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Liquid Waste Impoundment Closure Plan

Compressor Station No. 9

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Chaves County, New Mexico

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Prepared for the
State of New Mexico Environment Department
Santa Fe, New Mexico

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1.0 Introduction

Transwestern Pipeline Company (TPC) is the owner and operator of Compressor Station No. 9 located in Chaves County, New Mexico approximately five miles north of Roswell, New Mexico (Figure 1). The function of this facility is to compress natural gas for transportation through the TPC pipeline which delivers natural gas from west Texas producers to western U.S. markets. This facility has been in operation for approximately 30 years. During past operations, several in-ground liquid waste impoundments had been utilized at this site. The purpose of this document is to present a closure plan for a former liquid waste impoundment which is no longer in service. A site map indicating the former location of the impoundment relative to the facility site is attached as Figure 2.

The Compressor Station No. 9 facility is situated on 70 acres of property that are owned by TPC. Adjoining property located to the north and east of the station is owned by the State of New Mexico. Land use in the vicinity of the site is primarily for cattle grazing. This closure plan was developed with the intent to comply with all requirements of the State of New Mexico Environment Department and to restore the environment to a condition that is commensurate with the land use surrounding the site.

There have been three separate environmental investigations of shallow subsurface conditions in the vicinity of the impoundment. These investigation reports will be referred to as:

- The *HLA Report*, completed by Harding Lawson Associates, dated June 20, 1991
- The *Metric Report*, completed by Metric Corporation, dated December, 1991
- The *Brown & Root Report*, completed by Brown & Root Environmental, draft dated June 23, 1993.

Copies of the HLA Report and the Metric Report have already been submitted to the State of New Mexico Environment Department for review. A copy of the Brown & Root Report is included here as Appendix B.

2.0 Liquid Waste Impoundment Description

The impoundment addressed in this closure plan is located in the northeast corner of the facility property (Figure 2). This was an earthen (unlined) impoundment, approximately 20 feet × 20 feet, and in use between 1973 and 1986. The impoundment was taken out-of-service and backfilled in 1986. The primary wastes discharged to the impoundment were water and hydrocarbon condensate discharged from natural gas scrubbers. Other

wastes discharged to the impoundment include used motor oil and washdown water containing solvents discharged from the engine room and painting wastes. These wastes are no longer disposed of on-site. All regulated waste materials are shipped to off-site facilities following appropriate state and federal regulations for disposal.

3.0 Regional and Site Hydrogeologic Conditions

Surface Topology

The facility is located approximately 7 miles west of the Pecos River, on the Llano Estacado (Staked Plains). The plains stretch eastward into Texas and rise westward in gradual slopes to the Sacramento and Sierra Blanca Mountain Ranges. Surficial or shallow soils in the immediate vicinity of the facility consist of alluvium, disturbed gravel deposits, and terrace gravel deposits. Surface topology in the vicinity of the facility dips toward the southeast.

Shallow Ground Water

Shallow ground water first occurs at a depth of ≈ 25 feet below ground surface at various locations within the site boundary. This water is perched upon a continuous undulating clay layer. The ground water at this depth has been found in low discontinuous pockets of this shallow clay layer and generally saturates less than 1-4 feet of alluvium.

The next occurrence of shallow ground water is an unconfined aquifer that is found perched upon a clay layer at approximately 70 feet below ground surface. This aquifer is more continuous and saturates as much as 10 feet of alluvium.

San Andreas Formation

The primary source of ground water in the area immediately around the station site has historically been the San Andreas formation. This formation occurs at approximately 250 feet below ground surface in the vicinity of the station site. The general direction of ground water flow in the San Andreas formation is toward the southeast. Currently, this formation is not being used as a drinking water supply in the vicinity of the station since drinking water is supplied to this area by the City of Roswell.

