AP - 49

# STAGE 1 & 2 WORKPLANS

DATE:

March 23, 2004

*Highlander Environmental Corp.*

*Midland, Texas*

CERTIFIED MAIL
RETURN RECIEPT NO. 7004 2510 0001 1869 2020

March 23, 2004

Mr. Wayne Price
New Mexico Energy, Minerals, & Natural Resources
Oil Conservation Division, Environmental Bureau
1220 S. St. Francis Drive
Santa Fe, New Mexico 87504

RE: **CORRECTIVE ACTION PLAN (CAP)**
**Justis Saltwater Disposal System (SWD) Site Well #H-2**
**Unit H, Section 2, T-26-S, R-37-E, Lea County, New Mexico**
**NMOCD CASE #1R0423-01**

Mr. Price:

RICE Operating Company (ROC) has retained Highlander Environmental Corp (Highlander) to address potential environmental concerns at the above-referenced site. ROC is the service provider (operator) for the Justis SWD System (System) and has no ownership of any portion of the pipeline, well, or facility. The System is owned by a consortium of oil producers, System Partners, who provide all operating capital on a percentage ownership/usage basis. Environmental projects of this magnitude require System Partner AFE approval and work begins as funds are received. In general, project funding is not forthcoming until NMOCD approves the work plan. Therefore, your timely review of this submission is requested.

For all environmental projects, ROC will choose a path forward that:

- protects public health,
- provides the greatest net environmental benefit,
- complies with NMOCD Rules, and
- is supported by good science.

Each site shall have three submissions or a combination of:

1. An Investigation and Characterization Plan (ICP) is a proposal for data gathering and site characterization and assessment.

2. Upon evaluating the data and results from the ICP, a recommended remedy is submitted in this Corrective Action Plan (CAP).

3. Finally, after implementing the remedy, a Closure Report with final documentation will be submitted.

## 1.0 BACKGROUND & PREVIOUS WORK

Tank replacement activities began at the Justis H-2 SWD facility in November 2001 and are complete. During the replacement, soil samples were taken, and the sample results prompted the placement of monitor wells. In January 2002, Rice installed three monitor wells to evaluate groundwater in the vicinity of the H-2 injection facility. Originally, two monitor wells, MW-1 and MW-2 showed elevated chloride levels. After several quarterly sampling events, MW-2 continued to show elevated chloride levels. As a result, Rice installed two additional monitor wells in February 2004. The wells have been sampled on a quarterly basis since 2002.

## 2.0 RESULTS OF FIELD PROGRAMS & INVESTIGATIONS

As detailed in the most recently submitted annual summary report dated March 21, 2005, the general hydraulic gradient appears to be consistently towards the north-northwest in the vicinity of this facility. Chloride concentrations from monitor wells MW-1, MW-3, MW-4 and MW-5 were all below the New Mexico Water Quality Control Commission (WQCC) standards of 250 mg/L during the last two quarters of 2004. Only MW-2 exceeded the WQCC standard for all four quarters, with chloride concentrations ranging from 1130 mg/L to 2570 mg/L. Benzene levels in all of the monitor wells have fluctuated between near or slightly above WQCC standards to below method detection limits for the past several quarterly sampling events. No Phase-Separated Hydrocarbon (PSH) has ever been observed in any of the monitor wells.

Hydrographs representing fluctuations in groundwater levels and benzene concentration graphs were prepared for all of the monitoring wells and are included in annual summary report. The hydrographs of all monitor wells show a general decline in water levels in the past four quarters, although throughout this period there has been significant precipitation. Benzene levels have fluctuated up and down during this decline and do not show a distinct correlation between water level and benzene concentration at this time. Chloride levels have been consistently elevated in MW-2.

## 3.0 EVALUATION

When evaluating any proposed remedy or investigative work, ROC will confirm that there is a reasonable relationship between the benefits created by the proposed remedy or assessment and the economic and social costs. In evaluating the documented levels of impact versus a beneficial use of the groundwater, it was determined that if the dissolved phase hydrocarbons were remediated to below the New Mexico WQCC standards, the water quality would be of adequate quality to be provided for livestock watering purposes.

## 4.0 PROPOSED REMEDY

The proposed remedy for this site is a low-flow pump and treat system, with a beneficial end use for livestock consumption. Water will be pumped out of MW-2, historically the primary well impacted with both chloride and benzene above the WQCC standards. The well will be pumped at a rate not to exceed 3 gallons per minute. The water produced will be passed through

a hydrocarbon treatment process and piped to an above-ground stock tank for livestock consumption. The system will be monitored for the constituents of concern (COC) to ensure hydrocarbon levels remain below the WQCC standards and chloride and total dissolved solid levels do not exceed livestock consumption parameters. The sample analysis will be included in the quarterly monitoring reports.

Highlander will continue to monitor and sample the monitor wells on a quarterly basis. As more data is gathered, groundwater evaluation will continue. The NMOCD will be notified of all significant events pertaining to the implementation of this CAP. Should you have any questions, please contact me at (432) 682-4559. Your prompt review of this submission is appreciated. Thank you for your attention to this matter.

Highlander Environmental Corp.

