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REPORTS

DATE: 11/2002

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.

Mr Stephen Weathers November 4, 2002 Page 2

- 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.

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Respectfully Submitted, REMEDIACON INCORPORATED

Mechael 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.

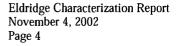
2.1 Monitoring Well Installation and Development

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	Dissolved Barium
Samples	(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.

	Hydraulic	Specific	
	Conductivity	Yield	
<u>Well</u>	<u>(feet/day)</u>	<u>(-)</u>	
	· ·		
MW-1	96	0.2	
MW-2	191	0.5	
MW-3	196	0.5	
Note: We	lle MW-4 and MW	-5 could not h	a analyzed because of no measurable drawdow

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 riskbased 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:

- 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.

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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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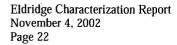
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TABLES

Table 1 – Well Construction Information

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			Elevation	Total			Top of
	Installed	Date	Top of	Well	Screen	Sand	Bentonite
Well	By	Installed	Casing	Depth	Interval	Interval	Pellets
<u>MW-1</u>	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

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Notes: All units are feet:

NA information not available



Table 2 – Field Parameter Summary

	Temperature	Conductivity	pН	DO	Average Flow
Well	(°C)	(<i>m</i> S/cm)	(unitless)	(mg/L)	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 Development Completed October 10, 2002

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 (<i>m</i> S/cm)	pH (unitless)	DO (mg/L)	Turbidity (NT)
VCII			(unitiess)	(ing/L)	(111)
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

· · · · · · · · · · · · · · · · · · ·	8/01	2/02	7/02	10/02	10/02		10/02
	Groundwater	Groundwater	Groundwater	Depth to	Depth to	Groundwater	Product
Well	Elevations	Elevations	Elevations	Water	Product	Elevations	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

Gasoline Diesel Sample Ethyl Total Range Range Well Date Benzene benzene Toluene **Xylenes** Organics Organics NMWQCCGWS 0.01 0.75 0.75 0.62 **MW-15** 0.002 < 0.001 < 0.001 < 0.001 <3 <3 10/11/2002 MW-16 10/11/2002 < 0.001 < 0.001 < 0.001 < 0.001 <3 <3 < 0.001 MW-17 10/11/2002 < 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 0.0013 <3 0.01 0.004 0.022 <3 MW-21 dup 10/11/2002 0.004 0.024 0.012 0.011 **MW-22** 10/11/2002 < 0.001 < 0.001 < 0.001 < 0.001 <3 <3 Irrigation Well@15 10/23/2002 0.112 0.371 1.45 1.49 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

Table 4 – October 2002 Groundwater Sampling Results for Organic Constituents

All units in mg/l

NMWQCCGWS: New Mexico Water Quality Control Commission Ground Water Standards Values exceeding the NMWQCCGWS are highlighted by bolding



	1					Gasoline	Diesel
	Sample		Ethyl		Total	Range	Range
Well	Date	Benzene	benzene	Toluene	Xylenes	Organics	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							

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

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

11-211		Sample						01 <i>6</i> .42	Chlorido Domini	Daritical		Manzanada
NMWOCCCWS	Date	1 ype	Calcium	Calcium Magnesium Folassium Soulium	rouassium	lininoc	AIKAIIIIIIY	Sullate	250	1		
									0	•	4	
MW-15	10/11/2002 Unfiltered	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	Filtered								0.098	0.054	0.015
MW-16	10/11/2002 Unfiltered	Unfiltered	49.1	14.2	7.89	56.4	190	11	55.4	0.608	16.2	0.16
MW-16	10/11/2002 Filtered	Filtered								0.165	0.156	0.069
MW-17	10/11/2002 Unfiltered	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	Filtered								0.272	0.035	0.421
MW-18	10/11/2002 Unfiltered	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	Filtered								0.309	0.201	0.224
MW-19	10/11/2002 Unfiltered	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	Filtered								0.278	0.02	0.156
MW-20	10/11/2002 Unfiltered	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	Filtered								0.135	0.17	0.023
MW-21	10/11/2002 Unfiltered	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	Filtered								0.161	0.045	0.331
MW-22	10/11/2002 Unfiltered	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	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

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Well	Date	Sample	Calcium	Calcium Magnesium Potassium Sodium Alkalinity	Potassium	Sodium	άλ. "	Sulfate	Sulfate Chloride Barium	Barium	Iron	Manganese
NMWQCCGWS				2				600	250	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	6.7.9	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
9-WM	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
7-WM	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	\$	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
6-MW	3/3/2002	Unfiltered	78.5	14.1	5.66	47.1	222	45.3	34.8	2.84	66.1	1.29
6-WM	7/18/2002	Filtered	71.0	12.8	5.05	49.1	254	62.6	40.8	0.230	0.047	0.040
01-WM	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	MW-14 7/18/2002 Filtered 101 23.4 4.36 45.7 372 <0.50 53.2 2.11 0.608	4.36	45.7	372	<0.50	53.2	2.11	0.608	0.139

.

Table 8 - Pumping Test Results

MW-1

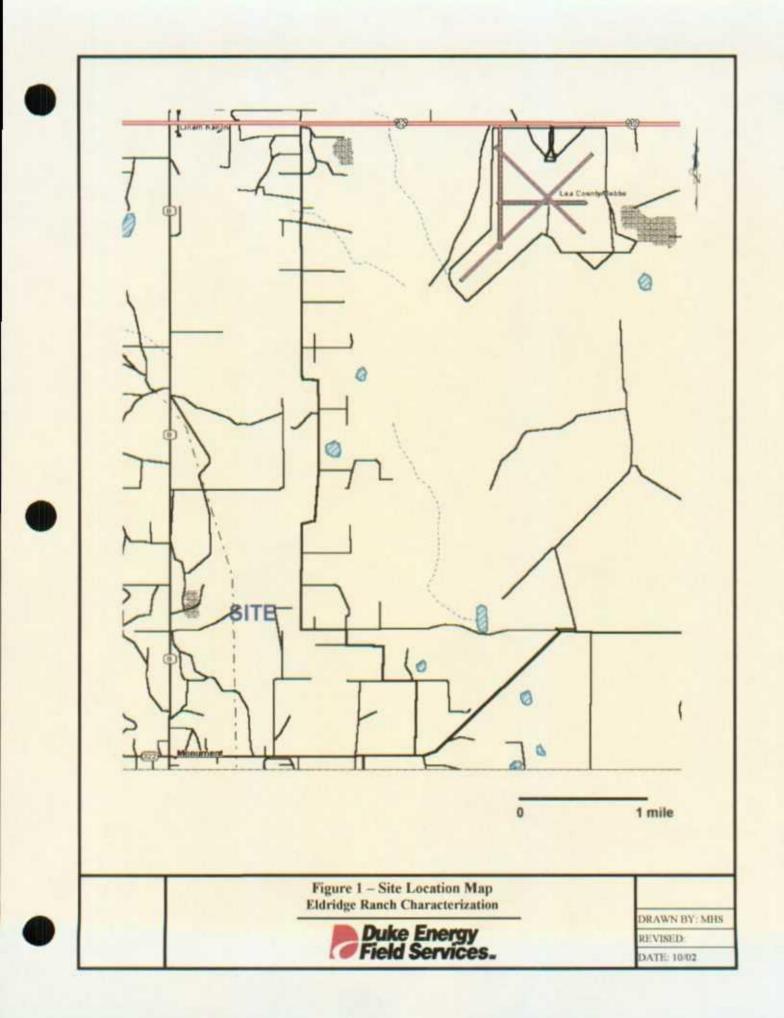
Elapsed Time	Drawdown
(minutes)	(feet)
2.0	0.15
2.5	0.17
3.0	0.17
3.5	0.18
4.0	0.19
4.5	0.19
5.0	0.20
6.0	0.22
7.0	0.24
8.0	0.26
9.0	0.28
14.3	0.33
20	0.29
25	0.30
30	0.31
37.5	0.34
42.5	0.36
50	0.39
60	0.43
70	0.46
86	0.50
90	0.51
100	0.54
150	0.63
175	0.68
201	0.74
226	0.76
250	0.81

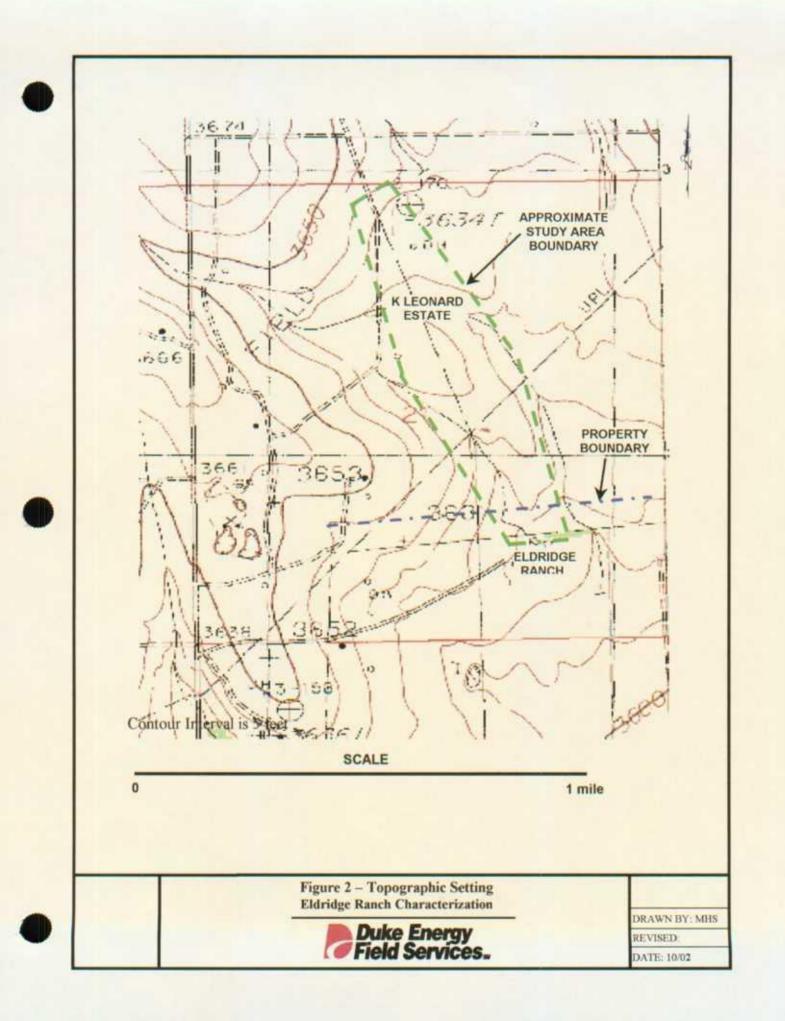
Elapsed Time (minutes)	Drawdown (feet)
12	0
36	0.02
66	0.07
126	0.13
189	0.19
235	0.24

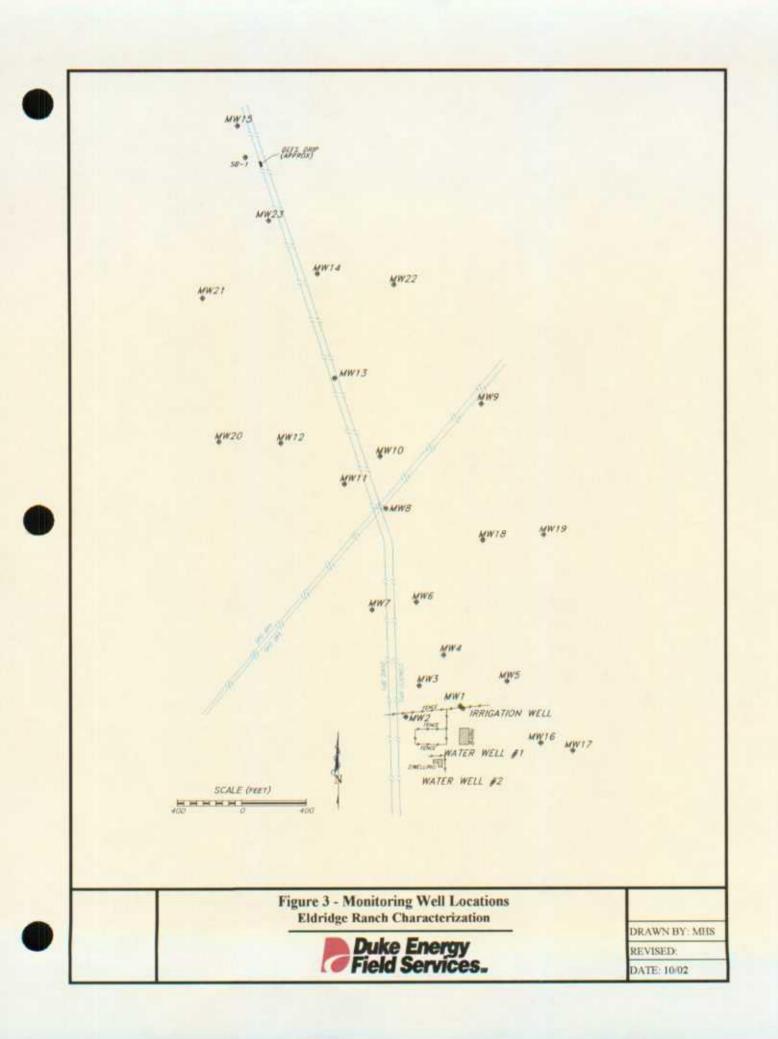
MW-3

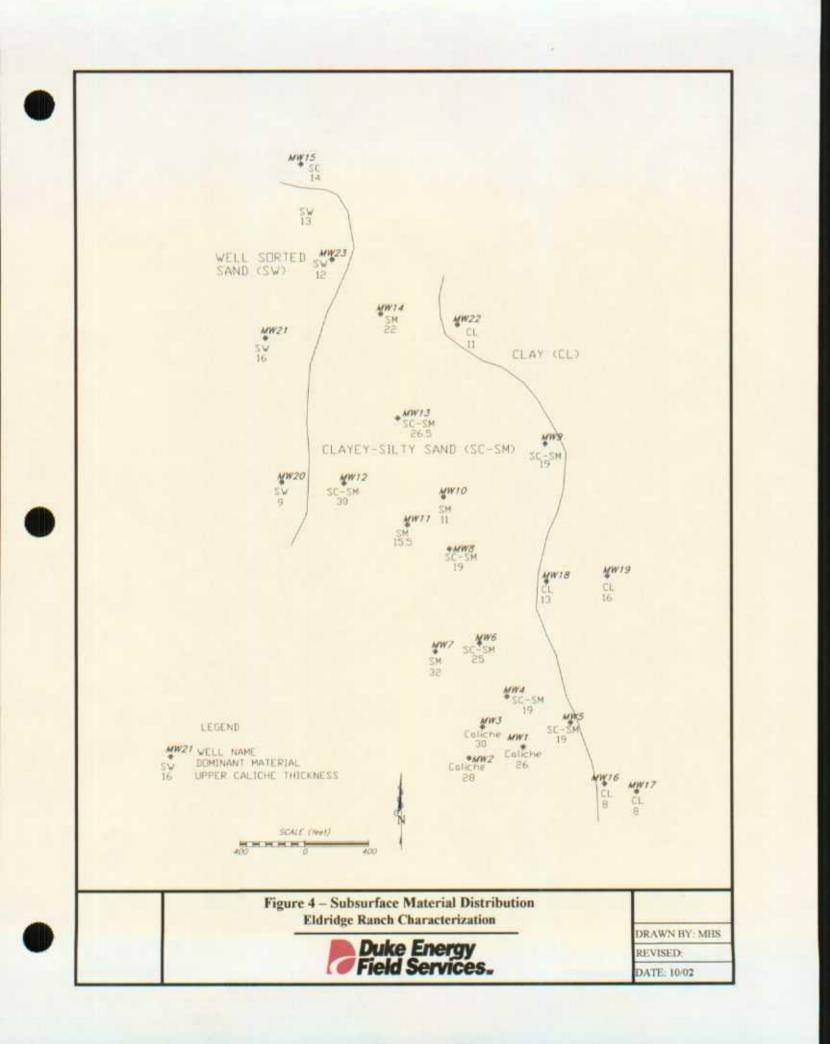
Elapsed	Drawdown
(minutes)	(feet)
9	0.02
39	0.03
69	0.06
124	0.1
187	0.18
232	0.21

