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REPORTS

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Email Received on 9/5/02 mlo

September 5, 2002

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

Re: Workplan to Complete Additional Characterization Activities On and North of the Eldridge Ranch, Lea County New Mexico for Duke Energy Field Services, LP

Dear Mr. Weathers:

Duke Energy Field Services, LP (DEFS) retained Remediacon to complete additional characterization activities both on and north of the Eldridge Ranch in Lea County, New Mexico (study area). This letter provides the work plan to complete that effort. The program purpose and objectives and a brief background section are presented first. A description of the field program is presented next. The final section provides the tentative schedule for the program.

PURPOSE AND OBJECTIVES

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

1. Define the plume boundaries up gradient to the north and west of the study area.
2. Establish background concentrations for several inorganic constituents.
3. Characterize the hydrocarbon distribution between the northern and southern half of the study area.
4. Define the extent of the hydrocarbon effects to the east and the south on the Eldridge Property.
5. Identify the sources of hydrocarbons and delineate the plume or plumes associated with them.
6. Evaluate the degree and extent of natural biodegradation processes on the hydrocarbon distribution.
7. Collect information on the physical and chemical properties of the subsurface materials.

BACKGROUND INFORMATION

The study area is primarily located in the southeastern quarter of Section 21, Township 19 South, Range 37 East approximate 1.5 miles north of Monument in Lea County New Mexico. 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 1. Note that the study area boundaries are approximately located on Figure 1 to provide a spatial perspective of the surface features and topographic setting of the study area.

Fourteen 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). The well locations and the study area boundaries corresponding to Figure 1 are shown on Figure 2. Construction summaries for the 14 wells are in Table 1.

Inspection of the AMEC boring logs indicates that the study area is underlain by a silty sand that grades with depth to a clayey silty sand. Much of the subsurface material is now a hard, dry caliche layer. Depths to water varied from approximately 15.5 feet to 25.7 feet below land surface (Table 1).

Groundwater flow, hydrocarbon constituent distribution and probable source locations were discussed in detail in an August 30, 2002 letter from Remediacon to DEFS. Subsequent to the publication of that report, Remediacon discovered a number of graphical and tabular errors in the AMEC data based upon the Basin Surveys data. A revised water table contour map is included as Figure 3. The water table contours were generated by the Surfer® program using the kriging option. The groundwater flow patterns depicted in Figure 3 are similar to those shown in the August 30, 2002 report except that the groundwater anomaly at MW-4 is no longer present. Based upon the water table contours in Figure 3, the groundwater appears to flow toward (southeast) and then parallel to (south) the surface drainage that transects the study area.

A revised isopleth map of the July 2002 benzene concentrations is included as Figure 4. The isopleths were generated by the Surfer® program using the kriging option. This map is similar to the isopleth map provided in the August 30, 2002 report except that the wells are in slightly different locations. It should also be noted that the two Sid Richardson lines were rotated on the revised map to a more southeasterly alignment to match the project survey information. As discussed in the August 30, 2002 report, the results indicate that multiple sources are probably present

The July sampling episode established that no polynuclear aromatic hydrocarbons are present in the groundwater at the Eldridge site at detectable concentrations. No further sampling for these constituents is necessary.

The August 30, 2002 report concluded the following for the inorganic data;

1. Fluoride was present at naturally high concentrations

2. The slightly elevated sodium and chloride values from the MW-12 sample are evidence of an historic release not related to the pipelines.

3. The barium distribution also appears to be non-natural although many of the more elevated concentrations in the AMEC also appear to originate from the dissolution of sediment particles.

4. There is no reason to continue analyzing for the suite of metals contained in this report. Samples from new wells should be tested for dissolved (filtered) barium at least during the initial sampling episode. In addition, any sample from a domestic well should sampled at least once for the seven "RCRA" metals arsenic, barium, cadmium, chromium, lead, mercury, selenium and silver.

PROPOSED PROGRAM COMPONENTS

The field program described in this section was designed to collect the data necessary to complete characterization of the site at a level that will fulfill the above objectives. The task include: 1) monitoring well installation, development and sampling, 2) well gauging and water table contouring; 3) physical property measurement; and 4) report preparation. Each task is described below.

