1R - 426-37

REPORTS

DATE:

Feb. 2006

February 2006

Final Report

Junction N-29

R.T. Hicks Consultants, Ltd.

901 Rio Grande Blvd. NW, Suite F-142, Albuquerque, NM 87104

R. T. HICKS CONSULTANTS, LTD.
901 Rio Grande Blvd NW ▲ Suite F-142 ▲ Albuquerque, NM 87104 ▲ 505.266.5004 ▲ Fax: 505.266-0745

February 10, 2006

Wayne Price
Bureau Chief
NMOCD Environmental Bureau
1220 South St. Francis Drive
Santa Fe, New Mexico 87505
Via E-mail

RE: Jct. N-29, T21S, R37E, Section 29, Unit N; NMOCD Case # 1R0426-37

Dear Mr. Price,

On behalf of Rice Operating Company, R.T. Hicks Consultants, Ltd. is pleased to submit the following report for the above-referenced site. The data presented in this report allow us to conclude that ground water has not been impacted by any releases from the N-29 site and we are requesting that the file for this site be closed without inclusion in Rule 19.

CD copies of this report follow FedEx. If you have any questions or concerns, please do not hesitate to contact us. Please note that we have included all of the information generally required in a Stage 1 Abatement Plan.

Sincerely,
R.T. Hicks Consultants, Ltd.

Katie Lee

Katie Lee
Staff Scientist

Copy: Hobbs NMOCD office;
Rice Operating Company

February 10, 2006

Final Report
Junction N-29

Prepared for:

Rice Operating Company
122 West Taylor
Hobbs, NM 88240

R.T. HICKS CONSULTANTS, LTD.
901 RIO GRANDE BLVD. NW, SUITE F-142, ALBUQUERQUE, NM 87104

1.0 EXECUTIVE SUMMARY

The N-29 Junction Box Site is located about 2 miles northwest of the intersection of State Routes 8/176 and Loop 18, near Eunice, New Mexico in Section 29, 21S, 37E Unit N. In 2002, ROC began delineation and excavation activities as part of the Junction Box Upgrade Program. In early 2003, a Disclosure Report was submitted by ROC to the NMOCD. In July of 2003 R.T. Hicks Consultants, Ltd. submitted a letter proposing a scope of work designed to identify and mitigate any threat to human health or the environment at Jct. N-29.

This report incorporates the preliminary findings from previous investigations, details the remedy that has been employed there to date, presents current analytical data collected at the site. Deep and shallow monitoring wells have been installed down-gradient from the site and sampling there indicates that ground water in the area has not been impacted by past releases at Jct. N-29. As presented in Section 5.0, we therefore conclude that this site file is ready for closure. Section 3.0 of this report describes the previous work employed. Quality assurance protocols are included in section 5.0.

This report incorporates the required elements for both Stage 1 and 2 Abatement Plans. However, because no evidence of ground water impairment due to the release we ask that NMOCD consider this report a file closure request.

2.0 CHRONOLOGY OF EVENTS

Summer, 2002	During a Junction Box upgrade, ROC discovers that releases from the Junction introduced produced water to the subsurface
October-December 2002	ROC excavates chloride and TPH-impacted soil to a depth of 40 feet below ground surface (bgs). Imported backfill placed in the deep excavation from 40 feet to 20 feet bgs is overlain by compacted clay liner and additional backfill to ground surface to create a vadose zone remedy. The ground surface is graded to drain rainwater away from the area above the cap. The surface is then reseeded.
January 2, 2003	Rice Operating Company submits a Disclosure Report detailing the vadose zone closure in 2002.
July 29, 2003	Hicks Consultants submits a workplan proposing examination of the regional hydrogeology and installation of a deep and shallow well down-gradient from the site to determine if the past release caused impairment of ground water quality.
August 21, 2003	NMOCD approves the 2003 workplan
2003-2005	The surface landowner prevents access to the site to implement the approved workplan. In Spring 2005, the landowner grants site access.
May 13, 2005	A deep monitoring well and a shallow monitoring well is installed down-gradient from the release site.
August 2005- present	Quarterly ground water sampling at the monitoring wells down-gradient from the site.

3.0 BACKGROUND

3.1 Site Location and Land Use

The N-29 Junction Box Site is located about 2 miles northwest of the intersection of State Routes 8 and Highway 207, near Eunice, New Mexico in Section 29, 21S, 37E Unit N. Plate 1 shows the location of the site.

Land in the site area is primarily utilized for oil and gas production and cattle ranching. The subsurface mineral owner is the BLM, the surface fee landowner is Tom Kennaan. Plate 2 is an aerial photograph of the area showing this land use and the access road from Highway 8.

3.2 Summary of Previous Work

Initial sampling activities that delineated a zone of impact associated the N-29 junction box area began in 2002, as part of ROC's junction box upgrade program.

ROC drilled a soil boring and conducted soil sampling within upper vadose zone during excavation activities between October 7, 2002 and December 27, 2002. Soil samples were analyzed in the field for chlorides using field-adapted Method 9253 (QP-03). Appendix A presents the 2002 Disclosure Report that gives the boring log and field analyses, details of soil excavation and soil field tests. Sidewall and bottom samples were sent to the laboratory for analysis of benzene, toluene, ethylbenzene, total xylenes (BTEX) using EPA Method 8021B, gas and diesel range organics (GRO/DRO) using EPA Method 8015M, and chlorides to confirm the completion of excavation activities. Results of the excavation sampling are listed in the Table 1.

Table 1: Soil Sample Results After Excavation

Sample Location	BTEX (mg/kg)	GRO (mg/kg)	DRO (mg/kg)	Chlorides (mg/kg)
Sidewalls	<0.025	<10	<10	5140
Bottom	<0.025	<10	<10	478

Most of the hydrocarbon-impacted soil that was excavated to a depth of 40 feet below ground surface was bio-remediated (landfarmed) on site. Approximately 84 cubic yards of hydrocarbon-impacted soil was transported to the Sundance/Parabo facility east of Eunice.

Imported backfill placed in the deep excavation from 40 feet to 20 feet bgs was overlain by a compacted clay liner and additional backfill to ground surface to create a vadose zone remedy. The ground surface was graded to drain rainwater away from the area above the cap. The surface was then reseeded. The disclosure report detailing all of the above-referenced work was completed on

December 27, 2002 and forwarded to the NMOCD in early 2003. The work completed in 2002 completed the vadose zone remedy for the site.

