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REPORTS

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CHARACTERIZATION REPORT FOR THE ELDRIDGE RANCH STUDY AREA LEA COUNTY, NEW MEXICO

(Case #1R334)

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ENVIRONMENTAL BUREAU
OIL CONSERVATION DIVISION

Prepared For

Duke Energy Field Services, LP
370 17th Street, Suite 900
Denver, CO 80202

Prepared By

Remediacon
P.O. Box 302
Evergreen, Colorado 80437
Telephone (303)674-4370
Facsimile (720)528-8132

November 4, 2002

Remediacon Incorporated
Geological and Engineering Services
mstewart@remedicon.com

PO Box 302, Evergreen, Colorado 80437
Telephone: 303.674.4370
Facsimile: 720.528.8132

November 4, 2002

Mr. Stephen Weathers
Duke Energy Field Services, LP
370 17th Street, Suite 900
Denver, CO 80202

Re: Transmittal of the Characterization Report for the Eldridge Ranch Study Area **CASE #1R334**, Lea County New Mexico

Dear Stephen:

Attached is the characterization report for the Eldridge Ranch and neighboring Leonard Trust. The report was prepared following completion of the field activities that were proposed in a September workplan that was submitted to the New Mexico Oil Conservation Division (OCD) and approved by them with conditions in a letter dated September 17, 2002.

The purpose of the investigation was to complete field investigative activities and then prepare a comprehensive characterization report for the area. This purpose was achieved.

The report concludes that shallow groundwater beneath the site has been impacted by several hydrocarbon releases. Some but not all of the releases appear to be associated with the two pipelines that transect the study area. Further study would be necessary to identify the exact source of the releases.

The releases have generated two plumes. The northern plume is restricted to the Leonard Trust land. The southern plume was drawn onto the Eldridge Ranch by their irrigation well between February and June 2000. Additional groundwater contamination probably resulted from the irrigation of an orchard and an alfalfa field on the Eldridge Ranch.

Biodegradation is apparently actively removing hydrocarbon constituents from the releases. This process may be limiting the expansion of the plumes, but this conclusion would have to be verified through repeated groundwater sampling.

Formulation of a remediation strategy should be postponed until limited additional field activities are completed. The recommended field activities include:

1. The construction and operational history of the existing active and relic pipelines should be investigated.

2. All historic hydrocarbon production and processing structures should be identified and evaluated as potential hydrocarbon sources.

3. The location and extent of the southern source and its relationship to the irrigation well should be better defined.

4. An additional well should be installed south of the former irrigated field to complete horizontal groundwater characterization.

5. A minimum of one deep well should be installed, preferably within the area of the southern source area to define the extent of the uppermost saturated materials and to measure vertical groundwater gradient.

6. Slug tests should be completed in the wells containing clays and wells in the northern source area to verify the homogeneity of the hydraulic conductivity measured in the southern study area.

Thank you for the opportunity to complete this work. Do not hesitate to contact me if you have any questions or comments.

Respectfully Submitted,
REMEDIACON INCORPORATED

Michael H. Stewart

Michael H. Stewart, P.E.
Principal Engineer

MHS/tbm

enclosure

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1 INTRODUCTION

Duke Energy Field Services, LP (DEFS) retained Remediacon to complete characterization activities on two adjacent properties property in Lea County, New Mexico (study area). This report completes that effort. The purpose and objectives of the program and a brief background section are presented first. A description of the field activities is presented next. The results and interpretations are then discussed followed by conclusions and recommendations.

1.1 Purpose And Objectives

The purpose of this program was to characterize the groundwater conditions and source locations within the study area. Specific objectives included:

1. Defining the plume boundaries up gradient (north and west) of the study area.
2. Establishing background concentrations for several inorganic constituents.
3. Characterizing the nature and extent of the hydrocarbons present in the study area.
4. Defining the extent of the hydrocarbon effects to the east and the south on the Eldridge Ranch Property.
5. Identifying the sources of hydrocarbons and delineating the plume or plumes associated with them.
6. Evaluating the degree of natural biodegradation processes.
7. Collecting information on the hydrologic properties of the subsurface materials.

1.2 Background Information

The study area is primarily in the southeastern quarter of Section 21, Township 19 South, Range 37 East approximately 1 mile north of and 0.75 miles east of the town of Monument in Lea County New Mexico (Figure 1). The approximate coordinates are 32 degrees 38.5 minutes north, 103 degrees 15.4 minutes east.

The study area includes two properties. The locations of the two properties and the surrounding topography and drainage features are shown on Figure 2. The study area boundaries are approximately located on Figure 2 to provide a perspective of the surface features and topographic setting of the study area.

The Katherine Leonard Estate is the northern property in the study area and constitutes approximately 90 percent of the study area. The land is uninhabited and is used primarily for cattle grazing.

The Eldridge Ranch Property, owned by the Eldridge family is the southern property. The property includes the Eldridge family residence and numerous farm buildings. A large-capacity well was used to irrigate an alfalfa field and an orchard and to provide water to a fish pond before it was contaminated by hydrocarbons and could no longer be used. The domestic well was also impacted so household water is currently brought several hundred feet from an up-gradient well.

There are numerous historical oil production facilities present on the Leonard estate. Two north-south trending pipelines and two northeast-southwest trending pipelines are also present. The two north-south pipelines are owned by DEFS and Conoco. The two northeast-southwest trending pipelines are owned by Sid Richardson.

Monitoring wells were installed in August 2001 (MW-1 through MW-7) and March 2002 (MW-8 through MW-14) by AMEC Earth and Environmental, Inc (AMEC) for the New Mexico Oil Conservation Division (OCD). AMEC provided construction data and limited interpretations in two reports (AMEC 2001, 2002). The well locations are shown on Figure 3. Table 1 provides construction summaries for the 14 wells.

AMEC sampled wells MW-1 through MW-7 in August 2001 and MW-8 through MW-14 in March 2002. The sampling techniques and analytical results were reported in their reports (AMEC 2001, 2002).

Trident Environmental (Trident) sampled all 14 monitoring wells in July 2002 for DEFS. The sampling results and subsequent interpretations were included in a report prepared by Remediacon, Inc. (Remediacon, August 2002). The Remediacon August 2002 report contained the following primary conclusions:

1. The July 2002 water-table contours indicated a southeasterly groundwater flow direction in the northern study area that changed to a southerly groundwater flow direction near the northern boundary of the Eldridge property.

2. Benzene, toluene, ethylbenzene and xylene (BTEX) constituents were present in the majority of the groundwater samples.

3. No polynuclear aromatic hydrocarbons were detected in the samples.

4. Fluoride was present at naturally high concentrations

5. Slightly elevated sodium and chloride values from the MW-12 sample were evidence of an historic release not related to the existing pipelines.

6. The majority of the high metals concentrations reported by AMEC resulted from the dissolution of sediments contained in the water samples when they were acidified by nitric acid as part of the preservation process. The concentrations from the dissolved (filtered) samples were significantly lower.

7. The barium distribution appeared to be biased by non-natural processes.

8. The hydrocarbon constituents are distributed in two physically distinct areas, and neither area has been adequately characterized.

The recommendations from that study formed the basis of the field program completed for this investigation.

2 FIELD PROGRAM

The field program described in this section was presented in a workplan (Remediacon, September 2002) that was submitted to the OCD. OCD approved the plan with conditions that were incorporated into the scope of work.

The field program included three tasks: 1) monitoring well installation and development; 2) groundwater sampling and 3) physical property measurement. Each task is described below.

2.1 Monitoring Well Installation and Development

Nine monitoring wells (MW-15 to MW-23) were installed by Trident Environmental at the locations shown on Figure 3. The final locations were installed at the locations proposed in the workplan with two exceptions. First, well MW-15 was moved because of an existing well at the same approximate location on the Eldridge Ranch (Water Well #2, Figure 3). This well was moved to the north of MW-23 to provide a background well. Second, MW-17 was moved to the south so that it was aligned along with MW-16 more perpendicular to the direction of groundwater flow.

Each boring was advanced using air rotary drilling. Samples were collected on a regular basis (maximum separation of 5 feet) and screened for the presence of volatiles using a photoionization detector until saturated materials were encountered. Lithologic logs were compiled by the field geologist for each boring based upon the cuttings and/or samples produced.

Each well was drilled to a depth approximately 10 feet below the first evidence of saturated materials or to a maximum depth of 35 feet if no evidence saturated materials was encountered (MW-19). Fifteen feet of 2-inch, threaded, factory-slotted Schedule 40 PVC was placed in all wells excepting MW-19. Twenty feet of screen was placed in MW-19 because no visibly saturated materials were encountered. The annular space was generally backfilled with artificially-graded sand to a minimum depth of 1 foot above the top of the slotted PVC interval. The remaining annular space was then backfilled with hydrated bentonite to a depth 3 feet below land surface (bls). The surface completion for each well included a locking, above-ground well protector and a minimum 2 foot by 2 foot concrete pad.

An additional boring (SB-1, Figure 3) was advanced north of the abandoned DEFS subsurface pipeline drip tank (DEFS Drip, Figure 3). Photoionization detector (PID) readings indicated that the vadose zone materials contained elevated hydrocarbon constituents. This location was abandoned by backfilling the hole with pelletized bentonite. MW-15 was then installed farther up-gradient (north) in a relatively unimpacted area.

Boring logs and well completion forms (excepting SB-1) were prepared for each well. The forms are included in Appendix 1.

On October 9th, 2002, all of the monitoring wells (MW-1 to MW-23) were gauged. Measurable light non-aqueous phase liquids (LNAPL) were observed in MW-11 and MW-23. Each of the recently installed monitoring wells that did not contain LNAPL were developed on October 10, 2002 using a Whaler 2-stage purge pump. A minimum of ten casing volumes of water was recovered from each monitoring well. Stabilization parameters were measured from discrete samples at 4-gallon purge volume intervals. Temperature, conductivity, pH, dissolved oxygen (DO), turbidity, and salinity readings were measured using a Horiba Model U-10 meter. Results from the measurements taken are provided in Table 2.

2.2 Groundwater Sampling

Groundwater samples were collected on October 11th, 2002 from the eight new monitoring wells that did not contain LNAPL. Each well was allowed to sit overnight before it was developed and sampled.

Prior to sampling, each monitoring well was purged using a disposable bailer to insure that a representative sample was being collected. A minimum of three casing volumes of water was recovered from each monitoring well. Stabilization parameters were measured from discrete samples at 2-gallon purge volume intervals. Temperature, conductivity, pH, DO, turbidity, and salinity readings were measured using a Horiba Model U-10 meter. Results from the measurements taken are also provided on Table 1.

Groundwater samples were collected using disposable bailers attached to heavy monofilament line. Water was then transferred to the following laboratory provided containers:

Laboratory Container	Preservative	Quantity	**Analysis**	**Method**
40-milliliter glass VOA vials	Hydrochloric Acid	2	Benzene, Toluene, Ethylbenzene, p/m-Xylenes, and o-Xylenes	EPA-8021B
1-liter glass jar (amber)	None	1	Polynuclear Aromatic Hydrocarbons	EPA-8270C
1-liter plastic container	None	1	Major Ions and Total Dissolved Solids	Various
500-milliliter plastic container	Nitric Acid	1	Ba, Fe, and Mn ("Field Filtered")	Various
500-milliliter plastic container	Nitric Acid	1	Ba, Fe, and Mn (Unfiltered)	Various

Groundwater samples for the "field filtered" metals were first recovered in 1-liter plastic containers. Air pressure was used to transfer the water through a disposable 0.45-micron filter into the 500-ml laboratory containers.

The glass containers were sealed with Teflon-lined lids. All samples were placed in an ice filled chest immediately upon collection, chilled to approximately 4°C, and delivered to Environmental Lab of Texas, in Odessa, using standard chain of custody protocol.

A field duplicate and trip blank were used to evaluate quality control. The field duplicate was collected from MW-21 for calculation of constituent relative percentage differences. The laboratory provided the trip blank. The field duplicate and the trip blank were both analyzed for BTEX.

2.3 Hydrologic Property Measurement

A pumping test was completed on October 23, 2002 to measure the hydraulic conductivity and specific yield of the saturated materials under stressed conditions. Slug tests were not completed because the materials are too permeable to accurately record the recovery of a small volume (1 liter) of water. In addition the pumping test provides more accurate data because of the much greater stress that it places on the saturated materials over a much larger area.

The test was completed by pumping water from the Eldridge Ranch irrigation well and measuring the response in wells MW-1 through MW-5. The depth to water could not be measured in the irrigation well because it is sealed at the surface.

The irrigation well was pumped for 250 minutes at an average flow rate of 73 gallons per minute (gpm). The water was routed to a 500 barrel frac tank for storage along with the well development and purge water. Samples were collected approximately 15 and 240 minutes into the test for analyses for the BTEX constituents by Environmental Laboratory of Texas.

2.4 Investigative Material Disposal

The investigative materials derived during the investigation included cuttings from the installation of the new monitoring wells, well development and purge water and water generated during the pumping test. The well cuttings were disposed of at the Environmental Plus Incorporated permitted landfarm. Following the completion of the well development, purge and sampling activities, approximately 260 gallons of purge water was transported via a trailer-mounted plastic tank to a rented frac tank. The pumping water was also placed in this frac tank. The water was disposed of in an approved injection well.

3 RESULTS AND INTERPRETATIONS

This section presents the data from the field program along with the resulting interpretations. The conclusions that are based upon the data and interpretations follow in the subsequent section. The data and interpretations include: subsurface materials; groundwater distribution and flow; chemical results; and hydrologic properties.

3.1 Subsurface Materials

Examination of the boring logs for all of the wells indicates that four material types are present:

- an upper caliche layer;
- a clayey-silty sand;
- a very fined grained well-sorted sand; and
- a sandy clay.

Each material type is described below.

Caliche was the uppermost material noted in all borings and was the exclusive material logged by AMEC in wells MW-1, MW-2 and MW-3. This material typically consists of dry-to-slightly-moist, cemented, very-fine sand with varying percentages of clays and silts. The material is described with an whitish-tan to orange hue and is interbedded in some locations with thin, fine-grained well cemented sands. Figure 4 lists the thickness of the upper caliche layer in every boring.

The remaining three materials all lie beneath the caliche. Their distribution based upon the material descriptions is shown on Figure 4. The approximate material boundaries are also shown on Figure 4.

The clayey-silty sand was described in all of the AMEC borings excluding MW-1, MW-2 and MW-3 and in Trident boring MW-15. The materials were typically described as a fine-grained sand with varying percentages of clay and silt. These materials also varied in cementation and moisture content. The base of these materials was not encountered in any borings to a total depth of 36 feet bls.

Trident described a well sorted, fine-grained sand with less than 10 percent clay and silt at four locations in the northwestern part of the study area (MW-20, MW-21, MW-23, SB-1, Figure 4). The base of these materials was not encountered in any borings to a total depth of 35 feet bls.

The final material underlying the caliche was described by Trident as a silty clay in wells MW-16, MW-17, MW-18 MW-19 and MW-22 in the eastern study area (Figure 4). The material is described as grayish orange and was interbedded with a fine grained silty sand

that appears to be similar to that described by AMEC in their borings. The base of these materials was not encountered in any borings.

The above material descriptions are based upon logs compiled by a minimum of two field personnel so the material variations may originate from personnel differences as well as actual field variation. The most important fact from a groundwater perspective that is derived from that above descriptions is that most of the non-caliche materials were described as containing a very fine sand mixed with varying percentages of clays and silts. This type of material typically possesses a low to medium primary permeability.

It is also important to note that none of the borings encountered the base of the described materials. Nicholson and Clebsch (1961) estimate that the top of the red beds in this area is at an elevation of 3,550 feet, resulting in an unconsolidated material thickness of approximately 75 feet. Nicholson and Clebsch (1961) also log this area as at or very near the contact between the Ogallala Formation and quaternary alluvial materials. The clayey-silty-sand nature of the material is more characteristic of a quaternary alluvium than the Ogallala Formation.

3.2 Groundwater Distribution and Flow

The October 2002 depth-to-water (product) measurements and the calculated groundwater elevation data are included in Table 3. The historic water-table elevation data are also included. The October 2002 water-table contours are depicted on Figure 5. The water-table contours were generated by the Surfer® program using the kriging option.

The water table contours shown on Figure 5 indicate a generally southeasterly groundwater flow direction in the northern study area that changes to a southerly groundwater flow direction near the northern boundary of the Eldridge property. This pattern is similar to that shown by the July 2002 measurements (Remediacon, August 2002). Two irregularities are present in Figure 5; a groundwater high at MW-6/MW-7 and a low at MW-3/MW-4. These two anomalies were also present in the July 2002 data. Neither anomaly significantly affects the groundwater flow direction.

The other important relationship shown on Figure 5 is the difference in the groundwater gradient in the northern and southern parts of the study area. The gradient is noticeably shallower in the northern part of the study area. The gradient steepens as the flow direction deflects toward the south just north of the Eldridge Ranch property boundary.

3.3 Chemical Results

The October 2002 analytical results for the organic constituents are summarized in Table 4. The Pre-October 2002 analytical results for the organic constituents are summarized in Table 5. The New Mexico Water Quality Control Commission Ground Water Standards

are shown for each constituent. The samples that exceed these standards are highlighted by bolding. Tables 4 and 5 show that benzene was the hydrocarbon constituent that most often exceeded the groundwater standards. This fact, coupled with its far lower standard, makes benzene the major organic constituent of concern in the study area.

Figure 6 is an isopleth map of the combined July and October 2002 benzene concentrations. Installation of the October 2002 wells resulted in enhanced plume definition as well as providing additional data on the probable source areas. The plume boundaries have been defined with the possible exception of the area directly south of the Eldridge residence and their irrigated field. Water well #2 will be sampled during the next monitoring episode to provide additional information on the area south of the Eldridge residence. An additional monitoring well would be necessary south of the Eldridge irrigated field to assess the impacts of irrigation watering on the groundwater in this area.

Well MW-18 further defined the separation between source areas on the northern part of the study area and the source area immediately north of the Eldridge Ranch. These source areas will be discussed in the conclusion section below.

The October 2002 analytical results for the inorganic constituents are summarized in Table 6. The pre-October 2002 analytical results for the organic constituents are summarized in Table 7. The New Mexico Water Quality Control Commission Ground Water Standards are also shown for each inorganic constituent. Note that the pre-October table is limited to the inorganic constituents that were included in the September sampling episode.

The data in Table 7 indicate two facts. First, the dissolving of sediments during the sample preservation process produces elevated metals concentrations in the unfiltered sample. This phenomena, discussed in the August 2002 Remediacon report, is further demonstrated by the samples from the new wells. Second, the New Mexico Water Quality Control Commission Ground Water Standards were exceeded in some of the filtered samples for barium and manganese. These constituents may have to be considered during the evaluation of remediation options.

Figures 7, 8, and 9 are isopleth maps for filtered (dissolved) barium, iron and manganese respectively. Remediacon concluded in its August 2002 report that barium was the only trace metal that appeared to be biased by non-natural sources. The background concentration of barium can be estimated by calculating the mean and standard deviation of the dissolved concentrations from the wells that show negligible or no hydrocarbon impacts. The results are summarized below:

Probable Background Samples	Dissolved Barium (mg/l)
MW-2	0.466
MW-3	0.621
MW-7	0.512
MW-9	0.234
MW-15	0.098
MW-16	0.165
MW-17	0.272
MW-20	0.135
MW-22	0.256
Mean	0.307
Standard Deviation	0.183

Examination of Figure 7 indicates that the new wells (MW-15 through MW-22) did not contain elevated concentrations of dissolved barium relative to the calculated background mean. The locations with elevated barium values also generally appear to coincide with the locations with the highest measured BTEX concentrations shown on Figure 6.

Figure 8 shows the filtered (dissolved) iron concentrations by location. Isopleths were not included because of the relatively small differences between the concentrations. The values at well MW-1 (1.92 mg/l) and MW-14 (0.608 mg/l) appear to be elevated when compared to the remaining locations. The implications, if any, of this distribution relative to bioremediation will be discussed below in the conclusion section.

Figure 9 shows the manganese values and the resulting isopleths. Relatively higher concentrations were measured at wells MW-12, MW-18, MW-19 and MW-21. Again, the implications, if any, of this distribution relative to bioremediation will be discussed below in the conclusion section.

Two quality assurance/quality control measures were completed during the field program. The trip blank supplied by the laboratory was analyzed for the BTEX constituents. None of them were present in the sample. No rinsate was collected because all well purging activities were completed using disposable bailers.

A blind duplicate sample was collected from well MW-21 and analyzed for the BTEX constituents. The resulting analyses were virtually identical as shown on Table 4. Relative percentage difference calculations were not necessary given the good agreement between the analytical results.

3.4 Hydrologic Properties

The data generated from the pumping test described in Section 2.3 above was analyzed using the Aqtesolve® program. The results of the interpretation are included in Appendix 3 and are summarized below.

Well	Hydraulic Conductivity (feet/day)	Specific Yield (-)
MW-1	96	0.2
MW-2	191	0.5
MW-3	196	0.5

Note: Wells MW-4 and MW-5 could not be analyzed because of no measurable drawdown

The hydraulic conductivity values are considered moderate to high (US Bureau of Reclamation, 1977) and generally representative of a clean sand rather than a sand containing significant percentages of clays and silts. The specific yield values are also higher than normally anticipated. The above values suggest that secondary (fracture) permeability contributes to the hydraulic conductivities measured at the site.

The average advective groundwater velocity can be estimated based upon the above physical properties and the measured groundwater gradient in the southern part of the study area. The gradient can be calculated using a modification of Darcy's Law:

$V = (K * i) / Sy$: where

K is the hydraulic conductivity (100 to 200 feet/day rounded from the above table);
Sy is the specific yield (0.2 to 0.5 rounded from the above table); and
i is the gradient (0.00875 in the southern study area from Figure 5)

Substituting the above values into the equation yields a calculated velocity range between 1.75 and 8.75 feet per day. These calculated groundwater velocities represent an extremely high range of numbers that originate from a combination of a high hydraulic conductivity and a steep groundwater gradient. The shallower groundwater gradient in the northern part of the study area will proportionally reduce the groundwater velocity.

It is important to note that this calculation represents the average groundwater velocity and thus the average velocity of an unimpeded chemical constituent. The calculation does not include the effects of biodegradation of the hydrocarbon constituents as they are transported away from the source area. Biodegradation processes are described more fully below.

4 CONCLUSIONS

This section present the conclusions that were derived from both the recent and historic data as well as the interpretations presented in Section 3. The conclusions are presented in two sections. The first section evaluates the success of the program relative to the project objectives. The second section presents a model of the subsurface hydrologic setting to evaluate the fundamental risk-based parameters of sources, pathways and receptors. The identified further data deficiencies were then used to formulate the recommendations included in Section 5.

4.1 Attainment of Project Objectives

This section concludes upon the fulfillment of the initial objectives that were presented in Section 1.1 above. Each Objective is listed followed by a conclusion on the degree to which it was met.

Objective 1: Defining the plume boundaries up gradient to the north and west of the study area

This objective was met. Examination of Figures 6 through 9 indicates that either nondetect (or near nondetect) conditions were achieved for the hydrocarbons and that background constituents were reached for the inorganic constituents. Further characterization in these geographic directions is not necessary.

Objective 2: Establishing background concentrations for several inorganic constituents

This objective was met. Figures 7 through 9 indicate that background concentrations were measured in the unaffected wells. The background concentration of 0.307 was calculated for barium. Background concentrations can be calculated for the other constituents if necessary.

Objective 3: Characterizing the hydrocarbon distribution

This objective has been met with two exceptions. First, the extent of the source areas needs to be better defined. Second, the effect of irrigation with contaminated water needs to be evaluated in the area immediately south of the former irrigated field on the Eldridge property.

Objective 4: Defining the extent of the hydrocarbon effects to the east and the south on the Eldridge Ranch Property

The objective has been met to the east. Additional characterization is needed on the Eldridge Ranch property as discussed above under Objective 3.

Objective 5: Identifying the sources of hydrocarbons and delineating the plume or plumes associated with them

This objective has been met although further source definition is necessary. Source evaluations and additional recommendations are discussed below.

Objective 6: Evaluating the degree and extent of natural biodegradation processes

This objective has been met but has not yet been described in this report. A comprehensive evaluation of the bioremediation processes is included in Section 4.2.1 below.

Objective 7: Collecting information on the hydrologic properties of the subsurface materials

This objective has been met at a level sufficient to formulate the hydrogeologic setting that is described in Section 4.2.1 below.

4.2 Hydrologic Setting and Preliminary Risk-Based Evaluation

This section integrates all of the information collected to date into a working hydrogeologic model for the area. The resulting model is then evaluated relative to the fundamental risk concepts of sources pathways and receptors to identify additional data needs.

4.2.1 Hydrogeologic Setting

The model of the hydrogeologic setting presented in this section was formulated based upon the data collected from August 2001 to October 2002. The model will serve as a framework to evaluate the fundamental risk components of sources, pathways and receptors.

The saturated materials in the area consist of a very fine sand that contains differing percentages of clays and silts. The saturated materials in the far eastern part of the study area include sandy clays that probably possess a lower primary permeability than the

materials in the other part of the study. The fact that the materials lie within an active surface drainage coupled with the presence of both significant percentages of clay and silt within the very-fine sand matrix and discrete clay layers indicate that the materials are probably alluvium rather than in-place Ogallala Formation materials.

The thickness of the uppermost saturated materials have yet to be defined. They are a minimum of 35-feet thick. Historic studies (Nicholson and Clebsch, 1961) indicate that the uppermost saturated materials are approximately 75-feet thick before the bedrock red beds are encountered.

Groundwater in these materials lies at a depth between 16 and 25 feet below land surface (bls). This depth is generally below the surficial caliche layer. Horizontal groundwater flow in the area changes from southeasterly to southward moving downgradient through the study area (Figure 5). This change in direction parallels and coincides with a change in the center of the surface drainage and a steepening of the groundwater gradient. The vertical gradient, if present, has not been evaluated.

The hydrocarbons that are present in the groundwater are believed to originate from several sources that will be discussed in detail in Section 4.2.2 below. Barium is also present at concentrations above background in the same approximate configuration as the hydrocarbons. Iron and manganese are also present at elevated concentrations that probably originate from the bioremediation mechanisms discussed below.

The majority of the hydrocarbon mass appears to be concentrated along the alignment of the parallel DEFS-Conoco pipelines. Pumping of the irrigation well has expanded the southern hydrocarbon plume to the south. The boundaries of the contaminant plumes have been defined at a scope adequate for this investigation.

The hydraulic conductivity measured during the pumping test is higher than anticipated based upon the materials present. The results indicate that significant secondary permeability that probably originates from fracturing enhances the ability of the materials to transmit groundwater. The resulting groundwater velocity of over 1 foot per day is also very high.

The hydrocarbon constituents are believed to be concentrated in the upped part of the saturated materials but they could spread to lower intervals as they move downgradient if a significant vertical downward groundwater flow component is present.

The data collected establishes that natural biodegradation is active at the site. The evidence for this originates from the dissolved oxygen values and inorganic data collected during the July and October 2002 groundwater monitoring episodes as presented below:

- The distribution of dissolved oxygen as measured in the equilibrated groundwater samples during the July and October groundwater sampling episodes is shown on Figure 10. Lower dissolved oxygen concentrations is evidence of aerobic

biodegradation (Barton, 2000). Examination of Figure 10 demonstrates that lower dissolved oxygen concentrations were measured in and directly downgradient from locations with elevated hydrocarbon concentrations (See Figure 6 for benzene concentrations).

- The presence of anaerobic biodegradation is also demonstrated by the distributions of iron and manganese within the hydrocarbon-affected area. Barton (2000) shows that the presence of anaerobic degradation can be demonstrated by elevated iron and manganese concentrations followed decreased sulfate concentrations. Examination of Figures 8 (for iron) shows that the concentration at well MW-14 is elevated relative to the readings at the other locations. The relationship between the hydrocarbon affected area and manganese is even stronger as shown on Figure 9.

- The presence of anaerobic biodegradation from sulfate reduction is demonstrated by examining the sulfate concentrations at the site as shown in Figure 11. The sulfate concentrations are lower in and downgradient from the hydrocarbon affected area.

In summary, the affected groundwater appears to lie within an alluvial aquifer. The permeability of the aquifer appears to exceed the expected value based upon the lithology present and probably results from significant secondary (fracture) sources. Parameters collected during the July and October sampling episodes establish that both aerobic and anaerobic biodegradation is occurring at the site.

4.2.2 Evaluation of Fundamental Risk Concepts

A remediation program should be selected after evaluating the traditional primary risk-based criteria of sources, pathways and receptors. This section evaluates the existing level of understanding relative to these primary criteria and identifies any data gaps that must be filled before risk can be properly evaluated.

4.2.2.1 Evaluation of Sources

Examination of benzene isopleths shown in Figure 6 indicates that two separate source areas are present. This section discusses the distribution and extent of these sources. Figure 12 is a triangular diagram that shows the relationship between benzene, toluene, and xylenes for select samples. Note that wells MW-1, MW-8, MW-10, MW-12, MW-14, MW-15 and MW-19 all plot at the benzene apex. The remaining wells with detectable BTEX concentrations plot off of the benzene apex. This figure helps to differentiate between differing potential hydrocarbon sources.

The northern source area extends from MW-23 to MW-8. Wells MW-8, MW-10, MW-12, MW-13, MW-14 and MW-23, where free product was measured, all have sufficiently high benzene values to indicate that they are at or near a potential source area. Note that the groundwater samples from wells MW-8, MW-10, MW-12 and MW-14 all contain

almost exclusively benzene. Wells MW-8, MW-10 and MW-14 all appear to originate from a leak or leaks along the DEFS-Conoco pipeline corridor.

A paraffin, isoparaffins, aromatics, naththenics and olefins (PIANO) analyses was completed from the 0.5 feet of free product that is present in MW-23. The analytical report for this sample is included in Appendix 4. The reporting laboratory indicated that the liquid is probably a condensate. The sample had the following BTEX weight percentages present:

- Benzene 0.62 weight percent
- Toluene 1.97weight percent
- Ethylbenzene 0.22 weight percent
- Total xylenes 1.03 weight percent

Benzene is also the primary BTEX constituents in MW-12; however, the ionic composition of the July water sample indicates that the hydrocarbons may originate from a different source. As originally discussed in the August report (Remediacon, August 2002), the sodium and chloride levels in the aqueous sample from well MW-12 are elevated when compared to all of the other wells; however, they do not exceed any published primary or secondary drinking water standards. This compositional difference, coupled with the fact that MW-12 is upgradient of the pipeline corridor strongly implies that the hydrocarbons originate from another source.

The sample from well MW-13 had the highest measured benzene concentration and a significant percentage of toluenes as shown on Figure 12. This sample could represent either a different source or a more recent spill containing toluene that has not degraded. MW-13 is located at or near a bare spot that appears to be associated with historic non-pipeline oil and/or gas production operations.

In summary the sources in the northern area represent three differing occurrences. Well MW-12 is located upgradient of the pipeline corridor and is associate with water that is slightly impacted by sodium chloride. Well MW-13 contains significantly more toluene than the other potential sources in the northern source area. The remaining locations all appear to originate from one or several pipeline releases.

There is a distinct break between the northern and southern source areas. Well MW-18 was installed to evaluate whether a buried stream channel could be conveying hydrocarbons into the southern source area. Clay was the dominate material encountered in MW-18 so this area does not appear to be a buried stream channel. In addition, as shown on Table 4, the BTEX concentrations in MW-18 were just above the method detection limits and much lower than the values measured in the northern source wells. The combination of low BTEX values in wells MW-6, MW-7 MW-18 and MW-19 effectively isolate the hydrocarbons in the northern study area from the southern study area.

Additional source delineation in the northern source area will be necessary before source control options can be considered. The source distribution discussed in this section could result from either several discrete leaks or it could result from single massive historical release. The location and type of source remediation could vary depending upon which of the above two scenarios is correct.

The source in the southern study area appears to be associated with well MW-4 but it cannot be directly linked to the DEFS-Conoco pipeline corridor with the existing data. This conclusion is based upon the following facts:

1. Well MW-4 is located approximately 350 feet east of the DEFS pipeline and is directly down gradient of wells MW-6 and MW-7 (Figure 5). Well MW-6 contains benzene, as well as other hydrocarbon constituents, but only at a concentration that is 6 percent of that measured in well MW-4. MW-7 does not contain BTEX constituents.

2. Wells MW-2 and MW-3 are located down groundwater gradient from the DEFS pipeline. A release along the pipeline corridor should appear in wells MW-2 and MW-3, and neither of these wells is impacted.

3. The subequal concentrations of benzene and toluene are also unusual relative to all but one of the sources in the northern area.

The above facts imply that the release from MW-4 may not be associated with the pipeline. More detailed evaluation would be necessary to pinpoint the exact source location or locations.

The groundwater velocity data indicates that the southern source is probably recent rather than historic. Mr. Frank Eldridge, owner of the Eldridge ranch, stated that there were no hydrocarbon odors when the irrigation well was shut down for the year in November 1999. Ms. Shelly Eldridge indicated that she started smelling hydrocarbons in the irrigation water soon after the pumping was initiated in February 2000. The problem became acute on Fathers day, June 18, 2000 when a sheen of oil appeared on the pump adjacent to the irrigation well and the irrigated alfalfa began to die. The Eldridge family owned the land and operated the irrigation system in a similar fashion for several years before the appearance of hydrocarbons in the irrigation well.

The high calculated natural groundwater flow velocity of 2 to 9 foot per day coupled with approximate 350 foot distance between MW-4 and the irrigation well suggests that the hydrocarbons probably migrated rapidly from the release point to the irrigation well. This scenario indicates that the release occurred in late 1999 or early 2000.

Additional characterization is necessary in the southern source area before remediation options can be evaluated. Well MW-1 is located adjacent to the irrigation well and directly between the irrigation well and MW-4 yet the benzene concentration of 0.28 mg/l is far less than the 10.4 and 1.26 benzene concentrations measured in MW-4 and the

irrigation well respectively. Examination of Figure 12 also indicates that the samples from MW-4 and the irrigation well both contain significant concentrations of toluene while MW-1 consists of almost exclusively benzene. Evaluation of potential remediation options cannot begin until the location and extent of the source is better defined.

4.2.2.2 Evaluation of Pathways

Risk assessment also involves the evaluation of the potential pathways for the contaminants to reach potential receptors. Groundwater constitutes the sole pathway of concern for this site. The existing data verifies the presence of lateral hydrocarbon migration downgradient from the source area(s), but the migration is constrained by bioremediation even in the presence of high groundwater velocities. The hydrogeologic system is sufficiently defined with the following exceptions.

1. First, the vertical extent of the uppermost saturated materials and the potential for vertical groundwater flow has yet to be assessed. The depth of saturated materials should be evaluated along with the presence or absence of the Ogallala Formation which may underlie the alluvial materials.

2. The potential for BTEX penetration vertically downward into saturated materials must be evaluated. Vertical constituent penetration is generally limited when no vertical gradient is present but it can be substantial in the presence of a significant vertical gradient. A plume may dive beneath boundary wells if a vertical groundwater gradient is present and the no wells tap the deeper part of the saturated materials.

3. Finally, bioremediation is constraining the lateral migration of the north plume and the south plume outside the influence of the irrigation well. The vertical effects of this mechanism should be evaluated if vertical constituent migration is present at this site.

4.2.2.3 Evaluation of Receptors

Receptors can be evaluated based upon their relationship to the two source areas. The receptors at the Eldridge Ranch have already been identified. The Eldridge Ranch lies directly downgradient from and has already been affected by the southern source(s). The data collected to date indicates that the biodegradation process may be able to attenuate the hydrocarbon compounds in the absence of irrigation pumping; however, the historic impacts may already be too severe to permit natural attenuation to pre-pumping levels. In addition, the Eldridge Ranch has appropriated water rights that originate from the pumping of the irrigation well, and the existing contamination prevents the further beneficial use of this well. Finally, the water supply well for the Eldridge Ranch dwelling has also been impacted, with the impacts probably originating from the placement of contaminated irrigation water on the field adjacent to the water supply well.

There are no defined receptors for the northern groundwater plume. The groundwater from this area flows into the area contaminated by the southern source(s). Reconnaissance of the downgradient areas for windmills should be completed to better define the potential receptors.

