AP - 75

STAGE 2 REPORTS

DATE: 4-1-08

BD [redacted] J-26 Boot

(IR426-40)

AP-75

CLOSURE

4-1-08

RICE OPERATING COMPANY
JUNCTION BOX FINAL REPORT

BOX LOCATION

SWD SYSTEM	JUNCTION	UNIT	SECTION	TOWNSHIP	RANGE	COUNTY	NEW BOX DIMENSIONS - FEET		
							Length	Width	Depth
Blinebry-Drinkard (BD)	J-26 boot	J	26	21S	37E	Lea	no box; junction eliminated		

LAND TYPE: BLM _____ STATE _____ FEE LANDOWNER Delrose Scott OTHER _____

Depth to Groundwater 42 feet NMOCD SITE ASSESSMENT RANKING SCORE: 20

Date Started 4/23/2002 Date Completed 10/2/2002 NMOCD Witness YES

Soil Excavated 1000 cubic yards Excavation Length 115 Width 75 Depth 40 feet

Soil Disposed 480 cubic yards Offsite Facility Sundance Location Eunice, New Mexico

General Description of Remedial Action:

For a summary of the junction box remediation and excavation activities, refer to the previously-submitted Junction Box Disclosure Report (2002). Since the Vadose remediation, groundwater at this site has been monitored on a quarterly basis.

The attached November 2007 Abatement Completion Report by Trident Environmental of Midland, Texas requests closure of this junction box site.

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

REPORT ASSEMBLED BY Kristin Farris Pope SIGNATURE Kristin Farris Pope

DATE 11/15/2007 TITLE Project Scientist

November 20, 2007

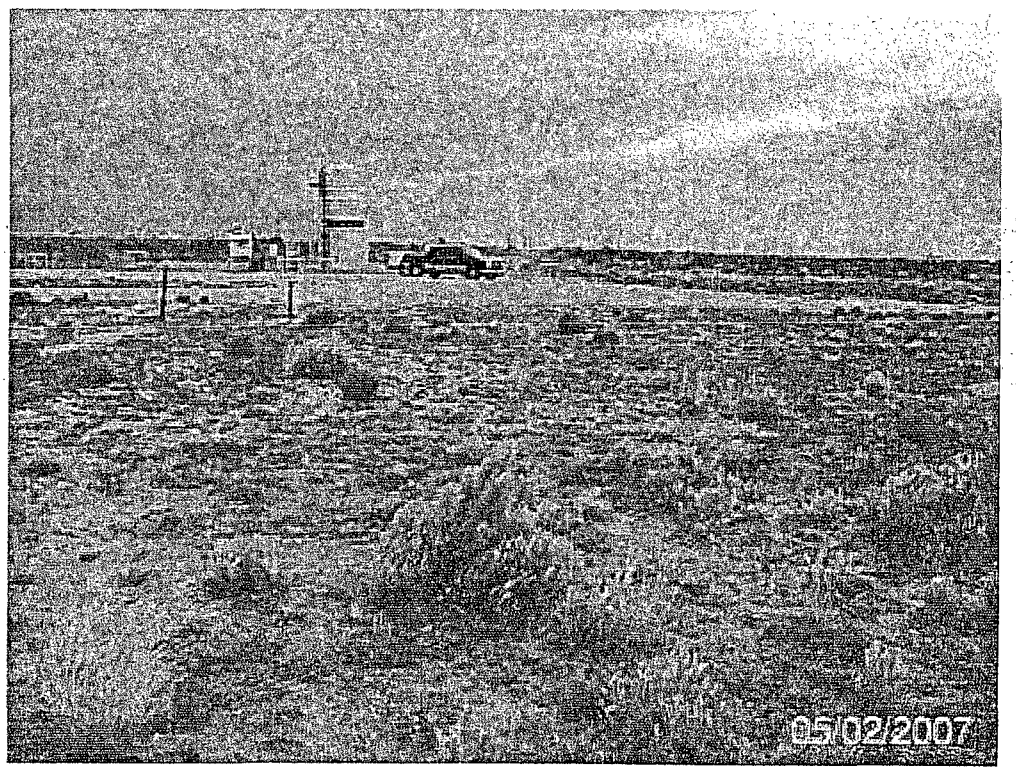
COPY

STAGE 2 FINAL INVESTIGATION AND ABATEMENT COMPLETION REPORT

BD JCT. J-26 SITE (1R0426-40)

T21S, R37E, SECTION 26, UNIT LETTER J

LEA COUNTY, NEW MEXICO



Prepared by:

TRIDENT ENVIRONMENTAL

P. O. Box 7624
Midland, Texas 79708

Prepared for:

RICE *Operating Company*

122 West Taylor

Hobbs, New Mexico 88240

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1.0 EXECUTIVE SUMMARY

This Stage 2 Final Investigation and Abatement Completion Report presents the results of the characterization activities performed by Trident Environmental and the characterization and site closure activities performed by ROC at the Jct. J-26 site. This report fulfills the obligations of ROC presented in the Stage 1 and 2 Abatement Plan of December 5, 2005, which was approved by NMOCD on June 26, 2006.

The following corrective actions were performed in accordance with the Stage 1 and 2 Abatement Plan:

- Quarterly groundwater monitoring activities of the three on site monitoring wells were continued to document the return of chloride and total dissolved solids (TDS) concentrations to background levels. The 2006 Annual Groundwater Monitoring Report was submitted to the NMOCD on February 5, 2007.
- Regional groundwater sampling was conducted to confirm that remediation of the constituents of concern is taking place, changes in the local and regional ground water flow directions were noted, and ambient ground water chemistry was confirmed.
- Data was input into a fate and transport model (WinTran - Version 1.3) to forecast the movement and attenuation of the chloride/TDS plume by dispersion and abatement by the water supply wells.

Since July 2004, chloride and TDS concentrations at the Jct. J-26 site have generally remained at or near background levels in each of the three on site monitoring wells. Background concentrations of chlorides and TDS at the site have been confirmed through recent laboratory analysis of several surrounding wells and research of local groundwater data. There is strong evidence that the continual withdrawal of groundwater by several supply wells for the operation of the Eunice Gas Plant has assisted in the redirection and recovery of residual chloride and TDS constituents from the Jct. J-26 site. In addition, WinTran fate and transport simulations show the effects of the water supply wells and natural dispersion in attenuating chloride and TDS constituents.

Based on the physical findings, source removal activities, backfilling with an infiltartion barrier, re-establishment of native vegetation, and results of the WinTran fate and transport simulations, ROC has performed sufficient remedies which have resulted in the protection of groundwater quality, human health, and the environment. On behalf of ROC, we respectfully request that NMOCD approve the plugging and abandonment of the three onsite monitoring wells and close the regulatory file for this site. A copy of the Final Junction Box Closure Report is included in Appendix E.

2.0 CHRONOLOGY OF EVENTS

April 23, 2002	Initial soil sampling activities were conducted to delineate the extent of chloride and hydrocarbon-impacted soils near the Jct. J-26.
September 2002	Excavation of chloride and TPH-impacted soil was completed to a depth of 42 feet bgs. 480 yd^3 of the impacted soils were removed and disposed. Imported backfill was placed in the deep excavation from 42 feet to 27 feet bgs. A 12-inch compacted clay layer was then installed prior to backfilling with the remediated soil in 3-foot lifts. A second 12-inch compacted clay layer was installed at 5 feet bgs. The remaining remediated soil was placed above the clay layer and contoured to drain rainwater away from the area. A new replacement junction box was installed about 60 feet north of the former location. The surface was then reseeded and monitored for growth which resulted in re-establishing the native vegetation.
October 10, 2002	One monitoring well (MW-1) was installed immediately adjacent to the southeast corner of the excavated area to further assess if groundwater was impacted with chlorides. Subsequent sampling of MW-1 confirmed that groundwater was impacted with chloride and TDS levels above WQCC standards; however there was no hydrocarbon impact based on BTEX concentrations below laboratory detection limit of 0.001 mg/L.
October 29, 2002	The disclosure report detailing all of the above-referenced work was completed and forwarded to the NMOCD in early 2003 along with the disclosure reports for other sites.
December 13, 2002	ROC notified the NMOCD Environmental Bureau Chief of groundwater impact in accordance with NM Rule 116.
June 20, 2003	A work plan addressing further actions was submitted by Trident Environmental to Wayne Price at the NMOCD office in Santa Fe.
June 27, 2003	The work plan was approved by Wayne Price of the NMOCD office in Santa Fe.
August 19, 2003	Monitoring wells MW-2 and MW-3 were installed approximately 220 feet down gradient (south-southeast) and approximately 150 feet upgradient (northwest) of MW-1, respectively. Subsequent sampling results indicated MW-2 and MW-3 delineated the downgradient and upgradient extent of chloride and TDS impact to groundwater.

December 16, 2004	Trident Environmental submitted a request to Wayne Price of the NMOCD office in Santa Fe for further actions regarding the chloride and TDS-impacted groundwater at the BD Jct. J-26 site.
January 28, 2005	Trident Environmental submitted an Update to the Site Plan which described the findings of assessment activities and proposed corrective actions for the Jct. J-26 site.
May 5, 2005	Mr. Daniel Sanchez of the NMOCD requested that ROC submit an abatement plan to the NMOCD pursuant to Rule 19.
December 5, 2005	A Stage 1 and 2 Abatement Plan was prepared by R. T. Hicks Consultants Ltd. and submitted to the NMOCD
April 17, 2006	ROC submitted proof of public notifications to the NMOCD
June 26, 2006	NMOCD approved the Stage 1 & 2 Abatement Plan
August 1, 2006	Depth to water measurements and samples for chloride and TDS analysis were obtained from several off site wells in the surrounding area.
October 4, 2006	Trident Environmental initiated fate and transport simulations for the site.
November 22, 2006	Trident Environmental performed an aquifer test at two nearby water supply wells to determine site-specific hydrological parameters.
February 5, 2007	Trident Environmental submitted the 2006 Annual Groundwater Monitoring Report to the NMOCD.
February 19, 2007	Trident completed fate and transport simulations for the site.

3.0 BACKGROUND

3.1 SITE LOCATION AND LAND USE

The Jct. J-26 site is located in township 21 south, range 37 east, section 26, unit letter J approximately 1 mile north-northwest of the intersection of NM State Highway 18 and County Highway 176 near Eunice, NM as shown on the attached topographic map (Figure 1) and aerial photographic map (Figure 2). Land in the site area is primarily utilized for oil and gas production and cattle ranching.

3.2 SUMMARY OF PREVIOUS WORK AND INVESTIGATIONS

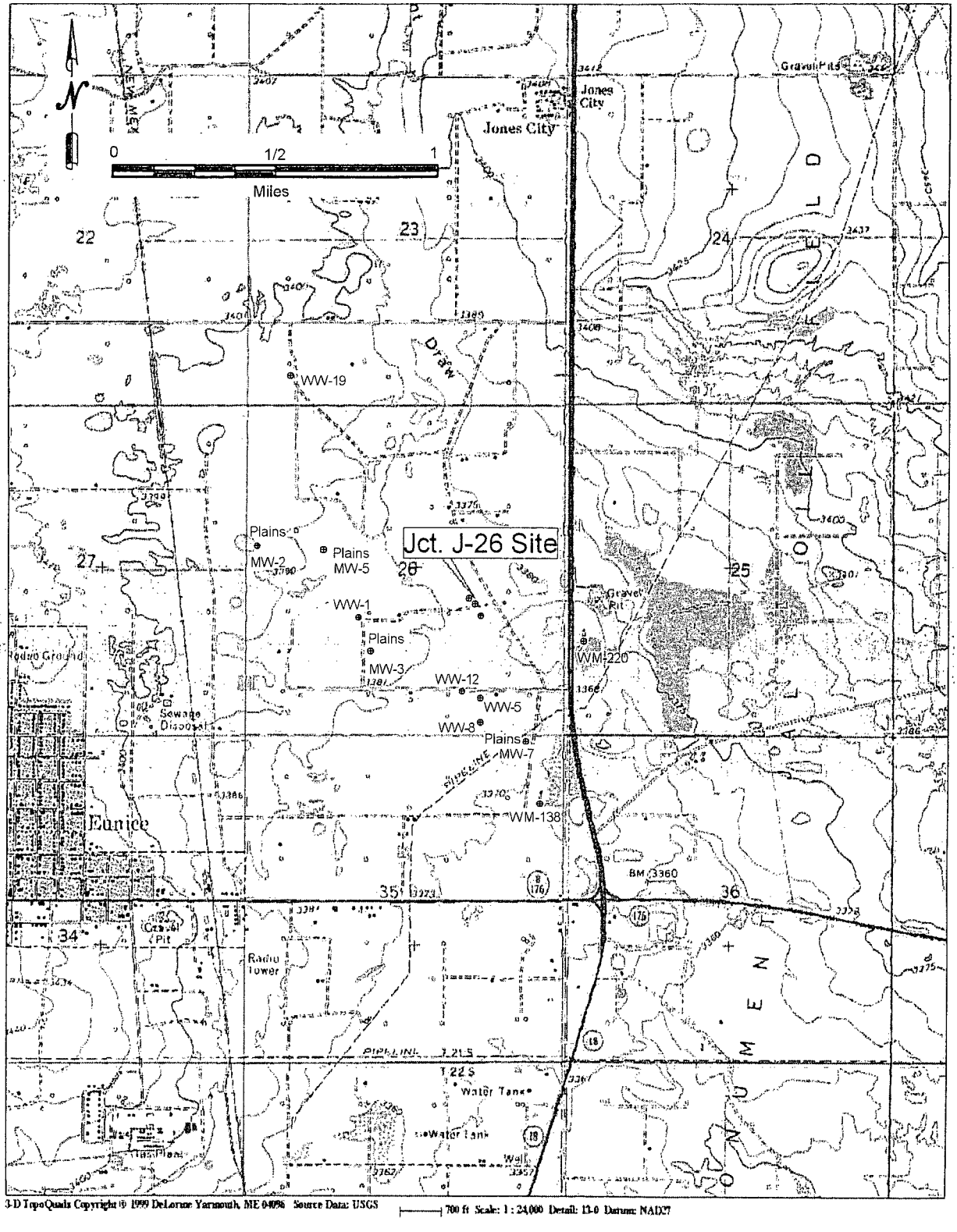
Initial soil sampling activities for delineation of the Jct. J-26 area began on May 2, 2002, as part of ROC's junction box upgrade program.

In September 2002, excavation of TPH impacted soil was completed to a depth of 42 feet bgs where groundwater was encountered. 480 cubic yards of TPH impacted soil was transported to the Sundance facility in Eunice, New Mexico and the remaining excavated soil was remediated on site. Imported backfill was placed in the deep excavation from 42 feet to 27 feet bgs. A 12-inch compacted clay layer was then installed prior to backfilling with the remediated soil in 3-foot lifts. A second 12-inch compacted clay layer was installed at 5 feet bgs. The remaining remediated soil was placed above the clay layer and contoured to drain rainwater away from the area. A new replacement junction box was installed about 60 feet north of the former location. The surface was then reseeded and monitored for growth.

On October 10, 2002, a monitoring well (MW-1) was installed immediately adjacent to the southeast corner of the excavated area, which was the presumed down gradient direction. Subsequent sampling of MW-1 confirmed that groundwater was impacted with chloride and TDS levels above WQCC standards, however there was no hydrocarbon impact based on BTEX concentrations below the WQCC standards. ROC notified the Director of the NMOCD, Environmental Bureau of groundwater impact in accordance with NM Rule 116.

Monitoring wells MW-2 and MW-3 were installed approximately 220 feet down gradient (south-southeast) and approximately 150 feet upgradient (northwest) of MW-1, respectively, on August 19, 2003. Subsequent sampling results indicated MW-2 and MW-3 delineated the downgradient and upgradient extent of chloride and TDS impact to groundwater.

A Stage 1 and 2 Abatement Plan was submitted to the NMOCD on December 5, 2005, and approved by the NMOCD on June 26, 2006.



TRIDENT ENVIRONMENTAL

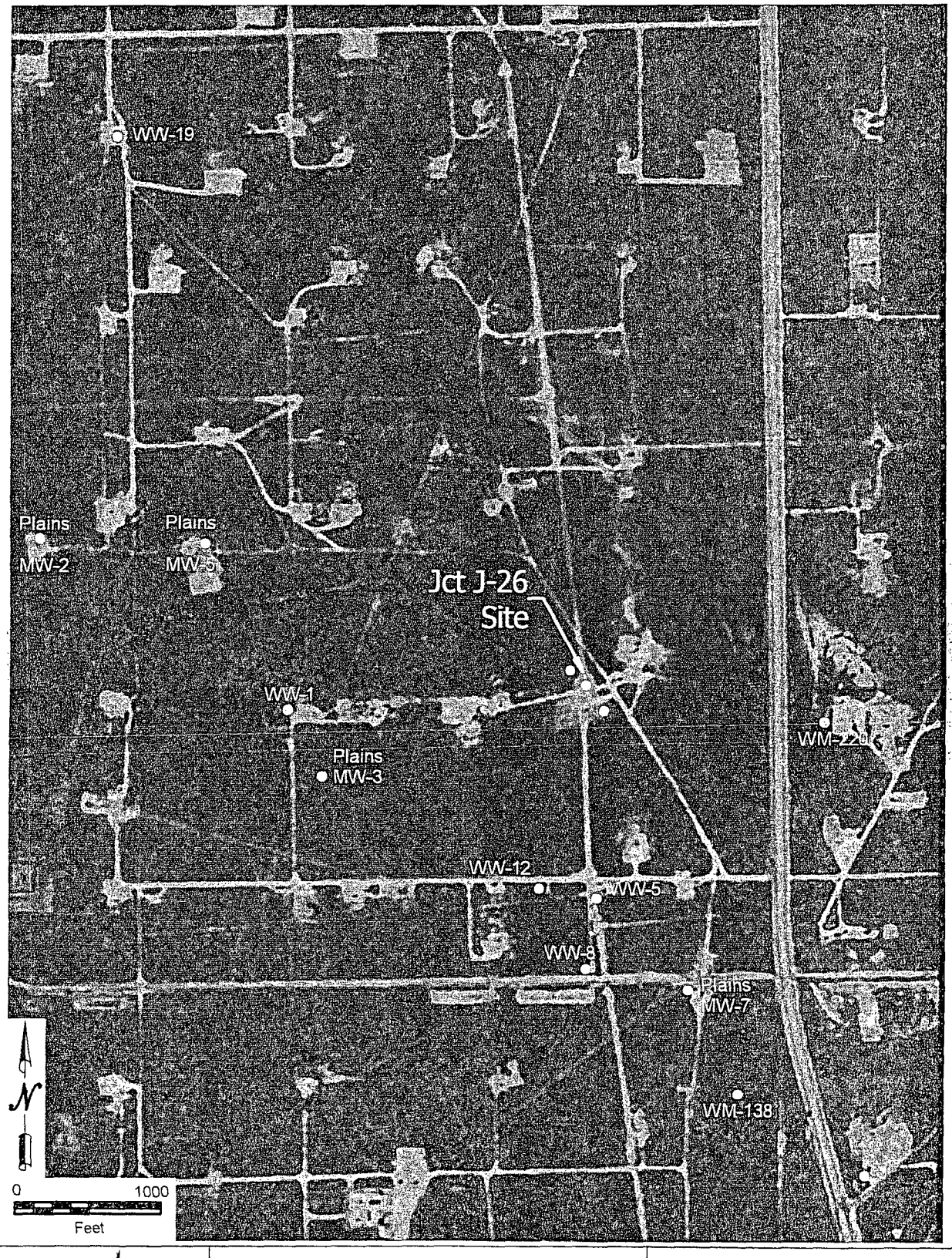
BD J-26 Junction Box Site

T21S - R37E - Section 26 - Unit J

RICE *Operating Company*

FIGURE 1

TOPOGRAPHIC MAP



TRIDENT ENVIRONMENTAL

BD J-26 Junction Box Site

T21S - R37E - Section 26 - Unit J

RICE Operating Company

FIGURE 2

AERIAL PHOTO (2005)

GEOLOGY AND HYDROGEOLOGY

4.1 REGIONAL AND LOCAL GEOLOGY

The Jct. J-26 site is situated within the center of Monument Draw. According to published information (Nicholson and Clebsch, 1961, Barnes, 1976, and Anderson, Jones, and Green, 1997) the site is underlain by Quaternary Colluvial Deposits composed of sand, silt, and gravel deposited by slopewash, and talus from the Tertiary Ogallala Formation. These colluvial deposits are often calichified (indurated with cemented calcium carbonate) with caliche layers from 1 to 20 feet thick. The thickness of the colluvial deposits and Ogallala Formation is approximately 45 feet; however it varies locally as a result of significant paleo-topography at the top of the underlying Triassic Dockum Group. Since Cretaceous Age rocks in the region have been removed by pre-Tertiary erosion, the alluvium and Ogallala Formation rest unconformably on the Triassic Dockum Group. The uppermost unit of the Dockum Group is the Chinle Formation, which primarily consists of micaceous red clay and shale but also contains thin interbeds of fine-grained sandstone and siltstone. The red clays and shale of the Chinle Formation act as an aquitard beneath the water bearing colluvial deposits/Ogallala Formation and therefore limit the amount of recharge to the underlying Dockum Group.

Based on the lithologic log descriptions provided by Trident Environmental the subsurface soils are composed of caliche with varying amounts of very fine to fine-grained sand in matrix (0-40 ft), calcareous fine to medium-grained sand (40-50 ft), and fine to medium-grained sand (50-60 ft). More detailed descriptions of the subsurface lithology are provided on the lithologic logs in Appendix A of the Stage 1 and 2 Abatement Plan.