4.0 GEOLOGY AND HYDROGEOLOGY

4.1 REGIONAL AND LOCAL HYDROGEOLOGY

Plate 3 presents a geologic map of southern Lea County. This map shows the Ogallala Formation is present throughout much of the area and is underlain by the Dockum Group redbeds. Along Monument Draw, east of the site, erosion has stripped the Ogallala and deposition of alluvium over the redbeds has created a separate aquifer that is hydraulically connected to the Ogallala in many locations (see Nicholsen and Clebsch, 1961).

Plate 4 displays the portion of the geologic map of southern Lea County southeast of Eunice, New Mexico from Nicholsen and Clebsch (1961). The Ogallala Formation underlies the City of Eunice, the site area and the eastern boundary of Plate 4. Quaternary erosion and deposition removed the Ogallala and deposited alluvium within the central part of Plate 4, which effectively outlines the active channel of Monument Draw. The N-29 junction box is plotted on Plate 4.

Plate 4 also shows the elevation of the top of the red bed surface. The Dockum Group red beds are an aquiclude below the Ogallala and alluvial aquifers. East of the N-29 Junction Box, the red bed elevation contours define a paleo-valley just west of and sub-parallel to Monument Draw. The elevation of the red bed surface influences ground water flow. Ground water is generally directed toward the axis of this subsurface feature

Plate 5 is the ground water map of southern Lea County (Nicholsen and Clebsch, 1961) covering the same area as Plate 4. This plate shows that the water table elevation mimics the red-bed elevation. At the N-29 junction box site, ground water flows southeast, toward Monument Draw.

Plate 6 presents a ground water map derived from 2005 ground water measurements at the N-29 junction box site and 2003 measurements from four wells at the ChevronTexaco site (CDU Tract 19, IRP-223) to the northeast of N-29. Appendix B presents a potentiometric surface map from a 2004 Chevron-sponsored report on the CDU Tract 19 site that confirms the south-southeast ground water flow direction. The deep and shallow Monitoring wells installed to the southeast of the old junction box are down gradient from any releases there.

From the data of Nicholsen and Clebsch (1961) presented in Plates 4 and 5 of this report one can estimate the saturated thickness of the alluvium in our area of interest as about 35 feet (10.5 meters). The lithologic logs of the on-site monitoring wells (Appendix C) show a saturated thickness of 31 feet with the saturated zone dominated by silty sand and clayey sand. Hydraulic conductivity values for silty sand and clayey sand are presented in Table 2.2 of

Freeze and Cherry (1979) and are estimated between 0.665 and 1.33 ft/day. A specific yield (porosity) of 0.23 for the Ogallala aquifer near the site area is based on limited published information (Hart & McAda, 1985). Data from Nicholsen and Clebsh show a regional hydraulic gradient of about 0.0047.

Using these values yields an average linear velocity of between 4.9 and 9.9-feet per year. The table below presents the parameters and calculations employed. Because our monitoring wells are located about 66-feet down gradient from the former junction box, the wells will *not* intercept molecules that were released from the site 6.6 years ago, if we use the fastest average linear velocity, or 13.2 years ago if the slower velocity is employed in the calculation. The monitoring wells would be ineffective in detecting a past chloride release if releases ceased before 1999 or, using the slower velocity, before 1992 *and* natural attenuation removed all evidence of such a release. As chloride impacted soil was excavated in 2002, this is highly unlikely.

Table 2. Ground Water Flow Velocity Calculations

Parameter	Low Estimate	High Estimate
Hydraulic Conductivity k (ft/day)	0.665	1.33
dh/dl (hydraulic gradient)	0.00473	
Q = k* dh/dl	0.0031	0.0063
Specific yield = porosity	0.23	
Average linear velocity = Q/porosity (ft/day)	0.014	0.027
Average linear velocity (ft/year)	***4.992***	***9.983***
Transport Time from Release to Well (years)	13.2	6.6

We conclude that the monitoring well cluster is located and constructed in a manner that would detect any past releases from Junction Box N-29. We conclude that any past releases from Junction Box N-29 did not introduce a sufficient mass of chloride or other constituent to cause impairment of ground water quality.

An inventory of water supply wells obtained from state (NMOSE) and federal (USGS) databases is shown in Plate 7. Field reconnaissance has confirmed that there are more wells in the area than appear in the databases used for this map.

Surface water in the area is ephemeral and flows in Monument Draw occur only after large precipitation events. We found no evidence to suggest that the release from the junction box affected Monument Draw or any watercourse in any manner. Therefore, this document does not provide information on surface water hydrogeology.

4.2 2005 Ground Water Monitoring

Monitoring wells N-29 MW-Deep and N-29 MW-Shallow were installed approximately 66 feet to the southeast (down gradient) of the excavated area. The inset in Plate 6 shows the location of the wells relative to the vadose zone remedy excavation. Subsequent sampling of N-29 MW-Deep and N-29 MW-Shallow in August and October of 2005 confirmed that ground water was not impacted with BTEX, chloride, or TDS levels above WQCC standards. BTEX concentrations were below laboratory detection limit of 0.01 µg/L. Copies of the laboratory analytical report and chain of custody form for the most recent ground water sampling event are included in Appendix C. See Table 3 (attached) for the results of the two sampling events.

