AP - 001

STAGE 1 & 2 REPORTS

DATE:

April 3, 1997

Appendix A

Ponding Capacity Report
Former Brickland Refinery Site
Sunland Park, New Mexico

PONDING CAPACITY REPORT
FORMER BRICKLAND REFINERY SITE
SUNLAND PARK, NEW MEXICO

April 3, 1997

Prepared for:

Mr. Reggie Baker
Rexene Corporation
2400 S. Grandview
Odessa, Texas 79760

Ponding Capacity Report
Former Brickland Refinery Site

BDM International, Inc. (BDM) performed a hydrologic flood analysis on the former Brickland Refinery site, located in Sunland Park, New Mexico. The site was operated as a petroleum refinery from 1933 to 1958 and is currently owned by the Rexene Corporation (Rexene). The objective of this analyses was to perform an off- and on-site hydrologic analyses of the volume and duration of surface runoff for both probable and extreme storm events. The site was evaluated to determine if surface water runoff from rainfall events had the potential to wash on-site soils into the Rio Grande. This task was carried out using the U.S. Army Corps of Engineers (COE) model, HEC-1, as the design basis to model expected average runoff volumes and consider impacts to the site, under the following two rainfall events:

1. A two-year, 24-hour storm was selected for evaluation because it is the most likely scenario to occur at the site and is an interim guideline employed by the New Mexico State Highway and Transportation Department (NMSHTD) in their National Pollution Discharge and Elimination System (NPDES) implementation package design criteria (NMSHTD, June 1993).

2. A 100-year, six-hour storm was evaluated because it represents conventional worst-case design criteria.

The site was evaluated to determine if the volume of water produced by these storm events would be effectively captured by the existing ponding capacity at the Rexene site.

Hydrologic Analyses

The HEC-1 model is designed to simulate the surface water runoff resulting from a rainfall. The hydrologic analysis was performed using the U.S. Army COE HEC-1 Flood Hydrograph Package computer model (version 4.0). Basin boundaries (Figure 1) were delineated using a U.S. Geological Survey (USGS) 7.5-minute quadrangle map, Smeltertown, Texas-New Mexico, N3145-W10630/7.5, photorevised in 1967 and 1973. Both off- and on-site hydrologic analyses were calculated for the Rexene site. The off-site (basin 1) and on-site (basin 2) drainage basin areas are approximately 42 acres (0.067 square mile), and 33 acres (0.0515 square mile), respectively, and are shown in Figure 1. The following parameters were derived for the two-year, 24-hour and the 100-year, six-hour storm:

- Runoff volume
- Peak flow rate
- Time to peak

The assumptions used are conservative because the simulations are limited to a single storm event for each scenario and provisions are not made for soil moisture recovery during periods of no precipitation.

All assumptions and information required for the HEC-1 model were obtained from the following sources:

- Realistic six-hour and 24-hour rainfall distributions were generated from depth-duration data presented in the U.S. Department of Commerce, National Oceanic and Atmospheric Administration (NOAA), Precipitation-Frequency Atlas for New Mexico.

- A synthetic unit hydrograph was generated by the Snyder method in accordance with procedures presented in the U.S. Army COE, "Flood Hydrograph Analysis and Computations," Engineering Manual 1110-2-1405, August 1959. Snyder unit hydrograph parameters Ct, Cp640 were obtained from "Report on Hydrologic Investigations, Flood Insurance Study, Northeast and Central El Paso, Texas," February 1978, using the curve for undeveloped areas.

- Infiltration loss rates were obtained from the Las Cruces Flood Insurance Study (March 1981). An initial loss of 0.7 inch and a constant loss of 0.2 inch/hour were used for the two-year, 24-hour design storm analysis. For the 100-year, six-hour storm, no initial loss was used (0.0 inches), and a constant loss of 0.2 inches per hour was used.

Results of HEC-1 Model

The peak flow rate, time to peak, and runoff volume (for basins 1 and 2) for the selected storm events are presented in Table 1.

Table 1

	Two-Year, 24-Hour			100-Year, Six-Hour		
	Peak Flows (cfs)	Time to Peak (hr)	Volume (ac-ft)	Peak Flows (cfs)	Time to Peak (hr)	Volume (ac-ft)
Basin 1	41	0.83	1.11	281	0.67	8.23
Basin 2	18	0.92	0.79	112	0.75	6.84
Total			**1.9**			**15.07**

The results of the analysis indicate surface-water runoff is 1.9 acre feet from a two-year, 24-hour storm and 15.07 acre feet from a 100-year, six-hour storm.

Actual Site Ponding Capacity Calculations

The 33-acre Rexene site was divided into six sub-areas onto which a 50 foot by 50 foot grid was superimposed for the purposes of calculating the total actual site ponding capacity. The ponding capacity volume for each sub-area was determined by summing the individual volumes of the grid squares. The volume of each 50-foot long by 50-foot wide grid square was calculated by multiplying the area by an estimated average depth obtained from mapped contour elevations (appendix). A map showing sub-area designation and grid placement is located in the appendix. Table 2 shows the calculated actual volume results for each of the sub-areas.

Table 2

SUB-AREA	SUB-AREA VOLUME (acre-feet)
Area 1	5.492
Area 2	2.484
Area 3	5.601
Area 4	4.968
Area 5	0.957
Area 6	0.286
TOTAL VOLUME:	**19.788**

Site topography indicates storm-water runoff would begin ponding in sub-area 3 and would extend into sub-areas 2, 1, 4, 5, and 6, respectively, as additional storm water runoff enters and crosses the site.

Conclusions

The following conclusions are estimates based on the analyses presented and summarized above:

- The ponding capacity of the site is 19.79 acre-feet.
- A two-year, 24-hour storm generates 1.9 acre-feet of water.
- A 100-year, six-hour storm generates 15.07 acre-feet of water.
- The total site ponding capacity (19.79 acre-feet) contains runoff from a 100-year, six-hour storm with a 1.3 factor of safety.
- Sub-areas 1, 2, 3, and 4 provide a total ponding volume of 18.5 acre-feet and would be utilized for the 100-year, six-hour storm.

Based on the topographic information used in this study, the site has sufficient ponding capacity to contain runoff from a 100-year, six-hour storm. However, several factors may contribute to decreasing the 1.3 safety factor of the calculations:

1. Topographic data is not recent and some earthmoving has occurred at the site. Rubbish, dirt, and construction debris have been removed while some clean soil has been brought to the site. We believe, however, any net gain or loss of material is negligible.

2. Although calculations show the site will contain surface water runoff, it is known that some runoff has occurred in the past across the northern portion of the site. Minor earth work to improve the border between the site and adjacent private property to the north was completed in 1996 to prevent runoff in the future.

A greater safety factor can be achieved by surveying the site to verify volumetric calculations and making minor improvements to the border and levee.

References

U.S. Department of Commerce, National Oceanic and Atmospheric Administration (NOAA), Precipitation-Frequency Atlas for New Mexico.

U.S. Army Corps of Engineers, 1959. Flood Hydrograph Analysis and Computations, Engineering Manual 1110-2-1405, August.

"Report on Hydrologic Investigations, Flood Insurance Study, Northeast and Central El Paso, Texas," February 1978.

U.S. Federal Emergency Management Agency, 1983. Flood Insurance Study: City of Las Cruces, New Mexico, Doña Ana County.

New Mexico State Highway Transportation Department, 1993. National Pollutant Discharge Elimination System Implementation Package, June.

\3031\RUNOFF.MWS

GCL
Environmental Science and Engineering
A BDM International Company

ENGINEERING CALCULATION

Sheet: ____ of ____
Date: ____
By: ____
File: ____

E
N S
W

North to South, West to East

1 cm²—0.1550 in²
1 in²—6.452 cm²
1m²—10.764 ft²
1 ft²—929.0 cm²

1 acre—43,560 ft²
—4049 m²

1 hectare—10,000 m²
—2.471 acres

1 mi²—2.590 km²
—640 acres

Volume

1 m³—1000 liters
—35 314 ft³
—264 gal (U S.)

1 ft³—28.320 liters
—7 481 gal (U.S.)

1 gal—3 785 liters

1 acre foot—43,560 ft³
—3 259 × 10⁵ gal
—1234 m³

Discharge

1ft³/min—0 472 liters/sec
1 acre foot/day
—3 259 × 10⁵ gal/day
1 ft³/sec—448.8 gal/min
—724 acre feet/year

Density

Water 1 000 g/cm³ at 4°C
0 998 g/cm³ at 20°C
Sea water 1 025 g/cm³ at 15°C
Mercury 13 55 g/cm³ at 20°C
Air 1 29 × 10⁻³ g/cm³ at 20°C and atmospheric pressure

Specific weight water in air

8 335 lb/gal at 0°C
8.328 lb/gal at 60° F
8.322 lb/gal at 20° C
62 18 lb/ft³ at 60° F

Pressure

1 bar—0 9869 atmosphere
—10⁶ dynes/cm²
—14 50 lb/in²

pressure developed from static liquid
1 cm mercury
—0 01316 atmosphere
1 ft water
—0 02950 atmosphere
33.90 ft water
—1 00 atmosphere

Area 1 (50x50 Grid)

Row 1 A = 2500 D = 3730 − 3729.6

2500 ft² × 0.4 ft = 1000 ft³ × $\frac{1 \text{ ac ft}}{43560 \text{ ft}^3}$ = 0.0229 ac·ft

0.0631 "
0.0459 "
0.2467 "

Row 1 A = 2500 ft² . D = 3735.6 − 3730 = 5.6

2500 × 5.6 = 14000 ÷ 43560 = ~~0.007 ac ft~~ 0.3213 ac ft

2500 × 6.4 = 16000 ÷ 43560 = 0.3673
2500 × 1.0 = 2500 ÷ " = ~~0.5739~~ 0.0573
" = ~~0.5739~~ 0.0573
2500 × 4.5 = 11250 ÷ " = 0.2582
2500 × " = 0.2582
2500 × " = 0.2582
" = 0.2582
" = 0.2582
" = 0.2582
2500 × " = 0.2582
2500 × 1.1 = 2750 ÷ " = 0.0631 2.6524
~~3.3856~~ ac·ft

Row 2

2500 × 2.4 = 6000 ÷ " = 0.1377
2500 × 3.9 = 9750 ÷ " = 0.2238
2500 × 0.2 = 500 ÷ " = 0.0114
2500 × 4 = 10,000 ÷ " = 0.2295
2500 × 1 = 2500 ÷ " = ~~0.0635734~~ 0.0573
2500 × 1 = 2500 ÷ " = ~~0.5734~~ 0.0573
2500 × 1.1 = 2750 ÷ " = 0.0631
" = 0.0631
" = 0.0631
" = 0.0631
" = 0.0631
" = 0.0631
" = 0.0631
" = 0.0631

~~2.1914~~ 1.1567 ac

GCL
Environmental Science and Engineering
A BDM International Company

ENGINEERING CALCULATION

Sheet: ____ of ____
Date: ____
By: ____
File: ____

1 cm²—0.1550 in²
1 in²—6.452 cm²
1m²—10.764 ft²
1 ft²—929.0 cm²

1 acre—43,560 ft²
—4049 m²

1 hectare—10,000 m²
—2.471 acres

1 mi²—2.590 km²
—640 acres

Volume

1 m³—1000 liters
—35.314 ft³
—264 gal (U.S.)

1 ft³—28.320 liters
—7.481 gal (U.S.)

1 gal—3.785 liters

1 acre foot—43,560 ft³
—3.259 × 10⁵ gal
—1234 m³

Discharge

1ft³/min—0.472 liters/sec
1 acre foot/day
—3.259 × 10³ gal/day
1 ft³/sec—448.8 gal/min
—724 acre feet/year

Density

Water 1 000 g/cm³ at 4°C
0 998 g/cm³ at 20°C
Sea water 1 025 g/cm³ at 15°C
Mercury 13.55 g/cm³ at 20°C
Air 1.29 × 10⁻³ g/cm³ at 20°C and atmospheric pressure

Specific weight water in air

8 335 lb/gal at 0°C
8 328 lb/gal at 60° F
8.322 lb/gal at 20° C
62 18 lb/ft³ at 60° F

Pressure

1 bar—0 9869 atmosphere
—10⁶ dynes/cm²
—14.50 lb/in²

pressure developed from static liquid
1 cm mercury
—0 01316 atmosphere
1 ft water
—0 02950 atmosphere
33 90 ft water
—1 00 atmosphere

Row 3

2500 × 0.2 = 500 ÷ 43560 = 0.0114 ac. ft
" " = 0.0114
2500 × 0.4 = 1000 ÷ 43560 = 0.0229
2500 × = 0.0229
" = 0.0229
" = 0.0229
2500 × 0.5 = 1250 ÷ " = 0.0286
" 0.2 = 500 ÷ " = 0.0114
" " = 0.0114
2500 × 1.5 = 3750 ÷ " = 0.0860
" = 0.0860

0.3378

Row 4

2500 × 0.4 = 1000 ÷ 43560 = 0.0229 × 11 = 0.2519

Row 5

0.3378

Row 6

0.2378

Row 7

~~0.5734~~ × 7 = 0.
0.0573 × 9 = 0.5157 ac. ft

Area 1 total ac. ft = ~~5.4921~~ 5.4921 — seems too high

GCL
Environmental Science and Engineering
A BDM International Company

ENGINEERING CALCULATION

Sheet: ____ of ____
Date: ____
By: ____
File: ____

1 cm²—0.1550 in²
1 in²—6.452 cm²
1m²—10.764 ft²
1 ft²—929.0 cm²

1 acre—43,560 ft²
—4049 m²

1 hectare—10.000 m²
—2.471 acres

1 mi²—2.590 km²
—640 acres

Volume

1 m³—1000 liters
—35.314 ft³
—264 gal (U.S.)