5 RECOMMENDATIONS

Remediacon concludes that the following activities should be completed before evaluation of potential remediation activities can commence:

1. The existing active and relic pipelines should be investigated to identify when they were installed, their operating history, what they conveyed and, if appropriate, when and how they were abandoned.

2. All hydrocarbon production and treatment structures should be identified using historic aerial photography and their operational history should be research.

3. The location and extent of the southern source and its relationship to the irrigation well should be better defined. Remediacon recommends that the use of passive soil vapor collectors to provide further definition be assessed. The units are typically buried in the shallow subsurface in a regular grid pattern for a period of one-to-several weeks. During that time hydrocarbon vapors that are released from the groundwater surface at a ratio proportionate to their concentration to the atmosphere are adsorbed to the collector. The collectors are removed and the trapped hydrocarbons are purged from the collectors and analyzed. The results can be used to define the approximate location and extent of the source as well as its hydraulic connection to the irrigation.

   The utility of this method should first be evaluated by a pilot test. Low permeability zones within the caliche layer could laterally deflect the vapors as they migrate tot he surface. The receptors should be placed in a regular grid in the area surrounding MW-4. The testing can be expanded if the pilot test yields positive results.

4. An additional well should be installed south of the former irrigated field. This well would be installed for two purposes. First, the groundwater would be sampled to verify the limits of impacts potentially related to the use of contaminated irrigation water. Second, the lithology should be evaluated in this area to assess whether the materials possess sufficient permeability to support a replacement irrigation well as a potential remediation option.

5. A minimum of one deep well should be installed, preferably within the area of the southern source area. The well should be advanced until one of two conditions are encountered:

   - A low permeability material (such as the Permian red beds) that prevents the significant continued vertical migration of hydrocarbon compounds; or

   - A combination of visual and PID measurements indicates that the depth of hydrocarbon impacts in the shallow groundwater had been reached. For this situation, surface casing would be set to below the probable extent of contamination and a well completed to measure the potential vertical gradient.

6. Slug tests should be completed in the wells containing clays and wells in the northern source area to verify the homogeneity of the hydraulic conductivity measured in the southern study area.

Evaluation of potential remediation options can begin when the above information is collected, analyzed and assimilated into the existing data base.

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TABLES

Table 1 – Well Construction Information

Well	Installed By	Date Installed	Elevation Top of Casing	Total Well Depth	Screen Interval	Sand Interval	Top of Bentonite Pellets
MW-1	AMEC	8/01	3,618.22	28.0	11.8-26.8	9.8-27	7.8
MW-2	AMEC	8/01	3,621.63	28.0	11.7-26.7	8.7-27	6.7
MW-3	AMEC	8/01	3,621.67	30.0	13.4-28.4	10.4-29	8.4
MW-4	AMEC	8/01	3,621.31	30.0	13.2-28.2	10.2-29	11.2
MW-5	AMEC	8/01	3,618.08	27.0	10.2-25.2	7.2-26	5.2
MW-6	AMEC	8/01	3,624.99	30.0	13.5-28.5	10.5-29.0	8.5
MW-7	AMEC	8/01	3,630.62	35.0	18.6-33.6	15.6-34	13.6
MW-8	AMEC	3/02	3,625.92	30.0	15.0-30.0	12-30	10.0
MW-9	AMEC	3/02	3,620.78	27.0	11.4-26.4	8.4-27	6.4
MW-10	AMEC	3/02	3,627.27	31.0	15.2-30.2	12-31	10.0
MW-11	AMEC	3/02	3,627.56	30.4	15.3-30.3	12-30.4	10.0
MW-12	AMEC	3/02	3,631.14	34.0	18-33	15-34	13.0
MW-13	AMEC	3/02	3,632.90	36.0	18.11-33.11	16-36	14.0
MW-14	AMEC	3/02	3,630.36	32.0	16.11-31.11	14-32	12.0
MW-15	Trident	9/02	3,635.47	35.5	20-35	18-35.5	3.0
MW-16	Trident	9/02	3,611.54	25.0	9.5-24.5	9-24.5	3.0
MW-17	Trident	9/02	3,608.83	25.0	9.5-24.5	9-24.5	3.0
MW-18	Trident	9/02	3,623.53	32.0	16.5-31.5	15-32	3.0
MW-19	Trident	9/02	3,617.99	30.0	7-27	6-30	3.0
MW-20	Trident	9/02	3,636.87	32.0	16.5-31.5	15-32	3.0
MW-21	Trident	9/02	3,633.27	35.0	19.5-34.5	18-35	3.0
MW-22	Trident	9/02	3,628.68	36.0	17-32	15-36	2.0
MW-23	Trident	9/02	3,632.02	30.0	14.5-29.5	11-30	3.0
WW-2	Existing	Existing	3,611.4	25.0	NA	NA	NA

Notes: All units are feet:
NA information not available

Table 2 – Field Parameter Summary

Well Development Completed October 10, 2002

Well	Temperature (°C)	Conductivity (*m*S/cm)	pH (unitless)	DO (mg/L)	Average Flow Rate (GPM)
MW-15	19.8	0.482	7.07	9.14	1.17
MW-16	19.1	0.555	6.88	7.41	1.10
MW-17	19.5	0.524	6.91	7.13	1.28
MW-18	19.1	0.709	6.71	0.25	1.21
MW-19	18.5	0.673	6.70	3.05	1.40
MW-20	19.6	0.682	7.00	8.13	0.44
MW-21	19.6	0.501	6.91	1.62	1.14
MW-22	19.4	0.559	6.85	4.07	1.16

Well MW-23 was not sampled because of the presence of free product

Well Purging and Sampling Completed October 11, 2002

Well	Temperature (°C)	Conductivity (*m*S/cm)	pH (unitless)	DO (mg/L)	Turbidity (NT)
MW-15	19.8	0.524	6.9	9.57	0
MW-16	19.0	0.603	6.8	7.66	999
MW-17	19.6	0.565	6.79	6.79	999
MW-18	19.2	0.771	6.60	1.18	999
MW-19	18.7	0.704	6.76	3.40	999
MW-20	19.8	0.740	6.92	8.45	530
MW-21	19.6	0.557	6.83	2.24	999
MW-22	19.1	0.602	6.81	4.50	999

Table 3 – Summary of October 2002 Groundwater Measurements and Historical Groundwater Elevation Data

Well	8/01 Groundwater Elevations	2/02 Groundwater Elevations	7/02 Groundwater Elevations	10/02 Depth to Water	10/02 Depth to Product	Groundwater Elevations	10/02 Product Thickness
MW-1	3,602.20	3,599.02	3,598.68	19.67		3,598.55	
MW-2	3,601.63	3,599.33	3,598.95	22.82		3,598.81	
MW-3	3,601.67	3,601.67	3,599.11	22.71		3,598.96	
MW-4	3,602.16	3,599.81	3,599.34	22.14		3,599.17	
MW-5	3,602.98	3,600.48	3,600.09	18.15		3,599.93	
MW-6	3,606.44	3,603.99	3,603.42	21.77		3,603.22	
MW-7	3,606.47	3,604.02	3,603.46	27.31		3,603.31	
MW-8		3,605.22	3,602.50	23.59		3,602.33	
MW-9		3,604.78	3,601.14	19.87		3,600.91	
MW-10		3,606.67	3,603.96	23.51		3,603.76	
MW-11		3,606.16	3,603.64	25.09	25.08	3,602.47	0.01
MW-12		3,607.44	3,604.87	26.45		3,604.69	
MW-13		3,608.80	3,605.01	28.11		3,604.79	
MW-14		3,608.66	3,606.04	24.51		3,605.85	
MW-15				27.05		3,608.42	
MW-16				18.66		3,592.88	
MW-17				15.91		3,592.92	
MW-18				23.34		3,600.19	
MW-19				18.29		3,599.70	
MW-20				31.43		3,605.44	
MW-21				26.98		3,606.29	
MW-22				22.88		3,605.80	
MW-23				24.89	24.31	3,607.55	0.58
WW-2				19.48		3,591.92	

All units in feet

Table 4 – October 2002 Groundwater Sampling Results for Organic Constituents

Well	Sample Date	Benzene	Ethyl benzene	Toluene	Total Xylenes	Gasoline Range Organics	Diesel Range Organics
NMWQCCGWS		**0.01**	**0.75**	**0.75**	**0.62**		
MW-15	10/11/2002	0.002	<0.001	<0.001	<0.001	<3	<3
MW-16	10/11/2002	<0.001	<0.001	<0.001	<0.001	<3	<3
MW-17	10/11/2002	<0.001	<0.001	<0.001	<0.001	<3	<3
MW-18	10/11/2002	0.008	0.001	0.005	0.002	<3	<3
MW-19	10/11/2002	0.003	<0.001	<0.001	<0.001	<3	<3
MW-20	10/11/2002	<0.001	<0.001	<0.001	<0.001	<3	<3
MW-21	10/11/2002	**0.01**	0.004	0.022	0.0013	<3	<3
MW-21 dup	10/11/2002	**0.011**	0.004	0.024	0.012		
MW-22	10/11/2002	<0.001	<0.001	<0.001	<0.001	<3	<3
Irrigation Well@15'	10/23/2002	**1.45**	**1.49**	0.112	0.371		
Irrigation Well@240'	10/23/2002	**1.26**	**1.12**	0.088	0.276		
Trip Blank	10/11/2002	<0.001	<0.001	<0.001	<0.001		

All units in mg/l
NMWQCCGWS: New Mexico Water Quality Control Commission Ground Water Standards
Values exceeding the NMWQCCGWS are highlighted by bolding

Table 5 – Pre- October 2002 Groundwater Sampling Results for Organic Constituents

Well	Sample Date	Benzene	Ethyl benzene	Toluene	Total Xylenes	Gasoline Range Organics	Diesel Range Organics
NMWQCCGWS		**0.01**	**0.75**	**0.75**	**0.62**		
MW-1	8/10/2001	**0.943**	0.052	0.120	0.06	4.36	<5
MW-1	7/18/2002	**0.279**	<0.001	0.002	<0.001	-	-
MW-2	8/10/2001	<.005	<.005	<.005	<.005	<0.5	<5
MW-2	7/18/2002	<0.001	<0.001	<0.001	<0.001	-	-
MW-3	8/10/2001	<.005	<.005	<.005	<.005	<0.5	<5
MW-3	7/18/2002	0.002	<0.001	<0.001	<0.001	-	-
MW-4	8/10/2001	**10.0**	0.190	**6.96**	**0.632**	31.9	<5
MW-4	7/18/2002	**10.4**	0.189	**5.52**	0.536	-	-
MW-5	8/10/2001	**0.217**	0.024	0.185	0.129	1.67	<5
MW-5	7/18/2002	**0.160**	0.020	0.004	0.010	-	-
MW-5 dup	8/10/2001	**0.182**	0.020	0.159	0.109	1.23	<5
MW-6	8/10/2001	**0.600**	0.024	0.502	0.100	<0.5	<5
MW-6	7/18/2002	**0.237**	0.009	0.046	0.025	-	-
MW-6 dup	7/18/2002	**0.253**	0.009	0.047	0.026	-	-
MW-7	8/10/2001	<.005	<.005	<.005	<.005	<0.5	<5
MW-7	7/18/2002	<0.001	<0.001	<0.001	<0.001	-	-
MW-8	3/3/2002	**8.60**	<.100	0.482	0.197	22.2	<5
MW-8	7/18/2002	**8.37**	0.074	0.176	0.035	-	-
MW-9	3/3/2002	<.005	<.005	<.005	<.005	<0.5	<5
MW-9	7/17/2002	<0.001	<0.001	<0.001	<0.001	-	-
MW-10	3/3/2002	**10.6**	<.100	<.100	<.100	19.7	<5
MW-10	7/18/2002	**14.0**	<0.020	0.144	<0.020	-	-
MW-11	3/3/2002	**27.8**	<.200	**2.49**	0.376	68.3	<5
MW-11	7/17/2002	**FPH**	FPH	FPH	FPH	-	-
MW-12	3/3/2002	**9.08**	<.100	0.281	<.100	22.2	<5
MW-12	7/17/2002	**6.95**	0.043	0.190	0.025	-	-
MW-13	3/3/2002	**19.8**	0.205	**5.95**	0.432	58	<5
MW-13	7/18/2002	**19.8**	0.206	**4.34**	0.453	-	-
MW-14	3/3/2002	**1.04**	<.005	0.0059	0.0085	1.05	<5
MW-14	7/18/2002	**1.21**	<0.010	<0.010	<0.010	-	-

All units in mg/l
NMWQCCGWS: New Mexico Water Quality Control Commission Ground Water Standards
Values exceeding the NMWQCCGWS are highlighted by bolding

Table 6 – October 2002 Groundwater Sampling Results for Inorganic Constituents

Well	Date	Sample Type	Calcium	Magnesium	Potassium	Sodium	Bicarbonate Alkalinity	Sulfate	Chloride	Barium	Iron	Manganese
NMWQCCGWS								**600**	**250**	**1**	**1**	**0.2**
MW-15	10/11/2002	Unfiltered	60.5	8.55	4.05	41.5	164	51	42.5	0.098	**1.13**	**0.027**
MW-15	10/11/2002	Filtered								0.098	0.054	0.015
MW-16	10/11/2002	Unfiltered	49.1	14.2	7.89	56.4	190	71	55.4	0.608	**16.2**	0.16
MW-16	10/11/2002	Filtered								0.165	0.156	0.069
MW-17	10/11/2002	Unfiltered	31.3	14.4	7.12	55.4	196	66.1	46.5	**1.83**	**70.9**	**3.1**
MW-17	10/11/2002	Filtered								0.272	0.035	**0.421**
MW-18	10/11/2002	Unfiltered	26.3	14.8	5.4	78.4	318	48.5	62	**2.36**	**22.2**	**0.406**
MW-18	10/11/2002	Filtered								0.309	0.201	**0.224**
MW-19	10/11/2002	Unfiltered	39.7	14.6	6.84	69.2	272	55.3	62	**2.65**	**98.2**	**2.91**
MW-19	10/11/2002	Filtered								0.278	0.02	0.156
MW-20	10/11/2002	Unfiltered	75.1	14.2	6.54	50.8	166	67.8	106	0.374	**4.54**	0.035
MW-20	10/11/2002	Filtered								0.135	0.17	0.023
MW-21	10/11/2002	Unfiltered	64	9.33	3.76	49.9	196	51.1	39.9	**1.25**	**29.6**	**0.758**
MW-21	10/11/2002	Filtered								0.161	0.045	**0.331**
MW-22	10/11/2002	Unfiltered	44.7	9.82	5.25	54.3	234	42.6	48.7	**8.38**	**40**	**34.8**
MW-22	10/11/2002	Filtered								0.256	0.022	0.08

All units in mg/l
NMWQCCGWS: New Mexico Water Quality Control Commission Ground Water Standards
Values exceeding the NMWQCCGWS are highlighted by bolding

Table 7 – Pre-October 2002 Groundwater Sampling Results for Inorganic Constituents

Well	Date	Sample Type	Calcium	Magnesium	Potassium	Sodium	Bicarbonate Alkalinity	Sulfate	Chloride	Barium	Iron	Manganese
NMWQCCGWS								**600**	**250**	**1**	**1**	**0.2**
MW-1	8/10/2001	Unfiltered	84.7	16.7	6.65	36.6	234	19.6	59.8	0.738	6.11	0.28
MW-1	7/18/2002	Filtered	78.5	12.6	3.38	41.1	256	32.2	65.0	0.996	1.92	0.072
MW-2	8/10/2001	Unfiltered	87.5	13.2	6.5	34.9	188	70.9	47	**1.39**	**12.8**	**0.169**
MW-2	7/18/2002	Filtered	70.0	8.29	3.78	33.9	192	52.8	33.7	0.466	0.067	<0.001
MW-3	8/10/2001	Unfiltered	70.6	10.9	5.79	25.3	172	57.0	29	0.555	**29.4**	**0.334**
MW-3	7/18/2002	Filtered	82.8	13.0	4.12	45.4	208	67.9	56.1	0.621	<0.002	<0.001
MW-4	8/10/2001	Unfiltered	76.5	15.8	6.28	35.2	230	57.2	72	**2.87**	**30.9**	**0.588**
MW-4	7/18/2002	Filtered	105	17.8	4.75	51.7	336	17.7	65.0	**1.71**	0.198	**0.119**
MW-5	8/10/2001	Unfiltered	96.0	17.4	8	36.9	232	37.0	62.6	**1.32**	**34.1**	**0.646**
MW-5	7/18/2002	Filtered	98.7	18.3	3.46	46.4	318	31.4	80.0	**1.41**	0.087	**0.148**
MW-5 dup	8/10/2001	Unfiltered	89.4	17.7	8.16	36.3	240	35.1	62.6	**1.27**	**31.7**	**0.621**
MW-6	8/10/2001	Unfiltered	93.6	16.2	7.85	35.9	220	72.0	70	**18.8**	**69**	**1.03**
MW-6	7/18/2002	Filtered	102	17.1	5.06	51.5	284	62.3	79.8	0.799	0.070	**0.063**
MW-7	8/10/2001	Unfiltered	113	22.5	8.93	56.5	650	189	120	**3.64**	**56.2**	**0.843**
MW-7	7/18/2002	Filtered	109	27.1	6.23	66.3	250	198	97.5	0.512	0.072	**0.028**
MW-8	3/3/2002	Unfiltered	129	23.1	<5	48.5	322	11.9	69.4	**2.03**	**3.21**	**0.128**
MW-8	7/18/2002	Filtered	106	24.4	3.79	48.7	382	<0.50	79.8	**5.53**	0.20	**0.098**
MW-9	3/3/2002	Unfiltered	78.5	14.1	5.66	47.1	222	45.3	34.8	**2.84**	**66.1**	**1.29**
MW-9	7/18/2002	Filtered	71.0	12.8	5.05	49.1	254	62.6	40.8	0.230	0.047	**0.040**
MW-10	3/3/2002	Unfiltered	89.9	20.3	5.29	52.1	278	19.0	56	**3.34**	**47.6**	**0.376**
MW-10	7/18/2002	Filtered	104	19.0	4.66	51.4	368	24.0	70.9	**1.16**	0.166	**0.081**
MW-11	3/3/2002	Unfiltered	142	22.9	5.48	50.1	316	12.2	87.3	**2.94**	**3.42**	**0.204**
MW-11	7/18/2002	Filtered	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-12	3/3/2002	Unfiltered	99.0	35.1	6.88	125	276	32.8	234	**9.41**	**39.8**	**0.554**
MW-12	7/18/2002	Filtered	96.0	37.3	5.30	128	361	36.2	246	**3.02**	0.215	**0.212**
MW-13	3/3/2002	Unfiltered	103	21.8	7.28	49.9	308	11.0	72.4	**4.61**	**5.01**	**0.0948**
MW-13	7/18/2002	Filtered	92.7	22.7	6.18	46.4	327	<0.50	79.8	**7.09**	0.110	0.016
MW-14	3/3/2002	Unfiltered	94.6	20.4	5.62	45.4	322	10.8	41	**1.66**	**13.9**	**0.353**
MW-14	7/18/2002	Filtered	101	23.4	4.36	45.7	372	<0.50	53.2	**2.11**	0.608	**0.139**

All units in mg/l NMWQCCGWS:New Mexico Water Quality Control Commission Ground Water Standards (exceedances highlighted by bolding)

Table 8 - Pumping Test Results

MW-1

Elapsed Time (minutes)	Drawdown (feet)
2.0	0.15
2.5	0.17
3.0	0.17
3.5	0.18
4.0	0.19
4.5	0.19
5.0	0.20
6.0	0.22
7.0	0.24
8.0	0.26
9.0	0.28
14.3	0.33
20	0.29
25	0.30
30	0.31
37.5	0.34
42.5	0.36
50	0.39
60	0.43
70	0.46
86	0.50
90	0.51
100	0.54
150	0.63
175	0.68
201	0.74
226	0.76
250	0.81

MW-2

Elapsed Time (minutes)	Drawdown (feet)
12	0
36	0.02
66	0.07
126	0.13
189	0.19
235	0.24

MW-3

Elapsed (minutes)	Drawdown (feet)
9	0.02
39	0.03
69	0.06
124	0.1
187	0.18
232	0.21

FIGURES

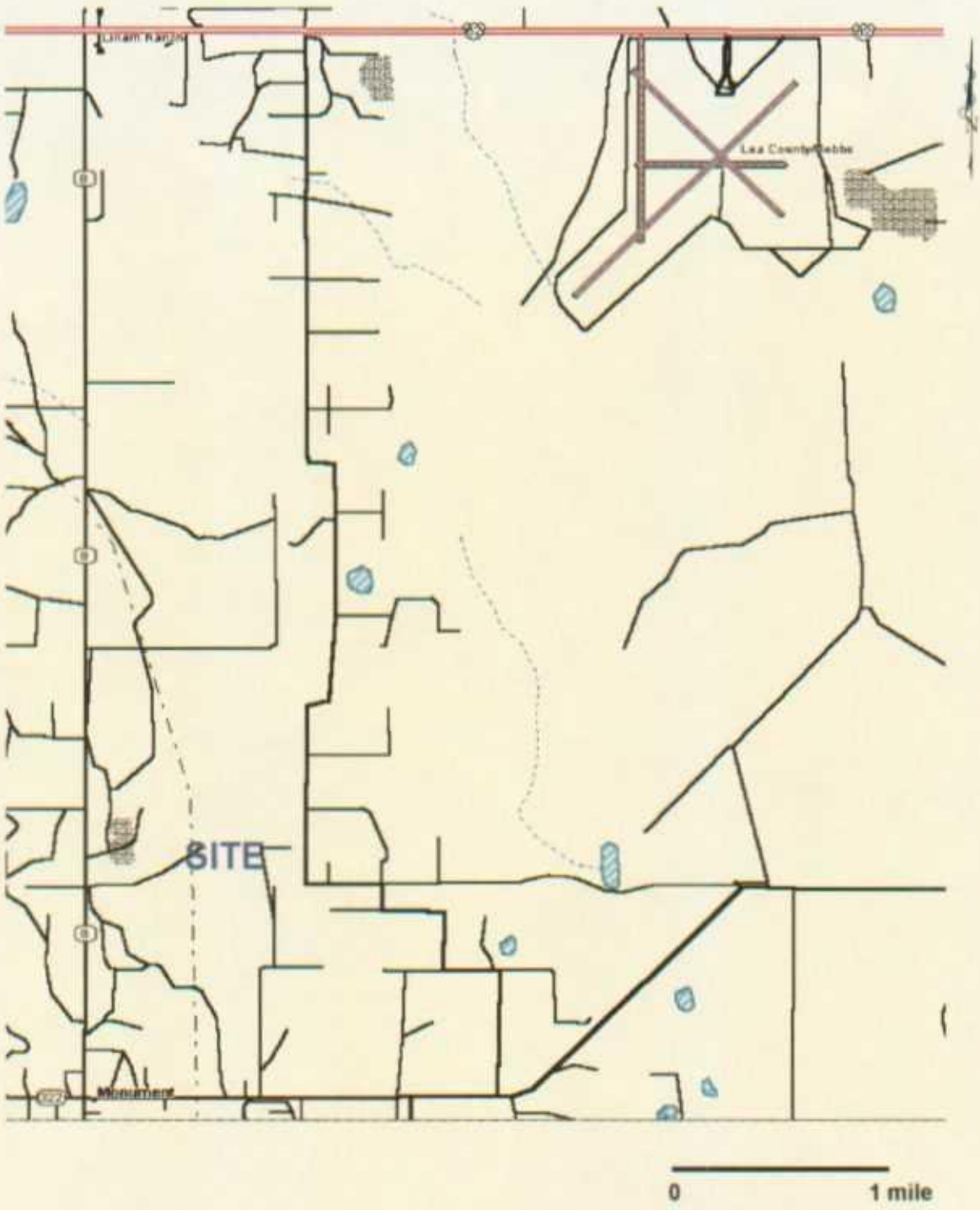

Figure 1 – Site Location Map
Eldridge Ranch Characterization

Duke Energy Field Services.

