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Listing Site Inspection Start

EL PASO PRODUCTS

Sunland Park, New Mexico

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Dennis Slifer

New Mexico Environmental Improvement Division

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SUMMARY AND CONCLUSION

El Paso Products is an old oil refinery site located on the west bank of the Rio Grande approximately two miles northwest of El Paso, Texas, near the community of Sunland Park, New Mexico. El Paso Products Co. changed its name to Rexene Products Co. (current owner). The site was originally known as the Brickland Refinery. The refinery operated between 1933 and 1958. The site is presently a vacant land parcel. The New Mexico Environmental Improvement Division (NMEID) conducted a Screening Site Inspection between April and September 1989, and found evidence of contamination. Heavy metals and volatile and semi-volatile organic compounds were identified in sediment and waste samples collected on-site at concentrations significantly above background. In early 1990 Rexene Products Co. retained Eder Associates (EA), Consulting Engineers, to conduct a phase I site investigation. In accordance with a workplan approved by NMEID, EA conducted field work at the site between April and July, 1990, and submitted the Phase I Report, parts 1 and 2, in August and October 1990. NMEID provided technical oversight and collected sample splits for portions of the site.

During refinery operation, waste water, tank bottoms, and other process wastes were disposed of in lagoons on the southern end of the property. This area has since been covered with dredge spoils from the Rio Grande. An oil pit and other areas of tar/asphalt-like material exist on site. A conservative estimate of waste volume is approximately 3,000 cubic yards. Analysis of waste/sediment samples, along with results of a soil gas survey, show moderate to high concentrations of volatile and semi-volatile hydrocarbon compounds throughout the southern half of the site. While these organic compounds are constituents of crude oil and fuels, many of the compounds detected, especially semi-volatiles, are also characteristic of CERCLA K-listed wastes (K-048 through K-052). Metals analyses of waste/sediment samples revealed many locations throughout the site with Pb, Cu, As, Zn, Ni, Cr, Cd, Ag, and Hg at concentrations significantly above site background. The majority of the samples containing high concentrations of metals are from the southern portion of the site. Their presence in the area of the site that was used for waste disposal, and the high concentrations observed, further suggest the presence of CERCLA K-listed wastes.

Groundwater at the site occurs at a depth of approximately 2 to 10 feet and flows to the east and southeast (toward the Rio Grande), except during the growing season when the river temporarily becomes a losing stream in locations where groundwater is heavily pumped. EA's well inventory lists 76 wells within four miles of the site and in the U.S. No domestic or municipal supply wells were identified within three miles of the site in the down-gradient direction. Fifteen monitoring wells were installed by EA during the site investigation. Analytical data show that concentrations of total dissolved solids range from 4460 ppm to 12,300 ppm across the site. Groundwater at the site is contaminated with moderate to high concentrations of organics beneath the southern half of the site. Several plumes of free phase hydrocarbon product are floating on the water table along the western and eastern edges of the property. The presence of high concentrations of volatile and semi-volatile compounds in the MW-6 well cluster, only 50 feet from the Rio Grande, indicate that contamination is moving off-site and may be entering the river. The only metals present in groundwater at signifcant concentrations above background are arsenic and silver in wells located in the southern half of the site.

Surface water is taken from the Rio Grande at a point four miles downstream from the site for use as El Paso's water supply. Surface runoff from the site is directed via four engineered drainage culverts to the Rio Grande. Samples of river water collected upstream, adjacent to, and downstream from the site revealed no discernable differences in water chemistry. However, surface soil samples collected near the entrances to the culverts in the southern end of the site contained high concentrations of heavy metals, and sediment samples collected from the culverts at locations near the river contained semi-volatile organic compounds at concentrations up to 39 ppm, as well as heavy metals at significant concentrations above background. These data indicate that sediment containing high concentrations of heavy metals is available for transport by surface water runoff, and that semi-volatile organic compounds and heavy metals have been transported off-site. Hence, the river and El Paso's water supply could be adversely affected by both surface-water runoff from the site and influx of contaminated groundwater.

The condition of most substances observed on-site makes for low probability that any will be released to air. The material having the greatest potential for release to air is the uncovered, fine-grained sediment at surface locations where high concentrations of heavy metals have been observed. Excavation or disturbance of subsurface material in the southern portion of the site could result in release of organic vapors from exposed volatile organic compounds present in product, waste, or contaminated soil. On-site exposure of persons to hazardous conditions is similarly limited to inhalation or ingestion of fine-grained sediment and dust containing high concentrations of heavy metals, and to organic vapors emanating from disturbed soil contaminated with volatile organic compounds.

INTRODUCTION

Site Location

El Paso Products is an old oil refinery located on the border of New Mexico and Texas, near El Paso. The site is approximately 30 acres in area and is located approximately two miles northwest of El Paso, adjacent to the Rio Grande (Figures 1 and 2). A residence and automobile salvage business are immediately north of the site and a smelter is approximately one mile south of the site. Industrial, commercial, and residential property are present within four miles of the site. El Paso Products Co. changed its name to Rexene Products Co., however, the site is referred to as El Paso Products.

Operating History

The following information is taken from the Phase I Site Investigation Report by Eder Associates (EA), August, 1990 (Appendix A):

> The Petroleum refinery at the El Paso Products site was constructed in 1933 and operated until 1955 by a series of business entities controlled by the McNutt family. Through several corporate transactions, the refinery was subsequently owned by the El Paso Natural Gas Products Company, which operated the refinery until 1958. Although refining operations ceased in 1958, a refinery products quality control laboratory operated on the site until 1964. The site was apparently unused from 1964 until approximately 1968. From 1968 to 1989, portions of the site were leased to a number of parties. The terms of the various leases permitted the lessees to garage and service trucks, graze livestock, and store used bricks.
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> Refinery process flow diagrams and plot plans (Figure 3), supplemented by interviews of former workers, indicate that the refinery contained the following processes: Crude oil was delivered to the tanker truck unloading racks in the central area of the refinery. Typical refinery operations in the 1950's included the following activities: removing salt and water from the crude feedstock in a "Petreco" de-salting unit, distilling crude in a single-column

Finished product was stored in tanks on the refinery site. Process water for the refinery was pumped from the river at the southern end of the site and was used mainly for cooling. Water was stored in cooling towers and nearby holding ponds. The Petreco de-salter may have used small quantities of an emulsion breaker as well as water. The polymerization unit used clay impregnated with small amounts of platinum as a catalyst, as well as beds of alumina as a feed pre-wash. The gasoline treatment process used a solution of copper, sulfuric acid, and caustic soda. The treatment process for kerosene used caustic soda, lead, and sulfur. Tetra-ethyl lead was blended into finished gasoline to increase its octane rating. Unspecified additives were blended with diesel fuel. Potassium di-chromate was used to inhibit slime buildup in cooling water. Small amounts of liquid phosphoric acid (a polymerization by-product) and other acids were also used to inhibit scaling and slime build-up. Mercury was not used as a product or process additive at the refinery.

The refinery's crude oil capacity in 1958 was 4,000 barrels per calendar day, up from 3,000 barrels in 1950. For comparison, the crude capacity of the Esso refinery in Linden, New Jersey in 1958 was 168,000 barrels per calendar day. In 1958, the thermal cracking unit had a charge of 1,600 barrels per stream day, the Platformer had a charge of 480 barrels of platformate per stream day, and the polymerization unit produced 65 barrels per stream day.

The desalting unit generated wastewater containing brine and the emulsifying agents used in the process. This solution was pumped through underground pipes to holding pits at the southernmost end of the property. Waste solutions generated by the gasoline and kerosene treatment processes were disposed of in a similar manner. Tank bottoms were disposed of in the same pits. It appears that accumulated petroleum product in these pits was recovered. Accumulated residuals were periodically shoveled out manually and hauled off-site by truck for disposal. Hard carbon "coke" that accumulated in heat exchange tubes in the crude distillation unit, and especially in the thermal cracker, was periodically removed with manually operated drills and air chisels. The coke was left in a powdery form on the ground. The polymerization unit and platformer unit catalysts, as well as the alumina used as a pre-wash in the Platformer, required periodic replacement. Some of this material, especially the platinum impregnated alumina, was sometimes sold to recyclers. Other catalysts, and clay used for petroleum filtration, were also replaced periodically and disposed of off-site by truck.

Product spills described by former employees arose from leaks in product tanks and in the underground piping between refinery units. Leaking pipes and tanks were repaired or replaced as necessary. The refinery recovered leaked product by excavating small pits and removing the accumulated product with a vacuum pump. The recovered product was reprocessed or returned to storage depending on its condition. In addition to underground leakage, small leaks of petroleum product occasionally occurred in aboveground pipes near the tetra-ethyl lead house.

EA inquired about fires or explosions which might have been recorded by fire departments. The refinery was apparently not under the El Paso Fire Department's jurisdiction and Sunland Park does not have an organized Fire Department.

Previous Investigations

The Preliminary Assessment completed on June 17, 1982 by USEPA's Field Investigation Team (FIT), identified the property owner and the activities present at the site. During the FIT inspection no evidence of "improper handling/storage or disposal of wastes" was observed. However, no samples were collected and very little information was included in the PA.

On April 12, 1989, personnel of the New Mexico Environmental Improvement Division (NMEID) conducted a Screening Site Inspection reconnaissance visit, during which an adjacent land owner was interviewed, groundwater was sampled, and the refinery property was observed from adjacent roadways (NMEID, 1989). In June and July 1989, personnel of the NMEID collected soil, waste, and groundwater samples at the site to investigate a complaint by a local resident who felt that contaminants from the site had killed some of his trees. The NMEID and Rexene split samples from the July sampling event and exchanged analytical results thereafter. NMEID prepared a draft SSI report on its Screening Site Inspection which was sent to USEPA Region VI (Dallas) for review.

Heavy metals and volatile and semi-volatile organic compounds were identified in sediment, tar, and sludge samples collected on-site during the SSI at concentrations significantly above background (NMEID, 1989). Samples of sludge collected near the southern outfall contained high concentrations of lead when compared to background. In similar comparisons to background soil chemistry, soil/sediment samples collected from the litharge area contained high concentrations of copper, lead, and mercury, and tar samples collected from one of the former oil pits contained high concentrations of chromium and lead. It is likely that waste material in the oil pit and litharge area are not exempt under the "petroleum exclusion" of CERCLA as they contain chromium, copper, or mercury which are not usually added to petroleum or petroleum products during refining nor are they natural constituents of petroleum at the observed concentrations (NMEID, 1989). Additionally, tank bottoms were disposed of in the pits at the southern end of the property, as per discussion above, some of which may have been leaded tank bottoms based on the observed concentrations of lead in samples from that area.

The samples of sediment, tar, or sludge collected during the SSI were from materials which were open to the environment and not contained by liners, berms, covers, or any other apparent containment system (NMEID, 1989). Material dredged from the Rio Grande and deposited over the impoundments in the southern portion of the site constitute the only form of containment identified on-site (ibid).

Eder Associates (EA), Consulting Engineers, was retained by Rexene Products Corporation to conduct a site investigation in 1990. Pursuant to a January, 1990 work plan, which was subsequently approved (with modification) by NMEID, the work was conducted by EA and submitted to NMEID in August 1990 as a draft Phase I Site Investigation Field Investigation for Old Brickland Refinery Site, Sunland Park, New Mexico. The report is included herein as Appendix A. EA submitted Part II of the Phase I Report (analytical data) to NMEID in October, 1990. Part II is included herein as Appendix B. EA, and Rexene Products, refer to the site as the Old Brickland Refinery. In the interest of consistency, NMEID continues to designate the site as the EL Paso Products site. Portions of this LSI are taken from the EA report.

Geography

This site is located in Dona Ana County, on the southeastern border of New Mexico adjacent to El Paso, Texas on the fluvial terrace of the Rio Grande River in the vicinity of the United States-Mexico border. The study area lies within the Mesilla Valley in the basin and range physiographic province of the United States. This area is characterized by north-trending mountain ranges separated by basins filled with alluvial material. The lower Mesilla Valley is cut into unconsolidated deposits of La Mesa Bolson and slopes at the rate of 4.5 feet per mile from the town of Anthony to the gorge of the Rio Grande. At the south end of the valley, the Rio Grande flows through a narrow gorge between the Franklin Mountains and the Cerro de Muleros. The majority of the site is fairly flat, being on the flood plain of the Rio Grande. However, the western edge of the site abuts very steep terrain and slopes in excess of 60% are present here. Intervening terrain between the site and the Rio Grande generally slopes between 3% and 5%.