1 ft³—28.320 liters
—7.481 gal (U.S.)

1 gal—3.785 liters

1 acre foot—43.560 ft³
—3.259 × 10⁵ gal
—1234 m³

Discharge

1ft³/min—0.472 liters/sec
1 acre foot/day
—3.259 × 10⁵ gal/day
1 ft³/sec—448.8 gal/min
—724 acre feet/year

Density

Water 1.000 g/cm³ at 4°C
0 998 g/cm³ at 20°C
Sea water 1 025 g/cm³ at 15°C
Mercury 13.55 g/cm³ at 20°C
Air 1 29 × 10⁻³ g/cm³ at 20°C and atmospheric pressure

Specific weight water in air

8 335 lb/gal at 0°C
8 328 lb/gal at 60° F
8 322 lb/gal at 20° C
62 18 lb/ft³ at 60° F

Pressure

1 bar—0 9869 atmosphere
—10⁶ dynes/cm²
—14 50 lb/in²

pressure developed from static liquid
1 cm mercury
—0 01316 atmosphere
1 ft water
—0 02950 atmosphere
33 90 ft water
—1 00 atmosphere

Area 2 (50 X 50)

Row 1
2500 X 1.0 = 2500 ÷ 43560 = 0.0573 X 7 = 0.4017 ac·ft

Row 2
2500 X 1.0 = 2500 ÷ " = 0.0573 X 7 = 0.4017 ac·ft

Row 3
2500 X 1,2 = 3000 ÷ " = 0.0688 X 6 = 0. 4132 ac·ft
2500 X 2 = 5000 ÷ " = 0.1147 ac·ft
0.5279 ac·ft

Row 4
2500 X 0.5 = 1250 ÷ " = 0.02869 X 7 = 0. 2008 ac·ft

Row 5
2500 X 0.1 = 250 ÷ 43560 = 0.0057 X 6 = 0.0344
2500 X 0.4 = 1000 ÷ " = 0.0229
0.0573 ac·ft

Row 6
2500 X 0.1 = 250 ÷ 43560 = 0.0057 X 6 = 0.0344 ac·ft

Row 7
2500 X 0.1 = 250 ÷ 43560 = 0.0057 X 6 = 0.0344 ac·ft

Row 8
2500 X 0.3 = 0750 ÷ 43560 = 0.0172 X 7 = 0.1205 ac·ft

Row 9
2500 X 0.7 = 1750 ÷ 43560 = 0.0401 X 6 = 0.2410

Row 10
2500 X 2.7 = 6750 ÷ 43560 = 0.1549 X 3 = 0.4648

Total Ponding Area 2 = 2.4845

GCL
Environmental Science and Engineering
A BDM International Company

ENGINEERING CALCULATION

Sheet: ____ of ____
Date: ____
By: ____
File: ____

1 cm²—0.1550 in²
1 in²—6.452 cm²
1m²—10.764 ft²
1 ft²—929.0 cm²

1 acre—43,560 ft²
—4049 m²

1 hectare—10,000 m²
—2.471 acres

1 m²—2.590 km²
—640 acres

Volume

1 m³—1000 liters
—35.314 ft³
—264 gal (U.S.)

1 ft³—28.320 liters
—7.481 gal (U.S.)

1 gal—3.785 liters

1 acre foot—43.560 ft³
—3.259 × 10⁵ gal
—1234 m³

Discharge

1ft³/min—0.472 liters/sec
1 acre foot/day
—3 259 × 10⁵ gal/day
1 ft³/sec—448.8 gal/min
—724 acre feet/year

Density

Water 1 000 g/cm³ at 4°C
0 998 g/cm³ at 20°C
Sea water 1.025 g/cm³ at 15°C
Mercury 13.55 g/cm³ at 20°C
Air 1 29 × 10⁻³ g/cm³ at 20°C and atmospheric pressure

Specific weight water in air

8 335 lb/gal at 0°C
8 328 lb/gal at 60° F
8 322 lb/gal at 20° C
62 18 lb/ft³ at 60° F

Pressure

1 bar—0 9869 atmosphere
—10⁶ dynes/cm²
—14 50 lb/in²

pressure developed from static liquid
1 cm mercury
—0 01316 atmosphere
1 ft water
—0 02950 atmosphere
33 90 ft water
—1 00 atmosphere

Area 3 (50×50)

Row 1

2500 × 0.1 = 250 ÷ 43560 = 0.0057 × 9 = 0.0513 ac-ft

Row 2

2500 × 0.1 = 250 ÷ 11 = 0.0057 × 9 = 0.0513 ac-ft

Row 3

2500 × 0.1 = 250 ÷ 11 = 0.0057 × 9 = 0.0513 ac-ft

Row 4

2500 × 0.4 = 1000 ÷ 11 = 0.0229 × 9 = 0.2061 ac-ft

Row 5

2500 × 0.8 = 2000 ÷ 11 = 0.0459 × 10 = 0.4591 ac-ft

Row 6

2500 × 3.9 = 9750 ÷ 11 = 0.2238 × 10 = 2.238 ac-ft

Row 7

2500 × 2.0 = 5000 ÷ 11 = 0.1147 × 9 = 1.033 ac-ft

Row 8

2500 × 1.1 = 2750 ÷ 11 = 0.0631 × 10 = 0.6313 ac-ft

Row 9

2500 × 0.2 = 500 ÷ 11 = 0.0114 × 1 = 0.0114 ac-ft

Row 10

2500 × 1.2 = 3000 ÷ 11 = 0.0688 × 10 = 0.688 ac-ft

Row 11

625 × 1.5 = 938 ÷ 11 = 0.0215 × 7 = 0.1505 ac-ft

Total Ponding Area 3 = 5.617 ac-ft

GCL
Environmental Science and Engineering
A BDM International Company

ENGINEERING CALCULATION

Sheet: ____ of ____
Date: ____
By: ____
File: ____

1 cm²—0.1550 in²
1 in²—6.452 cm²
1m²—10.764 ft²
1 ft²—929.0 cm²

1 acre—43,560 ft²
—4049 m²

1 hectare—10,000 m²
—2.471 acres

1 mi²—2.590 km²
—640 acres

Volume

1 m³—1000 liters
—35.314 ft³
—264 gal (U.S.)

1 ft³—28.320 liters
—7 481 gal (U.S.)

1 gal—3.785 liters

1 acre foot—43,560 ft³
—3 259 × 10³ gal
—1234 m³

Discharge

1ft³/min—0.472 liters/sec
1 acre foot/day
—3 259 × 10³ gal/day
1 ft³/sec—448.8 gal/min
—724 acre feet/year

Density

Water 1 000 g/cm³ at 4°C
0 998 g/cm³ at 20°C
Sea water 1 025 g/cm³ at 15°C
Mercury 13 55 g/cm³ at 20°C
Air 1 29 × 10⁻³ g/cm³ at 20°C and atmospheric pressure

Specific weight water in air

8 335 lb/gal at 0°C
8 328 lb/gal at 60° F
8 322 lb/gal at 20° C
62 18 lb/ft³ at 60° F

Pressure

1 bar—0 9869 atmosphere
—10⁶ dynes/cm²
—14 50 lb/in²

pressure developed from static liquid
1 cm mercury
—0 01316 atmosphere
1 ft water
—0 02950 atmosphere
33 90 ft water
—1 00 atmosphere

Area 4

Row 1

2500 × 1.1 = 2750 ÷ 43560 = 0.0631 × 2 = 0.1262 ac.ft

Row 2

2500 × 2.0 = 5000 ÷ 43560 = 0.1147 × 5 = 0.57341 ac.ft
2500 × 0.5 = 1250 ÷ " = 0.0286 × 8 = 0.2288
0.8027 ac.ft

Row 3

2500 × 1.2 = 3000 ÷ 43560 = 0.0688 × 12 = 0.8264 ac.ft

Row 4

2500 × 1.2 = 3000 ÷ " = 0.0688 × 12 = 0.8264 ac.ft

Row 5

2500 × 1.5 = 3750 ÷ " = 0.0860 × 12 = 1.033 ac.ft

Row 6

2500 × 1.0 = 2500 ÷ " = 0.0573 × 12 = 0.6876 ac.ft

Row 7

2500 × 0.7 = 1750 ÷ " = 0.0401 × 12 = 0.4820 ac.ft

Row 8

2500 × 0.2 = 500 ÷ " = 0.0114 × 11 = 0.1262 ac.ft

Row 9

2500 × 0.1 = 250 ÷ " = 0.0057 × 7 = 0.0401 ac.ft

Row 10

2500 × 0.1 = 250 ÷ " = 0.0057 × 3 = 0.0171 ac.ft

Total Ponding Area 4 = 4.9677 ac.ft

GCL
Environmental Science and Engineering
A BDM International Company

ENGINEERING CALCULATION

Sheet: _____ of _____
Date: _____
By: _____
File: _____

1 cm²—0.1550 in²
1 in²—6.452 cm²
1m²—10.764 ft²
1 ft²—929.0 cm²

1 acre—43,560 ft²
—4049 m²

1 hectare—10.000 m²
—2.471 acres

1 mi²—2.590 km²
—640 acres

Volume

1 m³—1000 liters
—35.314 ft³
—264 gal (U.S.)

1 ft³—28.320 liters
—7.481 gal (U.S.)

1 gal—3.785 liters

1 acre foot—43.560 ft³
—3.259 × 10⁵ gal
—1234 m³

Discharge

1ft³/min—0.472 liters/sec
1 acre foot/day
—3.259 × 10⁵ gal/day
1 ft³/sec—448.8 gal/min
—724 acre feet/year

Density

Water 1 000 g/cm³ at 4°C
0 998 g/cm³ at 20°C
Sea water 1.025 g/cm³ at 15°C
Mercury 13.55 g/cm³ at 20°C
Air 1.29 × 10⁻³ g/cm³ at 20°C and atmospheric pressure

Specific weight water in air

8 335 lb/gal at 0°C
8 328 lb/gal at 60° F
8 322 lb/gal at 20° C
62 18 lb/ft³ at 60° F

Pressure

1 bar—0 9869 atmosphere
—10⁶ dynes/cm²
—14.50 lb/in²

pressure developed from static liquid
1 cm mercury
—0 01316 atmosphere
1 ft water
—0 02950 atmosphere
33 90 ft water
—1 00 atmosphere

Area 5

Row 1
2500 X 0.2 = 500 X 43560 = 0.0114 X 5 = 0.0573 ac.ft

Row 2
2500 X 0.1 = 250 ÷ 11 = 0.0057 X 6 = 0.0342 ac.ft

Row 3
2500 X 0.1 = 250 ÷ 11 = 0.0057 X 6 = 0.0342 ac.ft

Row 4
2500 X 1.0 = 2500 ÷ 11 = 0.0573 X 5 = 0.2865 ac.ft

Row 5
2500 X 1.0 = 2500 ÷ 11 = 0.0573 X 5 = 0.2865 ac.ft

Row 6
2500 X 1.5 = 3750 ÷ 11 = 0.0860 X 3 = 0.2582 ac.ft

Total Ponding Area 5 = 0.9569 ac.ft

GCL
Environmental Science and Engineering
A BDM International Company

ENGINEERING CALCULATION

Sheet: ____ of ____
Date: ____
By: ____
File: ____

1 cm²—0.1550 in²
1 in²—6.452 cm²
1m²—10.764 ft²
1 ft²—929.0 cm²

1 acre—43,560 ft²
—4049 m²

1 hectare—10,000 m²
—2.471 acres

1 mi²—2.590 km²
—640 acres

Volume

1 m³—1000 liters
—35.314 ft³
—264 gal (U.S.)

1 ft³—28.320 liters
—7.481 gal (U.S.)

1 gal—3.785 liters

1 acre foot—43,560 ft³
—3.259 × 10⁵ gal
—1234 m³

Discharge

1ft³/min—0.472 liters/sec
1 acre foot/day
—3.259 × 10⁵ gal/day
1 ft³/sec—448.8 gal/min
—724 acre feet/year

Density

Water 1.000 g/cm³ at 4°C
0 998 g/cm³ at 20°C
Sea water 1 025 g/cm³ at 15°C
Mercury 13 55 g/cm ³ at 20°C
Air 1.29 × 10⁻³ g/cm³ at 20°C and atmospheric pressure

Specific weight water in air

8 335 lb/gal at 0°C
8 328 lb/gal at 60° F
8 322 lb/gal at 20° C
62.18 lb/ft³ at 60° F

Pressure

1 bar—0 9869 atmosphere
—10⁶ dynes/cm²
—14.50 lb/in²

pressure developed from static liquid
1 cm mercury
—0 01316 atmosphere
1 ft water
—0 02950 atmosphere
33 90 ft water
—1 00 atmosphere

Area 6

Row 1 $2500 \times 1.0 = 2500 \div 43\,560 = 0.0573$ ac.ft

Row 2 $2500 \times 1.0 = 2500 \div 43560 = 0.0573 \times 2 = 0.1146$ ac.ft

Row 3 0.0573

Row 4 0.0573

Total Ponding Area 6 = 0.2865 acft

GCL
Environmental Science and Engineering
A BDM International Company

ENGINEERING CALCULATION

Sheet: _____ of _____
Date: _____
By: _____
File: _____

1 cm²—0.1550 in²
1 in²—6.452 cm²
1m²—10.764 ft²
1 ft²—929.0 cm²

1 acre—43,560 ft²
—4049 m²

1 hectare—10,000 m²
—2.471 acres

1 mi²—2.590 km²
—640 acres

Volume

1 m³—1000 liters
—35.314 ft³
—264 gal (U.S.)