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REVISED:
DATE: 10/02

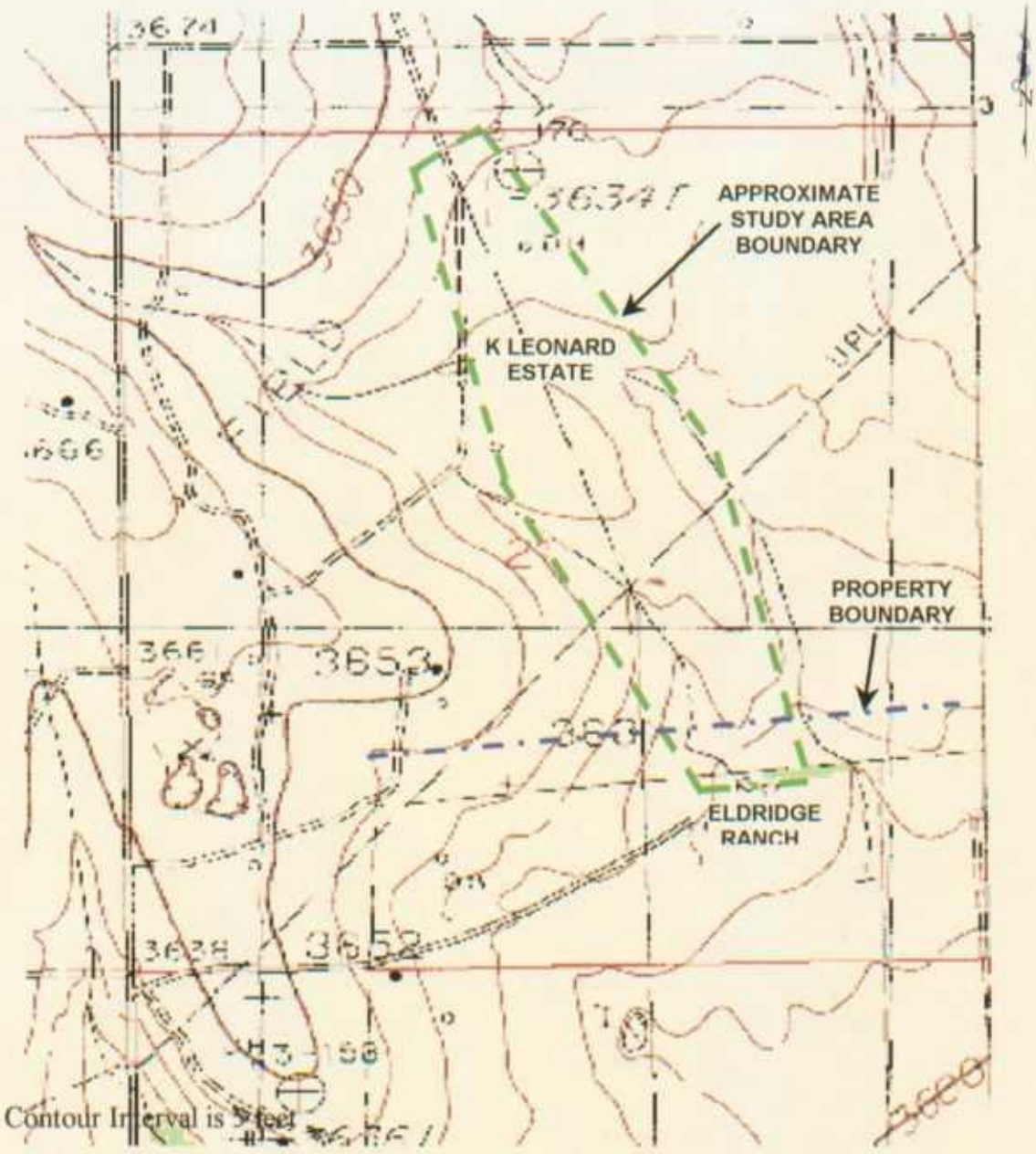

Figure 2 – Topographic Setting
Eldridge Ranch Characterization

Duke Energy Field Services

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DATE: 10/02

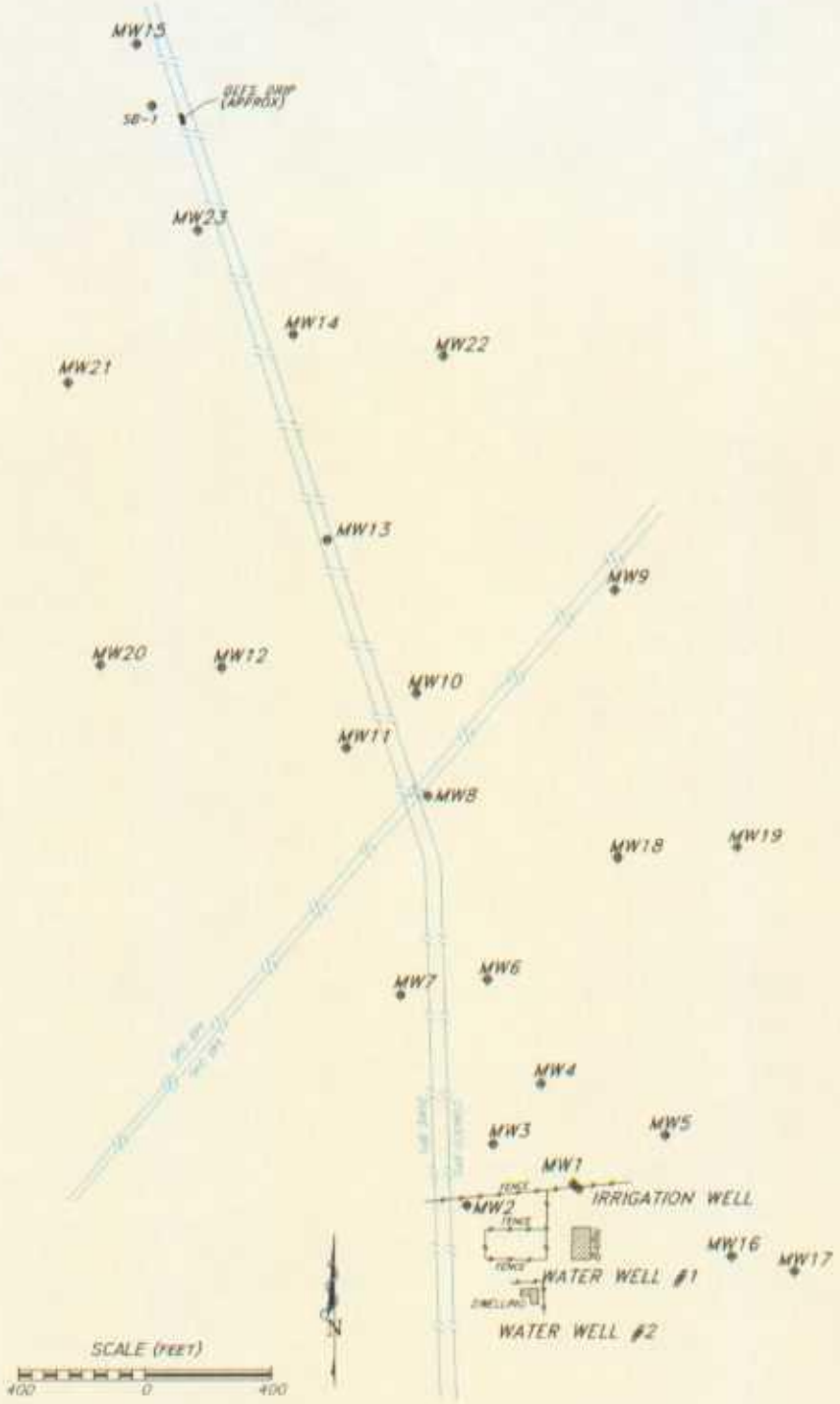

Figure 3 - Monitoring Well Locations
Eldridge Ranch Characterization

Duke Energy Field Services

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DATE: 10/02

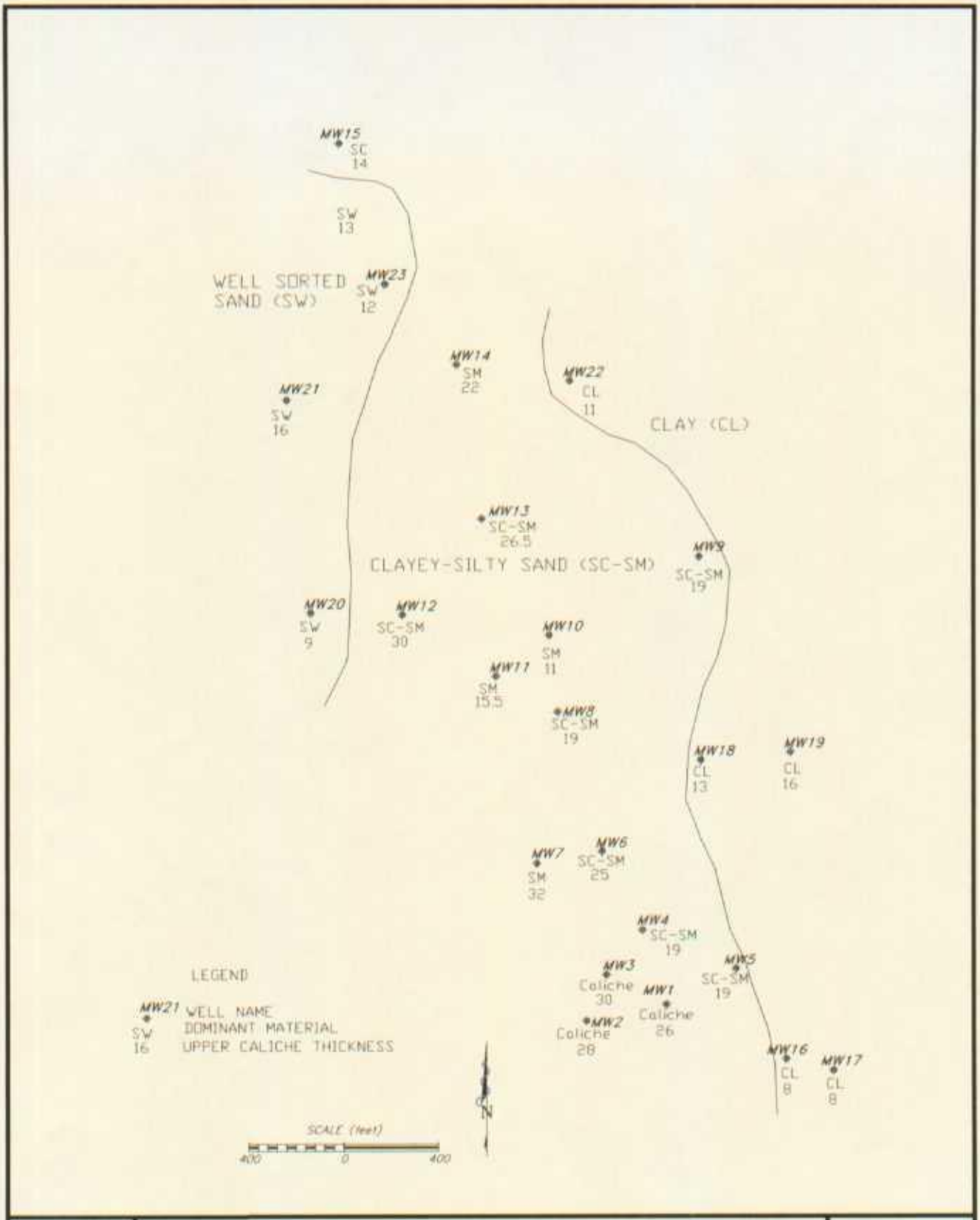

Figure 4 – Subsurface Material Distribution
Eldridge Ranch Characterization

Duke Energy Field Services

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DATE: 10/02

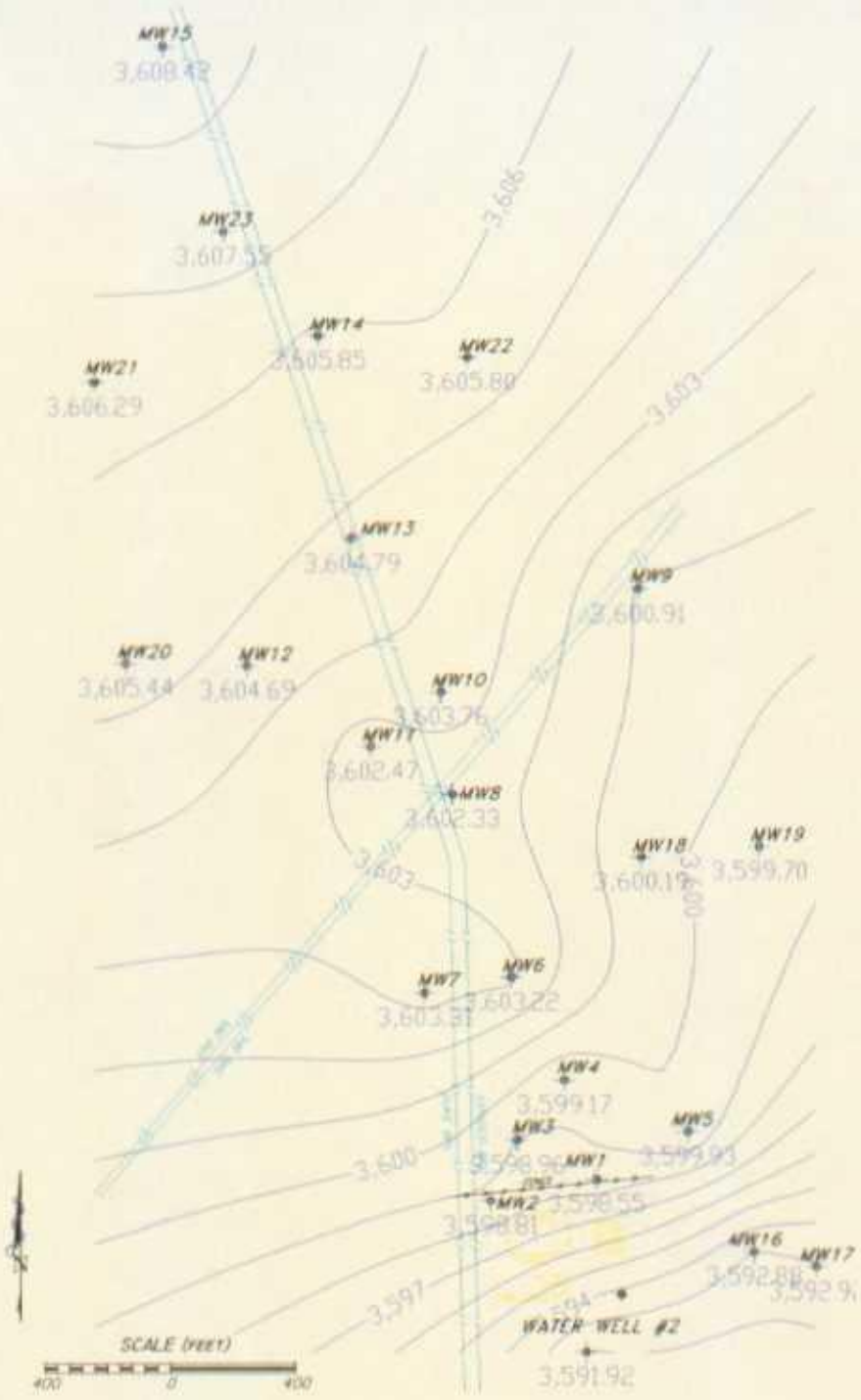

Figure 5 - October 2002 Water Table Contour Map
Eldridge Ranch Characterization

Duke Energy Field Services

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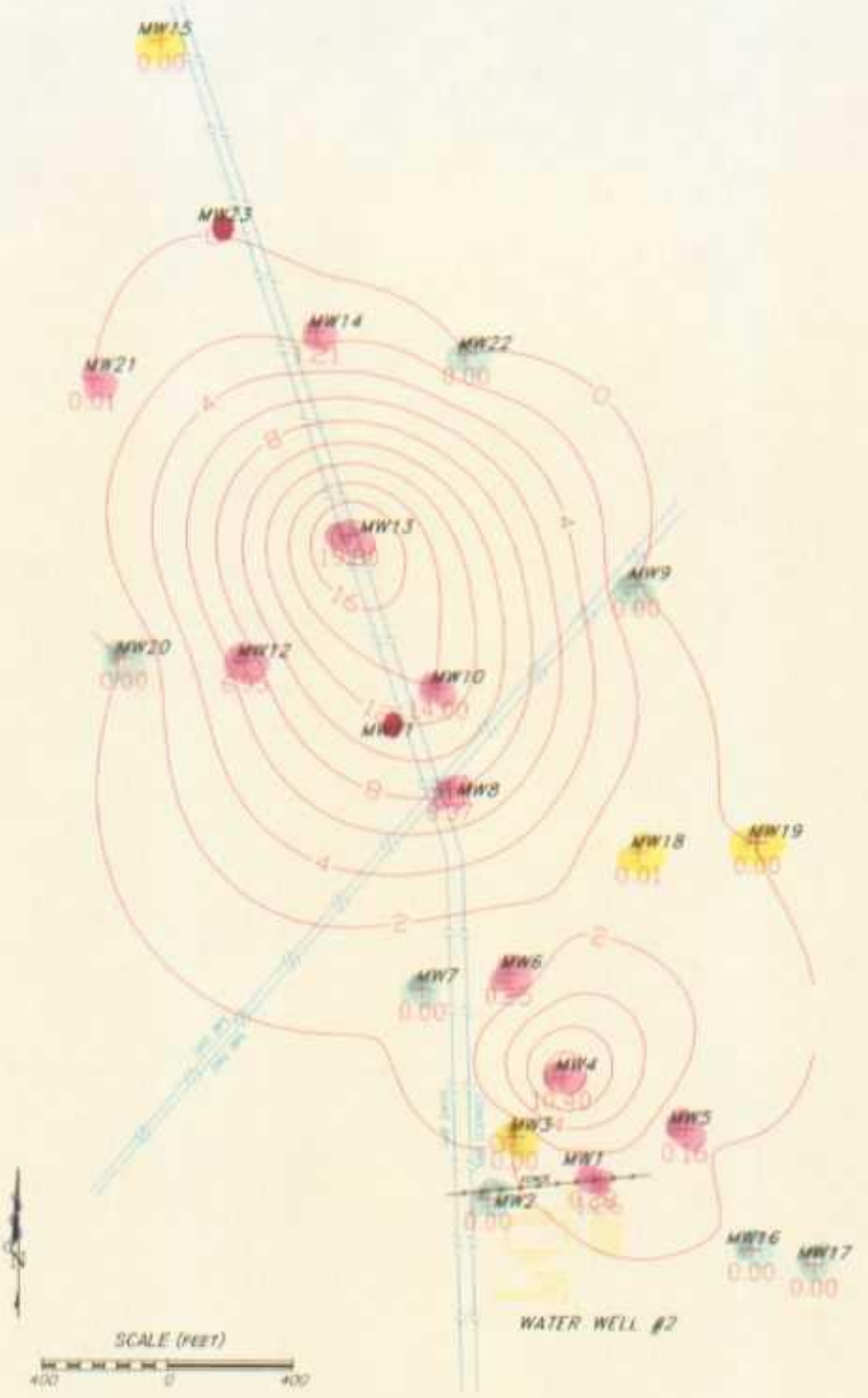
REVISED:	
DATE: 10/02	



: The values for
-1 and the
ation well are 0.28
1.26 mg/l

Figure 6 - Combined July and October 2002 Benzene Concentrations
Eldridge Ranch Characterization

Duke Energy Field Services

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DATE: 10/02

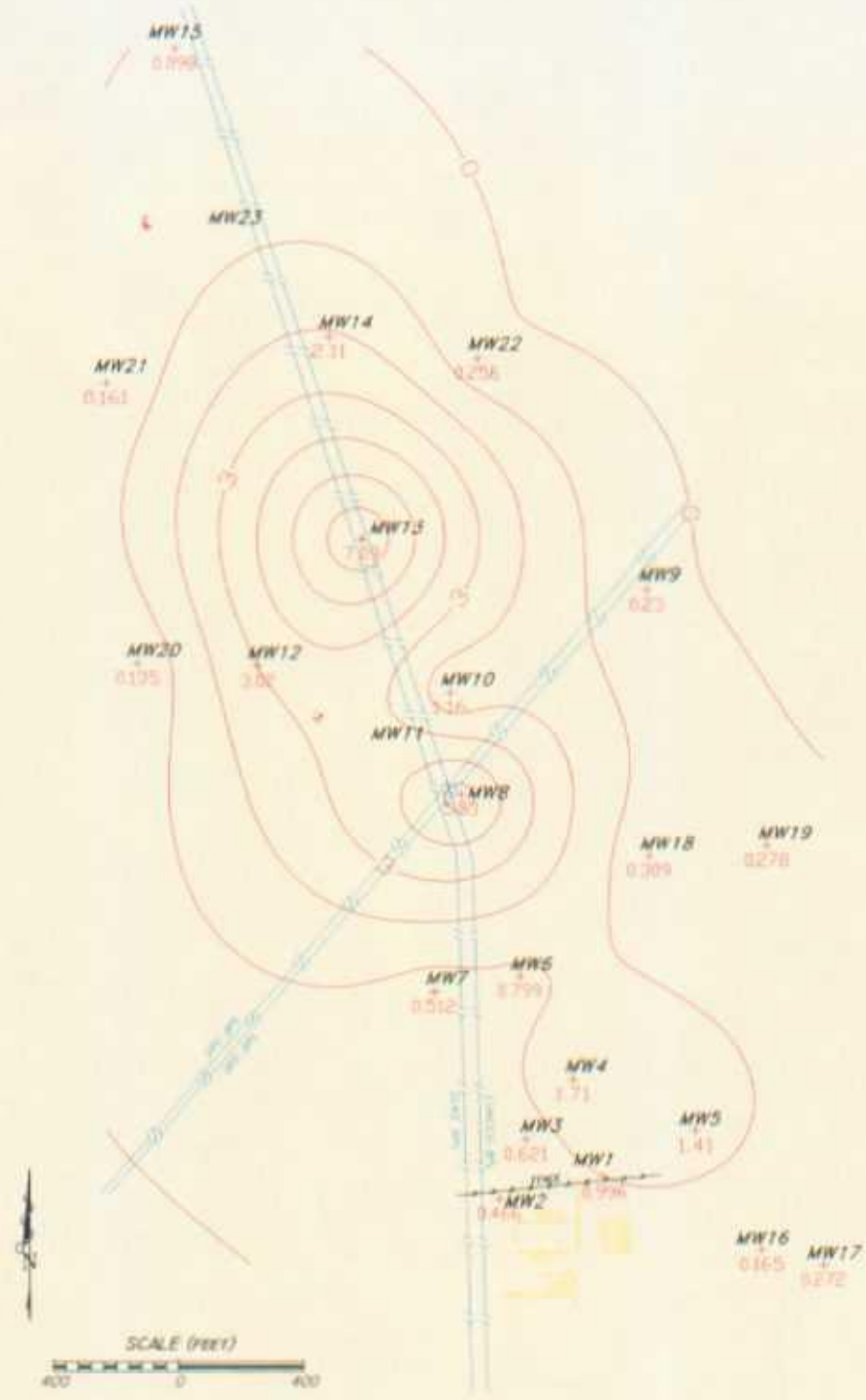

Figure 7- Combined July and October 2002 Barium Concentrations
Eldridge Ranch Characterization

Duke Energy Field Services

DRAWN BY: MBS
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DATE: 10/02

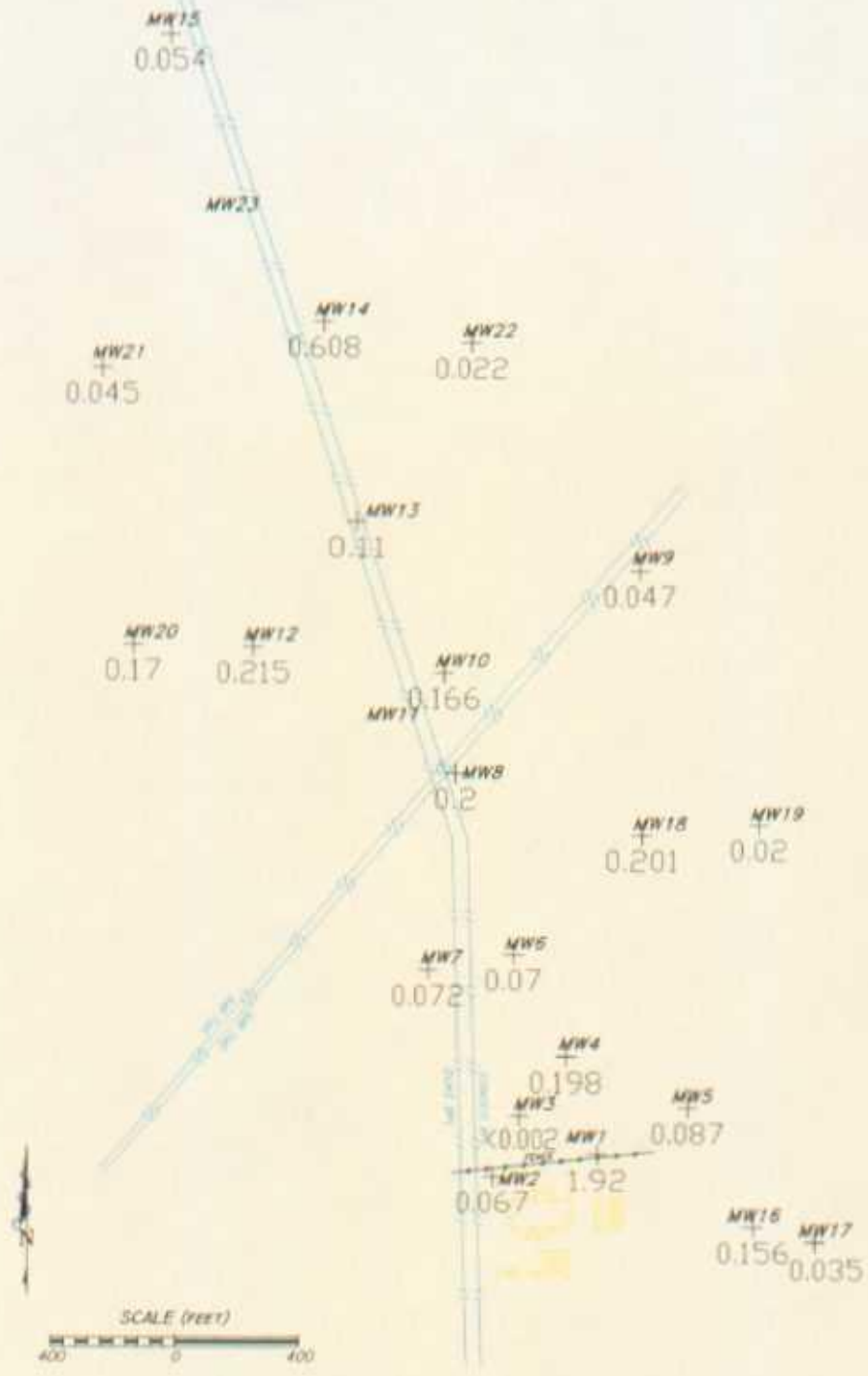

Figure 8 - Combined July and October 2002 Iron Concentrations
Eldridge Ranch Characterization

Duke Energy Field Services

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DATE: 10/02

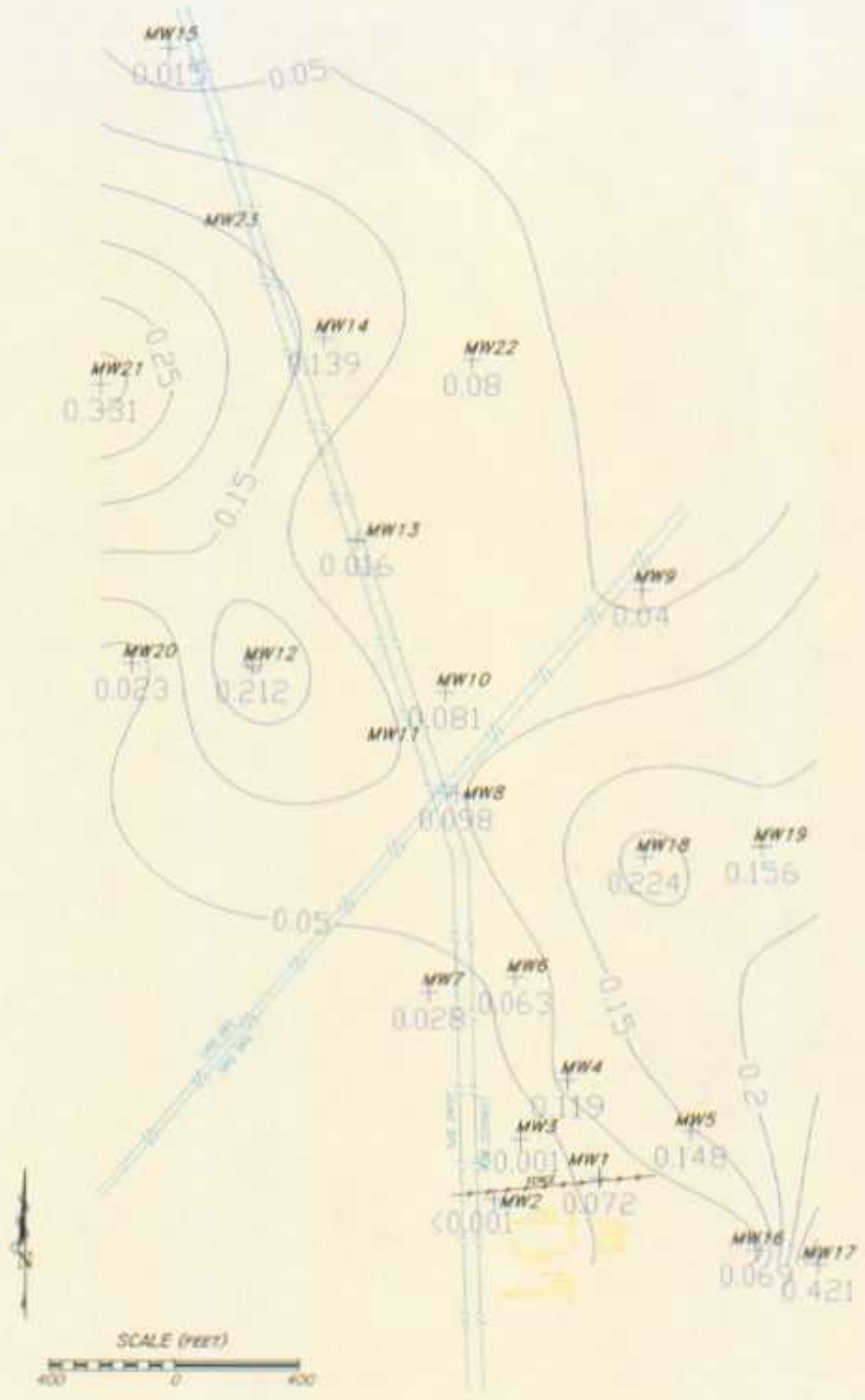

Figure 9 - Combined July and October 2002 Manganese Concentrations
Eldridge Ranch Characterization

Duke Energy Field Services

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DATE: 10/02	

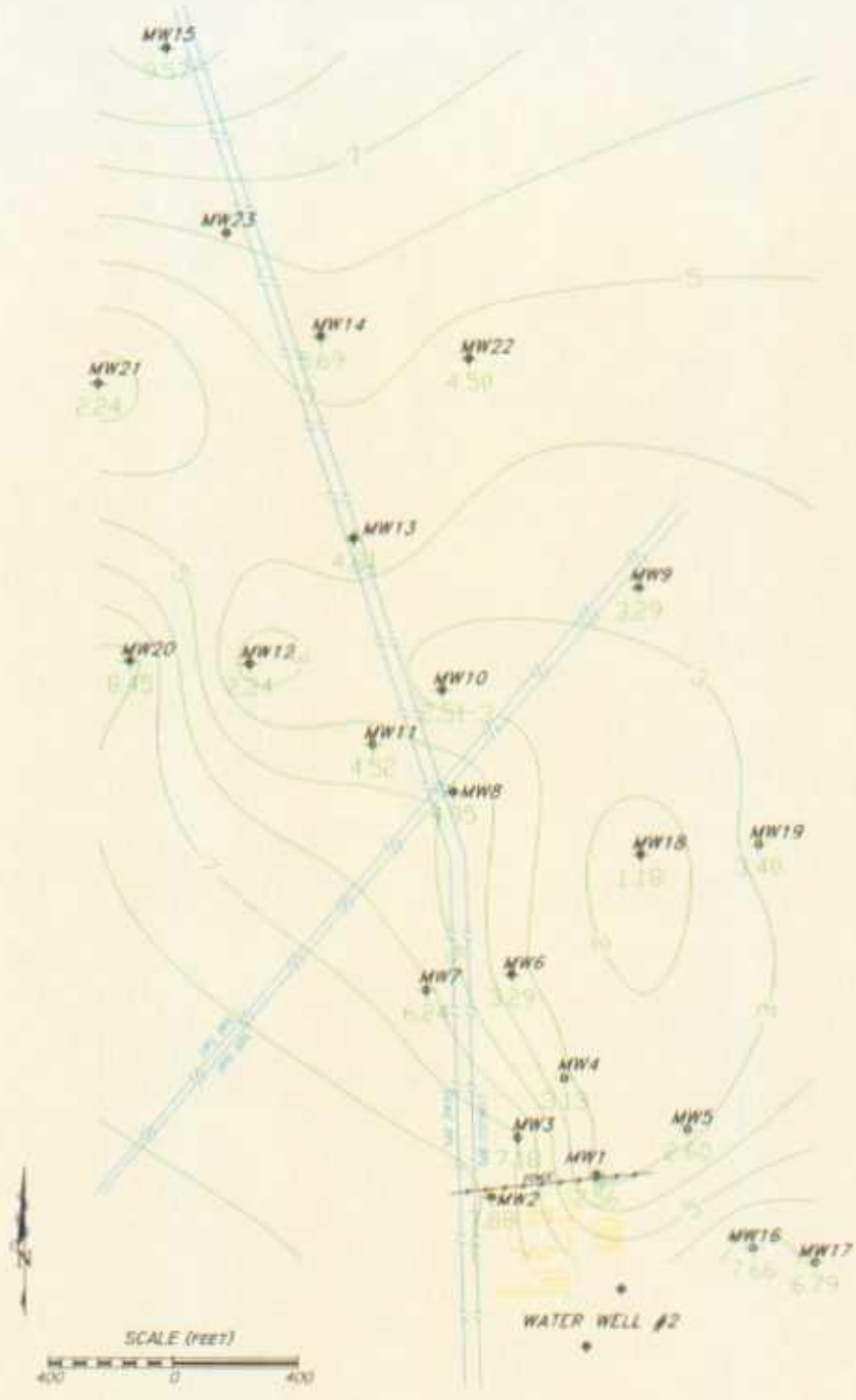

Figure 10 - Combined July & October 2002 Dissolved Oxygen Concentrations
Eldridge Ranch Characterization

Duke Energy Field Services

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REVISED:
DATE: 10/02

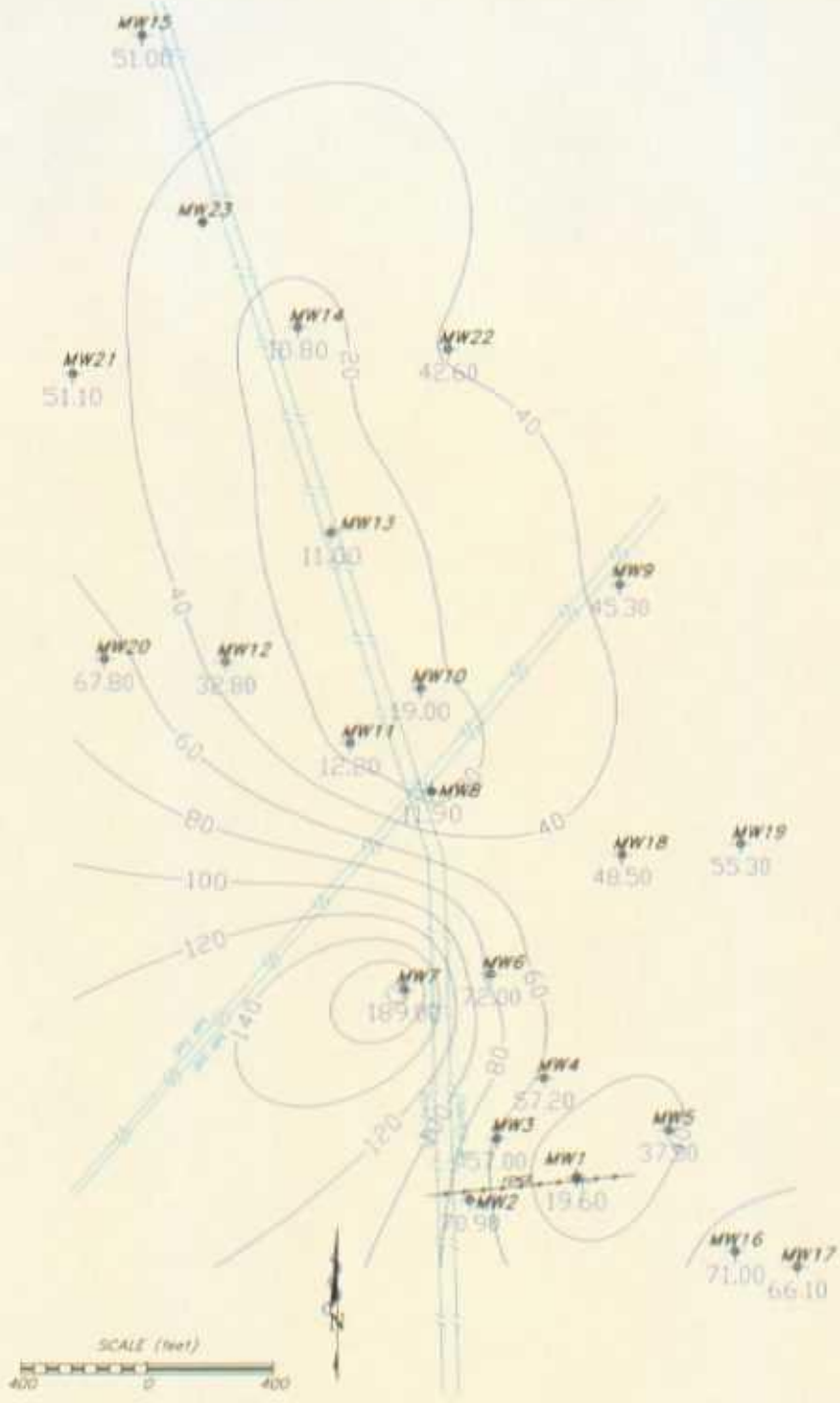

Figure 11 - Combined July & October 2002 Sulfate Concentrations
Eldridge Ranch Characterization

Duke Energy Field Services

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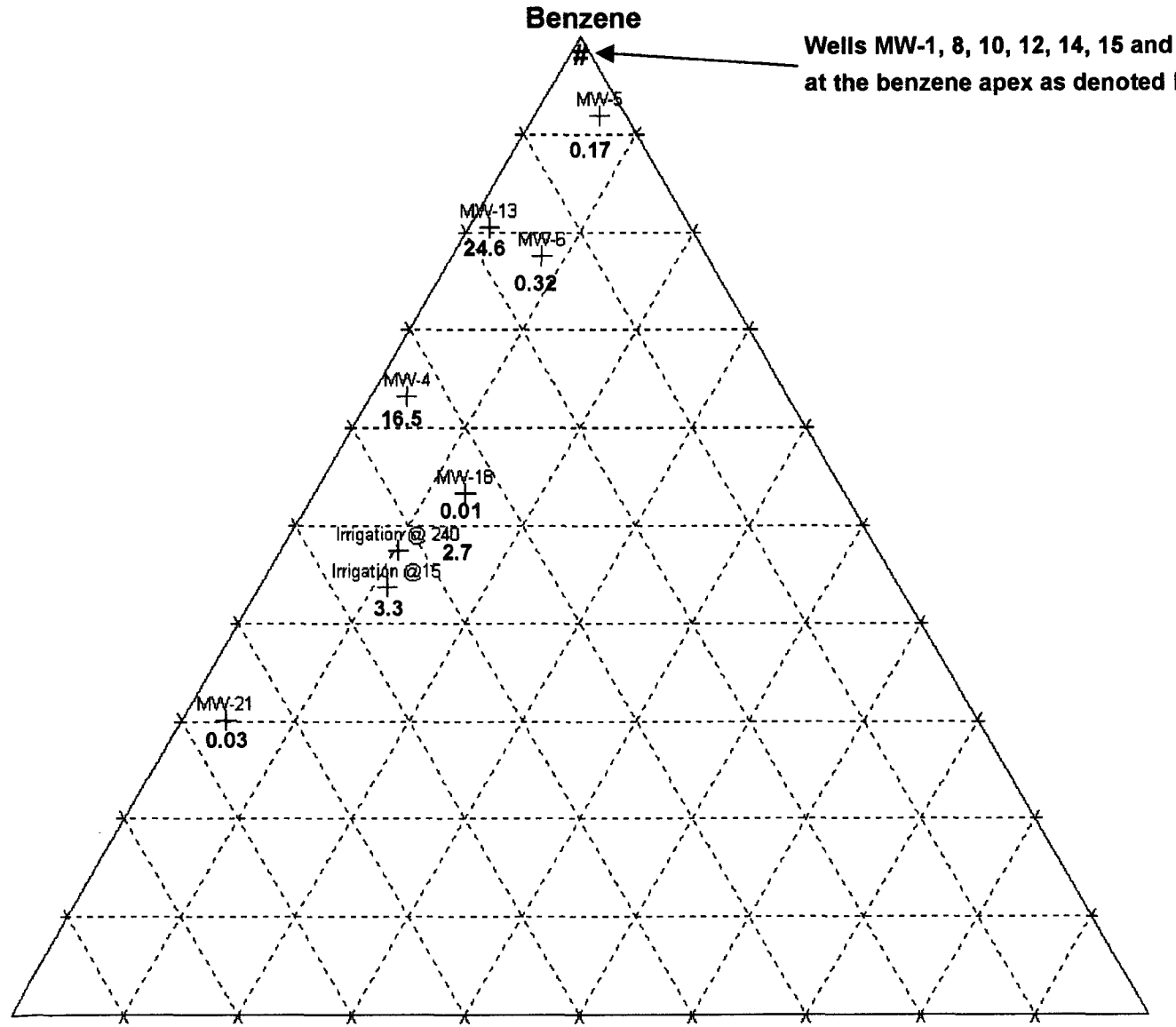
REVISED:
DATE: 10/02



Values shown below each data point are the sum of benzene, toluene and xylenes in mg/l.

Figure 12 - Trilinear Diagram of Select July and October 2002 Samples

Eldridge Ranch Characterization

Duke Energy Field Services

DRAWN BY: MHS

DATE: 10/02

APPENDICIES

APPENDIX 1

BORING LOGS AND WELL CONSTRUCTION DIAGRAMS

LITHOLOGIC LOG (SOIL BORING)

TRIDENT ENVIRONMENTAL

SOIL BORING NO.:	SB-1	TOTAL DEPTH:	25 Feet
SITE ID:	Eldridge Ranch	CLIENT:	Duke Energy Field Services
SURFACE ELEVATION:		COUNTY:	Lea
CONTRACTOR:	Eades Drilling	STATE:	New Mexico
DRILLING METHOD:	Air Rotary	LOCATION:	Monument
START DATE:	9/26/2002	FIELD REP.:	J. Fergerson
COMPLETION DATE:	9/26/2002	FILE NAME:	
COMMENTS:			

5 1/8 Inch Borehole

BENTONITE HOLEPLUG

LITH.	SAMPLE USCS	FROM	TO	TYPE	PID	DEPTH	LITHOLOGIC DESCRIPTION: LITHOLOGY, COLOR, GRAI SIZE, SORTING, ROUNDING, CONSOL., DIST. FEATURES
	ML						Clayey Silt, v pale orange-mod yellowish brown, unconsol, w/weathered-dense caliche and 5% clay in matrix, no odor.
	Cal	3	5	S Spoon	11.4ppm	5	Caliche, v pale-grayish orange, weathered-dense, w/30% clay and silt in matrix, sl hydrocarbon odor.
	Cal	8	10	S Spoon	17.5ppm	10	Caliche, v pale-grayish orange, weathered, interbedded w/mod-w cemented vf grain sand, w/30% clay, tr vf grain sand in matrix, good hydrocarbon odor.
	WS	13	15	S Spoon	129ppm	15	Sand, vf grain, v pale orange-light brown, w sorted, unconsol, interbedded w/mod-w cemented vf grain sand, w/tr weathered caliche and tr clay in matrix, strong hydrocarbon odor.
	WS	18	20	S Spoon	5.3ppm	20	Sand, vf grain, v pale orange-light brown, w sorted, unconsol, interbedded w/mod-w cemented vf grain sand, w/5% clay and tr weathered caliche in matrix, good-strong hydrocarbon odor.
		24	25	S Spoon	494ppm	25	Gray discoloration in matrix. TD @ 25 Feet.
						30	
						35	
						40	
						45	
						50	

LITHOLOGIC LOG (MONITORING WELL)

TRIDENT ENVIRONMENTAL

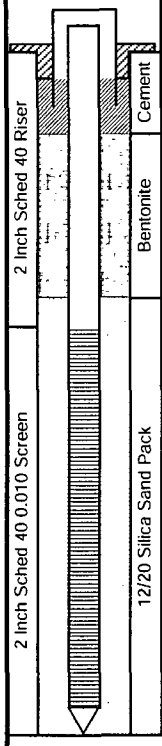
MONITORING WELL NO:	MW-15	TOTAL DEPTH:	35 Feet
SITE ID:	Eldridge Ranch	CLIENT:	Duke Energy Field Services
SURFACE ELEVATION:		COUNTY:	Lea
CONTRACTOR:	Eades Drilling	STATE:	New Mexico
DRILLING METHOD:	Air Rotary	LOCATION:	Monument
START DATE:	9/26/2002	FIELD REP.:	J. Fergerson
COMPLETION DATE:	9/26/2002	FILE NAME:	
COMMENTS:			

LITH.	USCS	FROM	TO	TYPE	PID	DEPTH	LITHOLOGIC DESCRIPTION: LITHOLOGY, COLOR, GRAI SIZE, SORTING, ROUNDING, CONSOL., DIST. FEATURES
	WS						Clayey Silt, v pale orange-mod yellowish brown, unconsol, w/weathered-dense caliche and 5% clay in matrix, no odor.
	CAL	5	7	Grab	0.0ppm	5	Caliche, v pale orange-lt brown, weathered-dense, w/tr silt in matrix.
	CAL	10	12	Grab	0.0ppm	10	Caliche, v pale-grayish orange, weathered-dense, interbedded w/mod-w cemented vf grain sand, w/5% clay, tr vf grain sand in matrix, no odor.
	SW	15	17	Grab	0.0ppm	15	Sand, vf grain, grayish orange pink-lt brown, w sorted, unconsol, interbedded w/mod-w cemented vf grain sand, tr weathered caliche in matrix, no odor
	SW	20	22	Grab	0.0ppm	20	Sand, vf grain, grayish orange pink-lt brown, w sorted, unconsol, interbedded w/mod-w cemented vf grain sand, w/5% clay and tr weathered caliche in matrix, no odor
	SC	25	27	Grab	0.0ppm	25	Clayey Sand, vf grain, white-pale brown, w sorted, unconsol, Encountered Water interbedded w/mod-w cemented vf grain sand, w/25% clay fines, tr chert, and weathered caliche in matrix, wet, no odor.
						30	
						35	TD @ 35 Feet
						40	
						45	
						50	

LITHOLOGIC LOG (MONITORING WELL)

TRIDENT ENVIRONMENTAL

MONITORING WELL NO:	MW-16	TOTAL DEPTH:	25 Feet
SITE ID:	Eldridge Ranch	CLIENT:	Duke Energy Field Services
SURFACE ELEVATION:		COUNTY:	Lea
CONTRACTOR:	Eades Drilling	STATE:	New Mexico
DRILLING METHOD:	Air Rotary	LOCATION:	Monument
START DATE:	9/26/2002	FIELD REP.:	J. Fergerson
COMPLETION DATE:	9/26/2002	FILE NAME:	
COMMENTS:			