Monitoring Well Installation, Development And Sampling,

A minimum of nine new monitoring wells will be installed, developed and sampled. The proposed well locations are shown on Figure 4, and the rationale for each well is described in Table 2. The well locations were selected based upon spatial and groundwater flow considerations. The exact locations may be altered based upon subsurface obstacles, access constraints, or changed conditions such as knowledge of new source locations. Additional wells may also be installed to either complete source delineation or the down-gradient extent of plumes.

Each of the ten borings will be advanced using either auger or air rotary drilling. All drilling and installation procedures will be supervised by an experienced geologist or engineer with an appropriate background.

Samples will be collected on a regular basis (maximum separation of 5 feet) and screened for the presence of volatiles using a photoionization detector. Lithologic logs will be compiled for each boring based upon the cuttings and/or samples produced.

Each well will be drilled to a depth approximately 10 feet below the first evidence of saturated materials or to a maximum depth of 35 feet if no saturated materials are encountered. Fifteen feet of 2-inch, threaded, factory-slotted Schedule 40 PVC will be placed in the well (20 feet if no saturated materials are encountered). The annular space will then be backfilled with artificially-graded sand to a minimum depth of 2 feet above the top of the slotted PVC interval. The remaining annular space will then be backfilled with hydrated bentonite. The surface completion for each well will included an above-ground well protector and a minimum 2 foot by 2 foot concrete pad. Well completion forms will be prepared for each well in included in the report. Each well will be allowed to sit a minimum of 10 hours (overnight) before it is developed and sampled.

Each new well will be developed using either a disposable bailer or a submersible pump. Well development will be completed when a minimum of 10 casing volumes of water are removed and the field parameters of temperature, pH and conductivity for the last three casing volumes are stable. In the event the well cannot be continuously purged, it will be bailed dry a minimum of three times.

Each new well will be sampled using a disposable bailer following the completion of development. Unfiltered samples will be collected from each well and will be analyzed for the organic constituents benzene, toluene, ethylbenzene and total xylenes (BTEX), total petroleum hydrocarbons as oil and diesel. An additional unfiltered samples will be collected from each well will also be analyzed for the inorganic constituents calcium, magnesium, sodium, potassium, bicarbonate alkalinity, chlorides, sulfate and fluoride and other bioremediation indicator parameters. Field filtered samples will be analyzed for barium. All samples will be placed in an ice-filled chest immediately upon collection and delivered to the analytical laboratory using standard chain-of-custody protocol.

The existing wells will not be sampled during this effort. The samples from the new wells should be collected within approximately 2 months of the July 2002 sampling effort. As discussed in the August 30, 2002 Remediacon report, the samples from the AMEC monitoring episodes agreed well with the July 2002 samples that were collected between 5 and 11 months after the initial AMEC sampling so the data should provide a good understanding of the spatial relationship of the various constituents.

Any well that produces free product at a thickness in excess of 0.1 feet either after construction or development will not be sampled. Instead, a product sample will be collected and submitted for PIANO analysis.

A field duplicate and a trip blank will be used to evaluated quality control. The field blank will be collected from a well with detectable constituents so that the relative percentage difference can be calculated. The laboratory will provide the trip blank. The trip blank and the field duplicate will both be analyzed for BTEX.

Well Gauging And Water Table Contouring:

The depth to water will be measured the same day in each well a minimum of 1 week following the completion of groundwater sampling activities to ensure that the water table has fully equilibrated.

A water table map will be prepared based upon the data collected. The map will include the water table elevations, a set of water table contours and indications of groundwater flow directions.

Physical Property Measurement

The final field activity will be to measure the physical properties of the saturated materials. A pump test and slug tests will be completed to measure the physical properties of the water saturated materials. Bail down tests will also be completed in any well containing a sufficient thickness of product.

A pump test will be completed to measure the hydraulic conductivity and effective porosity of the saturated materials under stressed conditions. The pump test will be completed after the well gauging efforts discussed in the previous section are completed. Well MW-1 was tentatively selected because of its central location relative to four other wells; however, another well may be substituted as necessary.