5.0 CONCLUSIONS AND RECOMMENDATIONS

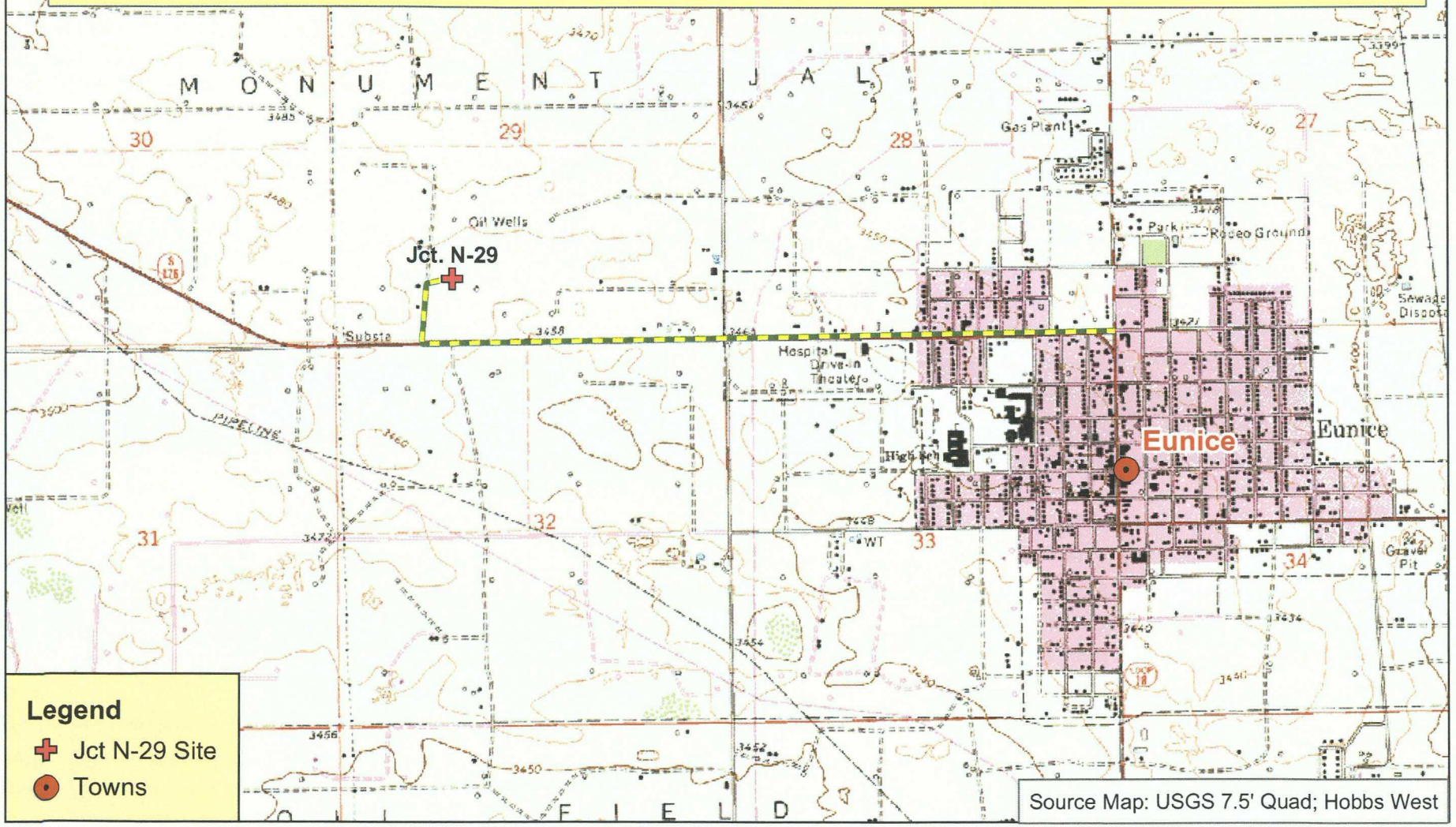
- The Vadose Zone remedy is complete.
- Deep and Shallow Monitoring Wells installed down gradient from the former junction box would detect any impairment to ground water that may have been caused by past releases from the N-29 Junction.
- Ground water monitoring of the Deep and Shallow Monitoring Wells at the site indicates that water in these wells has levels of BTEX, Chloride and TDS that are below WQCC standards
- We recommend that NMOCD withdraw this site from Rule 19 because the past release dose not pose a threat to fresh water, public health or the environment.
- We recommend plugging and abandonment of the two monitoring wells and closure of the regulatory file.

6.0 QUALITY ASSURANCE / QUALITY CONTROL

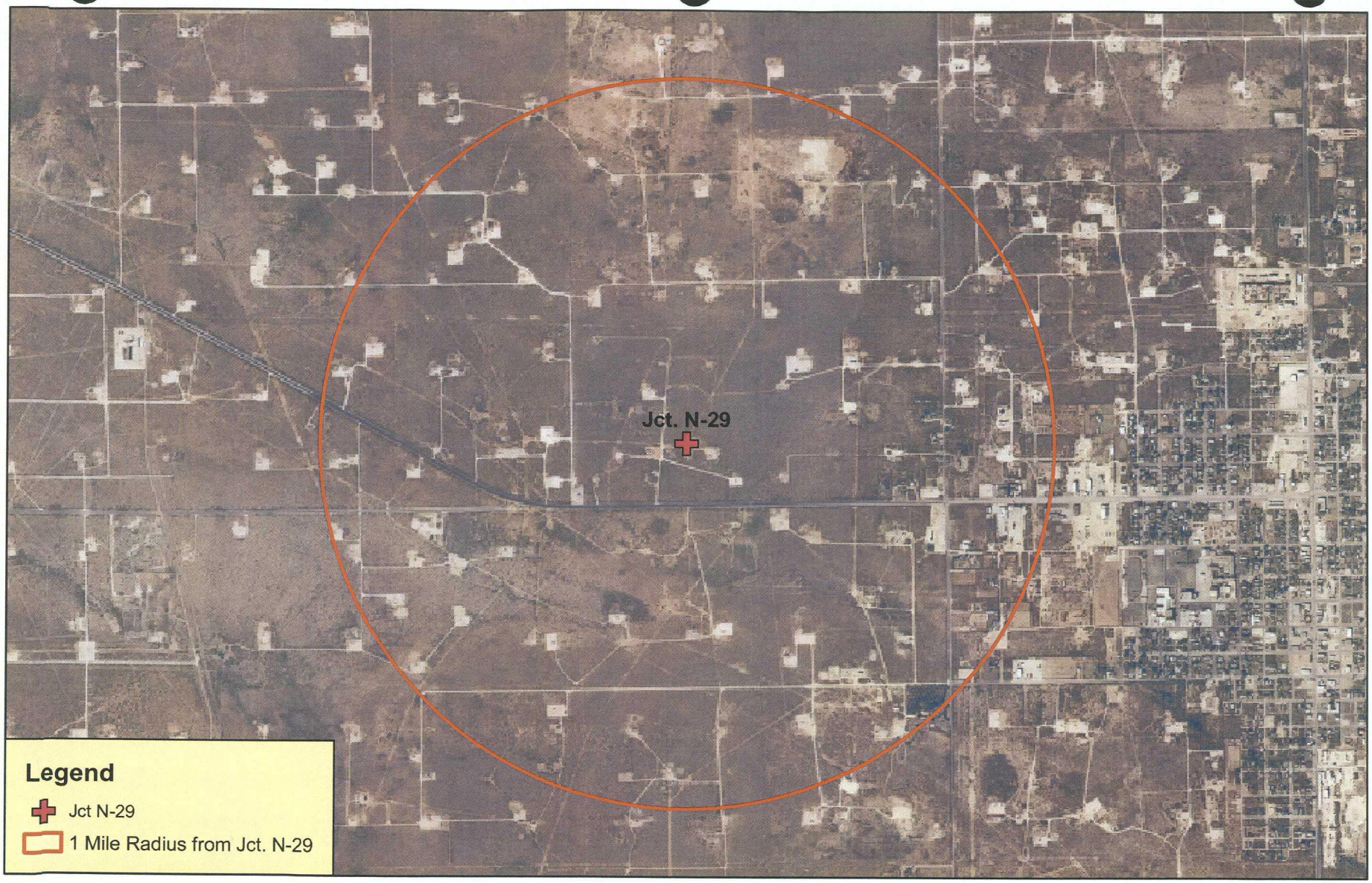
Sampling and analytical procedures were performed in accordance with Title 20 NMAC 6.3107.B and Section 103 of the Water Quality Standards for Interstate and Intrastate Streams in New Mexico (20 NMAC 6.1). Specific quality procedures for obtaining ground water samples are included in Appendix D.