4.2 REGIONAL AND LOCAL HYDROGEOLOGY

Potable ground water used in southern Lea County is derived primarily from the Ogallala Formation and the Quaternary alluvium. Water from the Ogallala and alluvium aquifers in southern Lea County is used for irrigation, stock, domestic, industrial, and public supply purposes.

Based on the total depths of water wells in the area (85 feet) and the depth to groundwater (average of 40 feet bgs), the saturated thickness of the Ogallala Formation in the site area is estimated at approximately 45 feet.

Nicholsen and Clebsch (1961) found that the regional gradient of the Ogallala and interconnected colluvial aquifer in the site area generally flows toward the southeast and the hydraulic gradient varies from approximately 0.001 to 0.01 feet/feet.

Based on the recent depth to groundwater data from accessible wells located within a mile of the Jct. J-26 site the magnitude of the regional groundwater gradient is 0.003 feet/foot and the direction of flow is to the southeast (Figure 3). However, the local groundwater gradient

in the more immediate area of the site has indicated magnitudes of 0.005 feet/foot or greater with direction of flow towards the south (Figure 4). The difference between the localized and regional gradient is attributed to the effect of the continual groundwater withdrawal from several nearby water supply wells that provide water for the Eunice Gas Plant. Based on records from the New Mexico Office of the State Engineer (NMSEO) these wells have been pumping at a combined rate of approximately 82 gallons per minute between July 6, 2005 and January 8, 2007. The groundwater withdrawal induces groundwater to flow from the site towards the water supply wells, which are located south (WW-5, WW-8, and WW12) and west (WW-1) of the site, as evidenced by a local groundwater gradient trending to the south (Figure 4) which differs from the regional gradient to the southeast (Figure 3).

No water wells are located within 1,000 feet of the site. A summary of active water wells located in the vicinity of the Jct. J-26 site are listed in Table 1 below. These wells are also depicted in Figure 3.

Table 1
Summary of Water Well Data

Well ID	Well Type/Use	Permit Holder (Site Name)	T21S-R37E		Distance from Jct. J-26 Site
			Sec	UL	
WM-220	Windmill/Livestock	Owens (L-0220)	25	I	1,610 ft East
WW-1	Industrial Supply	Targa (Eunice Gas Plant)	26	K	2,100 ft West
WW-5	Industrial Supply	Targa (Eunice Gas Plant)	26	P	1,450 ft South
WW-8	Industrial Supply	Targa (Eunice Gas Plant)	26	P	1,960 ft South
WW-12	Industrial Supply	Targa (Eunice Gas Plant)	26	O	1,410 ft SSW

There are no surface water bodies located within a mile of the site.

5.0 GROUND WATER QUALITY

5.1 MONITORING PROGRAM

The on site monitoring wells at the Jct. J-26 site have been sampled on a quarterly basis for major ions, TDS, and benzene, toluene, ethylbenzene, and xylenes (BTEX). A complete summary of historical analytical results and ground water elevations are provided in the 2006 Annual Groundwater Monitoring Report.

Each constituent of BTEX has been below the New Mexico Water Quality Control Commission (WQCC) standards at this site since the installation of monitoring well MW-1 in October 2002 (18 consecutive quarters).

Background concentrations of chlorides and TDS at the site have been confirmed through recent laboratory analysis of several surrounding wells and research of regional groundwater data. During the third quarter (August 1, 2006) access was granted for a one-time monitoring event (depth to water measurements and chloride and TDS analysis) for the following wells:

- Targa (Eunice Gas Plant) water supply wells (WW-1, WW-5, WW-8, WW-12, WW-19).
- One monitoring well at each of four nearby Plains Petroleum monitoring sites.
- One windmill (L-0220)

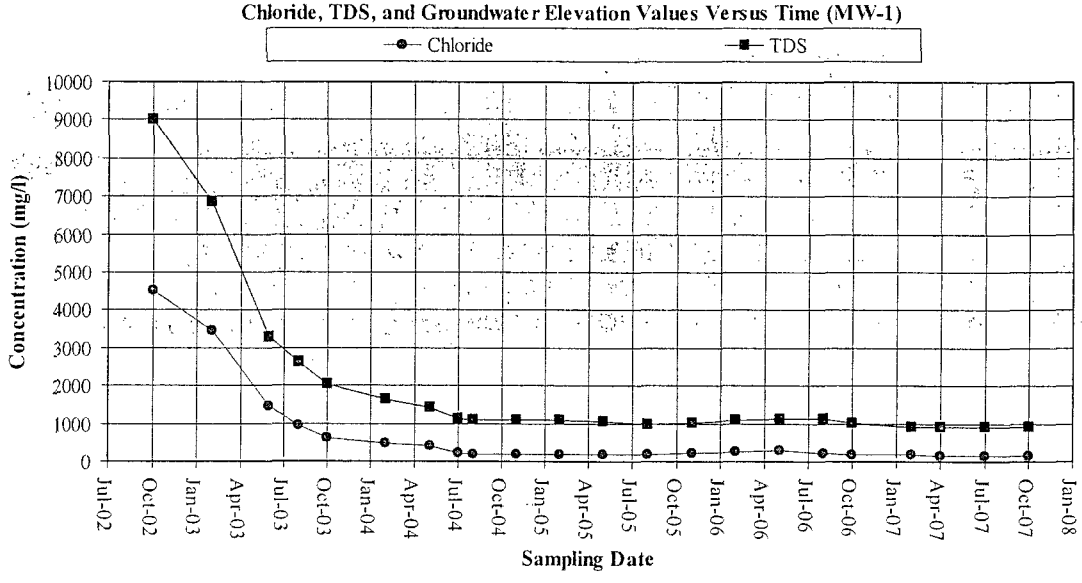
Results of this one time sampling event are summarized in Table 2 below and depicted in Figure 3. A copy of the laboratory analytical reports and chains of custody form are included in Appendix D.

Table 2
Regional Ground Water Sampling Results (August 1, 2006)

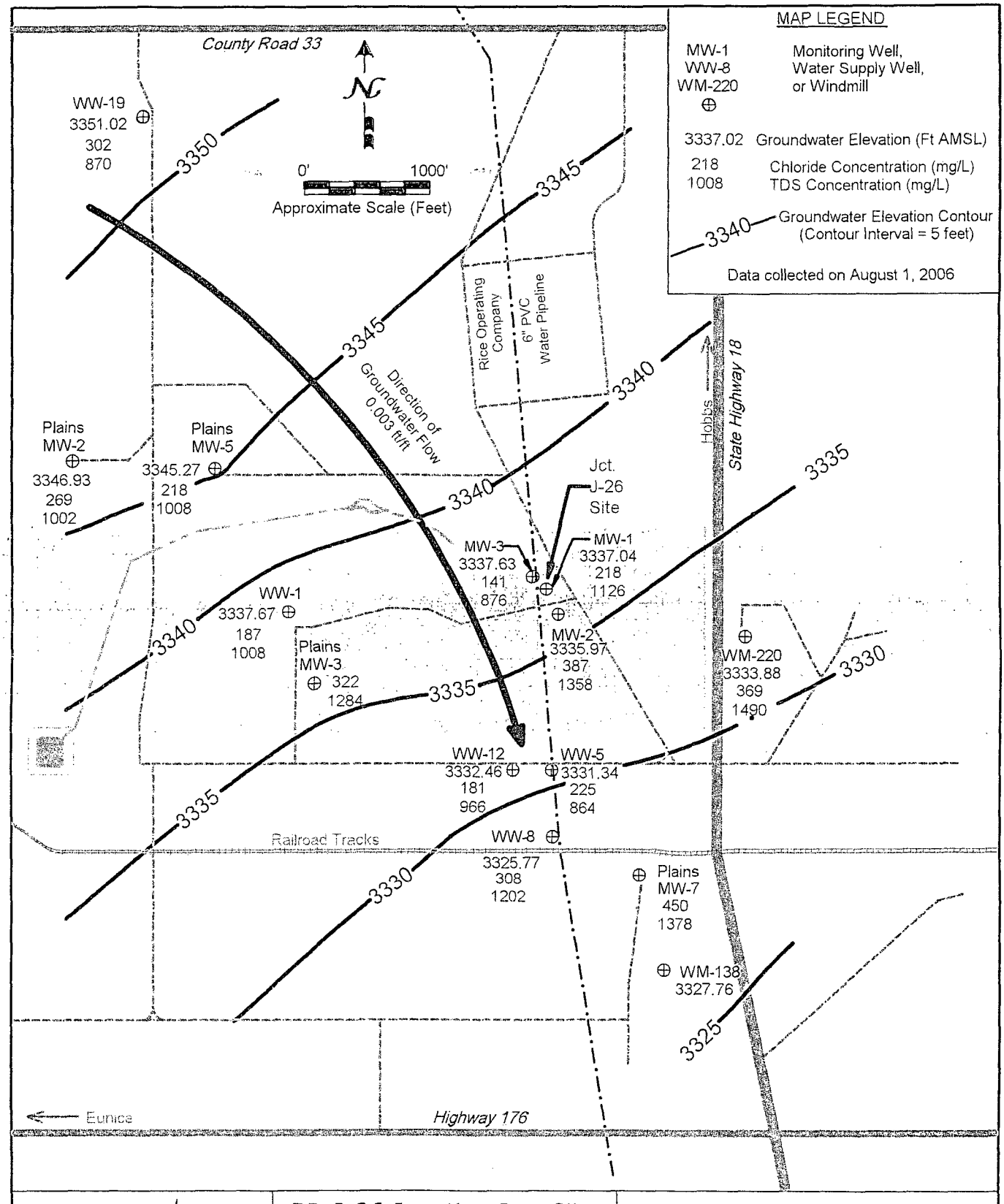
Well ID	Well Type/Use	Permit Holder	Site Name	Depth to Groundwater (feet BTOC)	Chloride (mg/L)	TDS (mg/L)
MW-1	Monitoring	ROC	Jct. J-26	38.80	218	1126
MW-2	Monitoring	ROC	Jct. J-26	39.35	387	1358
MW-3	Monitoring	ROC	Jct. J-26	38.22	141	876
WM-220	Windmill	Owens	L-0220	37.49	369	1490
MW-3	Monitoring	Plains	DH Gathering	45.52	322	1284
MW-7	Monitoring	Plains	Vacuum to Jal 14" Mainline#3	49.04	450	1378
MW-2	Monitoring	Plains	TNM 98-5B	47.82	269	1002
MW-5	Monitoring	Plains	TNM 98-5A	46.26	218	1008
WW-1	Industrial	Targa	Eunice Gas Plant	49.32	187	1008
WW-5	Industrial	Targa	Eunice Gas Plant	48.11	225	864
WW-8	Industrial	Targa	Eunice Gas Plant	51.00	308	1202
WW-12	Industrial	Targa	Eunice Gas Plant	49.28	181	966
WW-19	Abandoned	Targa	Eunice Gas Plant	47.28	302	870
Average (Background) Chloride and TDS Concentrations					275	1110

Based on the sampling results listed in the table above average (background) chloride and TDS concentrations in section 26 have ranged from 141 mg/L to 450 mg/L and 870 mg/L to 1,490 mg/L, respectively.

The highest chloride (4,520 mg/L) and TDS (9,020 mg/L) concentrations in MW-1 were observed during the first sampling event on October 29, 2002. The decreased chloride and TDS concentrations observed in MW-1, as shown in the graph below, can be attributed to the excavation activities (source removal) and the effect of groundwater withdrawal from the industrial water wells that supply process water for the Eunice Gas Plant. The groundwater withdrawal induces groundwater to flow from the site towards the water supply wells, which are located south (WW-5, WW-8, and WW-12) and west (WW-1) of the site and thus has assisted in the removal of any remnant chloride/TDS mass from the area of the Jct. J-26 site. Further evidence for this conclusion is supported by the fate and transport modeling simulations as explained in the following section.



There is no longer a threat of impact from the vadose zone at this site because of the excavation, source removal, and backfilling with an infiltration barrier over the former source area near MW-1 that was completed in 2002. The surrounding area was re-seeded with a mixture of native grasses and plants which has resulted in the re-establishment of native vegetation as depicted on the cover page photo of this report. ROC has been monitoring the site for continued healthy growth of native vegetation.



TRIDENT ENVIRONMENTAL

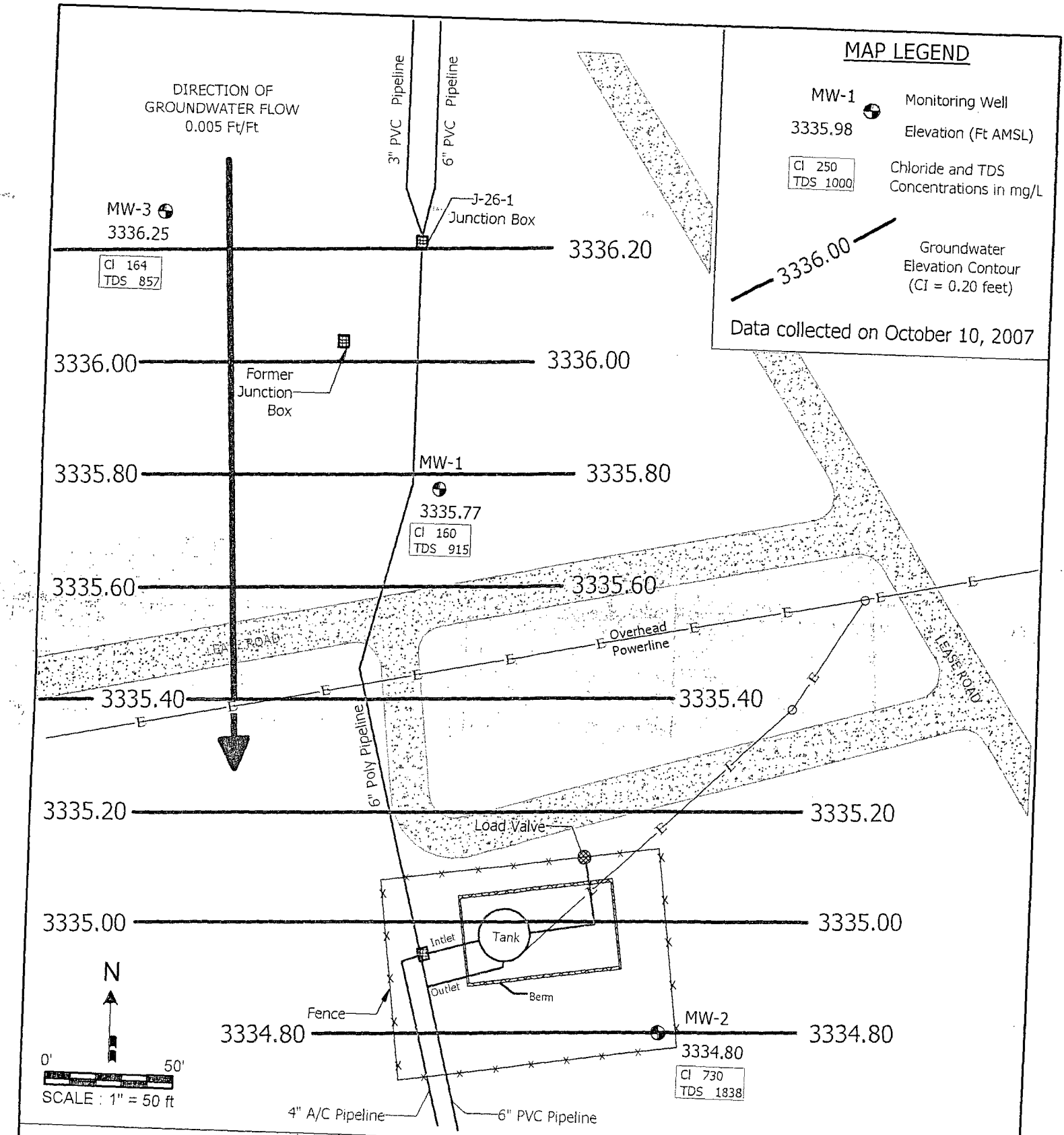
BD J-26 Junction Box Site

T21S - R37E - Section 26 - Unit J

RICE Operating Company

FIGURE 3

REGIONAL GROUNDWATER GRADIENT & CHLORIDE/TDS CONCENTRATION MAP



TRIDENT ENVIRONMENTAL

BD J-26 Junction Box Site

T21S - R37E - Section 26 - Unit J

RICE Operating Company

FIGURE 4

LOCAL GROUNDWATER GRADIENT & CHLORIDE/TDS CONCENTRATION MAP

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Table 3

Historical Groundwater Sampling Results

Monitoring Well	Sample Date	Depth to Groundwater (feet BTOC)	Groundwater Elevation (feet AMSL)	Chloride (mg/L)	TDS (mg/L)	Benzene (mg/L)	Toluene (mg/L)	Ethylbenzene (mg/L)	Xylene (mg/L)
MW-1	10/29/02	43.02	3332.82	**4520**	**9020**	< 0.001	< 0.001	< 0.001	< 0.001
	02/28/03	42.33	3333.51	**3470**	**6870**	< 0.001	< 0.001	< 0.001	< 0.001
	06/05/03	43.00	3332.84	**1460**	**3280**	< 0.001	< 0.001	< 0.001	< 0.001
	08/22/03	43.72	3332.12	**957**	**2620**	< 0.001	< 0.001	< 0.001	< 0.001
	10/30/03	43.91	3331.93	**620**	**2040**	< 0.001	< 0.001	< 0.001	< 0.001
	02/18/04	43.70	3332.14	**478**	**1630**	< 0.001	< 0.001	< 0.001	< 0.001
	05/05/04	40.80	3335.04	**390**	**1440**	< 0.001	< 0.001	< 0.001	< 0.001
	07/08/04	40.80	3335.04	230	**1140**	< 0.001	< 0.001	< 0.001	< 0.001
	08/10/04	37.02	3338.82	195	**1080**	< 0.001	< 0.001	< 0.001	< 0.001
	11/09/04	36.61	3339.23	177	**1100**	< 0.001	< 0.001	< 0.001	< 0.001
	02/09/05	36.62	3339.22	179	**1090**	< 0.001	< 0.001	< 0.001	< 0.001
	05/05/05	37.00	3338.84	179	**1060**	< 0.001	< 0.001	< 0.001	< 0.001
	08/13/05	37.56	3338.28	193	**1000**	< 0.001	< 0.001	< 0.001	< 0.001
	11/07/05	37.98	3337.86	233	**1020**	< 0.001	< 0.001	< 0.001	< 0.001
	02/06/06	38.39	3337.45	**262**	**1080**	< 0.001	< 0.001	< 0.001	< 0.001
	05/08/06	38.55	3337.29	**282**	**1140**	< 0.001	< 0.001	< 0.001	< 0.001
	08/01/06	38.80	3337.04	218	**1126**	< 0.001	< 0.001	< 0.001	< 0.001
	10/23/06	39.21	3336.63	193	**1010**	< 0.001	< 0.001	< 0.001	< 0.001
	02/08/07	39.52	3336.32	182	912	< 0.001	< 0.001	< 0.001	< 0.001
	04/18/07	39.66	3336.18	161	898	< 0.001	< 0.001	< 0.001	< 0.001
	07/18/07	39.86	3335.98	149	900	—	—	—	—
	10/10/07	40.07	3335.77	160	915	—	—	—	—
MW-2	08/22/03	43.99	3331.33	239	**1180**	< 0.001	< 0.001	< 0.001	< 0.001
	10/30/03	44.17	3331.15	239	**1240**	< 0.001	< 0.001	< 0.001	< 0.001
	02/18/04	43.91	3331.41	221	**1150**	< 0.001	0.001	< 0.001	< 0.001
	05/05/04	40.98	3334.34	204	**1060**	< 0.001	0.001	< 0.001	< 0.001
	08/10/04	37.14	3338.18	230	**1120**	< 0.001	< 0.001	< 0.001	< 0.001
	11/09/04	36.99	3338.33	230	**1120**	< 0.001	< 0.001	< 0.001	< 0.001
	02/09/05	37.03	3338.29	**294**	**1220**	< 0.001	< 0.001	< 0.001	< 0.001
	05/06/05	37.46	3337.86	**257**	**1210**	< 0.001	< 0.001	< 0.001	< 0.001
	08/13/05	38.02	3337.30	237	**1180**	< 0.001	< 0.001	< 0.001	< 0.001
	11/07/05	38.44	3336.88	206	**1130**	< 0.001	< 0.001	< 0.001	< 0.001
	02/06/06	38.83	3336.49	**250**	**1090**	< 0.001	< 0.001	< 0.001	< 0.001
	05/08/06	39.02	3336.30	**257**	**1210**	< 0.001	< 0.001	< 0.001	< 0.001
	08/01/06	39.35	3335.97	**387**	**1358**	< 0.001	< 0.001	< 0.001	< 0.001
	10/23/06	39.71	3335.61	**395**	**1370**	< 0.001	< 0.001	< 0.001	< 0.001
	02/08/07	40.03	3335.29	**378**	**1220**	< 0.001	< 0.001	< 0.001	< 0.001
	04/18/07	40.09	3335.23	**446**	**1380**	< 0.001	< 0.001	< 0.001	< 0.001
	07/18/07	40.30	3335.02	**679**	**1720**	—	—	—	—
	10/10/07	40.52	3334.80	**730**	**1838**	—	—	—	—
MW-3	08/22/03	43.06	3332.79	160	904	< 0.001	< 0.001	< 0.001	< 0.001
	10/30/03	43.28	3332.57	168	**1070**	< 0.001	< 0.001	< 0.001	< 0.001
	02/18/04	43.03	3332.82	160	862	< 0.001	< 0.001	< 0.001	< 0.001
	05/05/04	40.04	3335.81	160	891	< 0.001	< 0.001	< 0.001	< 0.001
	08/10/04	36.55	3339.30	164	941	< 0.001	< 0.001	< 0.001	< 0.001
	11/09/04	36.22	3339.63	142	**1160**	< 0.001	< 0.001	< 0.001	< 0.001
	02/09/05	36.17	3339.68	138	**1010**	< 0.001	< 0.001	< 0.001	< 0.001
	05/06/05	36.56	3339.29	141	870	< 0.001	< 0.001	< 0.001	< 0.001
	08/13/05	37.12	3338.73	125	842	< 0.001	< 0.001	< 0.001	< 0.001
	11/07/05	37.55	3338.30	125	826	< 0.001	< 0.001	< 0.001	< 0.001
	02/06/06	37.84	3338.01	119	748	< 0.001	< 0.001	< 0.001	< 0.001
	05/08/06	38.00	3337.85	142	806	< 0.001	< 0.001	< 0.001	< 0.001
	08/01/06	38.22	3337.63	141	876	< 0.001	< 0.001	< 0.001	< 0.001
	10/23/06	38.68	3337.17	147	834	< 0.001	< 0.001	< 0.001	< 0.001
	02/08/07	39.01	3336.84	147	788	< 0.001	< 0.001	< 0.001	< 0.001
	04/18/07	39.16	3336.69	150	818	< 0.001	< 0.001	< 0.001	< 0.001
	07/18/07	39.40	3336.45	139	848	—	—	—	—
	10/10/07	39.60	3336.25	164	857	—	—	—	—
WQCC Standards				250	1000	0.01	0.75	0.75	0.62

6.0 FATE AND TRANSPORT MODELING RESULTS

6.1 FATE AND TRANSPORT MODELING

As proposed in the NMOCD-approved Stage 1 and 2 Abatement Plan, fate and transport model simulations were performed to forecast the movement and attenuation of the chloride plume by dispersion and abatement by the water supply wells. Simulations were conducted with the two-dimensional groundwater flow and contaminant transport model WinTran, version 1.03 (1995) designed and distributed by Environmental Simulations, Inc. WinTran is built around a steady-state analytical element flow model, which is uniquely linked to a finite element contaminant transport model. A detailed description of the modeling procedure, parameter inputs, and the simulated results are provided in Appendix A. The features, equations, and benchmarking documentation are included in Appendix B.

