RCRA
Various

PHASE II RCRA FACILITY ASSESSMENT

of the

CHEVRON USA INC. (GULF) FACILITY
PHILADELPHIA, PENNSYLVANIA

EPA I.D. NO. PAD 049 791 098

Prepared for

U.S. Environmental Protection Agency
Region III
841 Chestnut Street
Philadelphia, Pennsylvania 19107

Prepared by

A.T. Kearney, Inc.
225 Reinekers Lane
Alexandria, VA 22314

EPA Contract No. 68-01-7038
Work Assignment No. R03-08-54

January 1989

0106x-AM

PHASE II
RCRA FACILITY ASSESSMENT REPORT

of the

CHEVRON USA INC. (GULF) FACILITY
PHILADELPHIA, PENNSYLVANIA

EPA ID NO. PAD 049 791 098

TABLE OF CONTENTS

PHASE II
RCRA FACILITY ASSESSMENT REPORT

of the

CHEVRON USA INC. (GULF) FACILITY
PHILADELPHIA, PENNSYLVANIA

EPA ID NO. PAD 049 791 098

TABLE OF CONTENTS (continued)

PHASE II
RCRA FACILITY ASSESSMENT REPORT

of the

CHEVRON USA INC. (GULF) FACILITY
PHILADELPHIA, PENNSYLVANIA

EPA ID NO. PAD 049 791 098

TABLE OF CONTENTS (continued)

FIGURES

TABLE OF CONTENTS (continued)

TABLES

I. INTRODUCTION

The 1984 Hazardous and Solid Waste Amendments (HSWA) to the Resource Conservation and Recovery Act (RCRA) authorize EPA to require corrective action for releases of hazardous wastes and/or hazardous constituents from solid waste management units (SWMUs) and other areas of concern (AOCs) at all operating, closed, or closing RCRA facilities. The intent of this authority is to address previously unregulated releases to air, surface water, soil, groundwater, and from the generation of subsurface gas. The first phase of the corrective action program as established by EPA is development of a RCRA Facility Assessment (RFA). The RFA includes a Preliminary Review (PR) of all available relevant documents, a Visual Site Inspection (VSI), and, if appropriate, a Sampling Visit (SV).

This Phase II report summarizes the results of the PR and VSI phases of the RFA of the Chevron USA facility in Philadelphia, Pennsylvania. The findings in the report are based on a review of files collected from EPA Region III in Philadelphia, Philadelphia Department of Public Health, Air Management Services and the Pennsylvania Department of Environmental Resources (PaDER) office in Norristown, Pennsylvania, during October 1987, and a VSI performed November 17–18, 1988. Files reviewed include RCRA, CERCLA, TSCA, air, and water (NPDES).

This report is organized under eight chapter headings and contains six attachments. Chapter II discusses the facility's location, climate, topography, geology, soils, and groundwater. Chapter III describes plant activities and operational areas, history of site ownership, regulatory history, manufacturing operations/processes, wastes handled, waste management practices, and history of releases. A description of the SWMUs identified by this study are presented in Chapter IV. A narrative summary of the report is presented in Chapter V; release pathways are discussed in Chapter VI. Conclusions regarding the release potential and suggested further actions for each unit or area are summarized in Chapter VII. References used to prepare this report are listed in Chapter VIII. A summary of the VSI and a photograph log showing facility conditions at the time of the VSI are included as Attachment A.

0106x

II. ENVIRONMENTAL SETTING

Location and Surrounding Land Use

The Philadelphia Refinery of Chevron USA, Inc. (Chevron) is located on 30th Street and Penrose Avenue in Philadelphia, Pennsylvania (Reference 58). Figure 1 shows a map of the area indicating the location and topography of the facility. The facility occupies 373 acres along the Schuylkill River, and is located approximately one mile above the confluence of the Schuylkill River with the Delaware River (Reference 61). The facility is located in a heavily industrialized area (Reference 45).

Climate and Meteorology

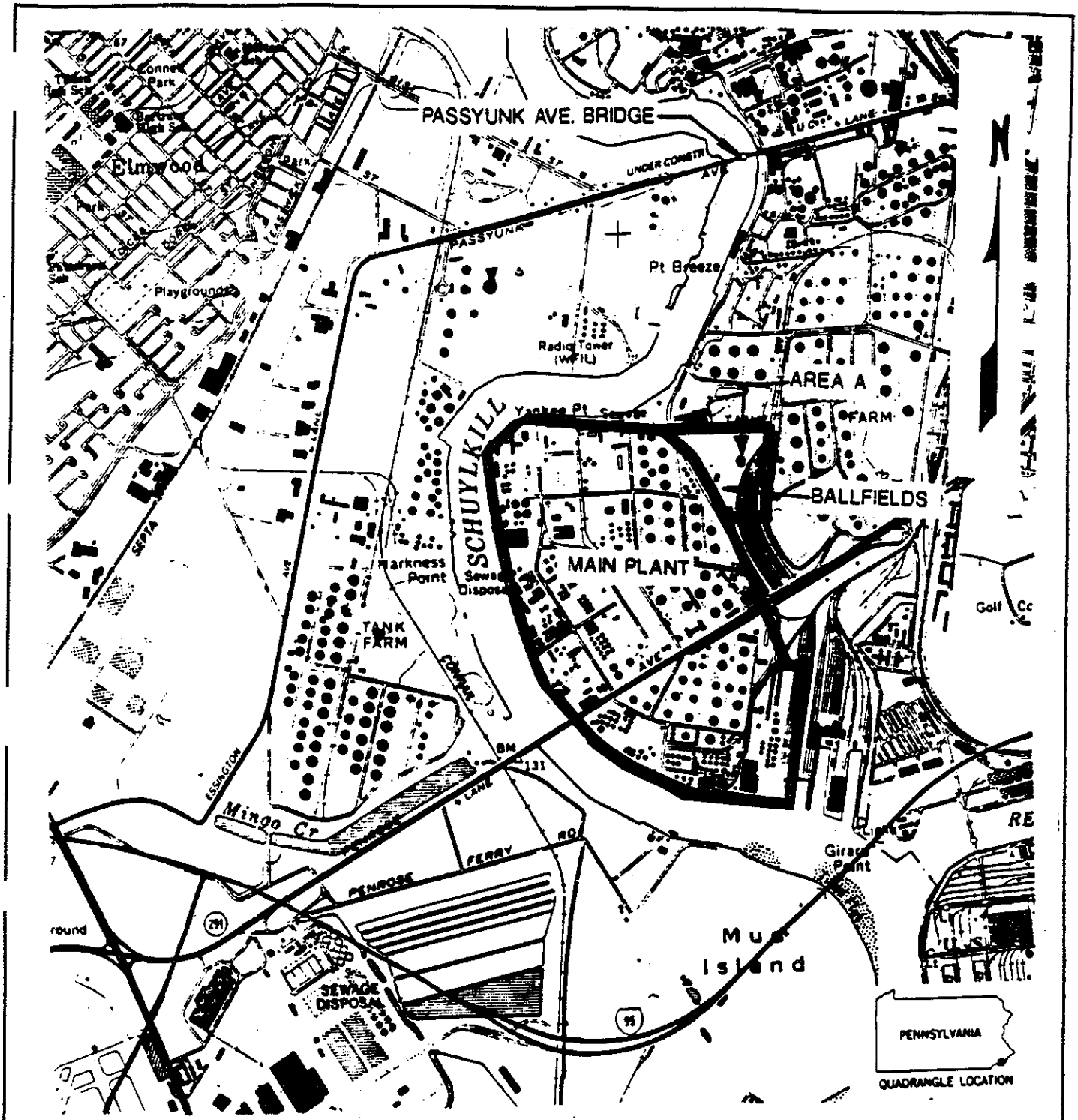
The climate in Philadelphia is classified as humid continental modified by the moisture from the Atlantic Ocean (Reference 15). In the summer, the mean daily maximum temperature is 86°F and the mean daily minimum is 67°F. In winter, the mean daily maximum temperature is 39°F and the average daily minimum is 25°F (Reference 15).

The maximum annual precipitation is 46.6 inches, with the maximum rainfall occurring in July of 4.1 inches and minimum monthly precipitation in October of 2.5 inches (Reference 41). The average rainfall is 40.0 inches (Reference 41). The prevailing winds are generally from the west (Reference 61). The average wind speed is 7 to 10 knots (Reference 61).

Topography, Surface Drainage and Soils

The Chevron facility is located on the east bank of the Schuylkill River approximately one mile north of the Delaware River (Reference 61). Initially in the 1920s, fill materials were placed behind a wooden sea wall. In the 1950s the entire perimeter of the facility bordering the Schuylkill River was walled with 8,400 feet interlocking sheet steel piling (Reference 61). This sheet steel piling is at an elevation of 2 to 3 feet above the 100–year flood plain and, according to the

Figure 1:
Location Map Of The Chevron Facility (Source: Reference 61)



10.531bh

facility, is sufficient to protect against a 100-year flood (Reference 61). Additionally, there is 1,400 feet of concrete sea wall on the eastern part of the facility which protects it from a 100-year flood (Reference 61).

The existing site topography at the Chevron facility is variable. This variable topography has been created by past erratic dumping of miscellaneous fill at the facility (Reference 41).

The average elevation on the eastern (lower) section of the facility is 7 feet relative to sea level and the average elevation on the western (higher) section of the facility is 15 feet relative to sea level (Reference 61).

The soil series identified at the facility is urban land which is artificial soil over coastal plain soil materials (Reference 41). This coastal plain soil consists of a high percentage of silt (Reference 45).

Geology and Hydrogeology

The Chevron facility is in the Coastal Plain physiographic province (Reference 44). The facility appears to have been constructed by placing artificial fill over a former marsh and therefore has disturbed material at the surface (Reference 39). According to documents prepared by the facility, the refinery is underlain by a thin veneer of recent unconsolidated sediments, under which lie 50 to 70 feet of deposits known as the Pleistocene Trenton Gravel characterized by clay, silt, sand and gravels with varying near-surface organic content (References 41 and 67). The Trenton Gravel is, in turn, underlain by a clay layer that is a member of the Raritan Magothy Formation (Reference 67). However, this clay layer is absent at the north part of the Ballfields and the Trenton Gravel overlies the Farrington Sand Member also of the Raritan Magothy Formation (Reference 41). The Farrington Sand Member occurs at depths ranging from approximately 50 feet in the northern boundary of the facility to 70 feet in the southern boundary (Reference 67). However, at places the Farrington Sand Member may be absent near the northern boundary of the refinery (Reference 67). The Farrington Sand Member is characterized by sand, silt and gravel. The Wissahickon Formation, which is a

weathered oligoclase–mica schist, occurs 80 feet below surface at the facility and lies beneath the Farrington Sand Member (Reference 67). Figure 2 shows a generalized geologic cross section of the facility. Figure 12 shows from where the cross section was taken.

On March 19 and 24, 1980, two on–site evaluations were conducted by PaDER in the Ballfields area. During the March 19, 1980, site evaluation, four random soil auger borings were drilled. The borings revealed cinders and other debris at shallow depths. Standing water was observed in the depressed areas. However, the PaDER representatives were not able to determine if this was surface or ground water. On March 24, 1980, 12 backhoe pits were excavated at the site. Nine of the pits revealed the presence of free flowing ground water at relatively shallow distances (approximately 3 feet) from the soil surface (Reference 38).

Groundwater occurs within two zones within the sediments overlying the Wissahickon Formation in the vicinity of the refinery (Reference 67). These zones have been designated as the Upper Unconsolidated Aquifer and the Lower Unconsolidated Aquifer (Reference 67). These aquifers are separated in areas by a wedge–shaped layer of clay of the Raritan Magothy Formation. This clay layer is absent in the northern part of the Ballfields allowing interconnection of the two aquifers (Reference 67). The Upper Unconsolidated Aquifer is approximately 10 feet thick and consists primarily of man–made fill that was placed over the silty clay (Reference 67). This aquifer is located 5 to 7 feet below surface and is recharged by rainfall. As can be seen from Figure 3, the general pattern of groundwater flow in this aquifer is radial, away from an elongated groundwater mound in the central part of the facility, discharging to the Schuylkill River. Furthermore, the groundwater velocity for this aquifer is estimated to be 0.43 feet/year (Reference 67). The Lower Unconsolidated Aquifer varies in thickness from 10 feet near the Schuylkill River to 55 feet in the vicinity of the Ballfields (Reference 67). This aquifer occurs 15 to 20 feet below surface (Reference 68). This aquifer is composed of sand and gravel which is overlain in places by the Raritan Magothy clay layer and underlain by the Wissahickon Formation. As can be seen from Figure 4, the groundwater flow in this aquifer is toward the southwest in the direction of the Schuylkill River. This aquifer receives recharge from the Upper Unconsolidated Aquifer in the Ballfields area. Also, some

ure 2:
Generalized Geologic Cross-Section Of The Chevron Facility (Source: Reference 67)

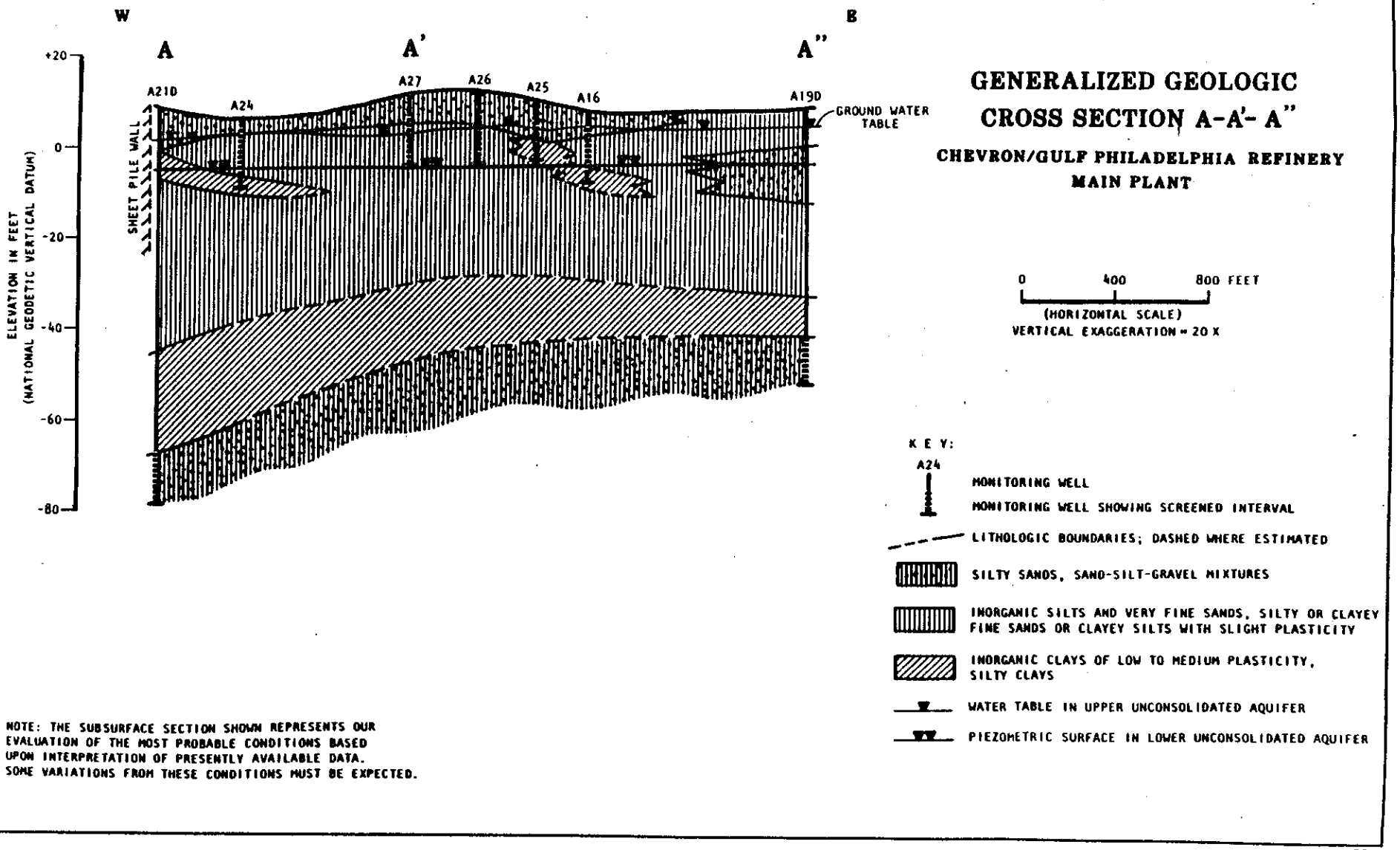
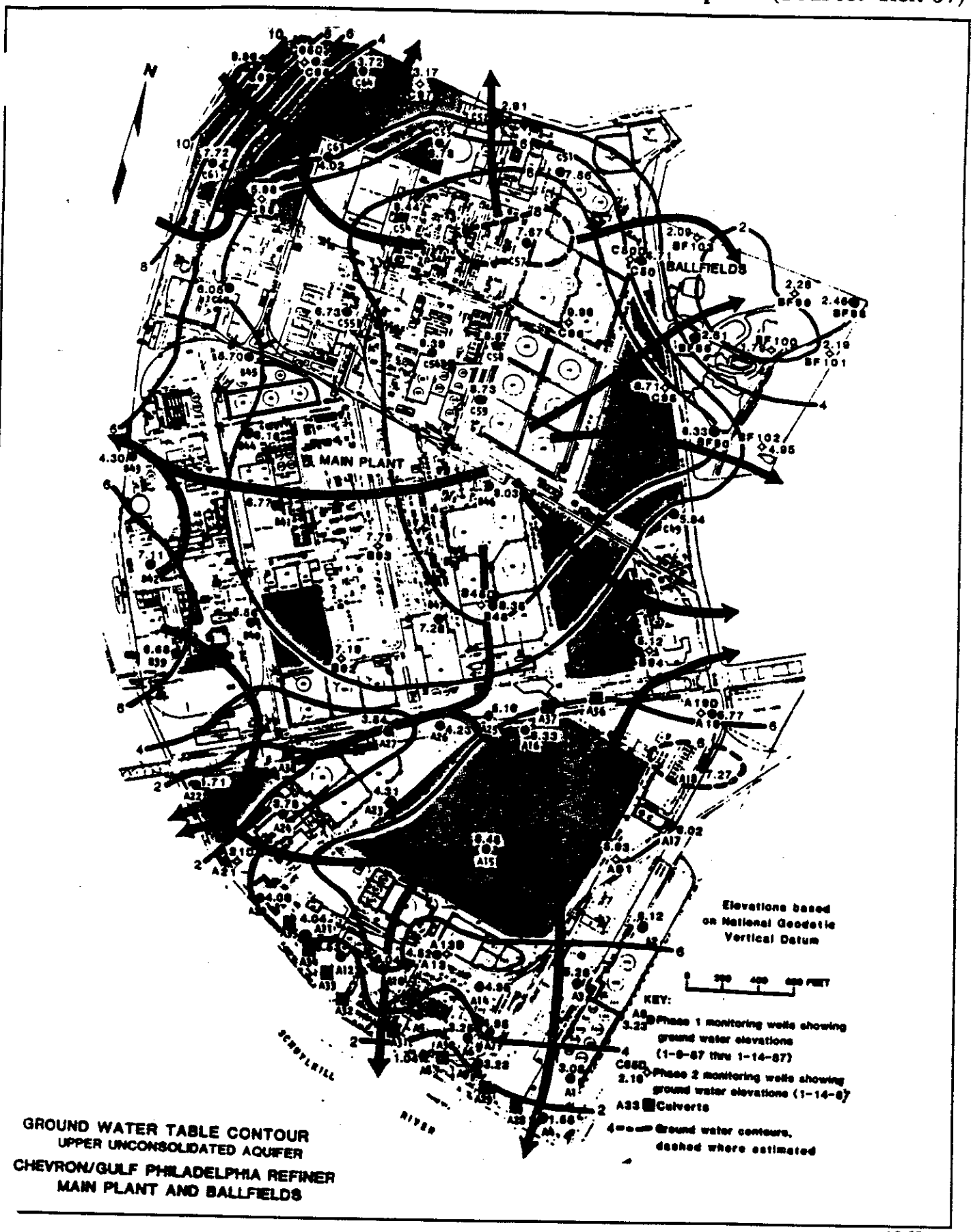


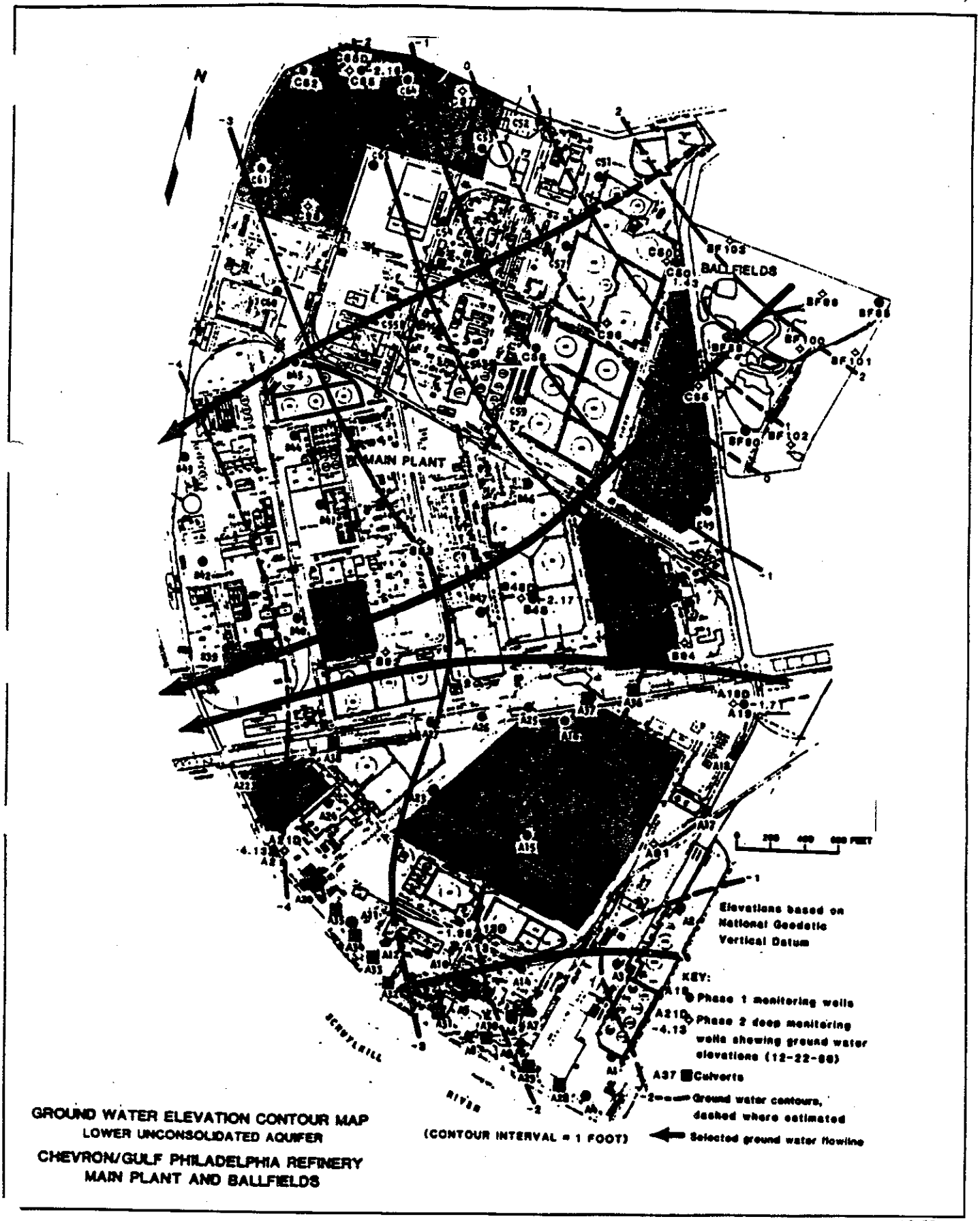
Figure 3:

- **Groundwater Flow Direction In The Upper Unconsolidated Aquifer (Source: Ref. 67)**



12.531bh

Figure 4:
Groundwater Flow Direction In The Lower Unconsolidated Aquifer (Source: Ref. 67)



13.531bh

recharge from vertical leakage through the clay layer from the Upper Unconsolidated Aquifer and some recharge from the Schuylkill River to the Lower Unconsolidated Aquifer has been observed (Reference 67). The groundwater velocity for the Lower Unconsolidated Aquifer is estimated to be between one to nine feet per day (Reference 67). The Lower Unconsolidated Aquifer is a major drinking water aquifer in New Jersey (Reference 66).

III. FACILITY DESCRIPTION

General Plant Description

The Chevron facility is divided by the Penrose Avenue Bridge into two areas, the terminal area and the process area (Reference 66). The terminal area is south of the Penrose Avenue Bridge and is the oldest part of the refinery, dating back to the 1920s (Reference 67). The loading areas for petrochemicals, gasoline and lube oils, a package and grease plant, a marine loading dock, and attendant tankage and piping are located in this area (Reference 67).

The process area is located north of the Penrose Avenue Bridge and contains the primary refining units, petrochemical process plants, wastewater treatment unit, incinerator, office buildings and laboratory (References 66 and 67). Most of this area was built after the 1940s (Reference 66). Also included with this area is an area known as the Ballfields which is north of Lanier Avenue (Reference 66).

History of Ownership and Land Use

The current facility owner and operator is Chevron USA, Inc. Operations at this facility began in the early 1920s as a Gulf Oil Corporation terminal. Gulf Oil commenced refinery operations in the late 1920s. Prior to the 1920s, this area was a marsh (Reference 66). In 1975, a fire at the facility destroyed 90% of the records and facility personnel have tried to reconstruct the site history.

Chevron USA, Inc., acquired the Gulf Oil Corporation's, Philadelphia refinery, and on June 20, 1985, USEPA Region III was notified of a name change of the Gulf Oil Corporation to Chevron USA, Inc. (Reference 52).

According to the facility personnel, the area known as Ballfields (located north of Lanier Avenue) was a railcar cleaning area operated by the Union Tank Car Cleaning Company from 1940 to 1959. The facility personnel estimated that all the railcar cleaning operations were gone by 1975. The property was then sold to Philadelphia Electric and then to Atlantic Richfield Company, which traded the property to Gulf Oil Corporation in 1979 (Reference 67). This area was part of the property acquired by Chevron from Gulf in 1985.

0106x

Regulatory History

The facility is currently discharging wastewater into the Schuylkill River under a National Pollutant Discharge Elimination Permit (PA 0011533) issued by the PaDER on September 18, 1985, and expiring on September 18, 1990. This permit regulates discharges to the Schuylkill River between Outfalls 001 and 015. Attachment F outlines the streams that are routed to each of these outfalls. The Wastewater Treatment Plant (SWMUs 46 to 70) discharges effluent to the Schuylkill River through the NPDES permitted Outfall 015 (Reference 61). The facility is requesting a permit-by-rule exclusion of the wastewater treatment facilities from the RCRA Part B permit application (Reference 61).

The facility has notified PaDER numerous times in the past five years for exceeding their NPDES permit No. 0011533 for both the organic and inorganic parameters at the different outfalls (Reference 51).

On April 20, 1978, the USEPA and the facility signed a Consent Decree - Civil Order No. 78-799 concerning violation of the facility's NPDES permit. This decree was settled and closed (Reference 61).

On August 1, 1980, the facility submitted a Part A permit application (Reference 59). The facility resubmitted the Part A permit application on March 2, 1983, November 22, 1985, and May 15, 1987 (References 57, 58, and 60). The revised Part A permit application submitted on May 15, 1987 indicated process design capacity for container storage, tank storage, tank treatment and incineration. According to the 1987 Part A permit application, the wastes specified as being managed at the facility were bundle cleaning sludge (K050), slop oil emulsion solids (K049 and D001), API separator sludges (K051), leaded tank bottoms (K052), spent caustic (D002), process water slag (D004 and D007), and fluoride sludge (D002), spent activated aluminum (D002), and incinerator ash (K049 and K051) (Reference 60).

On June 6, 1983, the company submitted the Part B permit application to PaDER. PaDER found the Part B permit application deficient in many areas. On June 30, 1987, the facility submitted a revised Part B permit application. The operation of

an Incinerator System (SWMUs 33 to 40), Tank 1086 (SWMU 23), Tank 1087 (SWMU 24), Tank 317 (SWMU 15), Tank 1004 (SWMU 18), Tank 1005 (SWMU 19), Tank 1163 (T-100) (SWMU 42), Tank 388 (SWMU 40), and the Container Storage Area (SWMU 10) were addressed in this permit application (Reference 61).

The facility has Prevention of Significant Deterioration (PSD) permits (Air Emissions from Proposed Sources) for 48 units on the facility. These refinery licenses expire on October 31, 1989 (Reference 61). The facility also has an industrial waste permit (PAD 5171202) (Reference 61).

On March 21, 1975, the City of Philadelphia, Department of Air Management Services issued an Administrative Order to the facility. The Order required the facility to install air pollution equipment for several process units. The facility complied with the conditions of this order (Reference 61).

On February 1, 1980, the City of Philadelphia, Department of Air Management Services issued another Administrative Order requiring the facility to install air pollution control equipment. The facility agreed to comply and reportedly completed the conditions of this order (Reference 61).

On January 4, 1982, the City of Philadelphia Department of Air Management Services issued an Administrative Order for installing secondary tank seals. The facility reportedly completed this requirement (Reference 61).

In 1987, Chevron and the City of Philadelphia conducted negotiations regarding Chevron's potential liability for not operating its sulfur recovery plant, thereby violating the Pennsylvania Air Pollution Control Act. Specifically, a May 1987 letter from the City of Philadelphia Law Department proposes a liability level of $16,000 per day of violation and up to $2,500 per day of continued violation (Reference 63). The facility did not provide information on the current status of this violation in time for this report.

The facility has had numerous notices of violation and the following is a chronology of notices of violation for the Chevron facility:

- March 11, 1982	Oil was observed on the ground during a NPDES inspection (Reference 61).
- April 15, 1982	Minor deficiencies noted in the Hazardous Waste Inspection (Reference 61).
- April 22, 1982	Minor deficiencies noted in the Hazardous Waste Inspection (Reference 61).
- November 15, 1982	U.S. Waste Hauler was used to transport a shipment of EP-Toxic (K051) waste solids when this transporter was licensed for EP-Toxic liquids, reactive and corrosive wastes (References 40 and 36).
- December 2, 1982	Act 97 Sect. 6.10(7) Solid Waste Act, the security personnel at facility delayed entry of inspectors to the facility (Reference 61)
- February 17, 1983	Exceeding the NPDES permit (Reference 61).
- March 4, 1983	Exceeding the NPDES permit (Reference 61).
- March 15, 1983	Minor deficiencies were noted during NPDES inspection (Reference 61).
- May 17, 1983	Oil seepage to the Schuylkill River (Reference 61).
- June 27, 1983	Written authorization was not available for a hazardous waste shipment to the Sun Refinery (Reference 34).
- September 15, 1983	Oil was observed on the ground during NPDES inspection (Reference 61).
- December 6, 1983	As required in Pennsylvania regulations 75.262(2), the facility was notified to develop a hazardous waste disposal plan (Reference 33).
- January 31, 1984	The Container Storage Area (SWMU 10) had no containment (Reference 32).
- April 11, 1984	Violation of the Clean Streams Act (Reference 61).
- June 15, 1984	The Container Storage Area (SWMU 10) had no containment (References 35 and 30).

-	September 11, 1984	The Container Storage Area (SWMU 10) had no containment, and an improper analysis was performed on the hazardous incinerator ash (References 28 and 29).
-	March 29, 1985	The Container Storage Area (SWMU 10) had no containment (References 25, 26 and 27).
-	November 13, 1985	Five 30-gallon drums containing waste solvents with accumulation dates (8/8/85) exceeded the maximum year-long storage period (References 19 and 20).
-	December 3, 1985	Authorization had not been received from Waste Conversions, the TSD that sometimes handles K049 and K051 wastes; 1985 personnel training was not complete; Hazardous Waste Storage Tank #317 (SWMU 15) not properly labeled and Hazardous Waste Tank #1163 (T-100) (SWMU 42) was not properly contained (References 16, 17, and 18).