Nearby Water Wells

A search for water wells located within a one mile radius of the facility identified five wells. The approximate location of each well is shown in Figure 3. Four of the five wells identified were completed in the San Andreas formation. These wells are generally 350 - 400 feet in total depth and are cased to 150 feet or below. Only one of the wells is potentially in use (Figure 3, well #1). This well is located approximately 1/2 mile northwest of the site and has been used for irrigation. Another well, not completed in the

San Andreas formation, is an abandoned stock well that is completed in the shallow alluvial fill, total depth ≈ 58 feet (Figure 3, well #5). This well is located approximately 1/2 mile northeast of the site.

4.0 Summary of Prior Investigations

There have been three separate environmental investigations of shallow subsurface conditions completed in the vicinity of the impoundment. The reports from these investigations are referred to as:

- The *HLA Report*, completed by Harding Lawson Associates, dated June 20, 1991
- The *Metric Report*, completed by Metric Corporation, dated December, 1991
- The *Brown & Root Report*, completed by Brown & Root Environmental, draft dated June 23, 1993.

The first investigation of shallow subsurface conditions at this site was conducted by a third party environmental consultant, Harding Lawson Associates (HLA). The primary objective of this investigation was to check for the potential presence of volatile organic compounds in the shallow subsurface soil. During February through May of 1990, HLA completed a soil gas survey of the entire facility site. The results of the survey indicated the possible presence of chlorinated volatile organics in the vicinity of the northeast corner of the facility site. The subject liquid waste impoundment is located in this area.

The next investigation of shallow subsurface conditions at this site was conducted by another third party environmental consultant, Metric Corporation. The primary objective of this investigation was to assess the presence of organic constituents in the vicinity of the former liquid waste impoundment. During July and November of 1991, eight boreholes were drilled and evaluated on-site and twelve boreholes were drilled and evaluated in the adjacent area off-site. This investigation concluded that free phase hydrocarbons and ground water were contained within the alluvial deposits of sand and gravel above a natural clay basin centered in the vicinity of the northeast corner of the site. This conclusion was based on evidence from a single borehole drilled near the northeast corner of the site that had accumulated approximately 30 feet of water in the open borehole (depth to clay ≈ 64 ft, depth to water ≈ 34 ft.). This interpretation of subsurface geology was subsequently proven inaccurate during the third investigation.

In July 1992, prior to the third investigation, a monitor well was installed by Brown & Root Environmental (formerly Halliburton NUS) near the center of the presumed basin. The well was installed for the purpose of collecting ground water samples and initiating liquid recovery. The well is constructed of 28 feet of 4 inch PVC casing and 40 feet of PVC screen. The screen is set at 28 feet to 68 feet below ground surface. In September 1992 the monitor well was purged and a ground water sample was collected. Subsequent analysis (EPA SW 8240, SW 8270, and SW 7000 series for metals) indicated the presence of volatile organic compounds and metals above the SDWA MCLs, however, none of the volatile organic compounds or metals detected were present in concentrations above the

RCRA regulatory levels for a TCLP leachate. Table 1 presents a list of the volatile organic compounds, semi-volatile organic compounds, and metals detected in the sample.

Table 1. Summary of Analytical Results for Impacted Ground Water

Analyte	Analytical Result ppm	SDWA MCL ppm	RCRA RL ppm
benzene	0.370	**0.005**	0.5
toluene	0.061	1.0	-
ethylbenzene	0.110	0.700	-
total xylenes	0.940	10.0	-
1,1,1 - TCA	0.180	0.200	-
1,1 - DCA	0.560	-	-
2 - butanone (MEK)	0.220	-	200.0
2 - methylnaphthalene	0.051	-	-
4 - methylphenol	0.250	-	-
naphthalene	0.034	-	-
arsenic	0.19	**0.05**	5.0
barium	4.4	**2.0**	100.0
chromium	0.01	0.1	5.0

The total petroleum hydrocarbon (TPH) concentration of the ground water sample was 37 ppm as determined by EPA Method 418.1.