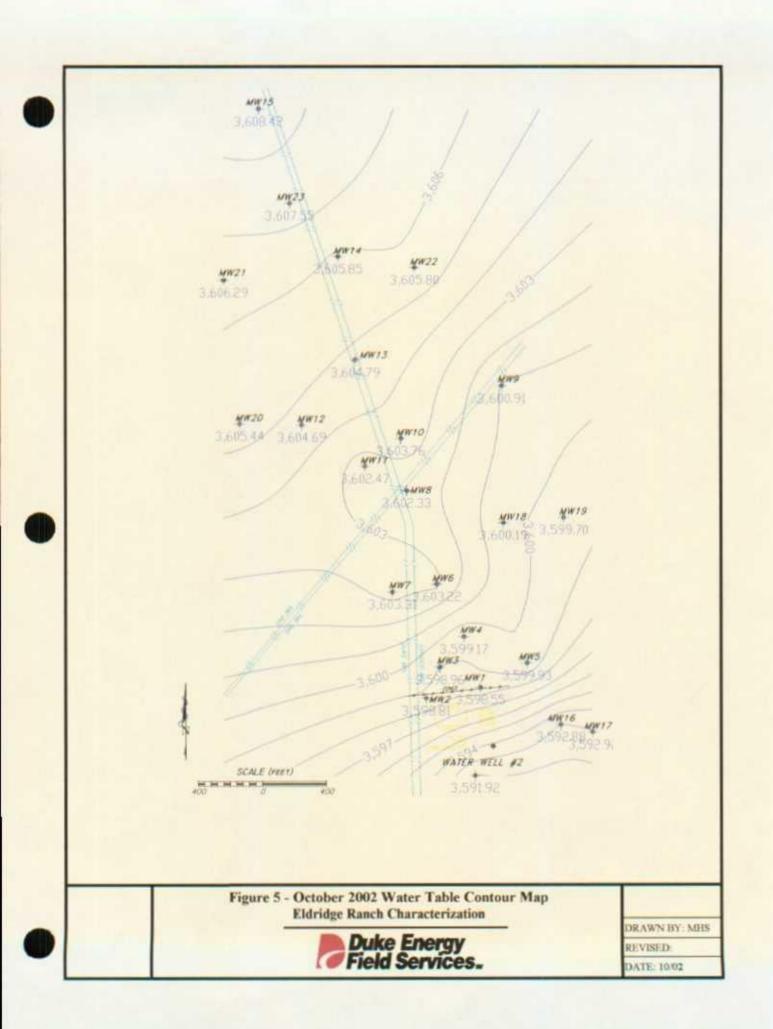
FIGURES

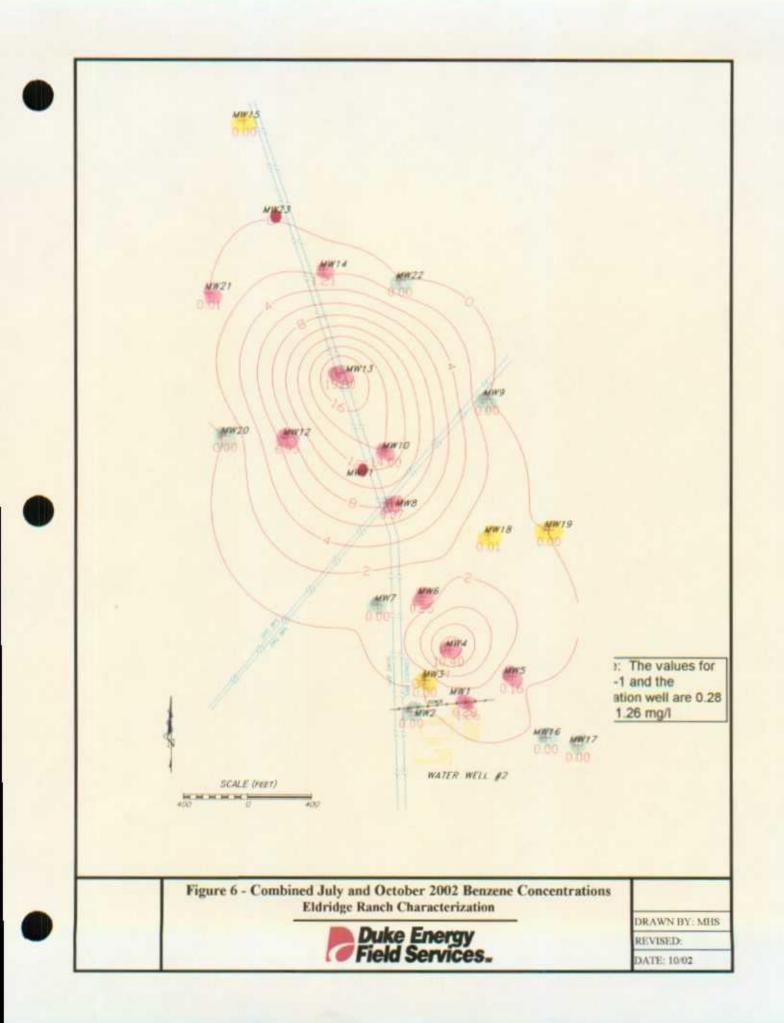


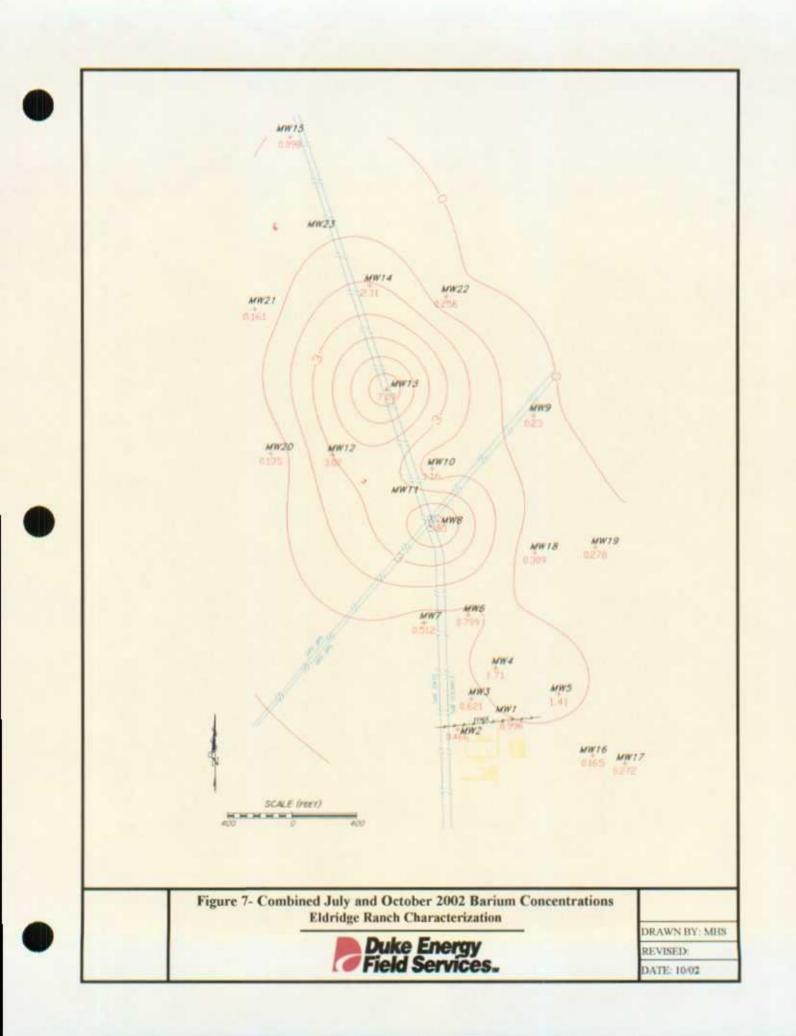


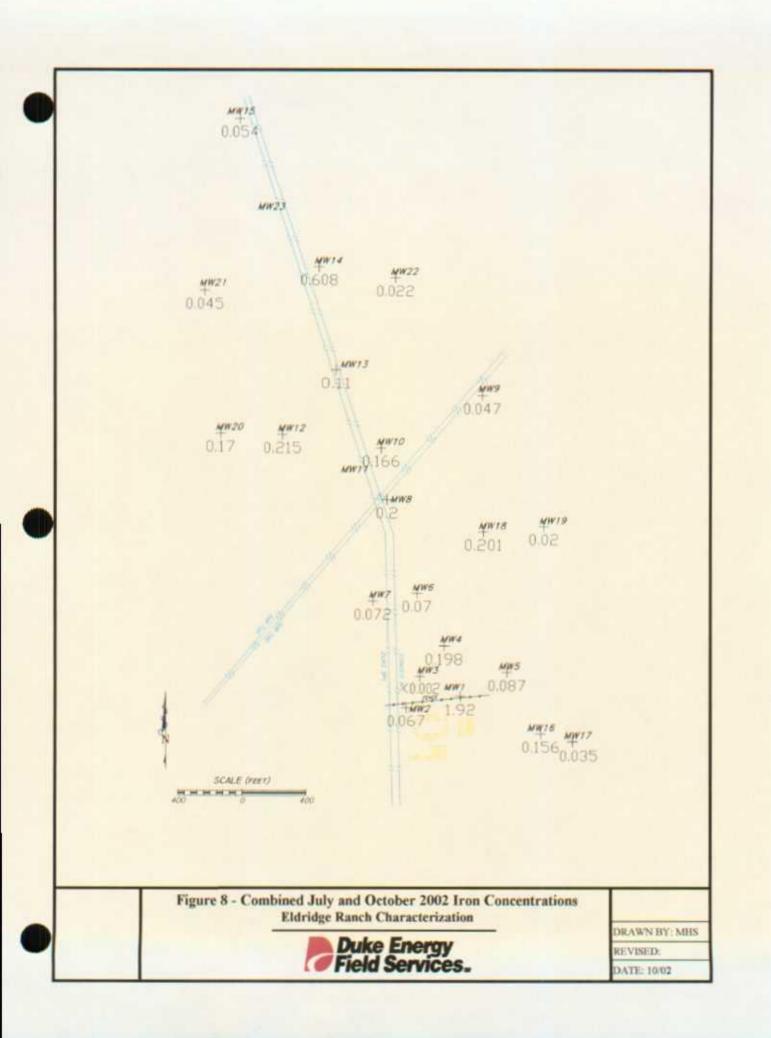


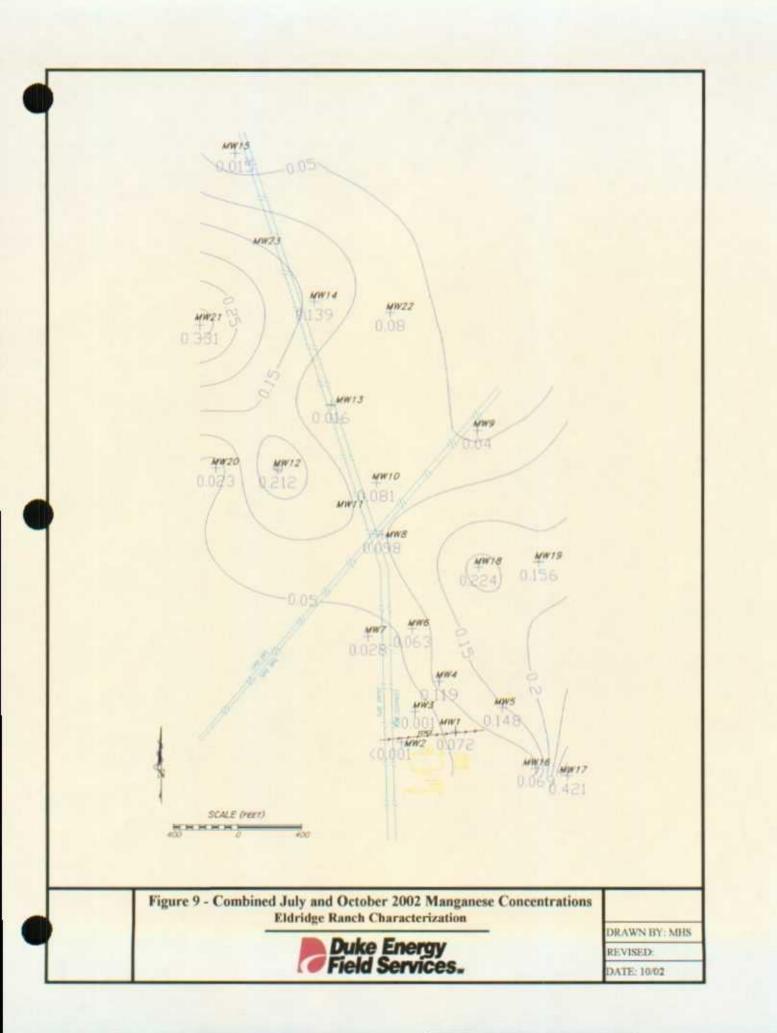


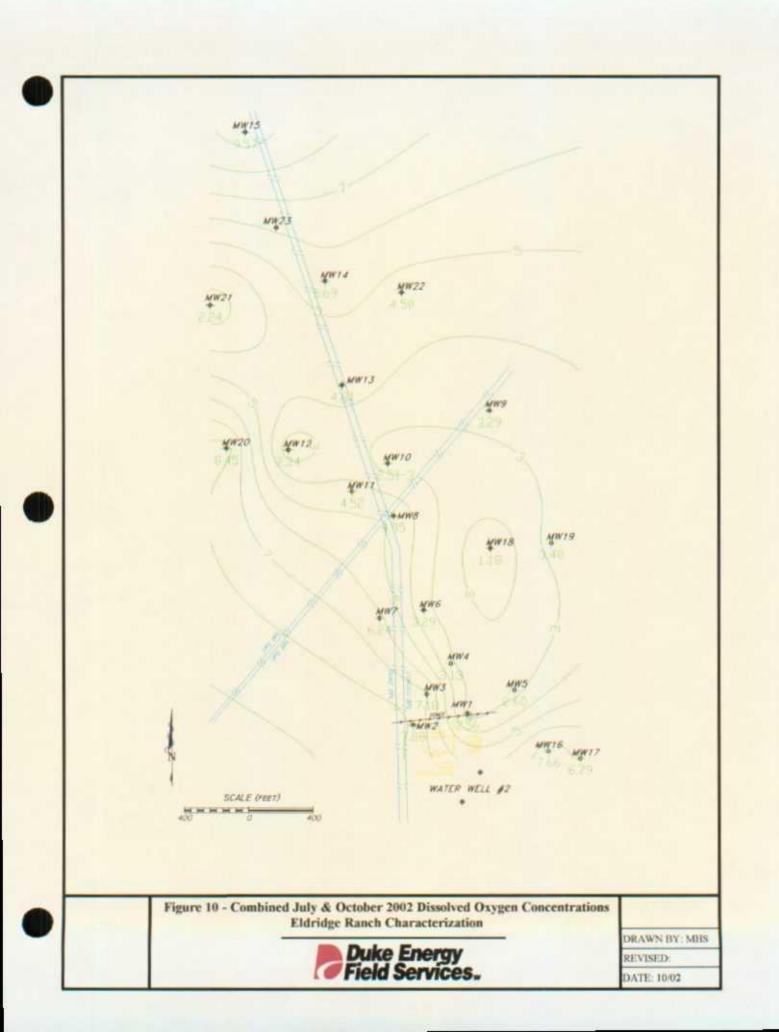


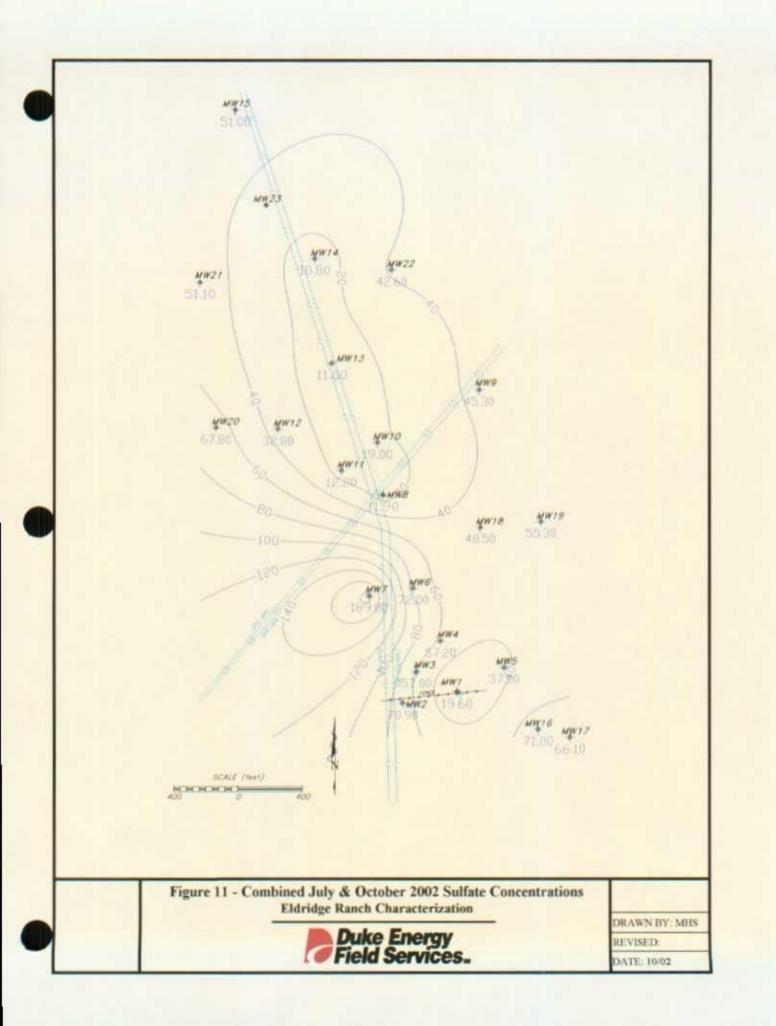


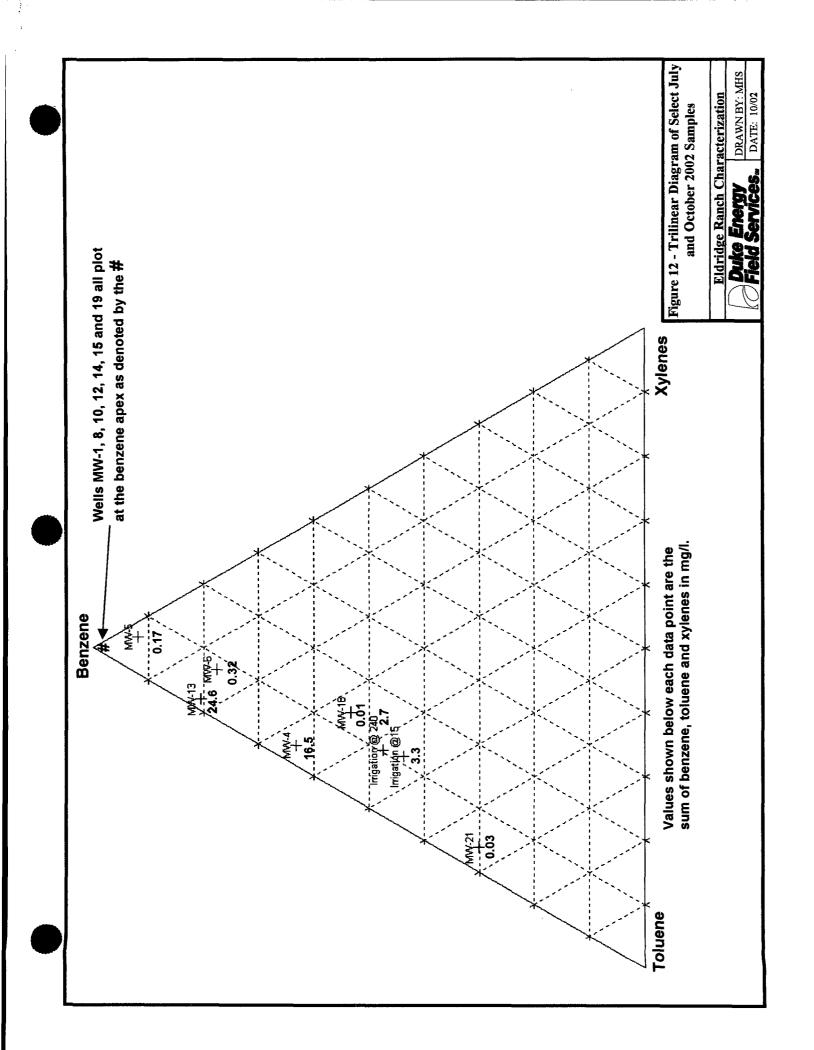












APPENDICIES

APPENDIX 1

BORING LOGS AND WELL CONSTRUCTION DIAGRAMS

					I	LITHO	OLOG	IC LO	G (SO	IL BORING)
7	CR V	II	U DEN		SURFA	CE ELEV CONTR LING M STAR PLETIOI	VATION: ACTOR: ETHOD: T DATE:	SB-1 Eldridge Eades Dr Air Rotar 9/26/2002 9/26/2002	illing /	TOTAL DEPTH: 25 Feet CLIENT: Duke Energy Field Services COUNTY: Lea STATE: New Mexico LOCATION: Monument FIELD REP.: J. Fergerson FILE NAME:
				USCS ML Cal	FROM 3	SAMPL TO 5	TYPE	PID 11.4ppm		LITHOLOGIC DESCRIPTION: LITHOLOGY, COLOR, GR SIZE, SORTING, ROUNDING, CONSOL., DIST. FEATUR Clayey Silt, v pale orange-mod yellowish brown, unconsol, w/weathered-dense caliche and 5% clay in matrix, no odor. Caliche, v pale-grayish orange, weathered-dense, w/30% clay and silt in matrix, sl hydrocarbon odor.
1/8 Inch Borehole	*	E HOLEPLUG		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.
5 1/8 Inc		BENTONITE		WS	13	15	S Spoon	129ppm	15	Sand, vf grain, v pale orange-light brown, w sorted, unconsinterbedded w/mod-w cemented vf grain sand, w/tr weathe 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, unconsinterbedded w/mod-w cemented vf grain sand, w/5% clay and tr weathered caliche in matrix, good-strong hydrocarbo odor.
	:				24	25	S Spoon	494ppm	25	Gray discoloration in matrix. TD @ 25 Feet.
									30 35 40 45	

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						LIT	HOLO	DGIC	LOG (MONI	FORING WELL)
{						MONITO					TOTAL DEPTH: 35 Feet
				10					Eldridge	Ranch	CLIENT: Duke Energy Field Services
				SC-	• .		CE ELEV CONTR		Eades Dr	rilling	COUNTY: Lea STATE: New Mexico
		R]		DEN	T				Air Rotar		LOCATION: Monument
	L 63	×vu ∕∕	ieic)		in and				9/26/2002		FIELD REP.: J. Fergerson
1	Å	8 .				COM		MENTS:	9/26/2002		FILE NAME:
							0011	MENTO.			
_					r		C 4 4 4 5 1	-		DEDTU	
		īL		LITH.	USCS	FROM	SAMPL TO	E TYPE	PID	DEPTH	LITHOLOGIC DESCRIPTION: LITHOLOGY, COLOR, GRAI SIZE, SORTING, ROUNDING, CONSOL., DIST. FEATURES
		10	са Ţ		ws						Clayey Silt, v pale orange-mod yellowish brown, unconsol,
			Cemen		W3						w/weathered-dense caliche and 5% clay in matrix, no odor.
			4	→→ →→ →→							Caliche, v pale orange-lt brown, weathered-dense, w/tr silt in matrix.
	1									5	
					CAL						
٦.				+ + + 		5	7	Grab	0.0ppm		
Ris			ĥ					Ì			4
2 Inch Sched 40 Riser	•		Bentonite Holeplug							10	Caliche, v pale-grayish orange, weathered-dense,
Sch			ite					1	1		interbedded w/mod-w cemented vf grain sand, w/5% clay,
hch	₽ ¹¹	1.	inton		CAL	10	12	Grab	0.0ppm		tr vf grain sand in matrix, no odor.
5			Be								
					<u> </u>	1				15	Sand, vf grain, grayish orange pink-lt brown, w sorted,
											unconsol, interbedded w/mod-w cemented vf grain sand,
	5. 1				SW	15	17	Grab	0.0ppm		tr weathered caliche in matrix, no odor
			-								·
						1				20	Sand, vf grain, grayish orange pink-lt brown, w sorted,
					sw						unconsol, interbedded w/mod-w cemented vf grain sand,
						20	22	Grab	0.0ppm	<u> </u>	w/5% clay and tr weathered caliche in matrix, no odor
ы			ъ								Clayey Sand, vf grain, white-pale brown, w sorted, unconsol,
0 0.010 Screen			ilica Sand Pack							25	Encountered Water interbedded w/mod-w cemented vf
13			San			25	07	Cart	0.0000		grain sand, w/25% clay fines, tr chert, and weathered
00			ilica			25	27	Grab	0.0ppm	<u> </u>	caliche in matrix, wet, no odor.
jed z			12/20 S		sc						
2 Inch Sched			121		50					30	
티											
~											
	<u> </u>		_				u			35	TD @ 35 Feet
										}	4
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		1.					MW-16 Eldridge	Ranch	TOTAL DEPTH: 25 Feet CLIENT: Duke Energy Field Services
		- K				VATION:	Eades Dr	illing	COUNTY: Lea STATE: New Mexico
Т	RI	DEN	I				Air Rotar		LOCATION: Monument
L i	NY IR	ONMENTA	ul.				9/26/2002		FIELD REP.: J. Fergerson
	ARE .			COM			9/26/2002	- · · ·	FILE NAME:
					001				
		LITH.			SAMPL	E		DEPTH	LITHOLOGIC DESCRIPTION: LITHOLOGY, COLOR, G
] д 🗠		USCS	FROM	то	TYPE	PID	ļ	SIZE, SORTING, ROUNDING, CONSOL., DIST. FEATUR
	ement		- ws						Clayey Silt, v pale orange-mod yellowish brown, unconsol, w/weathered-dense caliche and 5% clay in matrix, no odor.
liser	Je la		-						Caliche, grayish orange-grayish orange pink, weathered-
Inch Sched 40 Riser			<u> </u>						dense, w/ sl unconsol-mod cemented vf grain sand in matri
ped 1	1 - 1 e		CAL	3	5	S Spoon	0.0ppm	5	no odor.
L N	1 July								-
2 Inc		┊│┿╌┿╌┿╴							
			-		10			10	Silty Clay, v pale-grayish orange, interbedded w mod
	- ·		CL	8	10	S Spoon	0.0ppm	10	cemented vf grain sand, w/20% silt, sl vf grain sand, sl weathered caliche in matrix, v moist, no odor.
			ļ	1 1		1			
2 Inch Sched 40 0.010 Screen	Pack		-	13	15	S Spoon	0.0ppm	15	Silty Clay, v pale-grayish orange, interbedded w/mod Encountered Water cemented vf grain sand, w 20% silt
o Sc			-		15		0.0ppm		and tr weathered caliche in matrix, wet, no odor.
0.0	Sand		-						
d 40	Silica								
Sche	2120		CL					20	
fe III			_						
						1			
	7							25	TD @ 25 Feet
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								35	4
								40	-
								40	
									1
									4
								45	1
									1
									4
									4

					LIT	HOLO	DGIC	LOG (MONI	ORING WELL)
					MONITO	RING W	ELL NO:	MW-17		TOTAL DEPTH: 25 Feet
			11					Eldridge	Ranch	CLIENT: Duke Energy Field Services
			X	.		CE ELEN		Eades Dr	illina	COUNTY: Lea STATE: New Mexico
	R	Π	DEN	T				Air Rotar		LOCATION: Monument
	ENV	en ()	JEN	i. <u>I</u> .				9/26/2002		FIELD REP.: J. Fergerson
	-				COM			9/26/2002		FILE NAME:
						0011				
	 			·		CAMPI	<u> </u>			
	71		LITH.	USCS	FROM	SAMPL TO	E % REC	PID	DEPTH	LITHOLOGIC DESCRIPTION: LITHOLOGY, COLOR, GRAI SIZE, SORTING, ROUNDING, CONSOL., DIST. FEATURES
		Ξ		ws						Clayey Silt, v pale orange-mod yellowish brown, unconsol,
5		emen		·						w/weathered-dense caliche and 5% clay in matrix, no odor.
2 Inch Sched 40 Riser			 	1						Caliche, grayish orange-grayish orange pink, weathered- dense, w/ sl unconsol-mod cemented vf grain sand in matrix,
d 40					3	5	S Spoon	0.0ppm	5	no odor.
Sche		Bentonite		CAL						
Ę	I.	Ben	 	-						
\sim				<u> </u>						Silty Clay, v pale-grayish orange, interbedded w mod
Ľ				-	8	10	S Spoon	0.0ppm	10	cemented vf grain sand, w/20% silt, sl weathered caliche
				CL	; 					in matrix, v moist, no odor.
				-1			}			Encountered Water
eu				-						
Scre		Pack			13	15	S Spoon	0.0ppm	15	Silty Clay, v pale-grayish orange, interbedded w/mod
010		Sand								cemented vf grain sand, w 20% silt and tr weathered
0.0		ca S								caliche in matrix, wet, no odor.
2 Inch Sched 40 0.010 Screen) Silica					1			
Sct		12/20		. CL					20	
년 고다		ľ							ļ	
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	 <u> </u>						<u> </u>		25	TD @ 25 Feet
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				<i>k</i>		MONITO		ell no: Site id:	MW-18 Eldridge	Ranch	TOTAL DEPTH: <u>32 Feet</u> CLIENT: Duke Energy Field Service
				- K	a .			VATION:	Eades Di	illing	COUNTY: Lea STATE: New Mexico
r		R		DEN	Τ				Air Rotar		LOCATION: Monument
نى. ئەرب	E P	N¥€ ∕∕	йсэ	JEN MENTA	i. 📕				9/25/2002		FIELD REP.: J. Fergerson
	-	k.				СОМ		N DATE: MENTS:	9/25/2002		FILE NAME:
							0011		<u> </u>		
			1	LITH.	r		SAMPL	F		ЛЕРТН	LITHOLOGIC DESCRIPTION: LITHOLOGY, COLOR, G
222			772		USCS	FROM	TO	TYPE	PID		SIZE, SORTING, ROUNDING, CONSOL., DIST. FEATU
		ľ	ement		ws						Clayey Silt, v pale orange-mod yellowish brown, unconsol, w/weathered-dense caliche and 5% clay in matrix, no odor.
			Ğ								Caliche, v pale-grayish orange, weathered-dense, w/5% cla
		-		* * * ** *			_				and tr silt in matrix, no odor.
_				 	CAL	3	5	S Spoon	0.0ppm	5	4
Rise			Ð	ـــــــــــــــــــــــــــــــــــــ							4
2 Inch Sched 40 Riser	1		Holeplug								Caliche, v pale orange-pale yellowish brown, weathered-
Sche		-	te H			8	10	S Spoon	0.0ppm	10	dense, w/20% clay and sl silt in matrix, no odor.
LCh.			Bentonite	 	CAL	Ŭ					4
2	1		B								1
	<u>t</u>				i				ļ		Caliche, v pale orange-pale yellowish brown, weathered-
						13	15	S Spoon	2.6ppm	15	dense, interbedded w/mod-w cemented vf grain sand, w/10
Ī				÷							clay and sI silt in matrix, sI odor.
					CAL]		4
									1	}	4
						18	20	S Spoon	9.9ppm	20	1
reen			Pack				i				Encountered Water
Sched 40 0.010 Screen			Sand Pack								Silty Clay, very pale orange-mod brown, interbedded w/mod
0.0			Silica S								well cemented vf grain sand, w/20% silt, sl vf grain sand, a
5d 40			0 Sil			23	25	S Spoon	2.2ppm	25	tr weathered caliche in matrix, wet, sl hydrocarbon odor.
Sche			12/20								1
inch					CL						
~									1	30	4
											1
	∇										TD @ 32 Feet
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										45	4
											4
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						LIT	HOLO	DGIC	LOG (MONI	FORING WELL)
,		R	II	DEN		SURFA	CE ELEN CONTRA	ATION:	MW-19 Eldridge Eades Dr Air Rotar	illing	TOTAL DEPTH: 30 Feet CLIENT: Duke Energy Field Services COUNTY: Lea STATE: New Mexico LOCATION: Monument
.	L &	NVI A	ñ4.)	JEN	·	сом			9/25/2002 9/25/2002		FIELD REP.: J. Fergerson FILE NAME:
								MENTS:		· · · · · ·	
		7		LITH.	USCS	FROM	SAMPL TO	E TYPE	PID	DEPTH	LITHOLOGIC DESCRIPTION: LITHOLOGY, COLOR, GRAI SIZE, SORTING, ROUNDING, CONSOL., DIST. FEATURES
0 Riser			Cement								Clayey Silt, v pale orange-mod yellowish brown, unconsol, w/weathered-dense caliche and 5% clay in matrix, no odor.
2 Inch Sched 40 Riser			Bentonite C		WS	3	5	S Spoon	0.0ppm	5	
2 Inch			Ben	+++++	CAL						Caliche, v pale orange-pale yellowish brown, weathered-
						8	10	S Spoon	0.0ppm	10	dense, w/20% clay and sl silt in matrix, no odor. Silty Clay, very pale orange-mod brown, interbedded w/mod- well cemented vf grain sand, w/20% silt, sl vf grain sand, and
					CL						tr weathered caliche in matrix, v moist, no odor.
Screen						13	15	S Spoon	0.0ppm	15	
t0 0.010			Sand Pack								Encountered Water Silty Clay, very pale orange-mod brown, interbedded w/mod-
2 Inch Sched 40 0.010 Screen			Silica							20	well cemented vf grain sand, w/20% silt, sl vf grain sand, and tr weathered caliche in matrix, wet, no odor.
2 Inch			12/20								
Ì					CL					25	
		7									
										30	TD @ 30 Feet
										35	
										40	
										45	
										50	

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				1.		MONITO		SITE ID:	MW-20 Eldridge	Ranch	TOTAL DEPTH: 32 Feet CLIENT: Duke Energy Field Service
r		RI	L	DEN.	Т		CONTR. LING M	ETHOD:	Eades Dr Air Rotar 9/25/2002	у	COUNTY: Lea STATE: New Mexico LOCATION: Monument FIELD REP.: J. Fergerson
	- 1	¢.				СОМ		N DATE: MENTS:	9/25/2002		FILE NAME:
		7		LITH.	USCS	FROM	SAMPL TO	E TYPE	PID	DEPTH	LITHOLOGIC DESCRIPTION: LITHOLOGY, COLOR, COLOR, COLOR, COLOR, COLOR, SIZE, SORTING, ROUNDING, CONSOL., DIST. FEATURE
			ement		WS						Clayey Silt, v pale orange-mod yellowish brown, unconsol, w/weathered-dense caliche and 5% clay in matrix, no odor
2 Inch Sched 40 Riser					CAL	3	5	S Spoon	0.0ppm	5	Caliche, mod orange pink-light brown, weathered-dense, w/tr silt in matrix, no odor.
2 Inch Sche						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 grair sand, tr caliche in matrix, no odor.
		7 			SW					15	
0 Screen			Pack		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.
2 Inch Sched 40 0.010 Screen			12/20 Silica Sand Pack		sw	23	25	S Spoon	0.0ppm	25	Encountered Water 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.
		1		+_+_+_						30	TD @ 32 Feet
										35	
										40	
										45	
										50	

