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REPORTS

YEAR(S):

A REVIEW OF

SUBSURFACE PETROLEUM HYDROCARBONS

AT THE BLOOMFIELD REFINERY

Prepared for

BLOOMFIELD REFINING COMPANY

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Engineering-Science, Inc. 2901 North Interregional Austin, Texas 78722

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CHAPTER 1

INTRODUCTION

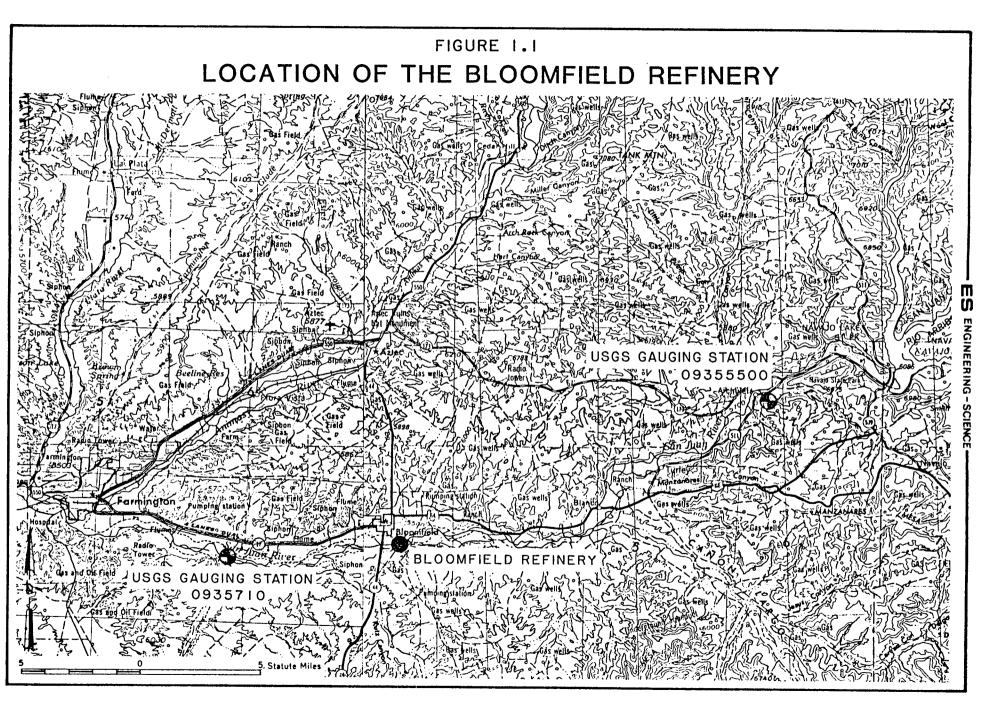
SITE LOCATION

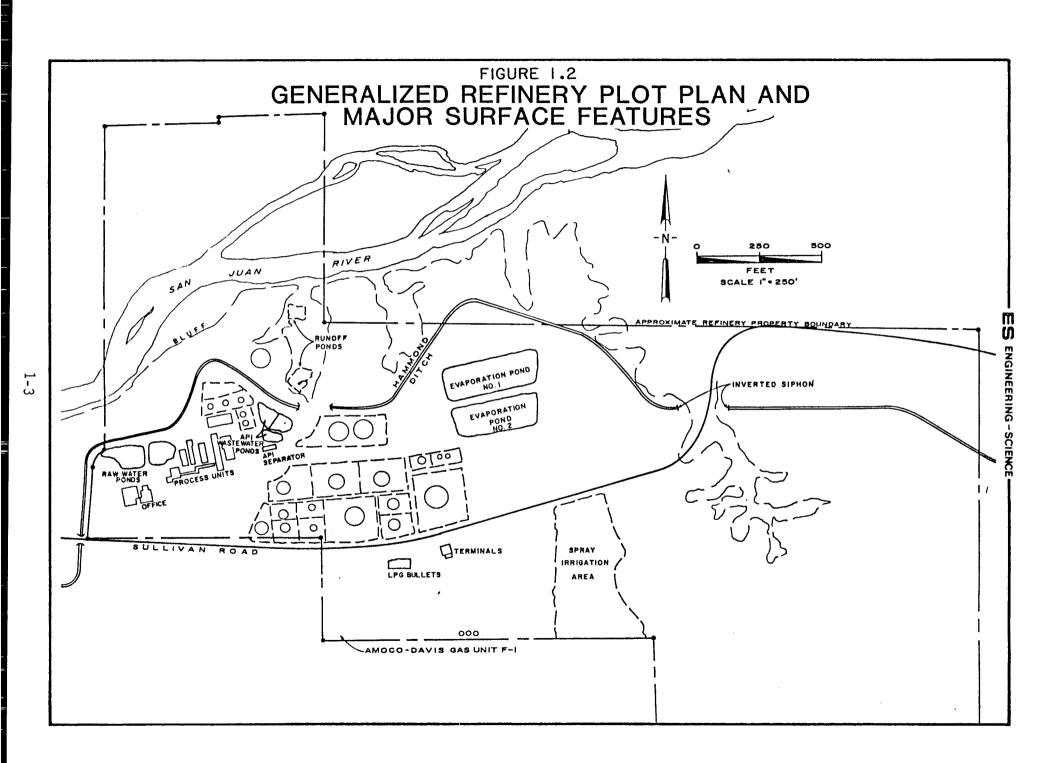
The Bloomfield refinery, currently owned and operated by Bloomfield Refining Company, is located in the northwest corner of the State of New Mexico, as shown in Figure 1.1. The refinery is situated on a bluff adjacent to the San Juan River, south and slightly east of the town of Bloomfield. Although the refinery owns land on both sides of the San Juan River, all process units and storage areas are located south of the river. Approximate refinery property boundaries are shown on the plot plan presented as Figure 1.2. The plot plan also indicates the locations of the process and tank storage areas, surface waters, and elements of the wastewater treatment system.

REFINERY HISTORY

The Bloomfield Refinery was reportedly constructed in the late 1950's. The refinery operated approximately five years before being sold to Suburban Propane Corporation in the early 1960's. Plateau, Inc., a subsidiary of Suburban Propane, operated the refinery prior to its sale to the current owner in the fall of 1984. The refinery processes a combination of low sulfur crudes and petroleum which are transported to the refinery by pipeline and truck. Major refinery products include gasoline and diesel fuel, although fuel gas, heavy burner fuel, propane, butane, and other petroleum products are produced in smaller quantities.

Information pertinent to the existing subsurface situation at the refinery has been developed by several sources. Much of the information was developed by American Ground Water Consultants, Inc. (AGWC) for Plateau, Inc. and was submitted to the then New Mexico Oil Conservation Commission (NMOCC) as part of its proposed discharge and monitoring plan for refinery effluent (Ref. 1-3). The original discharge plan was submitted to the NMOCC in October 1977 and was approved in June 1978. AGWC subsequently conducted monitoring activities on the solar evaporation ponds for the purpose of determining leakage rates from the ponds, and prepared milestone reports on these activities in January 1979 and January 1981





(Ref. 2, 3). These reports were submitted to the New Mexico Environmental Improvement Division (NMEID). Since the original discharge plan was scheduled to expire in the summer of 1982, an updated discharge plan was prepared and submitted to the New Mexico Oil Conservation Division (NMOCD) in March 1982 (Ref. 1). This plan ultimately was approved on June 7, 1984. During the interim, Plateau installed six groundwater monitoring wells to provide additional information on groundwater quality.

Soil and water samples from the Hammond Ditch, San Juan River, groundwater seeps, wastewater treatment system, and other refinery areas have been collected by Plateau as well as the state and EPA. Sampling efforts were conducted by the NMOCD on five separate occasions during 1981 and 1982. Plateau analyzed concurrent samples and collected additional information during the same time period. EPA's Region VI Field Investigation Team (FIT) conducted extensive site investigations during 1983 and 1984 (Ref. 4, 5).

OBJECTIVES AND SCOPE

The primary objective of this study was to compile and evaluate existing information pertaining to subsurface petroleum hydrocarbons at the Bloomfield Refinery and identify any additional data requirements to more fully characterize the nature and extent of subsurface petroleum constituents at the refinery and, if necessary, develop a remedial action plan. The scope of activities included the collection and evaluation of available data from the refinery and its consultants. Meetings were held with the NMEID and EPA in December 1984 to discuss the situation at the refinery and solicit input from these agencies. Existing data has been summarized in this report, and more detailed information can be obtained from the original sources listed in the bibliography to the report.

CHAPTER 2

ENVIRONMENTAL SETTING

SITE TOPOGRAPHY

Ground surface elevations at the site range from approximately 5,420 feet above mean sea level (msl) for the alluvial deposits along the San Juan River to over 5,570 feet msl along the southern property boundary. The most striking surface feature at the site is the bluff along the south side of the San Juan River. This bluff, shown on Figure 2.1, rises close to 100 feet above the river floodplain deposits. From the top of the bluff, the land surface slopes gradually upward to the south. Surface drainage has created several major and numerous minor intermittent stream channels or arroyos which drain in the direction of the river. The major intermittent stream channels are also indicated on Figure 2.1.

GEOLOGY AND SOILS

The Bloomfield Refinery is located on Quaternary Jackson Lake Terrace deposits approxiamtely 100 feet above the elevation of the present day San Juan River. At the time of formation, during the last glacial period, the San Juan River carried large quantities of glaciofluvial outwash which were deposited at a thickness of 10 to 15 feet over much of the refinery property. Later, wind-blown sands and silts were deposited over the coarser gravels and cobbles to form loess deposits. These deposits are found at the surface on much of the refinery property and are interbedded to some extent with the coarser deposits. The coarser gravels and cobbles underlying the quaternary silts and sands outcrop along the 70- to 100-foot bluff just south of the San Juan River.

Underlying the quaternary sand, silt, and cobble deposits is the Tertiary age Nacimiento Formation, a massively bedded gray to green to bluish clay or shale. The Nacimiento outcrops on the bluff south of the San Juan River where its exposure is at least 70 feet. The San Juan River channel is incised into the Nacimiento, which is approxiately 500 feet thick at the site as indicated by the log of the AMOCO-DAVIS gas unit F-1 near the southern property boundary. The location of this well is shown on

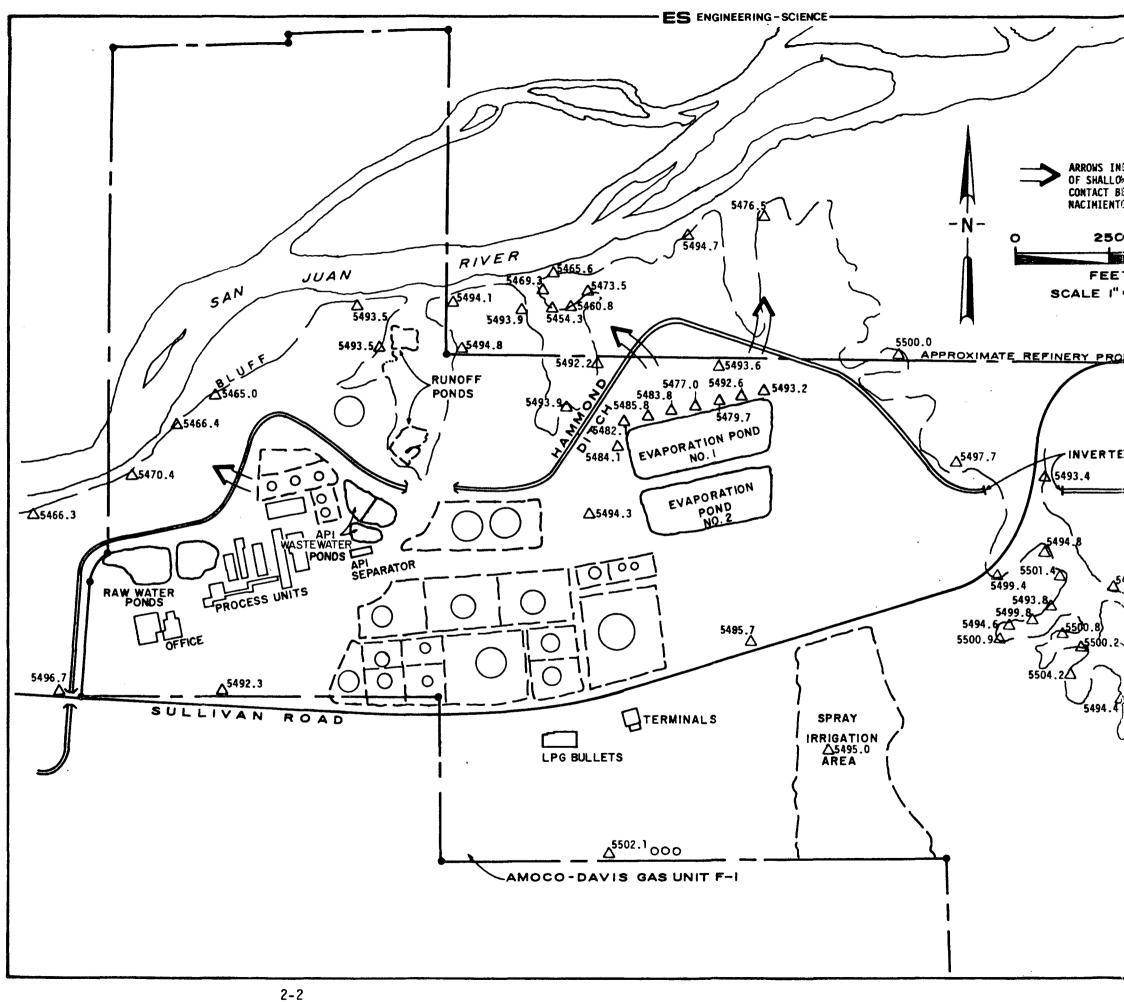


FIGURE 2.1 ELEVATIONS OF THE TO OF THE NACIMIENTO FORMATIO	
NDICATE THE PROBABLE MOVEMENT ON GROUNDWATER ON THE DOWNSLOPE BETWEEN THE COBBLE LAYER AND THE ITO FORMATION	
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Figure 2.1. The first major aquifer is the Ojo Alamo, consisting of sandstone of Tertiary Age, directly underlying the Nacimiento Formation. The Ojo Alamo is, in turn, underlain by the Kirtland Shale and Fruitland Formation.

Along the bluff, and in the intermittent stream channels which carry water from the terrace to the San Juan River, the contact between the coarse cobble layer and the underlying Nacimiento Formation can be determined visually. As a result of the many investigations which have been performed at the site, the elevation of the contact has been determined at over 50 locations along the bluff and intermittent stream channels and in observation and monitoring wells throughout the site. These elevations are shown on Figure 2.1. Although the top of the Nacimiento Formation generally increases in elevation to the south at an angle of approximately one degree, the contact is not flat but undulating. The lowest subcrop elevations occur to the northwest of the refinery and generally north of the solar evaporation ponds, in the general locations indicated by the arrows on Figure 2.1. Major seeps have been observed along the northwest bluff in the area coinciding with the low subcrop elevations. Likewise, arroyos north of the solar evaporation ponds which coincide with the low subcrop elevations normally contain water. Previous studies have postulated a major east-west depression in the subcrop connecting these low areas. However, there is no information on the subcrop elevation in the area just east of the API separator and API wastewater ponds, and the subcrop depressions may or may not be connected.

GEOHYDROLOGY

Seeps along the bluff emerge in several areas, particularly those areas where the elevation of the subcrop between the Nacimiento Formation and the overlying cobble layer is lowest, northwest of the refinery and generally north of the solar evaporation ponds. Additional seeps have been observed in intermittent stream channels at higher elevations, but also at the subcrop. It appears that water entering the cobble layer from the Hammond Ditch, solar evaporation ponds, or other sources migrates through the upper permeable sands, silts, and cobbles until it encounters the relatively impermeable Namimiento Formation. The water then follows the

subcrop depressions to the northwest and north of the refinery, emerging on the bluff as seeps. Some of the subsurface water is intercepted at higher subcrop elevations by the intermittent stream channels and also emerges as seeps. These seeps have been occurring for a long period of time, as evidenced by the presence of cattails, marsh grass, trees, and other vegetation in the vicinity of the active seeps.

It is probably significant that the seeps occur only at the contact between the Nacimiento Formation and the cobble layer. Although approximately 70 to 100 feet of the Nacimiento Formation are exposed on the bluff, seeps have been observed only at the contact between the two formations. Minor sandstone or silt lenses in the Nacimiento Formation and observed in the bluff during the FIT investigations did not produce seeps, suggesting that these potentially more permeable lenses are not connected to the permeable cobble, sand, and silt deposits overlying the Nacimiento.

The occurrence and movement of groundwater in the area of the refinery is complicated by the presence of the Hammond Ditch, the solar evaporation ponds, and the raw water ponds. The Hammond Ditch contributes to bank storage in the cobble layer overlying the Nacimiento Formation during the irrigation season when the ditch is full. During the winter months, water enters the ditch from the cobble layer where it was stored the previous irrigation season. Additional subsurface water emerges as seeps during all seasons in the intermittent stream channels and along the bluff at the Although it seems clear that water from the ditch Namimiento subcrop. alternately contributes to and draws from bank storage, depending on the season, the zone of influence of the ditch is not clear, and is further complicated by probable leakage from the solar evaporation ponds and the Water level measurements made at the refinery indicate raw water ponds. that maximum groundwater elevations are only slightly higher than the water surface elevations in the Hammond Ditch when flowing full. The groundwater disappears entirely when the maximum groundwater elevation encounters the Nacimiento subcrop near the southern property boundary. These observations suggest that the groundwater present in the upper sands, silts, and cobbles is attributable to the Hammond Ditch and the refinery ponds, and that there is little or no natural recharge within the quaternary sand, silt, and cobble deposits or the Nacimiento Formation in this area.

SURFACE WATERS

Two major surface water bodies may impact or may be impacted by subsurface contamination at the Bloomfield Refinery: the San Juan River and the Hammond Irrigation Ditch. Each of these water bodies will be discussed in more detail in the following paragraphs.

San Juan River

The San Juan River has its origins in the San Juan Mountains in extreme southwestern Colorado. The perennial stream is used as a domestic, agricultural, and industrial water supply in the area. Bloomfield Refining utilizes the river water as a raw water supply for refining operations. The river is used as an emergency municipal water supply by the City of Farmington, approximately 15 miles downstream from the refinery.

Flow in the San Juan River is regulated upstream of the refinery by the Navajo Dam, on which construction was completed in 1963. Between 1963 and 1982, the average regulated flow has been approximately 1,100 cfs.

As shown in Figure 2.1, the channel of the San Juan River is filled with alluvial deposits. The channel itself is incised into the top 100 feet of the Nacimiento Formation, which is visible on the exposure of the high bluff on which the refinery is located just south of the San Juan River.

Hammond Ditch

The Hammond Irrigation Ditch provides water for agriculture and livestock in the vicinity of the Bloomfield Refinery, and is not intended to be used as a source of potable water. As shown on Figure 2.1, the ditch is located on the high bluff overlooking the San Juan River, between the San Juan and the refinery process, tank storage, and wastewater treatment areas. In passing from east to west through the refinery property, the ditch passes through an inverted siphon beneath Sullivan Road on the east side of the property, through a culvert beneath an El Paso Natural Gas pipeline right-of-way near the refinery API wastewater ponds, and through another culvert beneath Sullivan Road where the ditch leaves the refinery property. The Hammond Ditch was constructed between 1960 and 1964 in Quaternary Jackson Lake Terrace deposits. The ditch carries water during the irrigation season - approximately mid-April through mid-October. Due to the presence of the upper permeable cobble layer, the ditch acts as a line source of recharge to the cobble deposits. During the nonirrigation season, water previously held as bank storage re-enters the Hammond Ditch. Additional water in the upper cobble deposits emerges on the bluff and in intermittent stream channels as seeps at the contact between the cobble layer and the less permeable Nacimiento Formation. These intermittent stream channels and seeps support lush vegetation, including marsh grass, cattails, and trees as evidence of the increased water supply.

SITE DRAINAGE

Surface drainage at the site follows four major drainage patterns, one for each of the following areas: (1) the area north of the Hammond Ditch; (2) process, tank farm, and other confined areas; (3) the area east of the spray irrigation area; and (4) other areas south of the Hammond Ditch. North of the Hammond Ditch, surface runoff occurs directly to the San Juan River or to the intermittent stream channels that lead to the river. Some runoff may also enter the two holding ponds in the major arroyo located across the Hammond Ditch from the API wastewater ponds. These holding ponds were constructed to capture any process area spills, runoff, or overflow from the API wastewater ponds which exit the process area via the El Paso Natural Gas pipeline right-of-way. These ponds are not a part of the wastewater treatment system and were intended to prevent spills and other potential surface contamination from entering the San Juan River. At present, these ponds contain water which is believed to originate primarily from seepage from the Hammond Ditch. The lower pond derives water from the upper ponds as well as from the seeps at the contact between the cobble layer and the Nacimiento Formation.

Drainage in the process area, tank farm, and wastewater treatment areas (including the spray irrigation area) is contained. Process area runoff is routed through sumps to the API separator for hydrocarbon recovery. Other accumulated water is contained within bermed areas and is subject to percolation or evaporation.

The area east of the spray irrigation area drains to a large arroyo on the eastern portion of the refinery property. This arroyo drains to the north, and ultimately contributes runoff to the San Juan River.

Other areas south of the Hammond Ditch drain to the ditches along Sullivan Road. The runoff then moves east along the road, and may enter the Hammond Ditch where it passes beneath the road.

REFINERY WASTEWATER TREATMENT

Refinery process wastewater is treated for primary oil removal in an API separator located east of the major refinery process units. The API separator is constructed of steel-reinforced concrete and follows standard API design. Process area runoff and tank farm water draw sumps are diverted to the API separator for hydrocarbon recovery. Petroleum hydrocarbon spills are handled in the same manner.

Following the API separator, wastewater flows to a series of three API wastewater ponds located north of the API separator and south of the Hammond Ditch. In 1983, these ponds were lined with a 100-mil high-density polyethylene liner by Permanent Lining Systems of Odessa, Texas. A french drain collection system consisting of four-inch PVC perforated pipe also was installed at this time to collect any leakage through the pond liner in a common observation well or sump. After the initial installation, water was detected in the observation well. Fluorescein dye added to the ponds confirmed that leakage was occurring from the ponds. The ponds were emptied and the liner seams repaired, and the ponds were put back in service. Leakage from the ponds to the collection system has occurred since that time. As leakage in a pond is detected, the pond is drained, repaired, and put back in service.

Wastewater from the API wastewater ponds is pumped to a series of two solar evaporation ponds east of the process area and northeast of the tank farm. The two evaporation ponds cover an area of approximately five acres and are operated in series, with wastewater passing through the south pond (No. 2) to the north pond (No. 1). Originally, the ponds were constructed by forming earthen embankments from silts and sands obtained from the pond

bottom. The pond bottoms have been treated with about two pounds per square foot of Wyoming bentonite to reduce leakage.

Increases in the quantity of raw wastewater during the late 1970's necessitated additional handling facilities. Consequently, in 1981, Plateau began spray irrigating approximately 10 acres east of the product and crude truck racks south of Sullivan Road and southeast of the solar evaporation ponds. The spray irrigation area is utilized primarily during the months between March and October when evapotranspiration is highest. The irrigation area is surrounded by a perimeter berm to prevent surface runoff of treated refinery effluent.

LAND-USE AND POPULATION CHARACTERISTICS

Land use in the vicinity of the refinery is primarily agricultural. Water in the Hammond Ditch is used downstream of the refinery for livestock watering and for irrigation of crops such as vegetable gardens, orchards, alfalfa, and corn, and is not intended to be a potable water supply. The refinery is remote from any major population centers. The nearest town, Bloomfield, is located approximately one mile northwest of the refinery and has a population of approximately 5,000. State Highway 44 is moderately traveled and is located approximately one-half mile west of the refinery.

CHAPTER 3

PREVIOUS SITE INVESTIGATIONS

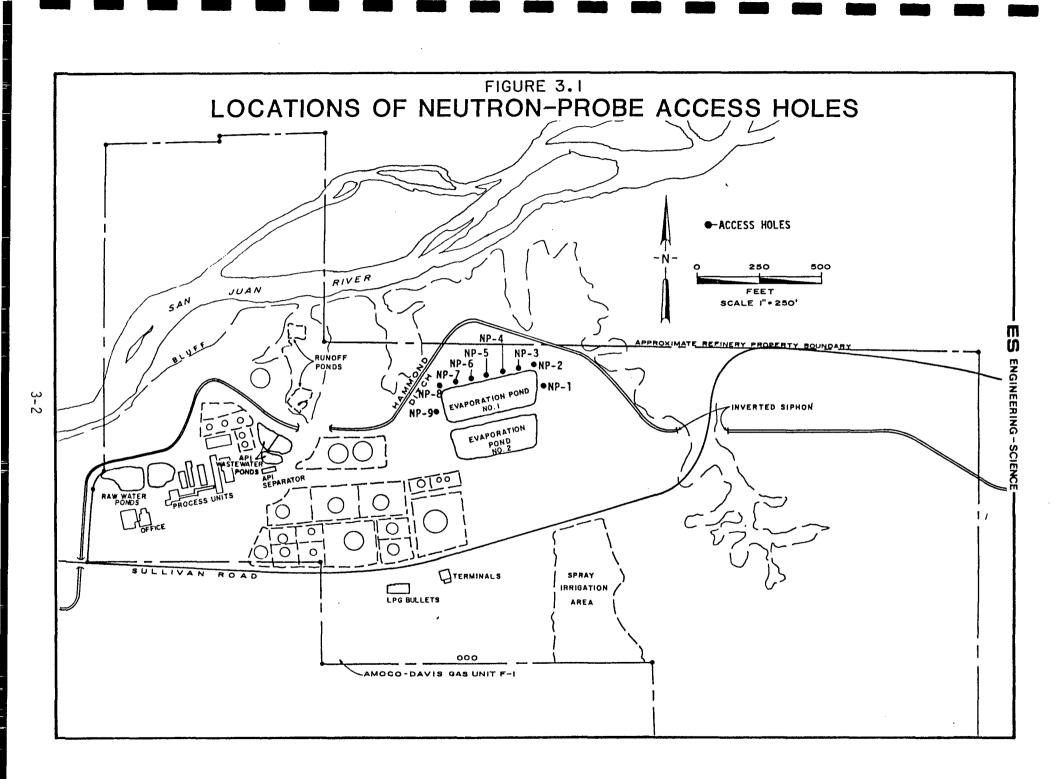
PLATEAU INVESTIGATIONS

During the past seven to eight years, Plateau conducted several evaluations of wastewater and groundwater quality, pond leakage, and subsurface geology in conjunction with the preparation of a discharge plan for refinery effluent. Early efforts were directed to the determination of leakage rates from the solar evaporation ponds through geophysical methods. More recent efforts have focused on the quality of soils and ground and surface waters at and in the vicinity of the refinery.

Neutron Logging

In April 1977, nine neutron-probe access holes were drilled around the north, east, and west embankments of solar evaporaton pond 1 to aid in detecting changes in soil moisture content due to leakage from the ponds when they were filled. The six-inch diameter holes were completed to a depth of 50 feet using mud-rotary methods. Locations of the access holes are shown in Figure 3.1. At the completion of drilling, the holes were water flushed and blown with air. Neutron-probe access tubes consisting of two-inch schedule 40 PVC pipe were installed in each of the holes, which were backfilled with a mixture of dry bentonite and soil to retard leakage through the annulus. The lithologic logs for the neutron-probe access holes are included as Appendix A. As shown by the logs, samples for some of the intervals were lost and were not recorded. The remaining intervals indicate that each of the holes is completed into the upper portion of the Nacimiento Formation.

Neutron logging is conducted by lowering the neutron probe into the access holes and determining the soil-moisture profile. Neutron logging is normally conducted in a dry hole so that accumulated water in the hole does not affect the probe readings. Since initially no water was anticipated in the boreholes, the holes were constructed without a bottom cap. However, water was unexpectedly detected in the access holes after they were completed. This water is attributable to leakage of water through the annular space or water contained in the Nacimiento Formation itself. Most of the



access holes exhibited a slow response to groundwater levels and required several months to reach equilibrium. Consequently, the early efforts at neutron logging indicated variable moisture contents due to changing water levels, as well as higher readings due to the presence of water in the holes. Data collected since the equilibration of water levels in the holes indicate few changes in the soil moisture content between subsequent readings.

Access holes NP-1, 2, 3, 4, and 5 indicate a two to five volume percent increase in moisture content in the top two to three feet of the evaporation-pond embankment after the pond was filled. A similar increase in soil moisture content was observed in access holes NP-6, 7, 8, and 9 at greater depths in the embankment. These small changes in moisture content are believed attributable to capillary action in the unsaturated zone in the pond embankment. Increases of approximately five to 10 volume percent were observed in most access holes at a depth of 10 to 25 feet, corresponding to the Jackson Lake Terrace silt deposits in which the ponds were constructed. Increases in moisture content were observed in the cobble layer underlying the silt deposits and, for several access holes, in the upper portion of the Nacimiento Formation. Those data indicate a slow rate of seepage from the bottom of the solar evaporation ponds, primarily to the underlying cobble layer.

