NM1 - 19

GENERAL CORRESPONDENCE

YEAR(S):

1999 - 1994

Gandy Marley Inc.
Larry Gandy
P.O. Box 1658
Roswell, NM 88202
(505) 398 4960
(505) 625 9206

CHECKLIST FOR RULE 711 PERMIT APPLICATION COMPLETENESS

1. FACILITY TYPE LAND FARM
2. OPERATOR NAME, ADDRESS, CONTACT PERSON AND PHONE#
3. LEGAL LOCATION Sec 4 5 8 9, T11S, R31E
4. MODIFICATION OR NEW FACILITY Modification
5. NAME AND ADDRESS OF THE FACILITY SITE LANDOWNER
6. NAME AND ADDRESS OF ALL LANDOWNERS OF RECORD WITHIN ONE MILE OF FACILITY SITE. Marley Ranches
7. NA NOTIFICATION OF ALL LANDOWNERS OF RECORD WITHIN ONE MILE OF FACILITY SITE RETURN RECEIPT SUBMITTED
8. NA PUBLIC NOTICE IN TWO NEWSPAPERS ORIGINAL AFFIDAVIT OF PUBLICATION SUBMITTED.
9. ✓ FACILITY DESCRIPTION WITH DIAGRAMS INDICATING ALL PERTINENT FEATURES (FENCES, BERM, ROADS, PITS, DIKES, TANKS, MONITORING WELLS ....)
10. CONSTRUCTION INSTILLATION DESIGNS FOR PITS, PONDS, LEAK-DETECTION SYSTEMS, AERATION SYSTEMS, ENHANCED EVAPORATION SYSTEMS, WASTE TREATING SYSTEMS, SOLIDIFICATION SYSTEMS, SECURITY SYSTEMS, AND LANDFARM FACILITIES. Requesting Alternate Remediation Level of 2500 ppm,
11. ✓ GEOLOGICAL/HYDROLOGICAL EVIDENCE THAT FACILITY WILL NOT IMPACT GROUNDWATER. DEPTH TO AND QUALITY OF GROUNDWATER INCLUDED. well # 1 11900 TDS 820' / well #2 18800 TDS 750' / well #3 4920 TDS 100'
12. ✓ CONTINGENCY PLAN FOR REPORTING AND CLEAN-UP OF SPILLS OR RELEASES.
13. ✓ H2S CONTINGENCY PLAN
14. ✓ ROUTINE INSPECTION AND MAINTENANCE PLAN TO ENSURE PERMIT COMPLIANCE
15. ✓ CLOSURE PLAN
16. CLOSURE COST ESTIMATE 48,650.00
17. BONDING AMOUNT # TYPE DATE APPROVED
18. ANY OTHER INFORMATION AS NECESSARY TO DEMONSTRATE COMPLIANCE WITH ANY OTHER OCD RULES REGULATIONS AND ORDERS.
19. CERTIFICATION SIGNATURE AND DATE ON PERMIT

✓ Look for well Data Treatment zone. monitoring will not Impact

ATTACHMENT 1
OCD Environmental Bureau Closure Cost Estimate
For
Gandy Marley, Inc. Landfarm, 156 acres
October 6, 1999

Quarterly Analytical Analysis for one year on twenty (20) five (5) acre cells

State Contract Laboratory Prices per analysis:

BTEX	$ 40.00	x	8 quarters	x 20 cells	=	$6,400.00
TPH	$ 50.00	x	8 quarters	x 20 cells	=	$8,000.00
Metals	$200.00	x	2 years	x 20 cells	=	$8,000.00
						$22,400.00 Analytical

Quarterly Sampling Time and Labor for 20 Cells

Labor $55.00/hour
Sample 30 min per cell
Travel 2 hour
Delivery & Paperwork 2 hour

Total Time = (30min/cell x 20 cells) + 2 hours + 2 hours = 14 hours

14 hours x $55.00/hour = $770.00/sampling event

$770.00/sampling event x 8 quarters = **$6,160.00 Labor**

Disking/Tilling for Two Years Every Two Weeks for 100 acres
Price and Time Quotes from Equipment Operators and Landfarm Operators:

Small Tractor and Operator $30.00 /hour
5 acres per hour = 12 min per acre
100 acres at 20 hours x 52 weeks = 1040 hours
1040 hours x $30.00/hour = **$ 31,200.00 Disking/Tilling**

Water for Bioremediation

Price Quotes from Equipment Operators

Water Truck $120.00/load

$120.00/load x 10 loads x 6 Events in Two Years = **$7,200.00 Water**

Level and Contour Landfarm
Price and Time Quotes from Equipment Operators

D-6 Dozer and Operator $75.00/hour

$75.00/hour x 15min/acre x 153 acres = **$5737.00**

Revegetation for 153 Acres

Equipment an labor cost
Tractor and seed drill $30.00/hour @ 15 min/acre for 153 acres = $1,147.00

Materials Cost
Seed $10.00/lb @ 5 lb/acre for 153 acres = $7,650.00

$1,147.00 + $7,650.00 = **$8,797 Revegetation**

Remove Fluids From All Tanks.

125 bbl water truck & driver $55.00/hour
2 hours per trip
$0.35 bbl disposal cost

1 x 750 bbl receiving tank = **750 bbl for disposal**
1 x 280 bbl skim tank = **280 bbl skim oil (not for disposal)**

= 750 bbl of tank fluid for disposal

750 bbl / 125 bbl * 2 hours * $55.00/hour = $660.00 transport cost

$.35 bbl * 750 bbl = $ 263.00 disposal cost

$923.00 Tank Fluid Disposal

Remove and Dispose/Recycle Tank, Plastic Liner and Concrete

$500.00 Disposal of Surface Equipment

Total Closure and Revegetation Cost of an 156 acre Landfarm = $82,917.00

MONTGOMERY WATSON

September 13, 1999

(Via: FedEx)

New Mexico Environmental Department (NMED)
Hazardous and Radioactive Materials Bureau
2044 Galisteo
P.O. Box 26110
Sante Fe, New Mexico 87502

Attn: Mr. Steve Pullen

Re: Groundwater Monitoring Draft Waiver Request
Triassic Park Waste Disposal Facility

Dear Mr. Pullen:

On behalf of Gandy Marley Incorporated (GMI), Montgomery Watson (MW) is pleased to submit two (2) copies of the above referenced Draft Waiver Request. Qualified individuals have prepared this groundwater monitoring wavier and the proper certification will be included in the final waiver.

If you have any questions concerning this report, please contact us.

Sincerely,

Montgomery Watson

Dan Clark for

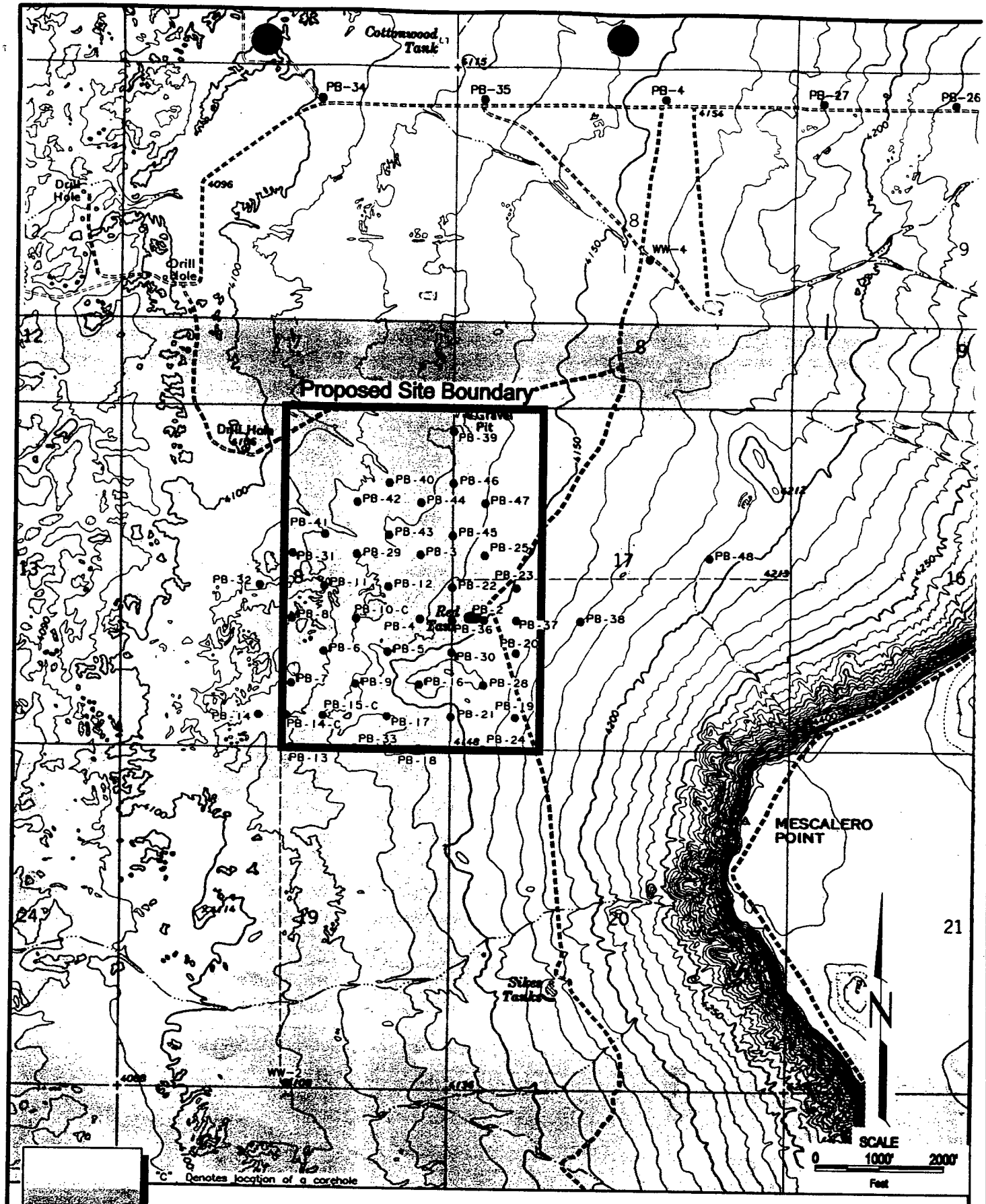
Patrick G. Corser, P.E.
Principal

Enclosure

cc: Dale Gandy (1)
Ken Schultz (1)
Trey Greenwood (1)
Jim Bonner (1)
Montgomery Watson (2)

P.O. Box 774018
1475 Pine Grove Road
Steamboat Springs, Colorado
80477

Tel: 970 879 6260
Fax: 970 879 9048



DRILL HOLE LOCATIONS

TRIASSIC PARK WASTE DISPOSAL FACILITY

Figure 1-1

AutoCAD FILE: GANDY-FIG1-W

3.0 GEOLOGY

This section describes the regional and geologic setting of the proposed facilities. The proposed facilities will be founded in unsaturated materials consisting of Quaternary alluvial sediments, Upper Dockum interbedded siltstones and mudstones, and Lower Dockum mudstone and thinly interbedded siltstone.

3.1 REGIONAL STRATIGRAPHY

The geologic formations present within the region range in age from Quaternary through Triassic. Those include Quaternary alluvium, Tertiary Ogallala Formation, and the Triassic Dockum Group. Permian sediments do not outcrop in this region but, because they underlie the proposed host sediments, they are also discussed in this section. The stratigraphic relationship of the formations discussed in this section is illustrated in Figure 3-1, Stratigraphic Column. Information concerning formation tops and thicknesses was obtained from well logs from the New Mexico OCD office in Hobbs, New Mexico.

3.1.1 Quaternary

The surface throughout the project area is covered by alluvial deposits of Quaternary age. These deposits are comprised of fine-grained, red-brown sands, interbedded with red-brown silts and clays. A major source of these sediments was the topographically higher Ogallala Formation, as evidenced by the abundant granitic cobbles, chert pebbles, and fragments of petrified wood found throughout this unit. The thickness of these alluvial deposits along the eastern flank of the Pecos River Basin in Chaves County varies from a few feet to as much as 50 feet.

3.1.2 Tertiary

The "Caprock," which is the surface expression of the Tertiary Ogallala Formation, unconformably overlies Triassic sediments in southeastern New Mexico. This flat-lying sandstone and conglomeritic unit is approximately 300 to 400 feet thick. It consists of fluviatile sand, silt, clay, and gravel capped by caliche. The sand deposits of the Ogallala Formation consist of fine- to medium-grained quartz grains, which are silty and calcareous. Bedding features range from indistinctly bedded to massive to crossbedded. The formation varies from unconsolidated to weakly cohesive and contains local quartzite lenses. The sand intervals of the Ogallala Formation occur in various shades of gray and red.

Ogallala Formation silt and clay deposits are reddish brown, dusky red, and pink and contain caliche nodules. Gravels occur as basal conglomerates in intra-formational channel deposits and consist primarily of quartz, quartzite, sandstone, limestone, chert, igneous rock, and metamorphic rock. There are abundant petrified wood fragments throughout this unit.

3.1.3 Triassic

Triassic sediments are the potential host rocks for the proposed Facility and, as such, are described in more detail than the other formations. The Depositional Framework of the Lower Dockum Group (Triassic), Texas Bureau of Economic Geology, No. 97, 1979, by McGowen was used as a major reference for gathering information on the characteristics of Triassic sediments.

along the base (8.58 gpd) of the landfill to provide conservative "worst case" estimate of unsaturated flow. The leakage rate for the floor of the landfill was based on HELP modeling simulations between 70 and 200 years. The initial leakage rates for the first 50 years of HELP modeling were excluded from the average because these rates were extremely low and probably not representative of steadystate conditions. These simulated leakage rates are based on extreme conditions such as waste moisture content conditions which exceed the field capacity of the waste and a termination of leachate pumping following the 30-year post-closure period.

Average site-specific saturated hydraulic conductivity values for the Lower Dockum (5.68×10^{-8} cm/s) were used as initial conditions for the modeling simulations. The effective saturation values for the Lower Dockum simulation was based on site-specific average initial moisture contents (Stoller, 1994). The bubbling pressures for the Lower Dockum simulation was based on average values of similar types of geologic materials reported by Bumb and McKee et al. (1988). Initial boundary conditions are presented in Figure 5-1, which shows a schematic of the proposed landfill and surrounding hydrostratigraphy. As displayed in Figure 5-1, the Lower Dockum Aquifer is approximately 600 feet (200 meters) below the site.

5.2.4 Modeling Results

The steady state unsaturated flow modeling results are presented in Figures 5-2 through 5-5. The Lower Dockum results are presented as a function of depth from the source. The results of the modeling simulations are in reference to the landfill source.

Figure 5-2 displays the effective saturation at various distances from the source. As the wetting front disperses from the landfill source the chart shows abrupt decreases in saturation. Although the effective saturation dissipates less rapidly in the Lower Dockum, moisture contents decrease by nearly one order of magnitude at approximately 200 meters from the landfill source. The modeling results indicate that the Lower Dockum maintains saturation because fluid movement is driven primarily by gravitational forces; therefore fluid migration is greatest in the vertical direction.

Figures 5-3 and 5-4 display the unsaturated hydraulic conductivity and interstitial water velocity results, respectively. Comparison of these data to the effective saturation distributions (Figure 5-2) show the high degree of correlation between unsaturated flow and soil moisture content. Figures 5-3 and 5-4 show abrupt decreases in unsaturated hydraulic conductivity and interstitial water velocity, respectively, at relatively short distances from the source. Although Figure 5-4 shows that the interstitial water velocities decrease exponentially over distance, gross travel times may be estimated. The simulated interstitial water velocities were used to compute the contaminant travel time for a non-reactive solute from the base of the landfill to the Lower Dockum Aquifer, located approximately 200 meters (600 feet) below the site, as at 4,084,674 years.

TABLE 5.3
INPUT PARAMETERS FOR UNSATURATED FLOW MODELING

	β	Ko			Q		α	Source Coordinates (m)		
Unit	(m)	(m/day)	Sr	Sm	(m^3/day)	n	1/m	x[1]	y[1]	z[1]
Lower Dockum	0.373	4.90E-05	0.279	1	8.00E-05	3	8.042	0, 33, 66, 99, 132, 165, 193, 231, 264, 297, 330, 363, 396, 429, 462	0	0
Upper Dockum	0.2076	1.05E-02	0.161	1	3.80E-05	3	14.45	5.5, 11, 16.5, 22, 27.5, 33, 38.5, 44, 49.5, 55, 60.5, 66, 71.5, 77	0	24.5, 22.6, 20.72, 18.84, 16.96, 15.07, 13.19, 11.31, 9.42, 7.54, 5.65, 3.77, 1.88, 0
Clay Berm	0.37	8.64E-05	0.126[a]	1	3.80E-05	3	8.108	0, 5.5, 11	0	3.77, 1.88, 0
Quaternary Alluvium	0.0726[a]	8.64E-02	0.0458[a]	1	3.80E-05	3	41.32	0, 5.5, 11	0	3.77, 1.88, 0

Key:

β = bubbling pressure; typical values reported by Bumb and Mckee et al. (1988)
- Ko = saturated hydraulic conductivity; site-specific means values
- Sm = maximum saturation; assumed
- Sr = residual saturation; site-specific mean values
- Q = leakage rate; based on HELP modeling results
- n = curve fitting parameter based on pre size index (Mckee and Bumb, 1988)

α = n/β
- 1 = Typical values reported by Bumb and Mckee et al (1988)
- a = typical values reported by Bumb and Mckee et al. (1988)
- b = assumed values

at or below residual saturation (Sr). Therefore, the observed initial moisture contents are probably at or near the residual moisture content. Generally, fluid flow is inhibited at soil moisture contents at or below the residual moisture content. The amount of saturation above the residual moisture content is referred to as the effective saturation. Unsaturated hydraulic conductivity is a function of the effective saturation and is expressed in the following equation (McKee and Bumb, 1988; Bumb and McKee et al., 1988):

$$K(\theta) = K_0 S_e^n \qquad \text{(EQ. 5)}$$

Brooks and Corey (1964) correlated the n exponent with the pore size distribution index α. McKee and Bumb (1988) by confirmation of theoretical derivations by Irmay (1954) suggest an optimal value of 3 for η.

Under steady state conditions flow is driven by the force of gravity as the matric potential approaches unity (Hillel, 1980). Therefore, under steady state conditions the unsaturated hydraulic conductivity is equal to the darcy flux which in turn is multiplied by the unit area to obtain a leakage or discharge rate (Q). The following equations express these relationships:

$$q(\theta) = K(\theta); \qquad \text{(EQ. 6)}$$

$$Q = \frac{q(\theta)}{A} \qquad \text{(EQ. 7)}$$

The average interstitial water velocity (v) was used to estimate advective transport rates of non-reactive conservative solutes. Approximate travel times to the nearest aquifers can be estimated from the interstitial water velocity using the following expression:

$$v = q / \theta \qquad \text{(EQ. 8)}$$

In summary, modeling assumptions include steady state unsaturated flow in an infinite domain, a continuous leakage source, flow through porous medium, complete saturation of the soil beneath the source, and initial uniform saturation of the medium. The modeling does not account for secondary permeability features such as faults, fractures and macropores.

5.2.3 Input Parameters

Input parameters and initial boundary conditions were based on observed field conditions, landfill design specification, and preliminary HELP modeling results [Note: These preliminary HELP modeling results were based on a landfill liner design which did not incorporate a double liner system on the side slope areas. These results should not be confused with the HELP modeling results presented in the engineering report in Volume III and VI. The results presented in the engineering report support the currently proposed landfill design which incorporates a double liner in all areas and does not indicate any leakage from the landfill.] Average hydraulic parameters for the Lower Dockum and landfill design specifications are presented in this section. Input parameters used for the unsaturated flow modeling are presented in Table 5.3, Input Parameters for Unsaturated Flow Modeling.

Modeled source coordinates correspond to the basal dimensions of the proposed landfill. Conservative average leakage rates from the preliminary HELP modeling were used as source terms

TABLE 5.2
TRIASSIC PARK HELP MODEL RESULT SUMMARY FOR CELL SLOPE[1]

Time (years)	LCRS Operational Beyond 30 Years Post Closure			LCRS Not Operational Beyond 30 Years Post Closure		
	Liner Leakage (gal/acre/day)	Cap Leakage (gal/acre/day)	Final Waste Moisture Content (vol/vol)	Liner Leakage (gal/acre/day)	Cap Leakage (gal/acre/day)	Final Waste Moisture Content (vol/vol)
0	173.0000	NA	0.1410	173.0000	NA	0.1414
20	123.0000	0.0453	0.1221	123.0000	0.0453	0.1223
30	53.5373	0.0442	0.1182	53.5373	0.0442	0.1182
50	37.0011	0.0453	0.1152	37.0282	0.0453	0.1152
70	24.5001	0.0461	0.1087	24.5114	0.0452	0.1087
90	18.0529	0.0442	0.1059	18.0583	0.0449	0.1059
100	13.6143	0.0425	0.1049	13.6174	0.0430	0.1049
120	12.9000	0.0443	0.1029	12.9032	0.0450	0.1029
140	10.7627	0.0439	0.1013	10.7642	0.0450	0.1013
160	9.2002	0.0457	0.0999	9.2030	0.0439	0.0999
180	8.0161	0.0462	0.0987	8.0178	0.0457	0.0987
200	7.0994	0.0461	0.0976	7.1002	0.0462	0.0976

Notes: [1]Initial HELP Modeling Results were based on landfill liner system without double liner system on side slopes. These should not be confused with HELP results presented in the Engineering Report.
NA - Not Applicable
LCRS = Leakage collection and recovery system.

5.2.2 Modeling Methodology

Unsaturated flow modeling was performed using the exact steady state solution developed by McKee and Bumb (1988) and Bump and McKee et al. (1988). The steady state solution derived from the Richards equation (1931) of unsaturated flow provides more conservative results in lieu of transient based solutions. The McKee and Bumb (1988) and Bumb and McKee et al. (1988) steady state solution for a continuous point source in an infinite isotropic medium is governed by the following equations.

(EQ. 1)

$$\Delta\eta_{\infty} = \frac{Q^{\exp\left[\frac{\alpha}{2}\left(z-z'-\sqrt{r^2+(z-z')^2}\right)\right]}}{4\pi\sqrt{r^2+(z-z')^2}}$$

(EQ. 2)

where

$$r = \sqrt{(x-x')^2-(y-y')^2}$$

(EQ. 3)

$\Delta\eta$ = hydraulic potential

$$S = S_r + (S_m - S_r)(\alpha\eta / K_o)^{1/n}$$

(EQ. 4)

or

$$S_e = (a\eta / K_o)^{1/n}$$

At the Facility site, the evapotranspiration rate is high with respect to precipitation (Stoller, 1994). According to McKee and Bumb (1988), the soils in semi-arid regions of the western United States are

5.2 CONTAMINANT TRANSPORT MODELING

Geologic and hydrologic characteristics of Lower Dockum sediments, as described in Section 3.0 and 4.0 have been incorporated into unsaturated flow modeling to estimate contaminant transport times.

5.2.1 Unsaturated Flow Modeling

Unsaturated flow modeling was performed to simulate potential leakage or infiltration from the proposed hazardous waste facilities. Site characterization data indicate unsaturated conditions in the strata underlying the proposed facilities. The unsaturated flow model developed by McKee and Bumb (1988) predicts the extent of wetting fronts emanating from leakage sources on the base of the landfill. Leakage rates were based on preliminary HELP (Hydrologic Evaluation of Landfill Performance) modeling results presented in Tables 5.1, Triassic Park HELP Model Results Summary for Cell Floor and 5.2, Triassic Park HELP Model Results Summary for Cell Slope. The modeling results help illustrate how the natural hydrological conditions at the site inhibit subsurface fluid flow. [Note: These HELP modeling results should not be confused with those presented in the engineering report in Volumes III and VI, which support the current landfill design.] The following simulation was performed to account for the heterogeneities at the site. The simulation predicts the soil moisture distribution in the Lower Dockum from leakage sources at the base of the landfill. The predicted wetting fronts led to the estimation of unsaturated hydraulic conductivities, darcy flux rates, interstitial water velocities and approximate contaminant travel times to the nearest aquifers. The primary modeling objectives include the following:

- prediction of the effective saturation distribution (wetting front) emanating from the landfill source; and,
- determination of the unsaturated hydraulic conductivity and advective transport rates.

TABLE 5.1
TRIASSIC PARK HELP MODEL RESULT SUMMARY FOR CELL FLOOR

Time (years)	LCRS Operational Beyond 30 Years Post Closure			LCRS Not Operational Beyond 30 Years Post Closure		
	Liner Leakage (gal/acre/day)	Cap Leakage (gal/acre/day)	Final Waste Moisture Content (vol/vol)	Liner Leakage (gal/acre/day)	Cap Leakage (gal/acre/day)	Final Waste Moisture Content (vol/vol)
0	1.3781	NA	0.1410	1.3781	NA	0.1410
20	0.9400	0.0454	0.1222	.9400	0.0454	0.1222
30	0.2735	0.0430	0.1181	0.2735	0.0430	0.1181
50	0.1927	0.0450	0.1125	3.4579	0.0450	0.1125
70	0.1329	0.0450	0.1087	8.0071	0.0450	0.1098
90	0.1007	0.0439	0.1059	9.1465	0.0439	0.1083
100	0.0775	0.0442	0.1049	8.5811	0.0442	0.1076
120	0.0744	0.0453	0.1029	8.8612	0.0453	0.1062
140	0.0629	0.0461	0.1013	8.6989	0.0461	0.1048
160	0.0547	0.0442	0.0999	8.5494	0.0442	0.1034
180	0.0482	0.0442	0.0987	8.4178	0.0442	0.1021
200	0.0431	0.0431	0.0976	8.2818	0.0442	0.1008

NA - Not Applicable
LCRS= Leakage collection and recovery system

5.0 TECHNICAL JUSTIFICATION

5.1 WATER BALANCE

The water balance analysis estimated groundwater recharge from direct precipitation, surface water bodies, and irrigation at the proposed landfill site. This information is useful for assessing the potential migration of contaminants released at or near the surface to groundwater. Groundwater recharge rate is directly related to the potential for contaminants spilled or leaked at the surface to reach groundwater. In areas with little or no groundwater recharge, there is less potential for groundwater contamination from releases of hazardous substances than in high recharge areas because the mechanisms to transport potential contamination are limited.

A water balance requires quantification of the hydrologic components, which can result in changes in the amount of water stored in the area of interest. Often, water balances are calculated for an entire watershed to understand the relative importance of the hydrologic components within that area. For this analysis, the water balance was performed to estimate groundwater recharge at the proposed landfill site.

Groundwater recharge at the proposed site can be estimated by summing precipitation, infiltration from surface water bodies, and irrigation at the site and subtracting evapotranspiration and surface run-off. As no natural surface water bodies or irrigation occur at the site, groundwater recharge is estimated as the difference between direct precipitation and evapotranspiration. This assumes no surface run-off at the site.

Precipitation data collected at the Roswell weather station indicate that mean annual precipitation is 10.61 inches. This annual mean is used as the average precipitation at the proposed site.

Evapotranspiration refers to the processes that return water to the atmosphere by a combination of direct evaporation and transpiration by plants and animals. It is the largest item in the water budget because most of the precipitation that falls in the area returns almost immediately to the atmosphere without becoming part of the surface water or groundwater systems. On unirrigated rangeland, much of the precipitation that does not evaporate immediately is taken up fairly rapidly by plants and transpired. In a regional water balance conducted in southeastern New Mexico, it was estimated that approximately 96 percent of total precipitation is lost to evapotranspiration (Hunter, 1985). This number corresponds to data presented for the Rio Grande Basin by Todd (1983), that estimated that 95.4 percent of total precipitation was being lost to evapotranspiration.

Assuming a mean annual precipitation rate of 10.61 inches, of which 96 percent is lost to evapotranspiration, the net recharge to groundwater is estimated as 0.42 inch per year. This low groundwater recharge rate significantly reduces the potential for groundwater contamination from spills or leaks at the proposed Facility.

The purpose of this water balance is to provide a conceptual understanding of the hydrologic components at the site. The amount of groundwater recharge is a reflection of the arid climate of the region. The net recharge estimate of 0.42 inch per year (based on average hydrologic components) represents the expected long-term annual conditions at the site. The relatively low recharge rate appears to be reasonable given the unsaturated conditions of the Upper Dockum within the site boundaries. Using the highest recorded annual precipitation value of 32.92 inches yields only a slightly higher recharge rate of 1.32 inches (assuming an evapotranspiration rate of 0.96). This short-term (1 year) increase in recharge is unlikely to have a significant impact on the unsaturated flow regime at the proposed site.

Exploratory drilling west of the proposed Facility boundary (updip), near the outcrop of the Upper Dockum Unit, the small sandy hills located along the section line between Section 18, T11S, R31E and Section 13, T11S, R30E, encountered an isolated occurrence of groundwater (Figure 4-1). In a single drill hole (PB-14), at a depth of 42 feet, a small accumulation of groundwater was found in a depression developed on the surface of the underlying Lower Dockum mudstones. This depression is consistent with the "scouring" of the Upper Dockum fluvial sediments into the Lower Dockum mudstones. Closer spaced drilling in the vicinity of this occurrence encountered no other such accumulations. This isolated "pooling" is most likely a result of surface run-off entering the subsurface from the nearby outcrop and being caught in a small "stratigraphic trap."

Water Quality - Preliminary water quality data were obtained from limited chemical analyses on a sample of the stratigraphically trapped groundwater from drill hole PB-14. These results include the following measurements:

Total Dissolved Solids	4,920 mg/l
Alkalinity	396 mg/l
Sodium	1,640 mg/l
Magnesium	103 mg/l

These preliminary data indicate that water from the Upper Dockum is of poor quality. The most significant parameter is total dissolved solids (TDS); water with TDS values of greater than 500 mg/l is considered to be unfit for human consumption. These data also indicate that while water quality is poor in both the upper and lower Dockum, the two units have significantly different water quality signatures with higher TDS and sodium concentations in the Lower Dockum.

Hole WW-1 also penetrated a saturated zone in the Upper Dockum Unit, resulting in a mixing of these groundwaters in this drill hole.

Both holes were drilled with an air rotary rig and drill-cutting samples were collected. WW-1 was completed to a depth of 820 feet and, at the time of drilling, no water saturation was apparent in the drill cuttings. WW-2 was completed to a depth of 710 feet; however, circulation was lost at a depth of 645 feet. Loss of circulation commonly occurs when drill cuttings are too wet for the air pressure of the rig to remove the cuttings from the hole. It is likely that the basal sandstone of the Lower Dockum Unit was penetrated at this depth.

Water Level Measurements - Temporary plastic casing was placed in each of the two holes immediately after completion. In July 1994, geophysical logs were run for each hole, and water levels were identified. WW-1 had a water level of 155 feet. This level is 20 feet above the Upper/Lower Dockum contact, and it is likely that groundwaters from both units are present in this drill hole. A water level of 467 feet was observed for WW-2. This finding indicates that there is a hydrostatic head pressure within the Lower Dockum Aquifer of 178 feet.

Both of these cased holes were pumped and allowed to recover. After a sufficient recovery period, a static water level (155 feet for WW-1 and 467 feet for WW-2) was maintained.