1 ft³—28.320 liters
—7.481 gal (U.S.)

1 gal—3.785 liters

1 acre foot—43.560 ft³
—3.259 × 10⁵ gal
—1234 m³

Discharge

1ft³/min—0.472 liters/sec
1 acre foot/day
—3.259 × 10⁶ gal/day
1 ft³/sec—448.8 gal/min
—724 acre feet/year

Density

Water 1 000 g/cm³ at 4°C
0 998 g/cm³ at 20°C
Sea water 1 025 g/cm³
at 15°C
Mercury 13 55 g/cm ³
at 20°C
Air 1 29 × 10−³ g/cm³
at 20°C and
atmospheric pressure

Specific weight water in air

8 335 lb/gal at 0°C
8 328 lb/gal at 60° F
8 322 lb/gal at 20° C
62.18 lb/ft³ at 60° F

Pressure

1 bar—0 9869 atmosphere
—10⁶ dynes/cm²
—14 50 lb/in²

pressure developed
from static liquid
1 cm mercury
—0 01316 atmosphere
1 ft water
—0 02950 atmosphere
33 90 ft water
—1 00 atmosphere

Total Ponding Areas 1-6

19.788 ac-ft

```
ID BASINS 1 & 2 - BRICKLAND WEST SLOPE, SUNLAND PARK, NM
ID 100-YEAR 6-HOUR RAINFALL FROM NOAA ATLAS - RELISTIC DISTRIBUTION PATTERN
ID WITH EXPECTED PROBABILITY ADJUSTMENT
ID FROM LAS CRUCES FIS: 0.00 INCH INITIAL LOSS & 0.20 INCH HOURLY LOSS
ID MARCH 1988 - BL
IT  5        300
IO  1
JR FLOW   1.03
KK   1   RUNOFF HYDROGRAPH FOR BASIN 1
BA0.0666
PB 3.10
PI 0.02  0.02  0.03  0.08  0.10  0.11  0.70  0.39  0.29  0.22
PI 0.16  0.15  0.08  0.07  0.07  0.02  0.02  0.02  0.02  0.02
PI 0.02  0.02  0.02  0.02  0.02  0.02  0.02  0.02  0.01  0.01
PI 0.01  0.01  0.01  0.01  0.01  0.01  0.01  0.01  0.01  0.01
PI 0.01  0.01  0.01  0.01  0.01  0.01  0.01  0.01  0.01  0.01
PI 0.01  0.01  0.01  0.01  0.01  0.01    0     0     0   0.01
PI 0.01  0.01  0.01  0.01  0.01  0.01    0     0     0     0
PI   0     0
LU 0.00   0.20
US0.0591   0.61
KK   2   RUNOFF HYDROGRAPH FOR BASIN 2
BA0.0371
PB 3.10
LU 0.00   0.20
US0.1202   0.61
ZZ
```

```
!****************************************                    ****************************************
*                  *                      *                  *
*  FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *                        *  U.S. ARMY CORPS OF ENGINEERS   *
*       SEPTEMBER 1990        *                           *  HYDROLOGIC ENGINEERING CENTER  *
*        VERSION 4.0          *                        *     609 SECOND STREET       *
*                  *                      *    DAVIS, CALIFORNIA 95616     *
*  RUN DATE  04/05/1980  TIME  10:14:21  *                        *       (916) 756-1104        *
*                  *                      *                  *
****************************************                    ****************************************
```

```
X   X XXXXXXX  XXXXX      X
X   X X    X   X    XX
X   X X    X       X
XXXXXXX XXXX   X    XXXXX  X
X   X X    X       X
X   X X    X   X    X
X   X XXXXXXX  XXXXX     XXX
```

THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.
THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION
NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,
DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL LOSS RATE:GREEN AND AMPT INFILTRATION
KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM

```
LINE      ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

  1       ID  BASINS 1 & 2 - BRICKLAND WEST SLOPE, SUNLAND PARK, NM
  2       ID  100-YEAR 6-HOUR RAINFALL FROM NOAA ATLAS - RELISTIC DISTRIBUTION PATTERN
  3       ID  WITH EXPECTED PROBABILITY ADJUSTMENT
  4       ID  FROM LAS CRUCES FIS: 0.00 INCH INITIAL LOSS & 0.20 INCH HOURLY LOSS
  5       ID  MARCH 1988 - BL
  6       IT    5         300
  7       IO    1
  8       JR  FLOW   1.03

  9       KK    1  RUNOFF HYDROGRAPH FOR BASIN 1
 10       BA 0.0666
 11       PB  3.10
 12       PI  0.02  0.02  0.03  0.08  0.10  0.11  0.70  0.39  0.29  0.22
 13       PI  0.16  0.15  0.08  0.07  0.07  0.02  0.02  0.02  0.02  0.02
 14       PI  0.02  0.02  0.02  0.02  0.02  0.02  0.02  0.02  0.01  0.01
 15       PI  0.01  0.01  0.01  0.01  0.01  0.01  0.01  0.01  0.01  0.01
 16       PI  0.01  0.01  0.01  0.01  0.01  0.01  0.01  0.01  0.01  0.01
 17       PI  0.01  0.01  0.01  0.01  0.01  0.01     0     0     0  0.01
 18       PI  0.01  0.01  0.01  0.01  0.01  0.01     0     0     0     0
 19       PI     0     0
 20       LU  0.00  0.20
 21       US 0.0591  0.61

 22       KK    2  RUNOFF HYDROGRAPH FOR BASIN 2
 23       BA 0.0371
 24       PB  3.10
 25       LU  0.00  0.20
 26       US 0.1202  0.61
 27       ZZ
```

```
|****************************************                ****************************************
*                    *                    *                    *
*  FLOOD HYDROGRAPH PACKAGE (HEC-1)  *                    *  U.S. ARMY CORPS OF ENGINEERS   *
*        SEPTEMBER 1990         *                    *  HYDROLOGIC ENGINEERING CENTER  *
*         VERSION 4.0           *                    *       609 SECOND STREET         *
*                               *                    *  DAVIS, CALIFORNIA 95616        *
*  RUN DATE  04/05/1980  TIME  10:14:21  *                    *       (916) 756-1104         *
*                    *                    *                    *
****************************************                ****************************************
```

BASINS 1 & 2 - BRICKLAND WEST SLOPE, SUNLAND PARK, NM
100-YEAR 6-HOUR RAINFALL FROM NOAA ATLAS - RELISTIC DISTRIBUTION PATTERN
WITH EXPECTED PROBABILITY ADJUSTMENT
FROM LAS CRUCES FIS: 0.00 INCH INITIAL LOSS & 0.20 INCH HOURLY LOSS
MARCH 1988 - BL

```
 7 IO      OUTPUT CONTROL VARIABLES
             IPRNT        1  PRINT CONTROL
             IPLOT        0  PLOT CONTROL
             QSCAL        0.  HYDROGRAPH PLOT SCALE

  IT       HYDROGRAPH TIME DATA
             NMIN         5  MINUTES IN COMPUTATION INTERVAL
             IDATE     1    0  STARTING DATE
             ITIME      0300  STARTING TIME
               NQ       101  NUMBER OF HYDROGRAPH ORDINATES
            NDDATE     1    0  ENDING DATE
            NDTIME      1120  ENDING TIME
            ICENT       19  CENTURY MARK

          COMPUTATION INTERVAL    .08 HOURS
            TOTAL TIME BASE   8.33 HOURS

     ENGLISH UNITS
       DRAINAGE AREA        SQUARE MILES
       PRECIPITATION DEPTH   INCHES
       LENGTH, ELEVATION     FEET
       FLOW                 CUBIC FEET PER SECOND
       STORAGE VOLUME       ACRE-FEET
       SURFACE AREA         ACRES
       TEMPERATURE          DEGREES FAHRENHEIT

  JP       MULTI-PLAN OPTION
             NPLAN        1  NUMBER OF PLANS

  JR       MULTI-RATIO OPTION
            RATIOS OF RUNOFF
           1.03
```

*** ***

```
     **************
     *       *
 9 KK   *     1 *      RUNOFF HYDROGRAPH FOR BASIN 1
     *       *
     **************
```

SUBBASIN RUNOFF DATA

10 BA SUBBASIN CHARACTERISTICS
TAREA .07 SUBBASIN AREA

PRECIPITATION DATA

11 PB STORM 3.10 BASIN TOTAL PRECIPITATION

12 PI INCREMENTAL PRECIPITATION PATTERN

.02	.02	.03	.08	.10	.11	.70	.39	.29	.22
.16	.15	.08	.07	.07	.02	.02	.02	.02	.02
.02	.02	.02	.02	.02	.02	.02	.02	.01	.01
.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
.01	.01	.01	.01	.01	.01	.00	.00	.00	.01
.01	.01	.01	.01	.01	.01				

20 LU UNIFORM LOSS RATE
STRTL .00 INITIAL LOSS
CNSTL .20 UNIFORM LOSS RATE
RTIMP .00 PERCENT IMPERVIOUS AREA

21 US SNYDER UNITGRAPH
TP .06 LAG
CP .61 PEAKING COEFFICIENT

SYNTHETIC ACCUMULATED-AREA VS. TIME CURVE WILL BE USED

***

TC INCREASED TO DELTA T OF .08 HR
CLARK DID NOT CONVERGE TO GIVEN SNYDER COEFFICIENTS
APPROXIMATE CLARK COEFFICIENTS FROM GIVEN SNYDER CP AND TP ARE TC= .08 AND R= .04 INTERVALS

UNIT HYDROGRAPH PARAMETERS
CLARK TC= .08 HR, R= .04 HR
SNYDER TP= .07 HR, CP= .50

UNIT HYDROGRAPH
2 END-OF-PERIOD ORDINATES

258. 258.

HYDROGRAPH AT STATION 1

DA	MON	HRMN	ORD	RAIN	LOSS	EXCESS	COMP Q	DA	MON	HRMN	ORD	RAIN	LOSS	EXCESS	COMP Q
1	0300	1	.00	.00	.00	0.	1	0715	52	.01	.01	.00	0.		
1	0305	2	.02	.02	.00	1.	1	0720	53	.01	.01	.00	0.		
1	0310	3	.02	.02	.00	2.	1	0725	54	.01	.01	.00	0.		
1	0315	4	.03	.02	.01	4.	1	0730	55	.01	.01	.00	0.		
1	0320	5	.08	.02	.06	20.	1	0735	56	.01	.01	.00	0.		
1	0325	6	.10	.02	.08	38.	1	0740	57	.01	.01	.00	0.		
1	0330	7	.11	.02	.09	46.	1	0745	58	.00	.00	.00	0.		
1	0335	8	.70	.02	.68	200.	1	0750	59	.00	.00	.00	0.		
1	0340	9	.39	.02	.37	272.	1	0755	60	.00	.00	.00	0.		
1	0345	10	.29	.02	.27	167.	1	0800	61	.01	.01	.00	0.		
1	0350	11	.22	.02	.20	123.	1	0805	62	.01	.01	.00	0.		
1	0355	12	.16	.02	.14	89.	1	0810	63	.01	.01	.00	0.		
1	0400	13	.15	.02	.13	71.	1	0815	64	.01	.01	.00	0.		
1	0405	14	.08	.02	.06	51.	1	0820	65	.01	.01	.00	0.		
1	0410	15	.07	.02	.05	30.	1	0825	66	.01	.01	.00	0.		
1	0415	16	.07	.02	.05	28.	1	0830	67	.01	.01	.00	0.		
1	0420	17	.02	.02	.00	15.	1	0835	68	.00	.00	.00	0.		
1	0425	18	.02	.02	.00	2.	1	0840	69	.00	.00	.00	0.		
1	0430	19	.02	.02	.00	2.	1	0845	70	.00	.00	.00	0.		
1	0435	20	.02	.02	.00	2.	1	0850	71	.00	.00	.00	0.		
1	0440	21	.02	.02	.00	2.	1	0855	72	.00	.00	.00	0.		
1	0445	22	.02	.02	.00	2.	1	0900	73	.00	.00	.00	0.		
1	0450	23	.02	.02	.00	2.	1	0905	74	.00	.00	.00	0.		
1	0455	24	.02	.02	.00	2.	1	0910	75	.00	.00	.00	0.		
1	0500	25	.02	.02	.00	2.	1	0915	76	.00	.00	.00	0.		
1	0505	26	.02	.02	.00	2.	1	0920	77	.00	.00	.00	0.		
1	0510	27	.02	.02	.00	2.	1	0925	78	.00	.00	.00	0.		
1	0515	28	.02	.02	.00	2.	1	0930	79	.00	.00	.00	0.		
1	0520	29	.02	.02	.00	2.	1	0935	80	.00	.00	.00	0.		
1	0525	30	.01	.01	.00	1.	1	0940	81	.00	.00	.00	0.		
1	0530	31	.01	.01	.00	0.	1	0945	82	.00	.00	.00	0.		
1	0535	32	.01	.01	.00	0.	1	0950	83	.00	.00	.00	0.		
1	0540	33	.01	.01	.00	0.	1	0955	84	.00	.00	.00	0.		
1	0545	34	.01	.01	.00	0.	1	1000	85	.00	.00	.00	0.		
1	0550	35	.01	.01	.00	0.	1	1005	86	.00	.00	.00	0.		
1	0555	36	.01	.01	.00	0.	1	1010	87	.00	.00	.00	0.		
1	0600	37	.01	.01	.00	0.	1	1015	88	.00	.00	.00	0.		
1	0605	38	.01	.01	.00	0.	1	1020	89	.00	.00	.00	0.		
1	0610	39	.01	.01	.00	0.	1	1025	90	.00	.00	.00	0.		