The fate and transport model simulations demonstrate how chloride concentrations in the center of the plume will decrease to background levels by the year 2047 as the mass of the plume is captured by the water supply wells and does not migrate beyond them. The results of the fate and transport modeling simulations support the conclusion that the chloride plume is not likely to impact any drinking water, livestock, municipal, or irrigation water supplies, the closest of which is a windmill (NM File No. CP-220) located approximately 1,610 feet east of the Jct. J-26 site. This windmill, which is used for livestock watering, is cross-gradient from the junction box and, therefore not in the direct path of the simulated plume.

7.0 CONCLUSIONS AND REQUEST FOR CLOSURE

Since July 2004, chloride and TDS concentrations at the Jct. J-26 site have generally remained at or near background levels in each of the three on site monitoring wells. Chloride and TDS concentrations in downgradient monitoring well MW-2 have exhibited a slight increase over background levels in the most recent quarter however, that is consistent with the modeling simulations as described in Appendix A. The fate and transport modeling simulates chloride concentrations in MW-2 peaking at 737 mg/L in year 2009 and then resume a decreasing trend.

Continued operation of the water supply wells is essential in maintaining the operation of the Eunice Gas Plant. The withdrawal of groundwater by several of these wells has resulted in redirecting and recovery of residual chloride and TDS constituents from the Jct. J-26 site. In addition, WinTran fate and transport modeling simulations show the capture effects of the water supply wells and natural dispersion in attenuating chloride and TDS constituents.

Based on the physical findings, source removal activities, backfilling with an infiltration barrier, re-establishment of native vegetation, and results of the WinTran fate and transport simulations, ROC has performed sufficient remedies which have resulted in the protection of groundwater quality, human health, and the environment. Therefore, additional groundwater monitoring is not necessary. On behalf of ROC, we respectfully request that NMOCD approve the plugging and abandonment of the three onsite monitoring wells and close the regulatory file for this site. A copy of the Final Junction Box Closure Report is included in Appendix E.

APPENDIX A

Description of Fate and Transport Modeling Procedures and Parameter Inputs

Description of Fate and Transport Modeling

Conceptual Model

Produced water containing high concentrations of chloride, and resultant high levels of total dissolved solids (TDS), reportedly leaked from the J-26 junction box. Extrapolating from current conditions for decades into the future, taking account of both advective flow and attenuation by hydrodynamic dispersion, enables prediction of the probable distance that the residual plume will travel as well as the gradually declining concentrations in the plume.

Basic Site Data

Information about site conditions was obtained from data collected by Rice Operating Company and Trident Environmental. This included lithologic records from well installations, water level data, and water quality analytical results.

Simulation Model

Simulations were conducted with the two-dimensional groundwater flow and contaminant transport model WinTran, version 1.03 (1995) designed and distributed by Environmental Simulations, Inc. (ESI) of Herndon, Virginia. WinTran is built around a steady-state analytical element flow model, linked to a finite element contaminant transport model. The Windows interface allows for rapid data input, processing, parameter manipulation and optimization, and output in multiple formats. The fundamental mathematics of the model solutions, model verification (benchmarked against MODFLOW), and use of WinTran is documented in the "Guide to Using WinTran" published by ESI.

Base Map

A simplified site base map, edited with TurboCAD (Version 12), was exported to a universal drawing exchange file (DXF) file format. The DXF base map was imported into WinTran, which preserves the original units of measurement.

Model Input Parameters

The following table lists the various parameters input into the fate and transport model simulations.

Parameter	Value	Source of Data
Hydraulic Conductivity (K_x, K_y, K_z)	4.4 ft/day (1.2E-03 cm/sec)	Aquifer test (Appendix C)
Hydraulic Gradient	0.003 ft/ft	Observed and measured
Gradient Direction	56° south of due east (SE)	Observed and measured
Longitudinal Dispersivity	328 ft	Estimated plume length (2002)
Transverse Dispersivity	32.8 ft	One-tenth of longitudinal
Porosity	0.25	Professional judgement
Base elevation of aquifer	3250 ft AMSL	Observed and measured
Depth to groundwater	40 ft	Observed and measured
Saturated thickness	45 ft	Observed and measured
Model X Extent (100 nodes)	2.5 miles	Professional judgement
Model Y Extent (100 nodes)	2.5 miles	Professional judgement
Coefficient of molecular diffusion	0.34 ft^2/yr (1.0E-07 cm^2/sec)	Bear and Verruijt (1987)

Flow Parameters

Input requirements for the steady-state groundwater flow simulation include: hydraulic gradient and direction of flow, hydraulic conductivity, aquifer top and bottom elevations, and reference head. The values used were based on the following sources:

- Hydraulic gradient – measured gradient of 0.003 feet/foot based on historical site measurements.
- Direction of flow – measured direction of approximately 56° south of due east (SE) based on past local and current regional measurements.
- Hydraulic conductivity – This is one of the most critical parameters used for any fate and transport modeling effort, and the various published values researched range widely from less than 2 ft/day to 200 ft/day. Therefore an aquifer test was performed at two nearby industrial water supply wells (WW-1 and WW-5) to determine the most accurate site-specific value. A hydraulic conductivity of 4.4 ft/day was determined by performing a Cooper-Jacob analysis of the recovery data, and a program from USGS Open-File 02-197 (Keith Halford, 2002). Documentation of the aquifer test procedures, results, and USGS program is included in Appendix C).
- Aquifer top and bottom elevations – bottom elevation of Ogallala Formation at 3250 feet based on published information (Nicholson & Clebsch, 1961). The top elevation for an unconfined aquifer must be greater than the reference head. An elevation of 3400 feet was assumed.
- Reference head – measured unconfined head of 3345 feet located upgradient of the site so as not to be influenced by pumping wells during modeling simulations.

Transport Parameters

Input requirements for the contaminant transport numerical simulation include: longitudinal and transverse dispersivity, porosity, diffusion coefficient, contaminant half-life, and retardation coefficient. The values used were based on the following sources:

- Longitudinal and transverse dispersivity – Longitudinal dispersivity represents the spreading of the contaminant plume in the direction of groundwater flow. The transverse component represents spreading perpendicular to the flow direction. Dispersivity is a scale-dependent parameter which is generally larger as the scale of the contaminant plume increases. Fetter (1993, Section 2.11, pp. 71-77) notes the apparent scale-dependency of longitudinal dispersivity, which typically may be about 0.1 times the flow length. However, values of dispersivity reported in the literature generally range from 1 to 100 percent of the problem scale (Gelhar, 1986). For the current site scale, a conservative value of 328 feet (100 meters) was selected for longitudinal dispersivity. A value of 32.8 feet (i.e., 10 meters, or one-tenth of the longitudinal value) was selected for transverse dispersivity. These conservative values also minimized modeling transport errors.

- Porosity – no site measurements were available; therefore a literature value based on saturated zone lithology was selected. Typical lithology is described as silty sand and very fine sand. A range of 0.25 to 0.50 is typically given for unconsolidated "sand" (e.g., Freeze & Cherry, 1979, Table 2.4, p. 37); however, the Ogallala Formation is predominantly very fine grained, compacted and partly cemented, and may also fit within the range of 0.05 to 0.30 for sandstone. Fetter (1988, Table 4.3 and Figure 4.10, pp. 74-75) cites an average value of 0.20 for the specific yield of very fine sands. Specific retention of silty fine sand is approximately 0.05, for a total porosity of 0.25, which is the value selected for the transport modeling. WinTran uses the porosity term to estimate groundwater velocity, and actually requires an effective porosity value. Fetter (1988, Section 4.4, pp. 84-85) notes that pores of most sediments down to clay size are interconnected and that the effective porosity is virtually equal to the total porosity.

- Diffusion coefficient – occurs when a contaminant spreads in water due to concentration gradients. That is, dissolved contaminants will spread in water from areas of high concentration to areas of

lower concentration. This process is caused by random movement of molecules in a fluid. The coefficient of molecular diffusion (or simply the diffusion coefficient) is expressed in units of L^2/T (e.g., cm^2/s) and is often assumed to equal zero in advective-dominated transport. Only in very slow-moving groundwater is diffusion important. Bear and Verruijt (1987) estimate the diffusion coefficient to be approximately 1 x 10-5 cm^2/s (0.34 ft^2/yr) in dilute systems.

- Contaminant half-life – this parameter accounts for chemical decay (e.g., radioisotopes, biological transformation of organic molecules); however, the species of interest in the present case are inorganic ions (chloride) and are not expected to decay to any appreciable extent. A conservative value of 1000 years was used, which produces a negligible decay coefficient of less than 0.001 yr^{-1}.

- Retardation coefficient – this parameter accounts for sorption processes that slow the movement of contaminants relative to the groundwater velocity. Inorganic ions such as chloride are commonly taken as conservative tracers in groundwater and are not considered to be retarded; therefore, a value of 1.0 was selected for the retardation coefficient.

Flow Model Calibration

The vicinity of the site where water level measurements were recorded between October 2002 and August 2006 is simulated closely by the flow model.

Transport Model Calibration

The objective of the transport modeling was to first obtain a plume configuration with concentration values that closely match current observed values. This was done by importing a grid file created from an isopleth map using Surfer (version 6.04) contouring program, producing the configuration and constituent concentration distribution observed in October 2002 at the completion of the upgrade of the junction box. The model again ran for 4 years (2002 to 2006) after entering in the known concentrations at each of the three monitoring wells and other area wells (Targa water recovery wells and two monitoring wells from nearby Plains Petroleum sites, and a windmill east-southeast of the site).

Simulation of Fate and Transport

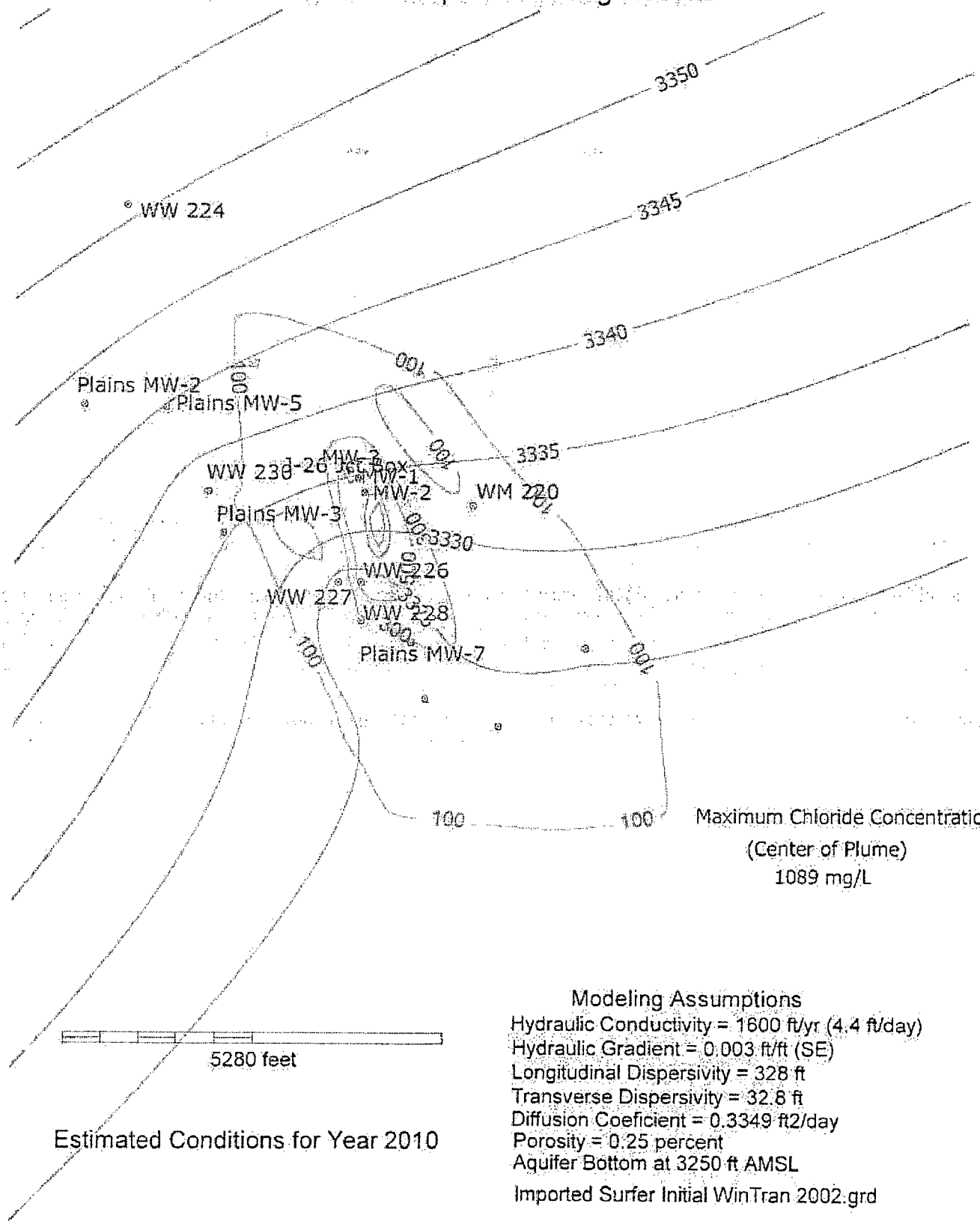
After model calibration, estimation of the fate and transport of chlorides was then achieved by restarting the transport model from the end of 2006 by retaining the distribution of contaminant mass and projecting into the future. Hydrodynamic dispersion serves to broaden the dimensions of the plume while reducing the concentrations in the middle of the plume. Advective flow moves the center of plume mass downgradient (southeast) while the groundwater withdrawal from the industrial supply wells directs the plume in a more southerly direction. Water supply wells WW-1 and WW-12 cause further dilution of the plume by directing the chloride mass transverse to the natural gradient direction. Similarly water supply wells WW-5 and WW-8 direct the chloride mass in a southerly direction. Various time increments were input to show the fate and transport of the chloride mass over a 41 year period (Years 2006 through 2047) after which the chloride plume center attenuated to a concentration of 276 mg/L (background conditions). Results of the fate and transport modeling output (Years 2010, 2015, 2020, 2025, 2030, 2035, 2040 and 2047) are depicted on site maps in the pages that follow.

For a hydraulic conductivity value of 4.4 ft/day the resultant average velocity is 14.9 ft/yr based on the darcy expression: $v = (k . i) / n$, where k is the hydraulic conductivity (ft/yr), i is the hydraulic gradient (ft/ft), and n is the effective porosity (unitless). The center of the modeled plume moves at a greater rate (22.8 ft/yr) over successive time intervals than the average groundwater velocity based on Darcy's law, due to the added effect of dispersion and the capture effect from the water supply wells.

The fate and transport model simulations demonstrate how chloride concentrations in the center of the plume will decrease to background levels by the year 2047 as the mass of the plume is captured by the water supply wells and does not migrate beyond them. These results strongly support the evidence that the chloride plume is not likely to impact any existing sources of water supply, the closest of which is a windmill (NM File No. CP-220) located approximately 1,610 feet east of the Jct. J-26 site. This windmill, which is used for livestock watering, is cross-gradient from the junction box and, therefore not in the direct path of the simulated plume.

It is not necessary to simulate the fate and transport of TDS because those concentrations are closer to meeting background concentrations in comparison with chloride values. In other words, the standard for TDS concentrations will be met before those for chloride concentrations.

BD J-26 Junction Box Site
WinTran Fate & Transport Modeling Results

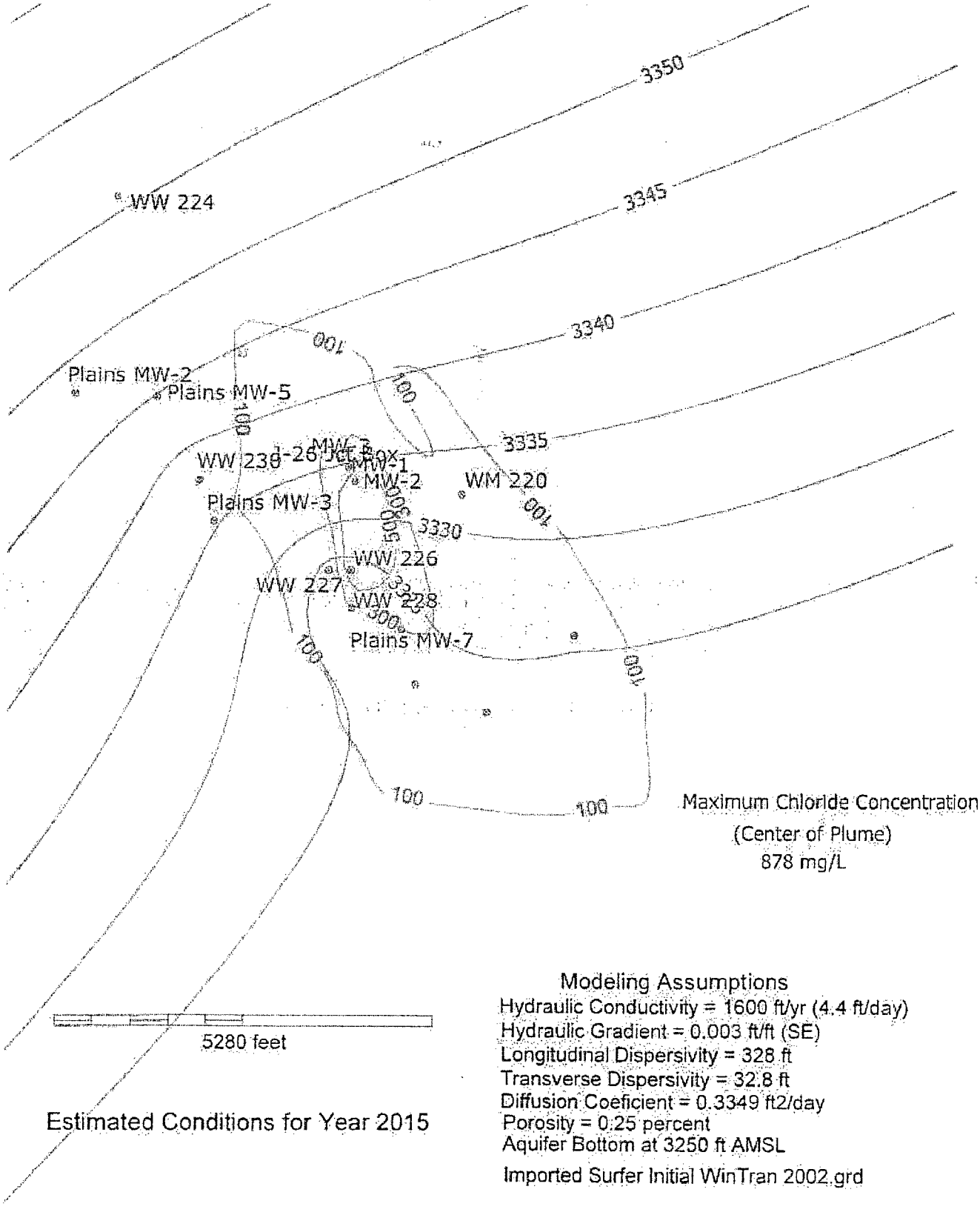


Maximum Chloride Concentration
(Center of Plume)
1089 mg/L

Estimated Conditions for Year 2010

Modeling Assumptions
Hydraulic Conductivity = 1600 ft/yr (4.4 ft/day)
Hydraulic Gradient = 0.003 ft/ft (SE)
Longitudinal Dispersivity = 328 ft
Transverse Dispersivity = 32.8 ft
Diffusion Coeficient = 0.3349 ft2/day
Porosity = 0.25 percent
Aquifer Bottom at 3250 ft AMSL
Imported Surfer Initial WinTran 2002.grd