PLATES & TABLES

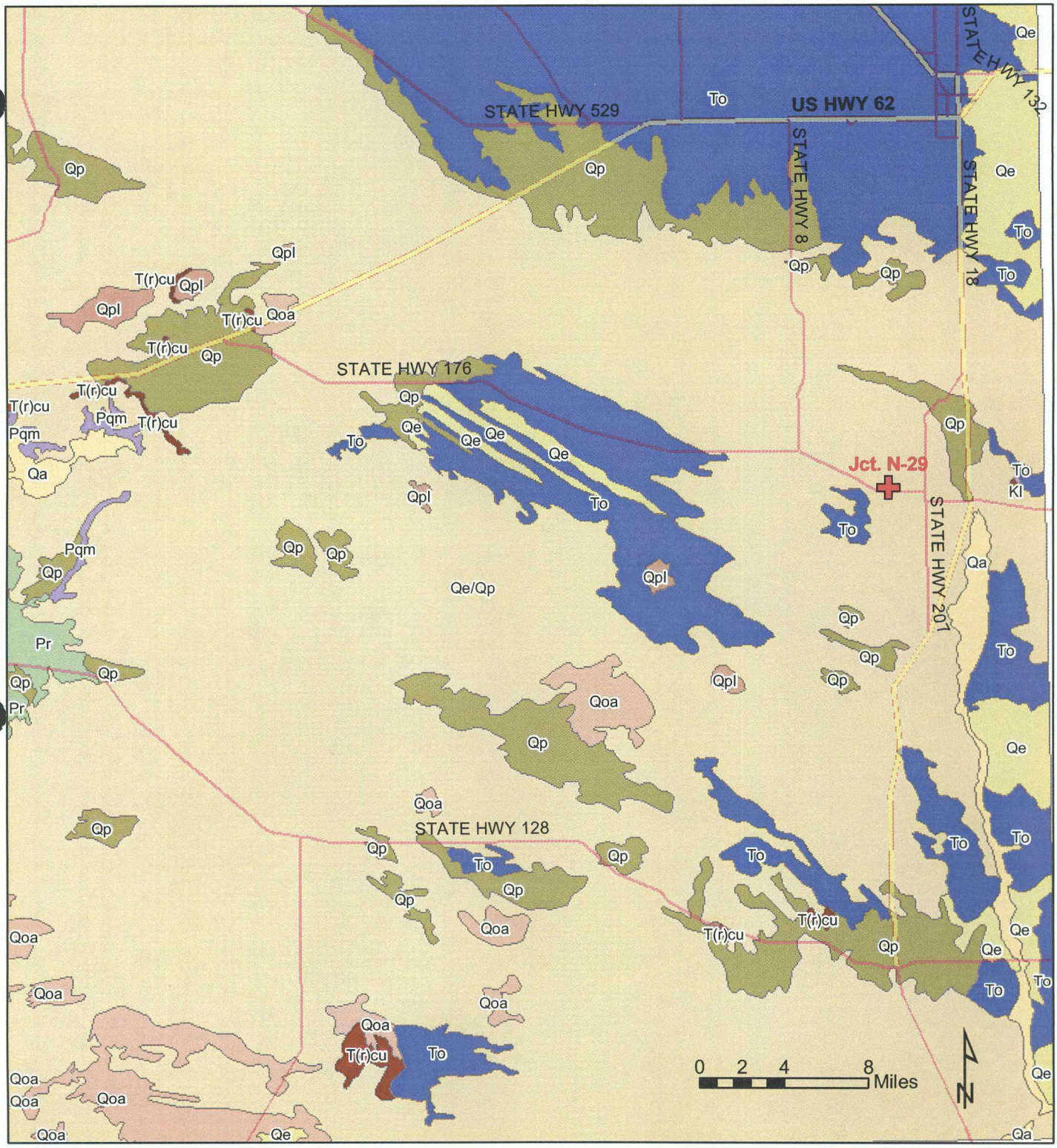
Directions to site: From the intersection of Highway 207 and Highway 8 in Eunice, proceed west on Highway 8 for 1.8 miles. Turn north on an unnamed dirt road. Proceed north for 850 feet. Then turn east on an unnamed dirt road. Proceed east for 340 feet. Jct N-29 is north of the road. The two monitoring wells are southeast of the junction box, south of the dirt road.



R.T. Hicks Consultants, Ltd 901 Rio Grande Blvd NW Suite F-142 Albuquerque, NM 87104 Ph: 505.266.5004	Site Map	Plate 1
	ROC: Jct. N-29 (NMOCD #: 1R0426-37)	January 2006



R.T. Hicks Consultants, Ltd 901 Rio Grande Blvd NW Suite F-142 Albuquerque, NM 87104 Ph: 505.266.5004	2004 Aerial Photograph of Surrounds	Plate 2
	ROC: Jct. N-29 (NMOCD #: 1R0426-37)	January 2006



Legend

Map_Unit, Description			
Kl, Lower Cretaceous, undivided	Pqm, Paleozoic-Quartermaster Formation	Qe, Quaternary Eolian Deposits	Qp, Quaternary Piedomon Alluvial Deposits
Pat, Permian-Tansill or Yates Formation	Pr, Paleozoic-Ruster Formation	Qe/Qp, Quaternary Eolian Piedmont Deposits	Qpl, Quaternary Lacustrine and Playa Deposits
	Qa, Quaternary Alluvium	Qoa, Quaternary-Older Alluvial Deposits	T(r)cu, Triassic-Upper Chinle
	T(r)s, Triassic-Santa Rosa Formation	To, Tertiary Ogallala Formation	