Operations/Process Description

The Chevron facility is a petroleum refinery (Reference 60), the primary products of which are gasoline, jet fuel and fuel oil. The refinery also produces a small amount of petrochemicals (cumene, benzene and toluene) (Reference 2).

The major refining operations identified in the 1987 Part B permit application (Reference 61) are:

- Crude Processing
- Fluid Catalytic Cracking
- Hydrogen Fluoride Alkylation
- Solvent Decarbonizing
- Catalytic Reforming
- Catalytic Disulfurization
- Gasoline Treating
- Sulfur Recovery
- Petrochemicals
- Aromatics Extraction

A schematic of the major refining operations is shown in Figure 5. The crude processing is done in crude units 136 and 137 (Reference 64) consisting of an atmospheric tower and a vacuum tower (Reference 65). Unit #136 has a still capacity of 36,000 barrels per day and Unit #137 has a still capacity of 138,000 barrels per day (Reference 65). These units are designed to split the crude oil into various fractions which will then be further processed by other units at the refinery to produce fuel oil no. 6, home heating oil and gasoline.

The Chevron Refinery has two fluid catalytic units (1231 and 1232). These units use powder catalyst to "crack" heavy gas oil steams from the atmospheric stills, vacuum stills and decarb oil from the solvent decarbonizer (Reference 1). These units convert the long chain gas molecules into "hydrocarbon product fractions in the gasoline range". (Reference 1).

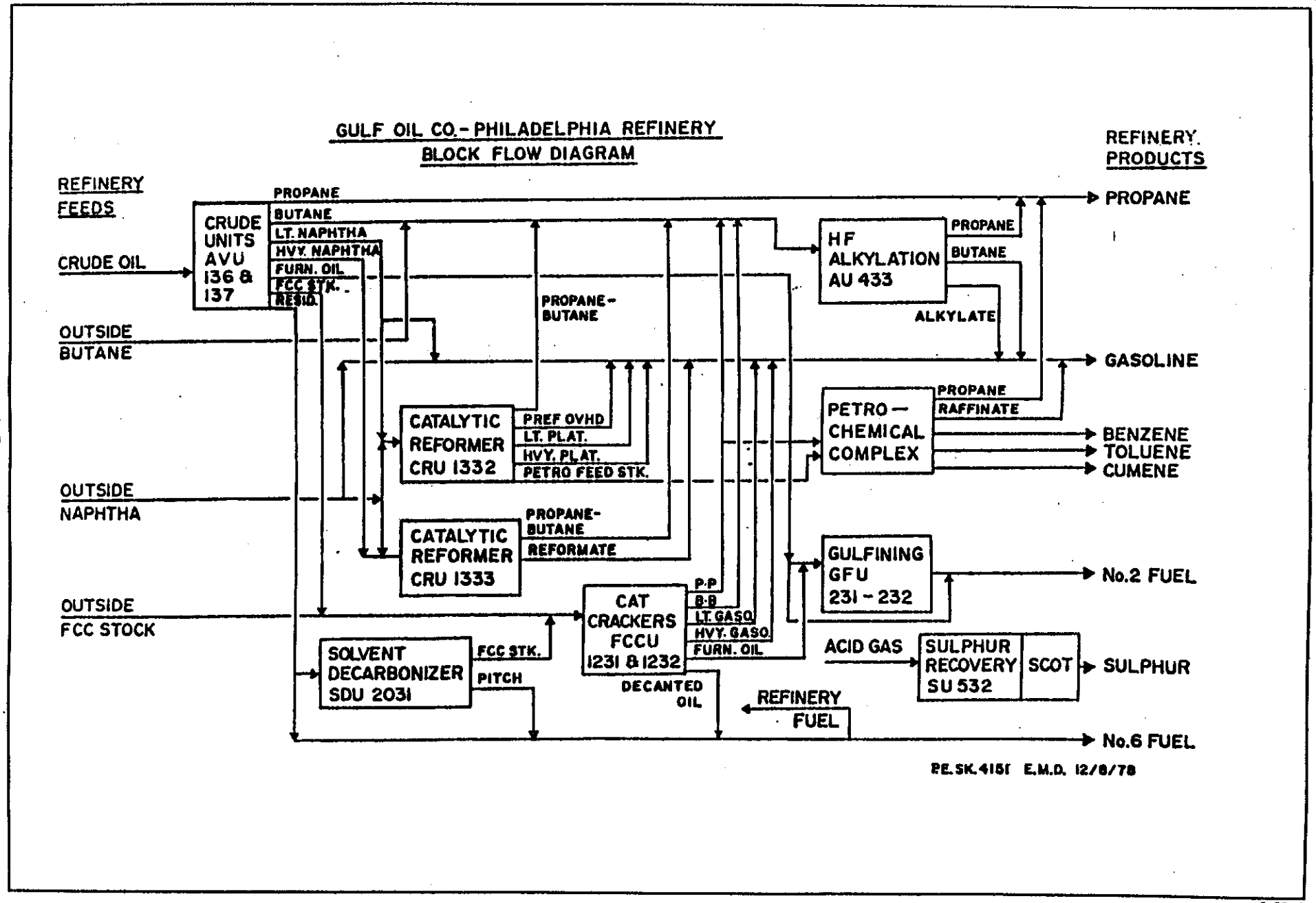
The facility has one alkylation unit. This unit utilizes hydrogen fluoride to alkylate butane/butylene from the fluid catalytic units with isobutane to produce high octane product (Reference 1). This high octane product is used in the gasoline blending system for improving the anti-knock characteristics of motor and aviation gasolines (Reference 1).

The solvent decarbonizing is done in the solvent decarbonizer unit (Reference 64). This unit processes the aromatics and heavier compounds from the crude stills using a propane-butane solvent. This unit extracts 60 to 70 percent gas oil and the residual is asphalt (Reference 64).

The facility has two catalytic reforming units (1332 and 1333), which produce a high octane blending stock for gasoline. The units process light and heavy naphtha from the crude units (Reference 64). Products from this process are primarily used in gasoline blending and can also be used in the petrochemical units for the production of cumene, benzene or toluene (Reference 1).

The facility has a Parsons sulfur recovery unit which manufactures elemental sulfur from the various acid gas streams (H_2S gas streams) (Reference 64).

ure 5:
Schematic Of The Major Refining Operations (Source: Reference 2)



5.531bh

The No.2 fuel oil from the catalytic cracking units and crude units are fed to the two gulfing units (Reference 64). This unit "hydrosulfurize the heavy distillate gas product" (Reference 64).

Various petrochemicals are manufactured at the facility. Cumene (isopropyl benzene) is produced from propylene over phosphoric acid catalyst (Reference 64). The facility also manufactures toluene, benzene and mixed xylenes (Reference 64).

Wastes and Waste Management Practices

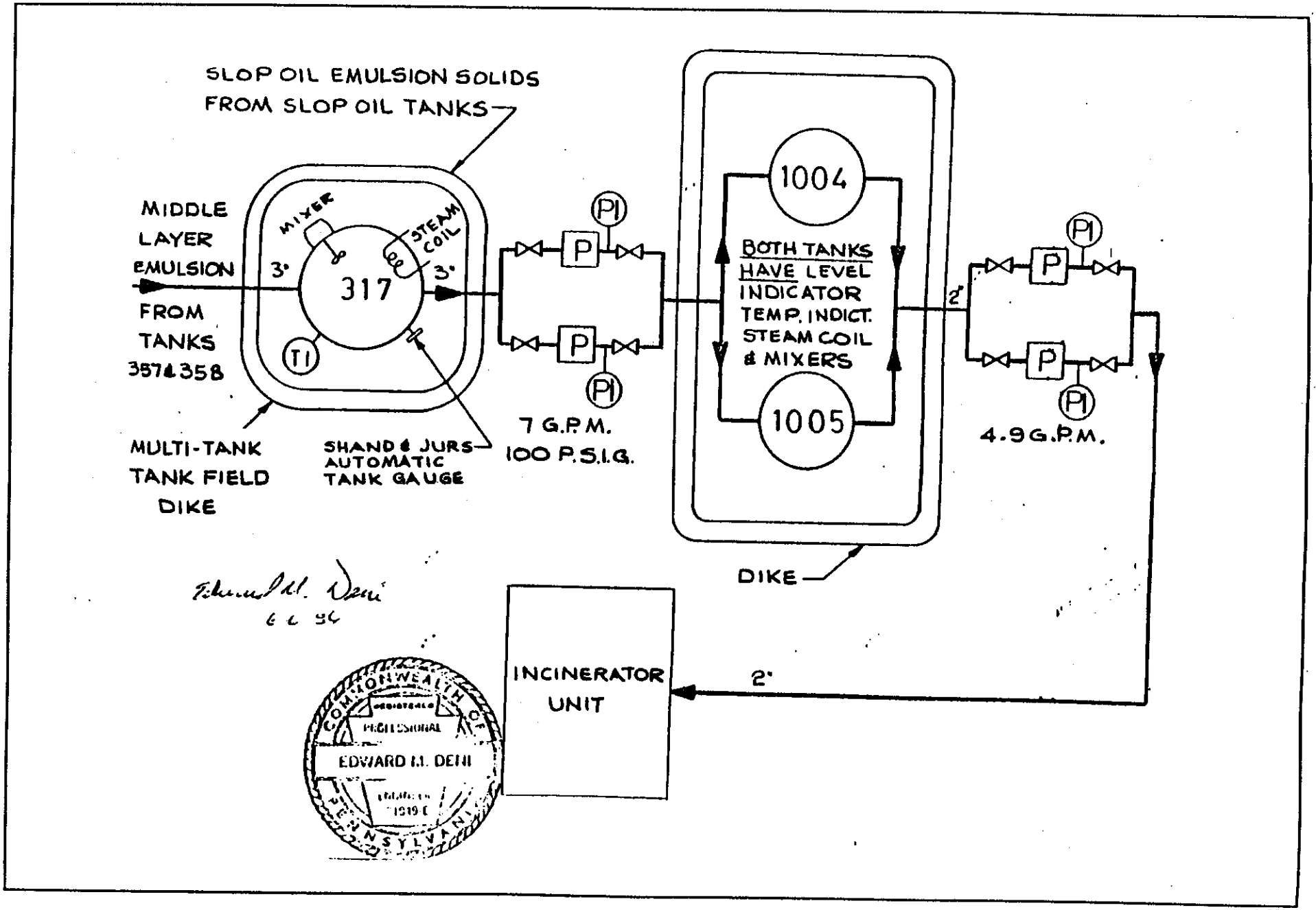
A variety of hazardous waste streams are managed at the facility. According to the Part A permit application submitted in 1987, the types of wastes treated and stored at the facility include slop oil emulsion solids (K049 and D001), heat exchanger bundle cleaning sludge (K050), API separator sludge (K051), leaded tank bottoms (K052), spent caustic (D002), process heater slag (D004 and D007), fluoride sludge (D002), spent activated alumina (D002) and incinerator ash (K049 and K051) (Reference 60). Table 1 lists the hazardous wastes generated at the Chevron facility and the basis for their selection.

Slop oil emulsion solids (K049 and D001) are the emulsified solids from slop oil tanks that receive skimmings from API separators in the wastewater treatment plant. This is a listed waste due to its toxicity (lead and hexavalent chromium). D001 or wastes that exhibit the characteristics of ignitability are also included with slop oil emulsion solids. Figure 6 is a flow diagram which illustrates the slop oil emulsion solids system at the facility. As can be seen from Figure 6, Tank 317 (SWMU 15) receives slop oil emulsion solids from slop oil tanks, as well as middle emulsion layer from Tanks 357 and 358 (SWMUs 16 and 17). These wastes are pumped to Tanks 1004 or 1005 (SWMUs 18 and 19) and subsequently to the Fluidactor (SWMU 33) as feed. Alternatively, this waste is stored in the Container Storage Area (SWMU 10). Approximately 23,315 tons of this waste are generated annually at the facility (Reference 61).

Hazardous Waste	Parameter	Rationale	EPA Hazardous Waste No.
Slop oil emulsion solids	EP toxicity (Pb, Cr^{+6}) Ignitability	This is a listed hazardous waste due to its toxicity (lead and hexavalent chromium) and its ignitability	K049
Heat exchanger bundle cleaning sludge	EP toxicity (Cr^{+6})	This waste is a listed hazardous waste because of its toxicity (hexavalent chromium)	K050
API separator sludge	EP toxicity (Pb, Cr^{+6})	This is a listed hazardous waste due to its toxicity (lead and hexavalent chromium)	K051
Leaded tank bottoms	EP toxicity (Pb)	This is a listed hazardous waste due to its toxicity (lead)	K052
Spent caustic	pH	This waste is hazardous due to its corrosivity.	D002
Process heater slag	EP toxicity (As & Cr^{+6})	This waste is hazardous due to its toxicity (arsenic and hexavalent chromium)	D004 D007
Fluoride sludge	pH	This waste is hazardous due to its corrosivity.	D002
Spent activated alumina	pH	This waste is hazardous due to its corrosivity.	D002
Incinerator ash	EP toxicity (Pb, Cr^{+6})	This waste is considered hazardous as a residue from incineration of listed hazardous wastes	K049 K051

Table 1 Hazardous Waste Streams and Rationale for Their Selection (Source: Reference 61).

ıre 6:
Slop Oil Emulsion Solids System (Source: Reference 61)



6.531bh

Heater exchanger bundle cleaning sludge (K050) is generated when heat exchanger bundles in cooling water towers are cleaned. This is a listed waste because of its toxicity (hexavalent chromium). This water is normally discharged into the Process Wastewater Pipes (SWMU 63) and treated in the Wastewater Treatment System (SWMUs 46 to 70). At times, this waste is also stored in the Container Storage Area (SWMU 10) and disposed off-site. Approximately 27 tons of this waste are generated annually at the facility (Reference 61).

API separator sludge (K051) is generated when sludge is removed from API separators and stored in Tank 1163 (T-100) (SWMU 42). This waste is listed due to its toxicity (lead and hexavalent chromium). Tank 1163 (T-100) (SWMU 42) also receives some nonhazardous cooling tower sludge and some tank bottoms. This mixture is used as a charge to the Fluidactor (SWMU 33). At times this waste is stored in the Container Storage Area (SWMU 10). Approximately 5,000 tons of this waste is generated annually (Reference 61).

Leaded Tank Bottoms (K052) is generated when sludge is cleaned from tanks storing leaded gasoline. This waste is listed due to its toxicity (lead). Leaded tank bottoms are stored in the Container Storage Area (SWMU 10). Approximately 10 tons of waste are generated annually (Reference 61).

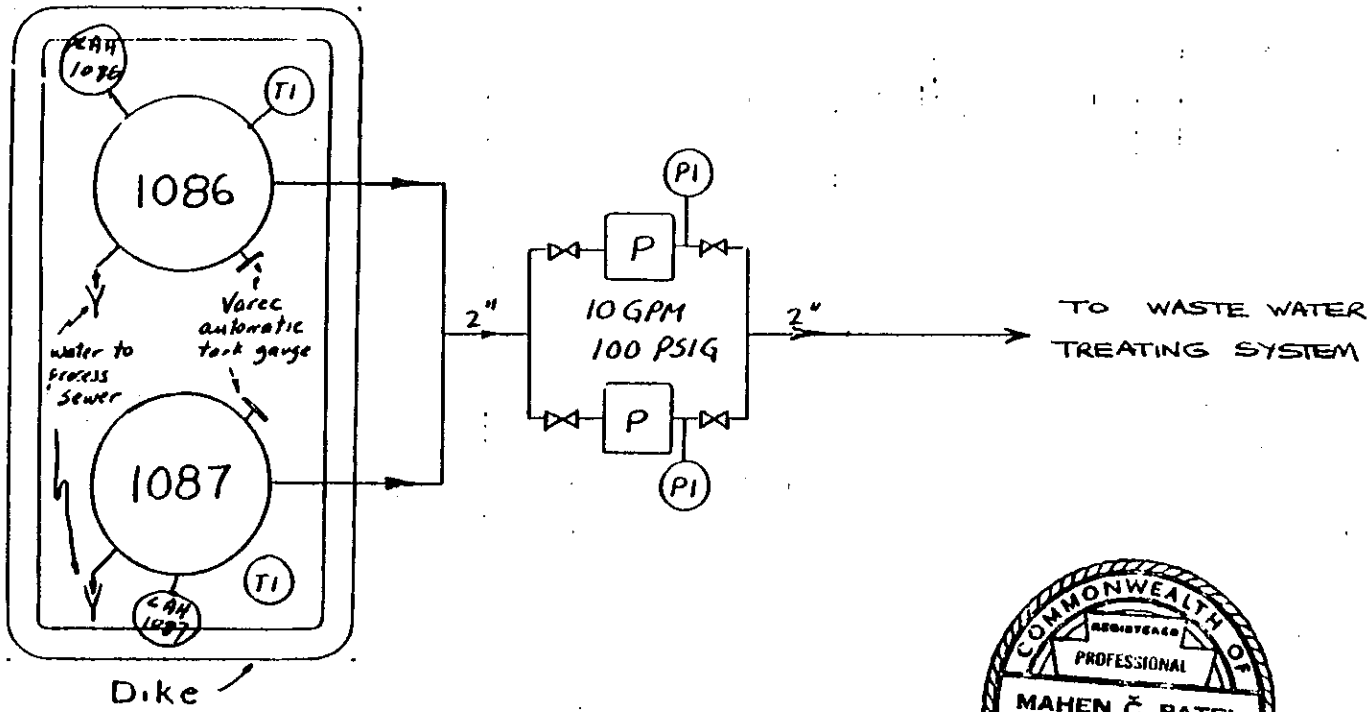
Spent caustic (D002) is generated from the various refinery caustic treating facilities. The hazardous characteristic is corrosivity. Figure 7 is a flow diagram which illustrates the spent caustic system at the facility. Spent caustic is stored in Tanks 1086 and 1087 (SWMUs 23 and 24). Spent caustic is sometimes stored in the Container Storage Areas (SWMU 10). Spent caustic is normally discharged to the Wastewater Treatment System (SWMUs 46 to 70); however, at times it is disposed off-site. Approximately 7,000 tons are generated annually (Reference 61).

Process heater slag (D004 and D007) is generated from cleaning the residue from a crude unit process heater. The hazardous characteristic is toxicity (arsenic and hexavalent chromium). This waste is normally stored in the Container Storage Area (SWMU 10) and disposed off-site. Approximately 30 tons are generated annually (Reference 61).

Figure 7:
Spent Caustic System (Source: Reference 61)

Date : 6/30/87
Revision No :
2

SPENT CAUSTIC SYSTEM



COMMONWEALTH OF PENNSYLVANIA
REGISTERED PROFESSIONAL
MAHEN C. PATEL
ENGINEER
31168-E

Mahen C Patel
7/1/87

III-12

2.531bh

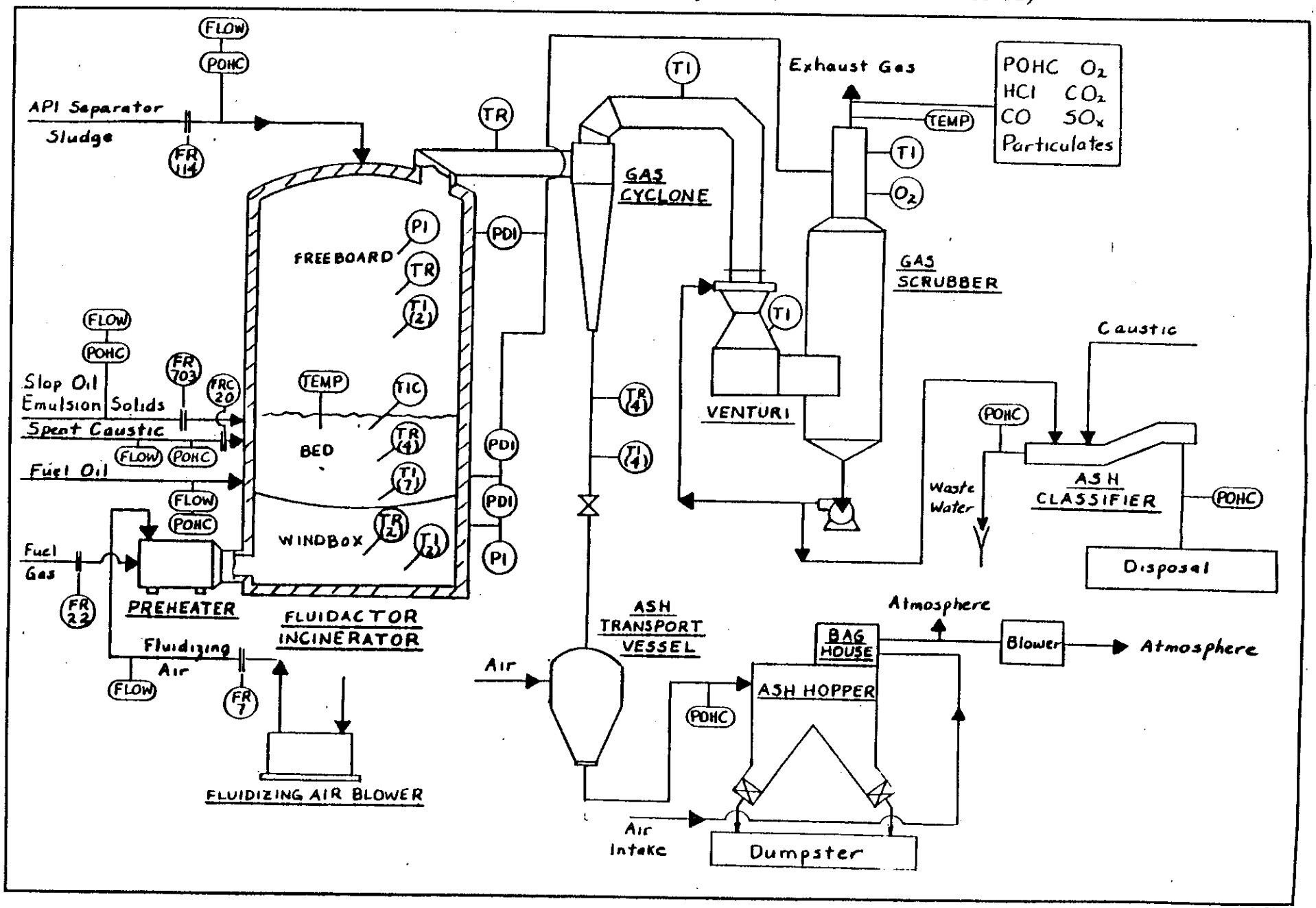
Fluoride sludge (D002) is generated during the shutdown of the Alkylation Unit. The hazardous characteristic is corrosivity. This waste is normally stored in Tank 388 (East and West Basin) (SWMU 41), but at times it is stored in the Container Storage Area (SWMU 10). Approximately 400 tons are generated annually (Reference 61).

Spent activated alumina (D002) is generated when super heated propane passes through defluorinators which are filled with activated alumina. The hazardous characteristic is corrosivity. The waste is stored in the Container Storage Area (SWMU 10). Approximately 41 tons are generated annually (Reference 61).

The Sludge Incinerator (Unit No. 8832) (SWMUs 33 to 40) at the facility is a fluidized bed combuster and is designed to receive API separator sludge (K051), slop oil emulsion solids (K049), spent caustic (D002), nonhazardous bio and alum sludges and oily tank bottoms. Figure 8 is a flow diagram of the incinerator system. The unit receives API separator sludge from Tank 1163 (T-100) (SWMU 42) and bio-alum sludge from Tank 104 (SWMU 31) through a common nozzle. Slop oil emulsion solids from Tanks 1004 and 1005 (SWMUs 18 and 19) are charged to the Fluidactor (SWMU 33) through dedicated nozzles. The incinerator was designed to process spent caustic from Tanks 1086 and 1087 (SWMUs 23 and 24); however, the refinery currently discharges this waste to the wastewater treatment system. Oil tank bottoms from Tank 102 (SWMU 98) are received through the oily sludge nozzles.

The main component of the incinerator system is the fluidactor or incinerator vessel. The system also includes the Bag House (SWMU 38), the Gas Cyclone (SWMU 34), the Ash Transport Vessel (SWMU 36), the Ash Hopper (SWMU 40), the Ash Dumpster (SWMU 39), and the Venturi Scrubber (SWMU 35). The Fluidactor (SWMU 33) is a refractory-lined steel vessel with a dome roof and a flat bottom, and is divided into three zones, the windbox, the bed and the freeboard. During the incineration operation, combustion air supplied by the blower enters the windbox of the fluidactor and passes through the bed of granular material. The freeboard acts as a disengagement zone for the particles that are carried from the bed, which are separated from the upward gas flow before being discharged (Reference 61).

ure 8:
Flow Diagram Of The Incinerator System (Source: Reference 61)



9.531bh

The operating temperatures in the bed and freeboard are 1250 to 1400°F. The roof contains a large duct for the passage of the combustion products. The gas is routed to the Gas Cyclone (SWMU 34) and the Venturi Scrubber (SWMU 35) before being exhausted to the atmosphere (Reference 61).

In the Gas Cyclone (SWMU 34), the gases are spun and the centrifugal pull forces the ash particles to the outside shell where they slide down to the tip of the cone. This unit removes ash particles from the combustion gases. These ash particles are removed from the bottom and transferred into the Ash Transport Vessel (SWMU 36). The ash is then pressured with air into the Ash Hopper (SWMU 40) for disposal. The Ash Hopper (SWMU 40) and the Ash Dumpster (SWMU 39) are connected to a Bag House (SWMU 38) to reduce the particle emission when dumping the ash. The combustion gas that leaves the Gas Cyclone (SWMU 34) is treated in the Venturi Scrubber (SWMU 35). The gases first pass through a throat where the velocity is increased. Water is also passed through this unit and is broken up into finely divided droplets to separate dust particles from the combustion gases. The trapped dust particles are removed as a water–ash slurry. The water–ash slurry is separated from the gases in the scrubber separator section of the unit, which has a continuous oxygen analyzer. The slurry is pumped from this unit to Tank 388 (East and West Basin) (SWMU 41) from where the water is drained to the sewer and the wet ash is disposed off–site (Reference 61).

Incinerator ash (K049 and K051) is generated by incineration of slop oil emulsion solids (K049), API separator sludge (K051), a bio–alum sludge and oily tank bottoms. This ash is considered hazardous because it is a residue of listed hazardous waste. Approximately 5,000 tons of ash is generated annually which includes 4,825 tons of dry ash and 175 tons of wet ash. The dry ash is removed from the Gas Cyclone (SWMU 34) and transferred to the Ash Dumpster (SWMU 39) for disposal off–site. The wet ash is generated from wet scrubbing of the combustion gases that leave the Gas Cyclone (SWMU 34) and are treated in the Venturi Scrubber (SWMU 35). This wet ash is pumped to Tank 388 (East and West Basin) (SWMU 41), where the water is drained to the sewer and the wet ash is disposed off–site (Reference 61).

The Part B application submitted in 1983 states that there are four separate sewer systems at the Chevron refinery: (1) a sanitary sewer, (2) once through cooling water sewer, (3) Process Water Pipes (SWMU 63), and (4) storm water sewers. Figure 9 shows the estimated flows to the Wastewater Treatment Plant from all the process water sewer units.

The facility's Wastewater Treatment System (SWMUs 46 to 70) treats various wastewater streams generated on the refinery through a 6 stage process shown in Figure 10. The six unit operations outlined in the Part B permit application submitted in 1987 are:

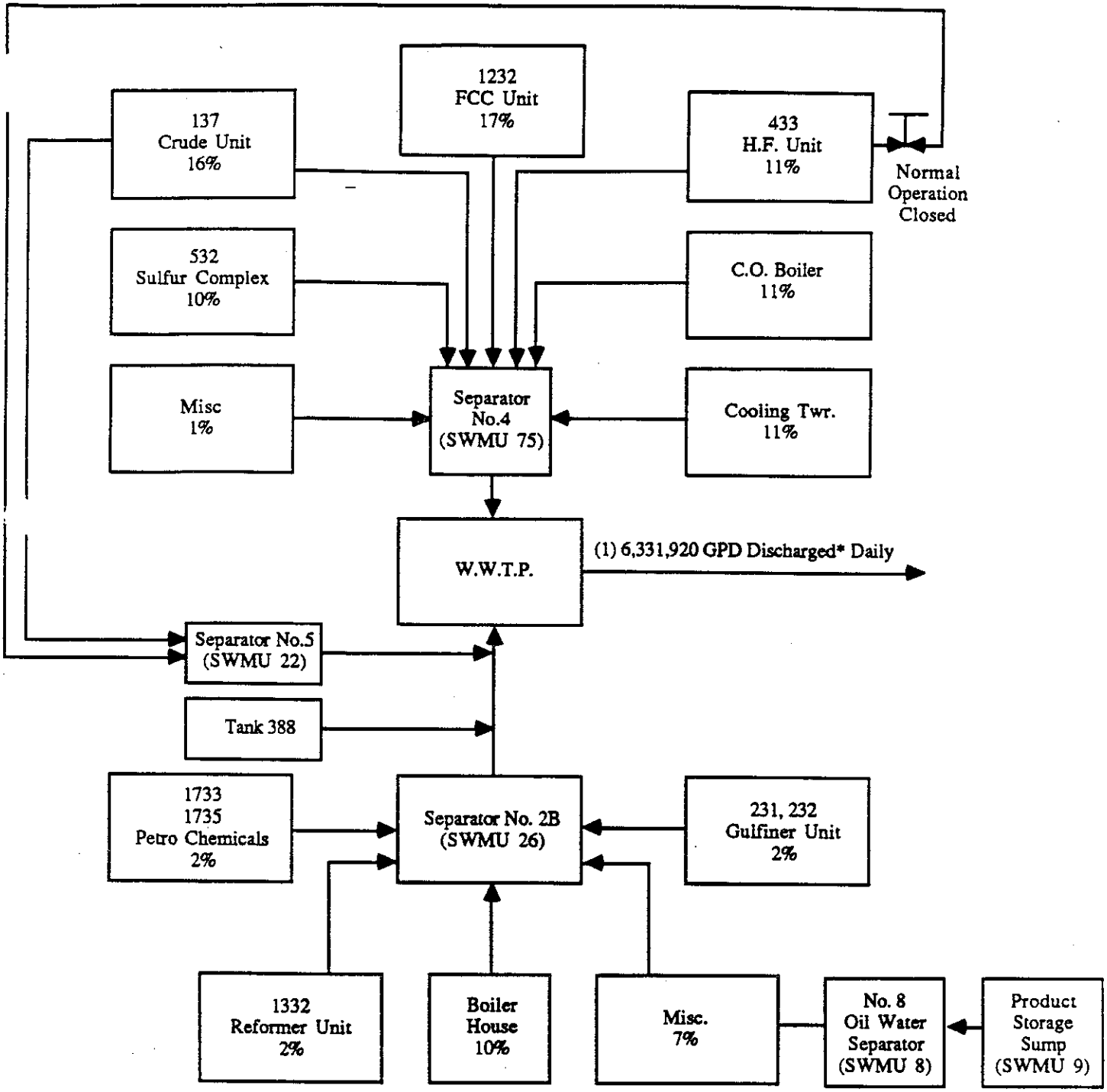
1) Primary separation in API separators
2) Primary filtration in roughing filters
3) Primary clarification
4) Aerobic treatment in oxidation tanks
5) Final clarification
6) Final filtration in sand filters

Four API separators, Separator No. 4A (SWMU 75), Separator No. 2B (SWMU 26), Separator No. 5 (SWMU 22) and Separator No. 8 (SWMU 8) feed into the wastewater treatment plant. As can be seen in Figure 10, wastewater enters the system at two locations. Forty percent of the feed passes through all six stages. This wastewater is from Separators 2B, 5 and 8 (SWMUs 26, 22 and 8). The remaining 60% of the wastewater which comes from Separator No. 4A (SWMU 75) bypasses the primary filtration and clarification stage. Separator 4A (SWMU 75) is larger than Separators 2B, 5, and 8 (SWMUs 26, 22, and 8). The large size increases residence time allowing more biodegradation, which according to the facility, eliminates the need for primary filtration and clarification. Spent caustic (D002) from Tanks 1086 and 1087 (SWMUs 23 and 24), and heater exchanger bundle cleaning sludge (K050) are discharged directly to 1146 and 1147 Roughing Tanks (SWMUs 46 and 47).