The test duration will be based upon the production capacity of the well and access for setting a water collection tank. The test should ideally be run for a duration between 6 and 24 hours; however, the duration time may have to be lessened if the size of the storage tank has to be limited or if the well cannot be pumped on a sustained basis. A recovery test will be run at the completion of the pump test. The data will be analyzed using methods for unconfined saturated materials.

Approximately 10 of the wells will be subjected to slug testing to provide data on spatial variations in hydraulic conductivity. Each well will be tested by removing a minimum of 1 liter of water; a volume that is generally sufficient to lower the water table approximately 2 feet. The recovery will then be monitored through hand measurements of depth to water. The data will be analyzed using methods for unconfined saturated materials.

Report Preparation

A report will be prepared to present the results of the field investigation and discuss important conclusions. The report will include the following components:

- A summary of the field methods used to install the wells and collect the data.
- A summary of the data collected during the field program.
- A summary of all of the data collected.
- Interpretations of the data collected.
- Conclusions on groundwater flow direction and velocity, constituent origin, fate and transport, and source locations.
- All analytical laboratory reports, pump and slug test analyses, boring logs, and well completion diagrams will be appended to the report.

The report will also include recommendations for additional characterization activities (if necessary) to assess remediation options at those sources that originate from DEFS releases.

PROGRAM SCHEDULE

The tentative program schedule is based upon rapid approval by the appropriate parties, access permission to both properties prior to the start of field activities and contractor (drilling) availability. The tentative schedule milestones include:

September 6, 2002:	Plan submittal to the New Mexico Oil Conservation Division (OCD).
September 16, 2002:	OCD plan approval and access permission received.
September 23, 2002:	Utility locates and initiation of well installation.
September 28, 2002:	Well installation and groundwater sampling completed.
October 7, 2002:	Well gauging and initiation of pump and slug tests. Surveying of new wells and other important surface features.
October 11, 2002:	Pump and slug tests completed.

October 21, 2002: Probable receipt date of analytical results.

November 4, 2002: Submittal of report to OCD.

The above schedule is extremely aggressive in that it results in the production of a report approximately 3 ½ weeks after the completion of the final field activities. The November 4, 2002 report date is considered the earliest possible date a report would be available. A number of unforeseen factors (including additional field work) could delay production of the report. DEFS will notify the OCD on or before November 1 if the report is to be delayed. The notification will include the reason for the delay and a new report delivery date.

Do not hesitate to contact me if you have any questions or comments on this work plan.

Respectfully Submitted,
REMEDIACOM INCORPORATED

Michael H. Stewart

Michael H. Stewart, P.E.
Principal Engineer

MHS/tbm

attachments

TABLES

Table 1 – Well Construction Information

Well	Elevation Top of Casing	Ground Elevation	Total Well Depth	Screen Interval	Sand Interval	Top of Bentonite Pellets	July 2002 Depth to Water
MW-1	3,618.22	3,615.92	28.0	11.8-26.8	9.8-27	7.8	19.54
MW-2	3,621.63	3,619.03	28.0	11.7-26.7	8.7-27	6.7	22.68
MW-3	3,621.67	3,619.07	30.0	13.4-28.4	10.4-29	8.4	22.56
MW-4	3,621.31	3,618.98	30.0	13.2-28.2	10.2-29	11.2	21.97
MW-5	3,618.08	3,615.58	27.0	10.2-25.2	7.2-26	5.2	17.99
MW-6	3,624.99	3,622.54	30.0	13.5-28.5	10.5-29.0	8.5	21.57
MW-7	3,630.62	3,628.17	35.0	18.6-33.6	15.6-34	13.6	27.16
MW-8	3,625.92	3,623.98	30.0	15.0-30.0	12-30	10.0	23.42
MW-9	3,620.78	3,617.63	27.0	11.4-26.4	8.4-27	6.4	19.64
MW-10	3,627.27	3,624.63	31.0	15.2-30.2	12-31	10.0	23.31
MW-11	3,627.56	3,625.46	30.4	15.3-30.3	12-30.4	10.0	23.92
MW-12	3,631.14	3,629.11	34.0	18-33	15-34	13.0	26.27
MW-13	3,632.90	3,630.21	36.0	18.11-33.11	16-36	14.0	27.89
MW-14	3,630.36	3,628.24	32.0	16.11-31.11	14-32	12.0	24.32