Tim Reed

Timothy M. Reed, P.G.
Vice President

cc: CDH, KFP, file
Enclosures: site maps, data tables, 2004 groundwater gradient maps, photos

# FIGURES

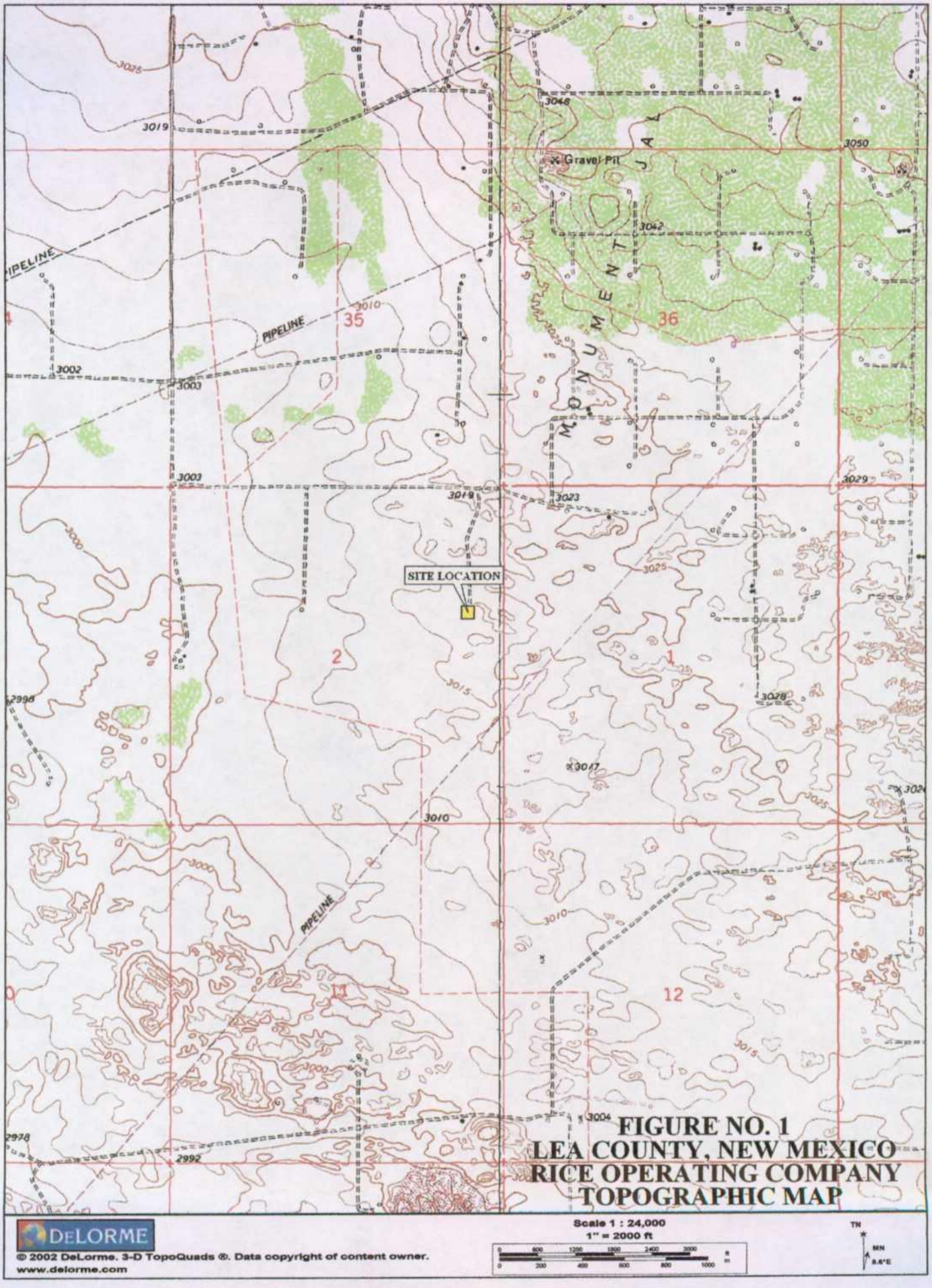


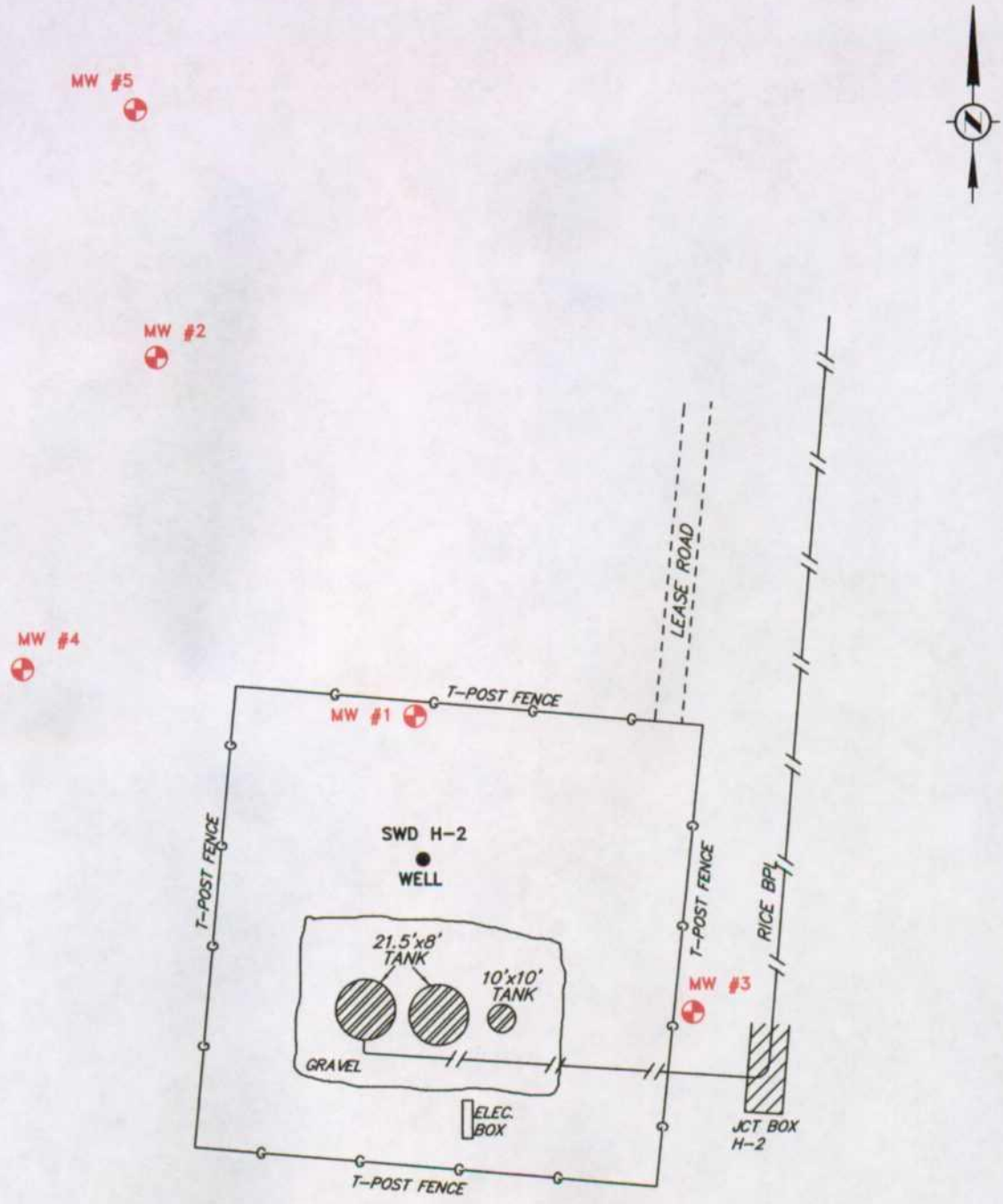

**FIGURE NO. 1**
**LEA COUNTY, NEW MEXICO**
**RICE OPERATING COMPANY**
**TOPOGRAPHIC MAP**

DeLORME



Scale 1 : 24,000
1" = 2000 ft

TN
MN
8.6°E




| WELL# | ELEVATION |
|---|---|
| MW #1 | 3023.52' |
| MW #2 | 3023.03' (TOP STEEL LID), 3022.83' (TOC) |
| MW #3 | 3020.13' (TOP BRASS CAP) |
| MW #4 | 3023.17' |
| MW #5 | 3021.08' |

MONITOR WELL LOCATION

SCALE: 1"=60'