Climate

Climate in the lower Mesilla Valley is arid continental and is characterized by a wide range in temperature, low humidity, high evaporation and low precipitation. Precipitation in the area is mostly in the form of rain; about one-half of total annual precipitation occurs from July-September. Rainfall during these three months usually is from brief, intense thunderstorms. Net precipitation of 0.64 inches occurs between the months of December and February (Tuan, et al., 1973). Winds are strongest during March, April and May, when wind direction is generally from the west-southwest and northwest. The prevailing winds are from the southeast during the summer months. The winds typically blow parallel through the valley.

Geology

The Mesilla Basin was formed by downward displacement relative to surrounding mountain uplifts and was concurrently filled with sediments and volcanic rocks from various sources. The course of the Rio Grande has been a major factor in the distribution of sediments in the study area, and Mesilla Valley and adjacent areas are characterized by a thick sequence of alluvial material. River flow was probably much greater during the Pleistocene age than at present because of the greater precipitation at that time. Even within historic times the river in flood stage covered the entire flood plain for weeks at a time and was as much as five miles wide in parts of the Mesilla Valley. In the first decades of the 20th century dams and levees were constructed along the river and the river channel was straightened.

The main body of sediments in the lower Mesilla Valley belong to the Santa Fe Group of middle Miocene to Pleistocene age. More recent sediments overlie the Santa Fe Group as outwash-fan deposits, windblown deposits, and alluvium laid down by the Rio Grande. The alluvium is derived from the erosion of the Santa Fe group and shows similar characteristics, consequently, it is difficult to determine the contact between alluvium and the Santa Fe group.

Consolidated rocks in and near the lower Mesilla Valley include igneous and sedimentary rocks. Most of the igneous rocks are either Precambrian or Tertiary in age; the sedimentary rocks are pre-Tertiary. In general, the consolidated rocks in the lower Mesilla Valley do not contain a usable groundwater supply due to their low permeability. The obstruction of the lower end of the valley by andesite materially affects water quality in the valley because of its mineral salts.

Groundwater Hydrology

Unconsolidated deposits in the lower Mesilla Valley consist of sand, gravel, clay, silt, caliche and conglomerate. The unconsolidated deposits contain what are referred to as shallow, medium and deep aquifers and, although these aquifers are discussed as separate water bearing units, tend to be hydraulically connected (Wilson, et al., 1981). The shallow aquifer consists of the shallow alluvial deposits and a part of the underlying Santa Fe group. Hydraulic conductivity of the shallow aquifer is typically about 70 feet per day (Frenzel and Kaehler, 1990). The bulk of the Santa Fe group comprises the medium and deep aquifers.

Groundwater in the lower Mesilla Valley occurs in both unconfined and confined conditions. The general direction of groundwater flow in the uplands and in the lower Mesilla Valley is toward the Rio Grande, except where concentrated withdrawals have formed cones of depression that extend over large areas (Frenzel and Kaehler, 1990). The southward gradient of the water table in the alluvium is about four feet per mile (figures 4 and 5), approximately the same as the river.

Groundwater recharge in the lower Mesilla Valley is the result of direct infiltration of precipitation; seepage from canals, laterals, and irrigation water applied to the land; seepage from the Rio Grande; and groundwater flow from the uplands. Under non-pumping conditions, the Rio Grande is a gaining stream during most of the year. However, as a result of large scale pumping, the river temporarily becomes a losing stream where the water table is lower than the riverbed.

Generally the three aquifers function as a single hydrologic system, and water moves from one aquifer to another in response to a change in head. Since pumping is mainly from the medium and deep aquifers, water may move from the shallow to the deeper aquifers in reaction to localized vertical gradients. However, the geologic cross-section (figure 6) of the Rio Grande gorge several hundred feet away from the site indicates that the maximum depth to the bedrock in this area is 86 feet and it is not likely that the generalized interaquifer hydraulic connection has significance on the site as only one aquifer is probably present. Discharge of groundwater at the southern end of the Mesilla Valley mostly occurs as drain flow, evaporation, and transpiration. Evaporation and transpiration account for a significant loss of water due to the very shallow water table.

Water levels measured in wells in the lower Mesilla Valley fluctuate almost continuously, and the magnitude of the fluctuations is greater in the medium and deep aquifers than in the shallow. Hydrographs of five Mesilla Valley irrigation wells (Wilson, et al., 1981) indicate that depth to groundwater from 1950 to 1970 fluctuates from 4 to 12 feet. The hydrographs show that the volume of groundwater stored in the floodplain alluvium is closely related to the volume of surface water used for irrigation in the preceding few years, and that, in general, there has been no material long-term decline in water levels or in the volume of storage in the Mesilla Valley. The configuration of the water table, and the quality of shallow groundwater, are closely related to the volume of surface water in the Rio Grande and irrigation canals. Similarly, the volume and quality of base flow in the Rio Grande are closely related to groundwater conditions.

Alluvial deposits in the study area contain moderately to highly mineralized water and groundwater quality varies areally and with depth (Appendix A, p. 15). The dissolved-solids concentration in groundwater in the southern part of the Mesilla Valley is generally much greater than in the northern part. Dissolved solids concentrations in the water in the flood-plain alluvium (shallow aquifer) of the Mesilla Valley are generally greater than 1000 milligrams per liter (Wilson, et al.,1981). Concentrations of dissolved solids in water samples from several wells on the east side of the valley exceeded 3,000 mg/l.

LSI INVESTIGATION

This LSI was designed to determine if CERCLA hazardous substances are present at the El Paso Products site and, if so, if groundwater, surface water, or surrounding properties are contaminated by the substances identified. Additional objectives of the LSI were to locate water-supply wells within four miles of the site, determine population within four miles of the site, and determine water uses of the Rio Grande downstream from the site. The investigation was designed to determine routes of off-site migration of contaminants and any off-site receptors. The LSI was conducted by NMEID between March, 1990 and October, 1990. The majority of the field work was conducted by Eder Associates on behalf of Rexene Products Company, with oversight by NMEID personnel. NMEID reviewed and approved a field sampling plan developed by EA and collected splits of select samples for independent analysis and verification.

Waste Characterization

Description- CERCLA hazardous substances documented to have been generated or used at the site include heavy metals and volatile and semi-volatile organic compounds. These substances were identified in sediment, tar, and sludge samples collected on-site during the SSI. Some or all of the organic compounds may be exempt from CERCLA action due to the petroleum exclusion, however, the wastes in the oil pit, litharge area and in the southern portion of the property are likely to be some of the K-listed, non-exempt, refinery wastes (K048-K052) as characterized by high levels of lead, copper, mercury, nickel, arsenic, and chromium (NMEID, 1989).

Based on review of aerial photography, field measurements, sample analyses, and conservative estimates of thickness, the volume of waste on-site has been estimated to be at least 3,000 cubic yards (NMEID, 1989). This estimate is based on volumetric calculations of the oil pit (150x50x2 feet) and the southern portion of the site (360x214x1 feet). The quantity of CERCLA hazardous substances on-site is not known but, based on the presence of elevated levels of heavy metals, is assumed to be greater than zero.

Methods- Initial components of EA's Phase I site investigation were the conducting of magnetometer and soil gas surveys over a grid pattern established for the entire site (Appendix A). The magnetometer survey was intended to delineate anomolous areas of total magnetic field intensity that could indicate concentrations of buried metallic objects such as drums, and to delineate buried pipelines, tanks or other utilities and structures. The soil gas survey was intended to provide a general indication of subsurface contamination by volatile hydrocarbons. Soil gas samples were taken at the same survey grid points used for the magnetometer survey. Soil gas was monitored with a Photovac Tip II and a Photovac 10S50 Portable Gas Chromatograph (PGC). For more information on survey or sampling methods and locations for both the magnetometer and soil gas surveys refer to Appendix A.

Waste characterization sampling consisted of nine surface samples collected in work areas E, F, and G, (analyzed for total Cr, Cu, Pb, Hg, and Ni) and an extensive program of subsurface sampling by soil auger and backhoe pits as specified in the workplan and documented in EA's Phase I report (Appendix A). Select samples were split by EA and NMEID. Sampling locations were spaced along gridded transects to provide areal coverage of the site. Sampling locations are shown on plates 3 and 4 of Appendix A. The EA report includes logs for 112 tests pits/hand auger holes and 26 soil borings.

Soil samples from 2 to 5 adjacent locations were composited and analyzed for 13 priority pollutant metals to determine the specific metal constituents to be analyzed from individual samples collected at the time the composite was prepared. The individual soil samples were analyzed only for those metals found in the composite in excess of levels specified in Table 5 under the column labeled "Eder Assoc. maximum background".

Samples to be analyzed for oil and grease content were collected from each sampling location at a depth determined by the highest photo-ionization detector (PID) reading from that particular sampling location and/or from visual inspection. Samples for oil and grease analysis were collected in duplicate so that 20 percent of the samples (those containing the highest concentration of oil and grease) were then analyzed for semi-volatile organics.

Samples to be analyzed for volatile organic compounds were collected only from locations characterized by significant contamination as indicated by high PID/visual screening. The results of the soil gas screen were used to establish the significant PID reading in a particular area (i.e., a reading of 100 ppm in Area C would be considered high but in Area F it would not merit the collection of a VOC sample).

Samples were collected and shipped in accordance with a written protocol outlined in the work plan. All sample bottles were labeled with an identification code indicating the date and location of the sample and the required analysis. Strict chain-of-custody procedure was followed for all samples. All pertinent sampling information, including a description of the soil horizons, unusual materials encountered, odor, and color at each sampling location was entered in the field logbook.

The major portion of the subsurface sampling program consisted of excavating 91 test pits. The depth of test pits ranged from 4 feet to 10 feet depending on the groundwater level and/or backhoe safe working depth. During test pit excavation varying levels of personnel protective equipment (PPE) were used depending on PID and soil gas readings in the area. The majority of the sampling activities required Level B, other sampling required Level C. The prevailing wind at the site was sufficient to allow personnel to stay upwind of the excavations.

The test pits yielded data on depth to groundwater, underground pipe, fill materials (including metal scrap and miscellaneous solid waste) in addition to sampling information. These data were recorded on a log sheet (Appendix A). All test pits were photographed for visual recall and to show the varying nature of soil and groundwater contamination. All test pits were visually checked for evidence of flowing water and oil (slicks, sheen, or floating product). Depth to standing water was measured from land surface before the pit was backfilled. The rate at which water entered the pit was noted as a rough indication of the relative permeability of the subsurface material. The pits were backfilled after they were sampled. Whenever possible, clean soil was stored to one side of the test pit while discolored soil/fill was stored on the opposite side. The test pit was backfilled with the clean soil at the top. The backhoe bucket was steam cleaned before each excavation to prevent cross-contamination. Sampling locations covered with construction and demolition debris and not accessible to the backhoe (in areas A and B) were sampled manually using a stainless-steel auger having a 3-inch diameter bucket. A total of 5 borings were made in sampling locations A and B and another 6 borings were made off-site in 4 storm water outfalls located along the bank of the Rio Grande. The borings were made to a depth ranging from 1 to 6 feet, depending on groundwater level. A physical description of each boring was noted in the field log book. Soil samples from the on-site manual borings were composited for metals and oil and grease analysis, while a set of duplicate samples were held by the lab. Samples from the off-site borings were analyzed for semi-volatile organic compounds (SVOCs) and priority pollutant metals. Prior to each soil boring the augers were cleaned by rinsing with tap water, Alconox, and a double rinse with deionized water.

A total of 24 borings were drilled in area D and 2 borings were drilled in area F to supplement the test pit subsurface sampling. These borings were located on transects crossing the area as indicated in Plate 4 of Appendix A. All borings were drilled to 10 feet, and soil was sampled continuously by advancing a decontaminated stainless steel split-spoon ahead of the augers. The lithology of each borehole was noted in the field log book along with the organic vapor analyzer (OVA) head-space screen and other information. The split-spoons were cleaned as described in the work plan. A soil sample was retained from each 0'-2' interval. These samples were composited with similar samples along a transect and analyzed for 13 priority pollutant metals. A duplicate sample from each borehole was also sent to the laboratory and held in the event that it was necessary to analyze for individual metals in composites. In each borehole a sediment sample from the interval that showed the highest VOC concentration in the head-space screen was sent to the laboratory and analyzed for oil and grease. A duplicate of this sample was also sent to the laboratory and held for SVOC analysis, if warranted, based on the oil and grease data. Table 7 presents a matrix showing the number of samples collected for particular analyses by work area.

