

AP - 75

**STAGE 1 & 2
WORKPLANS**

DATE:
4-17-12

Hansen, Edward J., EMNRD

From: Laura Pena <lpena@riceswd.com>
Sent: Thursday, May 03, 2012 10:07 AM
To: Hansen, Edward J., EMNRD
Cc: Hack Conder; Katie Jones; L Peter Galusky Jr
Subject: BD J-26 (AP-75) Project Update Addendum
Attachments: BD J-26 - Proposed MW-4.jpg

Mr. Hansen,

The following is an Addendum to the BD J-26 (AP-75) Project Update report submitted to the NMOCD on April 17, 2012.

Page 2, paragraph 3: *Proposed Path Forward*; red lettering will be deleted from the paragraph and blue lettering will be added to the paragraph.

"We believe, based on the analyses and results presented here, that the BD J-26 site is no longer a threat to groundwater quality. We therefore propose to ~~cease further sampling from monitor wells MW-1, MW-3 and RW-1 and to plug and abandon these wells~~ install one two inch monitor well upgradient of MW-2 (west) per NMOCD request during the May 1, 2012 meeting between ROC and NMOCD. ~~However,~~ We propose to continue ~~to~~ sampling ~~MW-2~~ on a quarterly basis ~~through 2012~~ and to submit a report to NMOCD with recommendations ~~when ROC has further delineated upgradient water conditions for the best path forward by April 1, 2013.~~ See attached plat for approximate location."

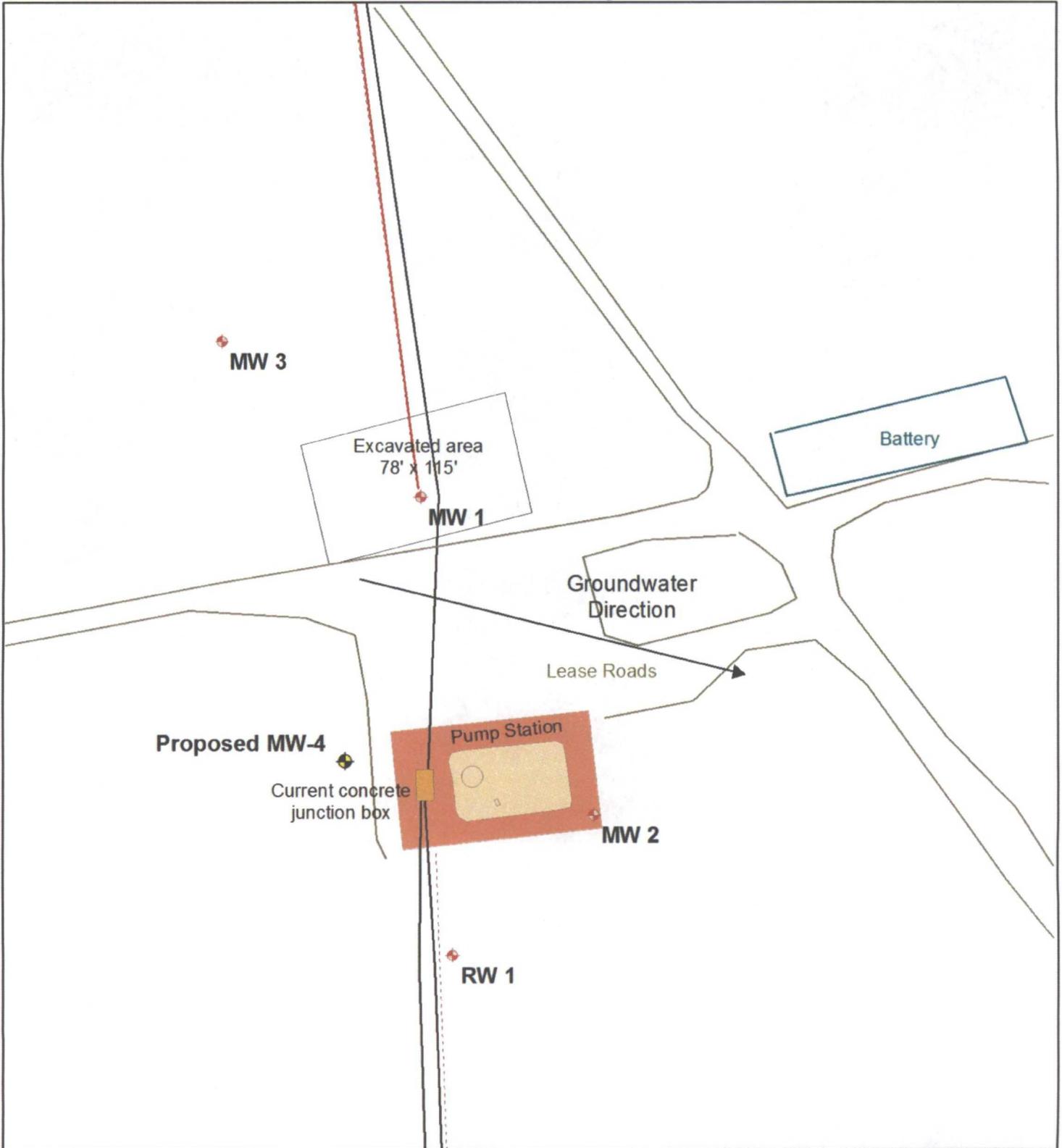
If you have any questions or require any additional information, please contact Hack Conder at (575)631-6432.

Thank you,

Laura Peña

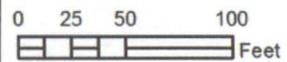
Environmental Project Scientist

Site map



BD J-26

Legals: UL/J sec. 26
T21S R37E
NMOCD Case #: AP-75



Drawing date: 5-2-12
Drafted by: L. Weinheimer

L. Peter Galusky, Jr. Ph.D., P.G.

Texerra LLC

**20055 Laredo Lane Monument, Colorado 80132
Tel: 719-339-6791 E-mail: lpg@texerra.com**

April 17th, 2012

Mr. Edward Hansen

New Mexico Energy, Minerals, & Natural Resources
Oil Conservation Division, Environmental Bureau
1220 S. St. Francis Drive
Santa Fe, New Mexico 87505

RECEIVED

APR 25 2012

RE: Project Update

Rice Operating Company – BD SWD System
BD J-26 T21S, R37E, Sec 26, UL J
NMOCD Case Number: AP-75

Oil Conservation Division
1220 S. St. Francis Drive
Santa Fe, NM 87505

Sent via Certified U.S. Mail w/ Return Receipt No. 7011 0110 0001 5863 4875

Mr. Hansen,

This report is to provide an update of groundwater monitoring results for Rice Operating Company's (ROC's) BD J-26 project near Eunice, New Mexico (Figures 1 & 2) and to propose a path forward for future work.