The third, and most recent, investigation of shallow subsurface conditions at this site was conducted by Brown & Root Environmental. A copy of the resulting report is included as Appendix B. The primary objective of this investigation was to evaluate the potential impact to the "regional aquifer" and to verify the Metric interpretation of subsurface topology. During May 1993, six borings were drilled and evaluated in the vicinity of the northeast corner of the site. The result of this investigation indicated that the prior interpretation of subsurface topology was inaccurate. The current interpretation of subsurface topology in the vicinity of the northeast corner of the site consists of the following sequences (from the surface):

- 20 to 35 feet of alluvial sand and gravel
- A clay layer, 2 to 8 feet thick, that forms a much less pronounced basin centered around the northeast corner of the property. The top of the clay varies from 20 feet to 35 feet below ground surface.
- Alluvial sediments that grade from sandy/silty clay to sandy gravel at approximately 70 feet below ground surface.
- A clay layer of unknown thickness at approximately 70 feet below ground surface.

A small volume of water (less than 10,000 gallons) and phase separated hydrocarbon are perched above the shallowest clay layer near the center of the topological basin. A larger

volume of water and phase separated hydrocarbon are perched above the lower clay layer. Cross-sections depicting the subsurface topology are presented in the Brown & Root Report.

5.0 Summary of Interim Corrective Measures

On May 21, 1993 a liquid recovery pump was installed in monitor well MW-1. The primary objective was to initiate free phase hydrocarbon recovery from both the shallow perched zone and the lower unconfined aquifer. The reason for initiating free phase hydrocarbon recovery at this time was twofold: first, recovering liquids from this well would prevent the continued migration of free phase hydrocarbon from the uppermost perched zone to the lower unconfined aquifer, and second, removing free phase hydrocarbon is a necessary step in cleaning up the two impacted zones. A secondary objective was to gather information regarding the potential free phase hydrocarbon recovery rate.

The pump was initially installed such that the pump inlet was at the hydrocarbon/water interface (≈ 61 ft. toc). However, due to insufficient recovery rate, the pump inlet was lowered to approximately 24 inches below the initial hydrocarbon/water interface (≈ 63 ft. toc). The pump has continued to operate on a 24 hour/day basis since it was first installed. Total recovery as of June 23, 1993 (33 days operating) was approximately 930 gallons of liquid (100% hydrocarbon, no water). Recovered liquids are stored in a 10,000 gallon tank that is located near the recovery well. The liquids will periodically be removed from the storage tank and properly disposed of by Transwestern Pipeline Company.

6.0 Closure Plan for the Shallow Perched Zone

MW = Monitor Well
RW = Recovery "

Remediation of the shallow perched zone will be accomplished by removing water and free phase hydrocarbon from the alluvial sediments above the shallow clay layer to the extent that these sediments are no longer in a saturated condition.

The vertical and lateral extent of contamination in this zone has been well defined. During the first week of June 1993, seven borings were advanced to the shallow clay layer in the immediate vicinity of the former liquid waste impoundment. Of the seven borings, boring RW-1 contacted the clay layer at the lowest elevation and was subsequently completed as a recovery well.

A two inch pneumatic pump will be installed in RW-1 with the pump inlet set as low as possible. The pump will operate continuously on a 24 hour/day basis in order to maximize drawdown at the well. Pumping will cease at which time the alluvial sediments are effectively unsaturated. This point in time will be determined by temporarily shutting down the pump and monitoring the water level in the wellbore. A water level shall be measured at 1.0 hour after shutting down the pump and again after 24.0 hours so that the

change in water level over a 24.0 hour period may be calculated. At which time the change in water level over a 24.0 hour period is less than 0.50 inches, the alluvial sediments will be considered effectively unsaturated.

This phase of remediation should be complete/well in advance of remediation activities associated with the lower unconfined aquifer. Therefore, a summary report will be prepared and submitted within 30 days of completion of this phase. A health based risk assessment of the remaining affected soils will be prepared and submitted with the final corrective measures plan for the lower unconfined aquifer.

