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North Eunice Chromate Remediation Phase One Study

ChevronTexaco Exploration and Production
Eunice, New Mexico, Lea County

January 30, 2004

ARCADIS

Infrastructure, buildings, environment, communications

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Introduction

ChevronTexaco Exploration and Production Inc. (ChevronTexaco) has retained ARCADIS G&M (ARCADIS) to conduct remedial activities at the Eunice #2 (North) Gas Plant (Site). This report is intended to address the requirements of the Discharge Permit Renewal (GW-4) issued by the Oil Conservation Division (OCD) and dated June 25, 2003. The following report and its attachments summarize remediation activities at the Site; a brief work plan is also included in the final section outlining future activities.

As of the date of this correspondence, groundwater remediation activities at the Site have included the installation of three injection wells and their associated monitoring wells at locations southwest of the plant site and the initiation of the injection of soluble carbon substrates for the remediation of chromate impacted groundwater. The purpose of these wells is to evaluate the effectiveness of this remediation method and the practicality of a full-scale remediation system (Phase 1). In addition, installation has begun on a line of injection wells and associated monitor wells located at the observed distal end of the chromate plume to the east-northeast of the Site (Phase 2).

The injection of a soluble carbohydrate substrate in the three southwest injection wells began in June of 2003. This report will primarily present the preliminary results of the three southwest injection wells and outline the work plan for interception and treatment of the distal end of the chromate plume with the east-northeast injection wells.

The Phase 1 study was designed to determine the effectiveness of the soluble carbon substrate technology in the remediation of the chromium in the complex multi-layer groundwater hydrogeologic system. In Phase 2, injection wells are being situated perpendicular to the path of groundwater flow and will be utilized to treat the distal (downgradient) end of the chromate plume. Phase 2 will utilize the hydrodynamic and biogeochemical information gathered from Phase 1, and the data gathered from Phase 1 and Phase 2 will be used to optimize the design and implementation the full-scale system. Results of the Phase 1 study, to date, have been encouraging but for the most part inconclusive. Additional time and effort will be needed to fully evaluate the effects of the injected fluids on the aquifer.

ARCADIS began its investigations at the Site in 2001 on behalf of ChevronTexaco. Activities since that time have included the installation of 53 monitoring wells, 3 recovery wells and 2 injection wells. Prior to the involvement of ARCADIS in the environmental evaluation of the Site, another contractor had conducted an initial investigation of the soil and groundwater. The prior investigation began in 1995 and continued through 2000. The reports associated with the earlier investigations will not be discussed in this report although the data gathered in the previous studies have been incorporated in the project database and used in the subsequent analyses.

The new and existing wells have been sampled and the samples analyzed. Aquifer testing has also been conducted on selected wells. A comprehensive summary of the results of the current groundwater investigation conducted by ARCADIS from 2001 through the May-June 2003 sampling event at the Site was reported to the in a report entitled *Groundwater Investigation Summary Report, ChevronTexaco Eunice #2 (North) Plant, Eunice, Lea County, New Mexico,* dated October, 9, 2003.

Site Background and Location

A former gas plant (constructed in the 1940s) was operated on the Site. The Site is no longer being operated as a gas plant. It is located approximately 0.25 miles north of Eunice, New Mexico, in the south half (S/2) of the southeast quarter (SE/4) of the northeast quarter (NE/4) of Section 28, Township 21 South (T-21-S), Range 37 East (R-37-E) and the northern portion of the NE/4 of the SE/4 of Section 21, T21-S, R-37-E. The plant has been partially dismantled, and is currently being operated as a compressor station by Dynegy Midstream Services, L.P. (Dynegy). Figure 1 presents the Site location map.

Physical Characteristics Of The Area

The following sections identify the physical characteristics of the Site and surrounding area including the physiological, topographical, geological and hydrological conditions.

Physiology

The Site lies in southern Lea County in the Pecos Valley section of the Great Plains physiographic province. The Site lays within the Eunice Plain, which is bounded by the South Plain to the south, the Rattlesnake Ridge to the east, the High Plains to the northeast, the Laguna Valley and Grama Ridge Area to the northwest, the San Simon Ridge and San Simon Swale to the west and the Antelope Ridge Area to the southwest. An estimated 80% of southern Lea County is covered by sand. Shin oak, bear grass and bur-grass dominate the areas of sand cover. Elsewhere, the vegetation is grama grass, bur-grass and mesquite.

Topography

Monument Draw is the only major surface drainage feature in southern Lea County. The draw runs north-northwest to south-southeast slightly over two miles east of the Site. The basic topography in the area of the plant slopes gently to Monument Draw at an approximate dip of 35 feet per mile. Small closed basins or playas exist on this sloping surface. The sewage treatment plant for the town of Eunice lies approximately 4,300 feet southeast of the southeast corner of the Site and northeast of the center of Eunice.

Geology

The geologic formations of interest at the Site include (from oldest to youngest): the Triassic Chinle; Cretaceous undifferentiated; Tertiary Ogallala; and Quaternary alluvium, designated the Blackwater Draw Formation. Of particular interest with regard to the impact of constituents of concern (COCs) released to groundwater are the Tertiary Ogallala and the Quaternary Blackwater Draw.

Triassic Chinle Formation

The Triassic Chinle is composed of red and green claystone, with minor fine-grained sandstones and siltstones. It is found to exist under all of the eastern part of southern Lea County, thinning to the west and absent in the extreme western part of the county. The Chinle forms the base of the fresh groundwater due to the formation's low vertical (and generally horizontal) permeability that impedes most vertical groundwater movement into the formation. The top of the Chinle (base of the Ogallala Aquifer) is an erosional surface that rises in elevation from west to east under the plant site. Just east of the plant, the Chinle top begins to dip down, toward Monument Draw.

Cretaceous Formations Undifferentiated

The Cretaceous formations, undifferentiated, have almost all been removed by erosion and are essentially nonexistent in the Site area. The only known exposure of Cretaceous rocks consists of large slump blocks of limestone in a gravel pit east of the town of Eunice. Semi-consolidated sands and gravels of possible lower Cretaceous, the equivalent of the Paluxy sand, have been described from exposures in gravel pits east of Eunice. However, the sand and gravel sequence also has characteristics of the Tertiary Ogallala described below. The Cretaceous has not been encountered at the Site.

Tertiary Ogallala Formation

The lower Tertiary Ogallala Formation is composed of fluvial sediments of the Miocene-Pliocene epochs. It is a heterogeneous combination of clay, silt, sand and gravel of braided-stream deposits interbedded with, and overlain by, eolian sediments deposited as sand sheets and loess resting directly upon an erosional surface carved into the Triassic Chinle Formation under the Site. The fluvial sediments were deposited on a sloping plain in the form of coalescing alluvial fans, by streams that originated in the Rocky Mountains to the west and northwest. The Ogallala Formation was deposited in laterally-restricted lenses of material, predominantly medium to yellowish-gray conglomeratic sandstone and fine to medium-grained well-sorted sandstone. The primary fresh water-bearing formation under and in the vicinity of the plant site is the Ogallala.

In contrast to the fluvial deposition of the lower Ogallala sediments, the upper part of the Ogallala and all of the Blackwater Draw Formation overlying the Ogallala are composed of windblown (eolian) deposits. In exposures and cores described in the literature, the very fine sand facies of the upper Ogallala are thick, ranging up to 125 feet, and are capped by the Caprock caliche or calcrete. The Caprock caliche marks the top of the Ogallala.

Quaternary Blackwater Draw Formation

The Blackwater Draw Formation occurs as a mantle of Quaternary eolian sediment locally as thick as 100 feet, covering an area of the Southern High Plains of northwestern Texas and eastern New Mexico. Throughout the depositional time of the Blackwater Draw, laterally restricted lenticular layers of eolian and playa or lacustrine facies were formed. The Blackwater Draw occurs near the ground surface at the plant site and contains reddish sediments composed of up to six well-developed buried soils with similar features of lithology and morphology. The soil development occurred during periods of landscape stability, separated by intermittent periods of deposition, or by deflation that stripped surface horizons from newly developed soils.

Hydrology

The primary source of fresh water at the Site is the Ogallala Formation. It is bounded on the base of the aquifer by the lowest geologic unit described in the Site investigations, a firm red silty clay of the Chinle Formation. Overlying this unit is a 5 to 10 foot interval of gravel/sand/clay, which in this study is informally termed the "deep" water-bearing zone in the Ogallala aquifer. The gravel unit is in turn overlain by a red to yellow sand that exhibits vertical heterogeneity with alternating layers of loose and well-consolidated sand. This overlying unit constitutes the "shallow-middle" water-bearing zone. Wells screened in the gravel unit have 40 to 50 feet of hydraulic head. Wells screened in the shallow-middle water-bearing zone of the groundwater have screens that intersect the groundwater table and typically have 10 to 45 feet of saturation. Overall depth to groundwater varies roughly with local topography and ranges from 37 to 73 feet below the surface.

Regionally, the groundwater gradient is to the southeast. However, a water table high exists south of the plant site, creating a hydraulic gradient that has southwest, west, northwest, north, and northeast trends (See Figure 3). The elevations of the groundwater in the shallow-middle and deep zones are similar, indicating that there is hydraulic conductivity between the zones. The maps included in this report show the water table elevation contours and resulting directions of groundwater flow occurring at the time of various water level measurements throughout the period of study at the Site. The groundwater in the subject area may extend into the eolian portion of the upper Ogallala, but lies below the Blackwater Draw Formation.

Hydraulic Conductivity Testing

Pumping tests were conducted prior to the development of the three primary injection sites. The aquifer pumping tests were designed to determine the hydraulic characteristics in two of the three zones in the Ogallala Aquifer where COCs had been identified. Two pumping tests (RW002 and RW003) were performed in the shallow Ogallala zone, and one pumping test (RW004A) was performed in the deep Ogallala zone. Each pumping test was monitored in three nearby observation wells: one well screened in the shallow zone; one well screened in the middle zone; and one well screened in the deep zone. Data gathered from these tests has allowed ARCADIS personnel to better understand the hydraulic interconnection between the shallow, middle and deep zones in the Ogallala. The locations of the monitor and recovery wells (MW008, MW008M, MW008A, MW011, MW011M, MW011A, MW012, MW012M and MW012A) are presented on Figure 2. The results of the pumping tests were used to determine hydraulic parameters including hydraulic conductivity, transmissivity and storage coefficient. These parameters are principal factors of aquifer performance and are used to better define the hydraulic properties of the Ogallala Aquifer at the Site in support of remediation efforts. The following sections present the aquifer pumping test procedures and results.

Aquifer Pumping Test Procedures

A constant-rate pumping test was performed at each of three recovery wells (RW002, RW003 and RW004A). For each pumping test, the pumping rate and the drawdown in the pumping well were recorded. Drawdown was also observed and recorded in the three associated observation wells at specific time intervals. The drawdown data was then analyzed to determine conductivity, transmissivity and the storage coefficient. Drawdown measurements were measured at specific time intervals by use of an in-well data logger connected to pressure transducers. Timing devices were synchronized so the time of each reading could be referenced accurately to the exact time that pumping began. ARCADIS personnel monitored drawdown measurements and recorded pumping rates frequently (at start up of the test and at regular intervals thereafter) to ensure that all equipment was operating properly. Barometric pressure readings were also monitored throughout the test. In addition, preliminary drawdown data was plotted during the course of the pumping test to identify apparent anomalies and to help determine when equilibrium conditions had been reached. Recovery data was recorded in the pumping well to verify the accuracy of the pumping data. Recovery measurements were also recorded with the same frequency as those taken during the pumping test.

Aquifer Pumping Test Results

Drawdown data from the constant-rate pumping tests were analyzed and values calculated for the hydraulic conductivity, transmissivity and storage coefficient (see Appendix A). It was concluded from the drawdown and recovery data that there is hydraulic conductivity between all three zones. When the shallow recovery wells were tested, the middle zone monitor wells reflected drawdown associated with the pumping of the shallow well. Similarly, when the deep zone recovery well was pump tested, the middle zone monitor well also reflected the drawdown associated with the pumping of the deep recovery well. However, the deep zone pumping did not impact the shallow zone, and the shallow zone pumping did not impact the deep zone. This is possibly the result of insufficient time elapsing before the pumping tests were terminated.

The groundwater level monitoring associated with the routine sampling of the wells at the Site has revealed similar water level elevations between the shallow and the deep zones. This similarity supports the conclusion that there is hydraulic conductivity between these zones, as illustrated in the hydraulic gradient maps, and as indicated by the pumping test results. The pumping tests indicate that the groundwater velocity is almost 100 times greater in the shallow zone than in the deep zone, 23 to 33 feet per year (ft/yr) versus 0.4 to 0.5 ft/yr, respectively.

In Situ Chromate Remediation

Prior to our current efforts, remediation at the Site was taking place via natural attenuation processes that remove both petroleum hydrocarbons and chromate. In areas where chromate and petroleum hydrocarbon impacts intermix, chromate has been removed by biochemical reduction driven by reactions with the petroleum hydrocarbon constituents. Chromate is also removed to a lesser degree by reaction with limited concentrations of native organic carbon, and limited concentrations of reducing inorganic constituents such as ferrous iron. In addition to the natural processes at the Site, an aggressive chromate remediation program has been initiated at three study areas located to the southwest of the plant, within plant property (MW008A, MW011 and MW012 locations) and east of the plant at the distal end of the chromate plume.

In the case of the chromate, in situ biological stimulation will be utilized to convert Cr^{+6} to insoluble and innocuous Cr^{+3}, exploiting some processes that are unique to the biological systems as well as processes more akin to those utilized for the treatment of chromate-laden industrial wastewater.

Remediation of groundwater impacted with chromate will be implemented by the use of injection wells through which reagents will be introduced to stimulate biological activity that will cause the reduction of Cr^{+6} to insoluble Cr^{+3} by primary and secondary processes. The primary reagents will be soluble carbon substrates that will serve to stimulate biological activity, that will in turn produce low redox conditions. A variety of carbon substrates are available for use. Carbon substrate and other soluble sugars are quick reacting, rapidly establishing the desired reducing conditions. Other carbon substrates, such as whey, offer similar reaction chemistry, but in a slow release form. Other materials have even slower reaction chemistry allowing increased active life in the aquifer and increased transport distances from individual injection points.

Chromate reduction will also take place by reaction with reduced inorganic species produced as a by-product of the stimulated primary bacterial activity. The dominant inorganic species produced by this process will be ferrous iron, with lesser concentrations of sulfides. Both can be produced by microbial action on iron-and sulfate-containing minerals in the native mineral matrix. Additional sources of reducing iron and sulfur species will naturally reside in the carbon substrates utilized, particularly in molasses. In the areas of the chromate plume that are the most distal from the injection points, the stimulated chromate reducing reactions are likely to be dominated by the presence of these reduced inorganic species. In some cases the economics offered by an enhanced radius of influence may justify the use of intentional supplementation of the injected carbon substrate with soluble iron or sulfate salts. The efficacy of iron as an inorganic reducing agent is particularly high for this type of application. When the ferrous iron reacts with chromate to form the Cr^{+3} species, it is oxidized to ferric iron. The ferric iron in the presence of a soluble carbon substrate is in turn biologically reduced to ferrous iron, beginning the chromate remediation cycle anew. This process works with great efficiency and significantly minimizes the requirement for supplemental inorganic reagents.

The implementation of the injection system for the underlying clayey gravel unit is likely to be more complex. This unit is relatively thin, with a typical thickness of ten to fifteen feet. At its bottom, it is in unconformable contact with Triassic clays and silts, and at its top, it is in contact with the Ogallala Sand. It is not uncommon in units of this type, with high permeability contrasts, for there to be zones of preferential transport at the contact. The pumping tests performed to date indicate that the hydraulic conductivity of the clayey gravel is approximately three orders of magnitude less than that of the overlying Ogallala Sand. While no direct testing has been done, it is likely that the hydraulic conductivity of the Triassic clays and silts is at least another three orders of magnitude less than that of the clayey gravel. With such contrasts in hydraulic conductivity, it may be necessary to have injection wells that are discretely screened at either the upper or lower contacts of the clayey gravel, discretely across the core of the clayey gravel, or (the simplest option if possible) with a continuous screen across the lower contact, the vertical extent of the clayey gravel layer, and its upper contact.

The site assessment has shown a distribution of chromate within the lower clayey gravel unit that is not possible (given the timeframes of the release and groundwater velocities that are in the range of 0.1 foot per year) assuming that transport has simply been horizontally through the interior of the unit. It is most likely that transport has taken place through secondary porosity that vertically transects the clayey gravel unit. The ideal injection program will be designed to naturally exploit these features, if present. This would consist of a focus for the injection of the reactive solutions along the lower and upper contact. With sufficient volumes and reagent concentrations, secondary porosity could be exploited. In addition, high chemical concentration gradients will stimulate high rates of diffusion and osmotic flow (possible because of the clay constituents) into the interior.

The evaluation of the injection of soluble carbon substrates for in-situ remediation of soluble chromate must include determination of key design parameters that fall into general categories, as well as, specific issues within each. These include:

- The hydrodynamics of the water-bearing zones to be treated.
    - The magnitude of lateral dispersion as injection solutions are carried away from an injection point.
    - The impact of vertical and horizontal heterogeneity under pressure injection conditions.

- The possible impact of hydraulic gradients induced by proximal extraction wells or water flood injection wells.

- The impact of the injected carbon substrates on the biogeochemical state of the treatment zones and ultimate efficacy of chromate remediation.
  - How long will it take to create oxidation-reduction potential (ORP) conditions that are at a minimum iron reducing?
  - Will the rate of chromate reduction vary with continued decreases of ORP, the use of supplemental iron, or type of carbon substrate?
    - What is the most cost effective approach (taking into account reagent costs versus duration of effort)?

- The transport properties of the carbon substrate.
  - The rate of carbon substrate consumption under relatively static flow conditions.
    - This is driven by the rate at which the indigenous bacterial populations can grow given stimulation.
  - The rate of carbon substrate consumption under flowing conditions.
    - The above, as well as the effective porosity of the treatment zone, and the existing bacterial population numbers drive this.

- The effect of the chemistry of the carbon substrate on the rate of biological utilization.
  - It must be sufficiently bioactive to stimulate the required ORP conditions given the local groundwater velocity.
  - It should not be so bioactive that it is consumed within a short distance from the injection point.

- The attenuation rates of chromate under treatment conditions and the geochemical parameters which will govern the reduction of soluble hexavalent chromium to the insoluble trivalent form.

The answers to the above issues are in many cases interrelated. This study is by definition a largely empirical process that is designed to cost effectively yield the design parameters required given the complexity of the inter-related processes described above. The injection arrays are located and screened to exploit these physical chemical processes using an iterative process that evaluates the effect of injection wells as they are installed and operated.

Phase 1 Groundwater Remediation Study

The first phase of groundwater remediation activities at the Site began with the installation of three injection wells and their associated monitoring wells at locations southwest of the plant site and the initiation of the injection of soluble carbon substrates for the remediation of chromate-impacted groundwater. The purpose of these wells is to evaluate the effectiveness of this remediation method and the practicality of a full-scale remediation system. The physical key to the success of the injection program is the design and location of the injection well arrays. It is possible that several distinct vertical zones of injection will be required. It is likely that the upper and middle zones of the Ogallala Sand will be combined into one injection zone.

Injection and Monitor Well Layout

The complex water-bearing zone is being evaluated with three separate injection locations. Detailed maps of the three injection sites (MW011, MW012 and MW008A) with total and hexavalent chromium concentrations are presented in Figures 4, 5 and 6 respectively.

The configuration of the three well systems can be outlined as follows:

MW011 Area (Shallow/Middle Injection)

- Injection Well 1 (IW001) – Screened between 40 to 95 feet.
  - Terminates at surface of clayey gravel.

- Monitor Well 11 (MW011) – Screened between 47 and 62 feet.
  - Terminates in sand unit.
  - Located 38 feet from the injection well.
- Monitor Well 11M (MW011M) – Screened between 80 to 90 feet.
  - Terminates in sand unit.
  - Located 36 feet from the injection well.
- Monitor Well 11A (MW011A) – Screened between 107.5 and 115.0 feet.
  - Terminates in Triassic redbed.
  - Located 40 feet from the injection well.
- Recovery Well 2 (RW002) – Screened between 48 and 68 feet.
  - Terminates in sand unit.
  - Located 15 feet from the injection well.

<u>MW012 Area (Shallow/Middle Injection)</u>

- Injection Well 2 (IW002) – Screened between 40 to 90 feet.
  - Terminates two feet above lower clayey gravel.
- Monitor Well 12 (MW012) – Screened between 45 and 65 feet.
  - Terminates in sand unit.
  - Located 36 feet from the injection well.

- Monitor Well 12M (MW012M) – Screened between 80 and 90 feet.
  - Terminates in sand unit.
  - Located 38 feet from the injection well.
- Monitor Well 12A (MW012A) – Screened between 106.1 and 113.6 feet.
  - Terminates in Triassic redbed.
  - Located 28 feet from the injection well.
- Recovery Well 3 (RW003) – Screened between 45 and 65 feet.
  - Terminates in sand unit.
  - Located 15 feet from the injection well.

MW008A Area (Deep Injection)

- Injection Well is Recovery Well 004A (RW004A) – Screened between 95 and 115 feet.
  - Terminates in Triassic redbed.
- Monitor Well 8 (MW008) – Screened between 46.6 and 66.1 feet
  - Terminates in sand unit.
  - Located 28 feet from the injection well.
- Monitor Well 8M (MW008A) – Screened between 75 to 85 feet
  - Terminates in sand unit.
  - Located 24 feet from the injection well.

- Monitor Well 8A (MW008A) – Screened between 105.5 and 113.4 feet
    - In Triassic redbed.
    - Located 16 feet from the injection well.

This configuration is designed to evaluate the hydraulic characteristics of the upper and mid levels of the sand unit (Shallow Zone) as well as the intrinsic characteristics of the gravelly clay (Deep Zone) and its relationship with the overlying sand unit. The primary difference between the three systems is the screened interval of the injection well. Injection Well 1 (IW001) contacts the upper surface of clayey gravel. Injection Well 2 (IW002) is screened only in the sand unit. Injection Well 3 (RW004A) terminates in the Triassic redbed and transects the clayey gravel but does not contact the overlying sand units.

Injection Program

The injection program began with the injection of 200 gallons of 10% carbon substrate into each of the three injection wells. Since the beginning of the study, injection volumes and concentrations have increased to 500 gallons of 15% carbon substrate into the deep well set and 1000 gallons of 15% carbon substrate into the two shallow/middle well sets.

Based on the size of the chromate plume, and given the relatively flat hydraulic gradients at the site, it is possible that there is heterogeneity expressed as preferential pathways either in the sand unit, the clayey gravel unit, or where the sand unit contacts the clayey sand unit.

This complex hydrogeologic system has been previously evaluated with the performance of a series of pumping tests. The hydraulic performance of the system under injection conditions could be distinctly different than that seen under pumping conditions. This difference is due to the effect of an injection head versus localized head reduction under pumping conditions. Under pumping conditions an extreme hydraulic gradient may be on the order of 0.5 foot of vertical gradient to one foot of horizontal distance (0.5 foot per foot). This is two orders of magnitude greater than a gradient commonly seen under natural flow conditions (i.e., 0.01 foot per foot).

Under injection conditions, the maximum pressure of injection is approximately 0.5 pound per square inch (PSI) per foot of depth to prevent the stimulation of hydrofracturing. For purposes of calculating the injection pressures, the top of the gravel pack in the well was used. This is the point at which hydrofracturing would most likely occur if pressure was applied to the well. The maximum injection pressure to be applied at the ground surface to IW001, IW002 and RW004A is 10 PSI, 10 PSI and 20 PSI, respectively.

Aside from the hydraulic gradient, two additional factors affecting the groundwater velocity are porosity and hydraulic conductivity. The porosity is typically 20 to 30%. However, the hydraulic conductivity can vary over seven orders of magnitude. Providing a source of hydraulic head that may be up to four orders of magnitude above the natural gradient can possibly result in preferential transport within the aquifer over significant distances. This in turn can have significant impact on the ultimate spacing of injection wells and injection well arrays.

The initial monitoring interval is designed to detect this type of preferential transport in the system. As the program matures, the initial effects of any preferential transport will be overwhelmed by the general stimulation between the preferential pathways in the geologic matrix. Sampling intervals will be appropriately lengthened.

As an additional aid to this hydrogeologic evaluation, a bromide tracer was used during the initial injection. The concentration of the bromide tracer began at 300 mg/L. In the event that the bromide signal is masked by the natural bromide concentration of the water-bearing zone, the bromide tracer concentrations may be increased to, but will not exceed, 1,100 mg/L. The use of a conservative tracer may offer an enhanced transport signal between the injection wells and the various screened intervals in the monitor well networks. Bromide concentrations prior to introduction of the tracer, and subsequent concentrations are listed in Tables 3, 4 and 5.

If it appears that there is significant transport through preferential pathways, there may be some effort in the latter stages of the test to evaluate the potential of alternative injection technologies. During the course of the study, wells used for pumping tests can also be used to create enhanced flow conditions by pumping, if required.

Monitoring Program

In addition to monitoring water levels, it is critical to monitor the biogeochemistry of the groundwater in the test treatment zone. This allows for the quantitative evaluation of the type of carbon substrate that will be required, the concentration of carbon substrate injection solutions, and the interval between injection events. The monitoring program falls into two broad categories. The first are field parameters and the second are parameters that require laboratory analysis. Table 1 summarizes both types of parameters, as they are to be applied during the test.

The need and use for each of the analytical parameters can be outlined as follows:

- The field parameters provides instant data on conditions that, in many cases, are so sensitive to ambient ORP conditions that they would not remain stable during shipment to the laboratory. In particular, this includes the oxidation-reduction potential (ORP), dissolved oxygen, ferrous iron and sulfides. Low-flow sampling procedures and a multiprobe sampling head are being used to further facilitate the evaluation of these sensitive parameters.

- Analyses of total and dissolved chromium evaluate the effectiveness of the chromium removal process. These analyses speciates the chromium (differentiate between Cr^{+6} and Cr^{+3}).

- Total alkalinity, TDS, chlorides, calcium, sodium, magnesium and potassium provide information concerning general groundwater quality as well as aid in identifying groundwaters that may be of different origins.

- Bromide is part of the tracer program.

- Analysis for arsenic evaluates the potential impact of the program on other oxy-anionic species present in the mineral matrix.

- Nitrate, nitrite, ammonia and phosphate analyses provide information on trace nutrient levels in the treatment zone as well as the Redox impact of nitrate.

- Iron, manganese, sulfate and sulfides analyses are important indicators of the redox state of the water-bearing zones before and after treatment.

- Total organic carbon provides information on the condition and concentration of the soluble carbon substrate.

- The permanent gases provide information on the level of biologic activity, as well as the type of activity.

As the program is implemented and dynamic biogeochemical feedback becomes available, the monitoring and injection program may be modified appropriately.

Well Design, Development And Sampling

Injection and monitoring well design and construction as well as the development and sampling of these wells, were all governed by the specific characteristics of the hydrogeological unit penetrated and the intended purpose of the well. The design, construction, development and sampling details for each well type are discussed in the following sections. Drilling was conducted by Scarborough Drilling Company of Lamesa, Texas. An air/water rotary drilling rig was utilized for the drilling of all wells.

Monitoring Well Design

Monitor wells were located downgradient from the injection wells in order to observe the effectiveness of the carbon substrate reagent in the groundwater. Three or four monitor wells were grouped with each of the three injection wells. The design and construction of the monitoring wells vary due to the site-specific geology. The wells were completed at varying depths and located at varying distances from the injection wells.

Monitoring well nomenclature is based upon the well construction. Monitoring wells with screened intervals in the shallow or shallow/middle portion of the aquifer have a numeric suffix. Three monitoring wells with screened intervals only in the middle portion of the aquifer have an "M" suffix. Monitoring wells with screened intervals in the deep portion of the aquifer have an "A" suffix. All monitor wells were drilled with an air/water rotary drilling rig and completed with 4-inch PVC casing and 0.020-inch PVC mill-slotted screen. The screens are gravel packed with 8/16 silica sand to a point approximately three to five feet above the top of the screen. Three to five feet of bentonite has been placed on top of the gravel pack, and the balance of the annular space between the casing and borehole wall has been grouted to the surface with a five-percent bentonite/cement slurry, circulating to the surface. A 3-foot by 3-foot concrete slab six inches thick has been placed around the casing for both flush-mount wells and

wells with risers and steel, locking, protective sleeves. Each well has been developed by bailing and subsequent pumping until cleared of suspended material and lost drilling fluid was recovered.

At the time the wells were drilled, drill cuttings were analyzed by an ARCADIS geologist on all wells drilled under ARCADIS supervision. Well locations and the top of the casing elevations have been surveyed by a State of New Mexico Registered Surveyor. Well logs showing subsurface lithologic descriptions and well completion data have been drafted and are located in Appendix B.

Injection Well Design

Of the three injection wells (IW001, IW002, and RW004A) operating as of the date of this report, two (IW001 and IW002) were constructed specifically for the IRZ Remediation Phase 1 Study and one of the deep recovery wells (RW004A) was converted to an injection well because of its location and construction. All of these injection wells are located to the southwest of the plant site. These wells are serving as injection points for the introduction of the IRZ carbon substrate fluids into the groundwater-bearing unit. IW001 and IW002 are completed at a total depth of 90f eet below ground level (bgl) and screened from 35-90 feet bgl. The screened intervals incorporate the shallow/middle portion of the aquifer. The well construction consists of 4-inch diameter flush-joint Schedule 40 PVC casing with 0.020-inch, mill slotted screen, an 8/16 silica sand filter pack and a hydrated bentonite seal. The well annulus has been grouted to the surface with 5 percent bentonite-cement slurry. A 3-foot by 3-foot by six-inch concrete foundation has been constructed and a 3-foot tall locking protective sleeve installed around each wellhead.

RW004A was completed at 115-feet bgl and screened to 95-feet bgl. This well, prior to its conversion to an injection well, was used to evaluate the deep water-bearing unit. The well was constructed with 6-inch diameter flush-joint Schedule 40 PVC casing with 0.020-inch, PVC mill-slotted screen, 8/16 silica sand filter pack and a hydrated bentonite seal. The well annulus is grouted to the surface with 5 percent bentonite-cement slurry. A 3-foot by 3-foot by 0.5-foot concrete foundation has been constructed and a 3-foot tall locking protective sleeve installed around each wellhead.

A State of New Mexico Registered Surveyor has surveyed the well locations and top of casing elevations. Drill cuttings were analyzed by an ARCADIS geologist during the drilling of the wells, and well logs showing subsurface lithologic descriptions and well

completion data have been drafted. Well logs for the injection wells are located in Appendix B.

Well Development

During the well construction, drilling fluids were introduced into the well bore to maintain the integrity of the hole while drilling. Wells were developed upon installation. The well development was intended to remove any fluids introduced to the well and the aquifer during installation as well as to remove suspended sand, silt or clay. Initially, each well was bailed to remove settled sand, silt or clay. Following the bailing, the wells were purged with a submersible pump for approximately three hours or until 1,000 gallons were removed. Additionally, purging continued until pH, temperature, and conductivity values of the groundwater had stabilized.

Well Sampling

Following well installation and development, groundwater samples were collected. Samples were collected using disposable bailers to minimize potential for cross-contamination between sampling locations.

Groundwater samples were analyzed for BTEX, TPH, dissolved hexavalent chromium, arsenic, barium, bromide, cadmium, chromium (Total), lead, mercury, selenium, silver, general groundwater chemistry and major ions. The analytical methods for these samples are contained in the following sections.

Groundwater Level Monitoring

Water level measurements are collected for the purpose of mapping the water table and determining the hydraulic gradient. These measurements are taken prior to purging or sampling of the monitor wells. The depth to water from the established measuring point for each well is measured using a battery-powered water level meter. Measurements for each well are taken from the same permanent, clearly marked, surveyed reference point (measuring point) marked on the top of the PVC casing. The depths to water are recorded to the nearest hundredth of a foot. The elevation of the water level with respect to mean sea level is calculated and reported to the nearest hundredth of a foot.

Each groundwater monitoring event includes a measurement of the water level in each monitor well, recovery well and water well available at the time of the monitoring event. Currently there are 93 monitor wells, four recovery wells, five water wells and two injection wells available for water level collection.

The water level meter is decontaminated prior to its use in each well. Decontamination is conducted using a low phosphate, laboratory-grade detergent followed by a deionized water rinse. The measurement probe is inspected for proper operation prior to each groundwater monitoring event. This ensures that accurate measurements of the water level are made during each event. In addition, the total depth of the well and the casing stickup above ground surface are measured on each well.

Groundwater Sampling

This section describes the field methods and procedures used during the groundwater sampling events conducted during the course of this investigation. These methods and procedures cover purging, field parameter collection and field documentation including field forms and field notes

Low-Flow Purging of Wells

Low-flow purging of wells to be sampled was initiated early in the current investigation to provide more consistent and representative samples and to reduce the volume of waste from the purging process. This technique, approved by the United States Environmental Protection Agency (EPA), has been used for the sampling of all injection wells and their associated monitoring wells to prevent the displacement of the carbon substrate in the well.

The following low-flow purging procedures are followed:

1. Prior to sampling, each monitor well is purged at a low flow rate. This is achieved by pumping groundwater in such a manner as to minimize drawdown and until monitored field parameters stabilize in the purged water;

2. A 2-inch air-driven bladder pump is used for the low-flow purging procedure;

3. To minimize cross-contamination, a new disposable bladder is installed on the pump during the decontamination process and prior to placing the pump in the next well; and

4. Each well has dedicated tubing.

Collection of Field Parameters

Stabilization of the groundwater during the low-flow purging process is established by monitoring field parameters. The equipment used for the field measurements is calibrated at least once during each day of the sampling event. Field parameters are collected with a QED Micropurge Basics ™ MP20D multi-meter. Low-flow purging of each well to be sampled continues until the field measurements of pH, temperature, specific conductance, oxidation-reduction potential and dissolved oxygen of the purged water has stabilized within a specified range of the previous measurements. The specified ranges for the measured parameters are:

1. Dissolved oxygen and pH: plus or minus 0.2 units;

2. Specific conductance: plus or minus 0.02 units; and

3. Oxidation-reduction potential: plus or minus 20 units.

During purging, water levels are measured to monitor drawdown in the well. In addition, field tests for ferrous iron and hydrogen sulfide are conducted using HACH ™ test kits. A summary of the field parameters collected is presented in Table 2.

Documentation of Field Activities

Field documentation includes preprinted field forms as well as field notes completed by the sampling personnel. Pre-printed well sampling logs are used to record the field parameters. In addition, color, odor, appearance, pumping rate, pump settings, purge times, sampling times and any other pertinent observations are recorded. All information related to a sampling event is recorded in bound field notebooks. The entries in the field notebook are recorded with black indelible ink. Information recorded in the field notes includes the project, location, date, time, weather conditions, name and identity of sampling personnel and all other pertinent notes.

Groundwater Analytical Methods and Procedures

This section discusses the methods and procedures utilized for sample collection, sample containers, preservation of the samples, sampling order and sample labeling. Analytical methods including shipment of samples to the analytical laboratory and field analytical methods are also discussed.

Sample Collection

The methods and procedures associated with sample collection include sample container selection, preservation, filtration and the order in which samples will be collected.

The volume of samples and types of sample containers used depend on the parameters to be analyzed. The EPA guidelines for sample containers, preservation, holding times, etc. (as presented in Table 1) are adhered to during sampling events conducted at this Site. Some of the primary elements of the EPA guidelines adhered to in the sampling events conducted during the current investigation are:

1. All samples are kept at, or below, a temperature of 4° Celsius (°C) from the time of collection until delivery to the analytical laboratory.