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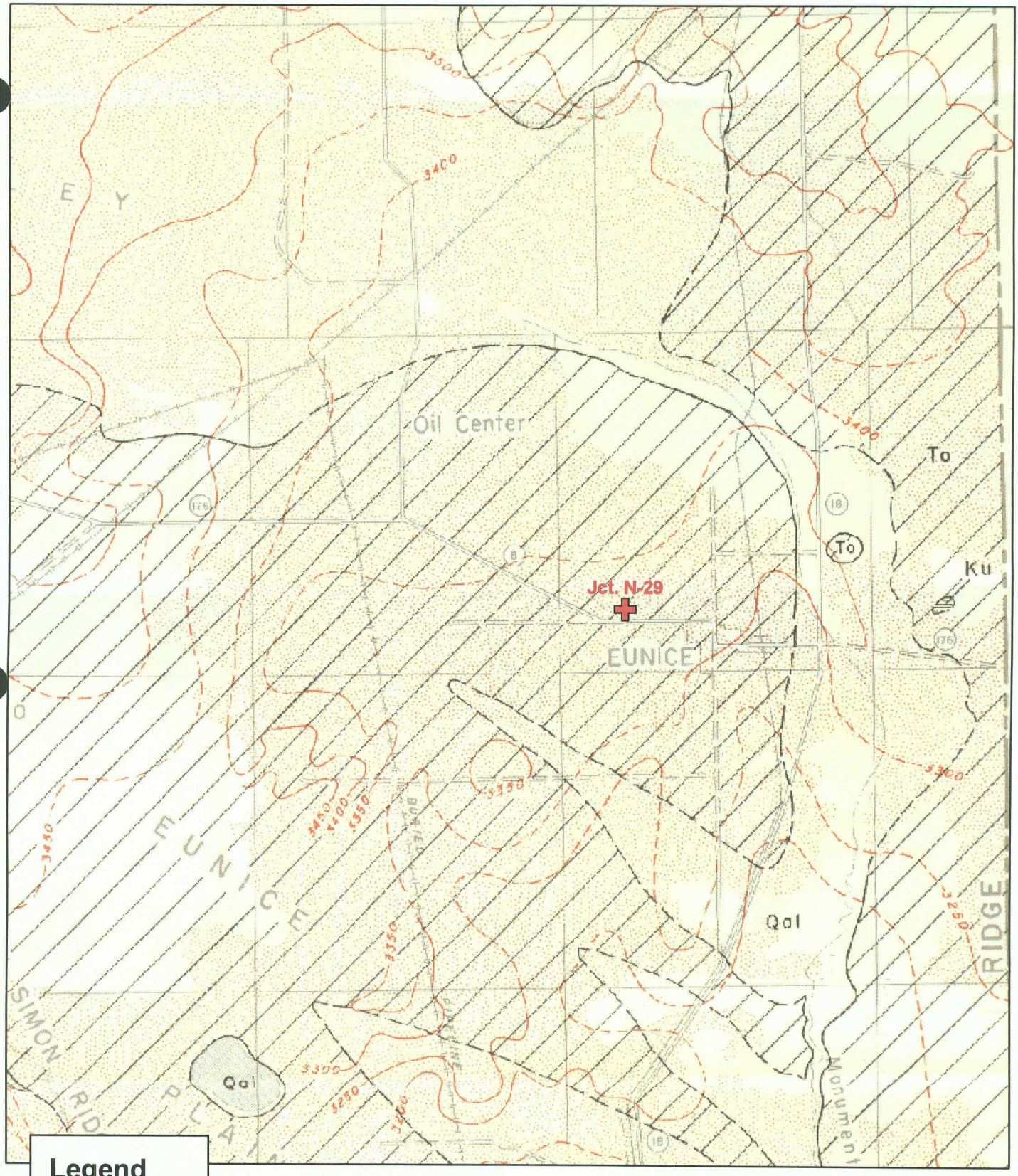
Regional Geologic Map (USGS Open File Report OF-97-52)

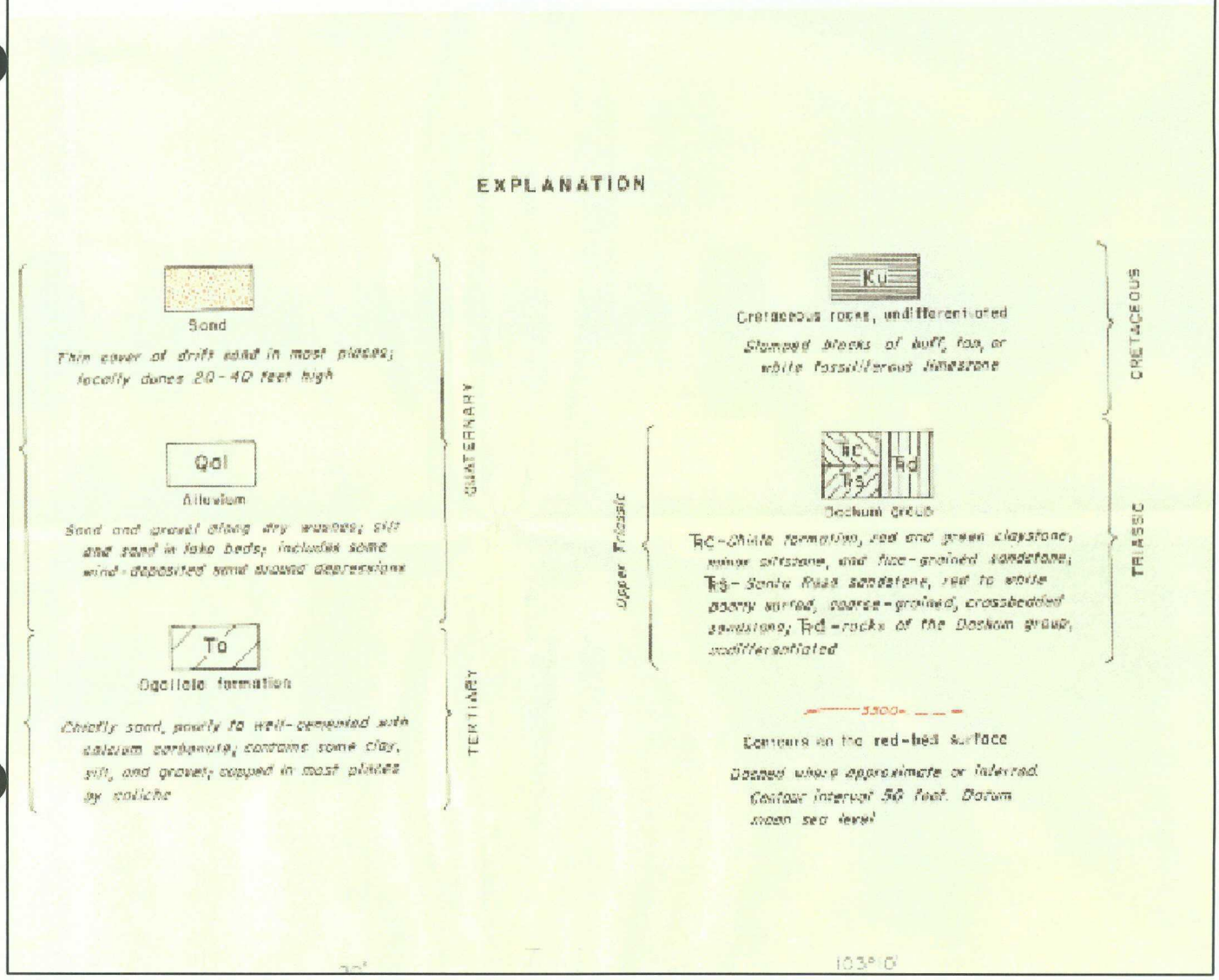
Plate 3

ROC: Jct. N-29 (NMOCD #: 1R0426-37)