BD J-26 Junction Box Site
WinTran Fate & Transport Modeling Results



Maximum Chloride Concentration
(Center of Plume)
878 mg/L

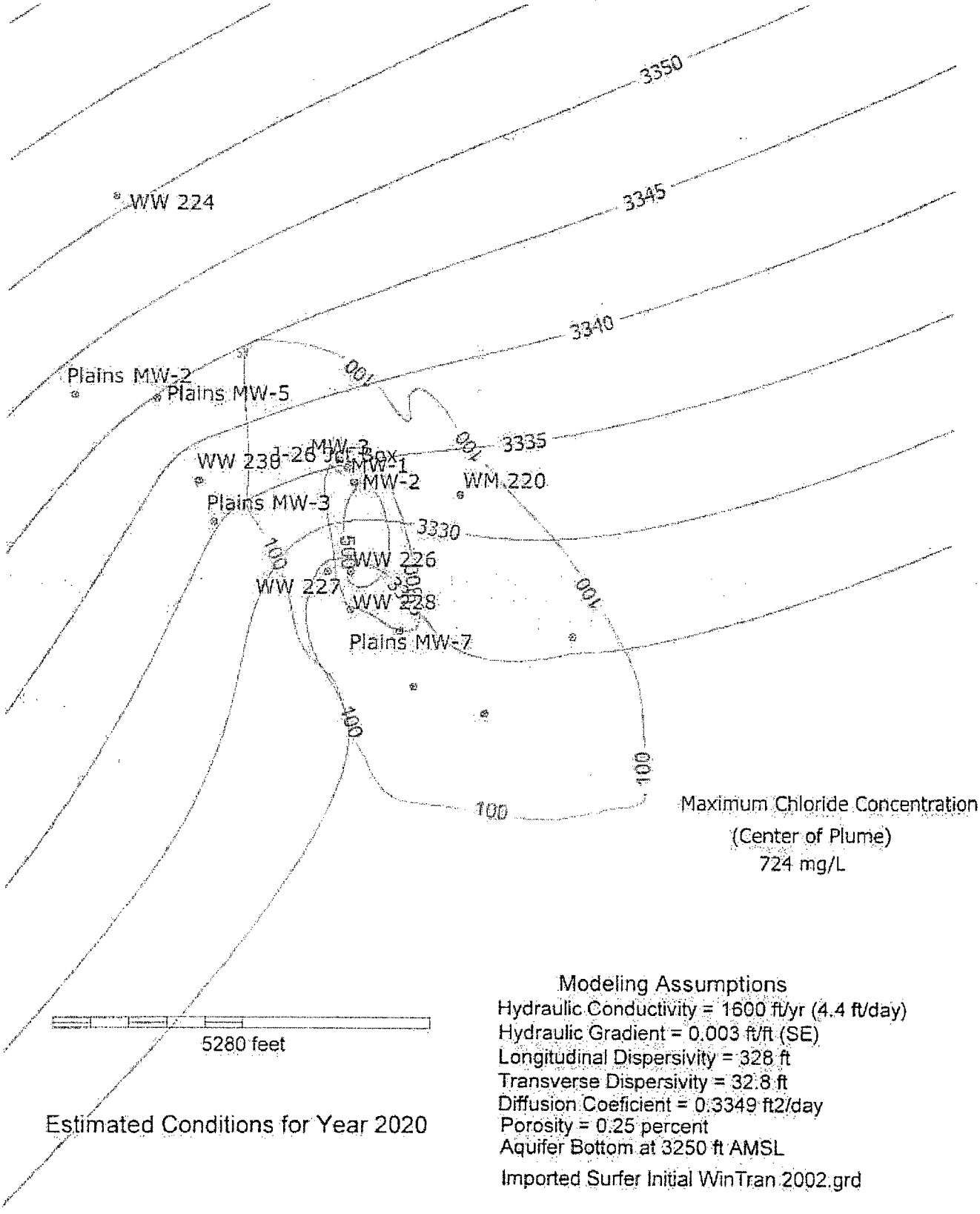
Estimated Conditions for Year 2015

Modeling Assumptions

Hydraulic Conductivity = 1600 ft/yr (4.4 ft/day)
Hydraulic Gradient = 0.003 ft/ft (SE)
Longitudinal Dispersivity = 328 ft
Transverse Dispersivity = 32.8 ft
Diffusion Coeficient = 0.3349 ft2/day
Porosity = 0.25 percent
Aquifer Bottom at 3250 ft AMSL

Imported Surfer Initial WinTran 2002.grd

BD J-26 Junction Box Site
WinTran Fate & Transport Modeling Results



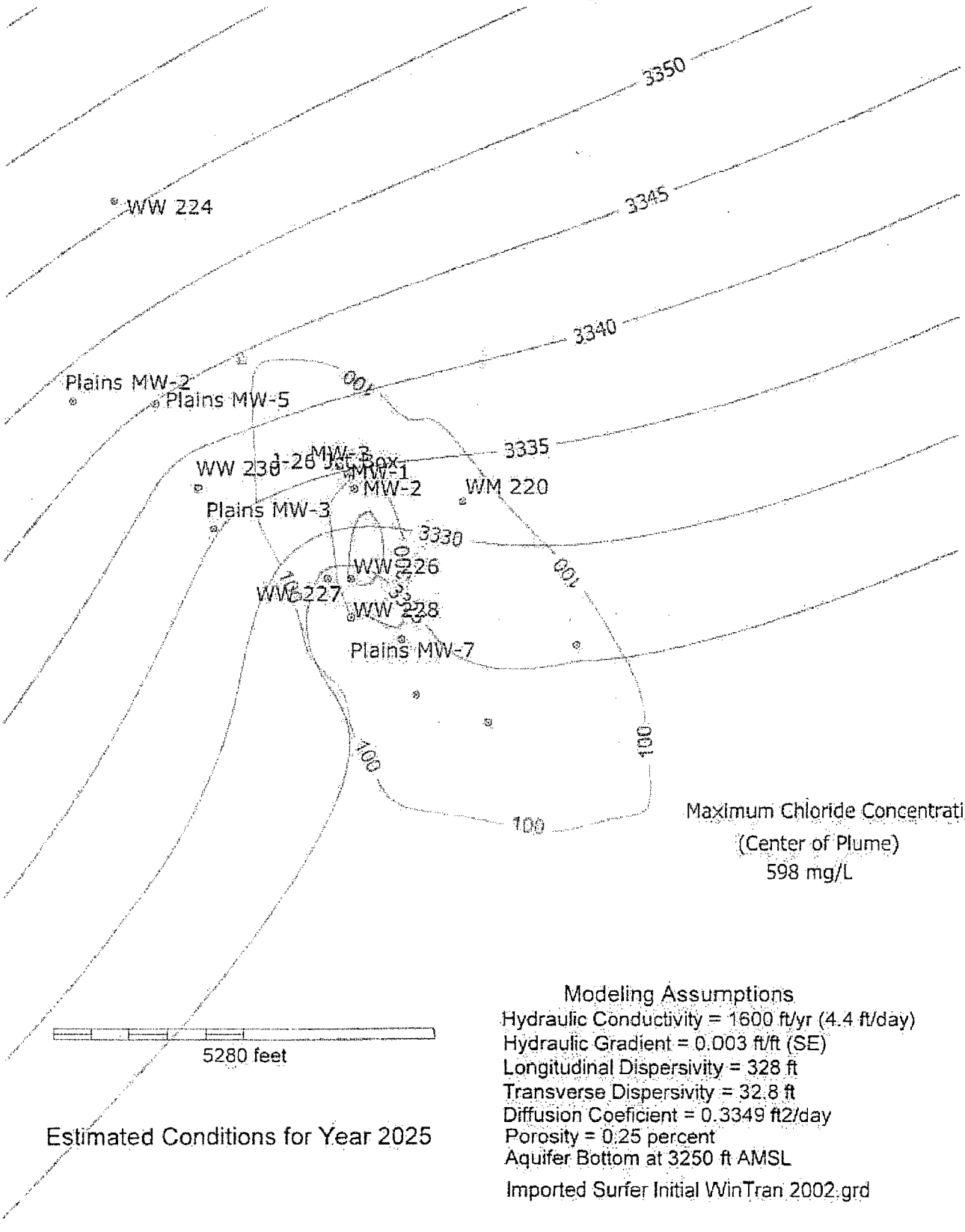
Estimated Conditions for Year 2020

Modeling Assumptions

Hydraulic Conductivity = 1600 ft/yr (4.4 ft/day)
Hydraulic Gradient = 0.003 ft/ft (SE)
Longitudinal Dispersivity = 328 ft
Transverse Dispersivity = 32.8 ft
Diffusion Coeficient = 0.3349 ft2/day
Porosity = 0.25 percent
Aquifer Bottom at 3250 ft AMSL

Imported Surfer Initial WinTran 2002.grd

BD J-26 Junction Box Site
WinTran Fate & Transport Modeling Results

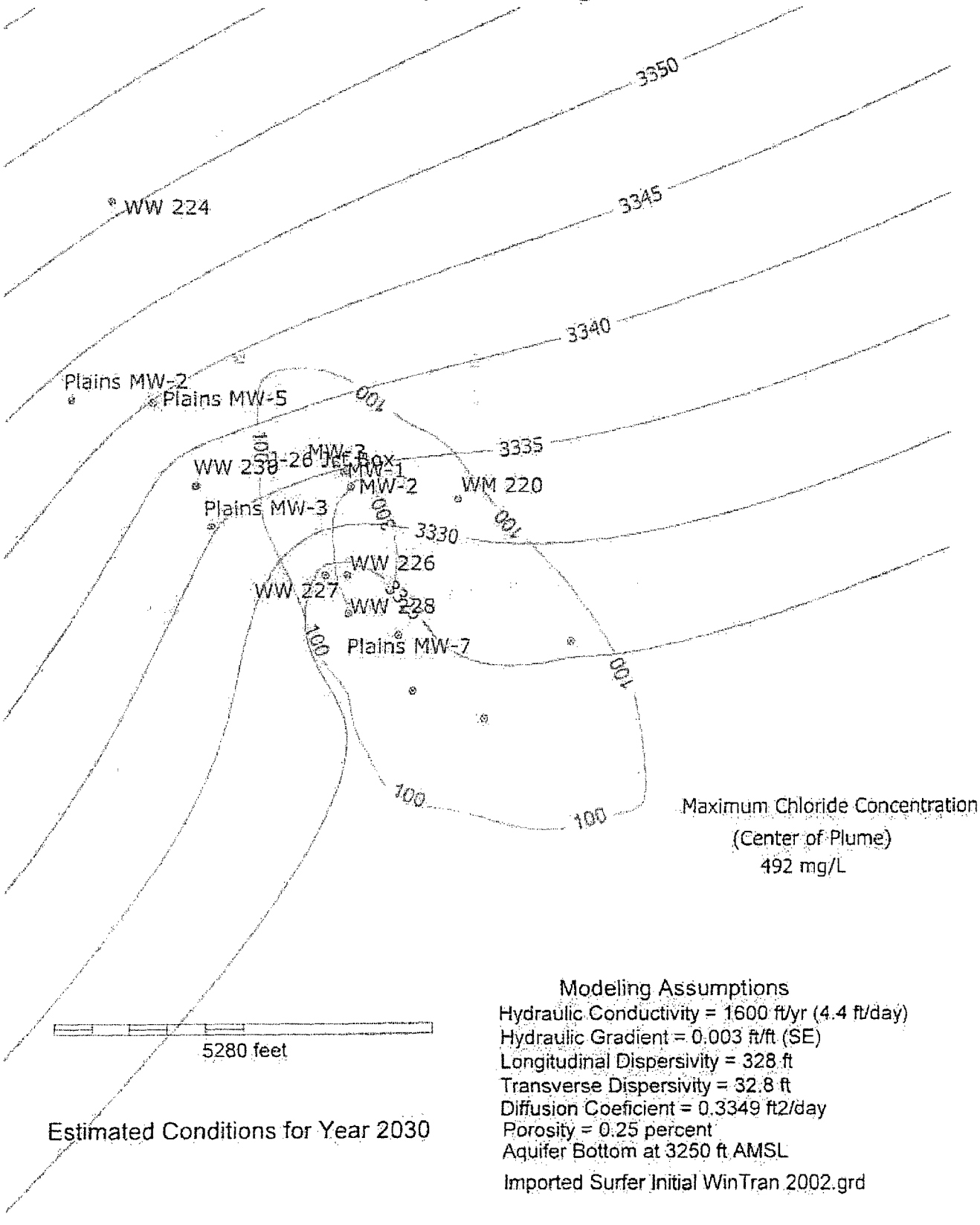


Maximum Chloride Concentration
(Center of Plume)
598 mg/L

Estimated Conditions for Year 2025

Modeling Assumptions
Hydraulic Conductivity = 1600 ft/yr (4.4 ft/day)
Hydraulic Gradient = 0.003 ft/ft (SE)
Longitudinal Dispersivity = 328 ft
Transverse Dispersivity = 32.8 ft
Diffusion Coeficient = 0.3349 ft2/day
Porosity = 0.25 percent
Aquifer Bottom at 3250 ft AMSL
Imported Surfer Initial WinTran 2002.grd

BD J-26 Junction Box Site
WinTran Fate & Transport Modeling Results



Maximum Chloride Concentration
(Center of Plume)
492 mg/L

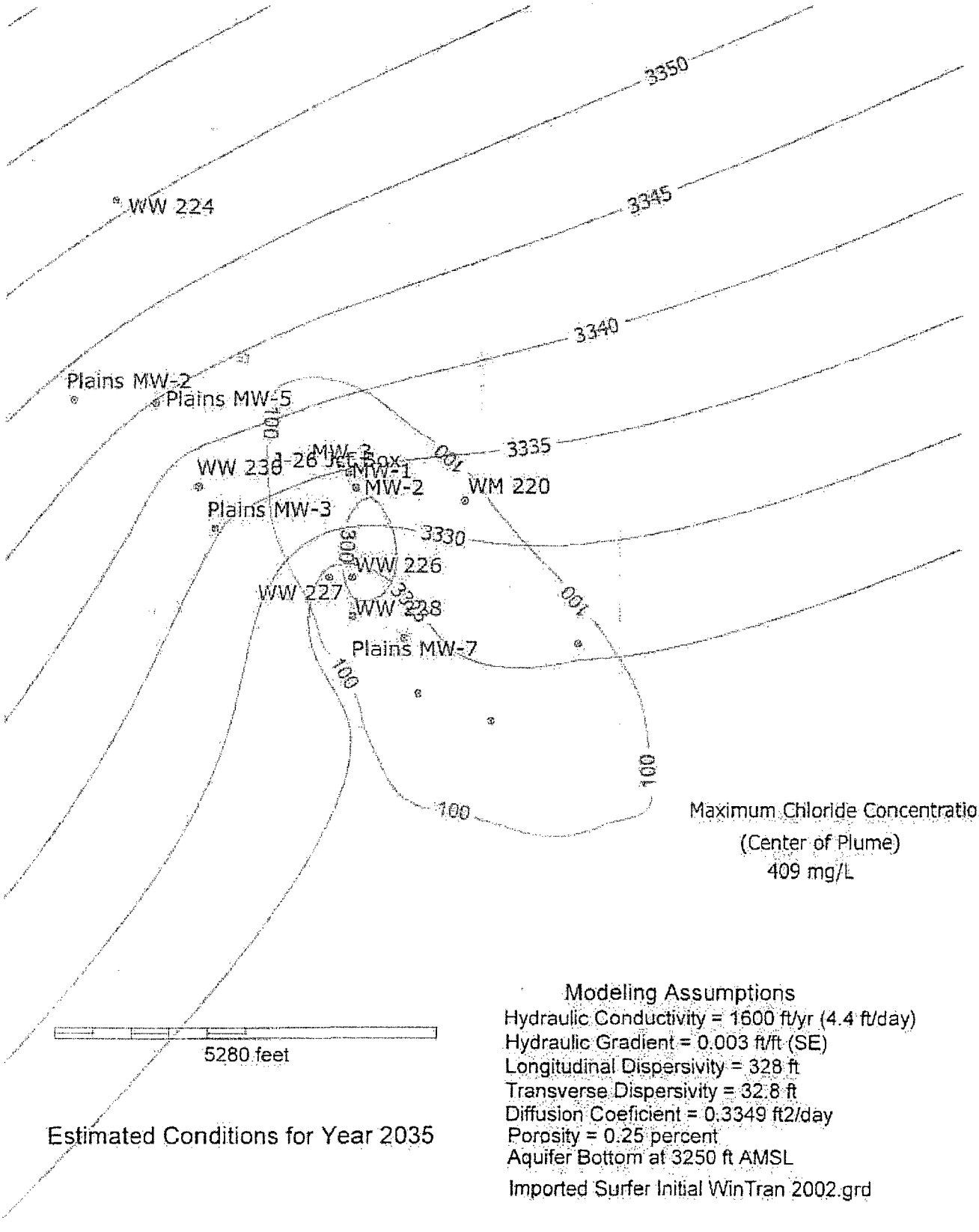
Estimated Conditions for Year 2030

Modeling Assumptions

Hydraulic Conductivity = 1600 ft/yr (4.4 ft/day)
Hydraulic Gradient = 0.003 ft/ft (SE)
Longitudinal Dispersivity = 328 ft
Transverse Dispersivity = 32.8 ft
Diffusion Coeficient = 0.3349 ft2/day
Porosity = 0.25 percent
Aquifer Bottom at 3250 ft AMSL

Imported Surfer Initial WinTran 2002.grd

BD J-26 Junction Box Site
WinTran Fate & Transport Modeling Results



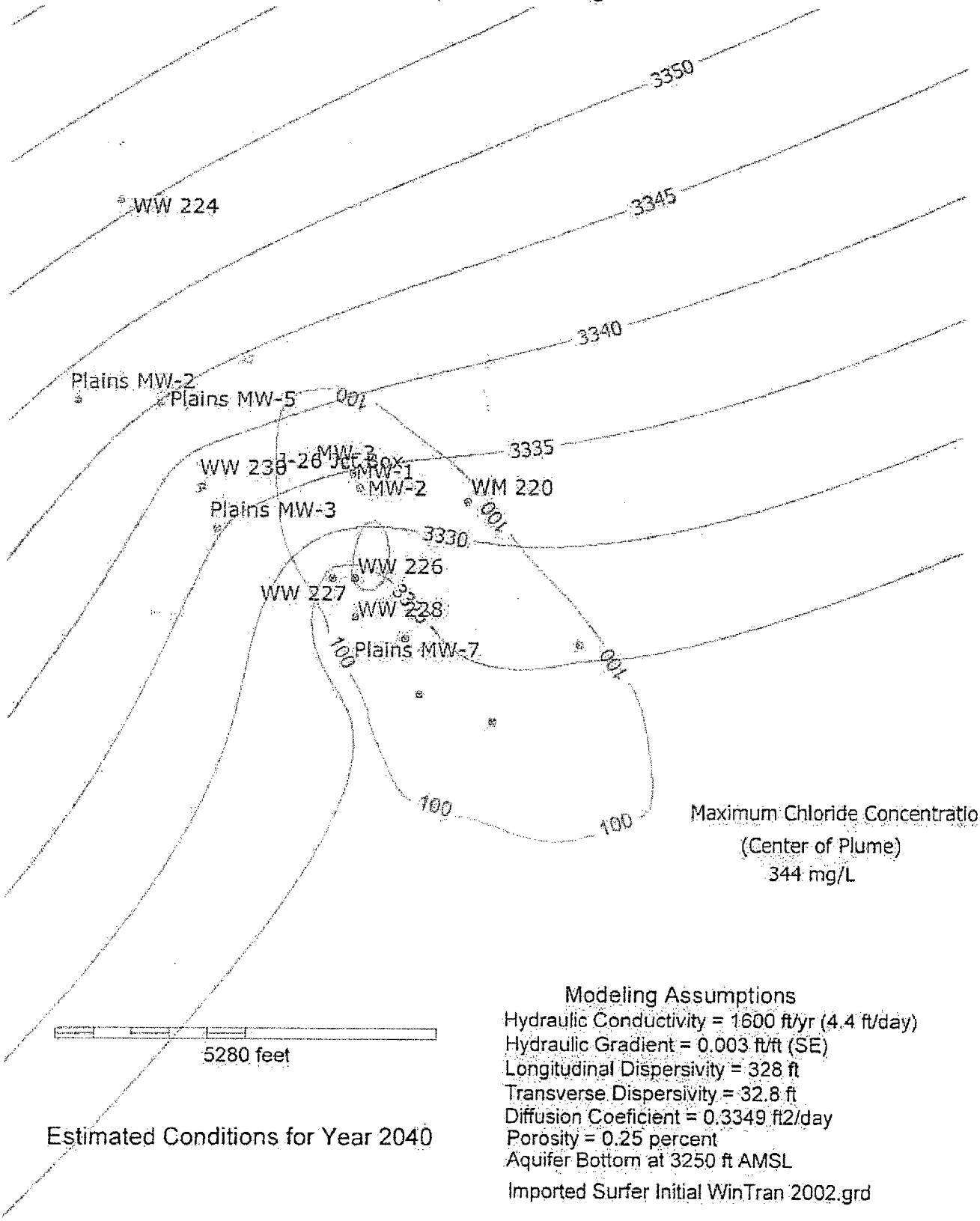
Maximum Chloride Concentration
(Center of Plume)
409 mg/L

Estimated Conditions for Year 2035

Modeling Assumptions

Hydraulic Conductivity = 1600 ft/yr (4.4 ft/day)
Hydraulic Gradient = 0.003 ft/ft (SE)
Longitudinal Dispersivity = 328 ft
Transverse Dispersivity = 32.8 ft
Diffusion Coeficient = 0.3349 ft2/day
Porosity = 0.25 percent
Aquifer Bottom at 3250 ft AMSL
Imported Surfer Initial WinTran 2002.grd