Zeta-SP

Zeta-SP surveys of solar evaporation pond 1 were conducted on three occasions. This technique involved dragging electrodes over the pond bottom to determine electropotentials. Areas with significantly lower electropotentials relative to background levels generally are indicative of pond leakage. The initial survey, conducted on July 15, 1977, gave no evidence of significant areas of leakage. Subsequent surveys, conducted on July 12 and September 20, 1978, indicated some low electropotentials in the northwest corner of the pond; however, the data were highly variable and may be misleading due to the presence of aquatic plants in the pond which prevented adequate contact between the pond bottom and the electrodes. Consequently, no further surveys were conducted after this date.

Thermonics

The nine neutron-probe access holes located in the solar evaporation pond embankments also were used to develop thermal profiles of the embankment and subsurface material. These thermal profiles were used to calculate seepage rates based on the premise that variations in temperatures at depth are the result of the variability in the rate of fluid flow through the pond embankment. Areas of greatest permeability will approach the temperature of the pond more closely, whereas areas of reduced permeability will reflect changes in pond water temperature more slowly due to the reduced diffusion of heat through the embankment soils.

Temperature profiles made during the period from 1977 to 1979 were used to estimate the thermal diffusivity of the embankment soil. By assuming a typical value of soil conductivity, the groundwater velocity and, ultimately, the rate of seepage was determined to be approximately 13 gallons per minute. Various profiles indicated the major area of leakage was either in the west or east end of evaporation pond 1.

AQUATRACE

Radioactive tracer tests were conducted on solar evaporation ponds 1 and 2 between 1978 and 1981. A tracer designated TRAC 5 was injected into pond 1 near neutron probe access hole NP-8. The tracer TRAC 3 also was injected into the south solar evaporation pond (pond 2). Initial analyses for the tracer found a low concentration of TRAC 5 in pond 1 but no tracer in the San Juan River downstream of the refinery or in the Hammond Ditch either upstream or downstream of the refinery. Subsequent sampling in September and October 1978 indicated TRAC 5 in low concentrations in the Hammond Ditch and the San Juan River downstream of the refinery due to leakage from the north pond. Subsequent sampling in December 1978, July and December 1980, and January 1981, did not find the tracer in downstream San Juan River water samples. The data indicate possible leakage from Pond 1 to the Hammond Ditch as well as a small surface depression located east of the solar evaporation ponds. The amount of leakage from pond 1 to these areas was not quantified. An attempt to estimate leakage from pond 2 was made using a separate tracer, designated as TRAC 3. Sampling based on this tracer was inconclusive, due to the fact that tracer was detected in higher concentrations upstream than downstream in both the Hammond Ditch and the San Juan River.

Water Levels

After the completion of the nine neutron-probe access holes and prior to the filling of the solar evaporation ponds, water was detected in each of the holes, and was believed to be the result of fluids introduced during drilling. The holes were blown dry, and immediately began to accumulate water again. Recovery was relatively rapid in holes NP-3, 5, 7, 8, and 9' and noticeably slower in NP-1, 2, and 4. The fact that the holes contained water prior to the filling of the pond is significant, and indicates the presence of water in the cobble layer and/or the upper Nacimiento Formation. The slow recovery of several of the observation wells is consistent with the movement of water from the cobble layer through the annular space containing a mixture of bentonite and sand or through the Nacimiento Formation, both of which are of very low permeability.

Water levels in the nine holes are tabulated in Table 3.1 and are illustrated in Figure 3.2. These data do not include periods when the holes were air blown to remove water prior to the introduction of temperature probes to provide the thermal data previously discussed. As shown, several wells such as NP-2 and NP-4 required up to one year to reach equilibrium with the water level in the vicinity of the solar evaporation ponds. Due to the slow well recovery, short-term changes in groundwater levels are impossible to assess, and the water level measurements are useful only for determining long-term trends.

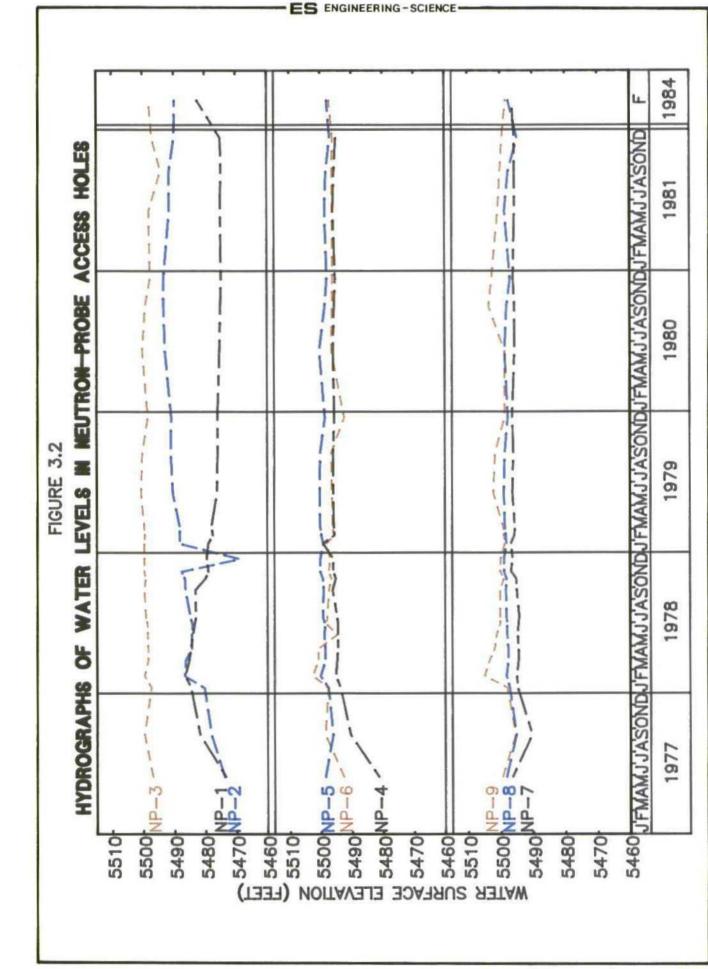
During the irrigation season, water levels in the Hammond Ditch in the vicinity of the solar evaporation ponds are typically 5,498 to 5,500 feet msl. This ditch contributes to the water stored in the cobble layer, as evidenced by the presence of water in the observation wells prior to the filling of the evaporation ponds. The water levels in the wells since pond 1 was filled indicates that the pond also contributes to the water in the cobble layer. Since pond 2 was constructed in the same manner, it too

GROUNDWATER ELEVATION MEASUREMENTS IN NEUTRON-PROBE ACCESS HOLES

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Date	NP-1	NP - 2	NP-3	NP-4	NP - 5	NP - 6	NP - 7	NP-8	NP-9
21-22 May 1977	5473.66	5473.97	5497.18	5481.78	5498.68	5492.71	5496.51	5498.18	5499.49
18-19 September 1977	5481.94	5478.27	5499.83	5490.68	5496.18	5498.60	5490.44	5495.17	5495.42
10-11 January 1978	5485.09	5480.59	5497.51	5493.82	5497.77	5497.60	5494.97	5497.00	5497.93
14 February 1978	5486.78	5486.60	5499.61	5495.41	5500.04	5502.84	5495.23	5498.27	5505.04
27 March 1978	5485.54	5486.50	5498.42	5495.01	5498.83	5501.03	5494.83	5497.61	5503.30
26 April 1978	5484.82	5484.57	5498.44	5494.68	5498.78	5500.84	5494.86	5497.75	5501.90
2 June 1978 🗳	5484.32	5484.57	5498.73	5494.87	5499.08	5494.89	5494.92	5497.94	5501.10
29 June 1978	5483.69	5484.17	5498.70	5494.77	5498.87	5498.31	5494.50	5497.85	5500.17
12 July 1978	5483.39	5484.82	5499.20	5494.96	5499.54	5497.94	5494.42	5498.32	5500.28
20 September 1978	5483.47	5486.50	5499.61	5496.67	5499.20	5497.42	5495.14	5498.55	5500.29
25 October 1978	5480.28	5486.64	5499.14	5495.58	5499.57	5496.72	5495.57	5498.37	5499.09
11 November 1978	5479.18	5487.69	5499.66	5496.30	5500.01	5497.35	5496.80	5498.90	5499.92
13-14 December 1978	5479.66	5469.13	5499.71	5496.27	5500.01	5497.18	5496.55	5498.90	5499.92
23 January 1979	5479.00	5488.34	5499.85	5495.58	5499.38	5498.34	5495.07	5498.00	5498.79
13 February 1979	5477.79	5488.03	5499.49	5495.64	5499.93	5495.81	5495.70	5498.51	5499.01
3-9 March 1979	5478.17	5488.27	5499.83	5495.98	5500.21	5496.24	5495.84	5498.75	5499.37
5 June 1979	5476.42	5490.49	5500.71	5496.03	5500.43	5496.68	5496.45	5498.91	5502.21
18-19 September 1979	5476.06	5491.22	5500.17	5496.19	5500.39	5496.70	5496.14	5498.81	5501.71
12 December 1979	5476.21	5491.01	5498.51	5495.64	5498.61	5492.47	5496.65	5497.50	5498.68
9 July 1980	5475.57	5492.94	5500.37	5496.27	5500.41	5496.40	5495.66	5498.89	5498.68
2 October 1980	5475.22	5493.47	5499.10	5495.73	5498.85	5496.16	5495.87	5498.06	5503.90
11 December 1980	5475.03	5493.43	5497.71	5495.45	5497.89	5496.04	5496.06	5497.06	5502,40
5 June 1981	5475.21	5491.47	5497.86	5496.03	5498.78	5496.10	5495.50	5498.65	5500.60
17 September 1981	5475.02	5491.57	5494.28	5495.67	5498.21	5496.07	5495.77	5497.44	5499.93
3 December 1981	5475.22	5490.06	5497.14	5495.28	5497.19	5495.90	5495.83	5496.60	5499.30
15 February 1984	5482.78	5489.67	5498.04		5497.94	5497.23	5496.53	5497.38	5498.18
24 February 1984	5483.33	5490.34	5498.66	5496.36	5498.45	5497.65	5496.91	5497.80	5498.57
Benchmark	5521.82	5520.67	5521.13	5521.17	5521.13	5520.94	5520.97	5521.29	5520.90



probably contributes to groundwater in the area. Maximum recharge from pond 1 appears to occur in the western end of the pond near observation well NP-9. The water level fluctuations in the wells do not appear to be related to the fluctuations of the water levels in the Hammond Ditch due to the irrigation season. Although it appears clear that both the evaporation ponds and the Hammond ditch contribute to shallow alluvial groundwater in the vicinity of the ponds, the magnitude and direction of groundwater movement is not well-defined.

Surface Water and Soil Samples

While the refinery was operated by Plateau, water and soil samples were collected on several occasions to provide additional information on wastewater quality and subsurface petroleum hydrocarbons relative to the refinery discharge plan which had been submitted previously to the NMOCD. Table 3.2 lists the analytical results of samples of the then unlined API wastewater ponds collected in September 1981. These data are typical of refinery process wastewaters (Ref. 6). A sample of the API wastewater pond effluent collected in December 1981, shown in Table 3.3, appears to be of somewhat better quality. This water is and was being pumped to the solar evaporation ponds, and was analyzed at the time the spray irrigation area had just begun operation.

Plateau collected one soil and six water samples simultaneous with an NMOCD investigation of the refinery site on July 12 and 14, 1982. These data are tabulated in Table 3.4. Concentrations of petroleum constituents, including benzene, toluene, xylene, and ethylbenzene, in the mg/l range were found in water in the alluvial river deposits at the bottom of the bluff adjacent to the San Juan River. Concentrations of aromatic and aliphatic petroleum compounds in the ppm range were detected in soil from the banks of the Hammond Ditch near the API wastewater ponds. Concentrations of several petroleum constituents in the lower ppm range were found in the API separator effluent and in the Hammond Ditch downstream of the refinery. A low concentration of the petroleum constituent toluene (0.2 mg/l) also was found in a seep on the bluff northwest of the refinery.

Parameter	North API Wastewater Pond	South API Wastewater Pond
BOD, mg/l	87.3	136
COD, mg/1	525	657
NH ₃ , mg/1	317	316
Sulfide, mg/l	619	802
Phenol, mg/l	145	102
pH, units	7.14	8.33

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ANALYTICAL RESULTS OF SEPTEMBER 1981 PLATEAU WATER SAMPLING

As, mg/l<0.1	ter nt on
Ba, mg/l <0.1	
Cd, mg/l 0.01 Cr, mg/l <0.05	
Cr, mg/l <0.05	
SCN, mg/l 7.5 F, mg/l 0.46 Pb, mg/l 0.15 Hg, mg/l <0.002	
F, mg/l0.46Pb, mg/l0.15Hg, mg/l<0.002	
Pb, mg/l 0.15 Hg, mg/l <0.002	
Hg, mg/l <0.002	
Se, mg/l 0.16 Ag, mg/l <0.05	
Se; mg/l 0.16 Ag, mg/l <0.05	
Cl, mg/l132.5Cu, mg/l0.05Fe, mg/l0.9Mn, mg/l0.1SO ₄ , mg/l975Phenols, mg/l12TDS, mg/l1870	
Cu, mg/l0.05Fe, mg/l0.9Mn, mg/l0.1SO_4, mg/l975Phenols, mg/l12TDS, mg/l1870	
Fe, mg/l0.9Mn, mg/l0.1SO,, mg/l975Phenols, mg/l12TDS, mg/l1870	
Mn, mg/l 0.1 SO ₄ , mg/l 975 Phenols, mg/l 12 TDS, mg/l 1870	
SO ₄ , mg/l 975 Phēnols, mg/l 12 TDS, mg/l 1870	
Phénols, mg/l 12 TDS, mg/l 1870	
TDS, mg/l 1870	
Zn, mg/1 0.35	
pH, units 9.0	
A1, mg/1 0.6	
B, mg/l 9.2	
Co, mg/l 0.11 Mo, mg/l 0.28	
Ca, mg/l 107 Mg, mg/l 13.8	
Na, mg/1 508	
K, mg/l 16.6	
Acid Extractables:	
Dimethylphenol, mg/l 0.45	
Chloromethylphenol, mg/l 1.70	
Base/Neutral Extractables:	
Naphthalene, mg/l 1.05	
Acenaphthalene, mg/l 0.04	
Benzene, mg/l 1.7	
Toluene, mg/l 1.9	
Ethylbenzene, mg/l 0.068	
Anthracene, mg/l <0.1	
Phenol, mg/l 6.1	
2,4-dichlorophenol, mg/l <0.1	
2,4,5-trichlorophenol, mg/l <0.1	
2,4,6-trichlorophenol, mg/l <0.1	
1,1,1-trichloroethane, mg/l <0.2	
Chloroform, mg/l 9.2	
PCB's, mg/1 <0.1	

ANAYLTICAL RESULTS OF DECEMBER 1981 PLATEAU SAMPLING OF API WASTEWATER POND EFFLUENT

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AMALYTICAL RESULTS OF 7/12/82 AND 7/14/82 PLATEAU WATER AND SOIL SAMPLING

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Parameter	Sample A Water from Test Trench 100 yards NW of Hammond Ditch and Sullivan Road Intersection	Sample B Water frow Test Trench 150 feet SE of Harmond Ditch and Sullivan Road Intersection	Sample C Water from Hammond Ditch 150 yards S of Hammond Ditch and Sullivan Road Intersection	Sample D Water from	Sample E Groundwater from River River Terrace Deposits	Sample F Seep from Bluff NW	Sample G Soil from Hammond Ditch Near API Waste- water Pond
SO ₄ , mg/l	210	65	30	230	175	85	125
Cl, mg/l	370	205	40	260	320	215	109
F, mg/l	0.7	0.5	0.2	0.9	1.1	0.2	0.6
Oil and grease, mg/l	NA	NA	0.8	8.0	60	NA	NA
Phenols, mg/l	NA	NA	<0.1	1.4	0.2	NA	ИА
TOC, mg/l	NA	NA	18	149	06	VN	NN
TDS, mg/l	NA	NA	5494	1710	5376	NA	NA
Cyanides, mg/l	NA	NA	4	300	80	NA	NA
Benzene, mg/l	NA	NA	0.2	5.3	70.6	QN	NA
Toluene, mg/l	NA	NA	1.3	3.7	100.0	0.2	NA
Xylenes, mg/l	NA	NA	0.8	0.3	150.3	· ON	NA
Ethylbenzene, mg/l	NA	NA	0.09	0.03	19.9	QN	NA
0/M Cresol, mg/l	NA	NA	ND	0.4	ΟN	QN	NA
Phenol, mg/l	NA	NA	ND	0.2	QN	QN	NA
Aromatic and Alipahtics, mg/l	cs, NA	NA	QN	28	QN	N	15,800

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NA: Not Analyzed. ND: Not Detected.

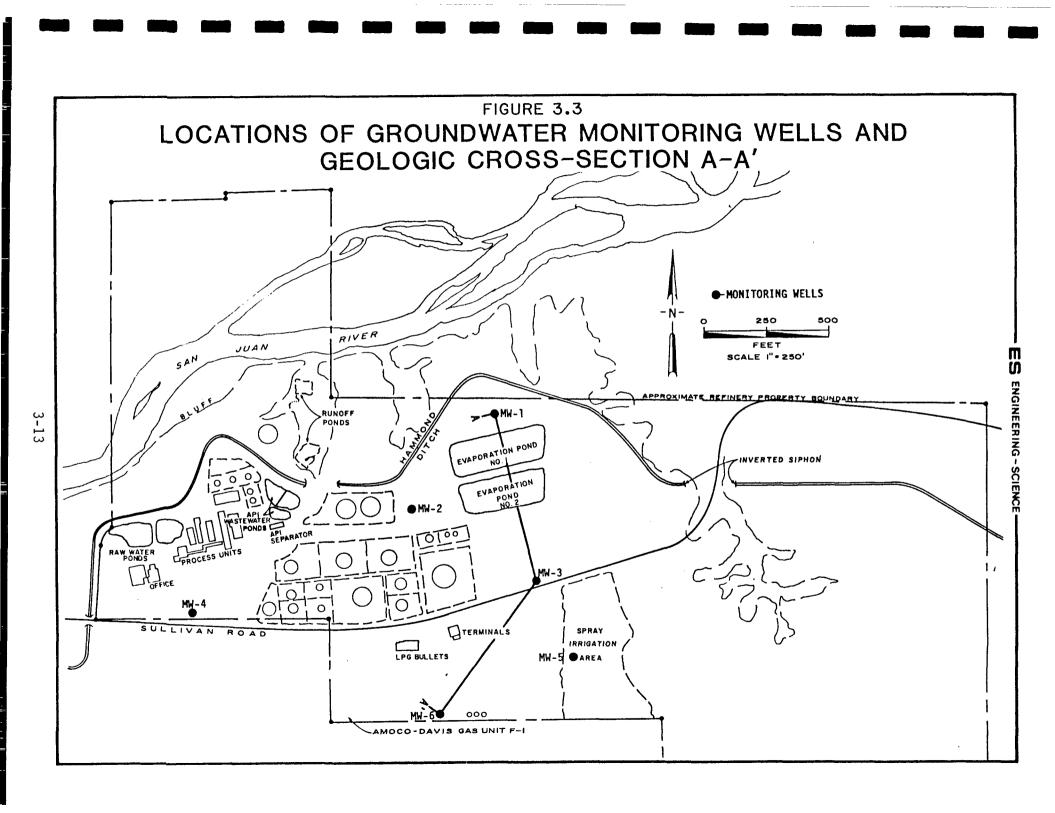
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GROUNDWATER MONITORING WELLS

In February 1984, Earl and Sons, Inc. of Cedar Crest, New Mexico, installed six monitoring wells at the Bloomfield Refinery at the locations shown on Figure 3.3. The holes were drilled using an Ingersoll Rand TH-60 rig using air rotary methods and a down-the-hole air hammer. Drilling was terminated in each hole when drilling cuttings indicated the top of the Nacimiento Formation had been penetrated. Some water also was required during drilling, and was obtained from the San Juan River. Methanol or acetone was used to rinse the bits between holes. The holes were drilled in the expected order of increasing organic concentrations to minimize cross-contamination between the wells. The lower 20 feet of each well were screened. Lithologic logs for each of the six wells are presented in Appendix B.

The water levels in the wells were determined on February 9, 1984, after the last well was completed, and again on February 14 and 15 and February 24. There were no significant differences between the sets of water level measurements. The water level measurements are presented in Table 3.5. Water levels in the five holes containing water varied by less than four feet. The water levels levels in these wells are consistent with those in the Hammond Ditch during the irrigation season, and the neutron-probe access holes. Well 6, which was dry, encountered the Nacimiento Formation above the water elevations in the other wells. The relationship between water levels and the subsurface geologic units is clearly illustrated by Cross-section A-A', taken through MW-1, 3, and 6, in a general north to south trend, as shown on Figure 3.4.

In MW-1, the top of the Nacimiento Formation is at approximately 5,493.6 feet msl. Water in the cobble layer contributed by the Hammond Ditch and evaporation ponds and overlying the Nacimiento was at 5,498.8 feet msl on February 24, 1984. At MW-3, the top of the Nacimiento is slightly higher, and the water elevation also has increased slightly in the cobble layer to about 5501.6 feet msl. South of MW-3, the elevation of the Nacimiento increases more rapidly than the water surface elevation, such that the cobble layer, which is still present at a reduced thickness in MW-6, is completely dry. The slope of the Nacimiento Formation is approximately one percent upward to the south on a regional basis.

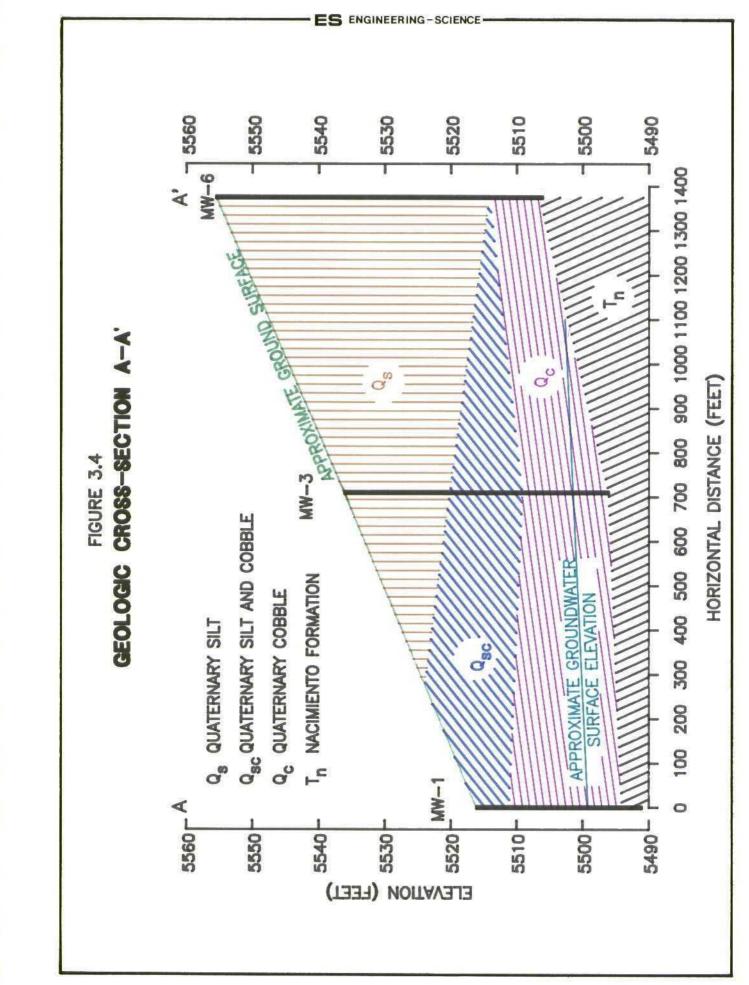


GROUNDWATER ELEVATION MEASUREMENTS IN MONITORING WELLS, 1984

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Monitoring Well	Benchmark	Water Elevation 2/9	Water Elevation 2/14-2/15	Water Elevation 2/24
MW-1	5515.64	5499.08	5498.63	5498.78
MW-2	5519.38	5500.27	5499.48	5500.37
MW-3	5535.74	5501.68	5501.48	5501.63
MW-4	5524.30	5499.36	5499.33	5499.46
MW-5	5545.01	5502.34	5501.28	5502.17
MW-6	5555.13	Dry	Dry	Dry

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Background water samples were collected from wells MW-1 through MW-4 on February 15, 1984, and submitted to two laboratories for analysis. As shown in Table 3.6, significant differences between the laboratories were observed for several parameters, including aluminum, cadmium, cobalt, copper, iron, lead, nickel, selenium, nitrate, and others. Concentrations of petroleum constituents in the low mg/l range were detected in MW-4, the well located closest to the process area. MW-1, located between the Hammond Ditch and the solar evaporation pond, did not show extensive petroleum hydrocarbon or heavy metal contamination. MW-3 also appeared relatively clean, and one laboratory detected benzene, toluene, and phenol concentrations of less than 100 ug/l in MW-2.

As part of the refinery discharge plan plan approved in June 1984, the refinery has initiated a program to analyze groundwater from MW-1 and MW-4 on a quarterly basis. At the time of this report, only the first set of data, collected in September 1984, are available. These data are tabulated in Table 3.7. As shown, MW-4 has increased concentrations of petroleum-derived compounds, including phenols, benzene, and toluene. Although all petroleum compounds analyzed were less than method detection limits for MW-1, parameters such as lead and phenols had increased from previous samples. Significant differences in TDS, sulfates, chlorides, and nitrate between the two wells indicate different probable sources of groundwater constituents.

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The differences between the February 15 and September analytical work are difficult to evaluate, particularly considering the differences observed between the two laboratories previously discussed. The fact that the Hammond Ditch was flowing in September but not in February probably has affected the water sampled in MW-1 since it is apparent the ditch contributes water to the cobble layer in this area. At present, it is unknown whether water in the ditch significantly impacts groundwater in the vicinity of MW-4. Given the complex hydrogeology of the site, it is likely that at least a full year of analytical data and water level measurements covering periods when the Hammond Ditch is and is not flowing, will be necessary to evaluate the water quality data adequately.

ANALYTICAL RESULTS OF FEBRUARY 15, 1984, MONITORING WELL SAMPLING

	Well	No. 1	Well	Well No. 2		Well No. 3		Well No. 4	
	Hauser	CEP	Hauser	CEP	Hauser	CEP	Hauser	CEP	
Aluminum, mg/l	43.8	<0.1	37.7	<0.1	48.8	<0.1	10.2	<0.1	
Arsenic, mg/l	0.0027	<0.01	0.0102	0.01	0.0035	<0.01	0.0038	<0.01	
Barium, mg/l	<1.0	0.1	<1.0	<0.1	<1.0	1.3	<1.0	0.2	
Boron, mg/l	<10.0	0.2	<10.0	0.3	<10.0	0.6	<10.0	0.5	
Cadmium, mg/l	0.1	0.006	0.11	0.004	0.1	0.002	0.2	0.010	
Chromium, mg/l	<0.1	<0.001	<0.1	<0.001	<0.1	<0.001	<0.1	<0.001	
Cobalt, mg/l	1.0	0.09	1.1	<0.01	0.93	<0.01	0.95	<0.01	
Copper, mg/l	0.13	0.009	0.11	0.001	<0.1	0.007	<0.1	0.004	
Iron, mg/l	12.7	0.04	15.7	0.03	43.1	0.02	8.3	<0.01	
Lead, mg/l	2.8	0.006	3.1	0.005	2.7	0.004	2.8	0.006	
Manganese, mg/l	1.1	1.21	11.3	18.1	1.8	4.43	3.5	2.07	
Mercury, mg/l	0.001	<0.0004	0.0013	<0.0004	<0.0024	<0.0004	<0.001	<0.000	
Molybdenum, mg/l	<0.5	0.24	<0.5	0.013	<0.5	0.014	<0.05	0.005	
Nickel, mg/l	0.84	0.05	0.87	0.02	0.76	<0.01	0.75	0.02	
Selenium, mg/l	0.0096	0.11	0.0057	0.10	0.0053	0.07	0.0036	0.10	
Silver, mg/l	<0.1	<0.01	<0.1	<0.01	<0.1	<0.01	<0.1	<0.01	
Zinc, mg/l	1.1	0.45	0.5	0.32	0.8	0.67	0.9	2.8	
pH (units)	7.22	7.27	7.25	7.33	7.14	7.00	6.92	6.98	
TDS, mg/l	3038	3050	4825	4360	4098	5220	1600	1780	
Chloride, mg/l	1040	1000	1120	1100	1012	1200	417.5	470	
Cyanide, mg/l	<1.0	0.19	<1.0	0.21	<1.0	0.24	<1.0	0.17	
Fluoride, mg/l	0.62	0.54	1.12	0.58	0.81	0.24	0.32	0.33	
Nitrate, mg/l	1.2	0.05	1.0	0.02	46.5	<0.01	1.3	0.02	
Sulfate, mg/l	240	520	1025	1700	975	2000	<10.0	<1.0	
Phenols, mg/l	<0.015	0.13	0.05	0.04	⁻ <0.05	0.09	0.19	0.05	
Benzene, mg/l	ND	<0.001	ND	0.032	ND	<0.001	9.24	3.96	
Toluene, mg/l	ND	<0.001	ND	0.074	ND	<0.001	2.43	5.08	

Hauser refers to Hauser Labs of Boulder, Colorado.