Water Quality - Preliminary water quality data are presented only for WW-2. This drill hole encountered groundwater from the Lower Dockum. Because groundwater from the Upper Dockum and Lower Dockum was mixed in drill hole WW-1, preliminary water quality data from WW-1 do not accurately characterize either aquifer and are not presented. The results from WW-2 include the following:

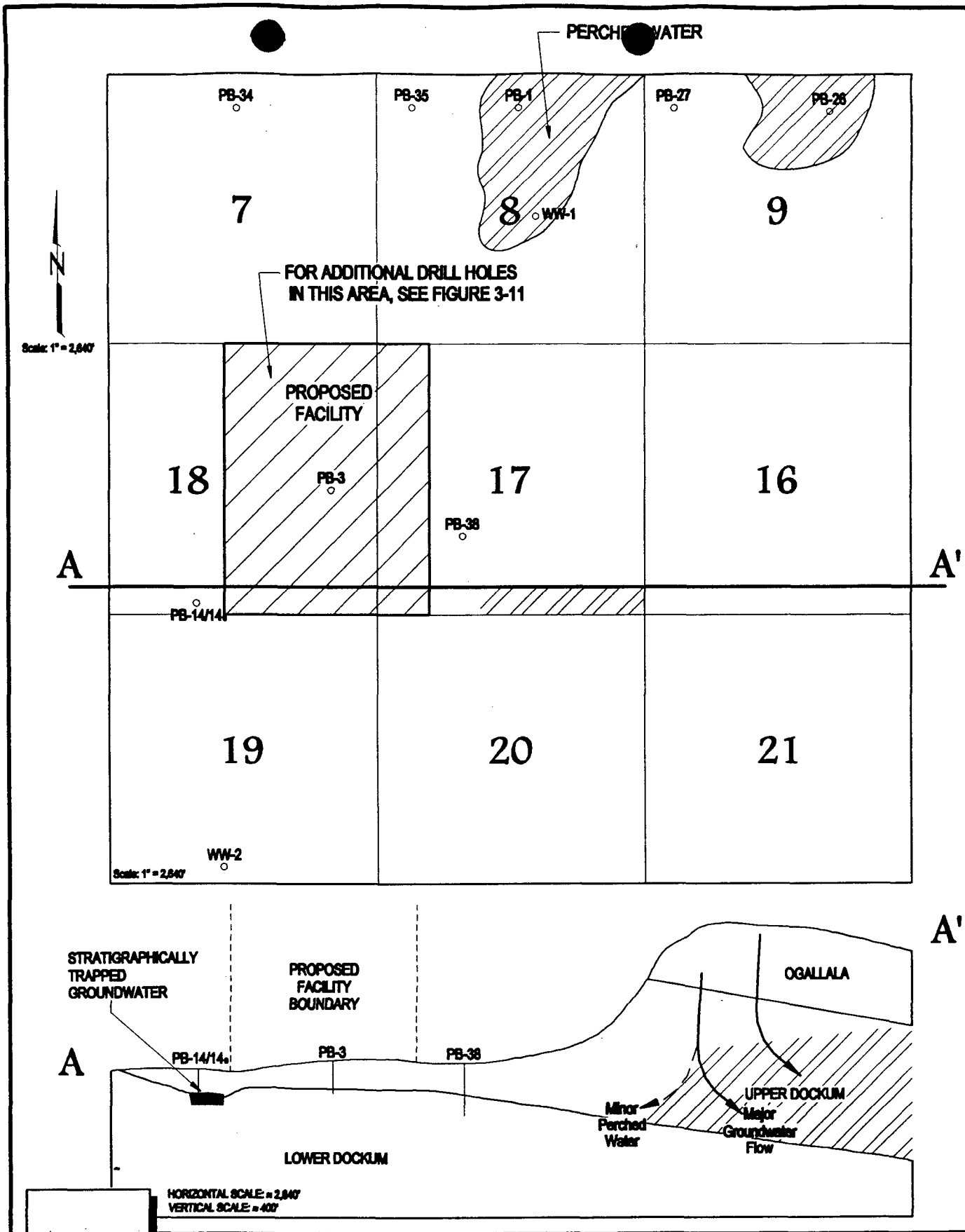
Total Dissolved Solids	18,800 mg/l
Alkalinity	83 mg/l
Sodium	7,030 mg/l
Magnesium	87 mg/l

These preliminary data indicate that the water quality of the Lower Dockum is very poor. The extremely high TDS values are indicative of long formation retention times, which reflects low groundwater flow and low permeability conditions within the Lower Dockum aquifer.

4.2.2.3 Upper Dockum - Perched Water

Several springs are present where the Ogallala Formation crops out, two miles east of the Facility site, along the 200-foot high Caprock escarpment. None of these springs occur near the proposed facility. These springs are present where the Ogallala sands unconformably overlie impermeable Dockum mudstones and claystones and the groundwater moves laterally to the surface. Where these water-bearing Ogallala sands are in contact with more permeable units of the Upper Dockum, saturation of these underlying sediments may occur. The result is sporadic accumulation of perched water within some Upper Dockum siltstones. As shown in Figure 4-1, three holes to the northeast of the proposed site (PB-1, PB-26 and WW-1) haven encountered this perched water. Due to the great variability in lithologies of the fluvial Upper Dockum sediments and the need for permeable sediments to be in contact with Ogallala source rocks, the occurrence of saturation within these sediments is extremely unpredictable.

It is extremely significant that this saturation does not extend beneath the Facility site. All 40 drill holes within the site boundary, as shown on Figure 1-1, have been unsaturated. For this reason, there were no groundwater production tests conducted.



UPPER DOCKUM - PERCHED WATER

TRIASSIC PARK WASTE DISPOSAL FACILITY

Figure 4-1

AutoCAD FILE: CANDY-FIG3-18

removed artificially through pumpage and catchment. Currently, the rate of withdrawal exceeds the rate of recharge for much of the Ogallala Aquifer.

4.2.1.2 Lower Dockum Aquifer

The major aquifer within the Lower Dockum is the Santa Rosa Sandstone. This sandstone is present along the northern and southern flanks of the Permian Basin and is a principal source of groundwater in Roosevelt and Curry Counties, New Mexico. The Santa Rosa Sandstone is not mapped along the western flank of the Permian Basin, which includes the proposed site. Where the Santa Rosa Aquifer has been studied, hydrochemical analyses and groundwater oxygen isotopes indicate that it is distinctly different from the Ogallala Aquifer. The thick, impermeable clays within the Triassic section have been sufficiently impermeable to prevent hydraulic communication between these aquifers.

4.2.2 Site Groundwater

Potential Triassic host sediments within the proposed Facility boundary are unsaturated. Detailed drilling within this boundary has encountered no groundwater. Drilling outside the proposed Facility boundary has identified saturated zones in both the Upper and Lower Dockum Units. The following subsections contain descriptions of these saturated zones.

4.2.2.1 Ogallala Aquifer

The western boundary of the Ogallala Aquifer, represented by the Caprock escarpment, is located topographically/stratigraphically above and 2 miles east of the proposed site. At the base of the escarpment, along the contact of the Ogallala Formation and the underlying Upper Dockum, are numerous springs, which are a result of downward-migrating Ogallala groundwater coming into contact with low permeability zones within the Upper Dockum and being diverted to the surface.

4.2.2.2 Lower Dockum - "Uppermost Aquifer"

For the purpose of this application, the uppermost aquifer is considered to be the basal sand unit of the Lower Dockum because the Ogallala Aquifer is not present at the site. The EPA has defined the uppermost aquifer as the geologic formation, group of formations, or part of a formation that is the aquifer nearest to the ground surface capable of yielding a significant amount of groundwater to wells or springs. The Lower Dockum certainly does not yield a significant amount of groundwater. However, preliminary drilling in the site area has found the basal portion of this unit to be water-bearing and to possess consistent hydrologic characteristics.

The identification of a confining layer is an essential factor in the identification of the uppermost aquifer. The 600 to 650 feet of Lower Dockum mudstones, which overly the basal sand unit, represents a high-integrity aquitard, effectively confining the aquifer. This thick sequence of mudstones is of sufficient low permeability to prevent hydraulic communication between the Upper and Lower Dockum Units.

The basal sandstone of the Lower Dockum Unit is the water-bearing portion of this unit. The recharge area for the Lower Dockum Aquifer is the Pecos River drainage to the west. Groundwater flow direction is easterly, along the regional dip of this unit.

Most of the shallow drilling in the site area has "bottomed" in the upper portion of the aquitard. Two holes (WW-1 and WW-2) were drilled to approximately the base of the Triassic section and encountered water from the Lower Dockum Aquifer (Figure 4-1, Upper Dockum - Perched Water).

4.0 HYDROLOGY

4.1 SURFACE WATER

There are no perennial stream drainages on or near the proposed site. The nearest surface drainage is the Pecos River, approximately 30 miles to the west.

There is one small stock tank (Red Tank) within the proposed Facility boundary and several additional tanks on adjacent lands. These tanks are approximately 200 feet by 200 feet and contain water for livestock. The tanks are clay-lined and retain water from run-off or receive water from an underground pipeline. Water in the underground pipeline is supplied from three water wells on the Marley Ranch located in Section 10, T11S, R31E. These wells are east of the Mescalero Rim and produce water from the Ogallala Formation. In the past, water from the springs along the Caprock excarpment was used in this pipeline, but now water is pumped from the Ogallala Formation. The pipeline is personally owned and maintained by the Marley Ranch to provide water to cattle operations below the Caprock.

Once the site is designated as a disposal area, cattle operations on this property will cease and the Marley Ranch will stop using Red Tank. They will also re-route their personal pipeline, as appropriate, to avoid waste disposal facility operations and continue to supply water to their cattle operations below the Caprock. It should be noted that pits that could pool surface water would be backfilled prior to operations.

4.2 GROUNDWATER

This section describes regional and local aquifers.

4.2.1 Regional Aquifers

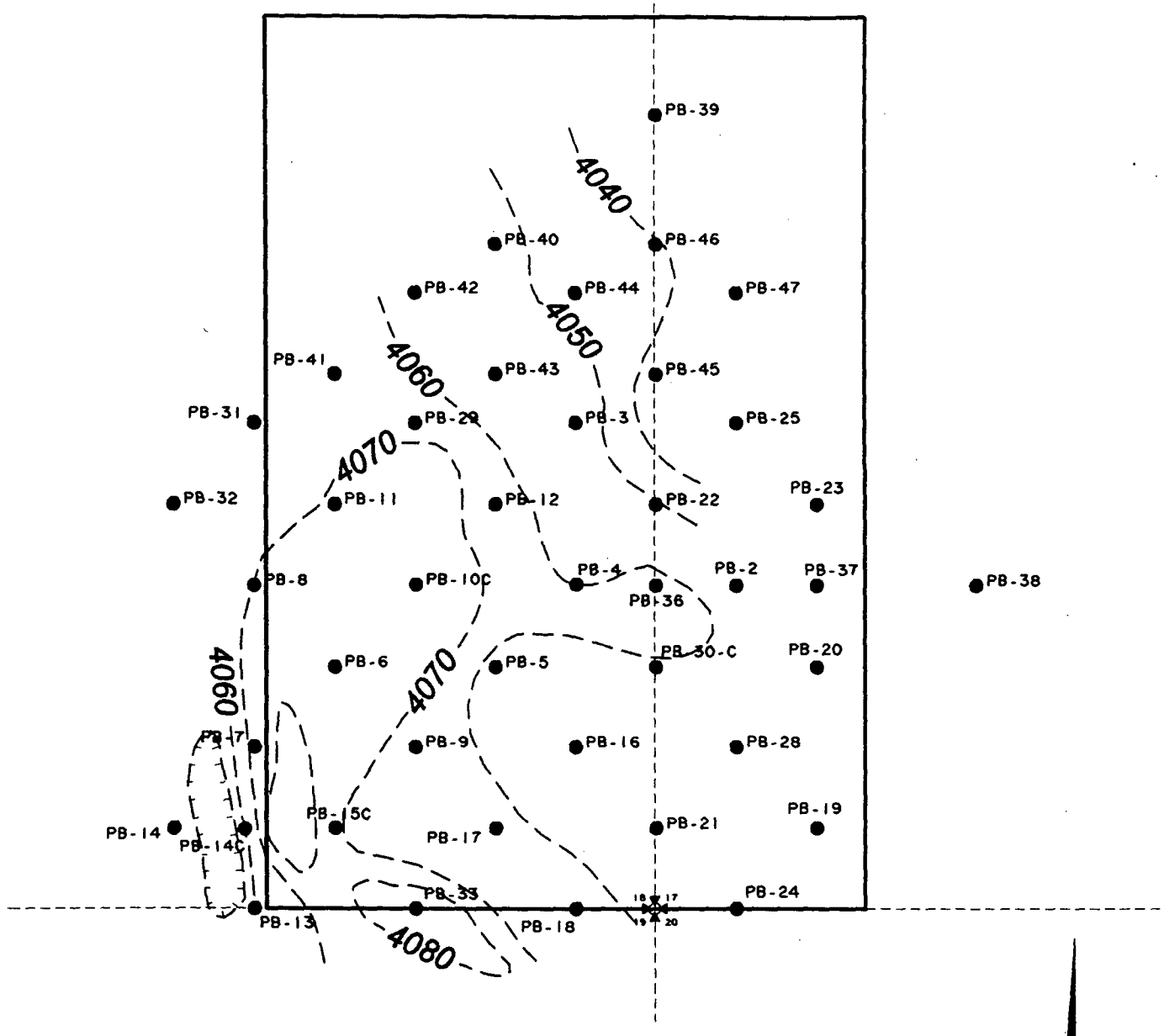
In the region surrounding the proposed site, there are two geologic units that have produced groundwater, the Triassic and the Tertiary Ogallala Formation. Very minor amounts of groundwater have been produced from Triassic sediments; but the Tertiary Ogallala Formation is a major aquifer in southeastern New Mexico, west Texas, and several other western states.

A listing of all water wells within a 4-mile radius of the proposed site was obtained from the New Mexico State Engineer's office. Sixteen water wells were reported, fourteen from the Ogallala Formation and two from the Triassic. Of the two Triassic wells, one is now reported to be dry and the other is actually located more than 6 miles west of the proposed site.

4.2.1.1 Ogallala Aquifer

The Ogallala Aquifer is the primary freshwater aquifer within the regional study area and serves as the principal source of groundwater in the Southern High Plains. The saturated thickness of the Ogallala Aquifer ranges from a few feet to approximately 300 feet in the Southern High Plains. Groundwater within the Ogallala Aquifer is typically under water table conditions, with a regional hydraulic gradient toward the southeast ranging from approximately 10 feet/mile to 15 feet/mile. The average hydraulic conductivity of the Ogallala Aquifer ranges from 1 foot/day to 27 feet/day.

The Ogallala Aquifer is recharged primarily through the infiltration of precipitation. The rate of recharge is believed to be less than 1 inch/year. Groundwater discharge from the Ogallala Aquifer occurs naturally through springs, underflow, evaporation, and transpiration, but groundwater is also



LEGEND

PROPOSED SITE BOUNDARY

-4080- STRUCTURAL CONTOURS

PB-13 BOREHOLES

N

SCALE
0 1000' 2000'
Feet

STRUCTURE CONTOUR TOP OF LOWER DOCKUM

TRIASSIC PARK WASTE DISPOSAL FACILITY

Figure 3-6

AutoCAD FILE: GAMD-3-6.DWG

From examination of lithology and down-hole electric logs, it is estimated that 30 percent of the unit is comprised of mudstones. Lithologies of the remainder of the unit are evenly divided between siltstones and sandy siltstones. However, as the geotechnical properties of these two lithologies are very similar, this geologic discussion will simply refer to them both as siltstone. Mudstones were found to have an average permeability of 2.45 x 10^{-7} cm/s, and the siltstones average 1.22 x 10^{-5} cm/s.

These sediments were deposited in a fluvial environment. Mudstone and siltstone bodies are very lenticular and are found to pinch out abruptly. Accordingly, individual lithologies are not correlatable over significant distances (thousands of feet). The fluvial nature of the Upper Dockum Unit has led to the scouring of channels into the underlying Lower Dockum Unit. This scouring and the pinching-out of fluvial sediments have resulted in the local development of an undulatory surface on top of the Lower Dockum Unit (Figure 3-6, Structure Contour - Top of Lower Dockum).

Lower Dockum - The Lower Dockum Unit has a completely different character from the upper unit. The lower unit represents a time of relatively quiet lacustrine deposition, which resulted in the accumulation of thick sequences of predominantly mudstones interbedded with thin siltstones. These sediments are very homogeneous, in contrast with the abrupt facies changes present in the more active Upper Dockum depositional system.

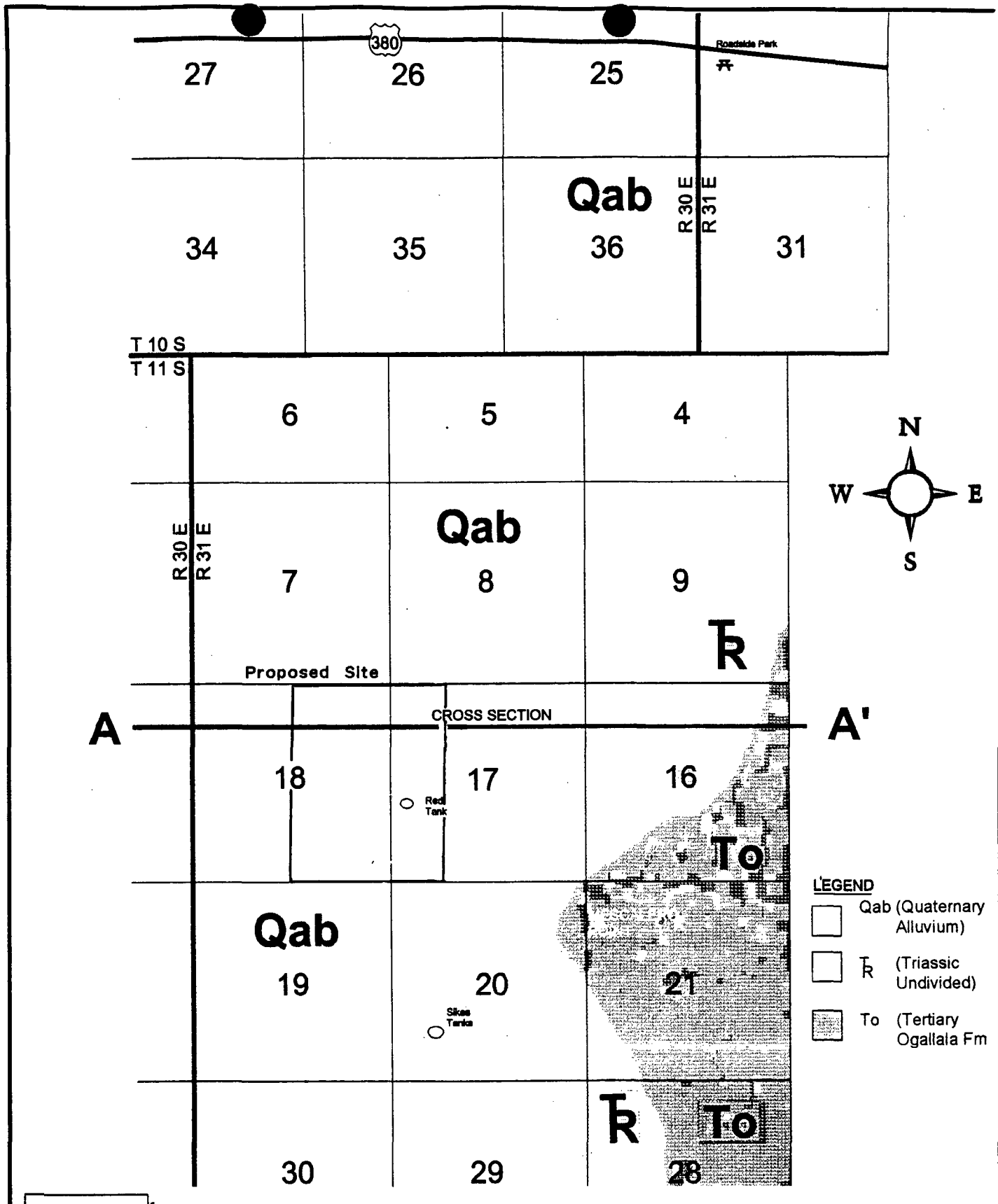
Most of the close-spaced drilling within the proposed Facility boundary "bottomed" in Lower Dockum mudstones. These mudstones were consistently a moderate reddish brown color, which according to McGowen (1979), is associated with low stand lacustrine and mud flat deposition. Two deep holes (WW-1 and WW-2) were drilled adjacent to the proposed site to examine the total extent of the Lower Dockum mudstones. Results of this drilling, along with the examination of several oil well logs, demonstrated a consistent thickness of 600-650 feet of these sediments. Representative core samples of this material were sent for permeability analyses. The results of these analyses confirm the Lower Dockum to have a very low permeability (average permeability of 5.7 × 10^{-8} cm/s), capable of performing as a geologic barrier to downward migration of fluids from the proposed facilities.

Underlying the thick sequence of mudstones, there is a basal sand unit in the Lower Dockum below the site. As illustrated in Figure 3-3, this sand unit is roughly equivalent to the Santa Rosa Formation. However, the major accumulation of Santa Rosa Sands that fills the northern portion of the Triassic paleobasin pinches out before reaching the Facility site. During the Lower Dockum time, the Facility site was part of a low-relief area with little fluvial deposition. The McGowen report specifies sand percentages of the Lower Dockum group in the Facility site area to be in the 10-20% range.

TRIASSIC PARK WASTE DISPOSAL FACILITY
CHAVES COUNTY, NEW MEXICO

Figure 3-5

Stratigraphic Cross-Section



SURFACE GEOLOGY - PROJECT AREA

TRIASSIC PARK WASTE DISPOSAL FACILITY

Figure 3-

consistent with the reported regional dip for Permian (and Triassic) sediments along the western flank of the Permian Basin.

Dewey Lake Formation - The uppermost Permian sediments underlying the Triassic sequence in the project area correlate to the Dewey Lake Formation. These sediments are predominately red to red-brown mudstones and siltstones and are virtually indistinguishable from the overlying Triassic sediments. Geologic literature reports a conformable relationship between these sediments and the overlying Triassic sediments. There are approximately 240 feet of Permian redbeds in this section.

Rustler Formation - The top of the Rustler Formation was identified on OCD well logs and corresponds to the top of a 40-foot bed of anhydrite. These anhydrites are visible in outcrop on the hills immediately east of the Pecos River drainage east of Roswell, New Mexico. Underlying the anhydrite are approximately 500 feet of halite (salt). The Rustler Formation represents the youngest anhydrite sequence in the Permian Basin.

Yates Formation - Unconformably underlying the Rustler, the Yates Formation is composed primarily of interbedded sandstone with minor dolostone and limestone. The sands are light gray and fine to very fine grained. Limestone is white to very light gray microcrystalline lime mudstone with a chalky texture. Dolostone is pink to light gray and microcrystalline.

3.2 SITE STRATIGRAPHY

This section will provide detailed descriptions of the proposed Triassic host sediments and the Quaternary alluvium that overlies these sediments Figure 3-4, Surface Geology - Project Area, illustrates the surficial geology on and adjacent to the proposed site. Figure 3-5, Stratigraphic Cross Section, is a stratigraphic cross-section based on site drilling, illustrating relationships between the proposed Triassic host sediments and adjacent formations.

3.2.1 Quaternary

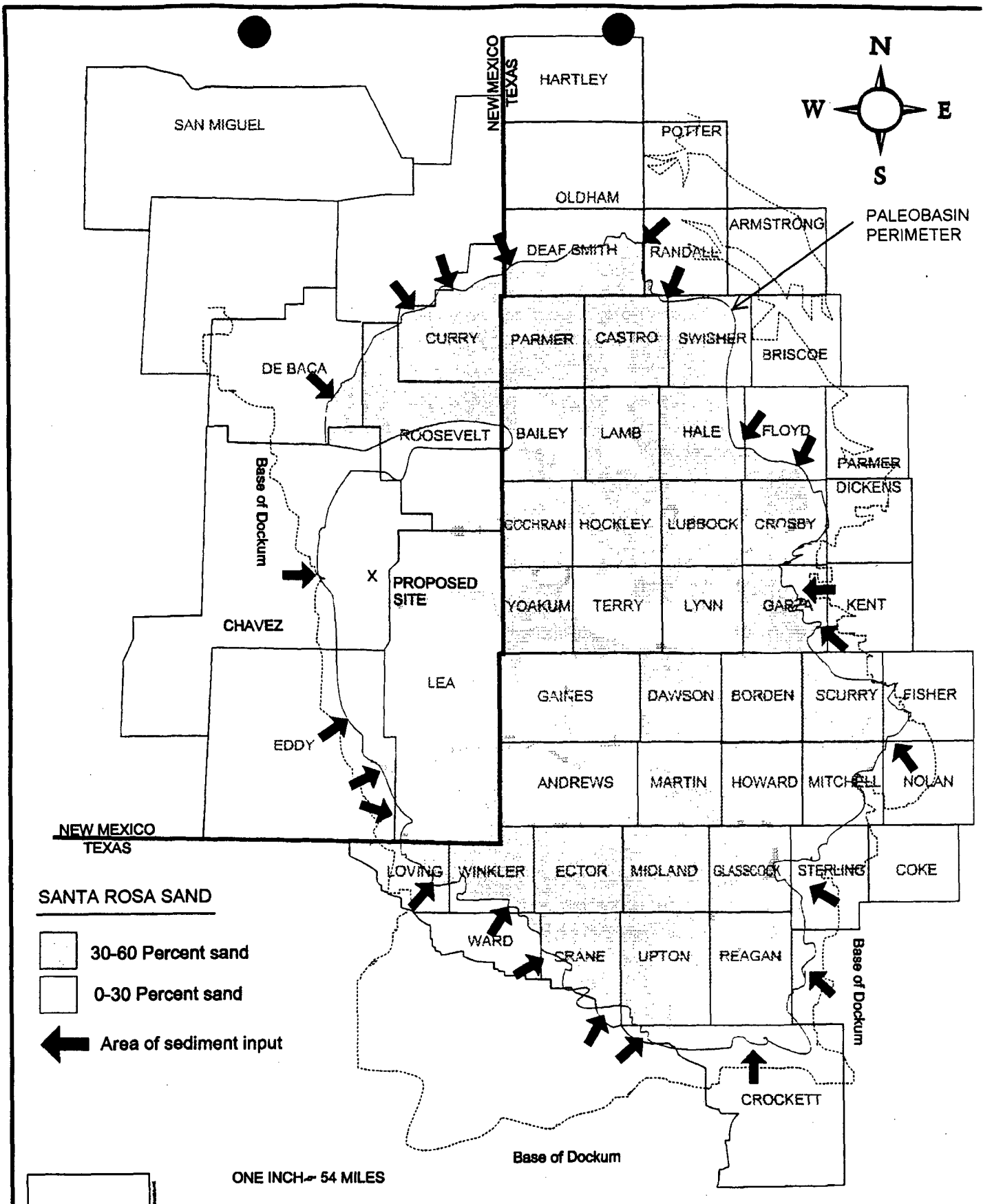
The thickness of Quaternary alluvial deposits at the site varies from less than 10 feet to 35 feet. The upper portion of these sediments consists of fine to very fine, wind-blown yellow-brown sands. Below this sand are varying thicknesses of red-brown to yellow-brown siltstones and silty mudstones. Scattered throughout these sediments are small chert pebbles and granitic cobbles derived from the Tertiary Ogallala Formation.

A caliche zone (Mescalero Caliche) is present in most of this unit. The caliche is found immediately under the top wind-blown sands and coats and fills fractures within the more consolidated siltstones. Where the Quaternary alluvium is quite thin, this caliche is found coating Triassic sediments.

3.2.2 Triassic

Drilling at the site has delineated 1,175 feet of Dockum sediments. Two distinct units can be identified in these sediments: the Upper Dockum (475 feet thick) and the Lower Dockum (700 feet thick). Within the proposed Facility boundary the thickness of the Upper Dockum unit never exceeds 100 feet. Upper Dockum sediments are in contact with the overlying Quaternary alluvium throughout the project area.

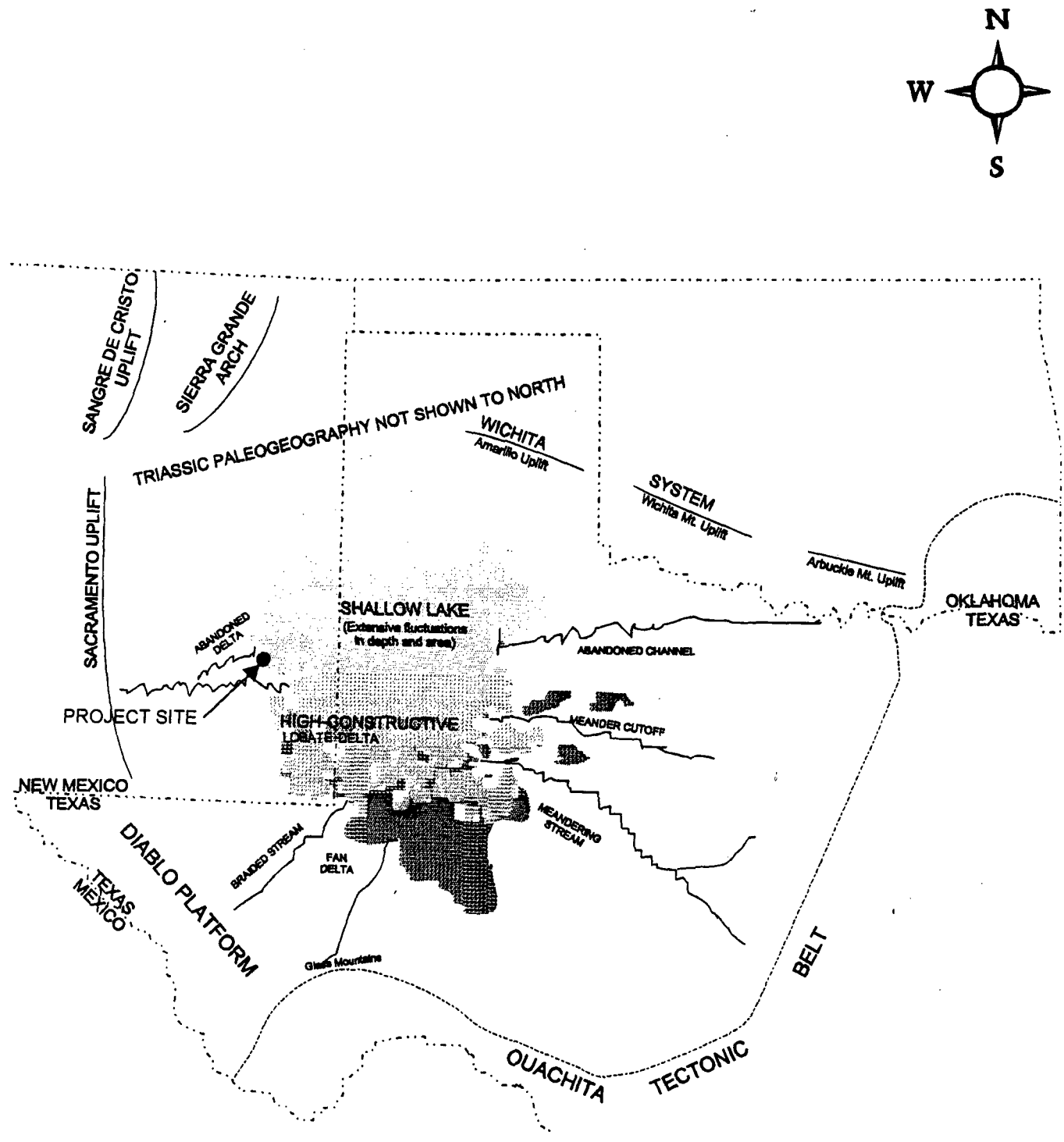
Upper Dockum - This unit consists of variegated (red-brown-green) mudstones interbedded with reddish gray siltstones and reddish-gray-green sandy siltstones. The siltstones are micaceous (predominantly muscovite), indicating they were part of a relatively active fluvial system capable of transporting material into the basin from distant source rocks.



TRIASSIC PERIOD SAND ACCUMULATION IN PALEOBASIN

TRIASSIC PARK WASTE DISPOSAL FACILITY

Figure 3-3



BASIN PALEOMAP FOR TRIASSIC PERIOD

TRIASSIC PARK WASTE DISPOSAL FACILITY

Figure 3-

Triassic sediments unconformably overlie Permian sequences in Texas and New Mexico and have been classified as the Triassic Dockum Group. The Dockum Group is comprised of a complexly interrelated series of fluvial and lacustrine mudstone, siltstone, sandstone, and silty dolomite deposits that can be as much as 2,000 feet thick in this part of the Permian Basin. These sediments accumulated in a variety of continental depositional settings, including braided and meandering streams, alluvial fan deltas, lacustrine deltas, lacustrine systems, and mud flats.

The Triassic Dockum Group is divided into an Upper and Lower Unit. The Upper Dockum Unit is very near the surface within the project boundary, covered only by a thin veneer of Quaternary sediments. The character of this unit, also know as the Chinle Formation, is a series of fluvial sediments. These sediments conformably overlie the Lower Dockum Unit and consist of red-green micaceous mudstones, interbedded with thin, discontinuous lenses of siltstone and silty sandstones. A continental fluvial depositional environment predominated during Upper Dockum time, when the Triassic basin was filled with lacustrine sediments. The Chinle Formation is widespread in the southwestern United States.