Groundwater Quality

Groundwater chloride concentrations (Figure 3) in the at-source monitor well (MW-1) have dropped from their measured high values of approximately 4,500 mg/l in 2002 to less than 250 mg/l in August 2004. This is in all likelihood due to the effectiveness of soil remediation work completed in 2002 (Figures 4 & 5) and to natural attenuation (dilution) processes¹. Chloride concentrations in the up-gradient monitor well (MW-3) have ranged between 119 and 172 mg/l since 2003. Chloride concentrations in a southerly well (RW-1) have similarly ranged between 136 and 200 mg/l since its installation in May of 2010. These wells are presumably indicative of the local, baseline groundwater chloride concentrations. It should further be noted that groundwater BTEX concentrations were negligible in MW-1, MW-2 and MW-3 from 2003 through 2006 after which their measurement was suspended. Thus, petroleum hydrocarbons in groundwater have been ruled out as an item of concern for this project.

In contrast, chloride concentrations in a southeasterly located monitor well (MW-2) have risen steadily from less than 250 mg/l in 2003 to 1,380 mg/l in early 2012. Although MW-2 is adjacent to an ROC SWD pump station, this facility was constructed in 2002, lined with a synthetic liner, and no spills or system upsets have been experienced at this facility. The east/southeasterly groundwater gradient (Figure 6) suggests that the source of these chlorides is not from the former junction box (near MW-1), but rather from a more westerly source. This is further supported by historical aerial photographs (Figures 7 - 13) which indicate a severely impacted area to the west/northwest of MW-2 and the ROC SWD pump station.

¹ BD Jct J-26 Amended Stage 2 Abatement Plan. February 26th, 2010.

BD J-26

Residual Unsaturated Zone Chlorides

The area of impact from the operation of the former junction box was excavated and protected by a double clay liner system in 2002 (Figures 4 and 5), where the composite average soil chloride concentration of backfilled soil material is approximately 500 mg/kg (Figure 15).

The MultiMed model was used to determine if residual soil (unsaturated zone) chlorides pose an on-going threat to groundwater quality. Key parameter values used in the model are given in Table 1. The time step option in the model was set to find the maximum concentration, which was estimated (calculated) to be 78 mg/l at 110 yrs. This indicates that the residual soil chlorides encompassed and capped by the double clay liner system should provide adequate protection to prevent substantial leakage of residual unsaturated zone chlorides into the groundwater.

Proposed Path Forward

We believe, based on the analyses and results presented here, that the BD J-26 site is no longer a threat to groundwater quality. We therefore propose to cease further sampling from monitor wells MW-1, MW-3 and RW-1 and to plug and abandon these wells. However, we propose to continue to sample MW-2 on a quarterly basis through 2012 and to submit a report to NMOCD with recommendations for the best path forward by April 1, 2013.

ROC is the service provider (agent) for the BD SWD 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 Parties, who provide all operating capital on a percentage ownership/usage basis.

We appreciate your consideration of this report. Please do not hesitate to contact either Rice Operating Company or myself if you have any questions or need additional information.