CEP refers to Controls for Environmental Pollution in Santa Fe, New Mexico.

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FIRST QUARTER MONITORING WELL ANALYTICAL RESULTS (SEPTEMBER 1984)

Parameter	Monitoring Well No. 1	Monitoring Well No. 4
As, mg/l	<0.002	<0.002
Ba, mg/l	1.0	4.0
Cd, mg/1	0.014	<0.002
Cr, mg/1	<0.005	0.10
Pb, mg/1	0.125	0.088
Hg, mg/l	<0.002	<0.002
Se, mg/l	0.35	0.40
Ag, mg/l	<0.003	<0.003
Cu, mg/1	0.10	0.03
Fe, mg/l	57.0	43.7
Mn, mg/l	1.70	7.8 0.18
Zn, mg/l	0.30 <0.1	<0.1
U, mg/l	1059.0	410.0
C1, mg/l	825.0	10.0
SO ₄ , mg/l		
PCB, mg/l	<0.01	<0.01
Phenols, mg/l	0.024	0.552
CN, mg/1	<0.01	<0.01
NO_3 as N, mg/1	7.2	0.02
A1, mg/1	2.0	<0.05
B, mg/1	<0.004	<0.004
Co, mg/1	0.08	<0.003
Mo, mg/l	<0.005	<0.005
Ni, mg/l	0.3	0.2
F, mg/l	0.284 3582.0	0.597 1860.0
TDS, mg/l	<0.01	0.419
Benzene, mg/l	<0.01	0.296
Toluene, mg/l	<0.01	<0.01
Carbon tetrachloride, mg/l 1,2 Dichloroethane, mg/l	<0.02	<0.01
1,1 Dichloroethylene, mg/l	<0.005	<0.005
1,1,2,2 Tetrachloroethylene, mg/l	<0.02	<0.02
1,1,2 Trichloroethylene, mg/l	<0.01	<0.01
pH, units	7.2	7.1
Ra 226 & 228, pCi/l	<5	<5

SITE SAMPLING BY NMOCD

The NMOCD conducted water and soil sampling investigations at the Bloomfield Refinery on five occasions during 1981 and 1982. The data obtained from four of these investigations are tabulated in Tables 3.8 through 3.12. A single sample collected at an unknown location on December 29, 1981, which had a COD concentration of 172 mg/l is not included.

The first sampling investigation conducted by the NMOCD occurred on September 3, 1981, when seven water samples were collected. These samples were analyzed for inorganic parameters, primarily metals, as shown in Table 3.8. 'Considering the high sulfate and chloride concentrations in the API wastewater pond, solar evaporation pond 1, and seeps, the fact that there is no difference in these parameters in the Hammond Ditch as it passes through the refinery suggests very little or no impact on the ditch water.

On July 6, 1982, the NMOCD collected 19 water samples at various points around the refinery, including an API wastewater pond, solar evaporation pond 1, the Hammond Ditch, the San Juan River, and numerous seeps. These samples were analyzed for TOC and seven inorganic parameters, as shown in Table 3.9. The API wastewater pond, solar evaporation pond 1, and many of the seeps were found to contain concentrations of lead, chloride, and or TDS exceeding state and federal drinking water criteria. Groundwater from the alluvial river deposits adjacent to the San Juan River and near a major seep had the highest TOC, boron, and lead concentrations. Water collected from the Hammond Ditch just downstream of the refinery contained low chloride and TDS concentrations relative to the other samples, and gave no evidence of being impacted by groundwater constituents at the refinery.

The NMOCD followed up this sampling with an investigation of water and soils at the refinery on July 12 and 14, 1982. These samples were analyzed for specific organics typically associated with petroleum products. These data are tabulated in Tables 3.10 and 3.11. Sample locations are presented in Figure 3.5.

ANALYTICAL RESULTS OF 9/3/81 NMOCD WATER SAMPLING

	Sample 1	Sample 2	Sample 3	Sample 4	Sample 5	Sample 6 Seep on Bluff	Sample 7	
Parameter	Sump from North API Wastewater Pond	Southeast Corner of Evaporation Pond No. 1	Upstream Hammond Ditch at West end of Siphon	Seep in Arroyo 150+ yards NE of Evaporation Pond No. 1	Seep NW of Evaporation Pond No. 1	250+ yards North of North API Wastewater Pond	Downstream Hammond Ditch at Sullivan Roa	
C1	1102.2	997.8	3.6	235.8	603.9	696.8	4.6	
F	0.45	0.56	0.16	1.12	1.16	0.77	0.15	
SO4	3,55.2	563.3	46.3	314.3	1118.0	1896.0	46.5	
Fe	0.4	<0.1	_ `	-	<0.1	-	<0.1	
Mn	<0.1	<0.1	-	-	<0.1	-	<0.1	
Ni	0.04	<0.01	-	-	<0.01	-	<0.01	
Мо	<0.01	<0.01	-	-	<0.01	-	<0.01	
Co	<0.005	<0.005	-	-	<0.005	-	<0.005	
As	0.046	<0.005	_	-	0.005	-	<0.005	
Ba	0.4	<0.1	-	-	0.4	-	<0.1	
Cd	<0.001	<0.001	-	-	<0.001	-	<0.001	
Cr	0.009	<0.005	-	-	<0.005	-	<0.005	
РЪ	<0.005	<0.005	-	-	<0.005	-	<0.005	
Hg	<0.005	<0.005	-	-	<0.005	-	<0.000	
Se	<0.005	<0.005	-	-	<0.005	-	<0.005	
Ag	<0.001	<0.001	-	-	<0.001	-	<0.001	
Zn	<0.1	<0.1	-	-	<0.1	-	<0.1	
Cu	0.061	<0.05	-	-	<0.05	-	<0.05	
A1	<0.1	<0.1	-	-	0.24	-	0.1	
В	1.2	-	-	- .	0.28	-	0.04	

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All values in mg/l.

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ANALYTICAL RESULTS OF 7/6/82 NMOCD WATER SAMPLING

	Sample Location	TOC (mg/l)	Boron (mg/l)	Cobalt (mg/l)	Chromium (mg/l)	Lead (mg/l)	Chloride (mg/l)	Fluoride (mg/l)	TDS (mg/l)
S-1	Downstream Hammond Ditch 35 feet South of Sullivan Road	3.75	<0.01	<0.01	<0.01	<0.01	10	0.0027	220
S-2	Seep from Bluff NW	3.75	0.32	<0.01	<0.01	<0.01	20	0.0060	640
S-3	Seep from Bluff NW	5.63	0.29	<0.01	<0.01	0.01	130	0.0069	1679
S-4	Seep from Bluff NW	3.75	0.36	<0.01	<0.01	0.01	150	0.0092	1124
S-5	Groundwater fróm River Terrace near Seep	26.25	0.74	<0.01	<0.01	0.40	330	0.0124	3127
S-6	Seep Below Holding Pond	3.75	0.54	<0.01	<0.01	0.10	760	0.0092	4667
S-7	Seep at Holding Pond just North of Hammond Ditch	<1.88	0.19	<0.01	<0.01	0.02	440	0.0162	2059
S-8	API Wastewater Pond Sump	1.88	<0,01	<0.01	<0.01	0.07	960	0.0019	2927
S-9	NW Corner of Evaporation Pond No. 1	5.63	0.07	<0.01	<0.01	0.09	1130	0.0281	3831
S-10	Seep North of Hammond Ditch and NE of Evaporation Pond No. 1	5.63	<0.01	<0.01	<0.01	0.04	420	0.0116	1782
S-11	Seep E of Evaporation Pond No. 1	5.63	0.16	<0.01	<0.01	0.09	920	0.0174	4289
S-12	Seep from Culvert at Sullivan Road and E of Evaporation Pond No. 1	7.50	0.46	0.01	<0.01	0.16	280	0.0083	7875
S-14	Spray Irrigation System	3.75	<0.01	<0.01	<0.01	0.07	1180	0.0299	3822
S-15	Seep at San Juan River from Arroyo E of Refinery	3.75	<0.01	0.01	<0.01	0.14	380	0.0101	7209
S-16	San Juan River Upstream	3.75	<0.01	<0.01	<0.01	<0.01	10	0.0040	208
S-17	Groundwater near Highway 44 and Sullivan Road	11.25	<0.01	<0.01	<0.01	0.03	200	0.0240	2098
S-18	Seep from Bluff NW	11.25	<0.01	<0.01	<0.01	0.05	220	0.0057	1713
S-19	Seep from Bluff NW	1.88	<0.01	<0.01	<0.01	0.04	60	0.0140	587
S-20	Seep from Bluff NW	18.75	<0.01	<0.01	<0.01	0.09	820	0.0108	3528

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ANALYTICAL RESULTS OF 7/12/82 AND 7/14/82 NMOCD WATER SAMPLING

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Parameter	Sample A Test Trench 100 yards NW of Hammond Ditch and Sullivan Road Intersection	Sample B Test Trench 150 feet SE of Harmond Ditch and Sullivan Road Intersection	Sample C Hammond Ditch 150 yards S of Hammond Ditch and Sullivan Road Intersection	·	Sample E Groundwater from River Terrace Deposits	Sample F Seep from Bluff NW
······			· · · · · · · · · · · · · · · · · · ·			
Cd, mg/l	. 0.002	0.001	<0.001	0.001	0.04	NA
Cr, mg/l	0.013	<0.008	<0.005	0.041	0.62	NA
Pb, mg/l	0.13	0.10	<0.005	0.12	18.17	NA
Hg, mg/l	0.0014	<0.0005	<0.0005	<0.0005	<0.0005	NA
Co, mg/l	0.05	0.05	<0.05	0.069	0.57	NA
Ni, mg/l	0.13	<0.05	<0.05	0.08	0.80	NA
Oil and Grease, mg/l	NA	NA	1.2	15.7	296.2	NA
Cn, mg/l	NA	NA	ND	0.19-0.39	0.0036	NA
Phenols, mg/l	NA	NA	0.0295	21.34	1.01	NA
Cl, mg/1	365.5	385.3	5.0	1499.5	554.5	NA
F, mg/1	0.49	0.38	0.22	0.38	0.43	NA
SO ₄ , mg/1	146.6	12.2	51.0	239.7	1420	NA
B, mg/1	0.53	0.49	0.03	0.37	0.38	NA
TDS, mg/1	1963	1733	4180	2170	4830	NA
TOC, mg/l	NA	323	3.6	323	860	NA
Benzene, ug/1	<1	<1	<1	21.13 mg/	'l 15.66 mg/	/] <1
Toluene, ug/l	<1	<1	<1	21.08 mg/	1 44.6 mg/1	1.43 mg/l
Ethylbenzene, ug/l	<1	NA	NA	<1. mg/l	4.03 mg/	/] <1
M-Xylene, ug/l	<1	<1	<1	1.27 mg/	1 16.3 mg/1	<1
Aliphatic Hydrocarbon Screen	ND	ND	ND	Present	Present	ND

ND: None Detected NA: Not Analyzed

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7/12/82 AND 7/14/82 NMOCD SOIL SAMPLING

	Sample A Test Trench 100 Yards NW	Sample B Test Trench 150 Feet SE	Sample E	Sample G
	of Hammond Ditch and Sullivan Road Intersection	of Hammond Ditch and Sullivan Road Intersection		Soil Sample in Hammond Ditch Near API Waste- water Ponds
-				0.000
Benzene	<1 ppb	<1 ppb	<1 ppb	0.009 ppm
Toluene	<1 ppb	<1 ppb	0 . 115 ppm	0.158 ppm
Ethylbenzene	NA NA	<1 ppb	0.044 ppm	0.056 ppm
M-Xylene	<1 ppb	<1 ppb	0 . 124 ppm	0.229 ppm

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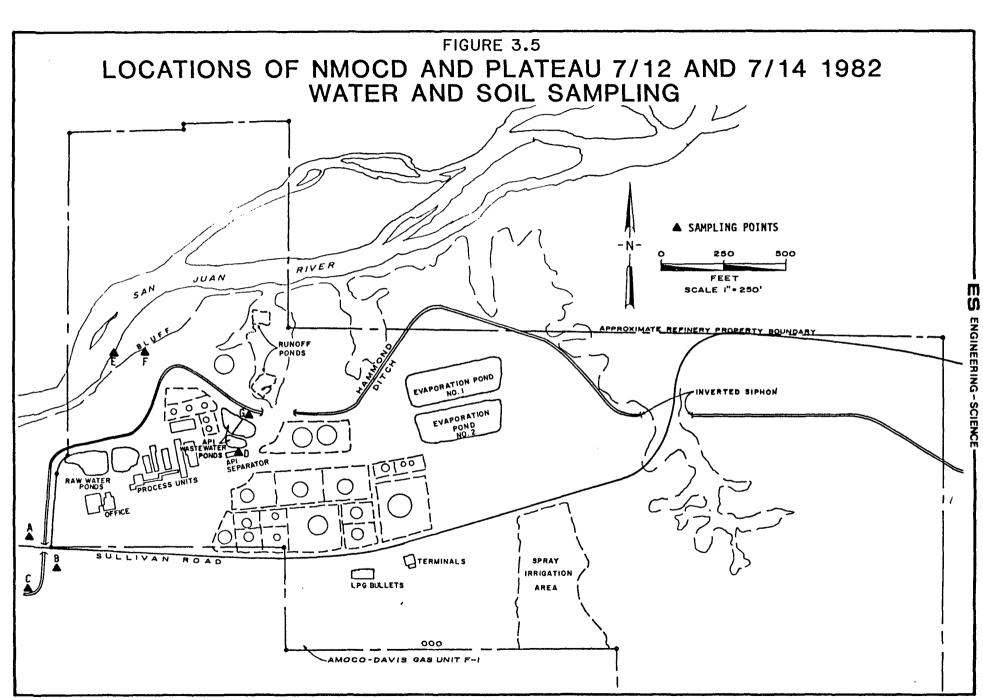
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2	Sample La	Sample Ca	Sample Da	Sample Ia Hammond	Sample Ja	Sample Ka Water from Test Trench
	Alluvial Vell Water	Hammond Ditch Downstream	API Separator Effluent	Ditch Upstream at Siphon	Seep from Bluff NW	50 yards South of two Ponds East of Refiner
SO ₄ , mg∕l	417.2	56.7	454.2	57.3	151.8	NA
C1, mg/1	38.2	6.5	1504	3.9	203.5	78.2
B, mg/1	0.29	0.07	0.35	0.03	0.84	0.66
TDS, mg/l	- 906	186	2676	184	1549	NA
TOC, mg/l	1.5	5.4	418	4.6	98	9.6
Mn, mg/l	0.36	0.05	0.11	0.05	0.92	0.13
Co, mg/1	0.05	0.05	0.05	0.05	0.05	0.069
Pb, mg/l	<0.005	<0.005	0.20	<0.005	0.26	0.38
U, mg/1	NA	NA	0.005	NA	NA	NA
Phenols, mg/l	NA	0.013	37.05	0.191	NA	NA
Cn, mg/l	ND	0.002	NA	NA	0.001	NA
Benzene, ug/l	<1	<1	17.1	<1	<1	<1
Toluene, ug/l	<1	<1	16.5	<1	<1	<1
M-Xylene, ug/l	<1	<1	3.0	<1	<1	NA
Ethylbenzene, u	Jg∕l NA	<1	3.6	<1	<1	NA
Aliphatic Hydro	-					
carbons,	ND	ND	Present	ND	ND	ND

7/28/82 NMOCD WATER SAMPLING

NA: Not Analyzed ND: Not Detected

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Water samples from the test trenches northwest and southeast of the downstream Hammond Ditch intersection with Sullivan Road had lead concentrations of two to three times state and federal drinking water criteria, and the southeast sample had a TOC concentration of 323 mg/l. However, concentrations of petroleum constituents including benzene, toluene, ethylbenzene, xylene, and aliphatic hydrocarbons typically present in refinery product were all less than detectable limits. Soil samples collected at the same locations also were free from significant concentrations of these organics. The sample of Hammond Ditch water contained low concentrations of oil and grease (1.2 mg/l) and phenols (29.5 ug/l), but otherwise differs from the concurrent sample collected by Plateau in that benzene, toluene, xylene, and aliphatic petroleum hydrocarbons were all less than detectable limits.

The water sample collected from the API separator contained concentrations of TOC and the petroleum constituents benzene and toluene in the mg/l range, as well as other compounds typical of refinery wastewaters. The concurrent sample collected by Plateau had lower petroleum hydrocarbon concentrations, although the same compounds were still present.

Groundwater from the alluvial river deposits was found to contain a variety of organic and inorganic compounds. A soil sample at this location also contained a similar variety of compounds. A high lead concentration (18.17 mg/l) was detected in this sample. Specific petroleum hydrocarbons, including benzene, toluene, ethylbenzene, and xylene, were present in concentrations in the mg/l range, although generally lower than the concentrations detected in Plateau's sample of the same date. It should be noted that the concentrations of many parameters exceed those present in the sample collected from the API separator, suggesting a probable source other than refinery effluent.

A soil sample collected from the south bank of the Hammond Ditch near the El Paso Natural Gas pipeline right-of-way was found to contain the petroleum constituents benzene, toluene, ethylbenzene, and xylene at concentrations of less than 0.25 ppm. The stained soils in this area are reportedly the result of diesel fuel spilled in the process area in past years due to improper tank-filling procedures. Downstream of this area of the ditch, two four-foot diameter berms were constructed to contain the

seepage, and the collected water and petroleum hydrocarbon mixture was pumped to the API wastewater ponds for subsequent treatment. This seepage may be the source of the petroleum hydrocarbons detected further downstream in the ditch water.

The NMOCD completed their site investigations during 1982 with a visit to the refinery on July 28 for the collection of additional water samples. These analyses are tabulated in Table 3.12. As shown in the table upstream and downstream samples of the Hammond Ditch water were almost identical, and show no evidence of refinery impacts. The API separator sample was similar to samples previously collected from the same source. Samples of a seep on the northwest bluff and water from a test trench near the solar evaporation ponds had elevated lead concentrations of five to eight times state and federal drinking water standards, although little evidence of petroleum compounds was present. The NMOCD also sampled an alluvial water well at an unknown location which showed no evidence of increased metals or organic concentrations.

FIT 1983 INVESTIGATION

On May 16, 1983, the EPA conducted a FIT investigation of the Bloomfield Refinery. Water samples were collected in the Hammond Ditch upstream, downstream, and near the process area; in the San Juan River upstream and downstream; in a retention pond seep north of the API wastewater ponds; and from two seeps on the bluff, one east and one west of the refinery. Soil samples were collected in the landfarm area, the Hammond Ditch near the process area, and in the vicinity of the three seeps from which water samples were collected. These data are attached to this report as Appendix C.

Upstream and downstream samples of San Juan River water show few differences and do not indicate measurable contamination of the water downstream of the refinery. Of the metals analyzed, iron was somewhat higher downstream of the refinery than upstream, but was still well within state and federal water quality standards for drinking water supplies. Priority pollutant analyses found a single alkane in the upstream sample at 0.0075 ppm which was not detected in the river water downstream of the refinery.

Water samples from the Hammond Ditch upstream and downstream of the refinery and adjacent to the process area show no significant differences for the metals analyzed (aluminum, iron, manganese, and zinc). The same alkane identified in the upstream San Juan River sample was found in similar concentrations in the Hammond Ditch upstream and downstream of the refinery. An unknown volatile organic compound was also found in the upstream sample at a concentration of 0.12 ppm. The water sample collected from the ditch near the process area contained a low concentration (0.011 ppm) of molecular sulfur. No other priority pollutants were identified in the water samples from the Hammond Ditch water which are commonly associated with refinery operations or product. The soil sample collected of the Hammond Ditch bank near the process area contained metals concentrations typical for U.S. soils. Two alkanes were found in this soil sample at a total concentration of less than 1 ppm.

The three water samples from the seeps contained numerous volatile organic and acid and base/neutral compounds common in raw crude and refined product, including alkanes, phenolic compounds, benzene isomers, polynuclear aromatics, and a variety of unidentified compounds. The retention pond seep contained fewer petroleum-derived compounds at generally lower concentrations than the seeps sampled on the west and east bluffs. Soil samples collected in the vicinity of the seeps indicated concentrations of polynuclear aromatic compounds in the ppb to low ppm range around the west seep, whereas the soil sample collected in the vicinity of the east seep was characterized by similar concentrations of alkanes and related petroleum compounds. Only a single alkane at a concentration of 0.32 ppm was identified in soil from the retention pond seep.

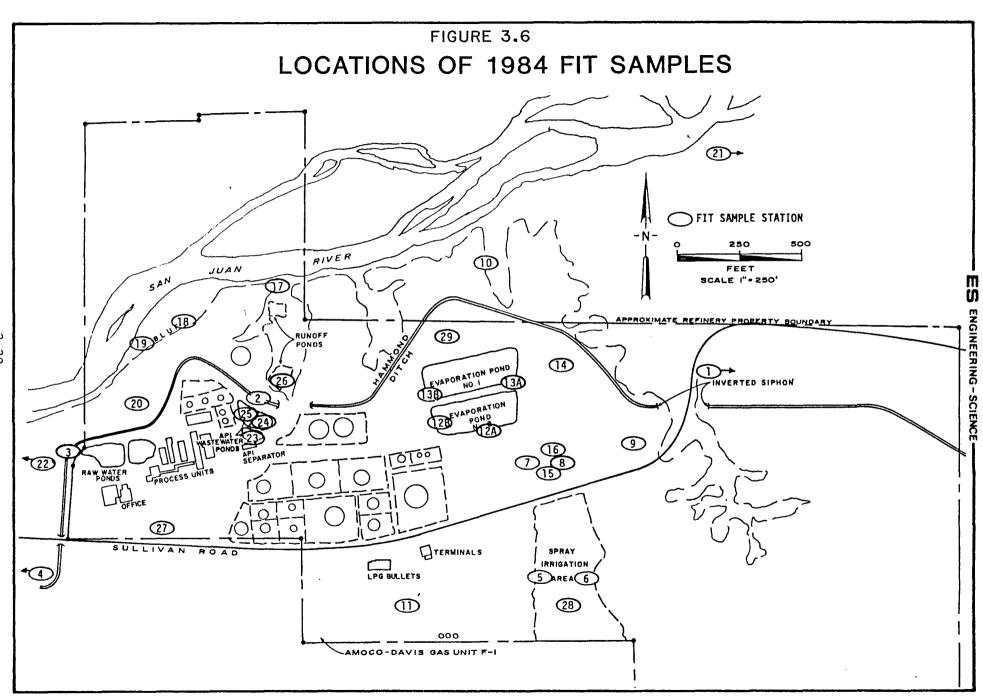
FIT 1984 INVESTIGATION

An extensive sampling program was conducted by the EPA Region VI FIT during the week of March 19-24, 1984. Samples were collected from the refinery API separator, solar evaporation ponds, spray irrigation area, groundwater monitoring wells, and other surface features in probable runoff pathways. Seepage samples and soil samples from the river alluvium also were collected, as well as upstream and downstream samples in the San Juan River and the Hammond Ditch. A map showing the locations of all samples is

presented in Figure 3.6. The analytical data is attached to this report as Appendix D, along with a data summary originally presented in the FIT report.

Water and soil samples were collected at four locations in the Hammond (1) upstream of the refinery, (2) near the API wastewater ponds, Ditch: (3) below the raw water ponds, and (4) downstream of the refinery. Water samples upstream and downstream of the refinery contained no measurable concentrations of organic or inorganic parameters. A small concentration of the petroleum constituent xylene (7.3 ppb) was detected in the ditch water near the raw water ponds. Petroleum hydrocarbons including several benzene compounds and numerous unknowns were detected in the water adjacent to the API wastewater ponds. In the soil samples, unknown organic compounds were detected in all samples except that collected near the raw water ponds, at concentrations greater than 45 ppm. In the soil near the API wastewater ponds, in the area where a stain of diesel fuel had been reported previously, four polynuclear aromatic compounds (PNA's) at a total concentration of over 18 ppm were detected. Alkanes were detected in all samples, including those collected upstream of the refinery, and a large number of unknown organic compounds were found in the soil samples both upstream and downstream of the refinery. Given the large concentrations of alkanes and unknown organic compounds detected in upstream soil samples, it is impossible to determine conclusively the source of similar compounds and concentrations in downstream samples. It should be noted that off-site migration of organic compounds was not demonstrated in water samples collected in the ditch.

Soil samples collected throughout the refinery indicate a variety of organic compounds are present in widely varying concentrations. Small concentrations of toluene, heptanol, and other petroleum-derived organics of less than 2 ppm were detected in soils in the spray irrigation area. Soils in a portion of the refinery property located just north of the spray irrigation area contained higher concentrations of the petroleum constituents PNA's, alkanes, and other unknown organics in the 10-50 ppm range. Evaporation pond soils were found to contain petroleum-derived phenolic compounds, PNA's, aromatic and other solvents, alkanes, and other compounds, mostly in concentrations of less than 1 ppm, although one of the



samples taken from the southern end of pond 2 had organic concentrations up to 10 ppm, as well as elevated chromium, copper, and zinc levels.

Soils and water samples in seepage areas and intermittent stream channels, north and northwest of the refinery, all contained evidence of organic compounds commonly associated with refinery operations and refined product. The highest concentrations of these petroleum constituents were found in soils from a major seep on the bluff northwest of the refinery and in the alluvial river deposits immediately below. PNA's, alkanes, benzene, and other petroleum constituents were detected at concentrations exceeding 100 ppm. The seeps containing the highest organic concentrations are likely the result of past spills of oil or product at the refinery, since organic concentrations are well in excess of the concentrations of the same compounds present in the API wastewater ponds or in the API separator effluent, solar evaporation ponds, or spray irrigation area.

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The FIT collected water and soil samples from the San Juan River both upstream and downstream of the refinery. No evidence of downstream impacts was found, despite the high organic concentrations present in the adjacent river terrace deposits. The compounds 1,1,2-trichloroethane and 1,1,2,2tetrachloroethane were found in both upstream and downstream soils in similar concentrations. The source of these compounds is unknown, although laboratory contamination is a strong possibility.

Three groundwater monitoring wells, MW-1, MW-4, MW-5, were sampled during the 1984 FIT visit. Petroleum hydrocarbons including ethylbenzene, xylene, and alkanes were detected in MW-5 at concentrations of less than 50 ug/l, and no organic compounds were detected in well MW-1, although a low phenol concentration had been detected in one previous analysis. Organic concentrations approaching 30 mg/l for individual petroleum constituents were found in MW-4, which is consistent with previous analyses, although concentrations of specific parameters differ from previous samples. Water from each of the wells contained elevated aluminum and iron concentrations. Manganese also was detected in MW-4 at a slightly elevated concentration (7.62 mg/l).

CHAPTER 4

SITE ASSESSMENT

CHARACTERIZATION AND POTENTIAL SOURCES OF GROUNDWATER CONSTITUENTS

Organic constituents commonly associated with refinery operations and refined product are widespread in groundwater in the upper sands, silts, and cobbles of the Jackson Lake Terrace and other Quaternary deposits above the Nacimiento Formation at the Bloomfield refinery, and have been observed in seeps in the intermittent stream channels to the north of the Hammond Ditch. The areas with petroleum hydrocarbon concentrations in the ppm range are the major seeps emerging from the bluff northwest of the refinery, the alluvial river deposits to which these seeps drain, and the vicinity of MW-4. Other seeps and arroyos north and northeast of the refinery show evidence of petroleum hydrocarbons at lower concentrations.

The areas with the highest petroleum hydrocarbon concentrations are believed to be primarily the result of hydrocarbon spills and leaks in and around the process area. The concentrations of aromatic solvents, polynuclear aromatics, alkanes, substituted benzenes, and other petroleum-derived hydrocarbons in the major northwest bluff seep and the alluvial river deposits are significantly higher than the concentrations observed in the API separator effluent, API wastewater ponds, solar evaporation ponds, and spray irrigation area and implicate a separate source. Concentrations of specific petroleum hydrocarbons in the API separator effluent and API wastewater ponds are typical of refinery operations as reported by EPA Furthermore, the presence of short-chain and low molecular (Ref. 6). weight hydrocarbons in the seepage from the northwest bluff is characteristic of refined product and also strongly suggests it may be the result of leaks and/or spillage. The 1984 FIT report also indicated that the river terrace deposits where the large petroleum hydrocarbon concentrations were found was the site of a 2,500-barrel oil spill in 1963.

The area in the vicinity of MW-4 also contains subsurface petroleum hydrocarbons. This area reportedly was near areas used at one time for truck washing and truck loading which may have contributed to the petroleum hydrocarbons present. The water sample collected at this location

contained some similar compounds to the northwest bluff seep, although numerous different petroleum constituents were present in the samples.

Samples collected from the arroyo north of the solar evaporation pond generally contain fewer organic compounds at lower concentrations than those near the process area or along the northwest bluff. The petroleum compounds detected are similar to those found in the evaporation ponds and spray irrigation area, which suggests these areas as possible sources.