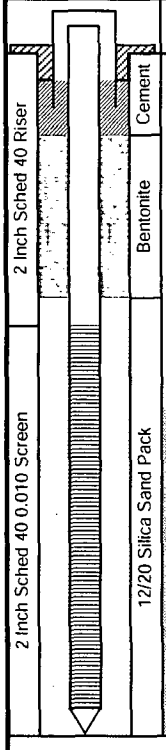


LITH.	SAMPLE USCS	FROM	TO	TYPE	PID	DEPTH	LITHOLOGIC DESCRIPTION: LITHOLOGY, COLOR, GRAI SIZE, SORTING, ROUNDING, CONSOL., DIST. FEATURES
	WS						Clayey Silt, v pale orange-mod yellowish brown, unconsol, w/weathered-dense caliche and 5% clay in matrix, no odor.
	CAL	3	5	S Spoon	0.0ppm	5	Caliche, grayish orange-grayish orange pink, weathered-dense, w/ sl unconsol-mod cemented vf grain sand in matrix, no odor.
	CL	8	10	S Spoon	0.0ppm	10	Silty Clay, v pale-grayish orange, interbedded w mod cemented vf grain sand, w/20% silt, sl vf grain sand, sl weathered caliche in matrix, v moist, no odor.
	CL	13	15	S Spoon	0.0ppm	15	Silty Clay, v pale-grayish orange, interbedded w/mod cemented vf grain sand, w 20% silt and tr weathered caliche in matrix, wet, no odor.
						20	Encountered Water
						25	TD @ 25 Feet
						30	
						35	
						40	
						45	
						50	

LITHOLOGIC LOG (MONITORING WELL)

TRIDENT ENVIRONMENTAL

MONITORING WELL NO:	MW-17	TOTAL DEPTH:	25 Feet
SITE ID:	Eldridge Ranch	CLIENT:	Duke Energy Field Services
SURFACE ELEVATION:		COUNTY:	Lea
CONTRACTOR:	Eades Drilling	STATE:	New Mexico
DRILLING METHOD:	Air Rotary	LOCATION:	Monument
START DATE:	9/26/2002	FIELD REP.:	J. Fergerson
COMPLETION DATE:	9/26/2002	FILE NAME:	
COMMENTS:			

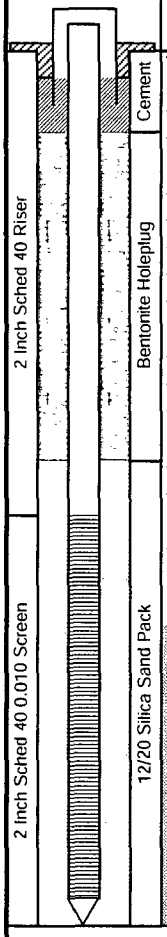


LITH.	SAMPLE USCS	FROM	TO	% REC.	PID	DEPTH	LITHOLOGIC DESCRIPTION: LITHOLOGY, COLOR, GRAI SIZE, SORTING, ROUNDING, CONSOL., DIST. FEATURES
	WS						Clayey Silt, v pale orange-mod yellowish brown, unconsol, w/weathered-dense caliche and 5% clay in matrix, no odor.
	CAL	3	5	S Spoon	0.0ppm	5	Caliche, grayish orange-grayish orange pink, weathered-dense, w/ sl unconsol-mod cemented vf grain sand in matrix, no odor.
	CL	8	10	S Spoon	0.0ppm	10	Silty Clay, v pale-grayish orange, interbedded w mod cemented vf grain sand, w/20% silt, sl weathered caliche in matrix, v moist, no odor.
							Encountered Water
	CL	13	15	S Spoon	0.0ppm	15	Silty Clay, v pale-grayish orange, interbedded w/mod cemented vf grain sand, w 20% silt and tr weathered caliche in matrix, wet, no odor.
						20	
						25	TD @ 25 Feet
						30	
						35	
						40	
						45	
						50	

LITHOLOGIC LOG (MONITORING WELL)

TRIDENT ENVIRONMENTAL

MONITORING WELL NO:	MW-18	TOTAL DEPTH:	32 Feet
SITE ID:	Eldridge Ranch	CLIENT:	Duke Energy Field Services
SURFACE ELEVATION:		COUNTY:	Lea
CONTRACTOR:	Eades Drilling	STATE:	New Mexico
DRILLING METHOD:	Air Rotary	LOCATION:	Monument
START DATE:	9/25/2002	FIELD REP.:	J. Fergerson
COMPLETION DATE:	9/25/2002	FILE NAME:	
COMMENTS:			

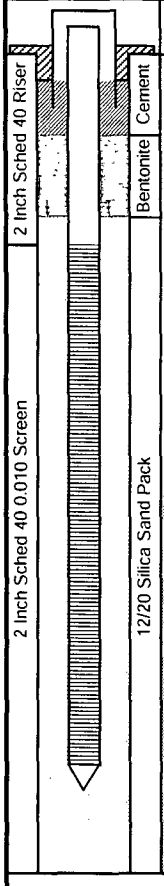


LITH.	SAMPLE USCS	FROM	TO	TYPE	PID	DEPTH	LITHOLOGIC DESCRIPTION: LITHOLOGY, COLOR, GRAI SIZE, SORTING, ROUNDING, CONSOL., DIST. FEATURES
	WS						Clayey Silt, v pale orange-mod yellowish brown, unconsol, w/weathered-dense caliche and 5% clay in matrix, no odor.
	CAL	3	5	S Spoon	0.0ppm	5	Caliche, v pale-grayish orange, weathered-dense, w/5% clay and tr silt in matrix, no odor.
	CAL	8	10	S Spoon	0.0ppm	10	Caliche, v pale orange-pale yellowish brown, weathered-dense, w/20% clay and sl silt in matrix, no odor.
	CAL	13	15	S Spoon	2.6ppm	15	Caliche, v pale orange-pale yellowish brown, weathered-dense, interbedded w/mod-w cemented vf grain sand, w/10% clay and sl silt in matrix, sl odor.
		18	20	S Spoon	9.9ppm	20	Encountered Water
	CL	23	25	S Spoon	2.2ppm	25	Silty Clay, very pale orange-mod brown, interbedded w/mod-well cemented vf grain sand, w/20% silt, sl vf grain sand, and tr weathered caliche in matrix, wet, sl hydrocarbon odor.
						30	TD @ 32 Feet
						35	
						40	
						45	
						50	

LITHOLOGIC LOG (MONITORING WELL)

TRIDENT ENVIRONMENTAL

MONITORING WELL NO:	MW-19	TOTAL DEPTH:	30 Feet
SITE ID:	Eldridge Ranch	CLIENT:	Duke Energy Field Services
SURFACE ELEVATION:		COUNTY:	Lea
CONTRACTOR:	Eades Drilling	STATE:	New Mexico
DRILLING METHOD:	Air Rotary	LOCATION:	Monument
START DATE:	9/25/2002	FIELD REP.:	J. Fergerson
COMPLETION DATE:	9/25/2002	FILE NAME:	
COMMENTS:			

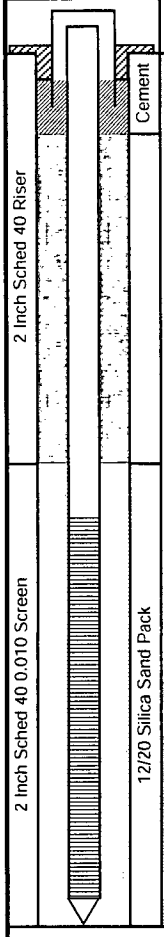


LITH.	SAMPLE USCS	FROM	TO	TYPE	PID	DEPTH	LITHOLOGIC DESCRIPTION: LITHOLOGY, COLOR, GRAI SIZE, SORTING, ROUNDING, CONSOL., DIST. FEATURES
	WS	3	5	S Spoon	0.0ppm	5	Clayey Silt, v pale orange-mod yellowish brown, unconsol, w/weathered-dense caliche and 5% clay in matrix, no odor.
	CAL						Caliche, v pale orange-pale yellowish brown, weathered-dense, w/20% clay and sl silt in matrix, no odor.
	CL	8	10	S Spoon	0.0ppm	10	Silty Clay, very pale orange-mod brown, interbedded w/mod-well cemented vf grain sand, w/20% silt, sl vf grain sand, and tr weathered caliche in matrix, v moist, no odor.
		13	15	S Spoon	0.0ppm	15	
							Encountered Water
	CL					20	Silty Clay, very pale orange-mod brown, interbedded w/mod-well cemented vf grain sand, w/20% silt, sl vf grain sand, and tr weathered caliche in matrix, wet, no odor.
						25	
						30	TD @ 30 Feet
						35	
						40	
						45	
						50	

LITHOLOGIC LOG (MONITORING WELL)

TRIDENT ENVIRONMENTAL

MONITORING WELL NO:	MW-20	TOTAL DEPTH:	32 Feet
SITE ID:	Eldridge Ranch	CLIENT:	Duke Energy Field Services
SURFACE ELEVATION:		COUNTY:	Lea
CONTRACTOR:	Eades Drilling	STATE:	New Mexico
DRILLING METHOD:	Air Rotary	LOCATION:	Monument
START DATE:	9/25/2002	FIELD REP.:	J. Fergerson
COMPLETION DATE:	9/25/2002	FILE NAME:	
COMMENTS:			

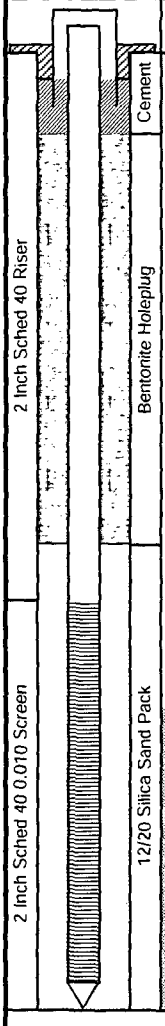


LITH.	USCS	FROM	TO	TYPE	PID	DEPTH	LITHOLOGIC DESCRIPTION: LITHOLOGY, COLOR, GRAI SIZE, SORTING, ROUNDING, CONSOL., DIST. FEATURES
	WS						Clayey Silt, v pale orange-mod yellowish brown, unconsol, w/weathered-dense caliche and 5% clay in matrix, no odor.
	CAL	3	5	S Spoon	0.0ppm	5	Caliche, mod orange pink-light brown, weathered-dense, w/tr silt in matrix, no odor.
	SW	8	10	S Spoon	0.0ppm	10	Sand, vf grain, grayish orange pink-light brown, w sorted mod-well cemented sand, interbedded w/unconsol vf grain sand, tr caliche in matrix, no odor.
						15	
	SW	18	20	S Spoon	0.0ppm	20	Sand, vf grain, grayish orange pink-light brown, w sorted unconsol, w/5% clay fines and tr weathered caliche in matrix, no odor.
							Encountered Water
	SW	23	25	S Spoon	0.0ppm	25	Sand, vf grain, grayish orange pink-light brown, w sorted unconsolidated, interbedded w/mod-w cemented vf grain sand, w/tr weathered caliche in matrix, wet, no odor.
						30	
							TD @ 32 Feet
						35	
						40	
						45	
						50	

LITHOLOGIC LOG (MONITORING WELL)

TRIDENT ENVIRONMENTAL

MONITORING WELL NO:	MW-21	TOTAL DEPTH:	35 Feet
SITE ID:	Eldridge Ranch	CLIENT:	Duke Energy Field Services
SURFACE ELEVATION:		COUNTY:	Lea
CONTRACTOR:	Eades Drilling	STATE:	New Mexico
DRILLING METHOD:	Air Rotary	LOCATION:	Monument
START DATE:	9/24/2002	FIELD REP.:	J. Fergerson
COMPLETION DATE:	9/24/2002	FILE NAME:	
COMMENTS:			

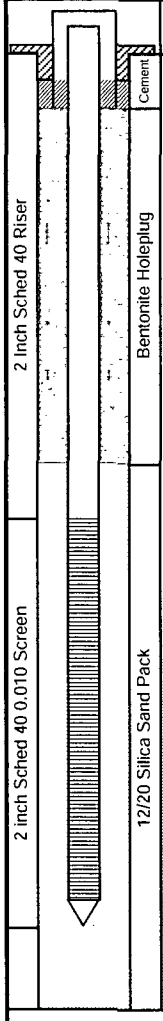


LITH.	SAMPLE					DEPTH	LITHOLOGIC DESCRIPTION: LITHOLOGY, COLOR, GRAI
	USCS	FROM	TO	TYPE	PID		SIZE, SORTING, ROUNDING, CONSOL., DIST. FEATURES
	WS						Clayey Silt, v pale orange-mod yellowish brown, unconsol, w/weathered-dense caliche and 5% clay in matrix, no odor.
	CAL	3	5	S Spoon	0.0ppm	5	Caliche, grayish orange pink-light brown, weathered-dense, w/sl silt in matrix, no odor.
		8	10	S Spoon	0.0ppm	10	
	CAL	13	15	S Spoon	6.8ppm	15	Caliche, grayish orange pink-light brown, weathered-dense, interbedded w/mod-w cemented vf grain sand w/sl unconsol vf grain sand in matrix, sl hydrocarbon odor.
	SW	18	20	S Spoon	3.6ppm	20	Sand, vf grain, mod orange pink-light brown, w sorted, unconsol, interbedded w/mod-well cemented vf grain sand, w/sl weathered caliche and tr clay in matrix, sl hydrocarbon odor.
							Encountered Water
	SW					25	Sand, vf grain, mod orange pink-light brown, w sorted, unconsol, interbedded w/mod-w cemented vf grain sand, w/tr clay in matrix, wet, sl hydrocarbon odor.
						30	
						35	TD @ 35 Feet
						40	
						45	
						50	

LITHOLOGIC LOG (MONITORING WELL)

TRIDENT ENVIRONMENTAL

MONITORING WELL NO:	MW-22	TOTAL DEPTH:	35 Feet
SITE ID:	Eldridge Ranch	CLIENT:	Duke Energy Field Services
SURFACE ELEVATION:		COUNTY:	Lea
CONTRACTOR:	Eades Drilling	STATE:	New Mexico
DRILLING METHOD:	Air Rotary	LOCATION:	Monument
START DATE:	9/24/2002	FIELD REP.:	J. Fergerson
COMPLETION DATE:	9/24/2002	FILE NAME:	
COMMENTS:			

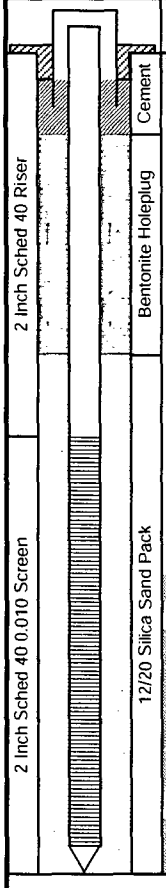


LITH.	USCS	FROM	TO	TYPE	PID	DEPTH	LITHOLOGIC DESCRIPTION: LITHOLOGY, COLOR, GRAI SIZE, SORTING, ROUNDING, CONSOL., DIST. FEATURES
	WS						Clayey Silt, v pale orange-mod yellowish brown, unconsol, w/weathered-dense caliche and 5% clay in matrix, no odor.
	CAL	8	10	S Spoon	0.0ppm	5 10	Caliche, v pale orange, dense-weathered, w/tr silt in matrix, no odor.
	CAL	13	15	S Spoon	0.0ppm	15	Caliche, mod orange-grayish orange pink, weathered-dense, interbedded w/mod-w cemented vf grain sand, w/5% clay and tr vf grain sand in matrix, no odor.
	CL	18	20	S Spoon	0.0ppm	20	Silty Clay, v pale orange-grayish orange pink, interbedded w/mod-well cemented vf grain sand, w/20% silt and sl vf grain sand in matrix, v moist, no odor. Encountered Water
	CL	23	25	S Spoon	0.0ppm	25 30 35	Silty Clay, v pale orange-grayish orange pink, interbedded w/mod-well cemented vf grain sand, w/20% silt and sl vf grain sand in matrix, wet, no odor. TD @ 35 Feet
						40 45 50	

LITHOLOGIC LOG (MONITORING WELL)

TRIDENT ENVIRONMENTAL

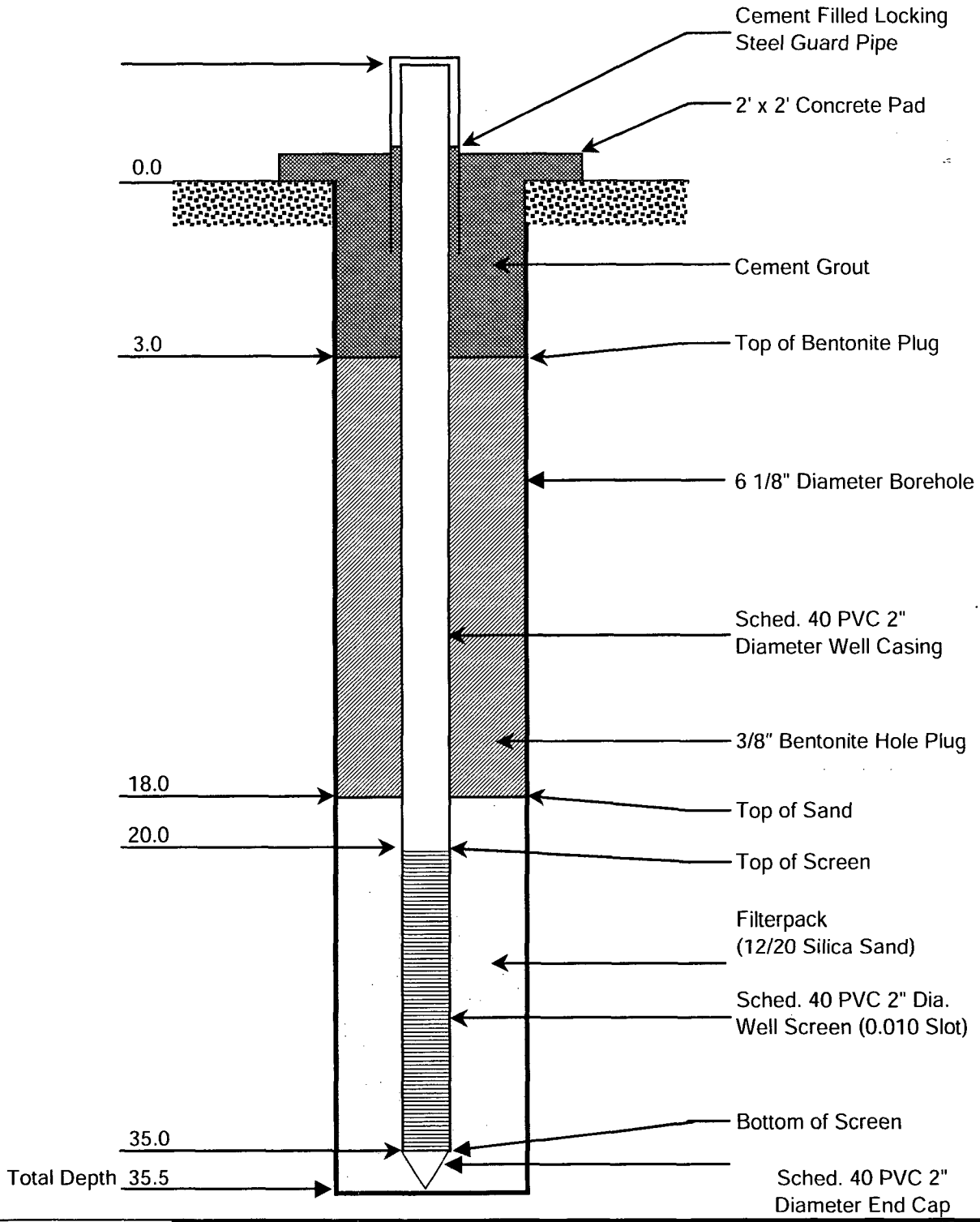
MONITORING WELL NO:	MW-23	TOTAL DEPTH:	30 Feet
SITE ID:	Eldridge Ranch	CLIENT:	Duke Energy Field Services
SURFACE ELEVATION:		COUNTY:	Lea
CONTRACTOR:	Eades Drilling	STATE:	New Mexico
DRILLING METHOD:	Air Rotary	LOCATION:	Monument
START DATE:	9/24/2002	FIELD REP.:	J. Fergerson
COMPLETION DATE:	9/24/2002	FILE NAME:	
COMMENTS:			



LITH.	USCS	FROM	TO	TYPE	PID	DEPTH	LITHOLOGIC DESCRIPTION: LITHOLOGY, COLOR, GRAI SIZE, SORTING, ROUNDING, CONSOL., DIST. FEATURES
	WS						Clayey Silt, v pale orange-mod yellowish brown, unconsol, w/weathered-dense caliche and 5% clay in matrix, no odor.
	CAL	3	5	S Spoon	0.0ppm	5	Caliche, v pale-grayish orange, weathered-dense, w/5% clay and tr silt in matrix, no odor.
	CAL	8	10	S Spoon	2.2ppm	10	Caliche, v pale-grayish orange, weathered-dense, interbedded w/mod-w cemented vf grain sand, w/10% clay in and tr vf grain sand in matrix, sl hydrocarbon odor.
	SW	13	15	S Spoon	20.7ppm	15	Sand, vf grain, mod orange pink-light brown, w sorted, unconsol, interbedded w/mod-well cemented vf grain sand, w/sl weathered caliche and tr clay in matrix, good hydrocarbon odor.
	SW	18	20	S Spoon	51.7ppm	20	Encountered Water | Sand, vf grain, mod orange pink-light brown, w sorted, unconsol, interbedded w/mod-well cemented vf grain sand, w/tr clay in matrix, wet, strong hydrocarbon odor.
						25	
						30	TD @ 30 Feet
						35	
						40	
						45	
						50	

MONITORING WELL CONSTRUCTION DIAGRAM (MW-15)

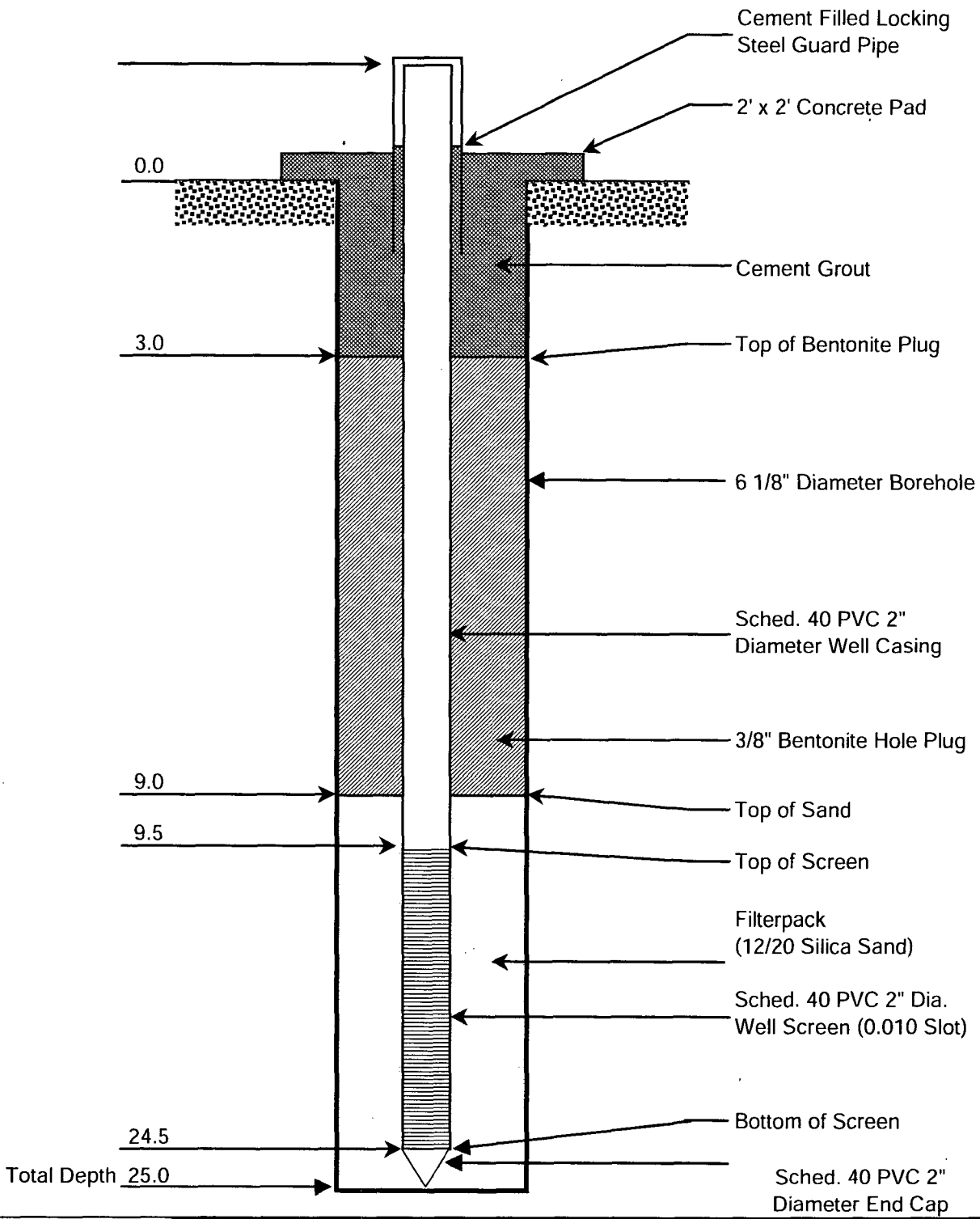
Not to Scale



TRIDENT ENVIRONMENTAL	SITE: Duke Energy Field Services-Eldridge Ranch		**MW-15 Monitoring Well Construction Diagram**
	DATE: 10/22/02	REV. NO.: 1	
	AUTHOR: JMF	DRAWN BY: JMF	
	CK'D BY:	FILE: Well Bore Diagram	

MONITORING WELL CONSTRUCTION DIAGRAM (MW-16)

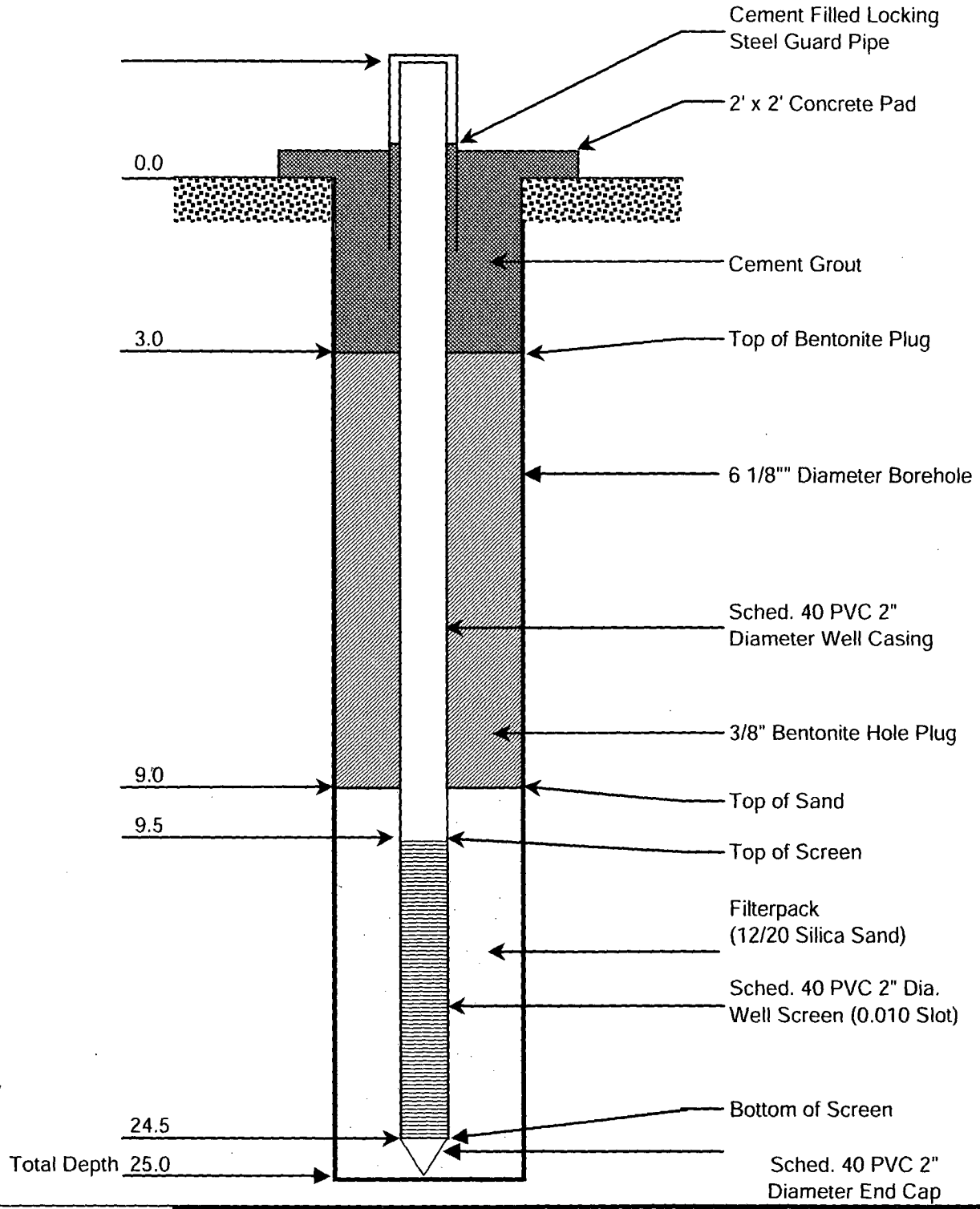
Not to Scale



TRIDENT ENVIRONMENTAL	SITE: Duke Energy Field Services-Eldridge Ranch		**MW-16 Monitoring Well Construction Diagram**
	DATE: 10/22/02	REV. NO.: 1	
	AUTHOR: JMF	DRAWN BY: JMF	
	CK'D BY:	FILE: Well Bore Diagram	

MONITORING WELL CONSTRUCTION DIAGRAM (MW-17)

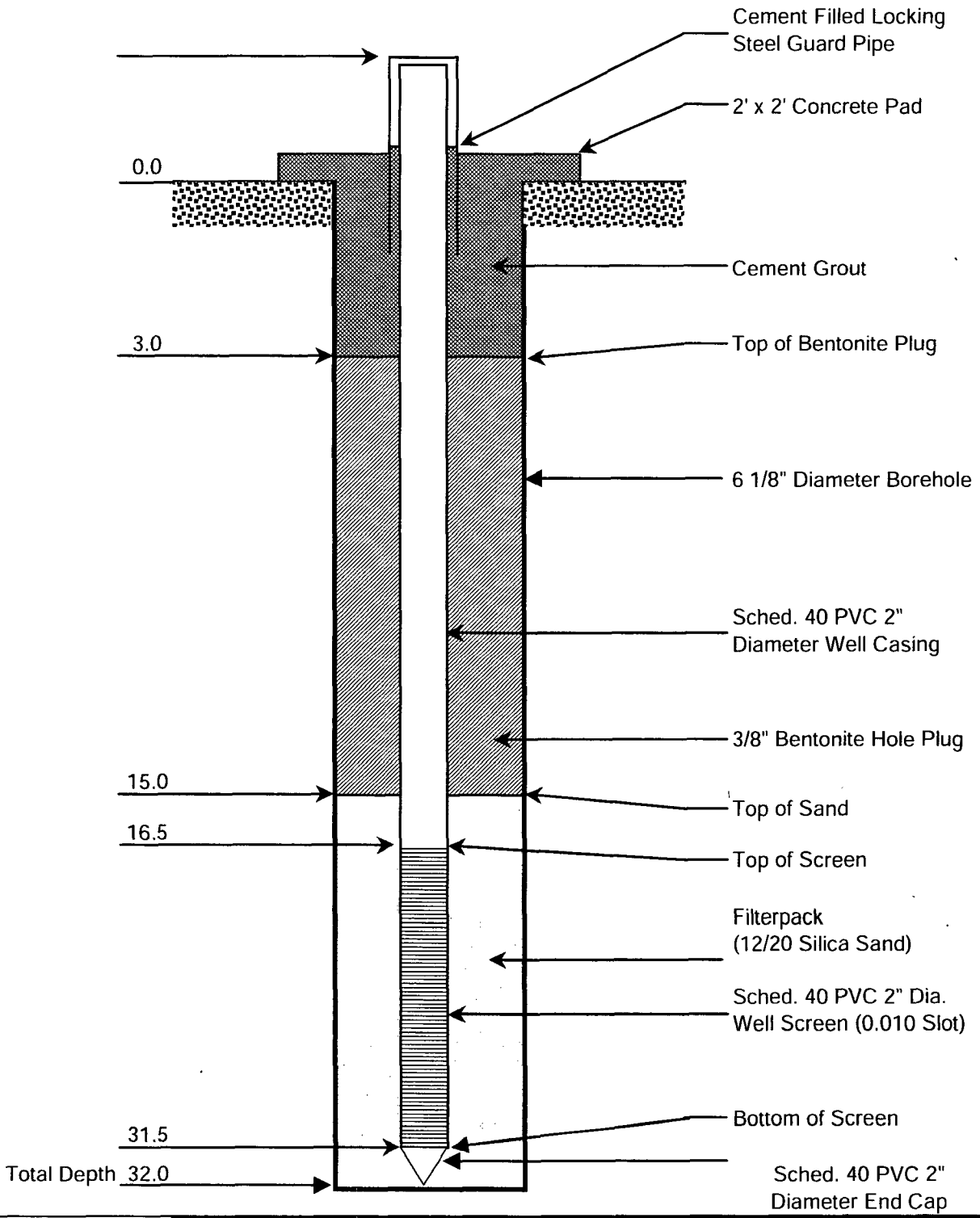
Not to Scale



TRIDENT ENVIRONMENTAL	SITE: Duke Energy Field Services-Eldridge Ranch		**MW-17 Monitoring Well Construction Diagram**
	DATE: 10/22/02	REV. NO.: 1	
	AUTHOR: JMF	DRAWN BY: JMF	
	CK'D BY:	FILE: Well Bore Diagram	

MONITORING WELL CONSTRUCTION DIAGRAM (MW-18)

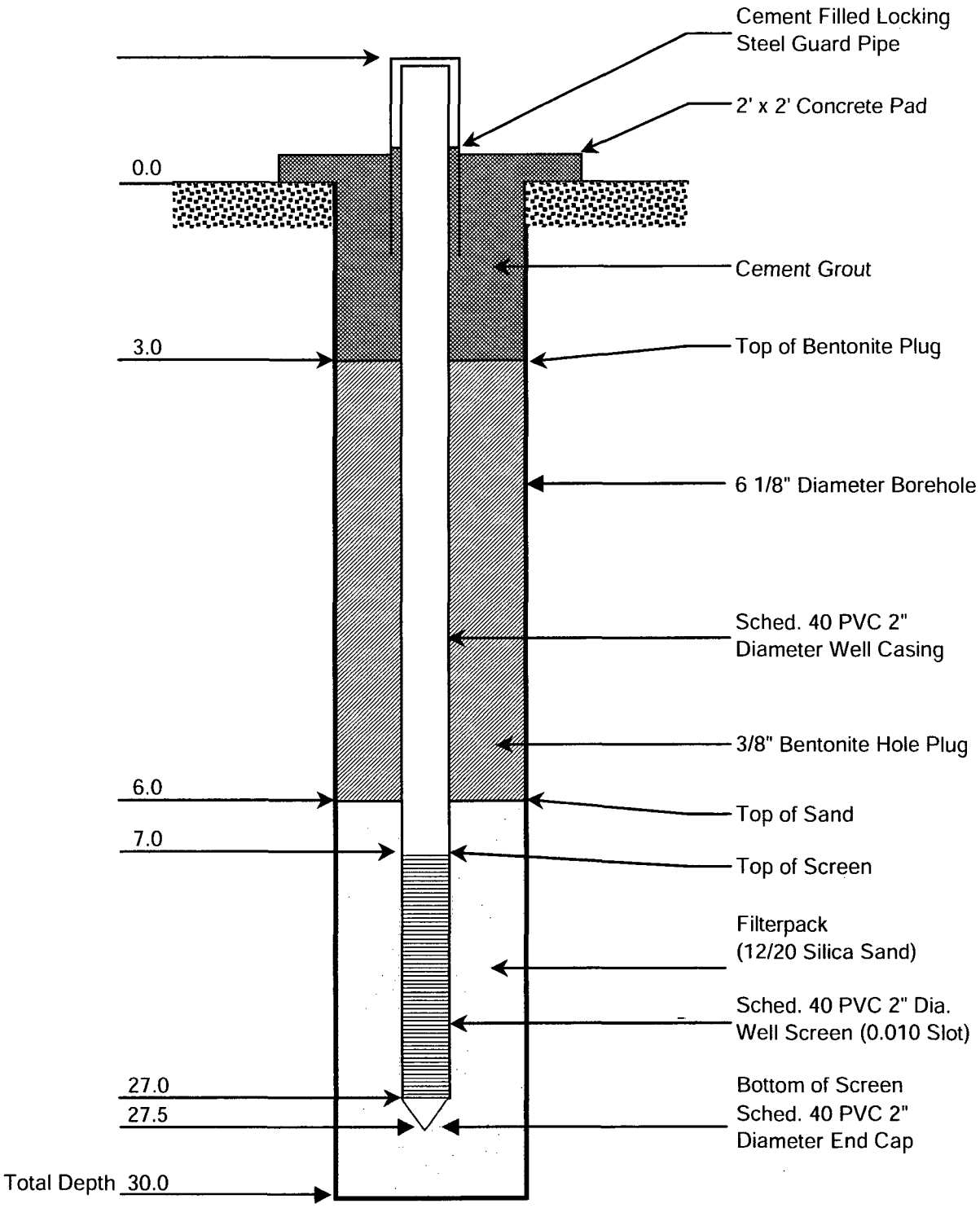
Not to Scale



TRIDENT ENVIRONMENTAL	SITE: Duke Energy Field Services-Eldridge Ranch		**MW-18 Monitoring Well Construction Diagram**
	DATE: 10/22/02	REV. NO.: 1	
	AUTHOR: JMF	DRAWN BY: JMF	
	CK'D BY:	FILE: Well Bore Diagram	

