation in pH from the two water sources is less than one percent.

General Chemistry Summary

The two water sources have an average coefficient of variation for the general chemistry constituents presented of 59 percent (Table 1). The high discrepancy in the coefficient of variation for SC, TDS and nitrate would suggest that the two water sources have different geochemical "footprints" with regard to the general chemistry constituents presented in this report.

Major Anions

Alkalinity:

The average concentration for Alkalinity ($CaCO_3$) from the artesian wells sampled is 335 mg/L. The median concentration for Alkalinity from the Morrison wells is 200 mg/L (Table 1). The calculated coefficient of variation in Alkalinity from the two water sources is 36 percent.

Sulfate:

The average concentration for Sulfate from the artesian wells sampled is 1,498 mg/L. The median concentration for Sulfate from the Morrison wells is 160 mg/L (Table 1). The calculated coefficient of variation in Sulfate from the two water sources is 114 percent. The highest Sulfate concentration from the artesian wells sampled is at "well 01," with a concentration of 3,900 mg/L.

Chloride:

The average concentration for Chloride from the artesian wells sampled is 56 mg/L. The median concentration for Chloride from the Morrison wells is 8.9 mg/L (Table 1). The calculated coefficient of variation in Chloride from the two water sources is 103 percent.

Major Anion Summary

The two water sources have an average coefficient of variation for the major anions presented of 84 percent (Table 1). The two water sources have a relatively low coefficient of variation for Alkalinity but a much higher coefficient of variation for Sulfate and Chloride. The major anion results indicate that the Morrison wells are Carbonate-dominated waters (due to high Alkalinity ($CaCO_3$) concentrations, with lesser concentrations of Sulfate and Chloride), while the artesian wells are Sulfate-dominated waters (with higher Sulfate concentrations, as described above). This would suggest that the two water sources have different geochemical "footprints" with regard to the major anions presented in this report.

Major Cations

Sodium:

The average concentration of Sodium from the artesian wells sampled is 659 mg/L. The median concentration for Sodium from the Morrison wells is 140 mg/L (Table 1). The calculated coefficient of variation in Sodium from the two water sources is 92 percent.

Calcium:

The average concentration of Calcium from the artesian wells sampled is 99 mg/L. The median concentration of Calcium from the Morrison wells is 14 mg/L (Table 1). The calculated coefficient of variation in Calcium from the two water sources is 106 percent.

Magnesium:

The average concentration of Magnesium from the artesian wells sampled is less than 15 mg/L. The median concentration of Magnesium from the Morrison wells is 3.7 mg/L (Table 1). The coefficient of variation in Magnesium from the two water sources is 85 percent.

Potassium:

The average concentration of Potassium from the artesian wells sampled is 3.92 mg/L. The median concentration for Potassium from the Morrison wells is 2 mg/L (Table 1). The calculated coefficient of variation in Potassium from the two water sources is 46 percent.

Major Cations Summary

The two water sources have an average coefficient of variation for the major cations presented of 82 percent (Table 1). The two water sources have a relatively high coefficient of variation in concentrations of the major cations compared, suggesting that the two water sources have different geochemical "footprints" with regards to major cations. However, it should also be noted that both water sources are Sodium-dominated with respect to the major cations compared in this report (both have relatively high Sodium concentrations, with lesser concentrations of Calcium, Magnesium, and Potassium, as described above).

Other Metals

Arsenic:

The average concentration of Arsenic from the artesian wells sampled is 0.0008 mg/L. The median concentration for Arsenic from the Morrison wells is 0.02 mg/L (Table 1). The calculated coefficient of variation in Arsenic from the two water sources is 131 percent.

Manganese:

The average concentration of Manganese from the artesian wells sampled is 0.0047 mg/L. The median concentration of Manganese from the Morrison wells is 0.1 mg/L (Table 1). The calculated coefficient of variation in Manganese from the two water sources is 50 percent.

Iron:

The average concentration of Iron from the artesian wells sampled is 0.07 mg/L. The median concentration of Iron from the Morrison wells is 0.6 mg/L (Table 1). The calculated coefficient of variation in Iron from the two water sources is 112 percent.

Other Metals Summary

The two water sources have an average coefficient of variation for the other metals presented of 98 percent (Table 1). This would suggest that the two water sources have different geochemical “footprints” with regard to the other metals presented in this report.

CONCLUSIONS

The artesian wells have higher concentrations of the major cations, major anions, SC, and TDS than the Morrison wells (see Table 1). The waters sampled from the artesian wells are Sodium Sulfate dominated, with relatively high concentrations of SC and TDS. In comparision, Morrison Formation wells are Sodium Carbonate dominated, with much lower concentrations of SC and TDS than the artesian wells sampled. The ***average coefficient of variation*** between the concentrations for those constituents presented herein for the artesian wells and the Morrison Formation Wells is 81 percent (Table 1). The stiff plots comparison (Figure 3) illustrates the relatively high dissimilarity in the ionic strengths of the two water sources. Based upon the data presented herein, the two water sources have distinct and dissimilar geochemical “footprints.”

REFERENCES

Dam, W.L., Kernodle, J.M., Leavings, G.W., and Craig, S.D., 1990, Hydrogeology of the Morrison Formation in the San Juan Structural Basin, New Mexico, Colorado, Arizona, and Utah; U. S. Geological Survey Water Resources Hydrologic Investigations Atlas HA-720-J, Sheets 1 and 2.

Miller Brooks Environmental Inc., 2006, Final Well Impact Report – Revision No. 1, Desert Rock Energy Project Four Corners Area, New Mexico, Sithe Global Power L.L.C.; October 5

If you have any questions or concerns, please do not hesitate to contact us at (602) 728-0577.

Sincerely,
Miller Brooks Environmental, Inc.

Chris J. Courtney, RG, PG
Office Manager/Associate Hydrogeologist

Stephen P. Flora, GIT
Project Hydrogeologist

Attachments: Table 1 – General Water Chemistry of Groundwater Produced from the Morrison Formation in the San Juan Basin
Figure 1 – Desert Rock Energy Project – Burnham Chapter Well Monitoring Locations
Figure 2 – Stiff Diagrams – Burnham Artesian Wells
Figure 3 – Stiff Diagrams – Historical Morrison Wells vs. Burnham Artesian Wells
Appendix 1 – Ecosphere Artesian Well Site Descriptions and Field Notes
Appendix 2 – Laboratory Analytical Results, Green Analytical Laboratories, Inc.

cc: Miller Brooks Project File 684-0001-01

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Table 1

General Water Chemistry of Groundwater Produced from the Morrison Formation in the San Juan Basin

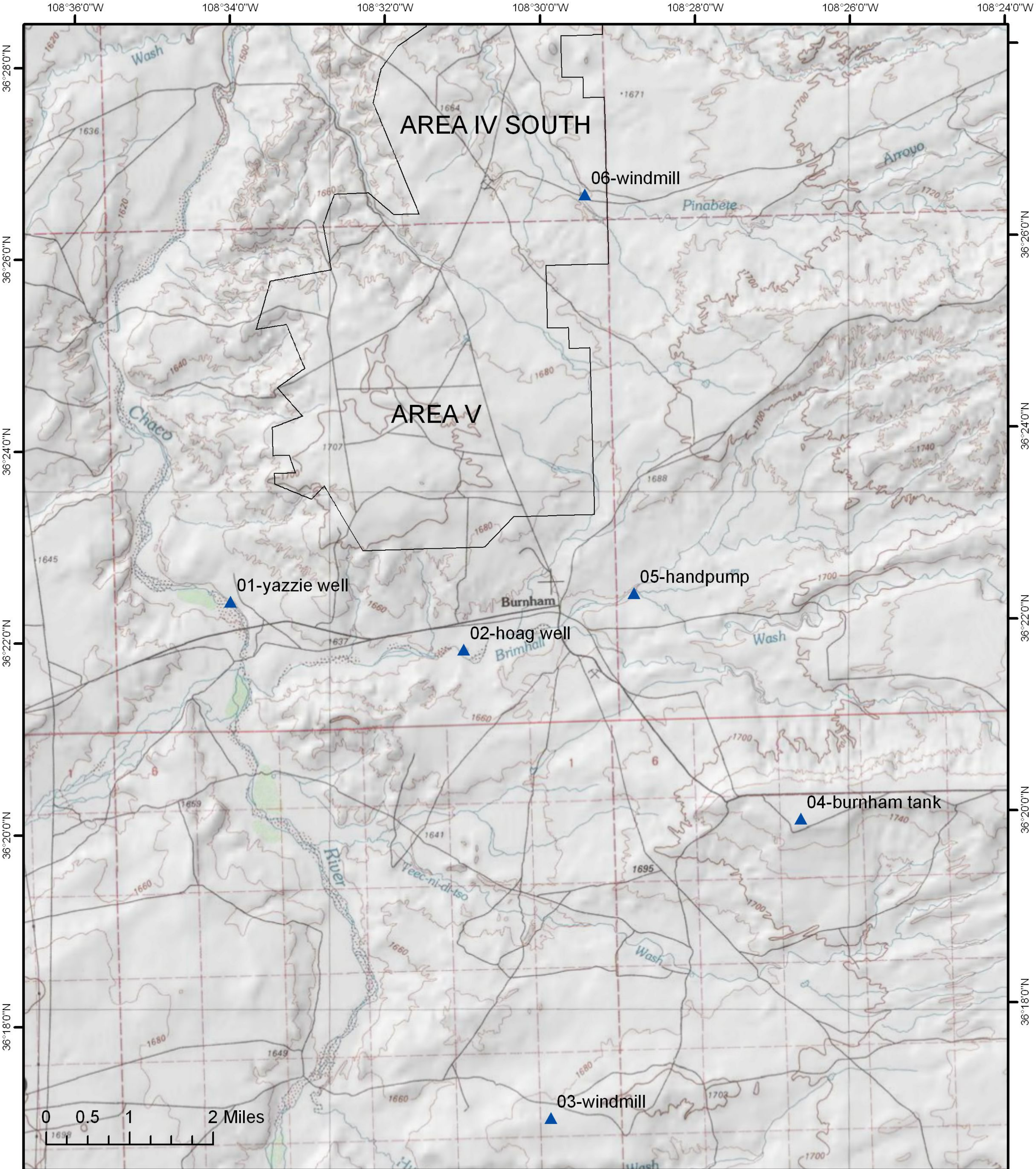
Desert Rock Energy Project, New Mexico

Parameter	Water Quality Data from 1948-1986 (Dam et. al, 1990)				Burnham Water Well Analytical Results, 2006							Coefficient of Variation
	# of samples	Minimum	Maximum	Median	01	02	03	04	05	06	Average	
GENERAL CHEMISTRY												
Specific Conductance (us/cm)	52	300	6,000	876	7,510	1,740	3,640	1,960	2,920	3,580	3,558	86%
Fluoride	50	0.2	7.7	0.6	0.9	2.4	2.6	0.5	2.7	3.3	2.07	78%
Nitrate (as nitrogen)	21	0.1	4.5	0.4	0.04	2.29	0.7	0.27	1.16	0.21	0.78	45%
Dissolved Solids (TDS)	52	116	5,000	614	6,100	915	2,130	1,220	2,000	2,570	2,489	85%
pH (standard units)	42	6.6	9.4	8.2	7.58	8.2	8.78	8.6	7.97	8.15	8.21	0%
General Chemistry - Average Coefficient of Variation												***59%***
MAJOR ANIONS												
Alkalinity (as CaCO3)	56	10	670	200	396	262	604	284	304	158	335	36%
Sulfate	52	6	3,200	160	3,900	600	1,040	660	1,240	1,550	1,498	114%
Chloride	57	1.1	1,200	8.9	89	19	172	23	17	16	56	103%
Major Anions - Average Coefficient of Variation												***84%***
MAJOR CATIONS												
Calcium	56	0.8	550	14	396	43.3	5.2	11.8	59.1	78.5	99	106%
Magnesium	53	0.1	62	3.7	60.5	4.9	2.9	3	7	11.7	15	85%
Sodium	57	43	1,400	140	1,310	317	763	388	528	647	659	92%
Potassium	56	0.1	24	2	9.4	2.7	3.6	2.6	3.7	1.5	3.92	46%
Major Cations - Average Coefficient of Variation												***82%***
OTHER METALS												
Arsenic	19	0.01	0.21	0.02	0.0012	0.0007	0.0005	< 0.0005	0.0007	< 0.0005	0.0008	131%
Iron	41	0.03	20	0.6	< 0.05	< 0.05	< 0.05	0.06	<0.05	0.08	0.07	112%
Manganese	21	0.01	19	0.1	0.2747	0.0017	0.0039	0.0021	0.0012	0.0023	0.0477	50%
Other Metals - Average Coefficient of Variation												***98%***

Average Coefficient of Variation for all Constituents ***81%***

Explanation:
us/cm = microsiemens per centimeter at 25 degrees Celsius
Dissolved constituents are reported in milligrams per liter unless noted otherwise
Radium-226 is reported in Pico curies per liter
< = not detected above the laboratory's lower detection limit (LDL)

MILLER BROOKS Environmental, Inc.