The extent of the petroleum hydrocarbons in the shallow subsurface is well defined in certain areas, and, although the horizontal extent is not known with 'certainty, the general area of petroleum hydrocarbons can be defined. It is likely that to the south, the petroleum hydrocarbons extend no further than the point where the water level intersects the Nacimiento Formation, and may not extend even this far, as the subsurface soil and water samples collected in this area by the NMOCD and Plateau did not indicate petroleum hydrocarbon presence. Soil and water samples collected west of the Hammond Ditch and north of Sullivan Road also did not indicate the presence of petroleum hydrocarbons and, furthermore, movement of impacted groundwater in this area is unlikely due to the location of the ditch, which would provide a barrier much of the year due to the hydraulic gradient when the ditch is full. In addition, groundwater movement appears to follow the Nacimiento subcrop which slopes down toward the north on a regional basis.

Taken together, the data on groundwater quality suggest multiple sources of groundwater petroleum hydrocarbons ranging from spills or leaks of crude oil or product to the seepage of partially treated wastewater. It is doubtful that all individual sources of spills could be identified, considering the hydrocarbons obviously have moved throughout the shallow subsurface and are influenced by the recharge of water form and surcharge to the Hammond Ditch. Therefore, it seems most prudent to consider the entire process area extending to MW-4 in the south as a single source of petroleum hydrocarbons.

POTENTIAL SURFACE WATER IMPACTS

Subsurface petroleum hydrocarbons at the Bloomfield Refinery potentially could impact two major surface water bodies: the San Juan River and

the Hammond Ditch. Potential impacts on the Hammond Ditch can be further divided into irrigation season and non-irrigation season impacts.

San Juan River

None of the surface water or soil samples collected by Plateau, the NMOCD, or EPA upstream or downstream of the refinery indicate the river has been affected adversely by the subsurface petroleum hydrocarbons at the refinery. Although it is apparent that concentrations of petroleum hydrocarbons are present in the alluvial river deposits adjacent to the San Juan River, these compounds have not been detected downstream in measurable concentrations. Given the small flow rate of the seeps relative to the flow rate of the San Juan River, the dilution rate is sufficiently high such that even if hydrocarbons are entering the river they are diluted to such an extent that they do not have a measurable impact on water quality. Field estimates of the total rate of seepage from all seeps have been as high as 10-20 gpm. At the average river flow rate of 1,090 cfs since the Navajo dam was completed in 1963 (determined at USGS gauging station 09355500, 7.2 miles downstream from the dam and approximately 19 miles upstream from the site), the dilution rate would be 24,460 to 1 if as much as 20 gpm were entering the river. Therefore, it is hardly surprising that petroleum hydrocarbon impacts downstream from the refinery in the San Juan River have never been demonstrated.

Due to the high flow rate of the San Juan River, flow rates have not been measured in conjunction with sampling activities. If the discharge of petroleum hydrocarbons through seeps eventually leading to the river were constant, the potential for adverse impacts increases as the flow in the river decreases. This is true for several reasons. Obviously, a reduction in the San Juan River flow reduces the dilution rate for any petroleum hydrocarbons which may be entering the river. Secondly, a lowering of the river level may allow petroleum hydrocarbons present in the alluvial deposits to enter the river during low-flow conditions. Although the river flow rates during site sampling invstigations are not known, river flow rates are available at several USGS gauging stations on the San Juan River. One of these, USGS gauging station 0935710, was used briefly as a water quality station as well as a gauging station between 1978 and 1981. The station is located several miles downstream of the refinery but upstream of

the City of Farmington. The locations of the gauging stations are shown on Figure 1.1. During this period, concentrations of a large number of inorganic and some organic analyses were determined on a monthly basis. Analyses of selected parameters which might be impacted by the introduction of refinery hydrocarbons to the river are summarized in Table 4.1. The data indicate there is no correlation between concentrations of these water quality parameters (including organic carbon and lead) and river flow rates which can be attributed to the subsurface petroleum hydrocarbons at the There is no indication that concentrations increase during refinery. low-flow conditions due to increased migration of petroleum hydrocarbons into the river. Furthermore, there is no indication that water quality parameters increase due to a flushing out of petroleum hydrocarbon substances from the alluvial deposits during periods of high flow.

Based on the available information, impacts on the San Juan River due to subsurface petroleum hydrocarbons at the refinery are not measurable, including during low-flow and high-flow periods.

Hammond Ditch

Potential impacts on the Hammond Ditch due to subsurface petroleum hydrocarbons at the refinery are difficult to assess, if only because of the seasonal use of the ditch to carry irrigation water. During the irrigation season, the ditch contributes water to the upper alluvial deposits as bank storage and the hydraulic gradient tends to move groundwater in directions away from the ditch, and in some instances toward the numerous seeps along the Nacimiento subcrop. Only one of many water samples collected from the ditch downstream during the irrigation season showed any evidence of petroleum hydrocarbons, and a sample collected concurrently by NMOCD was free of hydrocarbons. Petroleum hydrocarbons have been detected in the ditch below the API wastewater ponds and raw water ponds at low concentrations when the ditch is flowing - these are most likely the result of the surface soil stains in the ditch near the API wastewater ponds, since the hydrocarbons are absent in water downstream from the refinery but increase in an upstream direction to a maximum for the sample collected near the API wastewater ponds.

When the ditch is not carrying irrigation water, the hydraulic gradient is reversed and water will tend to come out of bank storage and

TABLE 4.1

ANALYSES OF SELECTED PARAMETERS AT USGS WATER QUALITY STATION 0935710 DURING THE TIME PERIOD 1977-1981

I.

Date	Instan- taneous Flow Rate (cfs)	Sulfate (mg/l)	Chloride (mg/l)	Nitrate + Nitrite- (mg/l)		Organic-N (mg/l)	Boron (ug/1)	Dissolved Organic Carbon (mg/l)	Total Chromium (ug/l)	Total Lead (ug/l)	Total Zinc (ug/l)
December 9, 1977	579	100	3.9	0.31	0.27	0.09	40	3.4	0	4	20
January 24, 1978	606	120	4.0	0.13	0.00	0.14	30	3.0	-	-	-
February 22, 1978	519	120	4.0	0.23	0.13	1.3	40	4.2	-	-	-
March 28, 1978	653	120	4.5	0.06	0.01	0.51	30	3.1	-	-	-
April 27, 1978	480	120	4.3	0.05	0.03	0.33	40	3.7	•	-	-
June 27, 1978	339	120	5.4	0.14	0.03	0.52	40	4.6	-	-	-
July 18, 1978	380	150	4.8	0.09	0.00	0.39	50	8.0	0	10	40
August 21, 1978	496	140	4.5	0.08	0.02	0.33	50	7.7	-	-	-
September 15, 1978.	490	140	5.0	0.08	0.04	0.42	40	4.9	-	-	-
October 18, 1978	524	170	5.2	0.15	0.01	0.37	50	5.8	0	2	20
November 28, 1978	5 60	170	5.0	0.14	0.02	0.56	60	3.8	-	-	-
December 18, 1978	701	140	5.4	0.20	0.01	0.31	60	3.8	-	-	-
January 23, 1979	627	150	4.8	0.18	0.03	0.20	40	5.6	-	-	-
February 21, 1979	934	170	4.7	0.25	. 0.04	4.2	60	6.4	-	-	-
March 26, 1979	2 520	130	4.4	0.23	0.04	9.2	50	3.3	-	-	-
April 24, 1979	5030	62	3.4	0.08	0.01	0.33	30	3.6	10	38	80
May 23, 1979	5530	64	3.2	0.06	0.05	0.46	40	4.9	-	-	-
June 18, 1979	4990	61	2.8	0.06	0.03	0.10	120	8.4	-	-	-
July 24, 1979	4850	50	2.2	0.15	0.02	0.41	3	1.9	0	8	30
August 22, 1979	793	94	2.5	0.08	0.27	0.93	30	5.8	-	-	-
September 17, 1979	510	130	2.5	0.06	0.01	0.39	30	7.2	-	-	-
October 2-, 1979	579	150	3.6	0.06	0.08	0.45	50	9.5	0	6	20
November 20, 1979	294	250	5.1	0.18	0.04	-	50	5.9	-	-	-
December 17, 1979	1630	80	6.6	0.11	0.03	0.57	140	4.1	-	-	-
January 22, 1980	1720	79	6.4	0.46	0.02	0.40	30	4.5	-	-	-
February 18, 1980	1820	-	2.5	0.19	0.12	1.9	30	4.8	-	-	-
March 18, 1980	2640	55	2.5	0.09	0.00	0.33	30	3.3	-	-	-
April 6, 1980	724	120	3.6	0.12	0.08	0.52	30	5.9	-	-	-
1ay 21, 1980	9 77	91	2.9	0.01	0.02	0.40	60	6.7	-	-	-
June 16, 1980	1390	69	2.7	0.02	0.00	0.76	30	7.6			
July 24, 1980	855	79	2.5	0.08	0.01	0.85	40	4.3	10	16	40
August 26, 1980	1020	100	3.1	0.00	0.00	0.64	20	4.0	-	-	-
September 24, 1980	1010	81	2.7	0.00	0.00	0.35	40	4.2	-	-	-
October 30, 1980	1210	80	2.5	-	-	-	50	-	-	-	-
November 24, 1980	1560	76	2.9	0.13	0.03	0.83	40	4.7	0	10	70
December 15, 1980	1520	65	2.3	-	-	-	10	-	-	-	-
January 19, 9181	1830	62	2.3	-	-	-	10	-	-	-	-
ebruary 23, 1981	969	86	2.7	0.01	0.06	0.75	0	4.8	-	-	-
larch 23, 1981	843	88	2.6	-	-	-	20	-	-	-	-
April 20, 1981	430	150	4.1	-	-	-	30	-	-	-	-
1ay 26, 1981	413	130	11	0.09	0.08	0.63	20	7.2	10	3	60
June 23, 1981	373	130	3.3	-	-	-	20	-	-	-	-
July 20, 1981	588	92	2.7	-	-	-	20	-	-	-	-
August 24, 1981	759	82	2.4	0.03	0.06	0.39	20	2.7	-	-	-
September 8, 1981	1030	320	5.5	-	-	-	50	-		-	-

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recharge the ditch. The presence of water in the ditch during all seasons supports this conclusion. The return water carries with it petroleum hydrocarbons from the shallow subsurface, which are evident in the ditch during the winter months. At present, Bloomfield Refining has constructed several earthen berms in the ditch to capture the water and low concentrations of petroleum hydrocarbons which are then pumped back to the refinery for treatment. The berms prevent the petroleum hydrocarbons from migrating off-site in the ditch during the non-irrigation season.

At the start of the irrigation season, the possibility exists that petroleum hydrocarbons in the ditch upstream of the berm will be transported downstream with the first flush of irrigation water. Some of the petroleum hydrocarbons would undoubtedly adhere to downstream ditch soils and may have contributed to the alkanes detected in off-site soil samples.

Impacts on downstream water users should be negligible during the irrigation season due to the hydraulic gradient which forces ditch water into bank storage, and the dilution factor due to the water flow in the ditch. Using current recovery procedures, petroleum hydrocarbon substances recharging the ditch during the non-irrigation season will remain on-site and receive treatment in the refinery wastewater treatment system.

POTENTIAL GROUNDWATER IMPACTS

Shallow Alluvial Groundwater

That shallow groundwater beneath the refinery contains hydrocarbons typical of refinery operations is well-documented, particularly in the vicinity of and downgradient of the process area. The available data indicate that petroleum hydrocarbons migrate downward through the permeable sand, silt, and cobble deposits until encountering the relatively impermeable Nacimiento Formation. Subsurface migration occurs along depressions in the formation, which slopes downward regionally in a northerly direction. The petroleum hydrocarbons emerge in seeps where the contact between the upper permeable layers and the Nacimiento Formation is exposed along the bluff adjacent to the San Juan River. After migrating down the bluff, the petroleum hydrocarbons accumulate in the San Juan River terrace deposits and the shallow groundwater of these deposits.

The depressions in the Nacimiento subcrop are well-documented by the presence of seeps and surveyed elevations at the contact, but are less well-defined in other areas of the refinery property. At least three separate depressions are noticeable along the bluff: two north and northeast of the solar evaporation ponds and one northwest of the refinery which contains a seep with the highest petroleum hydrocarbon concentrations analyzed. A connection between the subcrop depressions resulting in a major east-west depression through the refinery property has been inferred in previous reports and is a possibility based on the information available (Ref. 3). However, it is also possible that two of the depressions are separated by a ridge of the Nacimiento subcrop. If the ridge exists, subsurface petroleum hydrocarbons east of the ridge may be a result of past spills in the area, leakage from the solar evaporation ponds and/or the spray irrigation area. At present, the existence of this ridge and the extent of the Nacimiento subcrop depressions are not known.

Groundwater in the Nacimiento and Deeper Formations

The Ojo Alamo is the shallowest dependable potable groundwater supply in the vicinity of the refinery. This sandstone formation is approximately 500 feet below the ground surface at the refinery, underlying the thick and relatively impermeable Nacimiento Formation. Indirect evidence of the Nacimiento's low permeability exists in several facts: (1) groundwater emerges at seeps along the bluff only at the contact between the Nacimiento Formation and the more permeable cobble layer above it, never from the clay or shale itself or the thin sandstone or silt lenses which can be seen along the bluff in several locations; and (2) the neutron-probe access holes, which are completed into the top of the Nacimiento, have a very slow response to any changes in groundwater levels, indicating very slow groundwater movement at best. Based on the low formation permeability and the thickness of the formation at this location (over 400 feet), it is extremely unlikely that the upper subsurface hydrocarbons could migrate downward to such an extent that the Ojo Alamo sandstone would become contaminated.

There is presently no direct evidence to either document or disprove the presence of petroleum hydrocarbons within the Nacimiento Formation itself. Indirect evidence based on the location of groundwater seeps suggests that the potentially more permeable silts and sandstone lenses do

not contain significant water or petroleum hydrocarbons. In any case, there are no domestic or irrigation wells in the area which utilize this formation as a water supply.

CHAPTER 5

CONCLUSIONS AND RECOMMENDATIONS

Based on a review of analytical data collected by the refinery, the NMOCD, and EPA, hydrological data collected by the USGS, and hydrogeological data prepared for the refinery, the following conclusions can be drawn concerning the presence of subsurface petroleum hydrocarbons at the refinery:

- (1) Petroleum hydrocarbons and other compounds commonly associated with refinery operations are widespread in groundwater in the upper sand, silt, and cobble deposits underlying the refinery. The extent of the petroleum hydrocarbons appears limited on the western refinery boundary by the Hammond Ditch and on the south by the lack of natural shallow groundwater south of a point where the groundwater levels encounter the relatively impermeable Nacimiento Formation. Subsurface petroleum hydrocarbons appear to be the result of many sources, primarily the result of many individual leaks and spills known to have occurred at the refinery.
- (2) All available evidence supports the contention that petroleum hydrocarbons are confined to the upper layer of sands, silts, and cobbles overlying the Nacimiento Formation. However, there is no hard data on possible hydrocarbons in the Nacimiento Formation itself.
- (3) There is little likelihood that the first major potable water aquifer, the Ojo Alamo, will be impacted measurably by the subsurface hydrocarbons at the refinery.
- (4) There is no indication from the data examined that the San Juan River downstream of the refinery has been impacted measurably by the petroleum hydrocarbons, either under low-flow or high-flow conditions.
- (5) Few measurable impacts have been observed in the Hammond Ditch downstream of the refinery during the irrigation

season. Water and small amounts of petroleum hydrocarbons are pumped back to the refinery for treatment during the non-irrigation season. Even with collection, some petroleum hydrocarbons may be flushed downstream at the start of the irrigation season.

(6) The subcrop of the Nacimiento Formation shows three major depressions at the outcrop along the bluff adjacent to the San Juan River. Whether or not there is a major east-west depression through the refinery at the subcrop is presently unknown.

The following actions are recommended to obtain additional information prior to the development of a remedial action plan for the refinery:

- (1) The refinery should continue to monitor groundwater quality in the six monitoring wells on a quarterly basis to develop baseline water quality in the areas where the wells are located. At least one year of data is necessary to evaluate properly the seasonal impact of the Hammond Ditch on groundwater quality. Water levels in the wells should be determined monthly for the same purpose.
- (2) An additional well should be constructed in the vicinity of MW-4 to determine whether there are petroleum hydrocarbons in the Nacimiento Formation. The upper cobble layer should be cased off, and the well screened in the Nacimiento, preferably in an interval in the upper 10 to 20 feet which contains sand or silt lenses. This well should be monitored at the same frequency as the other wells.
- (3) An earth resistivity survey should be conducted to determine the Nacimiento subcrop elevations throughout the refinery, particularly in the area of the possible east-west depression. The survey also may be useful in determining the extent of seepage from the solar evaporation ponds and probable mixing with the Hammond Ditch water, since the TDS concentrations are different for both sources.

- (4) The San Juan River should be sampled downstream of the refinery (possibly at the Highway 44 bridge) during a lowflow period, preferably less than 300 cfs, to satisfy state and federal agency concerns about downstream water impacts. The sample should be analyzed for the full list of 129 priority pollutants.
- (5) Samples of the Hammond Ditch water are recommended at the start of the irrigation season to determine whether petroleum hydrocarbons are being transported downstream and, if there is surface water transport, at which concentrations.

REFERENCES

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- (3) American Ground Water Consultants. January 28, 1981. Second Milestone Report on Monitoring Activities at the Bloomfield Refinery operated by Plateau, Inc., San Juan County, New Mexico.
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- (5) Ecology and Environment, Inc. May 1984. On-site Sampling Investigation, Plateau, Inc. Refinery (NM1686), Bloomfield, New Mexico.
- (6) U.S. Environmental Protection Agency. Development Document for Effluent Limitations Guidelines and Standards for the Petroleum Refining Point Source Category. EPA 440/1-79/0146. December 1979.
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- (9) U.S. Geological Survey. Water Resources Data for New Mexico. USGS Water Data Report 79-1.
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(11) U.S. Geological Survey. Water Resources Data for New Mexico. USGS Water Data Report 81-1.

APPENDIX A

NEUTRON PROBE ACCESS HOLE LITHOLOGIC LOGS

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LITHOLOGY	INTERVAL (ft)
Neutron Access Hole 1	

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0-5
5-10
10-15
15-20
20-25
25-30
30-35
35-40
40-45
45-50

Neutron Access Hole 2

Samples missing	0-5
Samples missing	5-10
Samples missing	10-15
Samples missing	15-20
Brownish silt and pebbles	20-25
Greenish clay	25-30
Greenish gray silty clay	30-35
Grayish silty clay	35-40
Grayish silty caly	40-45
Grayish silty clay	45-50

Neutron Access Hole 3

Samples missing		0-5
Samples missing		5-10
Samples missing		10-15
Brown silt, and pebbles and cobble		15-20
Pebbles and cobble		20-25
Green shale		25-30
Greenish gray clay		30-35
Greenish gray silty clay	•	35-40
Bluish gray silty clay -	2	40-45
Bluish gray sandy clay		45-50

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LITHOLOGY	INTERVAL (ft)
Neutron Access Hole 5	
Samples missing Samples missing Samples missing Gravel and pebbles Pebbles Greenish gray silty clay Grayish silty clay Grayish silty clay Grayish silty clay	0-5 5-10 10-15 15-20 20-25 25-30 30-35 35-40 40-45 45-50
Neutron Access Hole 6	
Gray sand Gray sand Gray sand Gray sand Pebbles and cobble Pebbles Buff silt Buff silty clay Buff sand Buff sand	0-5 5-10 10-15 15-20 20-25 25-30 30-35 35-40 40-45 45-50
Neutron Access Hole 7	
Samples missing Brownish sand Silt and pebbles Pebbles Pebbles and cobble Pebbles and cobble Grayish clayey sand Grayish clayey sand Grayish clayey sand	0-5 5-10 10-15 15-20 20-25 25-30 30-35 35-40 40-45 45-50

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LITHOLOGY	INTERVAL (ft)
Neutron Access Hole 9	
Samples missing	0-5
Samples missing	5-10
Samples missing	10-15
Samples missing	15-20
Samples missing	20-25
Samples missing	25-30
Samples missing	30-35
Buff silt	35-40
Gray sand	40-45
Gray sand	45-50

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APPENDIX B

GROUNDWATER MONITORING WELL LOGS

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WELL NUMBER: Cate: Location:	1 8 February 1984 29.11.27.24221
DEPTH In Feft	DESCRIPTION
0-5	Light brown clayey sand, coarse, poorly sorted, quartzose and slightly calcareous
5-10	Yellowish gray sandy pebbles and cobbles, poorly scrted, rounded to subrounded
10-12	Yellowish gray pettly sand, very coarse, poorly sorted, felospathic and noncalcareous
12-22	Dark gray pebbly and sardy cobbles, some quartz pebbles, most are volcanic, subrounced cobcles and pebbles, some clay, a little water at about 18 feet
22-25	Gray-green clayey sand becoming light yellow clayey sandstone and sandy claystone

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	2 7 February 1934 29.11.27.24321
DEPTH In Feet	DESCRIPTION
C-5	Light yellow brown silty sandy clay, very calcareous
5-10	Light yellow brown clayey sand, subrounded to subangular, moderately to poorly sorted, very calcareous
10-15	Light brown pebbly sand, clayey, very calcareous, cobbles at 15 feet
15-20	Gray sandy pebbles, poorly sorted coarse quartzose sand, pebbles are dark gray and volcanic
20-25	Dark gray cobbles, some quartz bebbles, mostly volcanic, some sand
25-26	Yellow gray clayey sandstone and sandy claystone

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WELL NUMBER: 3 DATE: 8 February 1984 LOCATION: 29.11.27.24442

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CEPTH DESCRIPTION IN FEET

C-5 Yellow brown sandy silt and clay/ very calcareous quartzose

5-10 yellow brown sand, calcareous, silty and clayey, quartzose

10-15 Yellow brown sand, silty and clayey, finangrained, vary calcareous, duartzose

- 15-27 Light brown clay, sandy, very calcareous, becoming peobly with depth
- 27-35 Gray yellow brown cobbly sand, ccarse, poorly sorted, silty and clayey, volcanic pebbles small amount of water at about 35 feet
- 35-40 Gray coboles, pebbly and sandy, coarse sand, yellow gray clayey sandstone at about 40 feet

WELL NUMBER: Date: Location:	4 9 February 1984 29.11.27.23344
DEPTH In Feet	DESCRIPTION
0-5	Yellow gray-brown sandy silt and clay, calcareous
5-10	Yellow brown silty sandy clay and clayey silt/ very slightly calcareous
10-15	Reddish yellow-brown clayey sandy silt/ silty clay/ fine-grained quartzose sand/ noncalcareous
15-19	Light brown coarse sand with clay and pabbles, calcarecus
19-25	Gray pebbly sand, very coarse, poorly sorted, some clay and silt, subrounded to subangular, quartzose, pebbles rounded, slightly calcarecus
25-30	Gray cobbles and pebbles, subrounded to rounded, volcanic; at about 28 feet, hydrocarbon smell and color
30-32	Gray cobbly sand, with hydrocarbon smell and color, coarse grained, sand is quartzose and feldspathic, subrourded and subangular quartz grains are clear
32	Yellow gray clayey sandstone

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	5 6 February 1934 29.11.26.31112
DEPTH In Feet	DESCRIPTION
C-5	Pale yellow brown clay, silty, some sand, calcareous
5-1C	Pale yellow brown clayey sand and quartzose silt/ poorly sorted/ calcareous
10-15	Yellow brown sand, subrounded quartzose sand slightly calcareous
15-20	Yellow brown sand, clayey, moderately coarse grained, very slightly calcareous
20-25	Yellow brown sand, clayey, silty, fine to medium grained, moderately sorted, noncalcareous
25-35	Yellow brown sand, silty and slightly clayey, fine-to-medium grained, well sorted, subangular, noncalcareous, becoming more clayey with depth
35-37	Yellow brown pebbly and cobbly sand, clayey, calcareous
37-47	Dark gray sandy and clayey cobbles and pebbles≠ water at 42 feat
47-50	Dark gray cobbles with greenish clay
50-54	Green-gray pebbly clay

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	6 7 February 1984 29.11.27.42144 or 42233
DEPTH In Feet	DESCRIPTION
C-15	Pale yellow brown sand, clayey and silty, subangular, poorly sorted, quartzose, very calcareous, becoming more clayey with depth
15-20	Pale yellow brown silt, sandy and clayey, silt is coarse, sand is very fine, moderate sorting, quartzose and calcareous
20-25	Pale yellow sand, slightly clayey, subrounded, well sorted, quartzose, noncalcareous
25-35	Pale yellow sand/ coarse to medium grained/ quartzose/ noncalcareous
35-41	Pale yellow sand, clayey, fine grained, silty, quartzosa, slightly calcareous
41-49	Gray-black cobbles and pebbles, volcanic
49-52	Gray-green clayey sandstone and sandy claystone

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APPENDIX C

1983 FIT SAMPLES

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CASE NUMBER: SAS 542F

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	Silver								1	1	
	Arsenic								6.1	5.4	
	Antimony								150	1	
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Task 2									8	1	
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luoro trichloromethane	VDA	×					present	1		•	
CB-1248	Pest	X					19.2				
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luorene	ABN	×							49		
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. Sample	Sample Station Location	tion			Hammond dítch	West Bluff seen	East Bluff seen	Reten- tion Poud SFEP	-14-	MC soll blank	LC soll blank

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Priority Pollutant. Specified Hazardous Substance. Tentatively Identified.