60 0 60

FIGURE NO. 2

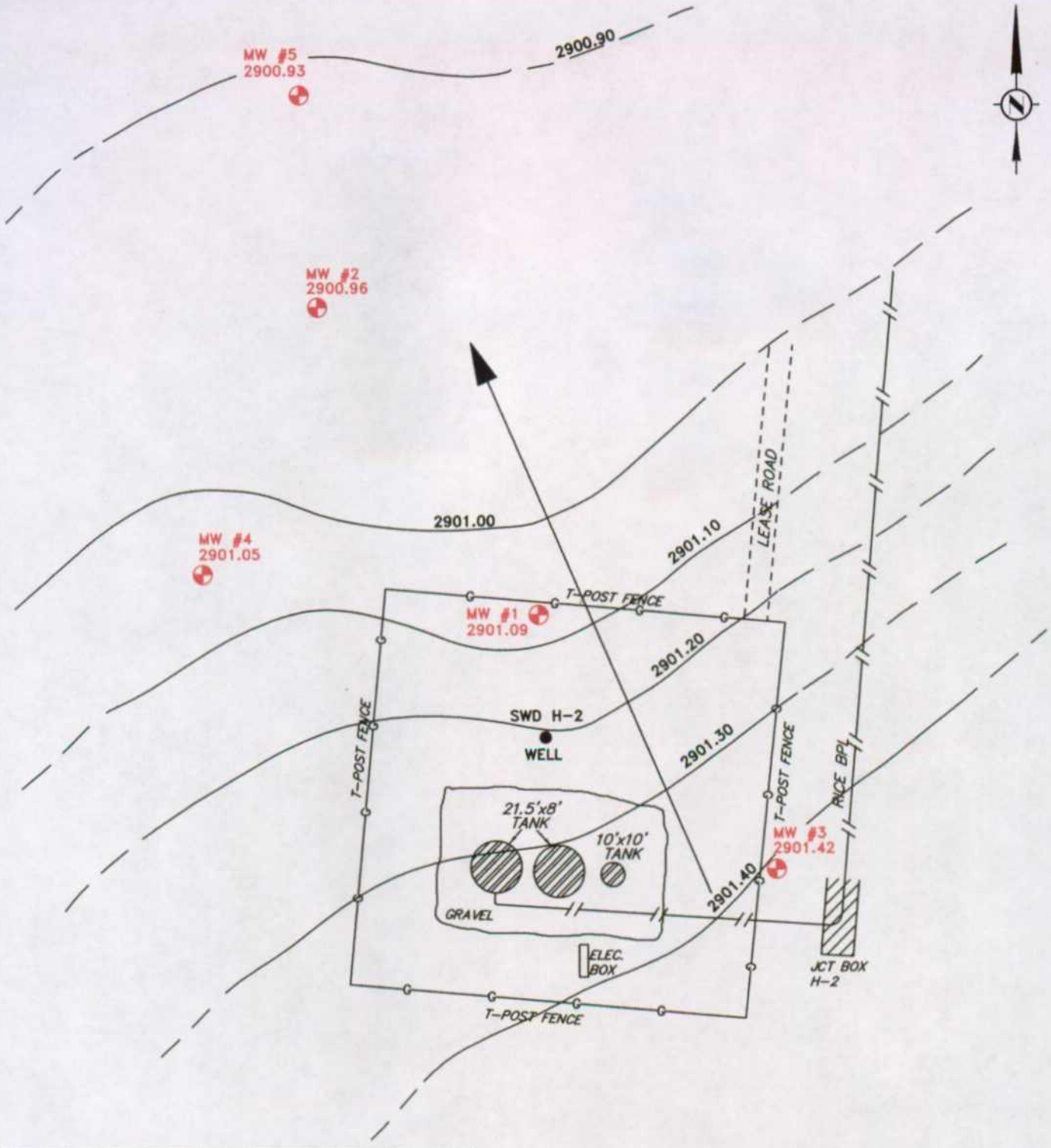
LEA COUNTY, NEW MEXICO

RICE OPERATING COMPANY

SITE MAP

*HIGHLANDER ENVIRONMENTAL CORP.*
*MIDLAND, TEXAS*

DATE: 4/30/04
DWG. BY: JJ
FILE: C:\RICE\SITE MAP JUSTIS




| WELL# | ELEVATION |
|---|---|
| MW #1 | 3023.52' |
| MW #2 | 3023.03' (TOP STEEL LID), 3022.83' (TOC) |
| MW #3 | 3020.13' (TOP BRASS CAP) |
| MW #4 | 3023.17' |
| MW #5 | 3021.08' |

MONITOR WELL LOCATION

SCALE: 1"=60'