BD J-26 Junction Box Site
WinTran Fate & Transport Modeling Results



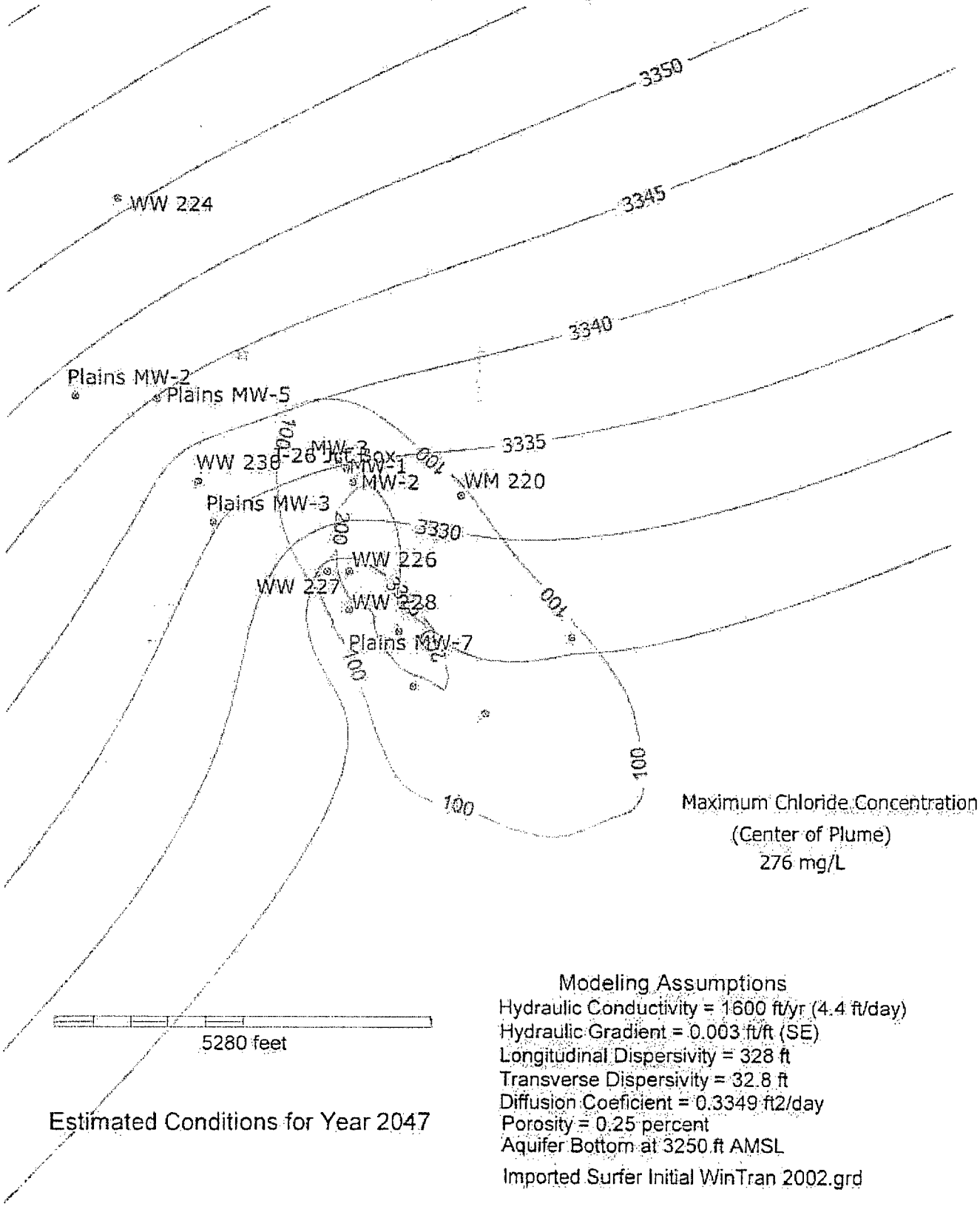
Maximum Chloride Concentration
(Center of Plume)
344 mg/L

Estimated Conditions for Year 2040

Modeling Assumptions

Hydraulic Conductivity = 1600 ft/yr (4.4 ft/day)
Hydraulic Gradient = 0.003 ft/ft (SE)
Longitudinal Dispersivity = 328 ft
Transverse Dispersivity = 32.8 ft
Diffusion Coeficient = 0.3349 ft2/day
Porosity = 0.25 percent
Aquifer Bottom at 3250 ft AMSL
Imported Surfer Initial WinTran 2002.grd

BD J-26 Junction Box Site
WinTran Fate & Transport Modeling Results



Maximum Chloride Concentration
(Center of Plume)
276 mg/L

Estimated Conditions for Year 2047

Modeling Assumptions
Hydraulic Conductivity = 1600 ft/yr (4.4 ft/day)
Hydraulic Gradient = 0.003 ft/ft (SE)
Longitudinal Dispersivity = 328 ft
Transverse Dispersivity = 32.8 ft
Diffusion Coeficient = 0.3349 ft2/day
Porosity = 0.25 percent
Aquifer Bottom at 3250 ft AMSL
Imported Surfer Initial WinTran 2002.grd

WinTran
Analytical Model of 2D Ground-Water Flow and
Finite-Element Contaminant Transport Model

Developed by

James O. Rumbaugh, III

Douglas B. Rumbaugh

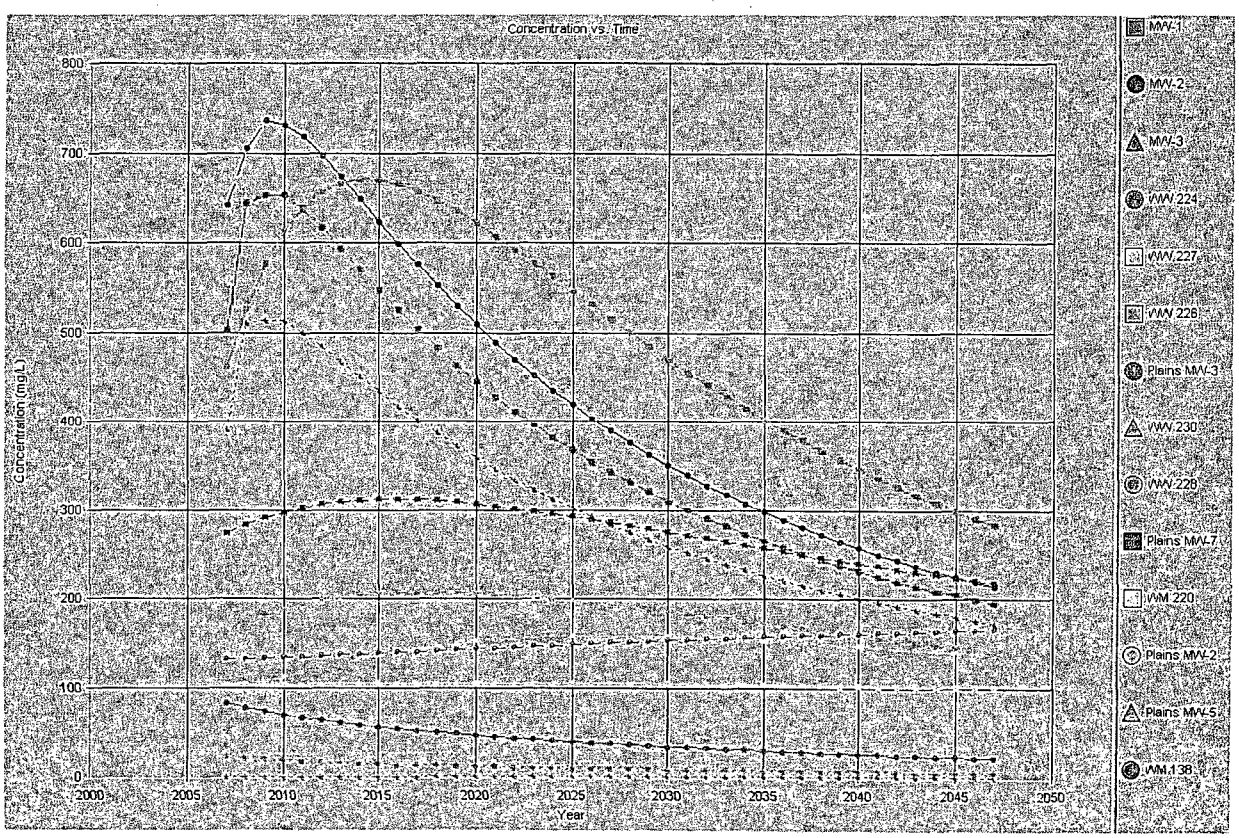
Model performed by: Trident Environmental (Gilbert Van Deventer)

Date: 03/02/07

Time: 13:19:54.00

Input File: 2006 CHLORIDE J26

Map File : D:\PROJECTS\RICE\BD\J-26\WINTRAN RESULTS\WINTRAN2002BASE.MAP



==========

Model Entities

Number of Wells = 17

Well #1
Center of Well -- x: 3873.000000 y: 5443.000000
Radius = 0.083330
Pumping Rate = 0.000000
Concentration of Injected Water = 218.000000
Head at Well Radius = 3334.738437

Well #2
Center of Well -- x: 3969.000000 y: 5243.000000
Radius = 0.083330
Pumping Rate = 0.000000
Concentration of Injected Water = 387.000000
Head at Well Radius = 3333.495421

Well #3
Center of Well -- x: 3764.000000 y: 5540.000000
Radius = 0.083330
Pumping Rate = 0.000000
Concentration of Injected Water = 141.000000
Head at Well Radius = 3335.402430

Well #4
Center of Well -- x: 631.000000 y: 9185.000000
Radius = 0.083330
Pumping Rate = 0.000000
Concentration of Injected Water = 302.000000
Head at Well Radius = 3355.727045

Well #5
Center of Well -- x: 3611.000000 y: 4012.000000
Radius = 0.375000
Pumping Rate = 721412.000000
Concentration of Injected Water = 181.000000
Head at Well Radius = 3318.357873

Well #6
Center of Well -- x: 3921.000000 y: 4012.000000
Radius = 0.375000
Pumping Rate = 543819.000000
Concentration of Injected Water = 225.000000
Head at Well Radius = 3318.856940

Well #7
Center of Well -- x: 2012.000000 y: 4694.000000
Radius = 0.083330
Pumping Rate = 0.000000
Concentration of Injected Water = 322.000000
Head at Well Radius = 3335.282440

Well #8
Center of Well -- x: 1802.000000 y: 5262.000000
Radius = 0.375000
Pumping Rate = 1202639.000000
Concentration of Injected Water = 187.000000
Head at Well Radius = 3328.076355

Well #9
Center of Well -- x: 3927.000000 y: 3481.000000
Radius = 0.375000
Pumping Rate = 2748248.000000
Concentration of Injected Water = 308.000000
Head at Well Radius = 3289.944035

Well #10
Center of Well -- x: 4628.000000 y: 3178.000000
Radius = 0.083330

```
      Pumping Rate = 0.000000
      Concentration of Injected Water = 450.000000
      Head at Well Radius           = 3323.670009
   Well #11
      Center of Well --  x: 5472.000000   y: 5065.000000
      Radius = 0.250000
      Pumping Rate = 1000.000000
      Concentration of Injected Water = 620.000000
      Head at Well Radius           = 3332.262314
   Well #12
      Center of Well --  x: 60.000000   y: 6446.000000
      Radius = 0.083330
      Pumping Rate = 0.000000
      Concentration of Injected Water = 269.000000
      Head at Well Radius           = 3348.295561
   Well #13
      Center of Well --  x: 1205.000000   y: 6403.000000
      Radius = 0.083330
      Pumping Rate = 0.000000
      Concentration of Injected Water = 225.000000
      Head at Well Radius           = 3344.810629
   Well #14
      Center of Well --  x: 4829.000000   y: 2410.000000
      Radius = 0.250000
      Pumping Rate = 0.000000
      Concentration of Injected Water = 341.000000
      Head at Well Radius           = 3324.074809
   Well #15
      Center of Well --  x: 5838.000000   y: 2032.000000
      Radius = 0.250000
      Pumping Rate = 0.000000
      Concentration of Injected Water = 971.000000
      Head at Well Radius           = 3323.649345
   Well #16
      Center of Well --  x: 7050.000000   y: 3103.000000
      Radius = 0.375000
      Pumping Rate = 100000.000000
      Concentration of Injected Water = 405.000000
      Head at Well Radius           = 3324.822825
   Well #17
      Center of Well --  x: 3914.520000   y: 5464.310000
      Radius = 4.000000
      Pumping Rate = 0.000000
      Concentration of Injected Water = 60000.000000
      Head at Well Radius           = 3334.824298

Reference Head = 3345.000000    Defined at -- x: 2360.290000   y: 7094.260000
```

Aquifer Properties

.... Steady-State Flow Model ....

Permeability.....= 1606.000000 [L/T]
Porosity.....= 0.250000
Elevation of Aquifer Top....= 3400.000000
Elevation of Aquifer Bottom.= 3250.000000
Uniform Regional Gradient...= 0.003000
Angle of Uniform Gradient...= 304.000000
Recharge.....= 0.000000

.... Transient Transport Model ....

Longitudinal Dispersivity...= 328.000000 [L]
Transverse Dispersivity.....= 32.800000 [L]
Diffusion Coefficient.....= 0.000000 [L2/T]
Contaminant half-life..... = 0.000000 [T]
Retardation Coefficient.....= 1.000000
Upstream Weighting in X.....= 0.000000
Upstream Weighting in Y.....= 0.000000

.... Time Stepping Information ....

Number of time steps.....= 41
Starting time value.....= 2006.000000
Initial time step size.....= 1.000000
Time step multiplier..... = 1.000000
Maximum time step size.....= 1.000000
Time stepping scheme.....= Central Differencing

.... Simulation Summary ....

Starting time.....= 2006.000000
Ending time.....= 2047.000000
Number of time steps.....= 41

(NOTE: following mass balance errors expressed as percent)
Transport Mass Balance Error= 7.032368

Peclet Criterion.....= 0.516657
Courant Number.....= 0.867743
Flow Model Type.....= Analytic Element

APPENDIX B

Documentation of WinTran (Version 1.03) Fate and Transport Model Capabilities and Benchmarking

Attached as separate Adobe Reader file in pdf format (What is WinTran.pdf)

APPENDIX C

Aquifer Test Procedures and Output

Description of Aquifer Test

Hydraulic conductivity is one of the most critical parameters used for any fate and transport modeling effort, and the various published values researched range widely over two orders of magnitude, from less than 2 ft/day to 200 ft/day. Therefore, an aquifer test at two nearby industrial water supply wells (WW-1 and WW-5) was performed on November 22, 2006, to determine site-specific hydraulic conductivity. There were several advantages in using these wells as follows:

- Each well is fully penetrating (screened across entire thickness of the aquifer)
- The wells had been reportedly running continuously for over 16-20 hours prior to recording the recovery drawdown data.
- The wells are located nearby the Jct. J-26 site thus available for site-specific testing.
- The wells were constructed efficiently as they are designed to provide maximum yields for supply to the Eunice Gas Plant.
- The wells play a useful role in abatement of chlorides and TDS in the area.

The wells had been running continuously for about 16-20 hrs according to the Eunice Gas Plant personnel who graciously allowed access to their wells for aquifer testing. Immediately prior to turning off the pump in each well, depth to groundwater was measured using an electronic water level indicator. A 10 psi pressure transducer and Hermit 2000 Data logger were then used to capture and record the recovery drawdown data. This instrumentation made it possible to obtain many data points early on in the test (first few minutes) which was essential for subsequent analysis and interpretation of the results. Data was recorded immediately after the water well pump was turned off to provide recovery drawdown data. Collection of data was terminated after the water table equilibrated to near static conditions; consequently the tests were of relatively short duration (less than 1 hour).

Hydraulic conductivity values were determined using a Cooper-Jacob analysis of the recovery data, and a program from USGS Open-File 02-197 (Keith Halford, 2002, documentation attached in Appendix C). The USGS program uses Thiem's equation and the Cooper-Jacob plotting methods for determining hydraulic conductivity. Results of the aquifer test analysis are shown on the following graphs and tables attached herein. The slope near the earlier time drawdown data (within the first few minutes of the test) provided the best estimation. Note that the time axis is plotted as t/t' so time increases from right to left. This is the preferred method to analyze recovery data from a pumping well.

Hydraulic conductivity values of 3.4 ft/day and 4.4 ft/day were calculated from water supply wells WW-1 and WW-5, respectively. Results from water supply well WW-1 probably provided better data because that well was pumping at a rate that stressed the aquifer, that is, the pumping water level was over 9 feet below the static level, whereas with WW-5 the pumping level was less than 2 feet from static. Either way the results from both tests are consistent with each other. The higher hydraulic conductivity value of 4.4 ft/day was used in the fate and transport modeling because it provided a more conservative value.

WELL ID: WW-1

Local ID: T21S-R37E-Section 26-J
Date: 11/22/06
Time: 2:00 PM

INPUT

Construction:	
Casing dia. (d_c)	8 Inch
Annulus dia. (d_w)	8 Inch
Screen Length (L)	40 Feet
Depths to:	
water level (DTW)	45 Feet
Top of Aquifer	45 Feet
Base of Aquifer	85 Feet
Annular Fill:	
across screen --	Gravel
above screen --	Cement
Aquifer Material --	Fine Sand
FLOW RATE	53 GPM

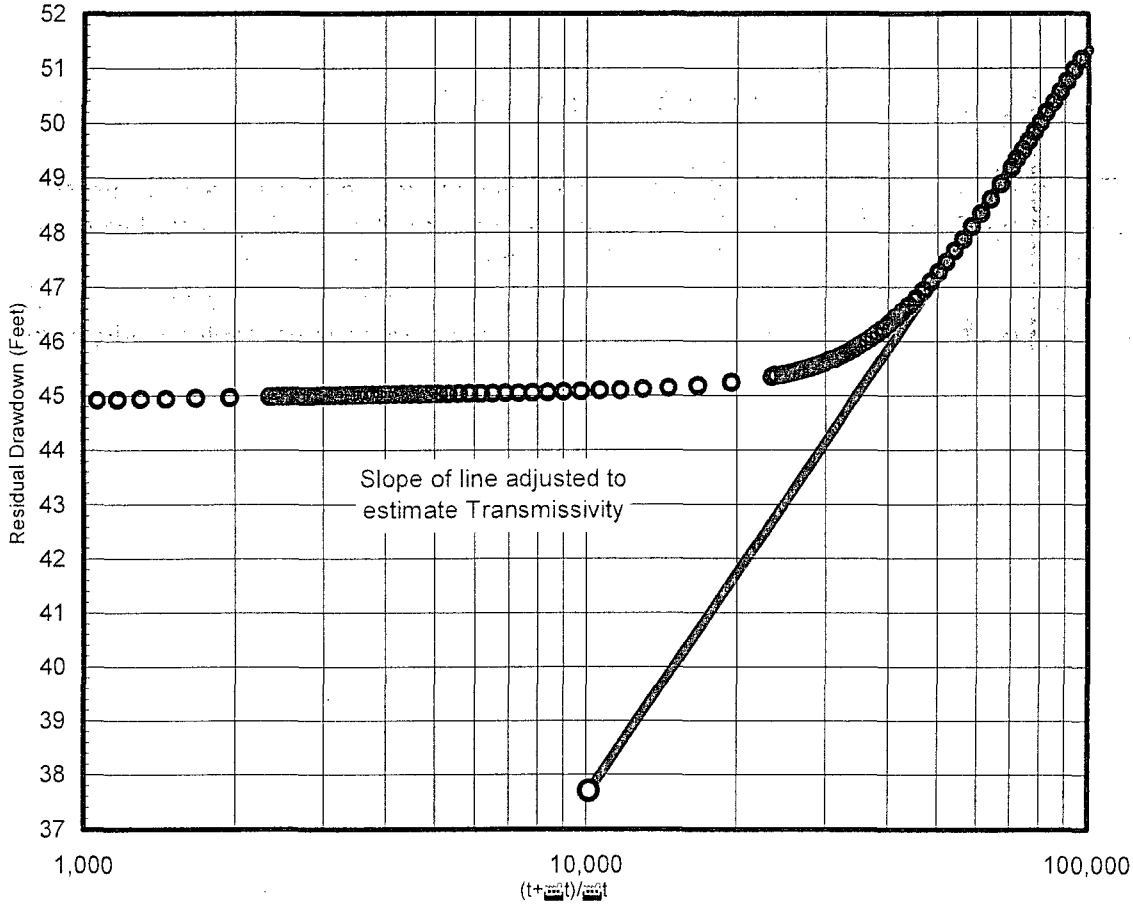
COMPUTED

Aquifer thickness = 40 Feet

Slope = 13.708543 Feet/log10

Input is consistent.

K =	3.4 Feet/Day
T =	140 Feet²/Day



REMARKS: Cooper-Jacob recovery analysis of single-well aquifer test

This recovery test was done on a water supply well (WW-1) that had been running continuously at ~53 gpm for 16-20 hours. A Hermit 2000 data logger was used to record the water level data for the length of the test (~50 minutes).

Depth to water before shutting off pump 54.09 ft (t = 0 min).

Depth to water at end of recovery test 44.84 ft (t = 50 min).