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SE NUMBER: P 1740 SAS 542F											Pase L	- - -	
тѣ кмнЕ/CODE: Plateau Refinery	ý							•	•	,			· . •
	-					-		CONCE	CONCENTRATIONS	\sim			•
PA	PARAMETERS	ERS							EPA SAM	PLE NUMBERS	RS	-	
Compound		Fraction] Р.Р.	2 S.H.S.	3 T.T.	F1866	F1868	F1870	F1872	F1874	F1875	F1877	
lsomer	/b4 RNN	ABN			XX		200			hracant			ĪĪ
Benzene isomer	843	ABN			~~	•	81			present			Ī
:Benzene isomer	879	ABN			X		IZU						Ī
kanet.t.t.t.t.t.t.t.t.t.t.t.t.t. thvt nanhthalene isomer 11	1032	ABN ARN ·			~ ~		0II						ĪĪ
	1133	ABN	Ť		: ×		126						Ī
naphthalene 1somer	1155	ABN			×		64						Ī
methyl naphthalene isomer · I.	0/11	ABN			×		100						
kane . 1	1316	ARN			×	1	100	1				0.26	
	1358	ABN			×	0.59	74	5,600					Ī
1	447	ABN			~	0.35		1,400		1,400			-
cyclopentane(12)	378	VOA	1		×>			c/0.0		7			Ī
alkene [12] Covelementane icomen		VUA			<>			121.0					I
cohol or alkene (12)	489	VOA			< 			0.068		•			I
(12)	503	VOA		•	Х			0.15					
	508	VOA			×			0:18					
	520	VUA			×			790-0					
cohol or alkene	536	VUA			×								
kane · · ·	557	YOA			×			0.36					Ī
	580	V0A			× >			0.28 1 800		360			Ĩ
	1197	ABN			<×		present	10		870			Ĩ
	1299	ABN			X			$\left - \right $		1200			Ī
tuted naphthalene		ABN			×			1,400		present			I
Macrix Sample		LYPe Station Number	ч										Ī
· · ·							1						
• Sample		Station Location	ion]
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SE NUMBER: D 1740 SAS 542F											۲۵۵۴	Jo	
		•						•	•				
	•				•			CONCI	CONCENTRATIONS	NS (ppm)			
			ł						EPA SAMPLE	EL L	cRS		
LA.	FAKAME LEKS	EKS	Ī		ſ								
pur		Fraction	P.P.	S.H.S.	л. н. Г.	F1866	F1868	F1870	F1872	F1874	F1875	F1877	•
Icohol or alkene	1445	ABN			×			110		present	2124		
ulkane l'	1483	ABN			×		present	8,900	0.32	1600	0.3		
l or alkene	1536	ABN			×			1700		present			
	1568	ABN			×		present	9,200					
ilkane l!	1572	ABN			X			4,300		1900			Ì
lkane l(1648	ABN '			×			6,8UU					[
lkane l	1655	ABN			X			p.200		1000			
ilkane l	1724	ABN			×			6,600		1.100			
	167	ABN ·			X			4,300		1,100			
	1866	ABN			Х			۲,400		present			
alkane 19	1933	ABN			Х		·	μ,500		850			
alkane 10	1998	ARN			X			006		800			
	2059	ABN			Х			610		940			
l or alkene	400	VOA			×					0.78			
J cyclohexane isomer	466	VOA			Х					0 • 65:			
cyclohexane isomer	479	VOA:		-	×					0.66			
	500	VOA			X		•			0.73			
	513	VOA			×					0.65			I
alkane	552	VQA			Х					1.3			
vl benzene isomer	602	YDA		_	X					4.			
•	678	VOA			×					0.6			
	1524	ABN			Х			4.500					
	-												
						·							
Matrix	- 1												
Sample		Station Number	٩٢										
		-								•			
2 Amp Le	- 1	SCACION LOCACION	uor										
l. Priority Pollutant.			•		•			·					
ified			•	•								•	-
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ASE NUMBER: P 1740 SAS 542F	542F										ê e	Į,	
SITE NAME/CODE: Plateau Refinery	efinery							•					
	-							CONCE	NTRATION	CONCENTRATIONS (ppm)			
-	PARAMETERS	TERS							EPA SAMP	LE NUMBE	RS		
Compound		Fraction	ь р Т	S.H.S.	T I 3	F1866	F1868	F1:870	F1872	F1874	F1875	F1877	
	2131	ABN					present	t present		950			
alkane	2253	ABN			×					0/6			
alkane	2330	ABN			X					0.011			
lkane	2423	ABN			×			, .		1000			
Ikane	2535	ABN			×					0011			
Ikane	2672	ABN	, C:		X					0011			
lkane	2833	ABN			×					870			
lkane	1363	ABN			X					850			
inknown	. 2589	ABN			Х						3.5		ľ
والمارية والمارية والمارية المارية المارية والمارية والمارية والمارية والمارية والمارية والمارية والمارية والم													
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	Matrix Type	ē											
	1 4	Station Number	ег										
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	Sample Sta	Station Location	tion		•					•			
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NSE NUMBER: 1740 SAS 542F				-							1 8 e 1	of 🖌	
ITÉ NAME/CODE: Plateau Refinery								•	•				
	•	•			•			CONCE	CONCENTRATIONS	(mnm) Si			
PAR	PARAMETERS			·					EPA SAMPLE	1123	RS		İ
	1			1 :									İ
alkane 1243		ARN		0 . H . U	1.1	F1861	F1862	F1863	F1864	F1869	F1871	F1873	F1876
	\downarrow				< >		0000	c/nn•n	600.0				
benzene	VOA	V	×						0.16	1 25			Ì
l, 2-dichloroethane	VOA	A	×					-		0.058	4.1		
ſoluene	V0A	A	×					.		0.074	17		
acetone	VOA	A		×						Dresent	0.48		
J-xylene	V0A	A	:	×						0.2	: 26	0.0055	
cyclohexane .	0	A			×					0.0088	11.0		Ī
methyl cyclopentane	VOA	· V			X					8900.0	1.0		
1. 2-dibromo ethane	VOV	4			×					2.810.0			Ī
CYCIO HEXANE	Aov -	Ą			X					0,0073	0 46		
	_	z			X					0:25			
	\neg	z			Х					0.05			Í
unknown, alkane 1242		z			X					1 1	0.02		0 093
phenol	ABN	N	X								Dresent		*****
2-methyl phenol	I ABN	N	×	-							present		Ì
_	AB	N	×								1 6	nrecent	İ
2-methyl naphthalene	ABN	N		k					ŀ		3.0	1126717	
ethyl benzene	VOA	A	×								Ŭ.46		
	VOA	A		×							present		
2-hexanone	VOA	A		Х							0.20		
4-methyl-z-PENTANONE	A0V	·		×							present		
2-methyl hutane	AOV	A		>-	X						c0.0		
hexane	AOX				.×						0.11		
alkane	5	A			×						U.24		
	AOV 1	A			×	 					1.6		
	Type					water	water	water	water	water	water	water	water
Sample :	Station Number	Mumb C	er			10	02	04	_	06	07	08	Blank
Sample	Station Location	1 Loca	t í on				Ditch W.F. Ditch W.F. Side Svidu	an Juar Liver JPSTREAM	h HammonedWest Ditch E.Bluff Side Svit-seep	beep Bluff seep	East Bluff seep	Keten- pond SEEア	Med. conc
Pollutant.			•		•								
. Specified Hazardous Substance.	e .	•		•								•	•

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SITE NAME/CODE: Plateau Refinery	ery						•.	•					
		•	•		•			CONCE	CONCENTRATIONS	(mqq) SN	÷		
	PARAMETERS	rers							EPA SAMPLE	PLE NUMBERS	<u>s</u> RS		
		-		=									
compound Strace		L L BC L L ON		0.11.0		F1861	F1862	F1863	F1864	F1869	F18/1	F18/3	F18/6
d 1 6 d ll 5 3 1 6 a no											0.10		Ī
ukaowa		VON			< ×						1.6		Ī
икаоми	497	ABN			×						0.11		
C-3 benzene isomer	630	ABN			×						0.13		
	667	ABN			X						0.072		
lkane	756	ABN			X						0.15		
benzene	778	ABN			×						0.084		
	789	ABN			×						0.14		
	819	ABN			X						0.27		
el kane	867	ABN			X						0.84		
alkane	881	ABN			х						0.25		
unknown	911	ABN			Х						0.11		
unknown	961	ABN r			Х						0.08		
alkane [.]	970	ABN			X						0.87		
alkane	1/186	ABN		•	X						0.054		
	1066	ABN		·	×						0.39		
dimethyl nanhthalene isomer 1	1097	ABN			Х						0.04		
	1123	ABN			Х						0.11		
	1157	ABN			Х						0,23		
	1283	ABN			×						0.091	0.13	
methylene chloride		VDA	×									present	
C-3 benzene isomer		VOA			×							0.064	İ
benzene isomer	-	VOA			×							0.035	
thyl benzene isomer	'537	ABN			×							0.55	İ
Matrix		Type											
Sample		tion Numb	er										
			-										
dup o	DIE DIA	Sample Station Location	LION										
			•										
<pre>Specified Hazardous Torrelin Thorefel</pre>	Substance. ad	•										•	

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			3 111 1		OPGANIC	_	ANALYSIS SUMMARY	IARY					
C NUMBER: P 1740 SAS 542F							· .				Page 7	of 7	
: NAHE/CODE: Plateau Refinery	ŗry							•	•	•			. •
	•	•				-		CONCE	CONCENTRATIONS	(mqq) Si			
đ	PARAMETERS	CERS							EPA SAMI	LE NUMBERS	ERS		
Compound		Fraction	Р.Р.	2 S.H.S.	2 T.I.	F1861	F1862	FIRG3	F1R64	F1869	51871	F1873	E1876
	707	ABN			×			•				0.25	
hydro-1H-inden-1-one	1012	ABN			X	-						•	
	1140	ABN			×							0.06	
nawn	163	ABN			×			• _•				0.22	
ane 1	1294	ABN			×			•				0.16	
ane 1	376	ABN			×							0.25	
	1526	ABN			×							0.093	•
									·				
Matrix													
Sample		Station Number	er										
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Sample		Station Location	tion										
Dallutant			•										
	•				•							-	

1984 FIT SAMPLES

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APPENDIX D

Plateau Inc. Refinery Bloomfield, NM Summary of Sample Data

These samples (Stations 01-29) were taken by FIT.

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NOTE: As an example to clarify this summary, unknowns (19-55,640 ppb) indicates that 19 unknowns were detected at a total concentration of 55,640 ppb.

Station 01: Hammond Ditch, upstream

Water Organics: none Inorganics: none

Soil

Organics: di-n-octyl phthalate (2300 ppb), alkanes (2-1020 ppb), unknowns (19-55,640 ppb) Inorganics: none

Station 02: Hammond Ditch, below API separator pond.

Water

Organics: Substituted benzenes (3-245 ppb), unknowns (20-1487 ppb) Inorganics: none

Soil

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Organics: Polynuclear aromatic hydrocarbons (4-18,810 ppb),
unknowns (21-268,300 ppb)
Inorganics: none
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Station 03: Hammond Ditch, below freshwater pond.

Water Organics:

Organics: xylene (7.3 ppb) Inorganics: none

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Soil
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Organics: alkanes (3-1245 ppb) Inorganics: none

Station 04: Hammond Ditch, downstream

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Water
Organics: none
Inorganics: none
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<u>Soil</u>

Organics: alkanes (11-45,000 ppb), unknowns (11-49,900 ppb) Inorganics: none Station 05: Spray irrigation area

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Soil
Organics:Di-n-octyl phthalate (440 ppb), toluene (1100 ppb),
heptanol (690 ppb), unknowns (3-1140 ppb)Inorganics:none

EPTox:

Station 06: Spray irrigation area

Soil Organics:

Organics: Toluene (1700 ppb), unknowns (2-1770 ppb) Inorganics: none

EPTox

Station 07: Landfarm, west end

Soil Organics: unknowns (9-6220 ppb) Inorganics: none

none

none

none

EPTox

Station 08: Landfarm, east end

Soil

Organics: Polynuclear aromatic hydrocarbons (6-4370 ppb), alkanes (20-467,043 ppb), unknowns (9-131,049 ppb), o-decyl hydroxyl amine (22,000 ppb)

Inorganics: Chromium (69.5 ppm), zinc (73 ppm).

EPTox none

Station 09: Tamerisk Area

Water

Organics:	none
Inorgànics:	none

Soil

Organics	un known s	(4-12, 620)	ppb)
Inorganics	none		

Station 10: Arroyo #1, below evaporation ponds Water Organics: none Inorganics: iron (46.5 ppm), maganese (17.1 ppm) Soil Organics: toluene (920 ppb), alkanes (2-29,700 ppb), unknowns (7-31,500 ppb)Inorganics: manganese (922 ppm) Transportation terminal sump Station 11: Water Organics: Aromatic solvents (4-169 ppb), other aromatics (5-3150 ppb), alkanes (25-37,130 ppb), 1,2-dichloro propane (8 ppb) Inorganics: none Soil Organics: Polynuclear aromatic hydrocarbons (3-146,000 ppb). aromatic solvents (2-25,300 ppb), vinyl acetate (2400 ppb), methyl cyclohexane (14,000 ppb), substituted benzenes (3-131,000 ppb), unknowns (15-8,210,000 ppb) Inorganics: Cadmium (2.2 ppm) High Concentration Oil: Organics: Polynuclear aromatic hydrocarbons (5-810,000 ppb), alkanes (18-75,830,000 ppb) Inorganics: chromium (40 ppm), cadmium (1.3 ppm) Station 12A: South evaporation pond Soil Organics: Phenols (4-12,850 ppb), polynuclear aromatics (5-3410 ppb), aromatic solvents (4-13,380 ppb), other solvents (4-2,340 ppb), alkanes (8-11,415 ppb), unknowns (22-69,396 ppb), aniline (present) Inorganics: chromium (347 ppm), copper (50 ppm), zinc (146 ppm) EPTox: ... Reactive, sulfide (285 ppm)

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Station 12B South eva	aporation pond
Water Organics:	Phenols (4-20,840 ppb), toluene (450 ppb), 2-methyl propane (12 ppb)
Inorganics:	none
Soil Organics:	Phenols (4-4120 ppb), polynuclear aromatics (2-present),
	aromatic solvents (3-210 ppb), other solvents (3-741 ppb), alkanes (5-121 ppb), unknowns (11-8195 ppb), aniline (present)
Inorganics:	none
EPTox	none
Station 13A North eva	poration pond
Water Organics:	
Inorganics:	none
Soil	
Organics:	4-methyl phenol (1300 ppb), 2-methyl naphthalene (present), alkanes (7-223 ppb), unknowns (12-7510 ppb)
Inorganics:	none
EPTox	Reactive, sulfide (362 ppm)
Station 13B North eva	poration pond
<u>Soil</u>	
Organics:	4-methyl phenol (660 ppb), 2-methyl naphthalene (present), acetone (126 ppb), xylenes (46 ppb), hexadecanoic acid (770 ppb), alkanes (8-310 ppb), unknowns (14-5147 ppb)
Inorganics:	none
EPTox	none
Station 14 Pond, nor	th of Landfarm
Water Organics:	Partachlererhonel (56 ark) fluggerthere (32 ark)
Inorganics:	Pentachlorophenol (56 ppb), fluoranthene (32 ppb), phenanthrene/anthracene (38 ppb), unknowns (7-180 ppb) none
Soil	
Organics: Inorganics:	unknown (1-870 ppb avg) Manganese (580 ppm), iron (poor duplicate agreement-29,550 & 3,690 ppm)
EPTox	Reactive, sulfide (238 ppm)

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Station 15 Landfarm, sludge on south side

High Concentration

Organics:Chrysene, 2-methyl naphthalene, N-nitroso diphenyl
amine, xylenes and diethyl phthalate all present,
.acetone (32,000 ppb), alkanes (26-4,381,200 ppb),
unknowns (4-389,000 ppb)Inorganics:Aluminum (30,000 ppm), chromium (1760 ppm), barium (600
ppm), copper (200 ppm), iron (16,800 ppm), zinc (12,000
ppm), arsenic (12 ppm), cadmium (1.1 ppm), lead (42
ppm).

Station 16 Landfarm, sludge on east side

High Concentration

Organics:	Xylenes (260,000 ppb), vinyl acetate (54,000 ppb), polynuclear aromatics (3-present), acetone, toluene and ethyl benzene present, alkanes (29-15,486,000 ppb), unknown (1-154,000 ppb), substituted benzene (1-510,000 ppb)
Inorganics:	Aluminum (14,800 ppm), chromium (1,880 ppm), barium (400 ppm), copper (200 ppm), iron (13,200 ppm), zinc (1,480 ppm), arsenic (12 ppm), cadmium (1.3 ppm), lead (44 ppm-triplicate analysis)

Station 17 Seepage area, below runoff pond

Water

Organics:	none	•				
Inorganics:	Aluminum	(32.4	ppm),	m ang an e se	(51	ppm)

Soil

Organics:Alkanes (2-14,700 ppb), unknowns (9-10,900 ppb)Inorganics:Cobalt (12.5 ppm), manganese (4,580 ppm)

Station 18 Seepage area, leachate spring on face of bluff.

Water

Organics: Aromatic solvents (4-1,961,000 ppb), polynuclear aromatics (3-11,200 ppb), alkanes (14-960,800 ppb), unknowns (8-451,600 ppb), substituted benzenes (11-2,612,000), substituted naphthalene (present) Inorganics: Manganese (7.19 ppn)

Soil

Organics: Polynuclear aromatics (4-87,000 ppb), aromatic solvents (4-579 ppb), alkanes (19-756,714 ppb), unknowns (9-339,070 ppb), substituted benzenes (7-343,469 ppb), substituted naphthalene (210,000 ppb) Inorganics: Manganese (347 ppm)

High Concentration

Organics:	Polynuclear aromatics (5-2,710,000 ppb), aromatic solvents (4-29,300,000 ppb), other solvents
	(3-1,310,000 ppb), N-nitrosodiphenylamine (76 ppb),
	alkanes (14-18,241,000 ppb), unknowns (3-2,179,000 ppb),
	substituted benzenes (10-19,352,000 ppb)
Inorganics:	Chromium (80 ppm)

Station 19 River terrace, stain on western edge

7 ...

<u>Soil</u>

Organics: Polynuclear aromatics (3-480,000 ppb), alkanes (7-1,370,00>ppb), unknowns (5-1,060,000 ppb), substituted benzenes (7-997,000 ppb), substituted naphthalenes (3-550,000 ppb) Inorganics: none

Station 20 Arroyo #2, west side of river terrace

High Concentration

Organics: Acetone, naphthalene, toluene, 2-hexanone and di-n-butyl phthalate all present Inorganics: Aluminum (37,200 ppm), chromium (160 ppm), barium (400 ppm), iron (15,000 ppm), lead (29 ppm)

Station 21 San Juan River, upstream

Water

Organics: Unknowns (6-522 ppb) Inorganics: none

Soil

Organics: 1,1,2-tricholorethane (430 ppb), 1,1,2,2-tetrachloroethane (820 ppb), unknown (7700 ppb) Inorganics: none

Station 22 San Juan River, downstream

Water

Organics: unknown (26 ppb) Inorganics: none

South API separator pond

Soil Organics:

Organics: 1,1,2-trichloroethane (610 ppb), 1,1,2,2-tetrachloroethane (950 ppb), di-n-octyl phthalate (680 ppb), unknowns (3-2460 ppb) Inorganics: none

Station 23

* Lord ford

Water -

Organics: Phenols (4-9620 ppb), polynuclear aromatics (5-860 ppb), aromatic solvents (4-12,800 ppb), aniline (220 ppb), substituted benzenes (5-8730 ppb), unknowns (4-1890 ppb), others (4-1460 ppb) Inorganics: none

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. High Concentration Polynuclear aromatics (4), aromatic solvents (4-384,000 Organics: ppb), other solvents (2-160,000 ppb), alkanes (25-4,347,000 ppb), substituted benzenes (2-358,000 ppb), unknown (92,000 ppb) Inorganics: Chromium (240 ppm), zinc (160 ppm), lead (91 ppm) EPTox Reactive, sulfide (410 ppm) Station 24 Northeast API separator pond Water Phenols (4-13,700 ppb), aromatic solvents (4-5430 ppb), Organics: other solvents (3-4840 ppb), 1,1-dichloroethane (7.3 ppb), substituted benzenes (2-3390 ppb), alkanes (7-2207 ppb), other (82 ppb), 3-ethyl phenols (200 ppb). Inorganics: none High Concentration Organics: xylenes, toluene, acetone, 2-hexanone all present, Inorganics: aluminum (27,600 ppm), chromium (160 ppm), barium (400 ppm), zinc (80 ppm), lead (17 ppm) Reactive, sulfide (158 ppm) EPTox Station 25 Northwest API separator pond Water Organics: Phenols (4-20,120 ppb), aromatic solvents (4-15,520 ppb), aniline (440 ppb), 2-methyl napthalene present, other solvents (3-2948 ppb), alkanes (9-4333 ppb), substituted benzene (1-3299 ppb), unknown (1-5100 ppb). Inorganics: none Station 26 Small pond north of API separator and Hammond Ditch Water Organics: Alkanes and unknowns (2-85 ppb) Inorganics: none Soil Organies: Polynuclear aromatics (12 below detection limits), phenanthrene (950 ppb), unknowns (23-42,140 ppb) Inorganics: Copper (107 ppm), manganese (322 ppm), zinc (228 ppm), lead (28 ppm)

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Page 8

Station 27 Plateau Well #4

7.4

Water	
Organics:	Aromatic solvents (3-19,000 ppb), 2-methyl naphthalene
-	(70 ppb), naphthalene (200 ppb), substituted benzenes
	(7-99,850 ppb), alkanes (23-233,938 ppb), unknowns
	(12-26,935 ppb), organic acids (2-320 ppb)
Inorganics:	Aluminum (31.8 ppm), iron (57.7 ppm), manganese (7.62 ppm)

Station 28 Plateau Well #5

Water

Organics:Ethyl benzene (31 ppb), xylene (6 ppb), alkanes
(4-37ppb)Inorganics:Aluminum (76 ppm), iron (70.6 ppm)

Station 29 Plateau Well #1

Water

Organics: none Inorganics: aluminum (11.6 ppm), iron (20.9 ppm)

Polynuclear aromatic hydrocarbons include naphthalene, fluorene, phenanthrene, anthracene, 2-methyl naphthalene, fluoranthene, benzo(a) anthracene, pyrene, benzo (b) fluoranthene, benzo (k) fluoranthene, acenaphthene, chrysene, benzo (ghi) perylene, dibenzofuran and ideno (1,2,3-cd) pyrene.

Aromatic solvents include benzene, toluene, ethyl benzene and xylenes.

Phenols include phenol, 4-methyl phenol, 2-methyl phenol, and 2,4-dimethyl phenol.

Other solvents include acetone, carbon disulfide, vinyl acetate, 2-hexanone and 2-butanone.

<u>Metals</u> are listed if sample concentration appears to be elevated in comparison to other samples in the same matrix (soil, water).

Plateau Inc. Refinery Bloomfield, NM Summary of Sample Data

These samples (Stations 001-008) were taken by U.S. EPA, Region VI. EPTox includes testing for ignitibility, corrosivity and reactivity.

Stations 001 API Separator effluent

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Water Organics:

Organics: Polynuclear aromatics (6-1968 ppb), aromatic solvents (4-11,700 ppb), phenols (3-1350 ppb), total phenols (10,800 ppb), aniline (380 ppb), diethyl phthalate (74 ppb), substituted benzenes (2-1330 ppb), substituted naphthalenes (2-1942 ppb), creosols (2-1280 ppb) Inorganics: none

EPTox

Station 002 API Separator influent

None

Water

Organics: Aromatic solvents (4-9180 ppb), polynuclear aromatics (7-1670 ppb), phenols (3-870 ppb), total phenols (2930 ppb), aniline (80 ppb), diethylphthalate (210 ppb), substituted benzenes (2-2070 ppb), substituted naphthalenes (2-1440 ppb), creosols (2-560 ppb) Inorganics: None

Oil

Organics:Aromatic solvents (4-82,700,000 ppb), polynuclear
aromatics (3-6,800,000 ppb), chlorobenzene (2,800,000
ppb), 1,1,1-trichloroethane (1,700,000 ppb), methylene
chloride (6,700,000 ppb), total phenols (23,300 ppb),
diethyl phthalate (2,000,000 ppb), alkanes
(5-117,000,000 ppb), substituted benzenes (5-29,800,000
ppb), substituted naphthalenes (10-38,779,000 ppb, 12
below detection limit)Inorganics:None

EPTox Ignitable (flash point 24°C).

Station 003:

API Separator sludge, east end

Oil/Sludge

Organics:	Aromatic solvents (4-4,730,000 ppb), polynuclear
•	aromatics (3-140,000 ppb), total phenols (82,800 ppb),
	diethyl phthalate (150,000 ppb), alkanes (15-17,000,000
	ppb), substituted benzenes (3-790,000 ppb, 2 below
	detection limit), substituted napthalenes (2-450,000
	ppb, 17 below detection limit)
Inorganics:	Chromium (883 ppm), copper (875 ppm), nickel (83 ppm),
	zinc (1370 ppm), arsenic (36.8 ppm), lead (372 ppm)
EPTox:	Reactive, sulfide (4300 ppm).

Page 2

Station 004 API Separator sludge, west end. Oil/Sludge Organics: Aromatic solvents (4-6,890,000 ppb), poly nuclear aromatics (5-140,000 ppb, 4 of 5 below detection limit). diethyl phthalate (150,000 ppb), 1,1,1-trichloroethane (8,400 ppb), alkanes (15-23,210,000 ppb), substituted benzenes (4-775,000 ppb, 1 below detection limit), substituted naphthalenes (6-975,000 ppb, 14 below detection limit) Inorganics: Chromium (502 ppm), copper (967 ppm), nickel (83.4 ppm), zinc (946 ppm), arsenic (34.5 ppm), cadmium (4.1 ppm), K lead (425 ppm) EPTox Reactive, sulfide (3000 ppb) Spent Caustic - Come rost track - caustic is from a present caustic (pH 12.8) more: thru a clusted system reactive, sulfide (16,800 ppm) of pipes onto the term. Station 005 EPTOX Station 006 Drum in north boneyard. 0i1 Organics: Aromatic solvents (4-12,880 ppb), cholorbenzene (340 ppb), l,l,l-trichloroethane (l,800 ppb), bis(2-ethyl hexyl) phthalate (1,600,000 ppb), diethyl phthalate (140, 000 ppb), total phenols (12,500 ppb), others (3-1,980,000 ppb) Inorganics: None EPTox None Station 007 Drum in north bone yard 0i1 Organics: Aromatic solvents (4-17, 370 ppb), chlorobenzene (720 ppb), 1,1,1-trichloroethane (2600 ppb), methylene chloride (4300 ppb), diethyl phthalate (270,000 ppb), phenanthrene present, total phenols (4,140 ppb) Inorganics: None EPTox None

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Station 008 Drum

Drum in north boneyard.

Oil/Sludge
Organics:Aromatic solvents (4-31,450 ppb), chlorobenzene (3100
ppb), methylene chloride (900 ppb), naphthalene, diethyl
phthalate and phenanthrene present, total phenols (5,600
ppb), alkanes (7-119,500 ppb), substituted naphthalenes
(2-570,000 ppb, 17 below detection limit)
chromium (57.1 ppm), zinc (270 ppm), arsenic (2.5 ppm)

EPTox None

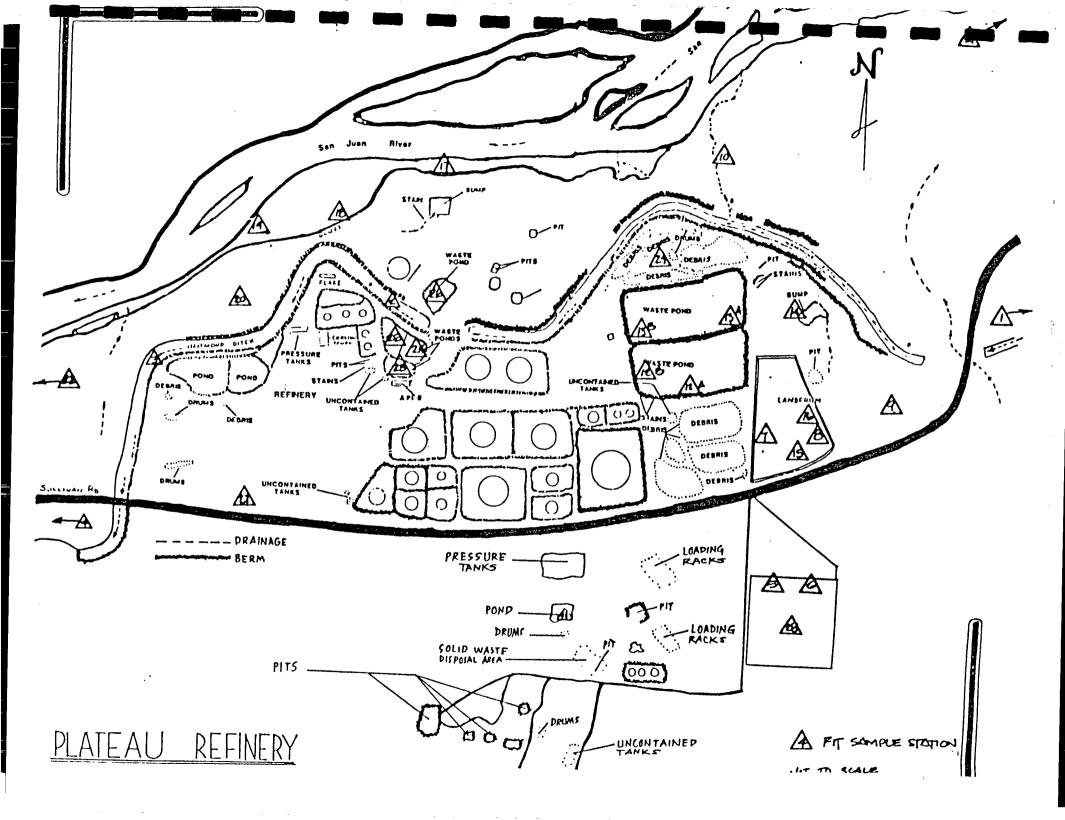
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Transportation Yard drum (assumed Station 009)

0i1

Organics:	Aromatic solvents (4-144,130,000 ppb), cholorbenzene (620,000 ppb), alkanes (2-48,700 ppb), substituted benzene (1-90,000,000 ppb).
Inorganics:	Not analyzed

EPTox None



ASE	ASE NUMBER:	2573			}							Page /	of 10
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					EPA	Samp	Numbera					Ambient llac	Hackground 1.
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ASE NUMBER:

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*Aqueous phase

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* Not analyzed

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${\rm M}$ <			EPA	Samp	Numbera						Unckeround 1.
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11:	HITE NAME/CODE:Plateau Refinery (NM 1686)	lateau Re	finery (<u>NM</u> 1686)								•	•
							CENTRATIC	CONCENTRATIONS (ppm)	(
					EPA	Samp	Vumbera					Ambient Background	kground 1.
	PAKAMETER	MF 1152	A, B MF1158	MF 1163	MF 1162	MF 1164	MF 1165	MF 1166	MF 1167	MF 1168	MF 1169	Western 11 c J	ιω
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ASE NUMBER

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						CONCENTRATIONS (ppm)	рш) 		
					EPA	Sample Numbera		Ambient Back	Background 1.
	PARAMETER	MF 1172	MF 1174	MF 1177	MF 1178			Western U.S. 2.	Eastern U.S. 7
	Mntrix Type	Water	Water	Water	Water			-	- i - ee
4	Aluminum	0.6	0.4	11.6				54,000	000.00
	Chromium			0.01				<u>θ</u> .	36
	Barium	0.2	0.2	0.2				560	000
	Ncryllium							0.6	0.6
	Cobalt			0.1				8	1
	Copper			- [21	11
	1 ron	0.75 C	1.2 C	<u>20.9 C</u>	NDB			20,000	15,000
	- [1		0	7				. 10	13
	nanganese	<u> </u>		_				. 390	290
	Z 1 1 C	0.01	0.03	0.06	0.02			21	36
	lloron							2.2	32
								66	46
	511465							<.50	1
	Arsenic	D 023	0.012					1.9	5.4
	Antimony							<150	I
	Selenium	0.003	0.004	0.003	0,003			0.25	65.0
	Thallum							1	1
	Mercury	0.0002	0.0004		0.0003			0.055	0.096
		NDB	NDB	NDB	BGN			<10	<10
	CHURITIA			0.003				1>	<1
	P C 110							18	14
	Amilout A							1	1
	sulfida Sulfida								1
1			001	00	1 1				,
1	2 LAL 101 40.	CF 13A	U End					1. Ambient ba	b ac kg ro und
		Corner		Wall #1	Rlank			concentrations upply	ya nppiyonly
	Samule Station	bf N	Fvan						IX Rumples.
-		Evap.	pond					values oocain chamistry of	oo cained trom Gro
		Pond	-						and Vegeta-
12.	והינייריים לחו	for Enst/Wone		Division is F	tha 97° u	W loweitudinal line whi			the Conterminuus
1	kegion VI.							Survey Profes	Profess Gond Panar
• >	- Concentration corrected	1 correct	ted for]	for lab blank concentrat	concent	ration			