Sincerely,



L. Peter Galusky, Jr. Ph.D., P.G.
Principal

Copy: Rice Operating Company
Attachments: Figures and Table

Attachments: Figures and Tables

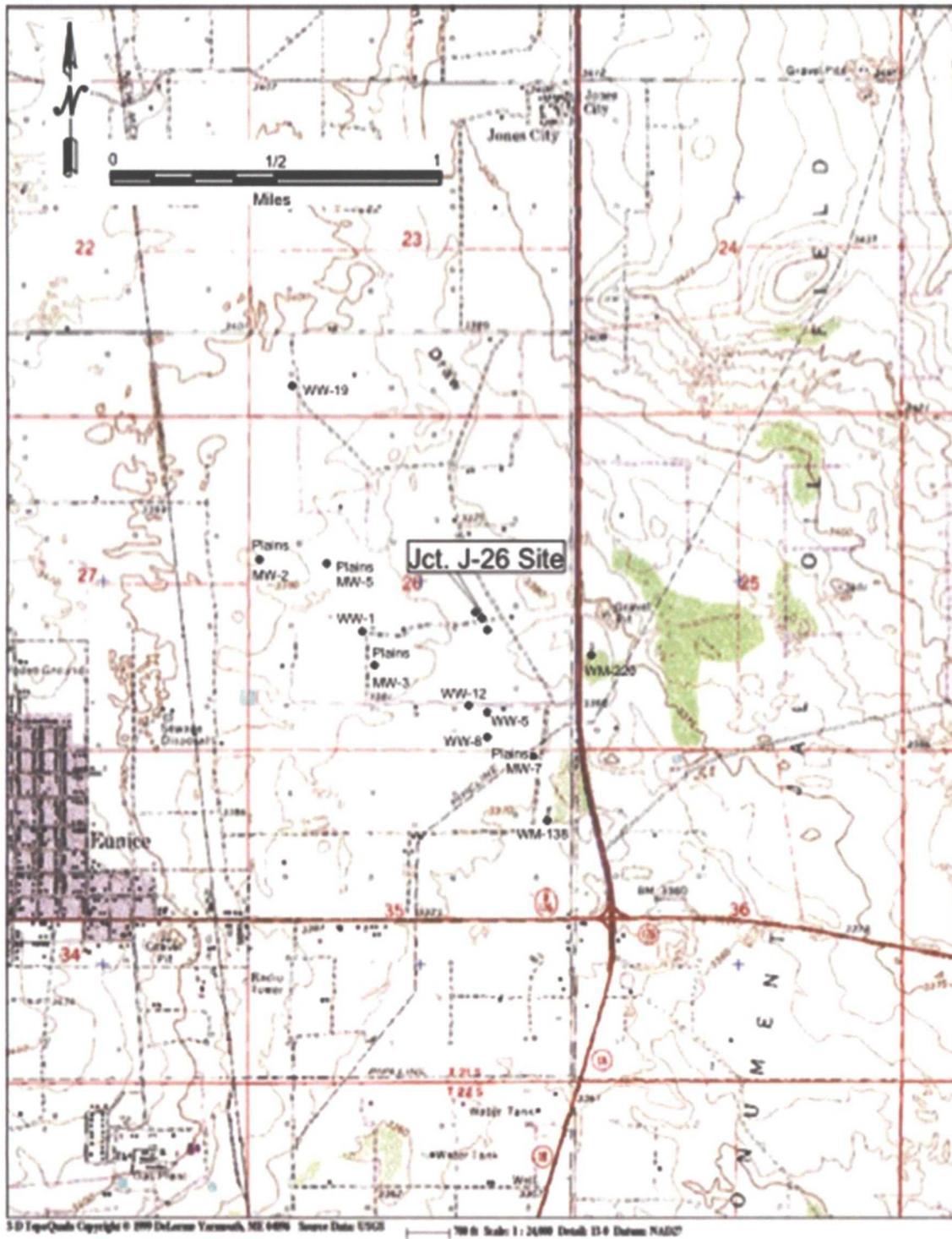


Figure 1 – BD J-26 location.

Site map

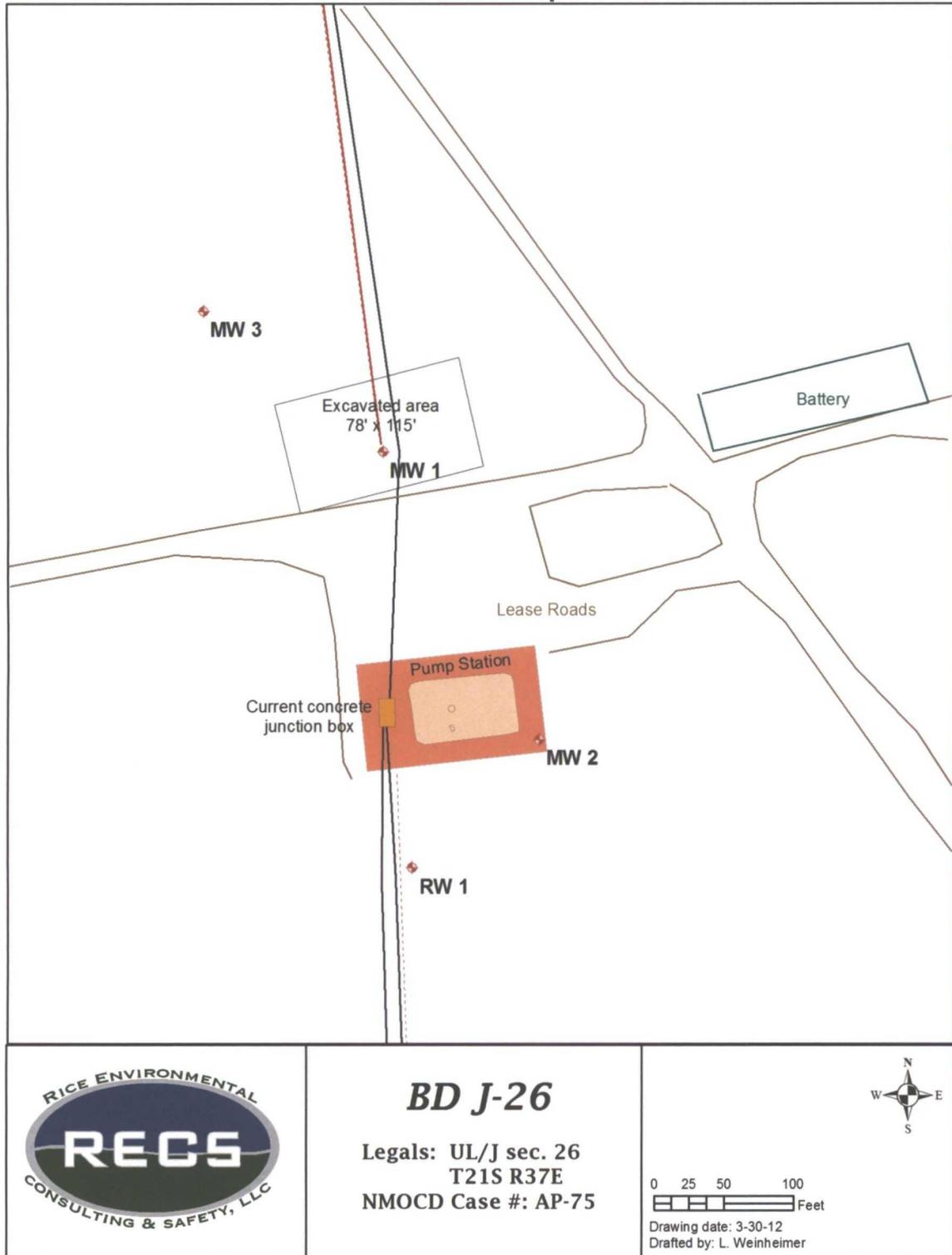


Figure 2 – BD J-26 site layout and monitor well locations. Note that MW-1 is next to the former (since removed) junction box and within the area of contaminated soil removal.