Raw input recovery data for water supply well WW-1

Entry	Reduced Data Time, Date Hr:Min:Sec	Water Level Feet	Entry	Time, Date Hr:Min:Sec	Water Level Feet	Entry	Time, Date Hr:Min:Sec	Water Level Feet
1	1/0/00 0:00:00	0.00	51	11/22/06 14:00:44	45.71	101	11/22/06 14:07:48	45.00
2	11/22/06 14:00:00	54.09	52	11/22/06 14:00:45	45.67	102	11/22/06 14:08:00	45.00
3	11/22/06 14:00:08	54.09	53	11/22/06 14:00:46	45.65	103	11/22/06 14:08:12	44.99
4	11/22/06 14:00:08	53.99	54	11/22/06 14:00:47	45.61	104	11/22/06 14:08:24	44.99
5	11/22/06 14:00:09	53.74	55	11/22/06 14:00:48	45.57	105	11/22/06 14:08:36	44.99
6	11/22/06 14:00:09	53.47	56	11/22/06 14:00:49	45.55	106	11/22/06 14:08:48	44.99
7	11/22/06 14:00:10	53.22	57	11/22/06 14:00:50	45.52	107	11/22/06 14:09:00	44.99
8	11/22/06 14:00:11	52.96	58	11/22/06 14:00:51	45.50	108	11/22/06 14:09:12	44.99
9	11/22/06 14:00:11	52.72	59	11/22/06 14:00:52	45.47	109	11/22/06 14:09:24	44.99
10	11/22/06 14:00:11	52.48	60	11/22/06 14:00:53	45.45	110	11/22/06 14:09:36	44.99
11	11/22/06 14:00:12	52.25	61	11/22/06 14:00:54	45.43	111	11/22/06 14:09:48	44.99
12	11/22/06 14:00:12	52.02	62	11/22/06 14:00:55	45.42	112	11/22/06 14:10:00	44.98
13	11/22/06 14:00:13	51.80	63	11/22/06 14:00:56	45.40	113	11/22/06 14:12:00	44.96
14	11/22/06 14:00:14	51.59	64	11/22/06 14:00:57	45.38	114	11/22/06 14:14:00	44.96
15	11/22/06 14:00:14	51.37	65	11/22/06 14:00:59	45.36	115	11/22/06 14:16:00	44.94
16	11/22/06 14:00:14	51.16	66	11/22/06 14:00:59	45.37	116	11/22/06 14:18:00	44.94
17	11/22/06 14:00:15	50.96	67	11/22/06 14:01:00	45.34	117	11/22/06 14:20:00	44.93
18	11/22/06 14:00:15	50.76	68	11/22/06 14:01:12	45.24	118	11/22/06 14:22:00	44.92
19	11/22/06 14:00:16	50.56	69	11/22/06 14:01:24	45.18	119	11/22/06 14:24:00	44.91
20	11/22/06 14:00:17	50.37	70	11/22/06 14:01:36	45.14	120	11/22/06 14:26:00	44.90
21	11/22/06 14:00:17	50.19	71	11/22/06 14:01:48	45.12	121	11/22/06 14:28:00	44.89
22	11/22/06 14:00:17	50.01	72	11/22/06 14:02:00	45.10	122	11/22/06 14:30:00	44.89
23	11/22/06 14:00:18	49.84	73	11/22/06 14:02:12	45.09	123	11/22/06 14:34:00	44.88
24	11/22/06 14:00:18	49.67	74	11/22/06 14:02:24	45.08	124	11/22/06 14:36:00	44.87
25	11/22/06 14:00:19	49.50	75	11/22/06 14:02:36	45.07	125	11/22/06 14:38:00	44.86
26	11/22/06 14:00:20	49.34	76	11/22/06 14:02:48	45.06	126	11/22/06 14:40:00	44.86
27	11/22/06 14:00:20	49.18	77	11/22/06 14:03:00	45.05	127	11/22/06 14:42:00	44.86
28	11/22/06 14:00:21	48.89	78	11/22/06 14:03:12	45.05	128	11/22/06 14:44:00	44.85
29	11/22/06 14:00:22	48.61	79	11/22/06 14:03:24	45.05	129	11/22/06 14:46:00	44.84
30	11/22/06 14:00:23	48.34	80	11/22/06 14:03:36	45.04	130	11/22/06 14:48:00	44.84
31	11/22/06 14:00:24	48.10	81	11/22/06 14:03:48	45.04	131	11/22/06 14:50:00	44.84
32	11/22/06 14:00:25	47.87	82	11/22/06 14:04:00	45.04			
33	11/22/06 14:00:26	47.66	83	11/22/06 14:04:12	45.04			
34	11/22/06 14:00:27	47.46	84	11/22/06 14:04:24	45.03			
35	11/22/06 14:00:28	47.27	85	11/22/06 14:04:36	45.03			
36	11/22/06 14:00:29	47.10	86	11/22/06 14:04:48	45.03			
37	11/22/06 14:00:30	46.94	87	11/22/06 14:05:00	45.03			
38	11/22/06 14:00:31	46.80	88	11/22/06 14:05:12	45.02			
39	11/22/06 14:00:32	46.66	89	11/22/06 14:05:24	45.02			
40	11/22/06 14:00:33	46.55	90	11/22/06 14:05:36	45.02			
41	11/22/06 14:00:34	46.43	91	11/22/06 14:05:48	45.02			
42	11/22/06 14:00:35	46.32	92	11/22/06 14:06:00	45.02			
43	11/22/06 14:00:36	46.23	93	11/22/06 14:06:12	45.02			
44	11/22/06 14:00:37	46.14	94	11/22/06 14:06:24	45.01			
45	11/22/06 14:00:38	46.06	95	11/22/06 14:06:36	45.01			
46	11/22/06 14:00:39	45.99	96	11/22/06 14:06:48	45.01			
47	11/22/06 14:00:40	45.92	97	11/22/06 14:07:00	45.01			
48	11/22/06 14:00:41	45.86	98	11/22/06 14:07:12	45.00			
49	11/22/06 14:00:42	45.81	99	11/22/06 14:07:24	45.00			
50	11/22/06 14:00:43	45.76	100	11/22/06 14:07:36	45.00			

WELL ID: WW-5

Local ID: T21S-R37E-Section 26-J
Date: 11/22/06
Time: 11:00 AM

INPUT

Construction:

Casing dia. (d_c)	8 Inch
Annulus dia. (d_w)	8 Inch
Screen Length (L)	34 Feet

Depths to:

water level (DTW)	46 Feet
Top of Aquifer	46 Feet
Base of Aquifer	80 Feet

Annular Fill:

across screen -- Gravel
above screen -- Cement

Aquifer Material -- Fine Sand

FLOW RATE 20 GPM

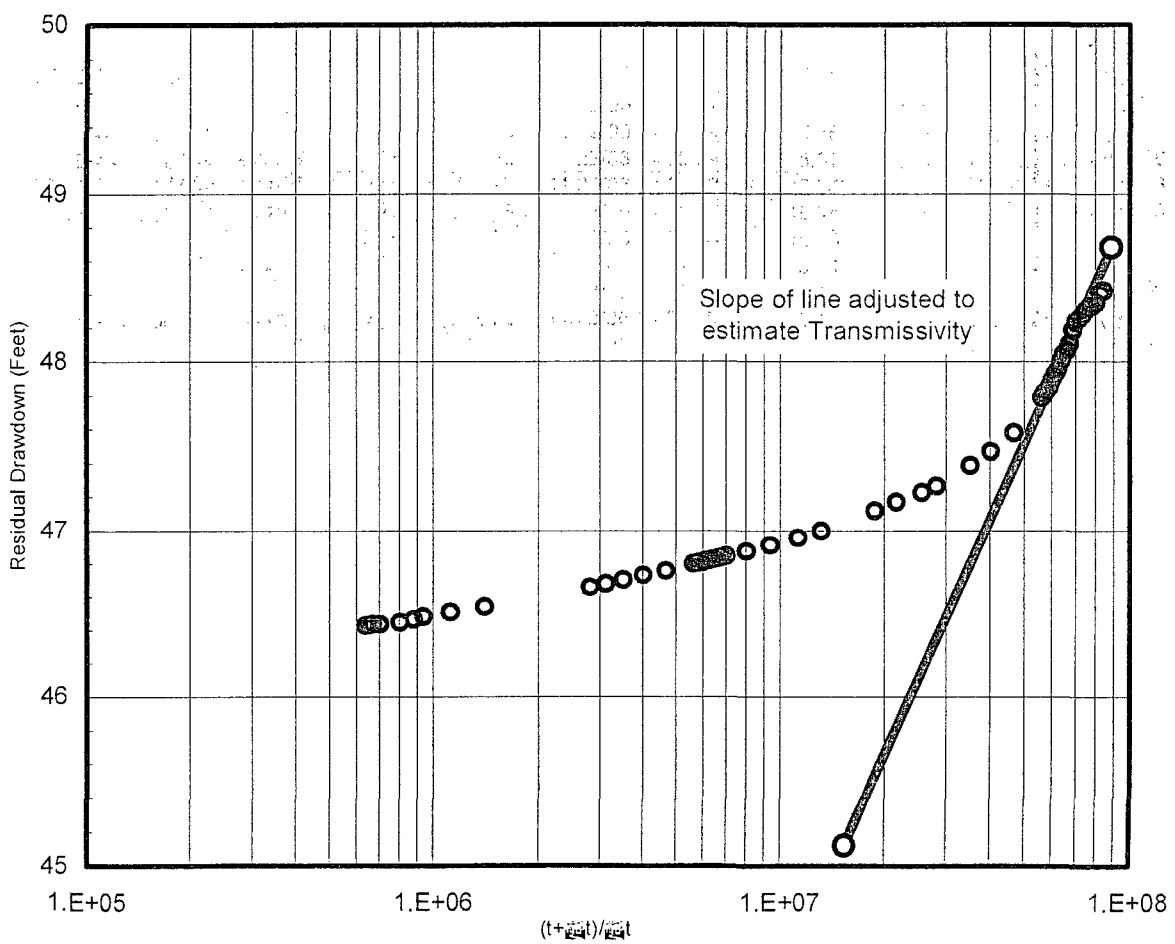
COMPUTED

Aquifer thickness = 34 Feet

Slope = 4.6657929 Feet/log10

Input is consistent.

K =	4.4 Feet/Day
T =	150 Feet²/Day



REMARKS: Cooper-Jacob recovery analysis of single-well aquifer test

This recovery test was done on a water supply well (WW-1) that had been running continuously at ~53 gpm for 16-20 hours. A Hermit 2000 data logger was used to record the water level data for the length of the test (~50 minutes).

Depth to water before shutting off pump 54.09 ft (t = 0 min).

Depth to water at end of recovery test 44.84 ft (t = 50 min).

Raw input recovery data for water supply well WW-5

Entry	Reduced Data Time, Date Hr:Min:Sec	Water Level Feet	Entry	Time, Date Hr:Min:Sec	Water Level Feet
1	11/22/06 11:00:00	0.00	31	11/22/06 11:05:00	47.00
2	11/22/06 11:00:40	48.42	32	11/22/06 11:06:00	46.96
3	11/22/06 11:00:41	48.42	33	11/22/06 11:07:00	46.92
4	11/22/06 11:00:42	48.40	34	11/22/06 11:08:00	46.88
5	11/22/06 11:00:43	48.35	35	11/22/06 11:08:12	46.85
6	11/22/06 11:00:44	48.33	36	11/22/06 11:08:24	46.84
7	11/22/06 11:00:45	48.32	37	11/22/06 11:08:36	46.84
8	11/22/06 11:00:46	48.31	38	11/22/06 11:08:48	46.83
9	11/22/06 11:00:47	48.28	39	11/22/06 11:09:00	46.83
10	11/22/06 11:00:48	48.25	40	11/22/06 11:09:12	46.82
11	11/22/06 11:00:49	48.24	41	11/22/06 11:09:24	46.82
12	11/22/06 11:00:50	48.18	42	11/22/06 11:09:36	46.81
13	11/22/06 11:00:51	48.11	43	11/22/06 11:09:48	46.81
14	11/22/06 11:00:52	48.07	44	11/22/06 11:10:00	46.80
15	11/22/06 11:00:53	48.05	45	11/22/06 11:12:00	46.80
16	11/22/06 11:00:54	48.00	46	11/22/06 11:14:00	46.76
17	11/22/06 11:00:55	47.95	47	11/22/06 11:16:00	46.73
18	11/22/06 11:00:56	47.93	48	11/22/06 11:18:00	46.70
19	11/22/06 11:00:57	47.89	49	11/22/06 11:20:00	46.68
20	11/22/06 11:00:58	47.85	50	11/22/06 11:40:00	46.66
21	11/22/06 11:00:59	47.83	51	11/22/06 11:50:00	46.54
22	11/22/06 11:01:00	47.81	52	11/22/06 12:00:00	46.51
23	11/22/06 11:01:12	47.79	53	11/22/06 12:04:00	46.48
24	11/22/06 11:01:24	47.58	54	11/22/06 12:10:00	46.47
25	11/22/06 11:01:36	47.47	55	11/22/06 12:20:00	46.45
26	11/22/06 11:02:00	47.39	56	11/22/06 12:24:00	46.44
27	11/22/06 11:02:12	47.27	57	11/22/06 12:26:00	46.44
28	11/22/06 11:02:36	47.23	58	11/22/06 12:28:00	46.43
29	11/22/06 11:03:00	47.17			
30	11/22/06 11:04:18	47.12			

APPENDIX D

Summary Laboratory Analytical Reports

And

Chain of Custody Documentation

(Full length lab reports with all QA/QC information are included separately on compact disk in Adobe Reader format)

Summary Report

Kristen Farris-Pope
Rice Operating Company
122 W Taylor Street
Hobbs, NM, 88240

Report Date: August 14, 2006

Work Order: 6080433

Project Location: Lea County,NM
Project Name: BD Junction J-26

Sample	Description	Matrix	Date Taken	Time Taken	Date Received
98085	Monitor Well #1	water	2006-08-01	09:45	2006-08-04
98086	Monitor Well #2	water	2006-08-01	10:25	2006-08-04
98087	Monitor Well #3	water	2006-08-01	08:35	2006-08-04

Sample: 98085 - Monitor Well #1

Param	Flag	Result	Units	RL
Hydroxide Alkalinity		<1.00	mg/L as CaCo3	1.00
Carbonate Alkalinity		<1.00	mg/L as CaCo3	1.00
Bicarbonate Alkalinity		**226**	mg/L as CaCo3	4.00
Total Alkalinity		**226**	mg/L as CaCo3	4.00
Dissolved Calcium		**86.2**	mg/L	0.500
Dissolved Potassium		**41.6**	mg/L	1.00
Dissolved Magnesium		**23.9**	mg/L	1.00
Dissolved Sodium		**225**	mg/L	1.00
Chloride		**218**	mg/L	0.500
Sulfate		**248**	mg/L	0.500
Total Dissolved Solids		**1126**	mg/L	10.00

Sample: 98086 - Monitor Well #2

Param	Flag	Result	Units	RL
Hydroxide Alkalinity		<1.00	mg/L as CaCo3	1.00
Carbonate Alkalinity		<1.00	mg/L as CaCo3	1.00
Bicarbonate Alkalinity		**216**	mg/L as CaCo3	4.00
Total Alkalinity		**216**	mg/L as CaCo3	4.00
Dissolved Calcium		**144**	mg/L	0.500
Dissolved Potassium		**18.3**	mg/L	1.00
Dissolved Magnesium		**42.4**	mg/L	1.00
Dissolved Sodium		**241**	mg/L	1.00
Chloride		**387**	mg/L	0.500
Sulfate		**247**	mg/L	0.500

continued

sample 98086 continued ...

Param	Flag	Result	Units	RL
Total Dissolved Solids		**1358**	mg/L	10.00

Sample: 98087 - Monitor Well #3

Param	Flag	Result	Units	RL
Hydroxide Alkalinity		<1.00	mg/L as CaCo3	1.00
Carbonate Alkalinity		<1.00	mg/L as CaCo3	1.00
Bicarbonate Alkalinity		**208**	mg/L as CaCo3	4.00
Total Alkalinity		**208**	mg/L as CaCo3	4.00
Dissolved Calcium		**91.8**	mg/L	0.500
Dissolved Potassium		**10.4**	mg/L	1.00
Dissolved Magnesium		**33.0**	mg/L	1.00
Dissolved Sodium		**140**	mg/L	1.00
Chloride		**141**	mg/L	0.500
Sulfate		**190**	mg/L	0.500
Total Dissolved Solids		**876.0**	mg/L	10.00

6701 Aberdeen Ave, Ste 5
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1 (800) 378-1296

TraceAnalysis, Inc.

155 McCutcheon Way, Suite H
El Paso, Texas 79932
Tel (915) 585-3443
Fax (915) 585-4944

CHAIN-OF-CUSTODY AND ANALYSIS REQUEST

LAB Order ID # 6080433

Company Name:	Phone #:
RICE Operating Company	(505)393-9174
Address: (Street, City, Zip)	Fax #:
122 W Taylor Street - Hobbs, New Mexico 88240	(505) 397-1471
Contact Person:	
Kristin Farris - Pope, Project Scientist	kpope@riceswd.com
Invoice to: (If different from above)	
Project #: None Given	Project Name: BD Junction J-26
Project Location: Lea County - New Mexico	Sampler Signature: Rozanne Johnson (505)631-9310 rozanne@valornet.com

ANALYSIS REQUEST
(Circle or Specify Method No.)

LAB # (LAB USE ONLY)	FIELD CODE	# CONTAINERS	Volume/Amount	MATRIX: WATER	SOIL	AIR	SLUDGE	PRESERVATIVE METHOD: HCL	HNO_3	$NaHSO_4$	H_2SO_4	ICE	NONE	SAMPLING: DATE 2006	TIME	MTBE 8021B/602	BTEX 8021B/602	TPH 418.1/TX1005 / TX1005 Extended (C35)	PAH 8270C	Total Metals Ag As Ba Cd Cr Pb Se Hg 6010B/200.7	TCLP Metals Ag As Ba Cd Cr Pb Se Hg	TCLP Volatiles	TCLP Semi Volatiles	TCLP Pesticides	RCI	GC/MS Vol. 8260B/624	GC/MS Semi. Vol. 8270C/625	PCB's 8082/608	Pesticides 8081A/608	BOD, TSS, pH	Moisture Content	Cations (Ca, Mg, Na, K)	Anions (Cl, SSSSO4, CO3, HCO3)	Total Dissolved Solids	Turn Around Time if different from standard
98085	Monitor Well #1	2	40 ml	X				X				X		8-1	9:45		X																	
	Monitor Well #1	1	1L	X								X		8-1	9:45																X	X	X	
86	Monitor Well #2	2	40 ml	X				X				X		8-1	10:25		X																	
	Monitor Well #2	1	1L	X								X		8-1	10:25																X	X	X	
87	Monitor Well #3	2	40 ml	X				X				X		8-1	8:35		X																	
	Monitor Well #3	1	1L	X								X		8-1	8:35																X	X	X	

Relinquished by: Rozanne Johnson	Date: 8/3/06	Time: 2:35 pm
Relinquished by:	Date:	Time:
Relinquished by:	Date:	Time:
Received by:	Date:	Time:
Received by:	Date:	Time:
Received at Laboratory by: Corey Adams	Date: 8/4/06	Time: 1030 hrs

LAB USE ONLY

Intact Y / N
Headspace Y / N
Temp 4c °
Log-In Review AT
Carrier # Corey Adams GLT 169017 106

REMARKS: Please email results to:
kpope@riceswd.com
mfranks @ riceswd.com
rozanne@valornet.com
☐ check if special reporting limits needed

Submittal of samples constitutes agreement to Terms and Conditions listed on reverse side of COC

Cation-Anion Balance Sheet

DATE: 8/16/2006

Sample #	Calcium ppm	Magnesium ppm	Sodium ppm	Potassium ppm	Alkalinity ppm	Sulfate ppm	Chloride ppm	Nitrate ppm	Fluoride ppm	TDS ppm	EC µMHOs/cm
98085	86.2	23.9	225	41.6	226	248	217.755			1130	
98086	144	42.4	241	18.3	216	247	387			1360	
98087	91.8	33	140	10.4	208	190	140.922			876	

Sample #	Calcium in meq/L	Magnesium in meq/L	Sodium in meq/L	Potassium in meq/L	Alkalinity in meq/L	Sulfate in meq/L	Chloride in meq/L	Nitrate in meq/L	Fluoride in meq/L	**Total Cations in meq/L**	**Total Anions in meq/L**	**Percentage Error**
98085	4.30	1.97	9.79	1.06	4.52	5.16	6.14			17.12	15.83	7.85
98086	7.19	3.49	10.48	0.47	4.32	5.14	10.92			21.63	20.38	5.93
98087	4.58	2.72	6.09	0.27	4.16	3.96	3.98			13.65	12.09	12.13

	EC/Cation	EC/Anion				
98085			range	0	to	0
98086			range	0	to	0
98087			range	0	to	0

TDS/EC	TDS/Cat	TDS/Anion	
	0.66	0.71	needs to be 0.55-0.77
	0.63	0.67	needs to be 0.55-0.77
	0.64	0.72	needs to be 0.55-0.77

Summary Report

Kristin Farris-Pope
Rice Operating Company
122 W Taylor Street
Hobbs, NM, 88240

Report Date: August 22, 2006

Work Order: 6080425

Project Location: Lea County,NM
Project Name: Windmill 220

Sample	Description	Matrix	Date Taken	Time Taken	Date Received
98071	Windmill 220	water	2006-08-01	09:40	2006-08-04

Sample: 98071 - Windmill 220

Param	Flag	Result	Units	RL
Hydroxide Alkalinity		<1.00	mg/L as CaCo3	1.00
Carbonate Alkalinity		<1.00	mg/L as CaCo3	1.00
Bicarbonate Alkalinity		**248**	mg/L as CaCo3	4.00
Total Alkalinity		**248**	mg/L as CaCo3	4.00
Dissolved Calcium		**137**	mg/L	0.500
Dissolved Potassium		**15.3**	mg/L	1.00
Dissolved Magnesium		**47.8**	mg/L	1.00
Dissolved Sodium		**277**	mg/L	1.00
Chloride		**369**	mg/L	0.500
Sulfate		**292**	mg/L	0.500
Total Dissolved Solids		**1490**	mg/L	10.00

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El Paso, Texas 79932
Tel (915) 585-3443
Fax (915) 585-4944

CHAIN-OF-CUSTODY AND ANALYSIS REQUEST

LAB Order ID # 6080425

Company Name:	Phone #:
RICE Operating Company	(505)393-9174
Address: (Street, City, Zip)	Fax #:
122 W Taylor Street - Hobbs, New Mexico 88240	(505) 397-1471
Contact Person:	
Kristin Farris - Pope, Project Scientist	kpope@riceswd.com
Invoice to: (If different from above)	
Project #: None Given	Project Name: Windmill ~ 220
Project Location: Lea County - New Mexico	Sampler Signature: Rozanne Johnson (505)631-9310 rozanne@valornet.com

LAB # (LAB USE ONLY)	FIELD CODE	# CONTAINERS	Volume/Amount	MATRIX: WATER	SOIL	AIR	SLUDGE	PRESERVATIVE METHOD: HCL	HNO_3	$NaHSO_4$	H_2SO_4	ICE	NONE	SAMPLING: DATE 2006	TIME
98071	Windmill ~ 220	1	1L	X								X		8-1	9:40

ANALYSIS REQUEST
(Circle or Specify Method No.)