Page 6 of 10

		•			CON	CENTRATI	ONS (PDm						
				EPA	Samp	Numberø					Ambient Bac	ckground 1.	
PARAMETER	MF 1134	MF 1135	MF	Ж	<u> </u>	MF 1141	MF 1142	MF1146	MF 1147	MF 1149	Western 11 c 7	Enstern 11 c J	
Matrix Type	Soil	Soil	Soll	Soil	5011	5011	1105	5011	Soi 1	Soil 1		.7.0.0	
Aluminum	6820	5640	5820	0006	8400	6120	5600	4970	2620 .	2140	1100 15		
Chromium	4	14.5	5	9.5	7.5	12	69.5	4.5	2	2	JHL JH	000° 00	
Barium	160	130	130	145	235	175		85	50	40	560	000	
Neryllium	0.5	0.25	0.25	0.5	0.5	0.25					0.6	4 0	
Cobalt	2.5	2.5	2.5	2	5	2.5	ſ	2.5	25	25	8	~~~~	
Copper	10	10	7.5	10	10	7.5	15	7 5	20		10		
l ron	. 7770 .	6770	6990	9600	11300	7820	8690	4720		295500			
Nickel	6	9	9	æ	8	9	9	4		6	16.000		
Manganese	172	157	168	156	188	196	214	237	922	580	061.	006	
Zinc	24.5	32	24	33	33.5	1~	73	19 5	17	0	212		
lloron								•1		,	2.		
V ипиd i um				01	20	10	01				27	72	
Silver										T		0.5	
Arsenic	1.1	1.4	-	2	2.2	2.6	2.1						
Antimony					2	,			:		1.0	÷. (
Selenium					~	0	-	7	2 0	6.0	100	1	
Thallium					Ņ			2	2		(7.0	66.0	
Hercury					0.6								
Tin	NDB	NDB	NDB	NDB	NDB	NDB	NDR	NDR	NDR	- NUR		0.030	
Cadmium	0.09	0.08	0.08	0.12	0.19	0.11	0.16						
Lend	9	6.5	5	3.6	4.4	4	4 7			1 6			
Antanonia									,		0-1-1	14	
Cynnide												-	
Sulfide												-	
ation No.	01	02	03	05	06	07	AD BO	DU	01		4 mV	1	
	HAMMOND	5.BANK HAMMOND	T	(5'E.0F	125 W.OF	Τ	1	TANERISK	ARROFO	MIDS	rati.	ons upply only	
	N	DITCH	DITCH	CORNER	CORNER	ANDFARM	LANDFARA	E.OF	BELON E.SIDEOF	E . OF EVAPORATION	to moil Valuem	іх влиріси. Іса Ггон "Ско-	
cation		CORVER CORVER	FOW. FRESHWAT POND	ERRIGATION	LRRIGATION AREA	ູ່		LANDFILL	EVAPORATION POND	1 POND	chemistry of Soils, Plant		
ku:ference for Region VI.			ion is t		·	d inal l i	ne which	bisects			bles in the C United States Survey Profes	I the Conterminous States" Geological Professional Proc	
Concentration			ab blank	concent	rntion								
	PARAMETER PARAMETER Aluminum Chronnium Barium Barium Heryllium Cobalt	MF 1134 Soil 5 50il 6 6820 4 10.5 2.5 2.5 2.5 2.5 2.5 2.5 2.5 2.5 2.5 2	MF 1134 MF Soil 6820 0 6820 0 5 160 0 5 1210 1 1 122 2 3 24.5 3 3 24.5 3 3 24.5 3 3 24.5 3 3 11 1 1 122 1 1 123 24.5 3 24.5 3 3 24.5 3 3 11 1 1 122 1 1 132 1 1 14 1 1 15 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	MF 1134 MF 1135 MF 113 Soil Soil Soil Soil Soil Soil Soil Soil Soil Soil Soil 5640 5620 5820 4 14.5 5 10 130 130 0.5 0.25 2.5 2.5 2.5 2.5 2.5 2.5 2.4 120 6770 6990 121 1.4 1 122 157 168 122 157 168 24.5 32 24 24.5 32 24 24.5 32 24 24.5 32 24 24.5 32 24 24.5 32 24 24.5 32 24 24.5 32 24 1 1.4 1 1 1.4 1 1 1.4 1 1 1.4 1 1 1.4 1 1 1.4 1 1 1.4 1 1 1.4 1 1	MF 1134 MF 1135 MF 113 Soil Soil Soil Soil Soil 501 Soil 5640 5820 160 130 130 130 150 130 130 130 160 10 7.5 2.5 170 6770 6990 170 6770 6990 172 10 7.5 172 6770 6990 6 6 6 172 157 168 172 157 168 172 1.1 1.4 1 172 1.4 1 1 172 1.4 1 1 172 1.4 1 1 172 1.4 1 1 172 1.4 1 1 172 1.4 1 1 172 1.4 1 1 172 1.4 1 1 172 1.4 1 1 172 1.4 1 1 172 0.09 0.08 0.08 0.09 0.08 0.08	MF 1134 MF 1135 MF 1138 MF 1139 MF Soil MF 1134 MF 1135 MF 1138 MF 1139 MF Soil ONCENTRATIONS (pp. MF 1134 MF 1135 MF 1139 MF 1139 MF 1141 MF 1141 MF 1142 Soil 501 Soil 7 <</td><td>CONCENTRATIONS (Ppm) CONCENTRATIONS (Ppm) MF 1134 MF 1135 MF 1138 MF 1136 MF 1134 MF 1146 5011 5011 5011 5011 5011 5011 5011 5011 5011 6820 5640 5820 9000 8400 6120 5600 4950 160 134.5 5<td>CONCENTRATIONS (ppm) EPA Sample Numbers MF 1134 MF 1135 MF 1138 MF 1136 MF 1136<td>CONCENTRATIONS (P_{Dm}) EPA Sample Numbers MF 1134 MF 1135 MF 1138 MF 1138 MF 1136 MF 126 M501 MF 126 MF 12</td><td>CONCENTRATIONS (pm) ETA Sample Numbers CONCENTRATIONS (pm) MF 1134 MF 1135 MF 1139 MF 1130 MF 1130 MF 1130 MF 1141 MF 1142 MF 1143 MF 1143 MF 1143 MF 1143 MF 1144 <th 1144<="" mf="" th=""> MF 1144 MF 1144</th></td></td></td></td>	MF 1134 MF 1135 MF 1138 MF 1139 MF Soil CONCENTRATIONS (pp. MF 1134 MF 1135 MF 1139 MF 1139 MF 1141 MF 1141 MF 1142 Soil 501 Soil 7 <</td> <td>CONCENTRATIONS (Ppm) CONCENTRATIONS (Ppm) MF 1134 MF 1135 MF 1138 MF 1136 MF 1134 MF 1146 5011 5011 5011 5011 5011 5011 5011 5011 5011 6820 5640 5820 9000 8400 6120 5600 4950 160 134.5 5<td>CONCENTRATIONS (ppm) EPA Sample Numbers MF 1134 MF 1135 MF 1138 MF 1136 MF 1136<td>CONCENTRATIONS (P_{Dm}) EPA Sample Numbers MF 1134 MF 1135 MF 1138 MF 1138 MF 1136 MF 126 M501 MF 126 MF 12</td><td>CONCENTRATIONS (pm) ETA Sample Numbers CONCENTRATIONS (pm) MF 1134 MF 1135 MF 1139 MF 1130 MF 1130 MF 1130 MF 1141 MF 1142 MF 1143 MF 1143 MF 1143 MF 1143 MF 1144 <th 1144<="" mf="" th=""> MF 1144 MF 1144</th></td></td></td>	CONCENTRATIONS (pp. MF 1134 MF 1135 MF 1139 MF 1139 MF 1141 MF 1141 MF 1142 Soil 501 Soil 7 <	CONCENTRATIONS (Ppm) CONCENTRATIONS (Ppm) MF 1134 MF 1135 MF 1138 MF 1136 MF 1134 MF 1146 5011 5011 5011 5011 5011 5011 5011 5011 5011 6820 5640 5820 9000 8400 6120 5600 4950 160 134.5 5 <td>CONCENTRATIONS (ppm) EPA Sample Numbers MF 1134 MF 1135 MF 1138 MF 1136 MF 1136<td>CONCENTRATIONS (P_{Dm}) EPA Sample Numbers MF 1134 MF 1135 MF 1138 MF 1138 MF 1136 MF 126 M501 MF 126 MF 12</td><td>CONCENTRATIONS (pm) ETA Sample Numbers CONCENTRATIONS (pm) MF 1134 MF 1135 MF 1139 MF 1130 MF 1130 MF 1130 MF 1141 MF 1142 MF 1143 MF 1143 MF 1143 MF 1143 MF 1144 <th 1144<="" mf="" th=""> MF 1144 MF 1144</th></td></td>	CONCENTRATIONS (ppm) EPA Sample Numbers MF 1134 MF 1135 MF 1138 MF 1136 MF 1136 <td>CONCENTRATIONS (P_{Dm}) EPA Sample Numbers MF 1134 MF 1135 MF 1138 MF 1138 MF 1136 MF 126 M501 MF 126 MF 12</td> <td>CONCENTRATIONS (pm) ETA Sample Numbers CONCENTRATIONS (pm) MF 1134 MF 1135 MF 1139 MF 1130 MF 1130 MF 1130 MF 1141 MF 1142 MF 1143 MF 1143 MF 1143 MF 1143 MF 1144 <th 1144<="" mf="" th=""> MF 1144 MF 1144</th></td>	CONCENTRATIONS (P_{Dm}) EPA Sample Numbers MF 1134 MF 1135 MF 1138 MF 1138 MF 1136 MF 126 M501 MF 126 MF 12	CONCENTRATIONS (pm) ETA Sample Numbers CONCENTRATIONS (pm) MF 1134 MF 1135 MF 1139 MF 1130 MF 1130 MF 1130 MF 1141 MF 1142 MF 1143 MF 1143 MF 1143 MF 1143 MF 1144 MF 1144 <th 1144<="" mf="" th=""> MF 1144 MF 1144</th>	MF 1144 MF 1144

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SASE NUMBER;

SITE NAME/CODE: Plateau Refinery (NM 1686)

S	CASE NUMBER:	2573		-	•				•				
51	SITE NAME/ CODE: F	PLATEAU REFINERY	REFINERY	1 1	•	•		·					: :
l		NM 1686					CONCENTRATIONS	(mqq) SNO			·	•	
					EPA	Sample	Numberg					Ambient Background	kground 1.
	rakanelek	MF1150	MF1151	MF1154	MF1156	MF1157	MF1159	MF1160	MF1161	MF1170	MF1171	Western 11 c 2	10
	Matrix Type	Sail	Soil	Sail	Soil	Soil	Soil	Snil	Soil	Soil	Soil	_	.7 . 6. 0
	Aluminum	2990	4820	2780	36901	. 7800	4620	4780	2060	1140	3530	54.000	
	Chronium	2.5	6	3	4 ·	ß	2.5		1.5	1.5	19.5	AC	36
	narıum Narılı	60	165	90	130	_	30	. 60	15	45	125	560	000
	Cohalt) E		0,25	$\frac{0.25}{5}$						0.6	0.6
	Conner	25	1/1	2 C	۲ . ۶	2,5 7,5	12.5			2		ß	1 1
	Iron	36906	6140	2000	5470	C./	0	0 2 2 2 2		10/	17.5	21	14
		2	2	0666	0/+6	<u>4480</u>	.008c	<u>. 180</u>	2980	5340	5530	20,000	15,000
-	Manganesc	432	154	123	159	0010.	AERO	136	247			0 I	
		12	69	12.5	181		717			775		060	290
	lloron			•				0		673	ليعلا		
	Vanadium					- 10						2.2 19	
	Silver				-							50 2	0
·	Arsenic	0.7	0.9	0 6	0.6	. 1.8		þ U	0 ~	۲ ۲	-	6 1	
	Antimony							•	1 - 1			<150	
	Selenium			0.2				0			220	0.25	01.0
ۍ 	2 Thalltum										•		
			.									0.055	0.046
155	Codmitte	BGN	Bay	NDB	NDR	. NDB	NDR	NDB	NDB		NDB	<10	<10
<u>ل</u> ر		1 2	<u>, , , , , , , , , , , , , , , , , , , </u>	7 6	9 6	_	-		- I'	0.15	1.0	<1	{
14					· · ·	7.4	L . 7	γ. Ω.	4 4	28	5.7	18	14
SE	Cyanide								ŀ				
	Sulfide												
	Station No.	14	11	21	22	90	17	19	18	26	1 20	r n a i	harburnad
	Sample Station Location	Mid sump E of evap pond QA lupl.	Truck area sump NW corner	Approx. ¹ 3 mile up- stream at S. Bank	5. BANK 55860M FROM HWY 44 0N 5. BANK	125'W.01 NE. CORNER OF SPRAT LRRIC. (DUPL)	Seep below ' lower overflov pond	STAINED TERAACE W. OF LEACHATE SPRING	45295	N.I.	SW Corner of N. evap.	ncentrati soil mat luce obta emistry o	ne apply only ix emplee. and from "Gree Some Rocks.
2. C	Reference for Region VI. - Concentration	East/West corrected		Division is the 97° W lon for lab blank concentrati	the 97° W k concentu	longitu ration	dinal li	gitudinal line which bisects on	bisects				the Contermious States ¹¹ Geologica Professional Paper

					, . 				Pa	Page 9 o	of 10.
CASE NUMBER:	2573		,		-		•				
SITE NAME/ CODE : P	PLATEAU REFINERY	NERY			. .	•					:
V	NM 1686			•	. CONCENT	CONCENTRATIONS (ppm)	(mq q)				
				EPA'	Sample Numbera	ocra			Ambien	Ambient Unckground	round 1.
PARAMETER	MF1173 MF1	MF1175	MF1176	MF1133	·. ••		-		Western	ern	10
Matrix Type	T	Soil	Soil	Soll		 			1.02	.7	U.S. Z.
Aluminum	47	90	3980	5080 -					24.000		000 11
Chromium	5	e	347	4 ·					RC		36
ll ar rum	100	95	150	110					560	0	000
lleryllum				·					9.0	6	0.6
CODALC		2.5							8		7
Lopper				2					21		14
	3520 5770	0/		6090					. 20	20,000	15,000
V VICKEL	Ť	÷	≈.	4	:		•		16) (1
H TILLANCAC	», ι	125	160	167					06C	0	2 4 0
2 1 N C	5 C.15	2.2	146	23					51		36
Verd				· ·					22		32
		Ì							00		46
211761			1	-	:		-		<.50 <	0	1
AT 3 EN LC			2.5	0.9					6.1		5.4
Ancimony							·		<150	0	1
2010110m	0.23		0,17	0.1					0.	0.25	95.0
									1		
nercury 			0.2						•	0.055	0,096
	\downarrow	NUB	NDB	NDB 200					01> <10		<10
	cn.n	2. J	<u>۲.0</u>	0.07					₹		41
ŀ	$\frac{1}{1}$		13	3.6					18		14
Ammon 1a								-	1		
									1		
1									1 .	- 1	-
	WIT		120	to the second se					.1. Anbient	ent bac	b nckg round
		end	Middle	lammond					concent	concentrations	apply only
Sample Station	corner of		ot S. Dark of	ditch			•			matrix	a nm pl
		evap.	Jank OT	-umop					Value B		d from Cer.
	hond pool		5. evap.	stream off oft	:				chemistry	0	Some Rocks,
			DUOD	<u>011 51 6</u>						1	nnd Vegetu-
2. Reference for	r East/West		ion is t	Division is the 97° W	long	al line	itudinal line which bisects	C L B	blea in United S	the Co States ⁿ	bles in the Contermious United States" Geologica
-				•-					Survey	Survey Professional	ional Paper
. – Concentration corrected	n corrected		ab blank	for lab blank concentratio	ration					•	

CASE N	CASE NUMBER: 2573	3 SAS 1006F	6F					· • •			Pag e <u>/</u> (Page 12 of 10
SITE N	NAHE/ CODE : PLATEAU REFINERY	LATEAU RE	FINERY	J	• .							•
	Z	NM1686		1	• .	CON	CONCENTRATIONS	(maa) SNO				
					EPA	S nmp	Numberø				Ambient Background	ckground 1.
	PARAMETER	MF5115	MF5116	MF5116	MF5116T	MF5117	MF5118	MF5119	MF5120	MEG121	Hestern 11 c J	
	HALLIX TYPE		Sludge	Sludge	Sludge	0i1	Sludge			Sludge		Soil
<u>`[</u>	Aluminum	30,000	14,800	14,000	15,600 -	• 400	37.200			3.600	54,000	000,00
	Clironitum	1./60	1,880	1,920	2,120.	40	160	80	160	240	38	J6
	Ucryllium	000	100	400	- + 100		1001		400		560	000
0	Cobalt				. .						0.0	0.0
U	Copper	200	200	200	400						21	14
-	Iron	16,800	13,200	12,200	13,400	600	15,000.		9.000	5.200	. 20.000	15.000
	Nickel		•			:				>	16	
- !	Hanganeac	240	180	180	300		180		180	120	390	290
	Z 1nc	12,000	1,480	1,480	1,640			•	80	160	51	36
	lloron			:	•						22	2.0
<u> </u>	V anad 1 um					• -					66	7 9 7
	Silver				-	:		•			<.50	
	Artimoni	21	1-12		13	-		-	- - -		6.1	5.4
<u> </u>	Selenium										<150	3
<u>'</u> [-	Thallium										0.25	60.0
2	Hercury			- 0 3							- 0	3
	Tin										((0.0)	0.096
SP	Cadmium			3	C 1 .							012
	Lend	42	44	46	53	6	29		17	6-16	18	14
< K3	Ammonia											
	Cynnide											
	Sulfide				•							
SU	Station No.		16	16	16	11	20	18	24	23	. l. Andient b	b nc kg round
			Boring Boring	- Dupli- cate	Tripli- cate	Truck area	ARROTO N.OF E.	LEACHATE SPRING	NE API hond	South ADT mond	concentrations	concentrations apply only to apply matrix somelas
Sample	ple Station	#8	10 # 8	<i>:</i>		su oil		25'8E-				ned from "Gue
i P	Location	bf LAND-	- E.ENDOF	u	•	NE		MOT				5 S O
		FILL	THNDFILL			corner	POND	DISCHARGE			Soils, l'Innt	•
2. Re	Reference for		East/West Division		rhe 97° v	W loneir.	it lanibu	itudinal lina which biazora	hi aac ra		bles in the	· • · ·
Re	•		· · ·	r r		0 					Survey Professional	seionel Bener
රි 1 ප	Concentration	n corrected		lab blan	for lab blank concentration	tration						

SE NUMBER: 2573											of	
TE NAME/CODE: Plateau Refinery	iry								-		• • •	
NM 1686							CONCE	CONCENTRATIONS (ppp)	(dqp) S			
P.	PARAMETERS							EPA SAMPLE	LE NUMBERS	RS		[
Compound	Praction Cl	Class F34	F3447 F3	F3449	F 3450	F 3451	F 3452	F 3453	F 3454	F 3455		
Bis(2-ethylhexyl) phthalate	$\uparrow \uparrow$						ana ana		-PT-P			T T
UN decane. 2.6 - Dimethyl	ABN	2900	Τ				0/N			<u></u>		
Heptadecane. Tetramethy Alkane Derivative	ABN	2200								16000		
Heptadecane tetramethyl		+	00						.	32000		·.
1 1			00 530	0						30000		+
Alkane		3 4000	00									1
Alkane		3 1 1700	00									, T
Hexadecane			00									-
Alkane			00									-
Unknown		-	9		/100		510	0//	1304	43000		
Unknown		+	15000		7800		300	1000	1207	26000		
Jnknown	ABN	3 2200	8	810	4000		330		· /20	46000		1
<u> Octadecane</u>		-								35000		
Juknown	ABN	+	\dashv	2900	5500				480			
Unknown		-	-	210	17000				380			
			-	2400	10000				420			
cicosane		+	+							31000		
UMDUXUD		╀	+	1700	8200				400	16000		7
Unknown	ABN			1200	nnncT		*UVV		040			T
1. 2. 4 Trithiolahe			1				0++					Т
ecane				490		620						7-
Ilnknown		3		450	6100				280			T
		So 11	-	Soil	Sail	Sail	Soil	Soil	Soil	Sott		T
Sample				10	02	03	05	90	07	08		T
Sample S	Station Location		- EX	eam NovD	S. Bank Hammond D/7-cH	S. Bank Hammond Dirc#	85ft. E NE corne JRR/GALEA	85ft. E 125 ft. West NE corner W. of end Land DR.G. ABEA N.E.C. ONDAL -FARM 2-4'	West East sid end Landlandfarm -FALM-2-W'/-3	East side landfarm /-3		
		DIFCH	4 ~					LAKIG.AKEA				-
Priority Pollutant. 2. Specified Hazardous Substance	nce.	I I C V D R V D R	Concen Concen	tration tration	Concentration less than Concentration corrected	han dete ted for	Concentration less than determined in Concentration corrected for lab blank		lab blank concentration			
ely Identified.		or I) н С) - Pre	- Present in sample	aple	below qu	antifica	tion lim	it (quant	below quantification limit (quantification limit)	it)
*Duplicate analysis did not d compound.	detect this	P - Pr + valu(- Present values on t	in sami this sa	mple sho	uld be m	identif	ied comp	gund) we	sample (tentatively identified compound) weight factor		

CASK NUMBER: 2573									Page	e 2 of 31	
NAME/ CODE	ery										•
							CONCE	CONCENTRATIONS	\sim		•
- A	PARAMETERS							EPA SAMPLE	LE NUMBERS		
Compound	Fraction	Cluss	F 3449	F 3450	F 3451	F 3452	F 3453	F 3455	F 3447		
Unknown	ABN	3	2100	15000					ഹ		
Unknown	ABN	3	3300	8200					1300		
Unknown	ABN	m	3900	17000							
Unknown	NUN	~	8900	14000							
Unknown	ABN		5900	1/000							
Unknown	ABN	7	64 UU								
Unknown	ABN	~	3800	14000							
Unknown	ABN	~	9000	18000							
Napthalene	ABN			4100							
r Fluorene	ABN	-		510							
- 1	ABN			1200				1000			
z mernyi naprnalene	ABN	2		13000				.1200			
101uene	VOV	-1		LT		1100					
Heptaalen-o-yne, uimeunyi	ABN	c		9400							
Unknown	ABN	ĉ	450	18000							
Unknown	ABN	m		20000							
Unknown	ABN	~		13000							
Fluorotrichloromethane	VOV				NDB	NDB	2.5				
L Xylene	VOV	2			LT						
Alkane	ABN	m			620						
Heptanol	ABN	~				690					
26	ABN							L J			
-Benzo (a) anthracene	ABN							460			
Currysene	ABN	-						0/6			
Curtene Curtebevers Barby	ABN							740			
		~			4 . ⁵			3.1			
Matrix			Soil	Sail	Sail	Sail	Soil	Sni1	Soil		
S Amp l e		lumber	10	02	63	05	06	B B			
Sanuple S	Station Location	ntion									
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_	unce.	C	u - Conc	centration centration	Lebb corre		determined in for lab blank		lab blank concentration		
3. Tentatively Identified.			or L'T (Present in	in sample	below qu		limit	(quantification limit)	tion limit)
		Ч	- Presen	L	in sample (tentatively identified	ıtatively	identif		compo und)		

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Fraction Class Fraction Fraction Class Fraction Fraction Class Fraction	
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P - Present in sumple (tentatively identified compound)

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ASE NUMBER: 2573												
ilte NAME/CODE: <u>Plateau Refinery</u> NM 1686	nery								ŀ			•
							CONCE	CONCENTRATIONS	(qaa) S			•
-	PARAMETERS							EPA SAMPLE	ιω	RS		
Compound	Fraction	C1488	7 24 4	E JAAF	E JAAG	L 2440	JAFC T	1				1
<u>Methvlene</u> Chloride	VUA	-			4		T JA2D		142B	1461	F 3464	E 3466
<i>Xvlene</i>	VUA	~				5 1						
Unknown.	ABN	2			7 9					10	55	36
llnknown	ABN				74					42	02	0
Juknown	ABN	3			57					34	160	
llaknown	ABN				48					26	6R	
Aenzene ethyl dimethyl	ABN	~			120							
Uaknawn	ABN	3			78						100	
<u>Uenzene ethyl dimethyl</u>	ABN	3			72							
Benzene ethyl dimethyl	ABN	3			53							
Unknown	ABN	3			160					26	69	
Unknown	ABN	3			61					22		
Unknown	ABN	3			95							
Unknown	ABN	3			210							
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Unknown	ABN	3			52					,		
Unknown	ABN	3			78							
Unknown	ABN	3			0/							
Pentachlorophenol	ABN	1								56		
Fluoranthene	ABN									65		
<u>Phenanthrene/anthracene</u>	ABN									Ч. Н		
Matrix	ix Type		Water	Water	Water	Water	Water	Water	Water	Water	Water	Uator
Sample		umber	04	10	02	03	Blank	60	10		71	77
			Down- stream	Up- stream	S. Bank Hammond	5. Bank Hammond	Field Blank	Tameris area	k Arroyo helnw	Sump E. of Fvan	15 mile	က =
Sample S	Station Location		HAMMOUD	HAMMOND		DITCH			E.SIDE EVAL.POND	POND	ON SOUTH	
. Priority Pollutant.		NDN	ı			han detei	determined in	n lab blank	ank			
· Justined mazardoug subgrance · Tentatively Identified.	ance.	×	C - Concen or IT (7 7		corrected for lab blank	lab blan		concentration			
					/ - Iteacht in Bumple below quant in Bumble (tentarivelv identified	entarivelv	idenrif	-	נונסטיטיט. במשמיותין)		LLLCALIC	(quantification limit)
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'E NAME/CODE: Plateau Refinery	Ŷ						•					•	
NM 1686							CONCE	CONCENTRATIONS ((dqq)			•	
Ч Ч	PARAMETERS							EPA SAMPLE	NUMIJERS				
Compound	Fraction	Clann	r 2461	r 2463	E 3173	E 2A76	E 3478						
	ABN	-	26		1	- 6							
enzene Dimethyl	ABN	2	13			32,000	98,000					T	
-Methylnaphthalene	ABN	2		560 LT		4600	+0/				Ì		
enzene	VDA	-		10		21.000	9.000						
 2 dichloropropane 	YOA	-		8							Ì		
au	YOA	1		14		280.000	E						
lethylene chloride .	YOA	ŀ		20							-		
oluene	VOA	7		61		560.000							1
ylene	VOA	2		84		1.100.000					İ	T	
yclohexane methyl	VOA	~		12		150,000	23,000						
lexane 3 methyl	VOA	~											
B.Hekeng, Z. J DIMETHYLE)	VOA	6		P1									
vclohexane dimethyl	VOA	3		8		61,000	20,000						
vclohexane trimethyl	VOA	6		13								Ī	
leptane. 2 methyl	VOA	9		2								T	
	V0A	3		130								T	
Indecane or isomer	ABN	3		1600							Ì		
1 kane	ABN	3		920								T	
11 kane	ABN	3		1400									
_		5		1000		Q.				 .·		T	
leptadecane tetramethyl	ABN	m		820		121		•					
llkane	ABN	~		2600									
kaphthalene Dimethyl	ABN	~		820		ટે							
Alkane or Derivative	ABN	~		1500		لى ا							
Waphthalene Dimethyl	ABN	~		1200									
alkane		~		2600									
Matrix			Water	Water	Water	Water	Mater					T	
Sample	Station Number	umber	01	11		18	27						
				Truck	Seen be-		Plateau						
Sample St	Sample Station Location	tion		SUMP	OVERFLOW 25'BELOW	25,0540%	WELL #4						
Priority Pollutant. Specified Hazardous Substance. Tentatively Identified.	.e.	NDB C K of)B - Concen C - Concen or L'T (, t t	ation less than ation corrected - Present in sm	than deter cted for 1 .n sample t	determined in for lab blank ple below quan	rmined in lab blank lab blank concentration below quantification li	ion 1 imit	(quanti	(quantification	n limit)	, -
Reanalysis of sample showed o	showed only less th	P - than DL	- Present · Concei	t in sample centration	e	catively	(tentatively identified	hnodnoo ba	~		·	-	
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Tr MMM COUST. Plateau Refinery. MM 1666 MM 166 MM 166 MM 166 MM 166 MM 166 MM 166 MM 166 MM 12 MM 12 MM 12 MM 12 MM 12 MM 12 MM 161 MM 12	Plateau RefineryNM 1686NM 1686PARAMETERSpoundFractionClass7463Fraction3ativeABNativeABNativeABN32600	CONCENTR	-	
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γlictul VOA 3 23,000 51,000 YOA 3 51,000 25,000 40,000 YOA 3 140,000 25,000 40,000 YOA 3 130,000 25,000 40,000 YOA 3 130,000 25,000 40,000 YOA 3 130,000 25,000 40,000 YOA 3 3,590 40,000 40,000 ABN 3 3,500 40,000 4,600 ABN 3 3,200 4,600 4,600 ABN 3 4,600 4,600 4,600 ABN 3 5,000 4,600 4,600 Matrix Type Mater Mater Mater 4,600 Matrix Type Sample Station Number 11 18 27 Sample Station Location Sample Station Location Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control C	· · · · · · · · · · · · · · · · · · ·	+		Т
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Station Location (cont.) (Cont.) (Cont.)				
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TE NAME/CODE: Plateau Refinery	ry					•						•
NM 1686					•		CONCE	CONCENTRATIONS	(daa)			•
- -	PARAMETERS							EPA SAMPLE	NUMISERS			
Compound	 	Cluss F	3476	F 3477	E 3478	E JAAG	E 3463					
nzene ethyl methyl 🧠	\uparrow	1 - 1	17.000	1 1	1 1		1 1					
	ARN	+	7,000									
nzene trimethyl	ABN	1	22,000					,				
nzene methyl propyl	ABN		4 800									
known	ABN		8.600	19								T
nzene ethyl dimethyl	ABN		2.400									
decane	ABN	m	7.200									
known	ABN		7,000	32								
decane	ABN		32,000									
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	ABN	- - -	200		*[]							
known	ABN		31,000	4/		38 05						
kane or alkyl derivative	ABN			dR R			550					
	ARN	T	26 000	45			222					
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kane or alky/derivative	ARN	~		54						 .•		
known	ABN			67								
tane 2 methyl	VDA	٣			14.000							
ritane ritohexane	VDA				12,000							·
clo Pentane Methyl	VOV				19.000			ŀ				
tanol Dimethyl	VUV											
Matrix	1	Ť	Water	Water	Water	Water	Water					
Sumple		t l	18	Blank	27	02	11					
Sanuple S	Station Location		Seel		Plateau monitor well #4							
. Priority Pollutant.		NDB	(cont) - Conce	ont) ((Concentration	cont.) less	than dete	(cont. determined i	.) in lab blank	<u>.</u>			
pecified Mazardous Suber entatively Identified. Reanalysis of sample did	cance. not show	L L L L L L L L L L L L L L L L L L L	2	ntral) - in i	cori lent e (1	trected for t in sample (tentatively	lab blank c below quant identified	rected for lab blank concentration in sample below quantification li centatively identified compound)	ation on limit nd)		(quantification limit)	limit)
The compound.											-	