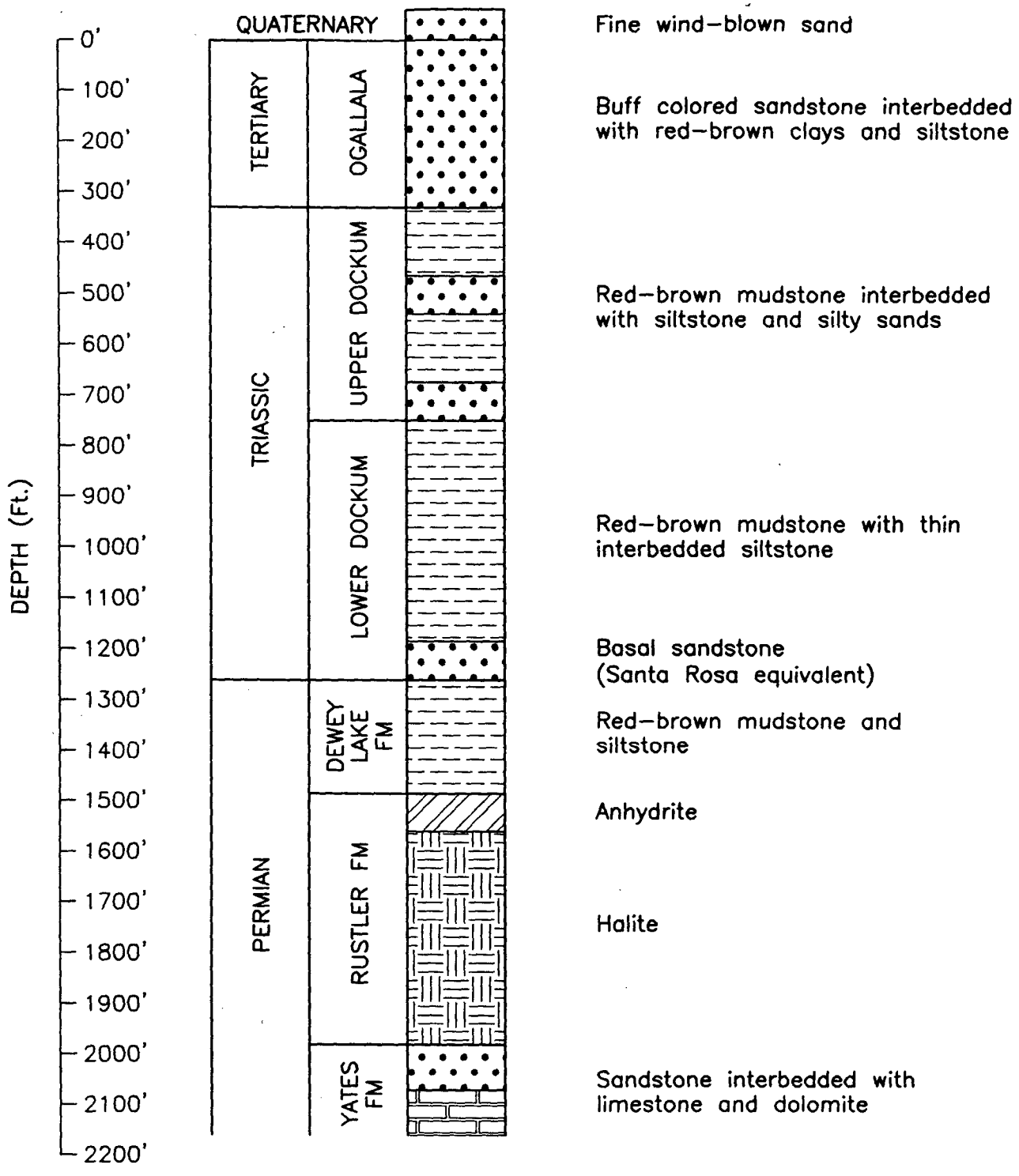
The Lower Dockum accumulated in a fluvial lacustrine basin defined by the Amarillo Uplift on the north and the Glass Mountains on the south (Figure 3-2, Basin Paleomap for Triassic Period). These former tectonic belts were more than 200 miles away, and the regional slopes were relatively low. As presented in this basin map, the Lower Dockum represents sediments from a large, regional depositional system. For any given portion of this basin, these sediments tend to be very homogeneous and not subject to abrupt local changes. This basin was peripherally filled, receiving sediment from the east, south, and west. Chief sediment sources were Paleozoic sedimentary rocks. Lowlands to the east and west were traversed chiefly by meandering streams. Higher gradient streams with flashy discharge existed at northern and southern ends of the basin. The large shallow lake (or lakes) was the last portion of the basin to be filled. The lacustrine sediments that accumulated here consist primarily of low-energy mudstone. Surface exposures today in these areas consist of thick sequences of maroon-red-purple variegated mudstones with thin discontinuous layers of siltstones and silty sandstones.

The stratigraphy of the basal Lower Dockum varies significantly throughout eastern New Mexico. Figure 3-3, Triassic Period Sand Accumulation in Paleobasin, a subsurface sand percent map of this unit, was compiled from drill hole data from more than 1,500 oil wells throughout the basin. Thick sequences of sandstones at the northern and southern portions of the basin are shown projecting inward toward the center of the basin. In the New Mexico portion of this basin, these sand accumulations are related to the occurrence of the Santa Rosa Sandstones. This medium-to-coarse grained, white to buff sandstone represents the lowermost Triassic depositional unit and is a major aquifer in many portions of New Mexico.

3.1.4 Permian

Permian sediments are important to the geologic setting because they are immediately below the proposed Triassic host rocks. The deeper formations of Permian age were deposited in a restricted-marine environment and thus contain salt deposits, which make the groundwater produced from them too brackish for use.

Permian sediments underlying the Triassic units in the project area are assigned to the Artesia Group. Oil well logs from the New Mexico OCD in Hobbs, New Mexico, have provided sufficient data to identify the Dewey Lake Formation, Rustler Formation, and Yates Formation from the upper portion of this group. Geologic literature describes these Permian sediments to be gently dipping to the east. This fact was confirmed by using oil well log data to construct a graphic 3-point solution. These calculations indicate a north-south strike and a dip of less than 1° to the east. These results are



STRATIGRAPHIC COLUMN

TRIASSIC PARK WASTE DISPOSAL FACILITY

Figure 3-1

AutoCAD FILE: GANDY-FIG3-1

THE REPRODUCTION OF

THE

FOLLOWING

DOCUMENT (S)

CANNOT BE IMPROVED

DUE TO

THE CONDITION OF

THE ORIGINAL

PART A AND PART B PERMIT APPLICATION

FOR THE

TRIASSIC PARK HAZARDOUS WASTE FACILITY

Volume I

December 1997
Revised November 1998

Prepared By:

Stoller
established 1959

and

terramatrix
MONTGOMERY WATSON
natural resource group

Jalmar soils are deep, evenly deposited, and moderately permeable. They are intermingled with Roswell soils in depressions. They consist of a surface layer of brown, reddish yellow, and yellowish red fine sand and loamy fine sand. The subsoil is light reddish brown, heavy loamy fine sand, and sandy clay loam.

3.3.1.2 Alama Series

The Alama Series consists of deep, well-drained soils formed in alluvium on flood plains. Slopes are 1% to 3%. Elevation is 3,400 to 3,600 feet. These soils are used for grazing, watershed, and wildlife habitat. Vegetation is mainly tobosa, buffalo grass, vine-mesquite, mesquite, and cactus. The frost-free season ranges from 200-215 days per year.

In a representative profile, the surface layer of these soils is brown loam about 3 inches thick. The subsoil is reddish brown clay loam and silty clay loam about 16 inches thick. The substratum is stratified reddish brown and light reddish brown sandy clay loam, silty clay loam, and loam to a depth of 69 inches or more. The soil profile is strongly calcareous and moderately alkaline throughout.

Permeability is moderately slow, and available water capacity is 11 to 12 inches. Effective rooting depth is 69 inches or more.

3.3.2 Land Ownership and Use

The property for the proposed site is owned by Marley Ranches, Ltd. Adjacent lands are both federally and privately owned. Generally, lands to the west are owned by the BLM, and lands to the east are privately owned.

The predominant land use in this area is grazing. With existing vegetation, approximately one section of land is required to sustain five animal units year-long. Intermittently, the land is the site of exploratory drilling for gas and oil wells, but there are no abandoned well sites within the proposed Facility boundary, and the nearest production well is approximately 3 miles from the proposed site.

The BLM has developed a recreation area known as Mescalero Sands approximately 2 miles northwest of the proposed site. The recreation area allows hikers and recreational vehicles in the sand dunes.

3.4 GEOLOGY

This section describes the regional and geologic setting of the proposed landfill.

3.4.1 Regional Geology

The geologic formations present within the region range in age from Quaternary through Triassic. Those include Quaternary alluvium, Tertiary Ogallala Formation, and the Triassic Dockum Group. Permian sediments do not outcrop in this region but, because they underlie the proposed host sediments, they are also discussed in this section.

3.4.1.1 Regional Stratigraphy

The stratigraphic relationship of the formations discussed in this section is illustrated in Figure 3-4. Information concerning formation tops and thicknesses was obtained from well logs from the New Mexico OCD office in Hobbs, New Mexico. Appendix B presented in Volume II contains a representative oil well log.

Quaternary

The surface throughout the project area is covered by alluvial deposits of Quaternary age. These deposits are comprised of fine-grained, red-brown sands, interbedded with red-brown silts and clays. A major source of these sediments was the topographically higher Ogallala Formation, as evidenced by the abundant granitic cobbles, chert pebbles, and fragments of petrified wood found throughout this unit. The thickness of these alluvial deposits along the eastern flank of the Pecos River Basin in Chaves County varies from a few feet to as much as 50 feet.

Tertiary

The "Caprock," which is the surface expression of the Tertiary Ogallala Formation, unconformably overlies Triassic sediments in southeastern New Mexico. This flat-lying sandstone and conglomeritic unit is approximately 300 to 400 feet thick. It consists of fluviatile sand, silt, clay, and gravel capped by caliche. The sand deposits of the Ogallala Formation consist of fine- to medium-grained quartz grains, which are silty and calcareous. Bedding features range from indistinctly bedded to massive to crossbedded. The formation varies from unconsolidated to weakly cohesive and contains local quartzite lenses. The sand intervals of the Ogallala Formation occur in various shades of gray and red.

Ogallala Formation silt and clay deposits are reddish brown, dusky red, and pink and contain caliche nodules. Gravels occur as basal conglomerates in intra-formational channel deposits and consist primarily of quartz, quartzite, sandstone, limestone, chert, igneous rock, and metamorphic rock. There are abundant petrified wood fragments throughout this unit.

Triassic

Triassic sediments are the potential host rocks for the proposed Facility and, as such, are described in more detail than the other formations. The Depositional Framework of the Lower Dockum Group (Triassic), Texas Bureau of Economic Geology, No. 97, 1979, by McGowen was used as a major reference for gathering information on the characteristics of Triassic sediments.

Triassic sediments unconformably overlie Permian sequences in Texas and New Mexico and have been classified as the Triassic Dockum Group. The Dockum Group is comprised of a complexly interrelated series of fluvial and lacustrine mudstone, siltstone, sandstone, and silty dolomite deposits that can be as much as 2,000 feet thick in this part of the Permian Basin. These sediments accumulated in a variety of continental depositional settings, including braided and meandering streams, alluvial fan deltas, lacustrine deltas, lacustrine systems, and mud flats.

The Triassic Dockum Group is divided into an Upper and Lower Unit. The Upper Dockum Unit is very near the surface within the project boundary, covered only by a thin veneer of Quaternary sediments. The character of this unit, also know as the Chinle Formation, is a series of fluvial sediments. These sediments conformably overlie the Lower Dockum Unit and consist of red-green micaceous mudstones, interbedded with thin, discontinuous lenses of siltstone and silty sandstones. A continental fluvial depositional environment predominated during Upper Dockum time, when the Triassic basin was filled with lacustrine sediments. The Chinle Formation is widespread in the southwestern United States.

The Lower Dockum accumulated in a fluvial lacustrine basin defined by the Amarillo Uplift on the north and the Glass Mountains on the south (Figure 3-5). As presented in this basin map, the Lower Dockum represents sediments from a large, regional depositional system. For any given portion of this basin, these sediments tend to be very homogeneous and not subject to abrupt local changes. This basin was peripherally filled, receiving sediment from the east, south, and west. Chief sediment sources were Paleozoic sedimentary rocks. Lowlands to the east and west were traversed chiefly by meandering streams. Higher gradient streams with flashy discharge existed at northern and southern

ends of the basin. The large shallow lake (or lakes) was the last portion of the basin to be filled. The lacustrine sediments that accumulated here consist primarily of low-energy mudstone.

The proposed site, situated on the western flank of the Triassic paleobasin, is underlain by thick sequences of Lower Dockum mudstones. In Triassic times this area was dominated by meandering streams. The former tectonic belts were more than 200 miles away, and the regional slopes were relatively low. Surface exposures today in these areas consist of thick sequences of maroon-red-purple variegated mudstones with thin discontinuous layers of siltstones and silty sandstones.

The stratigraphy of Lower Dockum sediments in east-central New Mexico is significantly different from that of the proposed site. Figure 3-6, a subsurface sand percent map of this unit, was compiled from drill hole data from more than 1,500 oil wells throughout the basin. Thick sequences of sandstones at the northern and southern portions of the basin are shown projecting inward toward the center of the basin. In the New Mexico portion of this basin, these sand accumulations are related to the occurrence of the Santa Rosa Sandstones. This medium-to-coarse grained, white to buff sandstone represents the lowermost Triassic depositional unit and is a major aquifer in this portion of New Mexico.

Figure 3-6 illustrates that the great accumulation of Santa Rosa Sands that fills the northern portion of the Triassic paleobasin pinches out before reaching the Facility site. During the Lower Dockum time, the Facility site was part of a low-relief area with little fluvial deposition. The McGowen report specifies sand percentages of the Lower Dockum group in the Facility site area to be in the 10-20% range. This is consistent with data gathered from the two deeper drill holes completed north and south of the site boundary. There is a basal sand unit in the Lower Dockum below the site, but it appears not to be depositionally related to the Santa Rosa Sandstone.

Permian

Permian sediments are important to the geologic setting because they are immediately below the proposed Triassic host rocks. The deeper formations of Permian age were deposited in a restricted-marine environment and thus contain salt deposits, which make the groundwater produced from them too brackish for use.

Permian sediments underlying the Triassic units in the project area are assigned to the Artesia Group. Oil well logs from the New Mexico OCD in Hobbs, New Mexico, have provided sufficient data to identify the Dewey Lake Formation, Rustler Formation, and Yates Formation from the upper portion of this group. Geologic literature describes these Permian sediments to be gently dipping to the east. This fact was confirmed by using oil well log data to construct a graphic 3-point solution, as shown in Figure 3-7. Using the top of the anhydrite (Rustler) as a marker bed, the following simple calculations were made:

Known Point Elevations of Marker Bed

A = Lowest elevation - 2,975 feet
C = Highest elevation - 3,148 feet
B = Middle elevation - 3,091 feet

Strike Determination

Strike is defined as the direction of a horizontal line along the bedding plane and is calculated as follows:

D = point along AC with the same elevation as B (BD is strike)

$$AD = AC \times \frac{\text{difference in elevation between A and B}}{\text{difference in elevation between A and C}}$$

$$AD = 18{,}500 \text{ ft} \times \frac{3091 - 2975}{3148 - 2975} = 12{,}405 \text{ ft}$$

$$CD = 18{,}500 \text{ ft} - 12{,}405 \text{ ft} = 6{,}095 \text{ ft}$$

BD = direction of strike = N6°E

Dip Determination

Dip is defined as the angle of the bedding plane measured from a horizontal line perpendicular to the strike and is calculated as follows:

E = point along strike, therefore, E(elevation) = B(elevation)

$$\text{Tangent of dip angle} = \frac{E(\text{elevation}) - A(\text{elevation})}{AE}$$

$$\text{Tangent of dip angle} = \frac{3091 \text{ ft} - 2975 \text{ ft}}{7520 \text{ ft}} = \frac{116 \text{ ft}}{7520 \text{ ft}} = .015$$

Dip angle = $\text{Tangent}^{-1}(.015)$

Dip angle = 0°52'

These calculations indicate a north-south strike and a dip of less than 1° to the east. These results are consistent with the reported regional dip for Permian (and Triassic) sediments along the western flank of the Permian Basin.

Dewey Lake Formation—The uppermost Permian sediments underlying the Triassic sequence in the project area correlate to the Dewey Lake Formation. These sediments are predominately red to red-brown mudstones and siltstones and are virtually indistinguishable from the overlying Triassic sediments. Geologic literature reports a conformable relationship between these sediments and the overlying Triassic sediments. There are approximately 240 feet of Permian redbeds in this section.

Rustler Formation—The top of the Rustler Formation was identified on OCD well logs and corresponds to the top of a 40-foot bed of anhydrite. These anhydrites are visible in outcrop on the hills immediately east of the Pecos River drainage east of Roswell, New Mexico. Underlying the anhydrite are approximately 500 feet of halite (salt). The Rustler Formation represents the youngest anhydrite sequence in the Permian Basin.

Yates Formation—Unconformably underlying the Rustler, the Yates Formation is composed primarily of interbedded sandstone with minor dolostone and limestone. The sands are light gray and fine to very fine grained. Limestone is white to very light gray microcrystalline lime mudstone with a chalky texture. Dolostone is pink to light gray and microcrystalline.

3.4.1.2 Regional Structure

The tectonic setting and seismic activity are discussed in this section.

Tectonic Setting

The proposed Facility site is located on the western flank of the Permian Basin of west Texas. Because of the distance from tectonic centers and the minimal seismic activity, this is considered one of the more geologically stable regions within the United States.

The region underwent intense deformation, however, during late Paleozoic times. As shown in Figure 3-5, major uplifting occurred along the Ouachita Tectonic Belt and the Wichita System of Texas and Oklahoma. The Sacramento and Sangre de Cristo uplifts in northeastern New Mexico were also active during late Paleozoic time. The overall structural configuration of the Permian Basin was established at this time.

This period of intense deformation was followed by a long period of gradual subsidence. The sea covered the region, and throughout the remainder of Permian era, the Permian Basin was slowly filled with several thousand feet of evaporites, carbonates, and shales. As discussed in Section 3.4.1.1, non-marine deposition began in Triassic time with the accumulation of lacustrine/fluvial sediments into a large shallow lake.

During the late Cretaceous to early Tertiary Laramide Orogeny, there was renewed uplifting along the Sacramento, Sangre de Cristo, and other ranges within the Rocky Mountains. This orogeny uplifted the region to its present position and supplied sediments for the Tertiary Ogallala Formation.

Seismic Activity

The Permian Basin is an area of moderate to low seismic activity. Data obtained from the National Geophysical Data Center of NOAA indicate a total of 102 observed earthquakes within a 250-km (155-mile) radius of the proposed site. These data reflect observations made from 1930 to 1993.

As shown in Figure 3-8, there were no recorded earthquakes with a magnitude greater than 3.9 within 70 miles of the proposed site and no recorded seismic activity within a radius of 45 miles. The distance from any tectonic centers and the low recorded seismic activity suggest that the proposed site is located in an extremely stable environment where activity is not expected. Consequently, little damage from earthquake activity is anticipated.

3.4.2 Site Geology

Figure 3-9 illustrates the surficial geology on and adjacent to the proposed site. This section will provide detailed descriptions of the proposed Triassic host sediments and the Quaternary alluvium that overlies these sediments only.

3.4.2.1 Site Stratigraphy

Specific data for this section was obtained through drilling activities described in Section 3.4.3. Figure 3-10 is a stratigraphic cross-section based on this drilling, illustrating relationships between the proposed Triassic host sediments and adjacent formations. Other site-specific cross-sections are located in Volume II, Appendix G.

Quaternary

The thickness of Quaternary alluvial deposits at the site varies from less than 10 feet to 35 feet. The upper portion of these sediments consists of fine to very fine, wind-blown yellow-brown sands. Below this sand are varying thicknesses of red-brown to yellow-brown siltstones and silty mudstones. Scattered throughout these sediments are small chert pebbles and granitic cobbles derived from the Tertiary Ogallala Formation.

A caliche zone (Mescalero Caliche) is present in most of this unit. The caliche is found immediately under the top wind-blown sands and coats and fills fractures within the more consolidated siltstones. Where the Quaternary alluvium is quite thin, this caliche is found coating Triassic sediments.

Triassic

Drilling at the site has delineated 1,175 feet of Dockum sediments. Two distinct units can be identified in these sediments: the Upper Dockum (475 feet thick) and the Lower Dockum (700 feet thick). Within the proposed Facility boundary the thickness of the Upper Dockum unit never exceeds 100 feet. Upper Dockum sediments are in contact with the overlying Quaternary alluvium throughout the project area.

Upper Dockum—This unit consists of variegated (red-brown-green) mudstones interbedded with reddish gray siltstones and reddish-gray-green sandy siltstones. The siltstones are micaceous (predominantly muscovite), indicating they were part of a relatively active fluvial system capable of transporting material into the basin from distant source rocks.

From examination of lithology and down-hole electric logs, it is estimated that 30 percent of the unit is comprised of mudstones. Lithologies of the remainder of the unit are evenly divided between siltstones and sandy siltstones. However, as the geotechnical properties of these two lithologies are very similar, this geologic discussion will simply refer to them both as siltstone. Mudstones were found to have an average permeability of 2.45×10^{-7} cm/s, and the siltstones average 1.22×10^{-5} cm/s.

These sediments were deposited in a fluvial environment. Mudstone and siltstone bodies are very lenticular and are found to pinch out abruptly. Accordingly, individual lithologies are not correlatable over significant distances (thousands of feet).

Cross-sections prepared from the close-spaced drilling within the proposed Facility boundary establish an understanding of the fluvial nature of this unit (see Appendix G in Volume II). Figure 3-11 shows the locations of drill holes for the close-spaced drilling pattern and provides an index of cross-sections that illustrate the character of the Upper Dockum Unit. Also shown on Figure 3-11 is the location of the "most favorable" area for the construction of the proposed landfill. As shown in the cross-section on Figure 3-12, the lithology of this area (centered on drill hole PB-4) is predominantly mudstone, with thin beds of siltstones. The lenticular nature of the mudstone and siltstone bodies is also shown in these cross-sections. Cross-sections 3-1 and 3-2, in Appendix G (Volume II), show the facies relationships of the "most favorable" area.

The fluvial nature of the Upper Dockum Unit has led to the scouring of channels into the underlying Lower Dockum Unit. This scouring and the pinching-out of fluvial sediments have resulted in the local development of an undulatory surface on top of the Lower Dockum Unit. This phenomenon is well illustrated in Cross-sections 3-3, 3-4, and 3-5, in Appendix G (Volume II).

Lower Dockum —The Lower Dockum Unit, described in Section 3.4.1.1, has a completely different character from the upper unit. The lower unit represents a time of relatively quiet lacustrine deposition, which resulted in the accumulation of thick sequences of predominantly mudstones interbedded with thin siltstones. These sediments are very homogeneous, in contrast with the abrupt facies changes present in the more active Upper Dockum depositional system.

Most of the close-spaced drilling within the proposed Facility boundary "bottomed" in Lower Dockum mudstones. These mudstones were consistently a moderate reddish brown color, which according to McGowen (1979), is associated with low stand lacustrine and mud flat deposition.

The 1995 confirmation drilling provided some important data on this unit. As illustrated in Figure 3-13, all three holes penetrated the clays of the Lower Dockum unit. PB-36 encountered 64 feet of this unit, PB-37 encountered 55 feet, and PB-38 encountered 18 feet. Ten feet of core of Lower Dockum were collected from PB-36 at a depth of 138 to 148 feet and 7 feet of Lower Dockum were collected from PB-37 at a depth of 148 to 155 feet. Four representative samples of this core were sent to AGRA Earth & Environmental laboratories for permeability analyses. The results of these analyses

confirm the Lower Dockum to be a very impermeable unit (average permeability of 5.7×10^{-8} cm/s), capable of performing as a geologic barrier to downward migration from the proposed landfill. Following are the results of the core analyses:

Core Interval	Permeability (cm/sec)
PB-36 (144'-145')	5.2×10^{-8}
PB-36 (147'-148')	6.8×10^{-8}
PB-37 (150'-151')	5.8×10^{-8}
PB-37 (154'-155')	4.9×10^{-8}

3.4.2.2 Site Structure

There are no identified faults within the project area. As previously discussed, the proposed site is located in a geologically stable area. There are no mapped faults on or adjacent to the project area. Color air photos of the area were examined for surface lineations, which can reflect faulting in the subsurface. All surface lineations observed on these photos were attributed to man-made features (i.e., fences, roads, etc.).

Subsurface drilling did not encounter displacement or repeating of geologic sequences that would be indicative of faulting. In the Upper Dockum Unit, there are abrupt changes in lithologies, but these are attributed to depositional processes associated with an active fluvial system.

3.4.3 Site Investigation Activities

Triassic sediments in eastern Chaves County were initially identified as excellent host rocks for proposed hazardous waste disposal because they (1) contain thick sequences of low permeability clays; (2) occur in remote, unpopulated areas; and (3) produce virtually no groundwater. This section describes the series of exploration activities undertaken to verify and document the suitability of the site for hazardous waste disposal.

As part of this permit application, a total of 41 drill holes were completed. The lithologies of these holes were recorded and a geophysical log was run on each drill hole. Thirty-one of these drill holes were completed within the project boundary (Figure 3-14).

3.4.3.1 Preliminary Evaluation Activities

The first phase in determining an appropriate disposal site was to identify potential sites with exposed or near-surface Triassic sediments. To identify such sites, color aerial photos were obtained of areas underlain by Triassic sediments in eastern Chaves County (Figure 3-15). The areas exhibiting the characteristic coloration associated with the Triassic sediments on the photos were then plotted on topographic maps. The locations with desirable geology were screened for additional factors, including accessibility and land ownership. From this process, a prioritization of sites was developed and a shallow drilling program designed.

In July and September 1993, two shallow drilling programs were conducted to examine Triassic sediments underlying the Quaternary alluvium. Average depth of these holes was 40 to 60 feet, and the drilling was conducted on a spacing of approximately 1,000 feet between holes. As shown in Figure 3-16, three areas encompassing seven sections were examined. The objective of this drilling was to identify an area where the Triassic sediments were unsaturated, were situated close to the surface, and contained low permeability clays. An Ingersol Rand 1500 air rotary drill was used to perform this work. This air rotary technique was used because of the high quality of drill cuttings it produces and because the presence of any subsurface water can be easily detected.

Of all areas investigated, the surface and near-surface geology in the vicinity of Red Tank (the proposed site) was found to be the most favorable. Over most of this area, the thickness of Quaternary alluvium averaged approximately 10 feet, and the shallow drilling indicated the presence of unsaturated mudstones underlying the alluvium. Five shallow core holes were completed, adjacent to rotary air holes, to obtain preliminary geotechnical data on the near-surface Triassic sediments. As a result of the shallow depth of these sediments, many of the clays were very dry and brittle. This presented some difficulty in obtaining "undisturbed" core samples. Despite these difficulties, materials testing results showed low permeabilities for Triassic clays, ranging from $1x10^{-7}$ to $3x10^{-8}$ cm/s. These values, along with the local geologic setting, established the Red Tank area as an area conducive to more detailed site characterization.

Two deep holes (WW-1 and WW-2) were drilled to the base of the Dockum Group in November 1993. These holes encountered an unsaturated thickness of 600 to 650 feet of Lower Dockum mudstones consisting primarily of reddish brown, maroon, and purple mudstones with thin intervals of reddish brown silts.

Lithologic logs developed from cuttings samples and down-hole geophysical logs (gamma and thermal neutron) confirm the homogeneity of this thick mudstone interval. In addition, samples of drill cuttings from one of the deep holes (WW-2) were taken to the University of New Mexico's Diagnoses Laboratory for a grain size analysis. This analysis showed a remarkably constant grain size distribution throughout the sequence, which is consistent with the technical definition of a mudstone. This procedure involved desegregating, centrifuging, drying, wet sieving, and weighing the samples. A complete procedure and the results of this analysis are contained in Volume II, Appendix F.

The 600- to 650-foot mudstone interval rests on a basal sandstone unit that is approximately 50 feet thick. This basal unit is present in oil well logs in the area as a clean to a silty sand. The deep drilling did not retrieve any cuttings from this basal unit. The drilling was performed with air, and the moisture in this unit prevented the return of cuttings to the surface. Casing was placed in these holes, and water levels were taken (Section 3.6.2).

WW-1 and WW-2 were drilled north and south of the project boundary to characterize the nature of the Lower Dockum. Because of the consistent, continuous depositional environment within the lacustrine sediments at the Lower Dockum, it was decided (and approved by the NMED) that is was unnecessary to penetrate the entire Lower Dockum sediments within the site boundary. Such penetration would have certainly violated the integrity of the formation in the area of the planned hazardous waste landfill and in all likelihood would not have provided additional geologic information.

3.4.3.2 1994 Site Characterization Activities

In June 1994, a drilling plan for site characterization activities at the proposed site was prepared and submitted to the Hazardous and Radioactive Materials Bureau of the New Mexico Environment Department. The plan identified drilling locations, depths and methods, proposed geotechnical tests and methods, and down-hole geophysical logging methods. The 100-foot depth was sufficient to penetrate the base of the Upper Dockum (with the exception of the easternmost portion of the site). The plan was approved as submitted.

Drilling operations commenced on July 17, 1994 and a total of 36 drill holes were completed. There were three distinct phases of this drilling program: (1) close-spaced pattern drilling in the area of the proposed site (to a depth of 100 feet) to obtain detailed lithologic and hydrologic information for the design of a landfill, (2) stratigraphic drilling across the project area (to a depth of 200 feet) to correlate the site geology with the regional setting, and (3) selected core drilling in the proposed site for geotechnical samples. Samples of drill cuttings were collected and logged for each hole (see Volume II, Appendix C). Southwest Geophysical Services, Inc. conducted down-hole geophysical logging of

each drill hole. These electrical surveys consisted of thermal neutron and gamma logs. The electric logs provide lithologic information from unsaturated drill holes to supplement and verify the lithologic interpretations based on drill cuttings. Copies of all geophysical logs can be found in Volume II, Appendix D.

A rotary air rig (Ingersol Rand 1500) was used for this work. Drilling with air provides cleaner drill cuttings than drilling with water, and usually a good indication of water saturation. However, in the case of the Upper Dockum sediments on the Facility site, this drilling technique was not always successful in identifying water saturation. This failure was a result of the low to very low permeabilities of the silty sands and the low amount of water saturation. The pressure of the air from the drilling process prevented water from immediately entering the holes. If groundwater was present, it was not always detected until the hole had stabilized and a geophysical log was taken. Geophysical logs on all 31 drill holes within the site boundary encountered no saturated Upper Dockum sediments.

Three core holes were completed and a total of 85 feet of core recovered. A CME-55 hollow-stem auger rig using a continuous sampler was used to collect these samples. The dry, brittle nature of these shallow, unsaturated sediments made the recovery of undisturbed core samples difficult.

Representative core samples of mudstones, siltstones, and sandy siltstones were sent to materials testing laboratories for measurement of geotechnical parameters to be used in the Facility design and contaminant transport modeling. In addition to core samples, 11 backhoe pits were dug adjacent to drill holes for the collection of bulk samples. Proctor tests were performed on these bulk samples to provide information required for design studies. All geotechnical results are contained in Volume II, Appendix E.

3.4.3.3 1995 Confirmation Drilling Program

In order to confirm the unsaturated nature of the Upper Dockum sediments on the eastern boundary of the proposed Facility, a drilling plan was submitted to Mr. Bob Sweeney of NMED on June 26, 1995. This plan was modified and approved in a letter from Mr. Ronald A. Kern, dated July 12, 1995. A three-hole drilling program was conducted on the GMI site on July 24 & 25, 1995. Mr. Bob Sweeney visited the site and observed the drilling operations on Monday, July 24, 1995.

Holes PB-36, PB-37, and PB-38 were completed as an extension to an existing east-west line of drill holes. The westernmost drill hole was located on the eastern boundary of the proposed landfill. The other two holes were drilled 1,000 feet apart and examined the area immediately east of the proposed landfill. All surface locations for these drill holes were surveyed.

No groundwater saturation was encountered. All holes were completed with air so that saturated sediments could have easily been detected. Lithology logs describing drill hole cuttings were prepared in the field and down-hole geophysical logs were run on each hole. The geophysical logs included gamma ray, thermal neutron, and caliper profiles.

3.5 SURFACE WATER AND WATER BALANCE

This section describes surface waters and meteorological conditions used to estimate groundwater recharge at the proposed site.

3.5.1 Surface Water

There are no perennial stream drainages on or near the proposed site. The nearest surface drainage is the Pecos River, approximately 30 miles to the west.

There is one small stock tank (Red Tank) within the proposed Facility boundary and several additional tanks on adjacent lands. These tanks are approximately 200 feet by 200 feet and contain water for livestock. The tanks are clay-lined and retain water from run-off or receive water from an underground pipeline. Water in the underground pipeline is supplied from three water wells on the Marley Ranch located in Section 10, T11S, R31E. These wells are east of the Mescalero Rim and produce water from the Ogallala Formation. In the past, water from the springs along the Caprock excarpment was used in this pipeline, but now water is pumped from the Ogallala Formation. The pipeline is personally owned and maintained by the Marley Ranch to provide water to cattle operations below the Caprock.

Once the site is designated as a disposal area, cattle operations on this property will cease and the Marley Ranch will stop using Red Tank. They will also re-route their personal pipeline, as appropriate, to avoid landfill operations and continue to supply water to their cattle operations below the Caprock.

3.5.2 Water Balance

The water balance analysis estimated groundwater recharge from direct precipitation, surface water bodies, and irrigation at the proposed landfill site. This information is useful for assessing the potential migration of contaminants released at or near the surface to groundwater. Groundwater recharge rate is directly related to the potential for contaminants spilled or leaked at the surface to reach groundwater. In areas with little or no groundwater recharge, there is less potential for groundwater contamination from releases of hazardous substances than in high recharge areas because the mechanisms to transport potential contamination are limited.