Wastewater from Separator 2B, 5, and 8 (SWMUs 26, 22, and 8) first enters the 1146 and 1147 Roughing Filters (SWMUs 46 and 47). These active primary filters reduce the biological oxygen demand (BOD) of the wastewater. The wastewater then passes through the 1140 and 1141 Primary Clarifiers (SWMUs 48 and 49). Here the

Figure 3.

Estimated Flows To WWTU From All Process Units
(Source: Ref. 66)

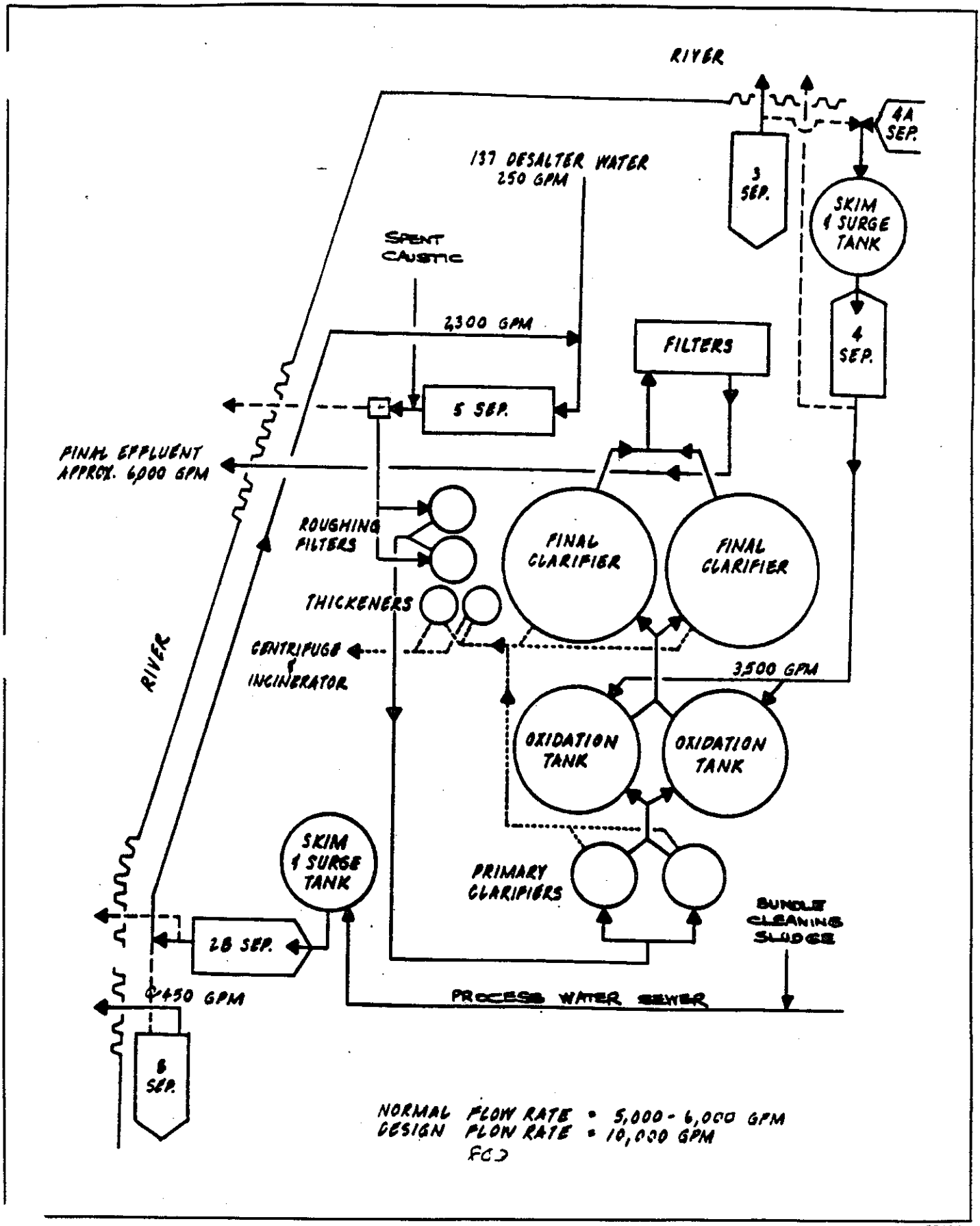


NOTE - **All percentages are approximate contributions to total influent load to the waste water treating plant**

* - **Does not include non-contact cooling water, uncontaminated storm water run-off, Schuylkill River Tank Farm and Darby Creek Tank Farm discharges**

(1) - **May, 1987 to April, 1988 time period used for obtaining avg. GPD discharged**

Figure 10:
Chevron's Wastewater Treatment System (Source: Reference 61)



4.531bh

particulate matter settles out. The wastewater then passes to the 1142 and 1143 Oxidation Tanks (SWMUs 50 and 51). The wastewater from Separator 4A (SWMU 75) is also discharged to these tanks. In these tanks major BOD reduction occurs when the oxygen is transferred to the waste in the presence of recirculated activated sludge. According to the facility, the pH, dissolved oxygen and nutrient content are controlled in these tanks. The wastewater then goes to the 1148 and 1149 Final Clarifiers (SWMUs 52 and 53) where there is further particulate settling. The wastewater then passes through the Wastewater Sump (SWMU 62) and then to the 8 Tertiary Sand Filters (SWMUs 54 to 61) and is then discharged to a Wastewater Sump (SWMU 62). This sump has a dual purpose. It receives wastewater from the 1148 and 1149 Final Clarifiers (SWMUs 52 and 53) and discharges the wastewater to the 8 Tertiary Sand Filters (SWMUs 54 to 61) and receives the wastewater back from the sand filters with subsequent discharge to the Schuylkill River. This unit has two compartments thus preventing the comingling of the wastewater streams. The solids that precipitate out of the 1146 and 1147 Roughing Filters (SWMUs 46 and 47), 1140 and 1141 Primary Clarifiers (SWMUs 48 and 49) and 1148 and 1149 Final Clarifiers (SWMUs 52 and 53) are discharged to 1144 and 1145 Thickeners (SWMUs 64 and 65), where the water is removed and returned to the 1146 and 1147 Roughing Filters (SWMUs 46 and 47). The solids are discharged to five Centrifuges (SWMUs 66 to 70) and then stored in Tank 1163 (T-100) (SWMU 42) before being incinerated.

History of Release

Releases of pollutants to groundwater, air, soil and surface water from the Chevron facility are documented in regulatory file material. The following is a chronology of specific documented releases at the facility:

October 8, 1980 — A ground pipeline carrying Tank 137's tank bottoms developed a leak due to external corrosion. Approximately 30 gallons of oil entered the Schuylkill River through the bulkhead. A SLIK - bar spill boom was deployed to contain the spill. The oil contaminated spill boom was taken off site by vacuum trucks. The leaking line was reportedly replaced (Reference 46).

March 12, 1981 — A spill of 2,000 barrels of slop oil emulsion solids (K049) occurred at Tank 317 (SWMU 15) pumphouse because the tank water draw off valve was left open. The facility reported that a majority of the spill flowed directly to a process sewer for recovery and vacuum trucks were used to remove the residue (Reference 37).

April 16, 1986 — A spill of 50 to 75 gallons of caustic (D002) occurred during the pumping of spent caustic to the hazardous waste storage tanks. The facility reportedly removed the spilled material and discharged it to the refinery Wastewater Treatment System (SWMUs 46 to 70). The facility flushed the residue on the ground with water and discharged to the refinery process sewer (Reference 22).

September 9, 1986 — A spill of 2,000 lbs. of spent caustic (D002) occurred during the pumping of spent caustic to the hazardous waste storage tanks. The facility reportedly discharged the material to the refinery Wastewater Treatment System (SWMUs 46 to 70) and the residue was flushed with water and discharged to the process sewer (Reference 21).

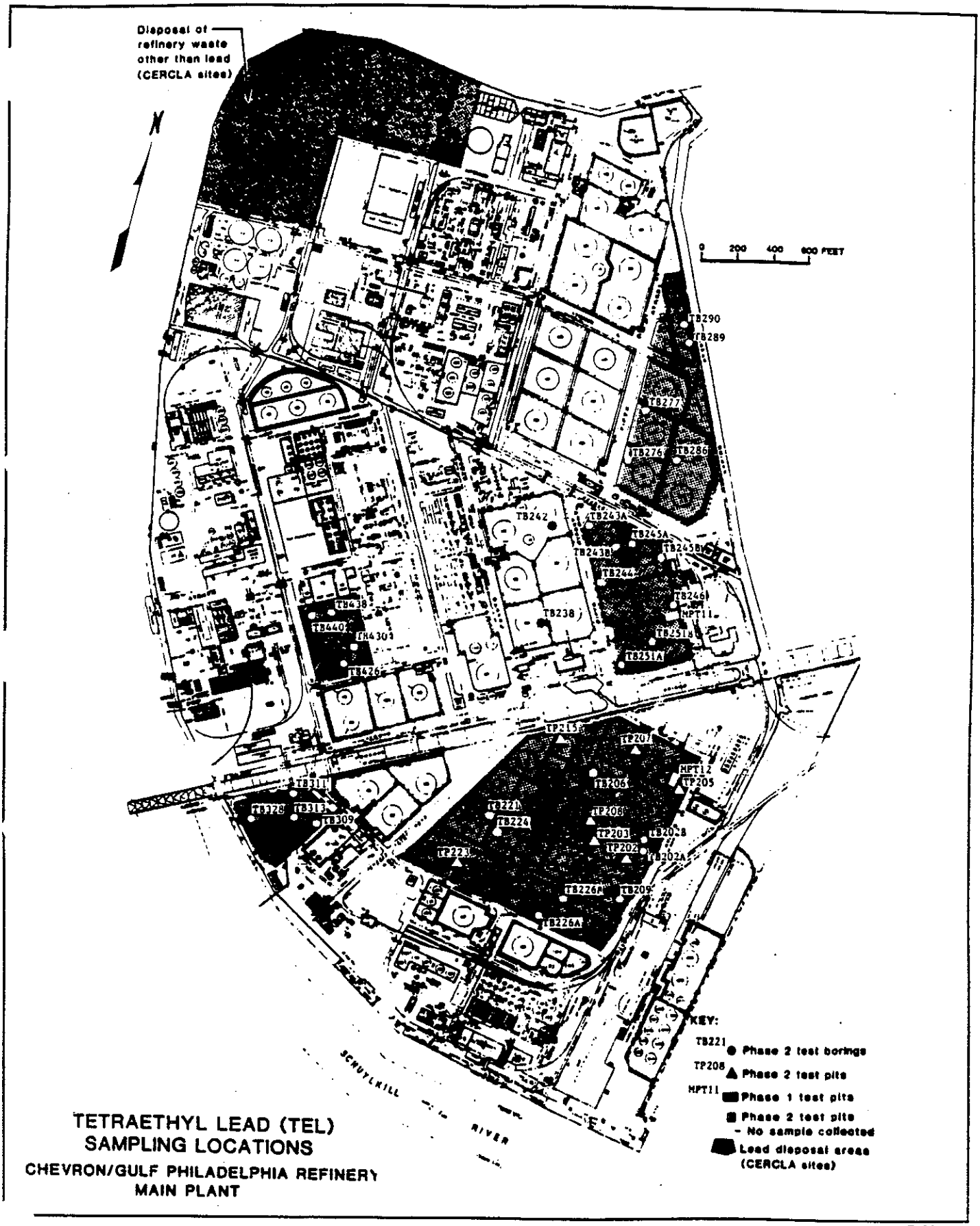
March 7, 1988 — A spill of 6,750 lbs. of cumene (isopropyl benzene) occurred when a line was improperly isolated and secured for works. The cumene was released when the valve for the line was opened from the open flanged connection. The facility reportedly removed the spilled cumene from the site by a vacuum truck and after the soil had been removed, the facility took a composite sample to determine if further soil removal was required (Reference 14). The results of this analysis were not made available prior to submission of this report.

Groundwater contamination has been detected at the facility. On April 25, 1985 a memorandum from Marilyn Hewitt, PaDER, to Larry Lunsk, PaDER, stated that during PaDER's site investigation of the Chevron facility, several backhoe pits were dug in the lower (eastern) and higher (western) sections of the site. The groundwater was reported by Ms. Hewitt to be visually contaminated with a "black oil scum" (Reference 39). The samples collected indicate elevated levels of Fe, Mn, SO_4, total dissolved solids, NH_3-N and COD (Reference 39). A GC/MS scan detected 21 parts per billion (ppb) of chloroethene (vinyl chloride monomer) a highly toxic contaminant.

The facility reported the presence of recoverable oil floating on the groundwater at several locations. Recoverable oil was reported in the main plant including the terminal area and along the ARCO pipelines which parallel the Penrose Avenue Bridge (Reference 68). Information on the magnitude of the pipeline leak or extent of contamination of subsurface oil is not known (Reference 68). It was reported that most of these hydrocarbons at the facility are less dense than water (Reference 67). In addition, the facility notified USEPA in 1981 of eight Comprehensive Environmental Response Compensation and Liability Act (CERCLA) sites. These sites are due to the historical practice of disposal of leaded tank bottoms on site and are outlined in Figure 11. These sites contain oily solids and heavy metals (Reference 69). The wastes disposed at these sites are characterized as K049, K051, and K052 (Reference 69).

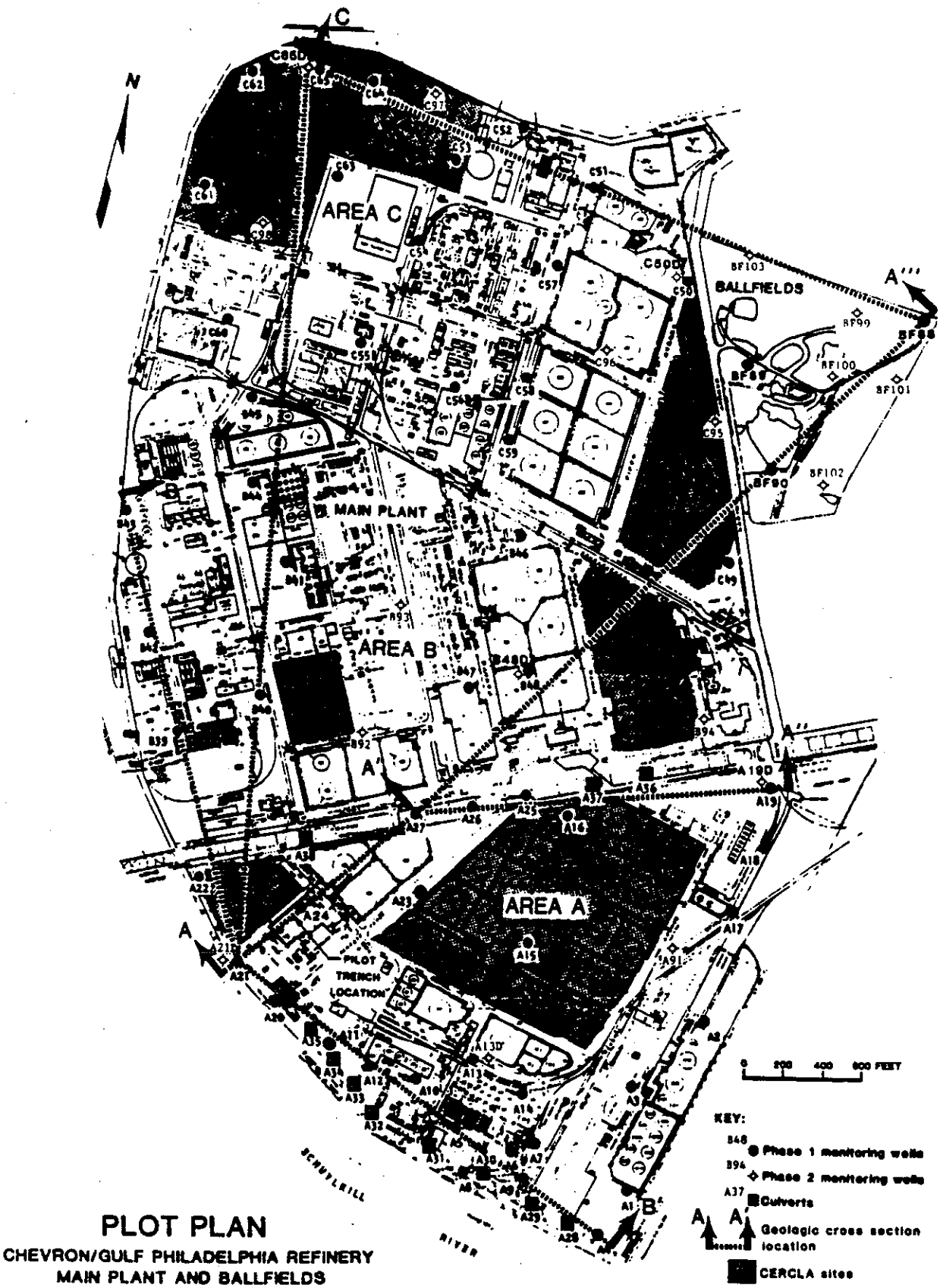
The facility installed 78 groundwater monitoring wells as part of a site assessment in 1987 in the locations shown in Figure 12 (Reference 67). The explosimeter readings (100 percent LEL) measured in many of the wells were high and suggest the presence of either low molecular weight organic compounds (e.g., methane) or dissolved volatile organic compounds. In addition, free product was encountered in 17 wells at the facility (Reference 67). The wells were not sampled for other parameters; therefore, the groundwater quality of the upper or lower aquifer is not well understood (Reference 69).

Figure 11:
High Lead Areas At The Chevron Facility (Source: Reference 67)



7.531bh

Figure 12:
Location Of Monitoring Wells At The Chevron Facility (Source: Reference 67)



PLOT PLAN
CHEVRON/GULF PHILADELPHIA REFINERY
MAIN PLANT AND BALLFIELDS

8.531bh

The facility has also conducted an investigation in the Ballfields area (References 72 and 73). This investigation indicated that there were two mounds, the Area A Ballfields (SWMU 96) and the Area B Ballfields (SWMU 97) which contain contaminated soil. These mounds are areas of waste disposal. The Area A Ballfields (SWMU 96) sample results indicated elevated levels of base neutrals extractable organics, total cyanide, total phenols and volatile organics (Reference 73). The Area B Ballfields (SWMU 97) sample results indicated elevated levels of base neutrals extractable organics, volatile organics, total petroleum hydrocarbons, metals and cyanide (Reference 72).

The facility conducted a study to evaluate tetraethyl lead soil contamination. The results are in Attachment B. These soil sampling results indicate elevated levels of lead at many areas at the facility (Reference 67). The lead concentration was reported as high as 17,000 ppm (Reference 67). The facility resampled some of the lead-contaminated areas; the results, which are provided in Attachment C, confirmed lead contamination at the facility. The results indicate nine areas (SWMUs 87 to 95) where there is buried lead sludge. Based on these results, the facility has identified seven areas of high lead concentration or "hot spots" and have delineated them for health reasons (Reference 66). At five of these "hot spots," lead disposal practices appear to be shallow (two to four feet) burial (Reference 66). At the other two sites, the lead sludge was in the past applied to the ground surface. In 1988, the facility surficially cleaned these sites (Reference 66).

Minor seepage to the Schuylkill River is occurring in the southeast part of the bulkhead in the terminal area. The source of the seepage has not yet been identified. Jet fuel, lube oils, gasoline and #2 oil are reported to be in this seepage (Reference 68). The facility has started construction of a slurry wall in an attempt to mitigate the seepage (Reference 66).

Table 2 is a list of SWMUs identified at the Chevron facility for this Phase II RFA report. Figure 13 is a site plan of the facility, indicating locations of the solid waste management units (SWMUs) identified in this report.

TABLE 2

SOLID WASTE MANAGEMENT UNITS

1. Empty Lube Oil Drum Storage Area
2. Empty Lube Area Sump
3. Terminal Buried Oil/Water Separator 516
4. Terminal Buried Oil/Water Separator 16
5. Buried No. 110 Separator
6. Trash Incinerator
7. Waste Oil Treatment Unit
8. No. 8 Oil/Water Separator
9. Product Storage Sump
10. Container Storage Area
11. Past Lagoon A
12. Previous Acid Unit
13. Tank 355
14. Waste Oil Drum Storage Area
15. Tank 317
16. Tank 357
17. Tank 358
18. Incinerator Feed Tank 1004
19. Incinerator Feed Tank 1005
20. No. 7 Separator
21. No. 6 Separator (Tank No. 599)
22. Separator No. 5
23. Tank 1086
24. Tank 1087
25. Former No. 2 Separator
26. Separator No. 2B
27. Separator No. 2A
28. Tank 200 (Separator No. 844)
29. Tank 200 Past Lagoon
30. Additive Plant Drum Storage Area
31. Tank 104
32. Tank 103 (Tank 1166)
33. Fluidactor
34. Gas Cyclone
35. Venturi Scrubber
36. Ash Transport Vessel
37. Ash Classifier
38. Bag House
39. Ash Dumpster
40. Ash Hopper
41. Tank 388 (East and West Basin)
42. Tank 1163 (T-100)
43. T-100 Double-Basket Strainer
44. T-100 Dumpster
45. Empty Drum Storage Area
46. 1146 Roughing Filter
47. 1147 Roughing Filter
48. 1140 Primary Clarifier
49. 1141 Primary Clarifier
50. 1142 Oxidation Tank

TABLE 2 (continued)

SOLID WASTE MANAGEMENT UNITS

51. 1143 Oxidation Tank
52. 1148 Final Clarifier
53. 1149 Final Clarifier
54. Tertiary Sand Filter 1
55. Tertiary Sand Filter 2
56. Tertiary Sand Filter 3
57. Tertiary Sand Filter 4
58. Tertiary Sand Filter 5
59. Tertiary Sand Filter 6
60. Tertiary Sand Filter 7
61. Tertiary Sand Filter 8
62. Wastewater Sump
63. Process Wastewater Pipes
64. 1144 Thickener
65. 1145 Thickener
66. Centrifuge 1
67. Centrifuge 2
68. Centrifuge 3
69. Centrifuge 4
70. Centrifuge 5
71. Past Lagoon B
72. Bundle Cleaning Area
73. Old Bundle Cleaning Area
74. Separator No. 4B
75. Separator No. 4A
76. Separator No. 3
77. Separator No. 4
78. Tank 400
79. Drum Storage Area
80. Asbestos Storage Area
81. Petrochemical Loading Area
82. Lube Oil Unloading Area
83. Agent Unloading Area
84. WEMCO Unloading Area
85. Oldest Loading Area
86. Spent Caustic Loading Area
87. Buried Lead Sludge Area 1
88. Buried Lead Sludge Area 2
89. Buried Lead Sludge Area 3
90. Buried Lead Sludge Area 4
91. Buried Lead Sludge Area 5
92. Buried Lead Sludge Area 6
93. Buried Lead Sludge Area 7
94. Buried Lead Sludge Area 8
95. Buried Lead Sludge Area 9
96. Area A Ballfield
97. Area B Ballfield
98. Tank 102
99. Trash Dumpsters
100. Process Lines and Sumps
101. Bulkhead Seepage Area

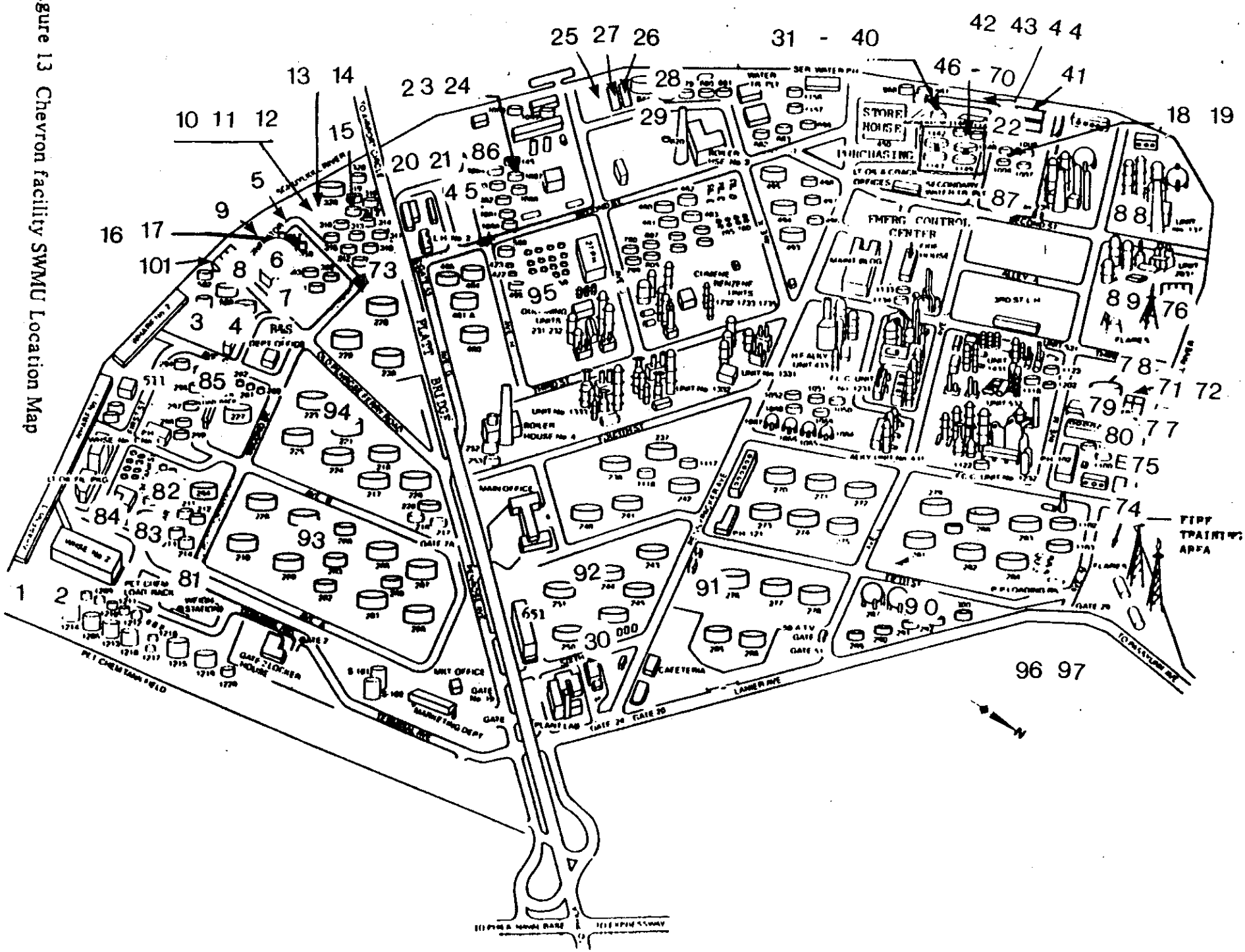


Figure 13 Chevron facility SWMU Location Map

IV. DESCRIPTION OF SOLID WASTE MANAGEMENT UNITS

1. UNIT NAME: Empty Lube Drum Storage Area (Photographs 1.1 and 1.2)

Unit Description: This unit is located east of Warehouse No. 2 in the southeastern part of the facility. East of this unit on the east side of the Chevron property line fence is a scrap yard used by the City of Philadelphia. The Empty Lube Drum Storage Area (SWMU 1) is underlain by gravel and has approximate dimensions of 100 feet by 100 feet and does not have a containment system. Drums were placed on gravel. Trucks were used to bring empty lube oil drums to this unit and the drums later were sent to a reclaimer.

Date of Start-Up: This unit was constructed in 1967.

Date of Closure: This unit was not used after mid-1987.

Waste Managed: This unit stored empty lube oil drums.

Release Controls: The spills and surface run-off from this unit are discharged to Empty Lube Drum Sump (SWMU 2).

History of Releases: During the VSI, oil stains were observed on the gravel. Drum caps were observed throughout the area.

References: 66

0107x

2. UNIT NAME: Empty Lube Area Sump (Photograph 2.)

Unit Description: This unit is a sump located east of Warehouse No. 2 in the southeastern part of the facility. Empty Lube Area Sump is constructed of concrete with a 6 inch high concrete berm and is 4 feet by 4 feet. The unit received spillage and runoff from the Empty Lube Drum Storage Area (SWMU 1). The waste from this unit flows to the wastewater treatment system via an underground pipeline. At the time of the VSI, the sump was surrounded by standing water, presumably from recent rains.

Date of Start-Up: This unit was constructed in 1967.

Date of Closure: This unit is active but has reportedly not received spillage from the Empty Lube Drum Storage Area (SWMU 1) since mid-1987.

Waste Managed: This unit received spillage and run-off containing lube oil.

Release Controls: This unit is constructed of concrete with a 6-inch high concrete berm.

History of Releases: During the VSI, oil stains was observed on the concrete berm and soil surrounding the unit.

References: 66

3. UNIT NAME: Terminal Buried Oil/Water Separator 516 (Photograph 3.)

Unit Description: This buried unit is located east of Tank 509 and south of Terminal Buried Oil/Water Separator 16 (SWMU 4) in the southern part of the facility. Terminal Buried Oil/Water Separator 516 (SWMU 3) is 101 feet long, 30 feet wide and 7 feet deep and is constructed of steel plates and is caulked inside and out. The unit was located in-ground when it was operational and received wastewater from the terminal area. The water was discharged directly to the Schuylkill River. The oil phase was skimmed and taken to Waste Oil Treatment Unit (SWMU 7). This unit was filled in and gravel now covers the unit.

Date of Start-Up: This unit began operation in approximately in 1936.

Date of Closure: This unit is inactive and was buried some time in the late 1960s.

Waste Managed: This unit received wastewater form the terminal area of the facility which contains the loading areas for petrochemicals, gasoline and lube oils, a package and grease plant, marine loading dock, and attendant tankage and piping. The petrochemicals manufactured by the facility include cumene (isopropyl benzene), benzene, toluene and xylene. Lead and unleaded gasoline have been produced by the facility.

Release Controls: This unit is constructed of steel with caulking. No other release controls are known for this unit.

History of Releases: This unit was not observed during the VSI because it was buried. However, when the unit was active, it discharged directly to the Schuylkill River.

References: 66, 71

4. UNIT NAME: Terminal Buried Oil/Water Separator 16 (Photograph 4.)

Unit Description: The buried unit is located east of Tank 509 and north of Terminal Buried Oil/Water Separator 516 (SWMU 3) in the southern part of the facility. This unit is approximately 90 feet long, 20 feet wide and 14 feet deep. All sides of the separator are constructed of 3-ply roofing paper and coated with asphaltium. Terminal Buried Oil/Water Separator 16 (SWMU 4) was located in-ground when it was operational and received wastewater from the terminal area. The water was discharged directly to the Schuylkill River. The oil phase was skimmed and taken to Waste Oil Treatment Unit (SWMU 7). This unit was filled in and is now covered with gravel.

Date of Start-Up: This unit began operation in approximately in 1924.

Date of Closure: This unit is inactive and was buried in in the late 1960s.

Waste Managed: This unit received wastewater from the terminal area of the facility which contains the loading areas for petrochemicals, gasoline and lube oils, a package and grease plant, marine loading dock, and attendant tankage and piping. The petrochemicals manufactured by the facility include cumene (isopropyl benzene), benzene, toluene and xylene. Lead and unleaded gasoline have been produced by the facility.

Release Controls: This unit is constructed of roofing paper. No other release controls are known for this unit.

History of Releases: This unit was not observed during the VSI because it was buried. However, when the unit was active, it discharged directly to the Schuylkill River.