1	0615	40	.01	.01	.00	0.	*	1	1030	91	.00	.00	.00	0.
1	0620	41	.01	.01	.00	0.	*	1	1035	92	.00	.00	.00	0.
1	0625	42	.01	.01	.00	0.	*	1	1040	93	.00	.00	.00	0.
1	0630	43	.01	.01	.00	0.	*	1	1045	94	.00	.00	.00	0.
1	0635	44	.01	.01	.00	0.	*	1	1050	95	.00	.00	.00	0.
1	0640	45	.01	.01	.00	0.	*	1	1055	96	.00	.00	.00	0.
1	0645	46	.01	.01	.00	0.	*	1	1100	97	.00	.00	.00	0.
1	0650	47	.01	.01	.00	0.	*	1	1105	98	.00	.00	.00	0.
1	0655	48	.01	.01	.00	0.	*	1	1110	99	.00	.00	.00	0.
1	0700	49	.01	.01	.00	0.	*	1	1115	100	.00	.00	.00	0.
1	0705	50	.01	.01	.00	0.	*	1	1120	101	.00	.00	.00	0.
1	0710	51	.01	.01	.00	0.	*							

*

****

TOTAL RAINFALL = 3.10, TOTAL LOSS = .82, TOTAL EXCESS = 2.28

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	8.33-HR
+ (CFS)	(HR)				
	(CFS)				
+ 272.	.67	16.	12.	12.	12.
	(INCHES)	2.283	2.283	2.283	2.283
	(AC-FT)	8.	8.	8.	8.

CUMULATIVE AREA = .07 SQ MI

****

HYDROGRAPH AT STATION 1
PLAN 1, RATIO = 1.03

****

DA	MON	HRMN	ORD	FLOW	*	DA	MON	HRMN	ORD	FLOW	*	DA	MON	HRMN	ORD	FLOW	*	DA	MON	HRMN	ORD	FLOW
1	0300	1	0.	*	1	0510	27	2.	*	1	0720	53	0.	*	1	0930	79	0.				
1	0305	2	1.	*	1	0515	28	2.	*	1	0725	54	0.	*	1	0935	80	0.				
1	0310	3	2.	*	1	0520	29	2.	*	1	0730	55	0.	*	1	0940	81	0.				
1	0315	4	4.	*	1	0525	30	1.	*	1	0735	56	0.	*	1	0945	82	0.				
1	0320	5	20.	*	1	0530	31	0.	*	1	0740	57	0.	*	1	0950	83	0.				
1	0325	6	39.	*	1	0535	32	0.	*	1	0745	58	0.	*	1	0955	84	0.				
1	0330	7	47.	*	1	0540	33	0.	*	1	0750	59	0.	*	1	1000	85	0.				
1	0335	8	206.	*	1	0545	34	0.	*	1	0755	60	0.	*	1	1005	86	0.				
1	0340	9	281.	*	1	0550	35	0.	*	1	0800	61	0.	*	1	1010	87	0.				
1	0345	10	172.	*	1	0555	36	0.	*	1	0805	62	0.	*	1	1015	88	0.				
1	0350	11	127.	*	1	0600	37	0.	*	1	0810	63	0.	*	1	1020	89	0.				

```
   1   0355  12    92.  *  1   0605  38     0.  *  1   0815  64     0.  *  1   1025  90     0.
   1   0400  13    73.  *  1   0610  39     0.  *  1   0820  65     0.  *  1   1030  91     0.
   1   0405  14    52.  *  1   0615  40     0.  *  1   0825  66     0.  *  1   1035  92     0.
   1   0410  15    31.  *  1   0620  41     0.  *  1   0830  67     0.  *  1   1040  93     0.
   1   0415  16    28.  *  1   0625  42     0.  *  1   0835  68     0.  *  1   1045  94     0.
   1   0420  17    15.  *  1   0630  43     0.  *  1   0840  69     0.  *  1   1050  95     0.
   1   0425  18     2.  *  1   0635  44     0.  *  1   0845  70     0.  *  1   1055  96     0.
   1   0430  19     2.  *  1   0640  45     0.  *  1   0850  71     0.  *  1   1100  97     0.
   1   0435  20     2.  *  1   0645  46     0.  *  1   0855  72     0.  *  1   1105  98     0.
   1   0440  21     2.  *  1   0650  47     0.  *  1   0900  73     0.  *  1   1110  99     0.
   1   0445  22     2.  *  1   0655  48     0.  *  1   0905  74     0.  *  1   1115 100     0.
   1   0450  23     2.  *  1   0700  49     0.  *  1   0910  75     0.  *  1   1120 101     0.
   1   0455  24     2.  *  1   0705  50     0.  *  1   0915  76     0.  *
   1   0500  25     2.  *  1   0710  51     0.  *  1   0920  77     0.  *
   1   0505  26     2.  *  1   0715  52     0.  *  1   0925  78     0.  *
                     *                *                *
*****************************************************************************************************************************************

 PEAK FLOW    TIME                MAXIMUM AVERAGE FLOW
                        6-HR     24-HR     72-HR     8.33-HR
+ (CFS)      (HR)
                (CFS)
+   281.     .67            17.       12.       12.       12.
               (INCHES)    2.352     2.352     2.352     2.352
               (AC-FT)      8.        8.        8.        8.

               CUMULATIVE AREA =    .07 SQ MI

*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***


      **************
      *        *
 22 KK   *      2 *       RUNOFF HYDROGRAPH FOR BASIN 2
      *        *
      **************

         SUBBASIN RUNOFF DATA

 23 BA       SUBBASIN CHARACTERISTICS
             TAREA       .04  SUBBASIN AREA

          PRECIPITATION DATA

 24 PB            STORM      3.10  BASIN TOTAL PRECIPITATION

 12 PI        INCREMENTAL PRECIPITATION PATTERN
```

```
     .02   .02   .03   .08   .10   .11   .70   .39   .29   .22
     .16   .15   .08   .07   .07   .02   .02   .02   .02   .02
     .02   .02   .02   .02   .02   .02   .02   .02   .01   .01
     .01   .01   .01   .01   .01   .01   .01   .01   .01   .01
     .01   .01   .01   .01   .01   .01   .01   .01   .01   .01
     .01   .01   .01   .01   .01   .01   .00   .00   .00   .01
     .01   .01   .01   .01   .01   .01
```

25 LU UNIFORM LOSS RATE
STRTL .00 INITIAL LOSS
CNSTL .20 UNIFORM LOSS RATE
RTIMP .00 PERCENT IMPERVIOUS AREA

26 US SNYDER UNITGRAPH
TP .12 LAG
CP .61 PEAKING COEFFICIENT

SYNTHETIC ACCUMULATED-AREA VS. TIME CURVE WILL BE USED

***

APPROXIMATE CLARK COEFFICIENTS FROM GIVEN SNYDER CP AND TP ARE TC= .13 AND R= .10 INTERVALS

UNIT HYDROGRAPH PARAMETERS
CLARK TC= .13 HR, R= .10 HR
SNYDER TP= .12 HR, CP= .61

UNIT HYDROGRAPH
8 END-OF-PERIOD ORDINATES
59. 108. 70. 29. 12. 5. 2. 1.

****

HYDROGRAPH AT STATION 2

****

DA	MON	HRMN	ORD	RAIN	LOSS	EXCESS		COMP Q		DA	MON	HRMN	ORD	RAIN	LOSS	EXCESS		COMP Q
1	0300	1	.00	.00	.00	0.	*	1	0715	52	.01	.01	.00	0.				
1	0305	2	.02	.02	.00	0.	*	1	0720	53	.01	.01	.00	0.				
1	0310	3	.02	.02	.00	1.	*	1	0725	54	.01	.01	.00	0.				
1	0315	4	.03	.02	.01	1.	*	1	0730	55	.01	.01	.00	0.				
1	0320	5	.08	.02	.06	5.	*	1	0735	56	.01	.01	.00	0.				
1	0325	6	.10	.02	.08	13.	*	1	0740	57	.01	.01	.00	0.				
1	0330	7	.11	.02	.09	19.	*	1	0745	58	.00	.00	.00	0.				
1	0335	8	.70	.02	.68	58.	*	1	0750	59	.00	.00	.00	0.				
1	0340	9	.39	.02	.37	105.	*	1	0755	60	.00	.00	.00	0.				
1	0345	10	.29	.02	.27	108.	*	1	0800	61	.01	.01	.00	0.				

1	0350	11	.22	.02	.20	89.	*	1	0805	62	.01	.01	.00	0.
1	0355	12	.16	.02	.14	70.	*	1	0810	63	.01	.01	.00	0.
1	0400	13	.15	.02	.13	54.	*	1	0815	64	.01	.01	.00	0.
1	0405	14	.08	.02	.06	41.	*	1	0820	65	.01	.01	.00	0.
1	0410	15	.07	.02	.05	29.	*	1	0825	66	.01	.01	.00	0.
1	0415	16	.07	.02	.05	21.	*	1	0830	67	.01	.01	.00	0.
1	0420	17	.02	.02	.00	15.	*	1	0835	68	.00	.00	.00	0.
1	0425	18	.02	.02	.00	8.	*	1	0840	69	.00	.00	.00	0.
1	0430	19	.02	.02	.00	4.	*	1	0845	70	.00	.00	.00	0.
1	0435	20	.02	.02	.00	2.	*	1	0850	71	.00	.00	.00	0.
1	0440	21	.02	.02	.00	1.	*	1	0855	72	.00	.00	.00	0.
1	0445	22	.02	.02	.00	1.	*	1	0900	73	.00	.00	.00	0.
1	0450	23	.02	.02	.00	1.	*	1	0905	74	.00	.00	.00	0.
1	0455	24	.02	.02	.00	1.	*	1	0910	75	.00	.00	.00	0.
1	0500	25	.02	.02	.00	1.	*	1	0915	76	.00	.00	.00	0.
1	0505	26	.02	.02	.00	1.	*	1	0920	77	.00	.00	.00	0.
1	0510	27	.02	.02	.00	1.	*	1	0925	78	.00	.00	.00	0.
1	0515	28	.02	.02	.00	1.	*	1	0930	79	.00	.00	.00	0.
1	0520	29	.02	.02	.00	1.	*	1	0935	80	.00	.00	.00	0.
1	0525	30	.01	.01	.00	1.	*	1	0940	81	.00	.00	.00	0.
1	0530	31	.01	.01	.00	0.	*	1	0945	82	.00	.00	.00	0.
1	0535	32	.01	.01	.00	0.	*	1	0950	83	.00	.00	.00	0.
1	0540	33	.01	.01	.00	0.	*	1	0955	84	.00	.00	.00	0.
1	0545	34	.01	.01	.00	0.	*	1	1000	85	.00	.00	.00	0.
1	0550	35	.01	.01	.00	0.	*	1	1005	86	.00	.00	.00	0.
1	0555	36	.01	.01	.00	0.	*	1	1010	87	.00	.00	.00	0.
1	0600	37	.01	.01	.00	0.	*	1	1015	88	.00	.00	.00	0.
1	0605	38	.01	.01	.00	0.	*	1	1020	89	.00	.00	.00	0.
1	0610	39	.01	.01	.00	0.	*	1	1025	90	.00	.00	.00	0.
1	0615	40	.01	.01	.00	0.	*	1	1030	91	.00	.00	.00	0.
1	0620	41	.01	.01	.00	0.	*	1	1035	92	.00	.00	.00	0.
1	0625	42	.01	.01	.00	0.	*	1	1040	93	.00	.00	.00	0.
1	0630	43	.01	.01	.00	0.	*	1	1045	94	.00	.00	.00	0.
1	0635	44	.01	.01	.00	0.	*	1	1050	95	.00	.00	.00	0.
1	0640	45	.01	.01	.00	0.	*	1	1055	96	.00	.00	.00	0.
1	0645	46	.01	.01	.00	0.	*	1	1100	97	.00	.00	.00	0.
1	0650	47	.01	.01	.00	0.	*	1	1105	98	.00	.00	.00	0.
1	0655	48	.01	.01	.00	0.	*	1	1110	99	.00	.00	.00	0.
1	0700	49	.01	.01	.00	0.	*	1	1115	100	.00	.00	.00	0.
1	0705	50	.01	.01	.00	0.	*	1	1120	101	.00	.00	.00	0.
1	0710	51	.01	.01	.00	0.	*							