Notes: All units are feet
Well MW-11 produced approximately 0.12 feet of free product after development

Table 2 – Proposed Well Locations and Purpose for Installation

Well	Location	Purpose
MW-15	Downgradient	Plume delineation on Eldridge property
MW-16	Downgradient	Plume delineation on Eldridge property
MW-17	Downgradient	Plume delineation at Eldridge property boundary
MW-18	Downgradient	Hydrocarbon assessment in drainage sediments
MW-19	Downgradient	Hydrocarbon assessment east of drainage, identification of potential sources to east
MW-20	Upgradient	Upgradient location and identification of potential sources to west
MW-21	Upgradient	Upgradient location and identification of potential sources to west
MW-22	Upgradient	Upgradient location and identification of potential sources to east
MW-23	Upgradient	Upgradient location and identification of potential sources to north

FIGURES

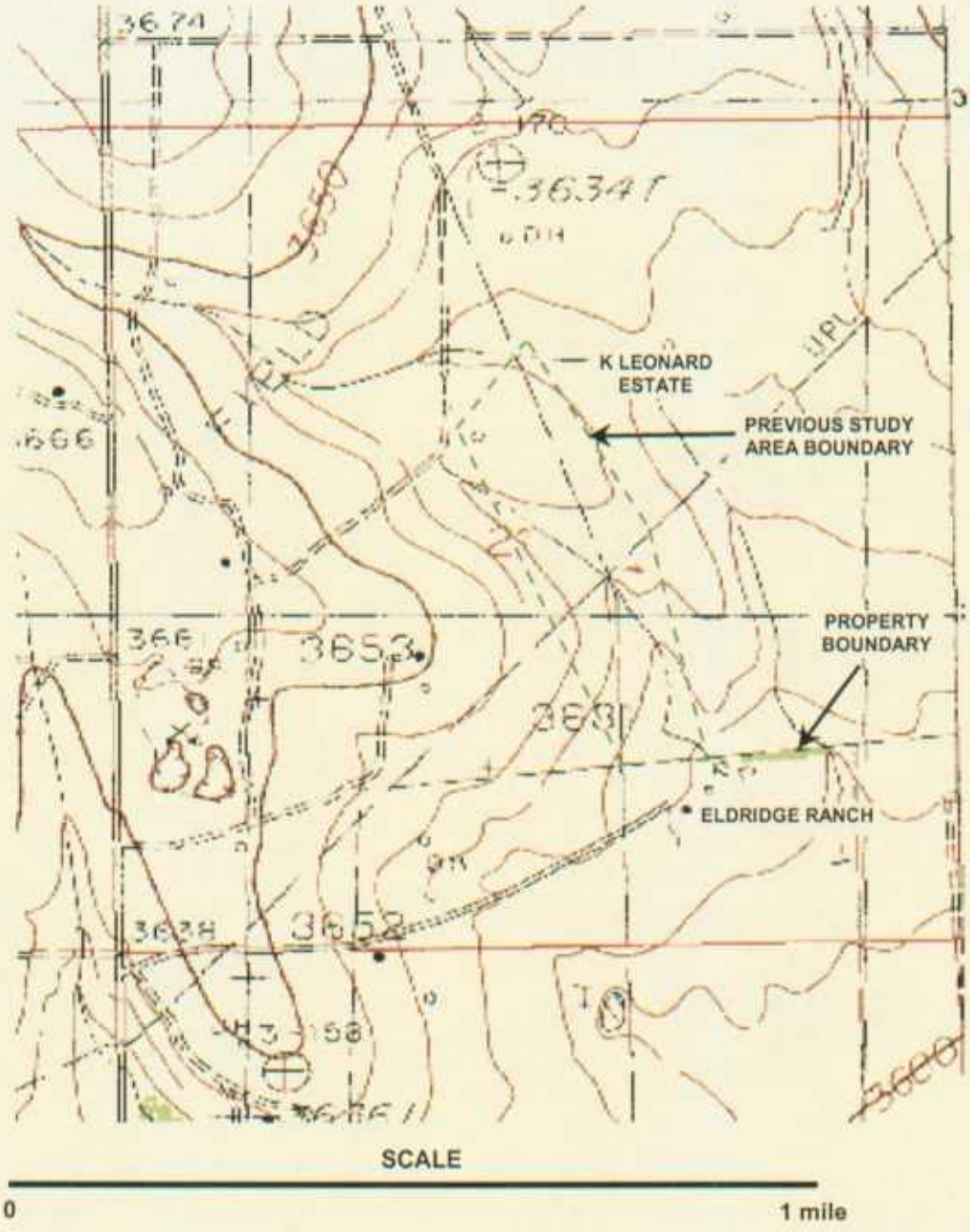

Figure 1 – Study Area Setting
Eldridge Ranch Characterization

Duke Energy Field Services

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REVISED:
DATE: AUG 02

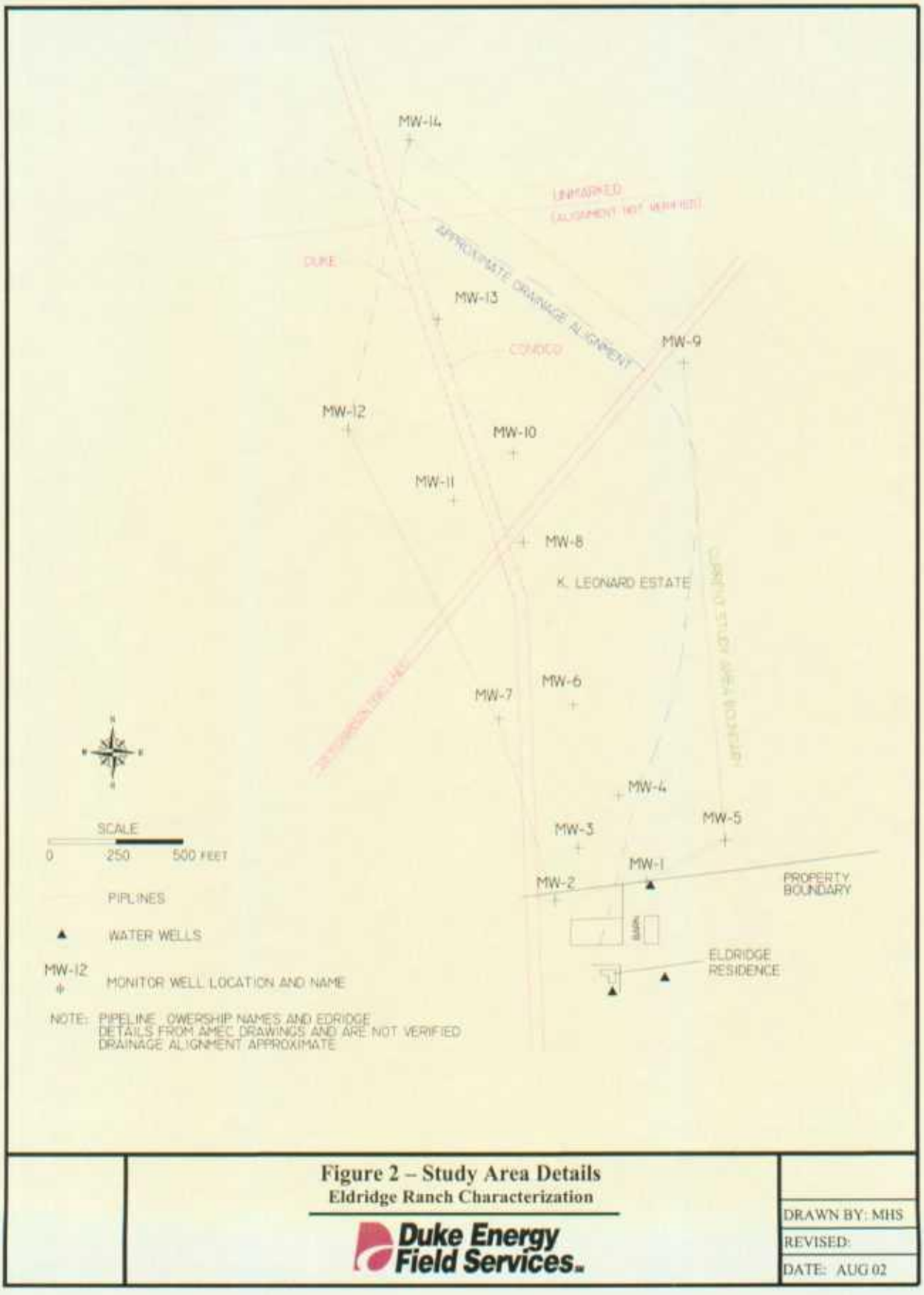

Figure 2 – Study Area Details
Eldridge Ranch Characterization

Duke Energy Field Services

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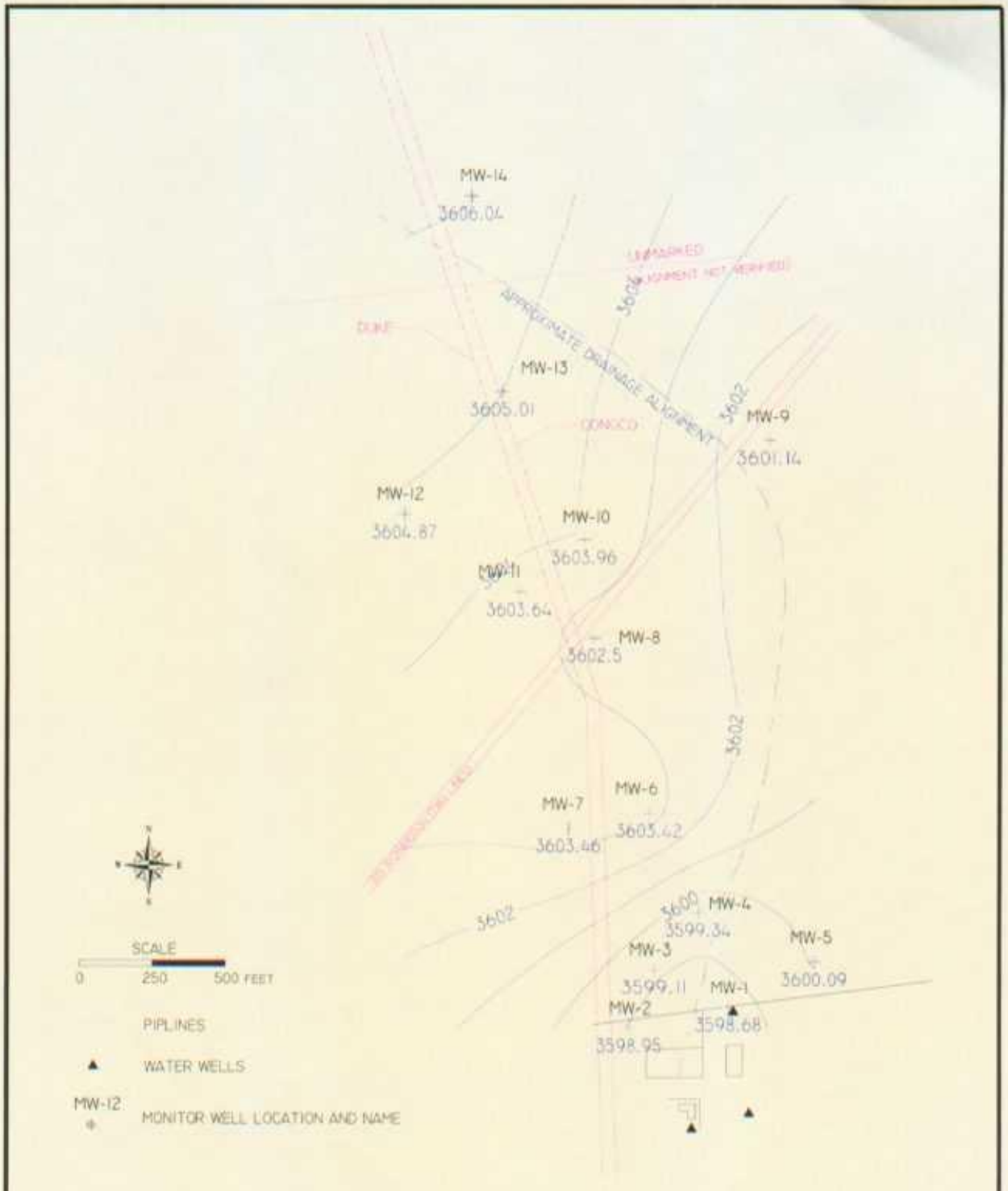