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ļ						LIT	HOLO	OGIC	LOG (MONE	FORING WELL)		
		'R ジ	11 7164	U DEN		DRIL	CE ELE CONTR LING M STAR PLETIO	SITE ID: VATION: ACTOR: ETHOD: T DATE:	MW-21 Eldridge Eades Di Air Rotar 9/24/2002 9/24/2002	rilling y	COUNTY: STATE: LOCATION: FIELD REP: FILE NAME:	Duke Energy Field Services Lea New Mexico Monument J. Fergerson	
Γ			1	LITH.			SAMPL			DEPTH	LITHOLOGIC DESCRIPTION:		
22	ø		777		USCS	FROM	то	TYPE	PID	<u> </u>	SIZE, SORTING, ROUNDING, Clayey Silt, v pale orange-mod ye	CONSOL, DIST. FEATURES	1
			ement		ws			}	ł		w/weathered-dense caliche and		
			Ge			{		1	[
Į.		Ē	T	<u> ++++</u> ++		1 1		{	1		Caliche, grayish orange pink-ligh		
1		ľ			.]	3	5	S Spoor	0.0ppm	5	dense, w/sl silt in matrix, no odor		
		1	·	 	Ì	}		ł	}		4		
Se			1		CAL	}		1	ļ	┝	4		
2 Inch Sched 40 Riser		ŧ.	1 B			{		ł	1		1		
ed 4			Holeplu	╎╶┿╴╍┿╶┿	.[8	10	S Spoor	0.0ppm	10			
Sch					.]			{	{				
цсн		ſ	Bentonite		·}	į į]		┝	Caliata maniah arawan aint liata		
2	E	- It	_ @		·			}	}	<u> </u>	Caliche, grayish orange pink-ligh dense, interbedded w/mod-w cer		
			1		CAL	13	15	S Spoon	6.8ppm	15	w/sl unconsol vf grain sand in ma		
					}	} }			{		, j	, ,	
1		Ĩ	1	1		1					Sand, vf grain, mod orange pink-		
{			1		ł	1 1		1	ł		unconsol, interbedded w/mod-we		
1			1		-						w/sl weathered caliche and tr cla	y in matrix, sl hydrocarbon	
	┦┟				sw	18	20	IS Spoor	3.6ppm	20	odor.		
				}]	Į į		ļ	ļ	<u>}</u>	4		
					}	} }		1	}	├ ─ ──	1		
١ <u>۾</u>			Т Зс]		Encountere	d Water	
ed 40 0.010 Screen			Sand Pack					}	ł	25	Sand, vf grain, mod orange pink-		
15			Sar				1	1	}		unconsol, interbedded w/mod-w		
00			Silica			(1	┟────	w/tr clay in matrix, wet, sl hydroca	arbon odor.	
ed 4			Soz			í (1	ĺ	<u>├</u>	1		
Sch			12/		SW]			ļ	30	1		
2 Inch Sch						} }							
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	₹	7	1			{ }		l	ł	35	TD @ 35	Feet	
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1		R	II	SEN.	\mathbf{T}	DRI	CE ELE CONTR LING M STAR	SITE ID: VATION: ACTOR: ETHOD: T DATE:	Eldridge Eades Di Air Rotar 9/24/2002	rilling y	TOTAL DEPTH: 35 Feet CLIENT: Duke Energy Field Service COUNTY: Lea STATE: New Mexico LOCATION: Monument FIELD REP.: J. Fergerson
	, 			LITH.				MENTS:	9/24/2002		FILE NAME:
		16		<u> </u>	USCS	FROM	TO	TYPE	PID		SIZE, SORTING, ROUNDING, CONSOL., DIST. FEATU
			Cement		ws						Clayey Silt, v pale orange-mod yellowish brown, unconsol, w/weathered-dense caliche and 5% clay in matrix, no odor
			J							5	Caliche, v pale orange, dense-weathered, w/tr silt in matrix no odor.
2 Inch Sched 40 Riser			ite Holeplug		CAL						
2 Inch Sc			Bentonite			8	10	S Spoon	0.0ppm	10	Caliche, mod orange-grayish orange pink, weathered-dens interbedded w/mod-w cemented vf grain sand, w/5% clay
	-			++++ +++++++++++++++++++++++++++++++++	CAL	13	15	S Spoon	1 0.0ppm	15	and tr vf grain sand in matrix, no odor.
en					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
inch Sched 40 0.010 Screen			a Sand Pack			23	25	S Spoon	0.0ppm	25	Silty Clay, v pale orange-grayish orange pink, interbedded
2 inch Scher			12/20 Silica		_						w/mod-well cemented vf grain sand, w/20% silt and sl vf grain sand in matrix, wet, no odor.
	\sim				CL					30	
										35	TD @ 35 Feet
										40	
										45	
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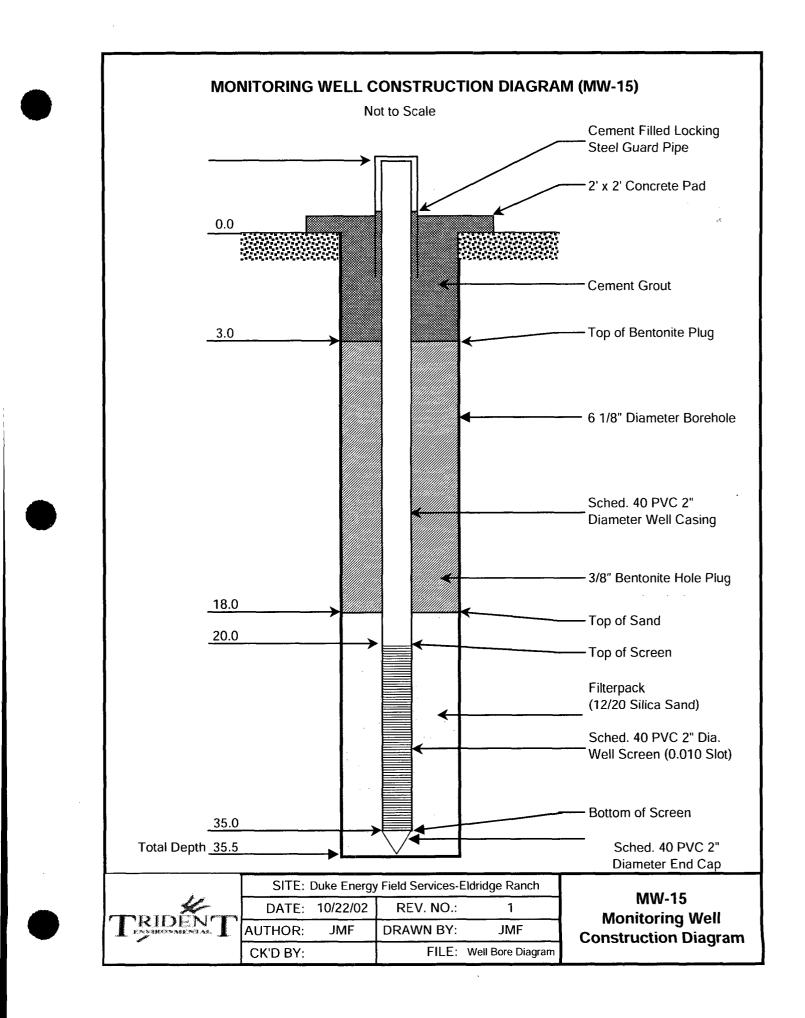
					LIT	HOLO	OGIC	LOG (MONI	FORING WELL)		
					MONITO					TOTAL DEPTH: 30 Feet		
11					SHDEA		SITE ID: VATION:	Eldridge I	Ranch	CLIENT: Duke Energy Field Services COUNTY: Lea		
	X							Eades Dr	illing	STATE: New Mexico		
TRIDENT								Air Rotary		LOCATION: Monument FIELD REP.: J. Fergerson		
								9/24/2002				
	ALCON.				COM			9/24/2002		FILE NAME:		
						CON	MENTS:		·			
_ 			นาโห.			SAMPL			DEPTH	LITHOLOGIC DESCRIPTION: LITHOLOGY, COLOR, GRAI		
øl		223		USCS	FROM	TO	TYPE	PID		SIZE, SORTING, ROUNDING, CONSOL., DIST. FEATURES		
	- M	ement		WS			1			Clayey Silt, v pale orange-mod yellowish brown, unconsol, w/weathered-dense caliche and 5% clay in matrix, no odor.		
		Ğ	+++++++++++++++++++++++++++++++++++++++		1					Caliche, v pale-grayish orange, weathered-dense, w/5%		
				CAL						clay and tr silt in matrix, no odor.		
		<u>B</u>		CAL	3	5	S Spoon	0.0ppm	5			
		olep	+ + + + + +									
		te H	┶┶┶				}			Caliche, v pale-grayish orange, weathered-dense, interbedded w/mod-w cemented vf grain sand, w/10% clay in		
		Bentonite Holeplug			8	10	S Spoon	i 2.2ppm		and tr vf grain sand in matrix, sl hydrocarbon odor.		
	Í	Ber	+ + + + + +	CAL					10			
				l I								
					1		1					
					13	15	IS Spoon	20.7ppm		Sand, vf grain, mod orange pink-light brown, w sorted, unconsol, interbedded w/mod-well cemented vf grain sand,		
	=								15	w/sl weathered caliche and tr clay in matrix, good		
				SW						hydrocarbon odor.		
		Зç										
		12/20 Silica Sand Pack										
		Sar	+++	ĺ	18	20	IS Spoon	51.7ppm	20	Encountered Water Sand, vf grain, mod orange pink-light brown, w sorted, unconsol, interbedded w/mod-well		
		ilica								cemented vf grain sand, w/tr clay in matrix, wet, strong		
E		20 S					1			hydrocarbon odor.		
		12/]				
				SW			1		25			
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			+ <u>+</u> +.									
. 1000					ļ		ļ	ļ	······································			
7	Z _								30	TD @ 30 Feet		
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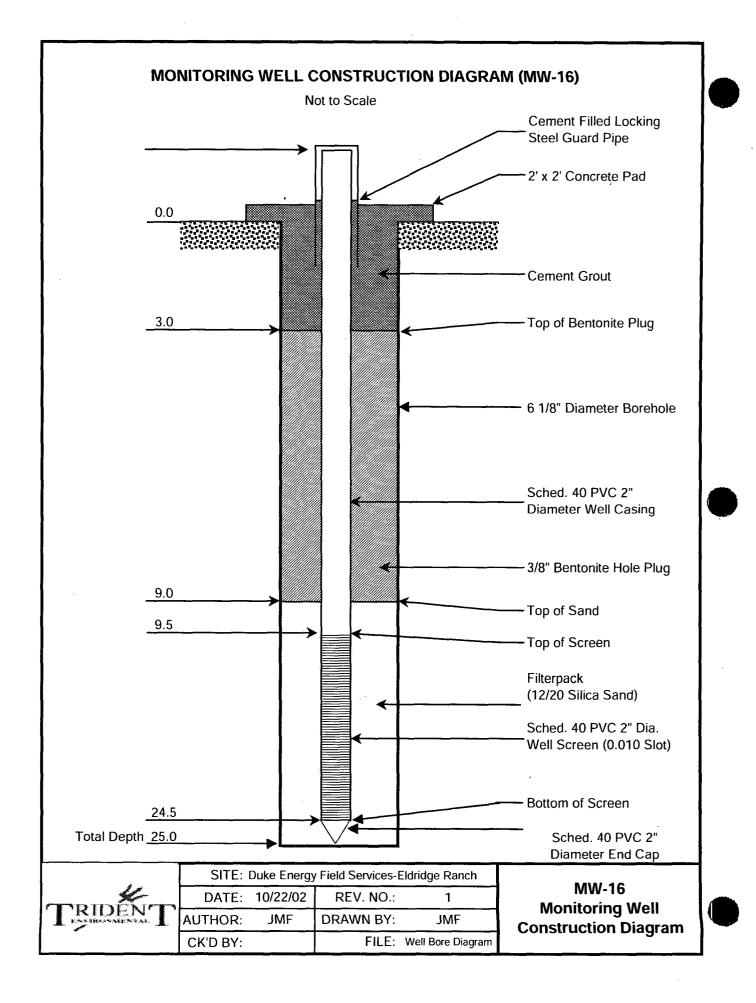


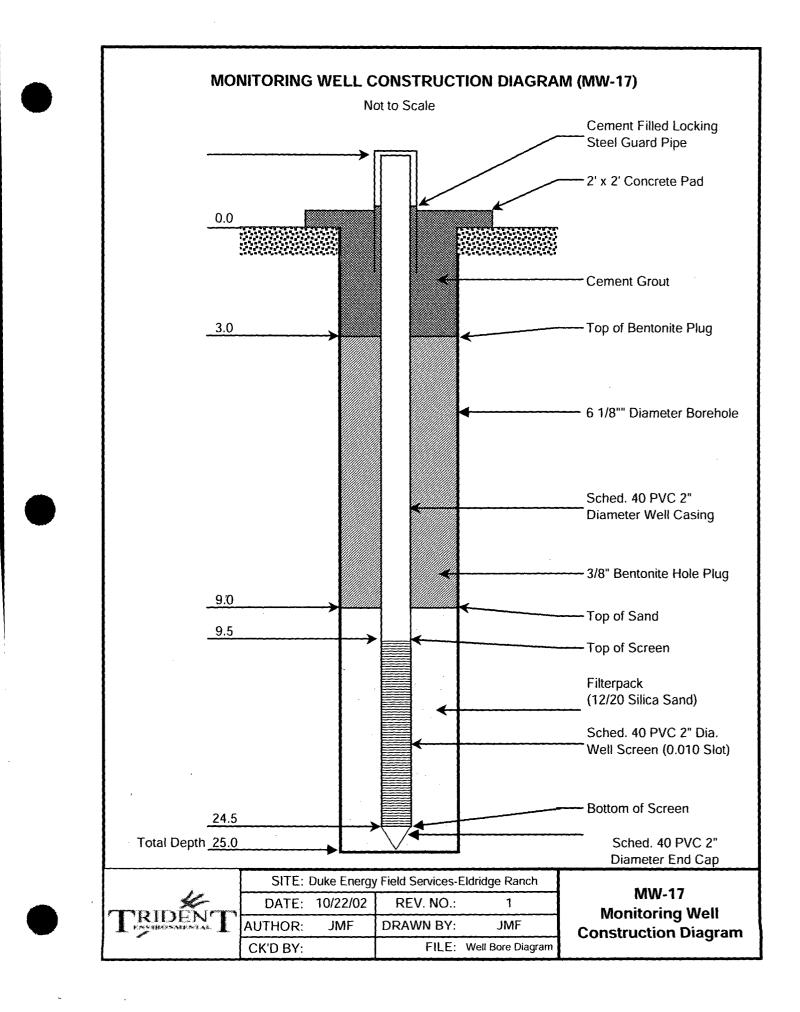
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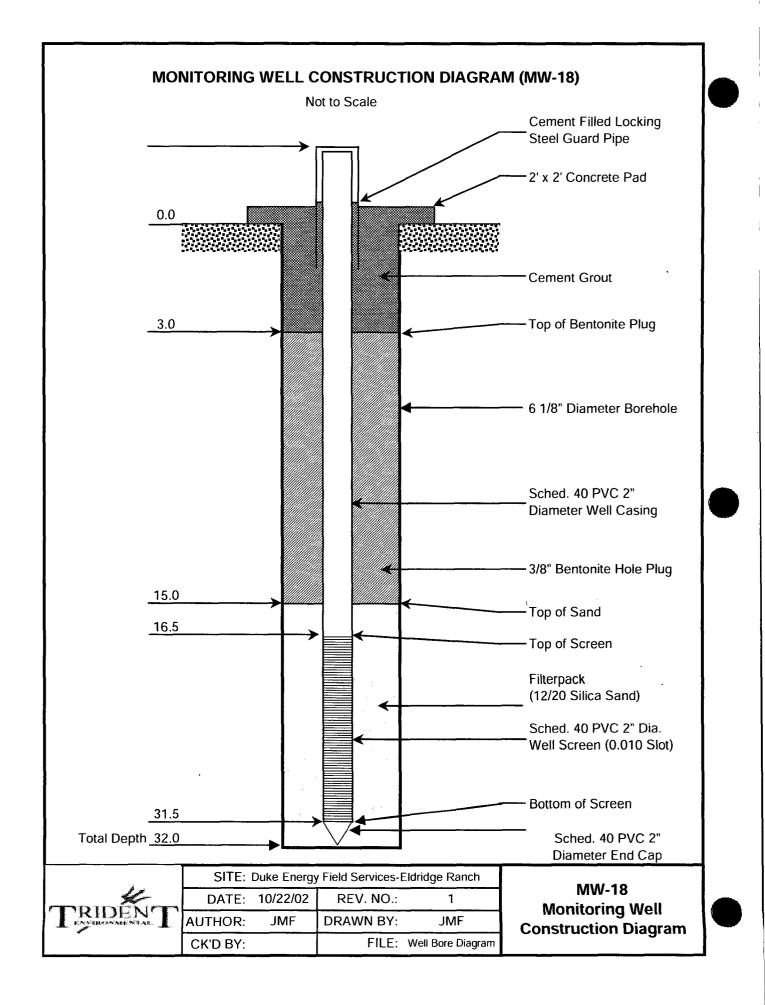
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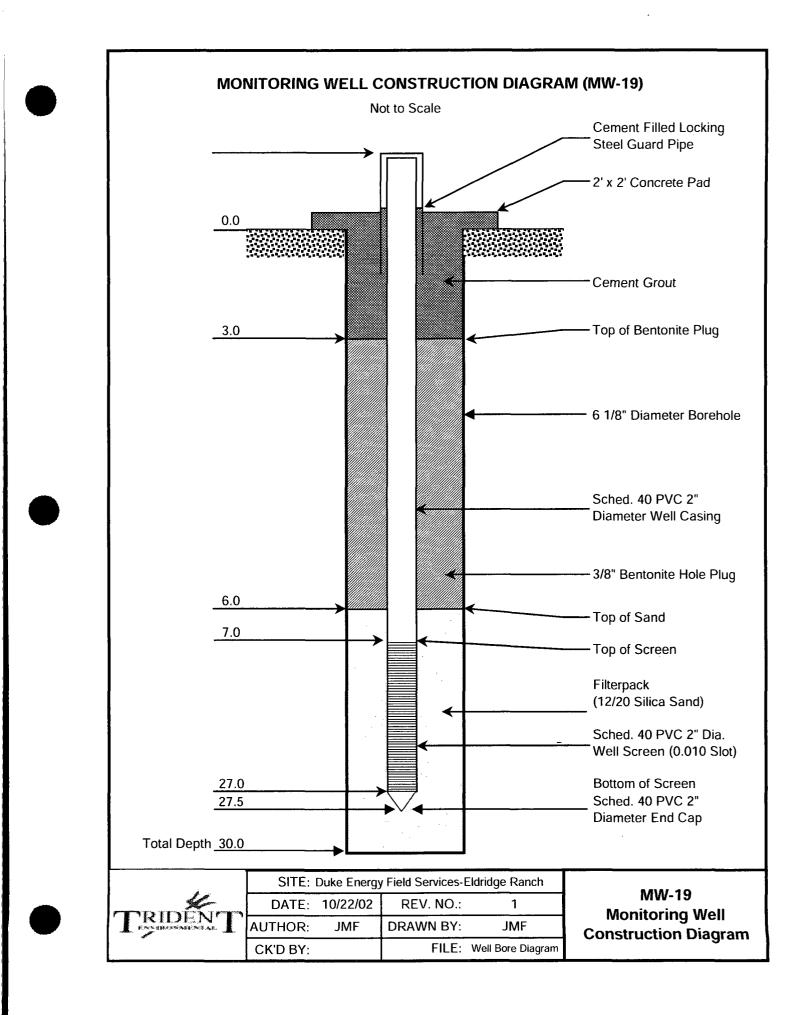
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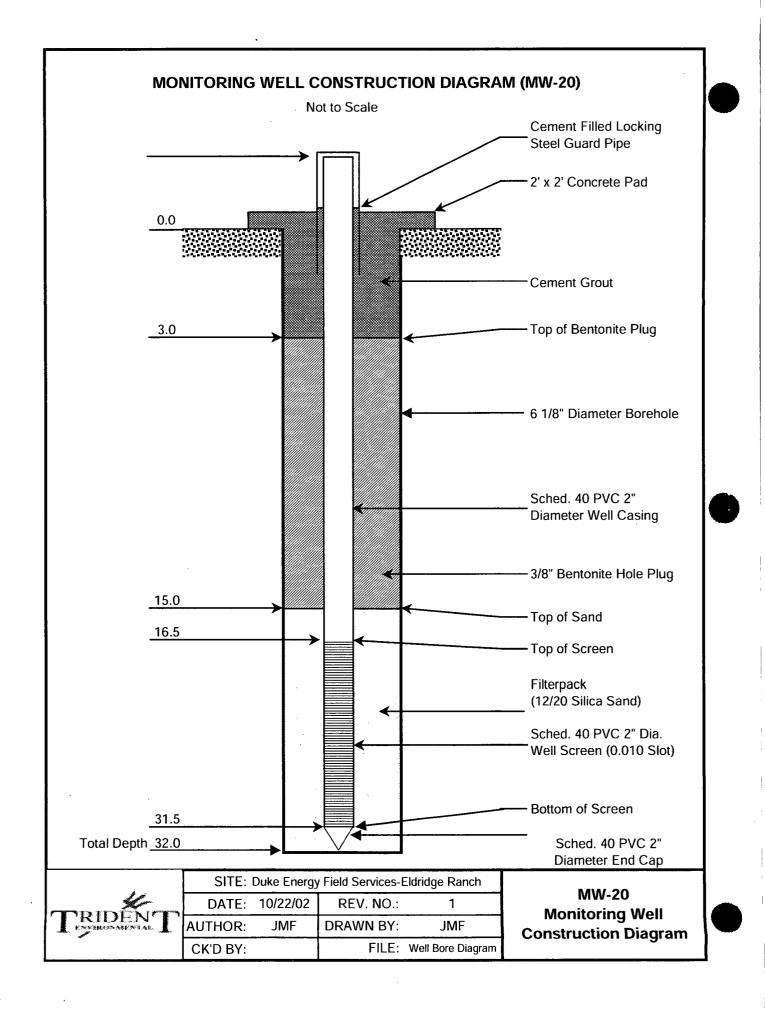


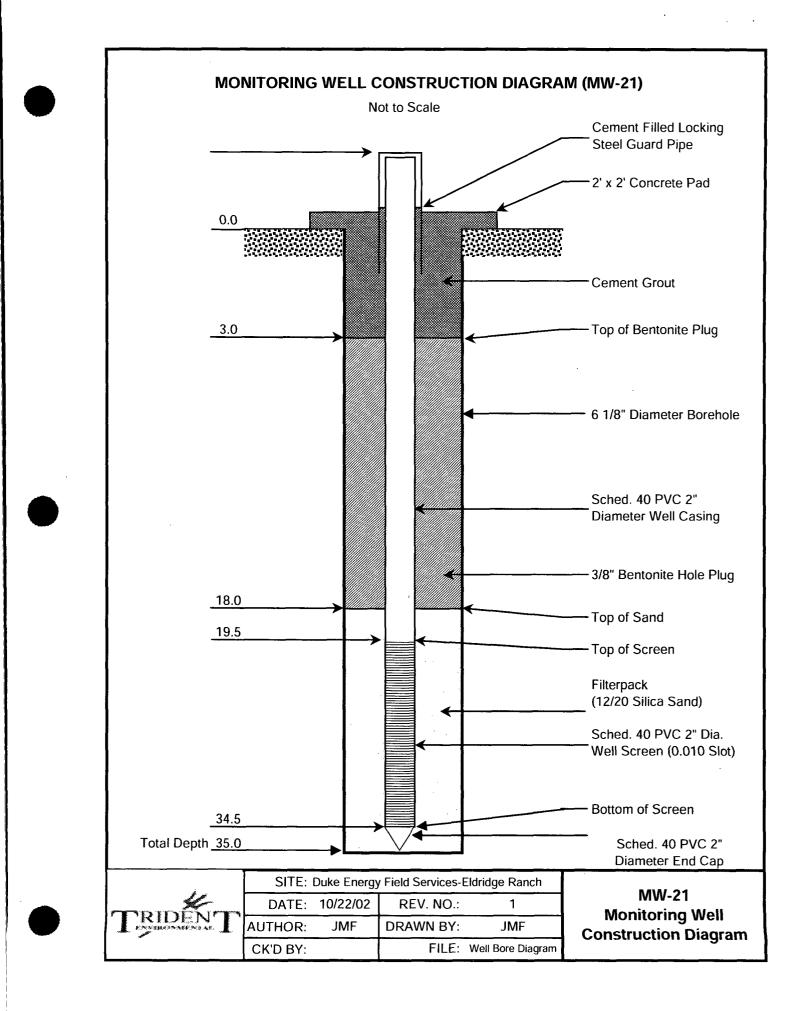


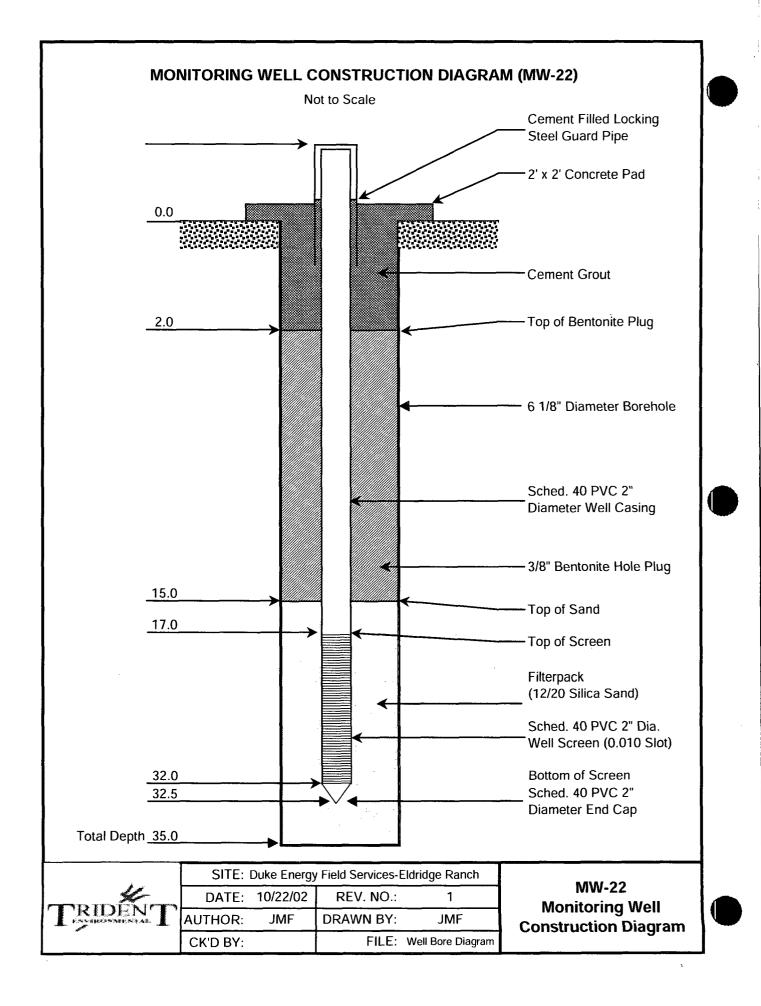


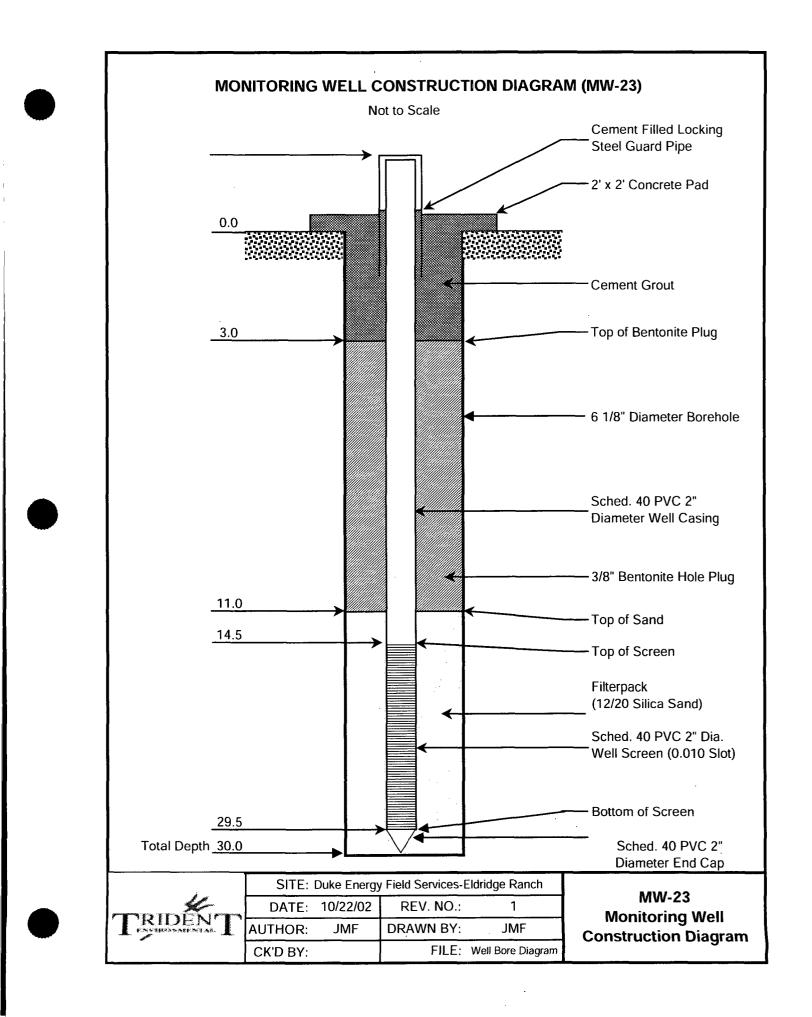












APPENDIX 2

OCTOBER 2002 FIELD FORMS AND LABORATORY REPORT FOR GROUNDWATER

	CLIENT:	Duke E	nergy Field S	ervices	_	WELL ID:	MW-15				
SITE NAME: Eldridge Ranch Site DATE: 10/10/2002 PROJECT NO. F-105 SAMPLER: Littlejohn / Fergerson											
PRC	JECT NO.		F-105			SAMPLER:	Littlejohn / Fergerson				
PURGING	G METHOD:	ļ	🗆 Hand Bai	led 🗹 Pu	mp If Pu	пр, Туре:	Whaler (2-stage)				
SAMPLIN	IG METHOD	D:	🗆 Disposab	le Bailer	Direct f	rom Disch	arge Hose				
DESCRIE		ENT DECO	NTAMINATI	ON METH	OD BEFO	RE SAMP	LING THE WELL:				
☑ Glove	s 🗹 Alcono	x 🗹 Distill	ed Water Ri	nse 🗆 C	Other:						
DISPOSA	L METHOD	OF PURG	E WATER:	Surface	e Discharç	je 🗖 Drui	ms 🗹 Disposal Facility (Frac Tank)				
TOTAL D	EPTH OF V	VELL:	38.71 27.05	Feet							
HEIGHT	OF WATER	COLUMN:	11.66	Feet		19.0	-				
WELL DI	AMETER:	2.0	Inch				purge 10 well volumes (Water Column Height x 1.63)				
TIME	VOLUME		COND.	pН	DO	Turb	PHYSICAL APPEARANCE AND				
10.54	PURGED	°C	<i>m</i> S/cm	•	mg/L		REMARKS Begin Pumping				
10:54 10:58	4	19.8	0.484	7.06	9.2	0	Sal = 0.02 %				
	8	19.8		7.08	9.01	0	Sal = 0.02 %				
11:02		19.9	0.484	7.1	9.01	0	Sal = 0.02 %				
11:05	12	19.8	0.483 0.482	7.13	9.16	0	Sal = 0.02 %				
11:08	16 20	19.8	0.482	7.13	9.15	0	Sal = 0.02 %				
11:11	20	19.0	0.402	7.07	9.14	0					
					<u> </u>	<u></u>					
	<u> </u>										
	<u> </u>				<u> </u>						
······											
0:17	:Total Time	e (hr:min)	20	:Total Vol	l (gal)	1.17	:Flow Rate (gal/min)				
SAMF	LE NO.:	Collected S	Sample No.:								
ANAI	LYSES:										
COM	MENTS:										