DESERT ROCK ENERGY PROJECT

BURNHAM CHAPTER WELL MONITORING LOCATIONS

DRAFT WORKING MAP

Figure 2 - Stiff Diagrams
Burnham Wells, Springs, and Seeps
November 2006
Desert Rock, New Mexico

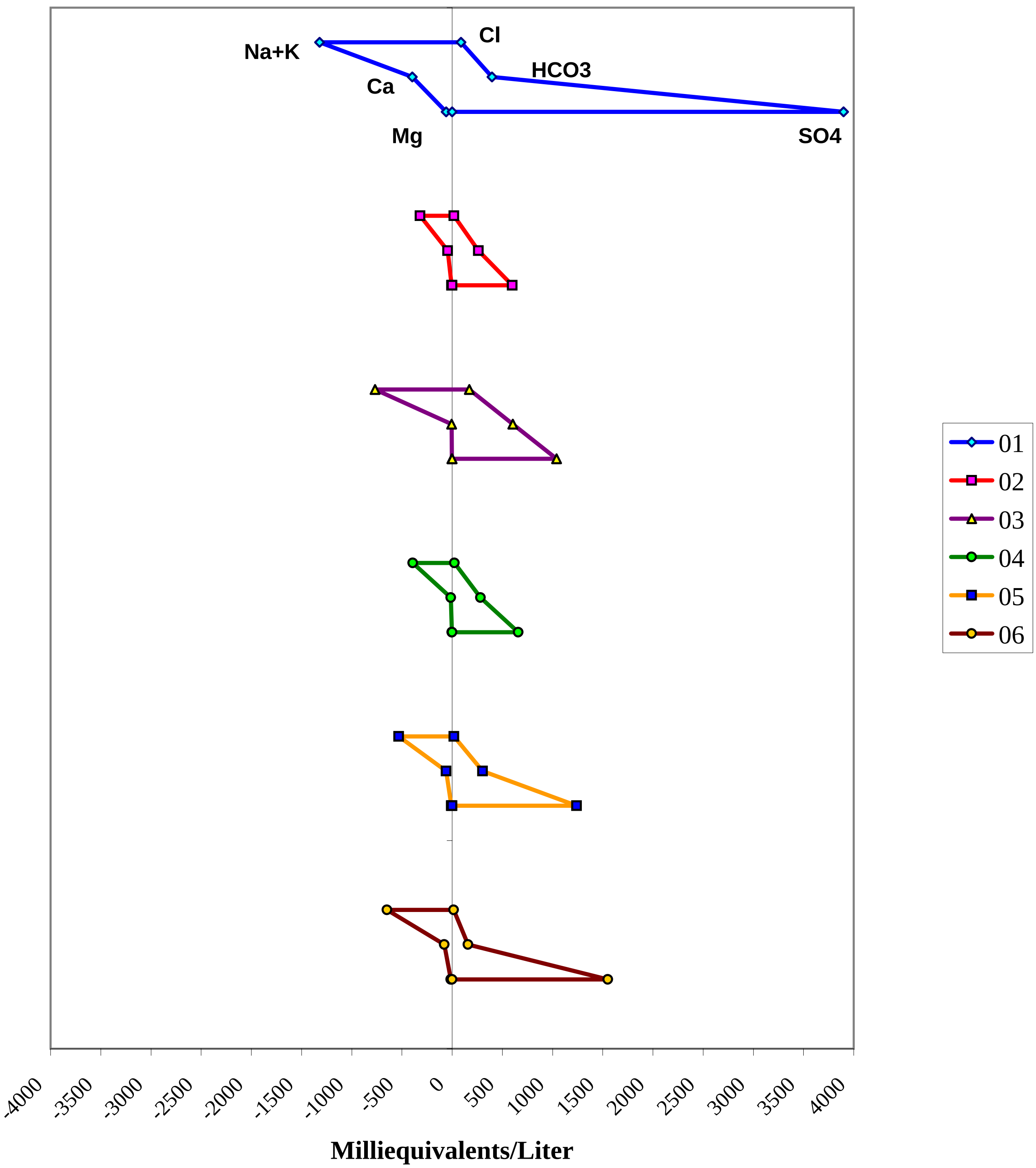
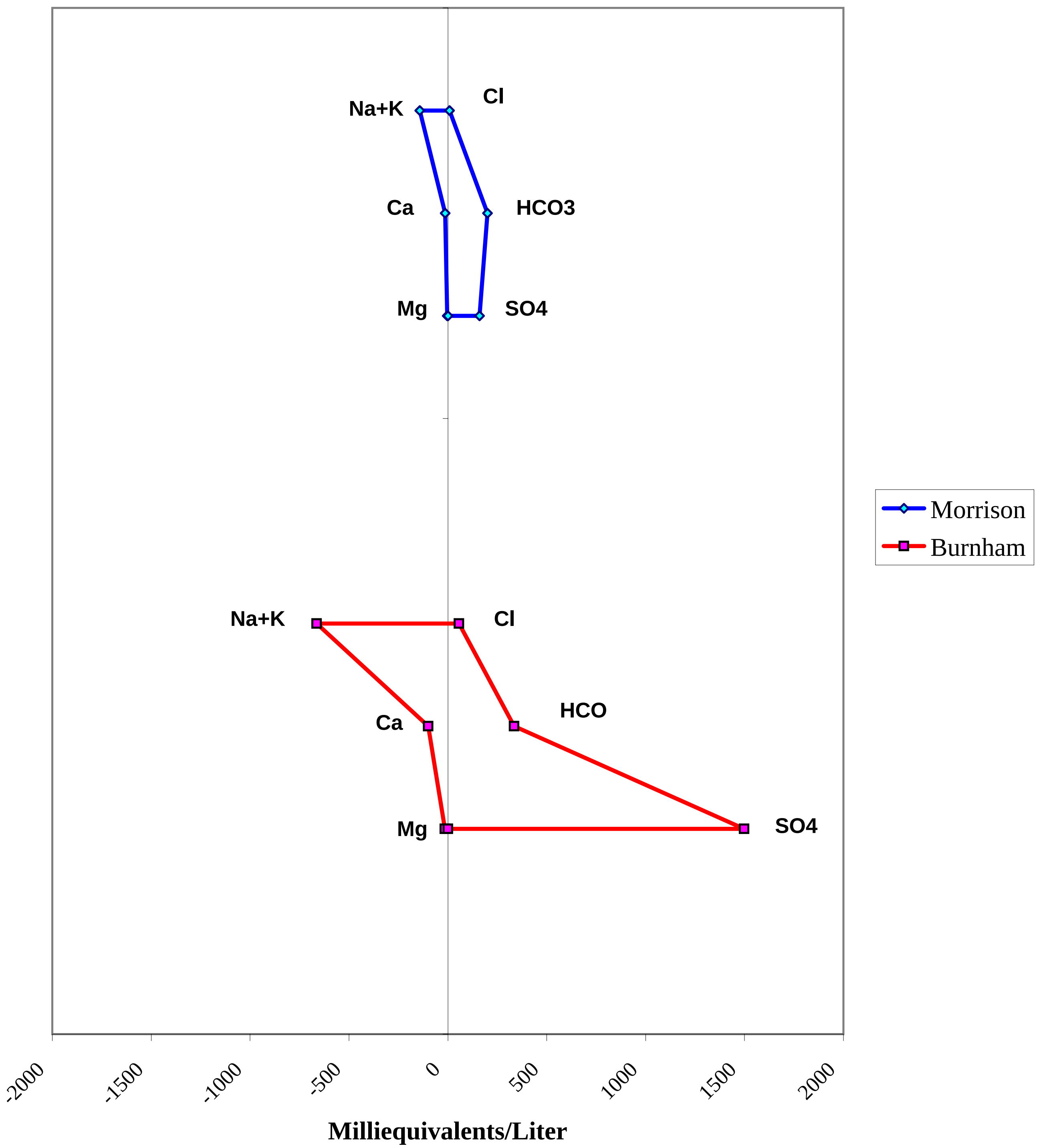


Figure 3 - Stiff Diagrams
Historical Morrison Wells vs Burnham Artesian Wells
Desert Rock, New Mexico



Ecosphere Burnham Chapter Artesian Well Monitoring Field Notes

Site 1: Yazzie Well
Physical Setting: Site is located on shallow south sloped flood plain of Chaco Wash drainage. The side high bank is next to the well. Recent rainfall is documented as sheet flow silt that drains directly into the well from the northwest from an old eroded two-track dirt road. The deposited silt is alkaline as indicated by the precipitated white salts coming off the drying deposited soils. Two home sites are located 1000-1500 feet to N and NW.
Plant Community: Vegetation plant community includes saltcedar, rubber rabbitbrush, spreading rabbitbrush, Drummond's goldenweed and alkali saccaton plant community. Sandy alluvial deposited soils.
Existing Well Facilities: Well site is fenced off with an existing low concrete well structure covered by a wooden frame, metal tank and bathtub for water trough. The well provides water for livestock.

Site 2: Hoag Well
Physical Setting: The fenced off well is located north of Brimhall Wash drainage, on the north flood plains. The well provides water for livestock. Home sites are located 400 feet north of the well.
Plant Community: Plant community consists of scattered saltcedar, rubber rabbitbrush, and alkali saccaton. The area surrounding the site is heavily grazed.
Existing Well Facilities: On the location in the fenced site are metal water trough, meatl tank, concrete spring housing, and hand water pump

Site 3: Windmill 3
Physical Setting: The site located on a regional high area surrounded by nearly barren badlands to the north and to the south is an extensive sand sheet. Access is from a two-track dirt road along the north region of the site.
Plant Community: Plant community type consists of sparse shadscale, Bigelow's rabbitbrush, alkali saccaton and sand dropseed. Silty sand soils are eolian deposited.
Existing Well Facilities: The location has 2 metal water troughs, windmill with solar panel, 2 large metal holding tanks and 2 taller, smaller volume metal tank elevated several feet above the ground.