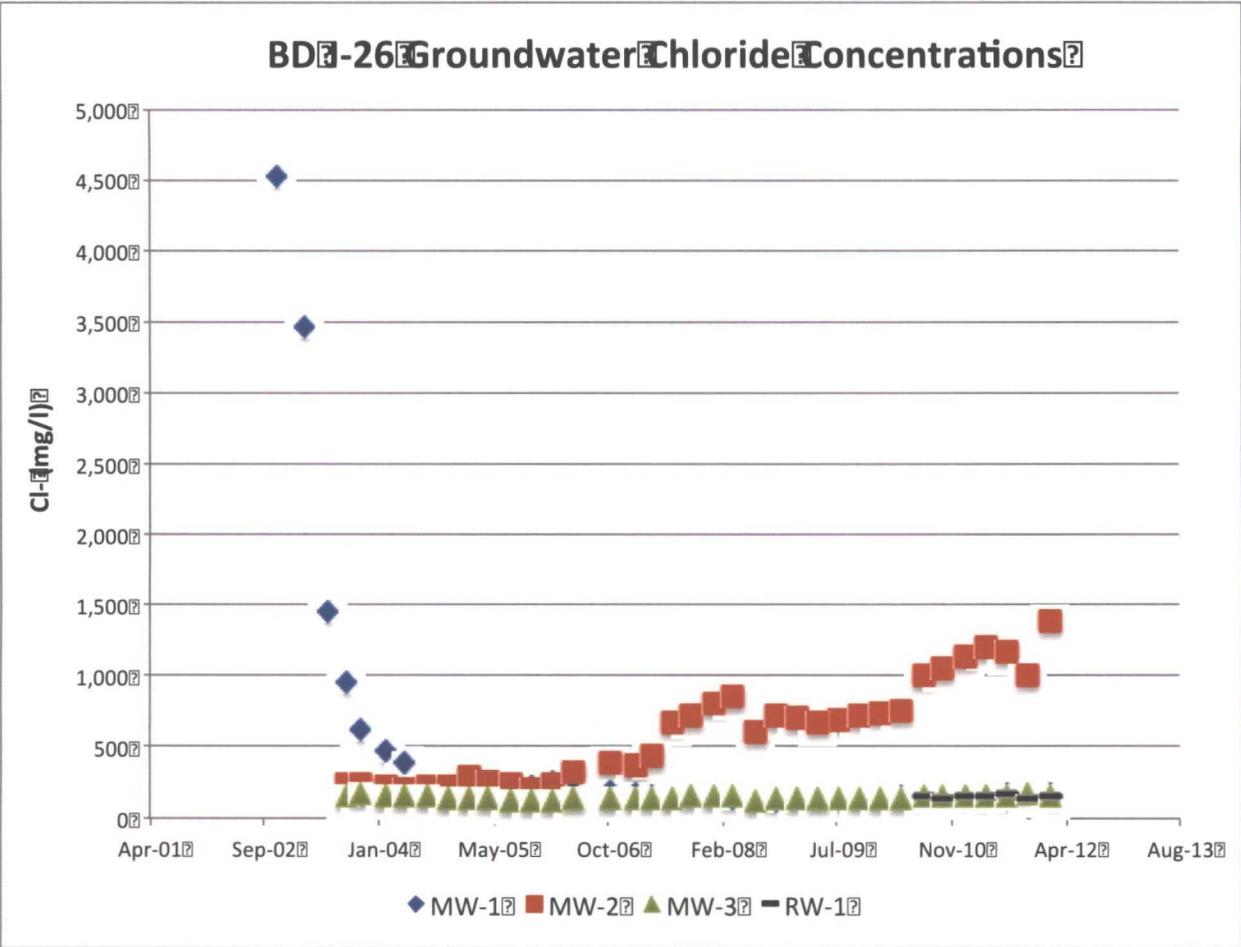


Figure 3 – BD J-26 groundwater chloride concentrations.

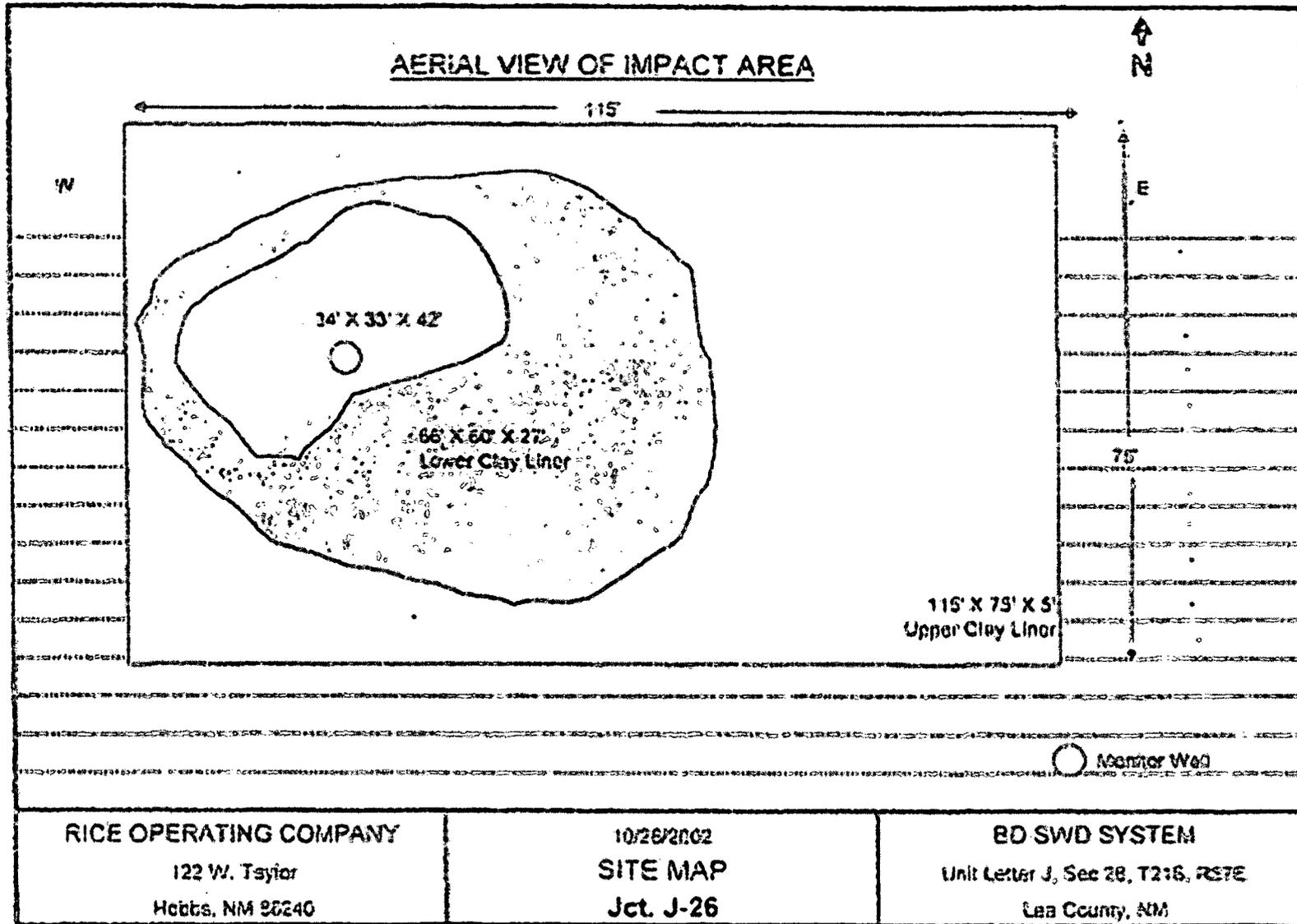


Figure 4- Plan view of cross sectional diagram of excavated soil at BD J-26 in 2002.