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	CLIENT:	Duke E	nergy Field S	ervices	_	WELL ID:	:MW-16
SI	TE NAME:	Eld	ridge Ranch S	Site	_		10/10/2002
PRC	JECT NO.		F-105			SAMPLER	: Littlejohn / Fergerson
	1						
PURGING	METHOD:		Hand Bai	iled 🗹 Pu	mp If Pu	тр, Туре:	Whaler (2-stage)
SAMPLIN	G METHOD) :	🗆 Disposab	le Bailer] Direct	from Disch	arge Hose 🔲 Other:
DESCRIB	E EQUIPM	ENT DECO	NTAMINATI	ON METH	OD BEFC	RE SAMP	LING THE WELL:
☑ Glove	s 🗹 Alcono	x 🗹 Distill	led Water Ri	nse 🗆 C	Other:		
DISPOSA	L METHOD	OF PURG	E WATER:	Surface	e Dischard	ge 🔲 Dru	ıms 🗹 Disposal Facility (Frac Tank)
TOTAL D DEPTH T HEIGHT (EPTH OF W O WATER:	/ELL: COLUMN:	27.83 18.66 9.17	Feet		4.5	Minimum Gallons to purge 10 well volumes (Water Column Height x 1.63)
TIME	VOLUME PURGED	ТЕМР. ° С	COND. <i>m</i> S/cm	рН	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 %
							· · · · · · · · · · · · · · · · · · ·
							<u></u>
0:29	:Total Time	e (hr:min)	32	:Total Vol	L	1.10	:Flow Rate (gal/min)
	-		Sample No.:		<u></u>		
	YSES:						<u> </u>
	AENTS:	<u>~</u>	• ···				
		<u> </u>					
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	CLIENT:	Duke E	nergy Field S	ervices		MW-17	
SI	TE NAME:	Eld	ridge Ranch S	Site	-	DATE:	10/10/2002
PRO	JECT NO.		F-105		. 9	SAMPLER:	Littlejohn / Fergerson
PURGING	METHOD:		🗆 Hand Bai	led 🗹 Pu	mp If Pu	тр, Туре:	Whaler (2-stage)
SAMPLIN	G METHO):	🗆 Disposab	le Bailer	Direct f	from Disch	arge Hose 🔲 Other:
DESCRIB	e equipm	ENT DECO	NTAMINATI	ON METH	OD BEFO	RE SAMP	LING THE WELL:
Gloves	s 🗹 Alcono	x 🗹 Distill	ed Water Ri	nse 🗆 C)ther:		
DISPOSA	L METHOD	OF PURG	E WATER:	Surface	e Discharç	je 🗌 Dru	ms 🗵 Disposal Facility (Frac Tank)
		VELL:					
HEIGHT (OF WATER	COLUMN:	15.91 11.94	Feet		19.5	Minimum Gallons to
		2.0	Inch				purge 10 well volumes (Water Column Height x 1.63)
TIME	VOLUME PURGED	темр. ° с	COND. <i>m</i> S/cm	pН	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	e (hr:min)	32	:Total Vol	(gal)	1.28	:Flow Rate (gal/min)
•		Collected S			<u></u>		
	YSES:						· · · · · · · · · · · · · · · · · · ·
	IENTS:						
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	CLIENT:	Duke E	nergy Field S	ervices	-	WELL ID:	MW-18
S	ITE NAME:	Eld	ridge Ranch S	Site	_	DATE	10/10/2002
PRC	DJECT NO.		F-105			SAMPLER	:Littlejohn / Fergerson
PURGINO	G METHOD:		Hand Bai	led 🗹 Pu	Imp If Pu	тр, Туре:	Whaler (2-stage)
SAMPLIN	G METHOD):	🗋 Disposab	le Bailer [Direct	from Disch	arge Hose 🔲 Other:
DESCRIE	BE EQUIPME	ENT DECO	NTAMINATI	ON METH	OD BEFC	RE SAMP	LING THE WELL:
J Glove	s 🗹 Alcono:	x 🗹 Distil	led Water Ri	nse 🛛 (Other:	<u></u>	
DISPOSA	L METHOD	OF PURG	E WATER:	Surface	e Discharg	je 🛛 Dru	ms 🗹 Disposal Facility (Frac Tank)
TOTAL D	EPTH OF W	/ELL:	34.87				
	O WATER:		23.34			18.8	Minimum Gallons to
	AMETER:		the second s	reel		10.0	purge 10 well volumes
		TEMP.					(Water Column Height x 1.63)
TIME	VOLUME PURGED	° <u>C</u>	COND. <i>m</i> S/cm	рН	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%
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<u></u>					<u> </u>		
0:23	:Total Time		28	:Total Vol	(gal)	1.21	:Flow Rate (gal/min)
	-	Collected S	Sample No.:				
	YSES:	<u> </u>					
COM	MENTS:			····	<u> </u>		
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	CLIENT:	Duke E	nergy Field S	ervices	-	WELL ID:	MW-19
S	ITE NAME:	Eld	ridge Ranch S	Site		DATE:	10/10/2002
PRO	DJECT NO.		F-105		. 9	SAMPLER:	Littlejohn / Fergerson
PURGING	G METHOD:		🗆 Hand Bai	led 🗹 Pu	mp If Pu	mp, Type:	Whaler (2-stage)
SAMPLIN		D:	🗆 Disposab	le Bailer	Direct f	from Disch	arge Hose 🔲 Other:
DESCRIE	BE EQUIPM	ENT DECO	ΝΤΑΜΙΝΑΤΙ	ON METH	OD BEFO	RE SAMP	LING THE WELL:
☑ Glove	es 🗹 Alcono	x 🗹 Distil	led Water Ri	nse 🗆 🤇)ther:		
DISPOSA			F WATER.		Dischare	ie 🗖 Dru	ms 🗹 Disposal Facility (Frac Tank)
					, 510011419	,0 _ 0.0	
DEPTH T	EPTH OF V	VELL:	29.86				
			18.29 11.57	Feet		18.9	_Minimum Gallons to
WELL DI	AMETER:	2.0	Inch				purge 10 well volumes (Water Column Height x 1.63)
TIME	VOLUME		COND.	рН	DO	Turb	PHYSICAL APPEARANCE AND
8.06	PURGED	°C	<u>m</u> S/cm	• 	mg/L		REMARKS
8:06 8:08		18.1	0.676	6.67	2 5 5	000	Begin Pumping
· · · · · · · · · · · · · · · · · · ·	4		0.676		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		28	:Total Vol	(gal)	1.40	:Flow Rate (gal/min)
		Collected S	Sample No.:				<u></u>
	LYSES:		<u> </u>				
COM	MENTS:		····_				

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	CLIENT:	Duke E	nergy Field S	ervices	_	WELL ID:	MW-20				
SI	TE NAME:	Eld	ridge Ranch S	Site	_	DATE: 10/10/2002					
PRC	JECT NO.		F-105			SAMPLER:	Littlejohn / Fergerson				
PURGING	PURGING METHOD: □ Hand Bailed ☑ Pump If Pump, Type: Whaler (2-stage)										
SAMPLIN	SAMPLING METHOD: Disposable Bailer Direct from Discharge Hose Other:										
DESCRIBE EQUIPMENT DECONTAMINATION METHOD BEFORE SAMPLING THE WELL:											
⊡ Glove	s ☑ Alcono	x 🗹 Distill	led Water Ri	nse 🗆 C	Other:						
DISPOSA	L METHOD	OF PURG	E WATER:	Surface	e Discharg	je 🗖 Drui	ms 🗹 Disposal Facility (Frac Tank)				
			<u> </u>								
HEIGHT (OF WATER	COLUMN:	3.58	Feet		5.8	Minimum Gallons to				
WELL DIA	AMETER:	2.0	Inch				purge 10 well volumes (Water Column Height x 1.63)				
TIME	VOLUME		COND.	pН	DO	Turb	PHYSICAL APPEARANCE AND				
9:37	PURGED	°C	<i>m</i> S/cm		mg/L		REMARKS Begin Pumping				
9:44	4	19.1	0.691	6.97	6.79	569	Sal = 0.02%				
9:54	8	19.1	0.683	6.96	7.85	0	Sal = 0.02%				
10:04	12	<u>19.5</u>	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%				
	10		0.002	7.00	0.10	Ŭ					
		· · · · · · · · · · · · · · · · · · ·									
0:36	:Total Time	e (hr:min)	16	:Total Vol	(gal)	0.44	:Flow Rate (gal/min)				
SAMP	LE NO.:	Collected S	Sample No.:								
ANAL	YSES:										
COM	IENTS:										

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	CLIENT:	Duke E	nergy Field S	ervices	-	WELL ID:	MW-21		
S	ITE NAME:	Eldi	ridge Ranch S	Site	-	DATE: <u>10/10/2</u>			
PRC	JECT NO.		F-105				Littlejohn / Fergerson		
PURGINO	G METHOD:	: 1	🗌 Hand Bai	iled 🗹 Pu	mp If Pu	тр, Туре:	Whaler (2-stage)		
SAMPLIN	G METHO	D:	🗋 Disposab	le Bailer	Direct 1	from Disch	arge Hose 🔲 Other:		
DESCRIE	BE EQUIPM	ENT DECO	NTAMINATI	ON METH	OD BEFO	RE SAMP	LING THE WELL:		
Glove Glove	s 🗹 Alcono	x 🗹 Distill	ed Water Ri	nse 🗆 C	Other:				
DISPOSA		OF PURG	E WATER:	Surface	e Discharg	je 🔲 Dru	ms 🗹 Disposal Facility (Frac Tank)		
DEPTH T	O WATER:		<u> </u>	Feet					
			10.91	Feet		17.8	Minimum Gallons to		
WELL DI	AMETER:	2.0	incn				purge 10 well volumes (Water Column Height x 1.63)		
TIME	VOLUME PURGED		COND. <i>m</i> S/cm	рН	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%		
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		L	ļ	L					
0:21	:Total Time	e (hr:min)	24	:Total Vol	(gal)	1.14	:Flow Rate (gal/min)		
SAMP	LE NO.:	Collected S	ample No.:	·····	······				
ANAL	YSES:		- <u></u>						
COM	MENTS:				<u> </u>		·		
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C:\Duke\Eldridge\October 2002 WDF

SITE NAME:		CLIENT:	Duke E	nergy Field S	ervices	_	WELL ID	:MW-22
PURGING METHOD:	S		Eld	ridge Ranch S	Site	_	DATE	:10/10/2002
SAMPLING METHOD: □ Disposable Bailer □ Direct from Discharge Hose ○ Other:	PRC	JECT NO.		F-105			SAMPLER	: Littlejohn / Fergerson
SAMPLING METHOD: □ bisposable 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 12.04 Feet 19.6 Minimum Gallons to purge 10 well volumes Well DIAMETER: 2.0 Imch purge 10 well volumes Weter Column Height x 1.63) 12.04 Feet 11/16 PURGED 12:16 0 12:16 19.5 12:21 4 19.5 0.556 12:21 19.5 12:22 19.5 12:23 16 12:24 19.5 12:31 16 19.5 0.559 6.79 4.05 0 12:31 16 19.4 0.559 12:33 16 19.4 0.559 6.79 4.05 0 12:33 24 19.4 0.559	PURGING	METHOD:		🛛 Hand Bai	led 🗹 Pu	mp If Pu	mp, Type:	Whaler (2-stage)
☐ Gloves ☐ Alconox ☐ Distilled Water Rinse ☐ Other:	SAMPLIN	G METHOD):	🗋 Disposab	le Bailer [Direct I	rom Disch	arge Hose 🔲 Other:
DISPOSAL METHOD OF PURGE WATER: □ Surface Discharge □ Drums □ Disposal Facility (Frac Tank) TOTAL DEPTH OF WELL:	DESCRIB	E EQUIPMI	ENT DECO	NTAMINATI	ON METH	OD BEFO	RE SAMP	LING THE WELL:
TOTAL DEPTH OF WELL: 34.92 Feet DEPTH TO WATER: 22.88 Feet HEIGHT OF WATER COLUMN: 12.04 Feet 19.6 Minimum Gallons to purge 10 well volumes (Water Column Height x 1.63) TIME VOLUME TEMP: COND. pH DO 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 6.82 4.06 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% 12:40 28 19.4 0.559 6.85 4.07 0 Sal = 0.02% <	☑ Glove	s 🗹 Alcono	x 🗹 Distill	led Water Ri	nse 🗆 C	Other:		
DEPTH TO WATER: 22.88 Feet HEIGHT OF WATER COLUMN: 12.04 Feet 19.6 Minimum Gallons to purge 10 well volumes (Water Column Height x 1.63) TIME VOLUME TEMP. COND. pH DO Turb PHYSICAL APPEARANCE AND REMARKS 12:16 0 0 Begin Pumping 12:24 8 19.5 0.556 6.91 3.80 871 Sal = 0.02% (very sandy) 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% 12:37 24 19.4 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% 12:40 28 19.4 0.559 6.85 4.07 0 Sal = 0.02% 12:40 28 19.4 0.559 6.85 4.07 0	DISPOSA	L METHOD	OF PURG	E WATER:	Surface	e Discharg	je 🗌 Dru	ıms 🗹 Disposal Facility (Frac Tank)
HEIGHT OF WATER COLUMN: 12.04 Feet 19.6 Minimum Gallons to purge 10 well volumes (Water Column Height x 1.63) TIME VOLUME PURGED °C ms/cm pH DO mg/L Turb PHYSICAL APPEARANCE AND REMARKS 12:16								
(Water Column Height x 1.63) TIME VOLUME TEMP. COND. 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% 12:40 28 19.4 0.559 6.85 4.07 0 Sal = 0.02%							19.6	Minimum Gallons to
TIME VOLUME PURGED TEMP. oc COND. mS/cm pH DO mg/L Turb PHYSICAL APPEARANCE AND REMARKS 12:16	WELL DIA	METER:	2.0	Inch				
PORGED *C mS/cm mg/L REMARKS 12:16			TEMP.	COND.		DO	Turb	
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% 12:27 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% 12:40 28 19.4 0.559 6.85 4.07 0 Sal = 0.02% 12:40 28 19.4 0.559 6.85 4.07 0 Sal = 0.02% 12:40 28 19.4 1.16 :Flow Rate (gal/min) Sal = 0.02% 12:41		PURGED	°C	<i>m</i> S/cm	pn	mg/L		
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% 12:31 16 19.4 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% 12:37 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% 12:40 28 19.4 0.559 6.85 4.07 0 Sal = 0.02% 12:40 28 19.4 0.559 6.85 4.07 0 Sal = 0.02% 12:40 28 19.4 0.559 6.85 4.07 0 Sal = 0.02% 12:40 28 19.4 0.559 1.16 Elow Rate (gal/min) SAMPLE NO.: 2								Begin Pumping
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% 12:37 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% 12:40 28 19.4 0.559 6.85 4.07 0 Sal = 0.02% 12:40 28 19.4 0.559 6.85 4.07 0 Sal = 0.02% 12:40 28 19.4 0.559 6.85 4.07 0 Sal = 0.02% 12:40 28 19.4 0.559 6.85 4.07 0 Sal = 0.02% 12:40 19.4 19.4 19.4 19.4 19.4 19.4 19.4 19.4 19		4	······································	0.551	6.95		999	
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% 12:40 28 19.4 0.559 6.85 4.07 0 Sal = 0.02% 12:40 28 19.4 0.559 6.85 4.07 0 Sal = 0.02% 12:40 28 19.4 0.559 6.85 4.07 0 Sal = 0.02% 12:40 28 19.4 0.559 6.85 4.07 0 Sal = 0.02% 12:40 28 19.4 0.559 6.85 4.07 0 Sal = 0.02% 12:40 28 19.4 0.59 1.16 Elow Rate (gal/min) 0:24 :Total Time (hr:min) 28 :Total Vol (gal) 1.16 :Flow Rate (gal/min) SAMPLE NO:: Collect				0.556	6.91	3.80	871	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% 12:40 28 19.4 0.559 6.85 4.07 0 Sal = 0.02% 12:40 28 19.4 0.559 6.85 4.07 0 Sal = 0.02% 12:40 28 19.4 0.559 6.85 4.07 0 Sal = 0.02% 12:40 28 19.4 0.559 6.85 4.07 0 Sal = 0.02% 12:40 10.4 10.4 10.4 10.4 10.4 10.4 12:40 10.4 10.4 10.4 10.4 10.4 10.4 12:40 10.4 10.4 10.4 10.4 10.4 10.4 12:41 Total Time (hr:min) 28 :Total Vol (gal) 1.16 :Flow Rate (gal/min) SAMPLE NO:: Collected Sample No.: 10.4			19.5	0.558	6.76	4.00	184	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% 12:40 28 19.4 0.559 6.85 4.07 0 Sal = 0.02% 12:40 28 19.4 0.559 6.85 4.07 0 Sal = 0.02% 12:40 19.4 19.4 19.4 19.4 19.4 19.4 19.4 12:40 19.4 19.4 19.4 19.4 19.4 19.4 19.4 12:40 19.4 19.4 19.4 19.4 19.4 19.4 19.4 12:40 19.4 19.4 19.4 19.4 19.4 19.4 19.4 12:40 10.4 19.4 19.4 19.4 19.4 19.4 19.4 12:40 10.4 19.4 19.4 19.4 19.4 19.4 19.4 13:41 19.4 19.4 19.4 19.4 19.4 19.4 19.4 14:41 19	12:31	16	19.4	0.559	6.9	4.05	34	Sal = 0.02%
12:40 28 19.4 0.559 6.85 4.07 0 Sal = 0.02%	12:34	20	19.5	0.559	6.79	4.05	0	
O:24 :Total Time (hr:min) 28 :Total Vol (gal) 1.16 :Flow Rate (gal/min) SAMPLE NO.: Collected Sample No.: ANALYSES:	12:37	24	19.4	0.559	6.82	4.06	0	Sal = 0.02%
SAMPLE NO.: Collected Sample No.: ANALYSES:	12:40	28	19.4	0.559	6.85	4.07	0	Sal = 0.02%
SAMPLE NO.: Collected Sample No.: ANALYSES:	 							
SAMPLE NO.: Collected Sample No.: ANALYSES:	<u> </u>							
SAMPLE NO.: Collected Sample No.: ANALYSES:	ļ							
SAMPLE NO.: Collected Sample No.: ANALYSES:								
SAMPLE NO.: Collected Sample No.: ANALYSES:			· · · · · · · · · · · · · · · · · · ·					
SAMPLE NO.: Collected Sample No.: ANALYSES:	L		·					
ANALYSES:	0:24	:Total Time	(hr:min)	28	:Total Vol	(gal)	1.16	:Flow Rate (gal/min)
	SAMP	LE NO.:	Collected S	Sample No.:			<u> </u>	
COMMENTS:	ANAL	YSES:						
	COM	MENTS:						
C:\Duke\Eldridge\October 2002 WDF								

	CLIENT:	Duke E	nergy Field S	ervices	-	WELL ID:	MW-15		
SI	TE NAME:	Eld	ridge Ranch S	Site	-	DATE: 10/11/2002			
PRC	JECT NO.		F-105		-	SAMPLER:	Littlejohn / Fergerson		
PURGING	METHOD:		☑ Hand Bai	led 🛛 Pu	mp If Pu	тр, Туре:			
SAMPLIN):	🗹 Disposab	le Bailer	Direct f	irom Disch	arge Hose 🔲 Other:		
DESCRIB	e equipm	ENT DECO	NTAMINATI	ON METH	OD BEFO	RE SAMP	LING THE WELL:		
Glove:	s 🗹 Alcono	x 🗹 Distill	ed Water Ri	nse 🛛 C	Other:	<u>.</u>			
DISPOSA	L METHOD	OF PURG	E WATER:	Surface	e Discharg	je 🗖 Dru	ms 🗵 Disposal Facility		
TOTAL DI DEPTH T	EPTH OF V O WATER:	VELL:	38.71 27.05 11.66	Feet Feet					
HEIGHT (OF WATER	COLUMN:	11.66	Feet		5.7	Minimum Gallons to		
WELL DIA	AVIE I ER:	2.0	Inch				purge 3 well volumes (Water Column Height x 0.49)		
TIME	VOLUME PURGED		COND. <i>m</i> S/cm	pН	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%		
			· · · · · · · · · · · · · · · · · · ·						
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0:10	:Total Time		6	:Total Vol		0.60	:Flow Rate (gal/min)		
		Collected S		021011	· · · · ·	<u> </u>			
		BTEX (802	1-B), GRO (8015-G) DI	RO (8015	-G), Major	lons, TDS, Metals (Fe, Ba, Mn)		
COMN	MENTS:								