MONITORING WELL CONSTRUCTION DIAGRAM (MW-19)

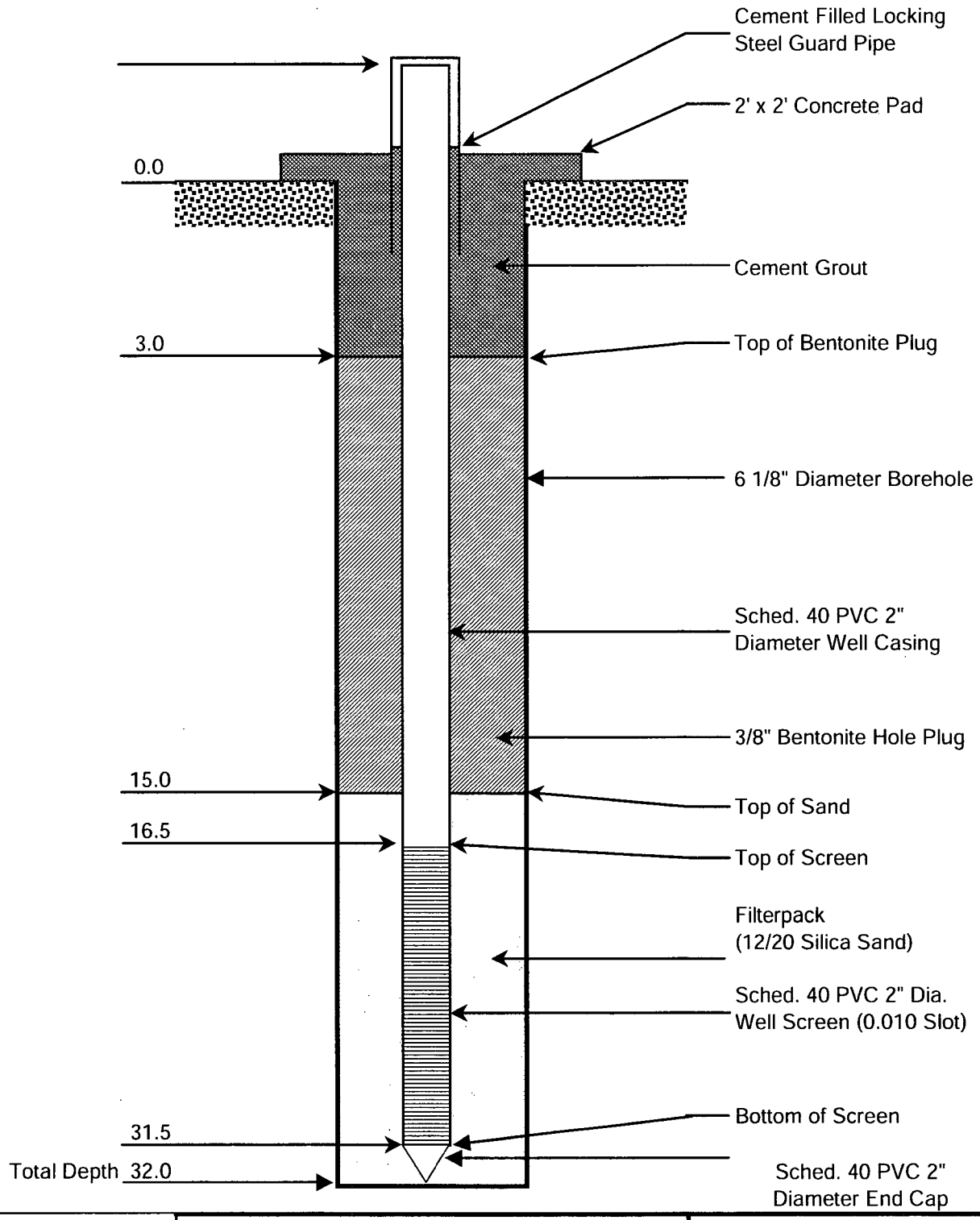
Not to Scale



TRIDENT ENVIRONMENTAL	SITE: Duke Energy Field Services-Eldridge Ranch		**MW-19 Monitoring Well Construction Diagram**
	DATE: 10/22/02	REV. NO.: 1	
	AUTHOR: JMF	DRAWN BY: JMF	
	CK'D BY:	FILE: Well Bore Diagram	

MONITORING WELL CONSTRUCTION DIAGRAM (MW-20)

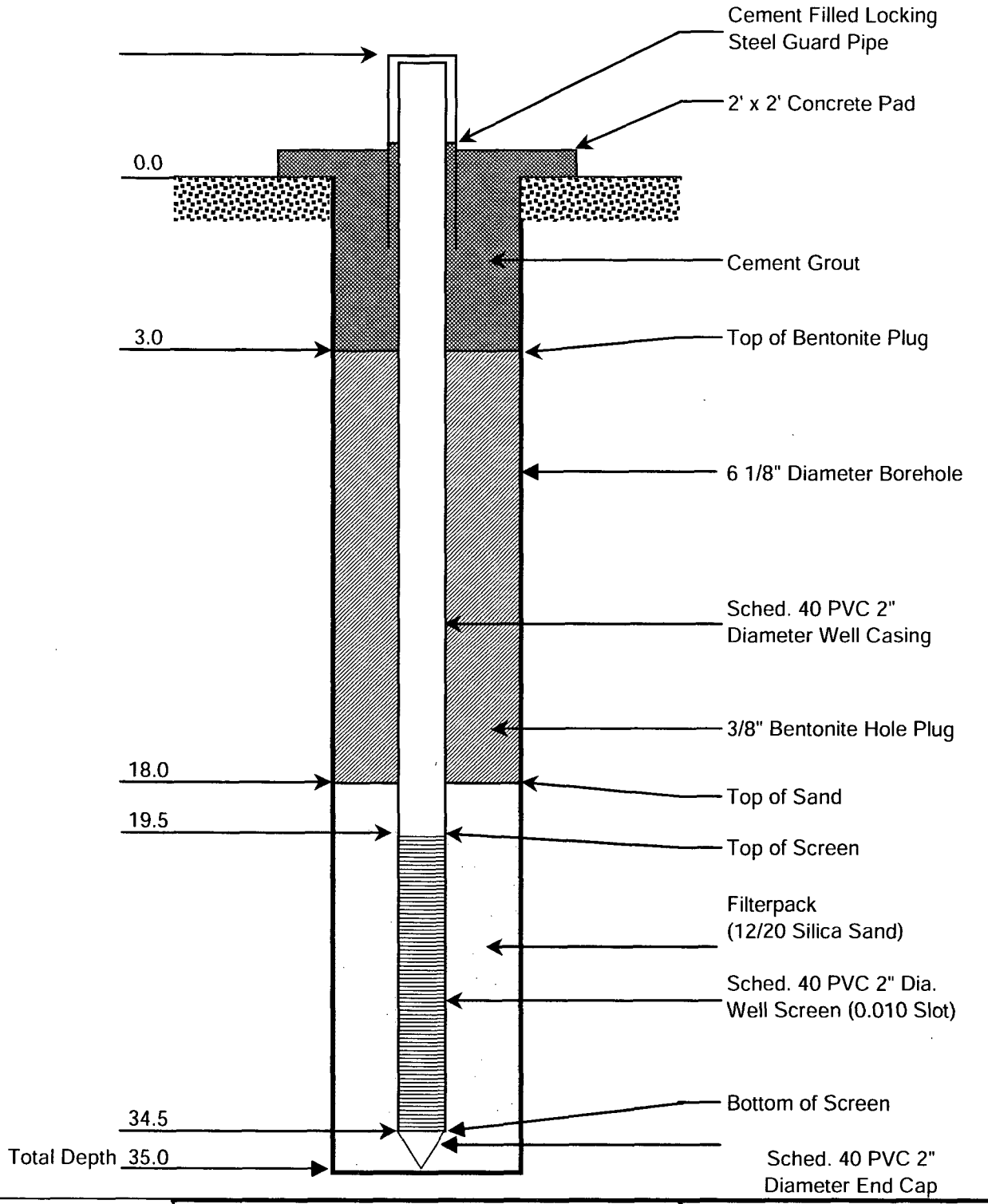
Not to Scale



TRIDENT ENVIRONMENTAL	SITE: Duke Energy Field Services-Eldridge Ranch		**MW-20 Monitoring Well Construction Diagram**
	DATE: 10/22/02	REV. NO.: 1	
	AUTHOR: JMF	DRAWN BY: JMF	
	CK'D BY:	FILE: Well Bore Diagram	

MONITORING WELL CONSTRUCTION DIAGRAM (MW-21)

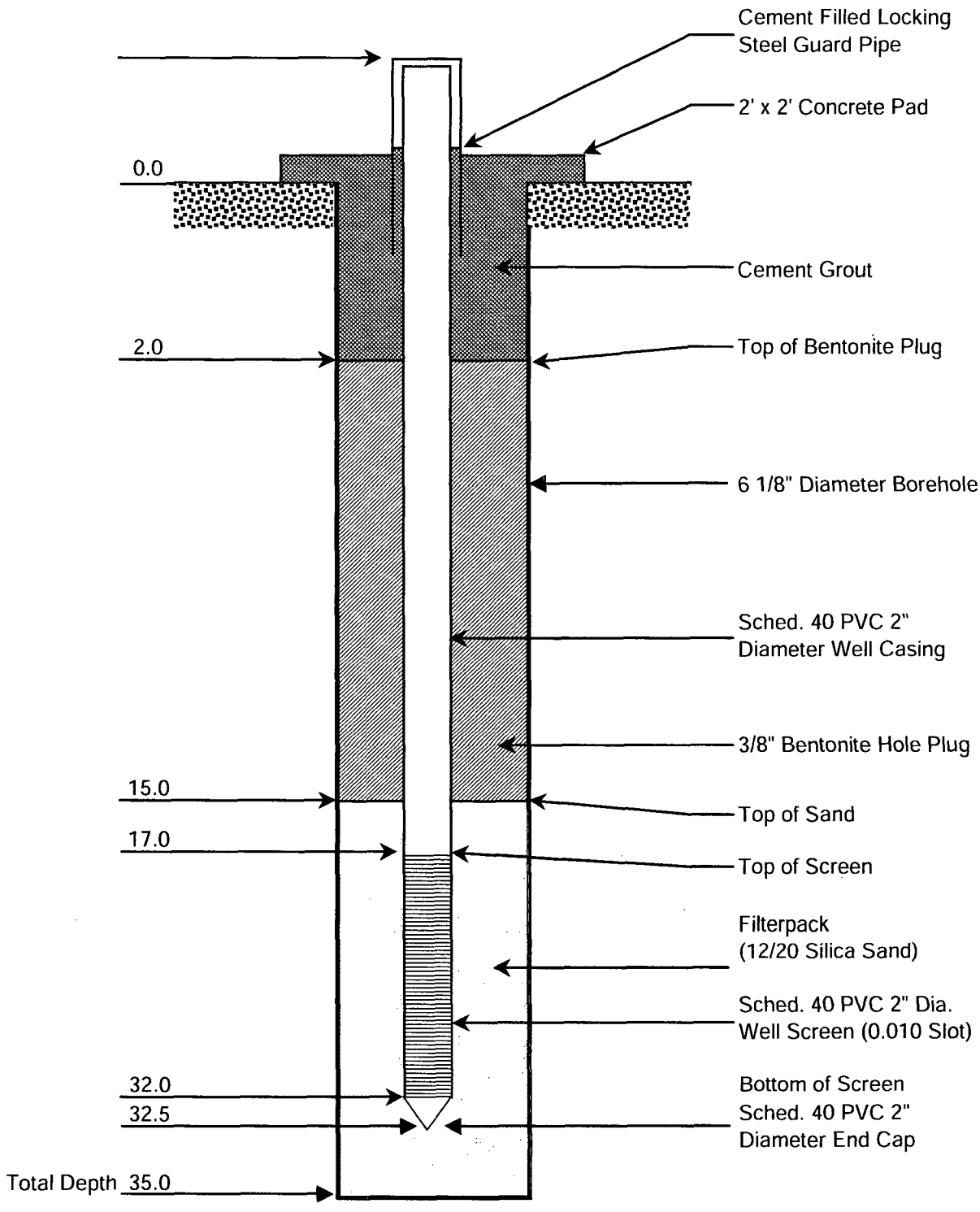
Not to Scale



TRIDENT	SITE: Duke Energy Field Services-Eldridge Ranch		**MW-21 Monitoring Well Construction Diagram**
	DATE: 10/22/02	REV. NO.: 1	
	AUTHOR: JMF	DRAWN BY: JMF	
	CK'D BY:	FILE: Well Bore Diagram	

MONITORING WELL CONSTRUCTION DIAGRAM (MW-22)

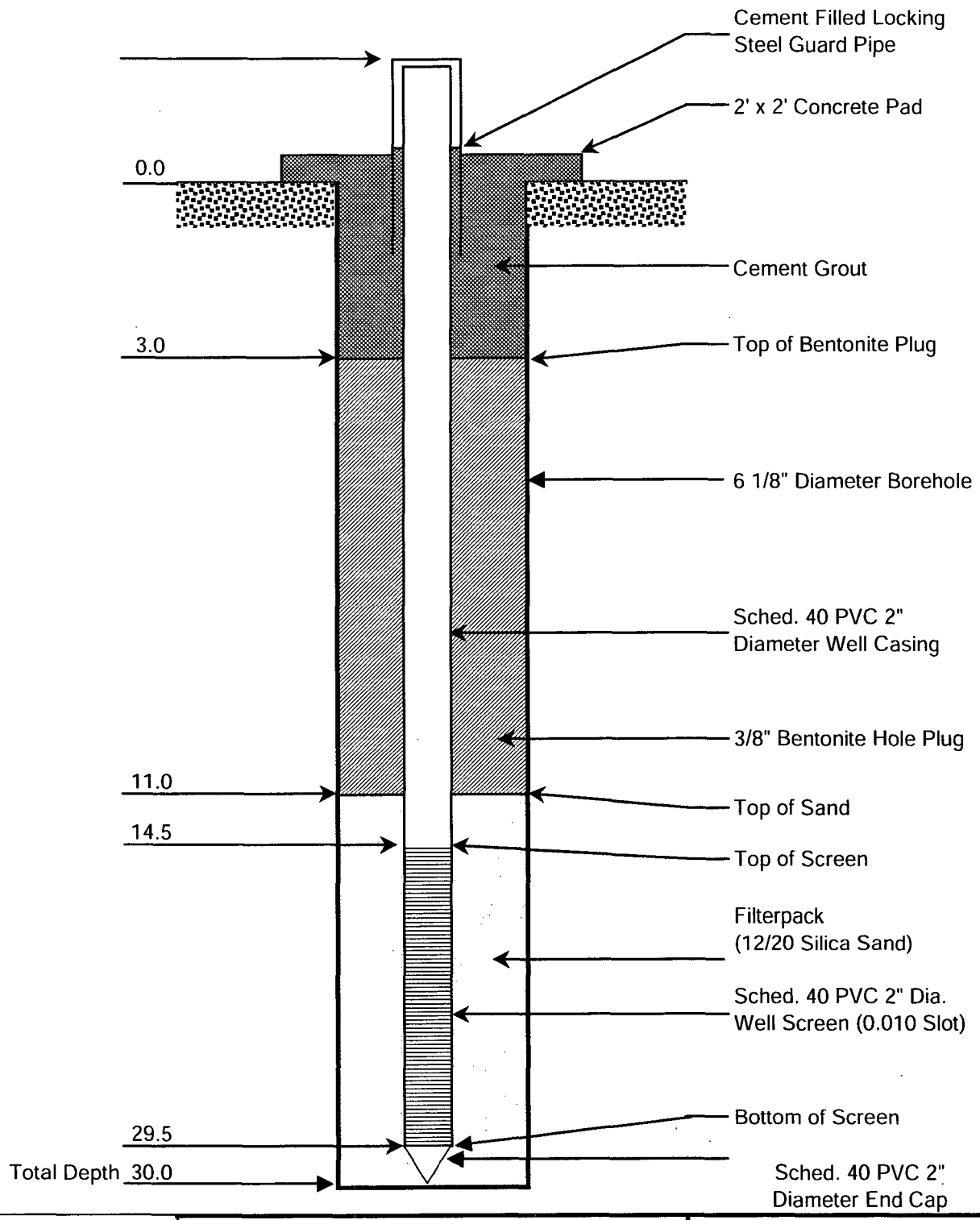
Not to Scale



TRIDENT	SITE: Duke Energy Field Services-Eldridge Ranch		**MW-22 Monitoring Well Construction Diagram**
	DATE: 10/22/02	REV. NO.: 1	
	AUTHOR: JMF	DRAWN BY: JMF	
	CK'D BY:	FILE: Well Bore Diagram	

MONITORING WELL CONSTRUCTION DIAGRAM (MW-23)

Not to Scale



TRIDENT ENVIRONMENTAL	SITE: Duke Energy Field Services-Eldridge Ranch		**MW-23 Monitoring Well Construction Diagram**
	DATE: 10/22/02	REV. NO.: 1	
	AUTHOR: JMF	DRAWN BY: JMF	
	CK'D BY:	FILE: Well Bore Diagram	

APPENDIX 2

OCTOBER 2002 FIELD FORMS AND LABORATORY REPORT FOR GROUNDWATER

WELL SAMPLING DATA FORM

CLIENT: Duke Energy Field Services
WELL ID: **MW-15**
SITE NAME: Eldridge Ranch Site
DATE: 10/10/2002
PROJECT NO. F-105
SAMPLER: Littlejohn / Fergerson

PURGING METHOD: ☐ Hand Bailed ☑ Pump If Pump, Type: Whaler (2-stage)
SAMPLING METHOD: ☐ Disposable Bailer ☐ Direct from Discharge Hose ☐ Other:

DESCRIBE EQUIPMENT DECONTAMINATION METHOD BEFORE SAMPLING THE WELL:

☑ Gloves ☑ Alconox ☑ Distilled Water Rinse ☐ Other:

DISPOSAL METHOD OF PURGE WATER: ☐ Surface Discharge ☐ Drums ☑ Disposal Facility (Frac Tank)

TOTAL DEPTH OF WELL: 38.71 Feet
DEPTH TO WATER: 27.05 Feet
HEIGHT OF WATER COLUMN: 11.66 Feet
WELL DIAMETER: 2.0 Inch

19.0 Minimum Gallons to purge 10 well volumes (Water Column Height x 1.63)

TIME	VOLUME PURGED	TEMP. °C	COND. *m*S/cm	pH	DO mg/L	Turb	PHYSICAL APPEARANCE AND REMARKS
10:54							Begin Pumping
10:58	4	19.8	0.484	7.06	9.2	0	Sal = 0.02 %
11:02	8	19.9	0.484	7.07	9.01	0	Sal = 0.02 %
11:05	12	19.8	0.483	7.1	9.16	0	Sal = 0.02 %
11:08	16	19.8	0.482	7.13	9.15	0	Sal = 0.02 %
11:11	20	19.8	0.482	7.07	9.14	0	Sal = 0.01 %

0:17 :Total Time (hr:min) **20** :Total Vol (gal) **1.17** :Flow Rate (gal/min)

SAMPLE NO.: Collected Sample No.:
ANALYSES:
COMMENTS:

WELL SAMPLING DATA FORM

CLIENT: Duke Energy Field Services
WELL ID: **MW-16**
SITE NAME: Eldridge Ranch Site
DATE: 10/10/2002
PROJECT NO. F-105
SAMPLER: Littlejohn / Fergerson

PURGING METHOD: ☐ Hand Bailed ☑ Pump If Pump, Type: Whaler (2-stage)
SAMPLING METHOD: ☐ Disposable Bailer ☐ Direct from Discharge Hose ☐ Other:

DESCRIBE EQUIPMENT DECONTAMINATION METHOD BEFORE SAMPLING THE WELL:

☑ Gloves ☑ Alconox ☑ Distilled Water Rinse ☐ Other:

DISPOSAL METHOD OF PURGE WATER: ☐ Surface Discharge ☐ Drums ☑ Disposal Facility (Frac Tank)

TOTAL DEPTH OF WELL: 27.83 Feet
DEPTH TO WATER: 18.66 Feet
HEIGHT OF WATER COLUMN: 9.17 Feet
WELL DIAMETER: 2.0 Inch

4.5 Minimum Gallons to purge 10 well volumes (Water Column Height x 1.63)

TIME	VOLUME PURGED	TEMP. °C	COND. *m*S/cm	pH	DO mg/L	Turb	PHYSICAL APPEARANCE AND REMARKS
15:00							Begin Pumping
15:03	4	19.7	0.570	6.96	1.84	999	Sal = 0.02 %
15:07	8	19.2	0.561	6.91	4.37	999	Sal = 0.02 %
15:10	12	19	0.555	6.91	6.99	999	Sal = 0.02 %
15:14	16	19	0.554	6.89	7.29	999	Sal = 0.02 %
15:17	20	19.1	0.555	6.90	7.26	560	Sal = 0.02 %
15:21	24	19	0.555	6.90	7.36	471	Sal = 0.02 %
15:25	28	19	0.554	6.90	7.4	16	Sal = 0.02 %
15:29	32	19.1	0.555	6.88	7.41	0	Sal = 0.02 %
0:29 :Total Time (hr:min)			**32** :Total Vol (gal)			**1.10** :Flow Rate (gal/min)	

SAMPLE NO.: Collected Sample No.:
ANALYSES:
COMMENTS:

WELL SAMPLING DATA FORM

CLIENT: Duke Energy Field Services
WELL ID: **MW-17**
SITE NAME: Eldridge Ranch Site
DATE: 10/10/2002
PROJECT NO. F-105
SAMPLER: Littlejohn / Fergerson

PURGING METHOD: ☐ Hand Bailed ☑ Pump If Pump, Type: Whaler (2-stage)
SAMPLING METHOD: ☐ Disposable Bailer ☐ Direct from Discharge Hose ☐ Other:

DESCRIBE EQUIPMENT DECONTAMINATION METHOD BEFORE SAMPLING THE WELL:
☑ Gloves ☑ Alconox ☑ Distilled Water Rinse ☐ Other:

DISPOSAL METHOD OF PURGE WATER: ☐ Surface Discharge ☐ Drums ☑ Disposal Facility (Frac Tank)

TOTAL DEPTH OF WELL: 27.85 Feet
DEPTH TO WATER: 15.91 Feet
HEIGHT OF WATER COLUMN: 11.94 Feet
WELL DIAMETER: 2.0 Inch

19.5 Minimum Gallons to purge 10 well volumes (Water Column Height x 1.63)

TIME	VOLUME PURGED	TEMP. °C	COND. *m*S/cm	pH	DO mg/L	Turb	PHYSICAL APPEARANCE AND REMARKS
14:16							Begin Pumping
14:18	4	20.6	0.524	6.94	5.45	999	Sal = 0.02%
14:21	8	19.6	0.522	6.93	6.85	322	Sal = 0.02%
14:26	12	19.6	0.522	6.91	6.94	101	Sal = 0.02%
14:29	16	19.5	0.523	6.89	7.04	47	Sal = 0.02%
14:32	20	19.5	0.523	6.90	7.11	15	Sal = 0.02%
14:35	24	19.5	0.524	6.89	7.17	10	Sal = 0.02%
14:38	28	19.5	0.524	6.92	7.22	10	Sal = 0.02%
14:41	32	19.5	0.524	6.91	7.13	0	Sal = 0.02%
0:25	:Total Time (hr:min)		**32**	:Total Vol (gal)		**1.28**	:Flow Rate (gal/min)

SAMPLE NO.: Collected Sample No.:
ANALYSES:
COMMENTS:

WELL SAMPLING DATA FORM

CLIENT: Duke Energy Field Services
WELL ID: **MW-18**
SITE NAME: Eldridge Ranch Site
DATE: 10/10/2002
PROJECT NO. F-105
SAMPLER: Littlejohn / Fergerson

PURGING METHOD: ☐ Hand Bailed ☑ Pump If Pump, Type: Whaler (2-stage)
SAMPLING METHOD: ☐ Disposable Bailer ☐ Direct from Discharge Hose ☐ Other:
DESCRIBE EQUIPMENT DECONTAMINATION METHOD BEFORE SAMPLING THE WELL:
☑ Gloves ☑ Alconox ☑ Distilled Water Rinse ☐ Other:

DISPOSAL METHOD OF PURGE WATER: ☐ Surface Discharge ☐ Drums ☑ Disposal Facility (Frac Tank)

TOTAL DEPTH OF WELL: 34.87 Feet
DEPTH TO WATER: 23.34 Feet
HEIGHT OF WATER COLUMN: 11.53 Feet
WELL DIAMETER: 2.0 Inch

18.8 Minimum Gallons to purge 10 well volumes (Water Column Height x 1.63)

TIME	VOLUME PURGED	TEMP. °C	COND. *m*S/cm	pH	DO mg/L	Turb	PHYSICAL APPEARANCE AND REMARKS
8:50							Begin Pumping
8:53	4	18.7	0.711	6.75	0.25	999	Sal = 0.03%
8:57	8	19.0	0.710	6.75	0.28	136	Sal = 0.03%
9:00	12	19.1	0.709	6.73	0.19	419	Sal = 0.03%
9:03	16	19.1	0.709	6.73	0.32	95	Sal = 0.03%
9:07	20	19.1	0.709	6.74	0.26	0	Sal = 0.03%
9:10	24	19.1	0.709	6.73	0.26	0	Sal = 0.03%
9:13	28	19.1	0.709	6.71	0.25	0	Sal = 0.03%
0:23	:Total Time (hr:min)		**28**	:Total Vol (gal)		**1.21**	:Flow Rate (gal/min)

SAMPLE NO.: Collected Sample No.:
ANALYSES:
COMMENTS:

WELL SAMPLING DATA FORM

CLIENT: Duke Energy Field Services
WELL ID: **MW-19**
SITE NAME: Eldridge Ranch Site
DATE: 10/10/2002
PROJECT NO. F-105
SAMPLER: Littlejohn / Fergerson

PURGING METHOD: ☐ Hand Bailed ☑ Pump If Pump, Type: Whaler (2-stage)
SAMPLING METHOD: ☐ Disposable Bailer ☐ Direct from Discharge Hose ☐ Other:
DESCRIBE EQUIPMENT DECONTAMINATION METHOD BEFORE SAMPLING THE WELL:
☑ Gloves ☑ Alconox ☑ Distilled Water Rinse ☐ Other:

DISPOSAL METHOD OF PURGE WATER: ☐ Surface Discharge ☐ Drums ☑ Disposal Facility (Frac Tank)

TOTAL DEPTH OF WELL: 29.86 Feet
DEPTH TO WATER: 18.29 Feet
HEIGHT OF WATER COLUMN: 11.57 Feet
WELL DIAMETER: 2.0 Inch

18.9 Minimum Gallons to purge 10 well volumes (Water Column Height x 1.63)

TIME	VOLUME PURGED	TEMP. °C	COND. *m*S/cm	pH	DO mg/L	Turb	PHYSICAL APPEARANCE AND REMARKS
8:06							Begin Pumping
8:08	4	18.1	0.676	6.67	2.55	999	Sal = 0.02%
8:11	8	18.4	0.670	6.74	2.76	168	Sal = 0.02%
8:14	12	18.4	0.672	6.75	2.84	89	Sal = 0.02%
8:17	16	18.4	0.673	6.72	2.92	62	Sal = 0.02%
8:20	20	18.5	0.672	6.75	2.89	0	Sal = 0.02%
8:23	24	18.5	0.672	6.75	3.10	0	Sal = 0.02%
8:26	28	18.5	0.673	6.70	3.05	0	Sal = 0.02%

0:20 :Total Time (hr:min) **28** :Total Vol (gal) **1.40** :Flow Rate (gal/min)

SAMPLE NO.: Collected Sample No.:
ANALYSES:
COMMENTS:

WELL SAMPLING DATA FORM

CLIENT: Duke Energy Field Services
WELL ID: **MW-20**
SITE NAME: Eldridge Ranch Site
DATE: 10/10/2002
PROJECT NO. F-105
SAMPLER: Littlejohn / Fergerson

PURGING METHOD: ☐ Hand Bailed ☑ Pump If Pump, Type: Whaler (2-stage)
SAMPLING METHOD: ☐ Disposable Bailer ☐ Direct from Discharge Hose ☐ Other:
DESCRIBE EQUIPMENT DECONTAMINATION METHOD BEFORE SAMPLING THE WELL:
☑ Gloves ☑ Alconox ☑ Distilled Water Rinse ☐ Other:

DISPOSAL METHOD OF PURGE WATER: ☐ Surface Discharge ☐ Drums ☑ Disposal Facility (Frac Tank)

TOTAL DEPTH OF WELL: 35.01 Feet
DEPTH TO WATER: 31.43 Feet
HEIGHT OF WATER COLUMN: 3.58 Feet
WELL DIAMETER: 2.0 Inch

5.8 Minimum Gallons to purge 10 well volumes (Water Column Height x 1.63)

TIME	VOLUME PURGED	TEMP. °C	COND. *m*S/cm	pH	DO mg/L	Turb	PHYSICAL APPEARANCE AND REMARKS
9:37							Begin Pumping
9:44	4	19.1	0.691	6.97	6.79	569	Sal = 0.02%
9:54	8	19.5	0.683	6.96	7.85	0	Sal = 0.02%
10:04	12	19.5	0.681	6.96	8.07	0	Sal = 0.02%
10:13	16	19.6	0.682	7.00	8.13	0	Sal = 0.02%
0:36	:Total Time (hr:min)		**16**	:Total Vol (gal)		**0.44**	:Flow Rate (gal/min)

SAMPLE NO.: Collected Sample No.:
ANALYSES:
COMMENTS:

WELL SAMPLING DATA FORM

CLIENT: Duke Energy Field Services
WELL ID: **MW-21**
SITE NAME: Eldridge Ranch Site
DATE: 10/10/2002
PROJECT NO. F-105
SAMPLER: Littlejohn / Fergerson

PURGING METHOD: ☐ Hand Bailed ☑ Pump If Pump, Type: Whaler (2-stage)
SAMPLING METHOD: ☐ Disposable Bailer ☐ Direct from Discharge Hose ☐ Other:
DESCRIBE EQUIPMENT DECONTAMINATION METHOD BEFORE SAMPLING THE WELL:
☑ Gloves ☑ Alconox ☑ Distilled Water Rinse ☐ Other:

DISPOSAL METHOD OF PURGE WATER: ☐ Surface Discharge ☐ Drums ☑ Disposal Facility (Frac Tank)

TOTAL DEPTH OF WELL: 37.89 Feet
DEPTH TO WATER: 26.98 Feet
HEIGHT OF WATER COLUMN: 10.91 Feet
WELL DIAMETER: 2.0 Inch

17.8 Minimum Gallons to purge 10 well volumes (Water Column Height x 1.63)

TIME	VOLUME PURGED	TEMP. °C	COND. *m*S/cm	pH	DO mg/L	Turb	PHYSICAL APPEARANCE AND REMARKS
11:34							Begin Pumping
11:37	4	20.0	0.569	6.76	0.69	999	Sal = 0.02%
11:40	8	19.7	0.516	6.98	1.20	500	Sal = 0.02%
11:44	12	19.7	0.504	7.04	1.36	0	Sal = 0.02%
11:47	16	19.7	0.502	6.95	1.51	0	Sal = 0.02%
11:52	20	19.7	0.501	6.95	1.54	0	Sal = 0.02%
11:55	24	19.6	0.501	6.91	1.62	0	Sal = 0.02%
0:21	:Total Time (hr:min)		**24**	:Total Vol (gal)		**1.14**	:Flow Rate (gal/min)

SAMPLE NO.: Collected Sample No.:
ANALYSES:
COMMENTS:

WELL SAMPLING DATA FORM

CLIENT: Duke Energy Field Services
WELL ID: **MW-22**
SITE NAME: Eldridge Ranch Site
DATE: 10/10/2002
PROJECT NO. F-105
SAMPLER: Littlejohn / Fergerson

PURGING METHOD: ☐ Hand Bailed ☑ Pump If Pump, Type: Whaler (2-stage)
SAMPLING METHOD: ☐ Disposable Bailer ☐ Direct from Discharge Hose ☐ Other:
DESCRIBE EQUIPMENT DECONTAMINATION METHOD BEFORE SAMPLING THE WELL:
☑ Gloves ☑ Alconox ☑ Distilled Water Rinse ☐ Other:

DISPOSAL METHOD OF PURGE WATER: ☐ Surface Discharge ☐ Drums ☑ Disposal Facility (Frac Tank)

TOTAL DEPTH OF WELL: 34.92 Feet
DEPTH TO WATER: 22.88 Feet
HEIGHT OF WATER COLUMN: 12.04 Feet
WELL DIAMETER: 2.0 Inch

19.6 Minimum Gallons to purge 10 well volumes (Water Column Height x 1.63)

TIME	VOLUME PURGED	TEMP. °C	COND. *m*S/cm	pH	DO mg/L	Turb	PHYSICAL APPEARANCE AND REMARKS
12:16							Begin Pumping
12:21	4	19.7	0.551	6.95	3.58	999	Sal = 0.02% (very sandy)
12:24	8	19.5	0.556	6.91	3.80	871	Sal = 0.02%
12:27	12	19.5	0.558	6.76	4.00	184	Sal = 0.02%
12:31	16	19.4	0.559	6.9	4.05	34	Sal = 0.02%
12:34	20	19.5	0.559	6.79	4.05	0	Sal = 0.02%
12:37	24	19.4	0.559	6.82	4.06	0	Sal = 0.02%
12:40	28	19.4	0.559	6.85	4.07	0	Sal = 0.02%
0:24	:Total Time (hr:min)		**28**	:Total Vol (gal)		**1.16**	:Flow Rate (gal/min)

SAMPLE NO.: Collected Sample No.:
ANALYSES:
COMMENTS:

WELL SAMPLING DATA FORM

CLIENT: Duke Energy Field Services
WELL ID: **MW-15**
SITE NAME: Eldridge Ranch Site
DATE: 10/11/2002
PROJECT NO. F-105
SAMPLER: Littlejohn / Fergerson

PURGING METHOD: ☑ Hand Bailed ☐ Pump If Pump, Type: _____

SAMPLING METHOD: ☑ Disposable Bailer ☐ Direct from Discharge Hose ☐ Other: _____

DESCRIBE EQUIPMENT DECONTAMINATION METHOD BEFORE SAMPLING THE WELL:

☑ Gloves ☑ Alconox ☑ Distilled Water Rinse ☐ Other: _____

DISPOSAL METHOD OF PURGE WATER: ☐ Surface Discharge ☐ Drums ☑ Disposal Facility

TOTAL DEPTH OF WELL: 38.71 Feet
DEPTH TO WATER: 27.05 Feet
HEIGHT OF WATER COLUMN: 11.66 Feet
WELL DIAMETER: 2.0 Inch

5.7 Minimum Gallons to purge 3 well volumes (Water Column Height x 0.49)

TIME	VOLUME PURGED	TEMP. °C	COND. *m*S/cm	pH	DO mg/L	Turb	PHYSICAL APPEARANCE AND REMARKS
12:06							Begin Hand Bailing
12:09	2	19.9	0.526	6.81	9.29	0	Sal = 0.02%
12:13	4	19.8	0.525	6.82	9.56	0	Sal = 0.02%
12:16	6	19.8	0.524	6.9	9.57	0	Sal = 0.02%

0:10 :Total Time (hr:min) **6** :Total Vol (gal) **0.60** :Flow Rate (gal/min)

SAMPLE NO.: Collected Sample No.: 021011 1220

ANALYSES: BTEX (8021-B), GRO (8015-G) DRO (8015-G), Major Ions, TDS, Metals (Fe, Ba, Mn)

COMMENTS: _____

WELL SAMPLING DATA FORM

CLIENT: Duke Energy Field Services
WELL ID: **MW-16**
SITE NAME: Eldridge Ranch Site
DATE: 10/11/2002
PROJECT NO. F-105
SAMPLER: Littlejohn / Fergerson

PURGING METHOD: ☑ Hand Bailed ☐ Pump If Pump, Type: _____

SAMPLING METHOD: ☑ Disposable Bailer ☐ Direct from Discharge Hose ☐ Other: _____

DESCRIBE EQUIPMENT DECONTAMINATION METHOD BEFORE SAMPLING THE WELL:

☑ Gloves ☑ Alconox ☑ Distilled Water Rinse ☐ Other: _____

DISPOSAL METHOD OF PURGE WATER: ☐ Surface Discharge ☐ Drums ☑ Disposal Facility

TOTAL DEPTH OF WELL: 27.83 Feet
DEPTH TO WATER: 18.66 Feet
HEIGHT OF WATER COLUMN: 9.17 Feet
WELL DIAMETER: 2.0 Inch

4.5 Minimum Gallons to purge 3 well volumes (Water Column Height x 0.49)

TIME	VOLUME PURGED	TEMP. °C	COND. *m*S/cm	pH	DO mg/L	Turb	PHYSICAL APPEARANCE AND REMARKS
15:03							Begin Hand Bailing
15:06	2	19.2	0.606	6.78	7.57	999	Sal = 0.02%
15:09	4	19.0	0.602	6.78	7.49	999	Sal = 0.02%
15:14	6	19.0	0.603	6.8	7.66	999	Sal = 0.02%
0:11	:Total Time (hr:min)		**6**	:Total Vol (gal)		**0.54**	:Flow Rate (gal/min)

SAMPLE NO.: Collected Sample No.: 021011 1520

ANALYSES: BTEX (8021-B), GRO (8015-G) DRO (8015-G), Major Ions, TDS, Metals (Fe, Ba, Mn)

COMMENTS: _____

WELL SAMPLING DATA FORM

CLIENT: Duke Energy Field Services
WELL ID: **MW-17**
SITE NAME: Eldridge Ranch Site
DATE: 10/11/2002
PROJECT NO. F-105
SAMPLER: Littlejohn / Fergerson

PURGING METHOD: ☑ Hand Bailed ☐ Pump If Pump, Type: _____

SAMPLING METHOD: ☑ Disposable Bailer ☐ Direct from Discharge Hose ☐ Other: _____

DESCRIBE EQUIPMENT DECONTAMINATION METHOD BEFORE SAMPLING THE WELL:

☑ Gloves ☑ Alconox ☑ Distilled Water Rinse ☐ Other: _____

DISPOSAL METHOD OF PURGE WATER: ☐ Surface Discharge ☐ Drums ☑ Disposal Facility

TOTAL DEPTH OF WELL: 27.85 Feet
DEPTH TO WATER: 15.91 Feet
HEIGHT OF WATER COLUMN: 11.94 Feet
WELL DIAMETER: 2.0 Inch

5.8 Minimum Gallons to purge 3 well volumes (Water Column Height x 0.49)

TIME	VOLUME PURGED	TEMP. °C	COND. *m*S/cm	pH	DO mg/L	Turb	PHYSICAL APPEARANCE AND REMARKS
14:30							Begin Hand Bailing
14:33	2	19.9	0.559	6.74	5.35	999	Sal = 0.02%
14:36	4	19.8	0.564	6.78	6.33	999	Sal = 0.02%
14:39	6	19.6	0.565	6.79	6.79	999	Sal = 0.02%
0:09 :Total Time (hr:min)			**6** :Total Vol (gal)			**0.66**	:Flow Rate (gal/min)

SAMPLE NO.: Collected Sample No.: 021011 1445

ANALYSES: BTEX (8021-B), GRO (8015-G) DRO (8015-G), Major Ions, TDS, Metals (Fe, Ba, Mn)

COMMENTS: _____

WELL SAMPLING DATA FORM

CLIENT: Duke Energy Field Services
WELL ID: **MW-18**
SITE NAME: Eldridge Ranch Site
DATE: 10/11/2002
PROJECT NO. F-105
SAMPLER: Littlejohn / Fergerson

PURGING METHOD: ☑ Hand Bailed ☐ Pump If Pump, Type: _____

SAMPLING METHOD: ☑ Disposable Bailer ☐ Direct from Discharge Hose ☐ Other: _____

DESCRIBE EQUIPMENT DECONTAMINATION METHOD BEFORE SAMPLING THE WELL:

☑ Gloves ☑ Alconox ☑ Distilled Water Rinse ☐ Other: _____

DISPOSAL METHOD OF PURGE WATER: ☐ Surface Discharge ☐ Drums ☑ Disposal Facility

TOTAL DEPTH OF WELL: 34.87 Feet
DEPTH TO WATER: 23.34 Feet
HEIGHT OF WATER COLUMN: 11.53 Feet
WELL DIAMETER: 2.0 Inch

5.6 Minimum Gallons to purge 3 well volumes (Water Column Height x 0.49)

TIME	VOLUME PURGED	TEMP. °C	COND. *m*S/cm	pH	DO mg/L	Turb	PHYSICAL APPEARANCE AND REMARKS
10:38							Begin Hand Bailing
10:44	2	19.1	0.773	6.53	1.25	999	Sal = 0.03%
10:48	4	19.2	0.774	6.56	1.01	999	Sal = 0.03%
10:52	6	19.2	0.771	6.60	1.18	999	Sal = 0.03%
0:14	:Total Time (hr:min)		**6**	:Total Vol (gal)		**0.43**	:Flow Rate (gal/min)

SAMPLE NO.: Collected Sample No.: 021011 1053

ANALYSES: BTEX (8021-B), GRO (8015-G) DRO (8015-G), Major Ions, TDS, Metals (Fe, Ba, Mn)

COMMENTS: _____

WELL SAMPLING DATA FORM

CLIENT: Duke Energy Field Services
WELL ID: **MW-19**
SITE NAME: Eldridge Ranch Site
DATE: 10/11/2002
PROJECT NO. F-105
SAMPLER: Littlejohn / Fergerson

PURGING METHOD: ☑ Hand Bailed ☐ Pump If Pump, Type: _____

SAMPLING METHOD: ☑ Disposable Bailer ☐ Direct from Discharge Hose ☐ Other: _____

DESCRIBE EQUIPMENT DECONTAMINATION METHOD BEFORE SAMPLING THE WELL:

☑ Gloves ☑ Alconox ☑ Distilled Water Rinse ☐ Other: _____

DISPOSAL METHOD OF PURGE WATER: ☐ Surface Discharge ☐ Drums ☑ Disposal Facility

TOTAL DEPTH OF WELL: 29.86 Feet
DEPTH TO WATER: 18.29 Feet
HEIGHT OF WATER COLUMN: 11.57 Feet
WELL DIAMETER: 2.0 Inch

5.7 Minimum Gallons to purge 3 well volumes (Water Column Height x 0.49)

TIME	VOLUME PURGED	TEMP. °C	COND. *m*S/cm	pH	DO mg/L	Turb	PHYSICAL APPEARANCE AND REMARKS
9:40							Begin Hand Bailing
9:44	2	18.5	0.717	6.64	3.81	992	Sal = 0.03%
9:49	4	18.8	0.697	6.76	3.07	999	Sal = 0.02%
9:54	6	18.7	0.704	6.76	3.40	999	Sal = 0.03%
0:14 :Total Time (hr:min)			**6** :Total Vol (gal)			**0.43** :Flow Rate (gal/min)	

SAMPLE NO.: Collected Sample No.: 021011 1000

ANALYSES: BTEX (8021-B), GRO (8015-G) DRO (8015-G), Major Ions, TDS, Metals (Fe, Ba, Mn)

COMMENTS: _____

WELL SAMPLING DATA FORM

CLIENT: Duke Energy Field Services
WELL ID: **MW-20**
SITE NAME: Eldridge Ranch Site
DATE: 10/11/2002
PROJECT NO. F-105
SAMPLER: Littlejohn / Fergerson

PURGING METHOD: ☑ Hand Bailed ☐ Pump If Pump, Type: _____

SAMPLING METHOD: ☑ Disposable Bailer ☐ Direct from Discharge Hose ☐ Other: _____

DESCRIBE EQUIPMENT DECONTAMINATION METHOD BEFORE SAMPLING THE WELL:

☑ Gloves ☑ Alconox ☑ Distilled Water Rinse ☐ Other: _____

DISPOSAL METHOD OF PURGE WATER: ☐ Surface Discharge ☐ Drums ☑ Disposal Facility

TOTAL DEPTH OF WELL: 35.01 Feet
DEPTH TO WATER: 31.43 Feet
HEIGHT OF WATER COLUMN: 3.58 Feet
WELL DIAMETER: 2.0 Inch

1.8 Minimum Gallons to purge 3 well volumes (Water Column Height x 0.49)

TIME	VOLUME PURGED	TEMP. °C	COND. *m*S/cm	pH	DO mg/L	Turb	PHYSICAL APPEARANCE AND REMARKS
11:16							Begin Hand Bailing
11:24	2	19.6	0.746	6.88	8.21	999	Sal = 0.03%
11:30	4	19.6	0.740	6.95	8.13	999	Sal = 0.03%
11:36	6	19.8	0.740	6.92	8.45	530	Sal = 0.03%
0:20 :Total Time (hr:min)			**6** :Total Vol (gal)			**0.30** :Flow Rate (gal/min)	

SAMPLE NO.: Collected Sample No.: 021011 1140

ANALYSES: BTEX (8021-B), GRO (8015-G) DRO (8015-G), Major Ions, TDS, Metals (Fe, Ba, Mn)

COMMENTS: _____

WELL SAMPLING DATA FORM

CLIENT: Duke Energy Field Services
WELL ID: **MW-21**
SITE NAME: Eldridge Ranch Site
DATE: 10/11/2002
PROJECT NO. F-105
SAMPLER: Littlejohn / Fergerson

PURGING METHOD: ☑ Hand Bailed ☐ Pump If Pump, Type: _____

SAMPLING METHOD: ☑ Disposable Bailer ☐ Direct from Discharge Hose ☐ Other: _____

DESCRIBE EQUIPMENT DECONTAMINATION METHOD BEFORE SAMPLING THE WELL:

☑ Gloves ☑ Alconox ☑ Distilled Water Rinse ☐ Other: _____

DISPOSAL METHOD OF PURGE WATER: ☐ Surface Discharge ☐ Drums ☑ Disposal Facility

TOTAL DEPTH OF WELL: 37.89 Feet
DEPTH TO WATER: 26.98 Feet
HEIGHT OF WATER COLUMN: 10.91 Feet
WELL DIAMETER: 2.0 Inch

5.3 Minimum Gallons to purge 3 well volumes (Water Column Height x 0.49)

TIME	VOLUME PURGED	TEMP. °C	COND. *m*S/cm	pH	DO mg/L	Turb	PHYSICAL APPEARANCE AND REMARKS
12:40							Begin Hand Bailing
12:45	2	19.8	0.572	6.64	1.33	999	Sal = 0.02%
12:48	4	19.6	0.561	6.73	1.83	999	Sal = 0.02%
12:52	6	19.6	0.557	6.84	2.08	999	Sal = 0.02%
12:55	8	19.6	0.557	6.83	2.24	999	Sal = 0.02%
0:15	:Total Time (hr:min)		**8**	:Total Vol (gal)		**0.53**	:Flow Rate (gal/min)

SAMPLE NO.: Collected Sample No.: 021011 1300

ANALYSES: BTEX (8021-B), GRO (8015-G) DRO (8015-G), Major Ions, TDS, Metals (Fe, Ba, Mn)

COMMENTS: _____

WELL SAMPLING DATA FORM

CLIENT: Duke Energy Field Services
WELL ID: **MW-22**
SITE NAME: Eldridge Ranch Site
DATE: 10/11/2002
PROJECT NO. F-105
SAMPLER: Littlejohn / Fergerson

PURGING METHOD: ☑ Hand Bailed ☐ Pump If Pump, Type: _____

SAMPLING METHOD: ☑ Disposable Bailer ☐ Direct from Discharge Hose ☐ Other: _____

DESCRIBE EQUIPMENT DECONTAMINATION METHOD BEFORE SAMPLING THE WELL:

☑ Gloves ☑ Alconox ☑ Distilled Water Rinse ☐ Other: _____

DISPOSAL METHOD OF PURGE WATER: ☐ Surface Discharge ☐ Drums ☑ Disposal Facility

TOTAL DEPTH OF WELL: 34.92 Feet
DEPTH TO WATER: 22.88 Feet
HEIGHT OF WATER COLUMN: 12.04 Feet
WELL DIAMETER: 2.0 Inch

5.9 Minimum Gallons to purge 3 well volumes (Water Column Height x 0.49)

TIME	VOLUME PURGED	TEMP. °C	COND. *m*S/cm	pH	DO mg/L	Turb	PHYSICAL APPEARANCE AND REMARKS
13:25							Begin Hand Bailing
13:30	2	19.5	0.600	6.67	3.46	965	Sal = 0.02%
13:35	4	19.4	0.601	6.75	4.21	999	Sal = 0.02%
13:40	6	19.3	0.602	6.8	4.48	999	Sal = 0.02%
13:44	8	19.1	0.602	6.81	4.50	999	Sal = 0.02%

0:19 :Total Time (hr:min) **8** :Total Vol (gal) **0.42** :Flow Rate (gal/min)

SAMPLE NO.: Collected Sample No.: 021011 1350

ANALYSES: BTEX (8021-B), GRO (8015-G) DRO (8015-G), Major Ions, TDS, Metals (Fe, Ba, Mn)

COMMENTS: _____

ANALYTICAL REPORT

Prepared for:

JOHN FERGERSON
TRIDENT ENVIRONMENTAL
P.O BOX 7624
MIDLAND, TX 79708

Project:	DEFS: Eldridge
PO#:	F-105
Order#:	G0204761
Report Date:	10/22/2002

Certificates
US EPA Laboratory Code TX00158

ENVIRONMENTAL LAB OF TEXAS

SAMPLE WORK LIST

TRIDENT ENVIRONMENTAL
P.O BOX 7624
MIDLAND, TX 79708
262-5216

Order#: G0204761
Project: F-105
Project Name: DEFS: Eldridge
Location: DEFS: Eldridge

The samples listed below were submitted to Environmental Lab of Texas and were received under chain of custody. Environmental Lab of Texas makes no representation or certification as to the method of sample collection, sample identification, or transportation/handling procedures used prior to the receipt of samples by Environmental Lab of Texas, unless otherwise noted.

Lab ID:	Sample :	Matrix:	Date / Time Collected	Date / Time Received	Container	Preservative
0204761-01	MW-19	WATER	10/11/02 10:00	10/11/02 17:40	See COC	See COC

Lab Testing: Rejected: No Temp: 0.5 C

8015M
8021B/5030 BTEX
Anions
Cations
Barium
Barium,Dissolved
Fluoride
Iron
Iron, Dissolved
Manganese
Manganese, Dissolved
Nitrogen, Nitrate
Total Dissolved Solids (TDS)

0204761-02	MW-18	WATER	10/11/02 10:53	10/11/02 17:40	See COC	See COC

Lab Testing: Rejected: No Temp: 0.5 C

8015M
8021B/5030 BTEX
Anions
Cations
Barium
Barium,Dissolved
Fluoride
Iron
Iron, Dissolved
Manganese
Manganese, Dissolved
Nitrogen, Nitrate
Total Dissolved Solids (TDS)

0204761-03	MW-20	WATER	10/11/02 11:40	10/11/02 17:40	See COC	See COC

Lab Testing: Rejected: No Temp: 0.5 C

ENVIRONMENTAL LAB OF TEXAS

SAMPLE WORK LIST

TRIDENT ENVIRONMENTAL
P.O BOX 7624
MIDLAND, TX 79708
262-5216

Order#: G0204761
Project: F-105
Project Name: DEFS: Eldridge
Location: DEFS: Eldridge

The samples listed below were submitted to Environmental Lab of Texas and were received under chain of custody. Environmental Lab of Texas makes no representation or certification as to the method of sample collection, sample identification, or transportation/handling procedures used prior to the receipt of samples by Environmental Lab of Texas, unless otherwise noted.

Lab ID:	Sample :	Matrix:	Date / Time Collected	Date / Time Received	Container	Preservative
	8015M					
	8021B/5030 BTEX					
	Anions					
	Cations					
	Barium					
	Barium,Dissolved					
	Fluoride					
	Iron					
	Iron, Dissolved					
	Manganese					
	Manganese, Dissolved					
	Nitrogen, Nitrate					
	Total Dissolved Solids (TDS)					
0204761-04	MW-15	WATER	10/11/02 12:20	10/11/02 17:40	See COC	See COC
	Lab Testing:	Rejected: No		Temp: 0.5 C		
	8015M					
	8021B/5030 BTEX					
	Anions					
	Cations					
	Barium					
	Barium,Dissolved					
	Fluoride					
	Iron					
	Iron, Dissolved					
	Manganese					
	Manganese, Dissolved					
	Nitrogen, Nitrate					
	Total Dissolved Solids (TDS)					
0204761-05	MW-21	WATER	10/11/02 13:00	10/11/02 17:40	See COC	See COC
	Lab Testing:	Rejected: No		Temp: 0.5 C		
	8015M					
	8021B/5030 BTEX					
	Anions					

ENVIRONMENTAL LAB OF TEXAS

SAMPLE WORK LIST

TRIDENT ENVIRONMENTAL
P.O BOX 7624
MIDLAND, TX 79708
262-5216

Order#: G0204761
Project: F-105
Project Name: DEFS: Eldridge
Location: DEFS: Eldridge

The samples listed below were submitted to Environmental Lab of Texas and were received under chain of custody. Environmental Lab of Texas makes no representation or certification as to the method of sample collection, sample identification, or transportation/handling procedures used prior to the receipt of samples by Environmental Lab of Texas, unless otherwise noted.

Lab ID:	Sample :	Matrix:	Date / Time Collected	Date / Time Received	Container	Preservative
	Cations					
	Barium					
	Barium,Dissolved					
	Fluoride					
	Iron					
	Iron, Dissolved					
	Manganese					
	Manganese, Dissolved					
	Nitrogen, Nitrate					
	Total Dissolved Solids (TDS)					
0204761-06	MW-22	WATER	10/11/02 13:50	10/11/02 17:40	See COC	See COC
	Lab Testing:	**Rejected:** No		**Temp:** 0.5 C		
	8015M					
	8021B/5030 BTEX					
	Anions					
	Cations					
	Barium					
	Barium,Dissolved					
	Fluoride					
	Iron					
	Iron, Dissolved					
	Manganese					
	Manganese, Dissolved					
	Nitrogen, Nitrate					
	Total Dissolved Solids (TDS)					
0204761-07	MW-17	WATER	10/11/02 14:45	10/11/02 17:40	See COC	See COC
	Lab Testing:	**Rejected:** No		**Temp:** 0.5 C		
	8015M					
	8021B/5030 BTEX					
	Anions					
	Cations					
	Barium					
	Barium,Dissolved					

ENVIRONMENTAL LAB OF TEXAS

SAMPLE WORK LIST

TRIDENT ENVIRONMENTAL
P.O BOX 7624
MIDLAND, TX 79708
262-5216

Order#: G0204761
Project: F-105
Project Name: DEFS: Eldridge
Location: DEFS: Eldridge

The samples listed below were submitted to Environmental Lab of Texas and were received under chain of custody. Environmental Lab of Texas makes no representation or certification as to the method of sample collection, sample identification, or transportation/handling procedures used prior to the receipt of samples by Environmental Lab of Texas, unless otherwise noted.

Lab ID:	Sample :	Matrix:	Date / Time Collected	Date / Time Received	Container	Preservative
	Fluoride					
	Iron					
	Iron, Dissolved					
	Manganese					
	Manganese, Dissolved					
	Nitrogen, Nitrate					
	Total Dissolved Solids (TDS)					
0204761-08	MW-16	WATER	10/11/02 15:20	10/11/02 17:40	See COC	See COC
	Lab Testing:	**Rejected:** No		**Temp:** 0.5 C		
	8015M					
	8021B/5030 BTEX					
	Anions					
	Cations					
	Barium					
	Barium,Dissolved					
	Fluoride					
	Iron					
	Iron, Dissolved					
	Manganese					
	Manganese, Dissolved					
	Nitrogen, Nitrate					
	Total Dissolved Solids (TDS)					
0204761-09	Duplicate A	WATER	10/11/02 0:00	10/11/02 17:40	See COC	See COC
	Lab Testing:	**Rejected:** No		**Temp:** 0.5 C		
	8021B/5030 BTEX					
0204761-10	Trip Blank	WATER	10/11/02	10/11/02 17:40	See COC	See COC
	Lab Testing:	**Rejected:** No,		**Temp:** 0.5 C		
	8021B/5030 BTEX					

ENVIRONMENTAL LAB OF TEXAS

ANALYTICAL REPORT

JOHN FERGERSON
TRIDENT ENVIRONMENTAL
P.O BOX 7624
MIDLAND, TX 79708

Order#: G0204761
Project: F-105
Project Name: DEFS: Eldridge
Location: DEFS: Eldridge

Lab ID: 0204761-04
Sample ID: MW-15

8015M

Method Blank	Date Prepared	Date Analyzed	Sample Amount	Dilution Factor	Analyst	Method
		10/16/02	1	1	CK	8015M

Parameter	Result mg/L	RL
GRO, C6-C12	<3.00	3.00
DRO, >C12-C35	<3.00	3.00
TOTAL, C6-C35	<3.00	3.00

Surrogates	% Recovered	QC Limits (%)	
1-Chlorooctane	88%	70	130
1-Chlorooctadecane	86%	70	130

8021B/5030 BTEX

Method Blank	Date Prepared	Date Analyzed	Sample Amount	Dilution Factor	Analyst	Method
0003450-02		10/15/02 20:17	1	1	CK	8021B

Parameter	Result mg/L	RL
Benzene	0.002	0.001
Ethylbenzene	<0.001	0.001
Toluene	<0.001	0.001
p/m-Xylene	<0.001	0.001
o-Xylene	<0.001	0.001

Surrogates	% Recovered	QC Limits (%)	
aaa-Toluene	87%	80	120
Bromofluorobenzene	90%	80	120

DL = Diluted out N/A = Not Applicable RL = Reporting Limit

ENVIRONMENTAL LAB OF TEXAS

ANALYTICAL REPORT

JOHN FERGERSON		Order#:	G0204761
TRIDENT ENVIRONMENTAL		Project:	F-105
P.O BOX 7624		Project Name:	DEFS: Eldridge
MIDLAND, TX 79708		Location:	DEFS: Eldridge

Lab ID: 0204761-05
Sample ID: MW-21

8015M

Method Blank	Date Prepared	Date Analyzed	Sample Amount	Dilution Factor	Analyst	Method
		10/16/02	1	1	CK	8015M

Parameter	Result mg/L	RL
GRO, C6-C12	<3.00	3.00
DRO, >C12-C35	<3.00	3.00
TOTAL, C6-C35	<3.00	3.00

Surrogates	% Recovered	QC Limits (%)	
1-Chlorooctane	89%	70	130
1-Chlorooctadecane	82%	70	130

8021B/5030 BTEX

Method Blank	Date Prepared	Date Analyzed	Sample Amount	Dilution Factor	Analyst	Method
0003450-02		10/15/02 10:37	1	1	CK	8021B

Parameter	Result mg/L	RL
Benzene	0.010	0.001
Ethylbenzene	0.004	0.001
Toluene	0.022	0.001
p/m-Xylene	0.010	0.001
o-Xylene	0.003	0.001

Surrogates	% Recovered	QC Limits (%)	
aaa-Toluene	120%	80	120
Bromofluorobenzene	94%	80	120

DL = Diluted out N/A = Not Applicable RL = Reporting Limit

ENVIRONMENTAL LAB OF TEXAS

ANALYTICAL REPORT

JOHN FERGERSON		Order#:	G0204761
TRIDENT ENVIRONMENTAL		Project:	F-105
P.O BOX 7624		Project Name:	DEFS: Eldridge
MIDLAND, TX 79708		Location:	DEFS: Eldridge

Lab ID: 0204761-06
Sample ID: MW-22

8015M

Method Blank	Date Prepared	Date Analyzed	Sample Amount	Dilution Factor	Analyst	Method
		10/16/02	1	1	CK	8015M

Parameter	Result mg/L	RL
GRO, C6-C12	<3.00	3.00
DRO, >C12-C35	<3.00	3.00
TOTAL, C6-C35	<3.00	3.00

Surrogates	% Recovered	QC Limits (%)	
1-Chlorooctane	72%	70	130
1-Chlorooctadecane	63%	70	130

8021B/5030 BTEX

Method Blank	Date Prepared	Date Analyzed	Sample Amount	Dilution Factor	Analyst	Method
0003450-02		10/15/02 20:57	1	1	CK	8021B

Parameter	Result mg/L	RL
Benzene	<0.001	0.001
Ethylbenzene	<0.001	0.001
Toluene	<0.001	0.001
p/m-Xylene	<0.001	0.001
o-Xylene	<0.001	0.001

Surrogates	% Recovered	QC Limits (%)	
aaa-Toluene	85%	80	120
Bromofluorobenzene	95%	80	120

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ENVIRONMENTAL LAB OF TEXAS

ANALYTICAL REPORT

JOHN FERGERSON
TRIDENT ENVIRONMENTAL
P.O BOX 7624
MIDLAND, TX 79708

Order#: G0204761
Project: F-105
Project Name: DEFS: Eldridge
Location: DEFS: Eldridge

Lab ID: 0204761-07
Sample ID: MW-17

8015M

Method Blank	Date Prepared	Date Analyzed	Sample Amount	Dilution Factor	Analyst	Method
		10/16/02	1	1	CK	8015M

Parameter	Result mg/L	RL
GRO, C6-C12	<3.00	3.00
DRO, >C12-C35	<3.00	3.00
TOTAL, C6-C35	<3.00	3.00

Surrogates	% Recovered	QC Limits (%)	
1-Chlorooctane	71%	70	130
1-Chlorooctadecane	66%	70	130

8021B/5030 BTEX

Method Blank	Date Prepared	Date Analyzed	Sample Amount	Dilution Factor	Analyst	Method
0003450-02		10/15/02 21:17	1	1	CK	8021B

Parameter	Result mg/L	RL
Benzene	<0.001	0.001
Ethylbenzene	<0.001	0.001
Toluene	<0.001	0.001
p/m-Xylene	<0.001	0.001
o-Xylene	<0.001	0.001

Surrogates	% Recovered	QC Limits (%)	
aaa-Toluene	80%	80	120
Bromofluorobenzene	88%	80	120

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ENVIRONMENTAL LAB OF TEXAS

ANALYTICAL REPORT

JOHN FERGERSON
TRIDENT ENVIRONMENTAL
P.O BOX 7624
MIDLAND, TX 79708

Order#: C0204761
Project: F-105
Project Name: DEFS: Eldridge
Location: DEFS: Eldridge

Lab ID: 0204761-08
Sample ID: MW-16

8015M

Method Blank	Date Prepared	Date Analyzed	Sample Amount	Dilution Factor	Analyst	Method
		10/16/02	1	1	CK	8015M

Parameter	Result mg/L	RL
GRO, C6-C12	<3.00	3.00
DRO, >C12-C35	<3.00	3.00
TOTAL, C6-C35	<3.00	3.00

Surrogates	% Recovered	QC Limits (%)	
1-Chlorooctane	76%	70	130
1-Chlorooctadecane	71%	70	130

8021B/5030 BTEX

Method Blank	Date Prepared	Date Analyzed	Sample Amount	Dilution Factor	Analyst	Method
0003450-02		10/15/02 21:37	1	1	CK	8021B

Parameter	Result mg/L	RL
Benzene	<0.001	0.001
Ethylbenzene	<0.001	0.001
Toluene	<0.001	0.001
p/m-Xylene	<0.001	0.001
o-Xylene	<0.001	0.001

Surrogates	% Recovered	QC Limits (%)	
aaa-Toluene	84%	80	120
Bromofluorobenzene	91%	80	120

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ENVIRONMENTAL LAB OF TEXAS

ANALYTICAL REPORT

JOHN FERGERSON
TRIDENT ENVIRONMENTAL
P.O BOX 7624
MIDLAND, TX 79708

Order#: G0204761
Project: F-105
Project Name: DEFS: Eldridge
Location: DEFS: Eldridge

Lab ID: 0204761-09
Sample ID: Duplicate A

8021B/5030 BTEX

Method Blank	Date Prepared	Date Analyzed	Sample Amount	Dilution Factor	Analyst	Method
0003450-02		10/16/02 9:36	1	1	CK	8021B

Parameter	Result mg/L	RL
Benzene	0.011	0.001
Ethylbenzene	0.004	0.001
Toluene	0.024	0.001
p/m-Xylene	0.010	0.001
o-Xylene	0.002	0.001

Surrogates	% Recovered	QC Limits (%)	
aaa-Toluene	130%	80	120
Bromofluorobenzene	88%	80	120

Lab ID: 0204761-10
Sample ID: Trip Blank

8021B/5030 BTEX

Method Blank	Date Prepared	Date Analyzed	Sample Amount	Dilution Factor	Analyst	Method
0003450-02		10/16/02 9:57	1	1	CK	8021B

Parameter	Result mg/L	RL
Benzene	<0.001	0.001
Ethylbenzene	<0.001	0.001
Toluene	<0.001	0.001
p/m-Xylene	<0.001	0.001
o-Xylene	<0.001	0.001

Surrogates	% Recovered	QC Limits (%)	
aaa-Toluene	89%	80	120
Bromofluorobenzene	92%	80	120

DL = Diluted out N/A = Not Applicable RL = Reporting Limit

ENVIRONMENTAL LAB OF TEXAS

ANALYTICAL REPORT

JOHN FERGERSON
TRIDENT ENVIRONMENTAL
P.O BOX 7624
MIDLAND, TX 79708

Order#: G0204761
Project: F-105
Project Name: DEFS: Eldridge
Location: DEFS: Eldridge

Approval: Raland K Tuttle 10-28-02
Raland K. Tuttle, Lab Director, QA Officer — Date
Celey D. Keene, Org. Tech. Director
Jeanne McMurrey, Inorg. Tech. Director
Sandra Biezugbe, Lab Tech.
Sara Molina, Lab Tech.