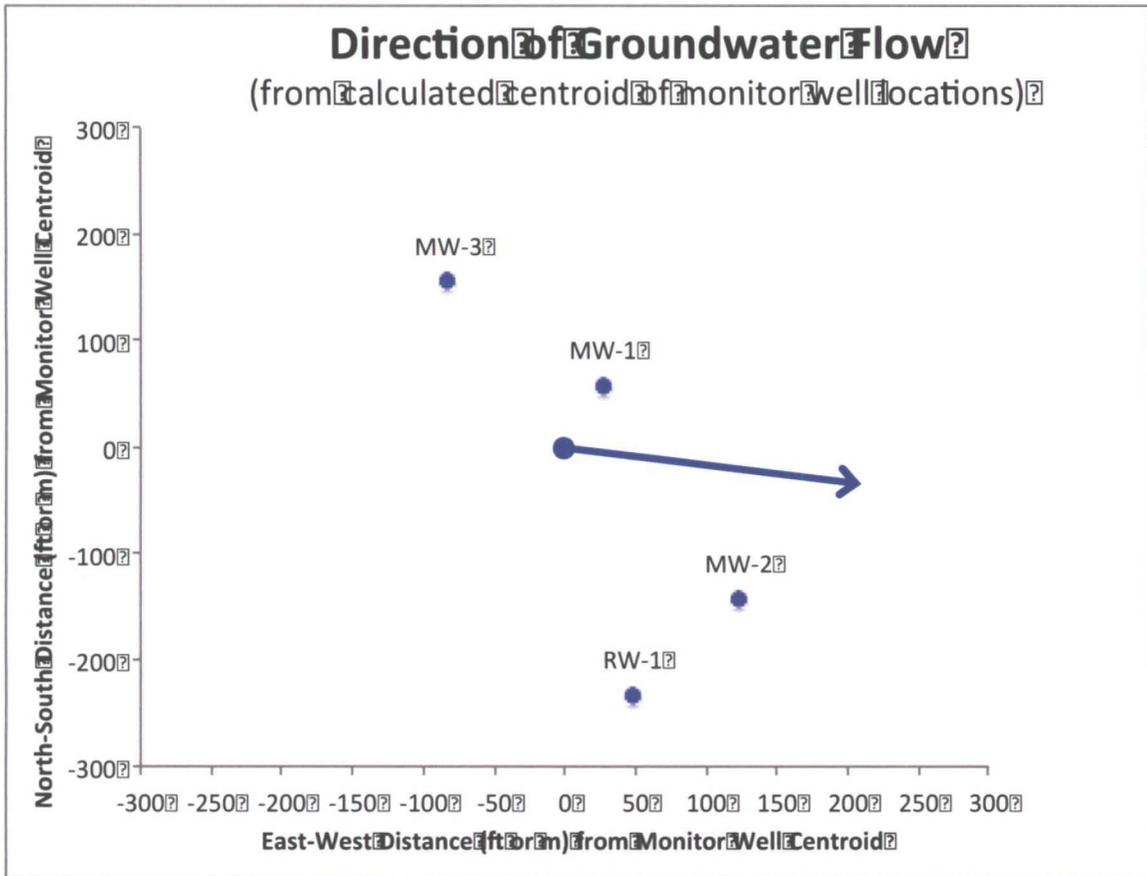


Figure 6 – Calculated average annual groundwater flow directions based on 4 quarterly depth-to-groundwater measurements taken in the respective monitor wells.