MTBE 8021B/602	BTEX 8021B/602	TPH 418.1/TX1005 / TX1005 Extended (C35)	PAH 8270C	Total Metals Ag As Ba Cd Cr Pb Se Hg 6010B/200.7	TCLP Metals Ag As Ba Cd Cr Pb Se Hg	TCLP Volatiles	TCLP Semi Volatiles	TCLP Pesticides	RCI	GC/MS Vol. 8260B/624	GC/MS Semi. Vol. 8270C/625	PCB's 8082/608	Pesticides 8081A/608	BOD, TSS, pH	Moisture Content	Cations (Ca, Mg, Na, K)	Anions (Cl, SSSSO4, CO3, HCO3)	Total Dissolved Solids		Turn Around Time if different from standard	Hold
																X	X	X			

Relinquished by: Rozanne Johnson	Date: 8/3/06	Time: 2:30pm	Received by:
Relinquished by:	Date:	Time:	Received by:
Relinquished by:	Date:	Time:	Received at Laboratory by: Date: 8/4/06 Time: 10AM

Submittal of samples constitutes agreement to Terms and Conditions listed on reverse side of COC

LAB USE ONLY

Intact Y / N
Headspace Y / N
Temp 4°C
Log-In Review

REMARKS: Please email results to:
kpope@riceswd.com
mfranks @ riceswd.com
rozanne@valornet.com

☐ check if special reporting limits needed

Carrier # Greyhound 1690176675

Cation-Anion Balance Sheet

DATE: 8/22/2006

Sample #	Calcium ppm	Magnesium ppm	Sodium ppm	Potassium ppm	Alkalinity ppm	Sulfate ppm	Chloride ppm	Nitrate ppm	Fluoride ppm	Bromide ppm	TDS ppm	EC µMHOs/cm
98071	137	47.8	277	15.3	248	292	369				1490	

Sample #	Calcium in meq/L	Magnesium in meq/L	Sodium in meq/L	Potassium in meq/L	Alkalinity in meq/L	Sulfate in meq/L	Chloride in meq/L	Nitrate in meq/L	Fluoride in meq/L	Bromide in meq/L	**Cations in meq/L**	**Anions in meq/L**	**Percentage Error**
98071	6.84	3.93	12.05	0.39	4.96	6.08	10.41	0	0	0	23.21	21.45	7.889490014

	EC/Cation	EC/Anion
98071	2321.0636	2144.893

range 0 to 0

TDS/EC	TDS/Cat	TDS/Anion
#DIV/0!	0.64	0.69

needs to be 0.55-0.77

Summary Report

Kristin Farris-Pope
Rice Operating Company
122 W Taylor Street
Hobbs, NM, 88240

Report Date: August 23, 2006

Work Order: 6080427

Project Location: Lea County,NM
Project Name: Plains Pipeline-DS Hugh Gathering

Sample	Description	Matrix	Date Taken	Time Taken	Date Received
98073	Monitor Well #3	water	2006-08-01	11:35	2006-08-04

Sample: 98073 - Monitor Well #3

Param	Flag	Result	Units	RL
Hydroxide Alkalinity		<1.00	mg/L as CaCo3	1.00
Carbonate Alkalinity		<1.00	mg/L as CaCo3	1.00
Bicarbonate Alkalinity		**280**	mg/L as CaCo3	4.00
Total Alkalinity		**280**	mg/L as CaCo3	4.00
Dissolved Calcium		**124**	mg/L	0.500
Dissolved Potassium		**10.3**	mg/L	1.00
Dissolved Magnesium		**63.3**	mg/L	1.00
Dissolved Sodium		**195**	mg/L	1.00
Chloride		**322**	mg/L	0.500
Sulfate		**255**	mg/L	0.500
Total Dissolved Solids		**1284**	mg/L	10.00

Lubbock, Texas 79424
Tel (806) 794-1296
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TraceAnalysis, Inc.

155 McCutcheon Way, Suite H
El Paso, Texas 79932
Tel (915) 585-3443
Fax (915) 585-4944

CHAIN-OF-CUSTODY AND ANALYSIS REQUEST

LAB Order ID # 6080427

Company Name:	Phone #:
RICE Operating Company	(505)393-9174
Address: (Street, City, Zip)	Fax #:
122 W Taylor Street - Hobbs, New Mexico 88240	(505) 397-1471
Contact Person:	
Kristin Farris - Pope, Project Scientist	kpope@riceswd.com
Invoice to: (If different from above)	
Project #: None Given	Project Name: Plains Pipeline~DS Hugh Gathering
Project Location: Lea County - New Mexico	Sampler Signature: Rozanne Johnson (505)631-9310 rozanne@valornet.com

ANALYSIS REQUEST
(Circle or Specify Method No.)

LAB # (LAB USE ONLY)	FIELD CODE	# CONTAINERS	Volume/Amount	MATRIX: WATER	SOIL	AIR	SLUDGE	PRESERVATIVE METHOD: HCL	HNO_3	$NaHSO_4$	H_2SO_4	ICE	NONE	SAMPLING: DATE 2006	TIME	MTBE 8021B/602	BTEX 8021B/602	TPH 418.1/TX1005 / TX1005 Extended (C35)	PAH 8270C	Total Metals Ag As Ba Cd Cr Pb Se Hg 6010B/200.7	TCLP Metals Ag As Ba Cd Cr Pb Se Hg	TCLP Volatiles	TCLP Semi Volatiles	TCLP Pesticides	RCI	GC/MS Vol. 8260B/624	GC/MS Semi. Vol. 8270C/625	PCB's 8082/608	Pesticides 8081A/608	BOD, TSS, pH	Moisture Content	Cations (Ca, Mg, Na, K)	Anions (Cl, SSSSO4, CO3, HCO3)	Total Dissolved Solids		Turn Around Time if different from standard	Hold
18023	Monitor Well #3	1	1L	X								X		8-1	11:36																X	X	X			

Relinquished by:	Date:	Time:	Received by: Date: Time:
Relinquished by:	Date:	Time:	Received by: Date: Time:
Relinquished by:	Date:	Time:	Received at Laboratory by: Date: Time:

Relinquished by: Rozanne Johnson 8/3/06 2:30pm
Received at Laboratory by: Jerry Holmes 8/4/06 10AM

If samples constitutes agreement to Terms and Conditions listed on reverse side of COC

LAB USE ONLY

Intact Y / N
Headspace Y / N
Temp 4°C
Log-in Review
Carrier # Fed Ex 1490 7766 75

REMARKS: Please email results to:
kpope@riceswd.com
mfranks @ riceswd.com
rozanne@valornet.com
☐ check if special reporting limits needed

Report Date: August 23, 2006
Plains Pipeline-DS Hugh Gathering

Work Order: 6080427
Plains Pipeline-DS Hugh Gathering

Cation-Anion Balance Sheet

DATE: 8/22/2006

Sample #	Calcium ppm	Magnesium ppm	Sodium ppm	Potassium ppm	Alkalinity ppm	Sulfate ppm	Chloride ppm	Nitrate ppm	Fluoride ppm	Bromide ppm	TDS ppm	EC µMHOs/cm
98073	124	63.3	195	10.3	280	255	322				1284	

Sample #	Calcium in meq/L	Magnesium in meq/L	Sodium in meq/L	Potassium in meq/L	Alkalinity in meq/L	Sulfate in meq/L	Chloride in meq/L	Nitrate in meq/L	Fluoride in meq/L	Bromide in meq/L	**Cations in meq/L**	**Anions in meq/L**	**Percentage Error**
98073	6.19	5.21	8.48	0.26	5.60	5.31	9.08	0	0	0	20.14	19.99	0.746530774

	EC/Cation	EC/Anion
98073	2014.2531	1999.272

range 0 to 0

TDS/EC	TDS/Cat	TDS/Anion
#DIV/0!	0.64	0.64

needs to be 0.55-0.77

Summary Report

Kristin Farris-Pope
Rice Operating Company
122 W Taylor Street
Hobbs, NM, 88240

Report Date: August 24, 2006

Work Order: 6080429

Project Location: Lea County,NM
Project Name: Plains Pipeline-Vacuum to Jal 14 Inch Mainline #3

Sample	Description	Matrix	Date Taken	Time Taken	Date Received
98075	Monitor Well 7	water	2006-08-01	10:55	2006-08-04

Sample: 98075 - Monitor Well 7

Param	Flag	Result	Units	RL
Hydroxide Alkalinity		<1.00	mg/L as CaCo3	1.00
Carbonate Alkalinity		<1.00	mg/L as CaCo3	1.00
Bicarbonate Alkalinity		**190**	mg/L as CaCo3	4.00
Total Alkalinity		**190**	mg/L as CaCo3	4.00
Dissolved Calcium		**138**	mg/L	0.500
Dissolved Potassium		**13.8**	mg/L	1.00
Dissolved Magnesium		**75.8**	mg/L	1.00
Dissolved Sodium		**196**	mg/L	1.00
Chloride		**450**	mg/L	0.500
Sulfate		**216**	mg/L	0.500
Total Dissolved Solids		**1378**	mg/L	10.00

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Fax (915) 585-4944

CHAIN-OF-CUSTODY AND ANALYSIS REQUEST

LAB Order ID # 6080429

Company Name:	Phone #:
RICE Operating Company	(505)393-9174
Address: (Street, City, Zip)	Fax #:
122 W Taylor Street - Hobbs, New Mexico 88240	(505) 397-1471
Contact Person:	
Kristin Farris - Pope, Project Scientist	kpope@riceswd.com
Invoice to: (If different from above)	
Project #: None Given	Project Name: Plains Pipeline ~ Vacuum to Jal 14" Mainline #3
Project Location: Lea County - New Mexico	Sampler Signature: Rozanne Johnson (505)631-9310 rozanne@valornet.com

ANALYSIS REQUEST
(Circle or Specify Method No.)

LAB # (LAB USE ONLY)	FIELD CODE	# CONTAINERS	Volume/Amount	MATRIX: WATER	SOIL	AIR	SLUDGE	PRESERVATIVE METHOD: HCL	HNO_3	$NaHSO_4$	H_2SO_4	ICE	NONE	SAMPLING: DATE 2006	TIME	MTBE 8021B/602	BTEX 8021B/602	TPH 418.1/TX1005/TX1005 Extended (C35)	PAH 8270C	Total Metals Ag As Ba Cd Cr Pb Se Hg 6010B/200.7	TCLP Metals Ag As Ba Cd Cr Pb Se Hg	TCLP Volatiles	TCLP Semi Volatiles	TCLP Pesticides	RCI	GC/MS Vol. 8260B/624	GC/MS Semi. Vol. 8270C/625	PCB's 8082/608	Pesticides 8081A/608	BOD, TSS, pH	Moisture Content	Cations (Ca, Mg, Na, K)	Anions (Cl, SSSSO4, CO3, HCO3)	Total Dissolved Solids		Turn Around Time if different from standard	Hold
98075	Monitor Well #7	1	1L	X								X		8-1	10:55															X	X	X			

Relinquished by: Rozanne Johnson	Date: 8/3/2006	Time: 2:30pm	Received by:
Relinquished by:	Date:	Time:	Received by:
Relinquished by:	Date:	Time:	Received at Laboratory by: Date: 8/4/06 Time: 10AM

Submittal of samples constitutes agreement to Terms and Conditions listed on reverse side of COC

LAB USE ONLY
Intact Y / N
Headspace Y / N
Temp 4°C
Log-In Review
Carrier # Overland 1690 1760 75

REMARKS: Please email results to:
kpope@riceswd.com
mfranks @ riceswd.com
rozanne@valornet.com
☐ check if special reporting limits needed

Report Date: August 24, 2006
Plains Pipeline-Vacuum to Jal 14 Inch Mainline #3
Work Order: 6080429
Page Number: 8 of 9
Lea County,NM

Cation-Anion Balance Sheet

DATE: 8/24/2006

Sample #	Calcium ppm	Magnesium ppm	Sodium ppm	Potassium ppm	Alkalinity ppm	Sulfate ppm	Chloride ppm	Nitrate ppm	Fluoride ppm	Bromide ppm	TDS ppm	EC µMHOs/cm
98075	138	75.8	196	13.8	190	215.661	450				1378	

Sample #	Calcium in meq/L	Magnesium in meq/L	Sodium in meq/L	Potassium in meq/L	Alkalinity in meq/L	Sulfate in meq/L	Chloride in meq/L	Nitrate in meq/L	Fluoride in meq/L	Bromide in meq/L	**Cations in meq/L**	**Anions in meq/L**	**Percentage Error**
98075	6.89	6.24	8.53	0.35	3.80	4.49	12.69	0	0	0	22.00	20.98	4.73731936

	EC/Cation	EC/Anion
98075	2200.2786	2098.4562

range 0 to 0

TDS/EC	TDS/Cat	TDS/Anion
#DIV/0!	0.63	0.66

Summary Report

Kristin Farris-Pope
Rice Operating Company
122 W Taylor Street
Hobbs, NM, 88240

Report Date: August 22, 2006

Work Order: 6080426

Project Location: Lea County,NM
Project Name: Plains Pipeline-TNM 98-5B

Sample	Description	Matrix	Date Taken	Time Taken	Date Received
98072	Monitor Well #2	water	2006-08-01	12:50	2006-08-04

Sample: 98072 - Monitor Well #2

Param	Flag	Result	Units	RL
Hydroxide Alkalinity		<1.00	mg/L as CaCo3	1.00
Carbonate Alkalinity		<1.00	mg/L as CaCo3	1.00
Bicarbonate Alkalinity		**162**	mg/L as CaCo3	4.00
Total Alkalinity		**162**	mg/L as CaCo3	4.00
Dissolved Calcium		**95.1**	mg/L	0.500
Dissolved Potassium		**8.10**	mg/L	1.00
Dissolved Magnesium		**45.5**	mg/L	1.00
Dissolved Sodium		**146**	mg/L	1.00
Chloride		**269**	mg/L	0.500
Sulfate		**197**	mg/L	0.500
Total Dissolved Solids		**1002**	mg/L	10.00

Lubbock, Texas 79424
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Tel (915) 585-3443
Fax (915) 585-4944

CHAIN-OF-CUSTODY AND ANALYSIS REQUEST

LAB Order ID # 6080426

Company Name: RICE Operating Company	Phone #: (505)393-9174
Address: (Street, City, Zip) 122 W Taylor Street - Hobbs, New Mexico 88240	Fax #: (505) 397-1471
Contact Person: Kristin Farris - Pope, Project Scientist	kpope@riceswd.com
Invoice to: (If different from above)	
Project #: None Given	Project Name: Plains Pipeline~TNM 98-5B
Project Location: Lea County - New Mexico	Sampler Signature: Rozanne Johnson (505)631-9310 rozanne@valornet.com

ANALYSIS REQUEST
(Circle or Specify Method No.)

LAB # (LAB USE ONLY)	FIELD CODE	# CONTAINERS	Volume/Amount	MATRIX: WATER	SOIL	AIR	SLUDGE	PRESERVATIVE METHOD: HCL	HNO_3	$NaHSO_4$	H_2SO_4	ICE	NONE	SAMPLING: DATE 2006	TIME
98072	Monitor Well #2	1	1L	X								X		8-1	12:50

MTBE 8021B/602	BTEX 8021B/602	TPH 418.1/TX1005 / TX1005 Extended (C35)	PAH 8270C	Total Metals Ag As Ba Cd Cr Pb Se Hg 6010B/200.7	TCLP Metals Ag As Ba Cd Cr Pb Se Hg	TCLP Volatiles	TCLP Semi Volatiles	TCLP Pesticides	RCI	GC/MS Vol. 8260B/624	GC/MS Semi. Vol. 8270C/625	PCB's 8082/608	Pesticides 8081A/608	BOD, TSS, pH	Moisture Content	Cations (Ca, Mg, Na, K)	Anions (Cl, SSSSO4, CO3, HCO3)	Total Dissolved Solids		Turn Around Time if different from standard	Hold
																X	X	X			

Relinquished by: Rozanne Johnson	Date: 8/3/06	Time: 2:30p	Received by:
Relinquished by:	Date:	Time:	Received by:
Relinquished by:	Date:	Time:	Received at Laboratory by: Date: 8/4/06 Time: 10AM

Total of samples constitutes agreement to Terms and Conditions listed on reverse side of COC

LAB USE ONLY
Intact Y / N
Headspace Y / N
Temp 4°C
Log-in Review

REMARKS: Please email results to:
kpope@riceswd.com
mfranks @ riceswd.com
rozanne@valornet.com
☐ check if special reporting limits needed

Carrier # Greyhound 1690 1766 75

Report Date: August 22, 2006
Plains Pipeline-TNM 98-5B

Work Order: 6080426
Plains Pipeline-TNM 98-5B

Cation-Anion Balance Sheet

DATE: 8/22/2006

Sample #	Calcium ppm	Magnesium ppm	Sodium ppm	Potassium ppm	Alkalinity ppm	Sulfate ppm	Chloride ppm	Nitrate ppm	Fluoride ppm	Bromide ppm	TDS ppm	EC µMHOs/cm
98072	95.1	45.5	146	8.1	162	196.943	268.96				1002	

Sample #	Calcium In meq/L	Magnesium In meq/L	Sodium in meq/L	Potassium in meq/L	Alkalinity in meq/L	Sulfate in meq/L	Chloride in meq/L	Nitrate in meq/L	Fluoride in meq/L	Bromide in meq/L	**Cations in meq/L**	**Anions in meq/L**	**Percentage Error**
98072	4.75	3.74	6.35	0.21	3.24	4.10	7.59	0	0	0	15.05	14.93	0.801773099

	EC/Cation	EC/Anion					TDS/EC	TDS/Cat	TDS/Anion	
98072	1504.7883	1492.77149	range	0	to	0	#DIV/0!	0.67	0.67	needs to be 0.55-0.77

Summary Report

Kristin Farris-Pope
Rice Operating Company
122 W Taylor Street
Hobbs, NM, 88240

Report Date: August 24, 2006

Work Order: 6080428

Project Location: Lea County, NM
Project Name: Plains Pipeline- TNM 98-5A

Sample	Description	Matrix	Date Taken	Time Taken	Date Received
98074	Monitor Well #5	water	2006-08-01	12:15	2006-08-04

Sample: 98074 - Monitor Well #5

Param	Flag	Result	Units	RL
Hydroxide Alkalinity		<1.00	mg/L as CaCo3	1.00
Carbonate Alkalinity		<1.00	mg/L as CaCo3	1.00
Bicarbonate Alkalinity		**274**	mg/L as CaCo3	4.00
Total Alkalinity		**274**	mg/L as CaCo3	4.00
Dissolved Calcium		**96.3**	mg/L	0.500
Dissolved Potassium		**10.8**	mg/L	1.00
Dissolved Magnesium		**49.3**	mg/L	1.00
Dissolved Sodium		**167**	mg/L	1.00
Chloride		**218**	mg/L	0.500
Sulfate		**148**	mg/L	0.500
Total Dissolved Solids		**1008**	mg/L	10.00

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Tel (915) 585-3443
Fax (915) 585-4944

CHAIN-OF-CUSTODY AND ANALYSIS REQUEST

LAB Order ID # 6080428

Company Name:	Phone #:
RICE Operating Company	(505)393-9174
Address: (Street, City, Zip)	Fax #:
122 W Taylor Street - Hobbs, New Mexico 88240	(505) 397-1471
Contact Person:	
Kristin Farris - Pope, Project Scientist	kpope@riceswd.com
Invoice to: (If different from above)	
Project #: None Given	Project Name: Plains Pipeline~TNM 9805A
Project Location: Lea County - New Mexico	Sampler Signature: Rozanne Johnson (505)631-9310 rozanne@valornet.com

ANALYSIS REQUEST
(Circle or Specify Method No.)