*

****

TOTAL RAINFALL = 3.10, TOTAL LOSS = .82, TOTAL EXCESS = 2.28

PEAK FLOW TIME MAXIMUM AVERAGE FLOW

6-HR 24-HR 72-HR 8.33-HR

```
+ (CFS)     (HR)
              (CFS)
+   108.     .75            9.       7.       7.       7.
             (INCHES)     2.278    2.278    2.278    2.278
             (AC-FT)      5.       5.       5.       5.

             CUMULATIVE AREA =    .04 SQ MI
```

****

HYDROGRAPH AT STATION 2
PLAN 1, RATIO = 1.03

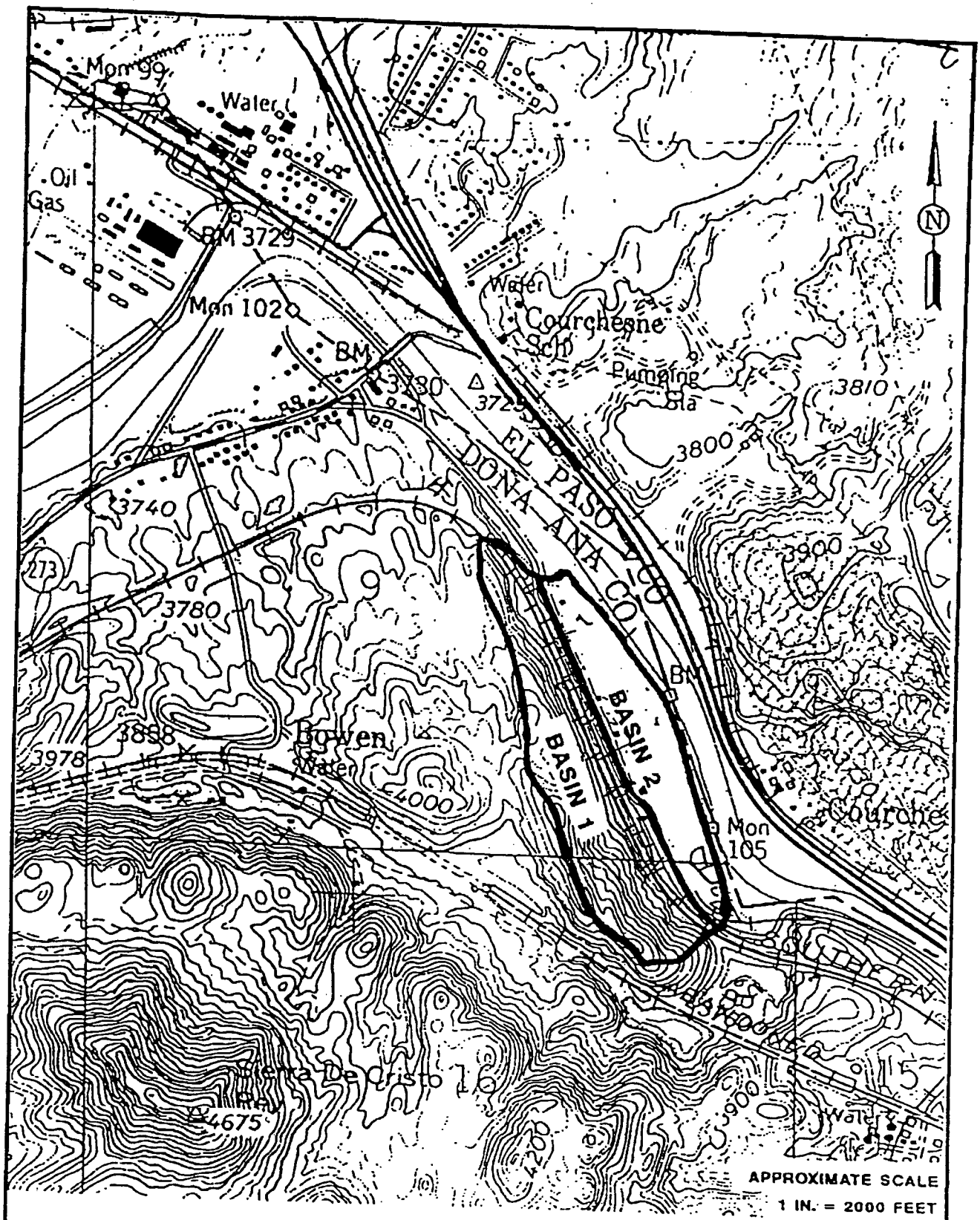
****

DA	MON	HRMN	ORD	FLOW	DA	MON	HRMN	ORD	FLOW	DA	MON	HRMN	ORD	FLOW	DA	MON	HRMN	ORD	FLOW
1	0300	1	0.	1	0510	27	1.	1	0720	53	0.	1	0930	79	0.				
1	0305	2	0.	1	0515	28	1.	1	0725	54	0.	1	0935	80	0.				
1	0310	3	1.	1	0520	29	1.	1	0730	55	0.	1	0940	81	0.				
1	0315	4	1.	1	0525	30	1.	1	0735	56	0.	1	0945	82	0.				
1	0320	5	6.	1	0530	31	0.	1	0740	57	0.	1	0950	83	0.				
1	0325	6	13.	1	0535	32	0.	1	0745	58	0.	1	0955	84	0.				
1	0330	7	20.	1	0540	33	0.	1	0750	59	0.	1	1000	85	0.				
1	0335	8	60.	1	0545	34	0.	1	0755	60	0.	1	1005	86	0.				
1	0340	9	109.	1	0550	35	0.	1	0800	61	0.	1	1010	87	0.				
1	0345	10	112.	1	0555	36	0.	1	0805	62	0.	1	1015	88	0.				
1	0350	11	92.	1	0600	37	0.	1	0810	63	0.	1	1020	89	0.				
1	0355	12	72.	1	0605	38	0.	1	0815	64	0.	1	1025	90	0.				
1	0400	13	56.	1	0610	39	0.	1	0820	65	0.	1	1030	91	0.				
1	0405	14	42.	1	0615	40	0.	1	0825	66	0.	1	1035	92	0.				
1	0410	15	30.	1	0620	41	0.	1	0830	67	0.	1	1040	93	0.				
1	0415	16	22.	1	0625	42	0.	1	0835	68	0.	1	1045	94	0.				
1	0420	17	15.	1	0630	43	0.	1	0840	69	0.	1	1050	95	0.				
1	0425	18	8.	1	0635	44	0.	1	0845	70	0.	1	1055	96	0.				
1	0430	19	4.	1	0640	45	0.	1	0850	71	0.	1	1100	97	0.				
1	0435	20	2.	1	0645	46	0.	1	0855	72	0.	1	1105	98	0.				
1	0440	21	1.	1	0650	47	0.	1	0900	73	0.	1	1110	99	0.				
1	0445	22	1.	1	0655	48	0.	1	0905	74	0.	1	1115	100	0.				
1	0450	23	1.	1	0700	49	0.	1	0910	75	0.	1	1120	101	0.				
1	0455	24	1.	1	0705	50	0.	1	0915	76	0.								
1	0500	25	1.	1	0710	51	0.	1	0920	77	0.								
1	0505	26	1.	1	0715	52	0.	1	0925	78	0.								

****

PEAK FLOW TIME MAXIMUM AVERAGE FLOW

```
                    6-HR     24-HR     72-HR     8.33-HR
+ (CFS)     (HR)
              (CFS)
+   112.    .75           9.       7.       7.       7.
            (INCHES)   2.346    2.346    2.346    2.346
            (AC-FT)     5.       5.       5.       5.

            CUMULATIVE AREA =    .04 SQ MI

1

        PEAK FLOW AND STAGE (END-OF-PERIOD) SUMMARY FOR MULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS
                FLOWS IN CUBIC FEET PER SECOND,  AREA IN SQUARE MILES
                        TIME TO PEAK IN HOURS


                                        RATIOS APPLIED TO FLOWS
 OPERATION     STATION    AREA   PLAN        RATIO 1
                           1.03

 HYDROGRAPH AT
+              1     .07   1  FLOW      281.
                           TIME       .67

 HYDROGRAPH AT
+              2     .04   1  FLOW      112.
                           TIME       .75


*** NORMAL END OF HEC-1 ***
```



GCL

CLIENT: REXENE	
DATE: 12/13/96	REV. NO.: 0
AUTHOR: M.G.H.	DRAWN BY: R.M.G.
CK'D BY: D.R.L.	FILE: F1TRIB.DWG

FIGURE 1
BRICKLAND REFINERY SITE
2 YEAR - 24 HOUR EVENT
TRIBUTARY AREAS

Appendix B

Environmental Agreement Between Rexene and the International Boundary Water Commission Former Brickland Refinery Site Sunland Park, New Mexico

ENVIRONMENTAL AGREEMENT

An environmental risk assessment conducted on behalf of Rexene Corporation ("Rexene") has been completed with respect to the Rexene facility known as the Old Brickland Refinery site located in Doña Anna County, New Mexico (the "plant site"). That assessment indicates that past industrial practices on the property have affected the groundwater underneath the plant site and at the site monitored by the groundwater monitoring well designated MW-6-S.

Rexene and the International Boundary and Water Commission ("IBWC") desire to minimize or eliminate the potential for human consumption of such water and also desire to maintain the current hydrogeology of the site to minimize the off-site migration of affected groundwater.

Therefore, the IBWC and Rexene agree that no water supply wells will be installed, constructed, placed, erected or permitted on the following lands so long as the subsurface water under such lands fails to meet drinking water standards as set by the state of New Mexico. The lands covered by this Agreement consist of land owned by the IBWC which is adjacent to the Rexene property as described on Exhibit A, and the land owned by Rexene as described in Exhibit B.

SO AGREED:

REXENE CORPORATION

BY: Todd M Carver

NAME: Todd M. Carver

TITLE: V.P. - E.H.&S.

DATE: 7/16/96

INTERNATIONAL BOUNDARY WATER COMMISSION

BY: Randall A McManus

NAME: Randall A McManus

TITLE: Legal Advisor

DATE: 1/31/97

ENV96.BRICKLAND.121

THE LAND GROUP INC.
SURVEYING • PLANNING • ENGINEERING
CONSTRUCTION MANAGEMENT

1 BWC PROPERTY

Exhibit A

DESCRIPTION OF A 3.769 ACRE TRACT

EOF TRACT 350-2

A tract of land situate in Sunland Park, Dona Ana County, New Mexico as part of Section 15, Township 29 South, Range 4 East New Mexico Principal Meridian and being more particularly described as follows, to wit;

BEGINNING at a square pin found for the southwesterly corner of the tract herein described, whence a brass cap set in concrete for Texas/New Mexico State Line Reference Monument No. 19 bears N.28°49'32"W., 380.90 feet;
THENCE N.23°04'57"W., 117.05 feet to a square pin found for an angle point;
THENCE N.34°08'58"W., 142.50 feet to a square pin found for an angle point;
THENCE N.47°02'06W., 196.90 feet to a square pin found for an angle point;
THENCE N.57°29'38"W., 367.66 feet to a square pin found for an angle point;
THENCE N.54°52'04"W., 118.24 feet to a square pin found for an angle point;
THENCE N.67°55'58"W., 223.18 feet to a square pin found for an angle point;
THENCE N.73°22'29"W., 147.55 feet to a 1/2 inch rebar with survey cap set for the southwesterly corner of the tract herein described;
THENCE N.12°36'00"E., 40.14 feet to a point for the northwesterly corner of the tract herein described;
THENCE S.77°41'30"E., 153.82 feet to an angle point;
THENCE S.71°33'00"E., 96.45 feet to an angle point;
THENCE S.69°31'30"E., 344.15 feet to an angle point;
THENCE S.65°52'30"E., 300.75 feet to an angle point;
THENCE S.54°21'00"E., 150.62 feet to an angle point on the Texas/New Mexico State Line;
THENCE following along the Texas/New Mexico State Line S.28°41'30"E., 466.78 feet to an angle point being Boundary Monument No. 106 and the northeasterly corner of the tract herein described;
THENCE continuing along the Texas/New Mexico State Line S.09°10'00"W., 107.37 feet to a 1/2 inch rebar with survey cap set for the most southerly corner of the tract herein described;
THENCE N.51°51'43"W., 193.09 feet to the point of beginning;

Said tract containing 3.769 acres more or less;

I hereby certify that this description was prepared by me or under my supervision.

Isaac Camacho

ISAAC CAMACHO, NMPS No. 9254

960356-A.DOC

LAND GROUP INC.
SURVEYING • PLANNING • ENGINEERING
CONSTRUCTION MANAGEMENT

January 31, 1997

DESCRIPTION OF A 1.238 ACRE TRACT

EOF TRACT 352-3

A tract of land situate in Sunland Park, Dona Ana County, New Mexico as part of Lot 6, Section 16, Township 29 South, Range 4 East New Mexico Principal Meridian and being more particularly described as follows, to wit;

BEGINNING at a 1/2 inch rebar with survey cap set on the north line of said Section 16 for the northeasterly corner of the tract herein described, whence a brass cap set in concrete for Texas/New Mexico State Line Reference Monument No. 21 bears S.08°56'16"E., 381.61 feet;
THENCE S.18°22'00"E., 313.10 feet to a 1/2 inch rebar with survey cap set for an angle point;
THENCE S.32°09'00"E., 96.57 feet to a 1/2 inch rebar with survey cap set for an angle point;
THENCE S.73°17'00"E., 112.93 feet to a 1/2 inch rebar set for the southeasterly corner of the tract herein described;
THENCE S.85°58'30"W., 114.23 feet to a 2 inch pipe found for an angle point;
THENCE S.60°50'02"W., 12.86 feet to a 2 inch pipe found for an angle point;
THENCE N.84°43'27"W., 78.66 feet to a 1/2 inch rebar found for an angle point;
THENCE N.76°04'16"W., 79.11 feet to a 2 inch pipe found for the southwesterly corner of the tract herein described;
THENCE N.08°42'12"W., 403.36 feet to a 1/2 inch rebar found for the northwesterly corner of the tract herein described;
THENCE N.89°31'35"E., 83.01 feet to the point of beginning;

Said tract containing 1.238 acres more or less;

I hereby certify that this description was prepared by me or under my supervision.