ace binder.										Puge 8	of <u>31</u>	
NAME/ CODE : P	, ,					•						.'
NM1686							CONCE	CONCENTRATIONS	(qdd) SI			•
	PARAMETERS							EPA SAMPLE	LE NUMBERS	ERS		
Сотрониа	Fraction	Class	F 3478	F 3476								
1	VOA	3	E	1 1								
Cycloheptatriene or isomer	ABN	3	110									
Octane	ABN	-	60	8800								
M	NBN	~	92									
Jenzene Ulmetnyi	ABN		910									
Nonane .	ABN	2~	220									
Cyclohexane propyl	ABN	~	100									
Octane Dimethyl	ABN	3	140									
Nonane Methyl	ABN	3	170									
i 1	ABN	Э	270									
Benzene Irimethyl	ABN	e	150									
Unknown	ABN	~	130									
Unknown	ABN	~	18									
Unknown	ABN	~	200									
222 - 11	ABN	~	280									
Alkene or benzene uerivative	ABN	~	250									
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UNKNOWN	NUM	~~~										
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lluknown	ABN	, m	240									
Benzene Methyl Propyl	ABN	~	150									
	ABN	£	340									
Unknown	ABN	ب	69									
Unknown	ABN	~	120									
Matrix	Type		Water	Water								
Sample	Stution	Number	27	18								
Sample S	Station Location	tion	Mull								,	
. Priority Pollutant.		NDB	cont.) (cont.) centration	leag	than dete	determined	in lab b	b l ank			
	unce.	:	- 1 ^{- 1}	Concentration	corr	ted for		ank conce	-			
). lentatively identified.		×₽	or LT (_ Dreent		Present in annule (tent	t in annple (rentativel)	below quant	-	-	ווחור לקעמו	(quantification	ton limit)
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VARMETERS Compound Frection Class 13/3 F 3435 F 3435 F 3435 Compound Frection Class 13/3 F 3435 F 3435 F 3435 Compound Frection Class 13/3 F 3435 F 3435 Compound Frection Class 13/3 F 3435 F 3435 Compound Frection Class 13/3 F 3435 F 3435 F 3435 Compound Frection Class 13/3 F 3435 F 3435 F 3436 All 3 200 Class 13/3 F 3436 All 3 200 Class 13/3 F 3436 All 3 200 Class 13/3 F 3436 All 3 2.20 Class 13/3 F 3436 All S 3436 F 3436<	NM 1686							CONCEI	TRATIONS	(ppb)			•
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Nimethy// V0A 3 12,000 Nimethy/ V0A 3 12,000 Nimethy/ Nob Nob Nob Nimethy/ Nob Nob Nob Nimethy/ Nob Nob Nob Nob Nob Nob Nob Nob Nob Nob Nob Sample Station Location Nob Nob Nob Concentration less than determined in 1db blank Nob Nob Nob Nature: Nob Nob Nob Nob Nob Nob Nob Nob Nob Nob Nob Nob Nob Nob Nob Nob Nob Nob Nob Nob	leptane Ethyl Methy <i>V</i>	ABN	с Г										
Matrix Type Mater Mater Mater Mater Sample Stution Number 27 01 11 18 Matrix Substance Concentration 10 11 18		VOV	r r	12,000									
Priority Pollutiant: Sample Station Location Sample Station Location Sample Station Location Sample Station Location Sample Station Location Priority Pollutiant: NDB - Concentration less thm determined in lab blank concentration Priority Pollutiant: NDB - Concentration less thm determined in lab blank concentration Priority Pollutiant: NDB - Concentration less thm determined in lab blank concentration Priority Pollutiant: NDB - Concentration less thm determined in lab blank concentration													
Priority Pollutiunt. Mater Mater Mater Mater Sample Station Location 27 01 11 18 Sectified Marries of Concentration corrected for lab blank concentration transitively identified compound) C-Concentration corrected for lab blank concentration transmised in lab blank concentration transmised in sample Station Location													
Priority Pollutint. Sample Station Location Sample Station Location Sample Station Location Sumple Station Location NDB - Concentration less than determined in lab blank concentration restriction soreceted for lab blank concentration to fund in sample below quantification limit													
Priority Pollutiant Matrix Type Mater													
Priority Pollutant Sample Station Location Sample Station Location Sample Station Location Sample Station Location NDB - Concentration less than determined in lab blank Priority Pollutant C - Concentration less than determined in lab blank Tentatively labelist of compound) P - Present in sample below quantified compound)													
Priority Pollutunt. Mater M													
Priority Pollutunt. Mater M													
Finite Mater										Ī			
Priority Pollutant. Mater Mater Mater Mater Mater Matrix Type Mater Mater Mater Mater Sample Station Number 27 01 11 18 Sample Station Location 27 01 11 18 Sample Station Location NOB - Concentration less than determined in lab blank concentration corrected for lab blank concentration Tentatively Identified. R or LT () - Present in sample below quantification													
Priority Pollutant. NBb - Concentration Location NBb - Concentration corrected for lab blank concentration Priority Pollutant. NBb - Concentration corrected for lab blank concentration Tentatively Identified. P - Present in sample below quantification limit													
Priority Pollutiant. Nater Mater													
Matrix Type Mater <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>-</td> <td></td> <td></td>											-		
Priority Pollutant. Nation Location Nater Mater								T					
Priority Pollutant. NDB Concentration less than determined in lab blank concentration Priority Pollutant. NDB Concentration less than determined in lab blank concentration Priority Pollutant. NDB Concentration less than determined in lab blank concentration Priority Pollutant. NDB Concentration corrected for lab blank concentration Priority Pollutant. NDB Concentration corrected for lab blank concentration													
Matrix Type Mater <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>													
Matrix Type Mater Mater Mater Mater Sample Station Number 27 01 11 18 Sample Station Location 27 01 11 18 Sample Station Location 27 01 11 18 Priority Pollutant. NDB - Concentration less than determined in lab blank concentration Tentatively Identified. C - Concentration corrected for lab blank concentration A found in reanalycis of sample P - Present in sample (tentatively identified compound)													
Matrix TypeMaterWaterWaterWaterSample Station27011118Sample Station27011118Sample Station27011118Sample Station27011118Sample Station20011118Station Location20011118Priority Pollutant.NDB - Concentration less than determined in lab blank concentrationTentatively Identified.C - Concentration corrected for lab blank concentrationA found in reamalysis of sampleP - Present in sample below quantification limit													
Sample Station Number27011118Sample Station LocationSample Station LocationImage: Sample Station LocationImage: Sample Station LocationPriority Pollutant.Sample Station LocationNDB - Concentration less than determined in lab blank concentrationSpecified Hazardous Substance.C - Concentration corrected for lab blank concentrationTentatively Identified.P - Present in sample below quantification limit	Matr			Water	Water	Water	Water						
Sample Station Location Sample Station Location Priority Pollutant. NDB - Concentration less than determined in lab blank Specified Hazardous Substance. C - Concentration corrected for lab blank concentration Tentatively Identified. K or LT () - Present in sample below quantification limit A found in reamalysis of sample P - Present in sample (tentatively identified compound)	S and	ole Station N	umber	27	10	1	18						
Sample Station LocationSample Station LocationPriority Pollutant.NDB - Concentration less than determined in lab blankSpecified Hazardous Substance.C - Concentration corrected for lab blank concentrationTentatively Identified.K or LT () - Present in sample below quantification limitAfound in regalveis of sampleP - Present in sample (tentatively identified compound)													
Priority Pollutunt. Specified Mazurdous Substance. C - Concentration corrected for lab blank concentration Tentatively Identified. K or LT () - Present in sample below quantification limit A found in reanalysis of sample P - Present in sample (tentatively identified compound)	Sample	Station Loca	ition							İ			
Specified Hazardous Substance. C - Concentration corrected for lab blank concentration Tentatively Identified. K or LT () - Present in sample below quantification limit of found in reanalysis of sample P - Present in sample (tentatively identified compound)	Priority Pollutant.		IN		centrati	on leas	dete	rnined i	n lab bla	nk			
F cample P - Present in sumple (tentatively identified compound)	Specified Mazardous Tentatively Identifi		¥	ן מי	centrati) — p	on corre resent in		below qu	k concent antificat			tificati	on limi
	4	camnla	d		, ii	mole (ter		identif	ied compo	\sim			

										Puge_10	of <u>31</u>	
SITE NAME/CODE: Plateau Refinery	- -					•					·	
NM 1686						i	CONCE	CONCENTRATIONS	(qdd) SI			•
74	PARAMETERS							EPA SAMPLE	LE NUMBERS	sus		
Compound	Fraction	Cluss F 3	3479 F	3480	F 3481	F 3482	F 3483	F 3486	F 3488	F 3491	F 3492	
2 A-dimethylphenol V	ABN.	1 8	820		520	300			840			
Phenol	ABN	1 3.6	.600		11,000	7.200			8,800			
2-methylphenol ·	ABN	2 2,200	00		3,000	2,200			4,400			
4-methyphenal	ABN	2 3.(20K		000.6	4 000			01810			
Acenaphinene	ABN		420									
Fluorene	ABN		22									
Phenanthrene v	ABN .		38						·			
Aniline	ABN	~~	220		440							
2-methylnaphthalene	ABN	7 	380 7 RND			2 600						
Uenzene 1 1 dichloroothane	VUA				00,47	- <u> </u>						
	VOV		1,000K		420	330						
Chlaraform	VOV				5K	5K						
Acetone	VOA	2			2,600	2,300						
2-Butanone	VOA				290	240						
Carbondisulfide	VON				53	140						
Toluene	VUV		- 600	ľ	11,000	1,000						
lotal Xylenes	VUA VUA	Ť	2,400	9	-	1 500						
BERZERE, 1, J-UINECULT	AUV			c	3,299							
	VUN			•1	+0	59						
Ē	ster VUA	 				82						
Cyclohexane	VUN	3		14	150	120						
•	VUA	3		6.3	150	130						
Cyclonexane, metnyr				6.9	390	339						
HATTIX	- 1	+	er	Water	Water	Water	Water	Water	Water	Water	Water	
Sample	le Station Number	+	Τ	28	25	24	26	134	128	29		
Sample S	Station Location		-	Spray Irriga- AREA	N. W. APT pond	N. E. API <i>PoND</i>	of API <i>Powos</i>	Corner	S. E. W. end Corner of S. V of W. EVAPEVAR POND	Well #1	Field Blank	
				VELLAS								
Priority Pol Specified He	unce.	NDU - C -	υυ	entration entration		han dete ted for	lab blac	less than determined in lub blank corrected for lab blank concentration	lank Itration			
3. Tentutively Identified.		K or	or LT (- Present in	in sample below	elow	uantific.	quantification limit		(quantification	n limit)
		1	רדפאכווו		זוי משולורב ורבוורמרואבוא	רמרזעפו)	Taent		com po muu /			

										Puge 11 of	of 31	
JASE NUMBER: 2573 SAS 1006F JITE NAME/CODE: Plateau Refinery	ery					•					1	•
							CONCI	CONCENTRATIONS	45 (ppb)	511		•
đ	PARAMETERS	ſ								evi		
Compound	Fraction	С1 и в в	F 3479	F 3480	F 3481	F 3482	F 3483	F 3486	F 3488	F 3491	F 3492	
	VOV	Э		31								
Dxetane. 2. 3. 4-trimethyl	VOA	m			76	80						
<pre>l. 5-Hexadiene-3-yne l</pre>	VOA	~~~			1,799	1,399						
2-Propanol. 2-methyl	VDA	2			43				12			
	VOA) C			16				16			
	VOA	m			5,100				.			
	ABN	3	300						450			
71		~	640		1.500							
zene (see volatile KAC		~	300									
1, 3-dimethyl (see yad	<u>S</u>	m	1,280		840	990						
	ABN	~	310									
1, 2, 1	VBN	~	580									
╏	ABN	~	200									
Selizente, 1, 2, 3- UT HHELHYI Sonzono 1-othony-2-mothyl	ABN	~ (190									
- h	ABN	2	061									
- H-	h											
101	1		2064									
ers 1 & 2)		'n								•		T
oluene (see volatile fraction)		5										
henol. 3-ethyl	ABN					200						
0	ABN	~					35					
laknown	ABN	~					50					
'nknawn	ABN	3	1200									
пкломп		3	310									
Matrix	T'ype		Water	Mater	Water	Water	Water	Water	Water	Water	Mater	
Sample	Station	Number	- 23	23	25	24	26 ·	.13A	128	29-		
Sample S	Station Location	ion	South API PøND	Spray Irriga- Tre ^N AREA	N.W. API <i>Pond</i>	N.E. API PoND	Pond N. of API PoNDS	er	NI SOL	end <i>of</i> Plateau ith well#/	Field Blank	
 Priority Pollutant. Specified Mazardous Substance 	itnce,		NDB - Conc C - Conc	Concentration less than determined in lab blank Concentrution corrected for lab blank concentru	n leas t n correc	han dete ted for	rmined i lab blan		lab blank concentrution			
י וכוווארואבוא זמכאבונוכט.		× 2.	or LT (- Present) - Present in sample below quantification in sample (tentatively identified compound)	a mple tatively	below qu identif	uantifica ied comp	fication limit compound)		(quantification limit)	n limit)

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	-		3492											Water	nk		
2			E 1				-							Ma	l Fle1d Blank		
71 - 91 -		КS	F 3491											Water	E ₹ *		
	(4ca) 2		F 3488											Water	W. end of sout EVAP. POND	ank	concentrution
	CONCENTOR ATTONC	EPA SAMPLE	F 3486											Water	04	i lab blank	
			F 3483											Water	N. N.	deternined in	lab blank
			F 3482											Water		ian deter	for
			F 3481											Water 75		n leas than	
			F 3480											Nd LEF	Spray . Irriga- Tion Aren	WELL#5 entration	- Concentration
			F 3479	16U 220										water 23	th	- Conc	C - Conce
			C1488	~~~										Number	1	NDN	Ū
		PARAMETERS	Fraction	ABN ABN										Type Station Number	ution Loc		. 90
10001 CAC 6/62	W 1686		Compound											Sample	Sample Station Location	Pollutânt.	Specified luzardous Substance.
CASE NUMBER:				Unknown Unknown													2. Specified

. 1991)

ITE NAME/CODE: Plateau Refinery												
	[54	WPLES C	SAMPLES COLLECTED BY EA	D BYEA	*				•	•
							CONCE	CONCENTRATIONS	\sim			•
PAR	PARAMETERS						-	EPA SAMPLE	LE NUMBERS	KS		;
Compound	Fraction	Cluss	AR 0402 011	AR 0403	AR 0404	AR 0406	AR 0407	AR 0408	AR 0414	Blank		
	VOA			290								
hlorobenzene	VOA		2,800			0.34	0.72	3.1	620			
1. 1-Trichloroethane	VOA	-	1,700		8.4	1.8	2.6					
thyl benzene	VOA		6,600	340	530	0.38	0.73	2.5	17,000			
ichloromethane	VOA		6,700				4.3	0.9				
oluene	VOA		18,000	1,500	1,400	2.6	3.9	6.5	4,600			
	ABN	1	5,000	140	140			<140				
is(2-ethylhexyl) phthalate	ABN	-1				1,600				4 4		
viethyl phthalate	ABN	-1	2,000	150	150	140	270	z140		× 2		
enzo(a)anthracene	ABN				<75							
luorene	ABN	-	086▼	<130	< 75							
henanthrene	ARN		1,800	<130	275		2160	<140				
	ARN				275							
otal Phenols (4AAP)	ABN		23.3	82.8	<3.4	12:5	4.14	5.6				
-xylene	VOA	-	34,000	1,600	2,700	4.7	6.0	11.7	66,000			
A/or p-xylene	VOV	~	23,000	1,000	1,800	4./	6. 2	9.9	56,000			
1	VOA			430	560							
yclobutanone, 2-methyl	VOA.	~						13.8				
yclohexane, methyl-	VDA	۲	23,000	3,200	5,000			37.2				
yclopentane, methyl	VDA	~		780	920			8.3				
Sutane, Z-methyl	V0V	5			550							
a i i	VDA	Ч							90,000			
- 1	VOA	٣	15,000	2,500	1,900							
í	VOA	٣		440	1,200			1.1				
utane, 2. 3-dimethyl-	VOA	~		160								
yclohexane	VOA	-			980							
Matrix	Туре		110	Kludge.	81udge	110	110	011	Sludge	Water		
Sample	Station Number		002	003	004	006	007	003		Blank		
			API	API API	API	Drum in	Drum in Lorth	Drum in	Trans-	Blank		
Sample Sta	Station Location		LOK LUFLU	Tot SLUDGE	LOR SLUDGE BONETARD		S S S	BONEYARD				
		ł	ENT	E.ENO	W.END							
Priority Pollutant.		NDB	ł	entratio:	Concentration leas than		determined i	in lab blank	ank			
2. Specified Muzurdous Substance.	ce.		C - Concen	entration	on corrected	for	leb blank		concentration			
There are in the Talante's		:				,						

P - Present in sumple (tentatively identified compound)

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ASE WUMUER: EPA Lah (Houston)	tan).								4	Puge 14 of 31	•
E/ CODE:	ry –			SAMI	SAMPLES C	COLLECTED &Y EPA	ED & L	セクチ			•
Samples collected by EPA							CONCE	CONCRNTRATIONS	s (PPb)ppm/ug/g	m/ua/a	-
۷d	PARAMETERS							FPA SAMPLE	LE NUMBERS	S	
Compound	Fraction	C 1 4 8 8	AR0402 0i1			AP 0406			1 1 1 0 0 V		
2-Butanone, 3-methyl	VDA	3				-	_				
-	VDA	~	10.000	1.400	1.200			26.5			
1	ADA	~	10.000		930						
aue ernyl		7		1.400	1./00						
	VUA	2			7/7			18 7			
Benzene, 1-methylethyl	VOV	0		510				-			
	VOA		41,000	1,800	2,800						
Heptane, 2-methyl-	VOA		18,000	830	1100				12.5		
k	VOA				1,500						
- 1	VOA	m		1,000							
$\sim r$	VOV	· m		400							
Octano Contante - Cont	VOA	~		1200							
Octane Substituted Budrocarbon	VUV	7			2,600						
Toluenel see volatile function	AUA MAN	~~							36.2		
Methylnaphthalene	NBN	~~~	7.900	130	110						
Ethylbenzene(see volatile Faach	L		p-100	DB1	200			210			
Xylene (isomers 1)		2		DELZ	412						
1	ABN	,	5 700	170	120						
C ₂ substituted Naphthalene	ABN	F			11K			140		•	
substituted	ABN	m	< 980	×130	< 75			< 140 Z 140			
substituted	ABN	m	4,900	×130	140			<140 <			
substituted	ABN	~	4,600	×130	120			× 140			
2 SUUSCITULEU NAPRENATARE	ABN	~	2,800	×130	80			× 140			
Naprilliale		~	1,500	<u>, <130</u>	<u>, 75</u>			~140			
Matrix	Туре			sYudye	Sludge	011	011	011	Studge		
Sample	Station	Number	02	003	004	006	007	008			
S amble St	Station Location		API Separator LNFLVENT	API Separar Severar	API Separator Stubbe	Drum in north Boveraro	Drum in north Bowersko	Drum in north BovernRD	Trans- portation MAD ORVM		
		NDN	I	entratio	Concentration less than determined	han dete	mined i	in lab blank	an k		
, spectited un zurdous Substance. . Tentatively Identified.	11ce.	×	C - Conc or LT (Concentration .T () - Pres	ation corrected - Present in sum	ed for sumple	lab bl below		concentration tification limit	t (quantification]imir)	ion limit)
			- Present		in sumple (tentatively identified	tatively	identif		\sim		

PARA Pound Fr Naphthalepe(150m 7)					COLLECTED	O BY EPA	69			•
pound Naphthalepe/(son 1						CONCE	CONCENTRATIONS (<mark>s (ppb) ppm</mark> Le numijens	su b/bn md/bn	
Naphthalene/15047	C1888	AR 0402 011	AR 0403	AR 0404	AR 0406				Blank	
	~	∠ 980		< 75	0010			¥		
Naphtha lene(zsee P)		× 980	<130	×75			<140			
Naphthalene(1504 1)	۰ ۲			< 75						
Naphthalene(zsedi)	~	∠ 980	<130	< 75			< 140			
	-	< 980	<130				< 140		•	
	~	< 980	<130				∠140			
4	7	× 980	<130				<140			
4	Ť	< 98U	×130				<140			
5		1,/00	<130 2130	V			<140			
Naphthalene(1500/7)	Ì	1,/00	< 130 <	< 75			<140			
Naphthalene(150/8)	~	990	< 130	< 75			×140			
Substituted Naphthalene(150/19) ABN	~	1, 000	<130	د/۶			<pre>< 140</pre>			
Naphtha Teres 150 10										
Substituted Naphthalene(250/11/ ABN Substituted Naphthalene(250/12) ABN	~~~~	× 980								
ene	İ	10,200	000	0.0						
isomer 1)	T		162	1.25						
(isomer 2)	İ			1002						
(isomer 3)		2 200	4130	<75						
somer 4)		2,800	\$ 130	100						
	~	1000, 51	270	360			360			
5.					210					
1 + + +	m				670					
A ME UNITE UNITUENE PLS PARA	~				1.100					
									3	
Matrix Tune		1:0	0il/a	Dilla				0:1.		
Station	Number	6	<u>a600</u>	ahnnis	100	110	110	s ludge		
it ion l.oc	,		API Separa-	AP I Separa-	L L	i in	in h	Trans- portation	Blank	
	1	NEWEN	723 1645	תואש וכשא	1					
Priority Pollutunt. Specified Nuzardoug Substance.	NDB C	08 - Concen C - Concen		tration less than tration corrected	det e for	determined in for lab blank		lab blank concentrution		

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P - Present in sumple (tentatively identified compound)

ASK NUMBER:, EPA Lab (Houston)	ton)	.								Puge <u>16</u> of	- 	
ITE NAME/ CODE: Plateau Refinery	ery		U)	SAMPLES		COLLECTED BY EPA	BLER	4		-	•	
							CONCE	CONCENTRATIONS	(dgq) Si			•
2	PARAMETERS							EPA SAMI	SAMPLE NUMBERS	:KS		
Compound	Fraction	C 1 0 8 8	AR 0401	AR 0402	Lab Blank	AR 04MB-AAR	1	04MB-2AR04MB-3	B	DAMR-4 AD DAWD C		
Benzene	YOA		1 0	2		1 1	1			*		T
Dichloromethane	VDA	-				2.3	2.8	3.7	5.0	2.5		T
Ioluene	VOV	-	5.500	4.500				5.8	5.9			
Naphthalene Di-n-ortvlnhthalate	ABN		480	440								
Diethyl phthalate	ABN	- 	VL	210	1							
-	ABN	 		z 80							- <u> </u>	
Fluorene	ABN.		02	120								
Phenanthrene	ABN	1	280	160								T
- 1	ABN	1	18									T
j n Nimothurphonel	ABN		10,800	2,930								
		╺┝	150	160								
M-Xylene	VUA	-										
U .8/or p-xylene	VOA	3	1.700									T
loluene	ABN	m	1,800	2,000								T
Methylnaphthalene	ABN	m	420	360								T
Ethylbenzene	ABN	3	300	400								Ī
ene (lsomers	ABN	m	1,780	3,200								T
Lo substituted Naphthalene	ABN	с г	I,038	966						 .		
	ABN	n	904	444				·				
methylethylhensene	ABN	m	240	190								Ι
	NUN	~	390	660								
U-cresol	NUM		940	1.410								
P-Creso1		,	520	300								
		~	760	260								
MACTIX	Lype		Mater	Water	Water	Water	Water	Water	Water	Water		
Sample	Station	Number	100	002	Blank	Blank	Blank	Blank	Blank	Blank		
S מוועות: S	Station Location	tion	API Sepakand Efflueur	API SEPARAA LUFLUENT	Blank	ц Ц	r Lab water	Water blank For oir	i V	Water blank zoe		
Priority Pollutant. Specified Mazardous Substance Tentatively Idantifiad	nce,		11	- L L L	lea	dete for	determined in for lab blank	in lab blank ink concentra	L L O	¥		
			- Present	i'n	Bumple (ten	tentatively	below quantification / identified compound)	ied comp	רוכפרוסה וישונ כסמיףס טהלו)		(quantification	limit)

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	P4ge <u>17</u> of <u>3</u>	l S	AR04MB-5	22					Water	blank to blank to blank to blank to blank to blank to blank to blank to blase
i i i i i i i i i i i i i i i i i i i	-	s (ppb) Le nummers	AR04MB-4	14					Water	23
	EPN	CONCENTRATIONS	1AR04MB-2AR04MB-3AR04MB-4	23					Water	Hater blank For 0/L
	COLLECTED BY EPN	CONCE	AR04MB-2	18					Water	er Lab water BLAVK
	<i>כ סדר</i> בו		AR04MB-1	45					Water	
	SJUPLES		Lab Blank	23					Water	
	27		AR 0402 80 590						Water	
			AR 0401 380 700						Water 002	AP I Sepakatak EFFLVENT
			C1488	~~~~					Type Station Number	1 1
	on) rry	u a ne re ne	Fraction ABN ABN	VOV					1 1	1 731
	EPA Lab (Houston) Plateau Refinery			H 00					Matrix	S an
	CASE NUMBER: EPAL		Compound Aniline 2-methylnaphthalene	Aldpate X'aight C						

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ISE NUMBER: 2573									18		
TE NAME/CUDE: Plateau Refinery					•					•	
NM 1686						CONCE	CONCENTRATIONS (ppb)	(dqq) S			•
74	PARAMETERS						EPA SAMPLE	LE NUMBERS	เเร		r
Compound	Fraction C1	Cluss F 3459	F 3460	F 3465	F 3467	F 3471	F 3473	F 3474	F 3475		 1
Methvlene Chloride	\uparrow	-	27								
Fluorotrichloromethane	VOV	1 4	8	4.2							
Илкломп	ABN	3 740					890				T
Unknown	ABN	3 10,000					0/6				T
Unknown	ABN						0011				,
Unknown	ABN	3 1200					890				
3 Nonyne	•	3	1700								
Unknown	ABN		2100	7700	480		1500				
Unknown	ABN	3	3200				1900				T
Unknown	ABN	3	<u> 6700 -</u>				006		Ī		
- Unknown	ABN	3	2.500				1000				1
Unknown	ABN	3	1400				1800				1
Docosane, 11 decyl	ABN	3	28,000								1
	ABN	3	14,000		580						
Benzene Methyl	ABN	3	920								1
	ABN	3	1600		1400						T
tyl pht	ABN	1			680						 T
1, 2-t		3		430	610						
Ethane, 1, 1, 2, 2-tetrachtodo	o ABN	3		820	950						1-
llexatriacontane	ABN	3					13,000		•		
Ioluene or isomer	ABN	3			1500	1700					[]
Alkane	ABN	0					1700				
Naphthalene	ABN							140,000	ဗ္ဗု		
Anthracene/phenanthrene	ABN							LT 13,000			
<u>2 methyl nøphthalene</u>	ABN	2						340,000	48,000		
Ethylbenzene		1	-						19		r
	- 1		Soil	Soil	Soil	Soil	Soil	Soil	5011		-
5 Auto Le	e Station Number	-1	0	21		06	11	19	18		
Sample S	Station Location	Tamerisk area n	Arroyo below Evaperation	l _s mile upstrear sir∈ s. BAVK	50 ft. upstream tsom wwr	125 ft. of N.E. cornerof	seep below Lower overfrov	terrace W. of LEACHATE SPAING	Teachate spring 25'8ELOW		
							POND				í
Priority Pollutant. Specified Hazardous Substance Tentatively Identified.	nce.	NDB - Cone C - Cone K or L'T (Concentration Concentration JT () - Prea	tion leas than dete tion corrected for Present in sumple	han dete ted for sumple	ation less than determined in lab blank ation corrected for lab blank concentration - Present in sumple below quantification limit	n lab bl k concen nucifica	lab blank concentration trification lim		(quantification]imit)	- - -
			in	ple (ten	tatively	sumple (tentatively identified	ied comp	compound)			