60 0 60

FIGURE NO. 3

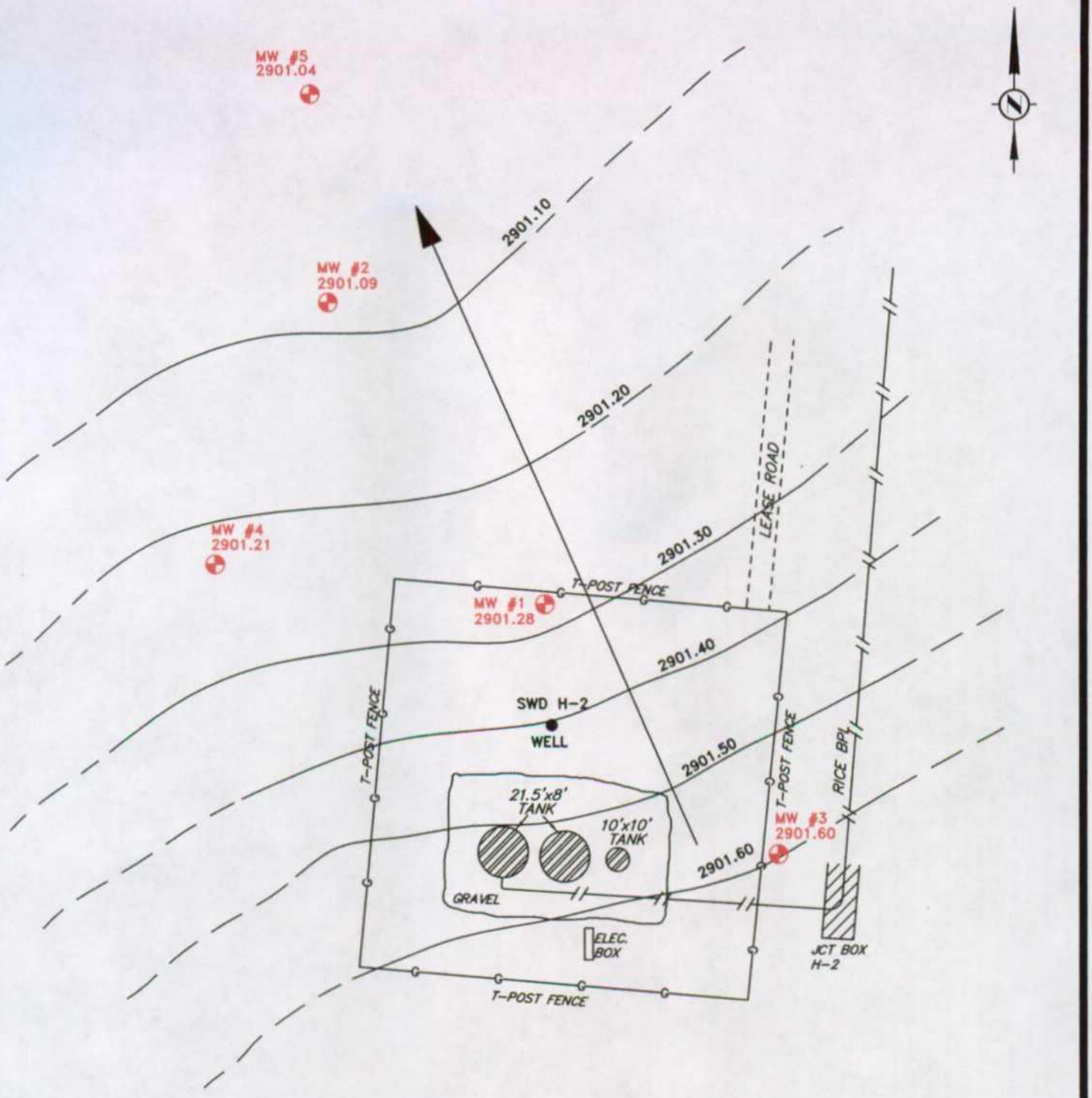
LEA COUNTY, NEW MEXICO

RICE OPERATING COMPANY

3/11/04 WATER TABLE MAP

HIGHLANDER ENVIRONMENTAL CORP.
MIDLAND, TEXAS

DATE: 9/13/04
DWG. BY: JJ
FILE: C:\RICE\WTM 3-11 JJSTR




| WELL# | ELEVATION |
|---|---|
| MW #1 | 3023.52' |
| MW #2 | 3023.03' (TOP STEEL LID), 3022.83' (TOC) |
| MW #3 | 3020.13' (TOP BRASS CAP) |
| MW #4 | 3023.17' |
| MW #5 | 3021.08' |

MONITOR WELL LOCATION

SCALE: 1"=60'