7.0 Closure Plan for the Lower Unconfined Aquifer

The closure plan for the lower unconfined aquifer is comprised of three phases: 1) interim corrective measures, 2) additional investigation and evaluation, and 3) final corrective measures.

Interim Corrective Measures

Interim corrective measures have already been initiated for remediation of the lower unconfined aquifer with the installation of the recovery pump in MW-1. In July 1993, two additional recovery pumps will be installed in MW-1b and MW-2. A two inch pneumatic recovery pump will be installed in each well with the pump inlet set 1.0 inch above the initial hydrocarbon/water interface. The pumps will operate continuously on a 24 hour/day basis. Recovered liquids will be stored in the 10,000 gallon tank currently located near MW-1. The fluids will periodically be removed from the storage tank and properly disposed of by Transwestern Pipeline Company.

Additional Investigation and Evaluation

Additional investigation and evaluation is required prior to development of a final corrective measures plan for the lower unconfined aquifer. The two primary issues remaining to be addressed are: 1) the lateral extent of free phase hydrocarbons, and 2) the lateral extent of the dissolved hydrocarbon plume. Both of these issues will be addressed by the addition of several subsurface borings. This work is scheduled to be completed by the end of this year.

Because stratigraphy in this area has been difficult to predict, an inside-out approach will be used to determine boring locations. The MW-1 location will serve as the center of the grid. The first boring will be located 100 feet east of MW-1. If the boring encounters free product then it will be completed as a potential recovery well. If the boring does not encounter separate phase hydrocarbon, but does encounter the aquifer, then a monitor well will be installed, the well will be developed, and a ground water sample will be collected and submitted for analysis. Additional borings will be advanced at 100 foot intervals away from the previous boring until the extent of the dissolved plume has been

determined. This same inside-out process will be repeated in two additional directions from MW-1: northeast and southeast. Borings will also be advanced 200 feet north of MW-1, 200 feet southwest of MW-1, and 100 feet south of MW-1b in order to evaluate the limits of the dissolved plume in those directions.

Three to four borings will be advanced below the lower clay layer in order to demonstrate that hydrocarbons have not migrated below the lower clay layer. These borings will be located outside of the lateral extent of the dissolved plume in order to avoid the potential to introduce hydrocarbons to unaffected aquifers. At least one of the borings will be located downgradient of the former impoundment and will be completed as a monitoring well. A long term monitoring plan for this well will be incorporated into the final corrective measures plan.

Final Corrective Measures

Several alternative remediation technologies will be considered and evaluated during development of the corrective measures plan. One such alternative to be considered is to de-water the lower unconfined aquifer in the affected area and then use a soil vacuum extraction technology to remove and biodegrade the remaining hydrocarbons. The final performance standard will most likely be based on a health based risk assessment.

A final corrective measures plan for the lower unconfined aquifer will be submitted to the State of New Mexico Environment Department by June 30, 1994. This schedule has been proposed to allow sufficient time for completion of the additional investigation work, evaluation of the interim corrective measures under way, and the implementation of any pilot test activities that may be necessary to develop an effective plan.