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SITE NAME: Eldridge Ranch Site DATE: 10/11/2002 PROJECT NO. F-105 SAMPLER: Littlejohn / Fergerson PURGING METHOD: Disposable Bailed Pump If Pump, Type:		CLIENT:	Duke E	nergy Field S	ervices	-	WELL ID	: <u>MW-16</u>
PURGING METHOD:	S	ITE NAME:	Eld	ridge Ranch S	Site	_	DATE	10/11/2002
SAMPLING METHOD: Disposable Bailer Direct from Discharge Hose Other: DESCRIBE EQUIPMENT DECONTAMINATION METHOD BEFORE SAMPLING THE WELL: Olivers Aconox Distilled Water Rinse Other: DISPOSAL METHOD OF PURGE WATER: Surface Discharge Drums Disposal Facility TOTAL DEPTH OF WELL: 27.83 Feet DEPTH TO WATER: 21.866 Feet HEIGHT OF WATER: 2.0 Inch Water Column Bailons to purge 3 well volumes (Water Column Height x 0.49) TIME VOLUME TEMP. COND. PH MORL 19.0 15.06 2 15.09 4 19.0 0.602 6.78 7.57 15.09 4 19.0 0.602 15.14 6 19.0 0.603 6.8 7.66 999 Sal = 0.02% 15.14 6 19.0 0.603 15.14 19.0 15.14 19.0 15.14 19.0 15.14 19.0 15.14 19.0 15.14 <td>PRC</td> <td>DJECT NO.</td> <td></td> <td>F-105</td> <td>······</td> <td>. 9</td> <td>SAMPLER</td> <td>: Littlejohn / Fergerson</td>	PRC	DJECT NO.		F-105	······	. 9	SAMPLER	: Littlejohn / Fergerson
SAMPLING METHOD: Disposable Bailer Direct from Discharge Hose Other: DESCRIBE EQUIPMENT DECONTAMINATION METHOD BEFORE SAMPLING THE WELL: Olivers Aconox Distilled Water Rinse Other: DISPOSAL METHOD OF PURGE WATER: Surface Discharge Drums Disposal Facility TOTAL DEPTH OF WELL: 27.83 Feet DEPTH TO WATER: 21.866 Feet HEIGHT OF WATER: 2.0 Inch Water Column Bailons to purge 3 well volumes (Water Column Height x 0.49) TIME VOLUME TEMP. COND. PH MORL 19.0 15.06 2 15.09 4 19.0 0.602 6.78 7.57 15.09 4 19.0 0.602 15.14 6 19.0 0.603 6.8 7.66 999 Sal = 0.02% 15.14 6 19.0 0.603 15.14 19.0 15.14 19.0 15.14 19.0 15.14 19.0 15.14 19.0 15.14 <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>								
DESCRIBE EQUIPMENT DECONTAMINATION METHOD BEFORE SAMPLING THE WELL: Image: Solution of Solution o	PURGING	G METHOD:		🗹 Hand Bai	led 🛛 Pu	mp If Pur	тр, Туре:	
☑ Gloves ☑ Alconox ☑ Distilled Water Rinse □ Other: □DISPOSAL METHOD OF PURGE WATER: □ Surface Discharge □ Drums ☑ Disposal Facility TOTAL DEPTH OF WELL:	SAMPLIN	G METHO	D:	Disposab	le Bailer	Direct f	rom Disch	narge Hose 🔲 Other:
DISPOSAL METHOD OF PURGE WATER: Surface Discharge Drums Disposal Facility TOTAL DEPTH OF WELL: 27.83 Feet DEPTH TO WATER: 18.66 Feet DEFTH TO WATER: 9.17 Feet DAMETER: 2.0 Inch purge 3 well volumes WelL DIAMETER: 2.0 Inch PHYSICAL APPEARANCE AND TIME VOLUME TEMP. COND. PH mg/L Turb PHYSICAL APPEARANCE AND REMARKS 15.03 0 0.606 6.78 7.57 999 Sal = 0.02% 15.04 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% 15.14 6 19.0 0.603 6.8 7.66 999 Sal = 0.02% 15.14 6 19.0 0.603 6.8 7.66 999 Sal = 0.02% 15.14 19.0 0.603 6.8 7.66 999 Sal = 0.02% 10.00000000000000000000000000000000000	DESCRIB	e Equipm	ENT DECO	NTAMINATI	ON METH	OD BEFO	RE SAMP	LING THE WELL:
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 TIME VOLUME PURGED °C mS/cm pH mg/L Turb PHYSICAL APPEARANCE AND REMARKS 15:03 Begin Hand Bailing 15:04 999 15:05 19.2 0.606 6 7.87 7.99 15:09 4 19.0 0.602 15:09 4 19.0 0.602 15:14 6 19.0 0.603 6.8 7.66 999 Sal = 0.02% 15:14 15:14 6 19.0 0.603 6.8 15:14 19.0 0.603 6.8 7.66 999 15:14 19.0 0.603 6.8 7.66 999 Sal = 0.02% 1 15:14 19.0 0.603 6.8 7.66 999 Sal = 0.02% 1 10.1 19.0 19.0	Glove:	s 🗹 Alcono	x 🗹 Distill	led Water Ri	nse 🗆 C)ther:		
DEPTH TO WATER: 18.66 Feet HEIGHT OF WATER COLUMN: 9.17 Feet WELL DIAMETER: 2.0 Inch Purge 3 well volumes (Water Column Height x 0.49) TIME VOLUME TEMP. COND. pH DO TIME VOLUME TEMP. COND. pH DO mg/L Turb PHYSICAL APPEARANCE AND REMARKS 15:03 0 0 60.66 6.78 7.57 999 Sal = 0.02% 15:04 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% 15:14 6 19.0 0.603 6.8 7.66 999 Sal = 0.02% 15:14 6 19.0 0.603 6.8 7.66 999 Sal = 0.02% 15:14 19.0 0.603 6.8 7.66 999 Sal = 0.02% 1 10.1 19.0 0.603 19.0 19.0 10.0 10.0 1 10.11 19.0 0.603	DISPOSA		OF PURG	E WATER:	Surface	Discharg	je 🗖 Dru	ıms 🗹 Disposal Facility
TIME VOLUME TEMP. COND. pH DO Turb PHYSICAL APPEARANCE AND REMARKS 15:03	DEPTH T HEIGHT (O WATER: OF WATER	COLUMN:	<u>18.66</u> 9.17	Feet		4.5	purge 3 well volumes
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% 15:14 6 19.0 0.603 6.8 7.66 999 Sal = 0.02% 15:14 6 19.0 0.603 6.8 7.66 999 Sal = 0.02% 15:14 6 19.0 0.603 6.8 7.66 999 Sal = 0.02% 15:14 6 19.0 0.603 6.8 7.66 999 Sal = 0.02% 1	TIME				рН		Turb	PHYSICAL APPEARANCE AND
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% 15:14 6 19:0 0.603 6.8 7.66 999 Sal = 0.02% 15:14 6 19:0 0.603 6.8 7.66 999 Sal = 0.02% 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	15:03							Begin Hand Bailing
15:14 6 19.0 0.603 6.8 7.66 999 Sal = 0.02%	15:06	2	19.2	0.606	6.78	7.57	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 BTEX (8021-B), GRO (8015-G) DRO (8015-G), Major Ions, TDS, Metals (Fe, Ba, Mn)	15:09	4	19.0	0.602	6.78	7.49	999	Sal ≈ 0.02%
SAMPLE NO.:Collected Sample No.:021011 1520ANALYSES:BTEX (8021-B), GRO (8015-G) DRO (8015-G), Major Ions, TDS, Metals (Fe, Ba, Mn)	15:14	6	19.0	0.603	6.8	7.66	999	Sal = 0.02%
SAMPLE NO.:Collected Sample No.:021011 1520ANALYSES:BTEX (8021-B), GRO (8015-G) DRO (8015-G), Major Ions, TDS, Metals (Fe, Ba, Mn)	[
SAMPLE NO.:Collected Sample No.:021011 1520ANALYSES:BTEX (8021-B), GRO (8015-G) DRO (8015-G), Major Ions, TDS, Metals (Fe, Ba, Mn)		· · · · · · · · · · · · · · · · · · ·						
SAMPLE NO.:Collected Sample No.:021011 1520ANALYSES:BTEX (8021-B), GRO (8015-G) DRO (8015-G), Major Ions, TDS, Metals (Fe, Ba, Mn)	l							
SAMPLE NO.:Collected Sample No.:021011 1520ANALYSES:BTEX (8021-B), GRO (8015-G) DRO (8015-G), Major Ions, TDS, Metals (Fe, Ba, Mn)								
SAMPLE NO.:Collected Sample No.:021011 1520ANALYSES:BTEX (8021-B), GRO (8015-G) DRO (8015-G), Major Ions, TDS, Metals (Fe, Ba, Mn)								
SAMPLE NO.:Collected Sample No.:021011 1520ANALYSES:BTEX (8021-B), GRO (8015-G) DRO (8015-G), Major Ions, TDS, Metals (Fe, Ba, Mn)								
SAMPLE NO.:Collected Sample No.:021011 1520ANALYSES:BTEX (8021-B), GRO (8015-G) DRO (8015-G), Major Ions, TDS, Metals (Fe, Ba, Mn)								
SAMPLE NO.:Collected Sample No.:021011 1520ANALYSES:BTEX (8021-B), GRO (8015-G) DRO (8015-G), Major Ions, TDS, Metals (Fe, Ba, Mn)								
SAMPLE NO.:Collected Sample No.:021011 1520ANALYSES:BTEX (8021-B), GRO (8015-G) DRO (8015-G), Major Ions, TDS, Metals (Fe, Ba, Mn)								
SAMPLE NO.:Collected Sample No.:021011 1520ANALYSES:BTEX (8021-B), GRO (8015-G) DRO (8015-G), Major Ions, TDS, Metals (Fe, Ba, Mn)	0:11	:Total Time	e (hr:min)	6	:Total Vol	(qal)	0.54	Flow Rate (gal/min)
ANALYSES: BTEX (8021-B), GRO (8015-G) DRO (8015-G), Major Ions, TDS, Metals (Fe, Ba, Mn)								
	ANAL	YSES:					-G), Major	lons, TDS, Metals (Fe, Ba, Mn)
	COMN							

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	CLIENT:	Duke E	nergy Field S	ervices	-	:MW-17			
S	ITE NAME:	Eld	ridge Ranch S	Site	-	DATE: 10/11/2002			
PRC	DJECT NO.		F-105		-	SAMPLER	: Littlejohn / Fergerson		
PURGING	G METHOD:		Hand Bai	iled 🛛 Pu	mp If Pu	тр, Туре:			
SAMPLIN	IG METHOD	D:	☑ Disposab	le Bailer	Direct	from Disch	arge Hose 🔲 Other:		
DESCRIE	BE EQUIPM	ENT DECO	NTAMINATI	ON METH	OD BEFC	RE SAMP	LING THE WELL:		
Glove	s 🗹 Alcono	x 🗹 Distil	ed Water Ri	nse 🗆 C	Other:				
DISPOSA		OF PURG	E WATER:	Surface	e Discharg	ge 🗆 Dru	ıms 🗹 Disposal Facility		
			27.85						
DEPTH T	O WATER:	COLUMN	15.91 11.94	Feet		5.8	Minimum Gallons to		
WELL DI	AMETER:	2.0	Inch	1.661			purge 3 well volumes		
r	VOLUME	TEMP.	COND.		DO		(Water Column Height x 0.49) PHYSICAL APPEARANCE AND		
TIME	PURGED	°C	mS/cm	рН	mq/L	Turb	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%		
ļ							· · · · · · · · · · · · · · · · · · ·		
(· · · · · · · · · · · · · · · · · · ·		
[ļ								
				ļ					
0:09	:Total Time	e (hr:min)	6	:Total Vol	(gal)	0.66	:Flow Rate (gal/min)		
SAMP	LE NO.:	Collected S	ample No.:	021011	1445				
ANAL	YSES:	BTEX (802	1-B), GRO (8015-G) DI	RO (8015	-G), Major	Ions, TDS, Metals (Fe, Ba, Mn)		
COM	MENTS:								

CLIENT:	Duke Energy Field Se	ervices		WELL ID:	MW-18
SITE NAME:	Eldridge Ranch S	Site		DATE:	10/11/2002
PROJECT NO.				AMPLER:	Littlejohn / Fergerson
PURGING METHOD:	Hand Bai	led 🗖 Pur	np If Pur	np, Type:	
SAMPLING METHOD:	🗹 Disposab	le Bailer 🗆] Direct f	rom Disch	arge Hose Other:
DESCRIBE EQUIPMENT		ON METHO	DD BEFO	RE SAMP	LING THE WELL:
🖸 Gloves 🗹 Alconox 🖸	Distilled Water Ri	nse 🛛 O	ther:		
DISPOSAL METHOD OF			Discharg		
			Dischary		
TOTAL DEPTH OF WELL DEPTH TO WATER:	L: <u>34.87</u>	Feet Feet			
HEIGHT OF WATER COL	LUMN: 11.53	Feet	_	5.6	Minimum Gallons to
WELL DIAMETER:	2.0 Inch				purge 3 well volumes
TIME VOLUME TE	EMP. COND.		DO	Turb	(Water Column Height x 0.49) PHYSICAL APPEARANCE AND
PURGED	° C S/cm	рН	mq/L		REMARKS
10:38					Begin Hand Bailing
10:44 2 1	19.1 0.773	6.53	1.25	999	Sal = 0.03%
10:48 4 1	19.2 0.774	6.56	1.01	999	Sal = 0.03%
10:52 6 1	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)
	ected Sample No.:	021011			
				G), Major	lons, TDS, Metals (Fe, Ba, Mn)
COMMENTS:					

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	CLIENT:	Duke E	nergy Field S	ervices	_	WELL ID:	MW-19
S	ITE NAME:	Eld	ridge Ranch S	Site	_	DATE:	10/11/2002
PRO	DJECT NO.		F-105		-	SAMPLER:	Littlejohn / Fergerson
PURGINO	G METHOD:		Hand Bai	led 🛛 Pu	imp If Pui	тр, Туре:	
SAMPLIN	IG METHOE	D:	Disposab	le Bailer	Direct 1	rom Disch	arge Hose 🔲 Other:
DESCRIE	BE EQUIPM	ENT DECO	NTAMINATI	ON METH	OD BEFO	RE SAMP	LING THE WELL:
☑ Glove	s I Alcono	x 🗹 Distill	ed Water Ri	nse 🗆 C	Other:	<u> </u>	
DISPOSA	L METHOD	OF PURG	E WATER:	Surface	e Discharg	je 🛛 Drui	ms 🗹 Disposal Facility
TOTAL D	EPTH OF V	VELL:	29.86 18.29 11.57	Feet			
HEIGHT	OF WATER	COLUMN:	11.57	Feet		5.7	Minimum Gallons to
WELL DI	AMETER:	2.0	Inch				purge 3 well volumes (Water Column Height x 0.49)
TIME	VOLUME		COND.	pН	DO	Turb	PHYSICAL APPEARANCE AND
9:40	PURGED	O	<u><i>m</i>S/cm</u>		mg/L		REMARKS 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	10.7	0.704	0.70	3.40		
					<u></u>		
	<u> </u>					L	
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, <u></u>					<u> </u>		· · · · · · · · · · · · · · · · · · ·
				<u> </u>			
							, ,
0:14	:Total Time	e (hr:min)	6	:Total Vol	(gal)	0.43	:Flow Rate (gal/min)
SAMP	LE NO.:	Collected S	ample No.:	021011		• <u> </u>	
ANAI	_YSES:	BTEX (802	1-B), GRO (8015-G) D	RO (8015	-G), Major	lons, TDS, Metals (Fe, Ba, Mn)
COM	MENTS:						
00101					· · · · · · · · · · · · · · · · · · ·		

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	CLIENT:	Duke E	nergy Field S	ervices		WELL ID	:MW-20
SI	TE NAME:	Eld	ridge Ranch S	Site	-	DATE	:10/11/2002
PRC	JECT NO.	. <u></u>	F-105		. 9	SAMPLER	: Littlejohn / Fergerson
PURGING	METHOD:		🗹 Hand Bai	iled 🛛 Pu	mp If Pu	пр, Туре:	
SAMPLIN	G METHOE	D:	Disposab	le Bailer	Direct f	from Disch	harge Hose 🔲 Other:
DESCRIB	e equipm	ENT DECO	NTAMINATI	ON METH	OD BEFO	RE SAMP	LING THE WELL:
☑ Glove:	s 🗹 Alcono	x 🗹 Distill	ed Water Ri	nse 🗆 C)ther:	<u></u>	
DISPOSA	L METHOD	OF PURG	E WATER:	Surface	Discharg	je 🗆 Dru	ıms 🗹 Disposal Facility
DEPTH T HEIGHT (O WATER: DF WATER		35.01 31.43 3.58 Inch	Feet		1.8	Minimum Gallons to purge 3 well volumes (Water Column Height x 0.49)
TIME	VOLUME PURGED		COND. <i>m</i> S/cm	рН	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%
						···· <u>·</u> ········	↓
					· · _ ·		
				· · · ·			<u> </u>
				L			+
<u> </u>							+
0:20	:Total Time	e (hr:min)	6	:Total Vol	(gai)	0.30	:Flow Rate (gal/min)
		Collected S	<u> </u>	021011			
						-G), Maior	lons, TDS, Metals (Fe, Ba, Mn)
	IENTS:		^	´			

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	CLIENT:	Duke E	nergy Field S	ervices	-	WELL ID:	MW-21
S	ITE NAME:	Eldi	ridge Ranch S	Site		DATE:	10/11/2002
PRO	DJECT NO.		F-105		. 9	SAMPLER:	Littlejohn / Fergerson
PURGING	G METHOD:		☑ Hand Bai	led 🛛 Pu	mp If Pu	тр, Туре:	·····
SAMPLIN	IG METHOD	D:	🗹 Disposab	le Bailer	Direct 1	from Disch	arge Hose 🔲 Other:
DESCRIE	BE EQUIPM	ENT DECO	NTAMINATI	ON METH	OD BEFO	RE SAMP	LING THE WELL:
☑ Glove	s 🗹 Alcono	x 🗹 Distill	ed Water Ri	nse 🛛 C	Other:		
DISPOSA	L METHOD	OF PURG	E WATER:	Surface	e Discharg	je 🗌 Dru	ms 🗹 Disposal Facility
			37.89				
DEPTH T	O WATER:	COLUMN	<u>26.98</u> 10.91	Feet		5.3	Minimum Gallons to
	AMETER:			1661			purge 3 well volumes
· · · ·	VOLUME	TEMP.	COND.			<u></u>	(Water Column Height x 0.49)
TIME	PURGED	°C	mS/cm	рН	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%
······							
ļ							
							
0:15	:Total Time	(hrimin)	8	:Total Vol	(gal)	0.53	:Flow Rate (gal/min)
-		Collected S		021011		0.55	
						-G) Maior	lons, TDS, Metals (Fe, Ba, Mn)
	MENTS:						
		<u></u>					

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	CLIENT:	Duke E	nergy Field S	ervices		WELL ID:	MW-22
SI	TE NAME:	Eldi	ridge Ranch S	Site		DATE:	10/11/2002
PRO	JECT NO.		F-105		Ś		Littlejohn / Fergerson
PURGING	METHOD:		☑ Hand Bai	led 🗖 Pu	mp If Pur	np, Type:	
SAMPLIN	G METHOD) :	☑ Disposab	le Bailer	Direct f	rom Disch	arge Hose 🔲 Other:
DESCRIB	e equipmi	ENT DECO	NTAMINATI	ON METHO	DD BEFO	RE SAMP	LING THE WELL:
☑ Gloves	s⊡ Alcono	x 🗹 Distill	ed Water Ri	nse 🗆 C)ther:		
DISPOSA	L METHOD	OF PURG	E WATER:	□ Surface	Discharg	je 🗆 Drui	ms 🗹 Disposal Facility
			34.92				
DEPTH TO	OWATER:	COLUMN	22.88 12.04	Feet		5.9	Minimum Gallons to
		2.0		reet		<u>J.J</u>	purge 3 well volumes
	VOLUME	TEMP.	COND.	<u></u>	DO		(Water Column Height x 0.49) PHYSICAL APPEARANCE AND
TIME	PURGED	°C	mS/cm	рН	mg/L	Turb	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	e (hr:min)	8	:Total Vol	(gal)	0.42	:Flow Rate (gal/min)
SAMPI	LE NO.:	Collected S	ample No.:	021011	1350	<u></u>	
ANAL	YSES:	BTEX (802	1-B), GRO (801 <u>5</u> -G) DF	RO (8015	-G), Major	lons, TDS, Metals (Fe, Ba, Mn)
COMM	IENTS:						

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213-097-0000

JUHN FERGERSON

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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

<u>Certificates</u> US EPA Laboratory Code TX00158

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



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-210-007-0000 Oct 28 02 04:07p

JUHN TERGERSUN

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.

<u>Lab ID:</u> 0204761-01	<u>Sample :</u> MW-19	<u>Matrix:</u> WATER		Date / Time <u>Collected</u> 10/11/02	Date / Time <u>Received</u> 10/11/02	Container: See COC	Preservative See COC
La	b Testing:	Rc]ected:	No	10:00 Ten	17:40 1p: 0.5 C		
2.4	8015M		•		- 14 - 14 - 14 - 14 - 14 - 14 - 14 - 14		
	8021B/5030 BTEX						
	Anions						
	Cations						
	Barium						
	Barium, Dissolved						
	Fluoride						
	lron						
	Iron, Dissolved						
	Manganese			•			
	Manganese, Dissolved						•
	Nitrogen, Nitrate						
	Total Dissolved Solids ((SGT					
			. 			•	
204761-02	MW-18	WATER		10/11/02 10:53	10/11/0 2 17:40	See COC	Sce COC
La	<u>b Testing:</u>	Rejected:	No	Теп	ıp: 0.5 C		
	8015M						
	8021B/5030 BTEX						
	Anions						
	Cations						
	Barium						
	Barium, Dissolved						
	Fluoride						
	Iron						
	Iron, Dissolved						
	Manganesc						
	Manganese, Dissolved						
	Nitrogen, Nitrate						
	Total Dissolved Solids ((TDS)			······································		
204761-03	MW-20	WATER		10/#1/02 11:40	10/11/02 17:40	See COC	See COC
La	b Testing:	Rejected:	No	Ten	ւթ։ 0,5 C		

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10/20/2002 10:37 7737082-002

JUHN FERGERSUN

Oct 28 02 04:07p

ENVIRONMENTAL LAB OF TEXAS SAMPLE WORK LIST

TRIDENT ENVIRONMENTAL P.O BOX 7624 MIDLAND, TX 79708 262-5216 Order#:G0204761Project:F-105Project Name:DEFS: EldridgeLocation:DEFS: Eldridge

The samples listed below were submitted to Environmental Lab of Taxas and were received under chain of custody. Environmental Lab of Taxas 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 Taxas, unless otherwise noted.

<u>Lad ID:</u>	Sample : 8015M 8021B/5030 BTEX Anions Cations Cations Barium Barium,Dissolved Fluoride Iron Iron, Dissolved Manganese Manganese, Dissolved Nitrogen, Nitrate	<u>Matríx:</u>		Date / Tin <u>Collecter</u>		ate / Time <u>Received</u>	<u>Container</u>	<u>Preservati</u>
	Total Dissolved Solids (10(11/02	6 CO C	Fac. (7)
0204761-04	MW-15	WATER		10/11/02		10/11/02 17:40	Sec COC	See COC
Lai	Testing:	Rejected:	No		Тетр:	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		10/11/02 17:40	See COC	Sce COC
La	<u> Testing:</u>	Rejected:	No		Temp:	0.5 C		
<u></u>	8015M							
,	8021B/5030 BTEX							
	Anions							

Oct 28 02 04:07p

ENVIRONMENTAL LAB OF TEXAS SAMPLE WORK LIST

TRIDENT ENVIRONMENTAL P.O BOX 7624 MIDLAND, TX 79708

262-5216

Order#:G0204761Project:F-105Project Name:DEFS: EldridgeLocation: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 receive of samples by Environmental Lab of Texas, unless otherwise noted.

<u>Lab ID:</u>	<u>Sample :</u> Cations Barium Barium, Dissolved Fluoride Iron Iron, Dissolved Manganese Manganese, Dissolved Nitrogen, Nitrate Total Dissolved Solids	<u>Matrix:</u> (TDS)		Date / Time <u>Collected</u>	Date / Time <u>Received</u>	<u>Container</u>	<u>Prescryative</u>
0204761-06	M W-22	WATER		10/11/02 13:50	10/11/02 17:40	See COC	See COC
La	b Testing: 8015M 8021B/5030 BTEX Anions Cations Barium Barium,Dissolved Fluoride iron Iron, Dissolved Manganese Manganese, Dissolved Nitrogen, Nitrate Total Dissolved Solids	(TDS)	N0	Теп	ър: 0.5 С		
0204761-07	MW-17 8015M 8021B/5030 BTEX Anions Cations Barium Barium,Dissolved	WATER Rejected:	No	10/11/02 14:45 Ten	10/11/02 17:40 1p: 0.5 C	Sec CDC	See COC

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TRIDEN	T ENVIRONMENTA	L		Ore	ler#:	G	10204761	
P.O BO)				Pro	ject:	F	-105	
MIDLAI	ND, TX 79708				-	ame: E	EFS: Eldridge	
262-5210	•			Lo	- cation:	Σ	DEFS: Eldridge	
no represent	s listed below were submitted t tation or certification as to the t mples by Environmental Lab c	nothod of sau	npie col	licction, sample	were reco e identifi	sived unde cation, or i	r chain of custody. Environm transportation/handling proce	eental Lab of Texas makes dures used prior to the
				Date / Tin		ate / Tii	me	
Lab ID:	<u>Sample :</u> Fluoride	<u>Matrix:</u>	—	Collecter	<u>1</u>	<u>Reccivo</u>	d <u>Container</u>	Preservative
	lron							
	Iron, Dissolved							
	Manganese							1
	Manganese, Dissolved							·
	Nitrogen, Nitrate							
	Total Dissolved Solids (TDS)						
204761-08	MW-16	WATER		10/11/02 15:20		10/11/02 17:40	2 See COC	900 ang
La	b 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)						
Bil				*-		······		
0204761-09	Duplicate A	WATER		10/11/02 0;00		10/11/0:	2 Set COC	See COC
-	h <u>Testing:</u>	Rejected:	NO		Temp:	0.5 C		
La	8021B/5030 BTEX							·····
<u>La</u>	0021000000101K							
······································	Trip Blenk	WATER		10/11/02		10/11/0: 17:40	2 Sec COC	Sec COC
0204761-10	· · · · · · · · · · · · · · · · · · ·	WATER Rejected:	No,	10/11/02	Temp:		2 Sec COC	Sec COC

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JUHN PERGERSON

Oct 28 02 04:09p

ENVIRONMENTAL LAB OF TEXAS

ANALYTICAL REPORT

			ANALII			TUR	. K		
JOHN FERGERSO TRIDENT ENVIRC P.O BOX 7624 MIDLAND, TX 79	NMENTAL				Project: Project Name:			i) Idridge Idridge	
Lab ID: Sample ID:	0204763-04 MW-15								,
				801:	M				
,	Method <u>Blank</u>	Date <u>Prepared</u>	Date Analyzed		Sample Imount	Dilut Fact		Analyst	Method
			10/16/02		I	1		СК	8015M
		Parameter			Result mg/L		F		
		ORO, C6-C12			<3.00		3	.00	
		DRO, >C12-C35	A STATE OF THE OWNER		<3.00		3	.00	
		TOTAL, C6-C3	s		<3.00		3	.00	
		Surrog			Recovered	001	imits ('	ट्रा	
		1-Chlorocc		<u>~</u>	88%	70	13		
		1-Chioroos			86%	70	13	1	
		··· ·	80211	3/503	O BTEX		,		
	Method	Dair	Date		ample	Diluti	tia)		
	Blank	Propared	Analyzed		<u>mount</u>	Facto		Analyst	Method
	0003450-02		10/15/02 20:17		t	1		СК	802LB
		Parameter			Result		R	L	
		Benzene			0.002		0.0	201	
		Ethylbenzene	,		<0.001		0.	201	
		Tolucne	<u>م</u>		<0.001			10(
		p/m-Xylene			<0.001			001	
		o-Xylene			<0.001	Ţ	0.0	001	

Surrogates	% Recovered	QC LI	mits (%)
eaa-Toluene	87%	80	120
Bromofluorobenzene	90%	80	120

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

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712 002-0008 Oct 28 02 04:09p

JUHN FERGERSON

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	ISON IRONMENTAL 79708		Order#: Project: Project Nas Location:	nc: 1	G0204761 F-105 DEPS: Eldridge DEPS: Eldridge		
Lab ID: Sample ID;	0204761-05 MW-21						
camper 104	17E 17 - A C			8015M			
	Method	Date	Date	Sample	TV()	ution	
	Blank	Propared	<u>Analyzed</u> 10/16/02	Amount 1	Fa	<u>ctor Analyst</u> 1 CK	Method 8015M
		······	au		· ···- ·	<u></u>	9
		Parameter		Resu mg/l		RL	
		GRO, C6-C12		<3.0		3.00	
		DRO, >C12-C35 TOTAL, C6-C35		<3.0		3.00	
		10171-00-005	·	,,		5.00	
		Surroga	les	% Recovered	Toc	Limits (%)	
		1-Chloroocte		89%	70	the second s	
		1-Chloraocti	decane	82%	70	130	
			80211	8/5030 BTEX			
	Method	Date	Date	Sample	•	tion	
	<u>Binak</u> 000 <i>345</i> 0-02	Prepared	<u>Analyzed</u> 10/15/02 20:37	<u>Amgaat</u> 1	<u>rac</u> 1	<u>tor Anglyst</u> CK	<u>Method</u> 8021B
		Parameter		Resul		RL	
		Benzene	······	0.010		0.001	
		Ethylbenzene		0.004	_	0.001	
		Toluene p/m-Xylene		0.022		0.001	
		o-Xylene		0.003	-	0.001	
				,			
		Surrogat	êş	% Recovered	QC	Limits (%)	
		aas-Toluene		120%	80		
		Bromofluorel	lenzene	84%	80	120	

DL = Diloted out - N/A = Not Applicable - RL = Reporting Limit

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ENVIRONMENTAL LAB OF TEXAS I, LTD. 12600 West 1-20 East, Odessa, TX 79765 Ph: 915-563-1800