60 0 60

FIGURE NO. 4

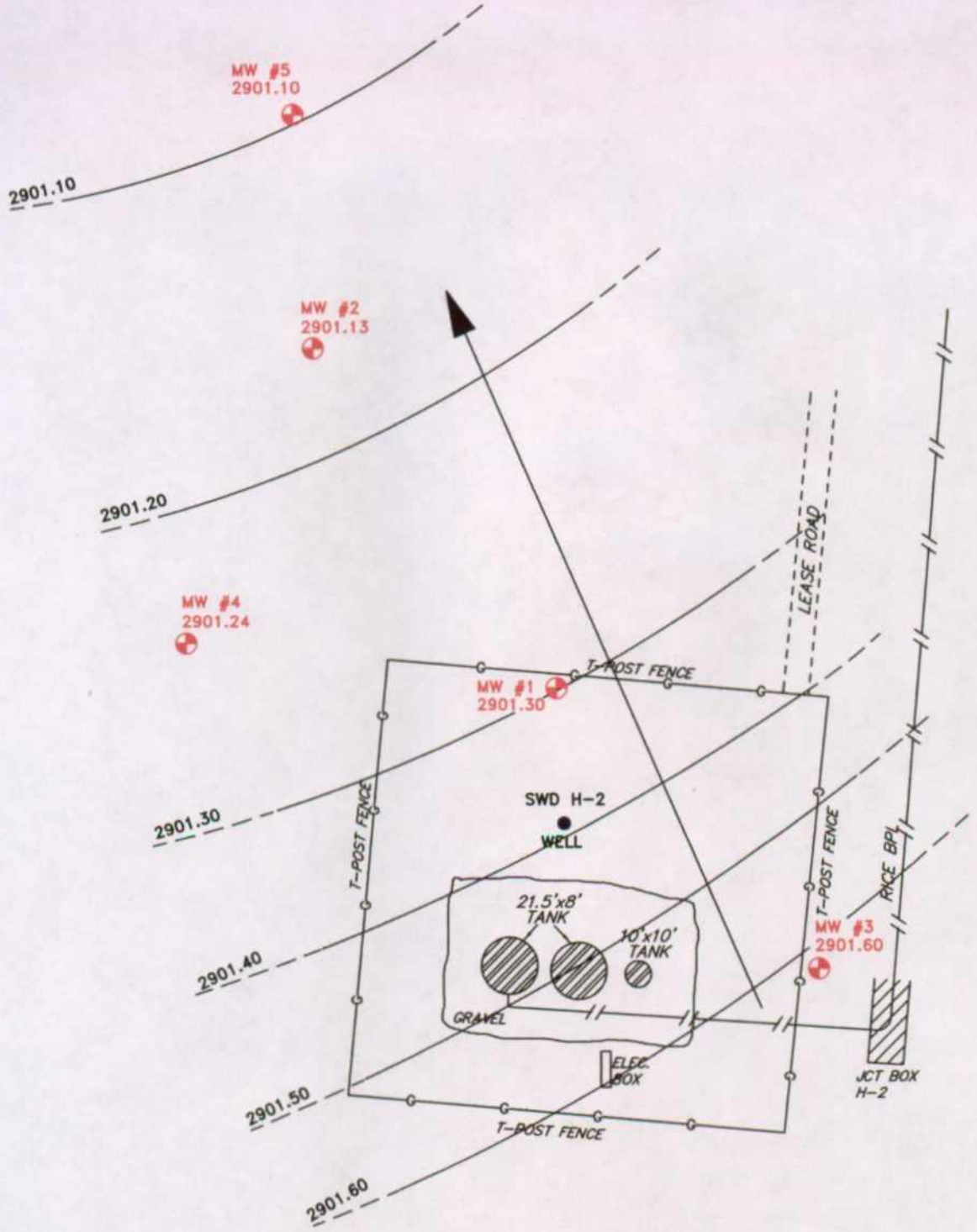
LEA COUNTY, NEW MEXICO

RICE OPERATING COMPANY

6/28/04 WATER TABLE MAP

HIGHLANDER ENVIRONMENTAL CORP.
MIDLAND, TEXAS

DATE: 9/13/04
DWG. BY: JJ
FILE: C:\RICE\WTM 6-28 JUSTIS




| WELL# | ELEVATION |
|---|---|
| MW #1 | 3023.52' |
| MW #2 | 3023.03' (TOP STEEL LID), 3022.83' (TOC) |
| MW #3 | 3020.13' (TOP BRASS CAP) |
| MW #4 | 3023.17' |
| MW #5 | 3021.08' |

MONITOR WELL LOCATION