Results- Tables 1,2,5,6, and 10 of this report, and Part II of the EA Phase I Report (Appendix B), give the analytical results of soil, sediment, and waste characterization samples. Figure 9 shows the locations of magnetic anomalies from the magnetometer survey. The soil gas survey revealed three major areas of high organic (volatiles) contamination: 1. western portion of area D plus southwest portion of area C, 2. southwest corner of area F plus northwest corner of area G, and 3. most of area F. The highest reliable concentrations of target analytes (VOCs in soil gas as determined by portable gas chromatograph) were 875 ppm benzene, 77 ppm toluene, and 97 ppm total xylene. Concentrations of VOC's in soil gas correlate well with the occurence of free phase petroleum product on the water table (Appendix A, plate 5).

The results of organics analysis of sediments by both NMEID (Table 1) and EA (Appendix A) indicate the presence of volatile and semi-volatile hydrocarbon compounds throughout much of the site, with the greatest concentrations and extent in areas D,E,F,and G. While most of the compounds detected are petroleum-related hydrocarbons typical of refinery processes and wastes, the common presence of many hazardous mono- and poly-nuclear aromatic compounds such as toluene, xylene, napthalene, phenanthrene, pyrene, chrysene, anthracene, benzo-a-pyrene, and benz-a-anthracene suggest that some CERCLA non-exempt wastes (K-048 through K-052) are present, particularly within the portions of areas G and F that represent the old waste disposal areas. Characterization data for the K-048 to K-052 wastes is presented for reference (E.P.A., 1988, of this report). Because not every SVOC characteristic of the K wastes was analyzed for, it is difficult to correlate the analytical results precisely to a particular K waste. However, it appears that many of the SVOCs and VOCs characteristic of K-049 (slop oil emulsion solids), K-051 (API separator sludge), and K-052 (leaded tank bottom sludge) are present in analyses of samples from areas G and F (and to a lesser extent in areas D and E). Table 9 compares select constituents (organics and metals) found in these K-listed wastes with the percent occurrence in sediment/waste samples from areas G and F. SVOC analysis of sediment from culvert #1 (drains area

G) also contains most of the SVOCs charcteristic of the above wastes (anthracene, benzo-a-pyrene, benz-a-anthracene, chrysene, phenanthrene, and pyrene). Metals data for the culverts draining areas G and F (Table 10) show Hg, Cd, Cr, Cu, and Pb are present at concentrations significantly above background.

Analytical results of metals analysis in sediments (Tables 2,5,6,8, and 10, plus Appendix B) show the following metals are present in significant concentrations above background: lead, copper, arsenic, zinc, nickel, chromium, cadmium, silver, and mercury. A "significant" concentration was determined as twice the average background value found in the samples shown in Table 5. The matrix presented in Table 6 shows the distribution of significant metals concentrations by work areas. Again, areas F and G contain the greatest numbers and highest concentrations of samples with elevated metals (area F has 63 "hits" and area G has 26 "hits"). Lead values as high as 377,000 ppm are found, along with concentrations of copper up to 35,800 ppm. Both lead and copper were used in refinery production. The extremely high levels of lead and copper, far in excess of soil background levels, indicate a concentrated waste source since these levels of concentration are not representative of crude oil or refined product. The source of the other metals is not known, but it should be noted that they are found primarily in the old waste disposal areas of the site (areas F and G) and these metals are common constituents of the CERCLA K listed wastes. The range of significant concentrations for lead, zinc, nickel, copper, chromium, cadmium, silver, and mercury found in the sediment analyses indicates that wastes deposited on site may include leaded tank bottom sludge, API separator sludge, or slop oil emulsion solids. Mercury was detected in area F at concentrations ranging from 3.7 ppm to 10.0 ppm. Cadmium was detected in area G at concentrations between 24.1 ppm and 36.7 ppm. Chromium occurs in areas F and G at concentrations between 22.6 ppm and 97.0 ppm. Nickel occurs in areas E,F, and G at concentrations between 14.5 ppm and 43 ppm. Zinc is found primarily in area F at levels as high as 2370 ppm. Based on currently available sample data, arsenic is found mostly in areas D and C, ranging from 10 to 170 ppm. However, arsenic data are incomplete at the time of writing this report; not all of the unique soil/waste samples have been analyzed due to lab problems. EA will submit the remaining arsenic data when it becomes available. Areas D and C were used mainly for unloading crude oil and loading refined product; likely sources for the observed concentrations of arsenic are unknown, given the current information.

From Table 6 it can be seen that a total of 152 of the soil/sediment samples that were analyzed for metals had significant concentrations above background. However, this table was constructed using only the metals data that were not flagged with "N" (matrix spike out of acceptable range). EA has explained that the "N" qualification is the result of instrument drift and an attempt has been made to compensate for this drift during laboratory quality control. Particularly for larger concentrations detected, matrix spike error would be relatively less, so that values for significant concentrations above background could still be considered as "hits". If Table 6 also considered the "N"-flagged metals data, the total number of "hits" would be much greater than 152.

Based on metals analyses of sediment samples from drainage culverts at the southern portion of the site (Table 10), it appears that some wastes may be migrating off-site. Concentrations significantly above background were detected for Hg (.27ppm), Cd (7.9 ppm), Cr (39 ppm), Cu (240 ppm), and Pb (260 ppm).

Conclusions- Sediment/waste samples contained lead, copper, arsenic, zinc, nickel, chromium, cadmium, silver, and mercury at significant concentrations above background. The majority of elevated metals are found in the southern end of the site (areas F and G) which contained the waste disposal pits, cooling water lagoons, oil pits, and litharge area. Lead and copper were used in refinery production, and are found at extremely high concentrations. The source of the other metals is unknown but their presence and range of concentrations suggests that wastes diposed of on site may have included CERCLA hazardous substances K-049, K-051, and K-052, as the observed concentrations of these metals are not natural occurrences in crude oil.

Organics analyses of sediments, along with results of a soil gas survey and visual observation, documents moderate to heavy contamination by VOCs and SVOCs throughout areas D,E,F,and G. A plume of free phase hydrocarbon product is floating on the water table along both the western and eastern edges of the property and under most of area F. Concentrations of total SVOCs in soil, sediment, and waste samples as high as 4000 ppm are found in area G, and total VOCs range as high as 5438 ppm in area F. Organic compounds present are largely petroleum-related hydrocarbons but many aromatic compounds characteristic of CERCLA K wastes are also found, especially SVOCs. Based on the presence and range of concentrations of these organic compounds (Table 9), CERCLA wastes most likely to be present are K-049 (slop oil emulsion solids), K-051 (API separator sludge), and K-052 (leaded tank bottom sludge). Both K-049 and K-051 are the result of residuals from waste water operations/disposal. All of the refinery processes listed on page 1 (desalting, distillation, cracking, reforming, polymerization, and blending) result in waste water production, which was disposed of in holding ponds/lagoons on the southern end of the property. It is known that tank bottoms were disposed of in these same ponds/lagoons. It is also known that tetra-ethyl lead was blended into gasoline at the refinery, to make leaded gasoline. Therefore, it is likely that leaded tank bottom sludge (K-052) was disposed in the waste water ponds as sediment/waste samples from the waste lagoon areas and the refinery process area.

Ground-water Route

Description- EA's Phase I report includes an inventory of 76 wells located within four miles of the site (Figure 8 and Appendix A, p.18 and plate 1). Four of these wells are classed as public supply and 12 are domestic supply (the remainder are for irrigation, stock, or industrial use, or are abandoned). The nearest domestic well (#45 on Figure 8) is approximately .75 mile from the site, and municipal water is available for an alternate supply (Contact report, Joe Ocho). Less than 100 people rely on groundwater from wells within three miles of the site. The NMEID Drinking Water Section is aware of no municipal/community supply wells within three miles of the site (Contact report, Richard Asbury). No wells are shown in the U.S. within 4 miles down-gradient of the site (southeast). Well locations within Mexico are not known at this time. Since shallow groundwater at the site and the surface water of the Rio Grande are in hydraulic connection, it should be noted that the City of El Paso's water supply intake is located approximately 4 miles downstream of the site. The water is first diverted into an open canal at a point 0.8 mile downstream from the site (as reported in the SSI), but does not actually enter the pipe system of the water plant until a point approximately 4 miles below the site. The diversion canal flows past the Asarco Smelter between these two points.

Methods- Fifteen monitoring wells were installed at the site by EA during the Phase I field work. Locations of monitor wells are shown on plate 4 of Appendix A. During drilling of the monitor wells, soil and sediment samples were taken from the boreholes continuously to 10 feet and every 5 feet thereafter. Lithologic boring logs are included in Appendix A, along with well construction logs. Pre-packed well screens were installed because of flowing sand at the site. The auger was advanced to a depth two feet deeper than the anticipated screen depth, the wooden plug was knocked out with the screen and casing, and the auger flight withdrawn. The screen was then pulled back to the required depth and the flowing sand was allowed to fill the void. Sediment samples from the boreholes were screened for volatile organic compounds (VOCs) by headspace analysis with a PID. Samples from well numbers 1,2,3,9,and 12 did not contain detectable concentrations of VOCs. Those samples were not sent to a lab for analysis. Samples from all other wells had elevated PID vapor readings and showed visual evidence of hydrocarbon staining. Those samples were analyzed for oil and grease. Duplicate samples were also sent to the lab for semi-volatile analysis pending the results of oil and grease analysis.

Water level measurements were made in all monitoring wells on the site. Elevations were measured simultaneously at the Rio Grande to determine groundwater - surface water interaction. These data were used to construct groundwater contour maps (figures 4 and 5). The EA report concludes that the Rio Grande is a losing stream for at least part of the year (Appendix A, p. 43). The water table gradient is nearly flat throughout much of the site, corresponding to the gradient of the Rio Grande. All measurements were made with a chalked steel tape which was decontaminated after each use. Split samples collected by NMEID were handled in accordance with the Superfund Programs' SOP, including chain of custody procedure.

Results- The groundwater flow direction in the vicinity of the site is to the east and southeast (toward the Rio Grande) as observed by water level measurements made in April and July of 1989 (Figures 4 and 5). Monitor well MW-12 is up-gradient of the site, MW-1 is probably off-gradient, and all others are either down-gradient or on-site.

Water chemistry data from monitor wells at the site are shown in Tables 3 and 4, and in Appendix B. Groundwater is contaminated with VOCs and SVOCs beneath the southern half of the site. The northern portion (areas A,B, and C) are apparently free of VOC and SVOC contamination in groundwater. The presence of VOCs and SVOCs correlated closely and the highest concentrations were in proximity to free product on the water table and/or heavy soil contamination. Concentrations of SVOCs were typically greater than concentrations of VOCs in most wells. Water chemistry data from the cluster wells show that organics contamination is greater at shallow zones than at the 35-foot depth. It should be noted that all wells are screened below the static water level and hence their sample data could be biased toward lower concentrations. The greatest VOC contamination was in wells MW-4,5,6,8,10, and 11, with a maximum value for total BTEX of 33,200 ppb in MW-8. Wells with SVOC contamination are MW-4,5,6,7,8,9,10,and 11. The well cluster at MW-6 is highly contaminated with organics and based on its' location close to the Rio Grande, indicates that groundwater contamination is moving off-site and may be entering the river. Several plumes of free phase petroleum hydrocarbon are floating on the water table beneath certain areas of the site (Appendix A, plate 5). The product resembles gasoline along the western site boundary (MW-5 and MW-8), and resembles oil along the eastern boundary.

Results of metals analysis in groundwater samples are shown in Table 4 and in Appendix B, pages 60-63. Using MW-12 as background, at twice the value of metals concentrations found, other wells at the site show elevated levels of arsenic and silver above background. Wells with significant concentrations of silver are MW-6s and MW-6d. Wells with significant concentrations of arsenic include MW-1,3,5,6s,6d,7,8,10,and 11. No other metals are present above background levels, probably due to pH/solubility factors.

pH/solubility factors.

Water chemistry data supplied by EA did not contain analytical results for total dissolved solids (TDS) at the time of writing this report. The data from NMEID's split samples (Table 4) show TDS values ranging from 4460 ppm in MW-6 to 17900 ppm in MW-12. Such high value for MW-12 make its use as an up-gradient well suspect, since it has apparently worse water quality, in terms of TDS, than other wells on the site. A sharp vertical gradient in water quality is reflected by a TDS of 4460 ppm in MW-6s and a TDS of 12300 ppm in MW-6d (35 feet deep). Water having a TDS in excess of 1000 ppm is considered unfit for a domestic water supply by New Mexico Water Quality Control Commission (WQCC) regulations, and all groundwater having a TDS of 10,000 ppm or less must be protected from contaminant degradation according to the N.M. Water Quality Control Commission Regulations 3-101. Therefore, groundwater at this site is, in some locations, subject to cleanup requirements under N.M. regulations. In some wells, based on general water chemistry alone, water would be suitable for agricultural use.