LAB # (LAB USE ONLY)	FIELD CODE	# CONTAINERS	Volume/Amount	MATRIX: WATER	SOIL	AIR	SLUDGE	PRESERVATIVE METHOD: HCL	HNO_3	$NaHSO_4$	H_2SO_4	ICE	NONE	SAMPLING: DATE 2006	TIME	MTBE 8021B/602	BTEX 8021B/602	TPH 418.1/TX1005/TX1005 Extended (C35)	PAH 8270C	Total Metals Ag As Ba Cd Cr Pb Se Hg 6010B/200.7	TCLP Metals Ag As Ba Cd Cr Pb Se Hg	TCLP Volatiles	TCLP Semi Volatiles	TCLP Pesticides	RCI	GC/MS Vol. 8260B/624	GC/MS Semi. Vol. 8270C/625	PCB's 8082/608	Pesticides 8081A/608	BOD, TSS, pH	Moisture Content	Cations (Ca, Mg, Na, K)	Anions (Cl, SSSSO4, CO3, HCO3)	Total Dissolved Solids		Turn Around Time if different from standard	Hold
18074	Monitor Well #5	1	1L	X								X		8-1	12:15															X	X	X			

Relinquished by: R Johnson	Date: 8/3/06	Time: 2:30pm
Received by:	Date:	Time:
Relinquished by:	Date:	Time:
Received by:	Date:	Time:
Relinquished by:	Date:	Time:
Received at Laboratory by: Sanz Adame	Date: 8/4/06	Time: 10AM

Samples constitutes agreement to Terms and Conditions listed on reverse side of COC

LAB USE ONLY

Intact Y/N
Headspace Y/N
Temp 4°C
Log-In Review
Carrier # Greyhound 1690176276

REMARKS: Please email results to:
kpope@riceswd.com
mfranks@riceswd.com
rozanne@valornet.com
☐ check if special reporting limits needed

Cation-Anion Balance Sheet

DATE: 8/24/2006

Sample #	Calcium ppm	Magnesium ppm	Sodium ppm	Potassium ppm	Alkalinity ppm	Sulfate ppm	Chloride ppm	Nitrate ppm	Fluoride ppm	Bromide ppm	TDS ppm	EC µMHOs/cm
98074	96.3	49.3	167	10.8	274	147.879	218.129				1008	

Sample #	Calcium in meq/L	Magnesium in meq/L	Sodium in meq/L	Potassium in meq/L	Alkalinity in meq/L	Sulfate in meq/L	Chloride in meq/L	Nitrate in meq/L	Fluoride in meq/L	Bromide in meq/L	**Cations in meq/L**	**Anions in meq/L**	**Percentage Error**
98074	4.81	4.06	7.26	0.28	5.48	3.08	6.15	0	0	0	16.40	14.71	10.8677829

	EC/Cation	EC/Anion
98074	1640.3031	1471.22599

range 0 to 0

TDS/EC	TDS/Cat	TDS/Anion
#DIV/0!	0.61	0.69

Summary Report

Kristin Farris-Pope
Rice Operating Company
122 W Taylor Street
Hobbs, NM, 88240

Report Date: August 29, 2006

Work Order: 6080422

Project Location: Lea County,NM
Project Name: TARGA

Sample	Description	Matrix	Date Taken	Time Taken	Date Received
98065	Water Well #1	water	2006-08-01	15:40	2006-08-04
98066	Water Well #5	water	2006-08-01	14:50	2006-08-04
98067	Water Well #8	water	2006-08-01	15:03	2006-08-04
98068	Water Well #12	water	2006-08-01	15:12	2006-08-04

Sample: 98065 - Water Well #1

Param	Flag	Result	Units	RL
Hydroxide Alkalinity		<1.00	mg/L as CaCo3	1.00
Carbonate Alkalinity		<1.00	mg/L as CaCo3	1.00
Bicarbonate Alkalinity		**332**	mg/L as CaCo3	4.00
Total Alkalinity		**332**	mg/L as CaCo3	4.00
Dissolved Calcium		**101**	mg/L	0.500
Dissolved Potassium		**9.01**	mg/L	1.00
Dissolved Magnesium		**51.5**	mg/L	1.00
Dissolved Sodium		**143**	mg/L	1.00
Chloride		**187**	mg/L	0.500
Sulfate		**147**	mg/L	0.500
Total Dissolved Solids		**1008**	mg/L	10.00

Sample: 98066 - Water Well #5

Param	Flag	Result	Units	RL
Hydroxide Alkalinity		<1.00	mg/L as CaCo3	1.00
Carbonate Alkalinity		<1.00	mg/L as CaCo3	1.00
Bicarbonate Alkalinity		**156**	mg/L as CaCo3	4.00
Total Alkalinity		**156**	mg/L as CaCo3	4.00
Dissolved Calcium		**83.1**	mg/L	0.500
Dissolved Potassium		**8.44**	mg/L	1.00
Dissolved Magnesium		**39.8**	mg/L	1.00
Dissolved Sodium		**126**	mg/L	1.00
Chloride		**225**	mg/L	0.500

continued

sample 98066 continued ...

Param	Flag	Result	Units	RL
Sulfate		**177**	mg/L	0.500
Total Dissolved Solids		**864.0**	mg/L	10.00

Sample: 98067 - Water Well #8

Param	Flag	Result	Units	RL
Hydroxide Alkalinity		<1.00	mg/L as CaCo3	1.00
Carbonate Alkalinity		<1.00	mg/L as CaCo3	1.00
Bicarbonate Alkalinity		**268**	mg/L as CaCo3	4.00
Total Alkalinity		**268**	mg/L as CaCo3	4.00
Dissolved Calcium		**90.5**	mg/L	0.500
Dissolved Potassium		**9.56**	mg/L	1.00
Dissolved Magnesium		**49.1**	mg/L	1.00
Dissolved Sodium		**206**	mg/L	1.00
Chloride		**308**	mg/L	0.500
Sulfate		**224**	mg/L	0.500
Total Dissolved Solids		**1202**	mg/L	10.00

Sample: 98068 - Water Well #12

Param	Flag	Result	Units	RL
Hydroxide Alkalinity		<1.00	mg/L as CaCo3	1.00
Carbonate Alkalinity		<1.00	mg/L as CaCo3	1.00
Bicarbonate Alkalinity		**296**	mg/L as CaCo3	4.00
Total Alkalinity		**296**	mg/L as CaCo3	4.00
Dissolved Calcium		**86.8**	mg/L	0.500
Dissolved Potassium		**9.66**	mg/L	1.00
Dissolved Magnesium		**42.7**	mg/L	1.00
Dissolved Sodium		**168**	mg/L	1.00
Chloride		**181**	mg/L	0.500
Sulfate		**160**	mg/L	0.500
Total Dissolved Solids		**966.0**	mg/L	10.00

Lubbock, Texas 79424
Tel (806) 794-1296
Fax (806) 794-1298
1 (800) 378-1296

TraceAnalysis, Inc.

155 McCutcheon Way, Suite H
El Paso, Texas 79932
Tel (915) 585-3443
Fax (915) 585-4944

CHAIN-OF-CUSTODY AND ANALYSIS REQUEST

LAB Order ID #: 6080422

Company Name:	Phone #:
ICE Operating Company	(505)393-9174
Address: (Street, City, Zip)	Fax #:
22 W Taylor Street - Hobbs, New Mexico 88240	(505) 397-1471
Contact Person:	
Kristin Farris - Pope, Project Scientist	kpope@riceswd.com
Invoice to: (If different from above)	
Project #: None Given	Project Name: TARGA
Project Location: Lea County - New Mexico	Sampler Signature: Gil Van Deventer GJV

ANALYSIS REQUEST
(Circle or Specify Method No.)

LAB # (LAB USE ONLY)	FIELD CODE	# CONTAINERS	Volume/Amount	MATRIX: WATER	SOIL	AIR	SLUDGE	PRESERVATIVE METHOD: HCL	HNO_3	$NaHSO_4$	H_2SO_4	ICE	NONE	SAMPLING: DATE 2006	TIME	MTBE 8021B/602	BTEX 8021B/602	TPH 418.1/TX1005 / TX1005 Extended (C35)	PAH 8270C	Total Metals Ag As Ba Cd Cr Pb Se Hg 6010B/200.7	TCLP Metals Ag As Ba Cd Cr Pb Se Hg	TCLP Volatiles	TCLP Semi Volatiles	TCLP Pesticides	RCI	GC/MS Vol. 8260B/624	GC/MS Semi. Vol. 8270C/625	PCB's 8082/608	Pesticides 8081A/608	BOD, TSS, pH	Moisture Content	Cations (Ca, Mg, Na, K)	Anions (Cl, SSSSO4, CO3, HCO3)	Total Dissolved Solids		Turn Around Time if different from standard	Hold
065	Water Well #1	1	1L	X								X		8-1	15:40																X	X	X			
106	Water Well #5	1	1L	X								X		8-1	14:50																					
107	Water Well #8	1	1L	X								X		8-1	15:03																					
108	Water Well #12	1	1L	X								X		8-1	15:12																					

Relinquished by: Deventer	Date: 8/1/06	Time: 18:00	Received by: Rozanne Johnson
Relinquished by:	Date:	Time:	Received by:
Relinquished by: Johnson	Date: 8/3/06	Time: 2:35pm	Received at Laboratory by: Date: 8/4/06 Time: 10AM

Samples constitutes agreement to Terms and Conditions listed on reverse side of COC

LAB USE ONLY
Intact Y/N
Headspace Y/N
Temp. 4°C
Log-in Review
Carrier # Grey Hound 1690177675

REMARKS: Please email results to:
kpope@riceswd.com
mfranks@riceswd.com
rozanne@valornet.com
☐ check if special reporting limits needed

Report Date: August 29, 2006
TARGA

Work Order: 6080422
TARGA

Cation-Anion Balance Sheet

DATE: 8/29/2006

Sample #	Calcium ppm	Magnesium ppm	Sodium ppm	Potassium ppm	Alkalinity ppm	Sulfate ppm	Chloride ppm	Nitrate ppm	Fluoride ppm	Bromide ppm	TDS ppm	EC µMHOs/cm
98065	101	51.5	143	9.01	332	147.08	187.376				1008	
98066	83.1	39.8	126	8.44	156	177.095	224.772				864	
98067	90.5	49.1	206	9.56	268	224.084	308				1202	
98068	86.8	42.7	168	9.66	296	160.337	180.704				966	

Sample #	Calcium in meq/L	Magnesium in meq/L	Sodium in meq/L	Potassium in meq/L	Alkalinity in meq/L	Sulfate in meq/L	Chloride in meq/L	Nitrate in meq/L	Fluoride in meq/L	Bromide in meq/L	**Cations in meq/L**	**Anions in meq/L**	**Percentage Error**
98065	5.04	4.24	6.22	0.23	6.64	3.06	5.29	0	0	0	15.73	14.99	4.822937211
98066	4.15	3.28	5.48	0.22	3.12	3.69	6.34	0	0	0	13.12	13.15	0.224022212
98067	4.52	4.04	8.96	0.24	5.36	4.67	8.69	0	0	0	17.76	18.71	5.220824465
98068	4.33	3.51	7.31	0.25	5.92	3.34	5.10	0	0	0	15.40	14.36	7.019268334

	EC/Cation	EC/Anion				
98065	1572.88108	1498.80826	range	0	to	0
98066	1311.87272	1314.7936	range	0	to	0
98067	1776.19338	1871.41089	range	0	to	0
98068	1540.02058	1435.58762	range	0	to	0

TDS/EC	TDS/Cat	TDS/Anion	
#DIV/0!	0.64	0.67	needs to be 0.55-0.77
#DIV/0!	0.66	0.66	needs to be 0.55-0.77
#DIV/0!	0.68	0.64	needs to be 0.55-0.77
#DIV/0!	0.63	0.67	needs to be 0.55-0.77

Summary Report

Kristin Farris-Pope
Rice Operating Company
122 W Taylor Street
Hobbs, NM, 88240

Report Date: August 22, 2006

Work Order: 6080423

Project Location: Lea County,NM
Project Name: TARGA

Sample	Description	Matrix	Date Taken	Time Taken	Date Received
98069	Water Well #19	water	2006-08-01	17:55	2006-08-04

Sample: 98069 - Water Well #19

Param	Flag	Result	Units	RL
Hydroxide Alkalinity		<1.00	mg/L as CaCo3	1.00
Carbonate Alkalinity		<1.00	mg/L as CaCo3	1.00
Bicarbonate Alkalinity		**244**	mg/L as CaCo3	4.00
Total Alkalinity		**244**	mg/L as CaCo3	4.00
Dissolved Calcium		**92.7**	mg/L	0.500
Dissolved Potassium		**9.16**	mg/L	1.00
Dissolved Magnesium		**26.6**	mg/L	1.00
Dissolved Sodium		**156**	mg/L	1.00
Chloride		**302**	mg/L	0.500
Sulfate		**88.1**	mg/L	0.500
Total Dissolved Solids		**870.0**	mg/L	10.00

TraceAnalysis, Inc.

155 McCutcheon Way, Suite H
El Paso, Texas 79932
Tel (915) 585-3443
Fax (915) 585-4944

CHAIN-OF-CUSTODY AND ANALYSIS REQUEST

LAB Order ID # 6080423

Phone #: (505)393-9174
Fax #: (505) 397-1471

122 W Taylor Street - Hobbs, New Mexico 88240

Contact Person: Kristin Farris - Pope, Project Scientist
kpope@riceswd.com

Invoice to: (If different from above)

Project #: None Given
Project Name: TARGA

Project Location: Lea County - New Mexico
Sampler Signature: Rozanne Johnson (505)631-9310 rozanne@valornet.com

LAB # (LAB USE ONLY)	FIELD CODE	# CONTAINERS	Volume/Amount	MATRIX: WATER	SOIL	AIR	SLUDGE	PRESERVATIVE METHOD: HCL	HNO_3	$NaHSO_4$	H_2SO_4	ICE	NONE	SAMPLING: DATE 2006	TIME
98069	Water Well #19	1	1L	X								X		8-1	17:55

ANALYSIS REQUEST (Circle or Specify Method No.)

MTBE 8021B/602	BTEX 8021B/602	TPH 418.1/TX1005/TX1005 Extended (C35)	PAH 8270C	Total Metals Ag As Ba Cd Cr Pb Se Hg 6010B/200.7	TCLP Metals Ag As Ba Cd Cr Pb Se Hg	TCLP Volatiles	TCLP Semi Volatiles	TCLP Pesticides	RCI	GC/MS Vol. 8260B/624	GC/MS Semi. Vol. 8270C/625	PCB's 8082/608	Pesticides 8081A/608	BOD, TSS, pH	Moisture Content	Cations (Ca, Mg, Na, K)	Anions (Cl, SSSSO4, CO3, HCO3)	Total Dissolved Solids		Turn Around Time if different from standard
																X	X	X		

	Relinquished by:	Date:	Time:	Received by:	Date:	Time:
1	Rozanne Johnson	8/3/06	2:30pm			
2	Relinquished by:	Date:	Time:	Received by:	Date:	Time:
3	Relinquished by:	Date:	Time:	Received at Laboratory by:	Date:	Time:
				Amy Adams	8/4/06	10AM

Submittal of samples constitutes agreement to Terms and Conditions listed on reverse side of COC

LAB USE ONLY
Intact Y / N
Headspace Y / N
Temp 4°C
Log-in Review

REMARKS: Please email results to:
kpope@riceswd.com
mfranks @ riceswd.com
rozanne@valornet.com
☐ check if special reporting limits needed

Carrier # Greyhound 1690176675

CARDINAL LABORATORIES

PHONE (325) 673-7001 • 2111 BEECHWOOD • ABILENE, TX 79603
PHONE (505) 393-2326 • 101 E. MARLAND • HOBBS, NM 88240

ANALYTICAL RESULTS FOR
RICE OPERATING COMPANY
ATTN: KRISTIN FARRIS-POPE
122 W. TAYLOR STREET
HOBBS, NM 88240
FAX TO: (575) 397-1471

Receiving Date: 10/12/07
Reporting Date: 10/16/07
Project Number: NOT GIVEN
Project Name: BD JUNCTION J-26
Project Location: T21S R37E SEC26 J~LEA COUNTY, NM

Sampling Date: 10/10/07
Sample Type: WATER
Sample Condition: COOL & INTACT
Sample Received By: BC
Analyzed By: HM/KS

LAB NUMBER	SAMPLE ID	Na (mg/L)	Ca (mg/L)	Mg (mg/L)	K (mg/L)	Conductivity (u S/cm)	T-Alkalinity (mgCaCO3/L)
ANALYSIS DATE:		10/15/07	10/15/07	10/15/07	10/12/07	10/15/07	10/15/07
H13494-1	MONITOR WELL #1	166	59.9	28.2	28.7	1,397	200
H13494-2	MONITOR WELL #2	323	174	68.6	10.7	3,040	192
H13494-3	MONITOR WELL #3	163	51.9	33.1	6.43	1,345	232
Quality Control		NR	47.9	51.6	1.87	9,770	NR
True Value QC		NR	50.0	50.0	2.00	10,000	NR
% Recovery		NR	95.8	103	93.6	97.7	NR
Relative Percent Difference		NR	2.7	< 0.1	< 0.1	0.4	NR
METHODS:			SM3500-Ca-D	3500-Mg E	8049	120.1	310.1

LAB NUMBER	SAMPLE ID	Cl- (mg/L)	SO4 (mg/L)	CO3 (mg/L)	HCO3 (mg/L)	pH (s.u.)	TDS (mg/L)
ANALYSIS DATE:		10/15/07	10/15/07	10/15/07	10/15/07	10/15/07	10/14/07
H13494-1	MONITOR WELL #1	160	228	0	244	7.90	915
H13494-2	MONITOR WELL #2	730	204	0	234	7.61	1,838
H13494-3	MONITOR WELL #3	164	160	0	283	7.77	857
Quality Control		500	22.6	NR	988	6.99	NR
True Value QC		500	25.0	NR	1000	7.00	NR
% Recovery		100	90.4	NR	98.8	99.9	NR
Relative Percent Difference		2.0	15.5	NR	1.2	0.1	NR
METHODS:		SM4500-Cl-B	375.4	310.1	310.1	150.1	160.1

Kristen Supiobo
Chemist

10/16/07
Date

I East Mariand - Hobbs, New Mexico 88240
Tel (505) 393-2326
Fax (505) 393-2476

Cardinal Laboratories, Inc.

CHAIN-OF-CUSTODY AND ANALYSIS REQUEST

LAB Order ID # _____

pany Name: ICE Operating Company	BILL TO Company: RICE Operating Company — PO#
ct Manager: ristin Farris-Pope, Project Scientist	Address: (Street, City, Zip) 122 W Taylor Street ~ Hobbs, New Mexico 88240
ss: (Street, City, Zip) 2 W Taylor Street ~ Hobbs, New Mexico 88240	Phone#: (505) 393-9174 — Fax#: (505)397-1471
e #: 05) 393-9174	Fax #: (505) 397-1471
ct #:	Project Name: BD Junction J-26
ct Location: 21S R37E Sec26 J ~ Lea County New Mexico	Sampler Signature: Rozanne Johnson (505)631-9310 rozanne@valornet.com

LAB # (LAB USE ONLY)	FIELD CODE	(G)rab or (C)omp	# CONTAINERS	MATRIX: WATER	SOIL	AIR	SLUDGE	PRESERVATIVE METHOD: HCL	HNO_3	$NaHSO_4$	H_2SO_4	ICE (1-1Liter HDPE)	NONE	SAMPLING: DATE (2007)	TIME
1444-1	Monitor Well #1	G	1	X								1		10-10	17:15
-2	Monitor Well #2	G	1	X								1		10-10	18:20
-3	Monitor Well #3	G	1	X								1		10-10	16:25

ANALYSIS REQUEST

(Circle or Specify Method No.)

MTBE 8021B/602	BTEX 8021B/602	TPH 418.1/TX1005 / TX1005 Extended (C35)	PAH 8270C	Total Metals Ag As Ba Cd Cr Pb Se Hg 6010B/200.7	TCLP Metals Ag As Ba Cd Cr Pb Se Hg	TCLP Volatiles	TCLP Semi Volatiles	TCLP Pesticides	RCI	GC/MS Vol. 8260B/624	GC/MS Semi. Vol. 8270C/625	PCB's 8082/608	Pesticides 8081A/608	BOD, TSS, pH	Moisture Content		Cations (Ca, Mg, Na, K)	Anions (Cl, SO4, CO3, HCO3)	Total Dissolved Solids	Chlorides	Turn Around Time ~ 24 Hours
																	X	X	X		
																	X	X	X		
																	X	X	X		

quished by: Rozanne Johnson	Date: 10-12-07	Time: 10:25	Received by:
quished by:	Date:	Time:	Received By: (Laboratory Staff) Burgess Hopkins 10/12/07 10:26

Phone Results: Yes / No
Fax Results: Yes / No Additional Fax Number:

REMARKS:

Email Results to: kpope@riceswd.com, lweinheimer@riceswd.com, rozanne@valornet.com

ered By: (Circle One)
ipler - UPS - Bus - Other:

Sample Condition: Cool: Yes / No; Intact: Yes / No

CHECKED BY: (Initials)

APPENDIX E

Junction Box Final Closure Report

RICE OPERATING COMPANY
JUNCTION BOX FINAL REPORT

BOX LOCATION

SWD SYSTEM	JUNCTION	UNIT	SECTION	TOWNSHIP	RANGE	COUNTY	NEW BOX DIMENSIONS - FEET		
							Length	Width	Depth
Blinebry-Drinkard (BD)	J-26 boot	J	26	21S	37E	Lea	no box; junction eliminated		

LAND TYPE BLM _____ STATE _____ FEE LANDOWNER Delrose Scott OTHER _____

Depth to Groundwater 42 feet NMOCD SITE ASSESSMENT RANKING SCORE: 20

Date Started 4/23/2002 Date Completed 10/2/2002 NMOCD Witness YES

Soil Excavated 1000 cubic yards Excavation Length 115 Width 75 Depth 40 feet

Soil Disposed 480 cubic yards Offsite Facility Sundance Location Eunice, New Mexico

General Description of Remedial Action:

For a summary of the junction box remediation and excavation activities, refer to the previously-submitted Junction Box Disclosure Report (2002). Since the vadose remediation, groundwater at this site has been monitored on a quarterly basis.

The attached November 2007 Abatement Completion Report by Trident Environmental of Midland, Texas requests closure of this junction box site.

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

REPORT ASSEMBLED BY Kristin Farris Pope SIGNATURE Kristin Farris Pope

DATE 11/15/2007 TITLE Project Scientist