1964

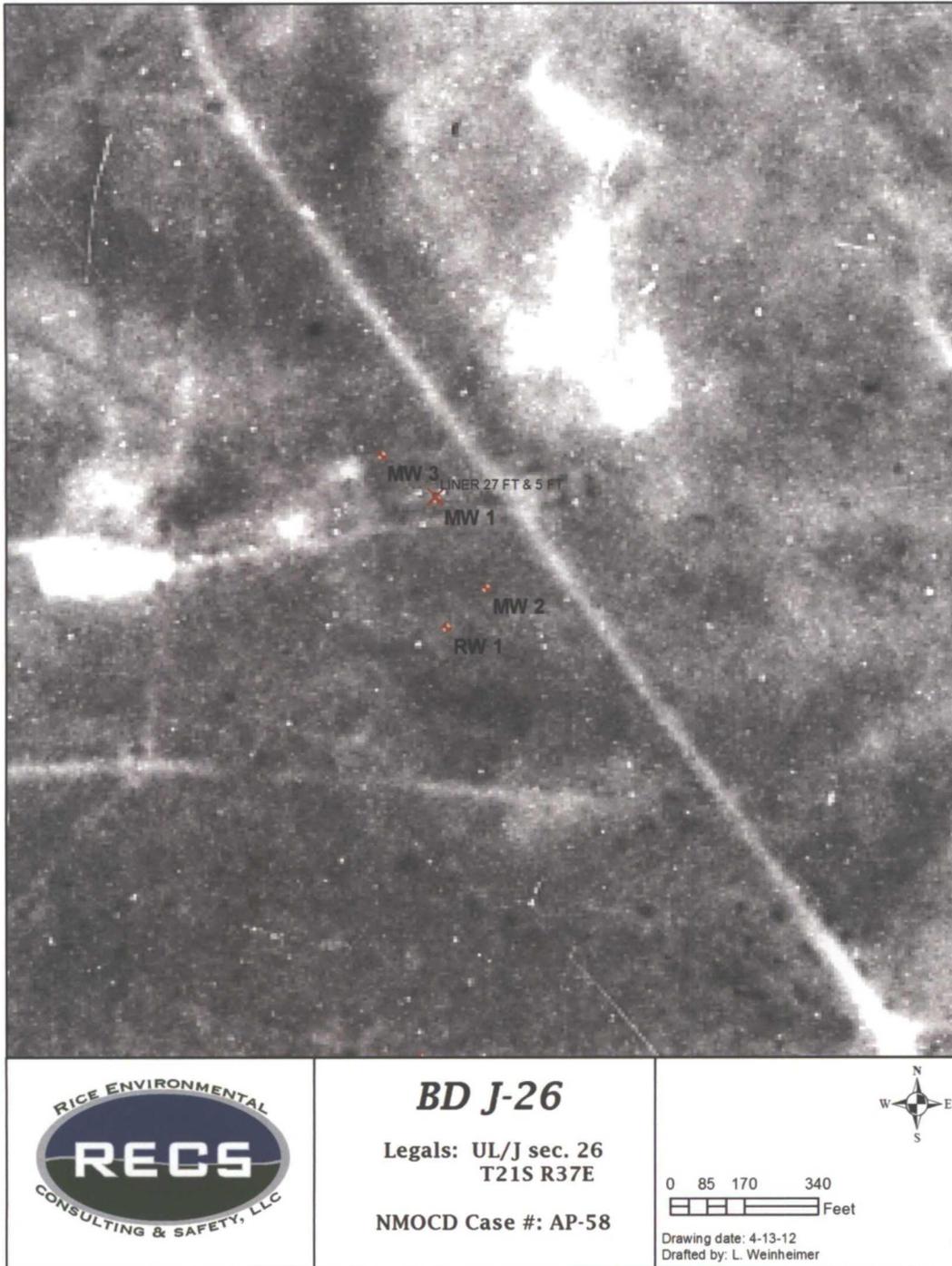


Figure 7 - BD J-26 1964 satellite photograph.

1977

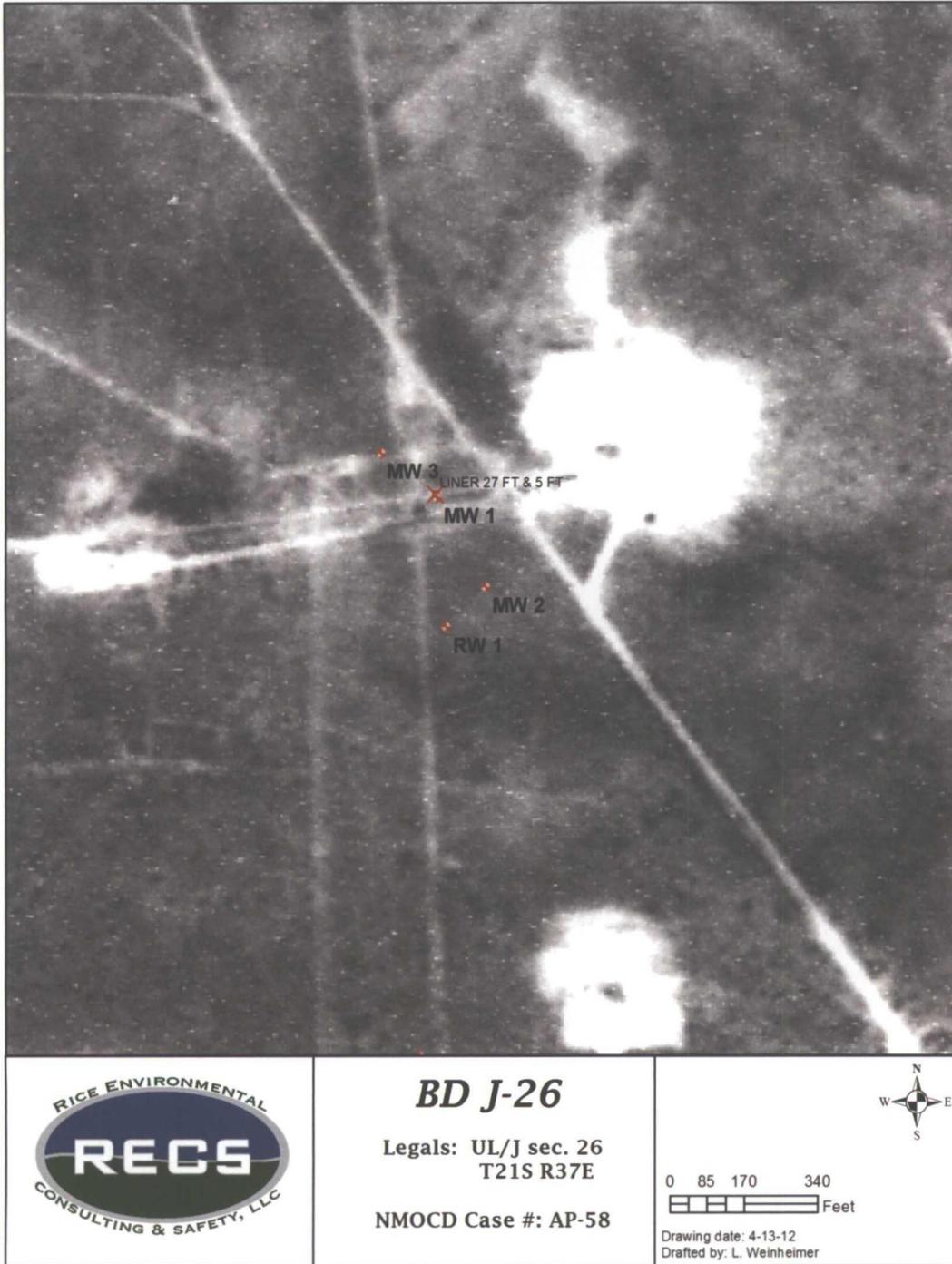


Figure 8 - BD J-26 1977 satellite photograph.

1986



Figure 9 – BD J-26 1986 satellite photograph.