Isaac Camacho

ISAAC CAMACHO, NMPS No. 9254

960356-B.DOC

PHONE (505) 526-2444 FAX (505) 526-0901
100 E. Hadley • P.O. Box 16227 • Las Cruces, NM 88004

THE LAND GROUP INC.
SURVEYING • PLANNING • ENGINEERING
CONSTRUCTION MANAGEMENT

January 31, 1997

DESCRIPTION OF A 0.668 ACRE TRACT

EOF TRACT 352-2

A tract of land situate in Sunland Park, Dona Ana County, New Mexico as part of Lot 8, Section 9, Township 29 South, Range 4 East New Mexico Principal Meridian and being more particularly described as follows, to wit;

BEGINNING at a 1/2 inch rebar with survey cap set for Boundary Monument No. 105 on the Texas/New Mexico State Line, whence a brass cap set in concrete for Texas/New Mexico State Line Reference Monument No. 21 bears S.11°30'49"E., 625.67 feet;
THENCE following along the State Line **S.20°02'30"E., 103.00 feet** to a 1/2 inch rebar with survey cap set for an angle point;
THENCE S.12°16'00"E., 142.60 feet to a 1/2 inch rebar with survey cap set on the south line of said Section 9 for the southeasterly corner of the tract herein described;
THENCE following along the south line of said Section 9 **S.89°31'35"W., 83.01** feet to a 1/2 inch rebar found for the southwesterly corner of the tract herein described;
THENCE N.07°50'15"W., 90.51 feet to a 1/2 inch rebar found for an angle point;
THENCE N.81°33'28"E., 27.80 feet to a 1/2 inch rebar found for an angle point;
THENCE N.08°36'48"W., 51.23 feet to a 1/2 inch rebar with survey cap set for an angle point;
THENCE S.81°34'15"W., 27.75 feet to a 1/2 inch rebar found for an angle point;
THENCE N.08°29'45"W., 79.27 feet to a 1/2 inch rebar found for an angle point;
THENCE N.11°29'04"W., 112.07 feet to a 2 inch pipe found for an angle point;
THENCE N.17°09'12"W., 111.86 feet to a 1/2 inch rebar found for an angle point;
THENCE N.20°02'30"W., 31.90 feet to a nail in post found for an angle point;
THENCE N.70°55'04"E., 7.36 feet to a 1/2 inch rebar found for an angle point;
THENCE N.19°58'05"W., 25.85 feet to a 1/2 inch rebar found for an angle point;
THENCE S.66°56'20"W., 7.36 feet to a 1/2 inch rebar found for an angle point;
THENCE N.20°04'09"W., 135.53 feet to a 1/2 inch rebar found for the northwesterly corner of the tract herein described;

THENCE N.71°13'22"E., 30.07 feet to a 1/2 inch rebar with survey cap set on the Texas/New Mexico State Line for the northeasterly corner of the tract herein described;
THENCE S.20°02'30"E., 414.50 feet to the point of beginning;

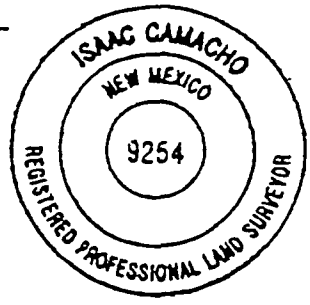
Said tract containing **0.668 acres** more or less;

I hereby certify that this description was prepared by me or under my supervision.

Isaac Camacho

ISAAC CAMACHO, NMPS No. 9254

960356-C.DOC



THE LAND GROUP INC.
SURVEYING • PLANNING • ENGINEERING
CONSTRUCTION MANAGEMENT

January 31, 1997

DESCRIPTION OF A 2.895 ACRE TRACT

EOF TRACT 353-1

A tract of land situate in Sunland Park, Dona Ana County, New Mexico as part of Lots 7 and 8, Section 9, Township 29 South, Range 4 East New Mexico Principal Meridian and being more particularly described as follows, to wit;

BEGINNING at a 1/2 inch rebar with survey cap set for the northwesterly corner of the tract herein described, whence a brass cap set in concrete found for Texas/New Mexico State Line Reference Monument No. 22 bears **N.30°47'39"E., 146.11 feet;**
THENCE N.67°52'00"E., 162.10 feet to a 1/2 inch rebar with survey cap set for the northeasterly corner of the tract herein described;
THENCE S.49°50'00"E., 119.87 feet to an angle point;
THENCE S.39°49'30"E., 621.84 feet to an angle point on the Texas/New Mexico State Line;
THENCE following along the Texas/New Mexico State Line S.20°02'44"E., 137.28 feet to a point being Boundary Monument No. 104;
THENCE continuing along the Texas/New Mexico State Line **S.20°02'44"E., 628.78 feet** to a 1/2 inch rebar with survey cap set for the southeasterly corner of the tract herein described;
THENCE S.71°13'22"W., 30.07 feet to a 1/2 inch rebar found for the southwesterly corner of the tract herein described;
THENCE N.20°01'49"W., 380.60 feet to a 2 inch iron pipe found for an angle point;
THENCE N.29°02'59"W., 169.41 feet to a 1/2 inch rebar with survey cap set for an angle point;
THENCE N.38°00'30"W., 647.23 feet to 1/2 inch rebar found for an angle point;
THENCE N.47°13'36"W., 175.28 feet to a 1/2 inch rebar found for an angle point;
THENCE N.56°43'32"W., 160.03 feet to the point of beginning;

Said tract containing 2.895 acres more or less;

I hereby certify that this description was prepared by me or under my supervision.

Isaac Camacho

ISAAC CAMACHO, NMPS No. 9254

960356-D.DOC

ISAAC CAMACHO NEW MEXICO 9254 REGISTERED PROFESSIONAL LAND SURVEYOR

PHONE (505) 526-2444 FAX (505) 526-0901
100 E. Hadley • P.O. Box 16227 • Las Cruces, NM 88004

THE LAND GROUP INC.
SURVEYING • PLANNING • ENGINEERING
CONSTRUCTION MANAGEMENT

January 31, 1997

DESCRIPTION OF A 0.111 ACRE TRACT

EOF TRACT 354-1/2

A tract of land situate in Sunland Park, Dona Ana County, New Mexico as part of Lots 5 and 7, Section 9, Township 29 South, Range 4 East New Mexico Principal Meridian and being more particularly described as follows, to wit;

BEGINNING at a 1/2 inch rebar set for the southwesterly corner of the tract herein described, whence a brass cap set in concrete found for Texas/New Mexico State Line Reference Monument No. 22 bears **S.51°34'47"E., 1002.89 feet;**
THENCE N.41°08'14"W., 13.69 feet to a 2 inch iron pipe found for the northwesterly corner of the tract herein described;
THENCE N.44°50'30"E., 140.60 feet to a 1/2 inch rebar with survey cap set for an angle point;
THENCE N.51°29'30"W., 41.20 feet to a 1/2 inch rebar with survey cap set for an angle point;
THENCE N.38°46'30"E., 45.02 feet to a 1/2 inch rebar with survey cap set for the northeasterly corner of the tract herein described;
THENCE S.68°12'01"E., 61.84 feet to a point for the southeasterly corner of the tract herein described;
THENCE S.44°09'30"W., 206.00 feet to the point of beginning;

Said tract containing 0.111 acres more or less.

I hereby certify that this description was prepared by me or under my supervision.

Isaac Camacho
ISAAC CAMACHO, NMPS No. 9254

960356-F.DOC

ISAAC CAMACHO NEW MEXICO 9254 REGISTERED PROFESSIONAL LAND SURVEYOR

PHONE (505) 526-2444 FAX (505) 526-0901
100 E. Hadley • P.O. Box 16227 • Las Cruces, NM 88004

THE LAND GROUP, INC.
SURVEYING • PLANNING • ENGINEERING
CONSTRUCTION MANAGEMENT

January 31, 1997

DESCRIPTION OF A 1.033 ACRE TRACT

EOF TRACT 355-1

A tract of land situate in Sunland Park, Dona Ana County, New Mexico as part of Lots 5 and 7, Section 9, Township 29 South, Range 4 East New Mexico Principal Meridian and being more particularly described as follows, to wit;

BEGINNING at a 1/2 inch rebar found for the southwesterly corner of the tract herein described, whence a brass cap set in concrete found for Texas/New Mexico State Line Reference Monument No. 22 bears **S.54°09'04"E., 807.22 feet;**
THENCE N.41°08'14"W., 199.80 feet to a 1/2 rebar with survey cap set for the northwesterly corner of the tract herein described;
THENCE N.44°09'30"E., 206.00 feet to a point for the northeasterly corner of the tract herein described;
THENCE S.41°23'00"E., 60.55 feet to an angle point;
THENCE S.47°09'50"E., 165.28 feet to a point for the southeasterly corner of the tract herein described;
THENCE S.50°58'30"W., 10.84 feet to a point;
THENCE S.50°58'30"W., 212.23 feet to the point of beginning;

Said tract containing **1.033 acres** more or less.

I hereby certify that this description was prepared by me or under my supervision.

Isaac Camacho

ISAAC CAMACHO, NMPS No. 9254

960356-G.DOC

ISAAC CAMACHO NEW MEXICO 9254 REGISTERED PROFESSIONAL LAND SURVEYOR

PHONE (505) 526-2444 FAX (505) 526-0901
100 E. Hadley • P.O. Box 16227 • Las Cruces, NM 88004

LAND GROUP INC.
SURVEYING • PLANNING • ENGINEERING
CONSTRUCTION MANAGEMENT

January 31, 1997

DESCRIPTION OF A 0.877 ACRE TRACT

EOF TRACT 355-2

A tract of land situate in Sunland Park, Dona Ana County, New Mexico as part of Lots 5 and 7, Section 9, Township 29 South, Range 4 East New Mexico Principal Meridian and being more particularly described as follows, to wit;

BEGINNING at a 1/2 inch rebar found for the southwesterly corner of the tract herein described, whence a brass cap set in concrete found for Texas/New Mexico State Line Reference Monument No. 22 bears **S.51°26'24"E., 1016.35 feet;**
THENCE N.38°55'58"W., 264.73 feet to a 2 inch iron pipe found for the northwesterly corner of the tract herein described;
THENCE N.56°39'30"E., 146.40 feet to a 1/2 inch rebar with survey cap set for the northeasterly corner of the tract herein described;
THENCE S.39°43'00"E., 38.99 feet to a 1/2 inch rebar with survey cap set for an angle point;
THENCE S.49°58'12"E., 149.20 feet to a 1/2 inch rebar with survey cap set for the southeasterly corner of the tract herein described;
THENCE S.38°46'30"W., 45.02 feet to a 1/2 inch rebar with survey cap set for an angle point;
THENCE S.51°29'30"E., 41.20 feet to a 1/2 inch rebar with survey cap set for an angle point;
THENCE S.44°50'30"W., 140.60 feet to the point of beginning;

Said tract containing **0.877 acres** more or less.

I hereby certify that this description was prepared by me or under my supervision.

Isaac Camacho

ISAAC CAMACHO, NMPS No. 9254

ISAAC CAMACHO NEW MEXICO 9254 REGISTERED PROFESSIONAL LAND SURVEYOR

960356-H.DOC

PHONE (505) 526-2444 FAX (505) 526-0901
100 E. Hadley • P.O. Box 16227 • Las Cruces, NM 88004

THE LAND GROUP INC.
SURVEYING • PLANNING • ENGINEERING
CONSTRUCTION MANAGEMENT

January 31, 1997

DESCRIPTION OF A 1.044 ACRE TRACT

EOF TRACT 356

A tract of land situate in Sunland Park, Dona Ana County, New Mexico as part of Lot 5, Section 9, Township 29 South, Range 4 East New Mexico Principal Meridian and being more particularly described as follows, to wit;

BEGINNING at a 2 inch iron pipe found for the southwesterly corner of the tract herein described, whence a brass cap set in concrete found for Texas/New Mexico State Line Reference Monument No. 22 bears **S.48°51'54"E., 1276.09 feet;**
THENCE N.42°55'37"W., 258.30 feet to a 2 inch iron pipe found for an angle point;
THENCE N.54°17'44"W., 82.52 feet to a 2 inch iron pipe found for the northwesterly corner of the tract herein described;
THENCE N.43°05'30"E., 124.63 feet to a 1/2 inch rebar with survey cap set for the northeasterly corner of the tract herein described;
THENCE S.48°29'45"E., 374.00 feet to a 1/2 inch rebar with survey cap set for the southeasterly corner of the tract herein described;
THENCE S.56°39'30"W., 146.40 feet to the point of beginning;

Said tract containing **1.044 acres** more or less.

I hereby certify that this description was prepared by me or under my supervision.