10,20,2007 10.03. Oct 28 02 04:09p 212-995-0008

JUHN FERGERSON

			ANALYT	ICAL REP	PORT	•	
JOHN FERGERS TRIDENT ENVIR P.O BOX 7624 MIDLAND, TX 7	ONMENTAL		<i>a</i>		F-10 c: DEF	04761 5 15: Eldridge 15: Eldridge	
Lab ID: Sample ID:	0204761-06 MW-22						
				8015M			
	Method Blank	Date <u>Prepared</u>	Date <u>Analyzed</u>	Sample <u>Amount</u>	Dilution Factor		Method
	<u></u>		10/16/02	I	1	СК	8015M
		Parameter		Resul	- 1	RJ.	
		GRO, C6-C12		<3.00		3.00	
		DRO. >C12-C3	and the second se	<3.00		00.E	
		TOTAL, C6-C3	5			3.00	
		Surrog	atch	% Recovered	QC Lin	uits (%)	
		1-Chlorooc		72%	70	130	
		1-Chloroos		63%	70	130	
	Method	Date	80211 Date	B/5030 BTEX Sample	Dilution	I	
	Blank	Prepared	Anglyzed	Amount	Factor	Analyst	Method
	0093450-02	;	10/15/02 20:57	ł	1	CK	8021B
		Parameter		Result mg/L	t	RL	
		Benzone	······································	<0.001		0.001	
		Ethylbenzenc		<0.001		0.001	
		Toluene	·	<0.001		0.001	
		p/m-Xylene		<0.001		0.001	
		(<u></u>		<0.001	<u>_</u>	0.001	
		Sucroga		% Recovered	QC Lim	its (%)	
		aee-Toluen	· · · · · · · · · · · · · · · · · · ·	85%	60	120	
		Bromofluor	cbenzene	95%	80	120	

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

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10, 20, 2002 11,00 310-682-0008

Oct 28 02 04:10p

JUHN FERGERSON

	ANALY	FICAL REPO	JRT	
OHN FERGERSON RIDENT ENVIRONMENTAL O BOX 7624 AIDLAND, TX 79708		Order#: Project: Project Name: Location:	G0204761 F-105 DEFS: Eldridge DEFS: Eldridge	
Lab ID: 0204761-07 Sample ID: MW-17				
		8015M	-	
Methor Blank	l Date Date <u>Prepared Analyzed</u>	,	Dilution <u>Factor Analyst</u>	Method
<u></u>	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-Chiorooctane	71%	70 130	
	1-Chlorooctadecane	66%	70 130	
.		B/5030 BTEX		
Methor Blank	Date Date Date Propared Analyzed	•	Dilution <u>Factor Analyst</u>	Method
0003450-(1	J CK	8021B
	Parameter	Result mg/L	RL	
	Benzene	<0.001	0.001	
	Ethylbenzenc	<0.001	0.001	
	Tolucne p/m-Xyicne	<0.001	0.001	
	o-Xylene	<0.001	0.001	
	ـــــــــــــــــــــــــــــــــــــ	04 Destrumed	NC 11-14- (0/)	
	Surregates asa-Toluene	% Recovered C 80%)C Limita (%) 80 120	

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

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10.10.2002 11.00 -10-082-0008

JUHN FERGERSON

ENVIRONMENTAL LAB OF TEXAS

ANALYTICAL REPORT

TRIDENT ENVIRÖ P.O BOX 7624 MIDLAND, TX 79				Order#: Project: Project Name Location:	F-J :: DE	204761 05 FS: Eldridge FS: Eldridge	
Lab ID; Sample ID:	0204761-08 MW-16						
•				8015M			
	Method	Date	Date	Sample	Düutk		<i>4.</i>
	<u>Blank</u>	Prepared	<u>Analyzed</u> 10/16/02	<u>Amount</u> 1	Facto 1	<u>r Analyst</u> CK	<u>Method</u> 8015M
		Parameter		Result		RL	
		1		mg/i.			
		GRO, C6-C12 DRO, >C12-C35	··	<3.00		3.00	
		TUTAL, C6-C35		<3.00		3.00	
		Surroge	lies	% Recovered	OC L	mits (%)	
		1-Chiorooci	أحججه ويستنققه تحججه وينتها	76%	70	130	
		1-Chlerooct		71%	70	130	
		(-0)(0)000	ad og wind			100	
			,,	3/5030 BTEX			
	Methód	Date	,,	·	Dilatio	لىنى	
	Blank	Date Prepared	80211 Date <u>Analyze</u> d	B/5030 BTEX Sample Amount	Dilatio Vacto	n r Analyst	Method
		Date Prepared	80211 Date	3/5030 BTEX Sample	Dilatio)n	Method 8021B
	<u>Blank</u> 0003450-02	Date <u>Prepared</u> Parameter	80211 Date <u>Analyzeğ</u> 10/15/02	B/5030 BTEX Sample Amount	Dilatio <u>Vaeto</u> 1	n r Analyst	
	<u>Biank</u> 0003450-92	Date <u>Prepared</u> Parameter Benzenc	80211 Date <u>Analyzeğ</u> 10/15/02	3/5030 BTEX Sample <u>Amount</u> 1 Result mg/L <0.001	Dilatic <u>Facto</u> 1	n <u>r Analvst</u> CK Rl. 0.001	
	<u>Biank</u> 0003450-92	Date Prepared Parameter Benzene Ethylbenzene	80211 Date <u>Analyzeğ</u> 10/15/02	B/5030 BTEX Sample <u>Amount</u> 1 Result mg/L <0.001 <0.001	Dilatik <u>Facto</u> 1	R1. 0.001	
	<u>Biank</u> 0003450-92	Date <u>Prepared</u> Parameter Benzene Ethylbonzene Toluene	80211 Date <u>Analyzeğ</u> 10/15/02	8/5030 BTEX Sample <u>Amount</u> 1 Result mg/L <0.001 <0.001 <0.001	Diantic <u>Facto</u> 1	R1. 0.001 0.001	
	<u>Blank</u> 00113450-02	Date Prepared Parameter Benzene Ethylbenzene Toluene p/m-Xylene	80211 Date <u>Analyzeğ</u> 10/15/02	8/5030 BTEX Sample <u>Amount</u> 1 Result mg/L <0.001 <0.001 <0.001 <0.001	Dilatik <u>Facto</u> 1	RL. 0.001 0.001 0.001	
	<u>Blank</u> 00113450-02	Date <u>Prepared</u> Parameter Benzene Ethylbonzene Toluene	80211 Date <u>Analyzeğ</u> 10/15/02	8/5030 BTEX Sample <u>Amount</u> 1 Result mg/L <0.001 <0.001 <0.001	Dilatik <u>Facto</u> 1	R1. 0.001 0.001	
	<u>Blank</u> 00113450-02	Date Prepared Parameter Benzene Ethylbenzene Toluene p/m-Xylene	80211 Date <u>Analyzerj</u> 10/15/02 21:37	3/5030 BTEX Sample <u>Amount</u> 1 Result mg/L <0.001 <0.001 <0.001 <0.001	Dilatic Facto 1	RL. 0.001 0.001 0.001	
	<u>Blank</u> 00113450-02	Date Prepared Parameter Benzene Ethylbenzene Toluene p/m-Xylene o-Xylene	80211 Date <u>Analyzecj</u> 10/15/02 21:37	3/5030 BTEX Sample <u>Amount</u> 1 Result mg/L <0.001 <0.001 <0.001 <0.001	Dilatic Facto 1	R1. 0.001 0.001 0.001 0.001 0.001	

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

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et 28 02	04:10p						
88	EN	•	· ·	ALLA		F TE	KAS
			ANALYTI	CAL REP	ORT		
JOHN FERGER TRIDENT ENV P.O BOX 7524 MIDLAND, TX	RONMENTAL			Order#: Project: Project Name: Location:		761 Eldridge Ektridge	
Løb ID: Sample ID:	0204761-09 Dupicate A						
			8021B	/5030 BTEX			
	Method <u>Blank</u> 0003450-02	Date <u>Preparod</u>	Date <u>Auslyzed</u> 10/16/02 9:36	Somple <u>Amouat</u> 1	Dil ation <u>Factor</u> I	<u>Analyst</u> CK	<u>Method</u> 80213
		Parameter	<u></u>	Result		RL	

 $m_{\rm g}/L$ 0.001 Benzenc 0.011 0.001 Ethylbenzene 0.004 0.001 Tolucne 0.024 0.001 p/m-Xylone 0.010 0.001 a-Xylene 0.002

Sprrogates	% Recovered	QC Li	mits (%)
aaa-Toluene	130%	80	120
Bromofluorobonzene	89%	80	120

Lab ID: Sample ID: 0204761-10 Trip Blank

8021B/5030 BTEX

Method <u>Blank</u>	Date <u>Prepered</u>	Date Analyzed	Sample <u>Amouat</u>	Dilution Factor	Analyst	Method
0003450-02		10/16/02	1	1	СК	8021B
		9:57				

Parameter	Result mg/L	RL
Benzene	<0.001	0.001
Ethylbenzene	<0.001	0.001
Toluenc	<0.001	0.001
p/m-Xylene	<0.601	0.001
o-Xylenc	<0.001	0.001

Surrogates	% Recovered	QC LL	mits (%)
Baa-Toluene	89%	80	120
Bromofluorobenzene	92%	80	120

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

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PAGE II P.14

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<u>910-682-0008</u>

JUHN FERGERSUN

Date

Oct 28 02 04:10p

17:01

10/28/2002

ENVIRONMENTAL LAB OF TEXAS

ANALYTICAL REPORT

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

0-28-02 land Khik Approval:____ Related K. Tuttle, Lab Director, CA Officer Celey D. Keene, Org. Tech. Director Jeanne McMurrey, Inorg. Tech. Director Sandra Biezugbe, Lab Tech. Sara Molina, Lah Tech

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ENVIRONMENTAL LAB OF TEXAS

ANALYTICAL REPORT

JOHN FERGERSON TRIDENT ENVIRONMENTAL P.O BOX 7624 MIDLAND, TX 79708			Order#: Project: Project Na Location:	me:	G020476 <u>1</u> F-105 DEFS: Eldridge DEFS: Eldridge			
Lab ID: 0204761-01 Sample ID: MW-19								
Cations			Dilution			Date	Date	
Parameter	Result	Units	Factor	<u>RL</u>	Method	Prepared	Analyzed	Analy
Calcium	39.7	mg/L	10	Ő. (0	6010B	10/20/200Z	10/20/02	SM
Magnesium	14.6		10	0.010	0 6010B	10/20/2002	10/20/02	SM
Potassium	6.84	mg/L	l	0.051	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			Dilution			Date	Date	
Farameter	Result	Units	Factor	RL	Method	Prenared	Analyzed	Anah
Barium	2.65	mg/L)	0.001		10/14/2002	10/15/02	SM
Barium, Dissolved	0.278	mg/L	í	0.001	•	10/15/2002	10/15/02	SM
Iron	98.2	mg/L.	10	0.020		10/14/2002	10/15/02	SM
Iron, Dissolved	0.020	mg/L	1	0.002		10/15/2002	10/15/02	\$M
Manganesc	2.91	mg/1.	1	.001	3005/60108	10/14/2002	10/15/02	SM
Manganese, Dissolved	0.156	mg/L	1	0.001		10/15/2002	10/15/02	SM
Cations	_ /		Dilution			Date	Date	
Cations Parameter Calcium Magnesium Potassium	<u>Result</u> 26.3 14.8 5.40 76.4	<u>Units</u> mg/L mg/L mg/L mg/L	Dilution <u>Factor</u> 10 10 1 10	<u>RL</u> 0.10 0.010 0.050 0.10		Date <u>Prepared</u> 10/20/2002 10/20/2002 10/20/2002 10/20/2002	Date <u>Analyzed</u> 10/20/02 10/20/02 10/20/02 10/20/02	<u>Analy</u> SM SM SM SM
Cations <u>Parameter</u> Calcium Magnesium Potassium Sodium	26.3 14.8 5.40	mg/L mg/L mg/L	<u>Factor</u> 10 10 1 10	0.10 0.010 0.050	6010B 6010B 6010B	Prepared 10/20/2002 10/20/2002 10/20/2002 10/20/2002	Analyzed 10/20/02 10/20/02 10/20/02 10/20/02	SM SM SM
Cations <u>Parameter</u> Calcium Magnesium Potassium Sodium	26.3 14.8 5.40	mg/L mg/L mg/L mg/L	Factor 10 10 1 10 Dilution	0.10 0.010 0.050 0.10	6010B 6010B 60303 6010B	Prepared 10/20/2002 10/20/2002 10/20/2002 10/20/2002 Date	Analyzed 10/20/02 10/20/02 10/20/02 10/20/02 Date	SM SM SM SM
Cations Parameter Calcium Magneslum Potassium Sodium Test Parameters Parameter	26.3 14.8 5.40 76.4	mg/L mg/L mg/L Mg/L	<u>Factor</u> 10 10 1 10	0.10 0.010 0.050	6010B 6010B 6030B 6010B <u>Method</u>	<u>Prepared</u> 10/20/2002 10/20/2002 10/20/2002 10/20/2002 Date <u>Prepared</u>	Analyzed 10/20/02 10/20/02 10/20/02 10/20/02 Date Analyzed	SM SM SM SM <u>Analy</u>
Cations Parameter Calcium Magnesium Potassium Sodium Test Parameters	26.3 14.8 5.40 76.4 <u>Result</u>	mg/L mg/L mg/L mg/L <u>Units</u> mg/L	Factor 10 10 1 10 10 Dilution Factor	0.10 0.010 0.050 0.10 <u>RL</u>	6010B 6010B 60303 6010B	Prepared 10/20/2002 10/20/2002 10/20/2002 10/20/2002 Date Prepared 10/14/2002	<u>Analyzed</u> 10/20/02 10/20/02 10/20/02 Date <u>Analyzed</u> 10/15/02	9M SM SM SM <u>Analy</u>
Cations Parameter Calcium Magneslum Potassium Sodium Test Parameters Parameter Barium	26.3 14.8 5.40 76.4 <u>Result</u> 2.36	mg/L mg/L mg/L Mg/L	Factor 10 10 1 10 10 Dilution Factor 1	0.10 0.010 0.050 0.10 <u>RL</u> 0.001	6010B 6010B 6010B 6010B <u>Method</u> 3005/6010B 6010B	<u>Prepared</u> 10/20/2002 10/20/2002 10/20/2002 10/20/2002 Date <u>Prepared</u>	Analyzed 10/20/02 10/20/02 10/20/02 10/20/02 Date Analyzed	9M SM SM SM <u>Analy:</u> SM
Cations Parameter Calcium Magnesium Potassium Sodium Test Parameters Parameter Barium Barium	26.3 14.8 5.40 76.4 <u>Result</u> 2.36 0.309	mg/L mg/L mg/L mg/L <u>Units</u> mg/L mg/L	Factor 10 10 1 10 10 10 Dilution Factor 1 1	0.10 0.010 0.050 0.10 <u>RL</u> 0.001	6010B 6010B 6010B 6010B <u>Method</u> 3005/6010B 6010B	Prepared 10/20/2002 10/20/2002 10/20/2002 10/20/2002 10/20/2002 10/20/2002 10/14/2002 10/15/2002	<u>Analyzed</u> 10/20/02 10/20/02 10/20/02 Date <u>Analyzed</u> 10/15/02 10/15/02	SM SM SM SM <u>Analy:</u> SM SM SM
Cations Parameter Calcium Magnesium Potassium Sodium Test Parameters Parameter Barium Barium Dissolved Iron, Dissolved	26.3 14.8 5.40 76.4 <u>Result</u> 2.36 0.309 22.2	mg/L mg/L mg/L mg/L <u>Units</u> mg/L mg/L mg/L	Factor 10 10 1 10 10 Dilution Factor 1 1 10	0.10 0.010 0.050 0.10 <u>RL</u> 0.001 0.001 0.020	6010B 6010B 6010B 6010B <u>Method</u> 3005/6010B 6010B 3005/6010B	Prepared 10/20/2002 10/20/2002 10/20/2002 10/20/2002 10/20/2002 10/20/2002 10/14/2002 10/14/2002 10/14/2002	Analyzed 10/20/02 10/20/02 10/20/02 Date Analyzed 10/15/02 10/15/02 10/15/02	SM SM SM SM SM <u>Analy:</u> SM
Cations Parameter Calcium Magneslum Potassium Sodium Test Parameters Parameter Barium Barium, Dissolved Iron, Iron, Dissolved Manganese	26.3 14.8 5.40 76.4 <u>Result</u> 2.36 0.309 22.2 0.201	mg/L mg/L mg/L mg/L <u>Units</u> mg/L mg/L mg/L	Factor 10 10 1 10 1 10 1 10 1 11 10 10 1	0.10 0.050 0.150 0.10 RL 0.001 0.001 0.020 0.002	6010B 6010B 60303 6010B <u>Method</u> 3005/6010B 6010B 6010B	Prepared 10/20/2002 10/20/2002 10/20/2002 10/20/2002 10/20/2002 10/12/2002 10/14/2002 10/15/2002 10/15/2002	Analyzed 10/20/02 10/20/02 10/20/02 Date Analyzed 10/15/02 10/15/02 10/15/02 10/15/02	SM SM SM SM SM SM SM SM
Cations Parameter Calcium Magneslum Potassium Sodium Test Parameters Parameter Barium Barium, Dissolved Iron	26.3 14.8 5.40 76.4 <u>Result</u> 2.36 0.309 22.2 0.201 0.406	mg/L mg/L mg/L mg/L mg/L mg/L mg/L mg/L	Factor 10 10 1 10 1 10 1 10 1 10 1 10 1 10 1 10 1 10 1	0.10 0.050 0.10 0.10 <u>RL</u> 0.001 0.001 0.002 0.002	6010B 6010B 60303 6010B <u>Method</u> 3005/6010B 6010B 3005/6010B 6010B 3005/6010B	Prepared 10/20/2002 10/20/2002 10/20/2002 10/20/2002 10/20/2002 00/15/2002 10/14/2002 10/14/2002 10/14/2002 10/14/2002	Analyzed 10/20/02 10/20/02 10/20/02 Date Analyzed 10/15/02 10/15/02 10/15/02 10/15/02	9M SM SM SM SM SM SM SM SM SM
Cations Parameter Calcium Magneslum Potassium Sodium Test Parameters Parameter Barium Barium, Dissolved Iron, Dissolved Manganese Manganese, Dissolved Lab ID: 0204761-03	26.3 14.8 5.40 76.4 <u>Result</u> 2.36 0.309 22.2 0.201 0.406	mg/L mg/L mg/L mg/L mg/L mg/L mg/L mg/L	Factor 10 10 1 10 1 10 1 10 1 10 1 10 1 10 1 10 1 1 1	0.10 0.050 0.10 0.10 <u>RL</u> 0.001 0.001 0.002 0.002	6010B 6010B 60303 6010B <u>Method</u> 3005/6010B 6010B 3005/6010B 6010B 3005/6010B	Prepared 10/20/2002 10/20/2002 10/20/2002 10/20/2002 Date Prepared 10/14/2002 10/15/2002 10/15/2002 10/15/2002 10/15/2002	<u>Analyzed</u> 10/20/02 10/20/02 10/20/02 10/20/02 Date <u>Analyzed</u> 10/15/02 10/15/02 10/15/02 10/15/02	9M SM SM SM SM SM SM SM SM SM
Cations Parameter Calcium Magneslum Potassium Sodium Test Parameters Parameter Barium Barium, Dissolved Iron, Iron, Dissolved Manganese Manganese, Manganese Manganese, Manganese Manganese	26.3 14.8 5.40 76.4 <u>Result</u> 2.36 0.309 22.2 0.201 0.406	mg/L mg/L mg/L mg/L mg/L mg/L mg/L mg/L	Factor 10 10 1 10 1 10 1 10 1 10 1 10 1 10 1 10 1 10 1	0.10 0.050 0.10 0.10 <u>RL</u> 0.001 0.001 0.002 0.002	6010B 6010B 60303 6010B <u>Method</u> 3005/6010B 6010B 3005/6010B 6010B 3005/6010B	Prepared 10/20/2002 10/20/2002 10/20/2002 10/20/2002 10/20/2002 00/15/2002 10/14/2002 10/14/2002 10/14/2002 10/14/2002	Analyzed 10/20/02 10/20/02 10/20/02 Date Analyzed 10/15/02 10/15/02 10/15/02 10/15/02	9M SM SM SM SM SM SM SM SM SM
Cations Parameter Calcium Magneslum Potassium Sodium Test Parameters Parameter Barium Barium, Dissolved Iron, Dissolved Manganese Manganese, Dissolved -ab ID: 0204761-03 Sample ID: MW-20 Cations	26.3 14.8 5.40 76.4 2.36 0.309 22.2 0.201 0.406 0.224	mg/L mg/L mg/L mg/L mg/L mg/L mg/L mg/L	Pactor 10 10 1 10 Dilution Factor 1 1 10 1 1 1 1 1 1 1 1 1	0.10 0.010 0.050 0.10 RL 0.001 0.001 0.002 0.001	6010B 6010B 6010B 6010B 3005/6010B 6010B 3005/6010B 6010B 3005/6010B	Prepared 10/20/2002 10/20/2002 10/20/2002 10/20/2002 Date Prepared 10/14/2002 10/15/2002 10/15/2002 10/15/2002 10/15/2002 10/15/2002	Analyzed 10/20/02 10/20/02 10/20/02 Date Analyzed 10/15/02 10/15/02 10/15/02 10/15/02 10/15/02 10/15/02	SM SM SM SM SM SM SM SM SM SM SM
Cations Parameter Calcium Magneslum Potassium Sodium Test Parameters Parameter Barium Barium, Dissolved Iron, Dissolved Manganese Manganese, Dissolved ab ID: 0204761-03 Sample JD: MW-20 Cations Parameter	26.3 14.8 5.40 76.4 2.36 0.309 22.2 0.201 0.406 0.224	mg/L mg/L mg/L mg/L mg/L mg/L mg/L mg/L	Pactor 10 10 1 10 Dilution Factor 1 1 10 1 1 1 10 1 1 1 10 1 1	0.10 0.050 0.050 0.10 <u>RL</u> 0.001 0.000 0.002 0.001 0.001	6010B 6010B 6010B 6010B 3005/6010B 6010B 3005/6010B 6010B 3005/6010B 6010B	Prepared 10/20/2002 10/20/2002 10/20/2002 10/20/2002 Date Prepared 10/14/2002 10/15/2002 10/15/2002 10/15/2002 10/15/2002 10/15/2002	<u>Analyzed</u> 10/20/02 10/20/02 10/20/02 <u>Date</u> <u>Analyzed</u> 10/15/02 10/15/02 10/15/02 10/15/02 10/15/02	9M SM SM SM SM SM SM SM SM SM

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ANALYTICAL REPORT

JOHN FERGERSON TRIDENT ENVIRONMENTAL P.O BOX 7624 MIDLAND, TX 79708			Project: Project Name:		204761 105 EFS: Eldriðge EFS: Eldriðge			
Lab TD: 0204761-03 Sample ID: MW-20								
Cations			C. Standar			Date	Date	
Parameter	Result	Units	Dilution Factor	<u>RĻ</u>	Method	Prepared	Analyzed	Analyst
Sodium	50.8	mg/L	10	0.10	6010B	10/20/2002	10/20/02	- SM
Test Parameters			Dilution			Date	Date	
Parameter	Result	Units	Factor	RL	Method	Propared	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		ĩ	0.002	3005/60103	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			Dilution			Date	Date	
Parameter	Result	Units	Factor	RL	Method	Prepared	Analyzed	Analyst
Calcium	60.5	mg/L	to	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			Dilution			Date	Date	
Parameter	Result	Units	Factor	RL	Method	Prepared	Analyzed	Analyst
Barium	0.098	me/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	3005/601013	10/14/2002	10/15/02	SM
Iron, Dissolved	0.054	mg/L	1	0.002	6010B	10/15/2002	10/15/02	SM
Manganesc	0.027	mg/L	1	.001	3005/6010B	10/14/2002	10/15/02	SM
Manganese, Dissolved	0.015	mg/L	1	0.001	6 010B	10/15/2002	10/15/02	SM
ab ID: 0204761-05			·			<u> </u>		
ample ID: MW-21								
Cations			Dilution			Date	Dste	
Parameter	Result	Units	Factor	<u>kL</u>	Method	Prepared	Analyzed	Analyst
Calcium	64.0	mg/L	10	0.10	601013	10/20/2002	10/20/02	SM
Magnesium	9.33	m _H /L	ł	0,001	60103	10/20/2002	10/20/02	SM
Potessium	3.76	mg/L	1	0.050	6010B	10/20/2002	10/20/02	.SM
Sodium	49.9	ma/L	10	0,10	6010B	10/20/2002	10/20/02	SM