2. Samples for analysis of dissolved metals, including dissolved hexavalent chromium, are filtered in the field. Filtration is accomplished using a disposable 0.45-micron filter. Acid is added to the containerized sample as a preservative.

3. After purging the well, the time elapsed before collecting the water sample is as short as possible to avoid variations in groundwater chemistry.

4. If contamination is known to be present in one or more of the monitor wells at the Site, sampling begins with the well known to be the least contaminated and ended with the well that was most contaminated. Where no contamination is known or suspected, sampling proceeded from the well with the highest water level elevation (upgradient) to the one with the lowest water level elevation (downgradient).

5. In addition, the sample containers are filled in the following order based on volatilization sensitivity: volatile organic compounds (VOCs); semi-volatile organic compounds (SVOCs); metals; and other inorganic parameters.

Sample Labeling

All sample containers are labeled with the well identification number, site identification, analyses to be performed, preservatives used, date and time of sample collection, and name of sampler. This information is written with indelible ink.

Sample Storing, Packing and Transporting

After sample collection, all samples are kept cold (at 4°C) and transported to the laboratory by overnight courier under standard custody protocols. Shipment of samples to the laboratory is done daily due to applicable holding times. The samples are placed in re-sealable bags and packed in a cooler containing ice in sufficient quantity to maintain the temperature at 4°C. A material such as vermiculite is used in the cooler to prevent or minimize the likelihood of container breakage. The cooler itself is secured using reinforced shipping tape.

Proper chain-of-custody (COC) documentation accompanies the samples from the field to the analytical laboratory. Each party handling the samples, from sampler to the laboratory, sign the COC form to document the possession of the samples at all times. Individuals relinquishing and receiving the samples are required to sign, date and note the time of transfer on the COC form. The COC documentation also contains data and information for each sample, including sample identification, well number, date and time of sample collection, preservatives used and the analyses to be performed. In addition, all sample coolers are sealed using a signed custody seal to prevent tampering or provide direct evidence in the event of tampering.

Analytical Methods

The methods used for analysis of water samples collected for the current groundwater monitoring program are documented in Standard Methods for Examination of Water and Wastewater, 18th edition, 1992 or EPA SW-846.

Waste Disposal

Wastewater generated from the development, sampling and testing of monitor, recovery, injection and water wells is characterized and disposed of in two ways: 1) wastewater is drummed and stored on location and periodically removed by oil-field vacuum truck for disposal into a NMOCD-permitted deep injection well; or 2) wastewater is also disposed of in the plant wastewater sump along with plant wastewater.

Phase 1 Conclusions

Injection of the carbon substrate (a diluted molasses solution) began in June of 2003. The following is a review of the results to date:

MW011 Area (Shallow/Middle Injection)

Laboratory and field analysis have indicated a response to the injected carbon substrate.

Injection well IW001 has demonstrated a reduction in hexavalent and total chromium. Hexavalent chromium concentrations have been reduced from 0.391 mg/L to less than 0.01 mg/L. Total dissolved chromium concentrations have been reduced from 4.1 mg/L to 0.32 mg/L. All geochemical analytical results are presented in Table 3. In addition, measured field parameters indicate a reduction in ORP, and an increase in iron. This data indicates that a reducing environment has developed in the aquifer. Bromide concentrations in the area of the injection well continue to be reduced significantly with each sampling event, indicating that the bromide tracer is being transported into the aquifer and is being transported with the reagent away from the well bore. Field parameters are presented in Table 2. The results of the laboratory analysis are presented in Table 3.

Monitor well MW011A has demonstrated a reduction in hexavalent and total chromium. Hexavalent chromium concentrations have been reduced from 0.354 milligrams per liter (mg/L) to 0.061 mg/L. Total dissolved chromium concentrations have been reduced from 0.38 mg/L to 0.1 mg/L. In addition, measured field parameters indicate a reduction in ORP, and an increase in both iron and sulfide. This data indicates that a reducing environment has developed in the aquifer.

MW012 Area (Shallow/Middle Injection)

Laboratory and field analysis have indicated a response to the injected carbon substrate.

Injection well IW002 has demonstrated a reduction in hexavalent and total chromium. Hexavalent chromium concentrations have been reduced from 3.28 mg/L to less than 0.01 mg/L. Total chromium concentrations have been reduced from 4.02 mg/L to 0.15 mg/L. All geochemical analytical results are presented in Table 4. In addition, measured field parameters indicate a reduction in ORP, and an increase in iron. This data indicates that a reducing environment has developed in the aquifer. Bromide concentrations in the area of the injection wells continue to be reduced significantly with each sampling event, indicating that the bromide tracer is being transported into the aquifer and is being transported with the reagent away from the well bore. Field parameters are presented in Table 2. The results of the laboratory analysis are presented in Table 4.

Monitor well MW012A has demonstrated a reduction in hexavalent and total chromium. Hexavalent chromium concentrations have, with a single exception, remained below the laboratory quantitation limit of 0.005 mg/L. A hexavalent chromium concentration of 0.35 was noted during the July 30, 2003 sampling. Total chromium concentrations have remained below the laboratory quantitation limit of 0.05 mg/L. However, measured field parameters indicate a reduction in ORP and an increase in both iron and sulfide. This data indicates that a reducing environment has developed in the aquifer.

MW008A Area (Deep Injection)

Laboratory and field analysis have indicated a response to the injected carbon substrate. Injection well RW004A has demonstrated a reduction in hexavalent and total chromium. Hexavalent chromium concentrations have been reduced from 4.62 mg/L to less than 0.01 mg/L. Total chromium concentrations have been reduced from 5.43 mg/L to 0.23 mg/L. All geochemical analytical results are presented in Table 5. In addition, measured field parameters indicate a reduction in ORP, and an increase in iron. This data indicates that a reducing environment has developed in the aquifer. Bromide concentrations in the area of the injection wells continue to be reduced significantly with each sampling event, indicating that the bromide tracer is being transported into the aquifer and is being transported with the reagent away from the well bore. Field parameters are presented in Table 2. The results of the laboratory analysis are presented in Table 5.

Monitor well MW008A has demonstrated a reduction in hexavalent and total chromium. Hexavalent chromium concentrations have been reduced from 7.8 mg/L to 2.0 mg/L. Total dissolved chromium concentrations have been reduced from 5.6 mg/L to 3.19 mg/L. Field parameters have not indicated a significant response to the injected reagent.

No other significant responses have been noted in the other monitor wells. No increase in bromide concentration, indicating the arrival of the tracer in the monitor wells, has been observed to date. To date the results of the Phase 1 study have been encouraging but inconclusive.

Phase 2 Work Plan

The purpose of the Phase 2 work plan is to define the implementation of the chromate remediation system at the distal-end of the defined chromate plume. This includes initial well layout, injection program and monitoring.

The distal end of the chromate plume presents a significantly different hydrogeologic setting than that seen in the source area where the three ongoing IRZ pilot studies are located. The surface of the underlying Triassic red beds increases in elevation along the path that the chromate plume is traveling to the ENE. Both the sand and gravely clay units above the Triassic red beds decrease in thickness, and any significant differences between the upper, middle and lower units in the sands disappears. Lastly, the saturated thickness of the upper water-bearing unit also decreases.

Based on the data collected to date, the surface of the Triassic red beds forms a ridge at or near the distal end of the current chromate plume. The saturated interval progressively thins, and then begins to thicken again downgradient of the Triassic crest as well as to the north and south of that crest. It is likely that the topography incised into the Triassic in this area is reflective of an incision associated with ancient erosion associated with Monument Draw. The incision has subsequently been buried with sediments that have collected in the Draw under the more recent arid conditions.

This unique hydrogeologic setting presents a different set of problems and opportunities for the implementation of an In-situ Reactive Zone (IRZ) remediation system. Concerns include:

- Rapid groundwater velocities with the potential for the rapid further migration of the chromate plume.
- The complex three-dimensional matrix offers potential preferential pathways to the north and south of the existing chromate plume trend.

The opportunities presented by this setting include:

- Rapid transport of injected carbon substrates. This will in turn allow for a much more rapid evaluation (compared to the source area systems) of the specifics of:
    - The rate of carbon substrate consumption and its subsequent downgradient distance of influence.
    - The downgradient distal effect of chromate reducing inorganic species associated with the IRZ.

- A rapid assessment of the values for hydraulic dispersion at the distal end treatment zone.
    - Given these velocities, the dominant component of dispersion that will be present will be due to mechanical mixing by interaction with the granular matrix, rather than mixing and diffusion. Given the rate of carbon substrate consumption in these systems a more accurate assessment of the mechanical diffusion component is of more value to the design process. This setting will allow for accurate isolation of the mechanical dispersion component.
- A rapid assessment of the effects of heterogeneity on the transport of reagents and IRZ modified groundwater during and following injection events.

In summary, it is fortunate that the distal end of the chromate plume occurred at a point where there is a significant shift in hydraulic regime. Remediation and capture can take place before the significantly higher groundwater velocities, evident on the eastern side of the Triassic high, can impact further migration. In addition, the presence of this regime allows for the implementation of a remediation system that will rapidly yield results that will not only be applicable to the distal end of the chromate plume, but to areas in the source area as well.

Configuration of the Field Study

The physical key to the injection program is the design and location of the injection well arrays. With regard to the distal-end, one vertical zone of injection will be required. The shallow, middle and deep zones will be treated as one unit.

The use of injectable soluble carbon substrates for the remediation of chromate impacted groundwater at the Eunice facility must take into account the effects of the following site-specific factors:

- Hydrogeology at the macro and micro scale;
- Geochemistry of the groundwater and mineral matrix; and

- Microbial consortia present in the subsurface and the dynamic processes that can be stimulated in them.

The most efficient design and implementation of a remediation program requires accommodation for the above conditions. When the size of the impacted area is large, the most economic and accurate method to gather data concerning the three key characteristics is to perform field scale tests. This work plan describes how the tests will be conducted.

The site assessment has shown a distribution of chromate within the lower clayey gravel unit that is not possible (given the time frames of the release and groundwater velocities that are in the range of 0.1 foot per year) assuming that transport has simply been horizontally through the interior of the unit. It is most likely that transport has taken place through secondary porosity that vertically transects the clayey gravel unit. The ideal injection program will be designed to naturally exploit these features, if present. This would consist of a focus for the injection of the reactive solutions along the lower and upper contact. With sufficient volumes and reagent concentrations, secondary porosity could be exploited. In addition, high chemical concentration gradients will stimulate high rates of diffusion and osmotic flow (possible because of the clay constituents) into the interior.

The evaluation of the injection of soluble carbon substrates for in-situ remediation of soluble chromate must include determination of key design parameters that fall into general categories, as well as, specific issues within each. Stated in Phase I on pages 9, 10 and 11 these include:

- The hydrodynamics of the water-bearing zones to be treated.
    - The magnitude of lateral dispersion as injection solutions are carried away from an injection point.
    - The impact of vertical and horizontal heterogeneity under pressure injection conditions.
    - The possible impact of hydraulic gradients induced by proximal extraction wells or water flood injection wells.

- The impact of the injected carbon substrates on the biogeochemical state of the treatment zones and ultimate efficacy of chromate remediation.
    - How long will it take to create ORP conditions that are at a minimum iron reducing?
    - Will the rate of chromate reduction vary with continued decreases of ORP, the use of supplemental iron, or type of carbon substrate?
        - What is the most cost-effective approach (taking into account reagent costs versus duration of effort)?
- The transport properties of the carbon substrate.
    - The rate of carbon substrate consumption under relatively static flow conditions.
        - This is driven by the rate at which the indigenous bacterial populations can grow given stimulation.
    - The rate of carbon substrate consumption under flowing conditions.
        - This is driven by the above, as well as the effective porosity of the treatment zone, and the existing bacterial population numbers.
- The effect of the chemistry of the carbon substrate on the rate of biological utilization.
    - It must be sufficiently bioactive to stimulate the required ORP conditions given the local groundwater velocity.
    - It should not be so bioactive that it is consumed within a short distance from the injection point.
    - The attenuation rates of chromate under treatment conditions and the geochemical parameters, which will govern the reduction of soluble hexavalent chromium to the insoluble trivalent form.

The answers to the above issues are in many cases interrelated. A study is by definition a largely empirical process that is designed to cost effectively yield the design parameters required given the complexity of the inter-related processes described above. The injection arrays are located and screened to exploit these.

Injection and Monitor Well Layout

The complex water-bearing zone will be evaluated with an array of fully penetrating injection wells and monitoring wells located perpendicular to the hydraulic gradient. An isopleth map of the measured hydraulic gradient is presented in Figure 3. The injection and monitor well configuration is designed to evaluate the hydraulic characteristics of the upper and mid levels of the sand unit (Shallow Zone) as well as the intrinsic characteristics of the gravelly clay (Deep Zone).

Well Design, Development, and Monitoring

Well design, development, and monitoring will be similar to those procedures outlined in Phase 1.

Injection Program

The development of the injection program for the Phase 2 wells will be similar to, but will build upon the data gathered from, the Phase 1 wells. Based on the size of the chromate plume, and given the increasing hydraulic gradients at the distal end of the Site, it is possible that there is heterogeneity expressed as preferential pathways either in the sand unit, the clayey gravel unit, or where the sand unit contacts the clayey sand unit. Therefore injection volumes and concentrations of the carbon substrate may be well specific.

As the program is implemented and dynamic biogeochemical feedback becomes available, the monitoring and injection program may be modified appropriately. The next report in this series will include proposed modifications to the remediation program and a report on the project's progress.

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Tables

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Table 1
Field Laboratory Analyte List
ChevronTexaco Eunice #2 (North) Gas Plant
Eunice, Lea County, New Mexico

Parameter	Analytical Method	Container and Preservation	Holding Times	Reporting Limits (mg/L)
Field Parameters				
Dissolved Oxygen	Field Probe	NA	Immediate	NA
Redox potential	Field Probe	NA	Immediate	NA
pH	Field Probe	NA	Immediate	NA
Temperature	Field Probe	NA	Immediate	NA
Specific Conductance	Field Probe	NA	Immediate	NA
Iron, ferrous	HACH Kit	NA	Immediate	NA
Hydrogen Sulfide	HACH Kit	NA	Immediate	NA
Laboratory Analyses				
Organic Analyses				
Total Organic Carbon	EPA 415.1	250-ml plastic/H3PO4	28 days	1.00
Inorganic Analyses				
Total Chromium	SW-846 6010B	500-ml plastic/HNO3	6 Months	0.05
Hexavalent Chromium	SW-846 7197	1-Liter plastic/Neat	Immediate	0.005
Total Arsenic	SW-846 6010B	500-ml plastic/HNO3	6 Months	0.01
Nitrate/Nitrite	EPA 300.0	250-ml plastic/H2SO4	28 Days	1.00
Total Alkalinity	SM2320B	1-Liter plastic/Neat	14 Days	5.00
Carbonate	SM2320B	1-Liter plastic/Neat	14 Days	5.00
Bicarbonate	SM2320B	1-Liter plastic/Neat	14 Days	5.00
Sulfate	EPA 300.0	1-Liter plastic/Neat	28 days	40.0
Sulfide	EPA 376.2	1-Liter plastic/ZnAc/NaOH	7 Days	0.05
Chlorides	EPA 300.0	1-Liter plastic/Neat	28 days	20.0
Bromide	EPA 300.0	1-Liter plastic/Neat	28 days	0.2
Calcium	SW-846 6010B	500-ml plastic/HNO3	6 Months	1.00
Sodium	SW-846 6010B	500-ml plastic/HNO3	6 Months	1.00
Magnesium	SW-846 6010B	500-ml plastic/HNO3	6 Months	0.05
Potassium	SW-846 6010B	500-ml plastic/HNO3	6 Months	1.00
Total Iron	SW-846 6010B	500-ml plastic/HNO3	6 Months	0.10
Dissolved Iron	SW-846 6010B	500-ml plastic/HNO3	6 Months	0.10
Ferrous Iron	Speciated Iron	500-ml plastic/HNO3	6 Months	0.025
Total Manganese	SW-846 6010B	500-ml plastic/HNO3	6 Months	0.05
Dissolved Manganese	SW-846 6010B	500-ml plastic/HNO3	6 Months	0.05
Oxygen	Headspace	40-ml vial/Neat	14 Days	1.00
Nitrogen	Headspace	40-ml vial/Neat	14 Days	1.00
Carbon Dioxide	Headspace	40-ml vial/Neat	14 Days	1.00
Methane	Headspace	40-ml vial/Neat	14 Days	0.01

All analytical results are reported in mg/L with the exception of methane which is in ug/L

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Table 2
Field Parameter Summary
ChevronTexaco Eunice #2 (North) Gas Plant
Eunice, Lea County, New Mexico

Station Name	Elapsed Time	Criteria	Date	Time	Temp-C	pH	SpC-mS/cm	TDS-g/L	DO%-Sat	DO-mg/L	ORP-mV	Fe	Sulfide
MW008			5/31/01		19.29	7.73	2.73			4.4	58	0	
MW008			5/31/01		19.84	7.49	1.31			1.5	65		
MW008			8/29/01		22.3	7.04	3			6.5	111	0	
MW008			9/27/01		23.5	7.37	1.53						
MW008			2/4/02		17.1	6	5.8			7.3	203	0	0
MW008			9/18/02	13:35:00	24.15	6.54	6.51			3.97	175	0	0
MW008	25:00:00	No	1/6/03	16:06:39	18.39	5.67	5.82	3.7	36.3	3.29	247		
MW008	30:00:00	No	3/26/03	13:28:18	21	6.88	5.65	3.6	40.5	3.53	205		
MW008	15:00	Yes	6/5/03	8:13:47	19.18	8.46	6.78		29.5	2.66	-262		
MW008	30:00:00	No	6/9/03	10:18:59	21.76	6.92	5.56	3.6	43.7	3.76	295	0.2	0
MW008	20:00	No	6/19/03	7:37:40	20.77	6.84	5.24	3.3	29.1	2.56	241	0	
MW008	30:00:00	No	6/30/03	14:52:05	22.29	7.17	5.41		23.6	2.03	185	0	0
MW008	30:00:00	No	7/9/03	12:50:34	21.73	6.97	6.13		42	3.61	8	0	0
MW008	30:00:00		7/15/03	10:10:00	22.78	7.08	4.09			1.21	-89	0	0
MW008	30:00:00	No	7/23/03	11:57:13	26.81	6.99	5.1	3.3	29.6	2.32	352	0.2	0
MW008	30:00:00	No	7/28/03	12:27:52	23.33	6.91	6.15	3.9	20.7	1.73	312	0	0
MW008	30:00:00	No	8/8/03	9:25:28	23.35	7.45	5.72	3.7	6.4	0.54	229	0	0
MW008	30:00:00	No	8/21/03	10:06:20	27.18	6.96	6.2	4	27.5	2.14	322	0	0
MW008	30:00:00	No	9/4/03	12:34:57	24.36	7.09	5.4	3.5	21.1	1.73	-47	0	0
MW008	13:00	Yes	9/17/03	7:23:45	20.41	7.11	6.03	3.9	24.5	2.16	312	0	0
MW008	13:00	Yes	9/29/03	7:50:46	21.8	7.1	5.46		20.4	1.77	360	0	0
MW008	9:00	Yes	10/14/03	8:08:24	19.98	6.66	5.62		20.6	1.83	222	0	0
MW008	11:00	Yes	10/27/03	12:19:43	21.6	7.05	6.72		27	2.32	215	0	0
MW008	25:00:00	Yes	11/10/03	15:07:29	21.2	7.12	6.91		32.6	2.82	316	0	0
MW008	30:00:00	No	12/4/03	9:01:26	17.52	7.11	6.82		14.6	1.36	108	0	0
MW008M			10/1/01		21.1	7.4	1.443						
MW008M			2/4/02		17.1	5.9	7			6	189	0	0
MW008M	30:00:00	No	6/9/03	11:05:41	23.43	6.99	5.89	3.8	17	1.42	263	0	0
MW008M	25:00:00	Yes	6/30/03	15:41:53	24.16	7.18	6.6		23.5	1.91	188	0	0
MW008M	30:00:00	No	7/9/03	13:41:18	24.14	6.9	6.45		18.2	1.49	6	0	0
MW008M	30:00:00		7/15/03	12:25:00	24.96	6.92	5.08			0.46	-116	0	0
MW008M	30:00:00	No	7/23/03	13:27:32	27.01	7.48	5.17	3.3	15.6	1.22	261	0	0
MW008M	25:00:00	Yes	7/29/03	10:03:37	21.71	6.97	7.5		6.7	0.57	-90	0	0
MW008M	30:00:00	No	8/8/03	10:35:26	22.26	7.3	6.19	4	17.5	1.49	229	0	0
MW008M	25:00:00	No	8/21/03	13:22:38	28.82	6.89	6.5	4.2	22.9	1.72	219	0	0
MW008M	18:00	Yes	9/4/03	13:16:11	25.88	6.91	7.11	4.6	18.3	1.45	21	0	0
MW008M	14:00	Yes	9/17/03	9:08:35	22.66	7.03	6.99		13.3	1.14	296	0	0
MW008M	16:00	Yes	9/29/03	9:32:37	24.23	7.15	6.39		15	1.19	296	0	0
MW008M	13:00	Yes	10/14/03	9:04:34	20.54	7.08	6.46		10.2	0.89	239	0	0
MW008M	9:00	Yes	10/27/03	13:48:12	22.19	7.07	7.04		17.4	1.48	221	0	0

All analytical results are reported
in mg/L with the exception of methane which is in ug/L

ARCADIS

Table 2
Field Parameter Summary
ChevronTexaco Eunice #2 (North) Gas Plant
Eunice, Lea County, New Mexico

Station Name	Elapsed Time	Criteria	Date	Time	Temp-C	pH	SpC-mS/cm	TDS-g/L	DO%-Sat	DO-mg/L	ORP-mV	Fe	Sulfide
MW008M	25:00:00	Yes	11/11/03	8:50:57	18.27	7.12	6.35		11.6	1.07	255	0	0
MW008M	20:00	Yes	12/4/03	7:51:36	15.7	7.08	7.1		14.4	1.39	98	0	0
MW008A			5/29/01		24.9	7.29	6.3			1.4	192	0	
MW008A			8/29/01		21.1	6.67	6.4			2.5	141	0	
MW008A			2/4/02		16.5	5.5	6.7			0.9	225	0	0
MW008A			9/18/02	15:45:00	24.59	7.31	6.32			0.96	138	0	0
MW008A	0:00	No	1/6/03	16:41:25	17.26	7.01	6.23	4	14.3	1.34	207		
MW008A	30:00:00	No	3/26/03	14:35:28	22.02	6.96	5.34	3.4	6.3	0.54	-81		
MW008A	15:00	Yes	6/5/03	9:15:31	20.66	8.46	6.39		12.3	1.08	-291		
MW008A	30:00:00	No	6/9/03	12:02:21	25.36	6.94	5.31	3.4	9.4	0.76	241	0.4	0
MW008A	30:00:00	No	6/19/03	8:27:43	22.67	6.81	4.9	3.1	5.7	0.48	224	0	
MW008A	30:00:00	No	6/30/03	13:47:54	23.36	7.13	5.82		10.4	0.87	168	0	0
MW008A	30:00:00	No	7/9/03	11:55:40	26.13	6.98	5.79		32.2	2.55	-6	0	0
MW008A	30:00:00		7/15/03	11:15:00	29.46	7.03	4.64			1.63	-98	0	0
MW008A	15:00	No	7/23/03	12:43:09	33.69	7.58	4.88	3.1	15.2	1.06	281	0	0
MW008A	20:00	Yes	7/29/03	11:48:02	22.87	6.97	6.7		4.6	0.38	-94	0	0
MW008A	30:00:00	No	8/8/03	9:58:54	26.1	7.22	6.26	4	2.9	0.23	204	0	0
MW008A	30:00:00	No	8/21/03	12:28:27	32.92	6.92	5.63	3.6	16.2	1.14	233	0	0
MW008A	30:00:00	No	9/4/03	11:40:26	23.24	7.07	5.84	3.7	4.5	0.37	-94	0	0
MW008A	8:00	Yes	9/17/03	8:10:33	23.24	7.13	5.76		26.9	2.21	288	0	0
MW008A	14:00	Yes	9/29/03	8:42:11	23.1	7.17	5.41		17.8	1.49	267	0	0
MW008A	12:00	Yes	10/14/03	8:37:08	19.49	7.09	5.25		2.8	0.25	240	0	0
MW008A	10:00	Yes	10/27/03	13:11:43	21.91	7.1	6.02		8.3	0.71	257	0	0
MW008A	30:00:00	Yes	11/11/03	8:21:01	17.35	7.12	5.45		3	0.28	257	0	0
MW008A	30:00:00	No	12/4/03	10:15:09	17.14	7.79	5.25		5.8	0.55	64	0	0
MW011			5/31/01		20.91	7.89	2.71			1.6	46	0	
MW011			5/31/01		22.31	7.89	2.51			2.5	47		
MW011			8/30/01		22.7	6.9	6.7			3.7	125	0	
MW011			1/31/02		18	5.78	7			5.3	194	0	0
MW011			9/19/02	10:00:00	20.65	7.22	6.48			0.99	197	0	0
MW011	25:00:00	Yes	1/7/03	10:08:13	17.21	5.71	6.14	3.9	11.8	1.11	239		
MW011	30:00:00	No	3/26/03	11:31:58	20.1	5.82	5.41	3.5	5.6	0.5	175		
MW011	30:00:00	No	6/2/03	14:45:19	22.84	8.23	6.66		10.6	0.88	-373		
MW011	30:00:00	No	6/10/03	6:44:12	19.52	6.87	4.91	3.1	4.4	0.4	289	0.3	0
MW011	30:00:00	No	6/19/03	11:11:20	21.14	6.8	5.18	3.3	1.4	0.12	208	0	
MW011	30:00:00	No	7/1/03	11:17:43	22.5	7.02	6.23		25.1	2.13	173	0	0
MW011	30:00:00	No	7/8/03	13:42:43	21.25	6.94	6.07		3.1	0.27	32	0	0
MW011	30:00:00		7/14/03	13:45:00	31.92	6.93	5.5			1.58	-327	0.4	0
MW011	30:00:00	No	7/23/03	17:00:40	24.12	7.57	5.12	3.3	7.8	0.64	193	NR	NR
MW011	30:00:00	No	7/29/03	15:00:16	22.47	6.9	7.34		10.8	0.91	-96	0	0

All analytical results are reported
in mg/L with the exception of methane which is in ug/L

ARCADIS

Table 2
Field Parameter Summary
ChevronTexaco Eunice #2 (North) Gas Plant
Eunice, Lea County, New Mexico

Station Name	Elapsed Time	Criteria	Date	Time	Temp-C	pH	SpC-mS/cm	TDS-g/L	DO%-Sat	DO-mg/L	ORP-mV	Fe	Sulfide
MW011	30:00:00	No	8/7/03	12:38:45	23.05	7.11	6.74	4.3	6.6	0.55	276	0	0
MW011	25:00:00	Yes	8/19/03	11:56:30	23.08	6.94	6.55		3.9	0.32	-371	0.6	0
MW011	30:00:00	No	9/3/03	15:52:30	26.37	6.91	6.34	4.1	7.5	0.59	-156	0	0
MW011	8:00	Yes	9/17/03	10:39:03	23.18	6.98	7.04		6.8	0.57	204	0	0
MW011	7:00	Yes	9/29/03	12:20:09	23.63	6.95	7.39		6.3	0.51	259	0	0
MW011	9:00	Yes	10/13/03	14:37:25	22.74	6.89	7.05		9.7	0.83	199	0	0
MW011	8:00	Yes	10/28/03	8:36:59	19.48	7.01	6.25		6.7	0.6	226	0	0
MW011	20:00	Yes	11/11/03	10:13:02	19.66	7.05	5.98		2.3	0.21	201	0	0
MW011	30:00:00	No	12/8/03	11:18:44	20.94	7.37	5.59		4.8	0.42	143	0	0
MW011M			10/1/01		296	7.42	1.382						
MW011M			2/4/02		17.1	6.7	6.5			6.8	164	0	0
MW011M	30:00:00	No	6/10/03	9:51:21	22.45	7.07	5.49	3.5	3.2	0.27	241	0.3	0
MW011M	30:00:00	No	6/19/03	11:56:09	22.21	6.94	5.55	3.5	13.2	1.13	193	0	
MW011M	30:00:00	No	7/1/03	12:32:19	30.62	7.09	6.63		22.1	1.61	174	0	0
MW011M	30:00:00	No	7/8/03	14:39:45	24.99	7.11	6.56		15.9	1.28	39	0	0
MW011M	30:00:00		7/14/03	14:50:00	29.09	7.03	6.17			1.42	-336	0	0
MW011M	30:00:00	No	7/23/03	17:53:59	24.25	7.69	5.28	3.4	9.8	0.81	205	0	0
MW011M	25:00:00	Yes	7/30/03	9:35:07	22.08	7.02	7.75		7	0.59	-5	0	0
MW011M	30:00:00	No	8/7/03	13:13:49	26.84	7.24	7.25	4.6	15.9	1.24	299	0	0
MW011M	30:00:00	No	8/19/03	10:33:21	23.56	7.04	7.05		2.7	0.22	-371	0	0
MW011M	27:00:00	Yes	9/3/03	16:59:20	23.72	6.96	7.13	4.6	10.3	0.85	-93	0	0
MW011M	10:00	Yes	9/17/03	12:01:28	26.89	7.01	6.9		6.2	0.5	311	0	0
MW011M	10:00	Yes	9/29/03	13:00:15	25.12	7.03	6.99		6.9	0.55	249	0	0
MW011M	8:00	Yes	10/14/03	6:34:36	16.75	7.09	7.6		9.7	0.91	255	0	0
MW011M	9:00	Yes	10/28/03	9:21:33	20.09	7.21	6.68		4	0.36	206	0	0
MW011M	30:00:00	No	11/11/03	10:58:01	20.49	6.98	7.15		7.8	0.69	221	0	0
MW011M	30:00:00	No	12/4/03	13:38:29	22.32	7.12	7.53		5.7	0.47	222	0	0
MW011A			5/22/01		21.02	5.5	0.133			5.3	90	0	
MW011A			1/28/02		18.3	5.76	1.5			9.4	214	0	0
MW011A			9/12/02	15:05:00	23.36	6.99	2.3			4.89	187	0	0
MW011A	20:00	Yes	12/26/02	13:19:34	17.81	6.88	2.13	1.4	33.4	3.15	165		
MW011A	25:00:00	No	3/18/03	12:21:20	18.45	5.89	1.8	1.1	33.3	3.11	230		
MW011A	20:00	Yes	6/2/03	13:42:01	23.51	7.98	2.45		29.6	2.5	-256		
MW011A	35:00:00	No	6/10/03	8:07:09	20.8	6.58	1.93	1.2	16.2	1.45	245	0.2	0
MW011A	30:00:00	No	6/19/03	9:42:32	21.72	6.72	1.77	1.1	3.6	0.31	183	0	
MW011A	30:00:00	No	7/1/03	10:08:47	22.85	6.94	2.23		16.7	1.43	157	0	0
MW011A	25:00:00	No	7/8/03	12:45:34	21.28	6.93	2.17		11	0.97	35	0	0
MW011A	30:00:00		7/14/03	12:35:00	32.11	6.95	2.04			0.95	-227	0	0
MW011A	30:00:00	No	7/23/03	16:13:25	26.44	7.65	1.79	1.1	9	0.72	79	0	0
MW011A	20:00	Yes	7/29/03	13:30:51	21.81	6.92	2.54		3	0.26	-98	0	0

All analytical results are reported
in mg/L with the exception of methane which is in ug/L

ARCADIS

Table 2
Field Parameter Summary
ChevronTexaco Eunice #2 (North) Gas Plant
Eunice, Lea County, New Mexico

Station Name	Elapsed Time	Criteria	Date	Time	Temp-C	pH	SpC-mS/cm	TDS-g/L	DO%-Sat	DO-mg/L	ORP-mV	Fe	Sulfide
MW011A	30:00:00	No	8/7/03	12:03:27	28.09	7.15	2.32	1.5	4.6	0.36	264	0	0
MW011A	15:00	Yes	8/19/03	14:12:57	24.24	6.95	2.31		3.3	0.28	-371	0	0.6
MW011A	30:00:00	No	9/3/03	14:55:17	26.84	7.01	2.25	1.4	2.8	0.22	-110	0.8	0
MW011A	11:00	Yes	9/17/03	9:54:01	23.46	6.97	2.48		3.4	0.28	-88	0.2	0.45
MW011A	11:00	Yes	9/29/03	11:34:36	27	7.05	2.22		6.9	0.54	57	0.4	0.35
MW011A	10:00	Yes	10/13/03	14:15:03	23.05	7.07	2.48		4.1	0.35	-7	0	0.8
MW011A	3:00	Yes	10/28/03	7:52:14	18.22	7.26	2.16		10.9	1.02	103	0.2	
MW011A	30:00:00	Yes	11/11/03	9:46:13	19.5	7.24	2.19		1.8	0.17	161	0	0.45
MW011A	25:00:00	Yes	12/8/03	10:15:05	19.5	7.5	2.21		3.1	0.28	144	0	0.45
MW012			5/30/01		22.2	7.4	5.4			5.6	221	0	
MW012			5/30/01		24.8	7.34	2.6			7.7	218		
MW012			8/27/01		23.5	7.14	5.4			6.5	112	0	
MW012			1/31/02		16.1	6.19	5.1			6.8	210	0	0
MW012			9/18/02	11:50:00	24.18	7.56	5			5.93	163	0	0
MW012	35:00:00	No	1/6/03	14:50:15	18.68	5.37	3.76	2.4	16.2	1.49	254		
MW012	10:00	Yes	3/26/03	10:47:38	19.03	7.3	4.23	2.7	59.2	5.4	-24		
MW012	25:00:00	No	6/3/03	13:38:03	22.89	5.84	3.29	2.1	45.4	3.86	266		
MW012	30:00:00	No	6/10/03	11:48:35	25.19	6.28	3.36	2.2	31.3	2.54	263	0	0
MW012	30:00:00	No	7/2/03	9:55:27	22.2	6.92	3.76		19.4	1.67	-347	0.3	0
MW012	30:00:00	No	7/7/03	14:36:42	22.73	7.11	4.34		54.2	4.62	-167	0	0
MW012	30:00:00	No	7/14/03	12:57:23	23.78	7	3.65	2.3	31.5	2.62	293	0	0
MW012	30:00:00	No	7/23/03	15:13:46	31.61	7.77	3.39	2.2	36.5	2.64	223	0.1	0
MW012	55:00:00	No	7/30/03	12:32:53	24.35	7.54	4.79		49.8	4.1	26	0	0
MW012	30:00:00	No	8/7/03	8:49:11	24.88	7.23	5.31	3.4	56.5	4.59	399	0	0
MW012	30:00:00	No	8/20/03	13:28:23	26.93	7.04	4.62		43.1	3.38	-259	0	0
MW012	30:00:00	No	9/3/03	11:10:58	23.39	7.24	4.99	3.2	43.7	3.65	148	0.1	0
MW012	11:00	Yes	9/18/03	6:47:34	21.04	7.16	5.45		36.4	3.18	301	0	0
MW012	11:00	Yes	9/30/03	7:56:39	21.14	7.29	4.73		35.3	3.08	274	0	0
MW012	11:00	Yes	10/13/03	11:28:49	23.78	7.27	4.33		51.8	4.31	306	0	0
MW012	11:00	Yes	10/28/03	11:45:27	21.77	7.28	4.86		24.9	2.15	158	0.2	0
MW012	30:00:00	No	11/11/03	13:49:06	23.67	6.98	5.9		34.9	2.89	280	0.3	0
MW012	30:00:00	No	12/8/03	14:38:51	20.93	7.11	5.43		28.6	2.51	196	0.3	0
MW012M			2/4/02		16.8	6.59	3.2			1.8	154	0	0
MW012M	30:00:00	No	6/10/03	13:24:55	24.13	7.07	3.13	2	36.7	3.05	269	0	0
MW012M	30:00:00	No	7/2/03	8:51:24	21.23	7.17	3.79		45	3.94	-205	0	0
MW012M	30:00:00	No	7/7/03	12:16:49	20.62	7.3	3.38		26	2.29	-98	0	0
MW012M	30:00:00	No	7/14/03	10:36:49	22.19	7.1	2.88	1.8	6.1	0.53	361	0	0
MW012M	30:00:00	No	7/23/03	18:15:31	22.97	7.17	3.87		6.2	0.52	-196	0	0
MW012M	30:00:00	No	7/30/03	11:32:03	22.81	6.9	3.9	2.5	11.6	0.99	346	0	0
MW012M	30:00:00	No	8/7/03	8:14:06	22.05	6.95	3.93	2.5	10.4	0.9	402	0	0