Site 4: Burnham Chapter Well
Physical Setting: The well is located on a large open level area 1000 feet south of a major dirt road. Home sites are located 1000 feet to the southwest. This includes a sheep corral 500 feet to the south of the tanks. A dirt road from the north is access to the site, the road continues southwest to the home sites.
Plant Community: Grassland plant community includes alkali saccaton, sand dropseed, galleta and purple threeawn. The site is heavily grazed.
Existing Well Facilities: On the location are 2 large metal holding tanks including 3 tall elevated metal tanks. A water trough and concrete well housing is located 500 feet to the north.

Site 5: Hand Pump Well 1
Physical Setting: The well is located south of Brimhall Wash on the flood plain, about 1.5 miles east of the Chapter House. Brimhall Wash drainage is 400 feet to the north.
Plant Community: Vegetation cover type consists of scattered saltcedar, four-winged saltbush, greasewood, rubber rabbitbrush, broom snakeweed, and alkali saccaton.
Existing Well Facilities: On the location are concrete well housing, hand pump, and 2 small water troughs.

Site 6: Pinabete Wash Windmill
Physical Setting: Windmill is located in a low bowl shaped area surrounded by sand sheet and minor dunes. To the west is Pinabete Wash drainage floodplain and sandy channel. A fenced off grazing section is located 150 feet east of the windmill.
Plant Community: Vegetation cover type includes scattered rubber rabbitbrush, saltcedar and alkali saccaton. Soils are sandy in composition and of eolian and alluvial depositional origin.
Existing Facilities: Active metal windmill, tall metal storage tank and metal water trough.

Ecosphere Burnham Chapter Artesian Well GPS locations

Well Name	Max_PDOP	Max_HDOP	Corr_Type	Rcvr_Type	**GPS_Date**	**GPS_Time**	Update_Sta	Feat_Name	Datafile	Unfilt_Pos	Filt_Pos
01-yazzie well	4.4	1.6	Postprocessed Code	GeoXT	**11/1/2006 0:00**	**10:34:11am**	New	Point_ge	R110109A.cor	6	6
02-hoag well	2.5	1.29	Postprocessed Code	GeoXT	**11/1/2006 0:00**	**11:44:31am**	New	Point_ge	R110109A.cor	5	5
03-windmill	3.29	1.7	Postprocessed Code	GeoXT	**11/1/2006 0:00**	**12:39:11pm**	New	Point_ge	R110109A.cor	5	5
04-burnham tank	5.09	3.09	Postprocessed Code	GeoXT	**11/7/2006 0:00**	**03:23:31pm**	New	Point_ge	R110714A.cor	2	2
05-handpump	5.9	5.4	Postprocessed Code	GeoXT	**11/7/2006 0:00**	**04:00:16pm**	New	Point_ge	R110714A.cor	4	4
06-windmill	2	1.1	Postprocessed Code	GeoXT	**11/22/2006 0:00**	**10:11:21am**	New	Point_ge	R112209A.cor	4	4

Well Name	Data_Dicti	GPS_Week	GPS_Second	**GPS_Height**	Vert_Prec	Horz_Prec	Std_Dev	**Northing**	**Easting**	Point_ID	
01-yazzie well	Generic	1399	322465	**1621.17**	1.4	0.6	0.37	**4028074.87**	**718028.42**	2	
02-hoag well	Generic	1399	326685	**1644.29**	0.8	0.5	0.23	**4027149.95**	**722527.27**	3	
03-windmill	Generic	1399	329965	**1694.67**	0.9	0.6	0.18	**4018115.02**	**724204.96**	4	
04-burnham tank	Generic	1400	253425	**1756.77**	1.3	1	0.28	**4023893.25**	**729024.51**	6	
05-handpump	Generic	1400	255630	**1660.04**	0.8	1.7	0.51	**4028239.15**	**725808.82**	7	
06-windmill	Generic	1402	321095	**1655.79**	0.5	0.4	0.19	**4035933.24**	**724857.8**	1	

Burnham Chapter Seeps, Springs, and Wells Survey
10/18/2006

GPS Waypoint	Well ID	GPS Coordinates (12 S)	Use
1	Windmill #1	0724477 4027345	Livestock (access sample through storage tank)
2	Unknown	0722622 4033116	None, locked
3	Unknown	0728681 4024348	None, open
4	Burnham Chapter	0728660 4024348	Chapter House, residential, livestock
10	Handpump Well #1	0724180* 4018120*	livestock
	Handpump Well #2	Within site of #1	livestock
7	Windmill #2	0726930 4020855	Out of service
9	Windmill #3	0724186 4018125	Livestock
11	Hoag Well	0722536 4027140	Livestock
12	Yazzie Well	0718024 4028085	Livestock
13	Unknown Well	0717827 4028215	None, locked
14	Closed Well	0723429 4039274	None, cemented

***wells are approximately ½ mile north and east from coordinates**

Green Analytical Laboratories, Inc.
75 Suttle Street
Durango, CO 81303

		GAL I.D.:	**611-015-01**
Ecosphere Environmental		Date Received:	11/02/06
2257 Main Ave, Patio Level		Date Reported:	12/07/06
Durango, CO 81301		QC Batches:	
Attention:	Tyler Scheid		

PROJECT NAME:	Desert Rock Burnham		
PROJECT NUMBER:		Sample Date:	11/01/06
SAMPLE I.D.:	01- Yazzie	Sample Matrix:	Water

Laboratory Report

RESULTS

PARAMETER	METHOD	REPORT LIMIT	RESULT	DIL	UNITS
Alkalinity, Total	2320B	10	396	1	mg/L
Alkalinity, Bicarbonate	2320B	10	396	1	mg/L
Alkalinity, Carbonate	2320B	10	<10	1	mg/L
Alkalinity, Hydroxide	2320B	10	<10	1	mg/L
Arsenic	200.8	0.0005	0.0012	1	mg/L
Calcium	200.7	0.5	396	1	mg/L
Chloride	4500CL	10	89	1	mg/L
Conductivity	2510B	1.0	7510	1	uS/cm
Fluoride	4500F C	0.2	0.9	1	mg/L
Iron	200.7	0.05	<0.05	1	mg/L
Magnesium	200.7	0.5	60.5	1	mg/L
Manganese	200.8	0.0005	0.2747	1	mg/L
Nitrate/Nitrite as N	353.3	0.02	0.04	1	mg/L
pH	150.1	NA	7.58	NA	SU
Potassium	200.7	0.5	9.4	1	mg/L
Sodium	200.7	0.5	1310	1	mg/L
Sulfate	4500SO4	10	3900	1	mg/L
TDS	2540C	10	6100	1	mg/L
Hardness	Calc	10	1240	1	mg/L

John Green, Laboratory Manager

Green Analytical Laboratories, Inc.
75 Suttle Street
Durango, CO 81303

PROJECT NAME:	Desert Rock Burnham		
PROJECT NUMBER:		Sample Date:	11/01/06
SAMPLE I.D.:	01- Yazzie	Sample Matrix:	Water

Laboratory Report

RESULTS

PARAMETER	METHOD	REPORT LIMIT	RESULT	DIL	UNITS

GAL I.D.: **611-015-02**

0 — Date Received: 11/02/06
0 — Date Reported: 01/00/00
0 — QC Batches:
Attention: Tyler Scheid

PROJECT NAME:	0		
PROJECT NUMBER:		Sample Date:	11/01/06
SAMPLE I.D.:	02- Hoag	Sample Matrix:	0

Laboratory Report

RESULTS

PARAMETER	METHOD	REPORT LIMIT	RESULT	DIL	UNITS
Alkalinity, Total	2320B	10	262	1	mg/L
Alkalinity, Bicarbonate	2320B	10	234	1	mg/L
Alkalinity, Carbonate	2320B	10	28	1	mg/L
Alkalinity, Hydroxide	2320B	10	<10	1	mg/L
Arsenic	200.8	0.0005	0.0007	1	mg/L
Calcium	200.7	0.5	43.3	1	mg/L
Chloride	4500CL	10	19	1	mg/L
Conductivity	2510B	1.0	1740	1	uS/cm
Fluoride	4500F C	0.2	2.4	1	mg/L
Iron	200.7	0.05	<0.05	1	mg/L
Magnesium	200.7	0.5	4.9	1	mg/L
Manganese	200.8	0.0005	0.0017	1	mg/L
Nitrate/Nitrite as N	353.3	0.02	2.29	1	mg/L
pH	150.1	NA	8.20	NA	SU
Potassium	200.7	0.5	2.7	1	mg/L
Sodium	200.7	0.5	317	1	mg/L
Sulfate	4500SO4	10	600	1	mg/L
TDS	2540C	10	915	1	mg/L
Hardness	Calc	10	128	1	mg/L

John Green, Laboratory Manager

Green Analytical Laboratories, Inc.
75 Suttle Street
Durango, CO 81303

PROJECT NAME:	Desert Rock Burnham		
PROJECT NUMBER:		Sample Date:	11/01/06
SAMPLE I.D.:	01- Yazzie	Sample Matrix:	Water

Laboratory Report

RESULTS

PARAMETER	METHOD	REPORT LIMIT	RESULT	DIL	UNITS

GAL I.D.: **611-015-03**

0 Date Received: 11/02/06
0 Date Reported: 01/00/00
0 QC Batches:
Attention: Tyler Scheid

PROJECT NAME:	0		
PROJECT NUMBER:		Sample Date:	11/01/06
SAMPLE I.D.:	03- Windmill 3	Sample Matrix:	0

Laboratory Report

RESULTS

PARAMETER	METHOD	REPORT LIMIT	RESULT	DIL	UNITS
Alkalinity, Total	2320B	10	604	1	mg/L
Alkalinity, Bicarbonate	2320B	10	444	1	mg/L
Alkalinity, Carbonate	2320B	10	160	1	mg/L
Alkalinity, Hydroxide	2320B	10	<10	1	mg/L
Arsenic	200.8	0.0005	0.0005	1	mg/L
Calcium	200.7	0.5	5.2	1	mg/L
Chloride	4500CL	10	172	1	mg/L
Conductivity	2510B	1.0	3640	1	uS/cm
Fluoride	4500F C	0.2	2.6	1	mg/L
Iron	200.7	0.05	<0.05	1	mg/L
Magnesium	200.7	0.5	2.9	1	mg/L
Manganese	200.8	0.0005	0.0039	1	mg/L
Nitrate/Nitrite as N	353.3	0.02	0.70	1	mg/L
pH	150.1	NA	8.78	NA	SU
Potassium	200.7	0.5	3.6	1	mg/L
Sodium	200.7	0.5	763	1	mg/L
Sulfate	4500SO4	10	1040	1	mg/L
TDS	2540C	10	2130	1	mg/L
Hardness	Calc	10	25	1	mg/L

John Green, Laboratory Manager

Green Analytical Laboratories, Inc.
75 Suttle Street
Durango, CO 81303

PROJECT NAME:	Desert Rock Burnham		
PROJECT NUMBER:		Sample Date:	11/01/06
SAMPLE I.D.:	01- Yazzie	Sample Matrix:	Water

Laboratory Report

RESULTS

PARAMETER	METHOD	REPORT LIMIT	RESULT	DIL	UNITS	
					GAL I.D.:	**611-058-01**
0					Date Received:	11/09/06
0					Date Reported:	01/00/00
0					QC Batches:	

Attention: Tyler Scheid

PROJECT NAME:	0		
PROJECT NUMBER:		Sample Date:	11/07/06
SAMPLE I.D.:	04- Burnham	Sample Matrix:	0