Figure 3 – July 2002 Water Table Elevations
Eldridge Ranch Characterization

Duke Energy Field Services

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DATE: AUG 02

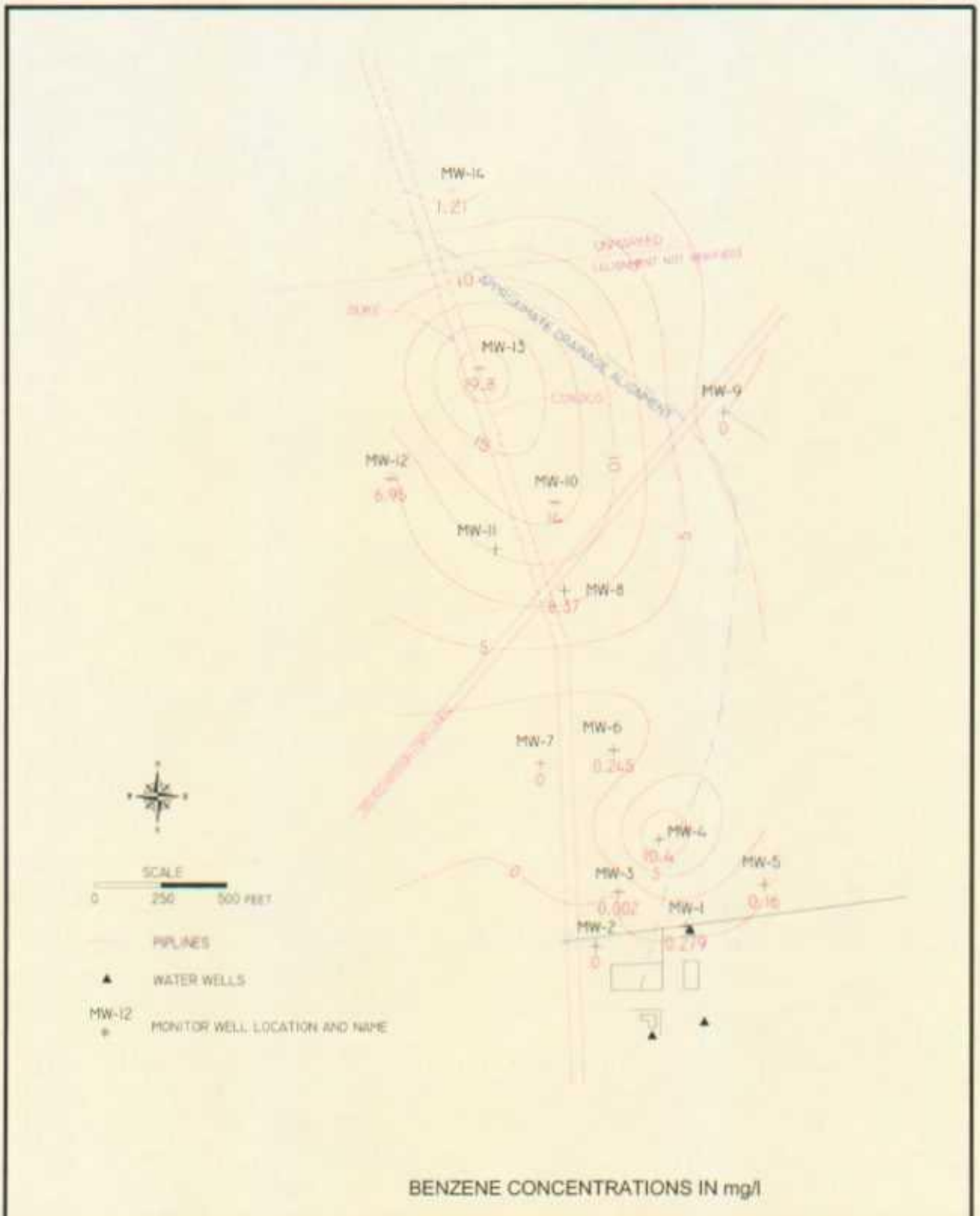

Figure 4 – July 2002 Benzene Isopleth
Eldridge Ranch Characterization