All analytical results are reported
in mg/L with the exception of methane which is in ug/L

ARCADIS

Table 2
Field Parameter Summary
ChevronTexaco Eunice #2 (North) Gas Plant
Eunice, Lea County, New Mexico

Station Name	Elapsed Time	Criteria	Date	Time	Temp-C	pH	SpC-mS/cm	TDS-g/L	DO%-Sat	DO-mg/L	ORP-mV	Fe	Sulfide
MW012M	30:00:00	No	8/20/03	14:35:36	24.91	7.08	3.81		10.4	0.85	-304	0.3	0
MW012M	6:00	Yes	9/3/03	11:34:15	23.95	7.22	3.79	2.4	22.7	1.88	142	0	0
MW012M	12:00	Yes	9/18/03	9:45:16	22.31	7.1	3.85		7.2	0.62	90	0	0
MW012M	10:00	Yes	9/30/03	8:45:08	21.84	7.21	3.58		14.4	1.24	206	0	0
MW012M	2:00	Yes	10/13/03	12:02:51	26.68	7.34	3.76		17	1.35	312	0	0
MW012M	9:00	Yes	10/28/03	12:26:05	21.09	7.07	3.99		23.1	2.03	195	0	0
MW012M	20:00	Yes	11/12/03	8:10:32	19.29	7.28	4.5		13.4	1.21	197	0	0
MW012M	30:00:00	No	12/9/03	8:25:13	11.5	6.97	4.59		17.1	1.83	198	0	0
MW012A			5/22/01		22.24	4.92	0.085			5	118	0	
MW012A			1/28/02		20.2	6.24	0.8			5.4	200	0	0
MW012A			9/5/02	15:25:00	23.9	6.1	0.912			3.74	107	0	0
MW012A			12/19/02	11:42:38	18.12	6.26	0.925	0.6	3.7	0.35	195		
MW012A	30:00:00	No	3/3/03	13:05:07	18.46	5.65	1.017	0.7	6.9	0.64	302		
MW012A	35:00:00	No	5/21/03	6:46:51	18.81	6.13	1.071	0.7	25	2.31	298		
MW012A	30:00:00	No	6/10/03	12:33:32	26.74	6.04	1.098	0.7	27.4	2.18	255	0.1	0
MW012A	25:00:00	No	6/19/03	13:48:03	23.36	6.02	0.99	0.6	4.5	0.38	113	0	
MW012A	30:00:00	No	7/2/03	11:06:03	26.08	6.45	1.329		32.4	2.61	-325	0	0
MW012A	30:00:00	No	7/7/03	13:30:55	26.15	6.41	1.201		22.9	1.84	-57	0	0
MW012A	30:00:00	No	7/14/03	11:43:57	25.98	6.42	0.945	0.6	6	0.49	136	0	0.5
MW012A	25:00:00	Yes	7/23/03	17:05:13	23.23	6.5	1.335		4.1	0.35	-206	NR	1.3
MW012A	20:00	Yes	7/30/03	13:27:49	23.42	6.53	1.324		3.2	0.27	-27	0.02	1
MW012A	30:00:00	No	8/7/03	9:25:01	22.81	6.66	1.203	0.8	5.4	0.47	126	0.5	0.35
MW012A	20:00	Yes	8/20/03	15:29:27	25.49	6.53	1.221		6.6	0.54	-306	0.2	0.48
MW012A	24:00:00	Yes	9/3/03	12:25:05	24.85	6.78	1.151	0.7	6	0.5	-263	0.3	>2.25
MW012A	8:00	Yes	9/18/03	10:21:06	24.24	6.56	1.318		6.3	0.52	-139	0.8	0.95
MW012A	6:00	Yes	9/30/03	9:32:39	23.23	6.85	1.176		5.3	0.45	-38	0.4	0.8
MW012A	7:00	Yes	10/13/03	12:39:26	23.72	6.54	1.242		5.4	0.45	-116	0	2.15
MW012A	4:00	Yes	10/28/03	13:00:01	23.95	6.73	1.212		19.3	1.62	-66	0.3	2.15
MW012A	30:00:00	No	11/11/03	14:43:47	22.2	6.75	1.362		2.5	0.22	-85	0.4	0.3
MW012A	30:00:00	No	12/9/03	9:42:57	8.7	6.85	1.003		10.5	1.22	-58	0.4	0.3
RW002			10/1/01		21.4	7.36	1.532						
RW002			2/4/02		16.4	6.87	6.9			5	149	0	0
RW002	30:00:00	No	6/10/03	9:09:25	24.13	6.8	5.43	3.5	23.5	1.94	250	0	0
RW002	30:00:00	No	7/1/03	13:36:14	27.84	6.91	6.45		13	1	177	0	0
RW002	30:00:00	No	7/9/03	9:37:45	21.88	6.93	6.52		47.8	4.09	-14	0	0
RW002	30:00:00	No	7/15/03	8:03:25	22.81	6.88	6.7	4.3	20.7	1.74	246	0	0
RW002	20:00	Yes	7/23/03	19:11:34	25.03	6.86	7.66		7.5	0.6	-196	0	0
RW002	30:00:00	No	7/30/03	9:52:24	27.01	6.72	7.23	4.6	21.9	1.71	322	0	0
RW002	30:00:00	No	8/8/03	7:54:55	23	6.99	6.93	4.4	18.2	1.52	253	0	0
RW002	30:00:00	No	8/20/03	10:15:07	25.23	6.89	6.98		22.8	1.82	-345	0	0

All analytical results are reported
in mg/L with the exception of methane which is in ug/L

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Table 2
Field Parameter Summary
ChevronTexaco Eunice #2 (North) Gas Plant
Eunice, Lea County, New Mexico

Station Name	Elapsed Time	Criteria	Date	Time	Temp-C	pH	SpC-mS/cm	TDS-g/L	DO%-Sat	DO-mg/L	ORP-mV	Fe	Sulfide
RW002	30:00:00	No	9/4/03	10:24:32	21.3	6.86	6.93	4.4	16.2	1.41	-9	0	0
RW002	7:00	Yes	9/17/03	13:01:53	30.31	6.94	7.37		15.7	1.15	243	0	0
RW002	10:00	Yes	9/30/03	6:56:43	19.87	6.93	6.87		8.7	0.77	279	0	0
RW002	7:00	Yes	10/14/03	7:01:32	17.69	6.89	5.91		5	0.46	250	0	0
RW002	8:00	Yes	10/28/03	10:17:46	21.15	6.96	6.64		6.2	0.54	230	0	0
RW002	30:00:00	Yes	11/11/03	12:37:12	24.37	6.78	7		8	0.65	120	0	0
RW002	30:00:00	No	12/8/03	13:18:25	23.67	6.81	7.61		12.1	1	194	0	0
RW003			2/4/02		15.2	6.51	5.4			3.4	178	0	0
RW003	20:00	No	6/10/03	11:13:26	23.22	6.99	4.05	2.6	33.7	2.83	252	0.1	0
RW003	30:00:00	No	6/19/03	13:13:15	22.76	7	3.57	2.3	39.7	3.38	175	0	
RW003	30:00:00	No	7/2/03	12:39:57	23.84	7.08	4.89		46.6	3.86	-347	0	0
RW003	30:00:00	No	7/8/03	10:06:57	21.29	7.15	4.3		41.9	3.66	-90	0	0
RW003	30:00:00	No	7/15/03	10:17:49	22.53	6.95	4.7	3	30.3	2.57	254	0	0
RW003	35:00:00	No	7/23/03	16:08:52	25.36	7.06	4.95		35.2	2.83	-187	0	0
RW003	20:00	No	7/30/03	12:57:06	24.43	6.86	4.16	2.7	26.1	2.14		0	0
RW003	30:00:00	No	8/7/03	10:09:14	22.12	7.03	5.05	3.2	54.7	4.7	298	0	0
RW003	30:00:00	No	8/21/03	9:08:02	21.56	7.08	4.56		19.3	1.68	-308	0	0
RW003	30:00:00	No	9/3/03	13:25:35	22.77	7.09	4.23	2.7	19.1	1.62	92	0	0
RW003	25:00:00	No	9/18/03	11:17:13	23.29	6.43	4.66		8.9	0.75	179	0	0
RW003	9:00	Yes	9/30/03	11:47:12	26.2	6.81	4.63		22.5	1.78	266	0	0
RW003	10:00	Yes	10/13/03	13:22:14	24.27	6	5.27		12.3	1.01	251	0	0
RW003	9:00	Yes	10/28/03	13:45:37	22.37	6.4	5.19		29.7	2.53	169	0	0
RW003	20:00	Yes	11/12/03	8:48:58	20.08	6.17	4.59		11.5	1.01	213	0	0
RW003	30:00:00	Yes	12/9/03	10:46:32	14.06	6.27	4.21		22.4	2.27	114	0	0
RW004A			10/1/01		21	7.5	1.39						
RW004A			2/4/02		17.1	6.57	5.7			2.1	172	0	0
RW004A			9/18/02	14:35:00	25.84	7.67	5.25			0.94	129	0	0
RW004A	30:00:00	No	6/9/03	13:15:18	23.36	7.06	3.78	2.4	5.6	0.47	218	0	0
RW004A	30:00:00	No	7/1/03	8:38:18	21.07	5.63	16.4		3.8	0.32	-484	0	0
RW004A	15:00	No	7/9/03	14:34:06	28.69	4.76	17.4		1.3	0.1	-18	0	0
RW004A	30:00:00		7/15/03	13:35:00	30.4	4.5	12.8			0.17	-130	2.1	0
RW004A	30:00:00	No	7/23/03	14:15:02	31.76	4.99	9.2	5.9	2.8	0.2	-355	2	0
RW004A	25:00:00	Yes	7/28/03	14:27:33	23.05	4.33	11.35		5.1	0.42	-124	3	0
RW004A	25:00:00	No	8/8/03	11:09:10	22.48	4.44	12.03	7.7	2.8	0.23	-344	3.25	0
RW004A	30:00:00	No	8/21/03	11:18:54	31.91	4.96	11.14	7.1	4.6	0.32	-400	2.3	0
RW004A	30:00:00	No	9/4/03	14:43:54	24.94	3.89	15.9	10.2	3.6	0.28	-377	0.9	0
RW004A	13:00	Yes	9/18/03	12:42:08	24.28	3.97	20.3		20.2	1.58	12	2.2	0
RW004A	12:00	Yes	10/1/03	10:08:34	21.07	3.95	17.5		11.7	0.96	-242	2.6	0
RW004A	19:00	Yes	10/14/03	11:30:05	22.99	3.63	17.2		9.6	0.77	-183	1.2	0
RW004A	18:00	Yes	10/29/03	9:09:27	22.12	4.04	16.9		9.6	0.78	-7	2.8	0

All analytical results are reported
in mg/L with the exception of methane which is in ug/L

ARCADIS

Table 2
Field Parameter Summary
ChevronTexaco Eunice #2 (North) Gas Plant
Eunice, Lea County, New Mexico

Station Name	Elapsed Time	Criteria	Date	Time	Temp-C	pH	SpC-mS/cm	TDS-g/L	DO%-Sat	DO-mg/L	ORP-mV	Fe	Sulfide
RW004A	30:00:00	No	11/12/03	13:23:51	21.39	3.7	12.31		21.6	1.82	25	1.8	0
RW004A	30:00:00	No	12/9/03	13:33:44	17.24	4.36	11.06		9.6	0.88	6	1.8	0
IW001			8/1/02	13:10:00	23	6.1	6.8				130	0	0
IW001	30:00:00	No	6/10/03	7:23:09	20.77	6.92	6.12	3.9	3.6	0.31	258	0	0
IW001	30:00:00	Yes	7/1/03	14:37:55	27.53	5.74	15.1		2.5	0.18	-574	1.1	0
IW001	30:00:00	No	7/9/03	10:29:34	23.26	4.95	17.8		2.8	0.23	-146	4	0
IW001	30:00:00	No	7/15/03	9:07:36	26.91	4.68	15.4	9.9	1.1	0.08	-439	3	0
IW001	15:00	Yes	7/23/03	19:54:58	21.72	5.12	18.7		3.1	0.26	-293	>10	0
IW001	30:00:00	No	7/30/03	7:42:58	22.49	5.27	14.84	9.5	3.7	0.3	-424	0	0
IW001	30:00:00	No	8/8/03	8:29:19	23.02	5.56	17.1	10.9	3.4	0.27	-270	4.5	0
IW001	25:00:00	Yes	8/20/03	11:11:51	25.82	5.72	18.3		8	0.61	-393	>10	0
IW001	30:00:00	No	9/4/03	17:13:13	25.18	5.1	15.1	9.7	1.2	0.09	-393	5.6	0
IW001	20:00	Yes	9/18/03	13:41:43	25.12	5.16	21.2		7.7	0.59	-317	3.4	0
IW001	20:00	Yes	10/1/03	8:52:38	20.86	5.2	20.1		8.4	0.69	-108	>10	0
IW001	14:00	Yes	10/14/03	12:12:15	24.94	5.24	18		3.1	0.23	-405	3.2	0
IW001	17:00	Yes	10/29/03	9:56:08	24.28	4.95	19		5.1	0.4		7.06	0
IW001	30:00:00	No	11/12/03	10:53:47	23.05	4.82	16.2		10.5	0.85	-331	2.6	0
IW001	30:00:00	No	12/9/03	14:22:51	16.27	4.32	17.2		5.8	0.53	-80	2.6	0
IW002			9/19/02	11:45:00	20.1	7.12	4.25			3.62	176	0.6	0
IW002	35:00:00	No	6/11/03	8:21:01	27.3	6.93	4.1	2.6	44.3	3.46	254	0	0
IW002	30:00:00	No	7/2/03	13:43:06	32.08	5.65	14.02		3	0.21	-515	1.3	0
IW002	25:00:00	Yes	7/8/03	10:53:40	22.47	5.12	17.8		4	0.33	-397	6	0
IW002	30:00:00	No	7/15/03	11:19:03	26.06	4.73	16.5	10.6	1.3	0.1	-460	4	0
IW002	15:00	Yes	7/23/03	14:20:33	27.68	5.48	20		4.3	0.32	-275	>10	0.01
IW002	20:00	Yes	7/30/03	14:49:52	25.08	4.78	15.7		6.5			3	0
IW002	30:00:00	No	8/7/03	10:45:48	33.5	5.56	17.8	11.4	1.8	0.12	-40	5	0
IW002	30:00:00	Yes	8/21/03	10:09:33	27.06	5.37	15.5		8.5	0.64	-364	1.8	0
IW002	30:00:00	No	9/4/03	16:03:57	35.3	5.3	13.09	8.4	1.2	0.08	-288	5.2	0
IW002	15:00	No	9/18/03	14:29:50	24.76	5.04	20.3		15.9	1.22	-410	6	0
IW002	14:00	Yes	9/30/03	12:51:43	28.61	5.32	22.7		12.1	0.86	-12	8.8	0
IW002	12:00	Yes	10/14/03	12:58:05	23.74	4.98	12.73		4.9	0.4	-457	2	0
IW002			10/29/03	11:35:00	24.48	4.84	21.3			0.31	-28	6.8	0
IW002	30:00:00	No	11/12/03	9:37:13	19.11	4.47	12.43		6.7	0.59	-395	3.8	0
IW002	30:00:00	No	12/10/03	10:01:04	11.7	4.54	19.5		3	0.3	18	3.8	0

All analytical results are reported
in mg/L with the exception of methane which is in ug/L

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Table 3
MW011 Location: Geochemical Analytical Results
ChevronTexaco Eunice #2 (North) Gas Plant
Eunice, Lea County, New Mexico
(mg/L)

Station Name	MW011	MW011	MW011	MW011	MW011	MW011	MW011	MW011	MW011	MW011	MW011	MW011	MW011	MW011A
Collection Date	6/10/03	6/10/03	6/10/03	7/1/03	7/8/03	7/14/03	7/29/03	8/19/03	9/5/03	9/29/03	9/29/03	10/28/03	12/8/03	6/10/03
Alkalinity	151		160	140	155	155	152	153		139		147	153	294
Arsenic			<0.05	<0.05	<0.05	<0.05	<0.05	<0.05		<0.05		<0.05	<0.05	
Bicarbonate	151		160	140	155	155	152	153		139		147	153	294
Bromide	7	8.32	7	7	7	7	7	6	6.61	6	4.99	5	7	2
Calcium			638	592	640	572	640	649		596		334	578	
Carbon Dioxide			25	32	22	17	37			21		13	19	
Carbonate (CO3)	<5		<5	<5	<5	<5	<5	<5		<5		<5	<5	<5
Chloride	1220		1200	1300	1300	1210	1300	1200		1300		1300	1170	340
Chromium (Total)			4.67	4.41	4.51	4.4	5.02	4.33		4.4		4.52	4.36	
Chromium, Dissolved			4.53	4.85	4.64	4.4	4.88	4.26		4.49		4.34	4.47	
Ferrous iron			<1	<1	<1	<1	<1	<1		0.17		<1	<1	
Hexavalent Chromium, Dissolved			3.97	3.91	3.92	3.94	4	3.4		2.2		3.4	3	
Iron			<0.1	<0.1	<1	<0.1	0.1	<0.1		<0.1		<0.1	<0.1	
Iron, Dissolved			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1		<0.1		<0.1	<0.1	
Magnesium			135	127	168	140	135	135		131		83.9	131	
Manganese			<0.05	<0.05	<0.05	<0.05	<0.05	0.1		<0.05		<0.05	<0.05	
Manganese, Dissolved			<0.05	<0.05	<0.05	<0.05	<0.05	0.1		<0.05		<0.05	<0.05	
Methane (ug/L)			66	120	98	59	1.4			0.52		88	46	
Nitrate-Nitrite Nitrogen			9.1	9	9.2	10	1.2	0.9		<0.4		<0.4	11	
Nitrogen			22	23	19	15	29			23		17	21	
Oxygen			0.52	1.6	0.71	1.6	4.5			0.26		2.6	2.6	
Potassium			16.2	16.3	19	16.8	16.4	17.2		17		11.4	15.4	
Sodium			739	707	804	757	740	771		729		408	702	
Sulfate	1940		1600	1780	1650	1600	2000	1770		1800		1700	1520	1790
Sulfide, Total			0.07	0.05	<0.05	0.08	0.08	0.05		0.05		<0.05	0.06	
Total Organic Carbon			12	8	8	5	5	5		5		5	5	

All analytical results are reported
in mg/L with the exception of methane which is in ug/L

ARCADIS

Table 3
MW011 Location: Geochemical Analytical Results
ChevronTexaco Eunice #2 (North) Gas Plant
Eunice, Lea County, New Mexico
(mg/L)

Station Name	MW011A	MW011A	MW011A	MW011A	MW011A	MW011A	MW011A	MW011A	MW011A	MW011A	MW011A	MW011A	MW011M	MW011M
Collection Date	6/10/03	6/10/03	7/1/03	7/8/03	7/14/03	7/29/03	8/19/03	9/5/03	9/29/03	9/29/03	10/28/03	12/8/03	6/10/03	6/10/03
Alkalinity		292	150	263	259	250	251		247		248	214	140	
Arsenic		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05		<0.05		<0.05	<0.05		
Bicarbonate		292	150	263	259	250	251		247		248	214	140	
Bromide	3.11	2	<2	2	2	2	2	4.99	3	4.05	3	3	8	9.91
Calcium		206	145	175	168	141	144		185		89.4	165		
Carbon Dioxide		73	34	34	34	13	32		14		22	23		
Carbonate (CO3)		<5	<5	<5	<5	<5	<5		<5		<5	<5	<5	
Chloride		340	200	290	300	340	320		340		300	310	1350	
Chromium (Total)		0.4	0.39	0.34	0.29	0.21	0.17		0.13		0.13	0.12		
Chromium, Dissolved		0.38	0.41	0.32	0.25	0.14	0.12		0.09		0.09	0.1		
Ferrous iron		<1	<1	<1	<1	<1	<1		<1		<1	<1		
Hexavalent Chromium, Dissolved		0.354	0.263	0.223	0.045	<0.005	<0.005		<0.005		<0.005	0.061		
Iron		<0.1	<0.1	<1	0.2	<0.1	0.2		0.2		0.2	<0.1		
Iron, Dissolved		<0.1	<0.1	<0.1	<0.1	<0.1	0.1		0.2		<0.1	0.1		
Magnesium		70.9	66.6	80.3	67.6	64.3	66.7		66.8		40.7	75.1		
Manganese		<0.05	<0.05	<0.05	<0.05	0.09	0.23		0.28		0.21	0.15		
Manganese, Dissolved		<0.05	<0.05	<0.05	<0.05	0.09	0.21		0.28		0.2	0.14		
Methane (ug/L)		0.67	0.4	0.3	0.27	2	0.97		77		2.5	1.4		
Nitrate-Nitrite Nitrogen		2.6	1.1	1.3	<0.4	1.4	6.4		<0.4		<0.4	<0.4		
Nitrogen		26	29	33	20	19	29		14		27	30		
Oxygen		1.3	0.81	0.49	0.38	5.4	0.66		1		1.2	1.6		
Potassium		9.4	17.8	21	19.8	17.7	21.6		16.4		9.3	14.1		
Sodium		193	204	241	211	197	211		205		125	230		
Sulfate		610	280	470	490	570	500		530		500	520	1800	
Sulfide, Total		0.06	<0.05	0.06	<0.05	0.24	4.7		1.1		0.12	<0.05		
Total Organic Carbon		3	3	8	5	4	7		3		3	3		

All analytical results are reported
in mg/L with the exception of methane which is in ug/L

ARCADIS

Table 3
MW011 Location: Geochemical Analytical Results
ChevronTexaco Eunice #2 (North) Gas Plant
Eunice, Lea County, New Mexico
(mg/L)

Station Name	MW011M	MW011M	MW011M	MW011M	MW011M	MW011M	MW011M	MW011M	MW011M	RW002	RW002	RW002	RW002	RW002
Collection Date	6/10/03	7/1/03	7/8/03	7/14/03	7/30/03	8/19/03	9/29/03	10/28/03	12/4/03	6/10/03	6/10/03	6/10/03	7/1/03	7/9/03
Alkalinity	140	140	145	155	156	168	147	152	146	142	152		150	152
Arsenic	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05		<0.05		<0.05	<0.05
Bicarbonate	140	140	145	155	156	168	147	152	146	142	152		150	152
Bromide	8	8	9	9	8	8	1.15	6	8	7	7	8.68	7	7
Calcium	596	670	580	592	1290	4240	574	326	610		575		582	604
Carbon Dioxide	14	140	16	14	15	14	12	12	14		21		18	22
Carbonate (CO3)	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5		<5	<5
Chloride	1400	1500	1400	1400	1400	1400	1600	1400	1400	1320	1300		1300	1400
Chromium (Total)	2.81	3.38	2.94	2.93	3.26	3.15	2.79	2.8	2.93		4.05		3.58	4.11
Chromium, Dissolved	2.9	5.7	3.01	3.01	3.38	2.95	2.9	2.68	2.98		4.31		7.13	4.27
Ferrous iron	<1	<1	<1	<1	<1	<1	<1	<1	<1		<1		<1	<1
Hexavalent Chromium, Dissolved	2.5	3.02	1.89	1.59	2.4	1.9	1.3	2.3	1.6		3.76		3.57	3.16
Iron	<0.1	<0.1	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1		<0.1		<0.1	<1
Iron, Dissolved	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1		<0.1		<0.1	<0.1
Magnesium	220	224	258	229	219	227	228	143	270		135		145	168
Manganese	<0.05	0.05	<0.05	<0.05	0.06	0.12	0.06	0.05	0.06		<0.05		<0.05	<0.05
Manganese, Dissolved	<0.05	0.1	<0.05	<0.05	0.06	0.12	0.06	0.05	0.06		<0.05		<0.05	<0.05
Methane (ug/L)	5	0.78	0.42	0.38	0.39	0.74	0.47	0.52	4.5		6.1		2.5	2
Nitrate-Nitrite Nitrogen	10	11.7	7.3	8.5	0.9	8.7	8	6.5	9.1		9.1		14.3	8.6
Nitrogen	27	20	26	21	19	23	14	20	19		20		19	14
Oxygen	0.47	1.6	0.37	1	2.2	1.3	0.4	1.4	2		1.5		2	0.56
Potassium	18.9	17.9	24	21.8	19.5	20.7	19	14.4	14		15.7		17	20
Sodium	634	730	670	709	1380	5330	648	371	687		688		730	745
Sulfate	2000	1800	1900	2010	2210	2060	2100	1900	1760	1600	1600		1500	1630
Sulfide, Total	0.06	<0.05	<0.05	0.06	0.07	0.05	<0.05	<0.05	<0.05		0.06		0.05	<0.05
Total Organic Carbon	12	7	11	6	6	6	6	5	6		5		9	9

All analytical results are reported
in mg/L with the exception of methane which is in ug/L

ARCADIS

Table 3
MW011 Location: Geochemical Analytical Results
ChevronTexaco Eunice #2 (North) Gas Plant
Eunice, Lea County, New Mexico
(mg/L)

Station Name	RW002	RW002	RW002	RW002	RW002	RW002	IW001	IW001	IW001	IW001	IW001	IW001	IW001	IW001
Collection Date	7/15/03	7/30/03	8/20/03	9/30/03	10/28/03	12/8/03	6/10/03	6/10/03	6/10/03	7/1/03	7/9/03	7/15/03	7/15/03	7/30/03
Alkalinity	153	150	152	150	162	212	139	141		1580	1300	403		1850
Arsenic	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05		<0.05		<0.05	<0.05	<0.05		<0.5
Bicarbonate	153	150	152	150	162	212	139	141		1580	1300	403		1850
Bromide	7	<2	6	6	5	7	8	8	10.2	220	300	<20		130
Calcium	655	670	613	580	291	635		690		981	3040	2260		2430
Carbon Dioxide	1400	21	15	17	16	46		15		1100	1200	1300		1200
Carbonate (CO3)	<5	<5	<5	<5	<5	<5	<5	<5		<5	<5	<5		<5
Chloride	1400	60	1300	1700	1200	1400	1700	1800		140	3400	2600		2000
Chromium (Total)	4.31	4.22	4.07	3.95	3.78	3.67		3.99		0.1	0.19	0.1		<0.5
Chromium, Dissolved	4.16	4.26	4.07	4.07	3.85	4.04		4.1		0.12	0.06	0.11		<0.5
Ferrous iron	64	<1	<1	<1	<1	<1		<1		<5	18	52		39
Hexavalent Chromium, Dissolved	<5	3.3	1.6	2	3	1.6		3.91		<0.05	<0.05	<0.1	<1	<0.02
Iron	0.2	<0.1	<0.1	<0.1	<0.1	<0.1		<0.1		8.5	44	30.8		43
Iron, Dissolved	<0.1	<0.1	<0.1	0.2	<0.1	<0.1		<0.1		10	10.5	31.6		41
Magnesium	189	147	142	147	85.1	141		233		116	299	242		198
Manganese	<0.05	<0.05	0.08	<0.05	<0.05	<0.05		<0.05		1.84	2.93	2.11		1.9
Manganese, Dissolved	<0.05	<0.05	0.08	<0.05	<0.05	<0.05		<0.05		2.24	0.73	2.21		1.8
Methane (ug/L)	0.18	3.7	4.5	3	2.8	8.9		0.8		1.1	0.11	0.18		2.4
Nitrate-Nitrite Nitrogen	8	1.2	12.4	7.8	7.3	8.8		10.3		<1	5	<4		<2
Nitrogen	0.79	18	14	18	17	18		17		7.3	3.9	3.2		1.6
Oxygen	<0.15	1	1.6	1.4	2.8	2.7		0.71		0.33	<0.15	<0.15		<0.15
Potassium	25.3	18.2	16.8	18.7	10.2	17.1		18.4		2250	5080	4250		3350
Sodium	816	770	772	741	377	736		823		171	477	288		254
Sulfate	1870	100	2130	2000	1600	1580	1800	1900		279	1350	1010		820
Sulfide, Total	0.05	0.08	0.06	<0.05	<0.05	0.06		<0.05		<1	<1	<1		2
Total Organic Carbon	5	5	5	6	5	6		5		18000	28000	26000		13000

All analytical results are reported
in mg/L with the exception of methane which is in ug/L

ARCADIS

Table 3
MW011 Location: Geochemical Analytical Results
ChevronTexaco Eunice #2 (North) Gas Plant
Eunice, Lea County, New Mexico
(mg/L)

Station Name	IW001	IW001	IW001	IW001	IW001
Collection Date	7/30/03	8/20/03	10/1/03	10/29/03	12/9/03
Alkalinity			6110	4360	3160
Arsenic			<0.05	<0.5	<0.05
Bicarbonate			6110	4360	3160
Bromide			70	70	<20
Calcium			4630	4180	4240
Carbon Dioxide		970	1400	1300	1300
Carbonate (CO3)			<5	<5	<5
Chloride			2800	2300	1400
Chromium (Total)			0.65	0.38	0.32
Chromium, Dissolved			1.53	0.32	0.32
Ferrous iron		200	240	230	280
Hexavalent Chromium, Dissolved			<0.1	<0.005	<0.01
Iron			244	279	244
Iron, Dissolved			235	256	242
Magnesium			409	277	247
Manganese			6.43	6.09	6.42
Manganese, Dissolved			6.2	5.61	6.36
Methane (ug/L)		6	11	15	9.6
Nitrate-Nitrite Nitrogen			<2	<2	<2
Nitrogen		3.4	4.4	0.98	2.5
Oxygen		<0.15	<0.15	<0.15	0.056
Potassium			4190	4630	3330
Sodium			328	366	280
Sulfate			1100	1000	1370
Sulfide, Total			1	<1	<1
Total Organic Carbon			37000	21000	22000

All analytical results are reported
in mg/L with the exception of methane which is in ug/L

ARCADIS

Table 4
MW012 Location: Geochemical Analytical Results
ChevronTexaco Eunice #2 (North) Gas Plant
Eunice, Lea County, New Mexico
(mg/L)

Station Name	MW012	MW012	MW012	MW012	MW012	MW012	MW012	MW012	MW012	MW012	MW012
Collection Date	6/10/03	6/10/03	7/2/03	7/7/03	7/14/03	7/30/03	8/20/03	9/5/03	9/30/03	10/28/03	12/8/03
Alkalinity		232	254	184	153	180	169		118	110	144
Arsenic		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05		<0.05	<0.05	<0.05
Bicarbonate		232	254	184	153	180	169		118	110	144
Bromide	5.36	<2	4	4	5	4	4	4.05	4	4	4
Calcium		447	400	383	438	430	320		604	514	310
Carbon Dioxide		130	27	18	21	8.3	12		8	5.8	12
Carbonate (CO3)		<5	<5	<5	<5	<5	<5		<5	<5	<5
Chloride		780	680	760	680	770	730		800	800	680
Chromium (Total)		2.96	2.54	3	3.64	3.28	1.66		3.95	4.27	3.29
Chromium, Dissolved		2.84	2.39	3.08	3.24	3.42	1.54		3.87	4.12	3.19
Ferrous iron		<1	<1	<1	<1	<1	<1		<1	<1	<1
Hexavalent Chromium, Dissolved		2.64	2.14	2.67	2.97	2.5	0.7		2.8	3.2	1.2
Iron		0.1	0.3	0.1	0.3	0.7	<0.1		0.3	0.2	<0.1
Iron, Dissolved		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1		<0.1	<0.1	<0.1
Magnesium		90.7	86.6	104	106	89.9	138		106	141	96.4
Manganese		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05		<0.05	<0.05	<0.05
Manganese, Dissolved		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05		<0.05	<0.05	<0.05
Methane (ug/L)		0.7	0.079	0.046	0.26	0.13	0.067		0.13	0.16	1.3
Nitrate-Nitrite Nitrogen		4.8	6.7	6.3	5.2	0.8	0.9		5.9	8.2	10.4
Nitrogen		19	24	16	18	18	14		16	14	18
Oxygen		3.1	0.58	2.4	1.5	1.6	0.67		4.8	4.7	6.2
Potassium		35	33	25	26	24.5	12.3		33	31	23.2
Sodium		485	485	467	522	490	318		706	593	362
Sulfate		1130	1060	1270	1150	1320	1140		1400	1500	1150
Sulfide, Total		0.06	<0.05	<0.05	0.05	0.1	0.06		0.06	<0.05	0.05
Total Organic Carbon		5	7	6	6	4	3		5	5	5

All analytical results are reported
in mg/L with the exception of methane which is in ug/L

ARCADIS

Table 4
MW012 Location: Geochemical Analytical Results
ChevronTexaco Eunice #2 (North) Gas Plant
Eunice, Lea County, New Mexico
(mg/L)

Station Name	MW012A	MW012A	MW012A	MW012A	MW012A	MW012A	MW012A	MW012A	MW012A	MW012A	MW012A	MW012A
Collection Date	6/10/03	6/10/03	6/10/03	7/2/03	7/7/03	7/14/03	7/30/03	8/20/03	9/5/03	9/30/03	10/28/03	12/9/03
Alkalinity	517		547	564	481	444	448	424		453	446	439
Arsenic			<0.05	<0.05	<0.05	<0.05	<0.05	<0.05		<0.05	<0.05	<0.05
Bicarbonate	517		547	564	481	444	448	424		453	446	439
Bromide	<2	<1.00	<2	<2	<2	<2	<2	<2	1.15	<2	<2	<2
Calcium			118	127	107	91.4	84.8	81.6		82.5	48.5	78.4
Carbon Dioxide			630	330	190	170	130	130		100	94	90
Carbonate (CO3)	<5		<5	<5	<5	<5	<5	<5		<5	<5	<5
Chloride	57		53	50	60	60	60	70		67	60	60
Chromium (Total)			<0.05	<0.05	<0.05	<0.05	<0.05	<0.05		<0.05	<0.05	<0.05
Chromium, Dissolved			<0.05	<0.05	<0.05	<0.05	<0.05	<0.05		<0.05	<0.05	<0.05
Ferrous iron			<1	<1	<1	<1	<1	<1		0.16	0.14	<1
Hexavalent Chromium, Dissolved			<0.005	<0.005	<0.005	<0.005	0.35	<0.005		<0.005	<0.005	<0.005
Iron			<0.1	<0.1	<0.1	<0.1	0.2	0.3		0.3	0.3	0.2
Iron, Dissolved			<0.1	<0.1	<0.1	<0.1	0.2	0.4		0.1	0.1	0.1
Magnesium			32.6	36.2	30.1	27.4	25.4	24.2		23.5	13.6	23.8
Manganese			<0.05	<0.05	<0.05	<0.05	0.18	0.22		0.21	0.25	0.27
Manganese, Dissolved			<0.05	<0.05	<0.05	<0.05	0.18	0.25		0.21	0.26	0.27
Methane (ug/L)			0.48	0.18	0.046	0.51	0.24	5.4		11	24	100
Nitrate-Nitrite Nitrogen			1.1	2.1	<0.4	<0.4	1.2	1.1		13	<1	<0.4
Nitrogen			10	17	26	28	23	18		16	17	21
Oxygen			1.1	0.83	0.28	0.36	0.48	0.2		0.4	0.64	0.5
Potassium			13.7	14.1	29	22.3	18.3	24.4		24.6	14.7	18.2
Sodium			110	124	124	116	106	108		106	60.2	105
Sulfate	95		88	90	90	90	100	90		68	74	70
Sulfide, Total			0.05	<0.05	0.65	0.8	2.3	5.9		15	7	7.3
Total Organic Carbon			9	1	8	7	8	11		4	4	4