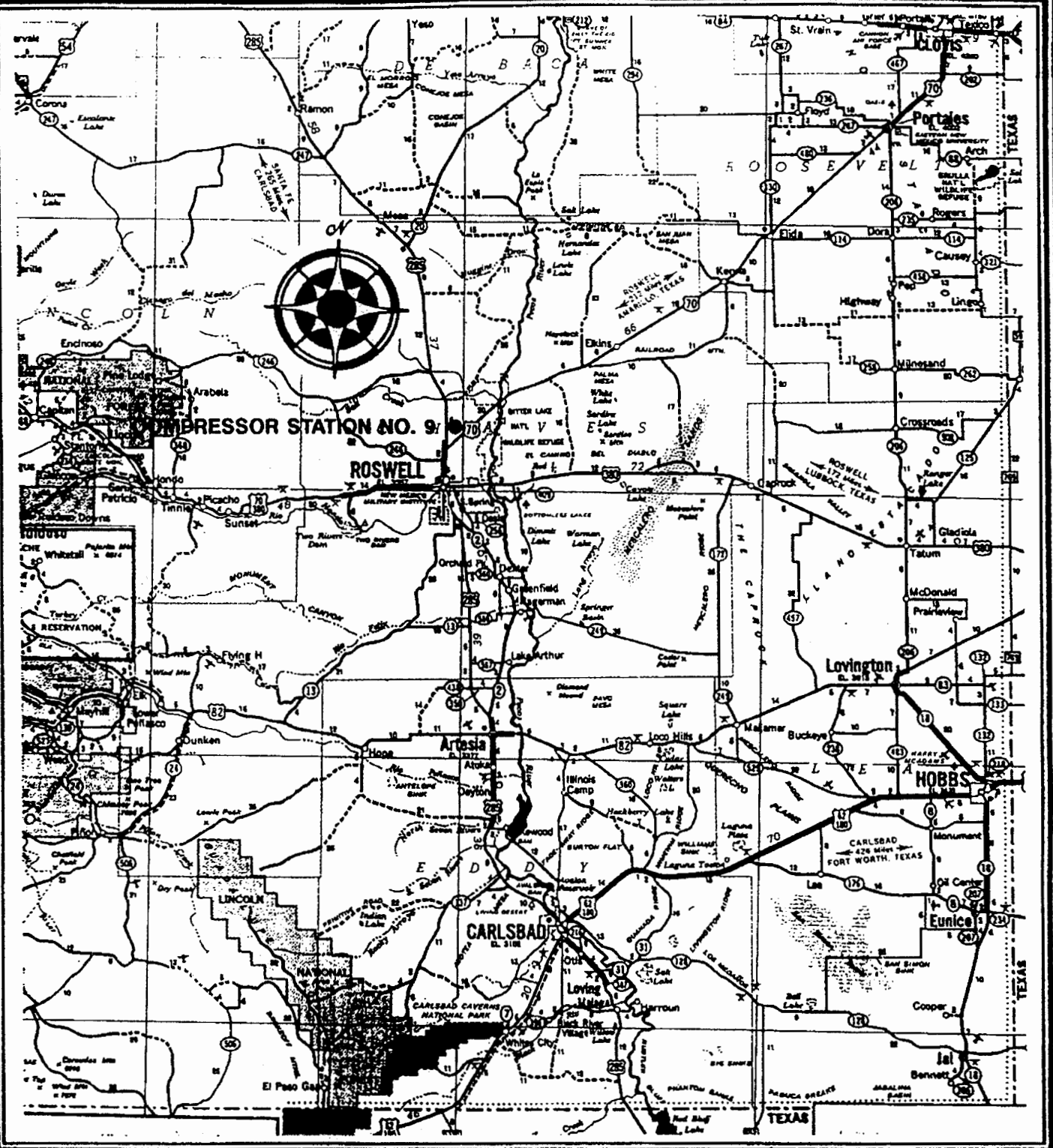

PLATE 1

Harding Lawson Associates
Engineering and
Environmental Services

TRANSWESTERN PIPELINE COMPANY
COMPRESSOR STATION NO. 9
Roswell, New Mexico
VICINITY MAP

Drawn By:	Job Number:	Approved By:	Date:	Revised:	Date:
AP	19181,025.12	RPL	10/30/90		