DL = Diluted out N/A = Not Applicable RL = Reporting Limit

ENVIRONMENTAL LAB OF TEXAS

ANALYTICAL REPORT

JOHN FERGERSON
TRIDENT ENVIRONMENTAL
P.O BOX 7624
MIDLAND, TX 79708

Order#: G0204761
Project: F-105
Project Name: DEFS: Eldridge
Location: DEFS: Eldridge

Lab ID: 0204761-01
Sample ID: MW-19

Cations

Parameter	Result	Units	Dilution Factor	RL	Method	Date Prepared	Date Analyzed	Analyst
Calcium	39.7	mg/L	10	0.10	6010B	10/20/2002	10/20/02	SM
Magnesium	14.6	mg/L	10	0.010	6010B	10/20/2002	10/20/02	SM
Potassium	6.84	mg/L	1	0.050	6010B	10/20/2002	10/20/02	SM
Sodium	69.2	mg/L	10	0.10	6010B	10/20/2002	10/20/02	SM

Test Parameters

Parameter	Result	Units	Dilution Factor	RL	Method	Date Prepared	Date Analyzed	Analyst
Barium	2.65	mg/L	1	0.001	3005/6010B	10/14/2002	10/15/02	SM
Barium,Dissolved	0.278	mg/L	1	0.001	6010B	10/15/2002	10/15/02	SM
Iron	98.2	mg/L	10	0.020	3005/6010B	10/14/2002	10/15/02	SM
Iron, Dissolved	0.020	mg/L	1	0.002	6010B	10/15/2002	10/15/02	SM
Manganese	2.91	mg/L	1	.001	3005/6010B	10/14/2002	10/15/02	SM
Manganese, Dissolved	0.156	mg/L	1	0.001	6010B	10/15/2002	10/15/02	SM

Lab ID: 0204761-02
Sample ID: MW-18

Cations

Parameter	Result	Units	Dilution Factor	RL	Method	Date Prepared	Date Analyzed	Analyst
Calcium	26.3	mg/L	10	0.10	6010B	10/20/2002	10/20/02	SM
Magnesium	14.8	mg/L	10	0.010	6010B	10/20/2002	10/20/02	SM
Potassium	5.40	mg/L	1	0.050	6010B	10/20/2002	10/20/02	SM
Sodium	76.4	mg/L	10	0.10	6010B	10/20/2002	10/20/02	SM

Test Parameters

Parameter	Result	Units	Dilution Factor	RL	Method	Date Prepared	Date Analyzed	Analyst
Barium	2.36	mg/L	1	0.001	3005/6010B	10/14/2002	10/15/02	SM
Barium,Dissolved	0.309	mg/L	1	0.001	6010B	10/15/2002	10/15/02	SM
Iron	22.2	mg/L	10	0.020	3005/6010B	10/14/2002	10/15/02	SM
Iron, Dissolved	0.201	mg/L	1	0.002	6010B	10/15/2002	10/15/02	SM
Manganese	0.406	mg/L	1	.001	3005/6010B	10/14/2002	10/15/02	SM
Manganese, Dissolved	0.224	mg/L	1	0.001	6010B	10/15/2002	10/15/02	SM

Lab ID: 0204761-03
Sample ID: MW-20

Cations

Parameter	Result	Units	Dilution Factor	RL	Method	Date Prepared	Date Analyzed	Analyst
Calcium	75.1	mg/L	10	0.10	6010B	10/20/2002	10/20/02	SM
Magnesium	14.2	mg/L	10	0.010	6010B	10/20/2002	10/20/02	SM
Potassium	6.54	mg/L	1	0.050	6010B	10/20/2002	10/20/02	SM

N/A = Not Applicable RL = Reporting Limit

ENVIRONMENTAL LAB OF TEXAS

ANALYTICAL REPORT

JOHN FERGERSON
TRIDENT ENVIRONMENTAL
P.O BOX 7624
MIDLAND, TX 79708

Order#: G0204761
Project: E-105
Project Name: DEFS: Eldridge
Location: DEFS: Eldridge

Lab ID: 0204761-03
Sample ID: MW-20

Cations

Parameter	Result	Units	Dilution Factor	RL	Method	Date Prepared	Date Analyzed	Analyst
Sodium	50.8	mg/L	10	0.10	6010B	10/20/2002	10/20/02	SM

Test Parameters

Parameter	Result	Units	Dilution Factor	RL	Method	Date Prepared	Date Analyzed	Analyst
Barium	0.374	mg/L	1	0.001	3005/6010B	10/14/2002	10/15/02	SM
Barium,Dissolved	0.135	mg/L	1	0.001	6010B	10/15/2002	10/15/02	SM
Iron	4.54	mg/L	1	0.002	3005/6010B	10/14/2002	10/15/02	SM
Iron, Dissolved	0.170	mg/L	1	0.002	6010B	10/15/2002	10/15/02	SM
Manganese	0.035	mg/L	1	.001	3005/6010B	10/14/2002	10/15/02	SM
Manganese, Dissolved	0.023	mg/L	1	0.001	6010B	10/15/2002	10/15/02	SM

Lab ID: 0204761-04
Sample ID: MW-15

Cations

Parameter	Result	Units	Dilution Factor	RL	Method	Date Prepared	Date Analyzed	Analyst
Calcium	60.5	mg/L	10	0.10	6010B	10/20/2002	10/20/02	SM
Magnesium	8.55	mg/L	1	0.001	6010B	10/20/2002	10/20/02	SM
Potassium	4.05	mg/L	1	0.050	6010B	10/20/2002	10/20/02	SM
Sodium	41.6	mg/L	10	0.10	6010B	10/20/2002	10/20/02	SM

Test Parameters

Parameter	Result	Units	Dilution Factor	RL	Method	Date Prepared	Date Analyzed	Analyst
Barium	0.098	mg/L	1	0.001	3005/6010B	10/14/2002	10/15/02	SM
Barium,Dissolved	0.098	mg/L	1	0.001	6010B	10/15/2002	10/15/02	SM
Iron	1.13	mg/L	1	0.002	3005/6010B	10/14/2002	10/15/02	SM
Iron, Dissolved	0.054	mg/L	1	0.002	6010B	10/15/2002	10/15/02	SM
Manganese	0.027	mg/L	1	.001	3005/6010B	10/14/2002	10/15/02	SM
Manganese, Dissolved	0.015	mg/L	1	0.001	6010B	10/15/2002	10/15/02	SM

Lab ID: 0204761-05
Sample ID: MW-21

Cations

Parameter	Result	Units	Dilution Factor	RL	Method	Date Prepared	Date Analyzed	Analyst
Calcium	64.0	mg/L	10	0.10	6010B	10/20/2002	10/20/02	SM
Magnesium	9.33	mg/L	1	0.001	6010B	10/20/2002	10/20/02	SM
Potassium	3.76	mg/L	1	0.050	6010B	10/20/2002	10/20/02	SM
Sodium	49.9	mg/L	10	0.10	6010B	10/20/2002	10/20/02	SM

N/A = Not Applicable RL = Reporting Limit

ENVIRONMENTAL LAB OF TEXAS

ANALYTICAL REPORT

JOHN FERGERSON
TRIDENT ENVIRONMENTAL
P.O BOX 7624
MIDLAND, TX 79708

Order#: G0204761
Project: F-105
Project Name: DEFS: Eldridge
Location: DEFS: Eldridge

Lab ID: 0204761-05
Sample ID: MW-21

Test Parameters

Parameter	Result	Units	Dilution Factor	RL	Method	Date Prepared	Date Analyzed	Analyst
Barium	1.25	mg/L	1	0.001	3005/6010B	10/14/2002	10/15/02	SM
Barium,Dissolved	0.161	mg/L	1	0.001	6010B	10/15/2002	10/15/02	SM
Iron	29.6	mg/L	10	0.020	3005/6010B	10/14/2002	10/15/02	SM
Iron, Dissolved	0.045	mg/L	1	0.002	6010B	10/15/2002	10/15/02	SM
Manganese	0.758	mg/L	1	.001	3005/6010B	10/14/2002	10/15/02	SM
Manganese, Dissolved	0.331	mg/L	1	0.001	6010B	10/15/2002	10/15/02	SM

Lab ID: 0204761-06
Sample ID: MW-22

Cations

Parameter	Result	Units	Dilution Factor	RL	Method	Date Prepared	Date Analyzed	Analyst
Calcium	44.7	mg/L	10	0.10	6010B	10/20/2002	10/20/02	SM
Magnesium	9.82	mg/L	1	0.001	6010B	10/20/2002	10/20/02	SM
Potassium	5.25	mg/L	1	0.050	6010B	10/20/2002	10/20/02	SM
Sodium	54.3	mg/L	10	0.10	6010B	10/20/2002	10/20/02	SM

Test Parameters

Parameter	Result	Units	Dilution Factor	RL	Method	Date Prepared	Date Analyzed	Analyst
Barium	8.38	mg/L	1	0.001	3005/6010B	10/14/2002	10/15/02	SM
Barium,Dissolved	0.256	mg/L	1	0.001	6010B	10/15/2002	10/15/02	SM
Iron	40.0	mg/L	10	0.020	3005/6010B	10/14/2002	10/15/02	SM
Iron, Dissolved	0.022	mg/L	1	0.002	6010B	10/15/2002	10/15/02	SM
Manganese	34.8	mg/L	10	0.010	3005/6010B	10/14/2002	10/15/02	SM
Manganese, Dissolved	0.080	mg/L	1	0.001	6010B	10/15/2002	10/15/02	SM

Lab ID: 0204761-07
Sample ID: MW-17

Cations

Parameter	Result	Units	Dilution Factor	RL	Method	Date Prepared	Date Analyzed	Analyst
Calcium	31.3	mg/L	10	0.10	6010B	10/20/2002	10/20/02	SM
Magnesium	14.4	mg/L	10	0.010	6010B	10/20/2002	10/20/02	SM
Potassium	7.12	mg/L	1	0.050	6010B	10/20/2002	10/20/02	SM
Sodium	55.4	mg/L	10	0.10	6010B	10/20/2002	10/20/02	SM

Test Parameters

Parameter	Result	Units	Dilution Factor	RL	Method	Date Prepared	Date Analyzed	Analyst
Barium	1.83	mg/L	1	0.001	3005/6010B	10/14/2002	10/15/02	SM
Barium,Dissolved	0.272	mg/L	1	0.001	6010B	10/15/2002	10/15/02	SM
Iron	70.9	mg/L	10	0.020	3005/6010B	10/14/2002	10/15/02	SM

N/A = Not Applicable RL = Reporting Limit

ENVIRONMENTAL LAB OF TEXAS

ANALYTICAL REPORT

JOHN FERGERSON
TRIDENT ENVIRONMENTAL
P.O BOX 7624
MIDLAND, TX 79708

Order#: G0204761
Project: E-105
Project Name: DEFS: Eldridge
Location: DEFS: Eldridge

Lab ID: 0204761-07
Sample ID: MW-17

Test Parameters

Parameter	Result	Units	Dilution Factor	RL	Method	Date Prepared	Date Analyzed	Analyst
Iron, Dissolved	0.035	mg/L	1	0.002	6010B	10/15/2002	10/15/02	SM
Manganese	3.10	mg/L	1	.001	3005/6010B	10/14/2002	10/15/02	SM
Manganese, Dissolved	0.421	mg/L	1	0.001	6010B	10/15/2002	10/15/02	SM

Lab ID: 0204761-08
Sample ID: MW-16

Cations

Parameter	Result	Units	Dilution Factor	RL	Method	Date Prepared	Date Analyzed	Analyst
Calcium	49.1	mg/L	10	0.10	6010B	10/20/2002	10/20/02	SM
Magnesium	14.2	mg/L	10	0.010	6010B	10/20/2002	10/20/02	SM
Potassium	7.89	mg/L	1	0.050	6010B	10/20/2002	10/20/02	SM
Sodium	56.4	mg/L	10	0.10	6010B	10/20/2002	10/20/02	SM

Test Parameters

Parameter	Result	Units	Dilution Factor	RL	Method	Date Prepared	Date Analyzed	Analyst
Barium	0.608	mg/L	1	0.001	3005/6010B	10/14/2002	10/15/02	SM
Barium,Dissolved	0.165	mg/L	1	0.001	6010B	10/15/2002	10/15/02	SM
Iron	16.2	mg/L	10	0.020	3005/6010B	10/14/2002	10/15/02	SM
Iron, Dissolved	0.156	mg/L	1	0.002	6010B	10/15/2002	10/15/02	SM
Manganese	0.160	mg/L	1	.001	3005/6010B	10/14/2002	10/15/02	SM
Manganese, Dissolved	0.069	mg/L	1	0.001	6010B	10/15/2002	10/15/02	SM

Approval: Raland K. Tuttle 10-28-02
Raland K. Tuttle, Lab Director, QA Officer — Date
Celey D. Keene, Org. Tech. Director
Jeanne McMurrey, Inorg. Tech. Director
Sandra Bizzugbe, Lab Tech.
Sara Molina, Lab Tech.

N/A = Not Applicable RL = Reporting Limit

ENVIRONMENTAL LAB OF TEXAS

ANALYTICAL REPORT

JOHN FERGERSON
TRIDENT ENVIRONMENTAL
P.O BOX 7624
MIDLAND, TX 79708

Order#: G0204761
Project: F-105
Project Name: DEFS: Eldridge
Location: DEFS: Eldridge

Lab ID: 0204761-01
Sample ID: MW-19

Anions

Parameter	Result	Units	Dilution Factor	RL	Method	Date Analyzed	Analyst
Bicarbonate Alkalinity	272	mg/L	1	2.00	310.1	10/12/02	SB
Carbonate Alkalinity	<0.10	mg/L	1	0.10	310.1	10/12/02	SB
Chloride	62.0	mg/L	1	5.00	9253	10/14/02	SB
Hydroxide Alkalinity	<0.10	mg/L	1	0.10	310.1	10/12/02	SB
SULFATE, 375.4	55.3	mg/L	1	0.5	375.4	10/15/02	SB

Test Parameters

Parameter	Result	Units	Dilution Factor	RL	Method	Date Analyzed	Analyst
Fluoride	1.19	mg/L	1	0.02	340.1	10/15/02	SB
Nitrogen, Nitrate	1.8	mg/L	1	0.5	353.3	10/12/02	SB
Total Dissolved Solids (TDS)	483	mg/L	1	5.0	160.1	10/14/02	TAL

Lab ID: 0204761-02
Sample ID: MW-18

Anions

Parameter	Result	Units	Dilution Factor	RL	Method	Date Analyzed	Analyst
Bicarbonate Alkalinity	318	mg/L	1	2.00	310.1	10/12/02	SB
Carbonate Alkalinity	<0.10	mg/L	1	0.10	310.1	10/12/02	SB
Chloride	62.0	mg/L	1	5.00	9253	10/14/02	SB
Hydroxide Alkalinity	<0.10	mg/L	1	0.10	310.1	10/12/02	SB
SULFATE, 375.4	48.5	mg/L	1	0.5	375.4	10/15/02	SB

Test Parameters

Parameter	Result	Units	Dilution Factor	RL	Method	Date Analyzed	Analyst
Fluoride	0.94	mg/L	1	0.02	340.1	10/15/02	SB
Nitrogen, Nitrate	1.3	mg/L	1	0.5	353.3	10/12/02	SB
Total Dissolved Solids (TDS)	529	mg/L	1	5.0	160.1	10/14/02	TAL

Lab ID: 0204761-03
Sample ID: MW-20

Anions

Parameter	Result	Units	Dilution Factor	RL	Method	Date Analyzed	Analyst
Bicarbonate Alkalinity	166	mg/L	1	2.00	310.1	10/12/02	SB
Carbonate Alkalinity	<0.10	mg/L	1	0.10	310.1	10/12/02	SB
Chloride	106	mg/L	1	5.00	9253	10/14/02	SB
Hydroxide Alkalinity	<0.10	mg/L	1	0.10	310.1	10/12/02	SB
SULFATE, 375.4	67.8	mg/L	1	0.5	375.4	10/15/02	SB

RL = Reporting Limit N/A = Not Applicable

ENVIRONMENTAL LAB OF TEXAS

ANALYTICAL REPORT

JOHN FERGERSON
TRIDENT ENVIRONMENTAL
P.O BOX 7624
MIDLAND, TX 79708

Order#: C0204761
Project: P-108
Project Name: DEFS: Eldridge
Location: DEFS: Eldridge

Lab ID: 0204761-03
Sample ID: MW-20

Test Parameters

Parameter	Result	Units	Dilution Factor	RL	Method	Date Analyzed	Analyst
Fluoride	1.21	mg/L	1	0.02	340.1	10/15/02	SB
Nitrogen, Nitrate	4.2	mg/L	1	0.5	353.3	10/12/02	SB
Total Dissolved Solids (TDS)	608	mg/L	1	5.0	160.1	10/14/02	TAL

Lab ID: 0204761-04
Sample ID: MW-15

Anions

Parameter	Result	Units	Dilution Factor	RL	Method	Date Analyzed	Analyst
Bicarbonate Alkalinity	164	mg/L	1	2.00	310.1	10/12/02	SB
Carbonate Alkalinity	<0.10	mg/L	1	0.10	310.1	10/12/02	SB
Chloride	42.5	mg/L	1	5.00	9253	10/14/02	SB
Hydroxide Alkalinity	<0.10	mg/L	1	0.10	310.1	10/12/02	SB
SULFATE, 375.4	51.0	mg/L	1	0.5	375.4	10/15/02	SB

Test Parameters

Parameter	Result	Units	Dilution Factor	RL	Method	Date Analyzed	Analyst
Fluoride	1.25	mg/L	1	0.02	340.1	10/15/02	SB
Nitrogen, Nitrate	3.5	mg/L	1	0.5	353.3	10/12/02	SB
Total Dissolved Solids (TDS)	357	mg/L	1	5.0	160.1	10/14/02	TAL

Lab ID: 0204761-05
Sample ID: MW-21

Anions

Parameter	Result	Units	Dilution Factor	RL	Method	Date Analyzed	Analyst
Bicarbonate Alkalinity	196	mg/L	1	2.00	310.1	10/12/02	SB
Carbonate Alkalinity	<0.10	mg/L	1	0.10	310.1	10/12/02	SB
Chloride	39.9	mg/L	1	5.00	9253	10/14/02	SB
Hydroxide Alkalinity	<0.10	mg/L	1	0.10	310.1	10/12/02	SB
SULFATE, 375.4	51.1	mg/L	1	0.5	375.4	10/15/02	SB

Test Parameters

Parameter	Result	Units	Dilution Factor	RL	Method	Date Analyzed	Analyst
Fluoride	1.31	mg/L	1	0.02	340.1	10/15/02	SB
Nitrogen, Nitrate	2.2	mg/L	1	0.5	353.3	10/12/02	SB
Total Dissolved Solids (TDS)	385	mg/L	1	5.0	160.1	10/14/02	TAL

RL = Reporting Limit N/A = Not Applicable

ENVIRONMENTAL LAB OF TEXAS

ANALYTICAL REPORT

JOHN FERGERSON
TRIDENT ENVIRONMENTAL
P.O BOX 7624
MIDLAND, TX 79708

Order#: G0204761
Project: F-105
Project Name: DEFS: Eldridge
Location: DEFS: Eldridge

Lab ID: 0204761-06
Sample ID: MW-22

Anions

Parameter	Result	Units	Dilution Factor	RL	Method	Date Analyzed	Analyst
Bicarbonate Alkalinity	234	mg/L	1	2.00	310.1	10/12/02	SB
Carbonate Alkalinity	<0.10	mg/L	1	0.10	310.1	10/12/02	SB
Chloride	48.7	mg/L	1	5.00	9253	10/14/02	SB
Hydroxide Alkalinity	<0.10	mg/L	1	0.10	310.1	10/12/02	SB
SULFATE, 375.4	42.6	mg/L	1	0.5	375.4	10/15/02	SB

Test Parameters

Parameter	Result	Units	Dilution Factor	RL	Method	Date Analyzed	Analyst
Fluoride	1.12	mg/L	1	0.02	340.1	10/15/02	SB
Nitrogen, Nitrate	1.4	mg/L	1	0.5	353.3	10/12/02	SB
Total Dissolved Solids (TDS)	420	mg/L	1	5.0	160.1	10/14/02	TAL

Lab ID: 0204761-07
Sample ID: MW-17

Anions

Parameter	Result	Units	Dilution Factor	RL	Method	Date Analyzed	Analyst
Bicarbonate Alkalinity	196	mg/L	1	2.00	310.1	10/12/02	SB
Carbonate Alkalinity	<0.10	mg/L	1	0.10	310.1	10/12/02	SB
Chloride	46.5	mg/L	1	5.00	9253	10/14/02	SB
Hydroxide Alkalinity	<0.10	mg/L	1	0.10	310.1	10/12/02	SB
SULFATE, 375.4	66.1	mg/L	1	0.5	375.4	10/15/02	SB

Test Parameters

Parameter	Result	Units	Dilution Factor	RL	Method	Date Analyzed	Analyst
Fluoride	1.94	mg/L	1	0.02	340.1	10/15/02	SB
Nitrogen, Nitrate	2.0	mg/L	1	0.5	353.3	10/12/02	SB
Total Dissolved Solids (TDS)	405	mg/L	1	5.0	160.1	10/14/02	TAL

Lab ID: 0204761-08
Sample ID: MW-16

Anions

Parameter	Result	Units	Dilution Factor	RL	Method	Date Analyzed	Analyst
Bicarbonate Alkalinity	190	mg/L	1	2.00	310.1	10/12/02	SB
Carbonate Alkalinity	<0.10	mg/L	1	0.10	310.1	10/12/02	SB
Chloride	55.4	mg/L	1	5.00	9253	10/14/02	SB
Hydroxide Alkalinity	<0.10	mg/L	1	0.10	310.1	10/12/02	SB
SULFATE, 375.4	71	mg/L	1	0.5	375.4	10/15/02	SB

RL = Reporting Limit N/A = Not Applicable

ENVIRONMENTAL LAB OF TEXAS

ANALYTICAL REPORT

JOHN FERGERSON		Order#:	G0204761
TRIDENT ENVIRONMENTAL		Project:	F-105
P.O BOX 7624		Project Name:	DEFS: Eldridge
MIDLAND, TX 79708		Location:	DEFS: Eldridge

Lab ID: 0204761-08
Sample ID: MW-16

Test Parameters

Parameter	Result	Units	Dilution Factor	RL	Method	Date Analyzed	Analyst
Fluoride	1.53	mg/L	1	0.02	340.1	10/15/02	SB
Nitrogen, Nitrate	2.3	mg/L	1	0.5	353.3	10/12/02	SB
Total Dissolved Solids (TDS)	426	mg/L	1	5.0	160.1	10/15/02	TAL

Approval: Roland K Tuttle 10-28-02
Roland K. Tuttle, Lab Director, QA Officer — Date
Celey D. Keene, Org. Tech. Director
Jeanne McMurrey, Inorg. Tech. Director
Sandra Biezugbe, Lab Tech.
Sara Molina, Lab Tech.

RL = Reporting Limit N/A = Not Applicable

ENVIRONMENTAL LAB OF TEXAS I, LTD. 12600 West I-20 East, Odessa, TX 79765 Ph: 915-563-1800

ENVIRONMENTAL LAB OF TEXAS

QUALITY CONTROL REPORT

8015M

Order#: G0204761

BLANK WATER	LAB-ID #	Sample Concentr.	Spike Concentr.	QC Test Result	Pct (%) Recovery	RPD
TOTAL, C6-C35-mg/L	0003447-02			<3.00		
MS WATER	**LAB-ID #**	**Sample Concentr.**	**Spike Concentr.**	**QC Test Result**	**Pct (%) Recovery**	**RPD**
TOTAL, C6-C35-mg/L	0204761-01	0	95.2	85.5	89.8%	
MSD WATER	**LAB-ID #**	**Sample Concentr.**	**Spike Concentr.**	**QC Test Result**	**Pct (%) Recovery**	**RPD**
TOTAL, C6-C35-mg/L	0204761-01	0	95.2	79.1	83.1%	7.8%
SRM WATER	**LAB-ID #**	**Sample Concentr.**	**Spike Concentr.**	**QC Test Result**	**Pct (%) Recovery**	**RPD**
TOTAL, C6-C35-mg/L	0003447-05		100	87.4	87.4%	

ENVIRONMENTAL LAB OF TEXAS

QUALITY CONTROL REPORT

8021B/5030 BTEX

Order#: G0204761

BLANK WATER	LAB-ID #	Sample Concentr.	Spike Concentr.	QC Test Result	Pct (%) Recovery	RPD
Benzene-mg/L	0003450-02			<0.001		
Ethylbenzene-mg/L	0003450-02			<0.001		
Toluene-mg/L	0003450-02			<0.001		
p/m-Xylene-mg/L	0003450-02			<0.001		
o-Xylene-mg/L	0003450-02			<0.001		
MS WATER	LAB-ID #	Sample Concentr.	Spike Concentr.	QC Test Result	Pct (%) Recovery	RPD
Benzene-mg/L	0204761-10	0	0.1	0.097	97.%	
Ethylbenzene-mg/L	0204761-10	0	0.1	0.100	100.%	
Toluene-mg/L	0204761-10	0	0.1	0.101	101.%	
p/m-Xylene-mg/L	0204761-10	0	0.2	0.210	105.%	
o-Xylene-mg/L	0204761-10	0	0.1	0.101	101.%	
MSD WATER	LAB-ID #	Sample Concentr.	Spike Concentr.	QC Test Result	Pct (%) Recovery	RPD
Benzene-mg/L	0204761-10	0	0.1	0.092	92.%	5.3%
Ethylbenzene-mg/L	0204761-10	0	0.1	0.094	94.%	6.2%
Toluene-mg/L	0204761-10	0	0.1	0.095	95.%	6.1%
p/m-Xylene-mg/L	0204761-10	0	0.2	0.198	99.%	5.9%
o-Xylene-mg/L	0204761-10	0	0.1	0.095	95.%	6.1%
SRM WATER	LAB-ID #	Sample Concentr.	Spike Concentr.	QC Test Result	Pct (%) Recovery	RPD
Benzene-mg/L	0003450-05		0.1	0.094	94.%	
Ethylbenzene-mg/L	0003450-05		0.1	0.096	96.%	
Toluene-mg/L	0003450-05		0.1	0.098	98.%	
p/m-Xylene-mg/L	0003450-05		0.2	0.202	101.%	
o-Xylene-mg/L	0003450-05		0.1	0.097	97.%	

ENVIRONMENTAL LAB OF TEXAS

QUALITY CONTROL REPORT

Anions

Order#: G0204761

BLANK WATER	LAB-ID #	Sample Concentr.	Spike Concentr.	QC Test Result	Pct (%) Recovery	RPD
Bicarbonate Alkalinity-mg/L	0003432-01			<2.00		
Carbonate Alkalinity-mg/L	0003430-01			<0.10		
Chloride-mg/L	0003436-01			<5.00		
Hydroxide Alkalinity-mg/L	0003434-01			<0.10		
SULFATE, 375.4-mg/L	0003443-01			<0.50		
DUPLICATE WATER	**LAB-ID #**	**Sample Concentr.**	**Spike Concentr.**	**QC Test Result**	**Pct (%) Recovery**	**RPD**
Bicarbonate Alkalinity-mg/L	0204760-01	168		169		0.6%
Carbonate Alkalinity-mg/L	0204760-01	0		<0.10		0%
Hydroxide Alkalinity-mg/L	0204760-01	0		<0.10		0%
SULFATE, 375.4-mg/L	0204760-01	124		126		1.6%
MS WATER	**LAB-ID #**	**Sample Concentr.**	**Spike Concentr.**	**QC Test Result**	**Pct (%) Recovery**	**RPD**
Chloride-mg/L	0204760-01	106	250	354	99.2%	
MSD WATER	**LAB-ID #**	**Sample Concentr.**	**Spike Concentr.**	**QC Test Result**	**Pct (%) Recovery**	**RPD**
Chloride-mg/L	0204760-01	106	250	350	97.6%	1.1%
SRM WATER	**LAB-ID #**	**Sample Concentr.**	**Spike Concentr.**	**QC Test Result**	**Pct (%) Recovery**	**RPD**
Bicarbonate Alkalinity-mg/L	0003432-04		0.05	0.0496	99.2%	
Carbonate Alkalinity-mg/L	0003430-04		0.05	0.0496	99.2%	
Chloride-mg/L	0003436-04		5000	4960	99.2%	
Hydroxide Alkalinity-mg/L	0003434-04		0.05	0.0496	99.2%	
SULFATE, 375.4-mg/L	0003443-04		50	51.1	102.2%	

ENVIRONMENTAL LAB OF TEXAS

QUALITY CONTROL REPORT

Cations

Order#: G0204761

BLANK WATER	LAB-ID #	Sample Concentr.	Spike Concentr.	QC Test Result	Pct (%) Recovery	RPD
Calcium-mg/L	0003494-02			<0.010		
Magnesium-mg/L	0003494-02			<0.001		
Potassium-mg/L	0003494-02			<0.050		
Sodium-mg/L	0003494-02			<0.010		
DUPLICATE WATER	LAB-ID #	Sample Concentr.	Spike Concentr.	QC Test Result	Pct (%) Recovery	RPD
Calcium-mg/L	0204761-01	39.7		39.3		1.%
Magnesium-mg/L	0204761-01	14.6		14.5		0.7%
Potassium-mg/L	0204761-01	6.84		7.13		4.2%
Sodium-mg/L	0204761-01	69.2		67.9		1.9%
SRM WATER	LAB-ID #	Sample Concentr.	Spike Concentr.	QC Test Result	Pct (%) Recovery	RPD
Calcium-mg/L	0003494-05		2	1.90	95.%	
Magnesium-mg/L	0003494-05		2	2.17	108.5%	
Potassium-mg/L	0003494-05		2	1.81	90.5%	
Sodium-mg/L	0003494-05		2	1.78	89.%	

ENVIRONMENTAL LAB OF TEXAS

QUALITY CONTROL REPORT

Test Parameters

Order#: G0204761

BLANK WATER	LAB-ID #	Sample Concentr.	Spike Concentr.	QC Test Result	Pct (%) Recovery	RPD
Barium-mg/L	0003461-01			<0.001		
Barium,Dissolved-mg/L	0003457-01			<0.001		
Fluoride-mg/L	0003442-01			<0.02		
Iron-mg/L	0003461-01			<0.002		
Iron, Dissolved-mg/L	0003457-01			<0.002		
Manganese-mg/L	0003461-01			<.001		
Manganese, Dissolved-mg/L	0003457-01			<0.001		
Nitrogen, Nitrate-mg/L	0003426-01			<0.5		
Total Dissolved Solids (TDS)-mg/L	0003439-01			<5.0		
Total Dissolved Solids (TDS)-mg/L	0003454-01			<5.0		
CONTROL WATER	**LAB-ID #**	**Sample Concentr.**	**Spike Concentr.**	**QC Test Result**	**Pct (%) Recovery**	**RPD**
Barium,Dissolved-mg/L	0003457-02		0.2	0.235	117.5%	
Iron, Dissolved-mg/L	0003457-02		0.2	0.198	99.%	
Manganese, Dissolved-mg/L	0003457-02		0.2	0.216	108.%	
CONTROL DUP WATER	**LAB-ID #**	**Sample Concentr.**	**Spike Concentr.**	**QC Test Result**	**Pct (%) Recovery**	**RPD**
Barium,Dissolved-mg/L	0003457-03		0.2	0.232	116.%	1.3%
Iron, Dissolved-mg/L	0003457-03		0.2	0.201	100.5%	1.5%
Manganese, Dissolved-mg/L	0003457-03		0.2	0.214	107.%	0.9%
DUPLICATE WATER	**LAB-ID #**	**Sample Concentr.**	**Spike Concentr.**	**QC Test Result**	**Pct (%) Recovery**	**RPD**
Fluoride-mg/L	0204761-01	1.19		1.30		8.8%
Nitrogen, Nitrate-mg/L	0204761-01	1.8		1.9		5.4%
Total Dissolved Solids (TDS)-mg/L	0204760-01	605		603		0.3%
Total Dissolved Solids (TDS)-mg/L	0204761-08	426		427		0.2%
MS WATER	**LAB-ID #**	**Sample Concentr.**	**Spike Concentr.**	**QC Test Result**	**Pct (%) Recovery**	**RPD**
Barium-mg/L	0204761-04	0.098	0.2	0.278	90.%	
Iron-mg/L	0204761-04	1.13	0.2	1.32	95.%	
Manganese-mg/L	0204761-04	0.027	0.2	0.228	100.5%	
MSD WATER	**LAB-ID #**	**Sample Concentr.**	**Spike Concentr.**	**QC Test Result**	**Pct (%) Recovery**	**RPD**
Barium-mg/L	0204761-04	0.098	0.2	0.281	91.5%	1.1%
Iron-mg/L	0204761-04	1.13	0.2	1.32	95.%	0.%
Manganese-mg/L	0204761-04	0.027	0.2	0.226	99.5%	0.9%
SRM WATER	**LAB-ID #**	**Sample Concentr.**	**Spike Concentr.**	**QC Test Result**	**Pct (%) Recovery**	**RPD**
Barium-mg/L	0003461-04		1	1.07	107.%	
Barium,Dissolved-mg/L	0003457-04		1	1.07	107.%	
Fluoride-mg/L	0003442-04		1	0.91	91.%	

ENVIRONMENTAL LAB OF TEXAS

QUALITY CONTROL REPORT

Test Parameters

Order#: G0204761

SRM WATER	LAB-ID #	Sample Concentr.	Spike Concentr.	QC Test Result	Pct (%) Recovery	RPD
Iron-mg/L	0003461-04		1	1.04	104.%	
Iron, Dissolved-mg/L	0003457-04		1	1.04	104.%	
Manganese-mg/L	0003461-04		1	1.02	102.%	
Manganese, Dissolved-mg/L	0003457-04		1	1.02	102.%	
Nitrogen, Nitrate-mg/L	0003426-04		2	1.90	95.%	

CASE NARRATIVE

ENVIRONMENTAL LAB OF TEXAS

Prepared for:

TRIDENT ENVIRONMENTAL
P.O BOX 7624
MIDLAND, TX 79708

Order#: G0204761

Project: DEFS: Eldridge

The following samples were received as indicated below and on the attached Chain of Custody record. All analyses were performed within the holding time and with acceptable quality control results unless otherwise noted.

SAMPLE ID	LAB ID	MATRIX	Date Collected	Date Received
MW-19	0204761-01	WATER	10/11/2002	10/11/2002
MW-18	0204761-02	WATER	10/11/2002	10/11/2002
MW-20	0204761-03	WATER	10/11/2002	10/11/2002
MW-15	0204761-04	WATER	10/11/2002	10/11/2002
MW-21	0204761-05	WATER	10/11/2002	10/11/2002
MW-22	0204761-06	WATER	10/11/2002	10/11/2002
MW-17	0204761-07	WATER	10/11/2002	10/11/2002
MW-16	0204761-08	WATER	10/11/2002	10/11/2002
Duplicate A	0204761-09	WATER	10/11/2002	10/11/2002
Trip Blank	0204761-10	WATER	10/11/2002	10/11/2002

Surrogate recoveries are utside control limits due to matrix interference.

The enclosed results of analyses are representative of the samples as received by the laboratory. Environmental Lab of Texas makes no representations or certifications as to the methods of sample collection, sample identification, or transportation handling procedures used prior to our receipt of samples. To the best of my knowledge, the information contained in this report is accurate and complete.

Approved By: Rolando Vela Date: 10-25-02

Environmental Lab of Texas I, Ltd.

TRIDENT ENVIRONMENTAL
Trident Environmental
P.O. Box 7624
Midland, Texas 79708
(915) 682-0008
(915) 262-5216 (Fax)

* Run total metals (Fe, Ba, Mn) on both filtered + unfiltered samples

F-105-10/02

Chain of Custody

Date 10/11/02 Page 1 of 1

0204761

Lab Name: Environmental Labs (of Texas)
Address: 12600 West I-20 East
Odessa, TX 79763
Telephone: (505) 563-1800 Fax: (915) 563-1713

Samplers (SIGNATURES): Dale Tuttle / John Ferguson

	Sample Identification	Matrix	Date	Time	Sample Type: G=Grab, C=Composite	BTEX (EPA 8021B)	MTBE (EPA 8021B)	SVOC (EPA 8270)	PAH (EPA 8270)	VOC (EPA 8260)	TPH (EPA 418.1)	TPH (TX-1005)	TPH (TX-1006)	GRO (EPA 8015G)	DRO (EPA 8015G)	TDS (EPA 160.1)	Major Ions & TDS	Tot.Metal (FE, Ba, Mn) Mn	TCLP Metals							Number of Containers
01	MW-19	Water	10/11/02	1000	G	✓								✓	✓		✓	✓									7
02	MW-18	"	"	1053	G	✓								✓	✓		✓	✓									7
03	MW-20	"	"	1140	G	✓								✓	✓		✓	✓									7
04	MW-15	"	"	1220	G	✓								✓	✓		✓	✓									7
05	MW-21	"	"	1300	G	✓								✓	✓		✓	✓									7
06	MW-22	"	"	1350	G	✓								✓	✓		✓	✓									7
07	MW-17	"	"	1445	G	✓								✓	✓		✓	✓									7
08	MW-16	"	"	1520	G	✓								✓	✓		✓	✓									7
09	Duplicate A	"	10/11/02	0000	G	✓																					2
10	Trip Blank	"				✓																					2

Analysis Request

Project Information		Sample Receipt	
Project Name:	Duke Energy	Total Containers:	
Project Location:	DEFS: Eldridge	COC Seals:	
Project Manager:	John Fergerson	Rec'd Good Cond/Cold:	05°
Cost Center No.:	F-105	Conforms to Records:	
Shipping ID No.:	Hand Delivered	Lab No.:	
Bill to (see below):			

Special Instructions/Comments: Please send invoice direct to client:
Duke Energy Field Services, Attention: Steve Weathers
P. O. Box 5493, Denver, Colorado 80217

Relinquished By: (1) (Company)	Relinquished By: (2) (Company)	Relinquished By: (3) (Company)
Trident Environmental		
(Printed Name) John M Fergerson	(Printed Name)	(Printed Name)
(Signature)	(Signature)	(Signature)
(Date) 10/11/02 (Time) 1740	(Date) (Time)	(Date) (Time)
Received By: (1) (Company)	**Received By: (2) (Company)**	**Received By: (3) (Company)**
ELOT		
(Printed Name) Rolandk Tuttle	(Printed Name)	(Printed Name)
(Signature)	(Signature)	(Signature)
(Date) 10-11-02 (Time) 1740	(Date) (Time)	(Date) (Time)

Copy signed original form for Trident Environmental records

4-250 mL w/HCl
1-L HDPE
2-250 mL w/HNO3

ENVIRONMENTAL LAB OF TEXAS

ANALYTICAL REPORT

JOHN FERGERSON
TRIDENT ENVIRONMENTAL
P.O BOX 7624
MIDLAND, TX 79708

Order#: G0204761
Project: F-105
Project Name: DEFS: Eldridge
Location: DEFS: Eldridge

Lab ID: 0204761-01
Sample ID: MW-19

8015M

Method Blank	Date Prepared	Date Analyzed	Sample Amount	Dilution Factor	Analyst	Method
		10/16/02	1	1	CK	8015M

Parameter	Result mg/L	RL
GRO, C6-C12	<3.00	3.00
DRO, >C12-C35	<3.00	3.00
TOTAL, C6-C35	<3.00	3.00

Surrogates	% Recovered	QC Limits (%)	
1-Chlorooctane	101%	70	130
1-Chlorooctadecane	101%	70	130

8021B/5030 BTEX

Method Blank	Date Prepared	Date Analyzed	Sample Amount	Dilution Factor	Analyst	Method
0003450-02		10/15/02 19:17	1	1	CK	8021B

Parameter	Result mg/L	RL
Benzene	0.003	0.001
Ethylbenzene	<0.001	0.001
Toluene	<0.001	0.001
p/m-Xylene	<0.001	0.001
o-Xylene	<0.001	0.001

Surrogates	% Recovered	QC Limits (%)	
aaa-Toluene	82%	80	120
Bromofluorobenzene	89%	80	120

DL = Diluted out N/A = Not Applicable RL = Reporting Limit

ENVIRONMENTAL LAB OF TEXAS

ANALYTICAL REPORT

JOHN FERGERSON		Order#:	G0204761
TRIDENT ENVIRONMENTAL		Project:	F-105
P.O BOX 7624		Project Name:	DEFS: Eldridge
MIDLAND, TX 79708		Location:	DEFS: Eldridge

Lab ID: 0204761-02
Sample ID: MW-18

8015M

Method Blank	Date Prepared	Date Analyzed	Sample Amount	Dilution Factor	Analyst	Method
		10/16/02	1	1	CK	8015M

Parameter	Result mg/L	RL
GRO, C6-C12	<3.00	3.00
DRO, >C12-C35	<3.00	3.00
TOTAL, C6-C35	<3.00	3.00

Surrogates	% Recovered	QC Limits (%)	
1-Chlorooctane	108%	70	130
1-Chlorooctadecane	108%	70	130

8021B/5030 BTEX

Method Blank	Date Prepared	Date Analyzed	Sample Amount	Dilution Factor	Analyst	Method
00034450-02		10/15/02 19:37	1	1	CK	8021B