All analytical results are reported
in mg/L with the exception of methane which is in ug/L

ARCADIS

Table 4
MW012 Location: Geochemical Analytical Results
ChevronTexaco Eunice #2 (North) Gas Plant
Eunice, Lea County, New Mexico
(mg/L)

Station Name	MW012M	MW012M	MW012M	MW012M	MW012M	MW012M	MW012M	MW012M	MW012M	MW012M	MW012M	MW012M
Collection Date	6/10/03	6/10/03	6/10/03	6/10/03	7/2/03	7/7/03	7/14/03	7/30/03	8/20/03	9/30/03	10/28/03	12/9/03
Alkalinity	210	134		134	136	143	135	147	140	139	139	127
Arsenic				<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Bicarbonate	210	134		134	136	143	135	147	140	139	139	127
Bromide	<2	<2	7.07	<2	5	4	5	4	4	4	3	5
Calcium				347	361	291	325	340	404	305	155	335
Carbon Dioxide				12	13	9.9	14	12	9.5	10	10	11
Carbonate (CO3)	<5	<5		<5	<5	<5	<5	<5	<5	<5	<5	<5
Chloride	830	460		720	720	610	630	710	770	600	600	620
Chromium (Total)				1.81	1.81	1.29	1.52	1.55	3.12	1.37	1.48	1.59
Chromium, Dissolved				1.73	1.82	1.3	1.51	1.55	2.61	1.25	1.48	1.54
Ferrous iron				<1	<1	<1	<1	<1	<1	<1	<1	<1
Hexavalent Chromium, Dissolved				1.57	1.75	1.23	1.4	1.1	1.8	1.4	1	0.61
Iron				<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Iron, Dissolved				<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Magnesium				142	147	119	138	128	91.3	148	76.4	136
Manganese				<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Manganese, Dissolved				<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Methane (ug/L)				0.42	0.14	0.38	0.66	0.2	0.1	0.057	0.13	9.7
Nitrate-Nitrite Nitrogen				6.1	6	4.8	17	0.6	1	4	5.3	6.5
Nitrogen				16	20	18	17	19	14	14	17	17
Oxygen				3.2	3.8	0.86	0.68	0.35	3.4	0.82	2.3	3
Potassium				11	11.8	12.2	13	12.3	29	11	8.4	10.6
Sodium				323	358	298	340	330	482	301	158	321
Sulfate	1160	730		1070	1070	950	980	1120	1320	1000	1000	960
Sulfide, Total				0.06	<0.05	<0.05	<0.05	0.06	0.06	<0.05	<0.05	<0.05
Total Organic Carbon				3	6	6	6	4	11	4	3	4

All analytical results are reported
in mg/L with the exception of methane which is in ug/L

ARCADIS

Table 4
MW012 Location: Geochemical Analytical Results
ChevronTexaco Eunice #2 (North) Gas Plant
Eunice, Lea County, New Mexico
(mg/L)

Station Name	RW003	RW003	RW003	RW003	RW003	RW003	RW003	RW003	RW003	RW003	RW003
Collection Date	6/10/03	6/10/03	6/10/03	7/2/03	7/8/03	7/15/03	7/30/03	8/21/03	9/30/03	10/28/03	12/9/03
Alkalinity	141	125		140	151	128	152	157	244	304	344
Arsenic		<0.05		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Bicarbonate	141	125		140	151	128	152	157	244	304	344
Bromide	5	5	7.11	5	4	5	4	4	3	3	4
Calcium		483		454	387	421	360	464	480	541	489
Carbon Dioxide		12		13	16	17	11	7.5	38	85	110
Carbonate (CO3)	<5	<5		<5	<5	<5	<5	<5	<5	<5	<5
Chloride	900	890		800	700	890	770	740	700	700	760
Chromium (Total)		3.51		3.35	3.08	3.87	2.75	3.32	3.2	2.85	2.94
Chromium, Dissolved		3.39		3.85	3.11	3.74	2.81	3.17	2.58	2.64	2.85
Ferrous iron		<1		<1	<1.0	<1	<1	<1	<1	<1	<1
Hexavalent Chromium, Dissolved		3.03		2.69	2.86	<5	2.1	2	2.2	2.4	0.9
Iron		<0.1		<0.1	<0.1	<1	<0.1	<0.1	<0.1	<0.1	<0.1
Iron, Dissolved		<0.1		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Magnesium		112		118	125	138	92.7	114	108	102	109
Manganese		<0.05		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Manganese, Dissolved		<0.05		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Methane (ug/L)		1.8		1.2	0.45	1.1	0.27	2.4	0.064	0.23	4.6
Nitrate-Nitrite Nitrogen		5.9		5.8	5.8	6	2	10.6	4	<0.4	12.5
Nitrogen		17		20	17	20	17	19	16	16	18
Oxygen		3.2		4.1	0.77	2.2	1.2	0.46	3.3	4.4	3.9
Potassium		12.8		12.5	13	15	10.7	12.3	11.8	12.2	12.3
Sodium		523		506	443	460	410	494	482	495	457
Sulfate	1590	1360		1200	1180	1400	1210	1130	1000	1200	1200
Sulfide, Total		0.08		<0.05	<0.05	<0.05	0.07	0.07	<0.05	<0.05	0.06
Total Organic Carbon		6		7	6	5	4	4	5	5	6

All analytical results are reported
in mg/L with the exception of methane which is in ug/L

ARCADIS

Table 4
MW012 Location: Geochemical Analytical Results
ChevronTexaco Eunice #2 (North) Gas Plant
Eunice, Lea County, New Mexico
(mg/L)

Station Name	IW002	IW002	IW002	IW002	IW002	IW002	IW002	IW002	IW002	IW002	IW002	IW002
Collection Date	6/11/03	6/11/03	6/11/03	7/2/03	7/8/03	7/15/03	7/15/03	7/30/03	8/21/03	9/30/03	10/29/03	12/10/03
Alkalinity	112	111		1310	1710	821		997	3990	6110	4750	3140
Arsenic		<0.05		<0.05	<0.05	<0.05		<0.5	<0.05	<0.05	<0.05	<0.05
Bicarbonate	112	111		1310	1710	821		997	3990	6110	4750	3140
Bromide	5	5	6.72	100	300	<20		140	90	70	70	<20
Calcium		504		882	1630	2600		2040	2270	207	5750	40900
Carbon Dioxide		18		1500	1200	26		1200	1200	1200	1300	1600
Carbonate (CO3)	<5	<5		<5	<5	<5		<5	<5	<5	<5	<5
Chloride	940	920		2200	3200	3000		2200	1500	300	1600	1230
Chromium (Total)		3.92		<0.5	0.09	<0.05		<0.5	0.13	4.13	0.11	0.16
Chromium, Dissolved		4.02		<0.5	0.09	<0.05		<0.5	0.19	2.04	0.11	0.15
Ferrous iron		<1		<100	<1	<1		51	130	180	210	290
Hexavalent Chromium, Dissolved		3.28		<0.05	<0.05	<0.1	<1	0.6	<0.005	<0.005	<0.005	<0.01
Iron		<0.1		12	22.7	40.1		42	176	158	208	247
Iron, Dissolved		<0.1		13	21.9	35.1		37	165	<0.1	207	224
Magnesium		157		103	158	271		198	184	18.8	275	204
Manganese		<0.05		8.2	1.97	2.54		1.4	5.59	5.23	5.93	4.19
Manganese, Dissolved		<0.05		8.9	1.88	2.18		1.2	5.27	<0.05	5.9	3.83
Methane (ug/L)		0.52		0.17	0.15	3.8		1.6	28	20	400	50
Nitrate-Nitrite Nitrogen		7.3		1	11	5		3	<2	<2	<2	<2
Nitrogen		21		2.6	0.87	20		1	0.78	1.5	3.4	1
Oxygen		0.77		<0.15	<0.15	0.95		<0.15	<0.15	0.3	0.16	<0.15
Potassium		15.3		1730	2890	4760		3520	2990	250	4190	26800
Sodium		477		186	221	317		259	275	15.8	224	178
Sulfate	1370	1360		900	1170	1160		860	750	1000	600	300
Sulfide, Total		0.06		<1	<1	<1		2	1	<1	<1	<1
Total Organic Carbon		18		16000	28000	11		18000	16000	39000	20000	24000

All analytical results are reported
in mg/L with the exception of methane which is in ug/L

ARCADIS

Table 5
MW008A Location: Geochemical Analytical Results
ChevronTexaco Eunice #2 (North) Gas Plant
Eunice, Lea County, New Mexico
(mg/L)

Station Name	MW008	MW008	MW008	MW008	MW008	MW008	MW008	MW008	MW008	MW008	MW008	MW008
Sample Collection Date	6/9/03	6/9/03	6/9/03	6/30/03	7/9/03	7/15/03	7/28/03	8/21/03	9/5/03	9/29/03	9/29/03	10/27/03
Alkalinity	146	144		215	162	192	179	141		141		132
Arsenic		<0.05		<0.05	<0.05	<0.05	<0.02	<0.05		<0.05		<0.05
Bicarbonate	146	144		215	162	192	179	141		141		132
Bromide	7	7	8.64	5	6	5	5	7	15.4	5	15.4	5
Calcium		612		519	641	472	537	1230		570		270
Carbon Dioxide			21	22	18	17	21	13			10	12
Carbonate (CO3)	<5	<5		<5	<5	<5	<5	<5		<5		<5
Chloride	1340	1300		1020	1200	1110	1100	1400		1200		1300
Chromium (Total)		5.22		3.37	4.02	3.85	2.1	4.67		4.9		5.55
Chromium, Dissolved		5.16		3.24	4.13	4.14	2.13	4.52		4.66		5.21
Ferrous iron			<1	<1	<1	<1	<1	<1			<1	<1
Hexavalent Chromium, Dissolved		7.07		2.71	3.6	<5	3.1	4.1		2		2.8
Iron		<0.1		<0.1	<0.1	<0.1	<0.1	<0.1		<0.1		0.1
Iron, Dissolved		<0.1		<0.1	<0.1	<0.1	<0.05	<0.1		<0.1		<0.1
Magnesium		138		98.5	125	122	109	122		127		273
Manganese		<0.05		<0.05	<0.05	<0.05	<0.05	<0.05		<0.05		<0.05
Manganese, Dissolved		<0.05		<0.05	<0.05	<0.05	<0.02	<0.05		<0.05		<0.05
Methane			0.4	0.35	0.066	0.11	1.3	6.7			1.7	0.093
Nitrate-Nitrite Nitrogen		10.9		9	10.8	8	1.4	10.9		16.6		8.9
Nitrogen			18	21	18	20	21	18			10	17
Oxygen			0.78	2.4	0.68	2	6.4	3.2			2	4.2
Potassium		15.6		13.1	14.9	18	13.7	14.1		14.4		30.3
Sodium		755		757	831	647	718	1530		739		330
Sulfate	1600	1600		1430	1550	1450	1450	1790		1620		1700
Sulfide, Total		0.08		<0.05	<0.05	<0.05	0.1	0.06		0.06		0.07
Total Organic Carbon		10		6	9	5	5	5		5		5

All analytical results are reported in mg/L with the exception of methane which is in ug/L

ARCADIS

Table 5
MW008A Location: Geochemical Analytical Results
ChevronTexaco Eunice #2 (North) Gas Plant
Eunice, Lea County, New Mexico
(mg/L)

Station Name	MW008	MW008A	MW008A	MW008A	MW008A	MW008A	MW008A	MW008A	MW008A	MW008A	MW008A	MW008A	MW008A	MW008A
Sample Collection Date	12/4/03	6/9/03	6/9/03	6/9/03	6/30/03	6/30/03	7/9/03	7/15/03	7/29/03	8/21/03	9/5/03	9/29/03	9/29/03	10/27/03
Alkalinity	160	129	131		148		151	155	168	168		165		171
Arsenic	<0.05		<0.05		<0.05		<0.05	<0.05	<0.05	<0.05		<0.05		<0.05
Bicarbonate	160	129	131		148		151	155	168	168		165		171
Bromide	6	7	7	8.89	7		7	7	7	8	6.7	7	6.7	7
Calcium	685		656		613		538	533	570	556		479		449
Carbon Dioxide	18			16	19		100	18	16	15			13	15
Carbonate (CO3)	<5	<5	<5		<5		<5	<5	<5	<5		<5		<5
Chloride	1090	1240	1200		1300		1100	1220	1240	1220		1100		1100
Chromium (Total)	4.79		5.47		5.21		2.01	4.95	4.52	3.86		3		3.16
Chromium, Dissolved	4.7		5.6		5.17		5.22	5.28	4.38	3.24		2.87		2.99
Ferrous iron	<1			<1	<1		<1	<1	<1	<1			<1	1.9
Hexavalent Chromium, Dissolved	2.7		7.8		3.6		3.88	<5	3.1	0.027		1.7		0.9
Iron	<0.1		<0.1		<0.1		<1	<0.1	<0.1	<0.1		<0.1		<0.1
Iron, Dissolved	<0.1		<0.1		<0.1		<0.1	<0.1	<0.1	<0.1		<0.1		1.4
Magnesium	131		161		192		177	174	155	157		148		147
Manganese	<0.05		<0.05		<0.05		<0.05	<0.05	<0.05	<0.05		<0.05		<0.05
Manganese, Dissolved	<0.05		<0.05		<0.05		<0.05	<0.05	<0.05	<0.05		<0.05		<0.05
Methane	5.8			0.34	1.7		0.33	0.53	45	3.2			0.94	0.38
Nitrate-Nitrite Nitrogen	21		9.8		5.8		6.5	4	1.8	9		0.5		0.8
Nitrogen	23			18	24		18	23	19	19			16	20
Oxygen	5.6			0.83	0.8		1.2	1.7	7.4	1.2			1.1	1.2
Potassium	15.3		24.1		27		22	20.2	19.9	21.5		19.4		19.1
Sodium	6470		772		716		658	632	670	644		579		594
Sulfate	1410	1600	1600		1830		1600	1710	1780	1730		1730		1600
Sulfide, Total	0.05		0.08		<0.05		<0.05	<0.05	0.08	0.06		<0.05		<0.05
Total Organic Carbon	6		11		10		12	7	6	7		6		6

All analytical results are reported in mg/L with the exception of methane which is in ug/L

ARCADIS

Table 5
MW008A Location: Geochemical Analytical Results
ChevronTexaco Eunice #2 (North) Gas Plant
Eunice, Lea County, New Mexico
(mg/L)

Station Name	MW008A	MW008M	MW008M	MW008M	MW008M	MW008M	MW008M	MW008M	MW008M	MW008M	MW008M	MW008M	MW008M
Sample Collection Date	12/4/03	6/9/03	6/9/03	6/9/03	6/30/03	7/9/03	7/15/03	7/29/03	8/21/03	9/29/03	9/29/03	10/27/03	12/4/03
Alkalinity	172	120	118		120	133	133	129	120	121		119	122
Arsenic	<0.05		<0.05		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05		<0.05	<0.05
Bicarbonate	172	120	118		120	133	133	129	120	121		119	122
Bromide	8	8	8	9.31	8	7	7	7	7	6	6.61	5	7
Calcium	622		609		485	672	589	640	826	654		656	734
Carbon Dioxide	19			11	13	19	16	18	9.8		9.6	10	18
Carbonate (CO3)	<5	<5	<5		<5	<5	<5	<5	<5	<5		<5	<5
Chloride	1030	1490	1500		1400	1300	1400	1400	1400	1400		1400	1500
Chromium (Total)	3.18		5.43		5.24	4.29	5.78	5.33	5.32	5.7		5.49	5.77
Chromium, Dissolved	3.19		2.57		5.29	5.37	5.52	5.72	5.36	5.36		5.33	5.92
Ferrous iron	<1			<1	<1	<1	<1	<1	<1		<1	2.1	<1
Hexavalent Chromium, Dissolved	2		7.43		4.07	4.36	5.2	3	4.5	2.3		4	2.6
Iron	<0.1		<0.1		<0.1	<0.1	<1	<0.1	<0.1	<0.1		<0.1	<0.1
Iron, Dissolved	<0.1		<0.1		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1		<0.1	<0.1
Magnesium	218		161		154	147	177	147	153	149		155	164
Manganese	<0.05		<0.05		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05		<0.05	<0.05
Manganese, Dissolved	<0.05		<0.05		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05		<0.05	<0.05
Methane	6.8			0.27	0.5	0.15	0.18	7.7	1.5		0.43	0.092	8.2
Nitrate-Nitrite Nitrogen	6.3		12.6		10.3	9.4	9	1.3	10.3	9.6		9.2	10.5
Nitrogen	20			19	19	17	21	24	16		15	16	22
Oxygen	1.2			3.2	2.3	0.46	0.75	5	2.2		1.6	3	4.1
Potassium	22		23.7		23.3	22.3	26	21.8	23.5	22.3		24.1	28
Sodium	757		692		567	818	734	740	955	772		783	6470
Sulfate	1450	1700	1700		2000	1690	1770	1990	1870	1600		1700	1650
Sulfide, Total	0.05		0.07		<0.05	<0.05	<0.05	0.11	0.07	<0.05		<0.05	0.06
Total Organic Carbon	17		5		7	8	5	5	5	5		5	5

All analytical results are reported in mg/L with the exception of methane which is in ug/L

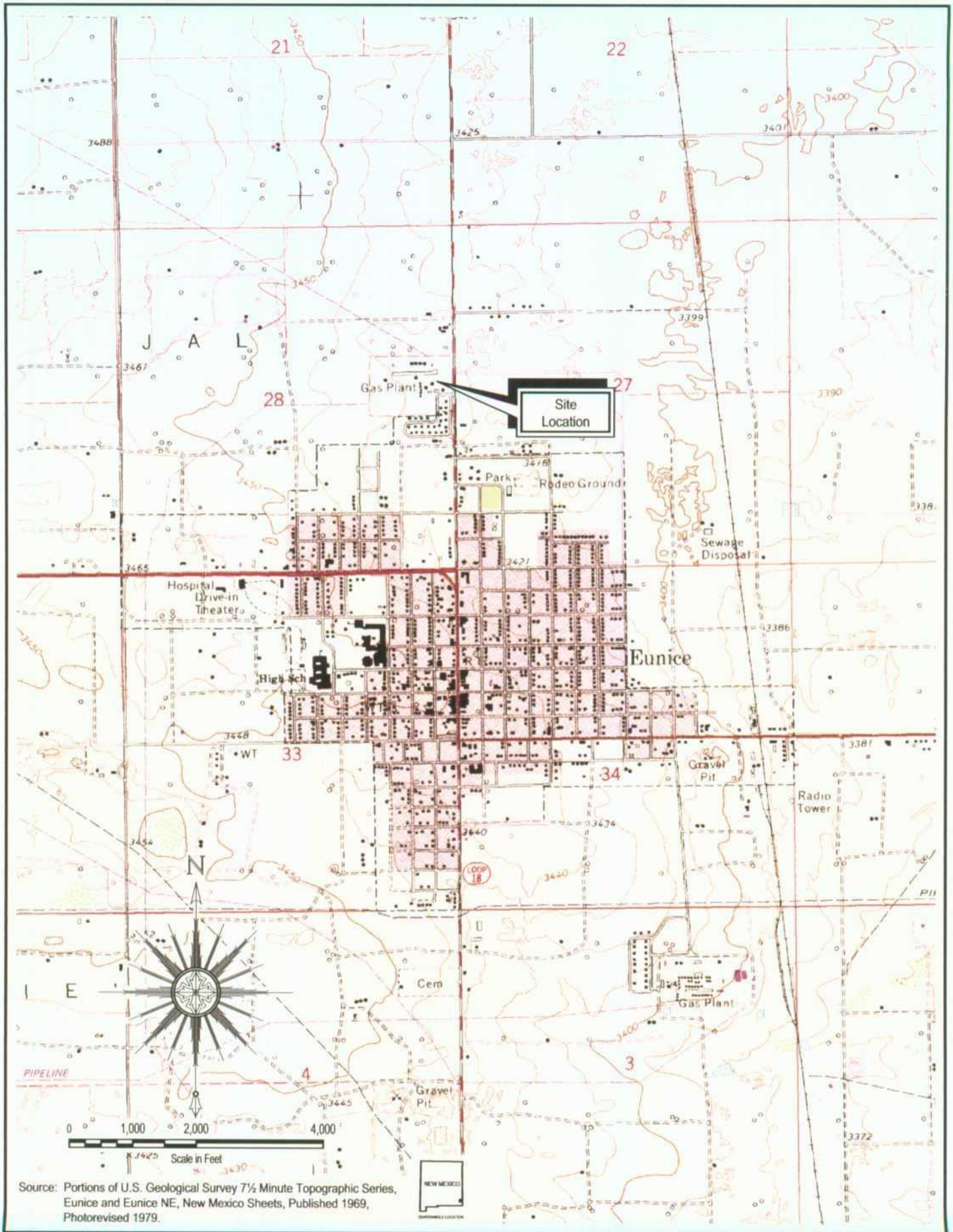
ARCADIS

Table 5
MW008A Location: Geochemical Analytical Results
ChevronTexaco Eunice #2 (North) Gas Plant
Eunice, Lea County, New Mexico
(mg/L)

Station Name	RW004A	RW004A	RW004A	RW004A	RW004A	RW004A	RW004A	RW004A	RW004A	RW004A	RW004A	RW004A
Sample Collection Date	6/9/03	6/9/03	6/9/03	7/1/03	7/9/03	7/15/03	7/15/03	7/28/03	8/21/03	10/1/03	10/29/03	12/9/03
Alkalinity	142	145		1320	231	<5		<5	<5	<5	<5	1120
Arsenic		<0.05		<0.05	<0.05	<0.05		<0.5	<0.05	<0.05	<0.05	<0.05
Bicarbonate	142	145		1320	231	<5		<5	<5	<5	<5	1120
Bromide	5	5	6.51	1100	500	180		110	120	24	160	30
Calcium		341		1200	2040	1050		1170	1870	3500	3950	16900
Carbon Dioxide		13		200	1200	1400		1100	890	1500	1700	1400
Carbonate (CO3)	<5	<5		<5	<5	<5		<5	<5	<5	<5	<5
Chloride	880	860		2300	3000	1900		1500	1500	4500	3000	1400
Chromium (Total)		2.61		0.07	0.08	0.07		0.6	0.12	0.41	0.24	0.21
Chromium, Dissolved		5.43		0.07	<0.05	0.1		<0.5	0.13	0.57	0.21	0.23
Ferrous iron		<1		6	<1	43		38	32	30	140	140
Hexavalent Chromium, Dissolved		4.62		<0.05	<0.05	<0.1	<1	<0.02	<0.005	<0.1	<0.005	<0.01
Iron		<0.1		11.5	22.2	22.3		19.6	75.8	54.4	145	123
Iron, Dissolved		<0.1		11	6.2	23.4		191	66.3	50.2	127	124
Magnesium		144		144	291	141		178	206	411	426	2220
Manganese		<0.05		1.73	2.47	1.95		1.59	4.23	4.94	21.9	17.9
Manganese, Dissolved		<0.05		1.66	0.78	2.12		14.9	3.62	4.55	20.3	11.1
Methane		0.54		1.6	0.089	0.12		2.3	0.94	4.1	2.7	5
Nitrate-Nitrite Nitrogen		5.7		7	9	4		<2	<2	4	2	<2
Nitrogen		16		13	6.1	1.8		2.6	3.2	2.2	2	1.5
Oxygen		1.2		0.57	<0.15	<0.15		<0.15	<0.15	<0.15	<0.15	<0.15
Potassium		10.6		3060	6090	2500		2370	2630	6770	5770	27900
Sodium		424		356	474	201		192	213	383	390	2710
Sulfate	1400	1490		910	1310	750		610	660	1600	1200	1160
Sulfide, Total		0.05		<1	4	<1		1	<1	<1	<1	1
Total Organic Carbon		4		21000	23000	14000		13000	21000	51000	37000	21000

All analytical results are reported in mg/L with the exception of methane which is in ug/L

Figures



Source: Portions of U.S. Geological Survey 7½ Minute Topographic Series, Eunice and Eunice NE, New Mexico Sheets, Published 1969, Photorevised 1979.

ARCADIS
1004 N. Big Spring Street, Suite 300
Midland, TX 79701-3383
Tel 432 687 5400 Fax 432 687 5401

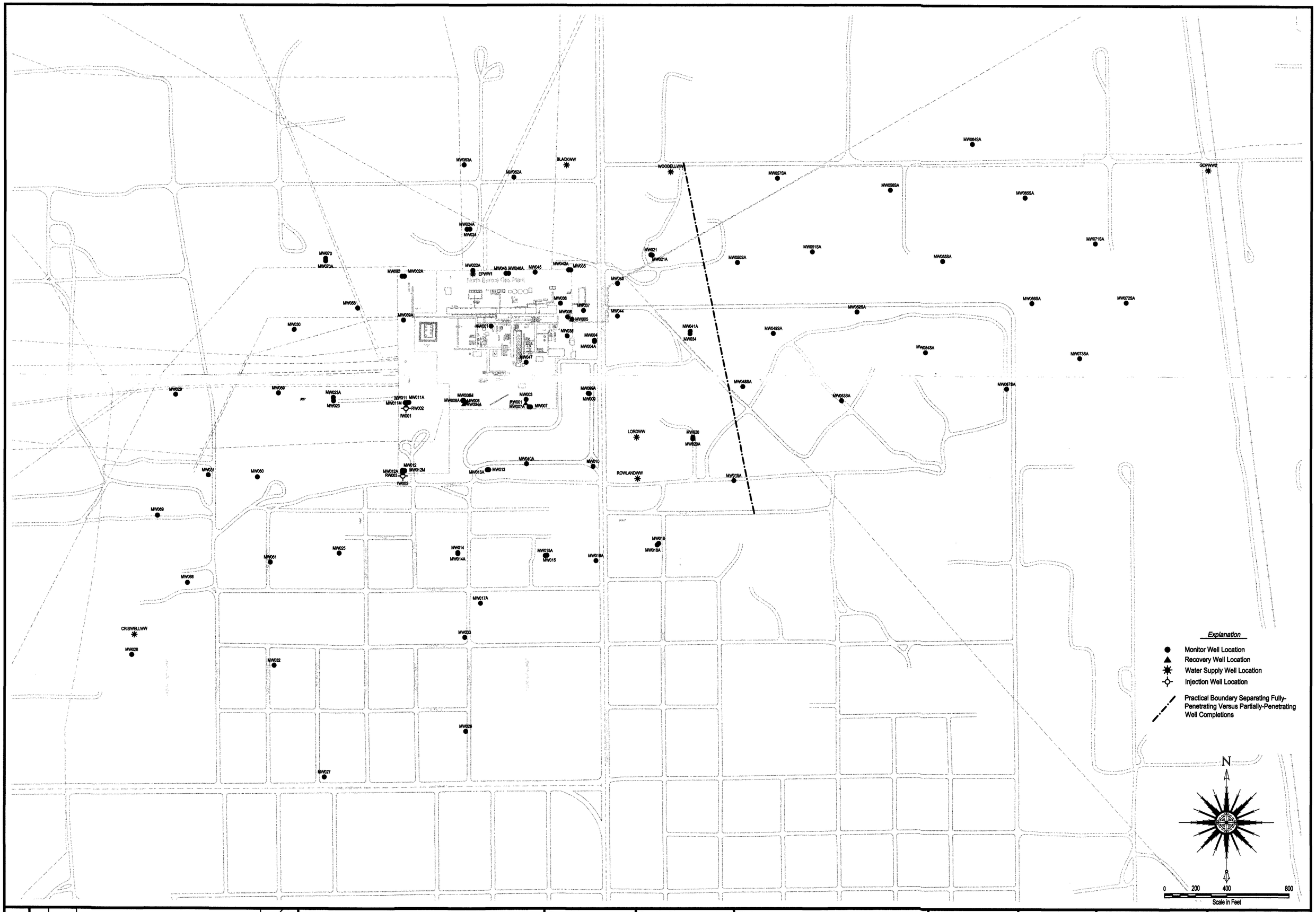
Drawing Date	File Name	File Location	Task Manager	Project Director	Area Manager
29 January 2004	MT7001007.dwg	\AutoCAD\DWG\ChevronTexaco\North Eunice\MT000700.0010	L. Markham	S. Tischer	A. Schmidt

ChevronTexaco Exploration & Production Company
North Eunice Plant Chromate Remediation Phase One Study

Site Location Map

Eunice #2 (North) Gas Plant, Lea County, New Mexico

Technical Review	Unique Number
M. Hagan	31-014-00615
Project Number	**Figure**
MT000700.0010	1



No.	Date	Revision Description	By	Ckd

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Drawn By	Drawing Date	File Location	File Name	Unique Number	Project Director	Area Manager
H. Clardy	29 January 2004	\AutoCAD\DWG\ChevronTexaco\North Eunice\MT000700.0010	MT7001008.dwg	31-014-00616	S. Tischer	A. Schmidt

ChevronTexaco Exploration & Production Company
North Eunice Plant Chromate Remediation Phase One Study

Monitor, Recovery, Injection And Water Well Location Map

Eunice #2 (North) Gas Plant, Lea County, New Mexico

Task Manager	Technical Review
L. Markham	M. Hagan

Project Number	Figure
MT000700.0010	2

Contour Interval
-- 0.50 Foot

Contour Interval
-- 0.50 Foot

North Eunice Gas Plant

Explanation

- Monitor Well Location
- Recovery Well Location
- Water Supply Well Location
- 3,371.21' Groundwater Elevation
- NC Not Collected
- —3,371.00'— Groundwater Elevation Contour Contour Interval – 1.0 Foot Except Where Noted
- Contour Interval Change
- Practical Boundary Separating Fully-Penetrating Versus Partially-Penetrating Well Completions

N

0 200 400 800
Scale in Feet

No.	Date	Revision Description	By	Ckd

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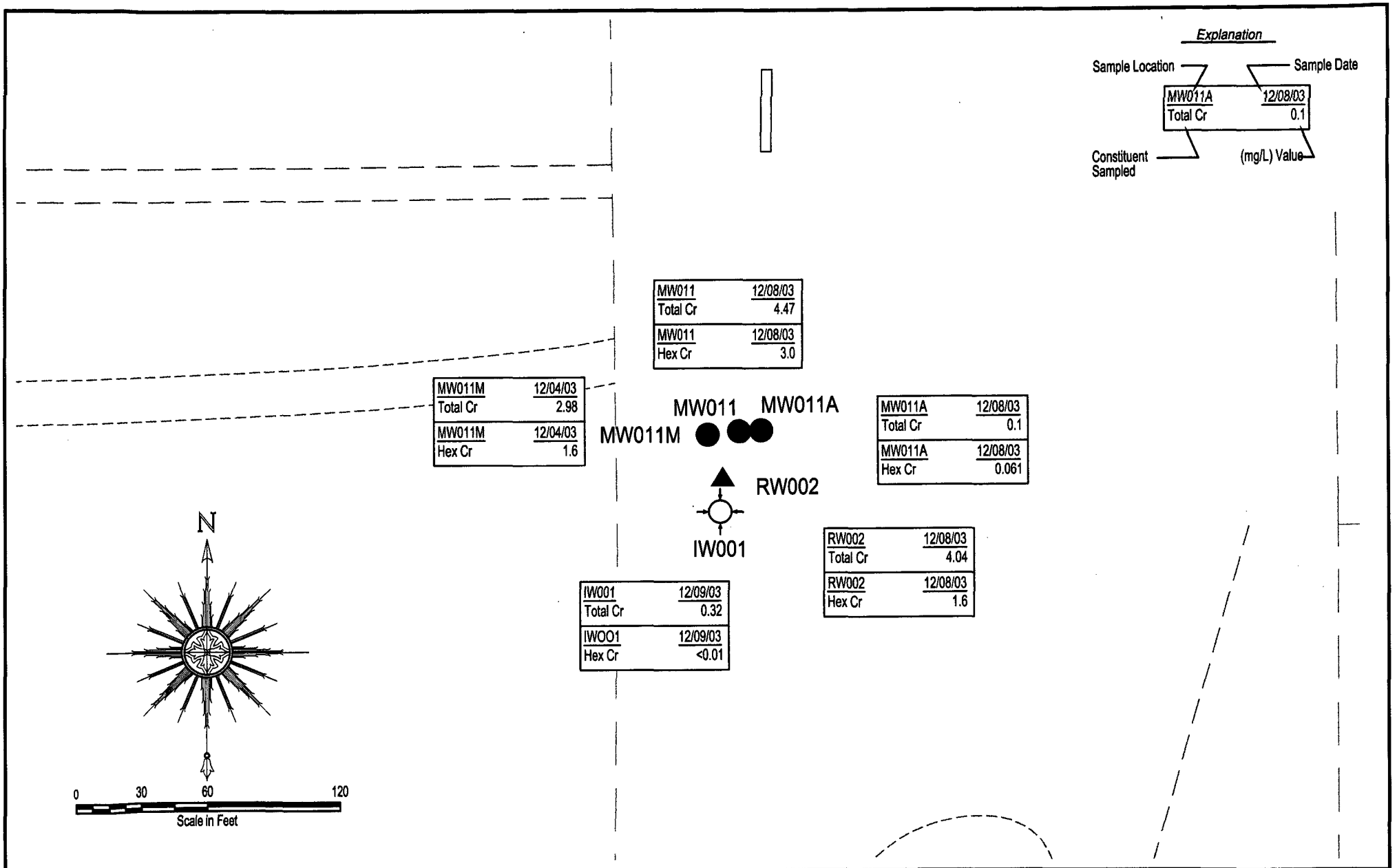
Drawn By	Drawing Date	File Location	File Name	Unique Number
H. Clardy	29 January 2004	\AutoCAD\DWG\ChevronTexaco\North Eunice\MT000700.0010	MT7001009.dwg	31-014-00617

ChevronTexaco Exploration & Production Company
North Eunice Plant Chromate Remediation Phase One Study

Hydraulic Gradient Map (May, 2003)

Eunice #2 (North) Gas Plant, Lea County, New Mexico

Project Director	Area Manager
S. Tischer	A. Schmidt
Task Manager	**Technical Review**
L. Markham	M. Hagan
Project Number	**Figure**
MT000700.0010	3