References: 66, 71

5. UNIT NAME: Buried No. 110 Separator (Photographs 5.1 and 5.2)

Unit Description: This buried separator is located southwest of the Trash Incinerator (SWMU 6) in the southern part of the facility, 11 feet from the outside of the bulk head sheet piling. The unit is 100 feet long, 40 feet wide, and 12 1/2 feet deep. This unit is constructed of wood and is surrounded by 2 1/2 feet of clay fill. The floor of the separator is reportedly covered by eroded bags of cement with concrete fillings. Buried No.110 Separator (SWMU 5) was located in ground when it was in operation. This unit received wastewater from the terminal area. The water was discharged directly to the Schuylkill River. The oil phase was skimmed and taken to Waste Oil Treatment Unit (SWMU 7). This unit was filled in and is now covered with gravel.

Date of Start-Up: This unit began operations in approximately 1927.

Date of Closure: The unit was buried sometime in 1967.

Waste Managed: This unit received wastewater from the terminal area of the facility which contains the loading areas for petrochemicals, gasoline and lube oils, a package and grease plant, marine loading dock, and attendant tankage and piping. The petrochemicals manufactured by the facility include cumene (isopropyl benezene), benzene, toluene and xylene. Lead and unleaded gasoline have been produced by the facility.

Release Controls: This unit is constructed of wood. No other release controls are known for this unit.

History of Releases: This unit was not observed during the VSI because it was buried. However, when the unit was active, it discharged directly to the Schuylkill River.

References: 66, 71

6. UNIT NAME: Trash Incinerator (Photographs 6.1 and 6.2)

Unit Description: This inactive unit is located west of Second Street and east of Tanks 357 and 358 (SWMUs 16 and 17) in the southern part of the facility. The waste was put into a conveyor, which moved the waste to the main flame of the incinerator. Ash was removed by an ash hopper. The feed end and the main frame of the incinerator are located on a concrete pad. This unit is surrounded by gravel. The facility did not provide information concerning whether this unit operated under an air permit in time for this report.

Date of Start-Up: The date of start-up for this unit is not known.

Date of Closure: This unit stopped operation in approximately 1974.

Waste Managed: This unit incinerated oily sludges, tank bottoms, and paper.

Release Controls: This unit is aboveground and is located partially on concrete and on gravel.

History of Releases: During the VSI, oil stains were observed on the gravel next to this unit and residues were noted to be on a portion of the conveyor system.

References: 66

7. UNIT NAME: Waste Oil Treatment Unit (Photograph 7.)

Unit Description: The inactive unit is located west of Old Penrose Ferry Road and east of the Trash Incinerator (SWMU 6) in the southern part of the facility. The Waste Oil Treatement Unit (SWMU 7) is a horizontal enclosed tank approximately 40 feet long and 10 feet in diameter. This unit is constructed of steel and is mounted on a concrete block within a concrete curbed area. The unit was used to recover oil by gravity settling. This unit received waste from the skimmings from the separators. The waste oil sludges from this unit were pumped to the Trash Incinerator (SWMU 6). According to facility representatives, residues have been removed from the unit and incinerated. At the time of the VSI, the containment area was full of standing water, apparently rainwater.

Date of Start-Up: The date of start-up for this unit is not known.

Date of Closure: This unit stopped operations sometime in 1970.

Waste Managed: This unit managed waste oily sludges.

Release Controls: This unit is aboveground and is located on a concrete pad with an approximate 8-inch high curb.

History of Releases: During the VSI, oil stains were observed on the concrete pad within the containment area.

References: 66

8. UNIT NAME: No. 8 Oil/Water Separator (Photograph 8.)

Unit Description: The in-ground unit is located on the south side of Old Penrose Ferry Road, southeast of the Trash Incinerator (SWMU 6) in the southern part of the facility. This unit is approximately 151 feet long, 79 feet wide and 4 feet deep. No. 8 Oil/Water Separator (SWMU 8) is constructed of steel sheet pilings and is underlain by concrete. This unit receives process water from the Product Storage Sump (SWMU 9) in the Terminal Area. The oil is skimmed from this unit and taken to Tank 355. This unit is permitted by the City of Philadelphia, Air Management Services for its air emissions.

Date of Start-Up: This unit began operation in approximately 1955.

Date of Closure: This unit is currently active.

Waste Managed: This unit receives process water from the Product Storage Sump (SWMU 9) which receives run-off from the a product storage area. This area stores gasoline, petrochemicals, home heating oil, and jet fuel.

Release Controls: This unit is constructed of steel underlain by concrete, and is equipped with baffles for oil retention.

History of Releases: This separator discharges to the Schuylkill River at NPDES Outfall 014. The facility has reported to PaDER several times for exceeding the NPDES permit requirements for lead, oil and grease, zinc and total organic content at this outfall.

References: 51, 66, 71

9. UNIT NAME: Product Storage Sump (Photographs 9.1 and 9.2)

Unit Description: This concrete sump is located west of No. 8 Oil/Water Separator (SWMU 8) and is approximately 10 feet by 10 feet and 15 feet deep. Product Storage Sump (SWMU 9) receives runoff from the product storage area of the terminal area and discharges this wastewater to the No. 8 Oil/Water Separator (SWMU 8).

Date of Start-Up: This unit began operation in 1977.

Date of Closure: This unit is currently active.

Waste Managed: This unit receives runoff from the product storage area. This area stores gasoline, petrochemicals, home heating oil and jet fuel.

Release Controls: This unit is constructed of concrete with a control level.

History of Releases: During the VSI, oil stains were observed around the unit at various locations.

References: 66

10. UNIT NAME: Container Storage Area (Photographs 10.1, 10.2 and 10.3)

Unit Description: The Container Storage Area (SWMU 10) is located at the southern portion of the refinery near Slop Oil Treating Tanks Nos. 355, 357 and 358 (SWMUs 13, 16 and 17) off Avenue E. This unit was built on the Past Lagoon (SWMU 11). This unit is permitted to contain a maximum of 500 drums and 10 roll-off containers and its dimension is approximately 100 feet by 75 feet. The Container Storage Area (SWMU 10) is underlain by a concrete pad and surrounded by a fence. The unit drains to a process sewer which drains to the wastewater treatment system. This area was upgraded to include secondary containment and a concrete pad in 1985. Prior to the concrete pad the containers were located on gravel. The facility has included this unit in their Part B permit application.

Date of Start-Up: This unit began operation in approximately 1980.

Date of Closure: This unit is currently active.

Waste Managed: The wastes stored here include slop oil emission solids (K049 and D001), heat exchanger bundle cleaning sludge (K050), spent caustic (D002), incinerator ash (K049 and K051), spent activated aluminum (D002), fluoride sludge (D002), process heater slag (D004 and D007), leaded tank bottoms (K052), and API separator sludge (K051).

Release Controls: The drums are stored on wooden pallets. The secondary containment system was installed in 1985 and consists of a 6-inch concrete curb. The concrete pad underlying the unit drains to the process sewer. The flow control valve to the sewer is normally in a closed position.

History of Releases: No evidence of release was noted in the file material or during the VSI.

References: 61, 66

11. UNIT NAME: Past Lagoon (Photograph 11.)

Unit Description: The Past Lagoon (SWMU 11) is located in the southern portion of the refinery underneath the Container Storage Area (SWMU 10). This unlined unit's dimensions were approximately 200 feet by 100 feet and was used to separate and recover oil. The oil was pumped off the top and solids were left in the unit. This unit was constructed on a Previous Acid Unit (SWMU 12). The wastes were left in place, and Container Storage Area (SWMU 10) was built on top of it. The origin of the wastes brought to this unit is not known by facility representatives.

Date of Start-Up: The date of start-up for this unit is unknown but was started after 1946.

Date of Closure: This unit stopped receiving wastes in 1979.

Waste Managed: This unit received oil bottoms, tank bottoms, and fuel tank bottoms.

Release Controls: There are no known release controls.

History of Releases: This unit was not observed during the VSI because it is covered with gravel and the Container Storage Area (SWMU 10). No evidence of release was noted in the review of the file material.

References: 66, 71

12. UNIT NAME: Previous Acid Unit (Photograph 12.)

Unit Description: The unit is located in the southern portion of the refinery underneath the present Container Storage Area (SWMU 10) and the Past Lagoon (SWMU 11). This unit's dimension is approximately 200 feet by 100 feet. The Previous Acid Unit (SWMU 12) consisted of several small buildings and tanks. The facility representatives do not know what was removed before the start-up of the Past Lagoon (SWMU 11). A concrete wall from this unit can still be seen.

Date of Start-Up: The date of start-up of this unit is not known, however, facility documents indicate this unit existed in 1946.

Date of Closure: The date of closure for this unit is not known.

Waste Managed: The exact nature of the wastes managed by this unit are not known.

Release Controls: There are no known release controls for this unit.

History of Releases: This unit was not observed during the VSI because it is covered with gravel and the Container Storage Area (SWMU 10). No evidence of release was noted in the file material.

References: 66, 71

13. UNIT NAME: Tank 355 (Photograph 13.)

Unit Description: This in-ground unit is located west of Avenue E and Container Storage Area (SWMU 10) in the southern part of the facility. The unit is a concrete basin approximately 21 feet by 23 feet and 10 feet deep. This unit has a gross capacity of 32,500 gallons. The walls are approximately 1 1/2 feet thick and bottom is 2 1/2 feet thick. This unit is used to recover oil. Tank 355 (SWMU 13) receives waste oil from vacuum trucks and drums stored in the Waste Oil Drum Storage Area (SWMU 14) which collect the oil skimmings from API Separators. The waste oil is conveyed by pipelines from this unit to Tanks 357 and 358 (SWMUs 16 and 17). During the VSI two closed drums were observed on the unit.

Date of Start-Up: The date of start-up for this unit is not known.

Date of Closure: This unit is currently active.

Waste Managed: This unit manages oily waste mixes.

Release Controls: This unit is constructed of concrete and surrounded by concrete. The unit has a steel grate cover.

History of Releases: During the VSI, oily stains were noted on the concrete surrounding the unit. In addition, steam-like vapor was noted to be emanating from the unit.

References: 54, 66

14. UNIT NAME: Waste Oil Drum Storage Area (Photographs 14.1 and 14.2)

Unit Description: The storage area is located south of Tank 355 (SWMU 13) and is approximately 4 feet by 20 feet. Ths unit is underlain by a concrete pad. During the VSI, this unit had approximately 15 drums and two drums from this unit were observed on Tank 355 (SWMU 13).

Date of Start-Up: The date of start-up is not known.

Date of Closure: This unit is currently active.

Waste Managed: This unit manages waste oil.

Release Controls: The drums are stored on wooden pallets and the area is underlain by a concrete pad with a curb.

History of Releases: During the VSI, oil stains were noted on the concrete pad.

References: 66

15. UNIT NAME: Tank 317 (Photographs 15.1, 15.2 and 15.3)

Unit Description: The aboveground tank is located east of the Schuylkill River off the Penrose Avenue Bridge. The capacity of the tank is 10,000 barrels. It is constructed of carbon steel and is a cone-roof tank. This tank has a diameter of 50 feet and a height of 30 feet. Tank 317 (SWMU 15) collects and stores slop oil emulsion solids. This tank receives middle layer emulsions from Tanks 357 and 358 (SWMUs 16 and 17) and slop oil emulsion solids from slop oil tanks. The waste is conveyed by pipes. These pipes are in open, earthen trenches which are heavily stained with pooled oil. These wastes are periodically pumped to Incinerator Feed Tanks 1004 and 1005 (SWMUs 18 and 19). The tank is located with 12 other tanks in a diked area that is approximately 300 feet by 400 feet by 5 feet high. The facility has included this unit in their Part B permit application.

Date of Start-Up: This unit began operation in 1927.

Date of Closure: This unit is currently active.

Waste Managed: This unit manages slop oil emulsion solids.

Release Controls: This unit is located on gravel and is located with 12 other tanks in a diked area that is approximately 300 feet by 400 feet and 5 feet high. This unit is equipped with a liquid level gauge.

History of Releases: During the VSI, stains were observed on the gravel surrounding the unit.

References: 37, 46, 47, 55, 57, 58, 66

16. UNIT NAME: Tank 357 (Photograph 16.)
17. UNIT NAME: Tank 358 (Photograph 17.)

Unit Description: These tanks are located in the southern part of the facility, west of the Container Storage Area (SWMU 10). Tanks 357 and 358 (SWMUs 16 and 17) are constructed of steel and according to API Standard 12-C. These tanks each have a capacity of 3,600 barrels and are part of the slop oil treating system. The tanks receive a mixture of oil and water from Tank 355 (SWMU 13). These tanks are supported by 6 legs each and rest on concrete blocks and underlain by gravel. The water and oil phases are separated by gravity, with the water settling into the conical bottom and oil phase remaining overhead. A third phase, the emulsion phase, settles at the interface. The recovered water is discharged to the process sewer and the oil is used in the refinery. The middle layer emulsion is pumped into Tank 317 (SWMU 15).

Date of Start-Up: The date of start up for these units is not known.

Date of Closure: This unit is currently active.

Waste Managed: These tanks manage slop oil emulsion solids.

Release Controls: These steel tanks are aboveground and are underlain by gravel. There is a 6 inch high concrete curbing surrounding the units.

History of Releases: During the VSI, stains were observed near the unit on the gravel. There was no diking to prevent migration of spills from this area to the adjacent soils.

References: 54, 61, 66

18. UNIT NAME: Incinerator Feed Tank 1004 (Photograph 18.)
19. UNIT NAME: Incinerator Feed Tank 1005 (Photograph 19.)

Unit Description: The aboveground tanks were located off Avenue "L" in the northwestern part of the facility. Tanks 1004 and 1005 (SWMUs 18 and 19) are located with two other tanks in a concrete diked area that measures 125 feet by 125 feet and 3 1/2 feet deep. These tanks receive slop oil emulsion solid from Tank 317 (SWMU 15). According to the facility, these tanks were removed in October 1988 and will be replaced in kind. The tanks discharged the waste to the Fluidactor (SWMU 33) through dedicated nozzles. These tanks had a capacity of 3,580 barrels each and were constructed of steel on a concrete pad. The facility has included these units in their Part B permit application.

Date of Start-Up: The separator began operation in 1945.

Date of Closure: These units were removed in October 1988 and will be replaced in kind.

Waste Managed: The tanks manage slop oil emulsion solid.

Release Controls: These tanks were surrounded by gravel in a concrete diked area that measured approximately 125 feet by 125 feet and 3 1/4 feet high. These units were constructed on concrete pads.

History of Releases: These units were not observed during the VSI because they had been removed. No evidence of release was noted in the review of file material or in the vicinity of the former units.

References: 46, 55, 56, 58, 66

20. UNIT NAME: No. 7 Separator (Photograph 20.)

Unit Description: The in-ground separator is located east of Penrose Avenue Bridge in the south part of the facility. The multi-chamber unit is approximately 52 feet by 134 feet and is 8 feet in depth. This unit is constructed of concrete and is surrounded by concrete. The oil phase is skimmed and taken to Tank 355 (SWMU 13).

Date of Start-Up: The separator began operation in approximately 1953.

Date of Closure: This unit is currently active.

Waste Managed: The separator currently receives non-contact cooling water from heavy fuel oil product coolers. In the past, it received process wastewater. The facility representatives did not know the hazardous constituents or source of the wastewater.

Release Controls: This unit is constructed of concrete and surrounded by a concrete pad. This unit is equipped with baffles for oil retention.

History of Releases: The separator discharges to the Schuylkill River at NPDES Outfall 013.

References: 66, 71

21. UNIT NAME: No.6 Separator (Tank No. 599) (Photograph 21.)

Unit Description: The inactive separator is located east of the Penrose Avenue Bridge in the southern part of the facility. This unit received separator sludge and leaded tank bottoms. This unit is approximately 52 feet wide, 134 feet long, and 10 feet deep. This concrete unit has a gross volume of 216,500 gallons. When this tank became full an outside contractor solidified the material and disposed of the waste offsite. The unit was damaged in December 1982 during cleaning operations and the facility has decided to close it. This unit is permitted by the City of Philadelphia, Air Management Services for its air emissions.

Date of Start-Up: The separator began operations in 1970.

Date of Closure: This unit last received waste in 1982.

Waste Managed: The separator managed separator sludge and leaded tank bottoms.

Release Controls: This tank is equipped with an alarm to prevent overflowing.

History of Releases: No evidence of release was noted in the file material or during the VSI.

References: 54, 66

22. UNIT NAME: Separator No. 5 (Photograph 22.)

Unit Description: This in-ground separator is located off Avenue "L" in the northwestern part off the facility, west of Tank 388 (East and West Basin) (SWMU 41). This steel unit is approximately 134 feet by 37 feet and is 10 feet in depth and is underlain by a concrete slab. The wastewater is discharged to the 1146 and 1147 Roughing Filters (SWMUs 46 and 47). This unit is permitted by the City of Philadelphia, Air Management Services, for its air emissions. The collected waste oil is sent to Tank 1163 (T-100) (SWMU 42) via trucks.

Date of Start-Up: This unit began operations approximately in 1944.

Date of Closure: The separator is currently active.

Waste Managed: This unit receives wastewater from the crude and hydrofluoric units.

Release Controls: The separator is equipped with baffles for oil retention and is underlain by concrete.

History of Releases: Prior to 1980, this unit discharged to the Schuylkill River. During the VSI, the unit was emitting a condensate.

References: 66, 71

23. UNIT NAME: Tank 1086 (Photograph 23.)
24. UNIT NAME: Tank 1087 (Photographs 24.1, 24.2 and 24.3)

Unit Description: The aboveground steel tanks are located west of the intersection of Avenue H and Second Street. They have a holding capacity of 12,200 barrels (6,100 barrels each). They are enclosed within a diked area that is 160 feet by 55 feet by 5 feet high. The dike is constructed of concrete and equipped with a HDPE liner. The dike and liner was constructed in June 1988. According to the facility, these upgraded tanks have been designed with a leak detection system. These tanks have a diameter and height of 35 feet. The cone-roof vertical steel tanks receive spent caustic from various caustic treating facilities in the refinery. The spent caustic from these tanks is discharged to the 1146 and 1147 Roughing Filters (SWMUs 46 and 47). Prior to 1986, these units discharged to Tank 103 (Tank 1166) (SWMU 32). The facility has included these units in their Part B permit application.

Date of Start-Up: These units began operation in 1954.

Date of Closure: These units are currently active.

Waste Managed: These tanks manage spent caustic.

Release Controls: These tanks are surrounded by a 5-foot-high concrete berm. An HDPE thermal-sealed liner surrounds the tanks in the bermed area. According to the facility, these upgraded tanks have been designed with a leak detection system. There are sewer lines in the diked area which lead to the 1146 and 1147 Roughing Filters (SWMUs 46 and 47). These tanks are equipped with verec automatic tank gauges and thermometers.

History of Releases: No evidence of past release was identified during the VSI or through review of available file material.

References: 54, 58, 61, 66

25. UNIT NAME: Former No. 2 Separator (Photograph 25.)

Unit Description: The inactive separator was located in the southwestern part of the facility, west of Separator No. 2A (SWMU 27). This unit is divided into two parts each approximately 129 feet long, by 51 feet wide and 11 feet deep. Former No. 2 Separator (SWMU 25) was constructed of wood and was surrounded by gravel. The separator was reportedly removed and taken off-site. The residue from the unit was incinerated in the on-site Incineration System (SWMUs 33 to 39) in 1981. At the time of the VSI there was ponding of what appeared to be rainwater in the general location of the unit.

Date of Start-Up: This unit began operation approximately in 1928.

Date of Closure: The separator was removed in approximately 1981.

Waste Managed: This unit managed process water from the petrochemical, sulfur recovery and reformer units.

Release Controls: There are no release controls associated with this unit.

History of Releases: The separator was not observed during the VSI because it had been removed. However, the unit used to discharge directly to the Schuylkill River.

References: 66, 71

26. UNIT NAME: Separator No. 2B (Photograph 26.)

Unit Description: This below-ground separator is located in the western part of the facility west of Tank 200 (Separator No. 844) (SWMU 28). This unit is approximately 133 feet by 66 feet and the unit is constructed of steel with a concrete bottom. This unit is surrounded by gravel. Separator No. 2B (SWMU 26) receives process water from Tank 200 (Separator No. 844) (SWMU 26) and discharges into 1146 and 1147 Roughing Filters (SWMUs 46 and 47). This unit is permitted by the City of Philadelphia, Air Management Services for its air emissions.

Date of Start-Up: This unit began operations in approximately 1940.

Date of Closure: The separator is currently active.

Waste Managed: This unit receives process waste from petrochemical, sulfur recovery, and reforming operations. The Boiler House also discharges wastewater to this unit.

Release Controls: The separator is constructed of steel with a concrete bottom. This unit is equipped with baffles for oil retention.

History of Releases: Prior to 1975, this unit discharged to the Schuylkill River on a continuous basis. Currently, it will periodically discharge to the river. The facility has reported to PaDER several violations of its NPDES permit requirements for total organic content, and total suspended solids.

References: 61, 66, 71

27. UNIT NAME: Separator No. 2A

Unit Description:	The separator is located in the western part of the facility, west of Tank 20 (Separator No. 844) (SWMU 28). This unit is approximately 128 feet long, 64 feet wide and 6 feet deep and is constructed of steel with a concrete bottom. Separator No. 2A (SWMU 27) receives non-contact cooling water from the gasoline stabilization unit and turbine driving air compressor yard. Prior to 1975, the separator received wastewater from the process units.
Date of Start-Up:	This unit was constructed in approximately 1945.
Date of Closure:	The separator is currently active.
Waste Managed:	This unit currently receives non-contact water. Prior to 1975, it received process water from the petrochemical unit, sulfur recovery unit, reformer unit and scrapyard.
Release Controls:	The separator is constructed of steel and has a concrete bottom. This unit is surrounded by gravel.
History of Releases:	This unit discharges to the Schuylkill River at NPDES Outfall 009.
References:	61, 66, 67

28. UNIT NAME: Tank 200 (Separator No. 844) (Photograph 28.)

Unit Description: The aboveground tank is located in the western part of the facility, east of Separator 2B (SWMU 26). This tank was constructed on or near Tank 200 Past Lagoon (SWMU 29). This unit is constructed of steel. The tank has a floating roof and has holding capacity of 80,000 barrels. This unit is surrounded by gravel. The tank discharges wastewater to Separator 2B (SWMU 26) via a pipeline.

Date of Start-Up: This tank began operation in 1975.

Date of Closure: This unit is currently active.

Waste Managed: This unit receives process water from the petrochemical, sulfur recovery, and reformer units. This unit also receives heat exchanger bundle cleaning sludge.

Release Controls: The unit is aboveground and is constructed of steel. This tank has a floating roof.

History of Releases: No evidence of past releases was identified during the VSI or through review of available file material.

References: 1, 66

29. UNIT NAME: Tank 200 Past Lagoon (Photograph 29.)

Unit Description: Tank 200 Past Lagoon is located either directly under or adjacent to Tank 200 (Separator No. 844) (SWMU 28), in the western part of the facility. This unit received waste from Separators 2, 2A, and 2B (SWMUs 25, 26 and 27). The waste was placed directly on the ground and allowed to dry. The unit is now covered with gravel. The wastes were not removed from this unit. Tank 200 Past Lagoon (SWMU 29) was unlined, aboveground and was later covered with gravel with the waste left in place.

Date of Start-Up: The date of start-up for this unit is unknown.

Date of Closure: This unit is not active; however, it is not known when this unit stopped receiving waste.

Waste Managed: The tank received separator sludge and tank bottoms.

Release Controls: There were no known release controls for this unit.

History of Releases: No evidence of past releases was identified during the VSI or through review of available file material.

References: 66

30. UNIT NAME: Additive Plant Drum Storage Area (Photograph 30.)

Unit Description: This unit is located off Sixth Avenue, west of Tank 250 in the eastern part of the facility. The Additive Plant Drum Storage Area (SWMU 30) received lab waste contained in drums before being shipped off-site. The site is now covered with gravel. A smoking area for the workers is located in the vicinity of the unit. The facility representatives did not know the estimated size.

Date of Start-Up: The date of start-up for this unit is unknown.

Date of Closure: This unit stopped receiving waste in 1978.

Waste Managed: The storage area received drums containing agent residue from the laboratory. The chemical composition of the agents is not known, but is believed to be both organic and inorganic in nature.

Release Controls: There are no known release controls for this unit. The drums were placed directly on soil.

History of Releases: No evidence of past release was identified during the VSI or through review of available file material.

References: 66

31. UNIT NAME: Tank 104 (Photograph 31.)

Unit Description: Tank 104 (SWMU 31) is located in the northwestern part of the facility, east of the Incinerator System (SWMUs 33 to 40). This unit is constructed of steel, aboveground and supported by six legs. The unit has a conical bottom. The tank receives bio-alum sludge from wastewater treatment system and discharges it to the Fluidactor (SWMU 33).

Date of Start-Up: This unit began operation in 1973.

Date of Closure: The tank is currently active.

Waste Managed: This unit manages bio-alum sludge.

Release Controls: The tank is aboveground and constructed of steel. It is underlain by gravel.

History of Releases: No evidence of past release was identified during the VSI or through review of available file material.

References: 66

32. UNIT NAME: Tank 103 (Photograph 32.)

Unit Description: The inactive tank is located in the northwestern part of the facility, south of 450 Storehouse. Tank 103 (SWMU 32) has a gross capacity of 5,970 gallons. This tank is mounted on four legs for withdrawal from the bottom. The unit received spent caustic from Tanks 1086 and 1087 (SWMUs 23 and 24). Subsequently, the waste is discharged either to the incinerator or to the wastewater treating system. A closure plan was submitted to PaDER in 1986.

Date of Start-Up: This unit began operation in 1973.

Date of Closure: The tank stopped receiving waste in 1986.

Waste Managed: This unit managed spent caustic (D002).

Release Controls: The tank is equipped with a level gauge. This unit is located in a concrete slab, however, the slab has no containment capacity.

History of Releases: Two spills of spent caustic have been reported to PaDER. These spills occurred during the pumping of spent caustic into this unit.

References: 12, 21, 22, 54, 58 66

33. UNIT NAME: Fluidactor (Photographs 33.1 and 33.2)
34. UNIT NAME: Gas Cyclone (Photograph 34.)
35. UNIT NAME: Venturi Scrubber (Photograph 35.)
36. UNIT NAME: Ash Transport Vessel (Photograph 34.)
37. UNIT NAME: Ash Classifier (Photograph 37.)
38. UNIT NAME: Bag House (Photograph 38.)
39. UNIT NAME: Ash Dumpster (Photograph 39.)
40. UNIT NAME: Ash Hopper (Photograph 39.)

Unit Description: These units are located in the northwestern part of the facility, north of the 450 Storehouse. The units collectively form the fluidized bed incinerator system. The main component of the system is the fluidactor or incinerator vessel. The system also includes the Bag House (SWMU 38), the Gas Cyclone (SWMU 34), the Ash Transport Vessel (SWMU 36), the Ash Hopper (SWMU 37), the Ash Dumpster (SWMU 39), Ash Hopper (SWMU 40), and the Venturi Scrubber (SWMU 35). The waste enters the Fluidactor (SWMU 33) which is a refractory–lined steel vessel with a dome roof and a flat bottom. The fluidactor is divided into three zones, the windbox, the bed and the freeboard. During the incineration operation, combustion air supplied by the blower enters the windbox of the fluidactor and passes through the bed of granular material. The freeboard acts as a disengagement zone for the particles that are carried from the bed, which are separated from the upward gas flow before being discharged.

The operating temperatures in the bed and freeboard are 1250 to 1400° F. The roof contains a large duct for the passage of the combustion products. The gas is routed to the Gas Cyclone (SWMU 34) and the Venturi Scrubber (SWMU 35) before being exhausted to the atmosphere.

The Gas Cyclone (SWMU 34) is a vertically mounted, stainless steel vessel lined with hexsteel and refractory. The upper cylindrical portion is approximately 6 to 8 1/2 feet in diameter and 10 feet long. The lower portion is formed by a series of cones tapering down to a diameter of 16 feet. The overall height of the unit is 30 feet. In this unit, the gases are spun in the stainless steel vessel and the centrifugal pull forces the ash particles to the outside shell where they slide down to the tip of the cone. The Gas Cyclone (SWMU 34) removes ash particles from the combustion gases. These ash particles are

33. UNIT NAME: Fluidactor (continued)
34. UNIT NAME: Gas Cyclone (continued)
35. UNIT NAME: Venturi Scrubber (continued)
36. UNIT NAME: Ash Transport Vessel (continued)
37. UNIT NAME: Ash Classifier (continued)
38. UNIT NAME: Bag House (continued)
39. UNIT NAME: Ash Dumpster (continued)
40. UNIT NAME: Ash Hopper (continued)

Unit Description cont: removed from the bottom of the unit and transferred to the Ash Transport Vessel (SWMU 36). The ash is then pressured with air into the Ash Hopper (SWMU 40). The ash is transferred to the Ash Dumpster (SWMU 39) for disposal. The Ash Hopper (SWMU 40) and the Ash Dumpster (SWMU 39) are connected to a Bag House (SWMU 38) to reduce the particle emission when dumping the ash. The combustion gas that leaves the Gas Cyclone (SWMU 34) is treated in the Venturi Scrubber (SWMU 35). The Venturi Scrubber (SWMU 35) is a high-energy venturi unit—Type VVD size 47/105. This unit is made of Type 316L stainless steel. The gases first pass through a throat where the velocity is increased. Water is also passed through this unit and is broken up into finely divided droplets to separate dust particles from the combustion gases. The trapped dust particles are removed as a water-ash slurry. The water-ash slurry is separated from the gases in the scrubber separator section of the unit. This unit has a continuous oxygen analyzer. The slurry is pumped from this unit to Tank 388 (East and West Basin) (SWMU 41) from where the water is drained to the sewer and the wet ash is disposed offsite. Prior to 1985, the wet ash was discharged to Ash Classifier (SWMU 31) and then discharged to Tank 388 (East and West Basin) (SWMU 41). The facility has included these units in their Part B permit application. The incinerator also has an air permit for its emissions. These units are on a concrete pad and surrounded by asphalt pavement.

Date of Start-Up: These units began operation in 1973.

Date of Closure: These units are currently active except the Ash Classifier which stopped receiving waste in 1985.

Waste Managed: The feed received by the fluidized bed of Fluidactor (SWMU 33) are biological and alum sludges, API separator sludges, slop oil emulsion solids, spent caustic and oily tank bottoms.

33. UNIT NAME: Fluidactor (continued)
34. UNIT NAME: Gas Cyclone (continued)
35. UNIT NAME: Venturi Scrubber (continued)
36. UNIT NAME: Ash Transport Vessel (continued)
37. UNIT NAME: Ash Classifier (continued)
38. UNIT NAME: Bag House (continued)
39. UNIT NAME: Ash Dumpster (continued)
40. UNIT NAME: Ash Hopper

Release Controls: The incinerator system has interlocks that cut off the waste feeds if certain parameters fall outside the controlled limits. These units are on a concrete pad and surrounded by asphalt pavement. These units are equipped with a scrubber stack which is equipped with a continuous oxygen analyzer to monitor the exhaust gases.

History of Releases: The incineration has been cited for violating the requirements of its air permit.

References: 2, 46, 55, 60, 66

41. UNIT NAME: Tank 388 (East and West Basin) (Photographs 41.1 and 41.2)

Unit Description: This unit is located west of Separator No.5 (SWMU 22). The in-ground tank has a gross volume of 115,000 gallons. The concrete tank's dimensions are 97.5 feet by 31.5 feet by 5 feet. A new concrete wall was constructed on the interior waste side in October 1988. Tank 388 (East and West Basin) (SWMU 41) is divided into two parts separated by a concrete wall, the west basin and the east basin. The west basin usually receives wet ash from the Venturi Scrubber (SWMU 35), and the east basin usually receives calcium fluoride sludge from the alkylation unit. However, if one of the basins is not in operation, the other basin receives all the waste. When this unit is full of sludge, an outside contractor cleans the basin and disposes the waste off-site. The facility included this unit in their Part B permit application.

Date of Start-Up: The tank began operation in 1944.

Date of Closure: This unit is currently active.

Waste Managed: The tank is used to manage calcium fluoride sludge, wet incinerator ash, spent caustic wastes and API separator sludge.