Conclusions- Groundwater at the site is contaminated with moderate to high concentrations of organics (both VOCs and SVOCs) beneath the southern half of the property. One or more plumes of free phase petroleum product are floating on the water table in the same area, and constitute a continuing source of contamination. The greatest concentrations of organics in groundwater are found in association with the product plume(s) and/or areas of heavy soil contamination. Most of the organic compounds present are petroleum-related hydrocarbons, however, some compounds characteristic of CERCLA K-list wastes are also present, especially semi-volatiles. Organics contamination appears to be greater in shallow zone wells than in the deeper (35 foot) wells. Because all monitor wells at the site are screened below the static water level, analytical data may be biased toward lower concentrations. The presence of high concentrations of VOCs and SVOCs in wells MW-6s and 6d indicate that contamination is moving off-site and may be entering the river. The only metals present in groundwater at significant concentrations above background are arsenic and silver, in wells located throughout the southern half of the site. The source of these metals is unknown, however, based on metals analysis of sediment/waste samples they may be derived from suspected CERCLA K-listed wastes such as slop oil emulsion solids, API separator sludge, or leaded tank bottom sludge.

Although complete TDS data for the site was not available at the time of writing this report, based on NMEID data from the samples that were split, it appears that groundwater at the site has TDS concentrations ranging from 4460 ppm to 12,300 ppm. Water having a TDS concentration in excess of 1000 ppm is considered unfit for a domestic water supply by New Mexico Water Quality Control

Commission (WQCC) regulations. However, all groundwater having a TDS concentration of 10,000 ppm or less must be protected from contaminant degradation according to the N.M. Water Quality Control Commission Regulations section 3-101. Therefore, groundwater at this site is, in some locations, subject to cleanup requirements under N.M. regulations. In some wells, based on general water chemistry alone, water would be suitable for agricultural use.

Surface-water Route

Description- Surface water runoff from the site is diverted to the Rio Grande via three engineered storm-water outfalls on the eastern edge of the property. The possibility of a release exists because wastes are not contained in the litharge area, oil pit, and sludge impoundments (with the exception of being covered with dredge material). The distance from the edge of the site to the Rio Grande is only about 50 feet.

Surface water from the Rio Grande is used for drinking by the City of El Paso. The water is first diverted into an open canal at a point 0.8 mile downstream from the site, but does not actually enter the pipe system of the water plant until approximately 4 miles below the site (thus water taken into the canal below the site is not subject to further dilution or other possible biological mitigation effects which could exist in the river system). This water serves 20% of the population of El Paso, or 80,000 people (NMEID, 1989). Surface water is apparently used by Ciudad Juarez but the quantity used and use made of the water are not presently known.
Based on field observations and the topographic map for the area (Smeltertown, TX-NM 7.5 Quadrangle) there are no sensitive environments within one mile of the site.

Methods- During the LSI six sediment samples were collected from three storm water outfalls and analyzed for metals and semi-volatiles. In addition, nine surface samples were collected from three locations in work areas E,F,and G (see Plate 4, Appendix A). Three samples of surface water were collected from the Rio Grande along the western bank adjacent to the site (upstream, downstream, and middle of property). These samples were analyzed for volatile and semi-volatile organics, 13 priority pollutant metals, and major anion-cations. Field sampling methods followed protocols outlined in EA's Phase I report and the EID Superfund SOP.

Results- Surface water samples from the Rio Grande did not show any discernable differences in parameters for samples collected upstream, adjacent to, and downstream from the site (Appendix B). However, it cannot be concluded that the site is not affecting the river because of very large dilution factors in sampling from the river. As was previously discussed, high concentrations of along the edge of the site adjacent to the river.

Of the six sediment samples collected from the culverts draining the site, metals analyses for the two upper culverts (4 and 3) did not contain elevated concentrations of metals (Appendix B, chart of soil background metal levels). However, of the two lower culverts draining areas F and G (culverts 1 and 2), sample CUL-1-2 contained the following metals at significant concentrations above background: Hg=.27 ppm, Cd=7.9 ppm, Cr=39 ppm, Cu=240 ppm, and Pb=260 ppm. Culverts 1 and 2 drain the area where the surface soil samples were collected in area F and G. These samples also contain high concentrations of metals (Hg,Cr,Cu,Ni,Pb), as shown in Table 8. Sediment or waste from these locations would be carried by surface runoff, via the culverts, into the Rio Grande. The results of SVOC analysis of soil samples from the drainage culverts are shown in Appendix B, Table 22. SVOC concentrations ranged from 1.0 to 39 ppm in these samples, indicating that organic contaminants have been moving off-site via surface water runoff from the culverts. Some of the target compounds detected are phenanthrene, anthracene, pyrene, chrysene, benzo(a)anthracene, fluoranthene, and benzo(a)pyrene - all compounds characteristic of some of the CERCLA K-listed wastes.

The results of the nine surface soil samples collected in areas E,F,and G for analysis of total Cr,Cu,Pb,Hg,and Ni are shown in Table 8. A total of 28 out of 45 analyses exceed the NMEID threshold for the various metals. High concentrations of mercury (10 ppm), chromium (89.5 ppm), copper (34,000 ppm), nickel (22 ppm), and lead (24,000 ppm) in these surface soil samples indicate that heavy metals are accessable for transport by surface water runoff.

Conclusions- Although samples of the Rio Grande are inconclusive in demonstrating surface water impacts from the site, other analytical data do indicate that contaminants are both available for transport and have been moving off-site. Semi-volatile organics in concentrations up to 39 ppm, and significant concentrations of heavy metals, have been found in sediment sampled from the culverts draining the site. Significant concentrations of the heavy metals mercury, chromium, copper, nickel, and lead have been detected in surface soil samples collected in areas E,F,and G.

As stated previously, the groundwater-surface water interaction has been studied throughout the Mesilla Valley, and is known to be closely related. The Rio Grande is a gaining stream during most of the year under non-pumping conditions. The volume and quality of base flow in the Rio Grande are closely related to groundwater conditions. Hence, contaminated groundwater under the site (hydrocarbon plumes, elevated metals, etc.) is probably having at least a seasonal effect on the Rio Grande. There are site (hydrocarbon plumes, elevated metals, etc.) is probably having at least a seasonal effect on the Rio Grande. There are analytical data to suggest that contaminated groundwater and soil may be impacting surface water of the Rio Grande. VOC concentrations of 63,700 ppb were measured in soil borings at MW-6 (50 feet from the river), along with total VOC concentration of 5750 ppb and total SVOC concentration of 20,000 ppb in groundwater from that well.

Air Route

Description- Arsenic, copper, lead, mercury, and zinc were detected at elevated levels in sediments and wastes collected on-site during the SSI. Elevated levels of these, and other, metals have been documented in the vicinity of the site by the Texas Air Control Board, and are believed due to emissions from the nearby Asarco Smelter (Appendix A, p.7 of sub-appendix A). During the LSI nine surface soil samples were collected in work areas E,F, and G. While some of the surface soil samples were silty sand and contained fine particles that could become wind-born, other samples were of tar or asphalt material which probably would not represent a potential source of contamination to be released to air. However, excavation and disturbance of subsurface contaminants could release volatile organic vapors to the atmosphere. During test pit excavation organic vapors were monitored by PID and necessitated the use of level B personal protective equipment, as benzene was detected in excess of 5 ppm. Total organic vapors as high as 1500 ppm were measured downwind of some test pits (Appendix A, boring reports). The population within a four mile radius is not known precisely, but the proximity to both Sunland Park and El Paso (400,000) makes the target category fall within the "greater than 10,000" range.

Methods- Sampling locations and field protocol for air route samples is identical with those described earlier for surface soil samples under the sections for waste characterization and surface water route.

Results- Analytical results for the surface soil samples collected in areas E,F, and G are shown in Table 8. Significant concentrations of the heavy metals Hg,Cr,Cu,Ni, and Pb were detected in 8 of the 9 samples.

Conclusions- The potential exists for wind-borne transport of fine sediment containing elevated concentrations of heavy metals. Organic vapors are not likely to be a problem unless the site is disturbed by excavation, thereby exposing hydrocarbon contaminated soils to volatilization.

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LIST OF TABLES

Table 1. El Paso Products – Concentrations of organic compounds in sediment samples collected on–site by NMEID. Concentrations in ppm.

	EPPCTP4	EPPCTP8S	EPPETP20	EPPFTP11	EPPFTP13
VOCs		not analyzed			
Halogenated Purgeables	<2.7		<1.89	<10	<10
Aromatic Purgeables					
Ethylbenzene	45.0		16.25	160	250
Xylenes	81.9		18.90	144	12.5
Benzene			8.32	80	Trace
Toluene			3.40	Trace	Trace
Aliphatic HCs	present		present	present (23)	present (25)
Benzenoid Compounds	present		present	present (11)	present (5)
BNA EOCs			not analyzed		
Naphthalene	7			0.6	6.5
2–methylnaphthalene	4	33		0.9	5.7
1–methylnaphthalene				0.8	3.4
Phenanthrene		56			
Pyrene		46			
Diesel–like Hydrocarbons		7,020		280	
Gasoline–like hydrocarbons	1,730			65	1,800
Kerosene–like Hydrocarbons					380
Motor Oil–like Hydrocarbons					400
Di–n–butylphthalate					
Bis(ethylhexyl)phthalate					
4–methyl–3–pentene–2–one					
4–hydroxy–4–methyl–2–pentanone					
Trans–4–chlorocyclohexanol					
Lab ID					
(VOCs)	OR900413		OR900414	OR900503	OR900504
(BNAs)	OR900410	OR900411		OR900511	OR900510

Notes: VOCs = volatile organic compounds
BNA EOCs = base neutral & acid extractable organic compounds
B = compound also detected in laboratory blank

Table 1. (cont.) El Paso Products – Concentrations of organic compounds in sediment samples collected on–site by NMEID. Concentrations in ppm.

	EPPGTP14	EPPMW8–3'	EPPBGSS10
VOCs		not analyzed	
Halogenated Purgeables	<10		>0.1
Aromatic Purgeables			>0.1
Ethylbenzene	Trace		
Xylene	Trace		
Benzene	65		
Toluene	Trace		
Aliphatic HCs	present (24)		
Benzenoid Compounds	present (8)		
BNA EOCs			<0.3
Naphthalene	0.6	21	
2–Methylnaphthalene	1.4	21	
1–Methylnaphthalene	1.1		
Phenanthrene	0.5		
Pyrene			
Diesel–like Hydrocarbons	770		
Gasoline–like hydrocarbons	350	5,890	
Kerosene–like Hydrocarbons			
Motor Oil–like Hydrocarbons			
Di–n–butylphthalate			Trace (B)
Bis(ethylhexyl)phthalate			1.2 (B)
4–methyl–3–pentene–2–one			1.6 (B)
4–hydroxy–4–methyl–2–pentanone			3.2 (B)
Trans–4–chlorocyclohexanol			0.08 (B)
Lab ID			
(VOCs)	OR900505		OR900447
(BNAs)	OR900509	OR900412	OR900446

Notes: VOCs = volatile organic compounds

BNA EOCs = base neutral & acid extractable organic compounds

B = compound also detected in laboratory blank

Table 2. El Paso Products – Concentrations of heavy metals in sediment samples collected on-site by EID. Concentrations in ug/g.