A water balance requires quantification of the hydrologic components, which can result in changes in the amount of water stored in the area of interest. Often, water balances are calculated for an entire watershed to understand the relative importance of the hydrologic components within that area. For this analysis, the water balance was performed to estimate groundwater recharge at the proposed landfill site.

Groundwater recharge at the proposed site can be estimated by summing precipitation, infiltration from surface water bodies, and irrigation at the site and subtracting evapotranspiration and surface run-off. As no natural surface water bodies or irrigation occur at the site, groundwater recharge is estimated as the difference between direct precipitation and evapotranspiration. This assumes no surface run-off at the site.

Precipitation data collected at the Roswell weather station indicate that mean annual precipitation is 10.61 inches (Section 3.2.2). This annual mean is used as the average precipitation at the proposed site.

Evapotranspiration refers to the processes that return water to the atmosphere by a combination of direct evaporation and transpiration by plants and animals. It is the largest item in the water budget because most of the precipitation that falls in the area returns almost immediately to the atmosphere without becoming part of the surface water or groundwater systems. On unirrigated rangeland, much of the precipitation that does not evaporate immediately is taken up fairly rapidly by plants and transpired. In a regional water balance conducted in southeastern New Mexico, it was estimated that approximately 96 percent of total precipitation is lost to evapotranspiration (Hunter, 1985). This number corresponds to data presented for the Rio Grande Basin by Todd (1983), which estimated that 95.4 percent of total precipitation was being lost to evapotranspiration.

Assuming a mean annual precipitation rate of 10.61 inches, of which 96 percent is lost to evapotranspiration, the net recharge to groundwater is estimated as 0.42 inch per year. This low

groundwater recharge rate significantly reduces the potential for groundwater contamination from spills or leaks at the proposed Facility.

The purpose of this water balance is to provide a conceptual understanding of the hydrologic components at the site. The amount of groundwater recharge is a reflection of the arid climate of the region. The net recharge estimate of 0.42 inch per year (based on average hydrologic components) represents the expected long term annual conditions at the site. The relatively low recharge rate appears to be reasonable given the unsaturated conditions of the Upper Dockum within the site boundaries. Using the highest recorded annual precipitation value of 32.92 inches yields only a slightly higher recharge rate of 1.32 inches (assuming an evapotranspiration rate of 0.96). This short term (1 year) increase in recharge is unlikely to have a significant impact on the unsaturated flow regime at the proposed site.

3.6 GROUNDWATER

This section describes regional and local aquifers.

3.6.1 Regional Aquifers

In the region surrounding the proposed site, there are two geologic units that have produced groundwater, the Triassic and the Tertiary Ogallala Formation. Very minor amounts of groundwater have been produced from Triassic sediments; but the Tertiary Ogallala Formation is a major aquifer in southeastern New Mexico, west Texas, and several other western states.

A listing of all water wells within a 4-mile radius of the proposed site was obtained from the New Mexico State Engineer's office. Sixteen water wells were reported, fourteen from the Ogallala Formation and two from the Triassic. Of the two Triassic wells, one is now reported to be dry and the other is actually located more than 6 miles west of the proposed site. These water wells, along with oil well locations and the locations for all site investigation drilling activities, are shown in Figure 3-17.

3.6.1.1 Ogallala Aquifer

The Ogallala Aquifer is the primary freshwater aquifer within the regional study area and serves as the principal source of groundwater in the Southern High Plains. The saturated thickness of the Ogallala Aquifer ranges from a few feet to approximately 300 feet in the Southern High Plains. Groundwater within the Ogallala Aquifer is typically under water table conditions, with a regional hydraulic gradient toward the southeast ranging from approximately 10 feet/mile to 15 feet/mile. The average hydraulic conductivity of the Ogallala Aquifer ranges from 1 foot/day to 27 feet/day.

The Ogallala Aquifer is recharged primarily through the infiltration of precipitation. The rate of recharge is believed to be less than 1 inch/year. Groundwater discharge from the Ogallala Aquifer occurs naturally through springs, underflow, evaporation, and transpiration, but groundwater is also removed artificially through pumpage and catchment. Currently, the rate of withdrawal exceeds the rate of recharge for much of the Ogallala Aquifer.

3.6.1.2 Triassic

Regionally, the only aquifer within Triassic sediments is the Lower Dockum Aquifer. However, because the Upper Dockum is known to have permeable facies that locally produce low quantities of good to poor quality water, it is included in this section.

Lower Dockum Aquifer

The major aquifer within the Lower Dockum is the Santa Rosa Sandstone. This sandstone is present along the northern and southern flanks of the Permian Basin and is a principal source of groundwater in Roosevelt and Curry Counties, New Mexico. The Santa Rosa Sandstone is not present along the western flank of the Permian Basin, which includes the proposed site.

Where the Santa Rosa Aquifer has been studied, hydrochemical analyses and groundwater oxygen isotopes indicate that it is distinctly different from the Ogallala Aquifer. The thick, impermeable clays within the Triassic section have been sufficiently impermeable to prevent hydraulic communication between these aquifers.

Upper Dockum Aquifer

There is no regional aquifer developed within Upper Dockum sediments. In local areas, recharge to the Upper Dockum is provided through vertical infiltration from overlying aquifers which are water-bearing units within the Ogallala Formation. This relationship has been illustrated in Figure 3-10.

3.6.2 Site Groundwater

Potential Triassic host sediments within the proposed Facility boundary are unsaturated. Detailed drilling within this boundary has encountered no groundwater. Drilling outside the proposed Facility boundary has identified saturated zones in both the Upper and Lower Dockum Units. The following subsections contain descriptions of these saturated zones.

3.6.2.1 Ogallala Aquifer

The western boundary of the Ogallala Aquifer, represented by the Caprock escarpment, is located topographically/stratigraphically above and 2 miles east of the proposed site. At the base of the escarpment, along the contact of the Ogallala Formation and the underlying Upper Dockum, are numerous springs, which are a result of downward-migrating Ogallala groundwater coming into contact with low permeability zones within the Upper Dockum and being diverted to the surface.

3.6.2.2 Upper Dockum - "Uppermost Aquifer"

For the purpose of this application, the uppermost aquifer is considered to be the Upper Dockum Unit because the Ogallala Aquifer is not present at the site. The EPA has defined the uppermost aquifer as the geologic formation, group of formations, or part of a formation that is the aquifer nearest to the ground surface capable of yielding a significant amount of groundwater to wells or springs. The Upper Dockum Unit certainly does not yield a significant amount of groundwater. However, preliminary drilling in the site area has found portions of this unit to be water-bearing and to possess consistent hydrologic characteristics.

The identification of a confining layer on the lower boundary is an essential factor in the identification of the uppermost aquifer. The thick sequence of mudstones of the Lower Dockum Unit (as discussed in Section 3.4.2.1) represents a high-integrity aquitard, effectively confining the aquifer. Although there is a saturated basal sandstone in this unit, the 600 to 650 feet of mudstones separating the Upper Dockum sediments from this sandstone are of sufficiently low permeability to prevent hydraulic communication between the Upper and Lower Dockum Units.

As previously discussed in Section 3.6.2.1, several springs are present where the Ogallala Formation crops out, two miles east of the Facility site, along the 200-foot high Caprock escarpment. These springs are present where the Ogallala sands unconformably overlie impermeable Dockum mudstones and claystones and the groundwater moves laterally to the surface. Where these water-bearing

Ogallala sands are in contact with more permeable units of the Upper Dockum, saturation of these underlying sediments occurs. The result, as illustrated in Figure 3-10, is the formation of a groundwater divide east of the proposed site. The majority of the groundwater entering the Upper Dockum flows to the east, conforming to the regional dip of the unit. There is also a minor flow component which slopes away from the unconformable contact, creating a steep hydraulic gradient towards the west. This gradient does not extend beneath the Facility site. As shown in Figure 3-18, this gradient must lie immediately east of PB-38, which is still unsaturated, whereas holes WW-1, and PB-26 are saturated.

Where groundwater has been observed in the Upper Dockum, not all lithologies within the unit are saturated. Air drilling through these sediments found the mudstones to be unsaturated. The more permeable sandy siltstone facies were water-bearing below depths of 135 to 150 feet. These saturated lithologies were encountered approximately 2,500 feet east (downdip) of the proposed landfill site, beyond the proposed Facility boundary (Figure 3-18). It is extremely significant that this saturation does not extend beneath the Facility site. All 31 drill holes within the site boundary, as shown on Figure 3-14, were unsaturated. For this reason, there were no groundwater production tests conducted.

Exploratory drilling west of the proposed Facility boundary (updip), near the outcrop of the Upper Dockum Unit, the small sandy hills located along the section line between Section 18, T11S, R31E and Section 13, T11S, R30E, encountered an isolated occurrence of groundwater (Figure 3-18 and Cross-section 3-3). In a single drill hole (PB-14), at a depth of 42 feet, a small accumulation of groundwater was found in a depression developed on the surface of the underlying Lower Dockum mudstones. This depression is consistent with the "scouring" of the Upper Dockum fluvial sediments into the Lower Dockum mudstones (Section 3.4.3.2). Closer spaced drilling in the vicinity of this occurrence encountered no other such accumulations. This isolated "pooling" is most likely a result of surface run-off entering the subsurface from the nearby outcrop and being caught in a small "stratigraphic trap."

Because of the identification of groundwater in borehole 14, an offset (borehole 14o) was completed 400 feet to the east (down-gradient). This borehole location was in addition to those pre-approved by the NMED, but determining the potential extent of groundwater saturation was important. Borehole 14o was drilled to a depth of 100 feet.

There was no saturation observed while drilling this offset, but the geophysical log indicated the presence of fluid at the bottom of this borehole. The top of the fluid was observed to be at a depth of 92.0 feet, indicating a maximum apparent concentration of 3.5 feet. This is an apparent concentration because a 2.25 inch probe will displace approximately one-half of the volume of the hole. Regardless of all of these factors, there was approximately one gallon of fluid in the bottom of this borehole introduced by a heavy rainfall that occurred after the hole was drilled and before it could be logged. Due to the impermeable nature of the Lower Dockum mudstones, the water did not infiltrate into the formation and was trapped in the bottom of the hole.

The hole was cased with 3-inch plastic tubing and monitored for several weeks. No additional water entered the hole, and, in fact, the gallon of water eventually dispersed into the Lower Dockum. An examination of the log for PB-14o shows the bottom of the sandy silt unit (Upper Dockum) to be a depth of 36 feet. If the Upper Dockum was the source of the water, the hole would have equilibrated or filled to a depth of at least 36 feet. The fluid did not migrate upward through several hundred feet of Lower Dockum mudstones; therefore, there is no apparent subsurface source for the small quantity of water shown in the log for this hole.

Water Level Measurements— After the stratigraphically trapped water (Cross-section 3-3, Appendix G, Volume II) was encountered, temporary casing was placed in the drill hole (PB-14) so that piezometric water levels could be measured. For the first six weeks after casing the drill hole, the water was pumped from the hole weekly. After each pumping event, the water returned to a static

level of 42 feet. Subsequent water level measurements have confirmed a static water level in this drill hole.

In addition to casing drill hole PB-14, nine other drill holes, located downdip, were also cased. Although the Upper Dockum is unstaturated in these other drillholes, the holes were examined weekly for six weeks. No water was observed except for that previously described in PB-14o. The drill holes that were cased with 3-inch plastic casing and the perforated intervals for these holes are as follows:

Hole No.	Perforated Zone	Base of Upper Dockum
PB-14	30-80	42'
PB-14o	20-40	36'
PB-33	20-55	52'
PB-18	60-80	78'
PB-16	60-80	79'
PB-15	30-65	62'
PB-13	30-50	48'
Hole No.	**Perforated Zone**	**Base of Upper Dockum**
PB-9	40-80	72'
PB-7	20-40	38'
PB-17	60-85	80'

The intent of installing casing in these 10 holes was to allow any groundwater in the vicinity of these drill holes to collect for detection purposes. The depths of the cased intervals varied because there is an approximate 1° regional dip to the east. All cased intervals extend down to the bottom of the Upper Dockum sand. Slits were cut in the PVC casing every foot throughout the perforated zones.

Water Quality— Preliminary water quality data were obtained from limited chemical analyses on a sample of the stratigraphically trapped groundwater from drill hole PB-14. These results include the following measurements:

Total Dissolved Solids	4,920 mg/L
Alkalinity	396 mg/L
Sodium	1,640 mg/L
Magnesium	103 mg/L

These preliminary data indicate that water from the Upper Dockum is of poor quality. The most significant parameter is total dissolved solids (TDS); water with TDS values of greater than 5,000 mg/L is considered to be unfit for human consumption.

3.6.2.3 Lower Dockum Aquifer

The basal sandstone of the Lower Dockum Unit is the water-bearing portion of this unit. As shown in Figure 3-19, this unit is overlain by a thick sequence (600 to 650 feet) of low permeability mudstones that act as an aquitard. The recharge area for the Lower Dockum Aquifer is the Pecos River drainage to the west. Groundwater flow direction is easterly, along the regional dip of this unit.

Most of the shallow drilling in the site area has "bottomed" in the upper portion of the aquitard. Two holes (WW-1 and WW-2) were drilled to approximately the base of the Triassic section and encountered water from the Lower Dockum Aquifer (Figure 3-18). Hole WW-1 also penetrated a

saturated zone in the Upper Dockum Unit, resulting in a mixing of these groundwaters in this drill hole.

Both holes were drilled with an air rotary rig and drill cutting samples were collected. WW-1 was completed to a depth of 820 feet and, at the time of drilling, no water saturation was apparent in the drill cuttings. WW-2 was completed to a depth of 710 feet; however, circulation was lost at a depth of 645 feet. Loss of circulation commonly occurs when drill cuttings are too wet for the air pressure of the rig to remove the cuttings from the hole. It is likely that the basal sandstone of the Lower Dockum Unit was penetrated at this depth.

Water Level Measurements—Temporary plastic casing was placed in each of the two holes immediately after completion. In July 1994, geophysical logs were run for each hole, and water levels were identified. WW-1 had a water level of 155 feet. This level is 20 feet above the Upper/Lower Dockum contact, and it is likely that groundwaters from both units are present in this drill hole. A water level of 467 feet was observed for WW-2. This finding indicates that there is a hydrostatic head pressure within the Lower Dockum Aquifer of 178 feet.

Both of these cased holes were pumped and allowed to recover. After a sufficient recovery period, a static water level (155 feet for WW-1 and 467 feet for WW-2) was maintained.

Water Quality—Preliminary water quality data are presented only for WW-2. This drill hole encountered groundwater from the Lower Dockum. Because groundwater from the Upper Dockum and Lower Dockum was mixed in drill hole WW-1, preliminary water quality data from WW-1 do not accurately characterize either aquifer and are not presented. The results from WW-2 include the following:

Total Dissolved Solids	18,800 mg/L
Alkalinity	83 mg/L
Sodium	7,030 mg/L
Magnesium	87 mg/L

These preliminary data indicate that the water quality of the Lower Dockum is very low. The extremely high TDS values are indicative of long formation retention times, which reflects low groundwater flow and low permeability conditions within the Lower Dockum aquifer.

3.6.3 Contaminant Transport Modeling

For the purpose of this application, two types of groundwater modeling were performed to estimate contaminant transport times. One approach is extremely conservative and presents a "worst case" scenario. One of the many conservative assumptions used in these calculations, despite field evidence, is that contaminant transport will take place under saturated conditions. A second, more realistic approach, assumes unsaturated flow conditions.

3.6.3.1 Saturated Flow Modeling

Saturated flow modeling was used to simulate potential leakage or infiltration from the Facility landfill. The objective of contaminant transport modeling was to calculate the time necessary for a hypothetical leak from the landfill to reach the uppermost aquifer. Travel time was calculated using a steady-state groundwater flow model. The model was based on results of the site investigation and geologic characterization, which indicated that perched groundwater exists upgradient and downgradient of the site (Section 3.6.2.2).

Perched groundwater located approximately 2,500 feet downgradient of the proposed landfill is the uppermost aquifer that could be affected by a contaminant. For the purpose of calculating travel time

NEW MEXICO ENERGY, MINERALS
& NATURAL RESOURCES DEPARTMENT

OIL CONSERVATION DIVISION
2040 South Pacheco Street
Santa Fe, New Mexico 87505
(505) 827-7131

May 10, 1999

CERTIFIED MAIL
RETURN RECEIPT NO. P-326-936-517

Mr. Phillip C. Nobis
Tierra Environmental Company, Inc.
P.O. Drawer 15250
Farmington, NM 87401

RE: Request To Accept Sewage Sludge

Dear Mr. Nobis:

The New Mexico Oil Conservation Division (OCD) received Tierra Environmental Company's, Inc. (Tierra) letter dated January 29, 1999 regarding the request to accept sewage sludge as an amendment to aid in landfarm bio-remediation. The OCD has reviewed the proposal and researched the appropriate regulations.

The United States Environmental Protection Agency (EPA) regulates the use or disposal of sewage sludge through 40 CFR Part 503. EPA does not recognize enhanced bio-remediation of petroleum contaminated soils as a land application or beneficial use. Instead EPA defines it as surface disposal of a waste which is covered under 40 CFR Part 503 Subpart C.

Under Rule 711, OCD surface waste disposal facilities may accept non-oilfield waste in an emergency if ordered by the Department of Public Safety. The disposal of sewage sludge would not qualify as an emergency. Therefor, OCD 711 surface waste management facilities shall not accept non-oil field waste including sewage sludge.

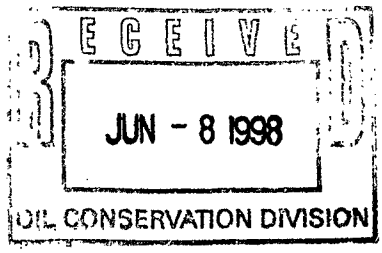
If you have any questions please do not hesitate to contact me at (505) 827-7153.

Sincerely,

Martyne J. Kieling
Environmental Geologist

Attachments
xc: Aztec OCD Office
Artesia OCD Office
Hobbs OCD Office
Gandy Marley, Inc.

COMMERCIAL LAND FARMS
A New Mexico Enterprise
Serving New Mexico's Needs



June 3,1998

New Mexico Oil Conservation Div.
2040 S. Pacheco Street
Santa Fe, New Mexico

Attn: Martyne Kieling

Dear Martyne:

I apologize for not including the closure costs with the C-137. Hopefully this will complete the permit application and we can continue on with the permit application at our reclaiming plant.

If you have any questions please do not hesitate to contact me at (505) 398-4960.

Sincerely,

Larry Gandy

Gandy Marley, Inc. • Box 1658 • Roswell, NM 88201 • (505) 398-4960 • FAX (505) 398-6887

WHOLE EARTH

Whole Earth Environmental, Inc.
19606 San Gabriel, Houston, Texas 77084
713/492-7077 Fax: 713/492-7077

November 18, 1997

Gandy Marley Inc.
P.O. Box 1658
Roswell, New Mexico

Atten: Larry Gandy

Dear Larry:
I want to thank you for the opportunity of quoting the closure of the Gandy Marley, Inc landfarm in accordance with the New Mexico OCD Closure Guidelines dated March,1993

As you know our approach is to perform the bulk of the analytical work on location saving both time and money over the conventional approach of sending all samples to laboratories for analyses. This capability will result in significant savings to you as we can far more efficient in our approach to the project.

I believe that we will be able to remediate the entire site within a period of three months using aeratoin.dilution and bio-augmentation as the remediation techniques for a total "not to exceed" cost of .$38,650.00. This cost includes all analytical testing, equipment, our supervision, and full documentation.

We will provide you with all of the detailed protocals and procedures within two weeks of your request.

Thank you for the opportunity of quoting this very interesting and challenging project.

Warmest regards,

Mike Griffin
President
Whole Earth Enviromental

District I - (505) 393-6161
P. O. Box 1980
Hobbs, NM 88241-1980
District II - (505) 748-1283
811 S. First
Artesia, NM 88210
District III - (505) 334-6178
1000 Rio Brazos Road
Aztec, NM 87410
District IV - (505) 827-7131

New Mexico
Energy Minerals and Natural Resources Department
Oil Conservation Division
2040 South Pacheco Street
Santa Fe, New Mexico 87505
(505) 827-7131

RECEIVED
DEC 16 1997
Environmental Bureau
Oil Conservation Division

Form C-137
Originated 8/8/95
Revised 6/25/97

Submit Original
Plus 1 Copy
to Santa Fe
1 Copy to appropriate
District Office

APPLICATION FOR WASTE MANAGEMENT FACILITY

(Refer to the OCD Guidelines for assistance in completing the application)

[X] Commercial [ ] Centralized

1. Type: [ ] Evaporation [ ] Injection [ ] Other _____
   [XX] Solids/Landfarm [ ] Treating Plant

2. Operator: Gandy Marley, Inc.
   Address: P. O. Box 1658, Roswell, NM 88202
   Contact Person: Larry Gandy Phone: 505-398-4960

3. Location: Sections 4, 5, 8 and 9 /4 Section _____ Township 11S Range 31 E
   Submit large scale topographic map showing exact location

4. Is this a modification of an existing facility? [X] Yes [ ] No

5. Attach the name and address of the landowner of the facility site and landowners of record within one mile of the site.

6. Attach description of the facility with a diagram indicating location of fences, pits, dikes, and tanks on the facility.

7. Attach designs prepared in accordance with Division guidelines for the construction/installation of the following: pits or ponds, leak-detection systems, aerations systems, enhanced evaporation (spray) systems, waste treating systems, security systems, and landfarm facilities.

NA ~~8.~~ Attach a contingency plan for reporting and clean-up for spills or releases.

NA ~~9.~~ Attach a routine inspection and maintenance plan to ensure permit compliance.

10. Attach a closure plan.

NA ~~11.~~ Attach geological/hydrological evidence demonstrating that disposal of oil field wastes will not adversely impact groundwater. Depth to and quality of ground water must be included.

NA ~~12.~~ Attach proof that the notice requirements of OCD Rule 711 have been met.

NA ~~13.~~ Attach a contingency plan in the event of a release of H_2S.

14. Attach such other information as necessary to demonstrate compliance with any other OCD rules, regulations and orders.

15. CERTIFICATION

I hereby certify that the information submitted with this application is true and correct to the best of my knowledge and belief.

Name: Larry Gandy Title: Vice-President

Signature: Larry Gandy Date: 12-9-97

COMMERCIAL LAND FARMS

A New Mexico Enterprise
Serving New Mexico's Needs

November 7, 1997

Mr, Roger Anderson
New Mexico Oil Conservation Division
2040 S. Pacheco Street
Santa Fe, New Mexico 88254

RE: Closure Bond and Repermitting of Commercial Landfarm
Gandy Marley, Inc.
Contaminated Soils Landfarm (NM-711-1-0020)
Sections 4, 5, 8 and 9, T-11-S, R-31-E
Chaves County, New Mexico

Dear Mr. Anderson:

Gandy Marley, Inc. requests approval of closure bond and remediation standards for the existing contaminated soils remediation site.

The enclosed permit application provides a description of the site and details facility operations in accordance with OCD Rule 711.

Sincerely,

Larry Gandy
Vice-President

cc: OCD District Office, Hobbs

COMMERCIAL LAND FARMS

A New Mexico Enterprise
Serving New Mexico's Needs

1. Type of Operation

The facility operates as a soil remediation, recycling, liquid and sludge solidification, and land farm facility.

2. Operator

Gandy Marley, Inc.
PO Box 1658
Roswell, New Mexico 88267
505-625-9206 or 505-398-4960

3. Location of Facility

Refer to figure #1 for large scale topo map.

4. Modification

This permit application relates to the new Rule 711 and a minor modification in remediation standards.

5. Land and ownership

Land owner of the facility site is:
Gandy Marley, Inc.
P.O. Box 1658
Roswell, NM 88202
The only land owners within one mile are the Marley Ranches.

6. Facility description

The purpose of the facility is to remediate oilfield contaminated soils and solidify and remediate oilfield liquids and sludges that are unacceptable for injection wells. This facility is depicted in Figure #1.

7. Facility Construction/Operation and Waste Classification

The facility is situated on the Western edge of a geological bench known locally as the Caprock. The Caprock is characterized by rocky terrain and runs in a North-South direction.

There are no water courses, lake beds, sink holes or other depressions located adjacent to the site. Thus no storm water run off plan is required to accompany this permit application.

As outlined in Figure 3, access to the facility is restricted by perimeter fencing. Gates to the facility will remain locked.

No contaminated soils will be placed within 100 feet of the fenced facility boundary. The buffer zone is illustrated in Figure 3.

The perimeter of the facility is bermed to alleviate storm water run off and run on. The perimeter bern has been constructed to a height of 3 feet. This will be adequate to contain precipitation in the event of a 100 year storm.

A treatment zone not to exceed two feet beneath the facility will be monitored. Twelve months following the placement of contaminated soils, a minimum of one random soil sample will be taken from the cell in which the soils were placed. Subsequent soil samples will be taken annually thereafter. Samples will be analyzed to identify any variation in levels of constituents found in the background sample taken prior to operation. Soil samples will be analyzed using EPA methods for TPH & BTEX annually, and general chemistry and heavy metal before successive lifts are placed. This sampling and analysis schedule will apply to each respective cell.

Analysis will be conducted in accordance with EPA approved methods. All analytical results will be submitted to the Santa Fe, New Mexico office of the OCD within 30 days after they are received from the laboratory.

Subsequent to collecting required soil samples, bore holes will be filled with an impermeable material such as cement or bentonite to prevent contamination below the native ground surface.

Further treatment zone monitoring will be conducted in the event of unusually

high precipitation and upon the recommendation of the OCD. Precipitation will be removed within 72 hours following the discovery of ponding, pooling or run off.

As necessary, moisture will be added to appropriate cells to diminish blowing dust and to enhance biological remediation of contaminated soils. Caution will be observed in order to ensure that added moisture does not result in ponding, pooling or run off.

All material accepted at the facility will be spread and disced within 72 hours of receipt. Soils will be spread on the surface in six inch lifts, and soils will disced a minimum of once every two weeks in order to enhance remediation of contaminates. Additional lifts of soil will be spread only after laboratory analysis is conducted to verify that: (1) TPH level in the previous lift is less than 2500 ppm. (2) that the sum of BTEX is less than 50 ppm, and (3) the benzene level is less than 10 ppm.

All laboratory analysis results as well as sampling location description will be maintained at the facility. No new lifts will be added without prior authorization from the OCD.

Site security will be the responsibility of facility personnel. Employees will verify that each transporter holds appropriate permits. Loads will be accepted only during daylight hours unless other prior arrangements have been made. When the facility is closed, the site will be locked to prevent unauthorized dumping.

The facility will only accept materials which are classified as non-hazardous by RCRA subtitle C exemption or by characteristic testing. Prior to placement of any contaminated materials into the facility, it will be verified that the wastes are accompanied by a "certificate of waste status" from the generator. Wastes from operations not currently exempt under RCRA subtitle C or mixed exempt and non exempt wastes will be sampled and analyzed to determine whether any hazardous constituents are present. Results of all analysis will be submitted to the OCD. No such wastes will be placed in the facility without prior approval from the OCD.

All wastes accepted by this facility will be documented at the time they are placed at the disposal facility. Each load will be inspected to ensure that only acceptable wastes are placed at the facility. At the time of the load inspection, the following information will be recorded on an inspection form and maintained at the facility

for a period of two years.

A. Origin of material
B. Verification of analysis (if applicable)
C. Name and signature of transporter
D. Cell in which material is placed
E. Date material is received
F. Quantity of material
G. Name and signature of authorized disposal facility employee
H. Certification of waste status

8. Contingency plan--N/A

9. Inspection, maintenance and reporting--N/A

10. Closure Plan

Upon closure, and following notification to OCD that operations have ceased, existing materials which have previously been placed at the facility will continue to be managed until such time that remediation meet standards established by the OCD. Within six months following verification that all materials have met OCD remediation standards, the site will be covered and mounded to ensure that storm water does not collect above or leak into the closed cells. The site will be restored with natural vegetation. Existing fences will be maintained following closure and access will be restricted. Any additional closure requirements or conditions of the OCD will be met. See Attachment A.

11. Site characteristics--N/A

12. Proof of notice--N/A

13. H2S contingency plan--N/A

14, Additional information

All regulatory requirements and OCD rules applicable to this facility will be complied with fully.