N/A = Not Applicable RL = Reporting Limit

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ANALYTICAL REPORT

Barium 1.23 mg/L 1 0.001 3003/6010B 10/14/202 10/15/02 SM Barium 2.96 mg/L 1 0.001 6010B 10/15/02 SM iron 2.96 mg/L 1 0.001 6010B 10/15/02 SM Magenese 0.733 mg/L 1 0.002 6010B 10/15/02 SM Magenese 0.733 mg/L 1 0.001 6010B 10/14/2002 10/15/02 SM Magenese 0.331 mg/L 1 0.001 6010B 10/14/2002 10/15/02 SM Lab JD: 020/761-06 Sampte TD: Mested Analyzed Analyzed <th>JOHN FERGERSON TRIDENT ENVIRONMENTAL F.O BOX 7624 MIDLAND, TX 79708</th> <th></th> <th></th> <th>Order#: Project: Project Ne Location;</th> <th>ame:</th> <th>G0204761 F-105 DEVS: Eldridge DEFS: Eldridge</th> <th></th> <th></th> <th></th>	JOHN FERGERSON TRIDENT ENVIRONMENTAL F.O BOX 7624 MIDLAND, TX 79708			Order#: Project: Project Ne Location;	ame:	G0204761 F-105 DEVS: Eldridge DEFS: Eldridge			
Parameter Result Units Paraton RL Misthod Prenured Analyzed Analyze					_				
Bartum,Dissolved 0.161 mgL 1 0.001 6010B 10/15/202 10/15/202 Mitron Iron, Dissolved 25.6 mgL 1 0.020 5005/6010B 10/15/202 10/20/202 10/20/202 10/20/202 10/20/202 10/20/202 10/20/202 10/20/202 10/20/202		Result	Units		<u>RL</u>	Method			Analyst
iron 29.6 mg/L 10 0.020 3005/60103 10/14/2002 10/15/02 SM iron, Dissolved 0.044 mg/L 1 0.002 60108 10/15/2002 10/15/02 SM Manganese 0.758 mg/L 1 0.001 60108 10/15/2002 10/15/02 SM Manganese 0.331 mg/L 1 0.001 60108 10/15/2002 10/15/02 SM Lab ID: 0240761-06 Sample ID: M4-22 Ditotion Date Date Date Analyzed Analyzed Calcium 44.7 mg/L 10 0.10 60108 10/20/202 10/20/02 SM Magnesium 9.42 mg/L 1 0.010 60108 10/20/202 10/20/02 SM Potassium 5.43 mg/L 1 0.050 60108 10/20/202 10/20/02 SM Sodium 5.43 mg/L 1 0.001 50038 10/20/202 10/20/02 SM Parameters Result Units Factor RL Method Presered Analyzed Analy Barlum 5.33 mg/L 1 0.001 5005/6	Barium	1.25	ing/L	1	0,001	3005/6010B	10/14/2002	10/15/02	SM
iron, Dissolved 0.045 ng/L 1 0.002 60108 10/15/2002 10/	Barium, Dissolved	0.161	mg/L	1	0.001	6010B	10/15/2002	10/15/02	5M
Marganese 0.758 mg/L 1 0.01 3005/6010B 10/14/2002 10/15/02 SM Marganese, Dissolved 0.331 mg/L 1 0.001 6010B 10/15/2002 10/15/02 SM Lab ID: 0204764-06 Sample ID: Method Prennetd Analyzed	Iron	29.6	mg/L	10	0.020) 3005/6010B	10/14/2002	10/15/02	SM
Marganese, Dissolved 0.331 mg/L 1 0.001 6010B 10/15/2002 10/15/20 1	Iron, Dissolved	0,045	mg/L	1	0.002	6010B	10/15/2002	10/15/02	SM
Lab TP: 0204764-06 Sample TP: MW-22 Cations Dilution Discover RL Method Prepared Analyzed Analyzed Cations Dimeter Result Units Factor RL Method Prepared Analyzed Analyzed Analyzed Calcium 44.7 mg/L 10 0.10 60108 10202002 10/20/02 SM Magnesium 5.25 mg/L 1 0.001 60108 10/20/02 SM Sodium 5.43 mg/L 10 0.10 60108 10/20/02 SM Test Parameters Result Units Factor RL Method Prepared Analyzed Analyzed Analyzed SM Barlum 5.33 mg/L 1 0.001 3005/60108 10/14/2002 10/15/02 SM Iren 6.00 mg/L 1 0.002 60108 10/15/202 Molis/202 10/15/02 SM	Manganese	0.758	mg/L	1	, 0 01	3005/6010B	10/14/2002	10/15/02	SM
Sample Th: MW-22 Cations Dilution Date Date Analyzed Information Catelium 9.82 mg/L 1 0.001 60108 10/20/002 10/20/02 SM Sadium 5.25 mg/L 10 0.10 60108 10/20/02 10/20/02 SM Sadium 5.43 mg/L 10 0.01 60108 10/20/02 10/20/02 SM Barium 8.33 mg/L 1 0.001 60108 10/15/2002 10/15/202 SM Barium 8.33 mg/L 10 0.001 60108 10/15/2002 SM Iron, Dissolved 0.022 mg/L 10 0.001 5005/0108 10/14/2002 10/15/2002 SM	Manganese, Dissolved	0.331	nte/1.	ł	0,001	6010B	10/15/2002	10/15/02	SМ
Parameter Basult Units Factor RL Method Prenared Analyzai Analyzai<			- القريبية _{الع}اسيات						
Parameter Basult Units Factor RL Method Prenared Analyzai Analyzai<	Cations						Data	B-4-	
Catelum 44.7 mg/L 10 0.10 6010B 10/20/20/2 10/20/02 SM Magnesium 9.82 mg/L 1 0.050 6010B 10/20/20/2 10/20/02 SM Potassium 5.25 mg/L 1 0.050 6010B 10/20/20/2 10/20/02 SM Sadium 54.3 mg/L 10 0.10 6010B 10/20/20/2 10/20/20 10/20/20 10/20/20 10/20/20 SM Test Parameters Parameter Result Initity Factor RL Method Preserved Analyzed Analyzed <t< td=""><td></td><td>Result</td><td>Linite</td><td></td><td>RI.</td><td>Mathad</td><td></td><td></td><td>Anniumt</td></t<>		Result	Linite		RI.	Mathad			Anniumt
Magnesium 9.82 mgL 1 0.001 60103 10/20/202 <t< td=""><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></t<>									
Potassium 5.25 mg/L 1 0.050 6010B 10/20/2002 10/20/202 SM Sadium 54.3 mg/L 10 0.10 6010B 10/20/2002 10/20/202 SM Test Parameters Dilution S.38 mg/L 1 0.01 6010B 10/20/2002 10/20/20 SM Barium S.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 10/14/2002 10/15/02 SM Iron. 40.0 mg/L 1 0.002 6010B 10/14/2002 10/15/02 SM Manganese, Dissolved 0.022 mg/L 1 0.001 3005/6010B 10/14/2002 10/15/02 SM Lab ID: 0204761-07 Sample ID: Mitoda Prepared Analyzed Analyzed Calcium 31.3 mg/L 10 0.10 6010B 10/20/2002 10			-						
Sadium 54.3 mg/L 10 0.10 6010B 10/20/002 10/20/002 SM Test Parameters Diletion Diletion Date Date Date Barium 8.34 mg/L 1 0.001 3003/6010B 10/14/2002 10/20/202 SM Barium 8.34 mg/L 1 0.001 3003/6010B 10/14/2002 10/15/202 SM Barium, Dissolved 0.255 mg/L 10 0.001 6010B 10/15/2002 10/15/202 SM Iron 40.0 mg/L 10 0.002 3005/6010B 10/15/2002 10/15/202 SM Iron, Dissolved 0.022 mg/L 10 0.001 6010B 10/15/2002 10/15/202 10/15/202 10/15/202 10/15/202 10/15/202 10/15/202 SM Manganese, Dissolved 0.080 mg/L 1 0.001 6010B 10/15/2002 10/15/202 SM Lab ID: 0204761-07 Sample ID:	-	-	-						
Test Parameters Diletion Date Date Date Analyzed Analyzed Barium 8.38 mg/L 1 0.001 6010B 10/14/2002 10/15/02 SM Barium, Dissolved 0.256 mg/L 1 0.001 6010B 10/14/2002 10/15/02 SM Iron 40.0 mg/L 1 0.002 3005/6010B 10/14/2002 10/15/02 SM Iron 40.0 mg/L 10 0.022 3005/6010B 10/15/2002 10/15/02 SM Maganese 34.8 mg/L 10 0.001 3005/6010B 10/14/2002 10/15/02 SM Maganese, Dissolved 0.080 mg/t. 1 0.001 6010B 10/15/2002 10/15/02 SM Lab ID: 0204761-07 Sample ID: MW-17 Cations Date Date Date Date Date Date Date Magaze/2 Analyzed Analyze/2 SM SM SM SM			-						
Parameter Rczult Units Factor RL Method Prenard Analyzed Analyzed </td <td>Tost Beause et an</td> <td></td> <td></td> <td></td> <td></td> <td>00100</td> <td>10/20/2002</td> <td>10/40/02</td> <td>2141</td>	Tost Beause et an					00100	10/20/2002	10/40/02	2141
Barlum 8.38 mg/L 1 0.001 3005/6010B 10/14/2002 10/15/02 SM Barlum,Dissolved 0.256 mg/L 1 0.001 6010B 10/15/02 SM Barlum,Dissolved 0.256 mg/L 1 0.001 6010B 10/15/02 SM Iron 40.0 mg/L 10 0.022 3005/6010B 10/15/2002 10/15/02 SM Manganese 34.8 mg/L 10 0.010 3005/6010B 10/15/2002 10/15/02 SM Manganese, Dissolved 0.080 mg/L 1 0.001 3005/6010B 10/15/2002 10/15/02 SM Lab ID: 0204761-07 Sample ID: MW-17 Cations Date Prepared Analyzed Analyzed Analyzed Analyzed SM Magnesitm 14.4 mg/L 10 0.10 6010B 10/20/2002 10/20/202 SM Magnesitm 51.4 mg/L 10 0.010 <td< td=""><td></td><td>W</td><td></td><td>·</td><td></td><td></td><td></td><td></td><td></td></td<>		W		·					
Barium, Dissolved 0.256 mg/L 1 0.001 6010B 10/15/202 10/15/202 SM Iron 40.0 mg/L 10 0.020 3005/6010B 10/15/202 10/15/202 SM Iron Dissolved 0.022 mg/L 1 0.002 6010B 10/15/202 10/15/202 SM Manganese 34.8 mg/L 10 0.010 3005/6010B 10/15/202 10/15/202 SM Manganese, Dissolved 0.080 mg/L 1 0.001 6010B 10/15/2002 10/15/20 SM Lab ID: 0204761-07 Sample ID: MW-17 Cations Date Date Analyzed Analyzed Analyzed Analyzed SM Calcium 31.3 mg/L 10 0.10 6010B 10/20/2002 10/20/202 10/20/202 10/20/202 10/20/202 10/20/202 10/20/202 10/20/202 10/20/202 10/20/202 10/20/202 10/20/202 10/20/202 10/20/202 <t< td=""><td></td><td></td><td></td><td></td><td></td><td></td><td>Prepared</td><td>Analyzed</td><td><u>Analyst</u></td></t<>							Prepared	Analyzed	<u>Analyst</u>
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 10/14/2002 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 10 0.001 6010B 10/15/2002 10/15/02 SM Lab ID: 0204761-07 Sample ID: MW-17 0.001 6010B 10/15/2002 10/15/02 SM Cations Date Pergared Analyzed Analyzed Analyzed Analyzed Analyzed 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 Nagnesium 7.12 mg/L 10 0.010 6010B 10/20/2002 10/20/02 SM Sodium 55.4 mg/L 10 0.10 6010B 10/20/2002 10/20/02 SM Fest Parameters Date Date Date Date Dat							10/14/2002	10/15/02	SM
Iron. Dissolved 0.022 mg/L 1 0.002 60100 10/15/2002 10/15/20	•		_				10/15/2002		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 Date Date Date Analyzed							10/14/2007	10/15/02	SM
Manganese, Dissolved 0.080 mg/t. i 0.001 6010B 10/15/2002 10/15/202 SM Lab ID: 0204761-07 Sample ID: MW-17 Dilution Date Date Date Analyzed Marking Marking Indite			-						SM
Lab ID: 0204761-07 Sample ID: MW-17 Cations Dilution Date Date Parameter Result Units Factor RL Method Prepared Analyzed	-		-						
Sample ID: MW-17 Cations Dilution Factor RL Method Prepared Analyzed		v.vav		<u> </u>		BOLOS	10/15/2002	10/13/02	SM
Parameter Result Units Factor RL Method Prepared Analyzed Analyzed<									
Parameter Result Units Factor RL Mgthod Prepared Analyzed Analyzed<	Cations			Dilution			Date	Date	
Calcium 31.3 rng/l. 10 0.10 6010B 10/20/2002 10/20/02 SM Magnesium 14.4 nng/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 rng/L 10 0.10 6010B 10/20/2002 10/20/02 SM Test Parameters Dilut/on 55.4 rng/L 10 0.10 6010B 10/20/2002 10/20/02 SM Barium 1.83 rng/L 1 0.001 3005/6010B 10/14/2002 10/15/02 SM Barium, Dissolved 0.272 rng/L 1 0.001 6010B 10/15/202 10/15/02 SM Iron 70.9 rng/L 10 0.020 3005/6010B 10/14/2002 10/15/02 SM Solution 0.272 rng/L 1 0.001 6010B 10/15/202 10/15/02 SM Barium, Dissolved 0.272 rng/L	Parameter	Result	Units		<u>RL</u>	Method			<u>Analyst</u>
Magnesium 14.4 ng/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 Dilution Date Date Date Date Parameter Result Units Factor RL Method Prepared Analyzed Analyzed Analyzed Barium 1.83 mg/L 1 0.001 3005/6010B 10/15/202 10/15/02 SM Barium, Dissolved 0.272 ng/L 1 0.001 6010B 10/15/202 10/15/02 SM Iron 70.9 mg/L 10 0.020 3003/6010B 10/15/202 10/15/02 SM	Calcium	31.3	mg/l.	10					
Potassium 7.12 mg/L i 0.050 6010B 10/20/202 10/20/02 SM Sodium 55.4 mg/L i0 0.10 6010B 10/20/2002 10/20/02 SM Test Parameters Dilution Dilution Date Date Date Parameter Result Units Factor RL Method Prepared Analyzed Analyzed Analyzed Analyzed Analyzed Analyzed SM Barium 1.83 mg/L 1 0.001 3005/6010B 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 10/15/202 SM	Magnesium	14.4	mg/1.	10	0.010		10/20/2002		
Test Parameters Dilution Date Date Parameter Result Units Factor RI Method Prepared Analyzed			mg/L	i	0.050	6010B	10/20/2002		SM
Parameter Result Units Factor RL Method Prepared Analyzed Analyzed<	Sodium	55.4	mg/L	10	0.10	6010B	10/20/2002	10/20/02	SM.
Parameter Result Units Factor RL Method Prepared Analyzed Analyzed<	Test Parameters			Dilution			Date	Date	
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 10/15/02 SM Iron 70.9 mg/L 10 0.020 3005/6010B 10/15/02 SM	Parameter	Result	Units		<u>RI.</u>	Method	_		Analyst
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	Barium								
Iron 70.9 mg/L 10 0.020 3003/6010B 10/14/2002 10/15/02 SM			-						
	,		-						
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ANALYTICAL REPORT

IOHN FERGERSON TRIDENT ENVIRONMENTAL P.O BOX 7624 MIDLAND, TX 79708			Order#: Project: Project Name: Location:		G0204761 K-105 DEFS: Ekiritige DKFS: Eldritige			
Lab ID: 0204761-07 Sample ID: MW-17								
Test Parameters Parameter	Result	Units	Dilution <u>Factor</u>	RL	Method	Date <u>Prepared</u>	Date Analyzed	<u>Analyst</u>
Iron, Dissolved	0.035	mg/L	ł	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	I	0.001	6010B	10/15/2002	10/15/02	SM
Lab ID: 0204761-08 Sample ID: MW-16			99 9. Yumining and a single set and a sin		,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,			
Cations			Dilution			Date	Date	
Parameter	Result	Units	Factor	<u>RL</u>	Method	Prepared	Analyzed	Analyst
Calcium	49.1	mg/L	10	0.10	6010B	10/20/2002	10/20/02	SM
Magnesium	14.2	mg/L	10	0.910) 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	60103	10/20/2002	10/20/02	SM
Test Parameters			Dilution			Date	Date	
Parameter	Result	Units	Factor	RL	Method	Prepared	Analyzed	Analyst
Barlum	0.608	mg/L	1	0.001	3005/601018	10/14/2002	10/15/02	SM
Barium, Dissolved	0.165	mg/L	1	0.001	60108	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	6010R	10/15/2002	10/15/02	SM
Manganese	0.160	mg/L	t	.001	3005/6010B	10/14/2002	10/15/02	SM
Manganese, Dissolved	0.069	ng/L	£	0.001	6010B	10/15/2002	10/15/02	5M

10-28-02 Date

Approval: <u>C.C.O.</u> <u>C.L.</u> Raland K. Tuttle, Lab Director, QA Officer Celey D. Keene, Org. Tech. Director Jeanne MeMurrey, Inorg. Tech. Director Sandra Biczugbe, Lab Tech. Sara Molina, Lab Tech.

N/A = Not Applicable RL = Reporting Limit Page 4 of 4

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ENVIRONMENTAL LAB OF TEXAS ANALYTICAL REPORT

JÖHN FERGERSON TRIDENT ENVIRONMENTAL P.O BOX 7624 MIDLAND. TX 79708		Order Projec Projec Locati	t: t Name:	G0204761 F-105 DEFS: Ridri DEFS: Eldri			
Lab 10: 0204761-01 Sample ID: MW-19							
Anions Parameter	Result	Units	Dilutio <u>Factor</u>		Method	Date <u>Annlyzed</u>	Analysi
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/1_	I	5,00	9253	10/14/02	SB
Hydroxide Alkalinity	<0.10	ng/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			Dilutio			Date	
Parameter	Result	Units	Factor	<u>R</u> L	Method	Analyzed	<u>Analys</u>
Fluorido	1.19	m2/L	ĩ	0.02	340.1	10/15/02	\$ B
Nitrogen, Nitrate	1.8	mg/L	I.	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-19 <i>Anions</i> <u>Perameter</u>	<u>Result</u>	Units	Dilution <u>Factor</u>		Method	Date Analyzed	Analys
Bicarbonate Alkalinity	318	mg/L		2.00	310.1	10/12/02	SB
Carbonate Alkalinity		mg/L	1	0.10	310.1	10/12/02	SB
Chloride	62.0	mg/L	ı	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	SD
Test Parameters	Result	Units	Dilution Factor		Method	Date <u>Analyzed</u>	Analys
Fluoride	(1.94	mg/L	1	0.02	340.1	10/15/02	
Nitrogen, Nitrate	1,3	mg/L mg/L	I I	0.5			SB
Total Dissolved Solids (TDS)	529	ന്നു/L	1	5,0	353.3 160.1	10/12/02 10/14/02	SB Tal
ab ID: 9204761-03 ample ID: NIW-20		, ,					
Anions			Dilution			Date	
Parameter	Result	<u>Unite</u>	Factor		Method	Analyzed	Analyst
Bicarbonate Alkalinity	166	mg/L]	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	L	0.10	310.1	10/12/02	5B
OT 17 17 A 1977 - 3 19 A	65.0			n ¢	774 4		A

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SULFATE, 375.4

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ANALYTICAL REPORT

JOHN FERGERSON TRIDENT ENVIRONMENTAL P.O BOX 7624 MIDLAND, TX 79708			Order#: Project: Projoct Name: Location:		G0204761 F-105 DEFS: Eldri DEFS: Eldri			~
Lab ID: Sample 1D:	0204761-03 MW-20							
Test Parameters		<u>Result</u>	Units	Dilution <u>Factor</u>		Method	Date Analyzed	Analys
Fluoride		1.21	mg/L	1	0,02	340,1	10/15/02	SB
Nitrogen, Nit	rate	4.2	mg/L	1	0.5	353.3	10/12/02	8B
Total Dissoived Solids (TDS)		608	mg/4,	1	5.0	160,1	10/14/02	TAL
Lab 1D: Sample ID:	0204761-04 MW-15		·		······	· · ·		
Anions Parameter		Result	Units	Dilution <u>Factor</u>		Method	Date <u>Ansivzed</u>	Analysi
Bicarbonate Alkalinity		164	mg/L	1	2.00	310.1	10/12/02	SB
Carbonate Alkalinity		<0.10	ாழி	L	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, 3	75.4	51.0	mg/1.	1	0.5	375.4	10/15/02	SB
Test Paran	neters			Dilution	1		Date	
Parameter		Result	Units	Factor	<u>RL</u>	Method	Analyzed	Analysi
Fluoride		1.25	mg/L	1	0.02	340.1	10/15/02	\$B
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.
Lah ID;	0204761-05		· · · · · · · · · · · · · · · · · · ·		····			<u>_</u>
Sample ID:	MW-21							
Anions		Davatt	B 1 B 4	Dilution			Date	
Parameter Disselector	11 - 1 ⁴ - ¹ 4	Result	<u>Units</u>	Factor		Method	Analyzed	Analyst
Bicarbonate Alkalinity		196	mg/L	1	2.00	310.1	10/12/02	S B
Carbonate Alkalinity		<0.10	mg/L	1	0.10	310.1	10/12/02	SB
Chloride Hudrovide Allenbaity		39,9	mg/L	I	5.00	9253	10/14/02	SB
Hydroxide Alkalinity SULFATE, 375,4		<0.10	mg/L.	1	0.10	310.1	10/12/02	SB
		51.1	mg/L	1	0.5	375.4	10/15/02	SB
Test Param	eters			Dilution			Date	
Parameter		Result	<u>Units</u>	Factor	RL	Method	Analyzed	Analyst
Fluoride		1.31	mg/L	t	0.02	340.1	10/15/02	SB
Nitrogen, Nitrate		2.2	mg/L	I	0.5	353.3	10/12/02	SB
Total Dissolved Solids (TDS)		385	mg/L	1	5.0	160.1	10/14/02	TAL

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ANALYTICAL REPORT

JOHN FERGERSON TRIDENT ENVIRONMENTAL P.O. ROX 7624 MIDLAND, TX 79708		Order#: Project: Project Name: Location:		G0204761 F-105 DEF8: Eldri DEF8: Eldri	••		
Lab 1D: 0204761-06 Sample 1D: MW-22							
Anions Parameter	Result	Units	Dilution <u>Factor</u>		Method	Date <u>Analyzed</u>	Analyst
Bicarbonate Alkalinity	234	mg/L	ł	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	<u>тц</u> у/Г.	1	5.00	9253	10/14/02	SB
Hydroxide Alkalinity	<d.10< td=""><td>mg/L</td><td>1</td><td>0.10</td><td>310,1</td><td>10/12/02</td><td>SB</td></d.10<>	mg/L	1	0.10	310,1	10/12/02	SB
SULPATE, 375.4	42.6	mg/L	1	0.\$	375.4	10/15/02	SB
Test Parameters Parameter	Reault	Units	Dilution Factor	RL	Method	Date Analyzed	Analysi
Pluorido	1.12	mg/L.	1	0.02	340.1	10/15/02	SB
Nitrogen, Nitrate	1.4	m g/L	1	0,5	353.3	10/12/02	SB
Total Dissolved Solids (TDS)	420	mg/L)	5.0	160.1	10/14/02	TAL
Somple 10: MW-17 Anions Parameter	<u>Resolt</u>	Unity	Dilution Factor	<u>RL</u>	Method	Date Anglyzed	Analysi
Bicarbonate Alkalinity	195	mg/L	t	2.00	310.1	10/12/02	SB
Carbonate Alkalinity	<0,10	mg/L	I.	0.10	j10.)	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	<u>Result</u>	Unita	Dilution Factor	<u>RL</u>	Method	Date Analyzed	Analyst
Fluoride	1.94	mg/1.	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/i.)	5.0	160,1	10/14/02	TAL
ab ID: 0204761-08 jampic ID: MW-16							,
Anions			Dilution			Date	
Parameter	Result	Units	Factor	<u>RL</u>	Method	Annivzed	Analyst
Bicarbonate Alkalinity	190	mg/L	L	2.00	310,1	10/12/02	SB ·
Carbonate Alkalinity	<0,10	mg/L	1	0.10	310.1	10/12/02	SB
-		mg/t,		5.00	9253	10/14/02	SB
Chloride	\$5.4	-	•	E	1444	10/19/04	.912
-	55.4 <0,10 71	mg/L mg/L mg/L	1	0.10 0,5	310.1 375,4	10/12/02	SB

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ANALYTICAL REPORT

JOHN FERGERSON TRIDENT ENVIRONMENTAL P.O BOX 7624 MDDLAND, TX 79708			Order#: Project: Project Name: Location:		G0204761 F-105 DKFS: Fldridge DEFS: Eldridge		مند بیر سند.	
Lan ID: Sample ID;	9204761-98 MW-16							
Test Parameters		_	Diluci				Date	
Parameter		<u>Result</u>	Units	Facto	<u>r RL</u>	<u>Method</u>	Analyzed	Analyst
Fluoride		1.53	mg/1.	1	0.02	340.1	10/15/02	SB
Nitrogen, Nitrate		2.3	mg/L	1	0.5	353.3	10/12/02	SH
Total Dissolved Solids (TDS)		426	mg/L	t	5.0	160.1	10/15/02	TAL

Approval: RO landthe 10-28-02 Raland K. Tuttle, Lab Director, QA Officer Date

Celey D. Keene, Org. Tech. Director Jeanne McMurrey, Inorg. Tach. Director Sandra Blezugbe, Lab Tech. Sara Molina, Lab Tech.

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ENVIRONMENTAL LAB OF TEXAS quality control report

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Order#; G0204761

BLANK	WATER	LAB-ID#	Sample Concentr.	Spike Concentr.	QC Test Result	Pct (%) Recovery	RPD
TO'I'AL, C6-C35-mg/L		0003447-02			<3.00		
MS	WATER	LAB-ID#	Sample Concentr.	Spike Concentr.	QC Test Result	Pet (%) Recovery	RPD
TOTAL, C6-C35-mg/L	<u></u>	0204761-01	0	95.2	85.5	89.8%	
MSD	WATER	LAB-ID #	Sample Conceptr.	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	J_AB-ID #	Sample Concentr.	Spike Concentr,	QC Test Result	Pet (%) Recovery	RPD
TOTAL, C6-C35-mg/L		0003447-05	······································	100	87,4	87.4%	

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8021B/5030 BTEX

Order#: G0204761

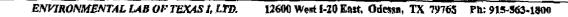
BLANK	WATER	1.AB-10 #	Sample Concontr.	Spike Concentr.	QC Test Result	Pct (%) Recovery	RYD
Benzene-mg/L		0003450-02			<0.001	· · ·	
Ethylhenzene-mg/L	۱۹۹۹ <u>ی پر والاند</u>	0003450-02			<0.001		
Toluene-mg/L	······	0003450-02	······································		<0.001		·
p/m-Xylene-mg/L		0003450-02		1	<0.001		
o-Xylenc-mg/L		0003450-02			<0.001		·····
MS	WATER	LAB-10#	Sample Concentr.	Spike Concentr.	QC Test Result	Pet (%) Recovery	RrD
Benzene-mg/L		0204761-10	Ü	0.1	0.097	97.%	
Ethylhenzene-mg/L	······································	0204761-10	0	0,1	0.100	100.%	
Tolucae-mg/L	·····	0204761-10	0	0.1	0.101	101.%	
p/m-Xylene-mg/L	<u></u>	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 Conceptr.	Spike Concentr.	QC Test Repuit	Pct (%) Recovery	RPD
Benzenc-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-ing/L		0204761-10	0	0.1	0.095	95.%	6.1%
n/m-Xylene-mg/l_		0204761-10	0	0.2	0.19\$	99.%	5.9%
o-Xylene-mg/L		0204761-10	0	0.1	0.095	95.%	6.1%
SRM	WATER	LAB-JD#	Sample Concentr.	Spike Concentr.	QC Test Result	Pet (%) Recovery	RPD
Benzeno-mg/L		0003450-05		0.1	0.094	94,%	
Ethylbenzene-mg/l.	··	0003450-05	······································	0.1	0.096	96.%	*
Toluenc-mg/L		0003450-05		0.1	0.098	98,%	
m-Xylene-mg/L		0003450-05	A 48	0.2	0.202	101.%	<u> </u>
o-Xylone-mg/L	·	0003450-05		0.1	0.097	97.%	

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Apions

Order#: G0204761

BLANK	WATER	LAR-ID #	Sample Conceptr.	Spike Concentr.	QC Test Result	Pst (%) Recovery	RPD
Bicerbonate Alkalini	ty-mg/L	0003432-01			<2.00		
Carbonato Alkalinity	-mg/L	0003430-01			<0.10		
Chloride-mg/L	<u>. </u>	0003436-01		*	<5.00	/	
Hydroxide Alkalinit	/-mg/L	0003434-01		· · · · · · · · · · · · · · · · · · ·	<0,10		
SULFATE, 375.4-m	g/l,	0003443-01			<0.50	-	
DUPLICAT	'E WATER	LAB-ID#	Sample Concentr.	Spike Concentr.	QC Test Result	Pet (%) Recovery	RPD
Bicarbonate Alkalini	ty-mg/L	0204760-01	168		169	ţ	0.6%
Carbonate Alkalinity	-mg/l.	0204760-01	0		<0.10		0.%
Hydroxide Alkalinity	/mg/L	0204760-01	0		<0.10	F	0,%
SULFATE, 375.4-un	g/L.	0204760-01	124	·	126		1.6%
MS	WATER	LAB-10#	Sample Concentr.	Spike Concentr.	QC Test Result	Pet (%) Recovery	RPD
Chloride-mg/L	······································	0204760-01	100	250	354	99.2%	<u></u>
MSD	WATER	LAB-ID #	Sample Concentr.	Spike Concentr.	QC Test Result	Pet (%) Recovery	RPD
Chloride-mg/L	<u></u>	0204760-01	106	250	350	97.0%	1.1%
SRM	WATER	LAB-ID#	Sample Concentr.	Spike Concentr.	QC Test Result	Pet (%) Recovery	RPD
Bicarbonate Alkalini	ty-mg/l.	0003432-04		0.05	0.0496	99.2%	·····
arbonate Alkalinity	-mg/1,	0003430-04		0.05	0.0495	99.2%	
Chioride-mg/L		0003436-04	······································	5000	4960	99.2%	
lydroxide Alkalinity	-ing/L	0003434-04		0.05	0.0496	99.2%	<u></u>
SULFATE, 375.4-mg	VL	0003443-04	······	50	51.1	102.2%	