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ASE NUMILER: 2573								Puge 19 of	19 of 31	
ITE NAME/CODE: Plateau Refinery	ery								·	•
NM 1686		-				CON	CONCENTRATIONS	(dqq)		•
ĥ	PANAMETERS						EPA SAMPLE	E NUMBERS		
Compound	ion	Clube F	3474	F 3475						
Toluene	h	1 11		160						
Xylene (ar isomer)	νολ			340						
	ABN		150,000							
Benzene Ethyl Dimethyl	ABN	1	110,000							
r Verivative	1	1	n , uuu			_				
etnyl		1	0.00	Ì						
Benzene ethyl dimethyl orisanta		+	150.000							
- 1	ABN	1	150.000							
Benzene Diethyl	ABN		220.000							
Unknown	ABN		170.000							
	ABN	+	500,000	Unk.						
Benzene Ethyl Methylethylokis		\neg	150,000							
F	ABN	1	120,000	Unk.						
Naphtha/ene Z methyl	ABN	Ť	250,000							
	ABN	T	360,000							
Naphthalene Ulmethyl	ABN	\neg	110,000							
l en	ABN		190,000							
Alkane or derivative	ABN		120,000							
5	ABN	с С	77,000							
AIKANE OF GERIVALIVE	ABN	T	230,000							
Alkane	ABN		30,000							
Опкложи	ABN		20,000							
Alkane	ABN		140,000							
ALKARE	ABN		000,00							
r i uorene	ABN	3		LT 2870						
benzene				15						
Matrix	x Type	_	Sail	Soil						
S Ain Ji J e	e Station Num		19	18						
Samule S	Station Location								•	
 Priority Pollutant. Specified Huzardous Substance Trateries U. Discription 	ince.	aυ	- Concen	trat trat	less than corrected	determined in for lab blank	in lab blank ank concentrution		-	
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SE NUMMER: C378							l'uge 19	12 ³⁰ 21		
'E NAME∕CODE: Plateau Refinery	ry								•	
NM 1686					CONCEN	CONCENTRATIONS	(dqq)			•
Vd	PANAMETERS				3	EPA SAMPLE	NUMBERS			
Compound	Fraction Clubs	88 F 3474	F 3475							Γ
Toluene		LT 	160							Π
Xylene (or Isomer) Renzene Ethvl Dimethvl	ABN 3	150.000								
Ethyl		$\left \right $								
ivative	ABN	1								
<u>Benzene ethyl dimethyl orrsayfra</u> Renzene ethyl dimethyl orrsayfra	ER ABN 3	140,000							- <u> </u>	T
	ABN	+								\uparrow
Benzene Diethyl										Γ
Unknown	ABN 3									Γ
	ABN		O Unk.							
Benzene Ethyl Methylethylokisowck	ABN		0							
			0 Unk.							
Naphthalene 2 methyl										
- 1	_	Ż	0							
Naphthalene Ulmetnyl		-†								
		Ť								
Alkane OF UEFIVALIVE Rentand dimethol pronvi		120,000								
Alkane or derivative		Ť								
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Fluorene	ABN	_	LT 2870							
benzene	YOY		15							T
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Sample S	Station Location							,		
. Priority Pollutant. . Specified Hazardous Substance	. 100	11	Concentration Concentration	leas than corrected	ermined lab bl	lab blank concentrut	k ution			
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Sauple Station Location		
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ASE NUMUER: <u>2573</u> 1TE NAME/CODE: Plateau Refinery									17agn.		· · ·
NM 1686						Ū	ONCENTRATI	(qaa) SNO			•
Vd	PAILAMETERS						EPA SAMPLE NUMBERS	MPLE NUMI	EILS		
Compound	Fraction (ClubB	F 3475				 				
thyli		~~~	140,000 61,000								
Unknown	ABN	m	34,000								
Alkane or derivative Eicosane	NUN	~~~	140,000								
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Matrix '	x 'l'ype		SOIL								Ī
Sample	e Station Number	mber	18/								
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l. Priority Pollutant. 1. Specified Hazardous Substance. 3. Tentatively Identified.	, noe	NDU C K or	- Conce - Conce LT (less than det corrected for ent in sumple	determined for lab bl ple below	ernined in lub lab blank conc below quantifi	• •	ы. г.	(auantification limit)	
		Ч	- Present	in sampl	in sumple (tentatively identified compound	rely ide	ntified co	\sim) ; ; ; ; ; ; ; ; ; ; ; ; ; ; ; ; ; ; ;	

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Image: Main of the state of the s	III. NAME/CODE: Plateau Refiner	۲. ۲										.*	
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	∕ PARAMETERS							EPA SAMPLE	LE NUMBERS	ßS		
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P - Present in sample (tentatively identified compound)

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			KaLT () - Present in sample below quantification limit						rrected	lab		ncentrat	ion					

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KaLT () - Present in sample below quantification limit (quantification limit)
P - Present in sample (tentatively identified compounds)

ASE NUMBER:	EK: 1006F										Page 25.		
ITE NAME	NAME/ CODE : PLATEAU REFINERY	EFINERY										•	
	NH1686							CONCE	CONCENTRATIONS	(dqq) S			
		PARAMETERS							EPA SAMP	SAMPLE NUMBERS	ĸs		
	Compound	Fraction	Class	F3460	E3469	E3470	F3484	F3485	F3487	F3489	F3490	Blank	Blank
-Unknown	(Scan #1513-1520)	BNA	м ,			Z10,000	1,900				4,200		
= =			4~			660 000		nrq					
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=	1600-	=	2				2,500				3, 700		
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=	(" I889-90)	- 11	ñ				1,200				2,900		
-	(" 2015-2018)	11	3				1.700	460		530	3,300		
=	(" 2075-2079)	=	6				1.700		730	700	3.000		
=	(" 2134-2138)	=	~				1,600	600	680	790			
=	2194-2199		-				1,700	450	1 100	1.000	3.nda		
=	(" 2261-2267)		~				1,600	450	1,100	1,200			
2								450					
=			~	T			1,500		680	1,000	2.800		
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=	(<u> </u>						770		590	700			
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		Sample Station Number	lumber	14	14	- I I	26	HEL	VEL	128	12A		
									-			Blank	Blank
-	S an	Sample Station Loca	Location										
l. Priori	ty Pollutant.		กฎห	t	entratio	Concentration less than	han dete	determined in lab blank	n lab bl	ank			
	ly Identifi	כון. הין י	×	י ד ג	entructure	Concentration corrected for law blank concentration of () - Present in sample below quantification limit	Bample	below dr	untifica	concentration itification lim		(quantification limit	on limit.
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P - Present in sample (tentatively identified compound)

CASE NUMBER: SITE NAME/CODE: <u>Plateau Refinery</u>	lery										a 5	•
							CONCE	CONCENTRATIONS EPA SAMPLE	4S (ppb) PLE NIMBERS	5 a c		
	PARAMETERS									CHI		
Compound ',	Fraction	C1888	F3468	F3469	F3470	F3484	F3485	F3497	F3489 510	F 3490	ßlank	Blank
	-	,							242			
										.,		
Matrix	ix Type		Soil	Soil	Med/Soil	Soil	Soil	Soil	Soil	Soft	Med/Soillow/Sol	Low/Sol
Sample	ile Station Number	mber	14	14		26	138	13A	128 V.END OF	12A	110	0110
S amp l e	Sample Station Location	ion							SEPARATION POND		D I GILK	DIANK
Priority Pollutant. Specified Hazardoug	Substance.	NDB C	B - Conc C - Conc	entration entration	less corre		determined in for lab blank		lab blank concentration			
•		¥	or LT (Present in	Bample	elow	antifice	quantification limit		(quantification	on limit)
			- Present		in sample (tentatively	tatively	r identified		combound)			

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CASE NUMBER:			•							Page 27	of <u>31</u>	• •
SITE NAME/CODE: Plateau Refinery	ery											•
2 0							CONCE	CONCENTRATIONS	(dqq) St			
id South IV	PARAMETERS							EPA SAMF	SAMPLE NUMBERS	ERS		
	Fraction	Class ³ lank	3lank 2	Blank 3	3							
e	Volatile "	1,	1K	3 . 6K								
Ace unite 2-He xanone		5	12	1								
4-methyl-2-pentanone	:	2	1	2K								
Styrene Total Yulanas	= =	20	X									
		L	41						.			
Matrix	ix Type		LOW/501	I OW/Soil								
S anp l e		umber										
			Blank	Blank								
. Sample S	Sample Station Location	tion										
Priority Pollutant.		NDB	- Con	centration	less		ed		ank			
 Specified Mazardous Substance. Tentatively Identified. 	ance.	×	C - Con or 1.T (centration) - Pre	ion corrected Present in an	for]	lab blank helow guer	k concer antifica		on limit four		(aumorification limit)
		: p.	- Present	in e		ativelv	idenrif	identified compound)				

										Page ²⁸ of 31	· .• ·
SITE NAME/ CODE:							CONCE	CONCENTRATIONS	(Pod) S		
d	PARAMETERS							EPA SAMPLE	161	RS	
Compound ,	Fraction	Class	F 5115	F 5116	F 5117	F 5118	F 5119	F 5120	F 5121		
sod	ABN	1	.	1 1	1	1		1 1	1 1		
diethyl phthalate	ABN		~:		\mathbf{x}						
Chrysene 2-methvl nanhthalene	ABN	1	~~	* *	440		2 600		~>		
1 1	VOA	2	320			×	3800	×	750		
. xylenes	VOA	2	\mathbf{x}	260			11,000	: ×	150 C		
ethyl benzene	VÛA	1		\succ			3,200		41		
vinyl acetate	VOV	2		54			930		85		
паритиатепе	ABN			~	×	×	\mathbf{x}		×		
fluorene	ABN				170	1					
prenantintene	ABN				2007		011				
pyrene toluene	VUN			1	د <u>ب</u>		12 000	<u> </u>	Y		
dibenzofuran	ABN	2					12.000	2	T 30		
	VDA		×	×	×			×	×		
Renzene	VOA						3.100		37		
di-n-hutyl phthalate	ABN	-1			×	×					
-2-hexanone	VOV	2			Х	×	×	×			
	VOA	3	d	280			1,900		4		
<u>methyl cyclopentane</u>	VOA	-	٩	d			2,300		170	•	
	VOV	3	٩	160			Р		96		
קיני ני	YOA	~	d	890			2.600		380		
atconol or atkene	VUA	26	<u>у</u> ч D	4 90 D			5.000		330		
CVCH/C alkane	VUV	2	. e	121			-		200		
		~	88	Ь					220		
	⊢ ×		Sludne	Sludge	110	Sludge	110	Sludae	Sludne		
Sample	Station	Number	15	16	11	20	1	24	23		
Sample S	Station Location		SO'SW.OF BORINE# 7 S.SITE LANDFILL	100 × 10	TRUCK AREA SVMP	AROVO N. OF E. FRESH	15	N.E. APE PONO	SOUTH API POND		
·			K*- missin	ng data she	eet		1				
 Priority Pollutant. Snerified Warstone Substance 		ND	B - Conce	entratio	l e 8 8	dete		in lab blank	ank		
• • • •		×		VONCENLEALION T () - Pres	n corrected Part in sem	sted for	LEU DIENK heiny Juen	k concen antifica	concentration tification lim	it (amontificati	
					iple (ter	itatively	identif	ied comp	ound)	in sample (tentatively identified compound)	

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ie number:		,							Page 29 of	31	•
'E NAME/ CODE:											•
	PARAMETERS					CONCE	CONCENTRATIONS EPA SAMPLE	IS (PPM) LE NUMBERS	(S		-
	┢										
Compound	Fruction C	CIABBE5115	F5116	F5117	F5118	F5119	F5120	F5121			
Ukane	ABN	3 5 2	P					57		<u> </u> 	
Inknown	ABN			d							T
Jlkane	ABN	3 126									
Ukane	ABN	+						đ			
Ulkane	ABN	+	\downarrow	d -				d 4			
VLKane ····································	ABN	3 84.6	0 P	4/4 n							
11 Kalle 11 kano	ABN	+	+					•			
11 Kane	ABN	2	+								
11 Adrie 11 kano	NUN	$\frac{1}{1}$	+								
	NUM	+									
											T
											T
											T
Matrix		5	<u>ا ا</u>	011	5 ludge		sludge	sTudge			
Sample	e Stution Number	- 1	16		20		24	23			
Sample S	Sample Station Location	50'S.W. OF BORNG	N. 20'N. OF NG BORING #8 TE E. ENDOF	lTruck area sump	ARROVO N. OF E.FRESH WATER POND	LEACHATE	NE API Pond	South API pond			
		NDB - C	Concentration	n less	than dete	determined i	in lab bl	b l an k			
. Spectfied Mazardoue Substance. . Tentatively Identified.	ince.	C - Con K or I.r (centr	COLL	for	lab blank	ank concentrat	tration rion limit		launatificantion	4
		P - Present	د د	nula (ra	ntivelu	ucrum qu idantif	ied comp			רדרמרוחו	

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CONCENTRA CONCENTRA	Page 30 of 31						
CONCENTRA NAME/ CODE: Plateau Refinery CONCENTRA A MAYAETERS Compound Faction Class F 5115 F 5113 F 5119 F 5 Compound Fraction Class F 5115 F 5113 F 5 Compound Fraction Class F 5115 F 5113 F 5 Compound Fraction Class F 5115 F 5113 F 5 Compound Fraction Class F 5115 F 5113 F 5 Compound Fraction Class F 5117 F 5113 F 5 Compound Fraction Class F 5117 F 5113 F 5 Compound Fraction Class F 5117 F 5113 F 5113 F 5 Compound <th c<="" td=""><td></td></th>	<td></td>						
Compound Fraction clares F 5115 F 5117 F 5119 F 5 Compound Fraction clares F 5115 F 5115 F 5119 F 5 I heptane V0A 3 20 S13 F 5 V0A 3 1 S13 F 5 S13 F 5 V0A 3 10 A S00 F V0A 3 10 S13 F S13<	•						
PARAMETERS Compound Fraction Class F 5115 F 5113 F 5119 F 5 Compound Fraction Class F 5115 F 5115 F 5119 F 5 VOA 3 250 P P VOA 3 120 610 B VOA 3 120 610 P VOA 3 120 610 B VOA 3 100 B VOA 3 100 B VOA 3 10 Compound F VOA 3 10 S VOA 3 <th <="" colspan="6" td="" th<=""><td>RATIONS (Pres</td></th>	<td>RATIONS (Pres</td>						RATIONS (Pres
Compound Fraction Class F 5115 F 5117 F 5119 F 5110 F 510 F 510 F 5100 LE NUMBERS							
Tkane VOA 3 78 P VOA 3 81 250 P	5120 E						
Ikane V0A 3 82 p p p p 1 heptane V0A 3 120 480 p p 1 heptane V0A 3 120 480 p p $v0A$ 3 p q^20 p p p $v0A$ 3 p p p p p $v1A$ 3 p p p p p $v1A$ 3 p p p p p $v1A$ $v0A$ 3 110 360 $11,700$ $11,700$ $v1A$ $v0A$ 3 173 511 $1,560$ 815 p $v1A$ $v0A$ 3 173 511 $1,560$ 815 p p $v1A$ $v0A$ 3 173 511 $1,560$ 815 p p p p p p p p p p p							
VOA 3 81 250 P P P VOA 3 120 480 P P P P VOA 3 10 3 10 F P P P VOA 3 71 P P P P P P VOA 3 71 P	d						
1 heptane VOA 3 120 480 P P bentene VOA 3 10 420 P P P bentene VOA 3 10 510 8,900 P P voa 3 7 P P P P P P vl benzene VOA 3 71 P							
1 heptane VOA 3 120 480 P P bentene VOA 3 10 510 9 900 bentene VOA 3 71 P P 9 y1 benzene VOA 3 71 P P 9 y1 benzene VOA 3 71 P P 9 y1 benzene VOA 3 71 P 9 3 3 3 10 3 3 3 10 3 <td< td=""><td></td></td<>							
VOA 3 P 420 P benrene VOA 3 110 510 8,900 y1 v0A 3 71 P P P y1 benzene V0A 3 71 P P P y1 benzene V0A 3 71 P P P v0A 3 71 P P P P P v0A 3 71 P P 3,000 P P ethyl benzene V0A 3 173 511 1,500 1,700 -see V0A 3 173 511 1,560 915 P i1 benzene V0A 3 173 511 1,560 915 i1 benzene ABN 3 ABN 3 1,373 916 714 v1 benzene ABN 3 ABN <td< td=""><td>270</td></td<>	270						
beneene VOA 3 110 510 8,900 $y1$ benzene VOA 3 7 p p p $y1$ benzene VOA 3 7 p p p $y1$ benzene VOA 3 71 p p p $y1$ benzene VOA 3 110 360 $1,700$ $1,700$ $ethy1$ benzene VOA 3 173 511 $1,560$ 815 $etwarene VOA 3 173 511 1,560 991 1 benzene YOA 3 173 511 1,560 991 1 benzene YBN 3 213 1,090 1,724 Y1 benzene ABN 3 AS 1,090 1,090 Y1 benzene YBN 3 724 724 1,090 Y1 benzene ABN 3 724 724 $	360						
bentene VOA 3 F P B <							
v_{0A} 3 r_{1} p p p p v_{0A} 3 71 p p p p p $ethyl$ benzene v_{0A} 3 110 360 $1,790$ $3,700$ $ethyl$ benzene v_{0A} 3 110 360 $1,790$ $1,790$ $-see$ v_{0A} 3 173 511 $1,560$ 815 200 $-see$ v_{0A} 3 173 511 $1,560$ 815 200 $-see$ v_{0A} 3 173 511 $1,560$ 815 200 1 benzene ABN 3 2	300						
y1 benzene v0A 3 71 p <t< td=""><td>d</td></t<>	d						
y1 benzene v0A 3 p p p 3 110 3 000 m ethy1 benzene v0A 3 110 360 m 1,700 m 1,700 set v0A 3 173 511 1,560 m 1,700 m -see v0A 3 173 511 1,560 m 815 m -see v0A 3 173 511 1,560 m 815 m -see v0A 3 m m m 991 m 1 benzene ABN 3 m m m 960 m v1 benzene ABN 3 m m m 1,090 m v1 benzene ABN 3 m 373 m 1,090 m v1 benzene ABN 3 p 373 m<	d						
ethyl benzene V0A 3 110 360 1,700 1,700 -see V0A 3 173 511 1,560 815 8 -see V0A ABN 3 173 511 1,560 815 8 -see V0A ABN 3 173 511 1,560 815 8 1 benzene isomer ABN 3 8 861 960 8 8 1 benzene isomer ABN 3 8 8 861 8 8 1 benzene isomer ABN 3 8 8 861 8 8 1 benzene isomer ABN 3 8 8 1,090 8 8 V1 benzene isomer ABN 3 8 8 1,090 8	d.						
-see VUA 3 110 360 360 360 -see VUA ABN 3 173 511 1.560 815 1 benzene isomer ABN 3 173 511 1.560 815 1 benzene isomer ABN 3 991 991 1 benzene isomer ABN 3 991 991 V1 benzene isomer ABN 3 9 960 960 V1 benzene isomer ABN 3 9 960 960 960 V1 benzene isomer ABN 3 9 724 960 724 960 V1 benzene isomer ABN 3 9 373 9 671 967 vted benzene ABN 3 \mathcal{LS} \mathcal{P} 724 \mathcal{P} \mathcal{P} \mathcal{M} ABN 3 \mathcal{LS} \mathcal{P} \mathcal{P} \mathcal{P} \mathcal{P} \mathcal{P} \mathcal{P} \mathcal{P} \mathcal{P} \mathcal{P} \mathcal{P} \mathcal{P} \mathcal{P} \mathcal{P} \mathcal{P} \mathcal{P} \mathcal{P} \mathcal{P}							
See VOA ABN 3 173 511 1.560 B15 -see VOA ABN 3 173 511 1.560 815 815 1 benzene isomer ABN 3 91 815 916 916 1 benzene isomer ABN 3 916 960 960 960 1 benzene isomer ABN 3 916 960 960 960 1 benzene isomer ABN 3 916 960 960 960 1 benzene isomer ABN 3 97 960 960 960 1 benzene ABN 3 97 97 960 960 960 1 benzene ABN 3 97 960 960 960 960 960 960 960 1 benzene ABN 3 97 970 960 960 960 960 960 960 960 960 960 960 960 960 960	290						
-see VOA ABN 3 (1) (3) <	131						
I benzene isomerABN3991991I benzene isomerABN396960ABN39960960ABN39960960VI benzene isomerABN39724ABN39724724VI benzeneABN39724Ved benzeneABN39724Vi benzeneABN39724Vi benzeneABN39724Vi benzeneABN39724Vi benzeneABN39724Ved benzeneABN3973Ved benzeneABN3973Matrix Type3659101Conto conto							
I benzene isomerABN3ABN3B61 $\sqrt{1}$ benzene isomerABN3ABN3960 $\sqrt{1}$ benzene isomerABN3ABN3724 $\sqrt{1}$ benzeneABN3P373P724 $\sqrt{1}$ benzeneABN3P373P671 $\sqrt{1}$ benzeneABN3P373P671 $\sqrt{1}$ benzeneABN3 $\sqrt{2}$ P671P $\sqrt{1}$ benzeneABN3 $\sqrt{2}$ $\sqrt{2}$ P671P $\sqrt{1}$ benzeneABN3 $\sqrt{2}$ $\sqrt{2}$ P671P $\sqrt{2}$ $\sqrt{2}$ $\sqrt{2}$ $\sqrt{2}$ P $\sqrt{2}$ <	d						
v1benzene isomerABN3960v1benzene isomerABN3960v1benzene isomerABN3960v1benzene isomerABN3960v2ABN3 p 373v2ABN3 p 373v2ABN3 e^{5} p v1 benzeneABN3 p v1 benzeneABN3 p v2ABN3 e^{5} w voA 3 e^{5} w voA 3 e^{5} w voA 3 e^{5} w $watrix Type$ $Nidge$ $NilwvoAsludgeSludgewvoAsludgeSludgewvoAsludgesludgewvoAsludgesludgewvoAsludgesludgewvoAsludgesludgewvoAsludgesludgewvoAsludgesludgewvoAsludgesludgewvoAsludgesludgewvoAsludgesludgewvoAsludgesludgewvoAsludgesludgewvoAsludgesludgewvoAsludgesludgewvoAsludge$	d						
v1 benzene isomerABN31,090v1 benzene isomerABN3 $ 724$ v1 benzene isomerABN3 $ 724$ ued benzeneABN3 $ 1,090$ $ 1,090$ $ 1,090$ $ 1,090$ $ 1,000$ $ -$ <t< td=""><td></td></t<>							
NI benzene isomerABN3ABN3ued benzeneABN3P 724 ued benzeneABN3P 373 PABN3P 373 P 671 ABN3P 373 P 671 ABN3P 373 PABN3 455 PABN3 457 PABN3 457 750 ABN3 457 750 ABN3 657 750 ABN3 657 750 ABN3 657 750 ABN3 657 750 ABN3 657 750 ABN3 657 750 ABN3 657 750 ABN3 657 750 ABN3 657 750 ABN 750 7100 011 Sludge 011 $51udge$ Control C							
hyl benzene isomerABN3P724tued benzeneABN3P373 p 671 ABN3P373P 671 p tuted benzeneABN3 $2 \cdot 5$ p 465 ψu voA 3 4.5 p 724 ψu voA 3 4.5 p 760 ψu ψu voA 3 4.5 p $\delta \epsilon v Z \epsilon w E$ voA 3 4.5 p $\delta \epsilon v Z \epsilon w E$ voA 3 $5.0 \cdot 100$ 760 $\delta \epsilon v Z \epsilon w E$ voA 3 $5.0 \cdot 100$ 760 $\delta \epsilon v Z \epsilon w E$ voA 3 $5.0 \cdot 100$ 710 $\delta \epsilon w Z \epsilon w E$ voA 3 $5.0 \cdot 100$ 710 $\delta \epsilon w Z \epsilon w E$ voA 3 $5.0 \cdot 100$ 0.01 $5.0 \cdot 100$ $\delta \epsilon w E \epsilon w E \epsilon w E \epsilon w E \epsilon w E \epsilon w E \epsilon w E \epsilon w E \epsilon w E \epsilon e \epsilon w E \epsilon e \epsilon w E \epsilon e \epsilon e \epsilon w E \epsilon e \epsilon w E \epsilon e \epsilon w E \epsilon e \epsilon w E \epsilon e \epsilon w E \epsilon e \epsilon e \epsilon e \epsilon w E \epsilon e \epsilon e \epsilon e \epsilon e \epsilon e \epsilon e \epsilon e \epsilon e \epsilon e \epsilon$. 62						
Lued DenzeneADN3P $3/3$ D $b/1$ Luted DenzeneABN3 μ 373 p p Luted DenzeneABN3 μ 465 $\mu'u$ YOA3 μ 750 750 $\delta \in vZ \in VE$ Matrix TypeSludge 011 Sludge e_{amole} 011 Sludge 011 Sludge							
tuted benzeneABN3 V_{03}							
AUN3 LS P 405 YOA 3 LS P 950 YOA 3 LS P 950 Matrix TypeSludgeSludge 011 Sludge $ConstructionSludge011Sludge$	100						
YUA34.34.3YOA34.3950Matrix Type31udge31udge011Sunds Type51udge011Sludge							
Matrix Type 3 Sludge Sludge Oil Sludge							
Type Sludge Sludge Oil Sludge Oil Sludge Oil Sludge	$ \rightarrow $						
NUMBER 15 16 11 20 18 24							
API S API A Pond p							

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K OF LI () - Fresent in sample below quantification P - Present in sample (tentatively identified compound)

CASE NUMBER:										Page <u>31</u> of <u>31</u>		
SITE NAME/ CODE:											•	
		-					CONCE	CONCENTRATIONS				
	PARAMETERS							EPA SAMPLE	LE NUMBERS	S		[]
Compound	Fraction	n Class	F 5115	F5116	F5117	F 5118	F 5119	F 5120	F 5121			
Unknown	ABN						594					
Unknown	ABN	ſ							92			
Unknown	ABN	3					625					
Alkane	ABN	~	a.	Ч	556							
Alkane	ABN	m r	4	Ь	Ъ		358		d			
Alkane	ABN		216	606			663		133			Т
Alkane	ABN	n m		2	3.350							T
Alkane	ABN	n	163	d			d					Γ
Alkane	ABN	3	Ь	630	3,200		663		149			
Alkane	ABN	3			7,010							
	ABN	m		154			Ρ					
	ABN	m			3430	3,430						
Alkane	ABN	e	266		· ·		648		187			
Alkane	ABN	~		405	9,680		495					
Alkane	ABN	m	222		5,180				144			
Alkane	ABN	6	324		9,220							
Alkane	ABN	m	4				648		101			
Alkane	ABN	Ē	d	113	2,510		Ρ		78			
Alkane	ABN	e	d	Ρ			617		Α.			
Alkane	ABN	~	284	1,330			946		140			
	ABN	-	312	1,300			946		158			
Alkane	ABN		294	1,160	3,440		- I		149			Т
Alkane	ABN	~	284	573	3,080		<u>م</u> ا		123			Т
Allero			101		00717							Т
	Matrix Type	1	Sludge	<u>s l u</u>		Sludge	0i1	Sludge	Sludge		-	T
	Sample Station Number	ber	15	1		20	18	24	23			T
	•		3	20 ¹ N.01	Tr uc k	Arreyo	Lea	NE API	South			T-
	Sample Station Location	i	boring	boring ** K.END	area sump	N. OF E FRESHWATER	hate Spring	puod	Pnoq pond			
 Priority Pollutant. 		I	centrat		t han	determined	i.	b blank				I
3. Tentatively Identified.	BLANCE. KO	. ~	L L			D	lad blank concentration ow quantification limit	concentration ication limit		(quantification lin	limit)	
		P - Present		in sample	(tentatively		identified	d compounds)	(8 pu			

P - Present in sample (tentatively identified compounds)

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