Laboratory Report

RESULTS

PARAMETER	METHOD	REPORT LIMIT	RESULT	DIL	UNITS
Alkalinity, Total	2320B	10	284	1	mg/L
Alkalinity, Bicarbonate	2320B	10	208	1	mg/L
Alkalinity, Carbonate	2320B	10	76	1	mg/L
Alkalinity, Hydroxide	2320B	10	<10	1	mg/L
Arsenic	200.8	0.0005	<0.0005	1	mg/L
Calcium	200.7	0.5	11.8	1	mg/L
Chloride	4500CL	10	23	1	mg/L
Conductivity	2510B	1.0	1960	1	uS/cm
Fluoride	4500F C	0.2	0.5	1	mg/L
Iron	200.7	0.05	0.06	1	mg/L
Magnesium	200.7	0.5	3.0	1	mg/L
Manganese	200.8	0.0005	0.0021	1	mg/L
Nitrate/Nitrite as N	353.3	0.02	0.27	1	mg/L
pH	150.1	NA	8.60	NA	SU
Potassium	200.7	0.5	2.6	1	mg/L
Sodium	200.7	0.5	388	1	mg/L
Sulfate	4500SO4	10	660	1	mg/L
TDS	2540C	10	1220	1	mg/L
Hardness	Calc	10	42	1	mg/L

John Green, Laboratory Manager

Green Analytical Laboratories, Inc.
75 Suttle Street
Durango, CO 81303

PROJECT NAME:	Desert Rock Burnham		
PROJECT NUMBER:		Sample Date:	11/01/06
SAMPLE I.D.:	01- Yazzie	Sample Matrix:	Water

Laboratory Report

RESULTS

PARAMETER	METHOD	REPORT LIMIT	RESULT	DIL	UNITS

GAL I.D.:	**611-058-02**
Date Received:	11/09/06
Date Reported:	01/00/00
QC Batches:	

0
0
0
Attention: Tyler Scheid

PROJECT NAME:	0		
PROJECT NUMBER:		Sample Date:	11/07/06
SAMPLE I.D.:	05- Handpump	Sample Matrix:	0

Laboratory Report

RESULTS

PARAMETER	METHOD	REPORT LIMIT	RESULT	DIL	UNITS
Alkalinity, Total	2320B	10	304	1	mg/L
Alkalinity, Bicarbonate	2320B	10	304	1	mg/L
Alkalinity, Carbonate	2320B	10	<10	1	mg/L
Alkalinity, Hydroxide	2320B	10	<10	1	mg/L
Arsenic	200.8	0.0005	0.0007	1	mg/L
Calcium	200.7	0.5	59.1	1	mg/L
Chloride	4500CL	10	17	1	mg/L
Conductivity	2510B	1.0	2920	1	uS/cm
Fluoride	4500F C	0.2	2.7	1	mg/L
Iron	200.7	0.05	<0.05	1	mg/L
Magnesium	200.7	0.5	7.0	1	mg/L
Manganese	200.8	0.0005	0.0012	1	mg/L
Nitrate/Nitrite as N	353.3	0.02	1.16	1	mg/L
pH	150.1	NA	7.97	NA	SU
Potassium	200.7	0.5	3.7	1	mg/L
Sodium	200.7	0.5	528	1	mg/L
Sulfate	4500SO4	10	1240	1	mg/L
TDS	2540C	10	2000	1	mg/L
Hardness	Calc	10	176	1	mg/L

John Green, Laboratory Manager

Green Analytical Laboratories, Inc.
75 Suttle Street
Durango, CO 81303

PROJECT NAME:	Desert Rock Burnham		
PROJECT NUMBER:		Sample Date:	11/01/06
SAMPLE I.D.:	01- Yazzie	Sample Matrix:	Water

Laboratory Report

RESULTS

PARAMETER	METHOD	REPORT LIMIT	RESULT	DIL	UNITS

GAL I.D.: **611-124-01**

#REF!
#REF!
#REF!
Attention: Tyler Scheid

Date Received: 11/28/06
Date Reported: #REF!
QC Batches:

PROJECT NAME:	#REF!		
PROJECT NUMBER:		Sample Date:	11/22/06
SAMPLE I.D.:	06 - Windmill	Sample Matrix:	#REF!

Laboratory Report

RESULTS

PARAMETER	METHOD	REPORT LIMIT	RESULT	DIL	UNITS
Alkalinity, Total	2320B	10	158	1	mg/L
Alkalinity, Bicarbonate	2320B	10	142	1	mg/L
Alkalinity, Carbonate	2320B	10	16	1	mg/L
Alkalinity, Hydroxide	2320B	10	<10	1	mg/L
Arsenic	200.8	0.0005	<0.0005	1	mg/L
Calcium	200.7	0.5	78.5	1	mg/L
Chloride	4500CL	10	16	1	mg/L
Conductivity	2510B	1.0	3580	1	uS/cm
Fluoride	4500F C	0.2	3.3	1	mg/L
Iron	200.7	0.05	0.08	1	mg/L
Magnesium	200.7	0.5	11.7	1	mg/L
Manganese	200.8	0.0005	0.0023	1	mg/L
Nitrate/Nitrite as N	353.3	0.02	0.21	1	mg/L
pH	150.1	NA	8.15	NA	SU
Potassium	200.7	0.5	1.5	1	mg/L
Sodium	200.7	0.5	647	1	mg/L
Sulfate	4500SO4	10	1550	1	mg/L
TDS	2540C	10	2570	1	mg/L
Hardness	Calc	10	244	1	mg/L

John Green, Laboratory Manager

January 31, 2007

Ms. Jennifer Pyne
URS Corporation
7720 N. 16th Street, Suite 100
Phoenix, AZ 85020

Re: Water Quality Comparison Report – A Comparison of 2006 Sanostee Chapter Water Well Data to Historical Morrison Formation Water Well Data
Desert Rock Energy Project, New Mexico

Miller Brooks Environmental, Inc. Project #0684-0001-0001

Dear Ms. Pyne:

Miller Brooks Environmental, Inc. (Miller Brooks) has prepared this report for URS Corporation (URS), per Sub-Task 5 of "Work Order No. 2" from URS dated August 31, 2006. This report presents the analytical results for water samples collected by Ecosphere Environmental Services (Ecosphere) in Farmington, New Mexico on September 6, 2006 at six artesian wells located on Sanostee Chapter land adjacent to the proposed Desert Rock Power Plant in the Four Corners Area, New Mexico. This report also compares that data to historical water quality data from samples collected in wells reported to have historically withdrawn groundwater from the Morrison Formation located in the Upper San Juan Basin (Dam, et. al, 1990) in the vicinity of the Desert Rock project site (the study area).

PROJECT BACKGROUND

The study area (see Figure 1) is located in the northwestern portion of New Mexico, southeast of Shiprock and due south of Farmington. The proposed water supply for the Desert Rock Power Plant is from new production wells proposed for future construction. The proposed wells will be designed to withdraw groundwater exclusively from the Morrison Formation to mitigate drawdown in Navajo Nation water supply wells and seeps and springs which derive most, if not all, of their water supply for an upper confined aquifer (above the Morrison Formation). The locations of the six artesian wells sampled by Ecosphere used for comparison in this report are shown on Figure 1. Site descriptions, GPS locations and Ecosphere's field notes are included in Appendix 1.

The purpose of this report is to compare water chemistry from the six artesian wells sampled by Ecosphere to historical groundwater chemistry from samples collected in wells reported to have produced water from the Morrison Formation. The comparison is intended to draw a similarity or dissimilarity in the two water sources with respect to their geochemical "footprints." Although not part of this evaluation, the "footprint" could be evaluated to determine the degree of hydrologic "connectivity" between seeps- and springs-derived water and Morrison Formation-derived water. This information could be helpful in relating drawdown at the proposed well field(s) for the proposed Desert Rock Power Plant as it relates to potential drawdown of artesian wells in the study area.

Since there are few documented wells constructed and currently producing groundwater exclusively from the Morrison Formation in the study area (Miller Brooks, 2006), this report compares the artesian well data to historical water quality data for groundwater samples collected in wells reported to have withdrawn groundwater from the Morrison Formation (Dam, et. al, 1990). The historical data are a compilation of wells sampled between 1948 and 1986 (Dam, et. al, 1990) located within and outside of the study area but within the same geologic province (the Upper San Juan Basin). Due to a lack of well construction records, we cannot conclusively confirm if the Morrison Formation well data set used in this report represents groundwater produced exclusively from the Morrison Formation.

WATER QUALITY RESULTS

The water quality data presented in the report is discussed in the following four sections:

- General Chemistry
- Major Anions
- Major Cations
- Other Metals

For ease of reference, samples colleted by Ecosphere on September 6, 2006 from the six artesian wells (Figure 1) will be referred in this report as the “artesian wells.” Samples collected from wells completed in the Morrison Formation (Dam. et. al., 1990) will be referred to as the “’Morrison Formation wells.” Table 1 provides a summary of the water quality data referenced in this report. The laboratory analytical reports from Green Analytical Laboratories, Inc. for the six artesian wells sampled are included as Appendix 2.

This report compares the median values of concentrations (for the selected constituents) of the Morrison Formation well data set to the average values of the artesian well data set, presented in Table 1 as a “coefficient of variation” (in percent). In addition, we have prepared stiff plots of each artesian well sampled (Figure 2) and a comparative stiff plot using the median concentrations from the Morrison Formation well data set (Figure 3) and the average values from the artesian well data set. These stiff plots are intended to graphically demonstrate the similarity or dissimilarity in geochemistry of the two water sources.

General Chemistry

Specific Conductance (SC) and Total Dissolved Solids (TDS):

The average concentration of SC and TDS from the artesian wells sampled is 479 microsiemens per centimeter (μs/cm) and 233 milligrams per liter (mg/L), respectively (Table 1). The median concentration of SC and TDS from the Morrison Formation wells is 876 μs/cm and 614 mg/L, respectively. The calculated coefficient of variation in SC and TDS from the two water sources is 41 and 644 percent, respectively.

Fluoride:

The average concentration of Fluoride from the artesian wells sampled is 0.4 mg/L (Table 1). The median concentration of Fluoride from the Morrison wells is 0.6 mg/L (Table 1). The calculated coefficient of variation in Fluoride from the two water sources is 31 percent.

Nitrate:

The average concentration of Nitrate from the artesian wells sampled is 0.02 mg/L. The median concentration of Nitrate from the Morrison wells is 0.4 mg/L (Table 1). The calculated coefficient of variation in Nitrate from the two water sources is 128 percent.

pH:

The average pH value from the artesian wells sampled is 9.5 (Table 1). The median pH value from the Morrison wells is 8.2 (Table 1). The calculated coefficient of variation in pH from the two water sources is 10 percent.

General Chemistry Summary

The two water sources have an average coefficient of variation for the general chemistry constituents presented of 55 percent (Table 1). The high discrepancy in the coefficient of variation for nitrate and TDS could suggest that the two water sources have different geochemical “footprints” with regard to the general chemistry constituents presented in this report.

Major Anions

Alkalinity:

The average concentration for Alkalinity ($CaCO_3$) from the artesian wells sampled is 214 mg/L. The median concentration for Alkalinity from the Morrison wells is 200 mg/L (Table 1). The calculated coefficient of variation in Alkalinity from the two water sources is 5 percent.

Sulfate:

The average concentration for Sulfate from the artesian wells sampled is 27 mg/L. The median concentration for Sulfate from the Morrison wells is 160 mg/L (Table 1). The calculated coefficient of variation in Sulfate from the two water sources is 101 percent.

Chloride:

The average concentration for Chloride from the artesian wells sampled is 10 mg/L. The median concentration for Chloride from the Morrison wells is 8.9 mg/L (Table 1). The calculated coefficient of variation in Chloride from the two water sources is 8 percent.

Major Anion Summary

The two water sources have an average coefficient of variation for the major anions presented of 38 percent (Table 1). The two water sources have a relatively low coefficient of variation for Alkalinity and Chloride, but a much higher coefficient of variation Sulfate. The major anions discussed above indicate that both water sources are Carbonate-dominated waters (due to high Alkalinity ($CaCO_3$). There is no conclusive evidence in the anion data presented to suggest a similarity or dissimilarity in the two water sources.