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1004 N. Big Spring Street, Suite 300
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Drawing Date	File Name	File Location	Task Manager	Project Director	Area Manager
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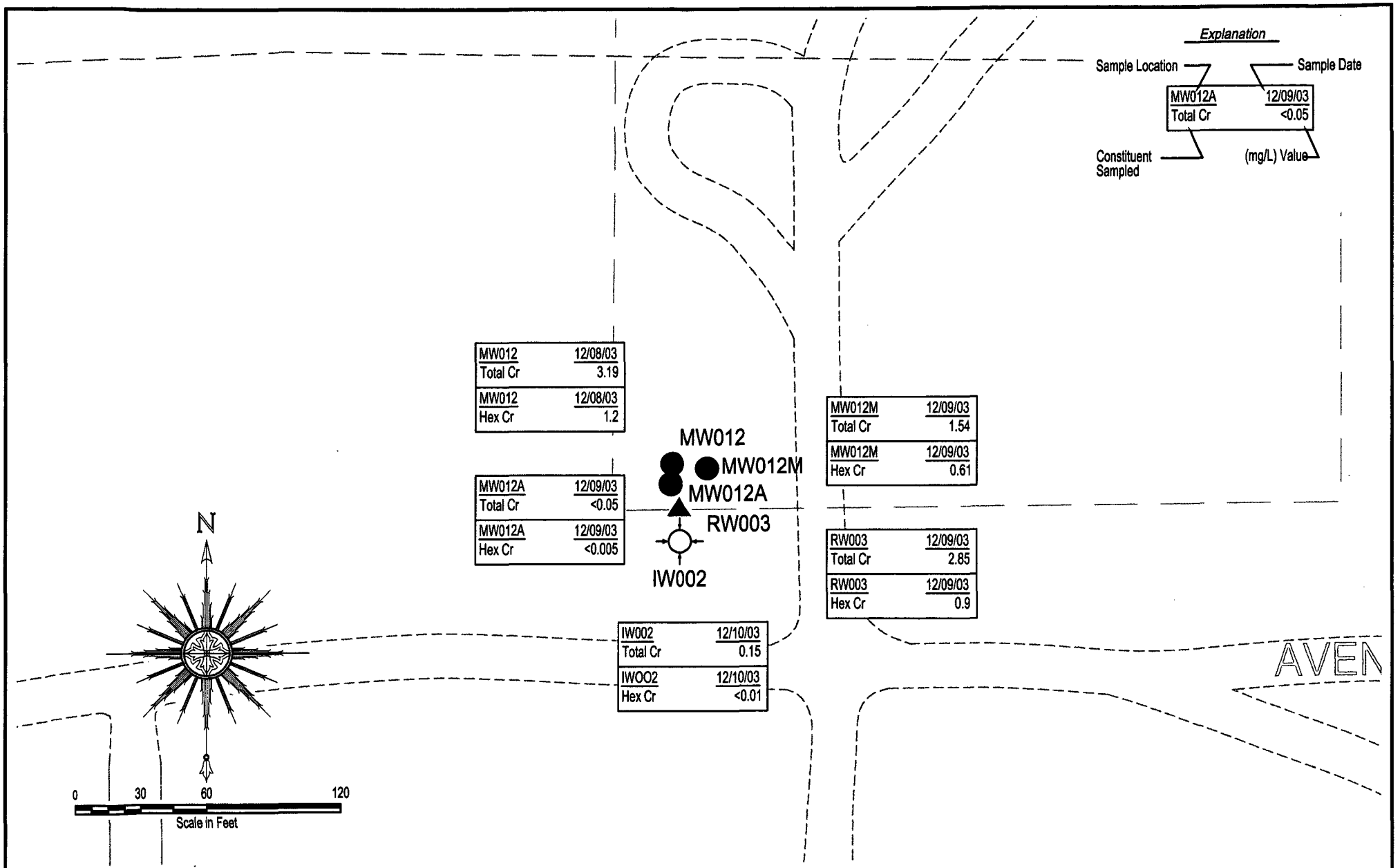
ChevronTexaco Exploration & Production Company
North Eunice Plant Chromate Remediation Phase One Study

MW011 Area

Well Locations and Dissolved Total Cr and Dissolved Hex Cr Concentrations (mg/L)

Eunice #2 (North) Gas Plant, Lea County, New Mexico

Technical Review	Unique Number
M. Hagan	31-014-00618
Project Number	**Figure**
MT000700.0010	4



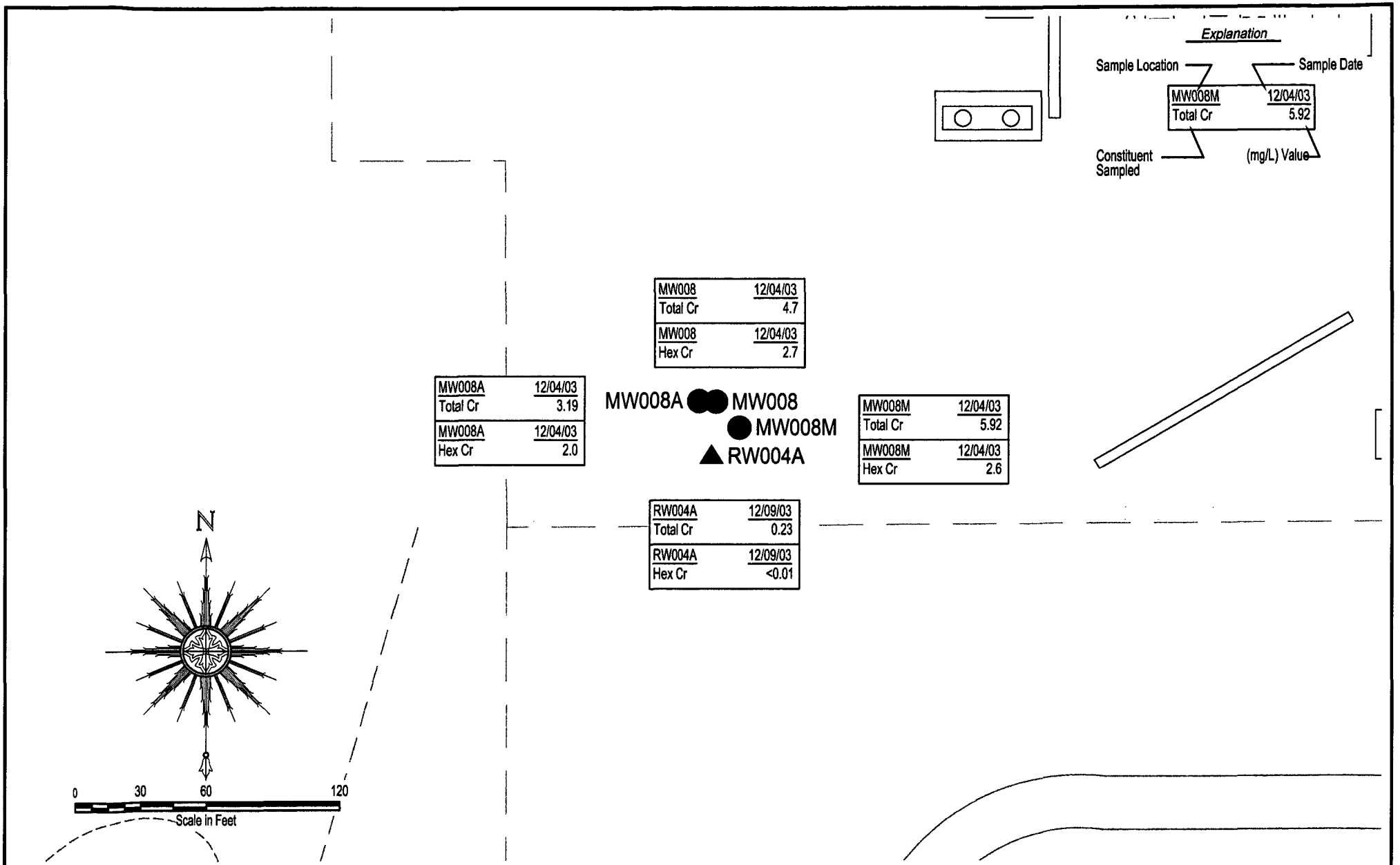
ARCADIS
1004 N. Big Spring Street, Suite 300
Midland, TX 79701-3383
Tel: 432 687 5400 Fax: 432 687 5401

Drawing Date	File Name	File Location	Task Manager	Project Director	Area Manager
29 January 2004	MT7001011.dwg	G:\AutoCAD\DWG\ChevronTexaco\North Eunice\MT000700.0010	L. Markham	S. Tischer	A. Schmidt

ChevronTexaco Exploration & Production Company
North Eunice Plant Chromate Remediation Phase One Study

MW012 Area
Well Locations and Dissolved Total Cr and Dissolved Hex Cr Concentrations (mg/L)
Eunice #2 (North) Gas Plant, Lea County, New Mexico

Technical Review	Unique Number
M. Hagan	31-014-00619
Project Number	**Figure**
MT000700.0010	5



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1004 N. Big Spring Street, Suite 300
Midland, TX 79701-3383
Tel: 432 687 5400 Fax: 432 687 5401

Drawing Date	File Name	File Location	Task Manager	Project Director	Area Manager
29 January 2004	MT7001012.dwg	G:\AutoCAD\DWG\ChevronTexaco\North Eunice\MT000700.0010	L. Markham	S. Tischer	A. Schmidt

ChevronTexaco Exploration & Production Company
North Eunice Plant Chromate Remediation Phase One Study

MW008A Area

Well Locations and Dissolved Total Cr and Dissolved Hex Cr Concentrations (mg/L)

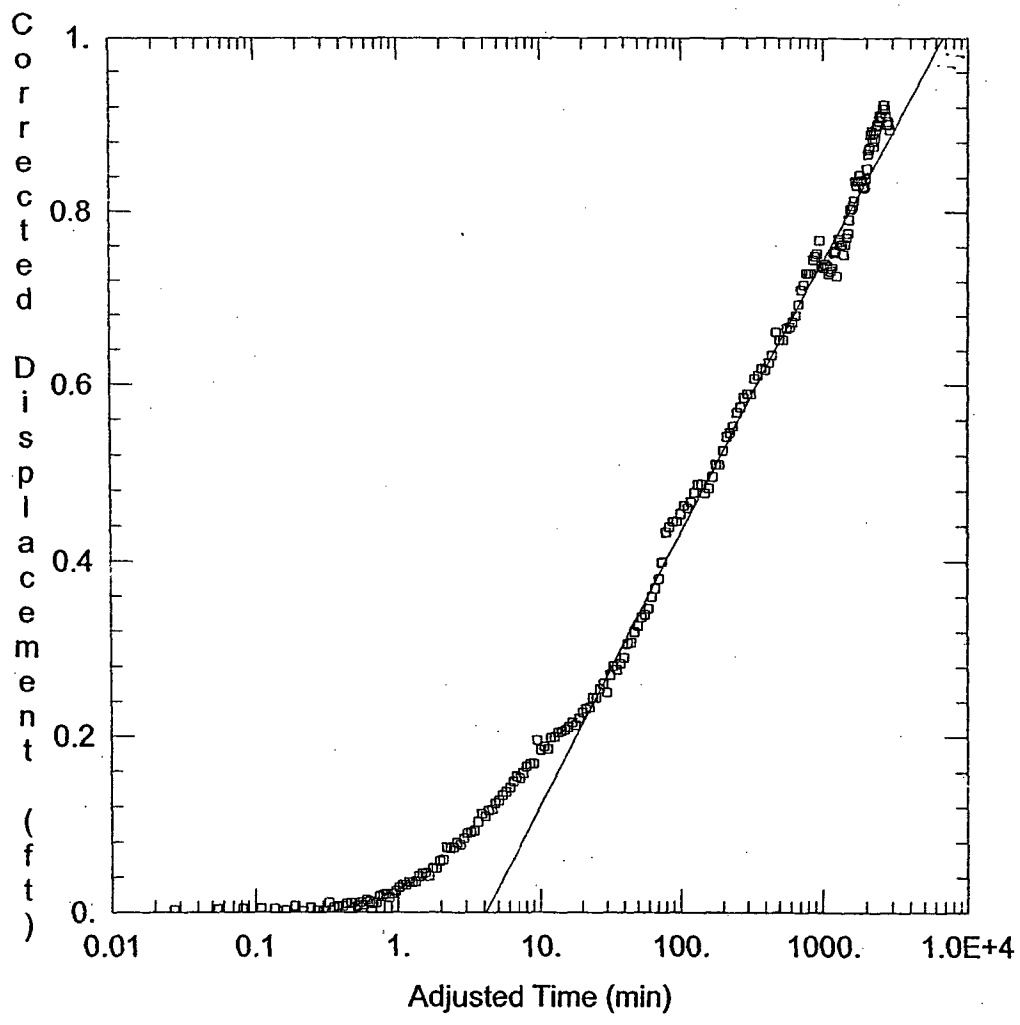
Eunice #2 (North) Gas Plant, Lea County, New Mexico

Technical Review	Unique Number
M. Hagan	31-014-00620
Project Number	**Figure**
MT000700.0010	6

ARCADIS

Appendix A

Pump Test Data



MW011 DRAWDOWN

Data Set: G:\...\MW011 Cooper-Jacob Early.aqt
Date: 10/01/03 Time: 08:44:47

PROJECT INFORMATION

Company: Arcadis
Client: Texaco
Project: MT000700.0001
Location: Eunice, NM
Test Well: RW002

AQUIFER DATA

Saturated Thickness: 64.22 ft Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA

Pumping Wells

Well Name	X (ft)	Y (ft)
RW002	0	0

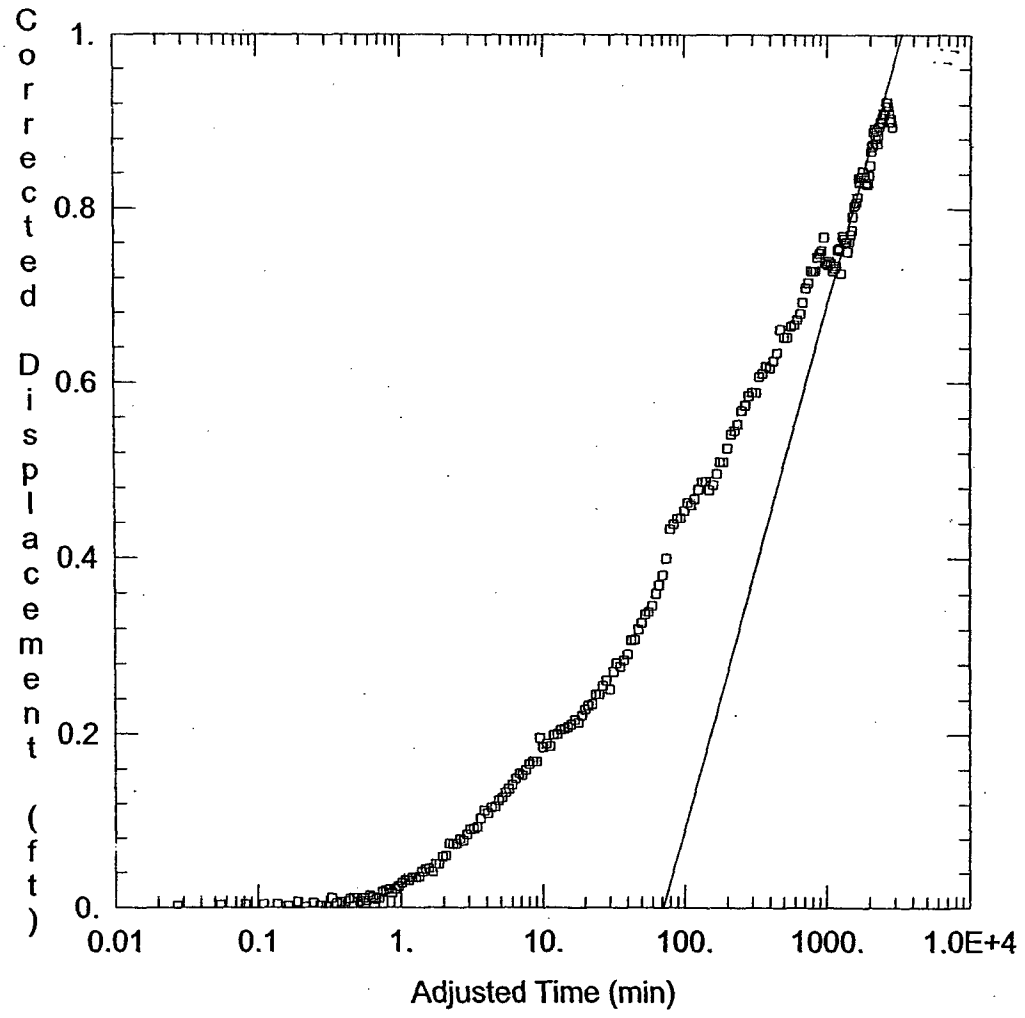
Observation Wells

Well Name	X (ft)	Y (ft)
▫ MW011	23	0

SOLUTION

Aquifer Model: Unconfined Solution Method: Cooper-Jacob

T = 7846.9 gal/day/ft S = 0.01267



MW011 DRAWDOWN

Data Set: G:\...\MW011 Cooper-Jacob Late.aqt
Date: 10/01/03 Time: 08:59:21

PROJECT INFORMATION

Company: Arcadis
Client: Texaco
Project: MT000700.0001
Location: Eunice, NM
Test Well: RW002

AQUIFER DATA

Saturated Thickness: 64.22 ft Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA

Pumping Wells

Well Name	X (ft)	Y (ft)
RW002	0	0

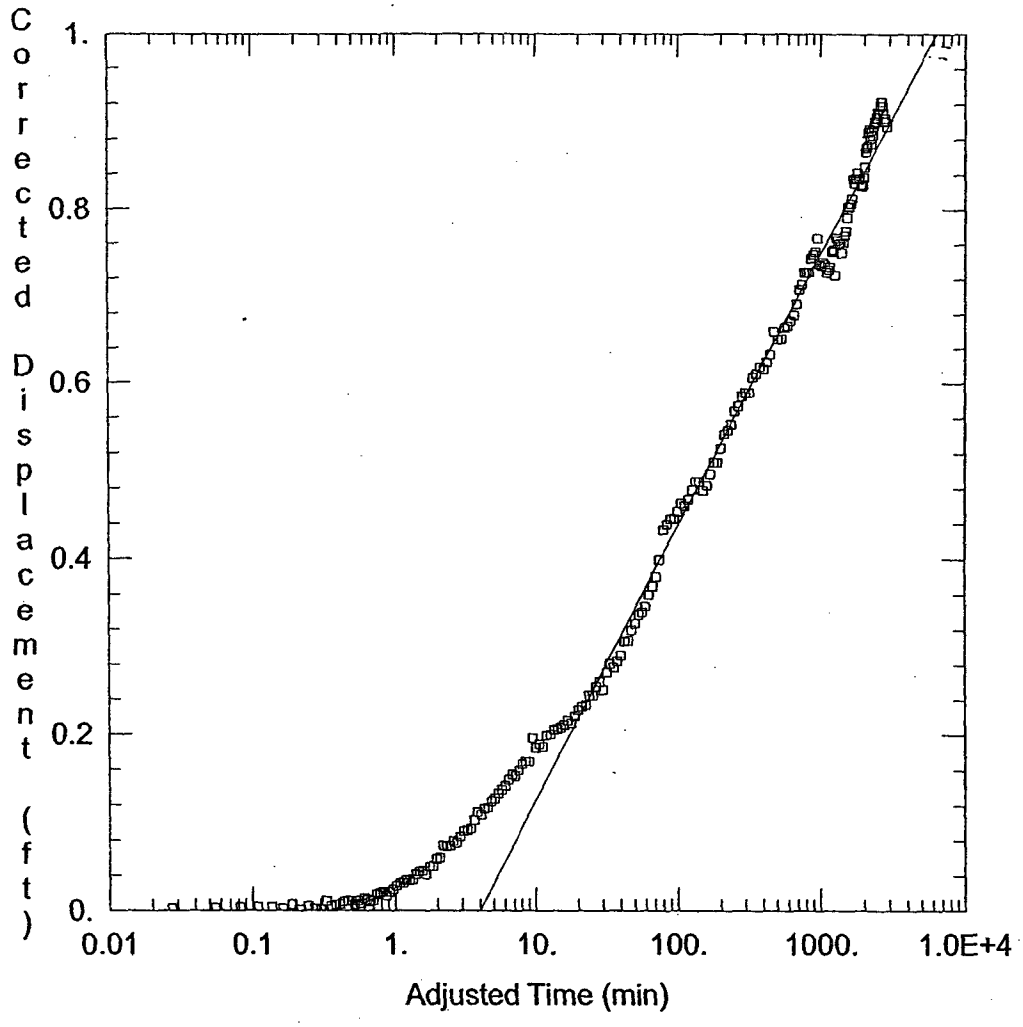
Observation Wells

Well Name	X (ft)	Y (ft)
▫ MW011	23	0

SOLUTION

Aquifer Model: Unconfined Solution Method: Cooper-Jacob

T = 4068.8 gal/day/ft S = 0.1145



MW011 DRAWDOWN

Data Set: G:\...\MW011 Cooper-Jacob Whole.aqt
Date: 10/01/03 Time: 09:00:19

PROJECT INFORMATION

Company: Arcadis
Client: Texaco
Project: MT000700.0001
Location: Eunice, NM
Test Well: RW002

AQUIFER DATA

Saturated Thickness: 64.22 ft Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA

Pumping Wells

Well Name	X (ft)	Y (ft)
RW002	0	0

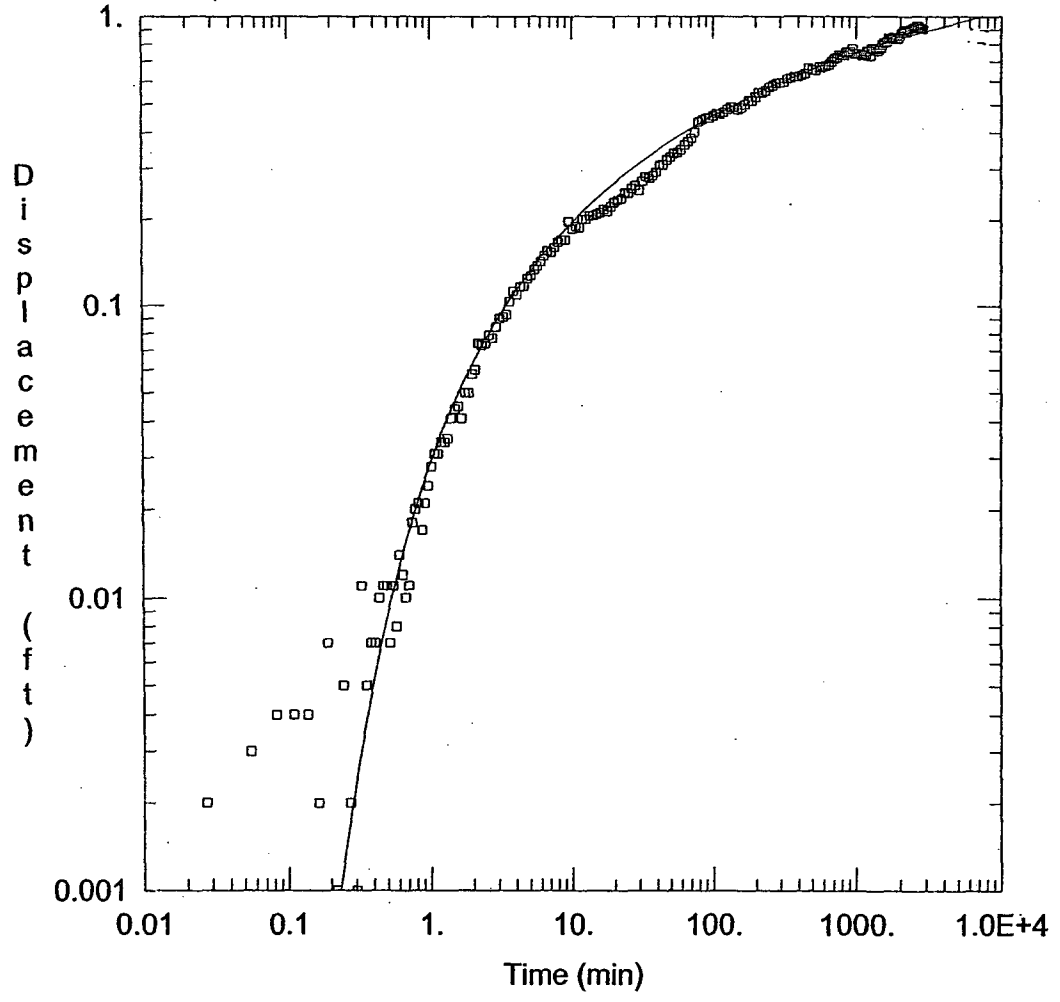
Observation Wells

Well Name	X (ft)	Y (ft)
MW011	23	0

SOLUTION

Aquifer Model: Unconfined Solution Method: Cooper-Jacob

T = 7804.9 gal/day/ft S = 0.01228



MW011 DRAWDOWN

Data Set: G:\APROJECT\TEXACO\NorthEunice\General\Report Aqtesolv\MW011 Hantush Leaky.aqt
Date: 10/01/03 Time: 09:05:38

PROJECT INFORMATION

Company: Arcadis
Client: Texaco
Project: MT000700.0001
Location: Eunice, NM
Test Well: RW002

WELL DATA

Pumping Wells

Well Name	X (ft)	Y (ft)
RW002	0	0

Observation Wells

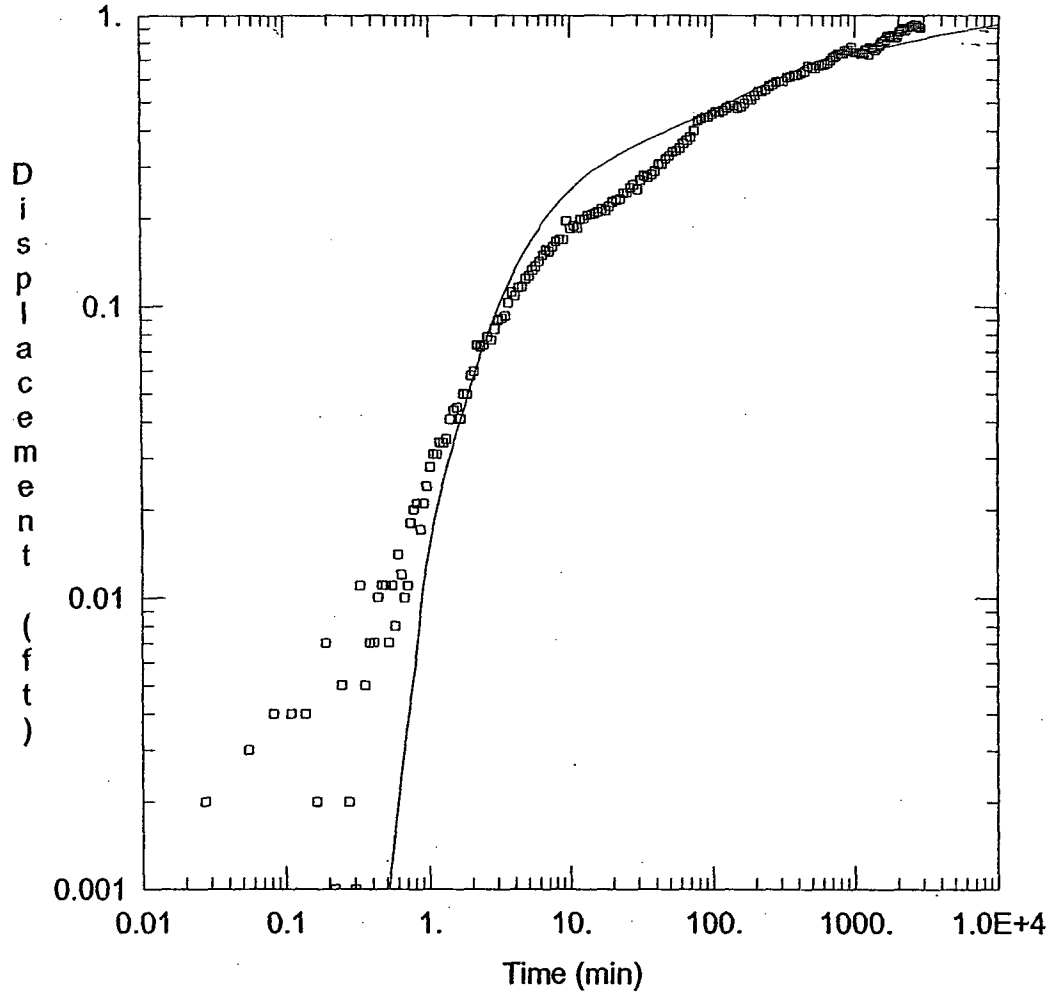
Well Name	X (ft)	Y (ft)
▫ MW011	23	0

SOLUTION

Aquifer Model: Leaky
Solution Method: Hantush

T = 4068.8 gal/day/ft
ß = 1.
b = 30. ft

S = 0.001927
Kz/Kr = 0.07796



MW011 DRAWDOWN

Data Set: G:\...\MW011 Quick Neuman Early.aqt
Date: 10/01/03 Time: 09:08:24

PROJECT INFORMATION

Company: Arcadis
Client: Texaco
Project: MT000700.0001
Location: Eunice, NM
Test Well: RW002

AQUIFER DATA

Saturated Thickness: 64.22 ft

WELL DATA

Pumping Wells

Well Name	X (ft)	Y (ft)
RW002	0	0

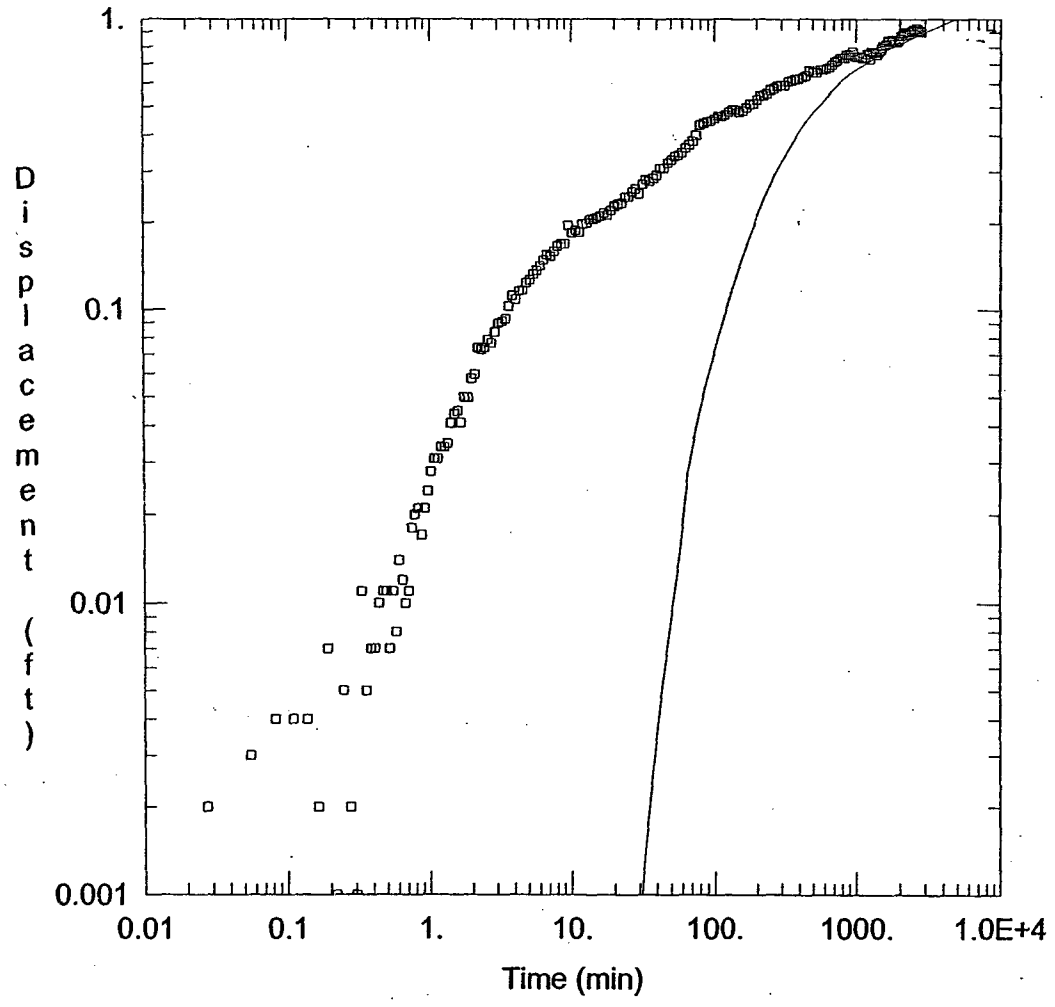
Observation Wells

Well Name	X (ft)	Y (ft)
▫ MW011	23	0

SOLUTION

Aquifer Model: Unconfined
Solution Method: Quick Neuman

T = 1.391E+4 gal/day/ft
Sy = 0.02438
S = 0.02032
ß = 0.01



MW011 DRAWDOWN

Data Set: G:\...\MW011 Quick Neuman Late.aqt
Date: 10/01/03 Time: 09:09:39

PROJECT INFORMATION

Company: Arcadis
Client: Texaco
Project: MT000700.0001
Location: Eunice, NM
Test Well: RW002

AQUIFER DATA

Saturated Thickness: 64.22 ft

WELL DATA

Pumping Wells

Well Name	X (ft)	Y (ft)
RW002	0	0

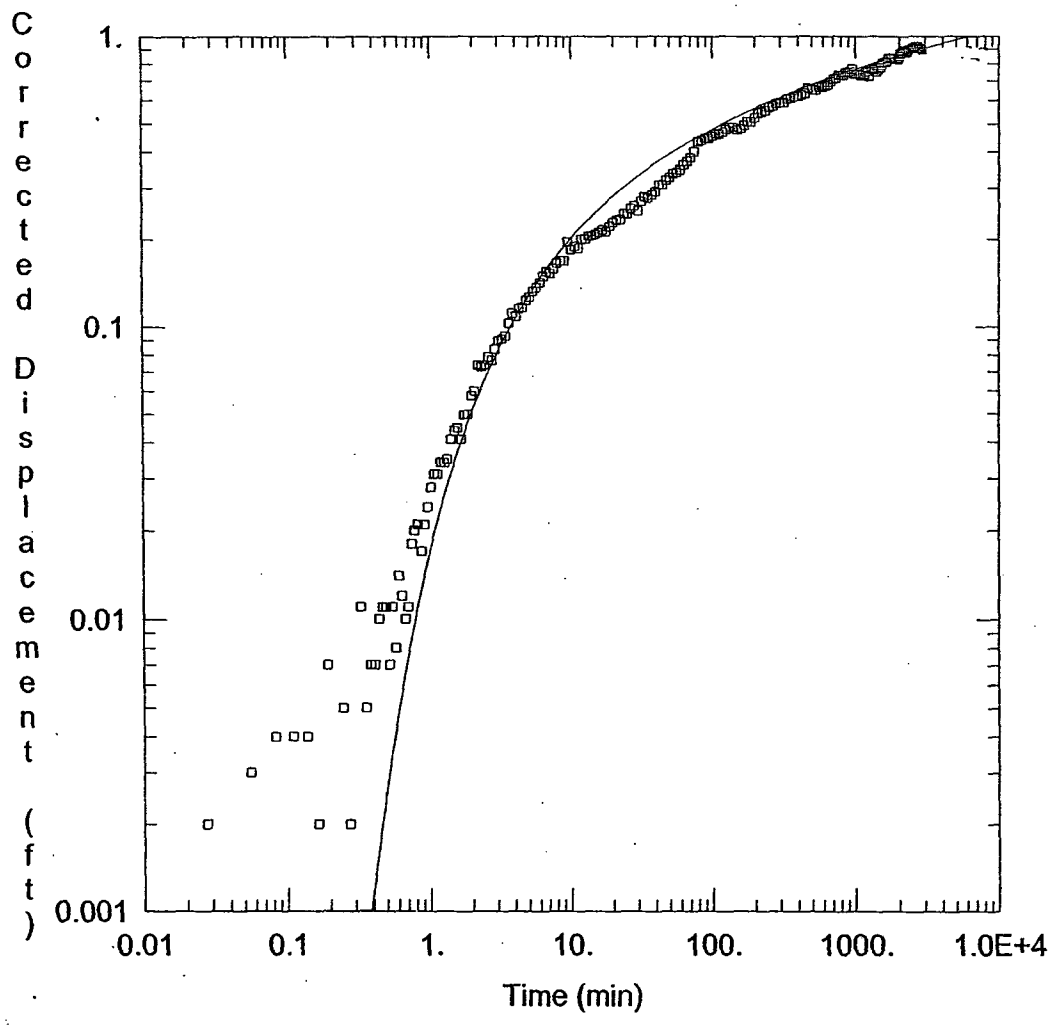
Observation Wells

Well Name	X (ft)	Y (ft)
▫ MW011	23	0

SOLUTION

Aquifer Model: Unconfined
Solution Method: Quick Neuman

T = 5999.3 gal/day/ft
S = 0.6203
Sy = 0.7369
ß = 0.01



MW011 DRAWDOWN

Data Set: G:\APROJECT\TEXACO\NorthEunice\General\Report Aqtesolv\MW011 Theis Whole.aqt
Date: 10/01/03 Time: 09:28:15