January 2006

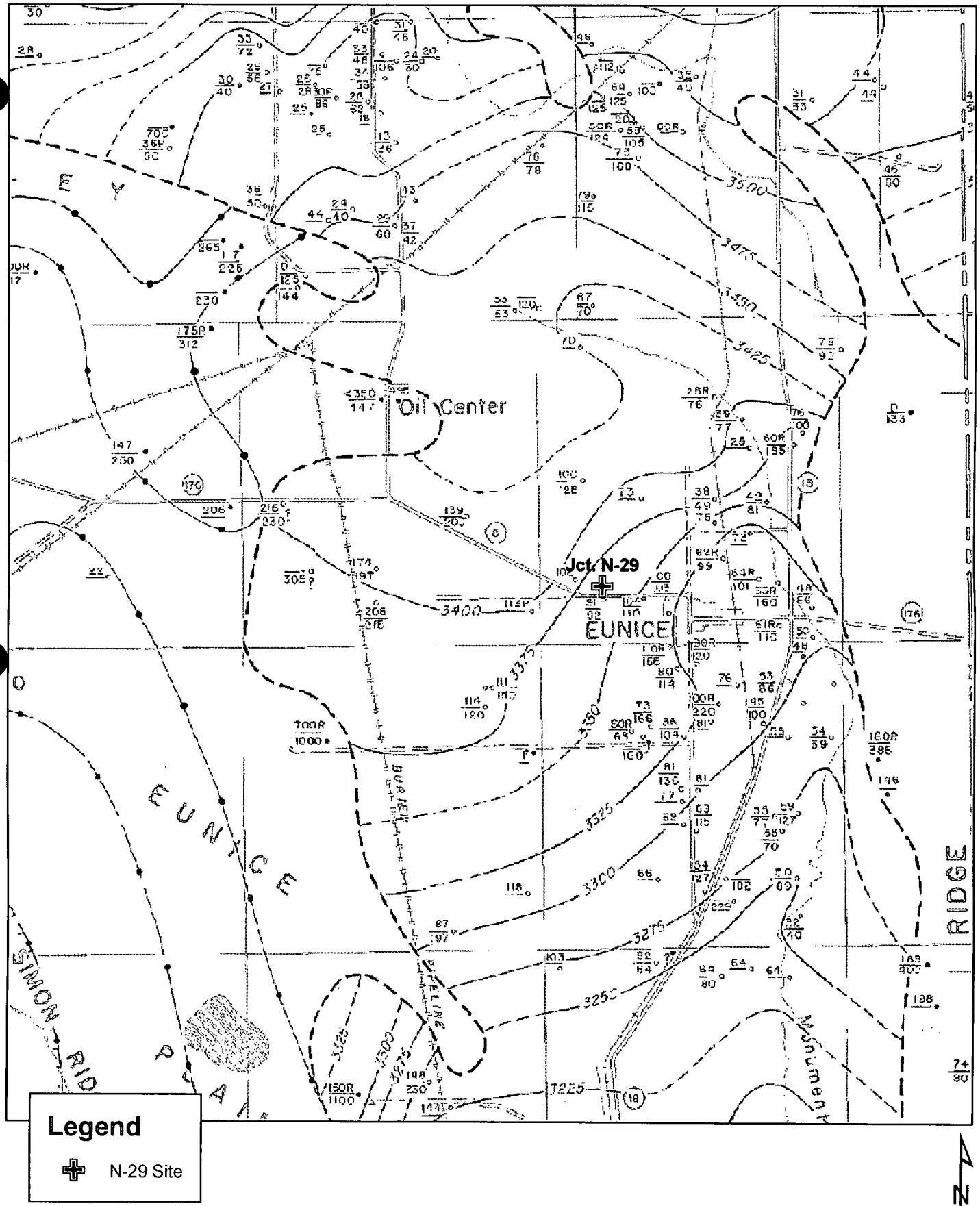


R.T. Hicks Consultants, Ltd 901 Rio Grande Blvd NW Suite F-142 Albuquerque, NM 87104 Ph: 505.266.5004	Local Geologic Map (Nicholson & Clebsch, 1961)	Plate 4
	ROC: Jct. N-29 (NMOCD #: 1R0426-37)	January 2006