1996

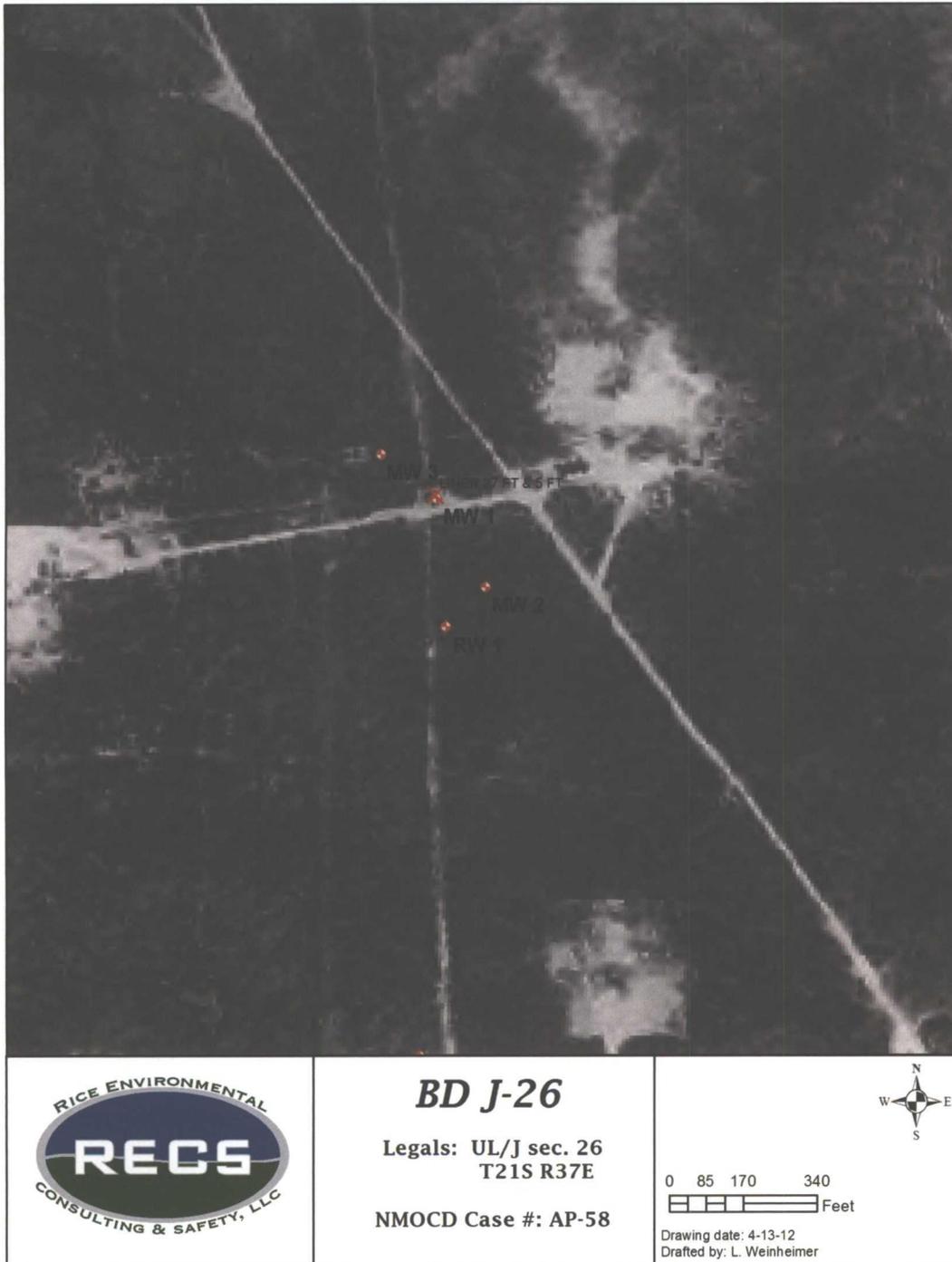


Figure 10 - BD J-26 1996 satellite photograph.

2004



Figure 11 - BD J-26 2004 satellite photograph.

2005

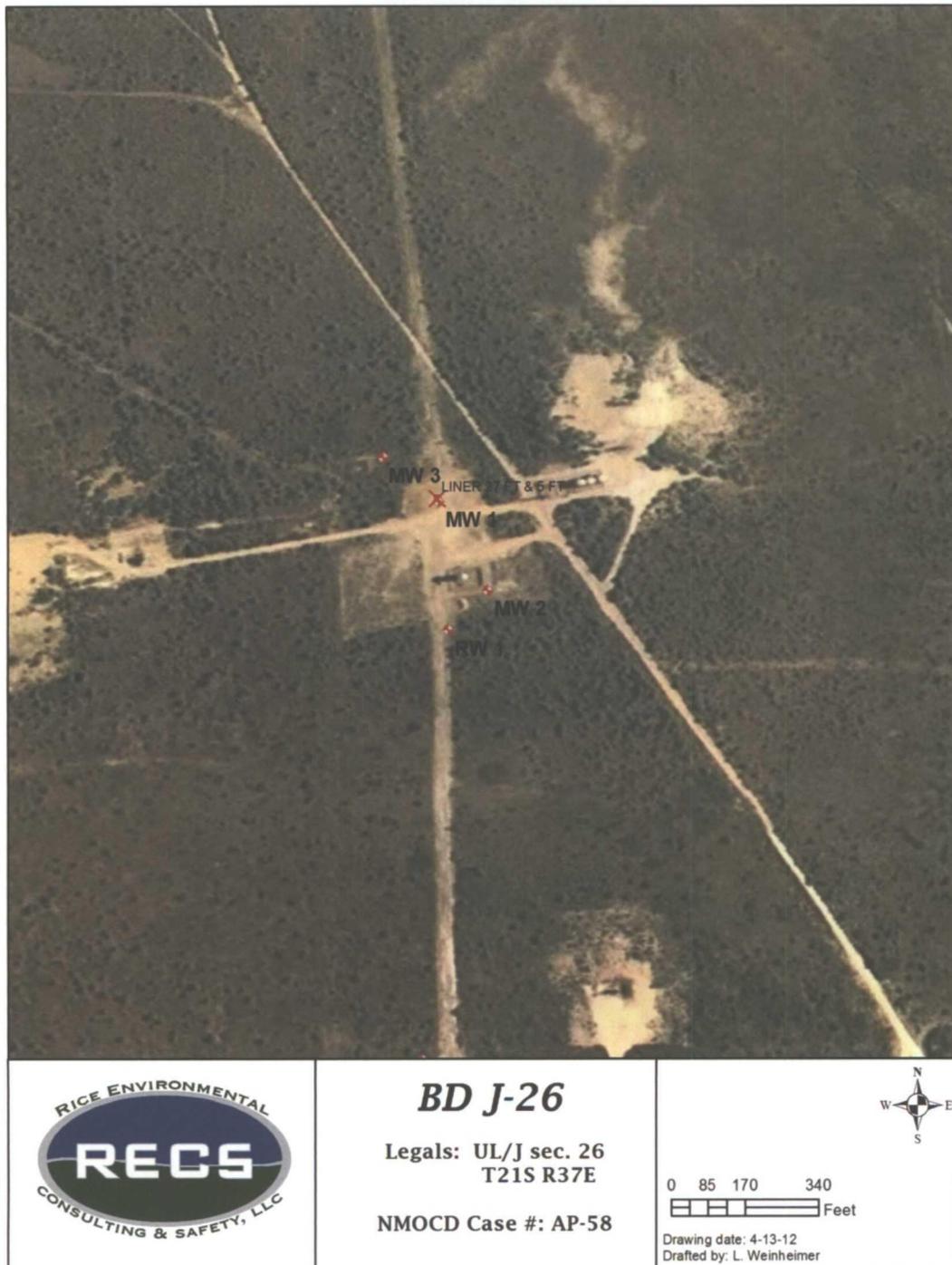


Figure 12 - BD J-26 2005 satellite photograph.