PROJECT INFORMATION

Company: Arcadis
Client: Texaco
Project: MT000700.0001
Location: Eunice, NM
Test Well: RW002

WELL DATA

Pumping Wells

Well Name	X (ft)	Y (ft)
RW002	0	0

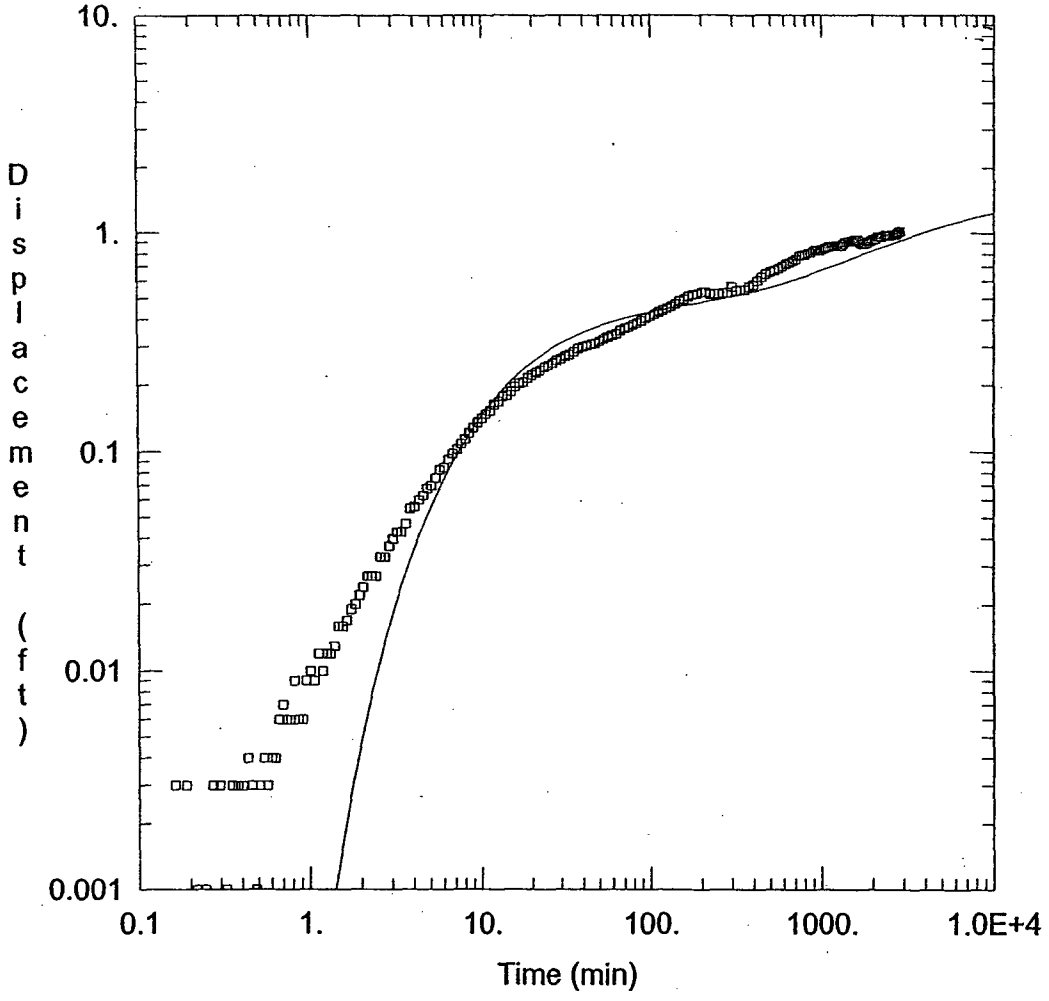
Observation Wells

Well Name	X (ft)	Y (ft)
MW011	23	0

SOLUTION

Aquifer Model: Unconfined
Solution Method: Theis

T = 8365.8 gal/day/ft
S = 0.00767
Kz/Kr = 0.1
b = 64.22 ft



MW012 DRAWDOWN

Data Set: G:\APROJECT\TEXACO\NorthEunice\General\Report Aqtesolv\MW012 Neuman Early.aqt
Date: 10/01/03 Time: 09:31:06

PROJECT INFORMATION

Company: Arcadis
Client: Texaco
Project: MT000700.0001
Location: Eunice, NM
Test Well: RW003

AQUIFER DATA

Saturated Thickness: 65.3 ft

WELL DATA

Pumping Wells

Well Name	X (ft)	Y (ft)
RW003	0	0

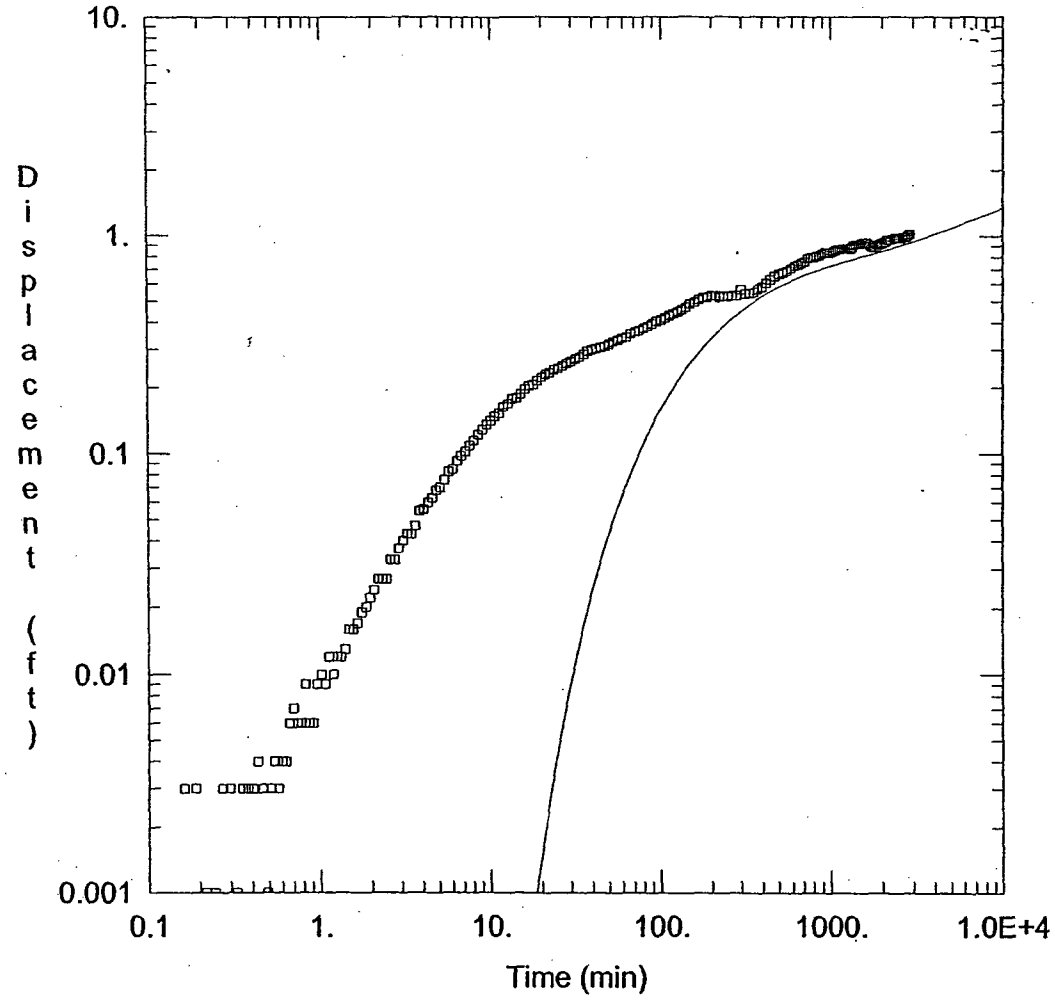
Observation Wells

Well Name	X (ft)	Y (ft)
▫ MW012	19.16	0

SOLUTION

Aquifer Model: Unconfined
Solution Method: Neuman

T = 6532. gal/day/ft
S = 0.0407
Sy = 0.2183
ß = 0.01



MW012 DRAWDOWN

Data Set: G:\APROJECT\TEXACO\NorthEunice\General\Report Aqtesolv\MW012 Neuman Late.aqt
Date: 10/01/03 Time: 09:32:07

PROJECT INFORMATION

Company: Arcadis
Client: Texaco
Project: MT000700.0001
Location: Eunice, NM
Test Well: RW003

AQUIFER DATA

Saturated Thickness: 65.3 ft

WELL DATA

Pumping Wells

Well Name	X (ft)	Y (ft)
RW003	0	0

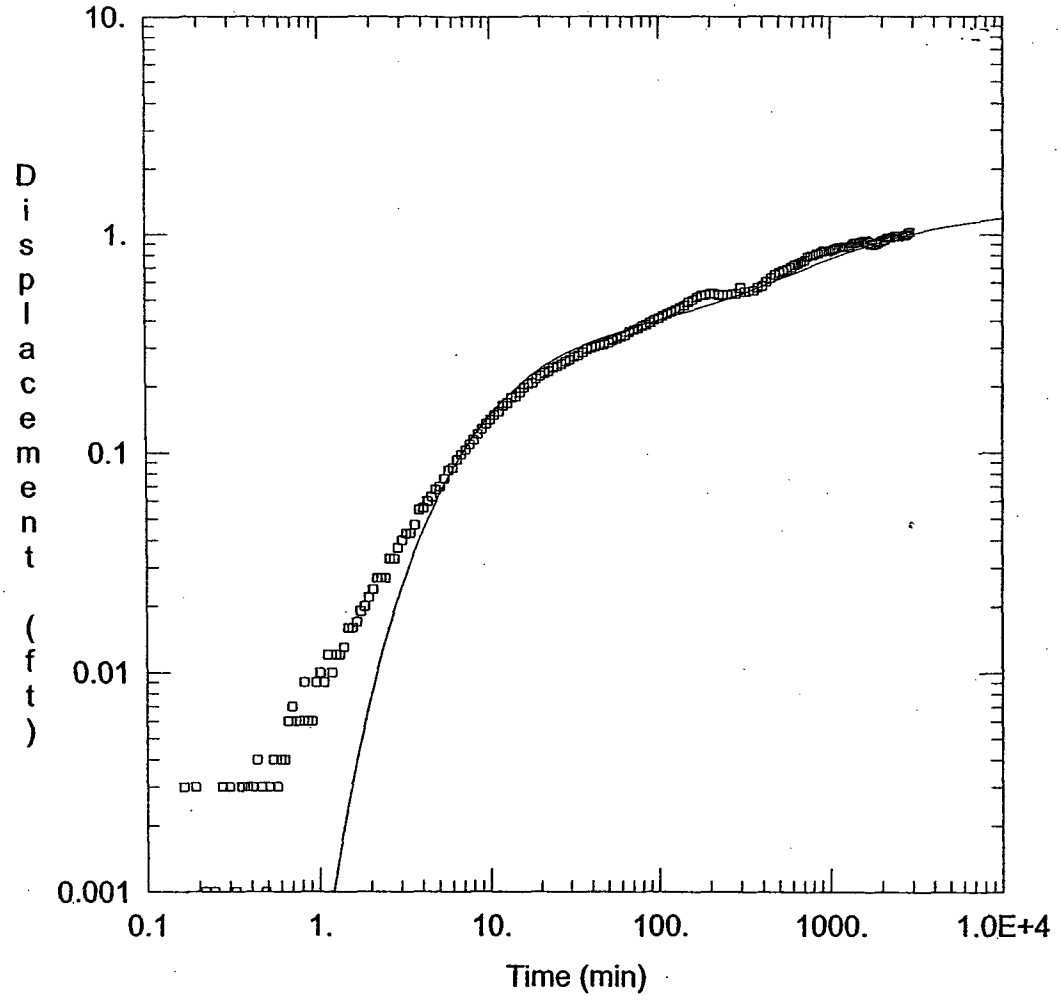
Observation Wells

Well Name	X (ft)	Y (ft)
MW012	19.16	0

SOLUTION

Aquifer Model: Unconfined
Solution Method: Neuman

T = 3804.2 gal/day/ft
S = 0.3433
Sy = 0.6836
ß = 0.01



MW012 DRAWDOWN

Data Set: G:\APROJECT\TEXACO\NorthEunice\General\Report Aqtesolv\MW012 Neuman Whole.aqt
Date: 10/01/03 Time: 09:35:40

PROJECT INFORMATION

Company: Arcadis
Client: Texaco
Project: MT000700.0001
Location: Eunice, NM
Test Well: RW003

AQUIFER DATA

Saturated Thickness: 65.3 ft

WELL DATA

Pumping Wells

Well Name	X (ft)	Y (ft)
RW003	0	0

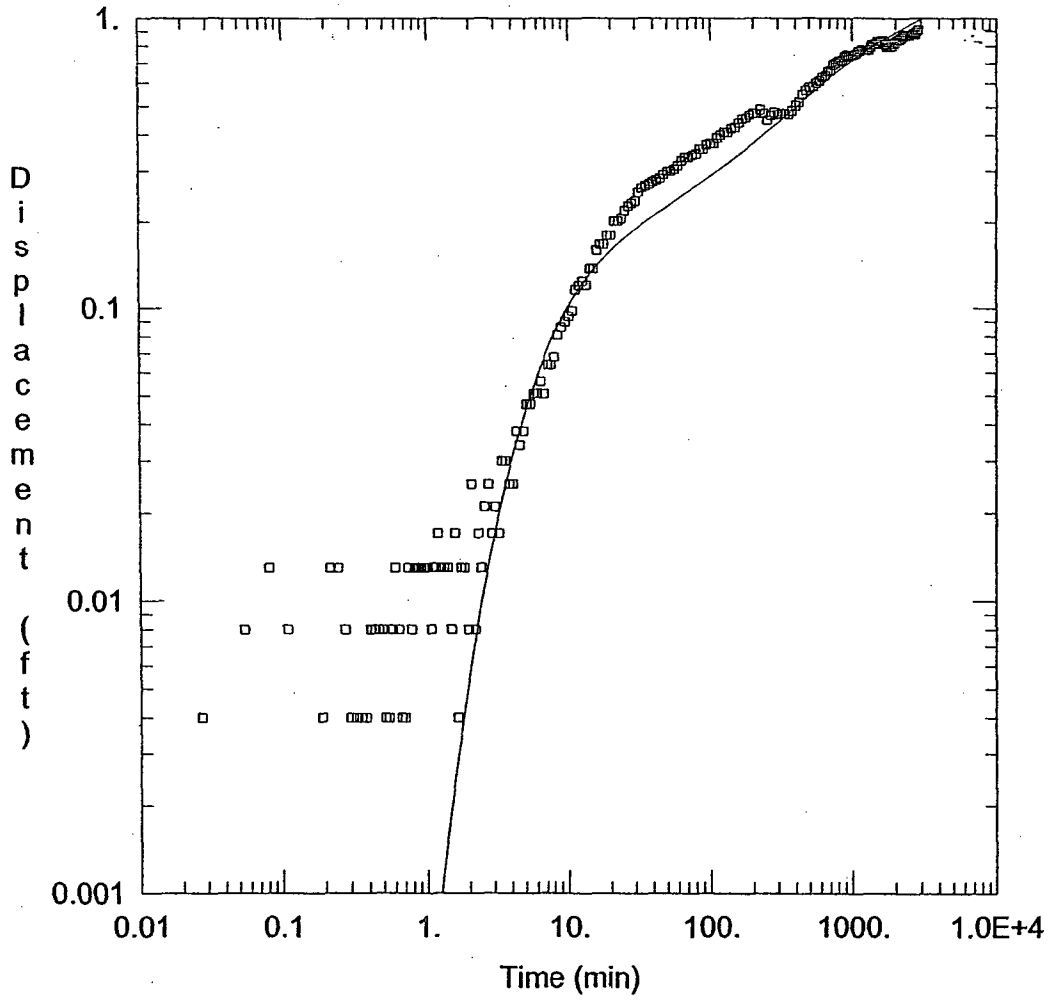
Observation Wells

Well Name	X (ft)	Y (ft)
MW012	19.16	0

SOLUTION

Aquifer Model: Unconfined
Solution Method: Neuman

T = 7701.9 gal/day/ft
S = 0.03985
Sy = 0.08868
ß = 0.01



MW012M DRAWDOWN

Data Set: G:\...\MW012M Neuman Whole.aqt
Date: 10/01/03 Time: 09:37:06

PROJECT INFORMATION

Company: Arcadis
Client: Texaco
Project: MT000700.0001
Location: Eunice, NM
Test Well: RW003

AQUIFER DATA

Saturated Thickness: 65.3 ft

WELL DATA

Pumping Wells

Well Name	X (ft)	Y (ft)
RW003	0	0

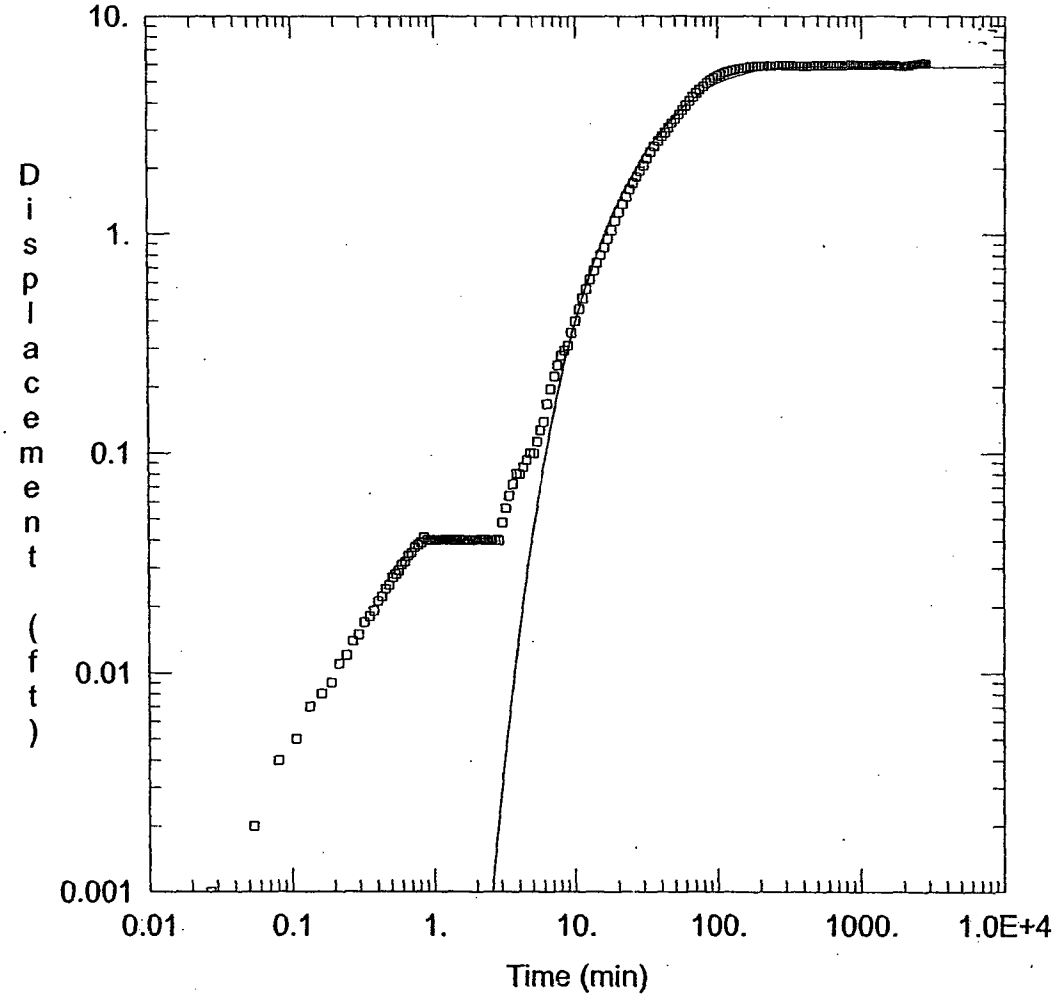
Observation Wells

Well Name	X (ft)	Y (ft)
MW012M	20.58	0

SOLUTION

Aquifer Model: Unconfined
Solution Method: Neuman

T = 3425.3 gal/day/ft
S = 0.001419
Sy = 0.007555
ß = 0.01



MW008A DRAWDOWN

Data Set: G:\...\MW008A Hantush-Jacob Leaky.aqt
Date: 10/01/03 Time: 09:38:01

PROJECT INFORMATION

Company: Arcadis
Client: Texaco
Project: MT000700.0001
Location: Eunice, NM
Test Well: RW004A

WELL DATA

Pumping Wells

Well Name	X (ft)	Y (ft)
RW004A	0	0

Observation Wells

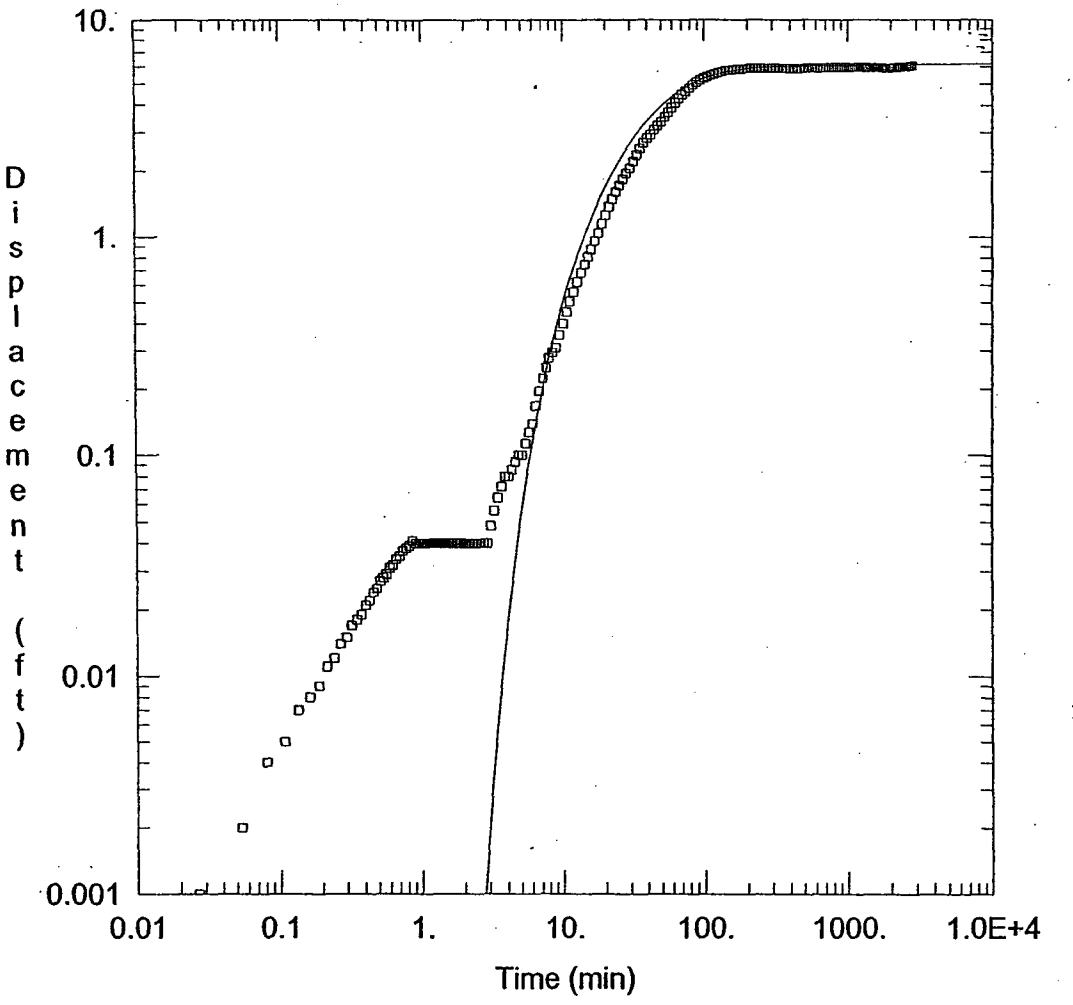
Well Name	X (ft)	Y (ft)
▫ MW008A	25	0

SOLUTION

Aquifer Model: Leaky
Solution Method: Hantush-Jacob

T = 100.4 gal/day/ft
r/B = 0.8
b = 30. ft

S = 0.001013
Kz/Kr = 0.1



MW008A DRAWDOWN

Data Set: G:\...\MW008A Neuman-Witherspoon Leaky.aqt
Date: 10/01/03 Time: 09:38:53

PROJECT INFORMATION

Company: Arcadis
Client: Texaco
Project: MT000700.0001
Location: Eunice, NM
Test Well: RW004A

AQUIFER DATA

Saturated Thickness: 30. ft Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA

Pumping Wells

Well Name	X (ft)	Y (ft)
RW004A	0	0

Observation Wells

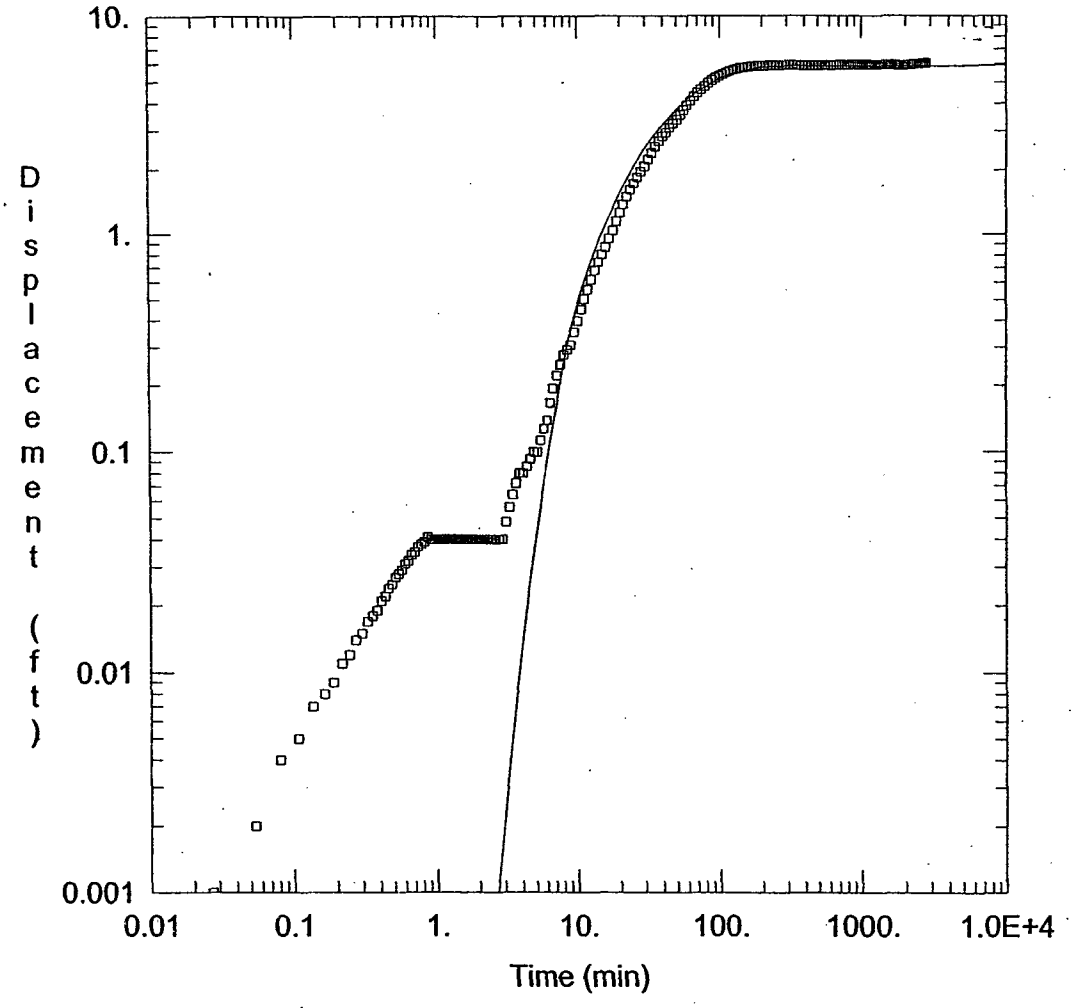
Well Name	X (ft)	Y (ft)
MW008A	25	0

SOLUTION

Aquifer Model: Leaky
Solution Method: Neuman-Witherspoon

T = 55.07 gal/day/ft
r/B = 1.
T' = 8600. gal/day/ft

S = 0.0005393
ß = 0.01
S' = 6.154E-6



MW008A DRAWDOWN

Data Set: G:\APROJECT\TEXACO\NorthEunice\General\Report Aqtesolv\MW008A Quick Neuman.aqt
Date: 10/01/03 Time: 09:40:25

PROJECT INFORMATION

Company: Arcadis
Client: Texaco
Project: MT000700.0001
Location: Eunice, NM
Test Well: RW004A

AQUIFER DATA

Saturated Thickness: 65.42 ft

WELL DATA

Pumping Wells

Well Name	X (ft)	Y (ft)
RW004A	0	0

Observation Wells

Well Name	X (ft)	Y (ft)
MW008A	25	0

SOLUTION

Aquifer Model: Unconfined
Solution Method: Quick Neuman

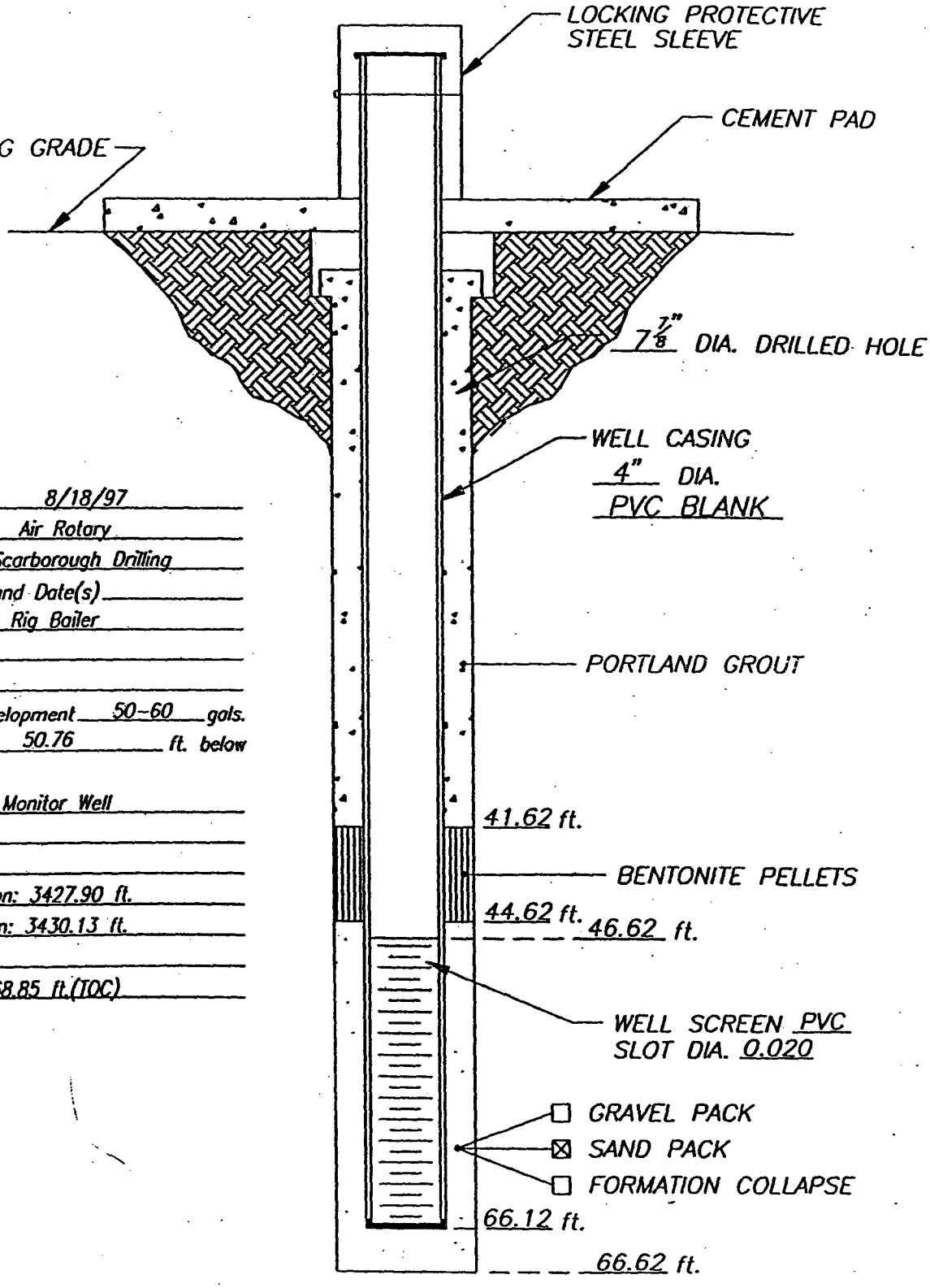
T = 110.1 gal/day/ft
S = 0.001244
Sy = 2.077
ß = 0.4

ARCADIS

Appendix B

Monitoring Well and Boring Logs

WELL CONSTRUCTION LOG



Installation Date(s) 8/18/97
Drilling Method Air Rotary
Drilling Contractor Scarborough Drilling
Development Technique(s) and Date(s)
8/19/97 - Rig Bailer

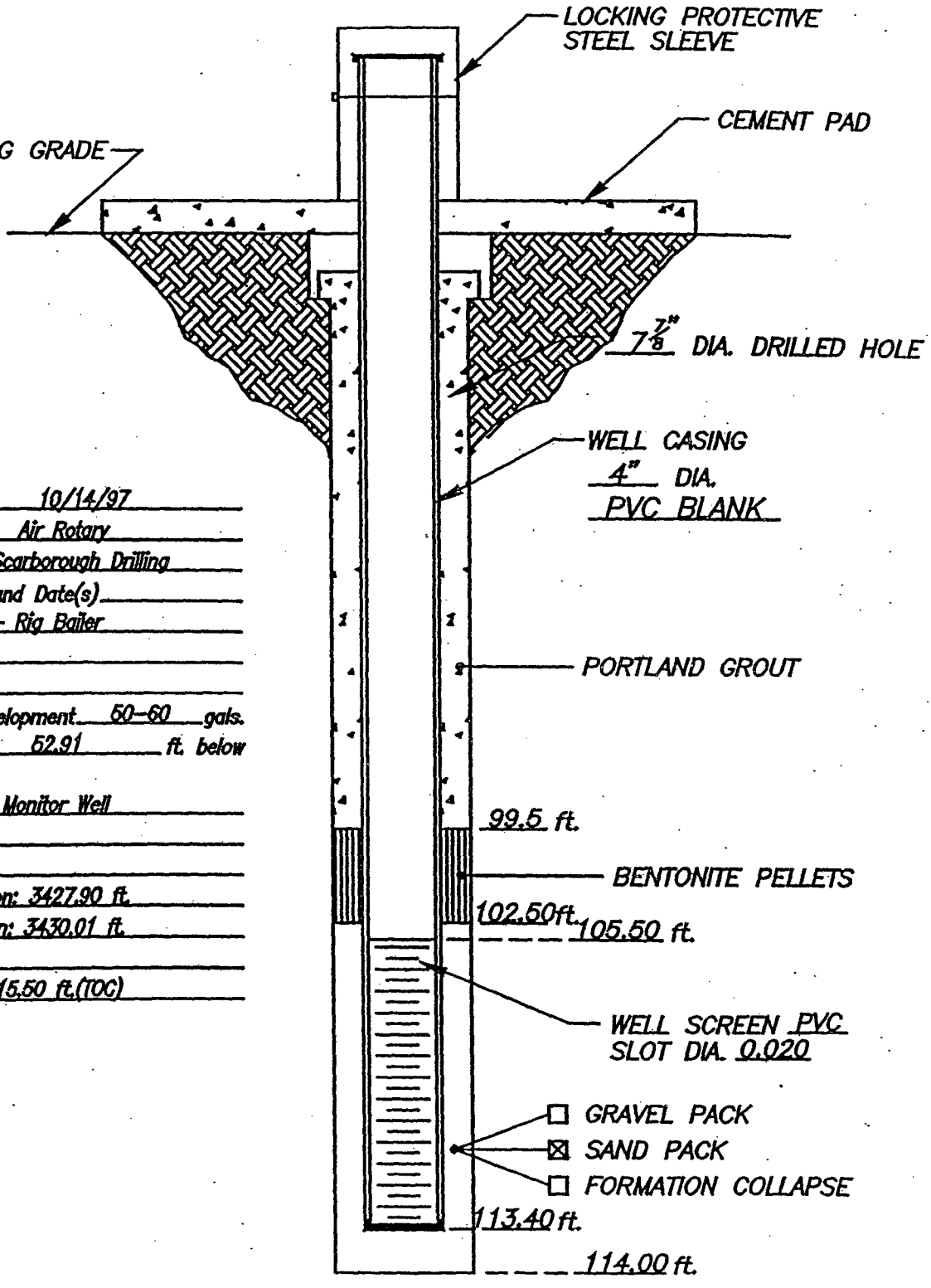
Water Removed During Development 50-60 gals.
Static Depth to Water 50.76 ft. below Ground Level
Well Purpose Monitor Well

Remarks
Ground Elevation: 3427.90 ft.
T.O.C. Elevation: 3430.13 ft.