	EPPCTP4	EPPCTP8s	EPPMW8-3'	EPPETP12	EPPETP17	EPPFTP01	EPPFTP11	EPPFTP12	EPPFTP13	EPPGTP14	PPBGSS10
Al	20,200.00	8,100.00	17,100.00	11,600.00	10,500.00	5,300.00	18,000	24,100	13,200	17,500	9,800.00
As	5.9000	4.2000	1.2000	1.8000	3.1000	45	13	4.7000	24	200	11
Ba	110.00	110.00	140.00	120.00	180.00	120.00	155.00	160.00	170.00	120.00	120.00
Be	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00
B	14.00	<5.00	9.00	<5.00	<5.00	6.00	<5.00	<5.00	5.00	8.00	<5.00
Cd	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	31.00	<5.00
Cr	15.00	9.00	13.00	11.00	10.00	28.00	13.00	13.00	11.00	18.00	10.00
Co	6.50	4.00	6.50	5.10	4.90	4.30	5.60	4.80	4.40	6.30	4.20
Cu	39.00	11.00	13.00	8.00	7.00	35,800	120.00	68.00	54.00	760.00	84.00
Fe	18,300.00	10,200.00	16,000.00	12,700.00	11,800.00	17,100	15,700	19,200	21,700	16,600	11,300
Pb	43.00	30.00	16.00	15.00	12.00	450.00	150.00	200.00	230.00	1,000.00	120.00
Mn	300.00	170.00	200.00	240.00	260.00	180.00	270.00	280.00	380.00	250.00	210.00
Hg	<0.2500	<0.2500	<0.2500	0.2500	<0.2500	7.0000	<0.2500	<0.2500	<0.2500	1.1000	<0.2500
Mo	<5.00	<5.00	<5.00	<5.00	<5.00	6.00	<5.00	<5.00	<5.00	<5.00	<5.00
Ni	11.00	7.00	11.00	8.00	7.00	25.00	9.00	8.00	7.00	11.00	6.00
Se	<0.5000	<0.5000	<0.5000	<0.2500	<0.2500	1.2000	<0.2500	<0.2500	<0.2500	3.5000	0.7800
Si	22.00	89.00	44.00	36.00	73.00	<5.00	210.00	270.00	290.00	200.00	<5.00
Ag	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00
Sr	140.00	74.00	110.00	98.00	130.00	82.00	110.00	120.00	130.00	130.00	120.00
Sn	<5.00	<5.00	<5.00	<5.00	<5.00	7.00	<5.00	<5.00	<5.00	6.00	<5.00
V	23.00	19.00	22.00	20.00	19.00	18.00	26.00	25.00	18.00	23.00	20.00
Zn	66.00	23.00	40.00	27.00	23.00	170.00	81.00	54.00	270.00	720.00	45.00
Lab ID	IC900086	IC900087	IC900088	IC900085	IC900084	IC900093	IC900110	IC900111	IC900109	IC900108	IC900094
Date collected	900328	900328	900328	900329	900329	900405	900407	900408	900408	900328	900405

Table 3. El Paso Products - Concentrations of organic compounds in ground-water samples collected on-site by NMEID. Concentrations in ppm.

	EPPMW6S	EPPW6Sd	EPPMW6D	EPPMW7	EPPMW12	EPPMWB*
VOCs						
Benzene	0.360	0.350				
Toluene	0.014	0.012				
1,4-Dimethylbenzene	0.310	0.160		Trace		
1,3-Dimethylbenzene	0.037					Trace
1,2-Dimethylbenzene	0.470	0.620	Trace	Trace	Trace	Trace
Naphthalene	Trace					
Ethylbenzene			Trace	Trace		Trace
1,2-Dichloroethane				Trace		
Benzylalcohol				0.2		
BNA EOCs						
2,4-Dimethylphenol	0.2	0.6				
Naphthalene	0.1	0.2				
2-Methylnaphthalene	0.1	0.1				
Di-n-butylphthalate	Trace	Trace		Trace	Trace	
Ethylbenzene	0.3					
1,3-Dimethylbenzene	0.6	0.8				
Bis (2-ethylhexyl) phthalate		0.2 (B)		0.2 (B)		0.7 (B)
Di-n-octylphthalate						0.02
Benzyl alcohol				0.1		
Gasoline-like Hydrocarbons	present	present				
Diesel-like hydrocarbons	present	present		present		
Kerosene-like hydrocarbons				present		
TIC	3.3 (8)	3.4 (8)	0.04 (nd)	1.7 (9)	0.04 (nd)	
Lab ID						
(VOCs)	OR900508	OR900500	OR900502	OR900507	OR900501	OR900506
(BNAs)	OR900520	OR900516	OR900512	OR900518	OR900514	OR900522
	OR900521	OR900517	OR900513	OR900519	OR900515	OR900523

Notes:

VOCs = volatile organic compounds

TIC = *Tentatively identified compounds; numbers indicate:* concentration (# of compounds; nd = # of compounds not determined)

B = also present in laboratory blank

* = sample not analyzed for concentrations of acid extractable organic compounds

Table 4. El Paso Products - Concentrations of major anions and cations and heavy metals in ground-water samples. Concentrations in mg/l. Samples collected by NMEID

Well #:	EPPMW6S	EPPMW6Sd	EPPMW6D	EPPMW7	EPPMW12	EPPMWB
Ca	248	272	508	306	936	<3.00
Mg	74	78	211	118	367	<3.00
Na	1286	1296	3464	2096	4404	<10.00
K	22	22	24	20	38	1.00
HCO3	1456	1431	482	1302	679	2.00
Cl	1550	1610	5650	2530	7975	<5.00
SO4	376	411	2350	1020	2340	<5.00
TDS	4460	4510	12300	6890	17900	<3.00
CO3	0	0	0	0	0	0
Al	<0.10	<0.10	0.10	<0.10	<0.10	<0.10
As	0.0280	0.0410	<0.0050	<0.0050	<0.0050	<0.0050
Ba	0.50	0.50	<0.10	0.40	<0.10	<0.10
Be	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
B	0.90	0.90	1.20	0.90	1.30	<0.10
Cd	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Cr	<0.10	<0.0050	<0.10	<0.0050	0.0060	<0.0050
Co	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Cu	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Fe	0.40	0.20	<0.10	0.50	3.10	<0.10
Pb	<0.10	<0.0050	<0.10	<0.0050	<0.0050	<0.0050
Mn	1.40	1.40	3.90	2.70	4.90	<0.05
Hg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Mo	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Ni	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Se	<0.0100	<0.0100	<0.0100	<0.0100	0.0050	<0.0100
Si	8.90	<0.10	8.00	0.20	0.50	0.20
Ag	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Sr	3.40	3.50	6.00	4.00	13.00	<0.10
Sn	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
V	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Zn	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Spec.Cond.@ 25C (umhos/cm)	7,254	7,254	17,074	10,228	21,820	NM
pH	7.29	7.29	7.15	7.06	6.84	NM
Lab ID						
(ions)	WC900934	WC900930	WC900929	WC900931	WC900933	WC900932
(metals)	IC900107	IC900103	IC900106	IC900102	IC900104	IC900105

Notes: Major anions and cation samples filtered, not acidified
Heavy metal samples - filtered, acidified with HNO3
NM = not measured

Table 5: El Paso Products, background soil metal levels (in ppm) and significant concentration threshold values as determined by NMEID, and Eder & Assoc.

Parameter	MW-12	EPPBGSS10	A-TP 87,88,89,90	B-TP 83,84,85,86	average background	NMEID threshold	EA determined max-background
Hg	0.11	<.25	<.0002	.06	.08	.16	.11
Ag	0.25	<5.0	0.85	1.2	1.2	2.4	1.2
Cd	5.5	<5.0	2.6	2.0	3.2	6.4	20
Cr	11.0	10.0	8.5	7.5	9.3	18.6	23
Cu	140.0	84.0	55.0	28.0	76.8	154	140
Ni	8.0	6.0	8.0	5.5	6.9	13.8	10
Zn	180.0	45.0	50.0	75.0	133	266	400
As	<1.4	11.0	<1.4	<1.4	3.3	6.6	40
Pb	270.0	120.0	42.0	6.5	110	220	400

Table 6. El Paso Products, concentrations of heavy metals (in ppm) by work area, for those soil samples in excess of NMEID determined threshold values (twice average background value). Data from EA Phase I Report, Part II (samples with matrix spike out of acceptable range were not counted), and NMEID samples (Table 2).

Parameter	Area A	Area B	Area C	Area D	Area E	Area F	Area G	Totals
Hg					.25	8.0 10.0 3.7 7.0	1.0 0.15	7
Ag		177 4.9	2.9	10.3 27.8 18.0 16.5	4.2	8.1 6.1 7.5	2.5	12
Cd		16.5 19.0	9.0		25.4 17.4	10.2	20.0 38.7 24.1 31.0	10
Cr		860			75 55	45.4 28.0 34.3 28.0 22.6 47.2	97.0 89.5	11
Cu			280 184 197	216 154 165	300 218 190	34,000 247 2,300 255 4,700 206 35,800	3100 2000 800 760	20
Ni					17.3 22.0 18.0	41.4 20.0 39.6 25.0 42.9 19.2	41.2 16.0 14.5	12
Zn			367			1710 1380 845 358 525 454 2370 277 376	985 671 720	13
As			19.7 43.3 129 50.9 14.7 14.7	10.1 19.1 10.9 169 22.0 21.7 95.5 55.6 11.1 51.0 13.6 13.8 58.4 21.7 13.0 11.0	14.0	35.3 45 24	200	27
Pb	284 270		683 278 328	516 290 308	139,000 686 1000 1100	377,000 1,340 4,860 1,400 2,470 764 1,090 564 890 628 260 899 676 300 718 547 320 1,100 268 333 450 488	1,260 3,800 24,000 800 1,000 336	40
Totals	2	3	17	26	15	63	26	152

OLD BRICKLAND REFINERY SITE
SUNLAND PARK, NEW MEXICO

TABLE 7

SUMMARY OF SAMPLES COLLECTED ON-SITE

	VOCs					Semi-VOCs	
Location	Proposed	Collected	Proposed Composite Metals	Actual Composite Metals	Unique Metals	Proposed	Collected
A	2	1	2	2	8	2	--
B	1	--	2	2	8	2	--
C	1	3	2	2	8	2	3
D	4	6	6	6	24	6	8
E	4	8	6	7	19	6	11
F	4	9	6	6	31	6	7
G	4	11	6	5	20	6	12
Total	20	38	30	30	118	30	41

NOTE: Area G was divided into a subarea delineated H included in G numbers.

TABLE 8: El Paso Products, concentrations of heavy metals in nine surface soil samples from areas E, F & G. Units = mg/kg

	ESS4	ESS5	FSS1	FSS2	FSS3	FSS6	GSS7	GSS8	GSS9	NMEID Significant Concentration
Hg	<.02	<.02	8	10	3.7	0.1	0.03	0.15	0.09	0.16
Cr	75	55	18	28	8	8	9.5	7	89.5	18.6
Cu	190	300	34,000	2,300	4,700	120	3,100	2,00	800	154
Ni	22	18	20	13	13	8	16	12	8.5	13.8
Pb	1,000	1,100	320	1,100	300	260	3,800	24,000	800	220

Table 9. El Paso Products – Comparison of selected constituents found in CERCLA K-listed wastes suspected at the site, with percent occurrence in sediment/waste samples from areas G and F.

	slop oil Emulsion Solids K-049	API Separator Sludge K-051	Leaded tank Bottoms K-052	Percent Area G Samples	Percent Area F Samples
Benzene	X		X	73	89
E-benzene	X	X	X	73	89
Toluene	X	X	X	36	63
Xylene	X	X	X	73	88
Anthracene	X			82	71
Acenapthene		X		55	57
Benzo-a-pyrene (1)	X	X	X	10	0
Benzo-a-anthracene (2)		X		36	14
Chrysene (1)	X	X		55	14
Fluorene		X		92	86
Napthalene	X	X	X	82	89
Phenanthrene	X	X	X	91	86
Pyrene	X	X		91	71
Arsenic (3)	X	X	X	05	10
Cadmium	X	X	X	35	15
Chromium	X	X	X	75	30
Copper	X	X	X	75	100
Lead	X	X	X	75	82
Mercury	X	X	X	20	39
Nickel	X	X	X	70	27
Silver	X	X	X	05	15
Zinc	X	X	X	30	52

(1) Data not available for 50% to 60% of EPA Waste characterization sources.
(2) Data not available for 60% to 80% of EPA Waste characterization sources.
(3) Arsenic data is incomplete for samples in areas G and F.

Table 10. El Paso Products, analytical results showing concentrations of heavy metals in sediment samples from drainage culverts 1 and 2. Significant concentrations above background are circled.