Release Controls: This unit reportedly has a leak detection system and a secondary concrete wall. There is a concrete sump to the south of the east basin which discharges to the wastewater treatment system.

History of Releases: No evidence of past release was identified during the VSI or through a review of available file material.

References: 58, 62, 66

42. UNIT NAME: Tank 1163 (T-100) (Photograph 42.)

Unit Description: This aboveground tank is located in the western part of the facility off Avenue "L." This tank has a capacity of 7,000 barrels and is constructed of A-283-C steel. Tank 1163 (T-100) (SWMU 42) has a diameter of 36 feet and a height of 40 feet. This unit receives API separator sludge from the process wastewater oil/water separators either by pipeline or vacuum trucks. The waste from this unit is pumped directly to the Fluidactor (SWMU 33) through a nozzle. Vacuum trucks bring the waste to this tank and unload the waste to the T-100 Double-Basket Strainer (SWMU 43). The facility has included this unit in their Part B permit application.

Date of Start-Up: This tank began operation in 1973.

Date of Closure: The tank is currently active.

Waste Managed: This unit manages API separator sludge, cooling tower sludge and some tank bottoms. The wastes managed in this tank are characterized as EPA K051 wastes.

Release Controls: This tank is aboveground and is surrounded by gravel. This tank is equipped with a level gauge.

History of Releases: During the VSI, staining was observed on the gravel near this unit. This unit does not have secondary containment.

References: 46, 54, 55, 58, 66

43. UNIT NAME: T-100 Double-Basket Strainer (Photograph 43.)

Unit Description: This unit is located adjacent to Tank 1163 (T-100) (SWMU 42). T-100 Double Basket Strainer (SWMU 43) is constructed of steel and is approximately 6 feet long, 4 feet wide and 3 feet deep. Vacuum trucks bring and unload the waste at this unit. This unit acts as a strainer, and prevents solids from entering Tank 1163 (T-100) (SWMU 42). The solids which remain in the basket are dumped into the T-100 Dumpster (SWMU 44).

Date of Start-Up: Use of the strainer was begun in 1973.

Date of Closure: The strainer is currently active.

Waste Managed: The strainer manages API separator sludge, cooling tower sludge and some tank bottoms. The wastes in this unit are characterized as EPA K051 wastes.

Release Controls: The strainer is on a 10-foot by 5-foot concrete pad surrounded on one side by an asphalt drive and on three sides by gravel.

History of Releases: During the VSI, staining was observed on the concrete next to the strainer.

References: 66

44. UNIT NAME: T-100 Dumpster (Photograph 44.)

Unit Description: This aboveground dumpster is located adjacent to Tank 1163 (T-100) (SWMU 42). This unit is constructed of steel and is 6 feet long, 4 feet wide, and 3 feet deep. This unit receives the solids strained from the T-100 Double-Basket Strainer (SWMU 43).

Date of Start-Up: This unit began operations in 1973.

Date of Closure: The dumpster is currently active.

Waste Managed: This unit manages API separator sludge, cooling tower sludge, and some tank bottoms. The wastes in this unit are characterized as EPA K051 wastes.

Release Controls: This unit is aboveground and located on a concrete pad.

History of Releases: During the VSI, a black residue was observed in the dumpster. The residue was about two feet deep. Staining was noted on the concrete pad near the dumpster.

References: 66

46. UNIT NAME: 1146 Roughing Filter (Photograph 46.)
47. UNIT NAME: 1147 Roughing Filter (Photograph 47.)

Unit Description: The two units are located south of Incinerator Feed Tanks 1004 and 1005 (SWMUs 18 and 19) off Ave "L". 1146 Roughing Filter (SWMU 46) is located south of 1147 Roughing Filter (SWMU 47). These units receive wastewater from Separators 2B, 5, and 8 (SWMU 26, 22, and 8), spent caustic from Tanks 1086 and 1087 (SWMUs 23 and 24), and heat exchanger bundle cleaning sludge. These cylindrical units are 36 feet in diameter and 25 feet high. They are open topped and are constructed of steel. 1146 and 1147 Roughing Filters (SWMUs 46 and 47) contain the plastic media which support the biological growth responsible for reducing the biological oxygen demand of the wastewater. Waste water then flows to 1140 and 1141 Primary Clarifiers (SWMUs 48 and 49).

Date of Start-Up: These units began operations in the mid-1970s.

Date of Closure: The filters are currently active.

Waste Managed: These units manage spent caustic (D002) heat exchanger bundle cleaning sludge (K050) and process wastewater.

Release Controls: The filters are aboveground and surrounded by a concrete pad.

History of Releases: No evidence of release was noted in the review of the file material or during the VSI.

References: 61, 66

48. UNIT NAME: 1140 Primary Clarifier (Photograph 48.)
49. UNIT NAME: 1141 Primary Clarifier (Photograph 49.)

Unit Description: These cylindrical units are located east of the incinerator system (SWMUs 33 to 40). These open topped units are 60 feet in diameter and 9 feet high and are constructed of steel. These tanks receive wastewater from 1146 and 1147 Roughing Filters (SWMUs 46 and 47). In these units, the particulate material settles out by gravity and the wastewater is then discharged to the 1142 and 1143 Oxidation Tanks (SWMUs 50 and 51). The particulate matter is discharged to 1144 and 1145 Thickeners (SWMUs 64 and 65). Gravel surrounds these units.

Date of Start-Up: These units began operations in the mid-1970s.

Date of Closure: The clarifiers are currently active.

Waste Managed: The clarifiers manage spend caustic (D002) heat exchanger bundle sludge (K050) and process wastewater.

Release Controls: These units are aboveground and constructed of steel with an overflow wier.

History of Releases: No evidence of release was noted in the review of the file material or during the VSI.

References: 61, 66

50. UNIT NAME: 1142 Oxidation Tank (Photograph 50.)
51. UNIT NAME: 1143 Oxidation Tank (Photograph 51.)

Unit Description: The cylindrical units are located south of the 1148 Final Clarifier (SWMU 52) and 1149 Final Clarifier (SWMU 53) in the northeastern part of facility. These tanks are approximately 120 feet in diameter and 20 feet high. These tanks are constructed of steel, are open-roof, and have a concrete floor. 1142 and 1143 Oxidation Tanks (SWMUs 50 and 51) receive wastewater from 1140 and 1141 Primary Clarifiers (SWMUs 48 and 49) and Separator No. 4 (SWMU 77). In these tanks, major BOD reduction occurs when oxygen is transferred to the wastewater in the presence of recirculated activated sludge with reportedly careful control of pH, dissolved oxygen and nutrient content. The wastewater is then discharged to 1148 and 1149 Final Clarifiers (SWMUs 52 and 53).

Date of Start-Up: These tanks began operations in the mid-1970s.

Date of Closure: These units are currently active.

Waste Managed: These units manage spent caustic (D002) heat exchanger bundle sludge (K050) and process wastewater.

Release Controls: These tanks are aboveground and surrounded by a concrete pad.

History of Releases: No evidence of past releases was identified during the VSI or through review of available file material.

References: 61, 66

52. UNIT NAME: 1148 Final Clarifier (Photograph 52.)
53. UNIT NAME: 1149 Final Clarifier (Photograph 53.)

Unit Description: These cylindrical units are located south of Ave "L" in the northeastern part of the facility. These units are 140 feet in diameter and 9 feet high. The open roof tanks are constructed of steel and have a concrete floor. Wastewater is received from the 1142 and 1143 Oxidation Tanks (SWMUs 50 and 51) for further particulate settling. The wastewater is then discharged to the Tertiary Sandfilters 1 through 8 (SWMUs 54 to 61). The settled particles are discharged to 1144 and 1145 Thickeners (SWMUs 64 and 65).

Date of Start-Up: These units began operations in the mid 1970s.

Date of Closure: The clarifiers are currently active.

Waste Managed: These units manage spent caustic (D002), heat exchanger bundle sludge (K050) and process wastewater.

Release Controls: The clarifiers are aboveground and surrounded by a concrete pad.

History of Releases: No evidence of past release was identified in the VSI or through review of available file material.

References: 61, 66

54. UNIT NAME: Tertiary Sand Filter 1 (Photograph 54.)
55. UNIT NAME: Tertiary Sand Filter 2 (Photograph 55.)
56. UNIT NAME: Tertiary Sand Filter 3 (Photograph 56.)
57. UNIT NAME: Tertiary Sand Filter 4 (Photograph 57.)
58. UNIT NAME: Tertiary Sand Filter 5 (Photograph 58.)
59. UNIT NAME: Tertiary Sand Filter 6 (Photograph 59.)
60. UNIT NAME: Tertiary Sand Filter 7 (Photograph 60.)
61. UNIT NAME: Tertiary Sand Filter 8 (Photograph 61.)

Unit Description: The units are located south of Avenue "L" in the northeastern part of the facility in an enclosed building. These units are each approximately 7 feet in height and 12.5 feet in diameter and each contain sand particles of which are 1/4 mm to 2 mm in size. Final filtration occurs in these units. These units receive and discharge wastewater from Wastewater Sump (SWMU 62).

Date of Start-Up: The filters began operation in the mid 1970s.

Date of Closure: These units are currently active.

Waste Managed: These units manage process wastewater, spent caustic (D002) and heat exchanger bundle sludge (K050).

Release Controls: The filters are in an enclosed area and are located aboveground.

History of Releases: The filters were not observed during the VSI, however, the building, which contains them was. No evidence of release was noted through review of available file material.

References: 61, 66

62. UNIT NAME: Wastewater Sump (Photograph 62.)

Unit Description: Wastewater Sump (SWMU 62) is located south of Avenue "L" in the northeastern part of the facility. This unit has two compartments. The concrete sump has a dual purpose. It receives wastewater from 1148 and 1149 Final Clarifiers (SWMUs 52 and 53) and discharges to eight Tertiary Sand Filters (SWMUs 54 to 61). This unit also receives the wastewater from the eight Tertiary Sand Filters (SWMUs 54 to 61) before discharging to Schuylkill River at NPDES Outfall 015. This unit has two compartments which prevent the comingling of the wastewater.

Date of Start-Up: This unit began operation in the mid 1970s.

Date of Closure: The sump is currently active.

Waste Managed: This unit manages process wastewater, spent caustic (D002) and heat exchanger bundle sludge (K050).

Release Controls: This unit is aboveground and is surrounded by gravel. This unit has valves that control the flow of wastewater into and out of the unit.

History of Releases: No evidence of past release was identified during the VSI or through review of available file material.

References: 66

63. UNIT NAME: Process Wastewater Pipes (Photograph 63.)

Unit Description: These pipes are both underground and aboveground and are located between the process areas, API separators and wastewater treatment system. They are of varying diameters and materials of construction.

Date of Start-Up: The pipes were installed in the mid 1970s.

Date of Closure: The pipes are currently active.

Waste Managed: This unit manages process water, spent caustic (D002) and heat exchanger bundle sludge (K050).

Release Controls: There are no known release controls.

History of Releases: No evidence of release was identified during the VSI and through a review of file material.

References: 66

64. UNIT NAME: 1144 Thickener (Photograph 64.)
65. UNIT NAME: 1145 Thickener (Photograph 65.)

Unit Description: These units are located east of the 1146 Roughing Filter (SWMU 46). These aboveground steel tanks are open roofed and cylindrical. The units receive waste solids from the 1146 and 1147 Roughing Filters (SWMUs 46 and 47), 1140 and 1141 Primary Clarifiers (SWMUs 48 and 49), and 1148 and 1149 Final Clarifiers (SWMUs 52 and 53). These units concentrate the solids and remove the water. The solids are discharged to the Centrifuge 1 to 5 (SWMUs 66 to 70) and the water conveyed to 1146 and 1147 Roughing Filters (46 and 47). The dimensions of these units were not provided in time for this report.

Date of Start-Up: These units began operation in the mid 1970s.

Date of Closure: The thickeners are currently active.

Waste Managed: These units manage spent caustic (D002), heat exchanger bundle sludge (K050) and process wastewater.

Release Controls: These units are aboveground and surrounded by a concrete pad.

History of Releases: No evidence of past release was identified during the VSI or through a review of available file material.

References: 61, 66

66. UNIT NAME: Centrifuge 1 (Photograph 66.)
67. UNIT NAME: Centrifuge 2 (Photograph 67.)
68. UNIT NAME: Centrifuge 3 (Photograph 68.)
69. UNIT NAME: Centrifuge 4 (Photograph 69.)
70. UNIT NAME: Centrifuge 5 (Photograph 70.)

Unit Description: The centrifuges are located south of 1144 Thickener (SWMU 64) in an enclosed area. These units receive solid wastes from 1144 and 1145 Thickeners (SWMUs 64 and 65) and discharges the solid waste to Tank 1163 (T-100) (SWMU 42) and wastewater to 1146 and 1147 Roughing Filters (SWMUs 46 and 47). Each centrifuge has a capacity of 127 gallons and is constructed of steel.

Date of Start-Up: These units began operation in the mid-1970s.

Date of Closure: The centrifuges are currently active.

Waste Managed: These units manage solid waste which comes from the treatment of spent caustic (D002), heat exchanger bundle sludge (K050) and process wastewater.

Release Controls: The units are in an enclosed area and are aboveground.

History of Releases: No evidence of past release was identified during the VSI or through review of available file material.

References: 66

71. UNIT NAME: Past Lagoon B (Photograph 71.)

Unit Description: The inactive unit was located northeast of Separator No. 3 (SWMU 76) in the vicinity of the present Bundle Cleaning Area (SWMU 72). This in-ground unit is approximately 200 feet by 100 feet. The wastes from this unlined unit were reportedly removed in 1979. During this removal of the waste, the facility discovered the bottoms of 4 tanks. The facility representatives did not know the function of these tanks.

Date of Start-Up: The date of startup for this unit is unknown; however, this unit was in operation in 1975.

Date of Closure: The wastes were reportedly removed from this area in 1979.

Waste Managed: This unit received separator sludges.

Release Controls: There are no release controls for this unit.

History of Releases: No evidence of release was identified during the VSI and review of available file material.

References: 66

72. UNIT NAME: Bundle Cleaning Area (Photograph 72.)

Unit Description: Bundle Cleaning Area (SWMU 72) is located northeast of Separator No. 3 (SWMU 76). This unit was constructed on top or in the vicinity of the Past Lagoon B (SWMU 71). This unit is approximately 120 by 100 feet. Heat exchanger bundles in cooling towers are steam cleaned in this unit. The wastewater is discharged to the wastewater treatment system.

Date of Start-Up: This unit began operation in 1987.

Date of Closure: The cleaning area is currently active.

Waste Managed: This unit manages heat exchanger bundle cleaning sludge (K050).

Release Controls: The cleaning takes place on a concrete pad in a fenced area.

History of Releases: No evidence of release was identified during the VSI and review of available file material.

References: 66

73. UNIT NAME: Old Bundle Cleaning Area (No photograph)

Unit Description: The Old Bundle Cleaning Area (SWMU 73) is located on the west end of 2nd Street, in the southwestern part of the facility. This aboveground unit is underlain by soil. Heat exchange bundles in cooling towers were steam cleaned in this area. This unit was not observed during the VSI. It was identified later after discussions with the facility.

Date of Start-Up: The date of start-up is approximately in the 1940s.

Date of Closure: This unit stopped receiving waste in Spring, 1988.

Waste Managed: This unit managed heat exchanger bundle cleaning sludge (K050).

Release Controls: There are no release controls for this unit.

History of Releases: No evidence of release was identified after a review of available file material.

References: 66

74. UNIT NAME: Separator No. 4B (Photographs 75.1 and 74.2)

Unit Description: This in-ground inactive unit is located west of Separator No. 4A, in the northern part of the facility. The unit is approximately 132 feet by 66 feet and is 14 feet deep. Separator No. 4B (SWMU 74) is constructed of steel with a concrete floor slab and surrounded by gravel. During the VSI, water was observed in this unit. The origin of the water was not known by the facility representative but presumably is rainwater. This unit is permitted by the City of Philadelphia, Air Management Services for its air emissions.

Date of Start-Up: This unit began operation in approximately 1944.

Date of Closure: The separator is currently inactive and reportedly has not received wastewater since the early 1970s.

Waste Managed: This unit received process wastewater from the hydrogen fluoride alkylation unit, cracking unit, sulfur recovery unit, and crude unit.

Release Controls: The separator is constructed of steel with a concrete floor slab.

History of Releases: This unit used to discharge to the Schuylkill River.

References: 66, 71

75. UNIT NAME: Separator No. 4A (Photograph 75.)

Unit Description: This unit is located west of Separator No. 4 (SWMU 77) in the northern part of the facility. Separator No. 4A (SWMU 75) is approximately 122 feet by 66 feet and 15 feet deep. Separator No. 4A (SWMU 75) is constructed of steel with a concrete floor slab surrounded by gravel. This unit is only used when excess capacity is needed to handle the wastewater. The wastewater is discharged to Tank 400 (SWMU 78). This unit is permitted by the City of Philadelphia, Air Management Services for its air emissions.

Date of Start-Up: The separator began operation in approximately 1952.

Date of Closure: This unit is currently active.

Waste Managed: The separator receives process wastewater from the hydrogen fluoride alkylation unit, cracking unit, sulfur recovery unit and crude units. It also receives wastewater from the cooling tower and carbon monoxide boilers.

Release Controls: This unit is constructed of steel with a concrete floor slab. The separator is equipped with baffles for oil retention.

History of Releases: This unit used to discharge to the Schuylkill River.

References: 66, 71

76. UNIT NAME: Separator No. 3 (Photograph 76.)

Unit Description: This in ground separator is located off Second Street, northwest of Unit 3031 in the northern part of the facility. This unit is approximately 16 feet by 12 feet and 15 feet deep. Separator No. 3 (SWMU 76) is constructed of steel and is surrounded by gravel. This unit discharges to the Schuylkill River under the NPDES permit at Outfall 002.

Date of Start-Up: This unit began operation after 1947.

Date of Closure: The separator is currently active.

Waste Managed: This unit currently receives non-contact cooling water from the solvent decarbonizing unit No. 2031 and surface runoff. In the past, this unit received process wastewater. The facility representatives did not know the hazardous constituents or source of the wastewater.

Release Controls: The separator is constructed of steel.

History of Releases: This unit discharges to the Schuylkill River under the NPDES permit at Outfall 002.

References: 61, 66, 71

77. UNIT NAME: Separator No. 4 (Photographs 77.1, 77.2 and 77.3)

Unit Description: Separator No. 4 is an in-ground unit and is located off Third Street, north of Tank 400 (SWMU 78) in the northern part of the facility. The unit is constructed of steel and has a concrete bottom. This unit receives wastewater from Tank 400 (SWMU 78) and discharges it to 1142 and 1143 Oxidation Tanks (SWMUs 50 and 51). This unit is permitted by the City of Philadelphia, Air Management Services for its air emissions.

Date of Start-Up: This unit began operation in the 1940s.

Date of Closure: The separator is currently active.

Waste Managed: This unit receives process wastewater from the hydrogen fluoride alkylation unit, cracking unit, sulfur recovery unit and crude unit.

Release Controls: The separator is constructed of steel with a concrete bottom. This unit is equipped with baffles for oil retention. This unit has an overflow wier as a release control.

History of Releases: This unit discharges to the Schuylkill River at NPDES Outfall 001. The facility has reported to PaDER several violations of their NPDES permit requirements for total suspended solid, total organic solids, and oil and grease at this outfall.

References: 66, 71

78. UNIT NAME: Tank 400 (Photograph 78.)

Unit Description: This aboveground steel tank is located in the northern part of the facility, south of Separator No. 4 (SWMU 77). The tank has a floating roof and has a holding capacity of 80,000 barrels. This unit is surrounded by gravel. This unit discharges wastewater to Separator No. 4 (SWMU 77) and receives wastewater from Separator No. 4A (SWMU 75).

Date of Start-Up: This unit began operation in 1975.

Date of Closure: The tank is currently active.

Waste Managed: This unit receives process wastewater from the hydrogen fluoride alkylation unit, cracking unit, sulfur recovery unit and crude units. It also receives non-contact wastewater from the cooling tower and carbon monoxide boilers.

Release Controls: The tank is aboveground and is constructed of steel. This tank has a floating roof.

History of Releases: No evidence of past releases was identified during the VSI or through review of available file material.

References: 1, 66

79. UNIT NAME: Drum Storage Area (Photographs 79.1, 79.2 and 79.3)

Unit Description: The Drum Storage Area (SWMU 79) is located east of Tank 400 (SWMU 78) in the northern part of the facility. This unit contains 55-gallon drums on wooden pallets and is underlain by gravel. The unit is approximately 10 feet by 20 feet. At the time of the VSI, this unit contained approximately 50 drums.

Date of Start-Up: The date of start-up for this unit is unknown.

Date of Closure: This unit is currently active.

Waste Managed: This unit contains sludges, residues from FCC unit, trash and spent catalyst.

Release Controls: The drums are stored on wooden pallets.

History of Releases: During the VSI, some of the drums with waste were open to the atmosphere and oil stains were observed on the soil next to the drums.

References: 66

80. UNIT NAME: Asbestos Storage Area (Photograph 80.)

Unit Description: This unit is west of the Drum Storage Area (SWMU 79) in the northern part of the facility. Asbestos Storage Area (SWMU 70) contains two covered steel hoppers, each 10 feet by 5 feet wide and 4 feet deep. Gravel surrounds this area. Wastes are taken offsite from this unit. A chain link fence surrounds the unit. The fence has a sign identifying the waste managed.

Date of Start-Up: Asbestos Storage Area (SWMU 80) began operation in the late 1970s.

Date of Closure: This unit is currently active.

Waste Managed: The storage area manages asbestos.

Release Controls: The wastes are contained in covered steel hoppers.

History of Releases: No evidence of past release was identified during the VSI or through review of available file material.

References: 66

81. UNIT NAME: Petrochemical Loading Area (Photograph 81.)
82. UNIT NAME: Lub Oil Unloading Area (Photograph 82.)
83. UNIT NAME: Agent Unloading Area (Photograph 83.)
84. UNIT NAME: WEMCO Unloading Area (Photograph 84.)
85. UNIT NAME: Oldest Loading Area (Photograph 85.)
86. UNIT NAME: Spent Caustic Loading Area (Photograph 86.)

Unit Description: The facility has numerous loading and unloading areas, however, facility representatives could not provide us with a comprehensive list. The areas beneath these loading and unloading areas were stained. Since there were multiple stains at each unit and since loading/unloading operations are by function repeated operations, there is a high potential for systematic and routine spills from these operations. Six representative areas were observed during the VSI. Since these units are used for similar purposes, specific information is provided in Table 3. The approximate locations for each unit are also listed in Table 3.

Date of Start-Up: The facility could not provide the dates of start-up for these units and the information was not identified through review of available file material.

Date of Closure: This information is presented in Table 3 under column entitled "Operational Status."

Waste Managed: This information is presented in Table 3.

Release Controls: Unit specific information on release controls is presented in Table 3.

History of Releases: Unit specific releases are presented in Table 3.

References: 66

	Unit	Location	Dimensions	Operational Status	Wastes Managed	Release Controls	History of Releases
81.	Petrochemical Loading Area	North of Warehouse No. 2	4 ft by 6 ft	Active	Petrochemical including cumene, benzene and toluene are loaded here.	Located outdoors with a partial roof. A steel catch pan, 4 ft by 6 ft, is located underneath the loading lines	During the VSI, stai were observed around the catch pan.
82.	Lube Oil Unloading Area	South of Tank 211	4 ft by 6 ft	Active	Lube Oil	Located outdoors with a partial roof. A steel catch pan, 4 ft by 6 ft, is located underneath the unloading lines.	During the VSI, stai were observed around the catch pan.
83.	Agent Unloading	South of Tank 211	20 ft by 50 ft	Active	Organic and inorganic agents	Located outdoors; steel grate underlain by concrete.	During the VSI, stai were observed around the steel grate.
84.	WEMCO Unloading Area	Intersection of Terminal Avenue and First Street	3 ft by 5 ft	Active	Transformer Oil (non-PCB)	Located outdoors; the unloading lines have a partially covered concrete sump below them.	During the VSI, stai were observed around the sump and residue in the sump.
85.	Oldest Loading Area	Off Avenue "C" south of Tank 262	100 ft by 5 ft	Active	Residual Fuels	Located outdoors; partially covered. 3 drains lead to process sewers.	During the VSI, stai were observed around the drain area. Cracks were observed in the drain area.
86.	Spent Caustic Unloading Area	East of Tank 1086 (SWMU 23)	5 ft by 5 ft	Active	Spent caustic	No release controls are known for this unit.	During the VSI, stai were observed in the soil around this uni

87. UNIT NAME: Buried Lead Sludge Area 1 (No photograph)
88. UNIT NAME: Buried Lead Sludge Area 2 (No photograph)
89. UNIT NAME: Buried Lead Sludge Area 3 (No photograph)
90. UNIT NAME: Buried Lead Sludge Area 4 (Photograph 90.)
91. UNIT NAME: Buried Lead Sludge Area 5 (Photographs 91.1 and 91.2)
92. UNIT NAME: Buried Lead Sludge Area 6 (Photograph 92.)
93. UNIT NAME: Buried Lead Sludge Area 7 (Photograph 93.)
94. UNIT NAME: Buried Lead Sludge Area 8 (Photograph 94.)
95. UNIT NAME: Buried Lead Sludge Area 9 (Photograph 95.)

Unit Description: The facility has identified, from a site assessment report, areas where sludge containing lead was buried. The results of this assessment is provided in Attachment B. Subsequent to the assessment, the facility resampled some of the areas and these results are provided in Attachment C. The results indicate 9 areas where there is buried lead sludge. Sludge, along with other wastes from the nearby tanks, was routinely buried at these areas. In addition, based on the analytical results, the facility has identified 7 areas of high lead concentration or "hot spots" and have delineated them for health reasons. At two of the "hot spots" the leaded sludge was applied directly onto the ground surface and at the remaining areas the lead sludge was buried 1-2 feet below the ground surface. During the VSI, all the areas were covered with gravel. Photographs of only the "hot spots" were taken.

- Buried Lead Sludge Area 1 (SWMU 87) is located in the western part of the facility bordered by Avenue "L" Second Street, Avenue "M" and Schuylkill River.

- Buried Lead Sludge Area 2 (SWMU 88) is located in the western part of the facility bordered by Second Street, Avenue "M" and the Schuylkill River.

- Buried Lead Sludge Area 3 (SWMU 89) is located in the northwestern part of the facility, bordered by Avenue "M," Second Street, Third Street and the Schuylkill River.

- Buried Lead Sludge Area 4 (SWMU 90) is located in the northeastern part of the facility, and is bordered by Fifth Avenue, Avenue "L" and Lanier Avenue. A "hot spot" was identified by the facility in this area. This hot spot is located east of Tank 289, off Lanier Avenue and is approximately 15 feet by 20

87. UNIT NAME: Buried Lead Sludge Area 1 (continued)
88. UNIT NAME: Buried Lead Sludge Area 2 (continued)
89. UNIT NAME: Buried Lead Sludge Area 3 (continued)
90. UNIT NAME: Buried Lead Sludge Area 4 (continued)
91. UNIT NAME: Buried Lead Sludge Area 5 (continued)
92. UNIT NAME: Buried Lead Sludge Area 6 (continued)
93. UNIT NAME: Buried Lead Sludge Area 7 (continued)
94. UNIT NAME: Buried Lead Sludge Area 8 (continued)
95. UNIT NAME: Buried Lead Sludge Area 9 (continued)

-- feet. According to the site assessment report, elevated levels of lead were detected in the soil. The lead concentration was 1,970 ppm in the soil sample collected 2.0 to 2.5 feet below the surface. During this assessment, petroleum odor was noted. This area was sampled by Chevron in early 1988. The soil sample had lead concentration of 55 ppm.

-- Buried Lead Sludge Area 5 (SWMU 91) is located in the northeastern part of the facility, bordered by Fifth Street, Avenue "L," Lanier Avenue, and Pennypacker Avenue. Two hot spots were identified by the facility. The first "hot spot" is located west of Tank 276, off Fifth Street and is approximately 30 feet by 10 feet. According to the Site Assessment Report, elevated levels of lead were detected in the soil. The lead concentration was 4,950 ppm in the soil sample collected 1 to 1-1/2 feet from the surface and 3,220 ppm 4 to 5 feet from the surface. During this site assessment, a strong gas odor was noted. This area was sampled by Chevron in early 1988 and the soil sample had lead concentration of 2,020 ppm. The second hot spot is located west of Tank 277, off Fifth Street and is approximately 30 feet by 10 feet. According to the site assessment, elevated levels of lead were detected in the soil. The lead concentration was 1,120 ppm in the soil sample collected 0 to 1/2 feet from the surface and 340 ppm, 1 to 1-1/2 feet from the surface. During this assessment, a strong gas odor was noted. This area was sampled by Chevron in early 1988 and the soil sample had a lead concentration of 355 ppm.

-- Buried Lead Sludge Area 6 (SWMU 92) is located in the western part of the facility, bordered by Pennypacker Avenue, Fifth Street, Penrose Avenue Bridge and Sixth Street. One hot spot was identified

87. UNIT NAME: Buried Lead Sludge Area 1 (continued)
88. UNIT NAME: Buried Lead Sludge Area 2 (continued)
89. UNIT NAME: Buried Lead Sludge Area 3 (continued)
90. UNIT NAME: Buried Lead Sludge Area 4 (continued)
91. UNIT NAME: Buried Lead Sludge Area 5 (continued)
92. UNIT NAME: Buried Lead Sludge Area 6 (continued)
93. UNIT NAME: Buried Lead Sludge Area 7 (continued)
94. UNIT NAME: Buried Lead Sludge Area 8 (continued)
95. UNIT NAME: Buried Lead Sludge Area 9 (continued)

in this area. This hot spot is located east of Tank 246 off Sixth Street. This unit is approximately 30 feet by 10 feet.

According to the site assessment, elevated levels of lead were detected in the soil. The lead concentration was 1,440 ppm in soil samples collected 1 to 1-1/2 feet from the surface and 1,390 ppm in the sample collected 3-1/2 to 4-1/2 feet from the surface. During this site assessment, a strong gas odor was noted. This area was also sampled by Chevron in early 1988 and the soil sample had lead concentrations of 537 ppm.

— Buried Lead Sludge Area 7 (SWMU 93) is located in the southwestern part of the facility bordered by Avenue "H," Second Street, Avenue "B" and Third Street. One hot spot was identified in this area. This hot spot is located east of Tank 209, off Avenue "H" and is approximately 10 feet by 10 feet.

According to the site assessment report, elevated levels of lead were detected in the soil. The lead concentration was 330 ppm in the soil sample collected 1 to 1.5 feet from the surface and 671 ppm in the soil samples collected 2.5 to 3.5 feet from the surface.

— Buried Lead Sludge Area 8 (SWMU 94) is located in the southern central part of the facility, bordered by Avenue "B," Penrose Avenue, Old Penrose Ferry Road and Second Street. One hot spot was identified in this area. In this area wastes were left on the ground.

This area is located west of Tank 224 and is approximately 10 feet by 20 feet. This area was surficially cleaned up in 1988.

87. UNIT NAME: Buried Lead Sludge Area 1 (continued)
88. UNIT NAME: Buried Lead Sludge Area 2 (continued)
89. UNIT NAME: Buried Lead Sludge Area 3 (continued)
90. UNIT NAME: Buried Lead Sludge Area 4 (continued)
91. UNIT NAME: Buried Lead Sludge Area 5 (continued)
92. UNIT NAME: Buried Lead Sludge Area 6 (continued)
93. UNIT NAME: Buried Lead Sludge Area 7 (continued)
94. UNIT NAME: Buried Lead Sludge Area 8 (continued)
95. UNIT NAME: Buried Lead Sludge Area 9 (continued)

According to the site assessment report, elevated levels of lead were detected in the soil. The lead concentration was 17,000 ppm in the soil sample collected 0.5 to 1.0 foot from the surface and 558 ppm 3 to 4 feet below surface. This area was resampled by Chevron in early 1988. Results from the ten soil samples also indicated elevated levels of lead, ranging in concentration from 983 ppm to 19,000 ppm.