Parameter	Result mg/L	RL
Benzene	0.008	0.001
Ethylbenzene	0.001	0.001
Toluene	0.005	0.001
p/m-Xylene	0.002	0.001
o-Xylene	<0.001	0.001

Surrogates	% Recovered	QC Limits (%)	
aaa-Toluene	108%	80	120
Bromofluorobenzene	88%	80	120

DL = Diluted out N/A = Not Applicable RL = Reporting Limit

ENVIRONMENTAL LAB OF TEXAS

ANALYTICAL REPORT

JOHN FERGERSON
TRIDENT ENVIRONMENTAL
P.O BOX 7624
MIDLAND, TX 79708

Order#: G0204761
Project: F-105
Project Name: DEFS: Eldridge
Location: DEFS: Eldridge

Lab ID: 0204761-03
Sample ID: MW-20

8015M

Method Blank	Date Prepared	Date Analyzed	Sample Amount	Dilution Factor	Analyst	Method
		10/16/02	1	1	CK	8015M

Parameter	Result mg/L	RL
GRO, C6-C12	<3.00	3.00
DRO, >C12-C35	<3.00	3.00
TOTAL, C6-C35	<3.00	3.00

Surrogates	% Recovered	QC Limits (%)	
1-Chlorooctane	92%	70	130
1-Chlorooctadecane	91%	70	130

8021B/5030 BTEX

Method Blank	Date Prepared	Date Analyzed	Sample Amount	Dilution Factor	Analyst	Method
0003450-02		10/15/02 19:57	1	1	CK	8021B

Parameter	Result mg/L	RL
Benzene	<0.001	0.001
Ethylbenzene	<0.001	0.001
Toluene	<0.001	0.001
p/m-Xylene	<0.001	0.001
o-Xylene	<0.001	0.001

Surrogates	% Recovered	QC Limits (%)	
aaa-Toluene	84%	80	120
Bromofluorobenzene	92%	80	120

DL = Diluted out N/A = Not Applicable RL = Reporting Limit

ENVIRONMENTAL LAB OF TEXAS

ANALYTICAL REPORT

JOHN FERGERSON
TRIDENT ENVIRONMENTAL
P.O BOX 7624
MIDLAND, TX 79708

Order#: G0204761
Project: F-105
Project Name: DEFS: Eldridge
Location: DEFS: Eldridge

Lab ID: 0204761-03
Sample ID: MW-20

Test Parameters

Parameter	Result	Units	Dilution Factor	RL	Method	Date Analyzed	Analyst
Fluoride	1.21	mg/L	1	0.02	340.1	10/15/02	SB
Nitrogen, Nitrate	4.2	mg/L	1	0.5	353.3	10/12/02	SB
Total Dissolved Solids (TDS)	608	mg/L	1	5.0	160.1	10/14/02	TAL

Lab ID: 0204761-04
Sample ID: MW-15

Anions

Parameter	Result	Units	Dilution Factor	RL	Method	Date Analyzed	Analyst
Bicarbonate Alkalinity	164	mg/L	1	2.00	310.1	10/12/02	SB
Carbonate Alkalinity	<0.10	mg/L	1	0.10	310.1	10/12/02	SB
Chloride	42.5	mg/L	1	5.00	9253	10/14/02	SB
Hydroxide Alkalinity	<0.10	mg/L	1	0.10	310.1	10/12/02	SB
SULFATE, 375.4	51.0	mg/L	1	0.5	375.4	10/15/02	SB

Test Parameters

Parameter	Result	Units	Dilution Factor	RL	Method	Date Analyzed	Analyst
Fluoride	1.25	mg/L	1	0.02	340.1	10/15/02	SB
Nitrogen, Nitrate	3.5	mg/L	1	0.5	353.3	10/12/02	SB
Total Dissolved Solids (TDS)	357	mg/L	1	5.0	160.1	10/14/02	TAL

Lab ID: 0204761-05
Sample ID: MW-21

Anions

Parameter	Result	Units	Dilution Factor	RL	Method	Date Analyzed	Analyst
Bicarbonate Alkalinity	196	mg/L	1	2.00	310.1	10/12/02	SB
Carbonate Alkalinity	<0.10	mg/L	1	0.10	310.1	10/12/02	SB
Chloride	39.9	mg/L	1	5.00	9253	10/14/02	SB
Hydroxide Alkalinity	<0.10	mg/L	1	0.10	310.1	10/12/02	SB
SULFATE, 375.4	51.1	mg/L	1	0.5	375.4	10/15/02	SB

Test Parameters

Parameter	Result	Units	Dilution Factor	RL	Method	Date Analyzed	Analyst
Fluoride	1.31	mg/L	1	0.02	340.1	10/15/02	SB
Nitrogen, Nitrate	2.2	mg/L	1	0.5	353.3	10/12/02	SB
Total Dissolved Solids (TDS)	385	mg/L	1	5.0	160.1	10/14/02	TAL

RL = Reporting Limit N/A = Not Applicable

ENVIRONMENTAL LAB OF TEXAS

ANALYTICAL REPORT

JOHN FERGERSON
TRIDENT ENVIRONMENTAL
P.O BOX 7624
MIDLAND, TX 79708

Order#: G0204761
Project: E-105
Project Name: DEFS: Eldridge
Location: DEFS: Eldridge

Lab ID: 0204761-06
Sample ID: MW-22

Anions

Parameter	Result	Units	Dilution Factor	RL	Method	Date Analyzed	Analyst
Bicarbonate Alkalinity	234	mg/L	1	2.00	310.1	10/12/02	SB
Carbonate Alkalinity	<0.10	mg/L	1	0.10	310.1	10/12/02	SB
Chloride	48.7	mg/L	1	5.00	9253	10/14/02	SB
Hydroxide Alkalinity	<0.10	mg/L	1	0.10	310.1	10/12/02	SB
SULFATE, 375.4	42.6	mg/L	1	0.5	375.4	10/15/02	SB

Test Parameters

Parameter	Result	Units	Dilution Factor	RL	Method	Date Analyzed	Analyst
Fluoride	1.12	mg/L	1	0.02	340.1	10/15/02	SB
Nitrogen, Nitrate	1.4	mg/L	1	0.5	353.3	10/12/02	SB
Total Dissolved Solids (TDS)	420	mg/L	1	5.0	160.1	10/14/02	TAL

Lab ID: 0204761-07
Sample ID: MW-17

Anions

Parameter	Result	Units	Dilution Factor	RL	Method	Date Analyzed	Analyst
Bicarbonate Alkalinity	196	mg/L	1	2.00	310.1	10/12/02	SB
Carbonate Alkalinity	<0.10	mg/L	1	0.10	310.1	10/12/02	SB
Chloride	46.5	mg/L	1	5.00	9253	10/14/02	SB
Hydroxide Alkalinity	<0.10	mg/L	1	0.10	310.1	10/12/02	SB
SULFATE, 375.4	66.1	mg/L	1	0.5	375.4	10/15/02	SB

Test Parameters

Parameter	Result	Units	Dilution Factor	RL	Method	Date Analyzed	Analyst
Fluoride	1.94	mg/L	1	0.02	340.1	10/15/02	SB
Nitrogen, Nitrate	2.0	mg/L	1	0.5	353.3	10/12/02	SB
Total Dissolved Solids (TDS)	405	mg/L	1	5.0	160.1	10/14/02	TAL

Lab ID: 0204761-08
Sample ID: MW-16

Anions

Parameter	Result	Units	Dilution Factor	RL	Method	Date Analyzed	Analyst
Bicarbonate Alkalinity	190	mg/L	1	2.00	310.1	10/12/02	SB
Carbonate Alkalinity	<0.10	mg/L	1	0.10	310.1	10/12/02	SB
Chloride	55.4	mg/L	1	5.00	9253	10/14/02	SB
Hydroxide Alkalinity	<0.10	mg/L	1	0.10	310.1	10/12/02	SB
SULFATE, 375.4	71	mg/L	1	0.5	375.4	10/15/02	SB

RL = Reporting Limit N/A = Not Applicable

ENVIRONMENTAL LAB OF TEXAS

ANALYTICAL REPORT

JOHN FERGERSON		Order#:	G02004761
TRIDENT ENVIRONMENTAL		Project:	F-105
P.O BOX 7624		Project Name:	DEFS: Eldridge
MIDLAND, TX 79708		Location:	DEFS: Eldridge

Lab ID: 0204761-08
Sample ID: MW-16

Test Parameters

Parameter	Result	Units	Dilution Factor	RL	Method	Date Analyzed	Analyst
Fluoride	1.53	mg/L	1	0.02	340.1	10/15/02	SB
Nitrogen, Nitrate	2.3	mg/L	1	0.5	353.3	10/12/02	SB
Total Dissolved Solids (TDS)	426	mg/L	1	5.0	160.1	10/15/02	TAL

Approval: Roland K Tuttle 10-28-02
Roland K. Tuttle, Lab Director, QA Officer — Date
Celey D. Keene, Org. Tech. Director
Jeanne McMurrey, Inorg. Tech. Director
Sandra Biezugbe, Lab Tech.
Sara Molina, Lab Tech.

RL = Reporting Limit N/A = Not Applicable

ENVIRONMENTAL LAB OF TEXAS I, LTD. 12600 West I-20 East, Odessa, TX 79765 Ph: 915-563-1800

ENVIRONMENTAL LAB OF TEXAS

QUALITY CONTROL REPORT

8021B/5030 BTEX

Order#: G0204761

BLANK WATER	LAB-ID #	Sample Concentr.	Spike Concentr.	QC Test Result	Pct (%) Recovery	RPD
Benzene-mg/L	0003450-02			<0.001		
Ethylbenzene-mg/L	0003450-02			<0.001		
Toluene-mg/L	0003450-02			<0.001		
p/m-Xylene-mg/L	0003450-02			<0.001		
o-Xylene-mg/L	0003450-02			<0.001		
MS WATER	**LAB-ID #**	**Sample Concentr.**	**Spike Concentr.**	**QC Test Result**	**Pct (%) Recovery**	**RPD**
Benzene-mg/L	0204761-10	0	0.1	0.097	97.%	
Ethylbenzene-mg/L	0204761-10	0	0.1	0.100	100.%	
Toluene-mg/L	0204761-10	0	0.1	0.101	101.%	
p/m-Xylene-mg/L	0204761-10	0	0.2	0.210	105.%	
o-Xylene-mg/L	0204761-10	0	0.1	0.101	101.%	
MSD WATER	**LAB-ID #**	**Sample Concentr.**	**Spike Concentr.**	**QC Test Result**	**Pct (%) Recovery**	**RPD**
Benzene-mg/L	0204761-10	0	0.1	0.092	92.%	5.3%
Ethylbenzene-mg/L	0204761-10	0	0.1	0.094	94.%	6.2%
Toluene-mg/L	0204761-10	0	0.1	0.095	95.%	6.1%
p/m-Xylene-mg/L	0204761-10	0	0.2	0.198	99.%	5.9%
o-Xylene-mg/L	0204761-10	0	0.1	0.095	95.%	6.1%
SRM WATER	**LAB-ID #**	**Sample Concentr.**	**Spike Concentr.**	**QC Test Result**	**Pct (%) Recovery**	**RPD**
Benzene-mg/L	0003450-05		0.1	0.094	94.%	
Ethylbenzene-mg/L	0003450-05		0.1	0.096	96.%	
Toluene-mg/L	0003450-05		0.1	0.098	98.%	
p/m-Xylene-mg/L	0003450-05		0.2	0.202	101.%	
o-Xylene-mg/L	0003450-05		0.1	0.097	97.%	

ENVIRONMENTAL LAB OF TEXAS

QUALITY CONTROL REPORT

Test Parameters

Order#: G0204761

SRM WATER	LAB-ID #	Sample Concentr.	Spike Concentr.	QC Test Result	Pct (%) Recovery	RPD
Iron-mg/L	0003461-04		1	1.04	104.%	
Iron, Dissolved-mg/L	0003457-04		1	1.04	104.%	
Manganese-mg/L	0003461-04		1	1.02	102.%	
Manganese, Dissolved-mg/L	0003457-04		1	1.02	102.%	
Nitrogen, Nitrate-mg/L	0003426-04		2	1.90	95.%	

ENVIRONMENTAL LAB OF TEXAS

SAMPLE WORK LIST

REMEDIACON
P.O. BOX 302
EVERGREEN, CO 80437
617-507-6178

Order#: G0204826
Project: None Given
Project Name: None Given
Location: None Given

The samples listed below were submitted to Environmental Lab of Texas and were received under chain of custody. Environmental Lab of Texas makes no representation or certification as to the method of sample collection, sample identification, or transportation/handling procedures used prior to the receipt of samples by Environmental Lab of Texas, unless otherwise noted.

0204826-02	Duke MW-1	WATER	10/22/02 10:15	10/23/02 10:00	40 mL VOA	HNO3 pH<2 / Ice

Lab Testing: Rejected: No Temp: 18 C

8021B/5030 BTEX

0204826-03	Duke Irrigation Well	WATER	10/22/02 14:25	10/23/02 10:00	40 mL VOA	HNO3 pH<2 / Ice

Lab Testing: Rejected: No Temp: 18 C

8021B/5030 BTEX

Lab ID: 0204826-02
Sample ID: Duke MW-1

8021B/5030 BTEX

Method Blank	Date Prepared	Date Analyzed	Sample Amount	Dilution Factor	Analyst	Method
0001033-02		10/29/02 12:13	5	10	CK	8021B

Parameter	Result mg/L	RL
Benzene	1.45	0.010
Ethylbenzene	0.112	0.010
Toluene	1.49	0.010
p/m-Xylene	0.295	0.010
o-Xylene	0.074	0.010

Surrogates	% Recovered	QC Limits (%)	
a,a,a-Toluene	156%	80	120
Bromofluorobenzene	97%	80	120

DL = Diluted out NA = Not Applicable RL = Reporting Limit

ENVIRONMENTAL LAB OF TEXAS

ANALYTICAL REPORT

MICHAEL STEWART
REMEDIACON
P.O. BOX 302
EVERGREEN, CO 80437

Order#: G0204826
Project: None Given
Project Name: None Given
Location: None Given

Lab ID: 0204826-03
Sample ID: Duke Irrigation Well

8021B/5030 BTEX

Method Blank	Date Prepared	Date Analyzed	Sample Amount	Dilution Factor	Analyst	Method
0003583-02		10/29/02 18:38	1	10	CK	8021B

Parameter	Result mg/L	RL
Benzene	**1.26**	0.010
Ethylbenzene	**0.088**	0.010
Toluene	**1.12**	0.010
p/m-Xylene	**0.220**	0.010
o-Xylene	**0.056**	0.010

Surrogates	% Recovered	QC Limits (%)	
aaa-Toluene	**154%**	**80**	**120**
Bromofluorobenzene	**95%**	**80**	**120**

Approval: Raland K Tuttle 10-31-02
Raland K. Tuttle, Lab Director, QA Officer — Date
Celey D. Keene, Org. Tech. Director
Jeanne McMurrey, Inorg. Tech. Director
Sandra Biezugbe, Lab Tech.
Sara Molina, Lab Tech.

DL = Diluted out N/A = Not Applicable RL = Reporting Limit

ENVIRONMENTAL LAB OF TEXAS

QUALITY CONTROL REPORT

8021B/5030 BTEX

Order#: G0204826

BLANK WATER	LAB-ID #	Sample Concentr.	Spike Concentr.	QC Test Result	Pct (%) Recovery	RPD
Benzene-mg/L	0003583-02			<0.001		
Ethylbenzene-mg/L	0003583-02			<0.001		
Toluene-mg/L	0003583-02			<0.001		
p/m-Xylene-mg/L	0003583-02			<0.001		
o-Xylene-mg/L	0003583-02			<0.001		
CONTROL WATER	**LAB-ID #**	**Sample Concentr.**	**Spike Concentr.**	**QC Test Result**	**Pct (%) Recovery**	**RPD**
Benzene-mg/L	0003583-03		0.1	0.104	104.%	
Ethylbenzene-mg/L	0003583-03		0.1	0.106	106.%	
Toluene-mg/L	0003583-03		0.1	0.105	105.%	
p/m-Xylene-mg/L	0003583-03		0.2	0.224	112.%	
o-Xylene-mg/L	0003583-03		0.1	0.107	107.%	
CONTROL DUP WATER	**LAB-ID #**	**Sample Concentr.**	**Spike Concentr.**	**QC Test Result**	**Pct (%) Recovery**	**RPD**
Benzene-mg/L	0003583-04		0.1	0.106	106.%	1.9%
Ethylbenzene-mg/L	0003583-04		0.1	0.108	108.%	1.9%
Toluene-mg/L	0003583-04		0.1	0.107	107.%	1.9%
[illegible]Xylene-mg/L	0003583-04		0.2	0.229	114.5%	2.2%
[illegible]ylene-mg/L	0003583-04		0.1	0.110	110.%	2.8%
SRM WATER	**LAB-ID #**	**Sample Concentr.**	**Spike Concentr.**	**QC Test Result**	**Pct (%) Recovery**	**RPD**
Benzene-mg/L	0003583-05		0.1	0.104	104.%	
Ethylbenzene-mg/L	0003583-05		0.1	0.108	108.%	
Toluene-mg/L	0003583-05		0.1	0.105	105.%	
p/m-Xylene-mg/L	0003583-05		0.2	0.228	114.%	
o-Xylene-mg/L	0003583-05		0.1	0.109	109.%	

ENVIRONMENTAL LAB OF TEXAS

QUALITY CONTROL REPORT

Test Parameters

Order#: G0204826

BLANK WATER	LAB-ID #	Sample Concentr.	Spike Concentr.	QC Test Result	Pct (%) Recovery	RPD
Chloride-mg/L	0003545-01			<5.00		
MS WATER	**LAB-ID #**	**Sample Concentr.**	**Spike Concentr.**	**QC Test Result**	**Pct (%) Recovery**	**RPD**
Chloride-mg/L	0204832-01	213	500	709	99.2%	
MSD WATER	**LAB-ID #**	**Sample Concentr.**	**Spike Concentr.**	**QC Test Result**	**Pct (%) Recovery**	**RPD**
Chloride-mg/L	0204832-01	213	500	717	100.8%	1.1%
SRM WATER	**LAB-ID #**	**Sample Concentr.**	**Spike Concentr.**	**QC Test Result**	**Pct (%) Recovery**	**RPD**
Chloride-mg/L	0003545-04		5000	4960	99.2%	

CASE NARRATIVE

ENVIRONMENTAL LAB OF TEXAS

Prepared for:

REMEDIACON
P.O. BOX 302
EVERGREEN, CO 80437

Order#: G0204826

Project: None Given

The following samples were received as indicated below and on the attached Chain of Custody record. All analyses were performed within the holding time and with acceptable quality control results unless otherwise noted.

SAMPLE ID	LAB ID	MATRIX	Date Collected	Date Received
Apache MW-12	0204826-01	WATER	10/23/2002	10/23/2002
Duke MW-1	0204826-02	WATER	10/22/2002	10/23/2002
Duke Irrigation Well	0204826-03	WATER	10/22/2002	10/23/2002

Surrogate recoveries are outside control limits due to matrix interference from coeluting compounds.

The enclosed results of analyses are representative of the samples as received by the laboratory. Environmental Lab of Texas makes no representations or certifications as to the methods of sample collection, sample identification, or transportation handling procedures used prior to our receipt of samples. To the best of my knowledge, the information contained in this report is accurate and complete.

Approved By: Rebecca Tuttle Date: 10-31-02

Environmental Lab of Texas I, Ltd.

Environmental Lab of Texas I, Ltd.

2600 West I-20 East
Odessa, Texas 79763
Phone: 915-563-1800
Fax: 915-563-1713

CHAIN OF CUSTODY RECORD AND ANALYSIS REQUEST

Project Manager: MICHAEL STEWART
Company Name: REMEDIACON
Company Address: P.O. Box 302
City/State/Zip: EVERGREEN CO 80437
Telephone No: 303-674-4370
Fax No:
Sampler Signature:

Project Name:
Project #:
Project Loc:
PO #:

(Lab use only)
ORDER #: 0004826

FIELD CODE	Date Sampled	Time Sampled	No. of Containers	Preservative: Ice	HNO_3	HCl	NaOH	H_2SO_4	None	Other (Specify)	Matrix: Water	Sludge	Soil	Other (specify)	Analyze For: TCLP: TPH: 418.1 8015M 1005 1006	Cations (Ca, Mg, Na, K)	Anions (Cl, SO_4, CO_3, HCO_3)	SAR / ESP / CEC	Metals: As Ag Ba Cd Cr Pb Hg Se	Volatiles	Semivolatiles	TOTAL: BTEX 8021B/5030	RCI	Chloride DBS	RUSH TAT (Pre-Schedule)	Standard TAT
01 APACHE MW-12	10/23	0825	3		2					1	X											X		X		
02 DUKE MW-1	10/22	1015	2		2						X											X				
03 DUKE EVAPORATION WELL	10/22	1425	2		2						X											X				

Special Instructions: QUESTIONS TO MIKE STEWART 303-674-4370 BILL TO DUKE? APACHE
FAX RESULTS TO MIKE STEWART ~~303~~ 720-521-8132

Sample Containers Intact? Y N
Temperature Upon Receipt: 18 C
Laboratory Comments: 40 ML VOA PLASTIC BOTTLE

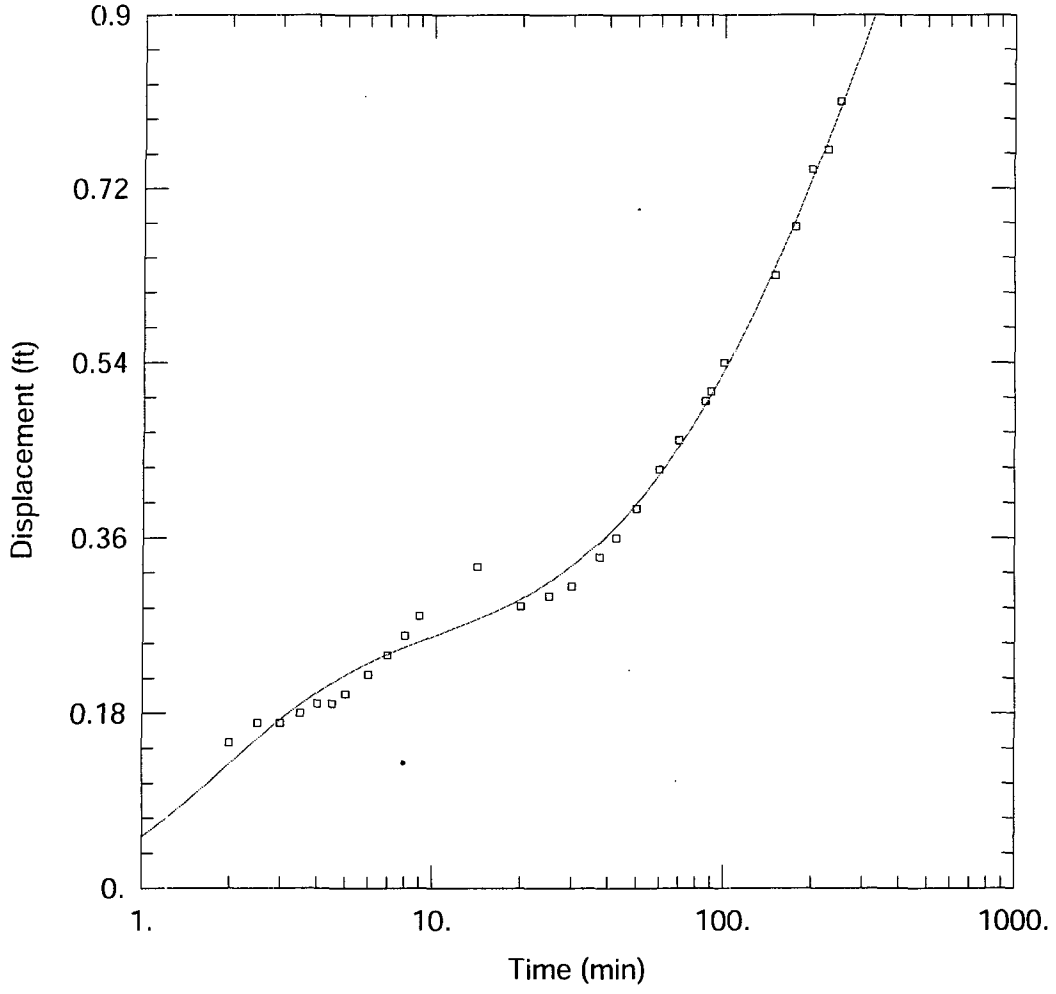
Relinquished by:	Date	Time	Received by:	Date	Time
	10/23	1005			
Relinquished by:	Date	Time	Received by ELOT:	Date	Time
			Dawn M. Caudill	10/23/02	10:00

Oct 31 02 01:43p

p.5

APPENDIX 3

OCTOBER 2002 PUMPING TEST ANALYSES



WELL TEST ANALYSIS

Data Set:
Date: 10/30/02 Time: 14:46:47

PROJECT INFORMATION

Company: Remediacon
Client: Duke
Project: Eldridge
Test Location: Eldridge Ranch
Test Well: Irrigation Well
Test Date: 10/23/02

AQUIFER DATA

Saturated Thickness: 27.6 ft

WELL DATA

Pumping Wells

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

Observation Wells

Well Name	X (ft)	Y (ft)
MW-1	0	25

SOLUTION

Aquifer Model: Unconfined
Solution Method: Neuman

T = 2662. ft^2/day
S = 0.01405
Sy = 0.273
ß = 0.652

APPENDIX 4

MW-23 FREE PRODUCT ANALYSIS

Certificate of Analysis

HOUSTON LABORATORY
8880 INTERCHANGE DRIVE
HOUSTON, TEXAS 77054
PHONE (713) 660-0901

Analysis Number: 02100252-001A

Sample ID:	0210111600 (17W-23)	**Date of Sample:**	10/11/02
Project #:		**Time Sampled:**	16:00
Project Name:		**Date Sample Analyzed:**	10/21/02
Client	Duke Energy Field Services	**Contact(s):**	Steve Weathers
Address	370 17th Street		
Suite / Department	Ste. 900		
City	Denver	**State**	Colorado **Zip** 80217
Phone	(303) 605-1718 **Ext**		
Fax	(303) 389-1957		

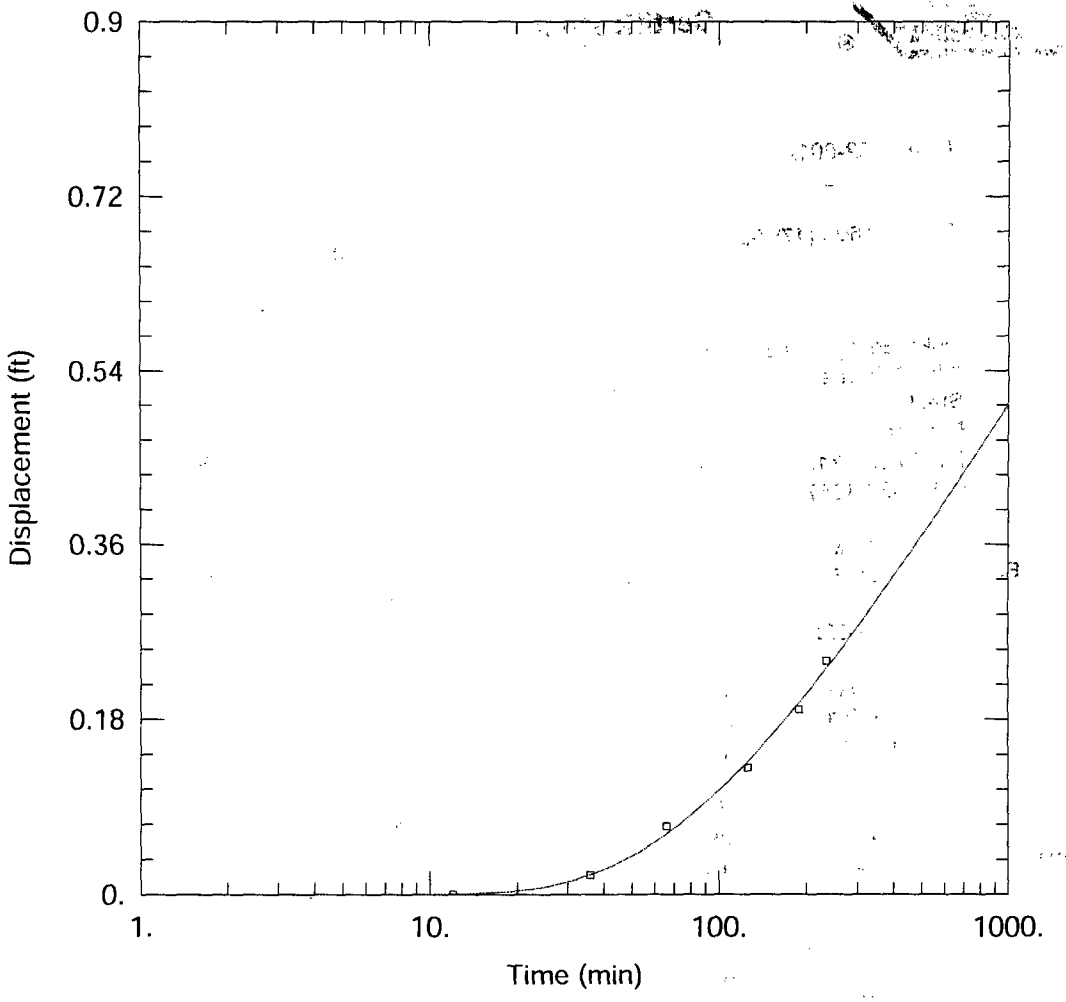
Color:	Straw	**Odor:**	Sour Condensate
***Specific Gravity @ 60° F.**	0.7231	***API @ 60° F.**	64.19
Carbon Range	C4 - C22	**Major Range**	C6 - C8

Paraffin	22.019	wt%	**N-Hexane**	8.604	wt%
Isoparaffins	31.461	wt%	**Benzene**	0.523	wt%
Naphthenics	40.544	wt%	**Ethyl Benzene**	0.219	wt%
Aromatics	3.901	wt%	**Toluene**	1.971	wt%
Olefins	1.979	wt%	**Meta-Xylene**	0.560	wt%
Unknowns	0.096	wt%	**Para-Xylene**	0.306	wt%
2,2,4-Tri Methylpentane	ND	wt%	**Ortho-Xylene**	0.167	wt%
			Xylenes	1.033	wt%
Research Octane	N/A		**EDB**	N/A	ppm
Lead/Manganese	N/A	ppm	**EDC**	N/A	ppm
Oxygnates	N/A	wt%	**Ethanol/Meoh**	N/A	wt%
C_{17}	0.009	wt%	**C_{18}**	0.011	wt%
Pristane	ND	wt%	**Phytane**	0.007	wt%
Naphthalene	ND	wt%	**2-Methyl Naphthalene**	ND	wt%
1-Methyl Naphthalene	ND	wt%			

	Gasoline Range:	C_4-C_{13} Indicators: 2,2,4-TMP; MTBE; Olefins, Lead
	Diesel Range:	C_7-C_{22} Indicators: No Olefins, Pristane, Phytane
X	**Crude/Condensate Range:**	C_2 - C_{25+}: Indicators: No Olefins, Light & Heavies
	Heavy Oil:	C_{20+} waxy, strong n-parrafins

Comments: Condensate hydrocarbon range C_4 - C_{22}. Naphthenics high, aromatics low and olefins low. No weathering indicated, insufficient bio markers.

Marsha Goudeau
QAQC



WELL TEST ANALYSIS

Data Set: C:\projects\DUKE\eldridge\1002 report\mw2.aqt
Date: 10/30/02 Time: 15:19:04

PROJECT INFORMATION

Company: Remediacon
Client: Duke
Project: Eldridge
Test Location: Eldridge Ranch
Test Well: Irrigation Well
Test Date: 10/23/02

AQUIFER DATA

Saturated Thickness: 27.6 ft

WELL DATA

Pumping Wells

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

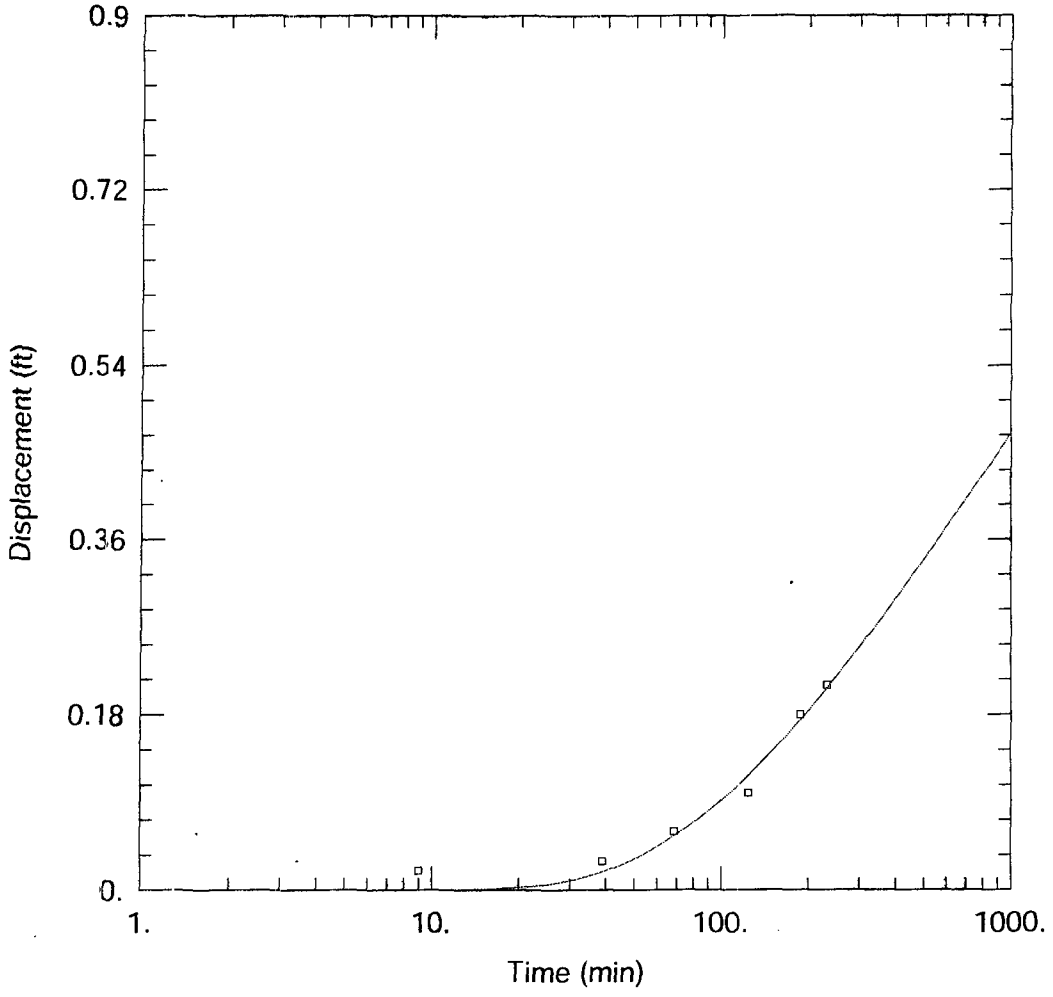
Observation Wells

Well Name	X (ft)	Y (ft)
MW-2	360	0

SOLUTION

Aquifer Model: Unconfined
Solution Method: Neuman

T = 5262.6 ft^2/day
S = 0.00622
Sy = 0.5
ß = 0.0004873



WELL TEST ANALYSIS

Data Set: C:\projects\DUKE\eldridge\1002 report\mw3.aqt
Date: 10/30/02 Time: 15:21:23

PROJECT INFORMATION

Company: Remediacon
Client: Duke
Project: Eldridge
Test Location: Eldridge Ranch
Test Well: Irrigation Well
Test Date: 10/23/02

AQUIFER DATA

Saturated Thickness: 27.6 ft

WELL DATA

Pumping Wells

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

Observation Wells

Well Name	X (ft)	Y (ft)
▫ MW-3	0	305

SOLUTION

Aquifer Model: Unconfined
Solution Method: Neuman

T = 5422.1 ft^2/day
S = 0.009881
Sy = 0.5
β = 9.495E-05