IT ANALYTICAL SERVICES
AUSTIN, TX
(512) 892-6684

ompany: EDER ASSOCIATES
ate: 08/17/90
lient Work ID: REXENE/BRICKLAND REFINERY

Work Order: B0-04-107

SAMPLE ID	CUL-1-1	CUL-1-2	CUL-2-1	
SAMPLED	04/06/90	04/06/90	04/06/90	
TEST				UNITS
ARSENIC by ICP	ND [1.4]	ND [2.3]	ND [1.4]	mg/kg
SELENIUM by ICP	ND [1.3]	ND [2.1]	ND [1.3]	mg/kg
MERCURY	ND [0.020]	0.27 [0.030]	ND [0.020]	mg/kg
SILVER by ICP	ND [0.25]	1.0 [0.40]	ND [0.25]	mg/kg
BERYLLIUM by ICP	1.3 [0.020]	1.6 [0.030]	1.7 [0.020]	mg/kg
CADMIUM by ICP	1.8 [0.080]	7.9 [0.13]	2.8 [0.080]	mg/kg
CHROMIUM by ICP	12 [0.20]	39 [0.30]	15 [0.20]	mg/kg
COPPER by ICP	17 [0.10]	240 [0.16]	23 [0.10]	mg/kg
NICKEL by ICP	9.2 [0.40]	12 [0.65]	12 [0.40]	mg/kg
LEAD by ICP	11 [1.1]	260 [1.8]	18 [1.1]	mg/kg
ANTIMONY by ICP	ND [1.1]	ND [1.8]	ND [1.1]	mg/kg
THALLIUM by ICP	ND [0.65]	ND [1.1]	ND [0.65]	mg/kg
ZINC by ICP	38 [0.065]	190 [0.10]	49 [0.065]	mg/kg

ND indicates the parameter was not detected.
Detection limits are specified in [].

LIST OF FIGURES

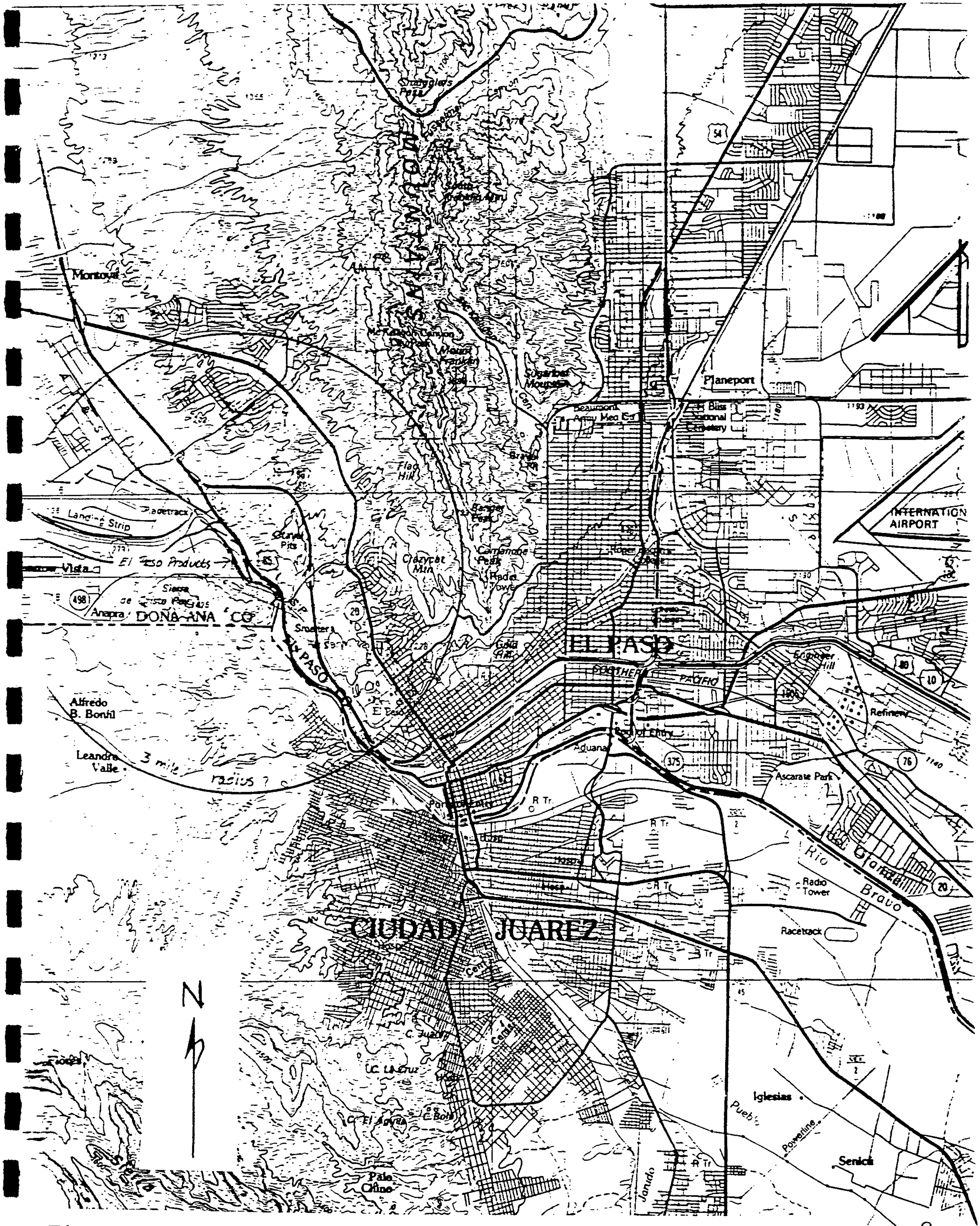


Figure 1. Location of El Paso Products site and 3 mile radius.

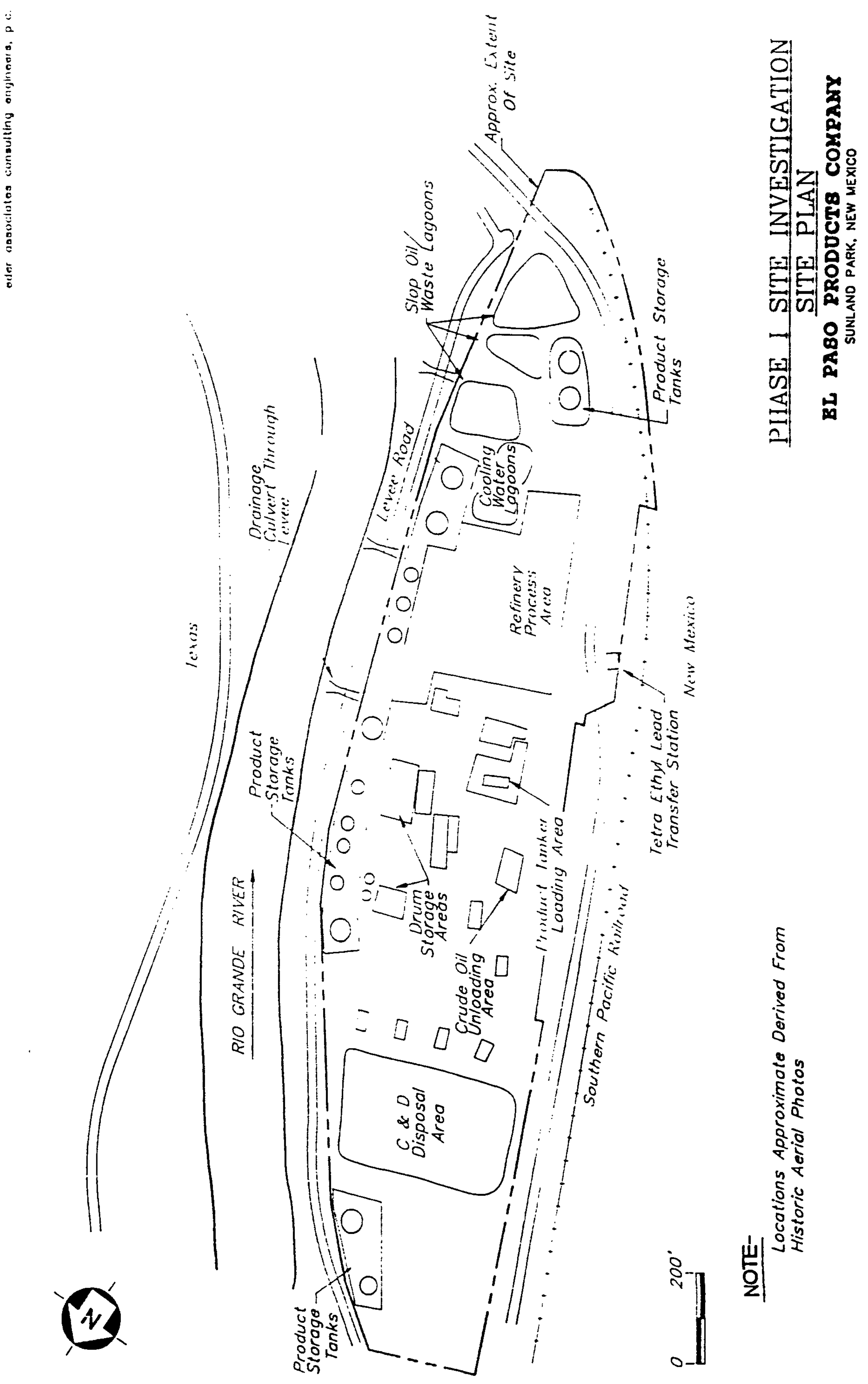
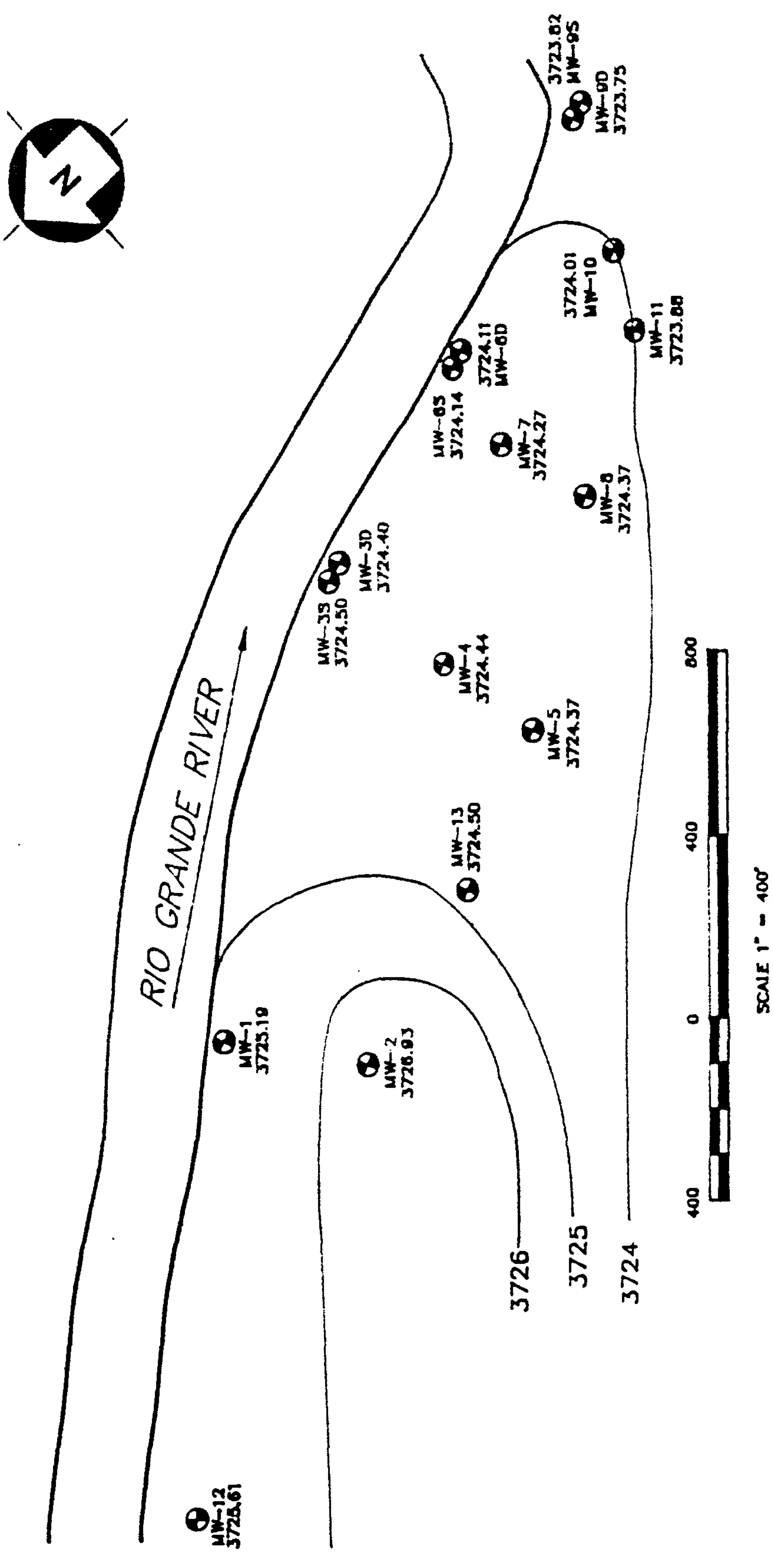