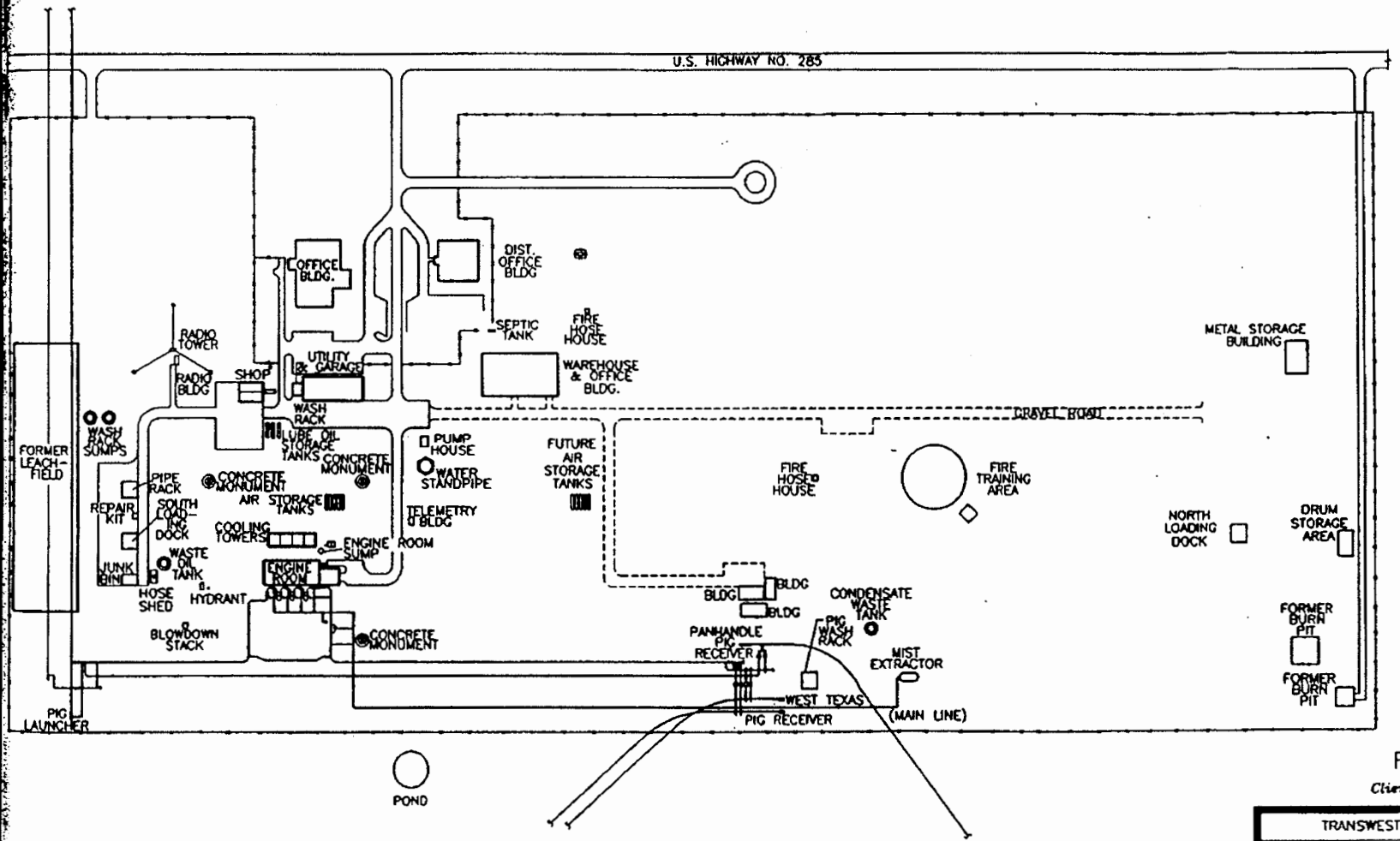

PLATE 2

Client Confidential

TRANSWESTERN PIPELINE COMPANY

FACILITY LAYOUT

COMPRESSOR STATION NO. 9
Roswell, New Mexico

Harding Lawson Associates
Engineering and Environmental Services

DATE 04/04/91

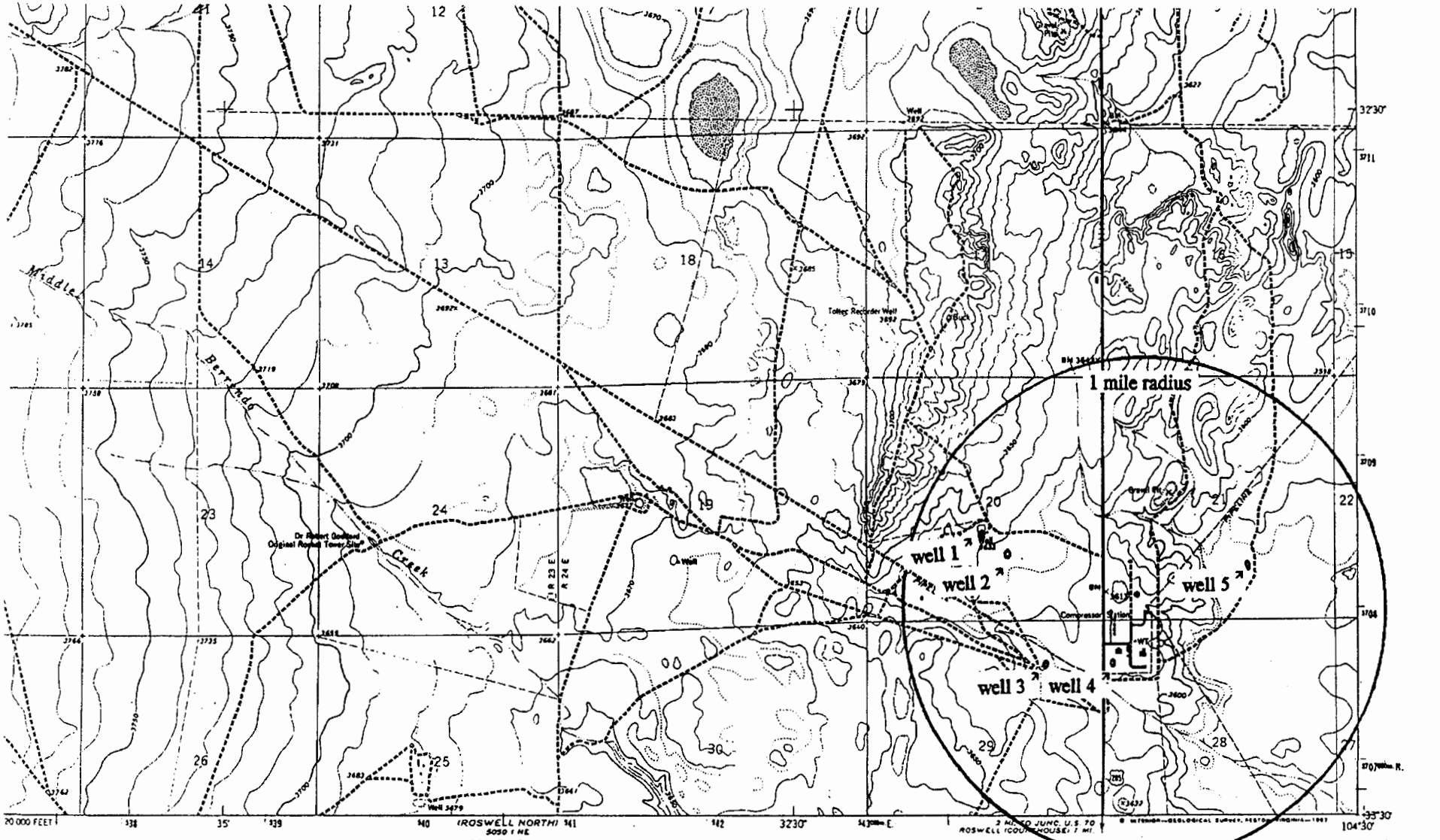

Figure 3: Location of nearby water wells

PANTHER HILL, N. MEX.
N3330-W10430/7.5

1962
PHOTOREVISED 1982
DMA 8091 II SE-SERIES V881

Engine Room 3/9/93
Waste Streams X-1, X-3

24" Panhandle Lateral Pig Receiver
3/9/93 Waste Stream X-2

Location of Backfilled Surface Impoundments
3/9/93 Process Code T-02

24" West Texas Lateral Pig Receivers
3/9/93 Waste Stream X-2