SCALE: 1"=60'

60 0 60

FIGURE NO. 5

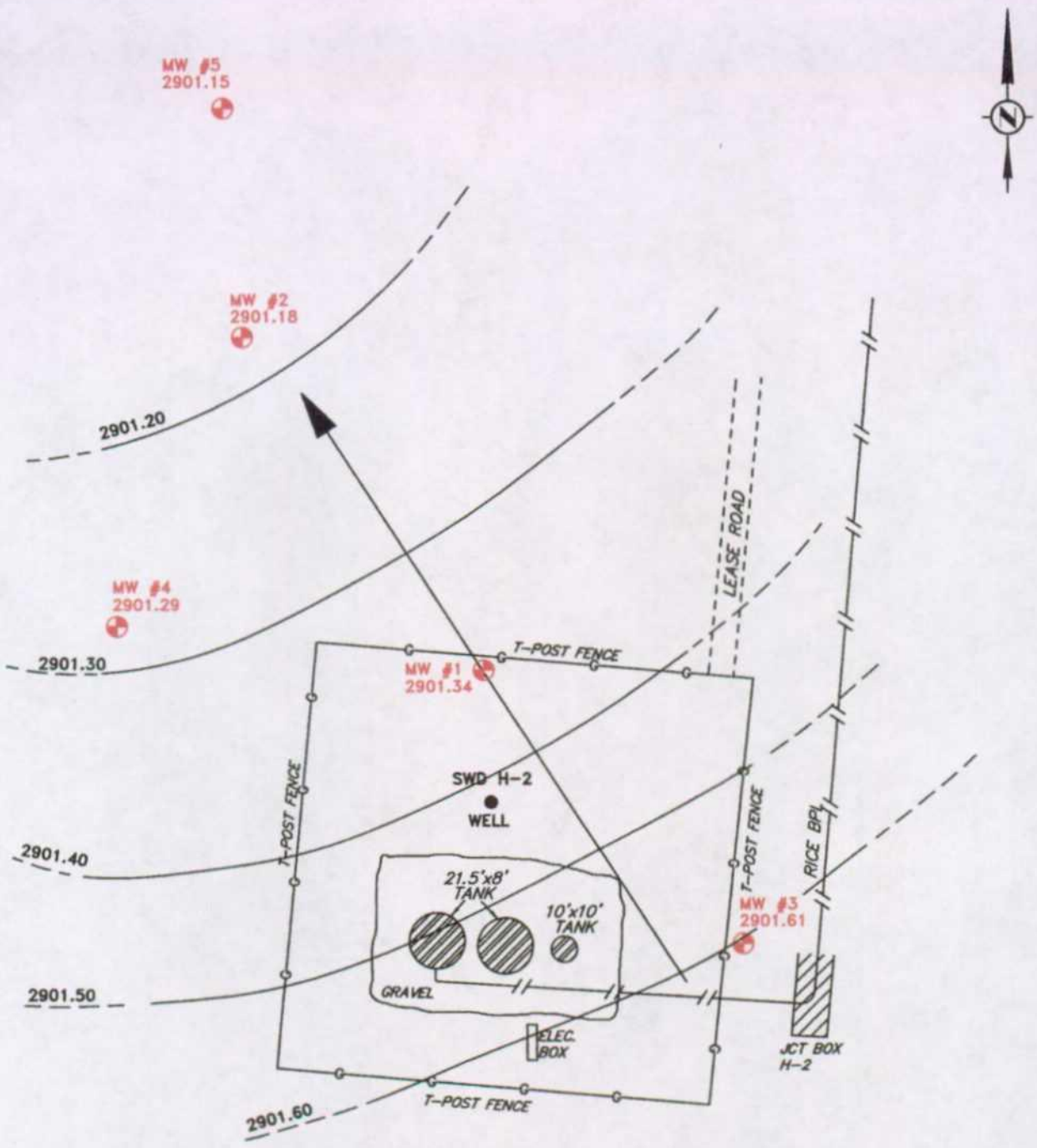
LEA COUNTY, NEW MEXICO

RICE OPERATING COMPANY

9/18/04 WATER TABLE MAP

*HIGHLANDER ENVIRONMENTAL CORP.*
*MIDLAND, TEXAS*

DATE: 10/29/04
DWG. BY: JJ
FILE: C:\RICE\MW 9-04 JJ.STR




| WELL# | ELEVATION |
|---|---|
| MW #1 | 3023.52' |
| MW #2 | 3023.03' (TOP STEEL LID), 3022.83' (TOC) |
| MW #3 | 3020.13' (TOP BRASS CAP) |
| MW #4 | 3023.17' |
| MW #5 | 3021.08' |