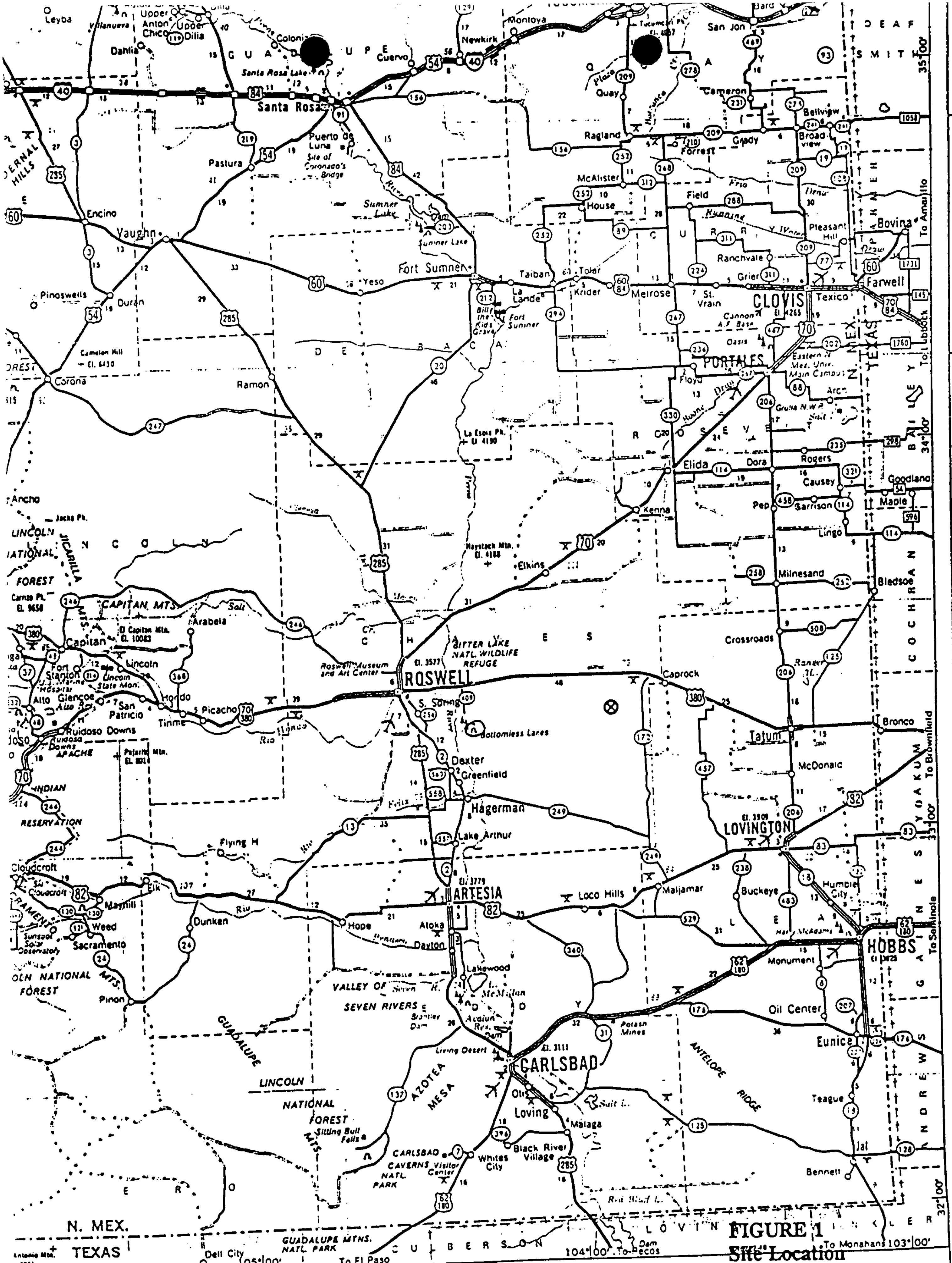


FIGURE 1
Site Location

MILEAGE LOG: Distances shown are computed over Controlled ... opposite the number assigned to the other. For example—Carls-

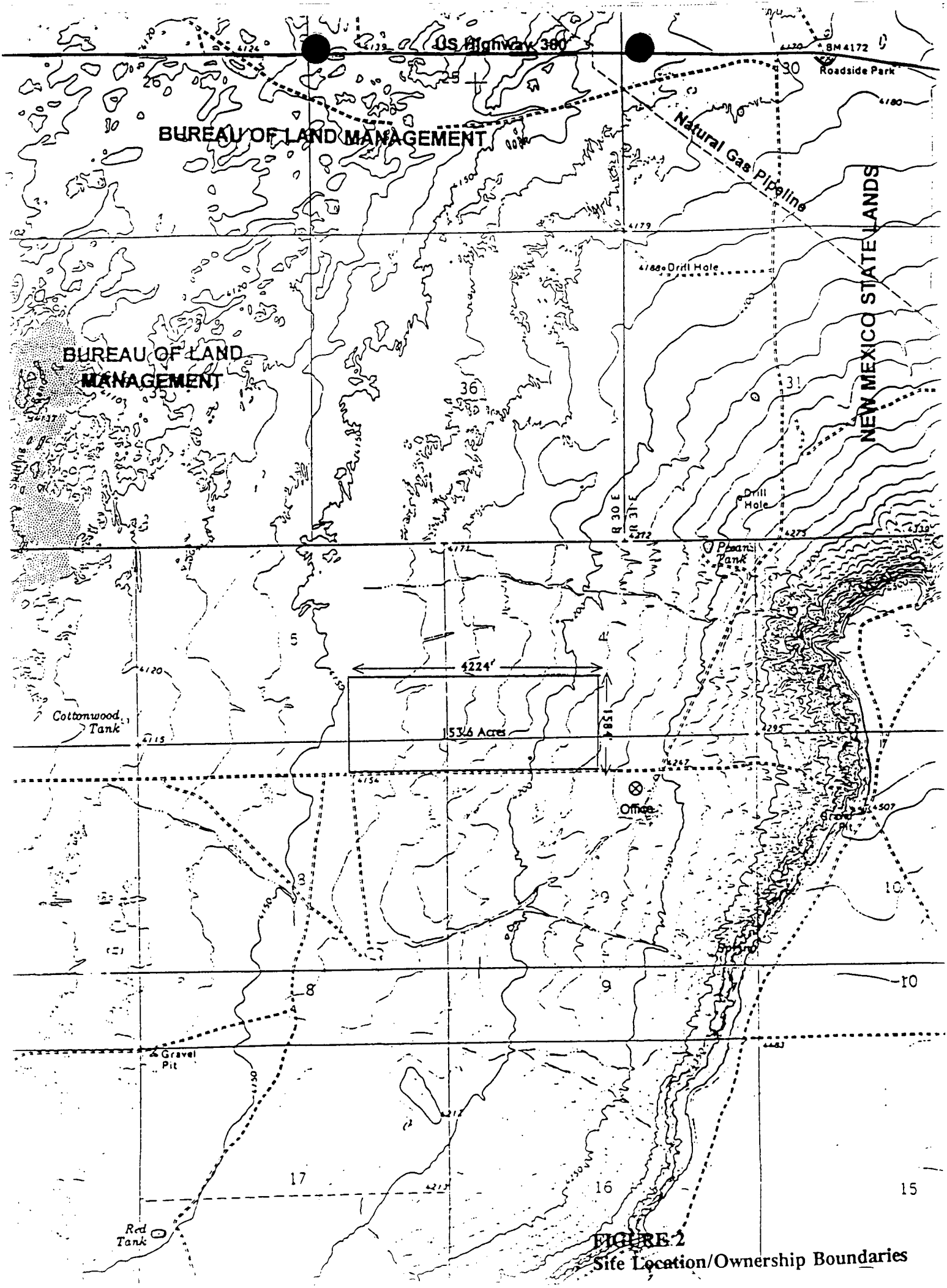
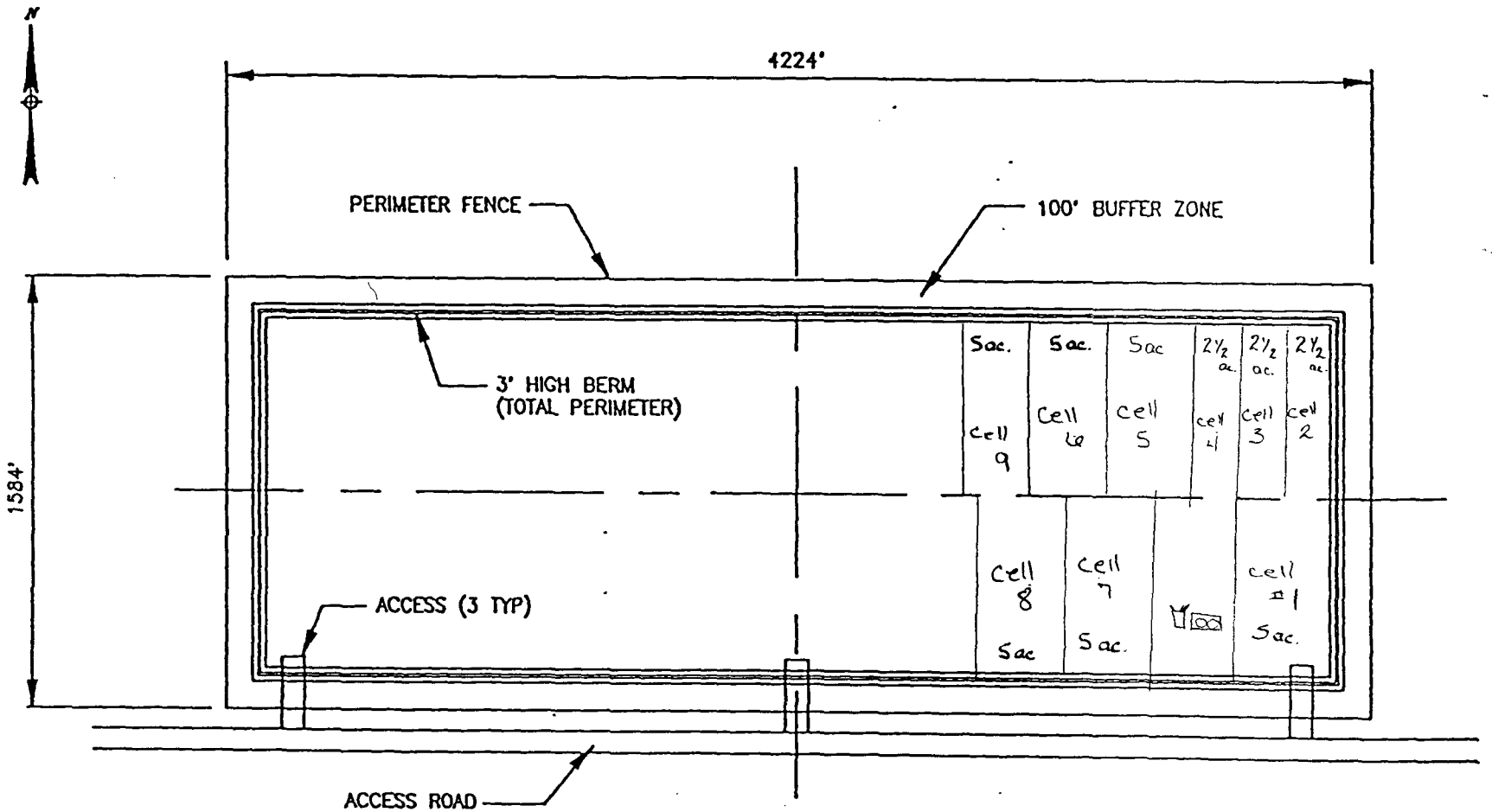


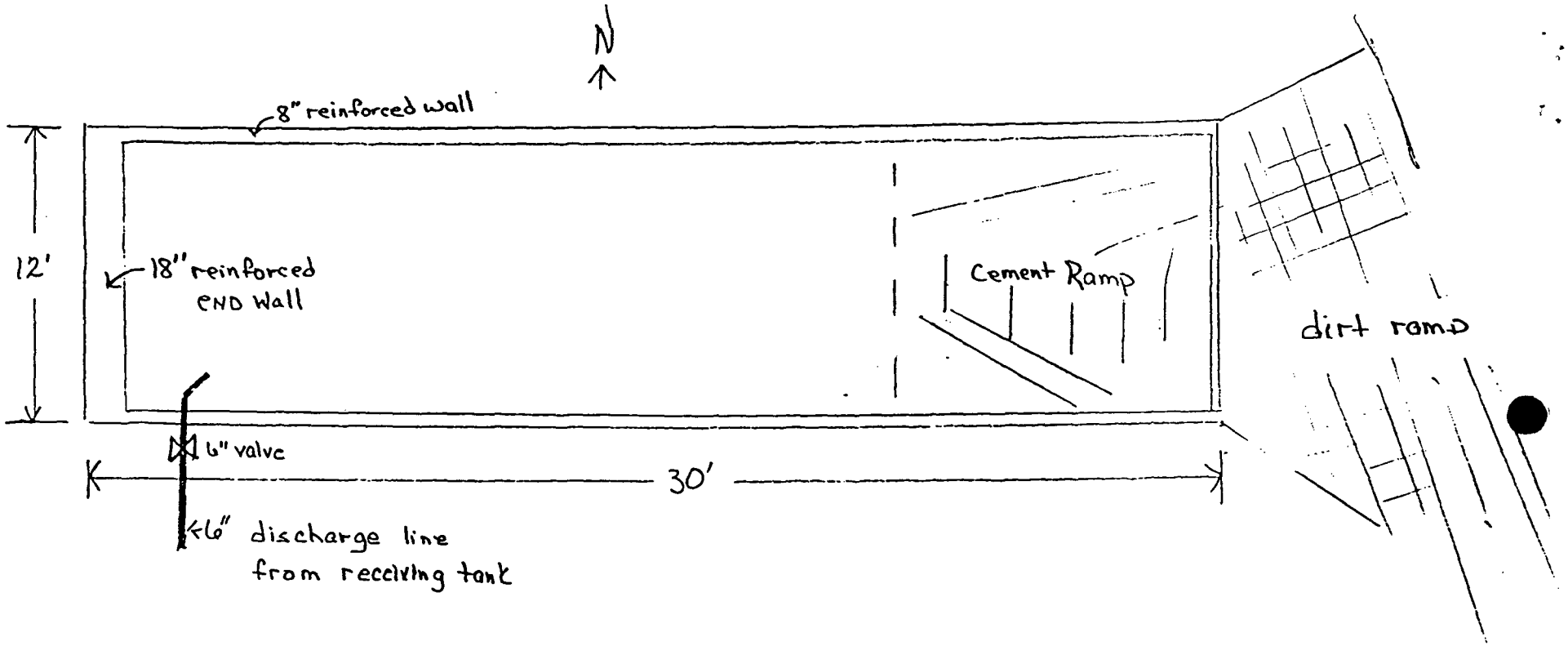
FIGURE 2
Site Location/Ownership Boundaries

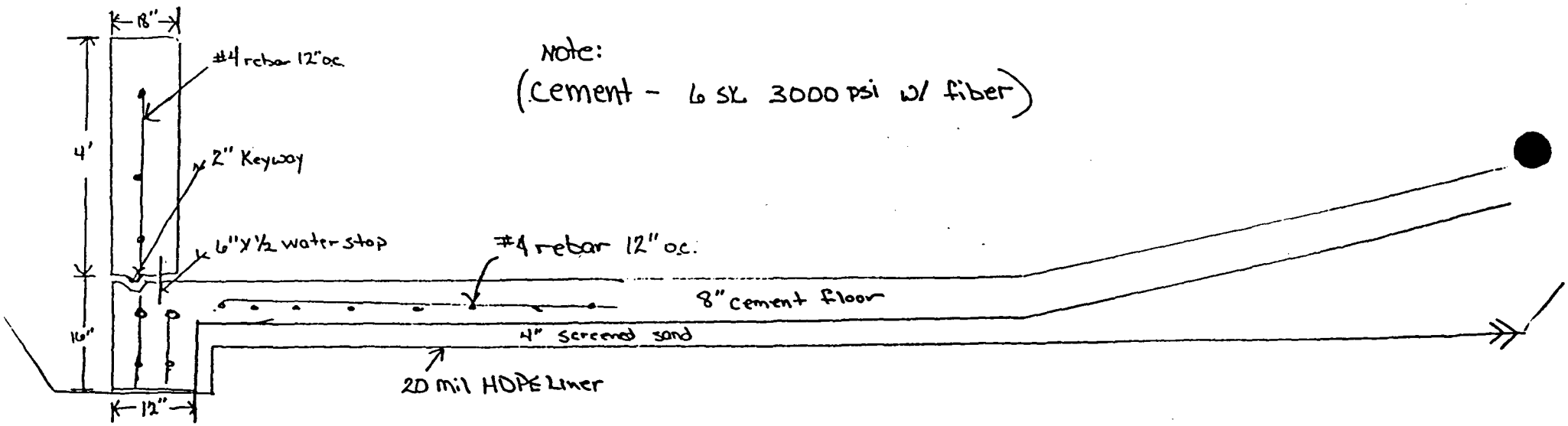


127 AC. W/IN PERIMETER BERM / 31.96 AC. W/IN EACH QUADRANT

SCALE: NONE 4-2-96

FIGURE 3
Site Diagram

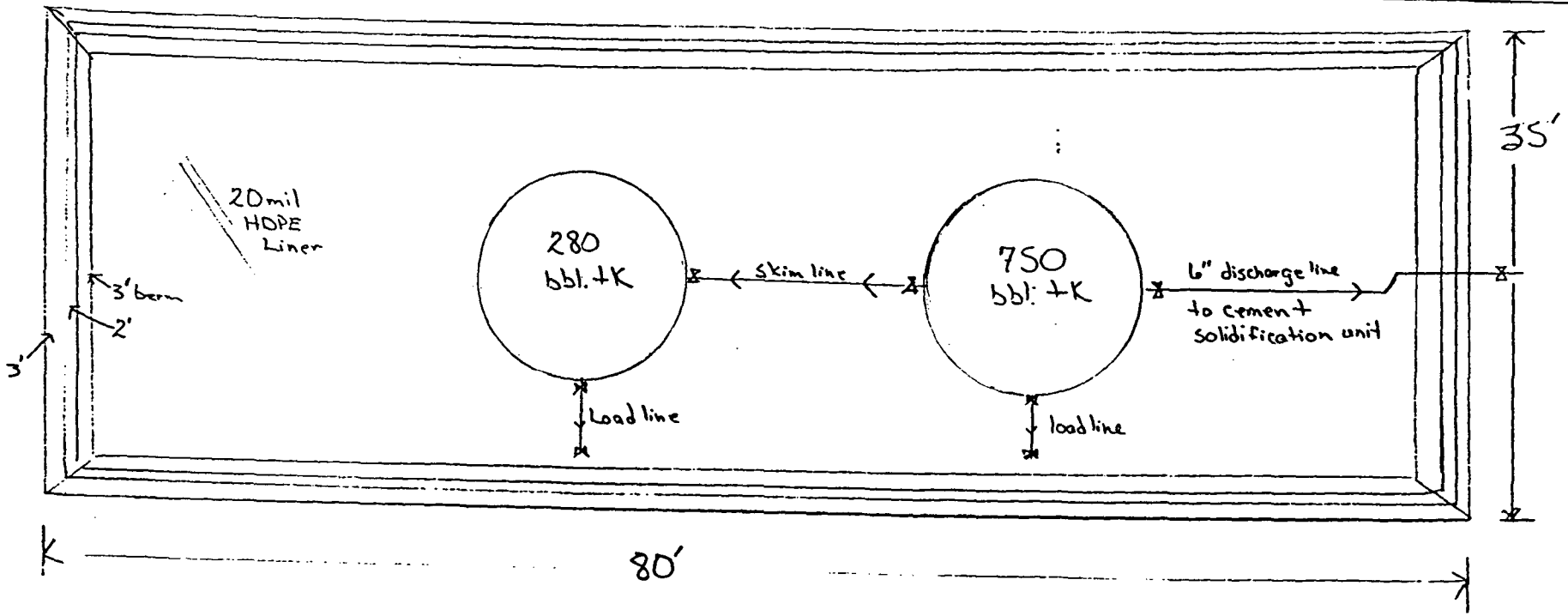




Note:
(Cement - 6 sk 3000 psi w/ fiber)

scale: none

fig. 3a



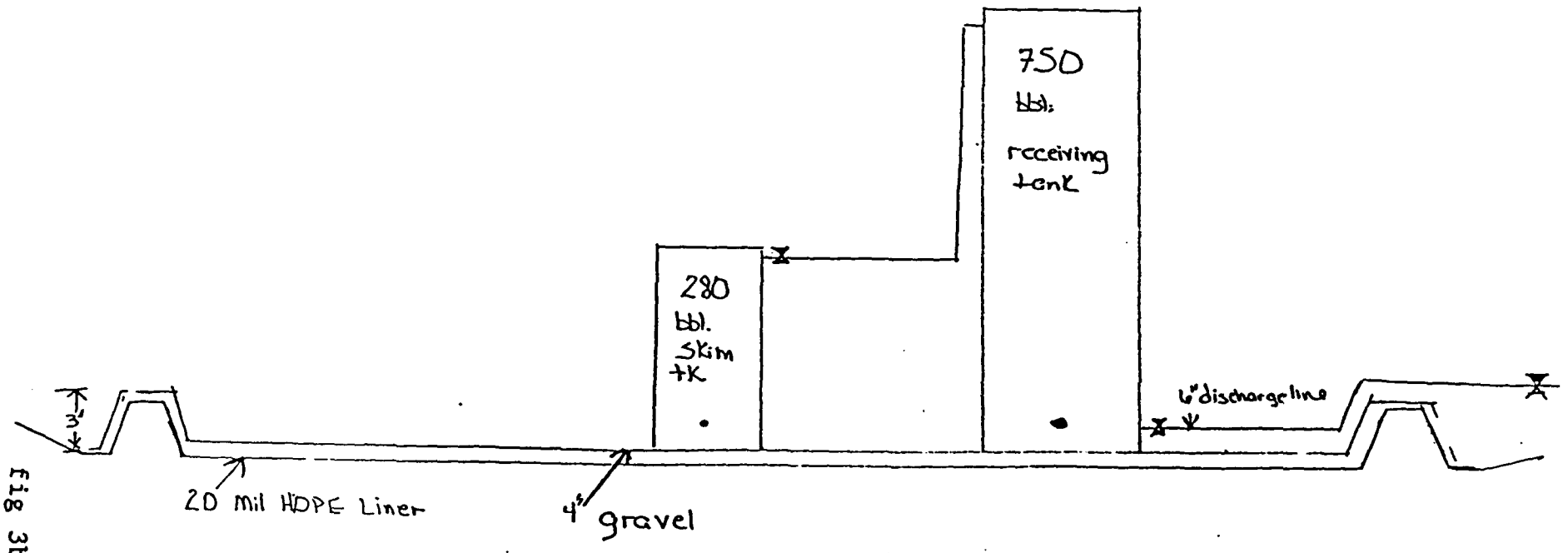


Fig 3b

scale: none

WHOLE EARTH

Whole Earth Environmental, Inc.
19606 San Gabriel, Houston, Texas 77084
713/492-7077 Fax: 713/492-7077

November 18, 1997

Gandy Construction
P.O. Box 827
Tatum, New Mexico

Attn: Larry Gandy

Dear Larry:
I want to thank you for the opportunity of quoting the closure of the Gandy Marley, Inc. landfill in accordance with the New Mexico OCD Closure Guidelines dated March, 1993.

As you know our approach to closures is to perform the bulk of the analytical work on location saving both time and money over the conventional approach of sending all samples to laboratories for analyses. This capability will result in significant savings to you as we can be far more efficient in our approach to the project.

I believe that by utilizing your own equipment, we will be able to remediate the entire site within a period of three months using aeration, dilution and bio-augmentation as the remediation techniques for a total "not to exceed" cost of $48,650.00. This cost includes all analytical testing, our supervision, and full documentation.

We will provide you with all of the detailed protocols and procedures within two weeks of your request.

Thank you again for the opportunity of quoting this very interesting and challenging project.

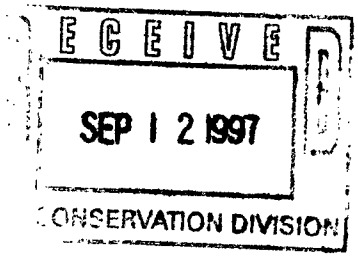
Warmest regards,

Mike Griffin
President
Whole Earth Environmental, Inc.

ATTACHMENT A

COMMERCIAL LAND FARMS

A New Mexico Enterprise
Serving New Mexico's Needs



September 10, 1997

Ms. Martyne J. Kieling
Environmental Geologist
New Mexico Energy, Minerals and Natural Resources Department
Oil Conservation Division
2040 S. Pacheco Street
Santa Fe, NM 87505

RE: Landfarm deficiencies
Gandy-Marley, Inc.
Attachment 1 dated April 4, 1997

Dear Ms. Kieling:

Thank you for your favorable comments on our landfarm during the April inspection. We apologize for the deficiencies found during this inspection. We are striving to maintain the best kept landfarm in the State. The deficiences from the inspection were listed in comment #6 and #10 on attachment 1. We have taken care of the deficiencies as follows:

Attachment 1
Comment #6 states:

Trash and Potentially Hazardous Materials: All trash and potentially hazardous materials should should be properly disposed of:

Plastic in the landfarm cells needs to be picked up and disposed of properly (see pictures 5,7, 8, 9 and 11).

Response to Comment #6.

All plastic has been picked up and disposed of at the Roswell Municipal landfill

COMMERCIAL LAND FARMS

A New Mexico Enterprise
Serving New Mexico's Needs

Comment #10 states:

Tank Labeling: All tanks, drums and containers should be clearly labeled to identify their contents and other emergency information necessary if the tank were to rupture, spill or ignite.

Tanks are not labeled as to their contents and hazard (see picture 2).

Response to Comment #10:

The tank has been labeled "Oilfield liquids and sludges only" for contents and "Danger Hydrogen Sulfide may be present" for the hazard.

Again we appreciate the Oil Conservation Divisions help in maintenance of the landfarm. If these responses do not answer the present problems, please call at 505-398-4960.

Sincerely,

Larry Gandy

Larry Gandy

Gandy Marley, Inc. • Box 1658 • Roswell, NM 88201 • (505) 398-4960 • FAX (505) 398-6887

COMMERCIAL LAND FARMS

A New Mexico Enterprise
Serving New Mexico's Needs

April 2, 1996

Mr. Roger Anderson
New Mexico Oil Conservation Division
2040 S. Pacheco Street
Santa Fe, New Mexico

RE: Modification for Surface Waste Disposal Facility
Gandy Marley, Inc.
Contaminated Soils Landfarm (NM-711-1-0020)
Parts of Sections 4, 5, 8, and 9, T-11-S, R-31-E
Chaves County, New Mexico

Dear Mr. Anderson:

Gandy Marley, Inc. requests approval for a permit modification to operate a solidification facility to process oil field sludges and tank bottoms for placement into the Surface Waste Disposal Facility. This is an existing facility and operates as a contaminated soils remediation site.

The enclosed permit application provides a description of the site and details facility operations in accordance with OCD Rule 711.

Sincerely,

Larry Gandy
Vice-President

cc: OCD District Office, Hobbs

District I - (505) 393-6161
P. O. Box 1980
Hobbs, NM 88241-1980
District II - (505) 748-1283
811 S. First
Artesia, NM 88210
District III - (505) 334-6178
1000 Rio Brazos Road
Aztec, NM 87410
District IV - (505) 827-7131

New Mexico
Energy, Minerals and Natural Resources Department
Oil Conservation Division
2040 South Pacheco Street
Santa Fe, New Mexico 87505
(505) 827-7131

Form C-137
Originated 8/8/95

Submit Original
Plus 1 Copy
to Santa Fe
1 Copy to appropriate
District Office

APPLICATION FOR WASTE MANAGEMENT FACILITY

(Refer to the OCD Guidelines for assistance in completing the application)

☒ Commercial ☐ Centralized

1. Type: ☐ Evaporation ☐ Injection ☐ Other
   ☒ Solids/Landfarm ☐ Treating Plant
2. Operator: Gandy Marley Inc.
   Address: P. O. Box 1658 Roswell, New Mexico 88202
   Contact Person: Larry Gandy Phone: (505) 398-4960
3. Location: Parts of Sections 4, 5, 8, and 9 /4 /4 Section Township 11S Range 31E
   Submit large scale topographic map showing exact location
4. Is this a modification of an existing facility? ☒ Yes ☐ No
5. Attach the name and address of the landowner of the facility site and landowners of record within one mile of the site.
6. Attach description of the facility with a diagram indicating location of fences, pits, dikes, and tanks on the facility.
7. Attach designs prepared in accordance with Division guidelines for the construction/installation of the following: pits or ponds, leak-detection systems, aerations systems, enhanced evaporation (spray) systems, waste treating systems, security systems, and landfarm facilities.
8. Attach a contingency plan for reporting and clean-up for spills or releases.
9. Attach a routine inspection and maintenance plan to ensure permit compliance.
10. Attach a closure plan.
11. Attach geological/hydrological evidence demonstrating that disposal of oil field wastes will not adversely impact groundwater. Depth to and quality of ground water must be included.
12. Attach proof that the notice requirements of OCD Rule 711 have been met.
13. Attach a contingency plan in the event of a release of H_2S.
14. Attach such other information as necessary to demonstrate compliance with any other OCD rules, regulations and orders.
15. CERTIFICATION

I hereby certify that the information submitted with this application is true and correct to the best of my knowledge and belief.

Name: Larry Gandy Title: vice-pres.

Signature: Larry Gandy Date: 4-4-96

COMMERCIAL LAND FARMS

A New Mexico Enterprise
Serving New Mexico's Needs

Modification for Surface Waste Disposal Facility
Gandy Marley, Inc.

I. Type of Operation

The facility operates as a soil remediation, recycling and landfarm facility.

II. Operator

Gandy Marley, Inc.
Attn: Larry Gandy
1109 East Broadway
PO Box 827
Tatum, New Mexico 88267
505/398-4960

III. Location of Landfarm

The facility is located in Southeastern New Mexico, southeast of Roswell, New Mexico. The facility is situated on privately-owned land in Chaves County, New Mexico, in parts of Section 4, 5, 8, and 9 of T11S, R31E.

This location is approximately 39 miles eastsoutheast of Roswell and approximately 33 miles northwest of Tatum. As illustrated in Figure 1, US Highway 380, which runs east and west, is located approximately 2 1/2 miles to the north. State Highway 172, which runs north and south, is approximately four miles to the east and above the Caprock from the proposed site. State Highway 172 does not provide access to the facility.

IV. Expansion Request

This permit application relates to proposed construction for a solidification facility to enable it to accept tank bottoms, pit sludge and exempt and nonexempt oilfield hydrocarbon contaminated wastes.

Gandy Marley, Inc. • Box 1658 • Roswell, NM 88201 • (505) 398-4960 • FAX (505) 398-6887

Modification of Surface Waste Disposal Facility
Gandy Marley, Inc.

V. Land and Ownership

As illustrated in Figure 2, the proposed facility site is situated on privately-owned land. There are no other landowners of record within one mile of the proposed facility location and there are no private residences within one mile of the proposed site.

VI. Facility Description

The purpose of the proposed solidification facility will be to solidify oil field liquid wastes (not produced water) to be placed into the landfarm for remediation and recycling.

The site will be set inside the existing land farm. The receiving tank, skimmer tank and solidification unit will be underlined with a 20 mil HDPE liner with a berm that will hold 1 1/3 times the capacity of all tanks.

This area is depicted in Figure 3 and will meet the 100 foot buffer requirements set forth in OCD Rule 711.

Gandy Marley, Inc. • Box 1658 • Roswell, NM 88201 • (505) 398-4960 • FAX (505) 398-6887

Modification of Surface Waste Disposal Facility
Gandy Marley, Inc.

VII. Facility Designs

This area is illustrated in Figure 3A in accordance with Division guidelines. All containments and piping are placed above grade and are underlined with a 20 mil HDPE liner.

VIII. Spill/Leak Prevention and Reporting (Contingency Plans)

The proposed solidificaiton facility will be placed inside the land farm perimeter berms which will serve to prevent storm water run on and run off. All liquids and sludges will be received into a receiving tank that is placed inside a liquid containment area. Equipment and machinery which could be used in the event of any spill or leak will be at the facility at all times. Should a leak or spill occur, notification to the OCD would be made immediately in accordance with OCD Rule 116 and WQCC Section 120.

IX. Inspection, Maintenance and Reporting

The facility will be inspected on a regular basis and immediately following significant precipitaion and/or wind. Inspections will include examination of berms, fences and the remediation area. Perimeter and interior berms will be maintained to prevent erosion. General maintenance will be routinely performed. Any necessary repairs will be made immediately.

Inspection and repair records will be maintained and will include time and date of inspection and types of repairs performed. These records will be maintained on site.

Gandy Marley, Inc. • Box 1658 • Roswell, NM 88201 • (505) 398-4960 • FAX (505) 398-6887

Modification of Surface Waste Disposal Facility
Gandy Marley, Inc.

X. Closure Plan

Upon closure, and following notification to OCD that operations have ceased, existing liquids, sludges and solids will be cleaned from tanks, solidified and placed within the landfarm. Tanks and piping will then be dismantled and hauled off for salvage. The 20 mil liner will be picked up and disposed of at the appropriate land fill. All berms and containments will be leveled off, disced and turned back to the land farm. Any additional closure requirements or conditions of the OCD will be met.

XI. Site Characteristics-Fresh Water Protection Demonstration

There are no stream drainages or water wells within one mile of the facility boundary. Approximately 1/2 mile east of the site there is a spring at the base of Mescalero Rim. This spring is located topographically higher (200 feet) than the facility and is a result of seepage from an overlying aquifer (Ogallala Fm.) The spring water is collected by the rancher and distributed through an underground pipeline to stock tanks on the ranch property. There are three such stock tanks within one mile of the outside perimeter of the proposed facility.

While there are no water wells within one mile of the outside perimeter of the site, subsurface drilling has encountered groundwater saturation within Upper Triassic sediments. The depth to this groundwater is 150 feet. A sample of the ground water was obtained from three drill holes, the location which are illustrated in Figure 4. The samples were analyzed at Assaigai Analytical Laboratories in Albuquerque, New Mexico. A copy of the analytical results is presented in Attachment A. This groundwater flows eastward and is controlled by stratigraphic and structural features within the Triassic sediments.

Gandy Marley, Inc. • Box 1658 • Roswell, NM 88201 • (505) 398-4960 • FAX (505) 398-6887

COMMERCIAL LAND FARMS

A New Mexico Enterprise
Serving New Mexico's Needs

Modification of Surface Waste Disposal Facility
Gandy Marley, Inc.

This information was obtained from geologic data from a sub-surface drilling program conducted in the region in July 1994.

The surface geology consists entirely of Quaternary age alluvial deposits. This alluvium is made up of fine yellow-brown sand and clays and contains abundant granitic and chert cobbles. This material was derived from the Tertiary age Ogallala Fm. which is located topographically higher and east of the site. Thickness of the alluvial materials varies from 5-25 feet.

Immediately underlying the alluvial deposits are Upper Triassic sediments. These sediments were deposited in a fluvial environment and consist of fine to very-fine grained sandstones, interbedded with siltstones and mudstones.

The Upper Triassic sediments underlying the proposed site dip approximately one degree to the east. The thickness of these sediments varies from 150 to 25 feet. Groundwater saturation was encountered in sandstone lenses below depths of 150 feet.

The aquifier material consists of thin (10-30 feet), lenticular fine to very-fine grained sandstones. Due to the fluvial nature of these sands, individual sandstone lenses are discontinuous and difficult to correlate.

The site consists of two soil types including Alama Loam and Faskin-Roswell Complex. These soils are typically well-drained with slopes of 0 to 15 percent. Vegetation consists primarily of Tobosa, Buffalo Grass, Vine-Mesquite, Mesquite, Cactus, Sand Dropseed, Little Bluestem, Sand Bluestem, Sandur, Three-Awn, Shinnery Oak, Yucca and Sand Sagebrush. No rare or endangered plant species are located near the proposed site or in the surrounding area.

Gandy Marley, Inc. • Box 1658 • Roswell, NM 88201 • (505) 398-4960 • FAX (505) 398-6887

The facility lies outside any 100-year floodplain boundary. The proposed site is in an area found on Federal Insurance Rate Map (FIRM) #3501250850. This map has not been printed because the National Flood Insurance Program has established that this is in an area of minimal flood hazards.

The perimeter berms will be designed to alleviate stormwater run-on and run-off during a 100-year stormwater event. Should such a storm event occur, the OCD will be notified immediately of any flooding or washout.

XII. Proof of Notice

There are no other owners of surface lands or occupants within one mile of the facility boundary. Notification requirements set forth in OCD Rule 117, therefore, do not apply. A legal notice of this pending application was published in the September 29, 1994 issue of the Roswell Daily Record. A copy of the notice, along with an Affidavit of Publication. is included as Attachment B.

XIII. H2S Contingency Plan

Hydrogen Sulfide can be expected at the receiving tank and solidification unit. Appropriate signs will be placed and H2S training will be provided to all personnel and all provisions set forth in OCD Rule 118 will be met.

XIV. Additional Information

All regulatory requirements and OCD rules applicable to this facility will be fully complied with.