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ENVIRONMENTAL LAB OF TEXAS QUALITY CONTROL REPORT

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Order#: G0204761

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BLANK	WATER.	LAB-ID #	Sample Concentr.	Spike Concentr.	QC Test Result	Pct (%) Recovery	RPD
Calcium-mg/L		0003494-02			<0.010	1	
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	Pet (%) Recovery	RFD
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 Cuncentr.	QC Test Result	Fct (%) Recovéry	RPD
Calcium-mg/L		0003494-05		2	1.90	95.%	
Asgacsium-nig/L		0003494-05	** [*] . ***********************************	2	2.17	108.5%	
otassium-mg/L	······································	0003494-05	, ,	2	1.81	90.5%	 ,
odium-mg/L		0003494-05		2	1.78	89.%	

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ENVIRONMENTAL LAB OF TEXAS QUALITY CONTROL REPORT

Test Parameters

Order#: G0204761

BLANK WATER	LAB-ID #	Sampie Concentr.	Spike Coucentr.	QC Test Result	Pct (%) Recovery	RPD
Barium-mg/L	0003461-01			<0.001	1	
Barium, Disselved-mg/L	0003457-01			<0.001		
Fluoride-mg/L	0003442-01	 ,	······································	<0.02		·· ····
fron-mg/L	0003461-01			<0.002	1	
Iron, Dissolved-mg/L	0003457-01			<0,002		
Manganese-mg/L.	0003461-01			<.001		·····
Manganese, Dissolved-mg/I.	0003457-01			<0.001		
Nitrogen, Nitrate-mg/L	0003426-01			<0.5	<u>+</u> +	
Total Dissolved Solids (TDS)-mg/L	0003439-01			<5.0		
Total Dissolved Solids (TDS)-mg/L	0003454-01		1	<5.0		
CONTROL WATER	LAB-ID #	Sample Concentr.	Spike Concentr.	QC Test Result	Pet (%) Recovery	RPD
Barium, Dissolved-mg/L	0003457-02		0.2	0.235	117.5%	
ron, Dissolved-mg/L	0003457-02		0.2	0.198	99.%	·
Manganese, Dissolved-mg/L	0003457-02		0.2	0.216	108.%	
CONTROL DUP	LAB-1D#	Sample Concentr.	Spike Concentr.	QC Text Result	Pct (%) Recovery	RPD
Barium, Dissolved-mg/L	0003457-03		0.2	0,232	116.%	1.3%
ron, 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.	OC Test Result	Pct (%) Recovery	RPD
Fluoride-mg/L	0204761-01	1.19		1.30	<u>}</u>	8.8%
Nitrogen, Nitrate-mg/L	0204761-01	1.8	.) . /	1.9		5.4%
fotal Dissolved Solids (TDS)-mg/L	0204750-01	605		603		0.3%
Fotal Dissolved Solids (TDS)-mg/L	0204761-08	426		427		0.2%
MS WATER	LAB-II) #	Sample Concentr,	Spike Concentr.	QC Test Result	Pct (%) Recovery	RPD
Borium-mg/L	0204761-04	0.098	0.2	0.278	90.%	
ron-mg/L	020476)-04	1.13	0.2	1.32	95.%	
Vianganese-mg/L	0204761-04	0.027	0.2	0,228	100.5%	
WSD WATER	LAB-ID #	Sample Concentr.	Spike Concentr.	QC Test Romit	Pct (%) Recovery	RPD
Sartum-mg/L	0204761-04	0.098	0.2	0.281	91.5%	1.1%
ron-mg/L	0204761-04	1,13	0,2	1.32	95.%	0.%
langanese-mg/L	0204761-04	0.027	0.2	0,226	99.5%	0.9%
SRM WATER	LAB-10 #	Sample Concentr.	Spike Concentr.	QC Test Result	Pet (%) Recovery	RPD
Buriton-rug/L	0003461-04		1	1.07	107.%	
Barium, Dissolved-mg/L	0003457-04		1 1	1.07	107.%	
Ivoride-me/L	0003442-04			0.91	91.%	

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Test Parameters

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SRM w	ATER	# Sample Concentr.	Spike Concentr.	QC Test Result	Pct (%) Recovery	RPD
lran-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/i.	0003457-	04	1	1.02	102.%	
Nitrogen, Nitrate-mg/L	0003426-	04	2	1.90	95.%	

ENVIRONMENTAL LAB OF TEXAS I, LTD. 12600 West 1-20 East, Odessa, TX 79765 Ph: 915-563-1800



Oct 28 02 04:18p

JUHN FERGERSUN

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	LABID	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:

aland K Thul) Environmental Lab of Texas I. Ltd.

Date: 10-25-02





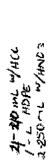
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Tident Environmental P.O. Box 7624 Micfand, Texas 79706 (915) 562-0008 (915) 262-5216 (Fax)			13 Fax: (915) 563-17	54	Marit C	ter	2	2	1	Ξ	2	:		=	,								Please send involce d	Duke Energy Field Services, Attention: Steve Weathers	P. O. Box 5493, Denver,	I
Tride P.O. (915) (915)	Environmental Lahe	12600 West I-20 East	Odessa, TX 79763 Telephone: (505) 563-1800 F	R		WACK		-		_	_	_	_	_	1		9y	DEFS: Eldridge	SON		ę,		Pleas	ld Ser	O. Box	
	Lou	Vest	TX													tion	Duke Energy	Ed	John Fergerson		Hand Deliver of			y Fie	م	
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8000-289-616



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 DEFS: Eldridge Location: Lab ID: 0204761-01 Sample ID: MW-19 8015M Method Date Sample Date Dilution Blank Prepared Analyzed Amount Factor <u>Analyst</u> Method 10/16/02 t 1 ĊК 8015M Result Parameter RL mg/i. 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 (%) Chlorocotane 101% 70 130 -Chlorooctadecane 101% 70 180 8021B/5030 BTEX Method Date Date Sample Dilution Prepared Analyzed Blank Amount Method Factor Analyst 10/15/02 1 1 СК 802133 0003450-02 19:17 Result Parameter RL. mg/L Benzene 0.003 0.001 Ethylbenzene <0.001 0.001 Toluenc <0.001 0.001 p/m-Xylenc <0.001 0,001 < 0.001 0.001 o-Xylenc Surrogates % Recovered QC Limits (%) aaa-Toluene 82% 80 120 Bromofluorobenzene 89% 80 120

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

Page 1 of 10

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

10/28/2002 17.09 212-995-0008 Oct 28 02 04:08p

JUHN FERGERSUN

ENVIRONMENTAL LAB OF TEXAS

ANALYTICAL REPORT

	ON ONMENTAL, 9708			Order#: Project: Project Namo Location:	F-109 :: Dens	4761 3 S: Eldridge S: Eldridge	
Lab ID: Sample ID:	0204761-02 MW-18						
				8015M			
	Method	Date	Date	Sample	Dilution		n n
	Blink	<u>Crepared</u>	<u>Analyzed</u> 10/16/02	<u>Amount</u> F	Factor: 1	<u>Analyst</u> CK	Method 8015M
			····				
		Parameter		Result mg/L	,	RL	
		ORO, C6-C12		<3.00		3.00	
		DRO, >C12-C35		<3.00		3.00	
		TOTAL, C6-C35		<3.00		3.00	
		Surroga	tes	% Recovered	QC Lim	its (%)	
		1-Chiorooct		108%	70	130	
		1-Chlorooct	edecano	108%	70	130	
			8021 B	N/5030 BTEX			
	Method	Date	Date	Sample	Dilution		
	Blank	Prepared	<u>Anriyzed</u> 10/15/02	<u>Asnount</u> I	Factor I	<u>Analyzt</u> CK	Method 8021B
	0003450-02		19:37	·	ĩ	C.R	GUL) D
		Parameter		Result mg/L		RL.	
		Benzene		0.008		0.001	
		Ethylbonzone		0.001		0.001	
				0.007	1	0.001	
		Toluene		0.005			
		p/m-Xylene		0.002		0.001	
		p/m-Xylenc o-Xylenc		0.002 <0.001		0.001	
		p/m-Xylene		0.002 <0.001	QC Limi	0.001	

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

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		L	ANALYT	ICAL REI	POR	Г	
OHN FERGERS RIDENT ENVIR O BOX 7624 IIDLAND, TX 7	ONMENTAL			Order#1 Project; Project Nam Location:	F-1 e: DE	204761 03 FS: Eldridge FS: Eldridge	
Lab ID: Sample ID:	0204761-03 MW-20						
				8015M			
	Method <u>Biank</u>	Date <u>Prepared</u>	Date <u>Analyzed</u> 10/16/02	Sample <u>Amount</u> 1	Dilutio <u>Facto</u> 1	-	Method 8015M
		Parameter		Resul		RL	
		GRO, C6-C12		mg/L <3.00		3.00	
		DRO, >C12-C35		<3.00		3.00	
		TOTAL, C6-C35		<3.00		3.00	
		Surroga		% Recovered	OC LI	mits (%)	
		1-Chloroact		92%	70	130	
		1-Chloroccu	decane	91%	70	130	
			8021B	/5030 BTEX	•		
	Method	Date	Date	Sample	Dílutio		
	<u>D)RDK</u> 0003450-02	<u>Prepared</u>	<u>Analyzed</u> 10/15/02 19:57	<u>Amount</u> 1	<u>Factor</u> 1	CK <u>Anglyst</u>	Method 8fl21B
		Parameter		Result mg/L	t	RL	
		Велгепе		<0.001		0.001	
		Ethylbenzene	······	<0.001		0.001	
		Toluene p/m-Xylene		<0.001		0.001	
		o-Xylene		<0.001		0.001	
		· · · · · · · · · · · · · · · · · · ·			l		
		Surroga	ies.	% Recovered	QC Li	mits (%)	
		i www.shin					
		asa-Toluene Bromofluoro)	84%	80	120	

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

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Page 3 of 10

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

10/20/2002 17:11 913-682-0008 Oct 28 02 04:14p JUHN FERGERSUN

ENVIRONMENTAL LAB OF TEXAS

ANALYTICAL REPORT

JOHN FERGERSC TRIDENT ENVIRG F.O BOX 7624 MIDLAND, TX 79	onmental,		Orders Projec Projec Locati	t: t Name:	G0204761 F-105 DEFS: Eldridge DEFS: Eldridge			
	0204761-03 MVV-20							
Test Paramet	ersi	Result	Units	Dilutio <u>Factor</u>		Method	Date <u>Anatyzed</u>	<u>Analyst</u>
Fluoride		1.21	mg/L	t	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 S		608	mg/L	1	5.0	160.1	10/14/02	TAL
	02(14761-04 MW-15			N	a 8 ¹ ¹ ¹ − 3 ¹ / − 5 ¹ − 5 ¹ − 10 − 10			
Anions Parameter		Result	<u>Units</u>	Dilutio Factor	_	Mothod	Date Anaiyzed	Analyst
Bicarbonate Alka	linity	164	mg/L	1	2.00	310.1	10/12/02	SB
Carbonate Alkali	•	<0.10	mg/L	ł	0.10	310.1	10/12/02	SB
Chloride	nay	42.5	mg/L	1	5.00	9253	10/14/02	SB
Hydroxide Alkali	inity.	<0.10	±ng/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 Paramel	ers	Result	Units	Dilution Factor		Method	Date Analyzed	<u>Analyst</u>
Fluoride		1,25	mg/L	1	0.02	340.1	10/15/02	\$B
Nitrogen, Nitrate		3.5	rox/L	1	0.5	353.3	10/12/02	SB
Total Dissolved S		357	mg/L	1	5.0	160.1	10/14/02	TAL
Lab ID:	0204761-0;;	h		, · · · · ·	, <u> </u>	·····		
Sample ID:	MW-21							
Anions <u>Parameter</u>		Result	<u>Units</u>	Dilution <u>Factor</u>	<u>RL</u>	Method	Date <u>Analyzed</u>	Analyst
Bicarbonate Alka	dinity	196	mp/1.	J	2.00	310.)	10/12/02	SB
Carbonnie Alkali	nity	<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 Alkali	inity	<0.10	mg/U	l	0.10	310.1	10/12/02	SB
SULFATE, 375.4	1	53.L	mg/L	1	0.5	375.4	10/15/02	SB
Test Paramet	ers	•.	** **.	Dilution		X8.44b	Date A polyrod	Amaluet
Parameter		Roault	Units	Facto		<u>Method</u>	Analyzed	Apaivst
Fluoride		 ,3 1	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	58 TA1
Total Dissolved S	Solids (TDS)	385	mg/L	i	5.0	160.1	10/14/02	TAL

RL = Reporting Limit N/A = Not Applicable

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ENVIRONMENTAL LAB OF TEXAS I, LTD.

12600 West 1-20 East, Odessa, TX 79765 Ph: 915-563-1800

ENVIRONMENTAL LAB OF TEXAS

ANALYTICAL REPORT

JOHN FERGERSON TRIDENT ENVIRONMENTAL P.O BOX 7624 MIDLAND, TX 79708		Order Project Project Locatio	ti t Name:	G0204761 F-105 DRFS: Eldridge DEFS: Eldridge			
Lab ID: 0204761-06 Sample ID: MW-22					_		
Anions Parameter	Result	Units	Dilution <u>Factor</u>		Method	Date <u>Analyzed</u>	<u>Analyst</u>
Bicarbonate Alkalinity	234	mg/L	Ĺ	2.00	310.1	10/12/02	SB
Carbonate Alkalinity	<0.10	ուք/Լ	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	Ţ	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	Result	Units	Dilution Factor		Method	Date <u>Analyzed</u>	Analyst
	1.12	mg/L	1	0.02	340.1	10/15/02	SB
Fluoride	1.12	mg/L	1	0.02	340.1	10/12/02	SB
Nitrogen, Nitrate 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	Unita	Dilutio Factor		Method	Date <u>Analyzed</u>	Analyst
Bicarbonate Alkalinity	196	mg/L	1	2.00	310.1	10/12/02	SB
Carbonate Alkalinity	<0.10	mg/L	i	0.10	310.1	10/12/02	SB
Chloride	46.5	m¢/L	1	5.00	9253	10/14/02	SB
Nydroxide Alkalinity	<0.10	mg/L	1	0.10	310.1	10/12/02	SB
SULPATE, 375.4	66,1	mg/L	1	0.5	375.4	10/15/02	SD
Test Parameters	R <u>esult</u>	T 1-14-	Dilution Factor		Method	Date Analyzed	Analyst
Parameter	1.94	<u>Units</u>	1	<u> </u>	340.1	10/15/02	SB
Fluoride	2.0	mg/i,	1	0.5	353.3	10/12/02	SB
Nitrogen, Nitrate Tetal Dissolved Solids (TDS)	405	mg/L mg/L	1	5.0	353,5 160,1	10/14/02	TAL
Lab ID: 0204761-08 Sample ID: MW-16	, , , , , , , , , , , , , , , , ,					· · ·	
Anions	فأندف تك	T - 4-	Dilution		Mathad	Date Annivrad	å n n lumt
Parameter	Result 190	Units	Factor		Method	Analyzed	Analyst cn
Bicerbonate Alkalinity		mg/L		2.00	310.1	10/12/02	SB SØ
Carbonate Alkalinity	<0.10 ##.4	mg/L	1	0.10	310.1	10/12/02	
Chloride	55.4	nıg/l.	1	5.00	9253	10/14/02 10/12/02	SB SB
Hydroxide Alkalinity	<0.10	mg/L	1	0,10 0.5	310.1	10/12/02	SB SB
SULFATE, 375.4	71	mg/1,	ı	0.0	375.4	10/13/02	20

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Page 3 of 4

Oct 28 02 04:15p

JUHN FERGERSUN

ENVIRONMENTAL LAB OF TEXAS

ANALYTICAL REPORT

JOHN FERGE TRIDUNT EN P.O BOX 7624 MIDLAND, T	VIRONMENTAL		Order Project Project Lacatio	i Nanc:	G0204761 F-105 DEFS: Ridrid DEFS: Eldrid			
Lab ID:	0204761-08							
Sample JD:	MW-16							
Test Parai	neters			Dilutio	8		Date	
Parameter	ف	Result	Units	Facto	<u> RL</u>	Method	Analyzed	Analyst
Fluoride		1.53	tng/L	1	0.02	340.1	10/15/02	SB
Nitrogen, Nit	trate	2.3	mg/l,	1	0.5	353.3	10/12/02	SB
Total Dissolv	ved Solids (TDS)	426	mg/L	t	5.0	160.1	10/15/02	TAL

Approval: Kaland K. Tuttie, Lab Director, OAOOTicer landes 10-28-02 Date

Raiand K. Hille, Lab Director, OACULICET Celey D. Koene, 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 1-20 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.	Spikt Conceptr.	QC Test Result	Pct (%) Recovery	RPD
Benzene-mg/L		0003450-02			<0.001		
Ethylbenzenc-mg/L	<u></u>	0003450-02		· · · · · · · · · · · ·	<0.001	╉ ╌╌╌ ─── ─ ┡	
l'olucne-mg/L	······	0003450-02	,		<0.001	1	
p/m-Xylene-mg/L		0003450-02			<0.001		
o-Xylene-ing/L	^ر	0003450-02			<0.001		
MS	WATER	LAB-JD #	Sample Concentr.	Spike Contentr.	QC Test Result	Pet (%) Recovery	RPD
Benzene-mg/L		0204761-10	0	0.1	0.097	97.%	
Ethylbetizene-mg/L		0204761-10	0	0.1	0.100	100.%	
Toluenc-mg/L		0204761-10	0	0.1	0.101	101.%	
o/m-Xylene-mg/L		0204761-10	n	0,2	0.210	105.%	
-Xylenc-mg/L		0204761-10	0	0.1	0.101	101.%	
MSD	WATER	LAB-ID #	Sample Concentr.	Spike Concentr.	QC Test Result	Pet (%) Recovery	RPD
Jenzene-mg/L		0204761-10	0	0.1	0.092	92.%	5,3%
thylbonzone-mg/L		0204761-10	0	0.1	0.094	94.%	6.2%
l'oluene-mg/L		0204761-10	0	0.1	0.095	95.%	5.1%
/m-Xylene-mg/l.		0204761-10	0	0.2	0.198	99.%	5.9%
-Xylene-mg/L		0204761-10	0	0.1	0.095	95.%	6.1%
SRM	WATER	LAB-ID #	Sample Concentr.	Spike Concentr.	QC Test Result	Pet (%) Recovery	RPD
Benzene-mg/L		0003450-05		0.1	0.094	94,%	
Ethylbenzene-mg/l.		0003450-05		0.1	0.096	96.%	
oluenc-mg/L		0003450-05	*****	0.1	0.098	98.%	
/m-Xylene-ing/L		0003450-05	······································	0.2	0.202	101.%	
-Xylenc-mg/L		0003450-05		0.1	0.097	97.%	

ENVIRONMENTAL LAB OF TEXAS I, LTD.

ENVIRONMENTAL LAB OF TEXAS QUALITY CONTROL REPORT

Test Parameters

Order#: G0204761

SRM ,	VATER	LAB-ID #	Sample Concentr.	Spike Concentr.	QC Test Result	Pct (%) Recovery	RPD
lron-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.%	· · · · · · · · · · · · · · · · · · ·
langanese, Dissolved-mg/l,		0003457-04		1	1.02	102.%	
Nitrogen, Nitrate-mg/L		0003426-04		2	1.90	95.%	

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

ENVIRONMENTAL LAB OF TEXAS

SAMPLE WORK LIST

REMEDIACON	Order#:	G0204 8 26
P.O. BOX 302	Projecti	None Given
EVERGREEN, CO 80437	Project Name:	None Given
617-507-6178	Location:	None Given

The samples fraud below were submitted to Environmental Lab of Years and were received under chein of controly. Environmental Late of Texas makes to representation or actification as in the method of semple collection, sample identification, or transposition/handling precedures used prior to the receipt of sumplex by Erreironsneatal Lab of Texas, unless otherwise noted.

0204826-02	ixic MW-1	WATER		13-22902 19:15	1023/02 10 <i>\$</i> \$	40 ml. VÜA	1000) p81<2/km
	<u>b Fending:</u> 802318/5030 BTEX	Rejerad:	Nia	Ťmp.	I#C	······································	
0204826-03	Deike Irrigalism Well	WATER		10/22/02 14:25	:073493 10.05	40 mš. VOA	30×03 #11+27/16#
	• Tenting: 802119/5030 BTEX	Rejected:	No	Temy:	180	10. 64668	

Lab ID: 000416-62 Sample ID:

Duke MW-I

8021B/5030 BTEX Date: Diete Sample Dilution Method Prepared Analyzed Amount Factor Analyst Method. Bach 18:29:02 R CX. Mittik (0003583-02 İ.Ž:3Š 13

Parameter	Rasult ng:1.	RI.
lienzene	1,45	0.010
Elhylbenzene	Q112	0.0I©
Toluen:	1.49	0.016
рід-Хукяю	0.293	0.010
«-Xylene	0.074	0.010

Secrogates	* Recovered	QC	(Jersits (%)
003-17/10746	136%	4 0	
Bromofupersbenzera	97%	80	120

Di. - Dilated out - N/A - Not Applicable - HL - Reporting Limit

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

ENVIRONMENTAL LAB OF TEXAS

ANALYTICAL REPORT

MICHAEL STEWARTOrder#:G0204826REMEDIACONProject:None GivenP.O. BOX 302Project Name:None GivenEVERGREEN, CO 80437Location:None Given

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

		8021E	R/5030 BTE.	X		
Method <u>Blank</u>	Date <u>Prepared</u>	Date <u>Analyzed</u>	Sample <u>Amount</u>	Dilution <u>Factor</u>	Analyst	Method
0003585-02		10/29/02 18:38	1	10	СК	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 LI	mits (%)
aaa-Toluene	154%	80	120
Bromofluorobenzene	95%	80	120

10-31.02 and Approval: ,Q, Date

Raland K. Tuttle, Lab Director, QA Officer Celey D. Kcene, 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

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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	1	
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.%	* <u>* </u>
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%
Kylene-mg/L	0003583-04		0.2	0.229	114.5%	2.2%
/lene-mg/L	0003583-04		0.1	0.110	110.%	2.8%
SRM WATER	LAB-ID #	Sample Concentr.	Spikc 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.%	
p-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	·= <u></u> ·	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:

Order#: G0204826

REMEDIACON P.O. BOX 302 EVERGREEN, CO 80437

Project: None Given

p.8

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.

Kala_dk_Just Environmental Lab of Texas I, Ltd. Date: 10-31-02 Approved By:

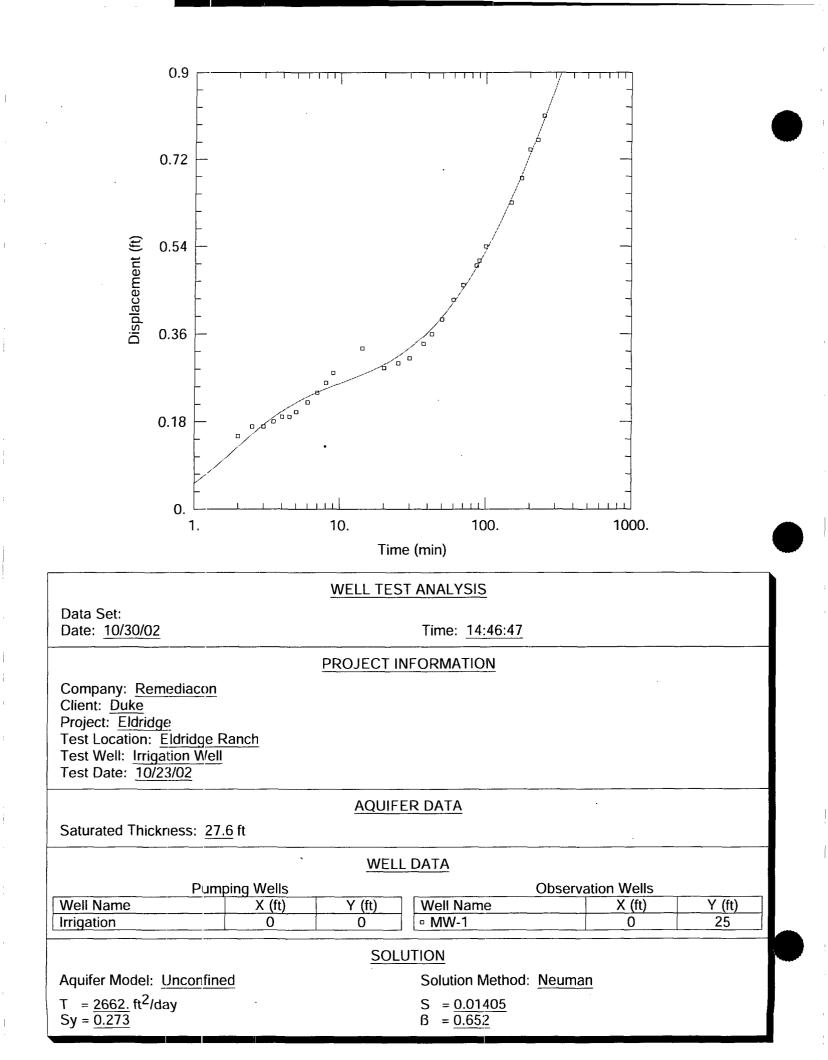
Oct 31 02 01:43p

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APPENDIX 3

OCTOBER 2002 PUMPING TEST ANALYSES

1



APPENDIX 4

MW-23 FREE PRODUCT ANALYSIS

10/25/2002 08:38 PAA 3033891957



-Certificate of Analysis

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

Ø 001

Analysis Number:	02100252-001A					
e ante les		201				
Sample ID:	0210111600 (17W-23)		Date of Sample:	10/11/02		
Project #: Project Name:			Time Sampled: Date Sample Analyzed:	16:00		
Froject 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 Cond	lensate	
*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 Methyipentarie	ND	wt%	Ortho-Xylene	0.167	wt%	
	provide to a state		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%	
C17	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:	C4-C13 Indicators:	2,2,4-TMP; MTBE; Olefins, Lead			
	Diesel Range:	C7-C22 Indicators:	No Olefins, Pristane, Phytane			

Crude/Condensate Range: C₂ - C₂₅₊: Indicators: No Olefins, Light & Heavies Heavy Oil: C₂₀₊ waxy, strong n-partafins

Comments:

х

Duke Energy 10-11-02 / Column 2

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

2

Marsha Goudeau

QAQC

. 1980

<u>1967</u>

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