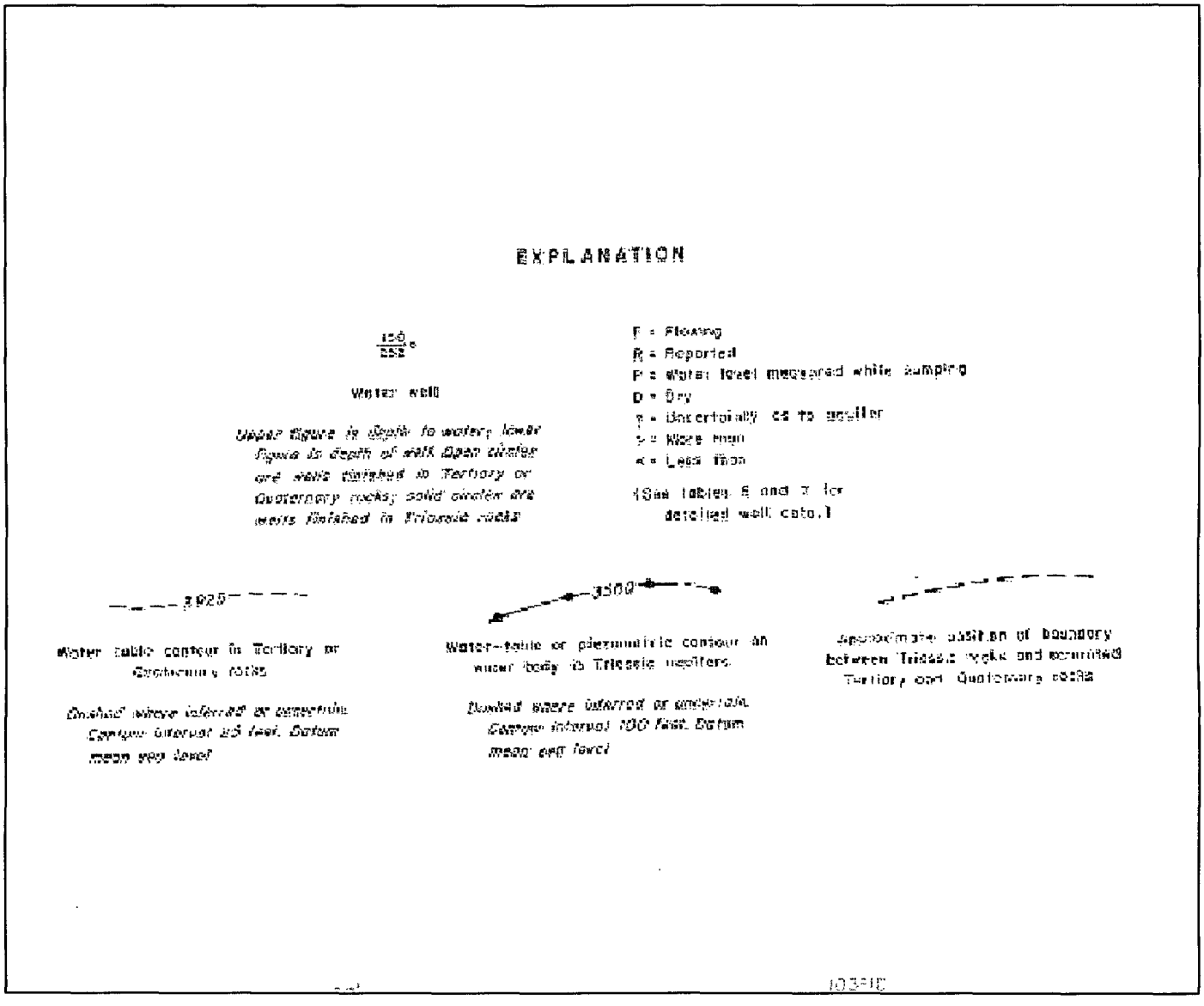


Legend to Nicholson & Clebsch (1961) Geologic Map

R.T. Hicks Consultants, Ltd 901 Rio Grande Blvd NW Suite F-142 Albuquerque, NM 87104 Ph: 505.266.5004	Supplemental Legend to Geologic Map	Plate 4 Supplemental
	ROC: Jct. N-29 (NMOCD #: 1R0426-37)	January 2006

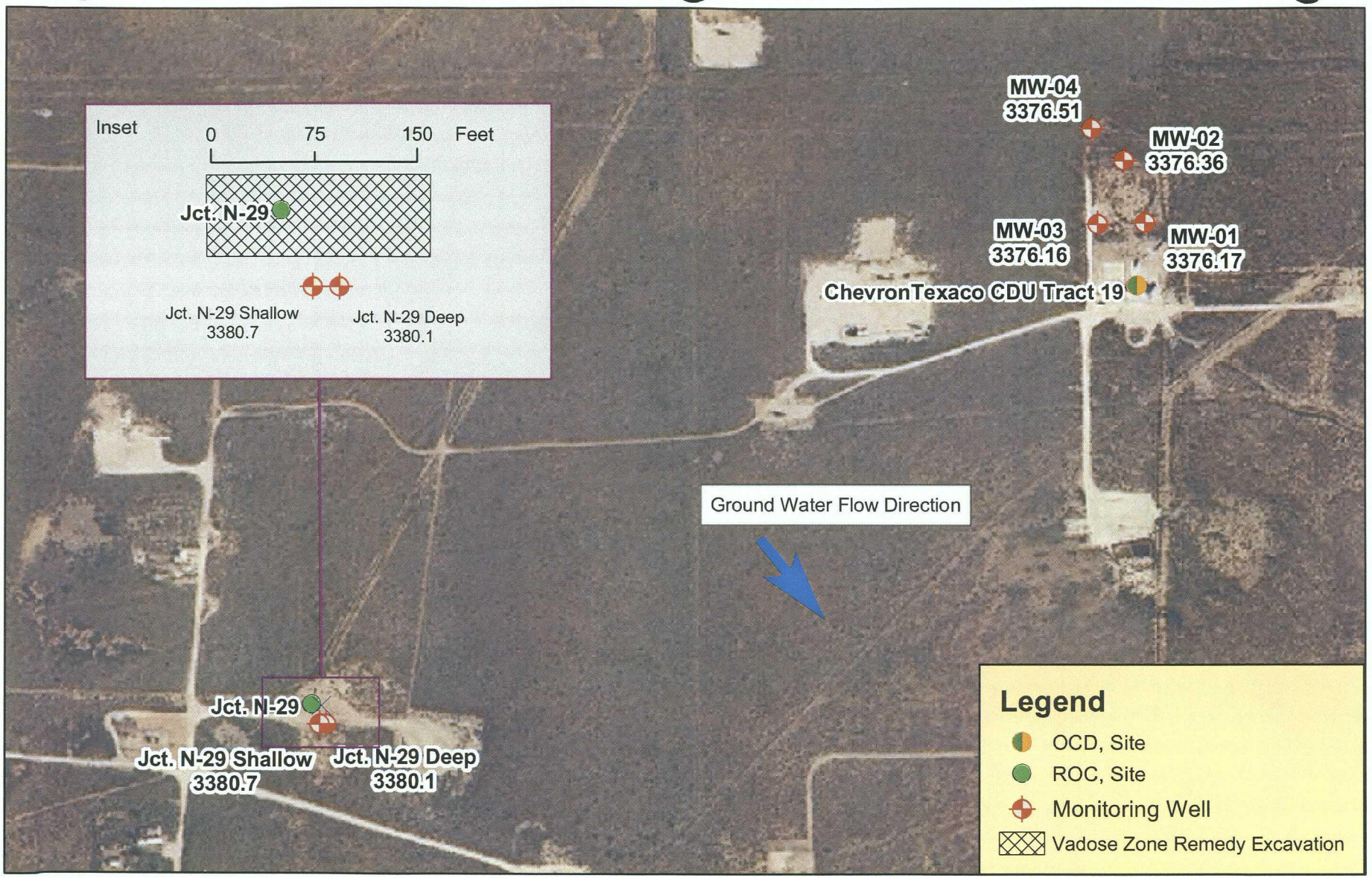


R.T. Hicks Consultants, Ltd 901 Rio Grande Blvd NW Suite F-142 Albuquerque, NM 87104 Ph: 505.266.5004	Local Ground Water Map (Nicholson & Clebsch, 1961)	Plate 5
	ROC: Jct. N-29 (NMOCD #: 1R0426-37)	January 2006