Gandy Marley, Inc. • Box 1658 • Roswell, NM 88201 • (505) 398-4960 • FAX (505) 398-6887

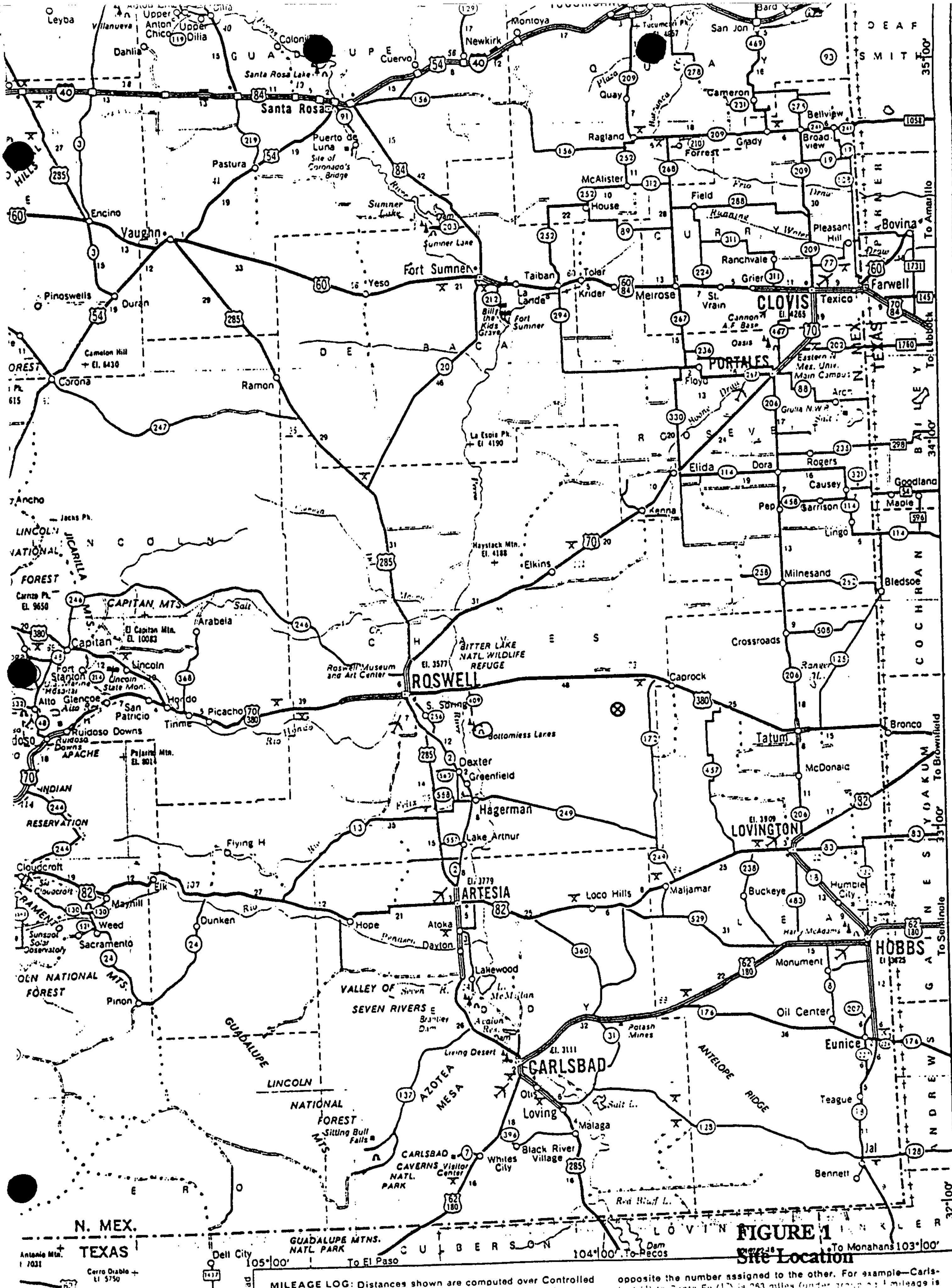


FIGURE 1
Site Location

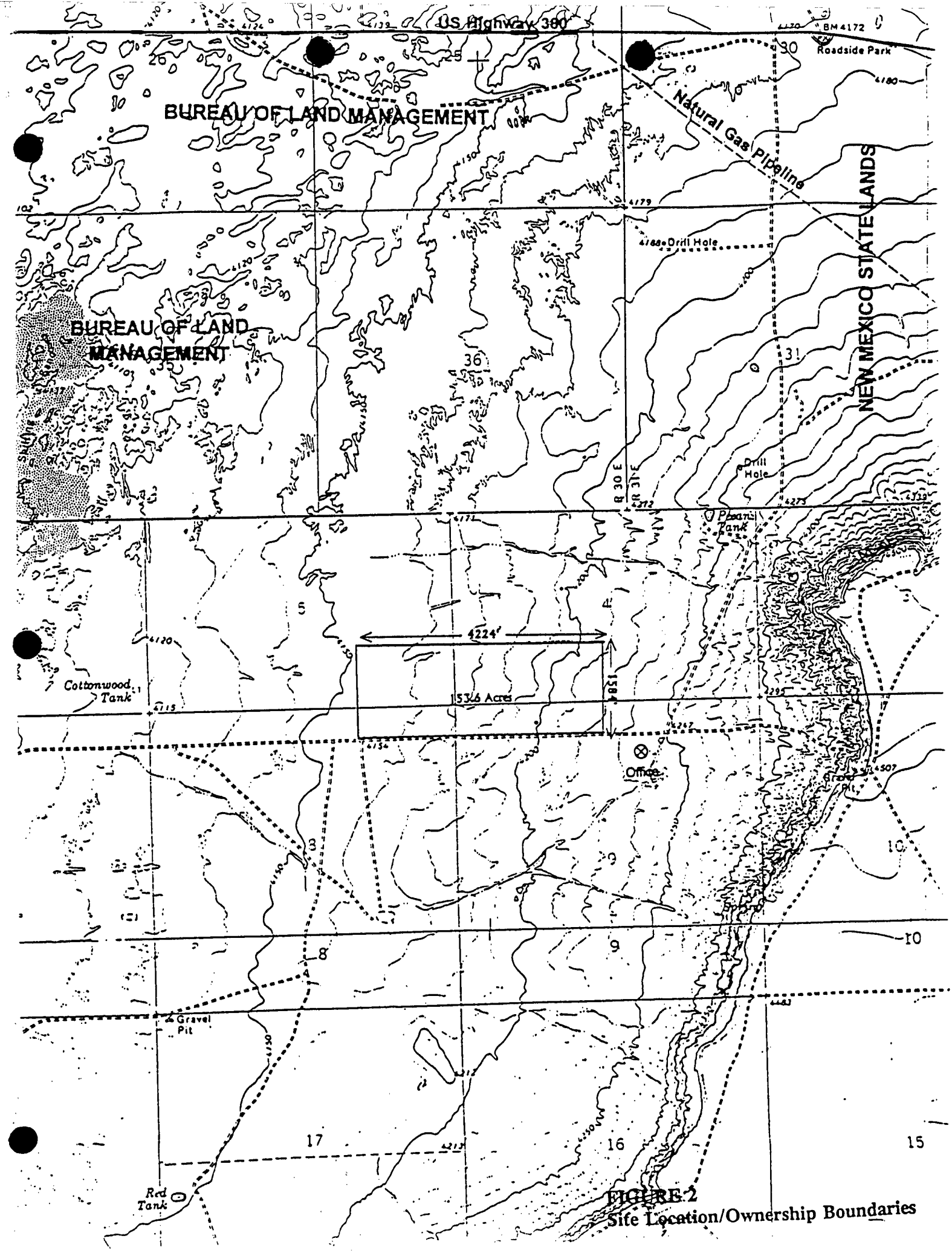
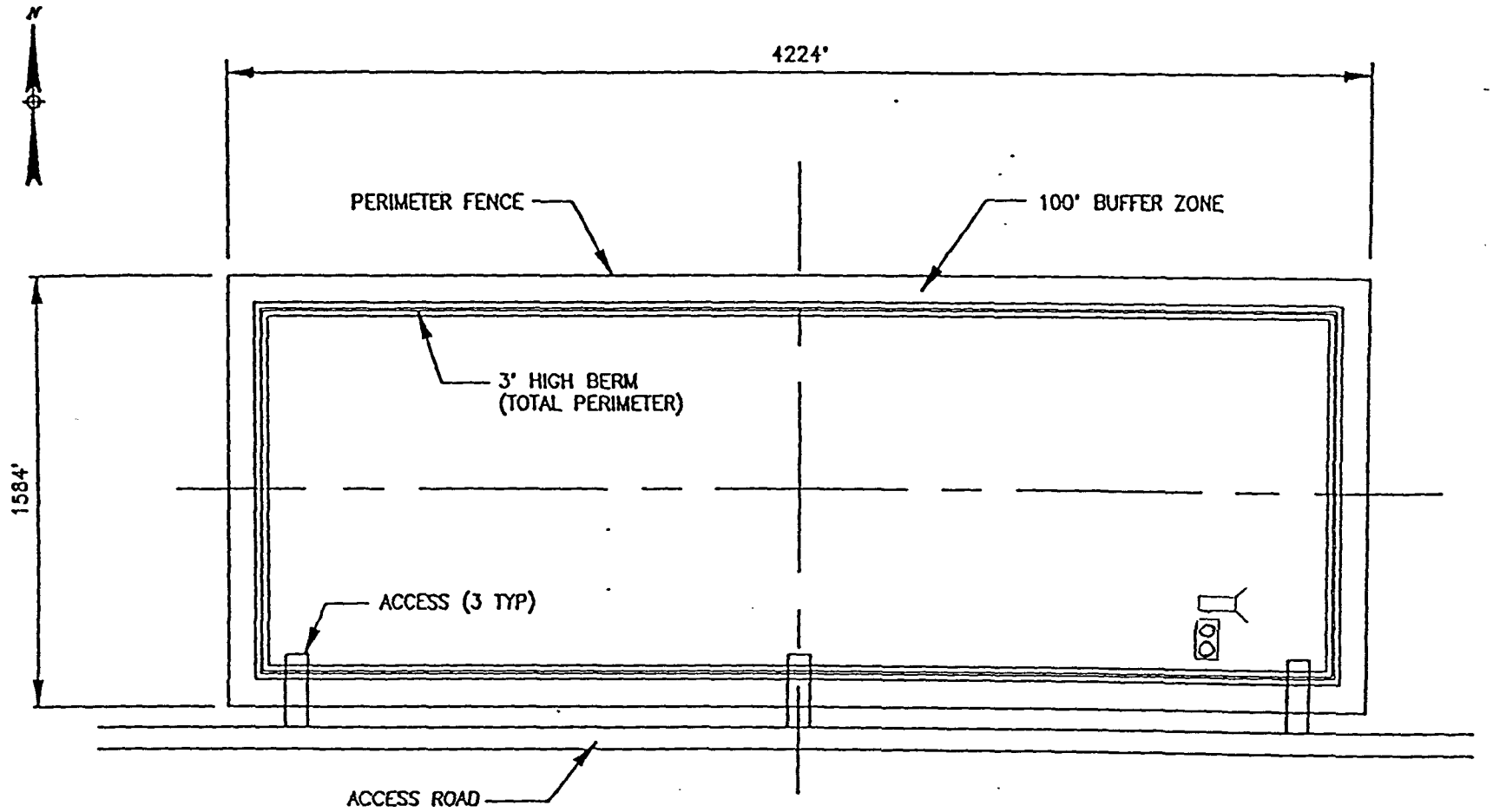


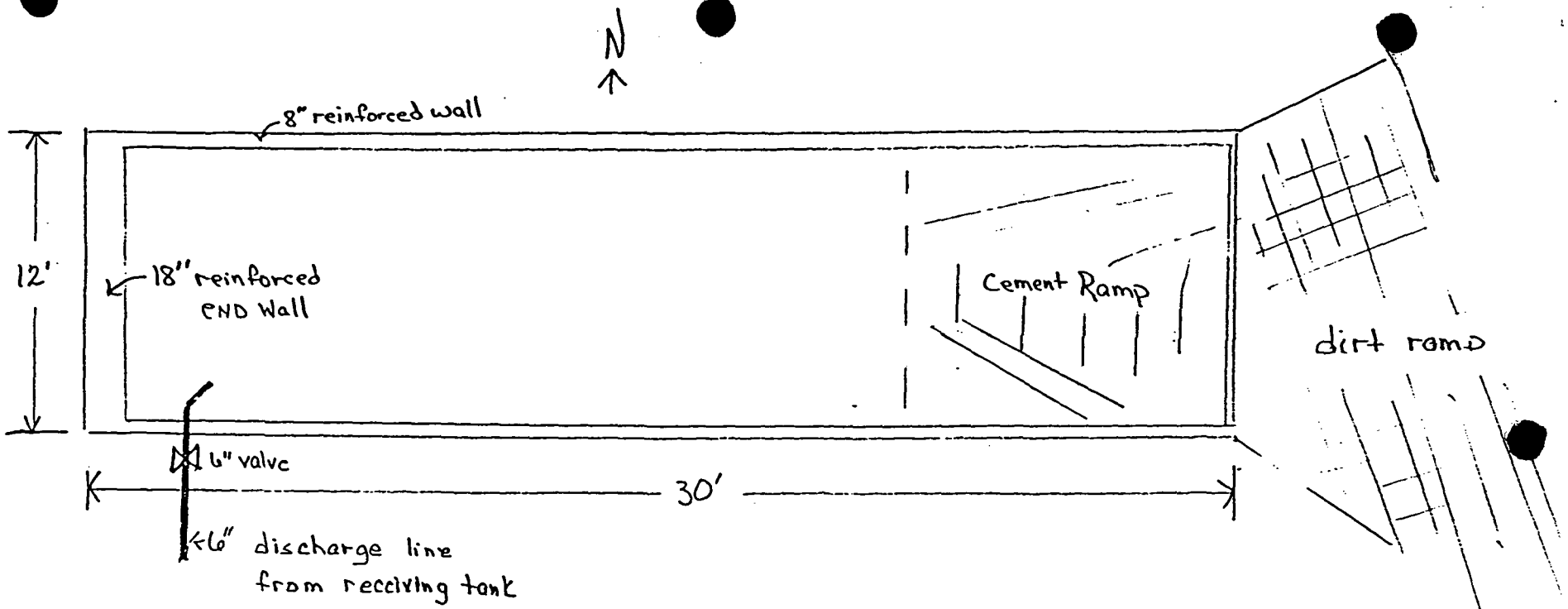
FIGURE 2
Site Location/Ownership Boundaries

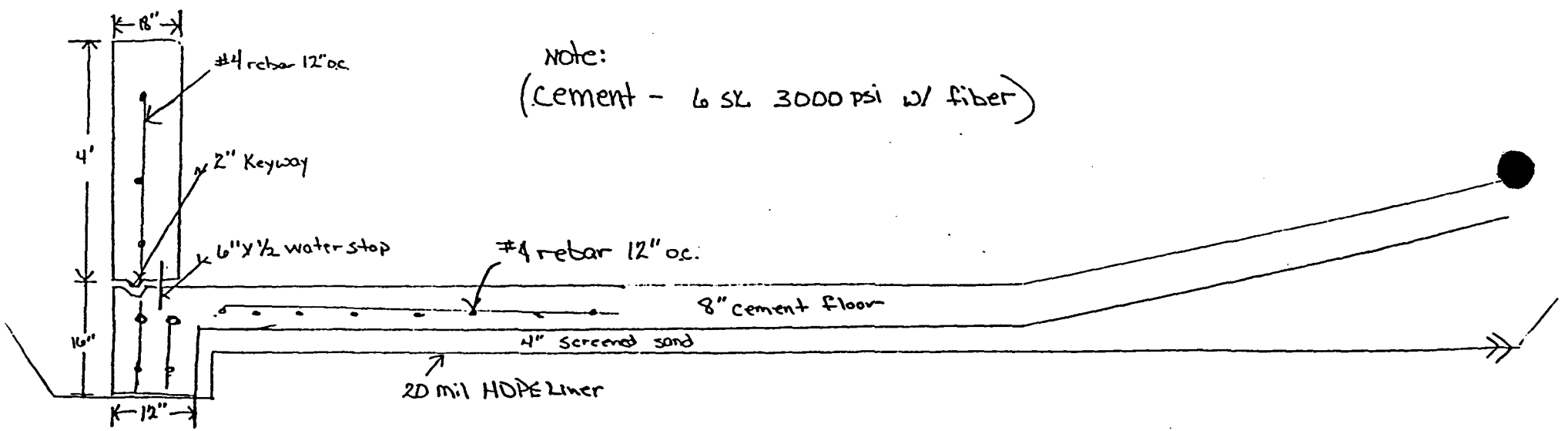


127 AC. W/IN PERIMETER BERM / 31.96 AC. W/IN EACH QUADRANT

SCALE: NONE 4-2-96

FIGURE 3
Site Diagram

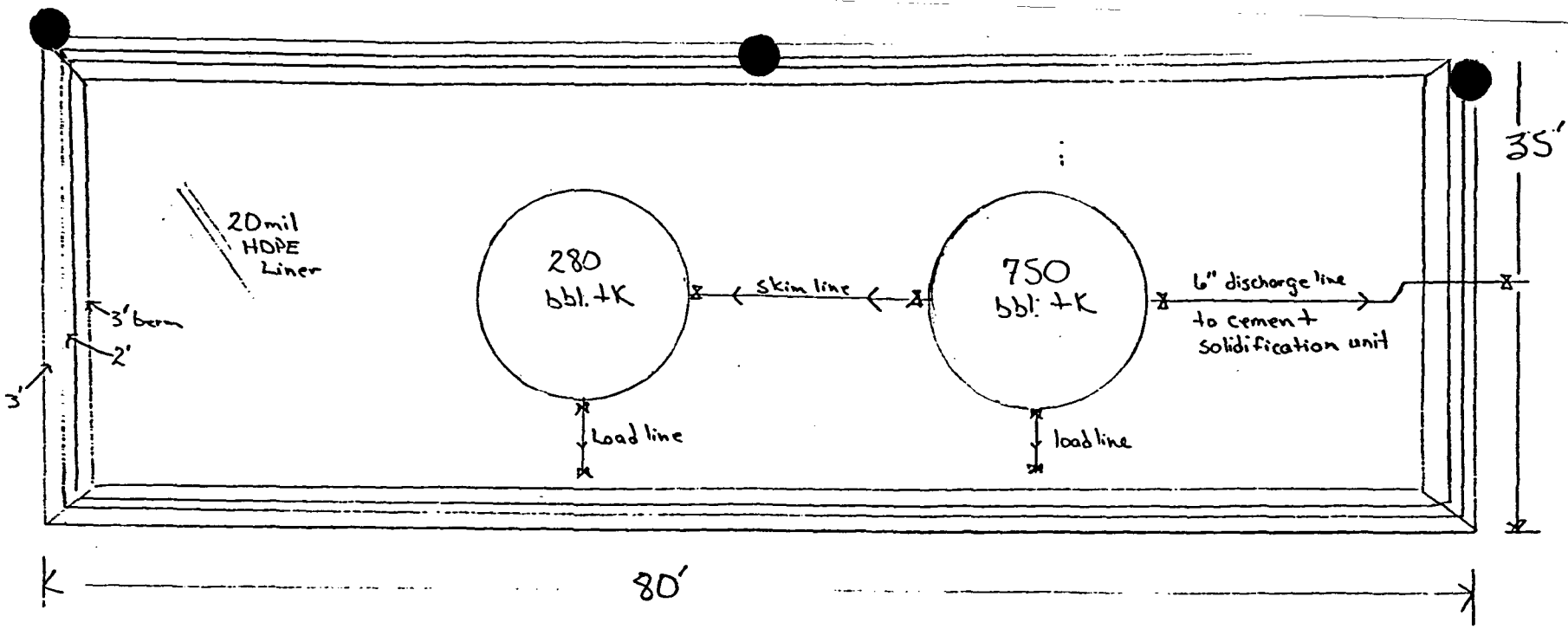




Note:
(Cement - 6 sk. 3000 psi w/ fiber)

scale: none

fig. 3a



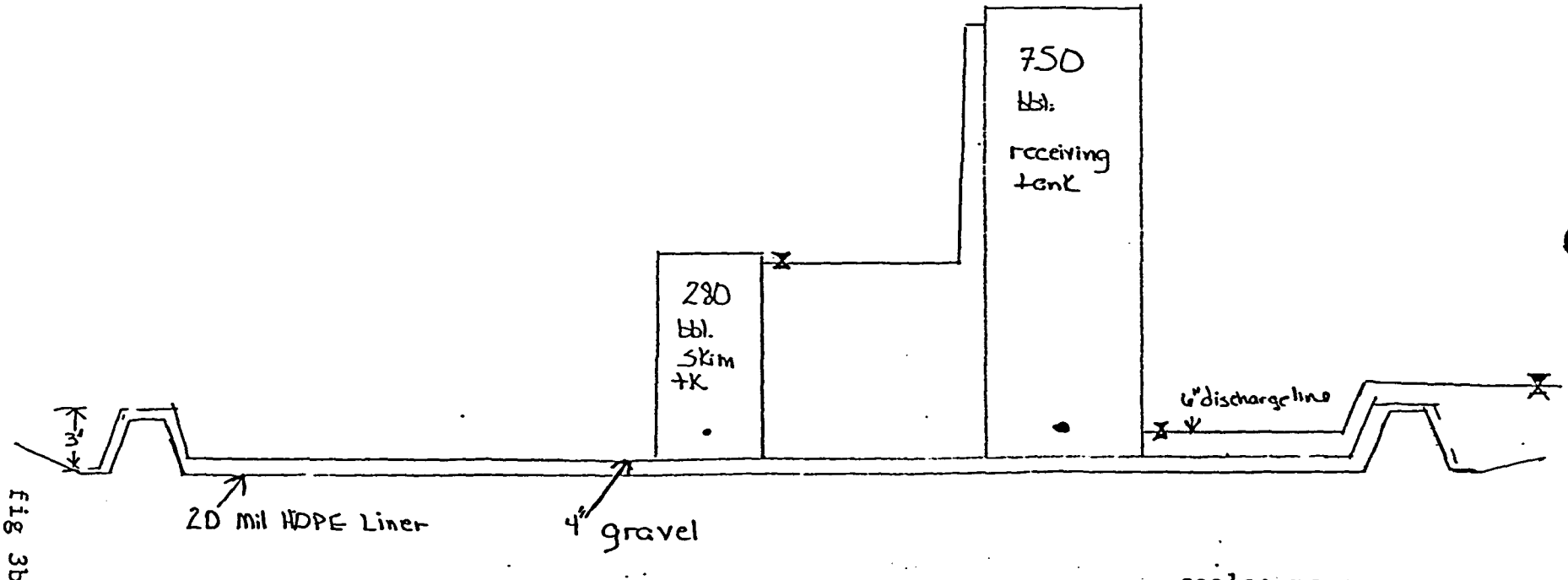


Fig 3b

scale: none

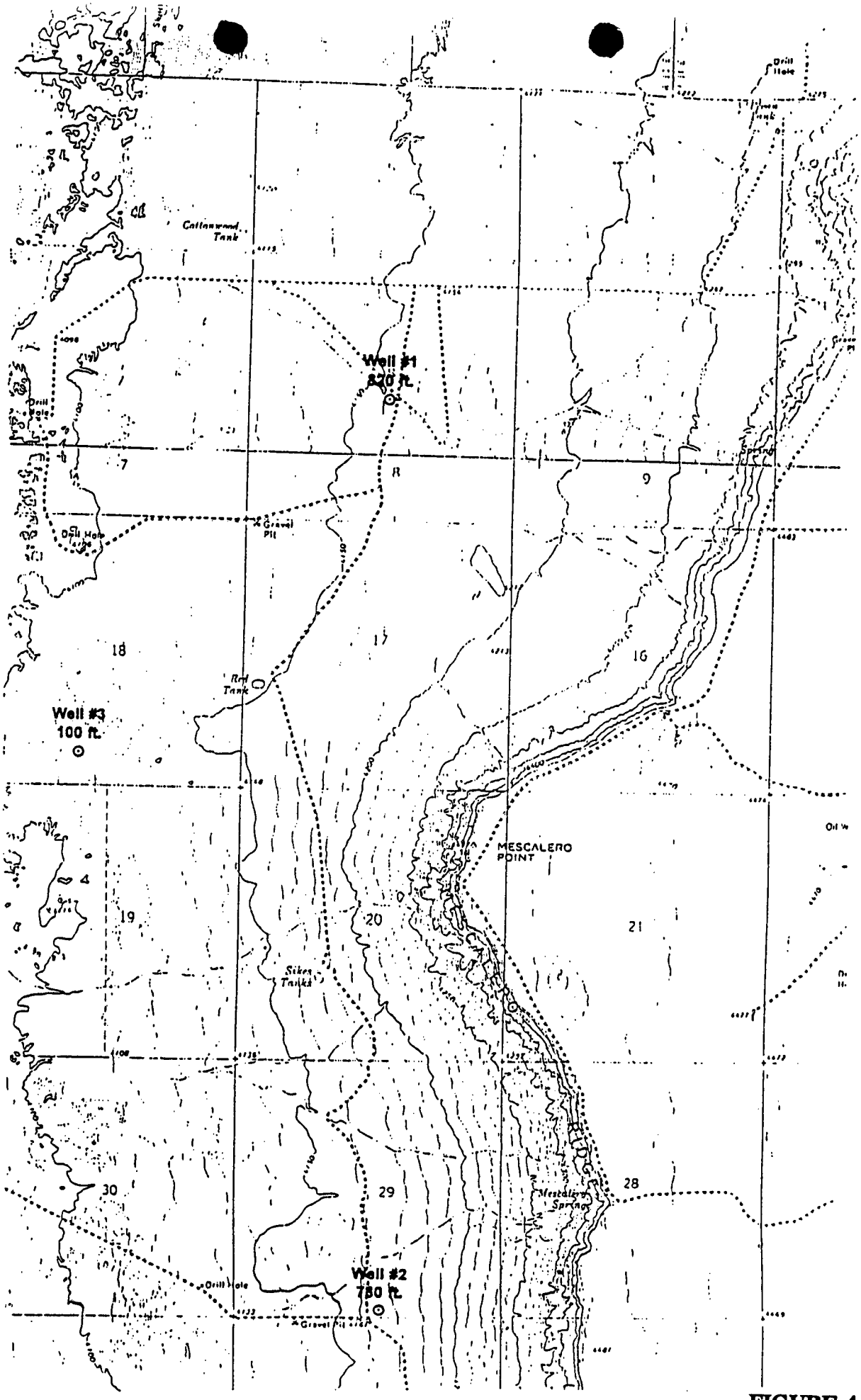


FIGURE 4
Well Locations

ASSAIGAI ANALYTICAL LABORATORIES
7300 Jefferson, N.E. • Albuquerque, New Mexico 87109 • (505) 345-8964 • FAX (505) 345-7259
3332 Wedgewood, E-5 • El Paso, Texas 79925 1910 N. Big Springs • Midland, Texas 79705

STOLLER CORPORATION
1717 LOUISIANA BLVD.
ABQ., NM 87110

Attn: JIM BONNER
Invoice Number:

Order #: 94-08-072
Date: 08/19/94 16:28
Work ID: GANDY
Date Received: 08/05/94
Date Completed: 08/19/94
Client Code: ST001

SAMPLE IDENTIFICATION

Sample Number	Sample Description
01	WELL #1
02	WELL #2
03	WELL #3

ND = None Detected D_F = Dilution Factor NT = Not Tested
B = Analyte was present in the blank
E = Estimated Value or Result exceeds calibration range
MULTIPLY THE LIMIT(= AAL'S DETECTION LIMIT) BY DILUTION FACTOR

Certified By

ATTACHMENT A
Water Sample Analysis Results

REPORT

Work Order # 94-08-072

Received: 08/05/94

Results By Test

TEST CODE default units	Sample 01 (entered units)	Sample 02 (entered units)	Sample 03 (entered units)
WPAAX N/A	N/A	N/A	N/A

PLE ID WELL #1 FRACTION 01A TEST CODE TDS NAME TDS/EPA 160.1
Date & Time Collected 07/20/94 Category WATER

PARAMETER	RESULT	LIMIT	D_F	DATE_ANAL
Total Dissolved Solids	11900	1.0	1.0	08/09/94

Notes and Definitions for this Report:

EXTRACTED
ANALYST JCB
UNITS mg/L
BATCH_ID WTDS-140
COMMENTS N/A

Received: 08/05/94 Results by Sample

SAMPLE ID WELL #1 FRACTION 01B TEST CODE WFAAMG NAME MAGNESIUM (FAA)/EPA 242.1

Date & Time Collected 07/20/94 Category WATER

PARAMETER	RESULT	LIMIT	D_F	DATE_EXT	DATE_ANAL
Magnesium, Mg	51.4	1.0	10	08/09/94	08/19/94

Notes and Definitions for this Report:

ANALYST KH

UNITS mg/L

BATCH_ID WFAA-181

COMMENTS RESULTS REFLECT TOTAL METALS ANALYSIS

Received: 08/05/94 Results by Sample

SAMPLE ID WELL #1 FRACTION 01B TEST CODE WFAANA NAME SODIUM (FAA)/EPA 273.1

Date & Time Collected 07/20/94 Category WATER

PARAMETER	RESULT	LIMIT	D_F	DATE_EXT	DATE_ANAL
Sodium, Na	4,600	1.0	500	08/09/94	08/19/94

Notes and Definitions for this Report:

ANALYST KH
UNITS mg/L
BATCH_ID WFAA-181
COMMENTS RESULTS REFLECT TOTAL METALS ANALYSIS

Received: 08/05/94 Results by Sample

LE ID WELL #2 FRACTION 02A TEST CODE TDS NAME TDS/EPA 160.1
Date & Time Collected 07/20/94 Category WATER

PARAMETER	RESULT	LIMIT	D_F	DATE_ANAL
Total Dissolved Solids	18800	1.0	1.0	08/09/94

Notes and Definitions for this Report:

EXTRACTED
ANALYST JCB
UNITS mg/L
BATCH_ID WTDS-140
COMMENTS N/A

REPORT

Work Order # 94-08-072

Received: 08/05/94

Results by Sample

SAMPLE ID WELL #2 FRACTION 02A TEST CODE WALK NAME ALKALINITY/EPA 310.1

Date & Time Collected 07/20/94 Category WATER

PARAMETER	RESULT	LIMIT	D_F	DATE_ANAL
Alkalinity	83.0	2.0	1.0	08/09/94

Notes and Definitions for this Report:

EXTRACTED

ANALYST DES

UNITS mg/L

BATCH_ID WALK-66

COMMENTS N/A

ceived: 08/05/94 Results by Sample

MPLE ID WELL #2 FRACTION 02B TEST CODE WFAAMG NAME MAGNESIUM (FAA)/EPA 242.1
Date & Time Collected 07/20/94 Category WATER

PARAMETER	RESULT	LIMIT	D_F	DATE_EXT	DATE_ANAL
Magnesium, Mg	87.8	1.0	15	08/09/94	08/19/94

Notes and Definitions for this Report:

ANALYST KH
UNITS mg/L
BATCH_ID WFAA-181
COMMENTS RESULTS REFLECT TOTAL METALS ANALYSIS

Received: 08/05/94 Results by Sample

SAMPLE ID WELL #2 FRACTION 02B TEST CODE WFAANA NAME SODIUM (FAA)/EPA 273.1
Date & Time Collected 07/20/94 Category WATER

PARAMETER	RESULT	LIMIT	D_F	DATE_EXT	DATE_ANAL
Sodium, Na	7,030	1.0	1,000	08/09/94	08/19/94

Notes and Definitions for this Report:

ANALYST KH
UNITS mg/L
BATCH_ID WFAA-181
COMMENTS RESULTS REFLECT TOTAL METALS ANALYSIS

Received: 08/05/94 Results by Sample

SAMPLE ID WELL #3 FRACTION 03A TEST CODE TDS NAME TDS/EPA 160.1

Date & Time Collected 07/20/94 Category WATER

PARAMETER	RESULT	LIMIT	D_F	DATE_ANAL
Total Dissolved Solids	4920	1.0	1.0	08/09/94

Notes and Definitions for this Report:

EXTRACTED

ANALYST JCB

UNITS mg/L

BATCH_ID WTDS-140

COMMENTS N/A

Received. 08/05/94 Results by Sample

LE ID WELL #3 FRACTION 03A TEST CODE WALK NAME ALKALINITY/EPA 310.1

Date & Time Collected 07/20/94 Category WATER

PARAMETER	RESULT	LIMIT	D_F	DATE_ANAL
Alkalinity	396	2.0	1.0	08/09/94

Notes and Definitions for this Report:

EXTRACTED

ANALYST DES

UNITS mg/L

BATCH_ID WALK-66

COMMENTS N/A

Received. 08/05/94 Results by Sample

SAMPLE ID WELL #3 FRACTION 03B TEST CODE WFAAMG NAME MAGNESIUM (FAA)/EPA 242.1

Date & Time Collected 07/20/94 Category WATER

PARAMETER	RESULT	LIMIT	D_F	DATE_EXT	DATE_ANAL
Magnesium, Mg	103	1.0	20	08/09/94	08/19/94

Notes and Definitions for this Report:

ANALYST KH

UNITS mg/L

BATCH_ID WFAA-181

COMMENTS RESULTS REFLECT TOTAL METALS ANALYSIS

Received: 08/05/94

REPORT

Work Order # 94-08-072

Results by Sample

SAMPLE ID WELL #3 FRACTION 03B TEST CODE WFAANA NAME SODIUM (FAA)/EPA 273.1

Date & Time Collected 07/20/94 Category WATER

PARAMETER	RESULT	LIMIT	D_F	DATE_EXT	DATE_ANAL
Sodium, Na	1,640	1.0	200	08/09/94	08/19/94

Notes and Definitions for this Report:

ANALYST KH

UNITS mg/L

BATCH_ID WFAA-181

COMMENTS RESULTS REFLECT TOTAL METALS ANALYSIS

ATTACHMENT B

Proof of Public Notice

AFFIDAVIT OF PUBLICATION

County of Chaves
State of New Mexico

I, Jean M. Pettit,
Bus. Manager,

Of the Roswell Daily Record, a daily newspaper published at Roswell, New Mexico, do solemnly swear that the clipping hereto attached was published once a week in the regular and entire issue of said paper and not in a supplement thereof for a period
of: one time weeks
.....
beginning with issue dated
September 29th , 1994
.....
and ending with the issue dated
September 29th ,1994
.....