Well Depth: 68.85 ft.(TOC)

8/18/97 Highlander Environmental	CLIENT: Texaco Exploration & Production, Inc. PROJECT: Eunice #1 (North) Plant LOCATION: Lea County, New Mexico	WELL NO. MW-8

WELL CONSTRUCTION LOG



Installation Date(s) 10/14/97
Drilling Method Air Rotary
Drilling Contractor Scarborough Drilling
Development Technique(s) and Date(s)
10/17/97 – Rig Bailer

Water Removed During Development 50–60 gals.
Static Depth to Water 52.91 ft. below Ground Level
Well Purpose Monitor Well

Remarks
Ground Elevation: 3427.90 ft.
T.O.C. Elevation: 3430.01 ft.

Well Depth: 115.50 ft.(TOC)

DATE: 12/5/97

Highlander Environmental

CLIENT: Texaco Exploration & Production, Inc.
PROJECT: Eunice #1 (North) Plant
LOCATION: Lea County, New Mexico

WELL NO. MW–8A

SAMPLE LOG

Boring/Well: MW-8/MW-8A
Site Location: Texaco E & P Eunice (North) Gas Plant
Location: Eunice, New Mexico
Total Depth: 114 feet
Date Installed: 10/14/97

DEPTH (Ft)	SAMPLE DESCRIPTION
0-10	Tan and brown, fine grain sand, some traces of caliche at 7'-10'
10-20	Fine grain sand, dense caliche and sandstone layers,
20-30	Tan, fine grain sand, cemented sandstone layers, traces of white caliche
30-40	Tan, fine grain sand, loose, dense layer of cemented sandstone at 38'-40'
40-50	Tan, fine grain sand, loose, some cemented sandstone
50-60	Tan, fine grain sand, some layers of sandstone, dense
60-70	Tan, fine grain sand, well sorted, and loose
70-80	Tan, fine grain sand, some layers of sandstone, dense
80-90	Tan, fine grain sand, some layers of sandstone, dense
90-100	Tan, fine grain sand, some layers of sandstone, dense
100-110	Tan, fine grain sand, some layers of sandstone, dense
110-112	Tan, fine grain sand, layers of cemented sandstone
112-113	Gravel and fine grain sand, well sorted, some brown clay
113-114	Redbed – clay
	TD - 114'

WELL LOG

WELL NO. MW008M

ARCADIS 1004 N. Big Spring St. Suite 300, Midland, TX 79701-3383 Tel: 432/687-5400 Fax: 432/687-5401

PROJECT NUMBER: MT000700.0001
CLIENT NAME: ChevronTexaco Exploration & Production Co.
PROJECT NAME: North Eunice Groundwater Investigation
SITE LOCATION: Eunice, New Mexico
Lea County, New Mexico
DRILLING CO: Scarborough Drilling Co.
DRILLING METHOD: Rotary
SAMPLE METHOD: Shovel
DATE BEGUN: 8/20/01 DATE COMPLETED: 8/20/01
DRILLER: S. Scarborough ELEVATION (SURF.): 3,427.95'
LOGGER: L. Markham ELEVATION (T.O.C.): 3,430.27'
FILE NAME: MW008M.dat UNIQUE NUMBER: 31-014-00263

STATIC WATER LEVEL: -51.71' MEAS. PT.: T.O.C. DATE: 10/01/01
HOLE SIZE(S): 8" TOTAL DEPTH: -85.0'
SURFACE COMPLETION: 8" Locking Steel Sleeve, 3'x3'x6" Conc. Slab

	TYPES	DEPTHS
GROUT TYPE:	Cement w/5% Bentonite	-65.0' to Surface
SEAL TYPE:	Bentonite	-70.0' to -65.0'
SCREEN PACK:	8/16 Ind. Quartz	-85.0' to -70.0'
CASING TYPE:	4" Diameter Sch. 40 PVC Blank	-75.0' to 2.0'
	—	—
	—	—
WELL SCREEN:	4" Diameter Sch. 40 PVC, 0.020" slots	-85.0' to -75.0'
PLUG BACK:	—	—

DEPTH	SAMPLED	SAMPLING METHOD	ANALYZED	MOISTURE	RECOVERY	OVM READING	U. S. C. S. CLASS	LITHOLOGY	DESCRIPTION	WELL INSTALLATION
0		Shovel							SAND 5 YR 4/6 yellow red, fine-grained to medium-grained.	
-5		Shovel							SAND 7.5 YR 7/4 pink, 50% SAND, fine-grained to medium-grained, 40% CALICHE, 10% CLAY.	
-10		Shovel							CALICHE 7.5 YR 8/4 pink, 70% CALICHE, 30% SAND. fine-grained to medium-grained, soft to firm.	
-15		Shovel								
-20		Shovel							SANDSTONE 7.5 YR 5/6 strong brown, 70% SANDSTONE, 30% CALICHE, 7.5 YR 7/4 pink, fine-grained to medium-grained, soft.	
-25		Shovel								
-30		Shovel							SANDSTONE 7.5 YR 4/6 strong brown, 25% SANDSTONE, 7.5 YR 6/4 light brown, interbeds, fine-grained to medium-grained, soft to firm.	
-35		Shovel								
-40		Shovel								

WELL LOG

WELL NO. MW008M

ARCADIS 1004 N. Big Spring St. Suite 300, Midland, TX 79701-3383 Tel: 432/687-5400 Fax: 432/687-5401

PROJECT NUMBER: MT000700.0001
CLIENT NAME: ChevronTexaco Exploration & Production Co.
PROJECT NAME: North Eunice Groundwater Investigation
SITE LOCATION: Eunice, New Mexico
Lea County, New Mexico
DRILLING CO: Scarborough Drilling Co.
DRILLING METHOD: Rotary
SAMPLE METHOD: Shovel
DATE BEGUN: 8/20/01 DATE COMPLETED: 8/20/01
DRILLER: S. Scarborough ELEVATION (SURF.): 3,427.95'
LOGGER: L. Markham ELEVATION (T.O.C.): 3,430.27'
FILE NAME: MW008M.dat UNIQUE NUMBER: 31-014-00263

STATIC WATER LEVEL: -51.71' MEAS. PT.: T.O.C. DATE: 10/01/01
HOLE SIZE(S): 8" TOTAL DEPTH: -85.0'
SURFACE COMPLETION: 8" Locking Steel Sleeve, 3'x3'x6" Conc. Slab

	TYPES	DEPTHS
GROUT TYPE:	Cement w/5% Bentonite	-65.0' to Surface
SEAL TYPE:	Bentonite	-70.0' to -65.0'
SCREEN PACK:	8/16 Ind. Quartz	-85.0' to -70.0'
CASING TYPE:	4" Diameter Sch. 40 PVC Blank	-75.0' to 2.0'
	—	—
	—	—
WELL SCREEN:	4" Diameter Sch. 40 PVC, 0.020" slots	-85.0' to -75.0'
PLUG BACK:	—	—

DEPTH	SAMPLED	SAMPLING METHOD	ANALYZED	MOISTURE	RECOVERY	OVM READING	U. S. C. S. CLASS	LITHOLOGY	DESCRIPTION	WELL INSTALLATION
-45		Shovel							SANDSTONE 7.5 YR 4/6 strong brown, 5% SANDSTONE, 7.5 YR 6/4 light brown, interbeds, fine-grained to medium-grained, soft.	
		Shovel								
		Shovel								
-50		Shovel								
		Shovel								
		Shovel								
-55		Shovel								
		Shovel								
		Shovel								
-60		Shovel								
		Shovel								
		Shovel								
-65		Shovel								
		Shovel								
		Shovel								
-70		Shovel								
		Shovel								
		Shovel								
-75		Shovel								
		Shovel								
		Shovel								
-80		Shovel								
		Shovel								
		Shovel								
-85										

Project No: 787

Well ID: MW-11

Project: Eunice # 2 (North) Gas Plant

Client: Texaco Exploration and Production Inc.

Enclosure: 1 of 1

Location: Lea County, New Mexico

Engineer: IT

SUBSURFACE PROFILE

Depth (ft)	Description	Elevation (ft)	Well Construction	Remarks
0	Ground Surface	3429.07		
	Sand and Sandstone Tan, fine grained, with traces of reddish clay at 5'			Locking Above-Grade Cover and Cap
	Interbedded with sandstone from 10-20'			4" Sch. 40 PVC Riser (Threaded)
	Sandstone dense from 38 to 40'			
20	Well sorted sand below 60', loose			Cement/Bentonite Grout
40				Bentonite Chips
				8-16 Silica Sand
				4" Sch. 40 PVC Screen, 0.02" Slot
				Depth-to-Water: 51.16' BGS
60				(11/16/99)
		3362.57		4" Sch. 40 PVC Cap (Threaded)
	TD: 66.5'			
80				

Drilled By: Scarborough Drilling, Inc.

Drill Method: Rotary (Water)

Drill Date: 06-Jan-99

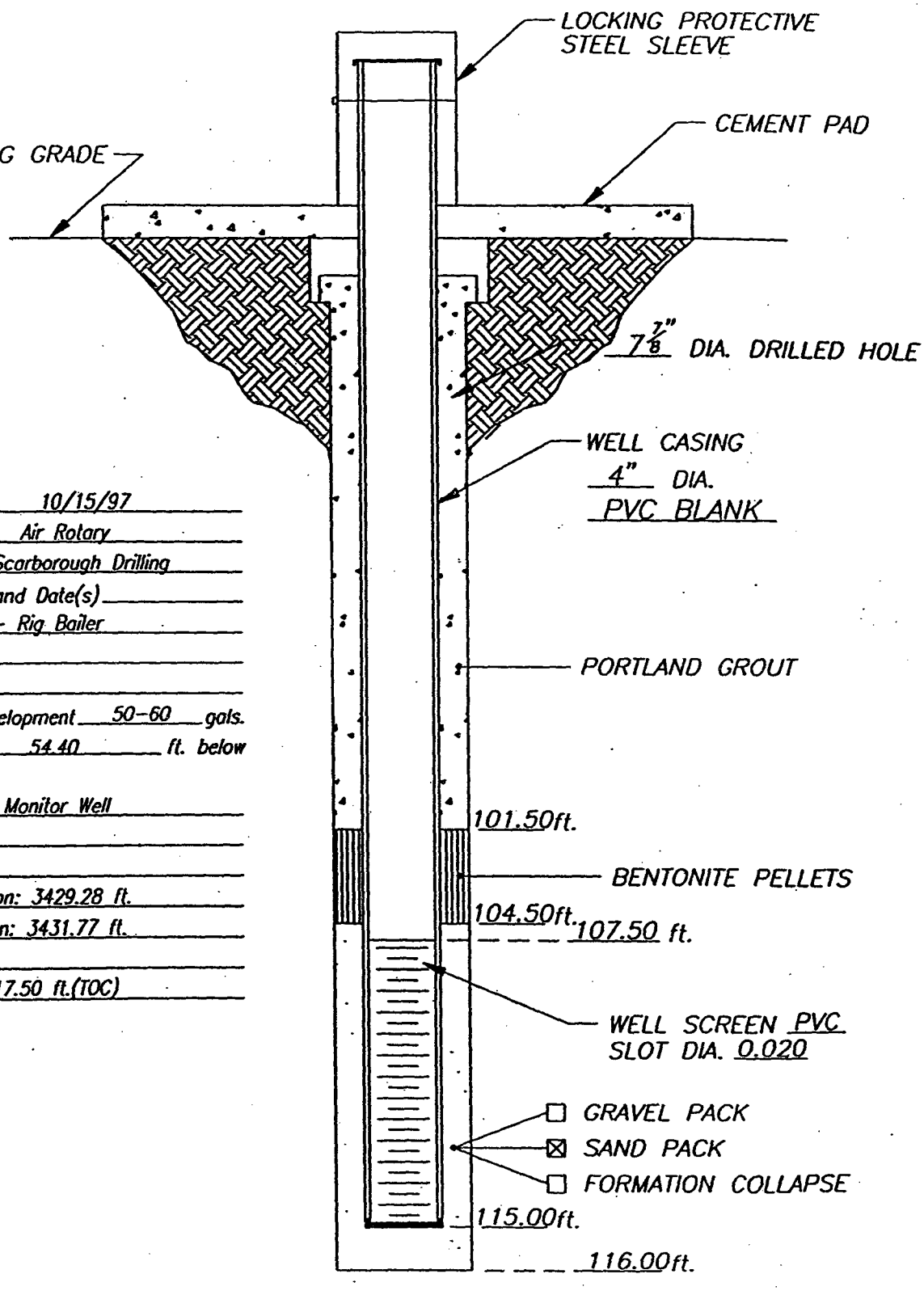
Highlander Environmental
1910 N. Big Spring
Midland, Texas 79705
(915) 682-4559

Hole Size: 7 7/8"

Datum: Mean Sea Level

Sheet: 1 of 1

WELL CONSTRUCTION LOG



Installation Date(s) 10/15/97
Drilling Method Air Rotary
Drilling Contractor Scarborough Drilling
Development Technique(s) and Date(s)
10/17/97 - Rig Bailer

...ater Removed During Development 50-60 gals.
Static Depth to Water 54.40 ft. below Ground Level
Well Purpose Monitor Well

Remarks
Ground Elevation: 3429.28 ft.
T.O.C. Elevation: 3431.77 ft.

Well Depth: 117.50 ft.(TOC)

12/5/97 Highlander Environmental	CLIENT: Texaco Exploration & Production, Inc. PROJECT: Eunice #1 (North) Plant LOCATION: Lea County, New Mexico	WELL NO. MW-11A

SAMPLE LOG

Boring/Well: MW-11A
Site Location: Texaco E & P Eunice (North) Gas Plant
Location: Eunice, New Mexico
Total Depth: 116 feet
Date Installed: 10/15/97

DEPTH (Ft)	SAMPLE DESCRIPTION
0-10	Tan and brown, fine grain sand, some traces reddish clay at 5.0'
10-20	Fine grain sand, dense caliche and sandstone layers
20-30	Tan, fine grain sand, cemented sandstone layers, traces of white caliche
30-40	Tan, fine grain sand, loose, dense layer of cemented sandstone at 38'-40'
40-50	Tan, fine grain sand, loose, some cemented sandstone
50-60	Tan, fine grain sand, some layers of sandstone, dense
60-70	Tan, fine grain sand, well sorted, and loose
70-80	Tan, fine grain sand, some layers of sandstone, dense
80-90	Tan, fine grain sand, some layers of sandstone, dense at 85.0'to 86.0'
90-100	Tan, fine grain sand, some traces of sandstone
100-115	Tan, fine grain sand and gravel, some traces of clay
115-116	Tan, fine grain sand and gravel
116	Redbed – clay
	TD - 116'

WELL LOG

WELL NO. MW011M

ARCADIS 1004 N. Big Spring St. Suite 300, Midland, TX 79701-3383 Tel: 432/687-5400 Fax: 432/687-5401

PROJECT NUMBER: MT000700.0001
CLIENT NAME: ChevronTexaco Exploration & Production Co.
PROJECT NAME: North Eunice Groundwater Investigation
SITE LOCATION: Eunice, New Mexico
Lea County, New Mexico
DRILLING CO: Scarborough Drilling Co.
DRILLING METHOD: Rotary/Mud/Water
SAMPLE METHOD: Shovel
DATE BEGUN: 8/21/01 DATE COMPLETED: 8/21/01
DRILLER: S. Scarborough ELEVATION (SURF.): 3,429.38'
LOGGER: L. Markham ELEVATION (T.O.C.): 3,431.21'
FILE NAME: MW011M.dat UNIQUE NUMBER: 31-014-00264

STATIC WATER LEVEL: -52.68' MEAS. PT.: T.O.C. DATE: 10/01/01
HOLE SIZE(S): 8" TOTAL DEPTH: -90.0'
SURFACE COMPLETION: 8" Locking Steel Sleeve, 3'x3'x6" Conc. Slab

	TYPES	DEPTHS
GROUT TYPE:	Cement w/5% Bentonite	-70.0' to Surface
SEAL TYPE:	Bentonite	-75.0' to -70.0'
SCREEN PACK:	8/16 Ind. Quartz	-90.0' to -75.0'
CASING TYPE:	4" Diameter Sch. 40 PVC Blank	-80.0' to 2.0'
	—	—
	—	—
WELL SCREEN:	4" Diameter Sch. 40 PVC, 0.020" slots	-90.0' to -80.0'
PLUG BACK:	—	—

DEPTH	SAMPLED	SAMPLING METHOD	ANALYZED	MOISTURE	RECOVERY	OVM READING	U. S. C. S. CLASS	LITHOLOGY	DESCRIPTION	WELL INSTALLATION
0		Shovel							CLAY 7.5 YR 4/6 strong brown, 60% CLAY, sticky, 35% SAND, very fine-grained, 5% SILT.	
-5		Shovel							CLAY 7.5 YR 4/6 strong brown, 80% CLAY, sticky, 10% SAND, very fine-grained, 10% SILT.	
-10		Shovel							SANDSTONE 7.5 YR 5/6 strong brown, SAND fine-grained to medium-grained, 20% CLAY, 5% CALICHE, soft to firm.	
-15		Shovel							SANDSTONE 7.5 YR 4/6 strong brown, 20% CALICHE interbeds, 7.5 YR 8/3 pink, SANDSTONE, fine-grained to medium-grained, soft to firm.	
-20		Shovel							SANDSTONE 10 YR 7/3 very pale brown, with 10% CALICHE interbeds, 10 YR 8/3 very pale brown, SANDSTONE, fine-grained to medium-grained.	
-25		Shovel								
-30		Shovel							SANDSTONE 7.5 YR 4/6 strong brown, with 10% SANDSTONE, 10 YR 7/3 very pale brown, interbeds, fine-grained to medium-grained, soft.	
-35		Shovel								
-40		Shovel								

WELL LOG

WELL NO. MW011M

ARCADIS 1004 N. Big Spring St. Suite 300, Midland, TX 79701-3383 Tel: 432/687-5400 Fax: 432/687-5401

PROJECT NUMBER: MT000700.0001
CLIENT NAME: ChevronTexaco Exploration & Production Co.
PROJECT NAME: North Eunice Groundwater Investigation
SITE LOCATION: Eunice, New Mexico
Lea County, New Mexico
DRILLING CO: Scarborough Drilling Co.
DRILLING METHOD: Rotary/Mud/Water
SAMPLE METHOD: Shovel
DATE BEGUN: 8/21/01 DATE COMPLETED: 8/21/01
DRILLER: S. Scarborough ELEVATION (SURF.): 3,429.38'
LOGGER: L. Markham ELEVATION (T.O.C.): 3,431.21'
FILE NAME: MW011M.dat UNIQUE NUMBER: 31-014-00264

STATIC WATER LEVEL: -52.68' MEAS. PT.: T.O.C. DATE: 10/01/01
HOLE SIZE(S): 8" TOTAL DEPTH: -90.0'
SURFACE COMPLETION: 8" Locking Steel Sleeve, 3'x3'x6" Conc. Slab

	TYPES	DEPTHS
GROUT TYPE:	Cement w/5% Bentonite	-70.0' to Surface
SEAL TYPE:	Bentonite	-75.0' to -70.0'
SCREEN PACK:	8/16 Ind. Quartz	-90.0' to -75.0'
CASING TYPE:	4" Diameter Sch. 40 PVC Blank	-80.0' to 2.0'
	—	—
	—	—
WELL SCREEN:	4" Diameter Sch. 40 PVC, 0.020" slots	-90.0' to -80.0'
PLUG BACK:	—	—

DEPTH	SAMPLED	SAMPLING METHOD	ANALYZED	MOISTURE	RECOVERY	OVM READING	U. S. C. S. CLASS	LITHOLOGY	DESCRIPTION	WELL INSTALLATION
-45		Shovel								
		Shovel								
		Shovel								
-50		Shovel								
		Shovel								
-55		Shovel								
		Shovel								
		Shovel								
-60		Shovel								
		Shovel							SANDSTONE 7.5 YR 4/6 strong brown, with 50% SANDSTONE, 10 YR 7/3 very pale-brown, interbeds, fine-grained to medium-grained, soft.	
-65		Shovel								
		Shovel								
		Shovel								
-70		Shovel								
		Shovel								
		Shovel								
-75		Shovel								
		Shovel								
		Shovel								
-80		Shovel							SANDSTONE 7.5 YR 4/6 strong brown, with 25% CLAY, 7.5 YR 5/6 CLAY, SANDSTONE, fine-grained to medium-grained, soft.	
		Shovel								
		Shovel								
-85		Shovel								
		Shovel								
		Shovel							SAND 7.5 YR 4/6 strong brown, SAND, very coarse-grained, subangular to angular, 20% CLAY.	

WELL LOG

WELL NO. MW011M

ARCADIS 1004 N. Big Spring St. Suite 300, Midland, TX 79701-3383 Tel: 432/687-5400 Fax: 432/687-5401

PROJECT NUMBER: MT000700.0001
CLIENT NAME: ChevronTexaco Exploration & Production Co.
PROJECT NAME: North Eunice Groundwater Investigation
SITE LOCATION: Eunice, New Mexico
Lea County, New Mexico
DRILLING CO: Scarborough Drilling Co.
DRILLING METHOD: Rotary/Mud/Water
SAMPLE METHOD: Shovel
DATE BEGUN: 8/21/01 DATE COMPLETED: 8/21/01
DRILLER: S. Scarborough ELEVATION (SURF.): 3,429.38'
LOGGER: L. Markham ELEVATION (T.O.C.): 3,431.21'
FILE NAME: MW011M.dat UNIQUE NUMBER: 31-014-00264

STATIC WATER LEVEL: -52.68' MEAS. PT.: T.O.C. DATE: 10/01/01
HOLE SIZE(S): 8" TOTAL DEPTH: -90.0'
SURFACE COMPLETION: 8" Locking Steel Sleeve, 3'x3'x6" Conc. Slab

	TYPES	DEPTHS
GROUT TYPE:	Cement w/5% Bentonite	-70.0' to Surface
SEAL TYPE:	Bentonite	-75.0' to -70.0'
SCREEN PACK:	8/16 Ind. Quartz	-90.0' to -75.0'
CASING TYPE:	4" Diameter Sch. 40 PVC Blank	-80.0' to 2.0'
	—	—
	—	—
WELL SCREEN:	4" Diameter Sch. 40 PVC, 0.020" slots	-90.0' to -80.0'
PLUG BACK:	—	—

DEPTH	SAMPLED	SAMPLING METHOD	ANALYZED	MOISTURE	RECOVERY	OVM READING	U. S. C. S. CLASS	LITHOLOGY	DESCRIPTION	WELL INSTALLATION
-90										

Project No: 787

Project: Eunice # 2 (North) Gas Plant

Client: Texaco Exploration and Production Inc.

Location: Lea County, New Mexico

Well ID: MW-12

Enclosure: 1 of 1

Engineer: IT

Depth (ft)	Description	Elevation (ft)	Well Construction	Remarks
0	Ground Surface	3427.69		
	Sand and Sandstone Tan and brown, fine grained, with traces of caliche at 5'			Locking Above-Grade Cover and Cap
				4" Sch. 40 PVC Riser (Threaded)
	Interbedded with sandstone and traces of caliche from 10-30'			
20				Cement/Bentonite Grout
40				Bentonite Chips
				8-16 Silica Sand
				Depth-to-Water: 49.3' BGS (11/16/99)
60				4" Sch. 40 PVC Screen, 0.02" Slot
		3362.69		4" Sch. 40 PVC Cap (Threaded)
	TD: 66.5'			
80				

Drilled By: Scarborough Drilling, Inc.

Drill Method: Rotary (Water)

Drill Date: 11-Feb-99

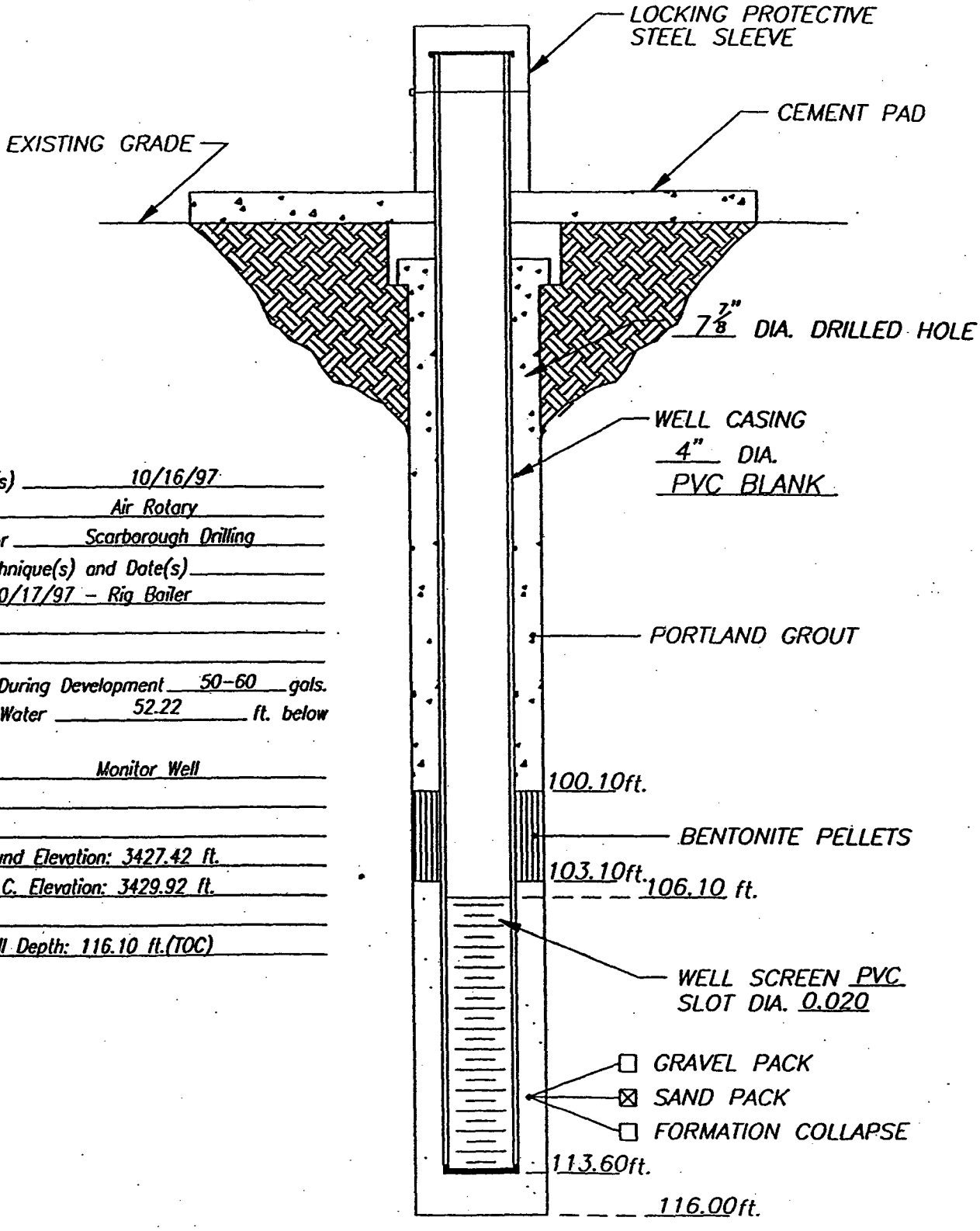
Highlander Environmental
1910 N. Big Spring
Midland, Texas 79705
(915) 682-4559

Hole Size: 7 7/8"

Datum: Mean Sea Level

Sheet: 1 of 1

WELL CONSTRUCTION LOG



Installation Date(s) 10/16/97
Drilling Method Air Rotary
Drilling Contractor Scarborough Drilling
Development Technique(s) and Date(s)
10/17/97 - Rig Bailer

Water Removed During Development 50-60 gals.
Static Depth to Water 52.22 ft. below Ground Level
Well Purpose Monitor Well

Remarks
Ground Elevation: 3427.42 ft.
T.O.C. Elevation: 3429.92 ft.