Major Cations

Sodium:

The average concentration of Sodium from the artesian wells sampled is 113 mg/L. The median concentration for Sodium from the Morrison wells is 140 mg/L (Table 1). The calculated coefficient of variation in Sodium from the two water sources is 15 percent.

Calcium:

The average concentration of Calcium from the artesian wells sampled is 1 mg/L. The median concentration of Calcium from the Morrison wells is 14 mg/L (Table 1). The calculated coefficient of variation in Calcium from the two water sources is 123 percent.

Magnesium:

The average concentration of Magnesium from the artesian wells sampled is less than 0.5 mg/L. The median concentration of Magnesium from the Morrison wells is 3.7 mg/L (Table 1). The coefficient of variation in Magnesium from the two water sources is 108 percent.

Potassium:

The average concentration of Potassium from the artesian wells sampled is 0.53 mg/L. The median concentration for Potassium from the Morrison wells is 2 mg/L (Table 1). The calculated coefficient of variation in Potassium from the two water sources is 82 percent.

Major Cations Summary

The two water sources have an average coefficient of variation for the major cations presented of 82 percent (Table 1). The two water sources have a relatively high coefficient of variation in concentrations of the major cations compared with the exception of sodium, suggesting that the two water sources have different geochemical “footprints” with regards to major cations. However, it should also be noted that both water sources are Sodium-dominated with respect to the major cations compared in this report (both have relatively high Sodium concentrations, with lesser concentrations of Calcium, Magnesium and Potassium, as described above).

Other Metals

Arsenic:

The average concentration of Arsenic from the artesian wells sampled is 0.0048 mg/L. The median concentration for Arsenic from the Morrison wells is 0.02 mg/L (Table 1). The calculated coefficient of variation in Arsenic from the two water sources is 87 percent.

Manganese:

The average concentration of Manganese from the artesian wells sampled is 0.0006 mg/L. The median concentration of Manganese from the Morrison wells is 0.1 mg/L (Table 1). The calculated coefficient of variation in Manganese from the two water sources is 140 percent.

Iron:

The average concentration of Iron from the artesian wells sampled is 0.052 mg/L. T he median concentration of Iron from the Morrison wells is 0.6 mg/L (Table 1). The calculated coefficient of variation in Iron from the two water sources is 119 percent.

Other Metals Summary

The two water sources have an average coefficient of variation for the other metals presented of 115 percent (Table 1). In addition, the ionic strengths of the three metals presented are substantially higher in the Morrison Formation wells. This would suggest that the two water sources have different geochemical "footprints" with regard to the other metals presented in this report.

CONCLUSIONS

The ***average coefficient of variation*** between the concentrations for the constituents presented herein for the artesian wells and the Morrison Formation wells is 73 percent (Table 1). Generally speaking, the artesian wells have lower concentrations of general chemistry parameters, major cations, sulfate, and other metals than the Morrison wells and relatively similar concentrations of Alkalinity ($CaCO_3$) and Chloride (see Table 1). Both water sources are Sodium Sulfate dominated as illustrated in the stiff plot comparison (Figure 3). However, Figure 3 also illustrates a relatively significant discrepancy in ionic strength with regards to Sulfate. The geochemical comparisons presented in this report do not conclusively indicate a similarity or dissimilarity with respect to the geochemical "footprints" of either water source.

REFERENCES

Dam, W.L., Kernodle, J.M., Leavings, G.W., and Craig, S.D., 1990, Hydrogeology of the Morrison Formation in the San Juan Structural Basin, New Mexico, Colorado, Arizona, and Utah; U. S. Geological Survey Water Resources Hydrologic Investigations Atlas HA-720-J, Sheets 1 and 2.

Miller Brooks Environmental Inc., 2006, Final Well Impact Report – Revision No. 1, Desert Rock Energy Project Four Corners Area, New Mexico, Sithe Global Power L.L.C.; October 5

If you have any questions or concerns, please do not hesitate to contact us at (602) 728-0577.

Sincerely,
Miller Brooks Environmental, Inc.

Chris J. Courtney, RG, PG
Office Manager/Associate Hydrogeologist

Stephen P. Flora, GIT
Project Hydrogeologist

Attachments: Table 1 – Chemistry Comparison -Groundwater Produced from the Morrison Formation in the San Juan Basin vs. Sanostee Chapter Seeps and Springs Water
Figure 1 – Desert Rock Energy Project – Sanostee Chapter Well Monitoring Locations
Figure 2 – Stiff Diagrams Sanostee Artesian Wells
Figure 3 – Stiff Diagrams Historical Morrison Wells vs. Sanostee Artesian Wells
Appendix 1 – Ecosphere Artesian Well Site Descriptions and Field Notes
Appendix 2 – Laboratory Analytical Results, Green Analytical Laboratories, Inc.

cc: Miller Brooks Project #0684-0001-0001

V:\URS\Desert Rock Energy\684-0001-0001\Sanostee Chapter Sampling\Seeps and Springs Report\Sanostee Water Quality Report Final (1-30-07).doc

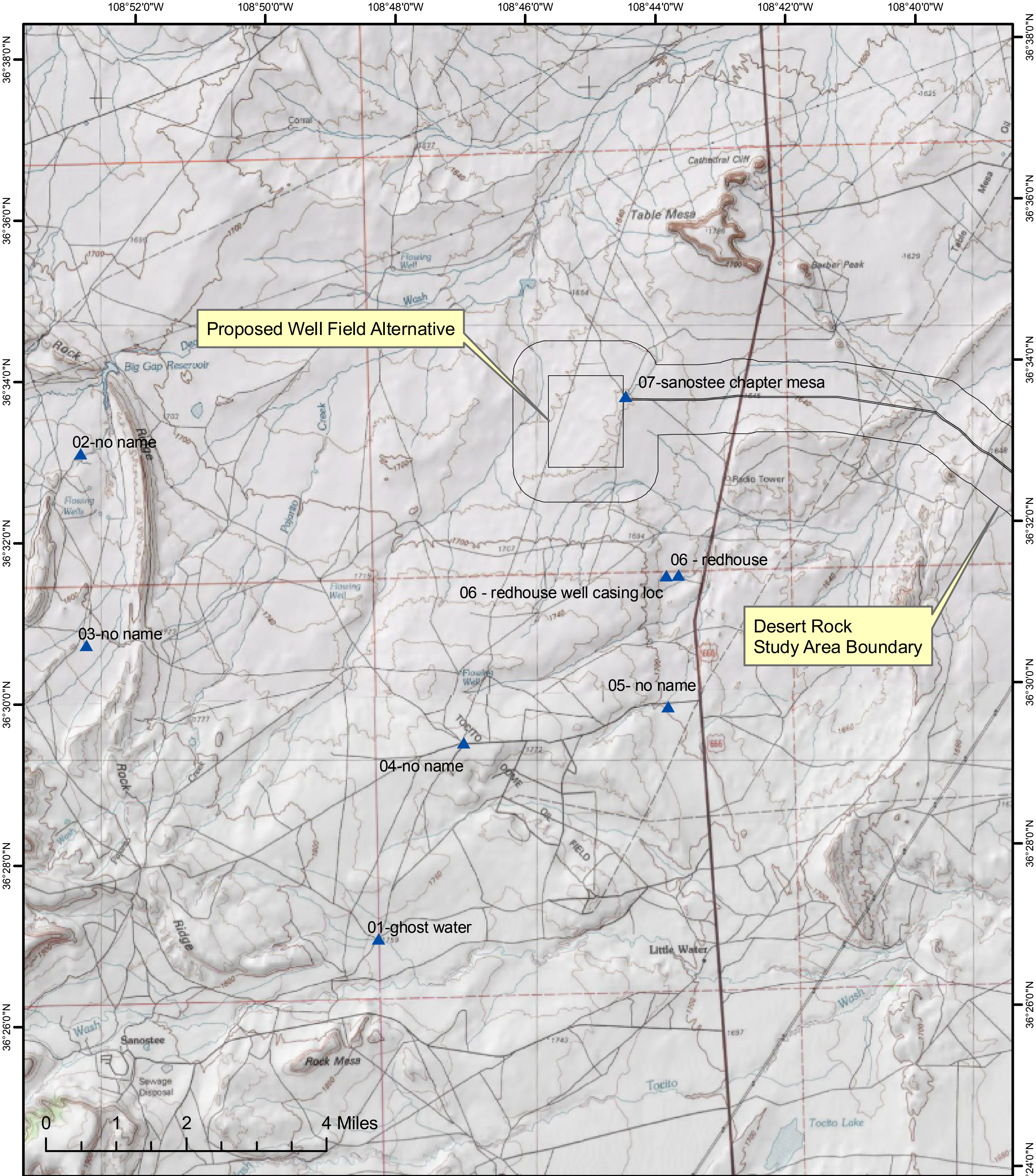
Table 1
Chemistry Comparison -Groundwater Produced from the Morrison Formation in the San Juan Basin vs. Sanostee Chapter Seeps and Springs
Desert Rock Energy Project, New Mexico

Parameter	Water Quality Data from 1948-1986 (Dam et. al, 1990)				Sanostee Water Well Analytical Results, 2006							Coefficient of Variation
	# of samples	Minimum	Maximum	Median	01	02	03	04	05	06	Average	
GENERAL CHEMISTRY												
Specific Conductance (us/cm)	52	300	6000	876	537	406	494	450	441	545	479	41%
Fluoride	50	0.2	7.7	0.6	1	0.3	0.2	0.3	0.2	0.3	0.4	31%
Nitrate (as nitrogen)	21	0.1	4.5	0.4	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	0.02	128%
Dissolved Solids (TDS)	52	116	5,000	614	255	205	210	220	220	285	233	64%
pH (standard units)	42	6.6	9.4	8.2	9.41	9.5	9.4	9.5	9.5	9.5	9.5	10%
											General Chemistry - Average Coefficient of Variation	***55%***
MAJOR ANIONS												
Alkalinity (as CaCO3)	56	10	670	200	226	187	238	214	214	202	214	5%
Sulfate	52	6	3,200	160	50	16	< 10	< 10	< 10	63	27	101%
Chloride	57	1.1	1,200	8.9	< 10	< 10	< 10	< 10	< 10	< 10	10	8%
											Major Anions - Average Coefficient of Variation	***38%***
MAJOR CATIONS												
Calcium	56	0.8	550	14	0.8	0.8	2	0.5	0.6	1	1	123%
Magnesium	53	0.1	62	3.7	< 0.5	<0.5	< 0.5	< 0.5	< 0.5	< 0.5	0.5	108%
Sodium	57	43	1,400	140	133	101	115	103	102	121	113	15%
Potassium	56	0.1	24	2	0.5	< 0.5	0.7	0.5	< 0.5	< 0.5	0.53	82%
											Major Cations - Average Coefficient of Variation	***82%***
OTHER METALS												
Arsenic	19	0.01	0.21	0.02	0.0005	0.0052	0.0114	0.0027	0.0045	0.0044	0.0048	87%
Iron	41	0.03	20	0.6	< 0.05	< 0.05	0.06	< 0.05	< 0.05	< 0.05	0.052	119%
Manganese	21	0.01	19	0.1	0.0005	0.0005	0.001	0.0006	0.0005	< 0.0005	0.0006	140%
											Other Metals - Average Coefficient of Variation	***115%***

Average Coefficient of Variation for all Constituents ***73%***

Explanation:
us/cm = microsiemens per centimeter at 25 degrees Celsius
Dissolved constituents are reported in milligrams per liter unless noted otherwise
Radium-226 is reported in Pico curies per liter
< = not detected above the laboratory's lower detection limit (LDL)

MILLER BROOKS Environmental, Inc.