Isaac Camacho

ISAAC CAMACHO, NMPS No. 9254

960356-I.DOC

ISAAC CAMACHO
NEW MEXICO
9254
REGISTERED PROFESSIONAL LAND SURVEYOR

PHONE (505) 526-2444 FAX (505) 526-0901
100 E. Hadley • P.O. Box 16227 • Las Cruces, NM 88004

THE LAND GROUP INC.
SURVEYING • PLANNING • ENGINEERING
CONSTRUCTION MANAGEMENT

Post-it™ Fax Note 7671	Date 1/20	# of pages ▶ 1
To Reggie Baker	From Mike Seike	
Co./Dept. Rexene	Co. BDM	
Phone # (915) 333-7200	Phone # (505) 848-5289	
Fax # (915) 333-8238	Fax # (505) 848-5299	

January 31,

DESCRIPTION OF A 4.434 ACRE TRACT

EOF TRACT 354

A tract of land situate in Sunland Park, Dona Ana County, New Mexico as part of Lot 7, Section 9, Township 29 South, Range 4 East New Mexico Principal Meridian and being more particularly described as follows, to wit;

BEGINNING at a 1/2 inch rebar with survey cap set for the southwesterly corner of the tract herein described, whence a brass cap set in concrete found for Texas/New Mexico State Line Reference Monument No. 22 bears **N.30°47'39"E., 146.11 feet;**
THENCE N.56°27'03"W., 312.88 feet to a 1/2 inch rebar found for an angle point;
THENCE N.12°14'05"W., 32.04 feet to a concrete monument found for an angle point;
THENCE N.31°38'17"W., 41.07 feet to a 1/2 inch rebar found for an angle point;
THENCE N.35°53'50"W., 160.79 feet to a 1/2 inch rebar found for an angle point;
THENCE N.41°18'51"W., 270.35 feet to a 2 inch iron pipe found for an angle point;
THENCE N.34°25'07"W., 31.22 feet to a 1/2 inch rebar found for the northwesterly corner of the tract herein described;
THENCE N.50°58'30"E., 21.23 feet to a point;
THENCE N.50°58'30"E., 10.84 feet to a point for the northeasterly corner of the tract herein described;
THENCE S47°52'30"E., 50.17 feet to an angle point;
THENCE S.42°17'30"E., 176.62 feet to an angle point;
THENCE S.34°16'00"E., 111.79 feet to a 1/2 inch rebar with survey cap set for an angle point;
THENCE S.44°50'00"E., 202.06 feet to a 1/2 inch rebar with survey cap set for an angle point;
THENCE S.35°03'51"E., 339.23 feet to a 1/2 inch rebar with survey cap set for the southeasterly corner of the tract herein described;
THENCE S.67°52'00"W., 162.10 feet to the point of beginning;

Said tract containing **4.434 acres** more or less;

I hereby certify that this description was prepared by me or under my supervision.

Isaac Camacho

ISAAC CAMACHO, NMPS No. 9254

960356-E.DOC

ISAAC CAMACHO NEW MEXICO 9254 REGISTERED PROFESSIONAL LAND SURVEYOR

PHONE (505) 526-2444 FAX (505) 526-0901
100 E. Hadley • P.O. Box 16227 • Las Cruces, NM 88004

THE LAND GROUP INC.
SURVEYING • PLANNING • ENGINEERING
CONSTRUCTION MANAGEMENT

REXENE PROPERTY Exhibit B

DESCRIPTION OF A 5.046 ACRE TRACT

TRACT 1

A tract of land located in Sunland Park, Dona Ana County, New Mexico as part of Lots 7 and 8, Section 9, Township 29 South, Range 4 East, New Mexico Principal Meridian and being more particularly described as follows, to wit:

BEGINNING at a 1/2 inch rebar with survey cap set for the northwest corner of the tract herein described, whence a brass cap set in concrete found for Texas/New Mexico State Line Reference Monument No. 22 bears **N.54°04'04"E., 369.29 feet**;

THENCE N.67°52'00"E., 242.05 feet to a 1/2 inch rebar with survey cap set for the northeast corner of the tract herein described:

THENCE S.56°43'32"E., 160.03 feet to a 1/2 inch rebar found for an angle point;

THENCE S.47°13'36"E., 175.28 feet to a 1/2 inch rebar found for an angle point;

THENCE S.38°00'08"E., 302.03 feet to a 1/2 inch rebar set for the southeast corner of the tract herein described;

THENCE S.67°52'00"W., 465.36 feet to a 1/2 inch rebar set for the southwest corner of the tract herein described;

THENCE N.24°32'41"W., 581.51 feet to the point of beginning;

Said tract containing 5.046 acres, more or less.

I hereby certify that this description was prepared by me or under my supervision.

Isaac Camacho

ISAAC CAMACHO NMPS No. 9254

ISAAC CAMACHO NEW MEXICO 9254 REGISTERED PROFESSIONAL LAND SURVEYOR

PHONE (505) 526-2444 FAX (505) 526-0901
100 E. Hadley • P.O. Box 16227 • Las Cruces, NM 88004

LAND GROUP INC.
SURVEYING • PLANNING • ENGINEERING
CONSTRUCTION MANAGEMENT

January 24, 1997

DESCRIPTION OF A 10.004 ACRE TRACT

TRACT 2

A tract of land located in Sunland Park, Dona Ana County, New Mexico as part of Lots 7 and 8, Section 9, Township 29 South, Range 4 East, New Mexico Principal Meridian and being more particularly described as follows, to wit:

BEGINNING at a 1/2 inch rebar set for the southwest corner of the tract herein described, whence a brass cap set in concrete found for Texas/New Mexico State Line Reference Monument No. 21 bears **S.41°36'11"E, 1123.16 feet**;

THENCE N.27°42'40"W., 651.18 feet to a 1/2 inch rebar set for an angle point;

THENCE S.64°43'00"W., 20.00 feet to a 1/2 inch rebar with survey cap set for an angle point;

THENCE N.24°27'00"W., 206.73 feet to a 1/2 inch rebar with survey cap set for the northwest corner of the tract herein described;

THENCE N.67°52'00"E., 465.36 feet to a 1/2 inch rebar with survey cap set for the northeast corner of the tract herein described;

THENCE S.38°00'30"E., 346.03 feet to a 1/2 inch rebar with survey cap set for an angle point;

THENCE S.29°02'59"E., 169.41 feet to a 2 inch pipe found for an angle point;

THENCE S.20°01'49"E., 380.60 feet to a 1/2 inch rebar found for the southeast corner of the tract herein described;

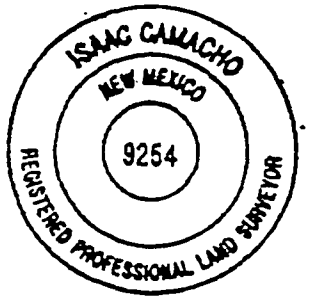
THENCE S.71°13'00"W., 475.64 feet to the point of beginning;

Said tract containing 10.004 acres, more or less.

I hereby certify that this description was prepared by me or under my supervision.

Isaac Camacho

ISAAC CAMACHO NMPS No. 9254



LAND GROUP INC.
SURVEYING • PLANNING • ENGINEERING
CONSTRUCTION MANAGEMENT

January 24, 1997

DESCRIPTION OF A 5.028 ACRE TRACT

TRACT 3

A tract of land located in Sunland Park, Dona Ana County, New Mexico as part of Lot 8, Section 9, Township 29 South, Range 4 East, New Mexico Principal Meridian and being more particularly described as follows, to wit:

BEGINNING at a 1/2 inch rebar found for the southeast corner of the tract herein described, whence a brass cap set in concrete found for Texas/New Mexico State Line Reference Monument No. 21 bears **S.20°42'51"E., 402.30 feet;**

THENCE S.89°44'00"W., 298.07 feet to a 1/2 inch rebar with survey cap set for the southwest corner of the tract herein described;

THENCE N.26°10'37"W., 387.73 feet to a 1/2 inch rebar found for an angle point;

THENCE N.52°22'37"W., 155.37 feet to a 1/2 inch rebar with survey cap set for an angle point;

THENCE N.26°58'00"W., 24.85 feet to a 1/2 inch rebar with survey cap set for the northwest corner of the tract herein described;

THENCE N.71°13'00"E., 475.64 feet to a 1/2 inch rebar found for the northeast corner of the tract herein described;

THENCE S.20°04'09"E., 135.53 feet to a 1/2 inch rebar found for an angle point;

THENCE N.66°56'20"E., 7.36 feet to a 1/2 inch rebar found for an angle point;

THENCE S.19°58'05"E., 25.85 feet to a 1/2 inch rebar found for an angle point;

THENCE S.70°55'04"W., 7.36 feet to a 1/2 inch rebar found for an angle point;

THENCE S.20°02'30"E., 31.90 feet to a 1/2 inch rebar found for an angle point;

THENCE S.17°09'12"E., 111.86 feet to a 1/2 inch pipe found for an angle point;

THENCE S.11°29'04"E., 112.07 feet to a 1/2 inch rebar found for an angle point;

THENCE S.8°29'45"E., 79.27 feet to a 1/2 inch rebar found for an angle point;

THENCE N.81°34'15"E., 27.75 feet to a 1/2 inch rebar with survey cap set for an angle point;

THENCE S.8°36'48"E., 51.23 feet to a 1/2 inch rebar found for an angle point;

THENCE S.81°33'28"W., 27.80 feet to a 1/2 inch rebar found for an angle point;

THENCE S.7°50'15"E., 90.51 feet to the point of beginning.

Said tract containing 5.028 acres, more or less.

I hereby certify that this description was prepared by me or under my supervision.

Isaac Camacho

ISAAC CAMACHO NMPS No. 9254

THE LAND GROUP INC.
SURVEYING • PLANNING • ENGINEERING
CONSTRUCTION MANAGEMENT

January 24, 1997

DESCRIPTION OF A 12.765 ACRE TRACT

TRACT 4

A tract of land located in Sunland Park, Dona Ana County, New Mexico as part of Lot 6, Section 16, Township 29 South, Range 4 East, New Mexico Principal Meridian and being more particularly described as follows, to wit:

BEGINNING at a 1/2 inch rebar found for the most northerly corner of the tract herein described, whence a brass cap set in concrete found for Texas/New Mexico Stateline Reference Monument No. 21 bears **S.20°42'51"E., 402.30 feet;**

THENCE S.8°42'12"E., 403.36 feet to a 2 inch pipe found for an angle point;

THENCE S.76°04'16"E., 79.11 feet to a 1/2 inch rebar found for an angle point;

THENCE S.84°43'27"E., 78.86 feet to a 2 inch pipe found for an angle point;

THENCE N.60°50'02"E., 12.86 feet to a 1/2 inch rebar with survey cap set for an angle point;

THENCE N.85°58'30"E., 114.23 feet to a 1/2 inch rebar with survey cap set for an angle point;

THENCE S.69°54'35"E., 87.72 feet to a 1/2 inch rebar with survey cap set for an angle point;

THENCE N.60°28'25"E., 188.50 feet to a 1/2 inch rebar with survey cap set for the northeast corner of the tract herein described;

THENCE S.00°08'39"E., 692.17 feet to a 1/2 inch rebar found for the southeast corner of the tract herein described;

PHONE (505) 526-2444 FAX (505) 526-0901
100 E. Hadley • P.O. Box 16227 • Las Cruces, NM 88004

THE LAND GROUP INC.
SURVEYING • PLANNING • ENGINEERING
CONSTRUCTION MANAGEMENT

January 24, 1997

DESCRIPTION OF A 0.424 ACRE TRACT

TRACT 5

A tract of land located in Sunland Park, Dona Ana County, New Mexico as part of Lot 8, Section 9, Township 29 South, Range 4 East, New Mexico Principal Meridian and being more particularly described as follows, to wit:

BEGINNING at a 1/2 inch rebar found for the southeast corner of the tract herein described, whence a brass cap set in concrete found for Texas/New Mexico Stateline Reference Monument No. 21 bears **S.51°09'12"E., 527.52 feet;**

THENCE S.89°44'00"W., 55.00 feet to a 1/2 inch rebar with survey cap set for the southwest corner of the tract herein described;

THENCE N.25°23'00"W., 433.34 feet to a 1/2 inch rebar with survey cap set for the northwest corner of the tract herein described;

THENCE S.62°28'03"E., 65.21 feet to a 1/2 inch rebar with survey cap set for the northeast corner of the tract herein described;

THENCE S.26°52'00"E., 404.80 feet to the point of beginning;

Said tract containing 0.424 acres, more or less.

I hereby certify that this description was prepared by me or under my supervision.