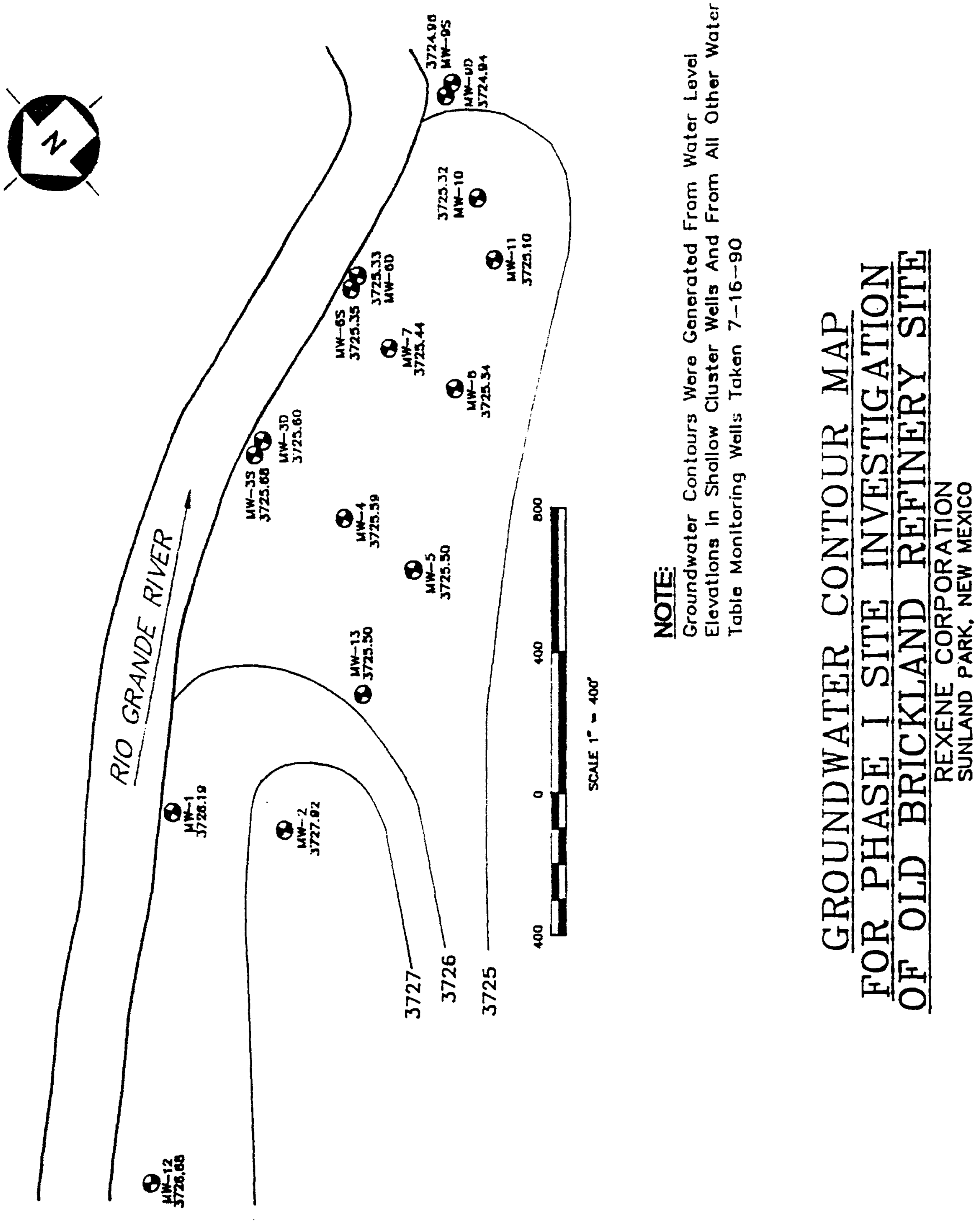
Figure 3. Site plan showing approximate locations of historic facility operations.



NOTE:
Groundwater Contours Were Generated From Water Level Elevations In Shallow Cluster Wells And From All Other Water Table Monitoring Wells Taken 4-13-90

GROUNDWATER CONTOUR MAP
FOR PHASE I SITE INVESTIGATION
OF OLD BRICKLAND REFINERY SITE
REXENE CORPORATION
SUNLAND PARK, NEW MEXICO

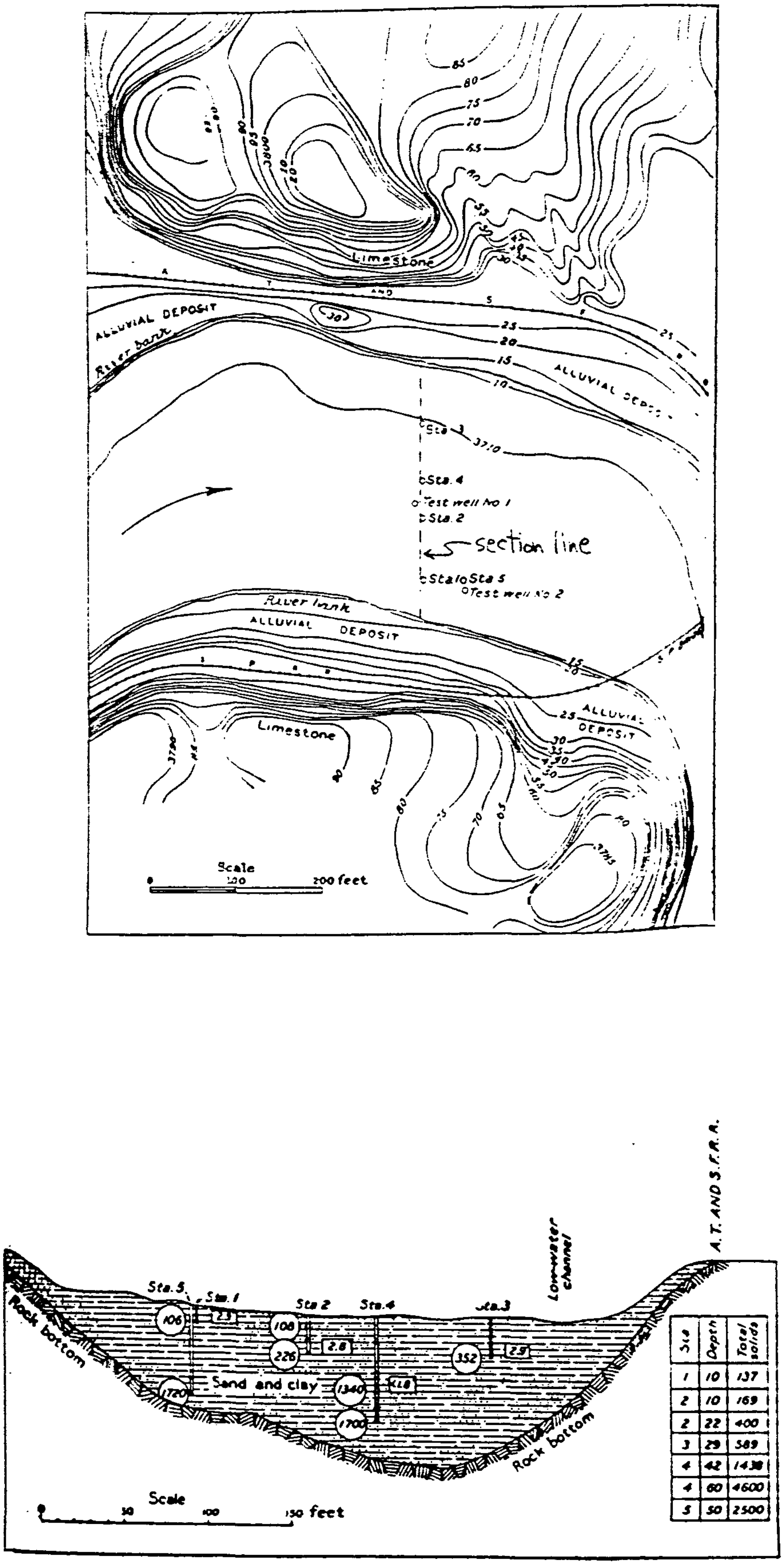
Figure 4. Groundwater contour map of the site on 4-13-90.



NOTE:
Groundwater Contours Were Generated From Water Level Elevations In Shallow Cluster Wells And From All Other Water Table Monitoring Wells Taken 7-16-90

GROUNDWATER CONTOUR MAP
FOR PHASE I SITE INVESTIGATION
OF OLD BRICKLAND REFINERY SITE
REXENE CORPORATION
SUNLAND PARK, NEW MEXICO

Figure 5. Groundwater contour map of the site on 7-16-90.



Sta	Depth	Total solids
1	10	137
2	10	169
2	22	400
3	29	589
4	42	1438
4	60	4600
5	50	2500

Figure 6. Geologic cross-section and location map showing thickness of alluvium in Rio Grande Gorge at a point several hundred feet downstream of the site. (from Schlicter, 1905)

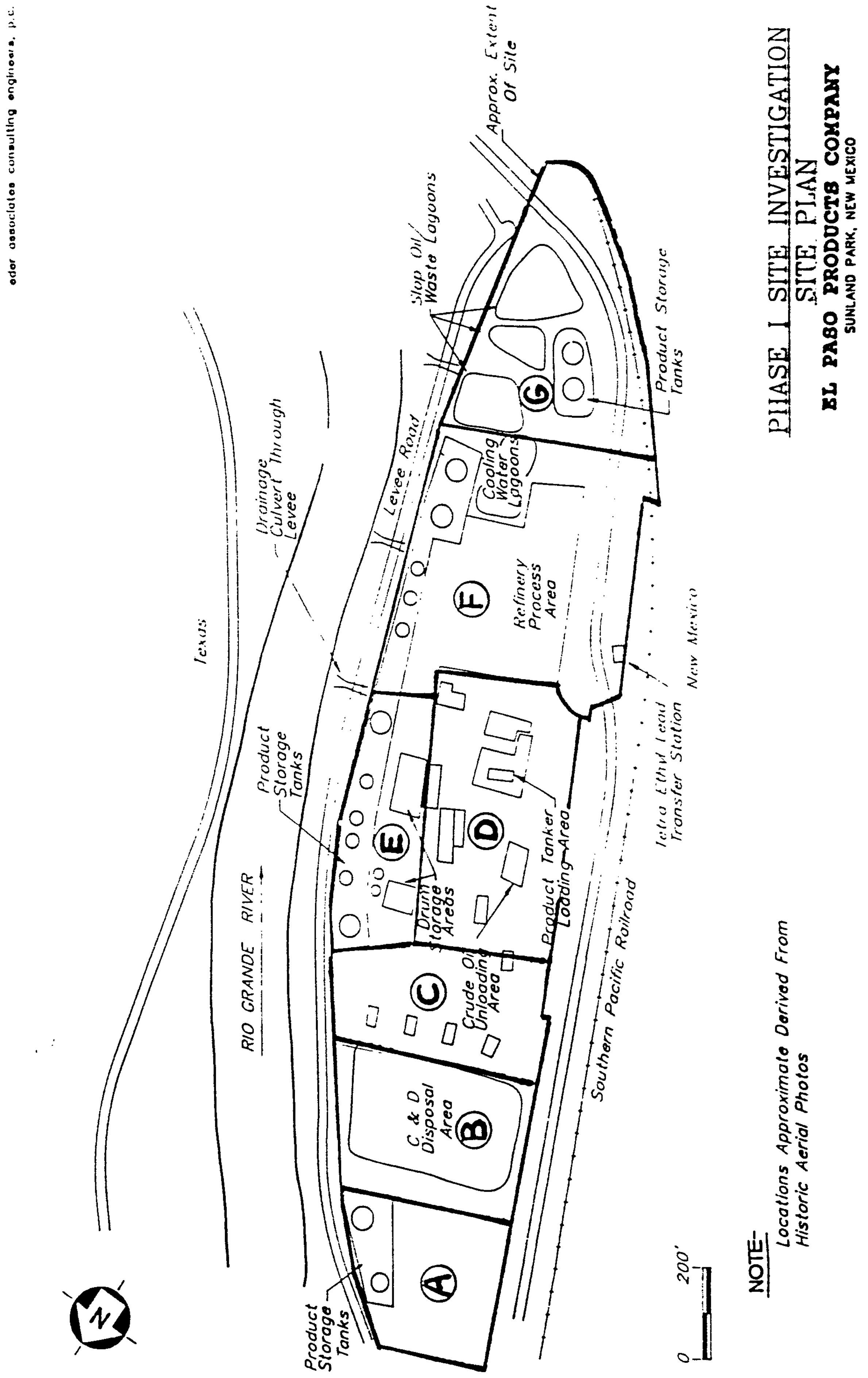


Figure 7. Site plan showing location of the seven work areas (A-G) used in site control and sampling plan.