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DATE: AUG 02

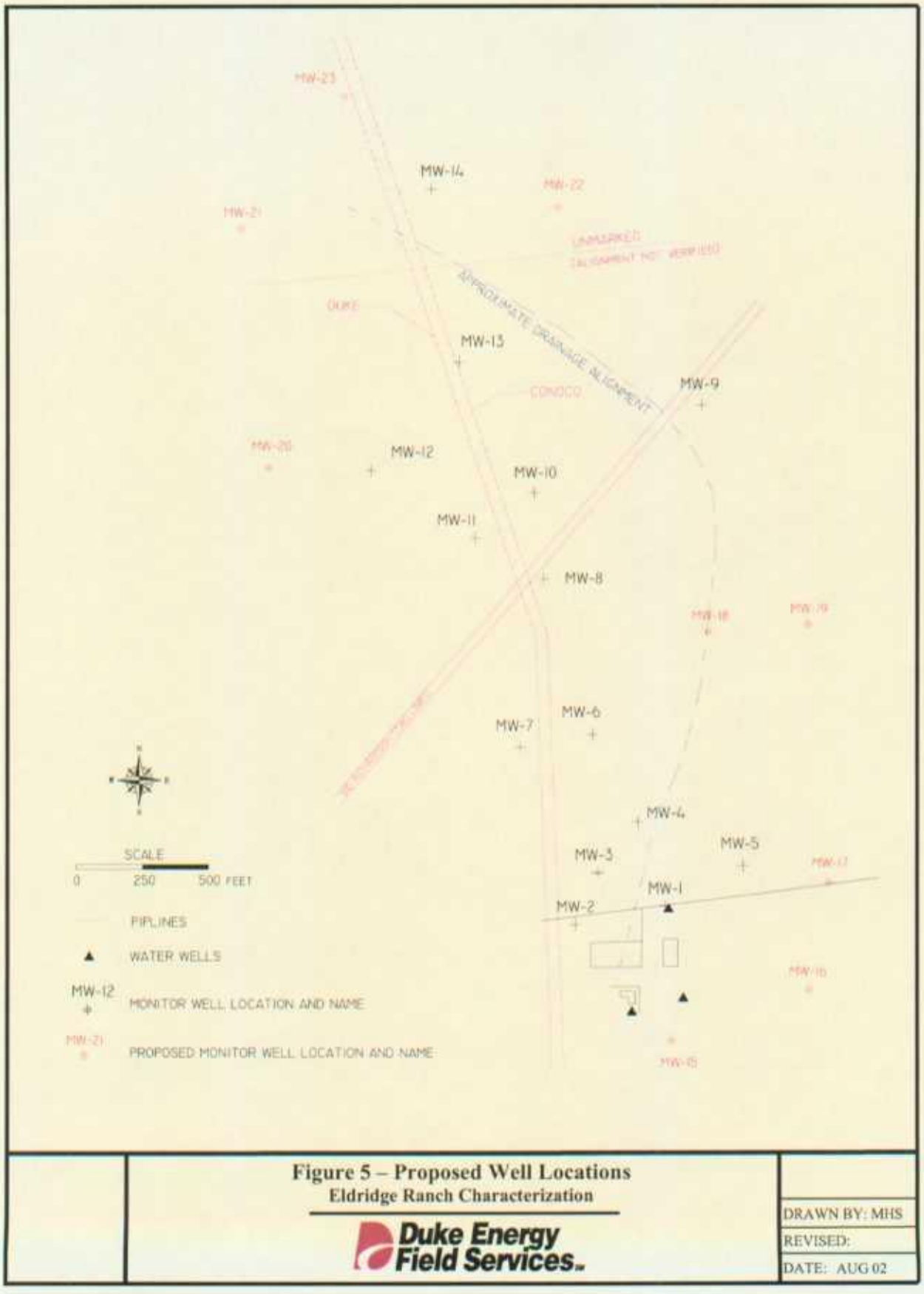

Figure 5 – Proposed Well Locations
Eldridge Ranch Characterization

Duke Energy Field Services

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DATE: AUG 02