-- Buried Lead Sludge Area 9 (SWMU 95) is located in the central part of the facility bordered by Second St., Ave "J", Ave "A" and Ave "H." One hot spot was identified in this area. In this area the wastes were left on the ground.

87. UNIT NAME: Buried Lead Sludge Area 1 (continued)
88. UNIT NAME: Buried Lead Sludge Area 2 (continued)
89. UNIT NAME: Buried Lead Sludge Area 3 (continued)
90. UNIT NAME: Buried Lead Sludge Area 4 (continued)
91. UNIT NAME: Buried Lead Sludge Area 5 (continued)
92. UNIT NAME: Buried Lead Sludge Area 6 (continued)
93. UNIT NAME: Buried Lead Sludge Area 7 (continued)
94. UNIT NAME: Buried Lead Sludge Area 8 (continued)
95. UNIT NAME: Buried Lead Sludge Area 9 (continued)

This area is located west of Tank 430 and is triangular in shape with approximately 6 feet by 6 feet by 6 feet. This area was surficially cleaned up in 1988.

According to the site assessment, elevated levels of lead were detected in the soil. The lead concentration was 1,760 ppm in the soil sample collected 1.5 to 2.0 feet from the surface. This area was sampled by Chevron in early 1988. Results from the four soil samples also indicated elevated levels of lead, ranging in concentration from 983 ppm to 1,659 ppm.

Date of Start-Up: These units started receiving waste in approximately 1960.

Date of Closure: The facility representative did not know when they stopped receiving wastes.

Waste Managed: The units manage leaded tank bottoms (K052), separator sludge, oily solids (K051) and spent catalysts. The "hot spots" were delineated with cords and signs were posted identifying that lead was buried.

Release Controls: No release controls were identified during the VSI or through review of available file material.

History of Releases: The site assessment and Chevron resampling indicate that all areas have elevated lead concentrations. See Attachments B and C for the analytical results.

References: 66, 67

96. UNIT NAME: Area A Ballfields (Photograph 96.)

Unit Description: The area known as the Ballfields is located in the northeastern part of the refinery. Baseball diamonds are located east of this site. Baseball is played at these diamonds. Area A is located near the center of the Ballfields area, on a mound of soil 6 to 15 feet in height. This area was investigated in 1988. The investigation indicated that the mound covers approximately 30,000 square feet of surface area and contains approximately 10,000 cubic yards of soil. This investigation stated that the soil may have been derived from the area near the Passyunk Avenue Bridge when the bridge was being widened. The area reportedly was vegetated prior to the investigation and vegetation was noted during the VSI.

Date of Start-Up: The investigation reviewed several historical aerial photographs to evaluate the history of Area A Ballfields (SWMU 96). According to the investigation this unit was not present in 1980 but was present in 1985.

Date of Closure: This unit is no longer active.

Waste Managed: The type of wastes managed here is unknown. Attachment D presents the results of the type of waste constituents found in this area.

Release Controls: There are no known release controls for this unit.

History of Releases: Soil samples were collected as part of the investigation. The sample results indicated elevated levels of base neutral extractable organics, total cyanide, total phenos, and volatile organics. Attachment D presents the results from this investigation.

References: 66, 73

97. UNIT NAME: Area B Ballfields (Photographs 97.1, 97.2, and 97.3)

Unit Description: The area known as the Ballfields is located in the northeastern part of the refinery. Baseball diamonds are located east of this site. Baseball is played at these diamonds. Area B Ballfields (SWMU 97) is located east of the parking area. This is a mound 6 to 12 feet in height. This area was investigated in 1988. The investigation indicated that the mound covers approximately 110,000 square feet of surface area and contains 32,000 cubic yards of soil. Four lagoons in the northern half of the mound where refinery wastes were disposed in 1979 were identified from historical aerial photographs. These lagoons were not observed during the VSI. These mounds are now covered. This area was constructed on a partially concrete pad.

Date of Start-Up: Several aerial photographs were reviewed to evaluate the history of Area B Ballfields (SWMU 97). According to this investigation this unit was not present in 1975 but was present in 1979.

Date of Closure: This unit is no longer active.

Waste Managed: Wastes managed by the unit includes refinery waste.

Release Controls: This unit has no known release controls.

History of Releases: Soil samples were collected as part of the facility investigation. The sample results indicated elevated levels of base neutrals, extractable organics, volatile organics, total petroleum hydrocarbons, metals, and cyanide. Attachment E presents the results from this investigation.

References: 66, 72

98. UNIT NAME: Tank 102

Unit Description: Tank 102 (SWMU 98) is located south of the Incinerator System (SWMUs 33 to 40). This unit is constructed of steel and is partially in-ground and partially aboveground. Asphalt pavement surrounds the unit. Vacuum trucks bring waste to this unit. The waste is then charged directly to the Fluidactor (SWMU 33). The capacity of this tank was not provided by the facility in time for this report.

Date of Start-Up: This unit began operation in 1973.

Date of Closure: The tank is currently active.

Waste Managed: This unit managed unpumpable sludge slurry.

Release Controls: The tank is surrounded by a 6-inch concrete berm.

History of Releases: No evidence of past release was identified during the VSI or through a review of available file material.

References: 66

99. UNIT NAME: Trash Dumpsters (no photograph)

Unit Description: The facility has numerous trash dumpsters. The dumpsters manage the non-hazardous waste generated at the facility. These dumpsters are aboveground, constructed of steel and generally open topped.

Date of Start-Up: The facility could not provide the dates of start-up for the dumpsters and the information was not identified through review of available file material.

Date of Closure: This unit is currently active.

Waste Managed: The unit manages all non-hazardous trash generated at the facility.

Release Controls: The dumpsters are aboveground and constructed of steel.

History of Releases: No evidence of past release was identified during the VSI or through review of available file material.

References: 66

100. UNIT NAME: Process Lines and Sumps (Photographs 100.1, 100.2 and 100.3)

Unit Description: The unit consists of pipes and sumps. The pipes are of varying diameters, materials of construction and are located aboveground, inground and belowground. The numerous inground concrete sumps are of varying sizes. The unit is employed in repeated and/or continuous operations, creating a high potential for systematic and routine spills.

Date of Start-Up: The facility could not provide the dates of start-up for the unit and the information was not identified through review of available file material.

Date of Closure: The lines and sumps are currently active.

Waste Managed: This unit manages all product and raw material used at the facility. This includes benzene, toluene, cumene, crude oil, and gasoline.

Release Controls: This unit has no known release controls.

History of Releases: During the VSI, the area beneath and/or around the unit was heavily stained.

References: 66

101. UNIT NAME: Bulkhead Seepage Area (Photograph 101.1)

Unit Description: The unit is located in the terminal area, south of Penrose Bridge, near the package and grease plant. The affected area is approximately 20 acres. There is reportedly oil in monitoring wells near the bulkhead with a thickness of several inches. This area contains several loading facilities and underground pipeways which according to a facility site assessment are common sources of leakage. The facility is constructing a slurry wall in an attempt to mitigate this seepage. The engineering design and other details of the slurry wall were not made available prior to the completion of this report.

Date of Start-Up: The facility could not provide the dates of start-up for the unit and the information was not identified through review of available file material.

Date of Closure: This unit is currently active.

Waste Managed: The seepage to the Schuylkill River contains #2 oil, jet fuel, lube oil and gasoline.

Release Controls: This unit has no known release controls.

History of Releases: Minor seepage to the Schuylkill River is occurring through the bulkhead from this area.

References: 66, 67

V. EXECUTIVE SUMMARY

A RCRA Facility Assessment (RFA) of the Chevron facility was conducted to identify sources and/or areas of contaminant releases and to evaluate the potential for releases of contaminants to the environment from solid waste management units (SWMUs) identified at this facility.

The 1984 Hazardous and Solid Waste Amendments to RCRA provides EPA with the authority to require corrective actions, if necessary, at SWMUs and AOCs at facilities operating, closed, or closing under RCRA requirements. The intent of this authority is to address otherwise unregulated releases of hazardous constituents to the environment via soils, groundwater, surface water, air and through subsurface gas generation. To meet this objective, a RCRA Facility Assessment was performed consisting of a Preliminary Review (PR) of available file information, a Visual Site Inspection (VSI) and subsequent assessment of collected data.

This document represents the Phase II report of the RFA of the Chevron facility. As directed by EPA, a Phase I report was not required. An initial PR and VSI was performed at the facililty for EPA Enforcement under the TES contract in August 1987. The 1987 report was later determined to be limited in scope, as it was based on incomplete file searches. Only 16 SWMUs were identified by the report. Both file searches and a VSI were therefore performed in order to develop the Phase II report. Information was gathered from EPA Region III offices in Philadelphia, Pennsylvania, the Department of Environment (PaDER) offices in Norristown, Pennsylvania, and the VSI performed on November 17 and 18, 1988. The Phase II document is based on an evaluation of the information gathered, and updates and expands on the information presented in the TES report. A total of 101 SWMUs were identified at the facility.

The Chevron facility occupies 373 acres along the Schuylkill River, and is located approximately one mile above the confluence of the Schuylkill River with the Delaware River. Surrounding land use is heavy industrial.

The Chevron facility is a petroleum refinery, the primary products of which are gasoline, jet fuel and fuel oil. The refinery also produces a small amount of petrochemicals (cumene, benzene and toluene). The major refining operations identified in the 1987 Part B permit application are: crude processing, fluid catalytic cracking, hydrogen fluoride alkylation, solvent decarbonizing, catalytic reforming, catalytic disulfurization, gasoline treating, sulfur recovery, petrochemicals, and aromatics extraction.

The types of wastes treated and stored at the facility include slop oil emulsion solids (K049 and D001), heat exchanger bundle cleaning sludge (K050), API separator sludge (K051), leaded tank bottoms (K052), spent caustic (D002), process heater slag (D004 and D007), fluoride sludge (D002), spent activated alumina (D002) and incinerator ash (K049 and K051).

At the Chevron facility, ground water occurs in two zones, designated as the Upper Unconsolidated Aquifer and the Lower Unconsolidated Aquifer. The Upper Unconsolidated Aquifer is located 5 to 7 feet below surface and the Lower Unconsolidated Aquifer occurs 15 to 20 feet below surface. These two aquifers are generally separated by a wedge-shaped layer of clay. This clay layer is absent in the northern part of the facility near the Ballfields allowing inner connection of the two aquifers. The Lower Unconsolidated Aquifer is a major drinking water aquifer in New Jersey.

The facility installed 78 groundwater monitoring wells as part of a site assessment in 1987 to evaluate site hydrogeology. Sixty-two wells were shallow (approximately 15 feet deep) and six wells were deep (approximately 25 to 85 feet deep). The explosimeter readings (100 percent LEL) measured in many of the wells were high and suggest the presence of either low molecular weight organic compounds (e.g., methane) or dissolved volatile organic compounds. In addition, free product was encountered in 17 wells at the facility. The wells were not sampled for other parameters, therefore the groundwater quality of the upper or lower aquifer is not well understood.

The facility has also conducted an investigation in the Ballfields area (References 72 and 73). This investigation indicated that there were two mounds, Area A Ballfields (SWMU 96) and Area B Ballfields (SWMU 97) which contain contaminated soil. Area A Ballfields (SWMU 96) sample results indicated elevated levels of base neutrals extractable organics, total cyanide, total phenols and volatile organics (Reference 73). Area B Ballfields (SWMU 97) sample results indicted elevated levels of base neutrals extractable organics, volatile organics, total petroleum hydrocarbons, metals and cyanide (Reference 72).

The facility conducted a study to evaluate tetraethyl lead soil contamination. These soil sampling results indicate lead contaminated soils are present at many areas at the facility. The lead concentration was reported as high as 17,000 ppm. The facility resampled some of the areas. These results confirmed lead contamination at the site. The results indicate nine areas where there is Buried Lead Sludge (SWMUs 87 to 95). Based on these results, the facility has identified seven areas of high lead concentration or "hot spots" and have delineated them for health reasons. At five of these "hot spots" lead disposal practices appear to be shallow (two to four feet) burial and at the other two the sludge waste was applied to the ground surface.

Correspondence from the facility concerning the regulatory status of the Area A and B Ballfields (SWMUs 96 and 97) was submitted to EPA on December 15, 1988. In this correspondence, the facility stated the area A and B Ballfields are not subject to corrective action measures since the property the Ballfields is located on is not contiguous with the property where the hazardous waste management units are located. The Part B permit application submissions in 1987 do not show the Ballfields on the Part A facility map. However, all previous submittals do include the Ballfields on the Part A facility map.

Based on the file search, no correspondence was found which either formally requested a modification to the Part A by Chevron to remove the Ballfields Area from the facility map nor approval by the regulatory agencies authorizing such a change.

The facility, in the early 1920s, was a Gulf Oil Corporation terminal. Refinery operation commenced in the late 1920s. Prior to Gulf Oil activities the area was a salt marsh. The facility was built by placing artificial fill over the former salt marsh. In the early 1920s, the fill materials were placed behind a wooden sea wall. In the 1950's the wall was upgraded with construction of a 1,400 feet concrete sea wall in the southeastern portion of the facility and construction of 8,400 feet of interlocking steel sheet piling protecting the remainder of the facility. The structure is called the bulkhead and protects the facility against a 100 year flood and prevents runoff from the facility to the Schuylkill River. Minor seepage has been reported to the Schuylkill River near the southeastern part in the terminal area. The source of the seepage is not known. Included in this seepage is jet fuel, lube oils, gasoline, and #2 oil. The facility is constructing a slurry wall in an attempt to mitigate the seepage.

The facility's wastewater system treats various wastewater streams generated at the refinery. The facility is requesting a permit-by-rule exclusion of wastewater treating facilities from the Part B permit application. This unit is not regulated by any air permits.

A total of 101 SWMUs were identified through the file review and VSI of the facility. Based on review of files and sampling data submitted by the facility, and observations during the VSI, the potential for release and suggested further action for SWMUs have been developed. In general, the SWMU of greatest concern are areas where wastes were buried or placed in unlined units. These include Past Lagoon A (SWMU 11), Past Lagoon B (SWMU 71), Buried Lead Sludge Areas 1 to 9 (SWMUs 87 to 95), Area A Ballfields (SWMU 96) and Area B Ballfields (SWMU 97).

Suggestions for further action include the following: conducting a hydrogeologic investigation to determine the nature, extent, direction, and rate of migration of releases to groundwater; soil sampling to determine if hazardous constituents have been released; and a soil assessment to determine the extent of releases to surrounding soils; and integrity testing to determine the condition of below grade units.

The facility should submit a detailed site wide geologic and hydrogeologic investigation. Therefore a base investigation is suggested to develop the required knowledge for further unit specific investigation. The facility wide geologic and hydrogeologic study should include but not be limited to a characterization of the subsurface geology, a determination of vertical and horizontal flow patterns, location of aquifers and a determination of hydraulic conductivity.

There were several categories of SWMUs which consisted of numerous similar units. These units included loading and unloading areas, process wastewater lines and sumps, and areas under process lines and sumps. To maximize on the available time during the VSI a representative number of each category of these SWMUs were actually observed. Therefore the suggested further action for each category of SWMUs applies to the entire category of units at the facility. An attempt was made to obtain additional information on all the units within each category from the facility. In most cases the facility did not provide this additional information in time for this report.

Based upon conversation with the EPA Technical Monitor, Gill Horowitz, all process related units which were suspected of have routine and systematic releases are listed as SWMUs. This approach was evaluated to give EPA the maximum leeway to proceed with facility corrective action measures.

A summary of conclusions and suggested further action for the 101 SWMUs are found in Chapter VII of this report.

VI. RELEASE PATHWAYS

Ground Water

Ground water occurs in two zones, designated as the Upper Unconsolidated Aquifer and the Lower Unconsolidated Aquifer. The Upper Unconsolidated Aquifer is located 5 to 7 feet below surface and the Lower Unconsolidated Aquifer occurs 15 to 20 feet below surface. The Lower Unconsolidated Aquifer is a major drinking water aquifer for New Jersey. These two aquifers are generally separated by a wedge-shaped layer of clay. This clay layer is absent in the northern part of the Ballfields allowing inner connection of the two aquifers.

The overall potential for release to groundwater is considered high for in-ground tanks, sumps, pipelines, other units that have impaired integrity or where waste is already in contact with soil. The potential for release to groundwater is considered high for unlined past lagoons, buried lead sludge areas, and the mounds at the Ballfields area.

Soil

The overall potential for releases to soils from current operations is high where there is evidence of overflows from units onto surrounding soils, where extensive cracking or pitting of containment has occurred, where waste is buried, or where a lack of secondary containment (such as diking) exists for outdoor units handling hazardous wastes. These situations provide pathways for hazardous constituents to migrate to the soil.

Surface Water

Initially in the 1920s, the fill materials were placed behind a wooden sea wall. In the 1950s, 1,400 feet of concrete sea wall was constructed in the eastern part of the facility and 8,400 feet of interlocking sheet steel piling was constructed along the remainder of the facility bordering the Schuylkill River. This sea wall is referred to

by the facility as the bulkhead and is reportedly at an elevation of 2 to 3 feet above the 100 year flood plain. According to facility representatives, this structure not only prevents the 100-year flooding by the Schuylkill River, it also acts as a run-on and run-off control. Based on this, all the SWMUs at the facility were determined to have a low potential for release to surface water. There are no release controls at the Area A and B Ballfields (SWMUs 96 and 97), therefore, this area has a high potential for release to surface water. There is documented minor seepage to the Schuylkill River occuring in the southeastern part of the bulkhead in the terminal area. Jet fuel, lube oils, gasoline and #2 oil are reported to be in this seepage. The source of the seepage is not known.

Air

The overall potential for non-permitted releases to air is low for most SWMUs under normal operating conditions.

Subsurface Gas

The facility has several areas where wastes were buried; Past Lagoon A (SWMU 11), Past Lagoon B (SWMU 71), Buried Lead Sludge Area 1 to 9 (SWMUs 87 to 95), and Area A and Area B Ballfields (SWMUs 96 and 97). All received wastes with organic constituents therefore may be susceptible to biodegradation and subsequent methane formation provided the proper geologic setting is available.

VII. SUMMARY OF CONCLUSIONS AND SUGGESTED FURTHER ACTIONS

This section represents the conclusions and suggested further actions for the solid waste management units (SWMUs) identified during the PR and VSI of the Chevron facility.

For each unit, the potential for release to soil/groundwater, surface water, air, and from the generation of subsurface gas is assessed. For the purpose of this report, a high potential for release was assigned in cases where there was documented contamination, visual evidence or release, or where the design/operation of the unit was determined to release to one or more environmental media. A moderate release potential was assigned in cases where there may be a release during certain operational periods or depending on the volume of material handled at a given time. A low potential for release was assigned in cases where units are located inside buildings, are in good condition, have appropriate release controls, or do not manage hazardous waste or wastes containing hazardous constituents.

In cases where the release potential is dependent on the integrity of the unit and the integrity could not be assessed as part of this investigation (e.g. below-grade units), integrity testing using a standard EPA-approved method (e.g., pressure, tracer, etc.), has been suggested as the further action. When integrity of a unit has been demonstrated to be impaired, visual evidence of a release is documented or when the design/operation of a unit is suspected of causing a release, a verification investigation is suggested to determine if hazardous constituents have been released. The suggested further actions include sampling of soil in the suspected area of contamination. The list of hazardous waste and/or constituents suspected to be present in refinery wastes are referred to as the "Modified Skinner List" as listed in Table IV. These constituents are therefore the recommended parameters to be analyzed for during verification investigations.

Soil and groundwater sampling and a soil gas survey have been suggested to determine the rate and extent of contamination when documented or verification investigation results indicate contamination is present. It is suggested that the groundwater wells be located downgradient and at the boundary limit of the unit. Consideration is made to include monitoring of the vadose zone and both aquifers. The parameters chosen should be based on previous analytical results.

Table III

Appendix VIII Hazardous Constituents Suspected to be Present in Refinery Wastes (Reference 75)

**Acetonitrile (Ethanenitrile)
**Acrolein (2-Propenal)
**Acrylonitrile (2-Propenenitrile)
Aniline (Benzenamine)
Antimony
Arsenic
Barium
Benz (c) acridine (3,4-Benzacridine)
Benz (a) anthracene (1,2-Benzanthracene)
**Benzene (Cyclohexatriene)
Benzenethiol (Thiophenol)
Benzidine (1,1-Biphenyl-4,4'diamine)
Benzo(b)fluoranthene (2,3-Benzofluoranthene)
Benzo(j)fluoranthene (7,8-Benzofluoranthene)
Benzo(a)pyrene (3,4-Benzopyrene)
**Benzyl chloride (Benzene, (chloromethyl)-)
Beryllium
Bis (2-chloroethyl) ether (Ethane, 1,1'-oxybis (2-chloro-))
Bis (2-chloroisopropyl) ether (Propane, 2,2'-oxybis (2-chloro-))
**Bis (chloromethyl) ether (Methane, oxybis (chloro))
Bis (2-ethylhexyl) phthalate (1,2-Benzenedicarboxylic acid, bis (2-ethylhexyl) ester
Butyl benzyl phthalate (1,2-Benzenedicarboxylic acid, butyl phenylmethyl ester)
Cadmium
Carbon disulfide (Carbon bisulfide)
p-Chloro-m-cresol
**Chlorobenzene (Benzene, chloro-)
**Chloroform (Methane, trichloro-)
**Chloromethane (Methyl chloride)
2- Chloronapthalene (Naphthalene, beta-chloro-)
2-Chlorophenol (Phenol, o-chloro-)
Chromium
Chrysene (1,2-Benzphenanthrene)
Cresols (Cresylic acid) (Phenol, methyl-)
**Crotonaldehyde (2-Butenal)
Cyanide
Dibenz(a,h)acridine (1,2,5,6-Dibenzacridine)
Dibenz(a,j)acridine (1,2,7,8-Dibenzacridine)
Dibenz(a,h)anthracene (1,2,5,6-Dibenzanthracene)
7H-Dibenzo(c,g)carbazole (3,4,5,6-Dibenzcarbazole)
Dibenzo(a,e)pyrene (1,2,4,5-Dibenzpyrene)
Dibenzo(a,h)pyrene (1,2,5,6-Dibenzpyrene)
Dibenzo(a,i)pyrene (1,2,7,8-Dibenzpyrene)
**1,2-Dibromoethane (Ethylene dibromide)
Di-n-butyl phthalate (1,2-Benzenedicarboxylic acid, dibutyl ester)
*Dichlorobenzenes
**1,2-Dichloroethane (Ethylene dichloride)
**trans-1,2-Dichloroethene (1,2-Dichlorethylene)
**1,1-Dichloroethylene (Ethene, 1,1-dichloro-)
**Dichloromethane (Methylene chloride)

**Dichloropropane
Dichloropropanol
Diethyl phthalate (1,2-Benzenedicarboxylic acid, diethyl ester)
7,12-Dimethyl-benz(a)anthracene
2,4-Dimethylphenol (Phenol, 2,4-dimethyl-)
Dimethyl phthalate (1,2-Benzenedicarboxylic acid, dimethyl ester)
4,6-Dinitro-o-cresol
2,4-Dinitrophenol (phenol, 2,4-nitro-)
2,4-Dinitrotoluene (Benzene, 1-methyl-2,4-dinitro-)
Di-n-octyl phthalate (1,2-Benzenedicarboxylic acid, dioctyl ester)
**1,4-Dioxane (1,4-Diethylene oxide)
1,2-Diphenylhydrazine (Hydrazine, 1,2-diphenyl-)
**Ethyleneimine (Azridine)
**Ethylene oxide (Oxirane)
Fluoranthene (Benzo (j,k) fluorene)
**Formaldehyde
Hydrogen sulfide (Sulfur hydride)
Indeno (1,2,3-cd)pyrene (1 10(1,2-phenylene)pyrene)
Lead
Mercury
Methanethiol (Thiomethanol)
3-Methylchlolanthrene (Benz(j)aceanthrylene, 1,2-dihydro-3-methyl-)
**Methyl ethyl ketone (MEK) (2-Butanone)
Naphthalene
Nickel
p-Nitroaniline (Benzenamine, 4-nitro-)
Nitrobenzene (Benzene, nitro-)
4-Nitrophenol (Phenol,pentachloro-)
Pentachlorophenol (Phenol, pentachloro-)
Phenol (Benzene, hydroxy-)
Pyridine
Selenium
*,**Tetrachloroethanes
**Tetrachloroethylene (Ethene, 1,1,2,2-tetra chloro-)
**Toluene (Benzene, methyl-)
*Trichlorobenzenes
*,**Trichloroethanes
**Trichloroethene (Trichloroethylene)
*Trichlorophenols
Vanadium

---

* If any of these groups of compounds are found, the specific isomers listed in Appendix VIII should be identified.

** Use Test Method 8240 for these volatile compounds.

*** Use Test Method 3050 in SW-846 for all metals; see Attachment 2 for semivolatile organic compounds.

Non-Appendix VIII Constituents of Concern (may be added to App. VIII)

Cobalt
1-Methylnapthalene
Styrene
Hydroquinone
Anthracene
Indene
5-Nitro acenaphthene
Quinoline
Phenanthrene
Pyrene

1. UNIT NAME: Empty Lube Oil Drum Storage Area

Conclusions:

Soil/Groundwater: The potential for release to soil/groundwater is high based on the observed soil staining.

Surface Water: The potential for release to surface water is low due to the facility wide run-on and run-off controls.

Air: The potential for release to air is low due to the inactive status of the unit.

Subsurface Gas: The potential for generation of subsurface gas is low due to the aboveground location of the unit.

Suggested Further Action:

Surface and subsurface soil sampling is suggested to determine if hazardous constituents have been released. An appropriate grid system should be set up with a minimum of four subsurface samples per grid collected. In addition, at least one surface soil sample should be collected from areas where staining is observed. All soil samples should be analyzed for the parameters in Table IV. Based on the results of the soil sampling, groundwater sampling may be warranted. The ground water samples should be analyzed for those hazardous constituents identified in the soil sampling.

2. UNIT NAME: Empty Lube Area Sump

Conclusions:

Soil/Groundwater: The potential for release to soil/groundwater is dependent on the integrity of the in-ground sump which could not be determined during the VSI.

Surface Water: The potential for release to surface water is low due to facility wide run-on and run-off control.

Air: The potential for relealse to air is low due to the inactive status of the unit.

Subsurface Gas: The potential for generation of subsurface gas is low based on the design and mode of operation of the unit.

Suggested Further Action: The facility should verify the integrity of the unit. If the integrity has been impaired, soil sampling should be conducted to determine if hazardous constituents have been released. Soil samples should be obtained from those areas where the unit's integrity is impaired. The analytical parameters of concern are listed in Table IV.

3. UNIT NAME: Terminal Buried Oil/Water Separator 516
4. UNIT NAME: Terminal Buried Oil/Water Separator 16
5. UNIT NAME: Buried No.110 Separator

Conclusions:

Soil/Groundwater: The potential for release to soil/groundwater is dependent on the integrity of the in-ground units which could not be determined during the VSI.

Surface Water: The potential for release to surface water is low due to the facility wide run-on and run-off controls.

Air: The potential for release to air is low because the units are buried and inactive.

Subsurface Gas: The potential for generation of subsurface gas is low based on the design and mode of operation of the unit.

Suggested Further Action: The facility should locate these units and determine their integrity. If the integrity has been impaired, soil sampling should be conducted to determine if hazardous constituents have been released. Soil samples should be obtained from those areas where the unit's integrity is impaired. The analytical parameters of concern are listed in Table IV.

6. UNIT NAME: Trash Incinerator

Conclusions:

Soil/Groundwater: The potential for release to the soil/groundwater is high based on the observed soil staining.

Surface Water: The potential for release to surface water is low due to the facility wide run-on and run-off controls.

Air: The potential for release to air is low due to the inactive status of the unit.

Subsurface Gas: The potential for generation of subsurface gas is low based on the above-ground location of the unit.

Suggested Further Action:

Soil sampling is suggested to determine if hazardous constituents have been released. An appropriate grid system should be set up and a minimum of four subsurface sample per grid should be obtained. In addition, at least one soil sample should be collected from the areas where staining was observed. All soil samples should be analyzed for the constituents in Table IV.

Based on the results of the soil sampling, further investigation may be warranted. The samples collected should be analyzed for those constituents identified in the initial soil sampling.

Additionally, it is suggested that the facility ensure and document removal of residues and decontamination of the unit.

7. UNIT NAME: Waste Oil Treatment Unit

Conclusions:

Soil/Groundwater: The potential for release to soil/groundwater is low due to the containment provided by the concrete curb area.

Surface Water: The potential for release to surface water is low due to the facility wide run-on and run-off controls.

Air: The potential for release to air is low due to the inactive status of the unit.

Subsurface Gas: The potential for release to subsurface gas is low due to the above-ground location of the unit.

Suggested Further Action: No further action is suggested at this time other than to insure and document removal of residues and decontamination of the unit.

8. UNIT NAME: No. 8 Oil/Water Separator

Conclusions:

Soil/Groundwater: The potential for release to soil/groundwater is dependent on the integrity of the in-ground separator which could not be determined during the VSI.

Surface Water: The potential for release to surface water is low due to the facility wide run-on and run-off controls.

Air: The potential for release to air is low to moderate since the unit is open topped. Releases from the unit are regulated by the City of Philadephia.

Subsurface Gas: The potential for generation of subsurface gas is low based on the design of the unit.

Suggested Further Action: The facility should verify the integrity of the unit. If the integrity has been impaired, soil sampling should be conducted to determine if hazardous constituents have been released. Soil samples should be obtained from those areas where the unit's integrity is impaired. The analytical parameters of concern are listed in Table IV. Additionally, the facility should continue compliance under its air permit regulated by the City of Philadelphia's Air Management Services.

9. UNIT NAME: Product Storage Sump

Conclusions:

Soil/Groundwater: The potential for release to soil/groundwater is dependent on the integrity of the in-ground sump which could not be determined during the VSI.

Surface Water: The potential for release to surface water is low due to the facility wide run-on and run-off controls.

Air: The potential for release to air is low to moderate since the unit is open topped.

Suggested Further Action:

The facility should verify the integrity of the unit. If the integrity has been impaired, soil sampling should be conducted to determine if hazardous constituents have been released. Soil samples should be obtained from those areas where the unit's integrity is impaired. Additionally, surface soil sampling is suggested to determine the nature and extent of release of hazardous constituents. Additionally, a minimum of one surface soil sample should be collected from areas where straining is observed. All soil samples should be analyzed for parameters in Table IV.

10. UNIT NAME: Container Storage Area
23. UNIT NAME: Tank 1086
24. UNIT NAME: Tank 1087

Conclusions:

Soil/Groundwater: The potential for release to soil and groundwater is low due to the secondary containment system and aboveground location of the unit on a concrete pad.

Surface Water: The potential for release to surface water is low due to the facility wide run-on and run-off controls.

Air: The potential for release to air is low since the units are closed-topped.

Subsurface Gas: The potential for generation of subsurface gas is low due to the aboveground management of the wastes in the unit.

Suggested Further Action: The facility should continue compliance with RCRA requirements.

11. UNIT NAME: Past Lagoon A
12. UNIT NAME: Previous Acid Unit
29. UNIT NAME: Tank 200 Past Lagoon
71. UNIT NAME: Past Lagoon B

Conclusions:

Soil/Groundwater: The potential for release to soil/groundwater is unknown since the nature of waste managed in the unlined units is unknown.

Surface Water: The potential for release to surface water is low due to the facility wide run-on and run-off controls.

Air: The potential of release to air is low due to the underground location of the units.

Subsurface Gas: The potential for generation of subsurface gas is high due to the nature of the waste managed and the mode of operation when the unit was active.

Suggested Further Action:

The facility should provide details on the nature of operations, waste management practices, and any releases at these units. Based on this information, subsurface soil sampling is suggested to determine if hazardous constituents have been released. A grid system should be set up and a minimum of four subsurface soil sample per grid should be collected. The depth of the samples should extend to the base of the unit. Samples should be analyzed for the constituents in Table IV. Also, a soil gas survey should be conducted during soil sampling to determine whether gas from volatiles or biodegradation products is being generated. Based on the results of the soil sampling, further investigation may be warranted. The samples collected should be analyzed for those hazardous constituents identified in the initial soil sampling.