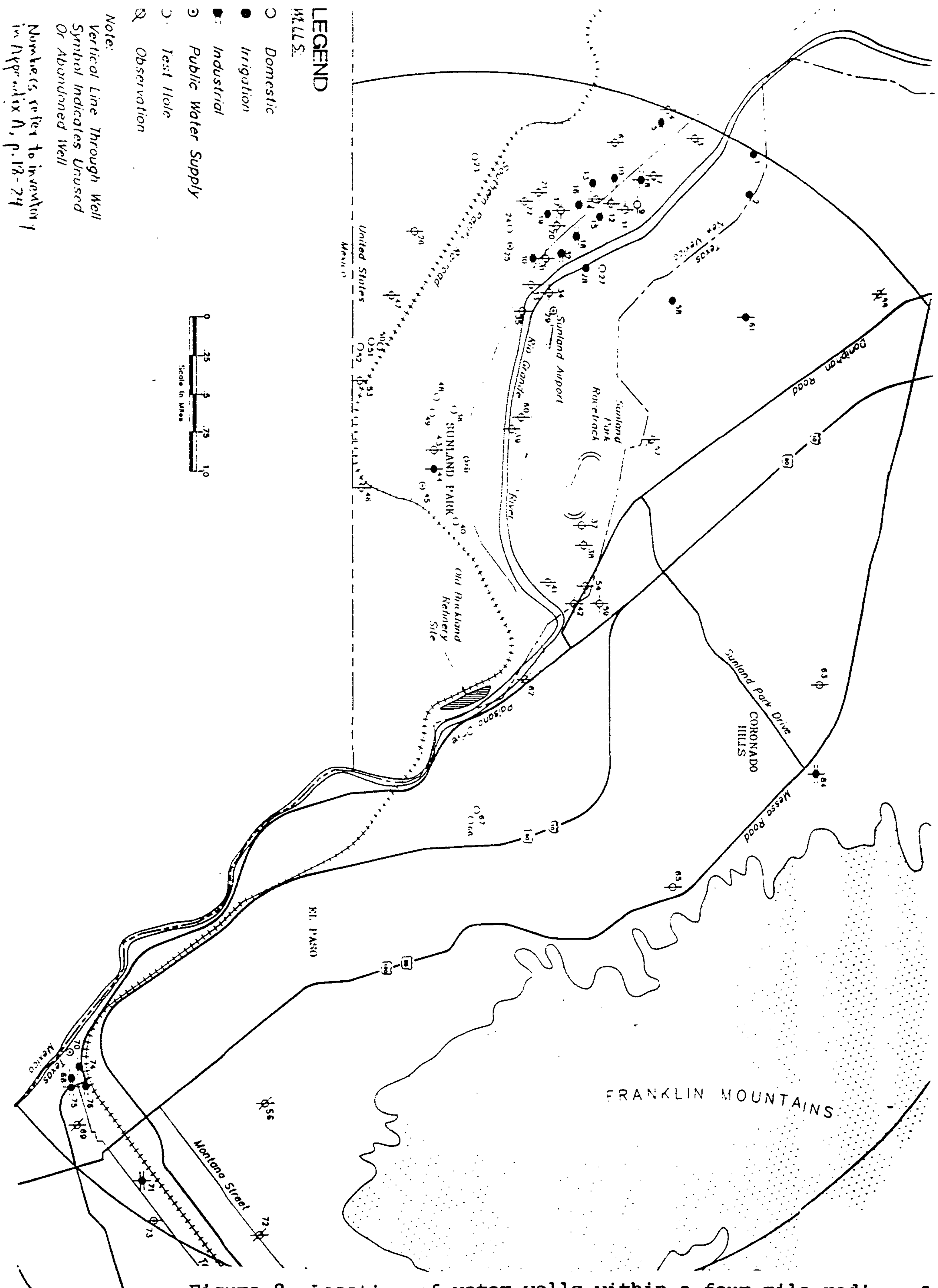


Figure 8. Location of water wells within a four mile radius of

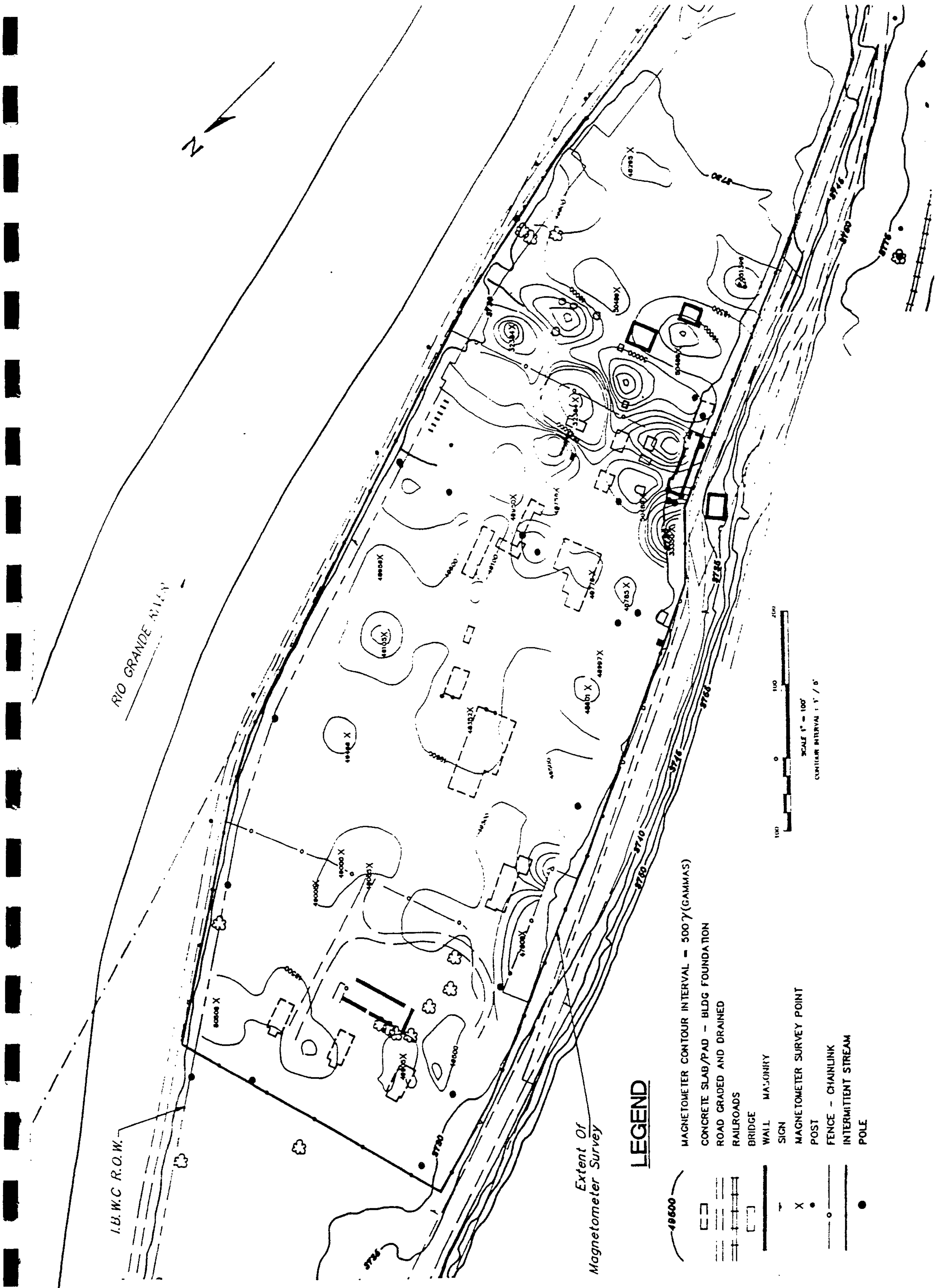


Figure 9. El Paso Products, results of magnetometer survey.

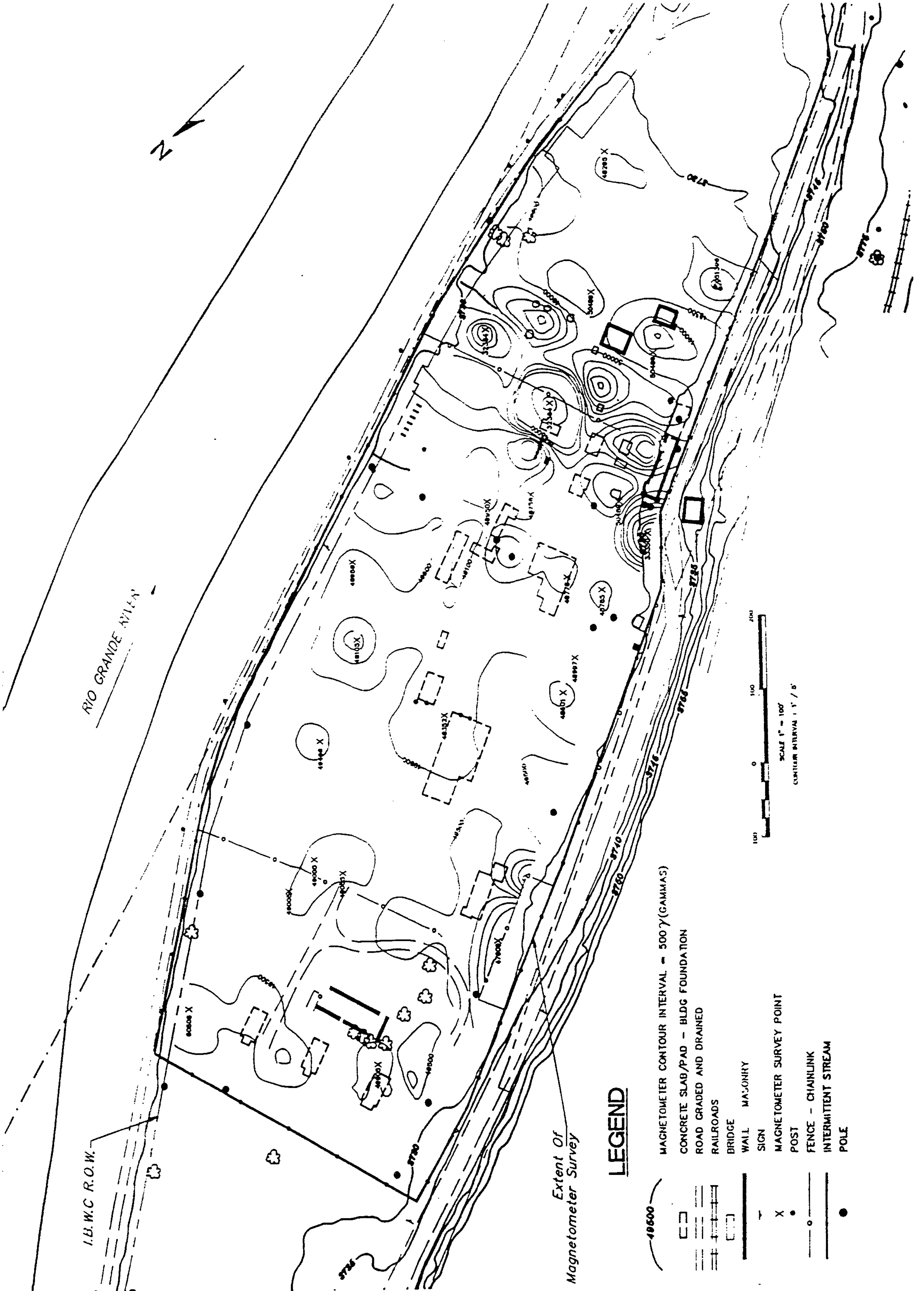


Figure 9. El Paso Products, results of magnetometer survey.