Legend to Nicholson & Clebsch (1961) Ground Water Map

R.T. Hicks Consultants, Ltd 901 Rio Grande Blvd NW Suite F-142 Albuquerque, NM 87104 Ph: 505.266.5004	Supplemental Legend to Ground Water Map	Plate 5 Supplemental
	ROC: Jct. N-29 (NMOCD #: 1R0426-37)	January 2006

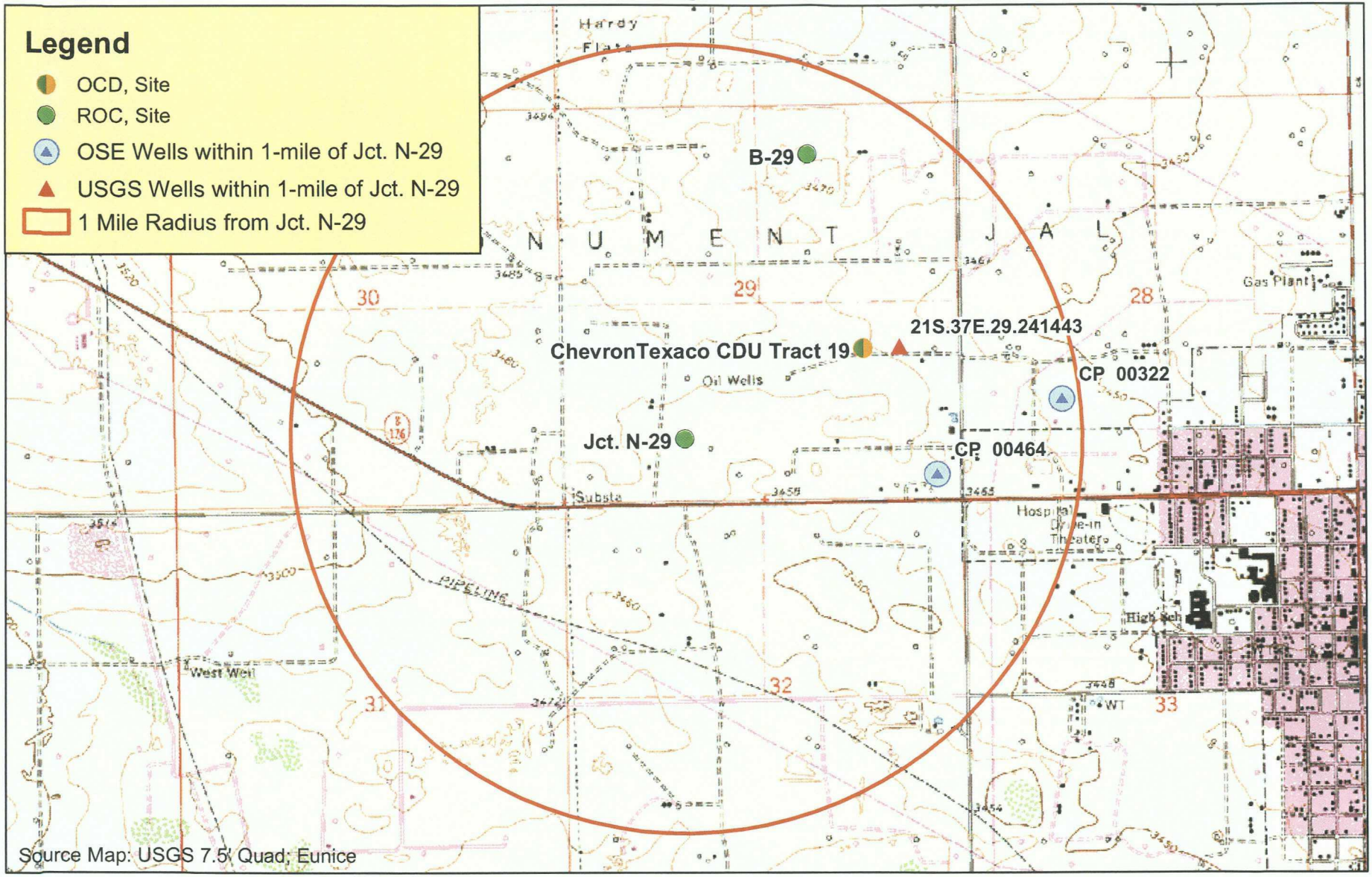


Source Map: USGS 7.5' Quad; Eunice

0 500 1,000 2,000 Feet

N

R.T. Hicks Consultants, Ltd 901 Rio Grande Blvd NW Suite F-142 Albuquerque, NM 87104 Ph: 505.266.5004	Ground Water Elevations (fmsl)	Plate 6
	ROC: Jct. N-29 (NMOCD #: 1R0426-37)	January 2006



R.T. Hicks Consultants, Ltd 901 Rio Grande Blvd NW Suite F-142 Albuquerque, NM 87104 Ph: 505.266.5004	Wells within 1-Mile of Jct. N-29	Plate 7
	ROC: Jct. N-29 (NMOCD #: 1R0426-37)	January 2006

Table 3:
Ground Water Chemistry

Well Name	Date	Benzene(ug/L)	Toluene(ug/L)	Ethyl Benz(ug/L)	Total Xylenes(ug/L)	Chloride(mg/L)	TDS(mg/L)
Jct. N-29 Deep	08/30/05	<1	<1	<1	<1	80.2	764
	10/18/05	<1	<1	<1	<1	82.8	766
	01/17/06	<1	<1	<1	<1	62.2	420
Jct. N-29 Shallow	08/30/05	<1	<1	<1	<1	73.1	590
	10/18/05	<1	<1	<1	<1	80.3	568
	01/17/06	<1	<1	<1	<1	78.8	454
WQCC Standards		*10*	*750*	*750*	*620*	*250*	*1000*

Well Name	Date	Sulfate(mg/L)	Sodium(mg/L)	Calcium(mg/L)	Magnesium(mg/L)	Potassium(mg/L)	CaCO3(mg/L)
Jct. N-29 Deep	08/30/05	170	168	56	29.8	11	218
	10/18/05	86.3	135	43.2	24	10.9	230
	01/17/06	111	116	30.3	18	9.3	204
Jct. N-29 Shallow	08/30/05	91.9	116	36.8	10	6.67	210
	10/18/05	179	84.6	51.8	18.7	5.38	206
	01/17/06	86.3	71.8	53.2	24.1	4.64	187
WQCC Standards		*600*	--	--	--	--	--