13. UNIT NAME: Tank 355

Conclusions:

Soil/Groundwater: The potential for release to soils/groundwater is dependent on the integrity of the in-ground basin which could not be determined during the VSI.

Surface Water: The potential for release to surface water is low due to the facility wide run-on and run-off controls.

Air: The potential for release to air is moderate because the unit is open-topped.

Subsurface Gas: The potential for generation of subsurface gas is dependent on the integrity of the unit.

Suggested Further Action:

The facility should verify the integrity of the unit. If the integrity has been impaired, soil sampling should be conducted to determine if hazardous constituents have been released. Soil samples should be obtained from those areas where the unit's integrity is impaired. All soil samples should be analyzed for the parameters in Table IV. It is also suggested that all drums currently stored at this unit be moved to the Waste Oil Drum Storage Area (SWMU 14).

14. UNIT NAME: Waste Oil Drum Storage Area

Conclusions:

Soil/Groundwater: The potential for release to soil/groundwater is low due to the aboveground location of the unit on a concrete pad.

Surface Water: The potential for release to surface water is low due to the facility wide run-on and run-off controls.

Air: The potential for release to air is low since the wastes managed at the unit are stored in closed-topped containers.

Subsurface Gas: The potential for release to subsurface gas is low due to the above-ground location of the unit.

Suggested Further Action: No further action is suggested at this time based on observations during the VSI.

15. UNIT NAME: Tank 317

Conclusions:

Soil/Groundwater: The potential for release to soil/groundwater is high based on the observed soil staining.

Surface Water: The potential for release to surface water is low due to the facility wide run-on and run-off controls.

Air: The potential for release to air is low since the unit is closed-topped.

Subsurface Gas: The potential for generation of subsurface gas is low due to the above-ground management of the wastes in the unit.

Suggested Further Action:

Surface and subsurface soil sampling is suggested to determine if hazardous constituents have been released. A minimum of four soil subsurface samples should be taken from around the perimeter of the tank. Additionally, at least one surface soil sample should be collected from areas where staining was observed. All soil samples should be analyzed for the parameters in Table IV. Based on the results, further investigation may be warranted. The samples collected should be analyzed for those hazardous constituents identified in the initial soil sampling. The facility should continue compliance with RCRA requirements.

16. UNIT NAME: Tank 357
17. UNIT NAME: Tank 358
42. UNIT NAME: Tank 1163 (T-100)

Conclusions:

Soil/Groundwater: The potential for release to soils/groundwater is high due to the observed gravel staining.

Surface Water: The potential for release to surface water is low due to the facility wide run-on and run-off controls.

Air: The potential for release to air is low since the unit is closed-topped.

Subsurface Gas: The potential for generation of subsurface gas is low due to the aboveground management of wastes in these units.

Suggested Further Action:

Soil sampling is suggested to determine if hazardous constituents have been released. A minimum of four soil borings should be taken from around the perimeter of each tank. The soil borings should be taken at a minimum depth of two feet. Additionally, at least one surface soil sample should be collected from areas where staining was observed. All soil samples should be analyzed for the parameters in Table IV. Based on the results, further investigation may be warranted. The samples collected should be analyzed for those hazardous constituents identified in the initial soil sampling.

18. UNIT NAME: Incinerator Feed Tank 1004
19. UNIT NAME: Incinerator Feed Tank 1005

Conclusions:

Soil/Groundwater: At the time of the VSI, these units were not observed because they had been removed. The potential for release to soil/groundwater is dependent on the integrity of the units.

Surface Water: The potential for release to surface water is low based on the facility wide run-on and run-off controls.

Air: The potential for release to air is low because the units have been removed.

Subsurface Gas: The potential for generation of subsurface gas is low due to the aboveground management of the wastes in these units.

Suggested Further Action:

Surface soil sampling is suggested to determine if hazardous constituents have been released because the tanks had been removed and the integrity could not be checked during the VSI. A minimum of four surface soil samples should be taken from around the perimeter of the concrete tank pads. The soil samples should be analyzed for the parameters in Table IV. Based on the results of the soil sampling, further investigation may be warranted. The samples collected should be analyzed for those constituents identified in the initial soil sampling. After these tanks have been replaced in kind, the facility should continue compliance with RCRA requirements.

20. UNIT NAME: No.7 Separator
21. UNIT NAME: No.6 Separator (Tank 599)
22. UNIT NAME: Separator No.5
26. UNIT NAME: Separator No.2B
27. UNIT NAME: Separator No.2A
74. UNIT NAME: Separator No.4B
75. UNIT NAME: Separator No.4A
76. UNIT NAME: Separator No.3
77. UNIT NAME: Separator No.4

Conclusions:

Soil/Groundwater: The potential for release to soils/groundwater is dependent on the integrity of the in-ground separators which could not be determined during the VSI.

Surface Water: Separator No. 7, 2A, and 3 (SWMU 20, 27 and 76) at times discharge to Schuylkill River under NPDES permit No. 0011533 and have a high potential for release to surface water. The potential for release to surface water is low for the other separators, due to facility wide run-on and run-off controls. However, some of these units which currently discharge to the WWTP, at one time, discharged directly to the river. The release potential in the past was high for these units.

Air: The potential for release to air is low for No.6 Separator (SWMU 21) since it is inactive. The potential for release is low to moderate for the other separators because the units are open-topped.

Subsurface Gas: The potential for generation of subsurface gas is low due to the mode of operation and design of the units.

Suggested Further Action: The facility should verify the integrity of the units. If the integrity has been impaired, soil sampling will be warranted to determine if hazardous constituents have been released. Soil samples should be obtained from those areas where the unit's integrity is impaired. The analytical parameters of concern are listed in Table IV. Separators 2B, 4, 4A, 5 and 6 and (SWMUs 26, 77, 75, 22, and 21) are regulated under the City of Philadelphia, Air Management Services program. It is suggested that these units continue compliance under their air permit.

25. UNIT NAME: Former No.2 Separator

Conclusions:

Soil/Groundwater: At the time of the VSI, this unit was not observed because it had been removed. The potential for release to soil/groundwater is dependent on the integrity of the unit prior to its removal.

Surface Water: The potential for release to surface water is low based on the facility wide run-on and run-off controls.

Air: The potential for release to air is low because the unit has been removed.

Subsurface Gas: The potential for generation of subsurface gas is low due to the mode of operation and design of the unit.

Suggested Further Action:

Subsurface soil sampling is suggested to determine if hazardous constituents have been released. A minimum of two subsurface soil samples should be taken directly in the area where the separator was located. The depth of the samples should extend to the base of the unit. The soil samples should be analyzed for the parameters in Table IV. Based on the results of the soil sampling, further investigation may be warranted. The samples collected should be analyzed for those constituents identified in the initial soil sampling.

28. UNIT NAME: Tank 200 (Separator No.844)
31. UNIT NAME: Tank 104
32. UNIT NAME: Tank 103 (Tank 1166)
78. UNIT NAME: Tank 400

Conclusions:

Soil/Groundwater: There is a low potential for release to soil/groundwater based on the above-ground location of the tanks and the good condition of the units observed during the VSI.

Surface Water: There is a low potential for release to surface water based on the facility-wide run-on and run-off controls.

Air: There is a low potential for release to air because the units are closed-topped.

Subsurface Gas: There is low potential for subsurface gas generation based on the aboveground location of the tanks.

Suggested Further Action: No further action is suggested at this time based on what was observed during the VSI.

30. UNIT NAME: Additive Plant Drum Storage Area
73. UNIT NAME: Old Bundle Cleaning Area

Conclusions:

Soil/Groundwater: The potential for release to soil/groundwater is high based on the mode of operation at the units.

Surface water: The potential for release to surface water is low due to the facility wide run-on and run-off controls.

Air: The potential for release to air is low due to the inactive status of units.

Subsurface Gas: The potential for generation of subsurface gas is low due to the aboveground location of the units.

Suggested Further Action:

Surface soil sampling is suggested to determine if hazardous constituents have been released from these units. A minimum of three surface samples should be collected at each unit. All soil samples should be analyzed for the parameters in Table IV. Based on the results of the soil sampling, further investigation may be warranted. The samples collected should be analyzed for those constituents identified in the initial soil sampling.

33. UNIT NAME: Fluidactor
34. UNIT NAME: Gas Cyclone
35. UNIT NAME: Venturi Scrubber
36. UNIT NAME: Ash Transport Vessel
37. UNIT NAME: Ash Classifier
38. UNIT NAME: Bag House
39. UNIT NAME: Ash Dumpster
40. UNIT NAME: Ash Hopper

Conclusions:

Soil/Groundwater: The potential for release to soil and groundwater is low because the units are on a concrete pad.

Surface Water: The potential for release to surface water is low due to the facility wide run-on and run-off controls.

Air: Releases to air are addressed by the City of Philadelphia air permit.

Subsurface Gas: The potential for generation of subsurface gas is low since these units are located aboveground on a concrete pad.

Suggested Further Action:

No further action is suggested for these units at this time, other than continued compliance under the City of Philadelphia Air Management Service permit and RCRA requirements.

41. UNIT NAME: Tank 388 (East and West Basin)

Conclusions:

Soil/Groundwater: The potential for release to soil and groundwater is low due to the secondary containment system.

Surface Water: The potential for relase to surface water is low due to the facility wide run-on and run-off controls.

Air: The potential for relase to air is moderate since the basin is open-topped.

Subsurface Gas: The potential for generation of subsurface gas is low due to the nature of operations at the unit.

Suggested Further Action: The facility should continue compliance with RCRA requirements.

43. UNIT NAME: T-100 Double Basket Strainer
44. UNIT NAME: T-100 Dumpster

Conclusions:

Soil/Groundwater: There is a low potential for release to soil/groundwater based on the aboveground location of the units on a concrete pad.

Surface Water: There is a low potential for release to surface water based on the facility wide run-on and run-off controls.

Air: There is a low potential for release to air for the T-100 Donble Basker Strainer based on the close-topped nature of the unit. There is a moderate potential for release to air for the T-100 Dumpster because the unit is open-topped and staining was noted on the concrete pad.

Subsurface Gas: There is a low potential for subsurface gas generation based on the aboveground location of the units on a concrete pad.

Suggested Further Action: No further action is suggested at this time based on what was observed during the VSI other than keeping the T-100 Dumpster (SWMU 44) covered and the area clean.

45. UNIT NAME: Empty Drum Storage Area
79. UNIT NAME: Drum Storage Area

Conclusions:

Soil/Groundwater: The potential for release to soils/groundwater is high based on observed soil staining.

Surface Water: The potential for release to surface water is low due to the facility wide run-on and run-off controls.

Air: The potential for release to air is low at Empty Drum Storage Area (SWMU 45) since, during the VSI, it was observed to be closed-topped.

The potential for release to air is moderate at Drum Storage Area (SWMU 79) since, during the VSI, some of the drums were open to the atmosphere.

Subsurface Gas: The potential for generation of subsurface is low due to the inactive status of the units.

Suggested Further Action:

Surface and subsurface soil sampling is suggested to determine hazardous constituents have been released. An appropriate grid system should be set up with a minimum of two subsurface samples per grid should be collected. Additionally, at least one surface sample at each unit should be collected from areas where staining was observed. All soil samples should be analyzed for the parameters in Table IV. Based on the results, further investigation may be warranted. The samples collected should be analyzed for those hazardous constituents identified in the initial soil sampling.

It is suggested that at Drum Storage Area (SWMU 45) the drums be closed and at both sites the drums be properly labeled. The facility should consider placing secondary containment around the areas to prevent future releases.

46. UNIT NAME: 1146 Roughing Filter
47. UNIT NAME: 1147 Roughing Filter
48. UNIT NAME: 1140 Primary Clarifier
49. UNIT NAME: 1141 Primary Clarifier
50. UNIT NAME: 1142 Oxidation Tank
51. UNIT NAME: 1143 Oxidation Tank
52. UNIT NAME: 1148 Final Clarifier
53. UNIT NAME: 1149 Final Clarifier
64. UNIT NAME: 1144 Thickener
65. UNIT NAME: 1145 Thickener

Conclusions:

Soil/Groundwater: There is a low potential for release to soil/groundwater based on the above-ground location of the tanks and the good condition of the tanks observed during the VSI.

Surface Water: There is a low potential for release to surface water based on the facility wide run-on and run-off controls.

Air: There is a moderate potential for release to air because the units are open-topped.

Subsurface Gas: There is a low potential for subsurface gas generation based on the aboveground location of the tanks.

Suggested Further Action:

An air release investigation is suggested to determine the nature of emissions. Emissions may be based on either calculations from wastewater constituent concentrations or actual air emission testing. Analysis of air emissions and wastewater for volatile organic compounds (VOCs) is suggested. Air sampling should take place when VOC concentrations in the wastewater is above the annual average, the ambient temperature is above the mean summer temperature and the barometric pressure is below the annual mean pressure conditions at the facility. In addition, continue compliance under the NPDES permit.

54. UNIT NAME: Tertiary Sand Filter Bed 1
55. UNIT NAME: Tertiary Sand Filter Bed 2
56. UNIT NAME: Tertiary Sand Filter Bed 3
57. UNIT NAME: Tertiary Sand Filter Bed 4
58. UNIT NAME: Tertiary Sand Filter Bed 5
59. UNIT NAME: Tertiary Sand Filter Bed 6
60. UNIT NAME: Tertiary Sand Filter Bed 7
61. UNIT NAME: Tertiary Sand Filter Bed 8
66. UNIT NAME: Centrifuge 1
67. UNIT NAME: Centrifuge 2
68. UNIT NAME: Centrifuge 3
69. UNIT NAME: Centrifuge 4
70. UNIT NAME: Centrifuge 5

Conclusions:

Soil/Groundwater: There is a low potential for release to soil/groundwater based on the aboveground and indoor location of the units.

Surface Water: There is a low potential for release to surface water based on the indoor location of the units and the facility wide run-on and run-off controls.

Air: There is a low potential for release to air based on the indoor location of the units.

Subsurface Gas: There is a low potential for subsurface gas generation based on the aboveground location of the units.

Suggested Further Action: No further action is suggested for the units at this time based on the observations of the VSI other than continued compliance under the NPDES permit.

62. UNIT NAME: Wastewater Sump
63. UNIT NAME: Process Wastewater Pipes

Conclusions:

Soil/Groundwater: The potential for release to soils/groundwater is dependent on the integrity of the in-ground units which could not be determined during the VSI.

Surface Water: The potential for release to surface water is low due to the facility wide run-on and run-off controls.

Air: The potential for release to air is low based on covered nature of the unit.

Subsurface Gas: The potential for generation of subsurface gas is low based on the mode of operation and design of the unit.

Suggested Further Action:

The facility should verify the integrity of the unit. If the integrity has been impaired, soil sampling will be warranted to determine if hazardous constituents have been released. Soil samples should be obtained from those areas where the unit's integrity is impaired. The soil should be sampled for the analytical parameters listed in Table IV.

72. UNIT NAME: Bundle Cleaning Area

Conclusions:

Soil/Groundwater: The potential for release to soil and groundwater is low due to the concrete pad underlying the unit.

Surface Water: The potential for release to surface water is low due to the facility wide run-on and run-off controls.

Air: The potential for release to air is low based on the mode of operation of the unit.

Subsurface Gas: The potential for generation of the subsurface gas is low due to the aboveground management of the wastes in the unit.

Suggested Further Action: No further action is suggested based on what was observed during the VSI.

80. UNIT NAME: Asbestos Storage Area

Conclusions:

Soil/Groundwater: The potential for release to soils/groundwater is low since the waste is containerized.

Surface Water: The potential for release to surface water is low due to the facility wide run-on and run-off controls.

Air: The potential for release to air is low since the waste is containerized.

Subsurface Gas: The potential for release to subsurface gas is low due to the aboveground location of the unit.

Suggested Further Action: No further action is suggested at this time based on what was observed during the VSI.

81. UNIT NAME: Petrochemical Loading Area
82. UNIT NAME: Lube Oil Unloading Area
83. UNIT NAME: Agent Unloading Area
84. UNIT NAME: WEMCO Unloading Area
85. UNIT NAME: Oldest Unloading Area
86. UNIT NAME: Spent Caustic Loading Area

Conclusions:

Soil/Groundwater: The potential for release to soil/groundwater is high based on the observed staining.

Surface Water: The potential for release to surface water is low due to the facility wide run-on and run-off controls.

Air: The potential for release to air is moderate since these units are open to the atmosphere.

Subsurface Gas: The potential for generation of subsurface gas is low due to the mode of operation of the units.

Suggested Further Action:

Surface and subsurface soil sampling is suggested to determine if hazardous constituents have been released. An appropriate grid system should be set up with a minimum of two subsurface samples per grid should be collected. A minimum of one surface sample from each unit should be collected from areas where staining was observed. All soil samples should be analyzed for the parameters in Table IV. Based on the results of the soil sampling,further investigation may be warranted. The samples collected should be analyzed for those hazardous constituents identified in the initial soil sampling.

Six representative loading and unloading areas were observed during the VSI, all of which showed routine and systematic spillage. Therefore, it is suggested that the facility perform a verification investigation at all the loading and unloading areas.

87. UNIT NAME: Buried Lead Sludge Area 1
88. UNIT NAME: Buried Lead Sludge Area 2
89. UNIT NAME: Buried Lead Sludge Area 3
90. UNIT NAME: Buried Lead Sludge Area 4
91. UNIT NAME: Buried Lead Sludge Area 5
92. UNIT NAME: Buried Lead Sludge Area 6
93. UNIT NAME: Buried Lead Sludge Area 7
94. UNIT NAME: Buried Lead Sludge Area 8
95. UNIT NAME: Buried Lead Sludge Area 9

Conclusions:

Soil/Groundwater: The potential for release to soil/groundwater is high based on reported soil contamination at the sites.

Surface Water: The potential for release to surface water is low based on the facility wide run-on and run-off controls.

Air: The potential for release to air is low based on the buried nature of the units.

Subsurface Gas: The potential for generation of subsurface gas is moderate due to the organic nature of wastes buried at these units.

Suggested Further Action:

It is suggested that soil and groundwater sampling and a soil gas survey be conducted at each unit to determine the nature and extent of contamination from these units. The facility should conduct a subsurface investigation of the groundwater conditions. The groundwater investigation should involve a hydrogeologic assessment to determine the nature, extent, direction, and rate of migration of releases to the groundwater from these buried lead areas. Detailed information about the geology beneath the site, horizontal and vertical extent of the uppermost aquifer, and groundwater flow paths and rates should be provided. A minimum of one upgradient and three downgradient wells should be installed around each unit. In addition, the facility should sample any wells installed as part of the site assessment (Reference 67) located in the vicinity of the units.

87. UNIT NAME: Buried Lead Sludge Area 1 (Continued)
88. UNIT NAME: Buried Lead Sludge Area 2
89. UNIT NAME: Buried Lead Sludge Area 3
90. UNIT NAME: Buried Lead Sludge Area 4
91. UNIT NAME: Buried Lead Sludge Area 5
92. UNIT NAME: Buried Lead Sludge Area 6
93. UNIT NAME: Buried Lead Sludge Area 7
94. UNIT NAME: Buried Lead Sludge Area 8
95. UNIT NAME: Buried Lead Sludge Area 9

A minimum of four subsurface soil samples should be taken from the perimeter of each unit to detect the horizontal distribution of hazardous constituents. The soil samples should penetrate to at least the depth of the waste buried within the documented contaminated areas.

The soil and groundwater samples should be analyzed for the parameters in Table IV.

Also, a gas monitoring survey should be conducted during soil sampling to determine whether gas from volatile organics or biodegradation products is being generated.

96. UNIT NAME: Area A Ballfields
97. UNIT NAME: Area B Ballfields

Conclusions:

Soil/Groundwater: The potential for release to soil/groundwater is high based on reported soil contamination at these sites.

Surface Water: The potential for release to surface water is moderate based on the lack of run-off controls and proximity of Schuylkill River.

Air: The potential for release to air is low based on the vegetated cover of the units.

Subsurface Gas: The potential for generation of subsurface gas is moderate due to the organic nature of the waste managed at the units.

Suggested Further Action:

It is suggested that soil and groundwater sampling and a soil gas survey be conducted at each unit to determine the nature and extent of contamination. The facility should conduct a subsurface investigation to determine the nature, extent, direction, and rate of migration of releases to the groundwater from these units. Detailed information about the geology beneath the site, horizontal and vertical extent of uppermost aquifer, and groundwater flow paths and rates should be provided. A minimum of one upgradient and three downgradient wells should be installed around the unit. Additionally, the facility should sample the existing wells in the area installed as part of the site assessment report (Reference 67).

Surface and subsurface soil sampling is suggested to determine the nature and extent of contamination. Since extensive sampling has been done in the mounded area, it is suggested that additional sampling should take place near the boundary of the mounded area. A minimum of four subsurface soil samples should be taken from the perimeter of the unit to detect the horizontal migration of hazardous constituents. Due to the unknown nature of the wastes managed at these units, all samples should be analyzed for the metals, volatiles, and semi-volatiles listed in 40 CFR 261, Appendix IX.

96. UNIT NAME: Area A Ballfields (Continued)
97. UNIT NAME: Area B Ballfields

Also, a gas monitoring survey should be conducted during soil sampling to determine whether gas from volatile organics or biodegradation products is being generated.

98. UNIT NAME: Tank 102

Conclusions:

Soils/Groundwater: The potential for release to soil/groundwater is low due to concrete berm surrounding the unit and aboveground location of the unit.

Surface Water: The potential for release to surface water is low due to the facility wide run-on and run-off controls.

Air: The potential for release to air is low since the units are closed topped.

Subsurface Gas: The potential for generation of subsurface gas is low due to the design and mode of operation of the unit.

Suggested Further Action: No further action is suggested at this time based on what was observed during the VSI.

99. UNIT NAME: Trash Dumpsters

Conclusions:

Soil/Groundwater: There is low potential for release to soil/groundwater based on the aboveground location of the unit.

Surface Water: There is a low potential for release to surface water based on facility wide run-on and run-off controls.

Air: There is a low potential for release to air because of the non volatile nature of wastes managed.

Subsurface Gas: There is a low potential for subsurface gas generation based on aboveground location of the unit.

Suggested Further Action: No further action is suggested at this time based on what was observed during the VSI.

100. UNIT NAME: Process Lines and Sumps

Conclusions:

Soil/Groundwater: The potential for release to soils/groundwater is high due to observed staining.

Surface Water: The potential for release to surface water is low due to the facility wide run-on and run-off controls.

Air: The potential for release to air is dependent on the integrity of the unit.

Subsurface Gas: The potential for generation of subsurface gas is dependent on the integrity of this unit.

Suggested Further Action:

The facility should verify the integrity of the unit, including the above-ground, in-ground, and below-ground parts. If integrity has been impaired, soil sampling will be warranted to determine if hazardous constituents have been released. Soil sampling should be obtained from these areas where the unit's integrity is impaired. The analytical parameters of concern are listed in Table IV.

Additionally, the facility should conduct a visual investigation of the above-ground parts of the unit and collect at least one surface soil sample from areas where staining was observed. All soil samples should be analyzed for the parameters in Table IV.

Based on the results of the soil sampling, further investigation may be warranted. The samples collected should be analyzed for those hazardous constituents identified in the initial soil sampling.

101. UNIT NAME: Bulkhead Seepage Area

Conclusions:

Soil/Groundwater: The potential for release to soils/groundwater is high based on the reported oil presence in the monitoring wells near the unit.

Surface Water: The potential for release to surface water is high based on the reported seepage to the Schuylkill River.

Air: The potential for release to air is low based on the below ground location of the unit.

Subsurface Gas: The potential for generation of subsurface gas is high based on the organic nature of the waste managed at the unit.

Suggested Further Action:

The facility is constructing a slurry wall in an attempt to mitigate the observed seepage. It is suggested the facility submit a detailed report outlining the engineering design, material of construction, etc. of the slurry wall.

It is suggested that soil and groundwater sampling and a soil gas survey be conducted at the unit to determine the nature and extent of contamination. The facility should conduct a subsurface investigation to determine the nature, extent, direction, and rate of migration of releases to the groundwater from these units. Detailed information about the geology beneath the site, horizontal and vertical extent of uppermost aquifer, and groundwater flow paths and rates should be provided. A minimum of one upgradient and three downgradient wells should be installed around the unit. Additionally, the facility should sample the existing wells in the vicinity of the unit installed as part of the site assessment report (Reference 67).

Surface and subsurface soil sampling is suggested to determine the nature and extent of contamination. A minimum of four subsurface soil samples should be taken from the perimeter of the unit. The soil and groundwater samples should be analyzed for parameters in Table IV.

Also, a gas monitoring survey should be conducted during soil sampling to determine whether gas from volatile organics or biodegradation products is being generated.

VIII. REFERENCES

1. Correspondence to Norval V. Smith, Surveillance and Analysis Division, US EPA, Region III; from George E. Umlauf, PES; Re: PES Inspection of Philadelphia Refinery of Gulf Oil; September 6, 1979.

2. Stationary Source Inspection Report for Gulf Oil Company, Philadelphia, Pennsylvania; by PES for US EPA; August 16, 1979.

3. Level II Inspection of Gulf Oil Company by Philadelphia AMS and EPA on January 21, 1980 and January 22, 1980.

4. Air Pollution Control Equipment Installation Permit Application; Re: Carbon Adsorption/Absorption Gasoline Vapor Recovery Unit, November 30, 1983.

5. Inspection Report Air Pollution Control; December 28, 1984.

6. Notice of Violation, Date of Violation December 27, 1984; Re: Upset Conditions at FCCL, 1232 required excess gas to be vented to the flare causing smoke, January 3, 1985.

7. Inspection Report – Air Pollution Control; December 4, 1984.

8. Notice of Violation; Re: Violation was issued during normal soot-blowing operations, December 6, 1984.

9. Inspection Report – Air Pollution Control, December 3, 1984.

10. Notice of Violation; Re: Upset Operations results from a fire on the unit from 5:00 P.M. until 6:15 P.M.; December 4, 1984.

11. Order, City of Philadelphia vs Gulf Oil Company – U.S.; Re: Control of Volatile Organic Compound Storage Tank Emissions, January 4, 1982.

12. Correspondence to D. Rajkotia, PaDER from J.H. Williams, Chevron; Re: Closure T-103 Tank (Tank 1166); August 14, 1986.

13. Hazardous Waste Inspection Report Generators – Part A, TSD Facilities – Part A, Chevron, April 14, 1988.

14. Correspondence to Dirk K. Robinson from J.P. Edmisson, Chevron; Re: Spill Report documenting a release of cumene; March 7, 1988.

15. Soil Survey of Bucks and Philadelphia Counties, Pennsylvania, United States Department of Agriculture, Soil Conservation Service, July 1983

16. Hazardous Waste Inspection Report Generators, – Part A and TSD Facilities – Part A; December 3, 1985.

0106x

17. Correspondence to Frank Hannigan, Chevron, from Frank Holmes, PaDER; Re: Hazardous Waste Inspection of December 3, 1985; Notice of Violation, December 3, 1985.

18. Correspondence to Frank Holmes, PaDER from J.H. Williams, Chevron; Re: Hazardous Waste Inspection, December 3, 1985, December 19, 1985.

19. Correspondence to Frank Hannigan, Chevron, from Mark Bonenberger, PaDER; Re: Hazardous Waste Inspection, November 13, 1986.

20. Hazardous Waste Inspection Report Generators – Part A and TSD Facilities – Part A, November 13, 1986.

21. Correspondence to Lawrence Lunsk; PaDER from W.A. Hackney, Chevron; Re: Hazardous Waste Spill Report of 2,000 lbs. of Spent Caustic (D002); September 9, 1986.

22. Correspondence to Lawrence Lunsk, PaDER from J.H. Williams, Chevron; Re: Hazardous Waste Spill Report; April 16, 1986.

23. Hazardous Waste Inspection Report Generators – Part A; February 3, 1986.

24. Facility Status Report; December 18, 1985.

25. FY 1985 Hazardous Waste Compliance Monitoring and Enforcement Log; July 18, 1985.

26. Correspondence to Frank Hannigan, Gulf Oil Corporation from Robert Zang, PaDER; Re: Hazardous Waste Inspection; April 29, 1985.

27. Hazardous Waste Inspection Report, TSD Facilities – Part A, Transporters – Part A, Generators – Part A; March 29, 1985.

28. Correspondence to Frank Hannigan, Gulf Oil Corporation from Robert Zang, PaDER; Re: Notice of Violation of the September 11, 1984, Hazardous Waste Inspection, September 24, 1984.

29. Hazardous Waste Inspection Report, Generators – Part A, Transporter – Part A, and TSD Facilities – Part A; September 11, 1984.

30. Correspondence to Frank Hannigan, Gulf Oil Co., from Robert Zang, PaDER; Re: Notice of Violation of the Hazardous Waste Inspection on July 14, 1984; August 2, 1984.

31. Hazardous Waste Inspection Report Generators – Part A, Transporter – Part A, and TSD Facilities – Part A, June 5, 1984.

32. Hazardous Waste Inspection Report Generators – Part A, Transporter – Part A and TSD Facilities – Part A, January 31, 1984.

33. Hazardous Waste Inspection Report Generators - Part A, Transporters - Part A and TSD Facilities - Part A, December 6, 1983.

34. Hazardous Waste Inspection Report Generators - Part A, Transporters - Part A and TSD Facilities - Part A, June 27, 1983.

35. Correspondence to Frank Hannigan, Gulf Oil Co., from Robert Zang, PaDER; Re: Hazardous Waste Inspection, November 15 and 16, 1982; December 7, 1982.

36. Hazardous Waste Inspection Report Generators - Part A, Transporters - Part A and TSD Facilities - Part A; November 15, 1986.

37. Correspondence to Walter Stanley, PaDER from J.H. Williams, Gulf Oil Co., Re: Spill Report - 2,000 bbl. of K049 Waste; March 12, 1981.

38. Memorandum from John F. Zwalinski, PaDER to Lawrence Lunsk, PaDER, Re: Gulf Oil, Proposed Land Farming Site; no date.

39. Memorandum from Marilyn A. Hewitt, PaDER to Lawrence Lunsk, PaDER; Re: Gulf Oil Co. - Proposed Sludge Land Farm; April 25, 1980.

40. Application for Permit for Solid Waste Disposal and/or Processing Facilities; Re: Soil Biological Treatment Operation, December 18, 1979.

41. Soil, Geology and Groundwater Information, Module No. 2; no date.

42. Correspondence to W. Lucas and F. Hannigan, Gulf Oil Co., from Dames and Moore; Re: Draft Permit Application (Phase 1) for Land Farm No. 1; December 5, 1979.

43. Attachment B Boring West of Proposed Land Farm, 1974.

44. Public Notice No. PA 0030, Application for NPDES Permit Discharge to State Waters; April 15, 1974.

45. Correspondence from Wayne L. Lynn, PaDER to E.E. Moore, Gulf Oil Co.; Re: Review of Land Farm Site; January 15, 1974.

46. Draft Preliminary Review Report for the Chevron (Gulf Facility), Philadelphia, Pennsylvania. Prepared by AEPCO, Inc. for US EPA; June 2, 1987.

47. Visual Site Inspection Report for the Chevron (Gulf) Facility, Philadelphia, Pennsylvania. Prepared by AEPCO, Inc. for US EPA; August 7, 1987.

48. Correspondence to J.H. Williams, Gulf Oil Co. from George Kohut, PaDER; Re: NPDES Permit No. PA 0011533, August, 22, 1985.

49. Draft Authorization to Discharge under the NPDES, Industrial Permit No. PA 0011533, issued by Bureau of Water Quality Management, Department of Environmental Resources, Commonwealth of Pennsylvania; issued to Gulf Oil Corporation; August 22, 1983.

50. Pennsylvania Department of Environmental Resources, Bureau of Water Quality Management, Internal Review and Recommendations; no date.