Isaac Camacho

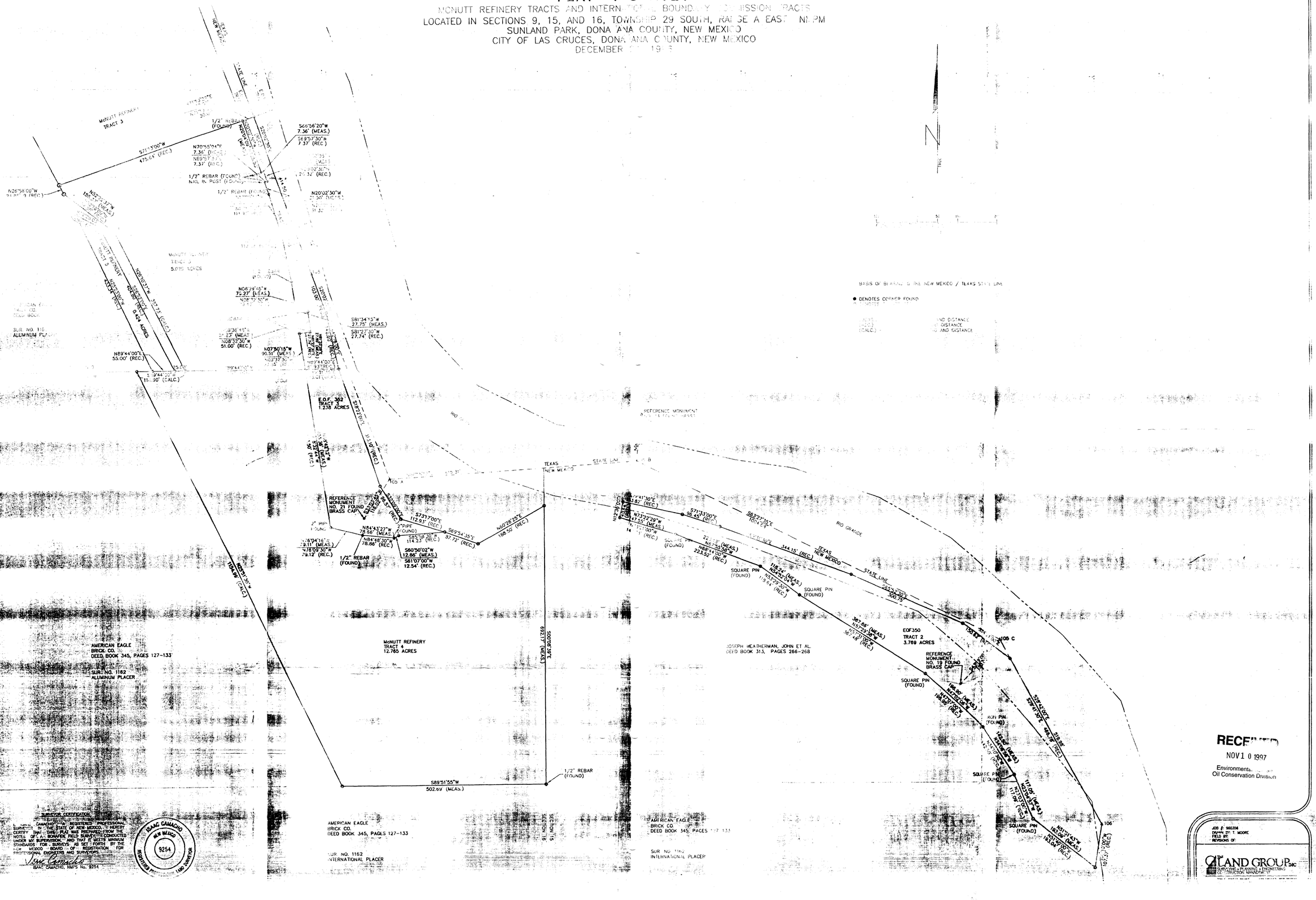
ISAAC CAMACHO NMPS No. 9254

ISAAC CAMACHO
NEW MEXICO
9254
REGISTERED PROFESSIONAL LAND SURVEYOR

PHONE (505) 526-2444 FAX (505) 526-0901
100 E. Hadley • P.O. Box 16227 • Las Cruces, NM 88004

PLAT OF SURVEY

MCNUTT REFINERY TRACTS AND INTERNATIONAL BOUNDARY COMMISSION TRACTS
LOCATED IN SECTIONS 9, 15, AND 16, TOWNSHIP 29 SOUTH, RANGE 4 EAST, NMPM
SUNLAND PARK, DONA ANA COUNTY, NEW MEXICO
CITY OF LAS CRUCES, DONA ANA COUNTY, NEW MEXICO
DECEMBER [illegible], 1996



SURVEYOR CERTIFICATION

I, ISAAC CAMACHO, A REGISTERED PROFESSIONAL SURVEYOR IN THE STATE OF NEW MEXICO, I HEREBY CERTIFY THAT THIS PLAT WAS PREPARED FROM THE NOTES OF ALL BOUNDARY FIELD SURVEYS CONDUCTED UNDER MY SUPERVISION, AND THAT IT MEETS MINIMUM STANDARDS FOR SURVEYS AS SET FORTH BY THE NEW MEXICO BOARD OF REGISTRATION FOR PROFESSIONAL ENGINEERS AND SURVEYORS.

ISAAC CAMACHO, NMPS No. 9254

ISAAC CAMACHO NEW MEXICO 9254 REGISTERED PROFESSIONAL LAND SURVEYOR

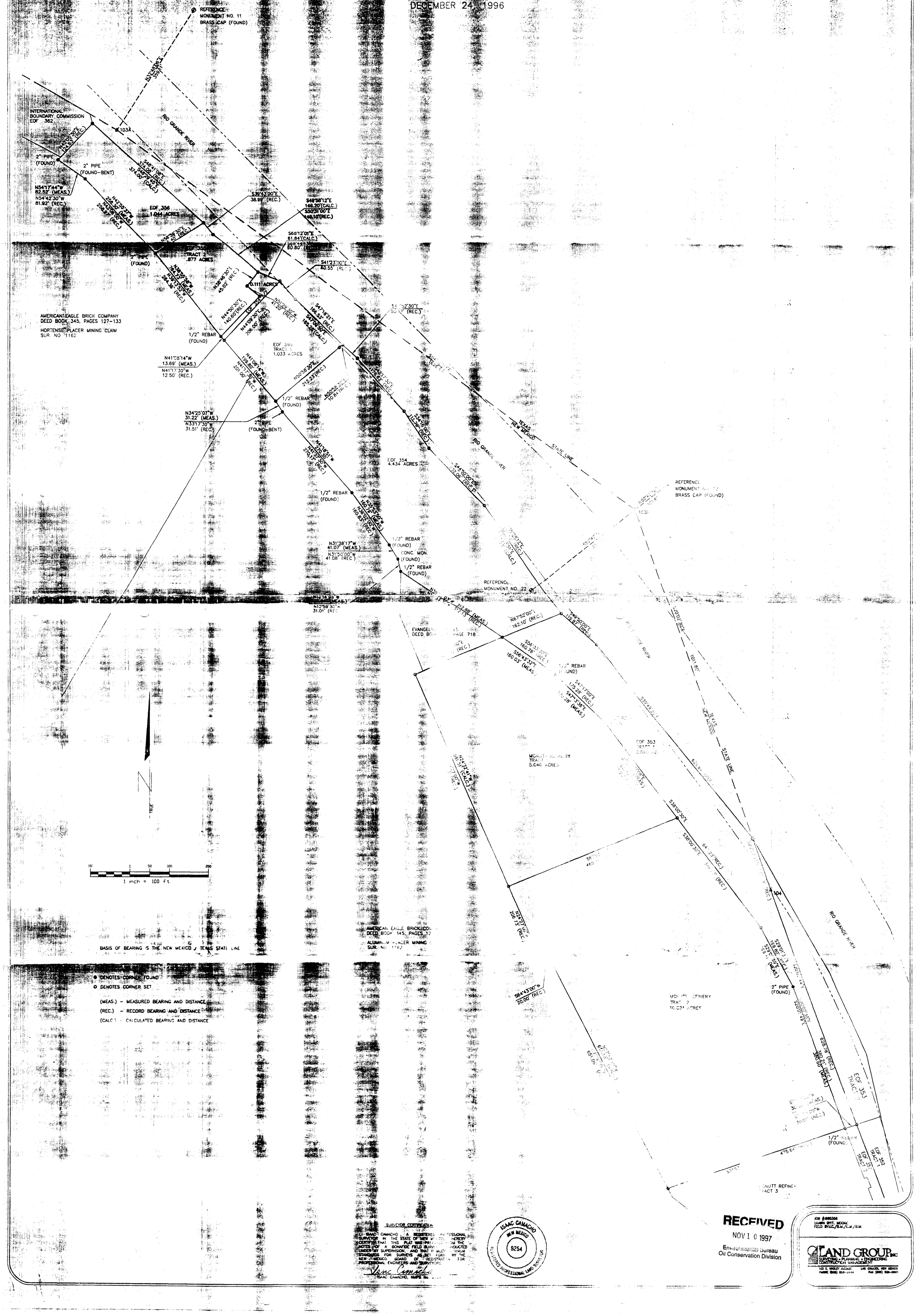
RECEIVED
NOV 10 1997
Environmental
Oil Conservation Division

JOB #: 960304
DRAWN BY: T. MOORE
FIELD BY:
REVISIONS OF:

THE LAND GROUP, INC
LAND DEVELOPMENT & ENGINEERING
CONSTRUCTION MANAGEMENT

PLAT OF SURVEY

MCNUTT REFINERY TRACTS AND INTERNATIONAL BOUNDARY COMMISSION TRACTS
LOCATED IN SECTION 9, TOWNSHIP 29 SOUTH, RANGE 4 EAST, N.M.P.M. OF THE U.S.G.L.O. SURVEYS
SUNLAND PARK, DONA ANA COUNTY, NEW MEXICO
DECEMBER 24, 1996



● DENOTES CORNER FOUND
○ DENOTES CORNER SET

(MEAS.) – MEASURED BEARING AND DISTANCE
(REC.) – RECORD BEARING AND DISTANCE
(CALC.) – CALCULATED BEARING AND DISTANCE

SURVEYOR CERTIFICATION

I, ISAAC CAMACHO, A REGISTERED PROFESSIONAL SURVEYOR IN THE STATE OF NEW MEXICO, HEREBY CERTIFY THAT THIS PLAT WAS PREPARED FROM THE NOTES OF A BONAFIDE FIELD SURVEY CONDUCTED UNDER MY SUPERVISION, AND THAT IT MEETS THE MINIMUM STANDARDS FOR SURVEYS AS SET FORTH BY THE NEW MEXICO BOARD OF REGISTRATION FOR PROFESSIONAL ENGINEERS AND SURVEYORS.

ISAAC CAMACHO, NMPS No. 9254

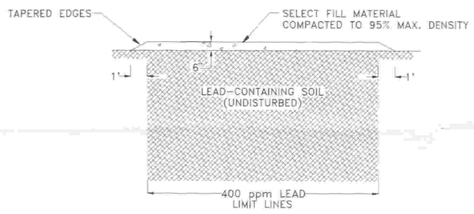
ISAAC CAMACHO NEW MEXICO 9254 REGISTERED PROFESSIONAL LAND SURVEYOR

RECEIVED
NOV 10 1997
Environmental Bureau
Oil Conservation Division

JOB #980356
SHAWN BYRT, MOORE
FIELD BY:G.C./B.M./E.M./B.M.

LAND GROUP, INC
SURVEYING • PLANNING • ENGINEERING
CONSTRUCTION MANAGEMENT
120 E. MADLEY AVENUE, LAS CRUCES, NEW MEXICO
PHONE (505) 523-2444 FAX (505) 526-0801

Schematic Diagram Of Typical Cap Construction For Lead-Containing Soil At The Brickland Site



SPECIFICATIONS

Clearing and Grubbing – The areas to be capped shall first be cleared of all natural and man-made objectionable material to include brush, weeds, boulders, fences, walls, rubbish, etc. The areas within the designated limit lines (400 ppm lead) shall be cleared and grubbed. All removed materials shall be deposited on site at a location designated by the Project Manager.

Material – The soil to be used for construction of the cap shall be similar in composition to typical subbase material used in residential street construction as described in the New Mexico Standard Specifications for Public Works Construction. It shall be natural soil that is readily workable and compatible. The material shall be imported from off site and shall be free of any deleterious substance. A representative sample of proposed material to be utilized as the cap material shall be submitted to the Project Manager for approval.

Compaction – The selected material shall be compacted to 95% of maximum density as determined by ASTM D1557 for its full thickness. The minimum compacted thickness of the cap shall be six inches.

LEGEND

- CONCRETE SLAB/PAD – BLDG FOUNDATION
- WALL – MASONRY
- TREE
- FENCE
- INTERMITTENT STREAM
- RIVER
- MONITORING WELL
- TEST PIT
- TEST BORING
- HAND AUGER BORING
- SURFACE SAMPLING LOCATIONS
- CISTERN SAMPLING LOCATION
- RIVER SAMPLING LOCATION
- STORM WATER OUTFALL WITH A DITCH
- WELL POINT
- TEST TRENCH
- GCL SAMPLING LOCATION (AND RESULTS IN mg/kg)
- EDER SAMPLING LOCATION (AND RESULTS IN mg/kg)
- E-SS-4 SURFACE SAMPLES
- 400 ppm CONTOURLINE–DEFINES AREAS TO BE CAPPED

- WELLS TO BE SAMPLED ANNUALY FOR BTEX,PAHs AND WQCC METALS
- WELLS TO BE SAMPLED EVERY TWO YEARS FOR BTEX,PAHs AND WQCC METALS
- WELLS TO BE SAMPLED SEMI-ANNUALLY FOR BTEX AND ANNUALLY FOR PAHs AND WQCC METALS

BDM

FIGURE 11b
DISTRIBUTION OF LEAD IN SOIL SAMPLES AND PROPOSED CAP DETAIL

CLIENT:	REXENE/HUNTSMAN
DATE:	11/05/97
AUTHORED BY:	CS
DRAWN BY:	DAG
CHECKED BY:	CS
DWG. NO.:	D:\REXENE\RXL2.DWG