Well Depth: 116.10 ft.(TOC)

Date: 12/5/97	CLIENT: Texaco Exploration & Production, Inc.	WELL NO.
Highlander Environmental	PROJECT: Eunice #1 (North) Plant	MW-12A
	LOCATION: Lea County, New Mexico	

SAMPLE LOG

Boring/Well: MW-12A
Site Location: Texaco E & P Eunice (North) Gas Plant
Location: Eunice, New Mexico
Total Depth: 116 feet
Date Installed: 10/16/97

DEPTH (Ft)	SAMPLE DESCRIPTION
0-10	Tan and brown, fine grain sand, some traces of caliche
10-20	Fine grain sand, dense caliche and sandstone layers
20-30	Tan, fine grain sand, cemented sandstone layers, traces of white caliche
30-40	Tan, fine grain sand, loose, dense layer of cemented sandstone
40-50	Tan, fine grain sand, loose, some cemented sandstone
50-60	Tan, fine grain sand, some layers of sandstone, dense
60-70	Tan, fine grain sand, well sorted, and loose
70-80	Tan, fine grain sand, some layers of sandstone, dense
80-90	Tan, fine grain sand, some layers of sandstone, dense at 85.0' to 86.0'
90-100	Tan, fine grain sand, traces of cemented sandstone layers
100-105	Tan, fine grain sand and gravel, traces of clay
105-113	Gravel and fine grain sand, traces of brown clay
113-116	Tan, fine grain sand and gravel, traces of red clay
116	Redbed – clay
	TD - 116'

WELL LOG

WELL NO. MW012M

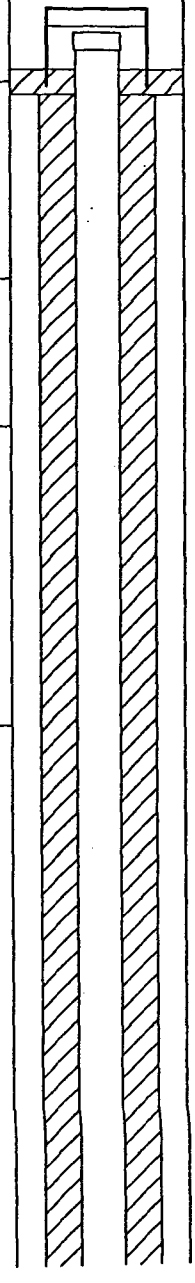
ARCADIS 1004 N. Big Spring St. Suite 300, Midland, TX 79701-3383 Tel: 432/687-5400 Fax: 432/687-5401

PROJECT NUMBER: MT000700.0001
CLIENT NAME: ChevronTexaco Exploration & Production Co.
PROJECT NAME: North Eunice Groundwater Investigation
SITE LOCATION: Eunice, New Mexico
Lea County, New Mexico
DRILLING CO: Scarborough Drilling Co.
DRILLING METHOD: Rotary/Mud/Water
SAMPLE METHOD: Shovel
DATE BEGUN: 11/13/01 DATE COMPLETED: 11/13/01
DRILLER: S. Scarborough ELEVATION (SURF.): 3,427.77'
LOGGER: L. Markham ELEVATION (T.O.C.): 3,430.06'
FILE NAME: MW012M.dat UNIQUE NUMBER: 31-014-00400

STATIC WATER LEVEL: -50.95' MEAS. PT.: T.O.C. DATE: 01/21/02
HOLE SIZE(S): 8" TOTAL DEPTH: -90.0'
SURFACE COMPLETION: 8" Locking Steel Sleeve, 3'x3'x6" Conc. Slab

	TYPES	DEPTHS
GROUT TYPE:	Portland Cement w/5% Bentonite	-74.0' to Surface
SEAL TYPE:	Bentonite Chips	-77.0' to -74.0'
SCREEN PACK:	8/16 Sand	-90.0' to -77.0'
CASING TYPE:	4" Diameter Sch. 40 PVC Blank	-80.0' to 2.0'
	—	—
	—	—
WELL SCREEN:	4" Diameter Sch. 40 PVC, 0.020" slots	-90.0' to -80.0'
PLUG BACK:	8/16 Sand	-93.0' to -90.0'

DEPTH	SAMPLED	SAMPLING METHOD	ANALYZED	MOISTURE	RECOVERY	OVM READING	U. S. C. S. CLASS	LITHOLOGY	DESCRIPTION	WELL INSTALLATION
0		Shovel							SANDY CLAY 2.5 YR 4/6 red, 40% fine-grained to medium-grained SAND, well rounded, soft.	
-5		Shovel								
		Shovel								
		Shovel							CALICHE 7.5 YR 8/3 pink, very fine-grained to medium-grained, 30% SAND, 20% CLAY, soft.	
-10		Shovel								
		Shovel								
		Shovel							CALICHE 7.5 YR 8/3 pink, very fine to fine grained, 30-40% SAND, soft to friable.	
-15		Shovel								
		Shovel								
-20		Shovel								
		Shovel								
-25		Shovel								
		Shovel							SANDSTONE 7.5 YR 4/6 strong brown, fine-grained to medium-grained, 20-40% SANDSTONE, 7.5 YR 6/4 light brown, interbeds, soft to firm.	
-30		Shovel								
		Shovel								
-35		Shovel								
		Shovel								
		Shovel								
-40		Shovel								
		Shovel								
-45		Shovel								
		Shovel								



WELL LOG

WELL NO. MW012M

ARCADIS 1004 N. Big Spring St. Suite 300, Midland, TX 79701-3383 Tel: 432/687-5400 Fax: 432/687-5401

PROJECT NUMBER: MT000700.0001
CLIENT NAME: ChevronTexaco Exploration & Production Co.
PROJECT NAME: North Eunice Groundwater Investigation
SITE LOCATION: Eunice, New Mexico
Lea County, New Mexico
DRILLING CO: Scarborough Drilling Co.
DRILLING METHOD: Rotary/Mud/Water
SAMPLE METHOD: Shovel
DATE BEGUN: 11/13/01 DATE COMPLETED: 11/13/01
DRILLER: S. Scarborough ELEVATION (SURF.): 3,427.77'
LOGGER: L. Markham ELEVATION (T.O.C.): 3,430.06'
FILE NAME: MW012M.dat UNIQUE NUMBER: 31-014-00400

STATIC WATER LEVEL: -50.95' MEAS. PT.: T.O.C. DATE: 01/21/02
HOLE SIZE(S): 8" TOTAL DEPTH: -90.0'
SURFACE COMPLETION: 8" Locking Steel Sleeve, 3'x3'x6" Conc. Slab

	TYPES	DEPTHS
GROUT TYPE:	Portland Cement w/5% Bentonite	-74.0' to Surface
SEAL TYPE:	Bentonite Chips	-77.0' to -74.0'
SCREEN PACK:	8/16 Sand	-90.0' to -77.0'
CASING TYPE:	4" Diameter Sch. 40 PVC Blank	-80.0' to 2.0'
	—	—
	—	—
WELL SCREEN:	4" Diameter Sch. 40 PVC, 0.020" slots	-90.0' to -80.0'
PLUG BACK:	8/16 Sand	-93.0' to -90.0'

DEPTH	SAMPLED	SAMPLING METHOD	ANALYZED	MOISTURE	RECOVERY	OVM READING	U. S. C. S. CLASS	LITHOLOGY	DESCRIPTION	WELL INSTALLATION
-50		Shovel							SANDSTONE 7.5 YR 4/6 strong brown, fine-grained to medium-grained, soft to firm.	
-55		Shovel								
-60		Shovel								
-65		Shovel								
-70		Shovel								
-75		Shovel								
-80		Shovel								
-85		Shovel							SANDSTONE 7.5 YR 4/6 strong brown, fine-grained to medium-grained, soft to firm, 30% GRAVEL, small to medium pebble, rounded to angular, poorly sorted, 10-20% CLAY, 5 YR 4/6 yellowish red, sticky.	
-90		Shovel								
-95										

WELL LOG

RW002

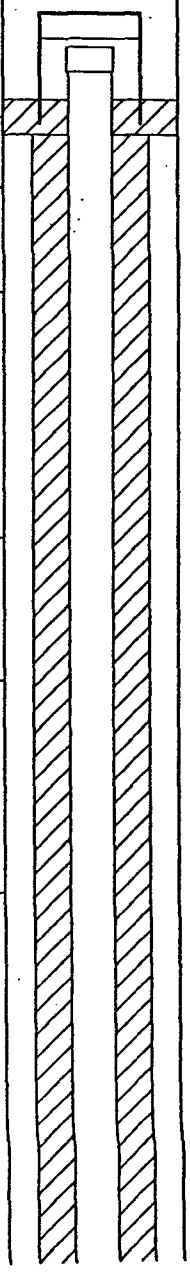
ARCADIS 1004 N. Big Spring St. Suite 300, Midland, TX 79701-3383 Tel: 432/687-5400 Fax: 432/687-5401

PROJECT NUMBER: MT000700.0001
CLIENT NAME: ChevronTexaco Exploration & Production Co.
PROJECT NAME: North Eunice Groundwater Investigation
SITE LOCATION: Eunice, New Mexico
Lea County, New Mexico
DRILLING CO: Scarborough Drilling Co.
DRILLING METHOD: Rotary/Mud/Water
SAMPLE METHOD: Shovel/Split Spoon
DATE BEGUN: 8/21/01 DATE COMPLETED: 8/22/01
DRILLER: S. Scarborough ELEVATION (SURF.): 3,429.48'
LOGGER: L. Markham ELEVATION (T.O.C.): 3,431.66'
FILE NAME: RW002.dat UNIQUE NUMBER: 31-014-00261

STATIC WATER LEVEL: -53.0' MEAS. PT.: T.O.C. DATE: 10/01/01
HOLE SIZE(S): 10" TOTAL DEPTH: -68.0'
SURFACE COMPLETION: 8" Locking Steel Sleeve, 3'x3'x6" Conc. Slab

	TYPES	DEPTHS
GROUT TYPE:	Cement w/5% Bentonite	-38.0' to Surface
SEAL TYPE:	Bentonite Chips	-43.0' to -38.0'
SCREEN PACK:	8/16 Sand	-68.0' to -43.0'
CASING TYPE:	6" Diameter Sch. 40 PVC Blank	-48.0' to 2.0'
	—	—
	—	—
WELL SCREEN:	6" Diameter Sch. 40 PVC, 0.020" slots	-68.0' to -48.0'
PLUG BACK:	—	—

DEPTH	SAMPLED	SAMPLING METHOD	ANALYZED	MOISTURE	RECOVERY	OVM READING	U. S. C. S. CLASS	LITHOLOGY	DESCRIPTION	WELL INSTALLATION
0									SILTY SAND 5 YR 5/4 reddish brown, 75% very fine-grained to fine-grained SAND, 25% SILT.	
		Shovel							SANDY CLAY 7.5 YR 4/4 brown, fine-grained, compactable.	
-5		Split Spoon			1.0				CALICHE 7.5 YR 8/4 pink, CALICHE 70%, SAND 30% very fine-grained to fine-grained, soft.	
		Shovel								
-10		Split Spoon			0.75					
		Shovel							CALICHE 10 YR 7/3 very pale brown, CALICHE 75%, SAND 25% very fine-grained to fine-grained.	
-15		Split Spoon			0.5					
		Shovel							CALICHE 10 YR 8/2 very pale brown, CALICHE 50%, SAND 50% fine-grained to medium-grained rounded to angular, poorly sorted, soft to firm.	
-20		Split Spoon			0.75					
		Shovel							SANDSTONE 7.5 YR 4/6 to 7.5 YR 6/4 strong brown to light brown, interbedded, fine-grained to medium-grained, soft to firm.	
-25		Split Spoon			0.75					
		Shovel								
-30		Split Spoon			0.75					



WELL LOG

RW002

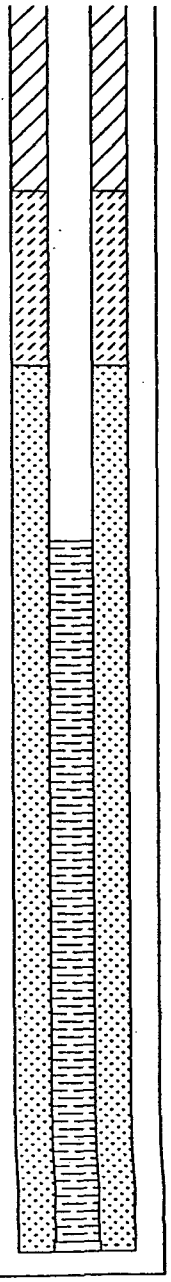
ARCADIS 1004 N. Big Spring St. Suite 300, Midland, TX 79701-3383 Tel: 432/687-5400 Fax: 432/687-5401

PROJECT NUMBER: MT000700.0001
CLIENT NAME: ChevronTexaco Exploration & Production Co.
PROJECT NAME: North Eunice Groundwater Investigation
SITE LOCATION: Eunice, New Mexico
Lea County, New Mexico
DRILLING CO: Scarborough Drilling Co.
DRILLING METHOD: Rotary/Mud/Water
SAMPLE METHOD: Shovel/Split Spoon
DATE BEGUN: 8/21/01 DATE COMPLETED: 8/22/01
DRILLER: S. Scarborough ELEVATION (SURF.): 3,429.48'
LOGGER: L. Markham ELEVATION (T.O.C.): 3,431.66'
FILE NAME: RW002.dat UNIQUE NUMBER: 31-014-00261

STATIC WATER LEVEL: -53.0' MEAS. PT.: T.O.C. DATE: 10/01/01
HOLE SIZE(S): 10" TOTAL DEPTH: -68.0'
SURFACE COMPLETION: 8" Locking Steel Sleeve, 3'x3'x6" Conc. Slab

	TYPES	DEPTHS
GROUT TYPE:	Cement w/5% Bentonite	-38.0' to Surface
SEAL TYPE:	Bentonite Chips	-43.0' to -38.0'
SCREEN PACK:	8/16 Sand	-68.0' to -43.0'
CASING TYPE:	6" Diameter Sch. 40 PVC Blank	-48.0' to 2.0'
	—	—
	—	—
WELL SCREEN:	6" Diameter Sch. 40 PVC, 0.020" slots	-68.0' to -48.0'
PLUG BACK:	—	—

DEPTH	SAMPLED	SAMPLING METHOD	ANALYZED	MOISTURE	RECOVERY	OVM READING	U. S. C. S. CLASS	LITHOLOGY	DESCRIPTION	WELL INSTALLATION
-35		Shovel							SANDSTONE 7.5 YR 4/6 to 7.5 YR 6/4 strong brown to very light brown, interbedded, fine-grained to medium-grained, soft to firm, with less light brown coloration	
-40		Split Spoon			0.75					
-45		Shovel								
-50		Split Spoon			1.0					
-55		Shovel								
-60		Shovel								
-65		Shovel								
		Shovel								



WELL LOG

WELL NO.: RW003

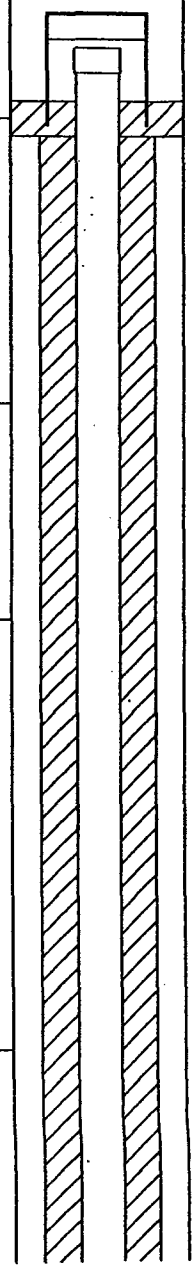
ARCADIS 1004 N. Big Spring St. Suite 300, Midland, TX 79701-3383 Tel: 432/687-5400 Fax: 432/687-5401

PROJECT NUMBER: MT000700.0001
CLIENT NAME: ChevronTexaco Exploration & Production Co.
PROJECT NAME: North Eunice Groundwater Investigation
SITE LOCATION: Eunice, New Mexico
Lea County, New Mexico
DRILLING CO: Scarborough Drilling Co.
DRILLING METHOD: Rotary/Mud/Water
SAMPLE METHOD: Shovel
DATE BEGUN: 11/14/01 DATE COMPLETED: 11/14/01
DRILLER: S. Scarborough ELEVATION (SURF.): 3,427.53'
LOGGER: L. Markham ELEVATION (T.O.C.): 3,429.82'
FILE NAME: RW003.dat UNIQUE NUMBER: 31-014-00401

STATIC WATER LEVEL: -50.75' MEAS. PT.: T.O.C. DATE: 01/21/02
HOLE SIZE(S): 10" TOTAL DEPTH: -65.0'
SURFACE COMPLETION: 8" Locking Steel Sleeve, 3'x3'x6" Conc. Slab

	TYPES	DEPTHS
GROUT TYPE:	Portland Cement w/5% Bentonite	-39.0' to Surface
SEAL TYPE:	Bentonite Chips	-42.0' to -39.0'
SCREEN PACK:	8/16 Sand	-65.0' to -42.0'
CASING TYPE:	4" Diameter Sch. 40 PVC Blank	-45.0' to 2.0'
	—	—
	—	—
WELL SCREEN:	4" Diameter Sch. 40 PVC, 0.035" slots	-65.0' to -45.0'
PLUG BACK:	—	—

DEPTH	SAMPLED	SAMPLING METHOD	ANALYZED	MOISTURE	RECOVERY	OVM READING	U. S. C. S. CLASS	LITHOLOGY	DESCRIPTION	WELL INSTALLATION
0		Shovel							SANDY CLAY 2.5 YR 4/6 red, 40% fine-grained to medium-grained SAND, well rounded, soft.	
-5		Shovel								
		Shovel								
		Shovel								
-10		Shovel							CALICHE 7.5 YR 8/3 pink, very fine-grained to medium-grained, 30% SAND, 20% CLAY, soft.	
		Shovel								
		Shovel								
-15		Shovel							CALICHE 7.5 YR 8/3 pink, very fine-grained to fine-grained, 30-40% SAND, soft to friable.	
		Shovel								
		Shovel								
-20		Shovel								
		Shovel								
		Shovel								
-25		Shovel							SANDSTONE 7.5 YR 4/6 strong brown, fine-grained to medium-grained, 20-40% SANDSTONE, 7.5 YR 6/4 light brown, interbeds, soft to firm.	
		Shovel								
		Shovel								
-30		Shovel								



WELL LOG

RW003

ARCADIS 1004 N. Big Spring St. Suite 300, Midland, TX 79701-3383 Tel: 432/687-5400 Fax: 432/687-5401

PROJECT NUMBER: MT000700.0001
CLIENT NAME: ChevronTexaco Exploration & Production Co.
PROJECT NAME: North Eunice Groundwater Investigation
SITE LOCATION: Eunice, New Mexico
Lea County, New Mexico
DRILLING CO: Scarborough Drilling Co.
DRILLING METHOD: Rotary/Mud/Water
SAMPLE METHOD: Shovel
DATE BEGUN: 11/14/01 DATE COMPLETED: 11/14/01
DRILLER: S. Scarborough ELEVATION (SURF.): 3,427.53'
LOGGER: L. Markham ELEVATION (T.O.C.): 3,429.82'
FILE NAME: RW003.dat UNIQUE NUMBER: 31-014-00401

STATIC WATER LEVEL: -50.75' MEAS. PT.: T.O.C. DATE: 01/21/02
HOLE SIZE(S): 10" TOTAL DEPTH: -65.0'
SURFACE COMPLETION: 8" Locking Steel Sleeve, 3'x3'x6" Conc. Slab

	TYPES	DEPTHS
GROUT TYPE:	Portland Cement w/5% Bentonite	-39.0' to Surface
SEAL TYPE:	Bentonite Chips	-42.0' to -39.0'
SCREEN PACK:	8/16 Sand	-65.0' to -42.0'
CASING TYPE:	4" Diameter Sch. 40 PVC Blank	-45.0' to 2.0'
	—	—
	—	—
WELL SCREEN:	4" Diameter Sch. 40 PVC, 0.035" slots	-65.0' to -45.0'
PLUG BACK:	—	—

DEPTH	SAMPLED	SAMPLING METHOD	ANALYZED	MOISTURE	RECOVERY	OVM READING	U. S. C. S. CLASS	LITHOLOGY	DESCRIPTION	WELL INSTALLATION
-35		Shovel								
		Shovel								
		Shovel								
		Shovel								
40		Shovel								
		Shovel								
		Shovel								
-45		Shovel								
		Shovel								
		Shovel								
-50		Shovel							SANDSTONE 7.5 YR 4/6 strong brown, fine-grained to medium-grained, soft to firm.	
		Shovel								
		Shovel								
-55		Shovel								
		Shovel								
		Shovel								
-60		Shovel								
		Shovel								
		Shovel								
-65		Shovel								

WELL LOG

RW004A

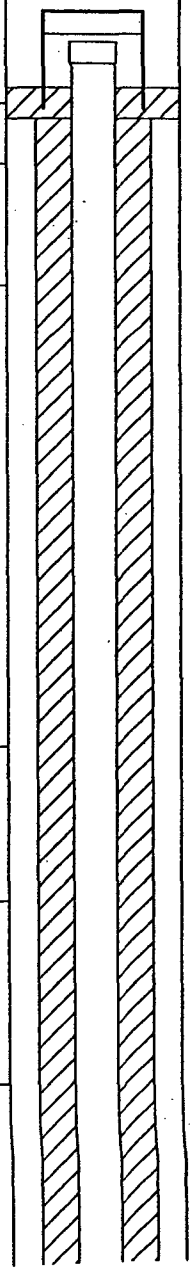
ARCADIS 1004 N. Big Spring St. Suite 300, Midland, TX 79701-3383 Tel: 432/687-5400 Fax: 432/687-5401

PROJECT NUMBER: MT000700.0001
CLIENT NAME: ChevronTexaco North America Upstream
PROJECT NAME: North Eunice Plant Remediation
SITE LOCATION: Eunice, New Mexico
Lea County, New Mexico
DRILLING CO: Scarborough Drilling Co.
DRILLING METHOD: Rotary/Mud/Water
SAMPLE METHOD: Shovel/Split Spoon
DATE BEGUN: 8/23/01 DATE COMPLETED: 8/23/01
DRILLER: S. Scarborough ELEVATION (SURF.): 3,427.76'
LOGGER: L. Markham ELEVATION (T.O.C.): 3,430.11'
FILE NAME: RW004A.dat UNIQUE NUMBER: 31-014-00262

STATIC WATER LEVEL: -51.59' MEAS. PT.: T.O.C. DATE: 8/23/01
HOLE SIZE(S): 10" TOTAL DEPTH: -115.5'
SURFACE COMPLETION: 8" Locking Steel Sleeve, 3'x3'x6" Conc. Slab

	TYPES	DEPTHS
GROUT TYPE:	Cement w/5% Bentonite	-80.0' to Surface
SEAL TYPE:	Bentonite Chips	-90.0' to -80.0'
SCREEN PACK:	8/16 Sand	-115.0' to -90.0'
CASING TYPE:	6" Diameter Sch. 40 PVC Blank	-95.0' to 2.0'
	—	—
	—	—
WELL SCREEN:	6" Diameter Sch. 40 PVC, 0.020" slots	-115.0' to -95.0'
PLUG BACK:	—	-115.5' to -115.0'

DEPTH	SAMPLED	SAMPLING METHOD	ANALYZED	MOISTURE	RECOVERY	OVM READING	U. S. C. S. CLASS	LITHOLOGY	DESCRIPTION	WELL INSTALLATION
0										
		Shovel							SILTY SAND 7.5 YR 5/6 strong brown, 70% SAND, very fine-grained to fine-grained, 30% SILT.	
									CLAY 7.5 YR 5/6 strong brown, 60% CLAY, 30% SAND, fine-grained, 10% CALICHE.	
-5		Split Spoon			1.0					
		Shovel							CALICHE 7.5 YR 8/2 pinkish white, 70% CALICHE, 30% SAND, very fine-grained to fine-grained, soft to firm.	
-10		Split Spoon			0.75					
		Shovel								
-15		Split Spoon			0.75					
		Shovel								
-20		Split Spoon			0.75					
		Shovel							SAND 7.5 YR 7/4 pink, 60% SAND, very fine-grained to fine-grained, 40% CALICHE, soft to firm.	
-25		Split Spoon			0.75					
		Shovel							SANDSTONE 7.5 YR 6/4 light brown, fine-grained to medium-grained, interbedded darker SANDSTONE, soft to firm.	
-30		Split Spoon			0.75					
									SANDSTONE 7.5 YR 6/4 mottled strong brown and light brown, fine-grained to medium-grained, interbedded darker SANDSTONE, soft to firm.	
-35		Shovel								



WELL LOG

RW004A

ARCADIS 1004 N. Big Spring St. Suite 300, Midland, TX 79701-3383 Tel: 432/687-5400 Fax: 432/687-5401

PROJECT NUMBER: MT000700.0001
CLIENT NAME: ChevronTexaco North America Upstream
PROJECT NAME: North Eunice Plant Remediation
SITE LOCATION: Eunice, New Mexico
Lea County, New Mexico
DRILLING CO: Scarborough Drilling Co.
DRILLING METHOD: Rotary/Mud/Water
SAMPLE METHOD: Shovel/Split Spoon
DATE BEGUN: 8/23/01 DATE COMPLETED: 8/23/01
DRILLER: S. Scarborough ELEVATION (SURF.): 3,427.76'
LOGGER: L. Markham ELEVATION (T.O.C.): 3,430.11'
FILE NAME: RW004A.dat UNIQUE NUMBER: 31-014-00262

STATIC WATER LEVEL: -51.59' MEAS. PT.: T.O.C. DATE: 8/23/01
HOLE SIZE(S): 10" TOTAL DEPTH: -115.5'
SURFACE COMPLETION: 8" Locking Steel Sleeve, 3'x3'x6" Conc. Slab

	TYPES	DEPTHS
GROUT TYPE:	Cement w/5% Bentonite	-80.0' to Surface
SEAL TYPE:	Bentonite Chips	-90.0' to -80.0'
SCREEN PACK:	8/16 Sand	-115.0' to -90.0'
CASING TYPE:	6" Diameter Sch. 40 PVC Blank	-95.0' to 2.0'
	—	—
	—	—
WELL SCREEN:	6" Diameter Sch. 40 PVC, 0.020" slots	-115.0' to -95.0'
PLUG BACK:	—	-115.5' to -115.0'

DEPTH	SAMPLED	SAMPLING METHOD	ANALYZED	MOISTURE	RECOVERY	OVM READING	U. S. C. S. CLASS	LITHOLOGY	DESCRIPTION	WELL INSTALLATION
-40		Split Spoon			0.75				SANDSTONE 7.5 YR 6/4 90% strong brown 10% light brown mottled, fine-grained to medium-grained, interbedded darker SANDSTONE, soft to firm.	
-45		Shovel								
-50		Split Spoon			0.5					
-55										
-60										
-65										
-70										
-75										
-80										

WELL LOG

RW004A

ARCADIS 1004 N. Big Spring St. Suite 300, Midland, TX 79701-3383 Tel: 432/687-5400 Fax: 432/687-5401

PROJECT NUMBER: MT000700.0001
CLIENT NAME: ChevronTexaco North America Upstream
PROJECT NAME: North Eunice Plant Remediation
SITE LOCATION: Eunice, New Mexico
Lea County, New Mexico
DRILLING CO: Scarborough Drilling Co.
DRILLING METHOD: Rotary/Mud/Water
SAMPLE METHOD: Shovel/Split Spoon
DATE BEGUN: 8/23/01 DATE COMPLETED: 8/23/01
DRILLER: S. Scarborough ELEVATION (SURF.): 3,427.76'
LOGGER: L. Markham ELEVATION (T.O.C.): 3,430.11'
FILE NAME: RW004A.dat UNIQUE NUMBER: 31-014-00262

STATIC WATER LEVEL: -51.59' MEAS. PT.: T.O.C. DATE: 8/23/01
HOLE SIZE(S): 10" TOTAL DEPTH: -115.5'
SURFACE COMPLETION: 8" Locking Steel Sleeve, 3'x3'x6" Conc. Slab

	TYPES	DEPTHS
GROUT TYPE:	Cement w/5% Bentonite	-80.0' to Surface
SEAL TYPE:	Bentonite Chips	-90.0' to -80.0'
SCREEN PACK:	8/16 Sand	-115.0' to -90.0'
CASING TYPE:	6" Diameter Sch. 40 PVC Blank	-95.0' to 2.0'
	—	—
	—	—
WELL SCREEN:	6" Diameter Sch. 40 PVC, 0.020" slots	-115.0' to -95.0'
PLUG BACK:	—	-115.5' to -115.0'

DEPTH	SAMPLED	SAMPLING METHOD	ANALYZED	MOISTURE	RECOVERY	OVM READING	U. S. C. S. CLASS	LITHOLOGY	DESCRIPTION	WELL INSTALLATION
-85										
-90										
-95									CONGLOMERATE 7.5 YR 4/6 strong brown, SANDSTONE matrix, fine-grained to medium-grained, 20% GRAVEL, (small pebble), rounded to angular, poorly sorted, 5% CLAY.	
-100										
-105									CONGLOMERATE strong brown, 60% SANDSTONE matrix, fine-grained to medium-grained, 40% GRAVEL small to medium pebble, rounded to angular, poorly sorted.	
-110										
-115									GRAVELLY CLAY 2.5 YR 5/6 red, 50% CLAY, 40% GRAVEL, small to medium pebble, rounded to angular, 10% SAND, poorly sorted.	
									CLAY 2.5 YR 5/6 red, elastic, sticky.	
-120										

WELL LOG

IW001

ARCADIS 1004 N. Big Spring St. Suite 300, Midland, TX 79701-3383 Tel: 432/687-5400 Fax: 432/687-5401

PROJECT NUMBER: MT000700.0006
LIENT NAME: ChevronTexaco Exploration & Production Co.
ROJECT NAME: North Eunice Groundwater Investigation
SITE LOCATION: Eunice, New Mexico
Lea County, New Mexico
DRILLING CO: Scarborough Drilling Co.
DRILLING METHOD: Rotary/Water/Mud
SAMPLE METHOD: Shovel
DATE BEGUN: 7/24/02 DATE COMPLETED: 7/24/02
DRILLER: S. Scarborough ELEVATION (SURF.): 3,429.47'
LOGGER: L. Markham ELEVATION (T.O.C.): 3,431.91'
FILE NAME: IW001.dat UNIQUE NUMBER: 31-014-00427

STATIC WATER LEVEL: -53.19' MEAS. PT.: T.O.C. DATE: 8/1/02
HOLE SIZE(S): 8" TOTAL DEPTH: -95.0'
SURFACE COMPLETION: 8" Locking Steel Sleeve, 3'x3'x6" Conc. Slab

	TYPES	DEPTHS
GROUT TYPE:	Portland Cement w/5% Bentonite	-32.0' to Surface
SEAL TYPE:	Bentonite Chips	-35.0' to -32.0'
SCREEN PACK:	8/16 Sand	-90.0' to -35.0'
CASING TYPE:	4" Diameter Sch. 40 PVC Blank	-40.0' to 2.0'
	—	—
	—	—
WELL SCREEN:	4" Diameter Sch. 40 PVC, 0.020" slots	-90.0' to -40.0'
PLUG BACK:	Bentonite	-95.0' to -90.0'

DEPTH	SAMPLED	SAMPLING METHOD	ANALYZED	MOISTURE	RECOVERY	OVM READING	U. S. C. S. CLASS	LITHOLOGY	DESCRIPTION	WELL INSTALLATION
0									CLAYEY SAND 5 YR 5/6 yellowish red, 60% fine-grained to medium-grained SAND, loose.	
-5		Shovel								
-10		Shovel							CALICHE 7.5 YR 8/3 pink, 30-40% very fine-grained to fine-grained SAND, soft to friable.	
-15		Shovel								
-20		Shovel								
-25		Shovel							SANDSTONE 7.5 YR 4/6 strong brown and 7.5 YR 6/4 light brown, fine-grained to medium-grained, soft to firm interbedded layers.	
-30		Shovel								
-35		Shovel								
-40		Shovel								
-45		Shovel								

WELL LOG

ARCADIS

1004 N. Big Spring St. Suite 300, Midland, TX 79701-3383 Tel: 432/687-5400 Fax: 432/687-5401

WELL NO.: IW001

PROJECT NUMBER: MT000700.0006
CLIENT NAME: ChevronTexaco Exploration & Production Co.
PROJECT NAME: North Eunice Groundwater Investigation
SITE LOCATION: Eunice, New Mexico
Lea County, New Mexico
DRILLING CO: Scarborough Drilling Co.
DRILLING METHOD: Rotary/Water/Mud
SAMPLE METHOD: Shovel
DATE BEGUN: 7/24/02 DATE COMPLETED: 7/24/02
DRILLER: S. Scarborough ELEVATION (SURF.): 3,429.47'
LOGGER: L. Markham ELEVATION (T.O.C.): 3,431.91'
FILE NAME: IW001.dat UNIQUE NUMBER: 31-014-00427

STATIC WATER LEVEL: -53.19' MEAS. PT.: T.O.C. DATE: 8/1/02
HOLE SIZE(S): 8" TOTAL DEPTH: -95.0'
SURFACE COMPLETION: 8" Locking Steel Sleeve, 3'x3'x6" Conc. Slab

	TYPES	DEPTHS
GROUT TYPE:	Portland Cement w/5% Bentonite	-32.0' to Surface
SEAL TYPE:	Bentonite Chips	-35.0' to -32.0'
SCREEN PACK:	8/16 Sand	-90.0' to -35.0'
CASING TYPE:	4" Diameter Sch. 40 PVC Blank	-40.0' to 2.0'
	—	—
	—	—
WELL SCREEN:	4" Diameter Sch. 40 PVC, 0.020" slots	-90.0' to -40.0'
PLUG BACK:	Bentonite	-95.0' to -90.0'

DEPTH	SAMPLED	SAMPLING METHOD	ANALYZED	MOISTURE	RECOVERY	OVM READING	U. S. C. S. CLASS	LITHOLOGY	DESCRIPTION	WELL INSTALLATION
-50		Shovel								
		Shovel								
		Shovel								
-55		Shovel								
		Shovel								
		Shovel								
-30		Shovel								
		Shovel								
-65		Shovel								
		Shovel								
		Shovel								
-70		Shovel								
		Shovel								
		Shovel								
-75		Shovel								
		Shovel								
		Shovel								
-80		Shovel								
		Shovel								
		Shovel								
-85		Shovel								
		Shovel								
		Shovel								
-90		Shovel							SANDY CLAY 5 YR 6/6 reddish yellow, 30-40% fine-grained to medium-grained SAND, elastic.	
		Shovel								
		Shovel								
-95										

WELL LOG

ARCADIS

1004 N. Big Spring St. Suite 300, Midland, TX 79701-3383 Tel: 432/687-5400 Fax: 432/687-5401

IW002

PROJECT NUMBER: MT000700.0006
CLIENT NAME: ChevronTexaco Exploration & Production Co.
PROJECT NAME: North Eunice Groundwater Investigation
SITE LOCATION: Eunice, New Mexico
Lea County, New Mexico
DRILLING CO: Scarborough Drilling Co.
DRILLING METHOD: Rotary/Water
SAMPLE METHOD: Shovel
DATE BEGUN: 9/09/02 DATE COMPLETED: 9/09/02
DRILLER: S. Scarborough ELEVATION (SURF.): 3,427.78'
LOGGER: R. Lang ELEVATION (T.O.C.): 3,430.33'
FILE NAME: IW002.dat UNIQUE NUMBER: 31-014-00426

STATIC WATER LEVEL: -51.09' MEAS. PT.: T.O.C. DATE: 9/19/02
HOLE SIZE(S): 7 7/8" TOTAL DEPTH: -90.0'
SURFACE COMPLETION: 8" Locking Steel Sleeve, 3'x3'x6" Conc. Slab

	TYPES	DEPTHS
GROUT TYPE:	Portland Cement	-10.0' to Surface
SEAL TYPE:	Bentonite	-35.0' to -10.0'
SCREEN PACK:	8/16 Sand	-90.0' to -35.0'
CASING TYPE:	4" Diameter Sch. 40 PVC Blank	-40.0' to 2.0'
	—	—
	—	—
WELL SCREEN:	4" Diameter Sch. 40 PVC, 0.020" slots	-90.0' to -40.0'
PLUG BACK:	8/16 Sand	-96.0' to -90.0'

DEPTH	SAMPLED	SAMPLING METHOD	ANALYZED	MOISTURE	RECOVERY	OVM READING	U. S. C. S. CLASS	LITHOLOGY	DESCRIPTION	WELL INSTALLATION
0									SAND 10 R 5/6 red, fine-grained to very fine-grained, subangular to subrounded, well sorted, loose, dry, frosted, argillaceous, blow sand.	
-5		Shovel								
-10		Shovel							CALICHE 7.5 YR 8/4 pink, firm to soft.	
-15		Shovel								
-20		Shovel								
-25		Shovel							SANDSTONE 10 R 6/6 light red, subrounded, fine-grained to very fine-grained, well sorted, firm, dry, argillaceous cement, some poorly cemented, rare CALICHE interbeds.	
-30		Shovel								
-35		Shovel							SAND 10 R 6/6 light red, subrounded, fine-grained to very fine-grained, well sorted, loose to well cemented, argillaceous cement.	
-40		Shovel								
-45		Shovel								

WELL LOG

IW002

ARCADIS 1004 N. Big Spring St. Suite 300, Midland, TX 79701-3383 Tel: 432/687-5400 Fax: 432/687-5401

PROJECT NUMBER: MT000700.0006
CLIENT NAME: ChevronTexaco Exploration & Production Co.
PROJECT NAME: North Eunice Groundwater Investigation
SITE LOCATION: Eunice, New Mexico
Lea County, New Mexico
DRILLING CO: Scarborough Drilling Co.
DRILLING METHOD: Rotary/Water
SAMPLE METHOD: Shovel
DATE BEGUN: 9/09/02 DATE COMPLETED: 9/09/02
DRILLER: S. Scarborough ELEVATION (SURF.): 3,427.78'
LOGGER: R. Lang ELEVATION (T.O.C.): 3,430.33'
FILE NAME: IW002.dat UNIQUE NUMBER: 31-014-00426

STATIC WATER LEVEL: -51.09' MEAS. PT.: T.O.C. DATE: 9/19/02
HOLE SIZE(S): 7 7/8" TOTAL DEPTH: -90.0'
SURFACE COMPLETION: 8" Locking Steel Sleeve, 3'x3'x6" Conc. Slab

	TYPES	DEPTHS
GROUT TYPE:	Portland Cement	-10.0' to Surface
SEAL TYPE:	Bentonite	-35.0' to -10.0'
SCREEN PACK:	8/16 Sand	-90.0' to -35.0'
CASING TYPE:	4" Diameter Sch. 40 PVC Blank	-40.0' to 2.0'
	—	—
	—	—
WELL SCREEN:	4" Diameter Sch. 40 PVC, 0.020" slots	-90.0' to -40.0'
PLUG BACK:	8/16 Sand	-96.0' to -90.0'

DEPTH	SAMPLED	SAMPLING METHOD	ANALYZED	MOISTURE	RECOVERY	OVM READING	U. S. C. S. CLASS	LITHOLOGY	DESCRIPTION	WELL INSTALLATION
-50		Shovel								
-55		Shovel								
-60		Shovel								
-65		Shovel								
-70		Shovel								
-75										
-80										
-85									SAND 10 R 6/6 light red, subrounded, fine-grained to very fine-grained, well sorted, loose, some rare CHERT.	
-90		Shovel								
		Shovel							GRAVEL GLEY 2 8/1 light bluish gray, CHERT GRAVEL to .75 cm.	
-95		Shovel								