DESERT ROCK ENERGY PROJECT

SANOSTEE CHAPTER WELL MONITORING LOCATIONS

DRAFT WORKING MAP

Figure 2 - Stiff Diagrams
Sanostee Wells, Springs, and Seeps
September 2006
Desert Rock, New Mexico

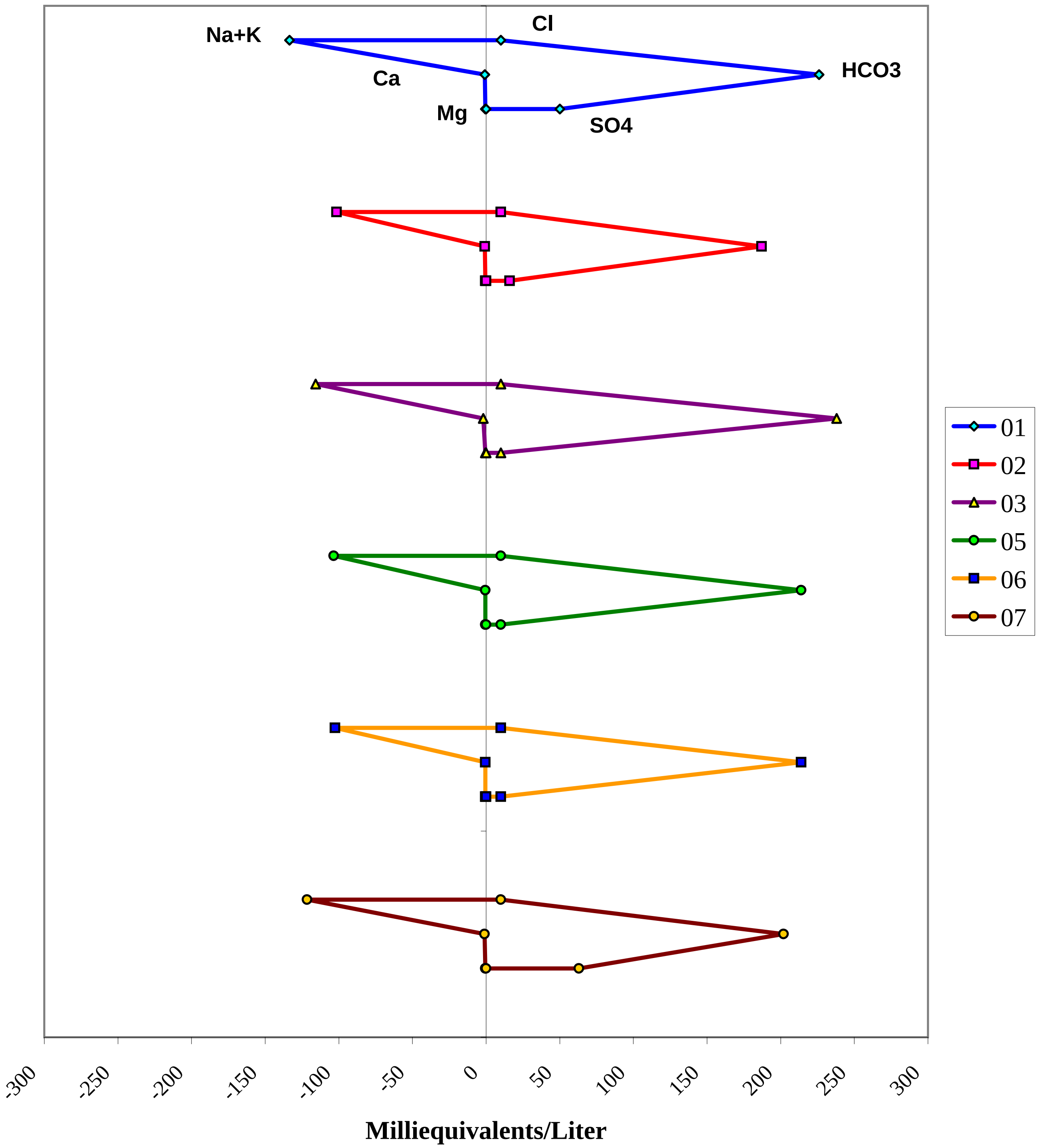
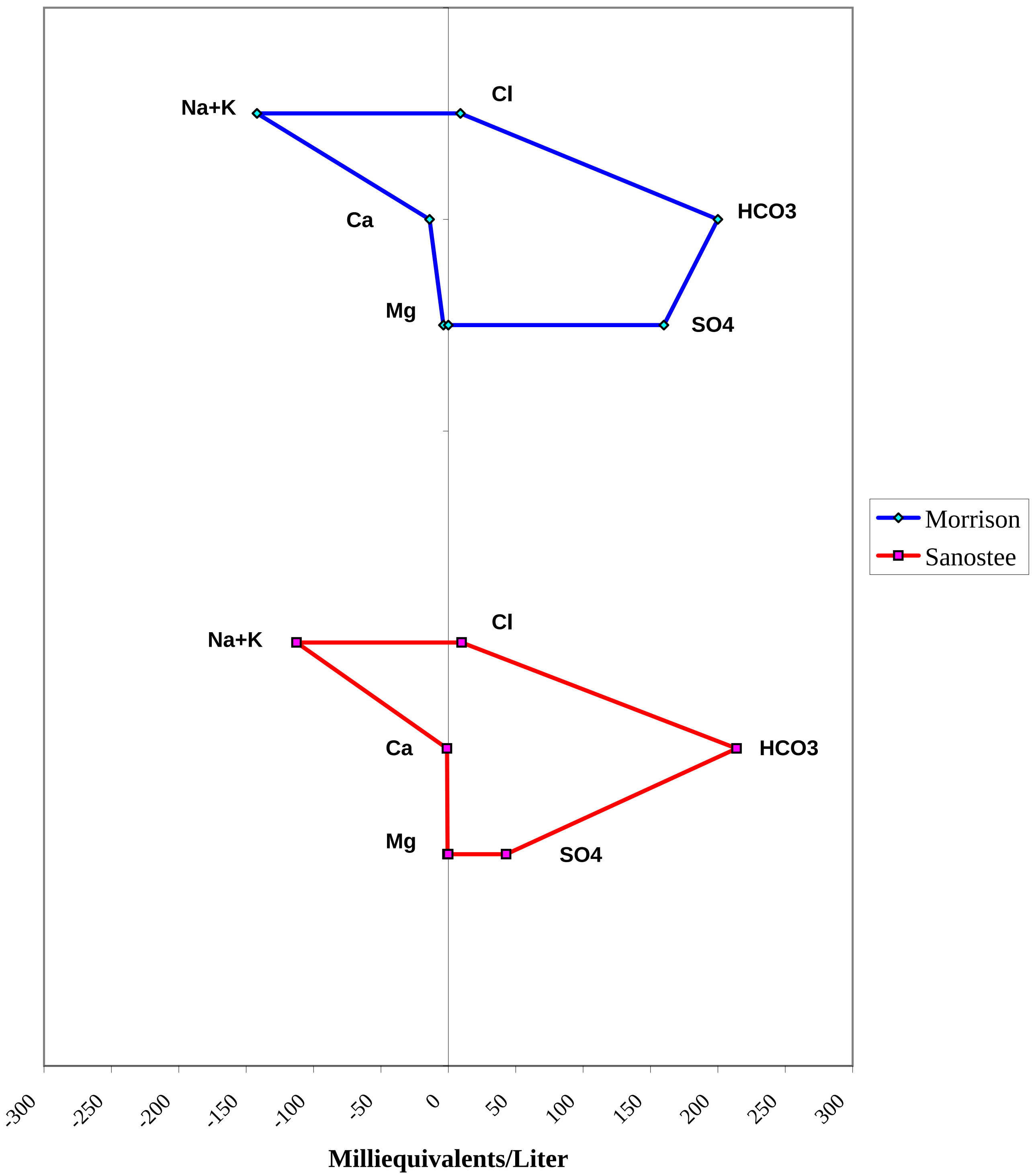


Figure 3 - Stiff Diagrams
Historical Morrison Wells vs. Sanostee Artesian Wells
Desert Rock, New Mexico



FID_	Comment	Max_PDOP	Max_HDOP	Corr_Type	Rcvr_Type	GPS_Date	GPS_Time	Update_Sta	GPS_Height	Vert_Prec	Horz_Prec	Std_Dev	Northing	Easting	Point_ID
	01-ghost water	1.89	1.2	Postprocessed Code	GeoXT	9/6/2006 0:00	11:39:41am	New	1758.63	0.6	0.5	8.50E-05	4036084.33	696303.61	1
	02-no name	2.09	1.1	Postprocessed Code	GeoXT	9/6/2006 0:00	12:45:01pm	New	1751.29	0.6	0.4	1.56E-04	4047215.11	689464.51	2
	03-no name	2.2	1.29	Postprocessed Code	GeoXT	9/6/2006 0:00	01:21:51pm	New	1810.22	0.7	0.5	4.87E-04	4042817.26	689600.24	3
	04-no name	3.79	2.59	Postprocessed Code	GeoXT	9/6/2006 0:00	01:59:11pm	New	1790.44	0.9	0.8	1.61E-04	4040587.84	698255.12	4
	05- no name	3.5	1.6	Postprocessed Code	GeoXT	9/6/2006 0:00	02:22:36pm	New	1699.63	1	0.5	2.85E-04	4041420.55	702950.47	5
	06 - redhouse	3.29	1.39	Postprocessed Code	GeoXT	9/6/2006 0:00	02:56:36pm	New	1668.73	1	0.5	2.26E-04	4044437.6	703189.76	6
	06 - redhouse well casing loc	5	1.5	Postprocessed Code	GeoXT	9/6/2006 0:00	03:03:36pm	New	1671.75	1.6	0.5	5.20E-05	4044415.35	702910.94	7
	07-sanostee chapter mesa	3.7	2	Postprocessed Code	GeoXT	9/6/2006 0:00	03:37:21pm	New	1683.32	1	0.7	3.35E-04	4048543.61	701980.12	8

Site	Conductivity (mS/cm)	Temp (deg C)	Note
01-ghost water	515	22.4	Artesian well. Open flow, no shut off. Trough runs to pond. Runs year round. Capped in the 1940's or 1950's. Known to taste of metallic substance.
02-no name	374	21.9	Hand pump/artesian well. Trough runs to dry pond. 12/8/15, 10/9/68 engraved on brass monument. Concrete bunker water tank of unknown storage capacity.
03-no name	452	22.3	Artesian well. Shut off valve engaged. Valve opened and allowed to flow for 5 minutes before sampled. Metal trough. Windmill 3T382 150 feet away.
04-no name	1828	34.3	Windmill pump/artesian well. Concrete trough. Not flowing, windmill locked. Water trickling at casing. Field measure taken inside of casing slot, no sample taken.
05-no name	406	26.7	Artesian well. Open flow, no shut off. Trough runs to pond/wetland. Runs year round. Known for good potability and livestock watering.
06-redhouse	397	28.7	Artesian well. Well piped to shut off valve at Redhouse residence. Drilled to approx 1400 feet in 1979 - info from onsite resident. Steady flow year round with pressure to power large lawn sprinkler. Sample taken from hose outlet.
07-sanostee chapter mesa	503	28.0	Artesian well. Open flow, no shut off. Trough runs to pond/wetland. Runs year round. 12/5/?2, 7/?/65 engraved on monument at casing.