Jean M. Pettit
Manager

Sworn and subscribed to before me

his 29th day of
.....
September ,1994
.....

Marylon L. Hyppa
Notary Public

My Commission expires

July 25, 1998

SEAL)

Publish September 29, 1994

LEGAL NOTICE

Pursuant to Rule 711 of the Oil Conservation Commission, State of New Mexico, notice is hereby given that Gandy Marley, Inc. will be filing an application for surface waste storage and remediation facility. The proposed facility will encompass approximately 154 acres of deeded land located in Sections 4, 5, 8, and 9, Township 11 South, Range 31 East. The facility site will be situated in Chaves County, approximately 39 miles eastsoutheast of Roswell, New Mexico and 33 miles northwest of Tatum, New Mexico. The purpose of the proposed facility is provide a safe place for remediation of contaminated soils from oil and gas operations. No produced water or tank bottoms will be allowed.

Any questions about the Application can be directed to Trey Greenwood, of the S.M. Stoller Corporation, at (505) 885-0172. Any comments or objections must be made to Roger Anderson, State of New Mexico, Oil Conservation Division, PO Box 2088, Santa Fe, NM 89501, within 30 days.

STATE OF NEW MEXICO
NMOCD District I

INTER-OFFICE MEMO

To file: Gandy Marley, Inc.

Date: March 3, 1995
Time: 9:00 am

Telephone call:____ Meeting:_X__ Other:____

Person called or attending:

Jon Gandy- Gandy Marley
Larry Gandy-Gandy Marley
Wayne Price - NMOCD

REFERENCE: Gandy Marley Landfarm - Permit # NM-711-1-0020

Subject: Meeting to discuss new permit conditions

Comments:

Gandy Marley requested a meeting to discuss their new landfarm operations. Reviewed the new permit conditions, discussed exempt and non-exempt waste issues, and proper procedures for accepting waste.

Wayne Price
NMOCD Environmental Engineer-District I

cc: Jerry Sexton-District I Supervisor
Roger Anderson-Environmental Bureau Chief
Chris Eustice-Environmental Geologist

February 6, 1995

TO BE PUBLISHED ON OR BEFORE FEBRUARY 10, 1995

PUBLIC NOTICE

NEW MEXICO ENVIRONMENT DEPARTMENT

Notice is hereby given that, pursuant to New Mexico Water Quality Control Commission Regulations, the following proposed discharge plans have been submitted for approval to the New Mexico Environment Department. The information in this notice generally has been supplied by the applicant and may or may not have been confirmed by the NM Environment Department.

DP-384 PHILMAR DAIRY, Philip and Nancy Douma, Owners, Route 2 Box 326, Portales, New Mexico 88130, proposes to renew DP-384 which allows the discharge of 4,000 gallons per day of dairy washwater from the Philmar Dairy. The facility is located 7 miles west of Portales in Section 34, 01S, R33E, Roosevelt County. Dairy barn washwater is discharged to a clay-lined lagoon for disposal by evaporation. Volumes of wastewater in exceedence of the lagoon capacity will be mixed with irrigation water and applied via pivot sprayer to 80 acres of silage crops. Ground water below the site is at a depth of approximately 90 feet and has a total dissolved solids concentration of approximately 300 milligrams per liter.

DP-627 KIRTLAND AIR FORCE BASE, Charles H. Perez, Commander, 377th ABW (AFMC) 377th ABW/CC, Kirtland Air Force Base, New Mexico 87117-5606, proposes to renew its plan to discharge 400,000 gallons per year of sodium hydroxide lasing medium from a chemical oxygen/iodine laser. The facility is located at the AWFL Chemical Laser Facility in the NW 1/4 of Section 2, T9N, R3E, Bernalillo County. Spent lasing fluid is discharged to a concrete-lined neutralization tank and then to an unlined evaporation pond. Ground water below the site is at a depth of approximately 435 feet and has a total dissolved solids concentration of approximately 234 milligrams per liter.

DP-636 KIRTLAND AIR FORCE BASE, Charles H. Perez, Commander, 377th ABW (AFMC) 377th ABW/CC, Kirtland Air Force Base, New Mexico 87117-5606, proposes to renew its plan to discharge 2,700 gallons per day of domestic wastewater from the High Energy Research and Technology Facility (HERTF) in the Section 30, T9N, R5E, Bernalillo County. Domestic wastewater with small amounts of aluminum dust is discharged to a septic tank and leach field. Ground water below the site is at a depth of approximately 600 feet and has a total dissolved solids concentration of approximately 250 milligrams per liter.

DP-974 THE SANTA FE OPERA, Greg Porter, President of the Board of Directors, P.O. Box 2408, Santa Fe, New Mexico 87504, proposes to modify its plan to discharge a maximum of 17,000 gallons per day of domestic septage from a performance center. The facility is located approximately 5 miles north of Santa Fe in Section 26.2, T18N, R9E, Santa Fe County. Domestic septage will be discharged to septic tanks for primary treatment. The wastewater will then flow through 2 synthetically lined constructed wetlands, a passive aeration/nitrification unit, and two final wetland cells. The modification consists of changing the final discharge from an infiltration-basin, to UV treatment to remove fecal coliform. The treated water will then be used to irrigate grass and trees on the Santa Fe Opera property. Ground water below the site is at a depth approximately 200 feet and has a total dissolved solids concentration of approximately 110 milligrams per liter.

DP-984 CAMPOS DE SUENOS, Anthony Piperata, President, 4051 Sera Road, Rio Rancho, New Mexico 87124, proposes to discharge up to 4,145 gallons per day of domestic wastewater from a restaurant and bar. The facility is located in Albuquerque in Section 23 and 24, T10N, R1E, Bernalillo County. The proposed discharge will be to a septic tank and leachfield (UIC well 532). Ground water below the site is at a depth of approximately 862 feet and has a total dissolved solids concentration of approximately 725 milligrams per liter.

DP-1022 SOUTHERN DRAW DAIRY, Ronald Schaap, Owner, ERR Box 24A, Portales, New Mexico 88130, proposes to discharge 18,000 gallons per day of dairy washwater from a 400 cow dairy. The facility is located approximately 12 miles north of Clovis in Section 19.1, T4N, R36E, Curry County. The dairy washwater will be held in a 1,000 cubic foot concrete holding tank where it will be mixed with fresh water at a ratio of two to one and land applied to 140 acres by sprinkler irrigation. A clay lined runoff lagoon will be constructed to hold dairy washwater when it cannot be land applied. Ground water below the site is at a depth of approximately 375 feet and has a total dissolved solids concentration of approximately 210 milligrams per liter.

DP-1039 G & S GWPA SITE, Gregg Crandell, NMED UST Bureau, 4131 Montgomery Blvd., NE, Albuquerque, New Mexico 87109, proposes to discharge 2,020 gallons per day of reclaimed hydrocarbon contaminated wastewater from a former service station. The facility is located in Albuquerque at 6100 Isleta Blvd., S.W. in Section 23.444, T9N, R2E, Bernalillo County. The discharge originates from an aquifer remediation program designed to control hydrocarbon contamination at the site. Contaminated groundwater is treated by an oil/water separator and activated carbon system and discharged to an infiltration gallery (UIC well 5 x26). Ground water below the site at a depth of approximately 7 feet and has a total dissolved solids concentration of approximately 1,570 milligrams per liter.

DP-1041 GANDY-MARLEY INC., LANDFARM, Larry Gandy, President, 1109 East Broadway, P.O. Box 827, Tatum, New Mexico 88267, proposes to discharge up to 10,000 cubic yards per month of contaminated soils at a contaminated soils landfarm. The facility is located 39 miles southeast of Roswell in Section 8 and 9, T11S, R31E. Chaves County. Contaminated soils will be spread in bermed cells and disked into the ground. Moisture will be added to enhance biological remediation. Ground water below the site is at a depth of approximately 150 feet and has a total dissolved solids concentration of approximately 11,900 milligrams per liter.

Any interested person may obtain further information from the Ground Water Section of the NM Environment Department, telephone (505) 827-2900, and may submit written comments to the Ground Water Section, NM Environment Department, P.O. Box 26110, Santa Fe, NM 87502. Prior to ruling on any proposed discharge plan or its modification, the NM Environment Department will allow thirty (30) days after the date of publication of this notice to receive written comments and during which a public hearing may be requested by any interested person. Requests for public hearing shall set forth the reasons why the hearing should be held. A hearing will be held if the NM Environment Department determines that there is significant public interest.

Clint Marshall GW Section
ED - ~~GW Bureau~~
PO 26110
87502

UNITED STATES DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE

NEW MEXICO ECOLOGICAL SERVICES STATE OFFICE
2105 OSUNA NE
ALBUQUERQUE, NEW MEXICO 87113
Telephone: (505) 761-4525 Fax Number: (505) 761-4542

December 5, 1994

William J. Lemay, Director
New Mexico Oil Conservation Commission
Oil Conservation Division
2040 South Pacheco
Santa Fe, New Mexico 87505

Dear Mr. Lemay:

This responds to the State of New Mexico Oil Conservation Division (Division) public notice dated November 3, 1994, regarding the Division's proposal to allow a landfarm facility for the applicant listed below.

> **Grandy Marley, Inc.**, has submitted an application to construct and operate a commercial landfarm facility for the remediation of hydrocarbon contaminated soils. The proposed facility is located in Sections 4,5,8, and 9, Township 11 South, Range 31 East, Chaves County, New Mexico. The facility will consist of 154 acres of land where oilfield waste solids will be spread on the surface and tilled to enhance biodegradation of organic contaminants.

Land treatment promotes microbial decomposition, photodegradation, and volatilization of organic compounds, thereby mitigating against ground water contamination by hydrocarbons. However, it is possible that these oilfield waste solids may contain significant levels of contaminants (although they are classified "nonhazardous" by RCRA Subtitle C) including, but are not limited to, oil, grease, chlorides, TSS, TDS, barium, naphthalene, phenanthrene, arsenic, antimony, lead, and solvents. These contaminants should not be allowed to increase the proposed site's soil concentrations above those of natural baseline concentrations from nearby uncontaminated soils.

The U.S. Fish and Wildlife Service recommends regular monitoring of landfarming soils for the full suite of oilfield waste contaminants. Land application must not injure any threatened or endangered species of plants, fish, or wildlife, or adversely affect migratory birds.

Thank you for the opportunity to review and comment on this application. If you have any questions concerning these comments, please contact Joel D. Lusk at (505) 761-4525.

Sincerely,

R. Mark Wilson

For Jennifer Fowler-Propst
State Supervisor

cc:
Director, New Mexico Department of Game and Fish, Santa Fe, New Mexico

Clayton M. Barnhill

Environmental and Geological Services
PO Box 2304
Roswell, New Mexico 88202-2304 Phone: (505) 622-2012

Mr. Roger Anderson
New Mexico Oil Conservation Division
PO Box 2088
Santa Fe, New Mexico 87504
(505) 827-7152

November 15, 1994

Re: Application for Surface Waste Disposal Facility
Gandy Marley, Inc.
Contaminated Soils Landfarm
Parts of Section 4,5,8,9, T.11S. R.31 E.
Chaves County, New Mexico

Dear Mr. Anderson:

As per our phone conversation of this date, this letter is a formal request to approve the above mentioned application. After further review of the data, and a conversation with one of the principals, I respectfully request, as a consulting geologist, Secretary of the Chaves County Public Land Use Committee, and citizen of Chaves County, that the application for a contaminated soil landfarm be granted to Gandy Marley, Inc. I appreciate you holding the application until attaching my comments. This morning I had the opportunity to review, in the Artesia, NM Office of the Oil Conservation Division, the application of Gandy-Marley for a surface waste disposal facility. Quite frankly, I had further questions. This afternoon I had a long conversation with Mr. Bill Marley and believe that Gandy-Marley has tried and performed a professional job in the analysis of this site for the purpose of a Landfarm. I believe the principals involved have done their homework. If you have any questions please do not hesitate to call me at the above mentioned number. Thank you.

Sincerely,

Clayton M. Barnhill
Consulting Geologist

OIL CONSERVATION DIVISION
RECEIVED
'94 DEC 9 AM 8 52

AFFIDAVIT OF PUBLICATION

County of Chaves
State of New Mexico

I, Jean M. Pettit,
Bus. Manager,

Of the Roswell Daily Record, a daily newspaper published at Roswell, New Mexico, do solemnly swear that the clipping hereto attached was published once a week in the regular and entire issue of said paper and not in a supplement thereof for a period
of: one time weeks
.....
beginning with issue dated
November 9th , 1994
.....
and ending with the issue dated
November 9th , 1994

.....

Jean M. Pettit
.....
Manager

Sworn and subscribed to before me

this 9th day of
.....
November ,1994
.....

Marylon D. Shepperd
.....
Notary Public

My Commission expires

July 25 ,19 98
.....
(SEAL)

Publish November 9, 1994

NOTICE OF PUBLICATION

STATE OF NEW MEXICO
ENERGY, MINERALS AND NATURAL RESOURCES DEPARTMENT
OIL CONSERVATION DIVISION

Notice is hereby given that pursuant to the New Mexico Oil Conservation Division Regulations, the following application has been submitted to the Director of the Oil Conservation Division, 2040 South Pacheco, Santa Fe, New Mexico 87505, Telephone (505) 827-7131:

Gandy Marley, Inc., Hart M. Greenwood, III, Agent, 1109 E. Broadway, P.O. Box 827, Tatum, New Mexico, 88267, has submitted an application to construct and operate a Rule 711 commercial landfarm facility for remediation of hydrocarbon contaminated soils. The proposed facility is located in the SW/4 of Section 4, SE/4 of Section 5, NE/4 of Section 8, NW/4 of Section 9, Township 11 South, Range 31 East, NMPM, Chaves County, New Mexico. The facility is proposed to consist of 1 154 acre land management area where only solids classified as "non-hazardous" oilfield waste by RCRA Subtitle C exemption or by characteristic testing will be spread on the ground surface in six inch lifts or less and periodically stirred to enhance biodegradation of contaminants. No liquids will be allowed to be accepted for disposal at the facility. Ground water most likely to be affected by an accidental release is at a depth of 150 feet with a total dissolved solids concentration of approximately 4920 mg/l. The permit application addresses the construction, operation, spill/leak prevention and monitoring procedures to be utilized at the facility site.

Any interested person may obtain further information from the Oil Conservation Division and may submit written comments to the Director of the Oil Conservation Division at the address given above. The application may be viewed at the above address between 8:00 a.m. and 4:00 p.m., Monday thru Friday. Prior to ruling on any proposed application, the Director of the Oil Conservation Division shall allow at least thirty (30) days after the date of publication of this notice during which comments may be submitted to him and public hearing may be requested by any interested person. Request for public hearing shall set forth the reasons why a hearing shall be held. A hearing will be held if the director determines that there is significant public interest.

If no hearing is held, the Director will approve or disapprove the application based on the information available. If a public hearing is held, the Director will approve the application based on the information in the application and information presented at the hearing.

GIVEN under the Seal of the State of New Mexico Oil Conservation Commission at Santa Fe, New Mexico on this 3rd day of November, 1994.

STATE OF NEW MEXICO
OIL CONSERVATION DIVISION

William J. LeMay
WILLIAM J. LEMAY, Director

SEAL

t of 13
eturns

shouldn't be made more
lt, but proponents said
rrently, too easy.
trailed 52-48 percent. It
authorize counties to
money to repair build-
nd purchase land for
space.
led 53-47 percent. It
revise the state consti-
's anti-donation clause
owing state, county or
ipal governments to pro-
nd, buildings or infra-
ire such as roads and
services to assist exist-
sinesses and attract new
Proponents said it would
versify the economy, but
ents said it would open
or to using and abusing
funds for strictly private
ss purposes.
l trailed 56-44 percent.
ld lower the voting age
1 to 18 and removing
c residency require-
for voter qualification,
rizing those require-
be established by law.
2 and 13 both trailed.
ould change the invest-
nanagement strategy for
s of dollars from the
everance tax permanent
nd the land grant per-
t fund and formulating
ution of proceeds, to
among others. With 61
of precincts in, 12 was
56-44 percent and 13
51-49 percent.

se seats
se race

Democrat Patsy Trujillo,
h worker, defeated ex-
tor William Shrecen-
Republican who repre-
l Lincoln and Sierra
es in the 960s, for the
Rep. Angie Vigil-Perez,
ta Fe.
Rep. Jeannette Wallace,
Alamos, beat Democrat
rd Ryan, a Los Alamos
al Laboratory retiree.
Rep. Max Coll, D-Santa
eated Republican write-
k Stamm

GETS RESULTS

Legals

Publish October 26, November 9, 1994

NOTICE is hereby given that o October 13, 1994, Charles Wagn Estate and Gleneta Lewis, 2805 Garden, Roswell, New Mexic 88201, filed application No. R 3133 into RA-971 with the STAT ENGINEER for permit to chang location of well and place of use 173.4 acre-feet per annum artesian ground water by ceasi the diversion of said waters fr artesian well No. RA-3133 loca in the NE¼SE¼SW¼ of Sect 14, Township 9 South, Range East, N.M.P.M., and ceasing irrigation of 57.8 acres of l described as Pt. of W½SE¼ E¼SW¼ of Section 14 and NE¼NW¼ & NW¼NE¼ of Sec 23, Township 9 South, Range East, N.M.P.M., and commen the use of the existing arte wells No. RA-971 located in NW¼, Lot 16 of Block Berrendo Irrigated Far Subdivision of Section Township 10 South, Range East, N..M.P.M. and RA-97 located in the W½ Lot 27 of Bl 22, Berrendo Irrigated Far Subdivision of Section Township 10 South, Range East, N.M.P.M., for the irrigation 57.8 acres of land described as E½SE¼ of Section 21, Townsh 10 South, Range 24 Ea N.M.P.M.

This is a companion application RA-971 into RA-3133 and is ma to swap priorities.

Any person, firm or corporation other entity objecting that the granting of the application will detrimental to the objectors wat right shall have standing to f objections or protests. Any pers firm or corporation or other ent objecting that the granting of t application will be contrary to t conservation of water within t state or detrimental to the pub welfare of the state and showi that the objector will be substanti ly and specifically affected by t granting of the application sh have standing to file objections protests. Provided, however, that the State of New Mexico or any of its branches, agencies, departments, boards, instrumentalities or institutions, and all political subdivisions of the state and their agencies, instrumentalities and institutions shall have standing to file objections or protests. The protest or objections shall be in writing and shall set forth all protestant's or objector's reasons why the application should not be approved and must be filed, in triplicate, with Eluid Martinez, State Engineer 1900 W. Second St., Roswell, New Mexico 88201, within ten (10) day after the date of the last publicatio of this Notice.
cc: Santa Fe
C:RRR No.: HAND DELIVERED

Publish November 2, 9, 1994

IN THE PROBATE COURT
COUNTY OF CHAVES
STATE OF NEW MEXICO

IN THE MATTER OF
THE LAST WILL AND TESTAMENT

OF Probate #7975

JU N B. G , Dec

Legals

Legals

Publish November 9, 1994

NOTICE OF PUBLICATION

STATE OF NEW MEXICO
ENERGY, MINERALS AND NATURAL RESOURCES DEPARTMENT
OIL CONSERVATION DIVISION

Notice is hereby given that pursuant to the New Mexico Oil Conservation Division Regulations, the following application has been submitted to the Director of the Oil Conservation Division, 2040 South Pacheco, Santa Fe, New Mexico 87505, Telephone (505) 827-7131:

Gandy Marley, Inc., Hart M. Greenwood, III, Agent, 1109 E. Broadway, P.O. Box 827, Tatum, New Mexico, 88267, has submitted an application to construct and operate a Rule 711 commercial landfarm facility for remediation of hydrocarbon contaminated soils. The proposed facility is located in the SW/4 of Section 4, SE/4 of Section 5, NE/4 of Section 8, NW/4 of Section 9, Township 11 South, Range 31 East, NMPM, Chaves County, New Mexico. The facility is proposed to consist of 1 154 acre land management area where only solids classified as "non-hazardous" oilfield waste by RCRA Subtitle C exemption or by characteristic testing will be spread on the ground surface in six inch lifts or less and periodically stirred to enhance biodegradation of contaminants. No liquids will be allowed to be accepted for disposal at the facility. Ground water most likely to be affected by an accidental release is at a depth of 150 feet with a total dissolved solids concentration of approximately 4920 mg/l. The permit application addresses the construction, operation, spill/leak prevention and monitoring procedures to be utilized at the facility site.

Any interested person may obtain further information from the Oil Conservation Division and may submit written comments to the Director of the Oil Conservation Division at the address given above. The application may be viewed at the above address between 8:00 a.m. and 4:00 p.m., Monday thru Friday. Prior to ruling on any proposed application, the Director of the Oil Conservation Division shall allow at least thirty (30) after the date of publication of this notice during which comments may be submitted to him and public hearing may be requested by any interested person. Request for public hearing shall set forth the reasons why a hearing shall be held. A hearing will be held if the director determines that there is significant public interest.

If no hearing is held, the Director will approve or disapprove the application based on the information available. If a public hearing is held, the Director will approve the application based on the information in the application and information presented at the hearing.

GIVEN under the Seal of the State of New Mexico Oil Conservation Commission at Santa Fe, New Mexico on this 3rd day of November, 1994.

STATE OF NEW MEXICO
OIL CONSERVATION DIVISION

William J. LeMay
WILLIAM J. LEMAY, Director

SEAL

Publish November 2, 9, 16, 23, 1994

FIFTH JUDICIAL DISTRICT COURT
COUNTY OF CHAVES
STATE OF NEW MEXICO

ROBERT J. JONES; CHARLES R. JONES; MAE JONES JACKSON; MARY JONES LEONARD; MARIE JONES JORDAN; STEPHEN J. LAMMERMANN (a/k/a Steve Lammermann); DONALD LAMMERMANN (a/k/a Don Lammermann); BILLIE ANN LAMMERMANN; CHAD MICHAEL LAMMERMANN; GEORGE LAKEY; ROBERT LAKEY; DIANE LAKEY WEBSTER; EARL COCHELL, JR., dealing in their respective sole and separate properties; and WILLIAM MERTCHING, ELDORA CASSIDY, LINDA LOGEMANN, CHARLES CASSIDY Trustees of the Cassidy Enterprise Trust,

Plaintiffs,

v.

THE UNKNOWN HEIRS OF THE FOLLOWING NAMED DECEASED PERSONS:

Robert McCarty;
Charles McCarty;
Justin Theodore McCarty;
Delila Jane Rogers McCarty;
Minnie McCarty Cochell;
Rose McCarty;
John McCarty;
Ona Mae McCarty;
Cora McCarty Cassidy;
Mary Sena McCarty Jones;
Earl Cochell, Sr.
Alonzo B. Cochell;
Charles A. Cassidy;
Mildred D. Cassidy Lakey;

NOTICE OF PUBLICATION

STATE OF NEW MEXICO
ENERGY, MINERALS AND NATURAL RESOURCES DEPARTMENT
OIL CONSERVATION DIVISION

Notice is hereby given that pursuant to the New Mexico Oil Conservation Division Regulations, the following application has been submitted to the Director of the Oil Conservation Division, 2040 South Pacheco, Santa Fe, New Mexico 87505, Telephone (505) 827-7131:

Gandy Marley, Inc., Hart M. Greenwood, III, Agent, 1109 E. Broadway, P.O. Box 827, Tatum, New Mexico, 88267, has submitted an application to construct and operate a Rule 711 commercial landfarm facility for remediation of hydrocarbon contaminated soils. The proposed facility is located in the SW/4 of Section 4, SE/4 of Section 5, NE/4 of Section 8, NW/4 of Section 9, Township 11 South, Range 31 East, NMPM, Chaves County, New Mexico. The facility is proposed to consist of a 154 acre land management area where only solids classified as "non-hazardous" oilfield waste by RCRA Subtitle C exemption or by characteristic testing will be spread on the ground surface in six inch lifts or less and periodically stirred to enhance biodegradation of contaminants. No liquids will be allowed to be accepted for disposal at the facility. Ground water most likely to be affected by an accidental release is at a depth of 150 feet with a total dissolved solids concentration of approximately 4920 mg/l. The permit application addresses the construction, operation, spill/leak prevention and monitoring procedures to be utilized at the facility site.

Any interested person may obtain further information from the Oil Conservation Division and may submit written comments to the Director of the Oil Conservation Division at the address given above. The application may be viewed at the above address between 8:00 a.m. and 4:00 p.m., Monday thru Friday. Prior to ruling on any proposed application, the Director of the Oil Conservation Division shall allow at least thirty (30) days after the date of publication of this notice during which comments may be submitted to him and public hearing may be requested by any interested person. Request for public hearing shall set forth the reasons why a hearing shall be held. A hearing will be held if the director determines that there is significant public interest.

If no hearing is held, the Director will approve or disapprove the application based on the information available. If a public hearing is held, the Director will approve the application based on the information in the application and information presented at the hearing.

GIVEN under the Seal of New Mexico Oil Conservation Commission at Santa Fe, New Mexico, on this 3rd day of November, 1994.

STATE OF NEW MEXICO
OIL CONSERVATION DIVISION

SEAL

WILLIAM J. LEMAY, Director

Stoller

established 1959

October 6, 1994

Mr. Roger Anderson
New Mexico Oil Conservation Division
PO Box 2088
Santa Fe, NM 87504

RE: Application for Surface Waste Disposal Facility
Gandy Marley, Inc.
Contaminated Soils Landfarm
Parts of Sections 4,5,8,9, R31E, T11S
Chaves County, New Mexico

Dear Mr. Anderson:

Gandy Marley, Inc. requests approval for a permit to operate a Surface Waste Disposal Facility. This will be a new commercial facility and will operate as a contaminated soils remediation site.

The enclosed permit application provides a description of the site and details facility operations in accordance with OCD Rule 711.

The S.M. Stoller Corporation has been retained by Gandy Marley, Inc. as a consultant for this project.

Sincerely,

Hart M. Greenwood, III
Manager
S.M. Stoller Corporation

cc: Mr. Larry Gandy, Gandy Marley, Inc.
Mr. Dale Gandy, Gandy Marley, Inc.
Mr. Bill Marley, Gandy Marley, Inc.
OCD District Office, Artesia

The S.M. Stoller Corporation 314 West Mermod Street, Suite 102 Carlsbad, New Mexico 88220 (505) 885-0172 FAX (505) 885-0776

Kevin Graham

Revised 5/93

State of New Mexico
Energy, Minerals and Natural Resources Department
OIL CONSERVATION DIVISION
P.O. Box 2088
Santa Fe, NM 87501

APPLICATION FOR SURFACE WASTE DISPOSAL FACILITY

(Refer to OCD Guidelines for assistance in completing the application)

☒ Commercial ☐ Centralized

I. Type: ☐ Produced Water ☐ Drilling Muds ☐ Other _____
☒ Solids/Landfarm ☐ Treating Fluids

II. OPERATOR: Gandy Marley, Inc.

ADDRESS: 1109 E. Broadway, P.O. Box 827, Tatum, NM 88267

CONTACT PERSON: Larry Gandy PHONE: (505) 398-4960

III. LOCATION: Parts of Sections 4, 5, 8, and 9 Township 11S Range 31E
Submit large scale topographic map showing exact location.

IV. IS THIS AN EXPANSION OF AN EXISTING FACILITY? ☐ Yes ☒ No

V. Attach the name and address of the landowner of the disposal facility site and landowners of record within one-half mile o the site.

VI. Attach discription of the facility with a diagram indicating location of fences, pits, dikes, and tanks on the facility.

VII. Attach detailed engineering designs with diagrams prepared in accordance with Division guidelines for the construction/installation of the following: pits or ponds, leak-detection systems, aerations sytems, enhanced evaporation (spray) systems, waste treating systems, security systems, and landfarm facilities.

VIII. Attach a contingency plan for reporting and clean-up of spills or releases.

IX. Attach a routine inspection and maintenance plan to ensure permit compliance.

X. Attach a closure plan.

XI. Attach geological/hydrological evidence demonstrating that disposal of oil field wastes will not adversely impact fresh water. Depth to and quality of ground water must be included.

XII. Attach proof that the notice requirements of OCD Rule 711 have been met (Commercial facilities only).

XIII. Attach a contingency plan in the event of a release of H_2S.

XIV. Attach such other information as necessary to demonstrate compliance with any other OCD rules, regulations and/or orders.

XV. CERTIFICATION

I hereby certify that the information submitted with this application is true and correct to the best of my knowledge and belief.

Name: Hart M. Greenwood, III Title: Agent

Signature: [signature] Date: 10/6/94

DISTRIBUTION: Original and one copy to Santa Fe with one copy to appropriate Division District Office.

Application for Surface Waste Disposal Facility
Gandy Marley, Inc.

I. Type of Operation

The proposed facility will operate as a soil remediation, recycling, and landfarm facility.

II. Operator

Gandy Marley, Inc.
Attn: Larry Gandy
1109 East Broadway
PO Box 827
Tatum, New Mexico 88267
505/398-4960

III. Location of Landfarm

The facility is located in Southeastern New Mexico, southeast of Roswell, New Mexico. The facility is situated on privately-owned land in Chaves County, New Mexico, in parts of Sections 4, 5, 8, and 9 of T11S, R31E.

This location is approximately 39 miles eastsoutheast of Roswell and approximately 33 miles northwest of Tatum. As illustrated in Figure 1, US Highway 380, which runs east and west, is located approximately 2 1/2 miles to the north. State Highway 172, which runs north and south, is approximately four miles to the east and above the Caprock from the proposed site. State Highway 172 does not provide access to the facility.

IV. Expansion Request

This permit application relates to proposed construction of a new surface waste disposal facility. This is not a request to expand an existing facility.

V. Land and Ownership

As illustrated in Figure 2, the proposed facility site is situated on privately-owned land. There are no other landowners of record within one-half mile of the proposed facility location and there are no private residences within one mile of the proposed site.

VI. Facility Description

The purpose of the proposed facility will be to remediate contaminated soils generated as a result of oilfield activities in southeastern New Mexico and west Texas.

The site will be contained within a five-strand barbed wire fence. Entrance to the facility will be gained through one of several gates which will remain locked when the facility is not in operation. Points of access are identified in Figure 3.

A perimeter berm will be built which will serve as the outer boundary of each cell developed within the facility. The perimeter berm will be three feet in height and located 100 feet to the inside of the perimeter fence on all sides. This area is depicted in Figure 3 and will meet the 100 foot buffer requirements set forth in OCD Rule 711.

An elevated, interior road will be developed which runs east and west along the middle portion of the facility. A similar interior road will run north and south to connect the main facility entrances to the interior road described above. These roads will be used by transporters to unload contaminated soils into respective cells. The roads will be elevated to a height of three feet and will serve dually as interior berms.

The size of each cell will be less than five acres. Each cell will be enclosed by berms which will be constructed to a minimum height of 1 1/2 feet.

VII. Facility Construction/Operation & Waste Classification

The proposed site is situated on the western edge of a geological bench known locally as The Caprock. The Caprock is characterized by rocky terrain and runs in a north-south direction.

There are no watercourses, lakebeds, sink-holes, or other depressions located adjacent to the proposed site. Thus, no stormwater runoff plan is required to accompany this permit application.

As outlined in Figure 3, access to the facility will be restricted by perimeter fencing. Gates to the facility will remain locked. Only authorized personnel will be given access to gate keys.

Appropriate signs will be posted at the gate and at various other locations along the perimeter fence which will: (1) warn against unauthorized entry, (2) list the name of the facility, (3) list the precise legal description of the facility by Section/Township/Range, and (4) list the telephone number of the appropriate person to call in the event of an emergency. Sign lettering will be of such size that the sign will be legible from at least 50 feet.

No contaminated soils will be placed within 100 feet of the fenced facility boundary. The buffer zone is illustrated in Figure 3.

As illustrated in Figure 2, no pipelines run through the proposed site. The nearest pipeline lies approximately 2 1/2 miles to the northeast of the proposed site. No pipeline buffer zone is required.