2009



Figure 13 – BD J-26 2009 satellite photograph.

2011



Figure 14 - BD J-26 2011 satellite photograph.

**RICE OPERATING COMPANY
JUNCTION BOX FINAL REPORT**

BOX LOCATION

SWD SYSTEM	JUNCTION	LIFT	SECTION			COUNTY	BOX DIMENSIONS - FEET		
			TOWNSHIP	RANGE	SECTION		Length	Width	Depth
ED	J-25	J	25	21S	37E	LEA			

LAND TYPE: BLM _____ STATE _____ FEE LANDOWNER DELROSE SCOTT OTHER _____

Depth to Groundwater 41' feet NMOCD SITE ASSESSMENT RANKING SCORE: 20

Date Started 04/23/2002 Date Completed 10/01/2002 OCD Witness YES

Soil Excavated 10000 cubic yards Excavation Length 115 Width 75 Depth 40 feet

Soil Disposed 480 cubic yards Offsite Facility Bandana Location Eunke, New Mexico

FINAL ANALYTICAL RESULTS: Sample Date 08/18/2002 Sample Depth 40'

Procure 5-point composite sample of bottom and 4-point composite sample of sidewalls. TPH, BTEX and Chloride laboratory test results completed by using an approved lab and testing procedures pursuant to NMOCD guidelines.

Sample Location	Benzene mg/kg	Toluene mg/kg	Ethyl Benzene mg/kg	Total Xylenes mg/kg	GRO mg/kg	DRO mg/kg	Chlorides mg/kg
SIDEWALLS	<0.005	<0.005	<0.005	<0.015	<10	<10	336
BOTTOM	<0.005	<0.005	<0.005	<0.015	<10	<10	304
Remediated Soil	<0.005	<0.005	<0.005	<0.015	<10	<10	480

General Description of Remedial Action: Vertical and lateral dewatering found a large area impacted with TPH and chlorides. TPH impacted soil was excavated to 42 bgs and land farmed on-site. Chlorides were removed to 42 bgs and tested at 304 ppm. Clean backfill was placed in the deep excavation from 42 bgs to 27 bgs. A 12" compacted clay liner was installed at 27 bgs. The remediated soil was replaced in 3 lifts and packed. A second 12" compacted clay liner was installed at 5' bgs. The results of the compaction tests are included. The remaining remediated soil was placed above the clay liner and contoured to drain rain water away from the area above the liner. These clay liners will ensure no detrimental effect to the groundwater. A monitor well was installed to monitor groundwater constituents. An annual report with the sampling results will be sent to the NMOCD. The site will be sealed in the fall of 2002. A new replacement junction box has been installed north of this site.

TPH/CHLORIDE FIELD TESTS

LOCATION	Depth	TPH	mg/kg
SIDEWALLS	20-25'	86	342
BOTTOM	40'	11	275
Remediated Soil	comp	222	500

I HEREBY CERTIFY THAT THE INFORMATION ABOVE IS TRUE AND COMPLETE TO THE BEST OF MY KNOWLEDGE AND BELIEF.

DATE October 29, 2002 PRINTED NAME D. E. Anderson

SIGNATURE *D. E. Anderson* TITLE Project Leader - Environmental

Figure 15- Junction box disclosure report summarizing initial work and measured soil chloride and petroleum hydrocarbon concentrations.

MultiMed			
Key Parameter Values			
Site:	BD J-26		
Date:	4/17/12		
Suggested Baseline Parameter Values:			
(in the absence of a liner or subsurface infiltration barrier)			
Source			
<u>parameter</u>	<u>unit</u>	<u>value</u>	<u>justification/notes</u>
Source area	m ²		... calculated
Source length	m	35.05	... measured
Source width	m	22.86	... measured
Source infiltration rate	m/yr	0.01524	... equiv to 0.6 inches per year
Initial concentration	mg/l	500	... from ROC junction box disclosure report
Source decay coeff	fraction	2.5%	... assumed, and believed conservative.
Unsat Zone Flow			
<u>parameter</u>	<u>unit</u>	<u>value</u>	<u>justification/notes</u>
Flow layer thickness	m	6.1	... half the distance from the chloride-affected zone to the water table.
Sat hydraulic conductivity	cm/hr	3.6	... equal to 1.5 inch/hr, assumed.
Effective porosity	fraction	0.25	... assumed.
Unsat Zone Transport			
<u>parameter</u>	<u>unit</u>	<u>value</u>	<u>justification/notes</u>
Transport layer thickness	m	6.1	... half the distance from the chloride-affected zone to the water table.
Bulk density	g/cm ³	1.99	... calculated based on porosity.
Saturated Zone			
<u>parameter</u>	<u>unit</u>	<u>value</u>	<u>justification/notes</u>
Aquifer thickness	m	6.10	... equals 20 ft (assumed).
Mixing zone thickness	m		... let model derive value.
Effective porosity	fraction	0.3	... assumed.
Bulk density	g/cm ³	1.855	... calculated based on porosity.
Sat hydraulic conductivity	m/yr	315	... representative for Ogalalla aquifer.
Hydraulic gradient	m/m	0.004	... estimated from surface topography.
Well Loc and Time			
<u>parameter</u>	<u>unit</u>	<u>value</u>	<u>justification/notes</u>
Radial distance to well	m	1.0	... provides at-source concentration.
Time step option	yrs	Find Max Conc	... used as default.
Start time	yrs		... can vary to match output.
Stop time	yrs		... can vary to match output.

Table 1 – MultiMed key parameter values.