MONITOR WELL LOCATION

SCALE: 1"=60'

60 0 60

FIGURE NO. 6

LEA COUNTY, NEW MEXICO

RICE OPERATING COMPANY

12/21/04 WATER TABLE MAP

HIGHLANDER ENVIRONMENTAL CORP.
MIDLAND, TEXAS

DATE: 3/11/05
DWG. BY: JJ
FILE: C:\RICE\WTM 12-04

# TABLES

## Table 1

**Rice Operating Co.**
**Justis SWD #H-2**
**Sample Analysis**

| MW# | Sample Date | Total Depth (TOC) (feet) | Depth to Water (TOC) (feet) | Purge Volume (gallons) |
|---|---|---|---|---|
| MW-1 | 8/16/2002 | 137 | 116.20 | 66 |
| | 11/12/2002 | 144* | 123.32 | 60 |
| | 2/13/2003 | 144* | 122.95 | 70 |
| | 5/20/2003 | 144* | 123.34 | 70 |
| | 9/16/2003 | 144* | 122.94 | 70 |
| | 12/16/2003 | 144* | 123.19 | 70 |
| | 3/11/2004 | 144* | 122.43 | 70 |
| | 6/28/2004 | 144* | 122.24 | 70 |
| | 9/23/2004 | 144* | 122.22 | 70 |
| | 12/21/2004 | 144* | 122.18 | 68 |
| MW-2 | 8/16/2002 | 142 | 121.85 | 25 |
| | 11/12/2002 | 142 | 122.10 | 25 |
| | 2/13/2003 | 142 | 121.71 | 25 |
| | 5/20/2003 | 142 | 122.08 | 25 |
| | 9/16/2003 | 142 | 121.70 | 25 |
| | 12/16/2003 | 142 | 122.00 | 30 |
| | 3/11/2004 | 142 | 121.87 | 30 |
| | 6/28/2004 | 142 | 121.74 | 30 |
| | 9/23/2004 | 142 | 121.70 | 25 |
| | 12/21/2004 | 142 | 121.65 | 10 |
| MW-3 | 8/16/2003 | 133 | 118.68 | 20 |
| | 11/12/2002 | 133 | 118.90 | 25 |
| | 2/13/2003 | 133 | 118.53 | 25 |
| | 5/20/2003 | 133 | 118.87 | 25 |
| | 9/16/2003 | 133 | 118.53 | 25 |
| | 12/16/2003 | 133 | 118.79 | 30 |
| | 3/11/2004 | 133 | 118.71 | 30 |
| | 6/28/2004 | 133 | 118.53 | 30 |
| | 9/23/2004 | 133 | 118.52 | 25 |
| | 12/21/2004 | 133 | 118.52 | 7 |
| MW-4 | 3/11/2004 | 137 | 122.12 | 30 |
| | 6/28/2004 | 137 | 121.96 | 30 |
| | 9/23/2004 | 137 | 121.93 | 25 |
| | 12/21/2004 | 137 | 121.88 | 8 |
| MW-5 | 3/11/2004 | 135 | 120.15 | 30 |
| | 6/28/2004 | 135 | 120.04 | 30 |
| | 9/23/2004 | 135 | 119.98 | 25 |
| | 12/21/2004 | 135 | 119.93 | 8 |