The perimeter of the facility will be bermed to alleviate stormwater run-off and run-on. The perimeter berm will be constructed to a height of three feet. This will be adequate to contain precipitation in the event of a 100-year storm event.

Prior to facility operation, a soil sample will be collected and analyzed to establish background levels of Total Petroleum Hydrocarbons (TPH), major cations and anions, volatile aromatic organics (BTEX), and heavy metals. It will be verified that laboratory analysis is done in accordance with EPA-approved methods. The background sample will be collected from the center portion of the facility.

A treatment zone not to exceed two feet beneath the facility will be monitored. Six months following the placement of contaminated soils, a minimum of one random soil

sample will be taken from the cell in which the soils were placed. Subsequent soil samples will be taken quarterly thereafter. Samples will be analyzed to identify any variation in levels of constituents found in the background sample taken prior to operation. This sampling and analysis schedule will apply to each respective cell.

Analysis will be conducted in accordance with EPA-approved methods. All analytical results will be submitted to the Santa Fe, New Mexico office of the OCD within 30 days after they are received from the laboratory.

Subsequent to collecting required soil samples, boreholes will be filled with an impermeable material such as cement or bentonite to prevent contamination below the native ground surface.

Further treatment zone monitoring will be conducted in the event of unusually high precipitation and upon the recommendation of the OCD. Precipitation will be removed within 72 hours following the discovery of ponding, pooling, or run-off.

As necessary, moisture will be added to appropriate cells to diminish blowing dust and to enhance biological remediation of contaminated soils. Caution will be observed in order to ensure that added moisture does not result in ponding, pooling, or run-off.

A double-lined system with leak detection equipment is not necessary. The treatment zone will be sampled.

All material accepted at the facility will be spread and disked within 72 hours of receipt. Soils will be spread on the surface in six inch lifts, and soils will be disked a minimum of once every two weeks in order to enhance remediation of contaminants. Additional lifts of soils will be spread only after laboratory analysis is conducted to verify that: (1) TPH level in the previous lift is less than 100 ppm, (2) that the sum of all BTEX is less than 50 ppm, and (3) the benzene level is less than 10 ppm.

All laboratory analysis results as well as sampling location description will be maintained at the facility. No new lifts will be added without prior authorization from the OCD.

Site security will be the responsibility of facility personnel. Employees will verify that each transporter holds appropriate permits. Loads will be accepted only during daylight hours, unless other prior arrangements have been made. When the facility is closed, the site will be locked to prevent unauthorized dumping.

The facility will only accept solids which are classified as non-hazardous by RCRA Subtitle C exemption or by characteristic testing. Prior to placement of any contaminated soils into the facility, it will be verified that the wastes are accompanied by a "Certification of Waste Status" from the generator. Wastes from operations not currently exempt under RCRA Subtitle C or mixed exempt and non-exempt wastes will be sampled and analyzed to determine whether any hazardous constituents are present. Results of all analyses will be submitted to the OCD. No such wastes will be placed in the facility without prior approval from the OCD.

All wastes accepted by this facility will be documented and logged at the time they are placed in the disposal facility. Each load will be inspected to ensure that only acceptable wastes are placed in the facility. At the time of the load inspection, the following information will be recorded on an inspection form and maintained at the facility for a period of two years:

- origin of material
- verification of analysis (if applicable)
- name and signature of transporter
- cell in which waste is placed
- date waste is received
- quantity of waste
- name and signature of authorized disposal facility employee
- verification of accompanying "Certification of Waste Status"

Monthly reporting will be made to the District OCD office on appropriate OCD reporting forms and in accordance with OCD Rule 711.

VIII. Spill/Leak Prevention and Reporting (Contingency Plans)

Wastewater and other liquids are prohibited at the facility. Therefore, risk of spills or leaks is negligible. Perimeter berms will serve to prevent stormwater run-on and run-off. Equipment and machinery will be at or near the facility at all times which could be used in the event of any spill or leak. Should a leak or spill occur, notification to the OCD would be made immediately in accordance with OCD Rule 116.

IX. Inspection, Maintenance, and Reporting

The facility will be inspected on a regular basis and immediately following significant precipitation and/or wind. Inspections will include examination of berms, fences, and the remediation area. Perimeter and interior berms will be maintained to prevent erosion. General maintenance will be routinely performed. Any necessary repairs will be made immediately.

Inspection and repair records will be maintained and will include time and date of inspection and types of repairs performed. These records will be maintained on site.

X. Closure Plan

Upon closure, and following notification to OCD that operations have ceased, existing soils which have previously been placed at the facility will continue to be managed until such time that remediation meets standards established by the OCD. Within six months following verification that all existing soils have met OCD remediation standards, the site will be covered and mounded to ensure that stormwater does not collect above or leach into the closed cells. The site will be restored with natural vegetation. Existing fences will be maintained following closure and access will be restricted. Any additional closure requirements or conditions of the OCD will be met.

XI. Site Characteristics - Fresh Water Protection Demonstration

There are no stream drainages or water wells within one mile of the facility boundary. Approximately 1/2 mile east of the proposed site, there is a spring at the base of Mescalero Rim. This spring is located topographically higher (200 feet) than the proposed facility and is a result of seepage from an overlying aquifer (Ogallala Fm.) The spring water is collected by the rancher and distributed through an underground pipeline to stock tanks on the ranch property. There are three such stock tanks within one mile of the outside perimeter of the proposed facility.

While there are no water wells within one mile of the outside perimeter of the proposed site, subsurface drilling has encountered groundwater saturation within Upper Triassic sediments. The depth to this groundwater is 150 feet. A sample of the ground water was obtained from three drill holes, the location of which are illustrated in Figure 4. The samples were analyzed at Assaigai Analytical

Laboratories in Albuquerque, New Mexico. A copy of the analytical results is presented in Attachment A. This groundwater flows eastward and is controlled by stratigraphic and structural features within the the Triassic sediments. This information was obtained from geologic data from a subsurface drilling program conducted in the region in July 1994.

The surface geology consists entirely of Quaternary age alluvial deposits. This alluvium is made up of fine yellow-brown sand and clays and contains abundant granitic and chert cobbles. This material was derived from the Tertiary age Ogallala Fm. which is located topographically higher and east of the proposed site. Thickness of the alluvial materials varies from 5-25 feet.

Immediately underlying the alluvial deposits are Upper Triassic sediments. These sediments were deposited in a fluvial environment and consist of fine to very-fine grained sandstones, interbedded with siltstones and mudstones.

The Upper Triassic sediments underlying the proposed site dip approximately one degree to the east. The thickness of these sediments varies from 150 to 25 feet. Groundwater saturation was encountered in sandstone lenses below depths of 150 feet.

The aquifer material consists of thin (10-30 feet), lenticular fine to very-fine grained sandstones. Due to the fluvial nature of these sands, individual sandstone lenses are discontinuous and difficult to correlate.

The proposed site consists of two soil types including Alama Loam and Faskin-Roswell Complex. These soils are typically well-drained with slopes of 0 to 15 percent. Vegetation consists primarily of Tobosa, Buffalo Grass, Vine-Mesquite, Mesquite, Cactus, Sand Dropseed, Little Bluestem, Sand Bluestem, Sandbur, Three-Awn, Shinnery Oak, Yucca, and Sand Sagebrush. No rare or endangered plant species are located near the proposed site or in the surrounding area.

The facility lies outside any 100-year floodplain boundary. The proposed site is in an area found on Federal Insurance Rate Map (FIRM) #3501250850. This map has not been printed because the National Flood Insurance Program has established that this is in an area of minimal flood hazards.

The perimeter berms will be designed to alleviate stormwater run-on and run-off during a 100-year stormwater event. Should such a storm event occur, the OCD will be notified immediately of any flooding or washout.

XII. Proof Of Notice

There are no other owners of surface lands or occupants within one-half mile of the proposed facility boundary. Notification requirements set forth in OCD Rule 117, therefore, do not apply. A legal notice of this pending application was published in the September 29 issue of the Roswell Daily Record. A copy of the notice, along with an *Affidavit of Publication,* is included as Attachment B.

13.0 H_2S Contingency Plan

No hydrogen sulfide is expected to be generated at this facility. If H_2S is encountered, provisions set forth in OCD Rule 118 will be met.

14.0 Additional Information

All regulatory requirements and OCD rules applicable to this facility will be fully complied with.

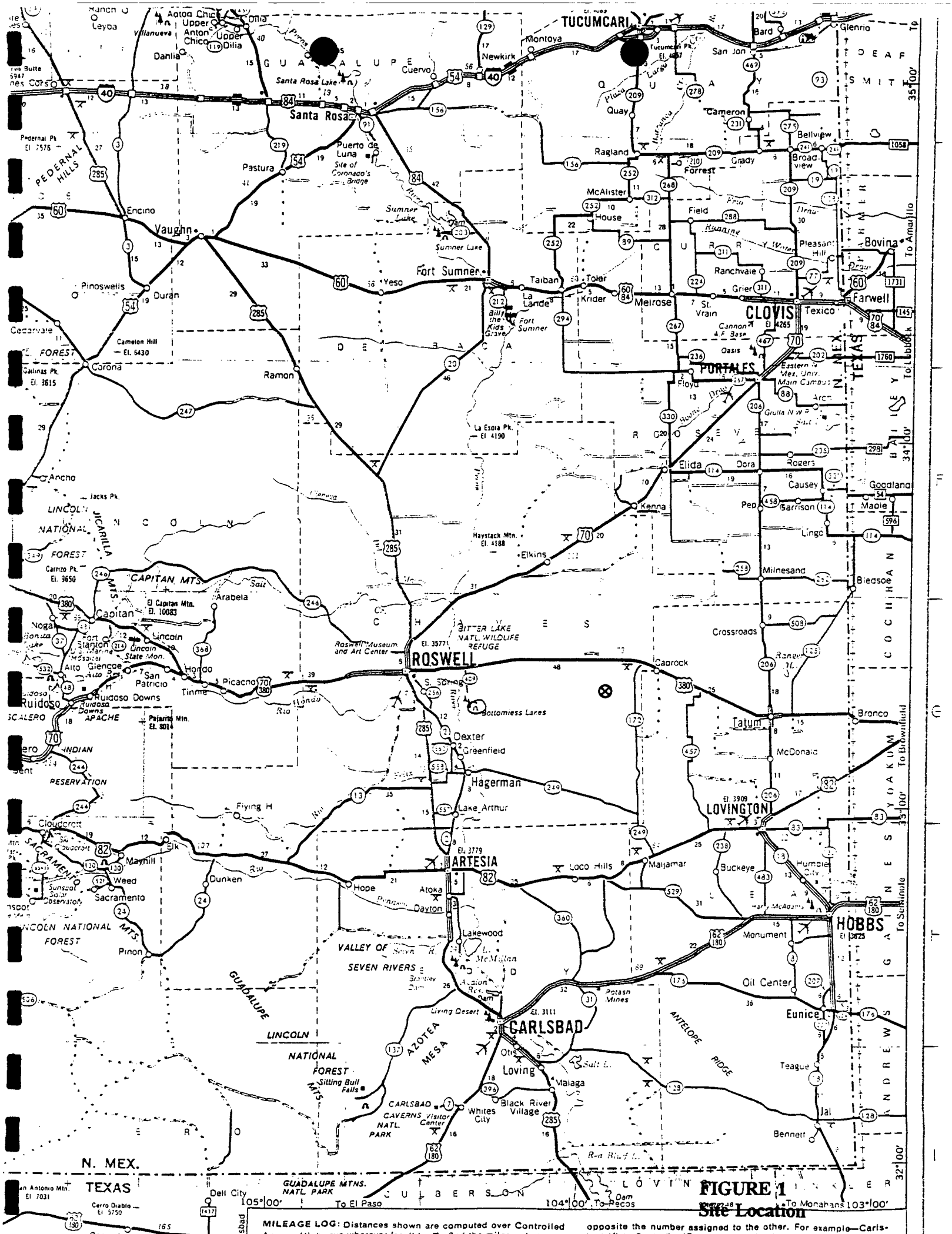


FIGURE 1
Site Location

MILEAGE LOG: Distances shown are computed over Controlled Access Highways wherever feasible. To find the mileage between opposite the number assigned to the other. For example—Carlsbad (4) to Santa Fe (17) is 263 miles (under grouping 4 mileage is

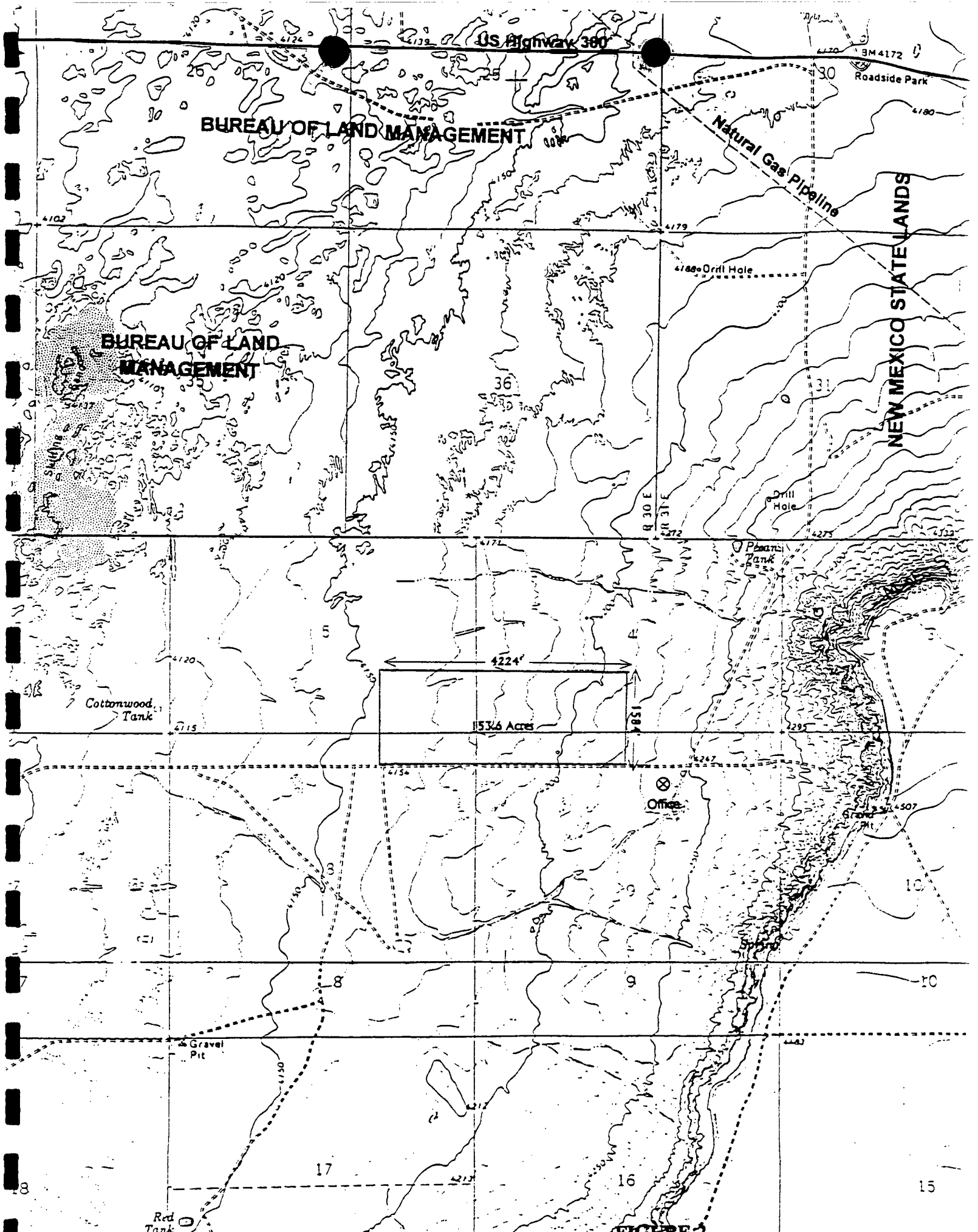
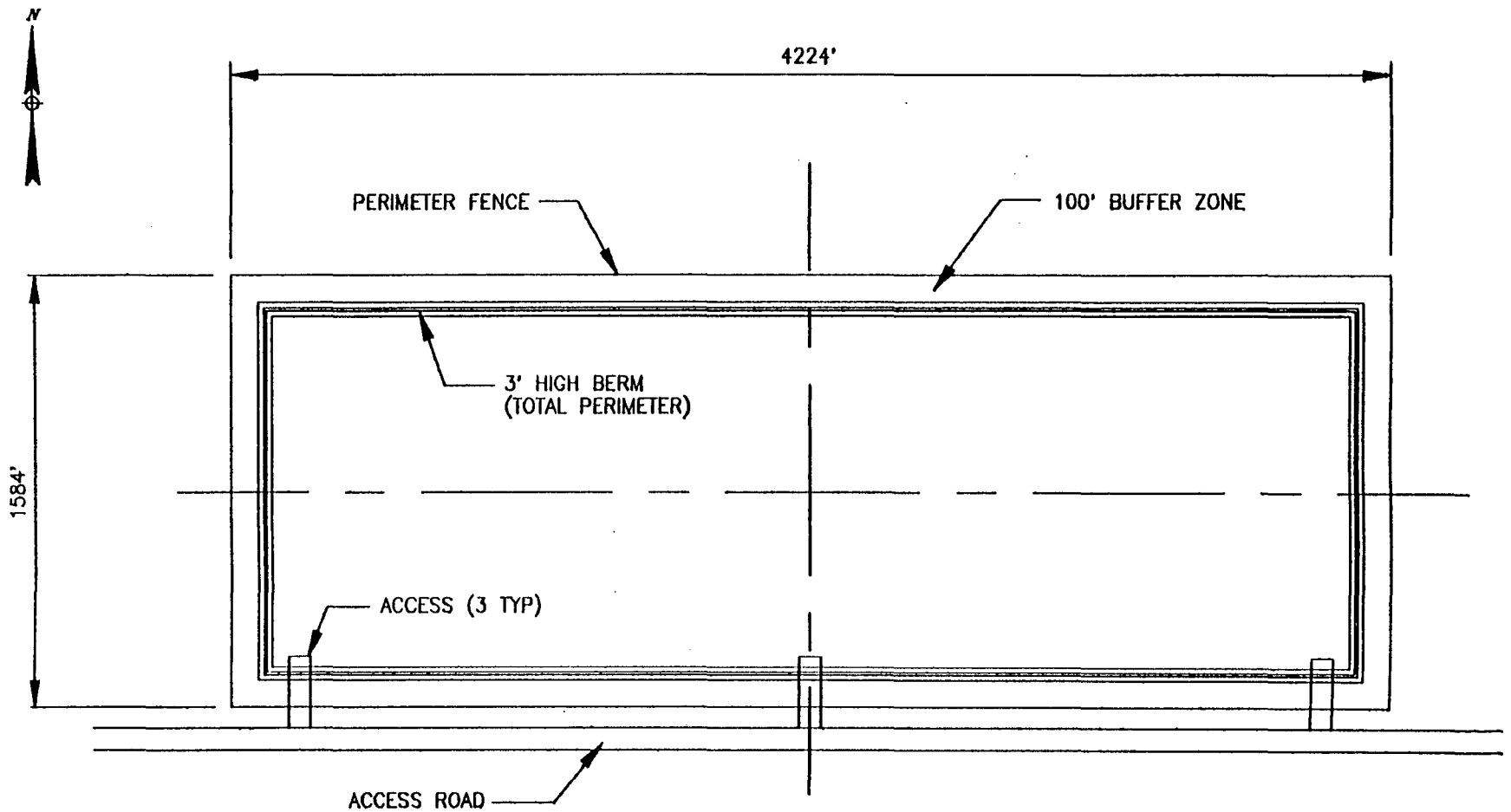


FIGURE 2
Site Location/Ownership Boundaries



127 AC. W/IN PERIMETER BERM / 31.96 AC. W/IN EACH QUADRANT

SCALE: NONE

9-21-94

FIGURE 3
Site Diagram

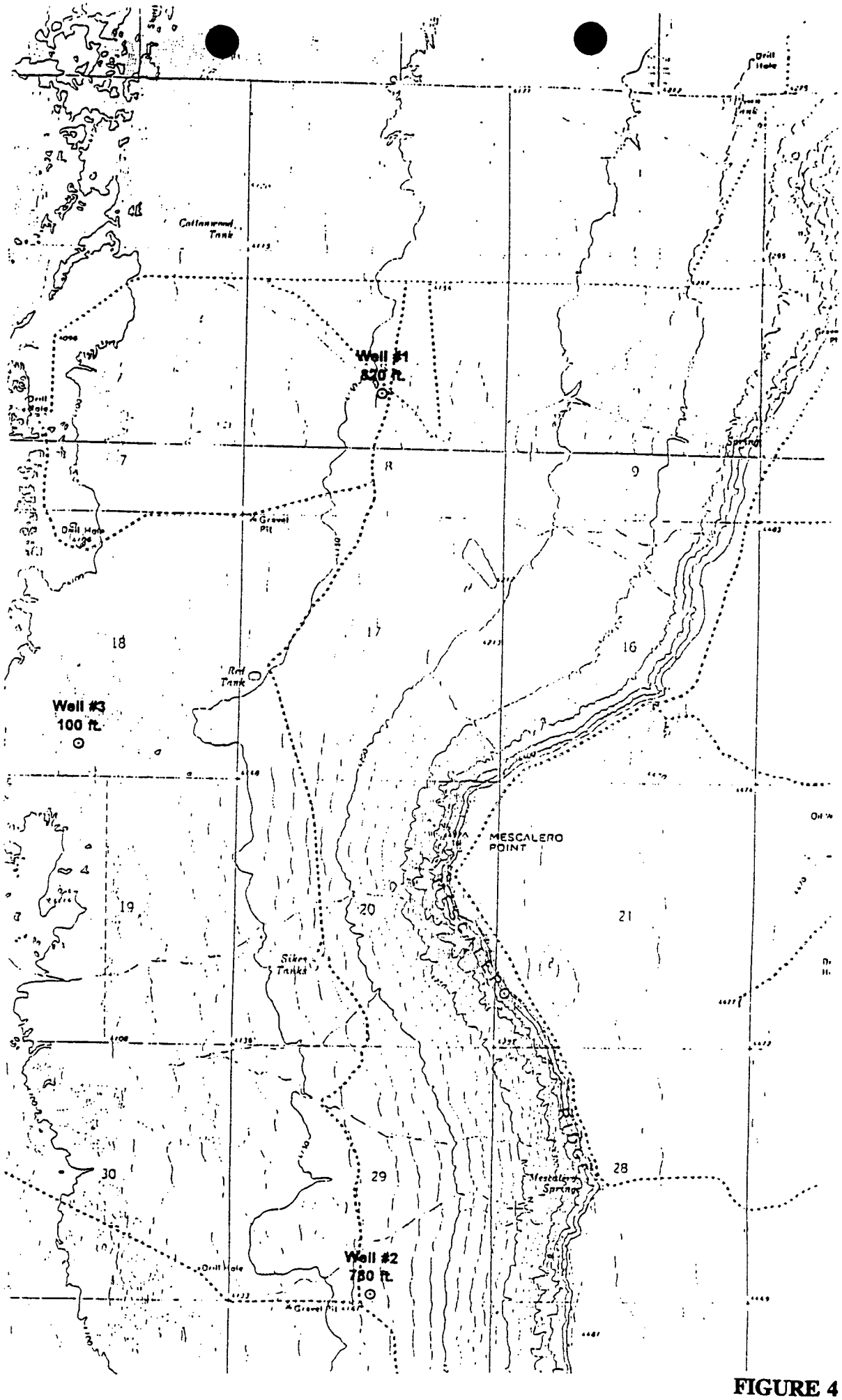


FIGURE 4
Well Locations

ASSAIGAI ANALYTICAL LABORATORIES
7300 Jefferson, N.E. • Albuquerque, New Mexico 87109 • (505) 345-8964 • FAX (505) 345-7259
3332 Wedgewood, E-5 • El Paso, Texas 79925 1910 N. Big Springs • Midland, Texas 79705

STOLLER CORPORATION
1717 LOUISIANA BLVD.
ABQ., NM 87110

Attn: JIM BONNER
Invoice Number:

Order #: 94-08-072
Date: 08/19/94 16:28
Work ID: GANDY
Date Received: 08/05/94
Date Completed: 08/19/94
Client Code: ST001

SAMPLE IDENTIFICATION

Sample Number	Sample Description
01	WELL #1
02	WELL #2
03	WELL #3

ND = None Detected D_F = Dilution Factor NT = Not Tested
B = Analyte was present in the blank
E = Estimated Value or Result exceeds calibration range
MULTIPLY THE LIMIT(= AAL'S DETECTION LIMIT) BY DILUTION FACTOR

Certified By

ATTACHMENT A
Water Sample Analysis Results

REPORT

Work Order # 94-08-072

Received: 08/05/94

Results By Test

TEST CODE default units	Sample 01 (entered units)	Sample 02 (entered units)	Sample 03 (entered units)
WFAAX N/A	N/A	N/A	N/A

Received: 08/05/94 Results by Sample

SAMPLE ID WELL #1 FRACTION 01A TEST CODE TDS NAME TDS/EPA 160.1

Date & Time Collected 07/20/94 Category WATER

PARAMETER	RESULT	LIMIT	D_F	DATE_ANAL
Total Dissolved Solids	11900	1.0	1.0	08/09/94

Notes and Definitions for this Report:

EXTRACTED

ANALYST JCB

UNITS mg/L

BATCH_ID WTDS-140

COMMENTS N/A

Received: 08/05/94 Results by Sample

SAMPLE ID WELL #1 FRACTION 01A TEST CODE WALK NAME ALKALINITY/EPA 310.1

Date & Time Collected 07/20/94 Category WATER

PARAMETER	RESULT	LIMIT	D_F	DATE_ANAL
Alkalinity	3.8	2.0	1.0	08/09/94

Notes and Definitions for this Report:

EXTRACTED

ANALYST DES

UNITS mg/L

BATCH_ID WALK-66

COMMENTS N/A

Received: 08/05/94 Results by Sample

SAMPLE ID WELL #1 FRACTION 01B TEST CODE WFAAMG NAME MAGNESIUM (FAA)/EPA 242.1

Date & Time Collected 07/20/94 Category WATER

PARAMETER	RESULT	LIMIT	D_F	DATE_EXT	DATE_ANAL
Magnesium, Mg	51.4	1.0	10	08/09/94	08/19/94

Notes and Definitions for this Report:

ANALYST KH

UNITS mg/L

BATCH_ID WFAA-181

COMMENTS RESULTS REFLECT TOTAL METALS ANALYSIS

Received: 08/05/94 Results by Sample

SAMPLE ID WELL #1 FRACTION 01B TEST CODE WFAANA NAME SODIUM (FAA)/EPA 273.1

Date & Time Collected 07/20/94 Category WATER

PARAMETER	RESULT	LIMIT	D_F	DATE_EXT	DATE_ANAL
Sodium, Na	4,600	1.0	500	08/09/94	08/19/94

Notes and Definitions for this Report:

ANALYST KH

UNITS mg/L

BATCH_ID WFAA-181

COMMENTS RESULTS REFLECT TOTAL METALS ANALYSIS

Received: 08/05/94 Results by Sample

SAMPLE ID WELL #2 FRACTION 02A TEST CODE TDS NAME TDS/EPA 160.1

Date & Time Collected 07/20/94 Category WATER

PARAMETER	RESULT	LIMIT	D_F	DATE_ANAL
Total Dissolved Solids	18800	1.0	1.0	08/09/94

Notes and Definitions for this Report:

EXTRACTED

ANALYST JCB

UNITS mg/L

BATCH_ID WTDS-140

COMMENTS N/A

Received: 08/05/94 Results by Sample

SAMPLE ID WELL #2 FRACTION 02A TEST CODE WALK NAME ALKALINITY/EPA 310.1

Date & Time Collected 07/20/94 Category WATER

PARAMETER	RESULT	LIMIT	D_F	DATE_ANAL
Alkalinity	83.0	2.0	1.0	08/09/94

Notes and Definitions for this Report:

EXTRACTED

ANALYST DES

UNITS mg/L

BATCH_ID WALK-66

COMMENTS N/A

Received: 08/05/94 Results by Sample

SAMPLE ID WELL #2 FRACTION 02B TEST CODE WFAAMG NAME MAGNESIUM (FAA)/EPA 242.1

Date & Time Collected 07/20/94 Category WATER

PARAMETER	RESULT	LIMIT	D_F	DATE_EXT	DATE_ANAL
Magnesium, Mg	87.8	1.0	15	08/09/94	08/19/94

Notes and Definitions for this Report:

ANALYST KH

UNITS mg/L

BATCH_ID WFAA-181

COMMENTS RESULTS REFLECT TOTAL METALS ANALYSIS

Received: 08/05/94 Results by Sample

SAMPLE ID WELL #2 FRACTION 02B TEST CODE WFAANA NAME SODIUM (FAA)/EPA 273.1

Date & Time Collected 07/20/94 Category WATER

PARAMETER	RESULT	LIMIT	D_F	DATE_EXT	DATE_ANAL
Sodium, Na	7,030	1.0	1,000	08/09/94	08/19/94

Notes and Definitions for this Report:

ANALYST KH

UNITS mg/L

BATCH_ID WFAA-181

COMMENTS RESULTS REFLECT TOTAL METALS ANALYSIS

Received: 08/05/94 Results by Sample

SAMPLE ID WELL #3 FRACTION 03A TEST CODE TDS NAME TDS/EPA 160.1

Date & Time Collected 07/20/94 Category WATER

PARAMETER	RESULT	LIMIT	D_F	DATE_ANAL
Total Dissolved Solids	4920	1.0	1.0	08/09/94

Notes and Definitions for this Report:

EXTRACTED

ANALYST JCB

UNITS mg/L

BATCH_ID WTDS-140

COMMENTS N/A

Received. 08/05/94 Results by Sample

SAMPLE ID WELL #3 FRACTION 03A TEST CODE WALK NAME ALKALINITY/EPA 310.1

Date & Time Collected 07/20/94 Category WATER

PARAMETER	RESULT	LIMIT	D_F	DATE_ANAL
Alkalinity	396	2.0	1.0	08/09/94

Notes and Definitions for this Report:

EXTRACTED

ANALYST DES

UNITS mg/L

BATCH_ID WALK-66

COMMENTS N/A

Received: 08/05/94 Results by Sample

SAMPLE ID WELL #3 FRACTION 03B TEST CODE WFAAMG NAME MAGNESIUM (FAA)/EPA 242.1

Date & Time Collected 07/20/94 Category WATER

PARAMETER	RESULT	LIMIT	D_F	DATE_EXT	DATE_ANAL
Magnesium, Mg	103	1.0	20	08/09/94	08/19/94

Notes and Definitions for this Report:

ANALYST KH

UNITS mg/L

BATCH_ID WFAA-181

COMMENTS RESULTS REFLECT TOTAL METALS ANALYSIS

Received: 08/05/94 Results by Sample

SAMPLE ID WELL #3 FRACTION 03B TEST CODE WFAANA NAME SODIUM (FAA)/EPA 273.1

Date & Time Collected 07/20/94 Category WATER

PARAMETER	RESULT	LIMIT	D_F	DATE_EXT	DATE_ANAL
Sodium, Na	1,640	1.0	200	08/09/94	08/19/94

Notes and Definitions for this Report:

ANALYST KH

UNITS mg/L

BATCH_ID WFAA-181

COMMENTS RESULTS REFLECT TOTAL METALS ANALYSIS

ATTACHMENT B

Proof of Public Notice

AFFIDAVIT OF PUBLICATION

County of Chaves
State of New Mexico

I, Jean M. Pettit,
Bus. Manager,

Of the Roswell Daily Record, a daily newspaper published at Roswell, New Mexico, do solemnly swear that the clipping hereto attached was published once a week in the regular and entire issue of said paper and not in a supplement thereof for a period
of: one time weeks
beginning with issue dated
September 29th , 1994
and ending with the issue dated
September 29th ,1994

Jean M. Pettit
Manager

Sworn and subscribed to before me
this 29th day of
September ,1994

Marylon L. Shipp
Notary Public

My Commission expires

July 25, 1998

(SEAL)

Publish September 29, 1994

LEGAL NOTICE

Pursuant to Rule 711 of the Oil Conservation Commission, State of New Mexico, notice is hereby given that Gandy Marley, Inc. will be filing an application for surface waste storage and remediation facility. The proposed facility will encompass approximately 154 acres of deeded land located in Sections 4, 5, 8, and 9, Township 11 South, Range 31 East. The facility site will be situated in Chaves County, approximately 39 miles eastsoutheast of Roswell, New Mexico and 33 miles northwest of Tatum, New Mexico. The purpose of the proposed facility is provide a safe place for remediation of contaminated soils from oil and gas operations. No produced water or tank bottoms will be allowed.

Any questions about the Application can be directed to Trey Greenwood, of the S.M. Stoller Corporation, at (505) 885-0172. Any comments or objections must be made to Roger Anderson, State of New Mexico, Oil Conservation Division, PO Box 2088, Santa Fe, NM 89501, within 30 days.