Ecosphere Artesian Well Site Descriptions

Site 01: Ghost Water Well (Chii dii toh)
Physical Setting: Site is located on shallow southeast sloped swale. The site is an area with several dirt roads that intersect. The site is disturbed with limited vegetation.
Plant Community: Surrounding plant community is sparsely scattered four-winged saltbush, greasewood and alkali saccaton plant community. Disturbed areas have weedy plant species represented by summer cypress, false buffalograss, prostrate knotweed and Russian thistle.
Existing Well Facilities: Perennial artesian well with existing concrete well structure, 2 metal troughs and 2 overflow ponds nearby. The well provides water for livestock and small mammals. Navajo families that live in the region use the well for limited domestic use.

Site 02: Big Gap Well
Physical Setting: The well is located between the Hogback monoclinal ridge to the east and lateral extensive benches and mesas that surround the eastern foothills of Beautiful Mountain to the west. On site setting is characterized by a shallow east slope swale. Two large Chinese elm located to the east of the well, provides shade for livestock.
Plant Community: Three distinct plant community types occur within the spring location. The northwestern section is dominated by shadscale, New Mexico matted saltbush, broom snakeweed and alkali saccaton. The southeastern region is dominated by greasewood and limited alkali saccaton. A narrow riparian community exists next to the well housing the community consists of spikerush, aster and broadleaf plantain.
Existing Well Facilities: On the location are 2 metal water troughs, concrete spring housing, hand water pump and a large overflow pond to the southeast.

Site 03: Well # T382
Physical Setting: The site setting is characterized by a shallow southeast sloped swale in a broad open region. The site shows signs of sheetflow during excessive rainfall.
Plant Community: Plant community type within the spring location consists of sparse four-winged saltbush, alkali saccaton and Russian thistle.
Existing Well Facilities: The location has 2 metal water troughs, windmill, 1 large metal holding tank and 1 taller, smaller volume metal tank elevated several feet above the ground. This tank is utilized for domestic water.

Site 04: Well # 20
Physical Setting: The well is located next to a major dirt road intersection. A homesite is located 500-700 feet to the north.
Plant Community: Plant community nearby includes scattered four-winged saltbush, broom snakeweed, Greene’s rabbitbrush and alkali saccaton.
Existing Well Facilities: On the location are a windmill and metal elevated metal with a concrete water trough. The elevated tank is used for domestic water.

Site 05: No name or number
Physical Setting: The well is located on a shallow east sloped swale.
Plant Community: Vegetation cover type consists of four-winged saltbush, Bigelow’s rabbitbrush, broom snakeweed, alkali saccaton and galleta. A narrow riparian community extends to the northeast.
Existing Well Facilities: On the location are water troughs, well, and overflow pond.

Site 06: No well number or name
Physical Setting: The well is located next to an existing lawn surrounded by trees. The actual well is located approximately 1500 feet to the west. The water is piped down to near several homesites located in the immediate vicinity.
Plant Community: The vegetation cover consists of lawn grasses, weedy forbs, and Navajo willows.
Existing Well Facilities: On the location is a faucet, sprinkler, lawn and shade trees.

Site 07: No number or name.
Physical Setting: The well is located on the north side of a major dirt road. The site is on top of an elevated region with gentle slopes away from the well to the north, northeast and south.
Plant Community: The region surrounding the well is covered by salt desert scrub of matted saltbush, Castle Valley saltbush and sparse galleta. The region northeast of the site is and extended wetland with two large circular wetlands that occupy a large region before the large overflow pond to the northeast. The riparian vegetation cover includes spikerush, wirerush, rabbitfoot grass, alkali saccaton, scratchgrass and water speedwell.
Existing Well Facilities: On the location are wellhead, water trough, plus an extensive wetland to the northeast and a large overflow pond to the northeast.

Ecosphere Artesian Well GPS locations

FID_	**Comment**	Max_PDOP	Max_HDOP	Corr_Type	Rcvr_Type	**GPS_Date**	**GPS_Time**	Update_Sta
	01-ghost water	1.89	1.2	Postprocessed Code	GeoXT	**9/6/2006 0:00**	**11:39:41am**	New
	02-no name	2.09	1.1	Postprocessed Code	GeoXT	**9/6/2006 0:00**	**12:45:01pm**	New
	03-no name	2.2	1.29	Postprocessed Code	GeoXT	**9/6/2006 0:00**	**01:21:51pm**	New
	04-no name	3.79	2.59	Postprocessed Code	GeoXT	**9/6/2006 0:00**	**01:59:11pm**	New
	05- no name	3.5	1.6	Postprocessed Code	GeoXT	**9/6/2006 0:00**	**02:22:36pm**	New
	06 - redhouse	3.29	1.39	Postprocessed Code	GeoXT	**9/6/2006 0:00**	**02:56:36pm**	New
	06 - redhouse well casing loc	5	1.5	Postprocessed Code	GeoXT	**9/6/2006 0:00**	**03:03:36pm**	New
	07-sanostee chapter mesa	3.7	2	Postprocessed Code	GeoXT	**9/6/2006 0:00**	**03:37:21pm**	New
FID_	**Comment**	**GPS_Height**	Vert_Prec	Horz_Prec	Std_Dev	**Northing**	**Easting**	Point_ID
	01-ghost water	**1758.63**	0.6	0.5	8.50E-05	**4036084.33**	**696303.61**	1
	02-no name	**1751.29**	0.6	0.4	1.56E-04	**4047215.11**	**689464.51**	2
	03-no name	**1810.22**	0.7	0.5	4.87E-04	**4042817.26**	**689600.24**	3
	04-no name	**1790.44**	0.9	0.8	1.61E-04	**4040587.84**	**698255.12**	4
	05- no name	**1699.63**	1	0.5	2.85E-04	**4041420.55**	**702950.47**	5
	06 - redhouse	**1668.73**	1	0.5	2.26E-04	**4044437.6**	**703189.76**	6
	06 - redhouse well casing loc	**1671.75**	1.6	0.5	5.20E-05	**4044415.35**	**702910.94**	7
	07-sanostee chapter mesa	**1683.32**	1	0.7	3.35E-04	**4048543.61**	**701980.12**	8

Ecosphere Artesian Well Field Notes

Site	Conductivity (mS/cm)	Temp (deg C)	Note
01-ghost water	515	22.4	Artesian well. Open flow, no shut off. Trough runs to pond. Runs year round. Capped in the 1940's or 1950's. Known to taste of metallic substance.
02-no name	374	21.9	Hand pump/artesian well. Trough runs to dry pond. 12/8/15, 10/9/68 engraved on brass monument. Concrete bunker water tank of unknown storage capacity.
03-no name	452	22.3	Artesian well. Shut off valve engaged. Valve opened and allowed to flow for 5 minutes before sampled. Metal trough. Windmill 3T382 150 feet away.
04-no name	1828	34.3	Windmill pump/artesian well. Concrete trough. Not flowing, windmill locked. Water trickling at casing. Field measure taken inside of casing slot, no sample taken.
05-no name	406	26.7	Artesian well. Open flow, no shut off. Trough runs to pond/wetland. Runs year round. Known for good potability and livestock watering.
06-redhouse	397	28.7	Artesian well. Well piped to shut off valve at Redhouse residence. Drilled to approx 1400 feet in 1979 - info from onsite resident. Steady flow year round with pressure to power large lawn sprinkler. Sample taken from hose outlet.
07-sanostee chapter mesa	503	28.0	Artesian well. Open flow, no shut off. Trough runs to pond/wetland. Runs year round. 12/5/?2, 7/?/65 engraved on monument at casing.

GREEN
Analytical
Laboratories, Inc.

GAL ID No.: **609-037,01-06**

September 29, 2006

Ecosphere Environmental
2257 Main Ave
Durango, CO 81301
Attention:

Project Name:
Project Number:
Date Received: 09/08/06

This is to transmit the attached analytical report. The analytical data and information contained therein was generated using specified or selected methods contained in references, such as Standard Methods for the Examination of Water and Wastewater, 18th & 19th editions, and Methods for Determination of Organic Compounds in Drinking Water, EPA-600/4-79-020.

Samples were received by Green Analytical Laboratories, Inc. in good condition on 09/08/06.

If you should have any questions or comments regarding this report, please do not hesitate to call.

Sincerely,

Debbie Zufelt

FOR: John Green
Laboratory Director

Enclosure

75 Suttle Street, Durango, Colorado 81303
Telephone (970) 247-4220 Fax (970) 247-4227

Green Analytical Laboratories, Inc.
75 Suttle Street
Durango, CO 81303

Ecosphere Environmental
2257 Main Ave
Durango, CO 81301
Attention:

GAL I.D.: **609-037-01**
Date Received: 09/08/06
Date Reported: 09/29/06
QC Batches:

PROJECT NAME: Desert Rock Monitoring
PROJECT NUMBER:
SAMPLE I.D.: 01 - Ghost Water

Sample Date: 09/06/06
Sample Matrix: Water
Units: mg/L

Metals

RESULTS

PARAMETER	METHOD	REPORT LIMIT	RESULT	DILUTION
Arsenic	200.8	0.0005	0.0005	1
Calcium	200.7	0.5	0.8	1
Iron	200.7	0.05	<0.05	1
Magnesium	200.7	0.5	<0.5	1
Manganese	200.8	0.0005	0.0005	1
Potassium	200.7	0.5	0.5	1
Sodium	200.7	0.5	133	1
Hardness	Calc		<10	1

For: John Green, Laboratory Director

Green Analytical Laboratories, Inc.
75 Suttle Street
Durango, CO 81303

GAL I.D.: **609-037-01**
Date Received: 09/08/06
Date Reported: 09/29/06
QC Batches:

Ecosphere Environmental
2257 Main Ave
Durango, CO 81301
Attention:

PROJECT NAME: Desert Rock Monitoring
PROJECT NUMBER:
SAMPLE I.D.: 01 - Ghost Water

Sample Date: 09/06/06
Sample Matrix: Water

Wet Chemistry

RESULTS

PARAMETER	METHOD	REPORT LIMIT	RESULT	UNITS	DATE ANALYZED	ANALYST
Alkalinity as CaCO3	2320B	10	226	mg/L		
Chloride	4500CL	10	<10	mg/L		
Conductivity	2510B	1.0	537	uS/cm		
Fluoride	4500F C	0.2	1.0	mg/L		
Nitrate/Nitrite as N	353.3	0.02	<0.02	mg/L		
pH	150.1	NA	9.41	SU		
Sulfate	4500SO4	10	50	mg/L		
TDS	2540C	10	255	mg/L		

D-Zufelt
FOR: *John Green, Laboratory Manager*

Green Analytical Laboratories, Inc.
75 Suttle Street
Durango, CO 81303

GAL I.D.:	**609-037-02**
Date Received:	09/08/06
Date Reported:	09/29/06
QC Batches:	

Ecosphere Environmental
2257 Main Ave
Durango, CO 81301
Attention:

PROJECT NAME: Desert Rock Monitoring
PROJECT NUMBER:
SAMPLE I.D.: 02

Sample Date:	09/06/06
Sample Matrix:	Water
Units:	mg/L

Metals

RESULTS

PARAMETER	METHOD	REPORT LIMIT	RESULT	DILUTION
Arsenic	200.8	0.0005	0.0052	1
Calcium	200.7	0.5	0.8	1
Iron	200.7	0.05	<0.05	1
Magnesium	200.7	0.5	<0.5	1
Manganese	200.8	0.0005	0.0005	1
Potassium	200.7	0.5	<0.5	1
Sodium	200.7	0.5	101	1
Hardness	Calc		<10	1

D. Zufelt
for: *John Green, Laboratory Director*

Green Analytical Laboratories, Inc.
75 Suttle Street
Durango, CO 81303

Ecosphere Environmental
2257 Main Ave
Durango, CO 81301
Attention:

GAL I.D.: **609-037-02**
Date Received: 09/08/06
Date Reported: 09/29/06

QC Batches:

PROJECT NAME: Desert Rock Monitoring
PROJECT NUMBER:
SAMPLE I.D.: 02

Sample Date: 09/06/06
Sample Matrix: Water

Wet Chemistry

RESULTS

PARAMETER	METHOD	REPORT LIMIT	RESULT	UNITS	DATE ANALYZED	ANALYST
Alkalinity as CaCO3	2320B	10	187	mg/L		
Chloride	4500CL	10	<10	mg/L		
Conductivity	2510B	1.0	406	uS/cm		
Fluoride	4500F C	0.2	0.3	mg/L		
Nitrate/Nitrite as N	353.3	0.02	<0.02	mg/L		
pH	150.1	NA	9.5	SU		
Sulfate	4500SO4	10	16	mg/L		
TDS	2540C	10	205	mg/L		

D. Zufelt
For: *John Green, Laboratory Manager*

Green Analytical Laboratories, Inc.
75 Suttle Street
Durango, CO 81303

GAL I.D.: **609-037-03**
Date Received: 09/08/06
Date Reported: 09/29/06
QC Batches:

Ecosphere Environmental
2257 Main Ave
Durango, CO 81301
Attention:

PROJECT NAME: Desert Rock Monitoring
PROJECT NUMBER:
SAMPLE I.D.: 03

Sample Date: 09/06/06
Sample Matrix: Water
Units: mg/L

Metals

RESULTS

PARAMETER	METHOD	REPORT LIMIT	RESULT	DILUTION
Arsenic	200.8	0.0005	0.0114	1
Calcium	200.7	0.5	2.0	1
Iron	200.7	0.05	0.06	1
Magnesium	200.7	0.5	<0.5	1
Manganese	200.8	0.0005	0.0010	1
Potassium	200.7	0.5	0.7	1
Sodium	200.7	0.5	115	1
Hardness	Calc		<10	1

D. Zufelt
for: John Green, Laboratory Director

Green Analytical Laboratories, Inc.
75 Suttle Street
Durango, CO 81303

Ecosphere Environmental
2257 Main Ave
Durango, CO 81301
Attention:

GAL I.D.: **609-037-03**
Date Received: 09/08/06
Date Reported: 09/29/06

QC Batches:

PROJECT NAME: Desert Rock Monitoring
PROJECT NUMBER:
SAMPLE I.D.: 03

Sample Date: 09/06/06
Sample Matrix: Water

Wet Chemistry

RESULTS

PARAMETER	METHOD	REPORT LIMIT	RESULT	UNITS	DATE ANALYZED	ANALYST
Alkalinity as CaCO3	2320B	10	238	mg/L		
Chloride	4500CL	10	<10	mg/L		
Conductivity	2510B	1.0	494	uS/cm		
Fluoride	4500F C	0.2	0.2	mg/L		
Nitrate/Nitrite as N	353.3	0.02	<0.02	mg/L		
pH	150.1	NA	9.40	SU		
Sulfate	4500SO4	10	<10	mg/L		
TDS	2540C	10	210	mg/L		

For John Green, Laboratory Manager

Green Analytical Laboratories, Inc.
75 Suttle Street
Durango, CO 81303

GAL I.D.: **609-037-04**
Date Received: 09/08/06
Date Reported: 09/29/06
QC Batches:

Ecosphere Environmental
2257 Main Ave
Durango, CO 81301
Attention:

PROJECT NAME: Desert Rock Monitoring
PROJECT NUMBER:
SAMPLE I.D.: 05

Sample Date: 09/06/06
Sample Matrix: Water
Units: mg/L

Metals

RESULTS

PARAMETER	METHOD	REPORT LIMIT	RESULT	DILUTION
Arsenic	200.8	0.0005	0.0027	1
Calcium	200.7	0.5	0.5	1
Iron	200.7	0.05	<0.05	1
Magnesium	200.7	0.5	<0.5	1
Manganese	200.8	0.0005	0.0006	1
Potassium	200.7	0.5	0.5	1
Sodium	200.7	0.5	103	1
Hardness	Calc		<10	1

For: D. Zufelt
John Green, Laboratory Director

Green Analytical Laboratories, Inc.
75 Suttle Street
Durango, CO 81303

Ecosphere Environmental
2257 Main Ave
Durango, CO 81301
Attention:

GAL I.D.: **609-037-04**
Date Received: 09/08/06
Date Reported: 09/29/06
QC Batches:

PROJECT NAME: Desert Rock Monitoring
PROJECT NUMBER:
SAMPLE I.D.: 05

Sample Date: 09/06/06
Sample Matrix: Water

Wet Chemistry

RESULTS

PARAMETER	METHOD	REPORT LIMIT	RESULT	UNITS	DATE ANALYZED	ANALYST
Alkalinity as CaCO3	2320B	10	214	mg/L		
Chloride	4500CL	10	<10	mg/L		
Conductivity	2510B	1.0	450	uS/cm		
Fluoride	4500F C	0.2	0.3	mg/L		
Nitrate/Nitrite as N	353.3	0.02	<0.02	mg/L		
pH	150.1	NA	9.50	SU		
Sulfate	4500SO4	10	<10	mg/L		
TDS	2540C	10	220	mg/L		

D. Zufelt
for: *John Green, Laboratory Manager*

Green Analytical Laboratories, Inc.
75 Suttle Street
Durango, CO 81303

GAL I.D.: **609-037-05**
Date Received: 09/08/06
Date Reported: 09/29/06
QC Batches:

Ecosphere Environmental
2257 Main Ave
Durango, CO 81301
Attention:

PROJECT NAME: Desert Rock Monitoring
PROJECT NUMBER:
SAMPLE I.D.: 06 - Residence

Sample Date: 09/06/06
Sample Matrix: Water
Units: mg/L

Metals

RESULTS

PARAMETER	METHOD	REPORT LIMIT	RESULT	DILUTION
Arsenic	200.8	0.0005	0.0045	1
Calcium	200.7	0.5	0.6	1
Iron	200.7	0.05	<0.05	1
Magnesium	200.7	0.5	<0.5	1
Manganese	200.8	0.0005	0.0005	1
Potassium	200.7	0.5	<0.5	1
Sodium	200.7	0.5	102	1
Hardness	Calc		<10	1

D. Zufelt
For: *John Green, Laboratory Director*

Green Analytical Laboratories, Inc.
75 Suttle Street
Durango, CO 81303

Ecosphere Environmental
2257 Main Ave
Durango, CO 81301
Attention:

GAL I.D.: **609-037-05**
Date Received: 09/08/06
Date Reported: 09/29/06
QC Batches:

PROJECT NAME: Desert Rock Monitoring
PROJECT NUMBER:
SAMPLE I.D.: 06 - Residence

Sample Date: 09/06/06
Sample Matrix: Water

Wet Chemistry

RESULTS

PARAMETER	METHOD	REPORT LIMIT	RESULT	UNITS	DATE ANALYZED	ANALYST
Alkalinity as CaCO3	2320B	10	214	mg/L		
Chloride	4500CL	10	<10	mg/L		
Conductivity	2510B	1.0	441	uS/cm		
Fluoride	4500F C	0.2	0.2	mg/L		
Nitrate/Nitrite as N	353.3	0.02	<0.02	mg/L		
pH	150.1	NA	9.50	SU		
Sulfate	4500SO4	10	<10	mg/L		
TDS	2540C	10	220	mg/L		

D. Zufelt
For: John Green, Laboratory Manager

Green Analytical Laboratories, Inc.
75 Suttle Street
Durango, CO 81303

Ecosphere Environmental
2257 Main Ave
Durango, CO 81301
Attention:

GAL I.D.: **609-037-06**
Date Received: 09/08/06
Date Reported: 09/29/06

QC Batches:

PROJECT NAME: Desert Rock Monitoring
PROJECT NUMBER:
SAMPLE I.D.: 07

Sample Date: 09/06/06
Sample Matrix: Water
Units: mg/L

Metals

RESULTS

PARAMETER	METHOD	REPORT LIMIT	RESULT	DILUTION
Arsenic	200.8	0.0005	0.0044	1
Calcium	200.7	0.5	1.0	1
Iron	200.7	0.05	<0.05	1
Magnesium	200.7	0.5	<0.5	1
Manganese	200.8	0.0005	<0.0005	1
Potassium	200.7	0.5	<0.5	1
Sodium	200.7	0.5	121	1
Hardness	Calc		<10	1

For: D-Zufelt
John Green, Laboratory Director

Green Analytical Laboratories, Inc.
75 Suttle Street
Durango, CO 81303

GAL I.D.: **609-037-06**
Date Received: 09/08/06
Date Reported: 09/29/06

QC Batches:

Ecosphere Environmental
2257 Main Ave
Durango, CO 81301
Attention:

PROJECT NAME: Desert Rock Monitoring
PROJECT NUMBER:
SAMPLE I.D.: 07

Sample Date: 09/06/06
Sample Matrix: Water

Wet Chemistry

RESULTS

PARAMETER	METHOD	REPORT LIMIT	RESULT	UNITS	DATE ANALYZED	ANALYST
Alkalinity as CaCO3	2320B	10	202	mg/L		
Chloride	4500CL	10	<10	mg/L		
Conductivity	2510B	1.0	545	uS/cm		
Fluoride	4500F C	0.2	0.3	mg/L		
Nitrate/Nitrite as N	353.3	0.02	<0.02	mg/L		
pH	150.1	NA	9.50	SU		
Sulfate	4500SO4	10	63	mg/L		
TDS	2540C	10	285	mg/L		

D. [signature]
For John Green, Laboratory Manager

Green Analytical Laboratories, Inc.

CHAIN OF CUSTODY RECORD

Page 1 of 1

Client: Ecosphere Environmental
Contact: Tyler Scheid
Address: 2257 Main Ave. 81301
Phone Number: 970-382-7256
FAX Number:

NOTES:
1) Ensure proper container packaging.
2) Ship samples promptly following collection.
3) Designate Sample Reject Disposition.
PO#
Project Name: Desert Rock Monitoring

Table 1. – Matrix Type
1 = Surface Water, 2 = Ground Water
3 = Soil/Sediment, 4 = Rinsate, 5 = Oil
6 = Waste, 7 = Other (Specify) ______

FOR GAL USE ONLY
GAL JOB # 609-037

Samplers Signature: [signature]

Lab Name: Green Analytical Laboratories, Inc. (970) 247-4220 FAX (970) 247-4227
Address: 75 Suttle Street, Durango, CO 81303

Sample ID	Collection Date	Collection Time	Collected by: (Init.)	Matrix Type From Table 1	No. of Containers	Sample Filtered ? Y/N	Unpreserved (Ice Only)	HNO3	HCL	H2SO4	NAOH	Other (Specify)	per quote									Comments
1. 01 - Ghost Water	9/6	11:39am	TPS	2	3								X									e-mail
2. 02	9/6	12:45pm	TPS	2	3								↓									scheid@ecosphere-services.com
3. 03	9/6	1:21pm	TPS	2	3																	
4. 05	9/6	2:22pm	TPS	2	3																	
5. 06 - Residence	9/6	3:03pm	TPS	2	3																	
6. 07	9/6	3:37pm	TPS	2	3																	
7.																						
8.																						
9.																						
10.																						

Relinquished by:	Date:	Time:	Received by:	Date:	Time:
[signature]	9/8/2006	11:14am	[signature]	9-08-06	11:14

* Sample Reject: [ ] Return [ ] Dispose [ ] Store (30 Days)