* Denotes new TD measurement due to monitor well pipe extension

**Table 2**
**Rice Operating Co.**
**Justis SWD #H-2**
**Sample Analysis (in mg/L)**

| MW# | Sample Date | Chloride | TDS | Benzene | Toluene | Ethyl Benzene | Total Xylenes |
|---|---|---|---|---|---|---|---|
| MW-1 (5") | 3/1/2002 | 301 | 971 | - | - | - | - |
| | 6/10/2002 | 173 | - | 0.001 | 0.008 | 0.01 | 0.066 |
| | 8/16/2002 | 111 | 619 | <0.001 | <0.001 | <0.001 | <0.001 |
| | 11/12/2002 | 257 | 971 | <0.001 | 0.001 | <0.001 | <0.001 |
| | 2/13/2003 | 97.5 | 647 | <0.001 | <0.001 | <0.001 | <0.001 |
| | 5/20/2003 | 102 | 682 | <0.001 | <0.001 | <0.001 | <0.001 |
| | 9/16/2003 | 594 | 1920 | <0.001 | <0.001 | <0.001 | <0.001 |
| | 12/16/2003 | 81.5 | 587 | 0.013 | <0.001 | <0.001 | <0.001 |
| | 3/11/2004 | 727 | 2060 | <0.001 | <0.001 | <0.001 | <0.001 |
| | 6/28/2004 | 1030 | 3230 | 0.0056 | <0.001 | <0.001 | <0.001 |
| | 9/23/2004 | 106 | 749 | <0.001 | <0.001 | <0.001 | <0.001 |
| | 12/21/2004 | 93.1 | 858* | <0.001 | <0.001 | <0.001 | 0.00108 |
| MW-2 | 3/1/2002 | 700 | 1780 | - | - | - | - |
| | 5/23/2002 | 904 | 2710 | <0.001 | <0.001 | <0.001 | <0.001 |
| | 8/16/2002 | 1040 | 3390 | <0.001 | <0.001 | <0.001 | <0.001 |
| | 11/12/2002 | 1130 | 2600 | 0.002 | 0.003 | <0.001 | <0.002 |
| | 2/13/2003 | 1110 | 2780 | <0.001 | <0.001 | <0.001 | <0.001 |
| | 5/20/2003 | 1130 | 3600 | <0.001 | <0.001 | <0.001 | <0.001 |
| | 9/16/2003 | 1070 | 3540 | <0.001 | <0.001 | <0.001 | <0.001 |
| | 12/16/2003 | 1230 | 2490 | 0.032 | 0.003 | <0.001 | <0.001 |
| | 3/11/2004 | 1200 | 3660 | <0.001 | <0.001 | <0.001 | <0.001 |
| | 6/28/2004 | 2570 | 6290 | 0.0112 | <0.001 | <0.001 | <0.001 |
| | 9/23/2004 | 1130 | 3760 | <0.001 | <0.001 | <0.001 | <0.001 |
| | 12/21/2004 | 1150 | 2877* | 0.0055 | <0.001 | <0.001 | <0.001 |
| MW-3 | 3/1/2002 | 37.2 | 561 | - | - | - | - |
| | 5/16/2002 | 35.4 | 570 | <0.001 | <0.001 | <0.001 | <0.001 |
| | 8/16/2002 | 93.1 | 631 | <0.001 | <0.001 | <0.001 | <0.001 |
| | 11/12/2002 | 97.5 | 688 | 0.030 | 0.014 | 0.002 | 0.003 |
| | 2/13/2003 | 102 | 666 | <0.001 | <0.001 | <0.001 | <0.001 |
| | 5/20/2003 | 168 | 885 | <0.001 | <0.001 | <0.001 | <0.001 |
| | 9/16/2003 | 204 | 568 | <0.001 | <0.001 | <0.001 | <0.001 |
| | 12/16/2003 | 40.8 | 517 | 0.013 | <0.001 | <0.001 | <0.001 |
| | 3/11/2004 | 65 | 666 | <0.001 | <0.001 | <0.001 | <0.001 |
| | 6/28/2004 | 124 | 735 | 0.0124 | <0.001 | <0.001 | <0.001 |
| | 9/23/2004 | 115 | 703 | 0.00113 | <0.001 | <0.001 | <0.001 |
| | 12/21/2004 | 154 | 1057* | 0.0127 | <0.001 | 0.00144 | <0.001 |

NOTE: - denotes not analyzed

**Table 2**
**Rice Operating Co.**
**Justis SWD #H-2**
**Sample Analysis (in mg/L)**

| MW# | Sample Date | Chloride | TDS | Benzene | Toluene | Ethyl Benzene | Total Xylenes |
|---|---|---|---|---|---|---|---|
| MW-4 | 3/1/2002 | - | - | - | - | - | - |
| | 6/10/2002 | - | - | - | - | - | - |
| | 8/16/2002 | - | - | - | - | - | - |
| | 11/12/2002 | - | - | - | - | - | - |
| | 2/13/2003 | - | - | - | - | - | - |
| | 5/20/2003 | - | - | - | - | - | - |
| | 9/16/2003 | - | - | - | - | - | - |
| | 12/16/2003 | - | - | - | - | - | - |
| | 3/11/2004 | 35.4 | 610 | <0.001 | <0.001 | <0.001 | <0.001 |
| | 6/28/2004 | 57.6 | 596 | 0.00749 | <0.001 | <0.001 | <0.001 |
| | 9/23/2004 | 53.2 | 648 | <0.001 | <0.001 | <0.001 | <0.001 |
| | 12/21/2004 | 59.1 | 865* | 0.00275 | <0.001 | <0.001 | <0.001 |
| MW-5 | 3/1/2002 | - | - | - | - | - | - |
| | 5/23/2002 | - | - | - | - | - | - |
| | 8/16/2002 | - | - | - | - | - | - |
| | 11/12/2002 | - | - | - | - | - | - |
| | 2/13/2003 | - | - | - | - | - | - |
| | 5/20/2003 | - | - | - | - | - | - |
| | 9/16/2003 | - | - | - | - | - | - |
| | 12/16/2003 | - | - | - | - | - | - |
| | 3/11/2004 | 195 | 894 | <0.001 | <0.001 | <0.001 | <0.001 |
| | 6/28/2004 | 310 | 1130 | 0.0105 | <0.001 | 0.00108 | <0.001 |
| | 9/23/2004 | 160 | 792 | <0.001 | <0.001 | <0.001 | <0.001 |
| | 12/21/2004 | 165 | 1072* | 0.00292 | <0.001 | <0.001 | <0.001 |

NOTE: - denotes not analyzed

# PHOTOGRAPHS

Looking South Toward Facility.

Looking North from MW-4.

Looking South From MW-5, Toward Facility.