51. Notification in Compliance with Part B, Section 1, of Permit No. 0011533. Addressed to Pennsylvania Department of Environmental Resources from Chevron USA, Inc. Date: August 17, 1983; October 3, 1983; October 30, 1984; July 17, 1985; September 9, 1985; October 7, 1985; March 3, 1986; April 23, 1986; July 1, 1986; July 14, 1986; August 29, 1986; November 10, 1986; January 12, 1987; May 1, 1987; May 14, 1987; June 17, 1987; July 13, 1987; August 13, 1987; November 5, 1987; December 18, 1987; and January 14, 1988.

52. Correspondence to US EPA, Region III from J.H. Williams, Gulf Oil Co.; Re: Name Change to Chevron USA, Inc.; June 20, 1985.

53. Correspondence to John Williams, Gulf Oil Co., from Stephan Sindeng, PaDER; Re: NPDES Permit No. PA 0011533, October 9, 1984.

54. Part B Permit Application for Gulf Oil Corporation; April 12, 1983.

55. Gulf Oil Corporation, Philadelphia Refinery Hazardous Waste Incinerator Trial Burn Program; Prepared for: Gulf Oil Products Co.; Prepared by Scott Environmental Services; January, 1985.

56. Attachment No. 3; Series of Outfall Maps, US EPA Region III Water Division files; no date.

57. Part A Application, for Gulf Oil Corporation, March 2, 1983.

58. Part A Application for Chevron USA Inc., November 22, 1985.

59. Part A Application for Chevron USA Inc., August 1, 1980.

60. Part A Application for Chevron USA Inc., May 13, 1988.

61. [illegible] Application submitted to PaDER for the Chevron, [illegible] June 30, 1987.

62. [illegible] Thomas J. Maslany, US EPA Region III from J.H. Holmes, [illegible] Re: 3AM22 Clear Air Act Request for Compliance [illegible] July 1988.

63. Correspondence to Philip Katauskas, Baskin, Flaherty, Elliott & Mannino, P.C. from Frederick C. Bader, City of Philadelphia; Re: Chevron USA, Inc. – Philadelphia Refinery; May 21, 1987.

64. General Refinery Data for Chevron facility; no date.

65. Air Pollution Survey at the Refinery of the Gulf Oil Corporation, Prepared by K. Humiston and J. Hammond, Philadelphia Department of Public Health; November 1, 1972.

66. Visual Site Investigation of Chevron USA, Inc., Philadelphia, PA; November 17–18, 1988.

67. Dames and Moore, Chevron, Philadelphia – Site Assessment, no date.

68. Correspondence to B. Banner, Chevron, USA, from William DeSimone, Commonwealth Land Title Insurance Company; Re: Identification of all Commercial/Industrial Record Owners for the Area Referred to as the Ballfield; October 21, 1987.

69. Notification of Hazardous Waste Site, under Section 103(c) of CERCLA, submitted to U.S. EPA by Gulf Oil Corp., Philadelphia Refinery, 1981.

70. Draft Permit for Hazardous Waste Storage, Treatment and Storage; issued by Commonwealth of Pennsylvania, Department of Environmental Resources; issued to Chevron U.S.A., Philadelphia Refinery.

71. Drawings for:

- 2A Separator, 1940
- 2B Separator, 1945
- 2 Separator, 1928
- 3 Separator, 1941
- 4A Separator, 1952
- 4B Separator, 1944
- 5 Separator, 1944
- 6 Separator, 1944
- 7 Separator, 1953
- 8 Separator, 1955
- 16 Terminal, 1924
- 110 Separator, 1927
- Separator 516, 1936

72. Dames and Moore, "Final Investigation of Area B Ballfields, Chevron Refinery, Philadelphia, Pennsylvania," August 30, 1988

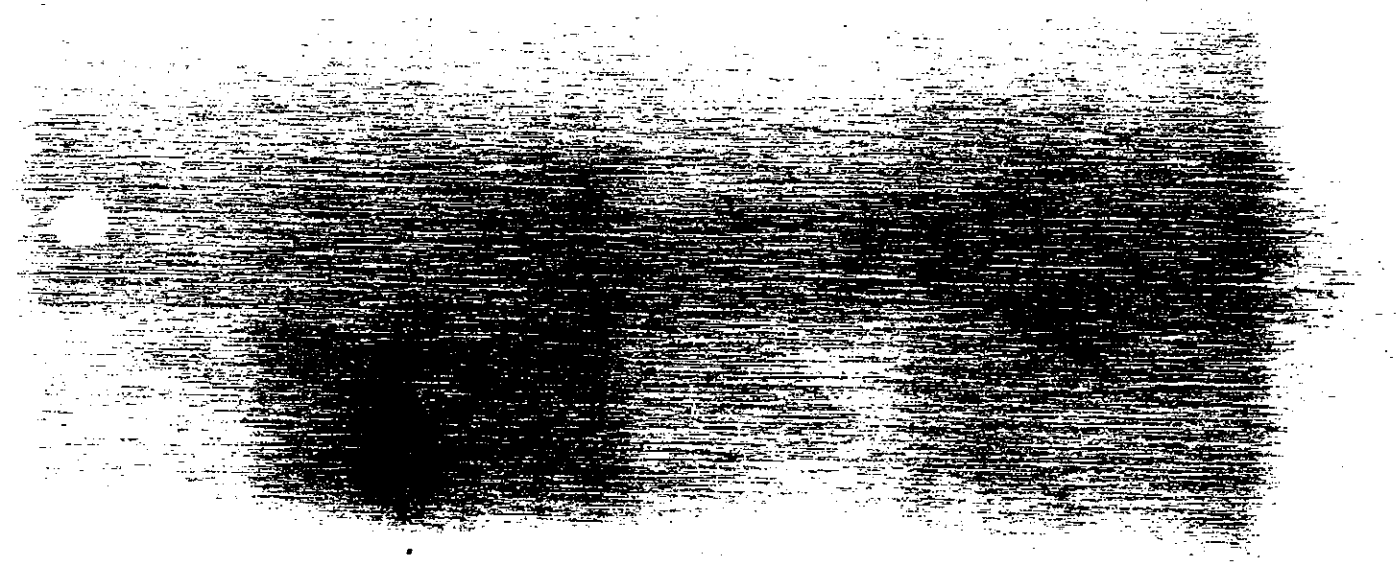
73. Dames and Moore, "Report Investigation of Area A Ballfields, Chevron Refinery, Philadelphia, Pennsylvania," July 10, 1988

74. Correspondence to Gil Horwitz, US EPA from M.J. Holmes, Chevron; Re: Removal of Ballfield from RCRA Facility Assessment; December 15, 1988.

75. Memorandum from John Skinner, Office of Solid Waste, to Hazardous Waste Permit Branch Chiefs Regions I–X; Re: Guidance on Petroleum Refinery Waste Analysis for Land Treatment Permit Applications; April 3, 1984.

ATTACHMENT A

VISUAL SITE INSPECTION SUMMARY AND PHOTOLOG



The visual site inspection (VSI) summary and photograph log document the activities and observations of representatives of A.T. Kearney and the U.S. Environmental Protection Agency (US EPA) during the November 17-18, 1988, VSI of the Chevron facility located near Philadelphia, Pennsylvania. Observations and findings from the VSI have been incorporated into the main body of this report and provide a basis for the suggested further actions.

VISUAL SITE INSPECTION SUMMARY

Prior to the VSI, a proposed RCRA Visual Site Inspection Agenda was prepared by A.T. Kearney based on a file review. This agenda was provided to all interested parties.

The following persons participated in the VSI.

Gil Horwitz	US EPA Region III
C. K. Lee	US EPA Region III
Paul Letki	A.T. Kearney
Lata Venkateshwara	A.T. Kearney
Bob Vogelsong	Chevron
Frank Hannigan	Chevron
Eric Scheider	Chevron
Nick Salladino	Chevron

The EPA and Kearney inspection team and Chevron representatives assembled in a conference room at the facility at 9:00 a.m. on November 17 and 8:00 a.m. on November 18 to discuss the day's agenda and information needs. At the Day 1 opening meeting, the facility representatives described the history of operations at the site, present facility layout and operations, and future plans for manufacturing operations. Past and present waste management practices and the history and details of releases were discussed. The facility provided recent data about spill events, groundwater monitoring data. At the Day 2 opening meeting, the facility representatives answered specific questions about SWMUs.

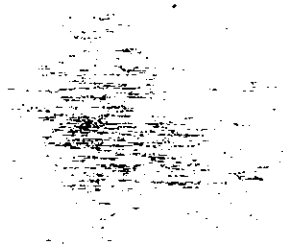
0109x

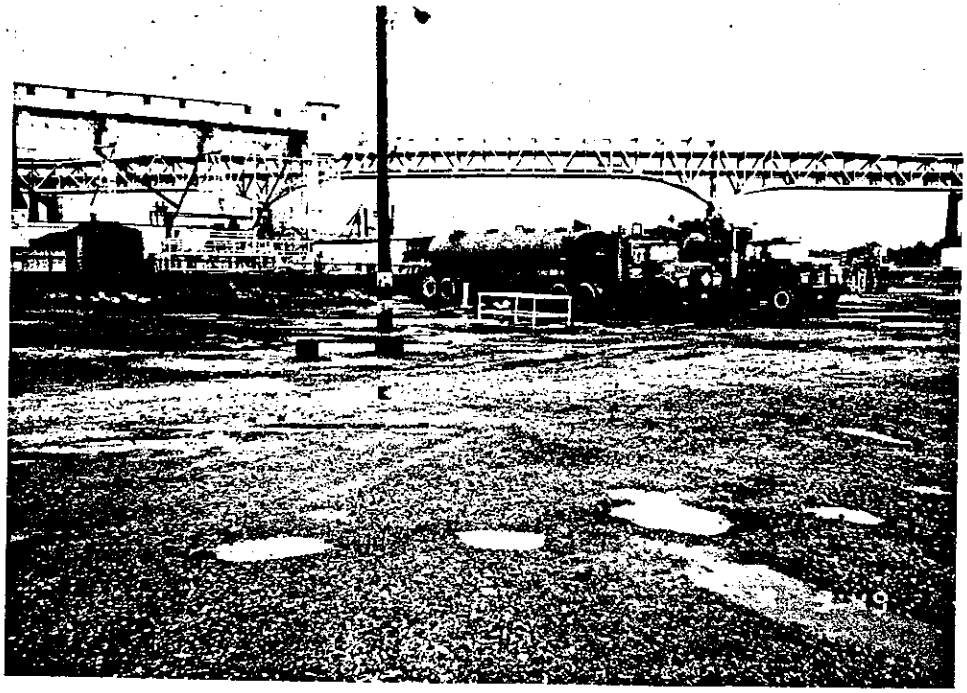
After a brief discussion of the list of SWMUs included with the VSI agenda, the opening meetings ended for both days. On Day 1, the visual inspection began at 11:50 a.m. and continued until 5:00 p.m., covering the areas identified in the agenda. On Day 2, the visual inspection began at 9:00 a.m. and ended at approximately 3:00 p.m. In a closing meeting on Day 2, arrangements for additional technical information and clarification were discussed, and Gil Horwitz answered questions about the RFA process. The inspectors departed the site at approximately 5:30 p.m.

The weather on both days was partly cloudy and cold, with temperatures in the 50s °F. On November 17, 1988, it had rained two to three inches in the morning. Paul Letki took photographs of the SWMUs with a Kodak Metalist VRG 35mm camera, using Kodak ASA 100 color print film with no special filters or lenses.

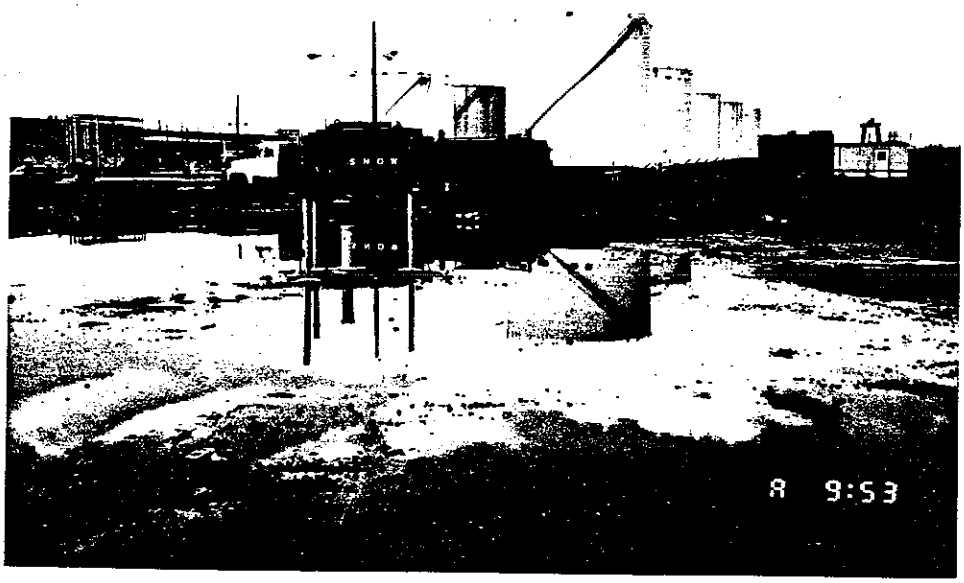
PHOTOGRAPH LOG

The photographs on the following pages document the observation made during the VSI. The photographs are identified by a number or letter which corresponds to an appropriate SWMU identifier. In instances where several photographs are provided for one unit, decimals are used to denote the photograph sequence (i.e. 1.1 and 1.2 denote photos associated with SWMU 1). This camera has the ability to document the time each photograph was taken. However, this was not adjusted at the time of the VSI; therefore, the number on the right of each photograph should be ignored.

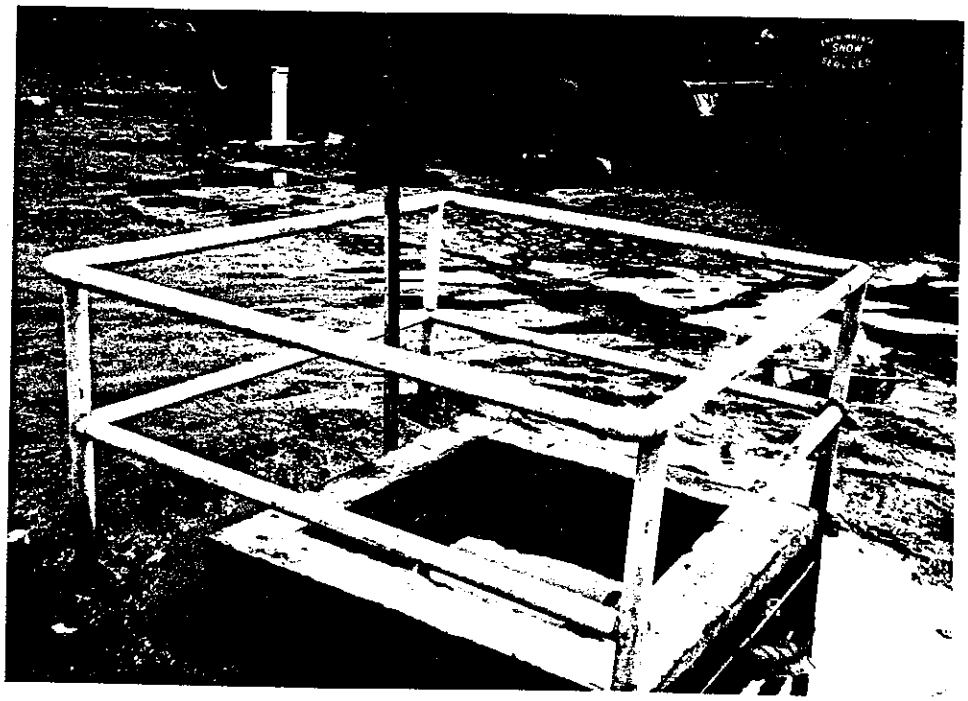




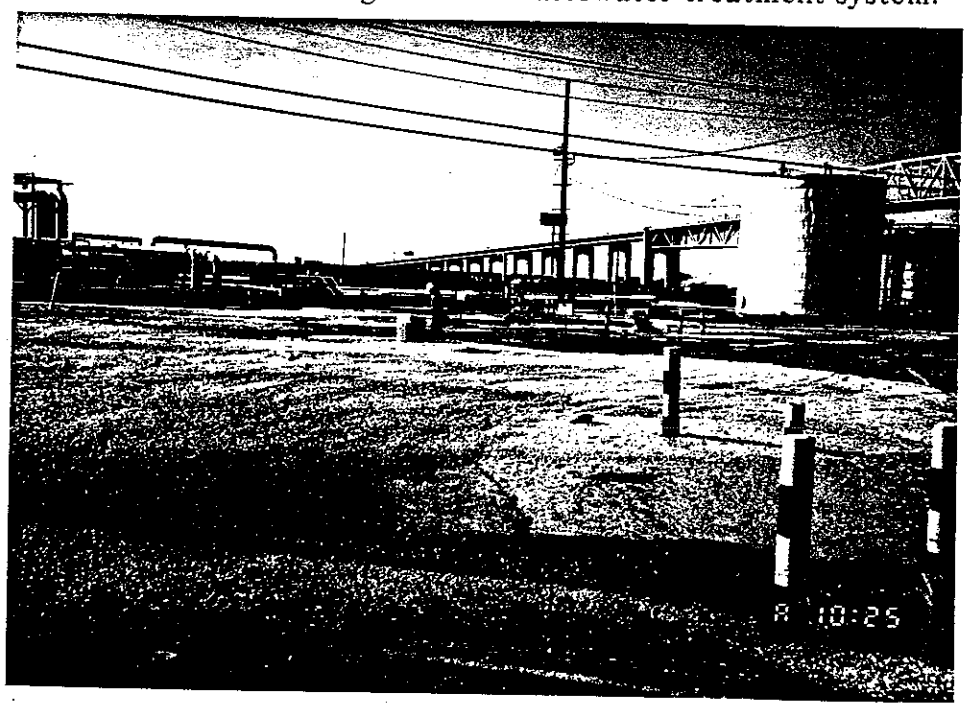
1.1 View of Empty Lube Oil Drum Storage Area (SWMU 1), facing southwest. The Empty Lube Area Sump (SWMU 2) is in the background.



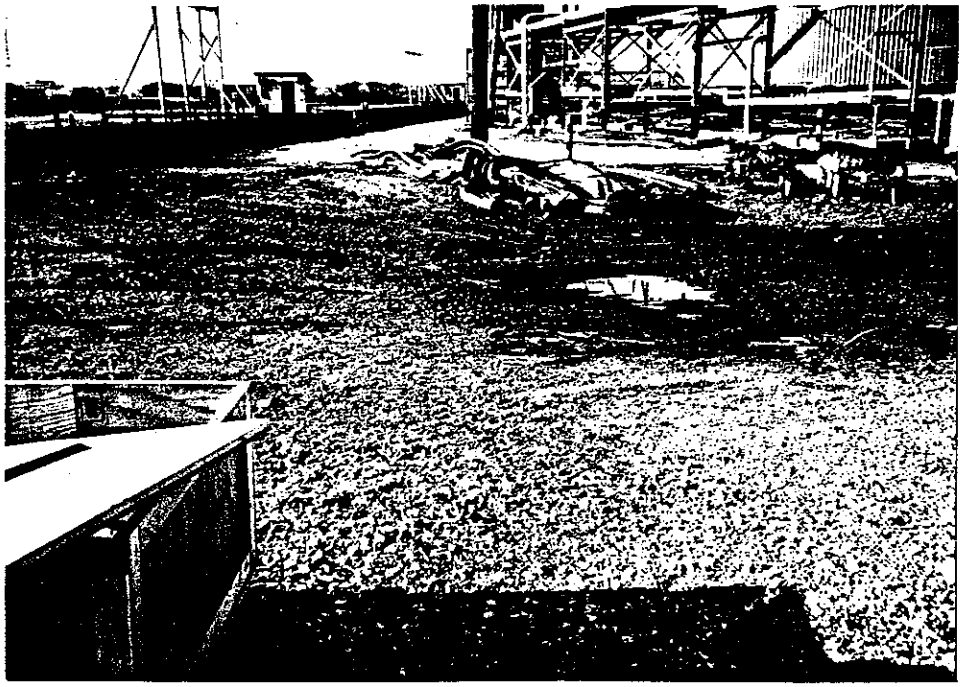
1.2 View of Empty Lube Drum Storage Area (SWMU 1), facing northeast.



2. Close-up view of the Empty Lube Area Sump (SWMU 2). The runoff from this unit is discharged to the wastewater treatment system.

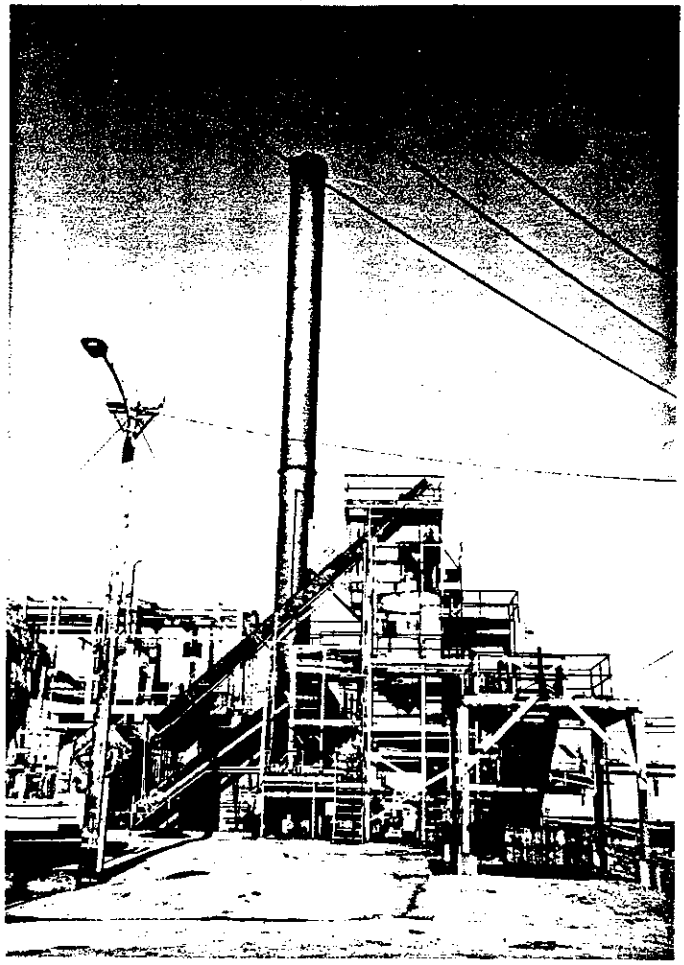


3. View of the Terminal Buried Oil/Water Separator 516
4. (SWMU 3) and Terminal Buried Oil/Water Separator 16 (SWMU 4), facing south. These units are buried in this area.



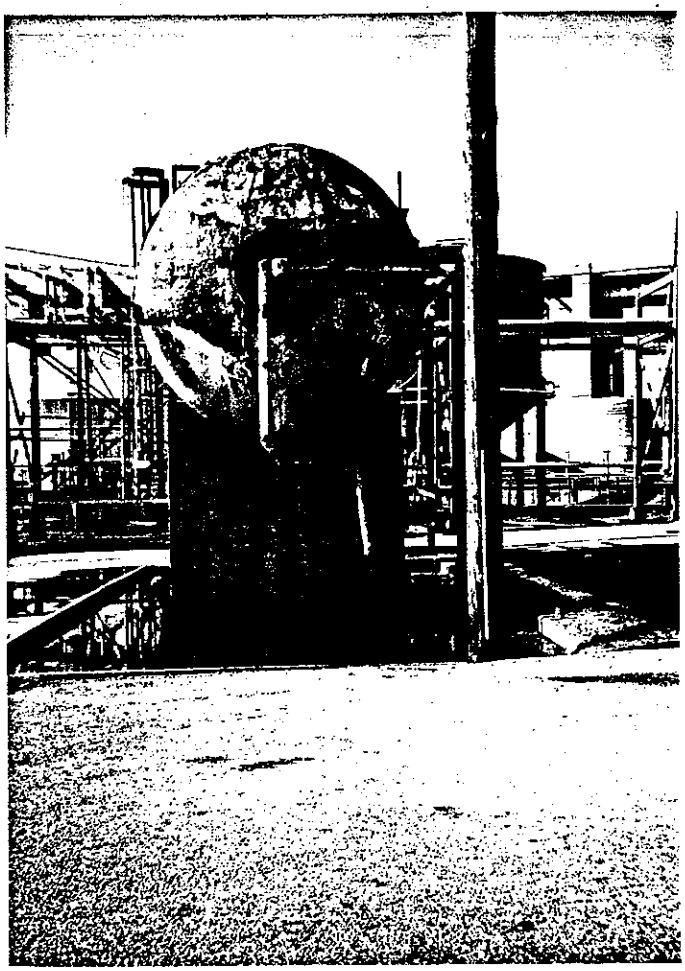
5.1 View of Buried No. 110 Separator (SWMU 5), facing west. This unit is buried in this area.

5.2 View of Buried No. 110 Separator (SWMU 5), facing south. The Schuylkill River is in the background.

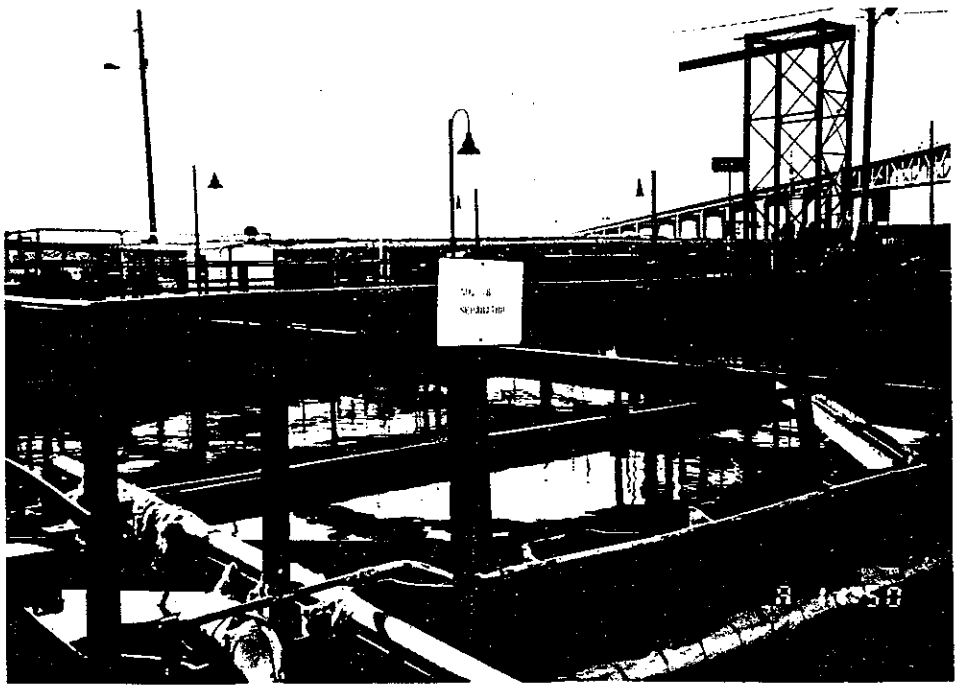


6.1 View of Trash Incinerator (SWMU 6), facing north.

6.2 Close-up view of area underlying the Trash Incinerator (SWMU 6), facing west. Note the soil staining in area outside and on the concrete pad.

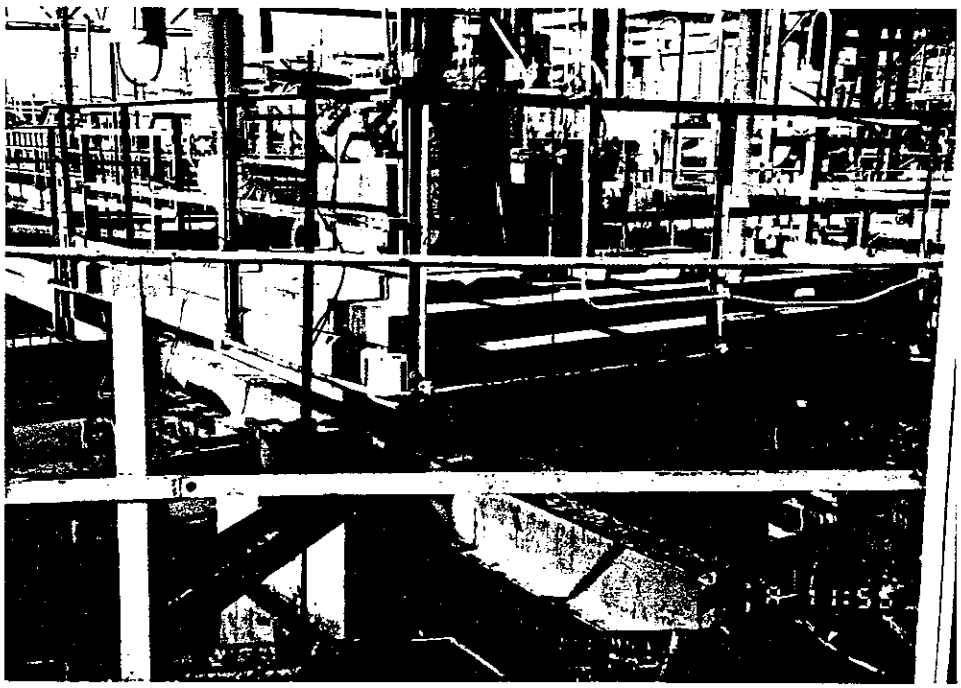


7. View of the Waste Oil Treatment Unit (SWMU 7), facing west. Note concrete pad elevating the unit above the ground and the concrete secondary containment.



8. View of No. 8 Oil/Water Separator (SWMU 8), facing southwest.

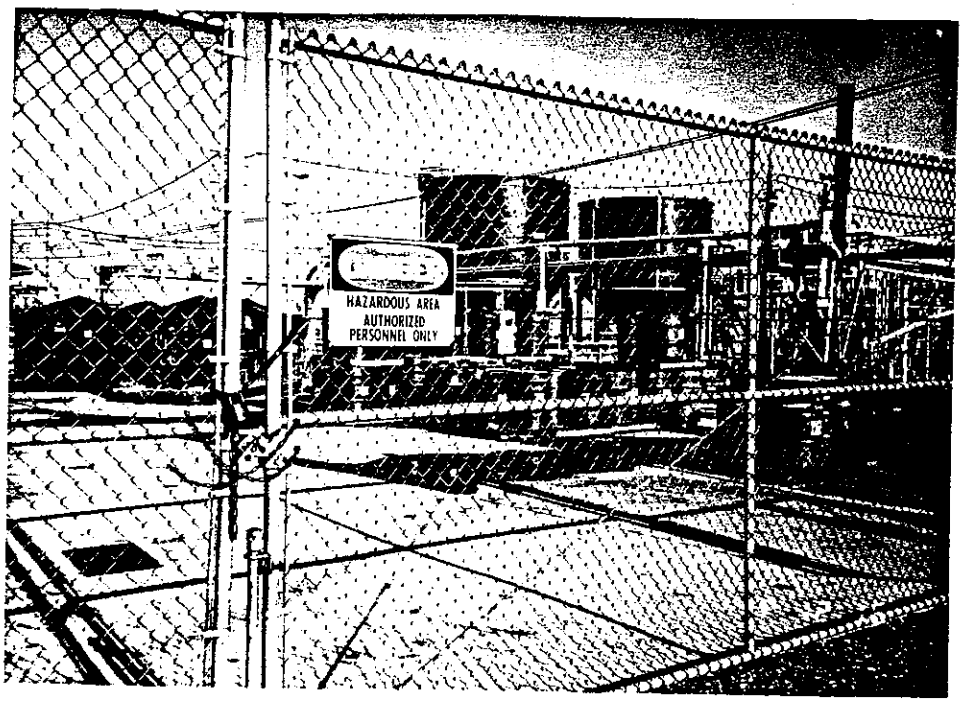
9. View of Product Storage Sump (SWMU 9), facing west. Note the oil stain on the water and the staining outside the unit.



9.2 View of Product Storage Sump (SWMU 9), facing west.

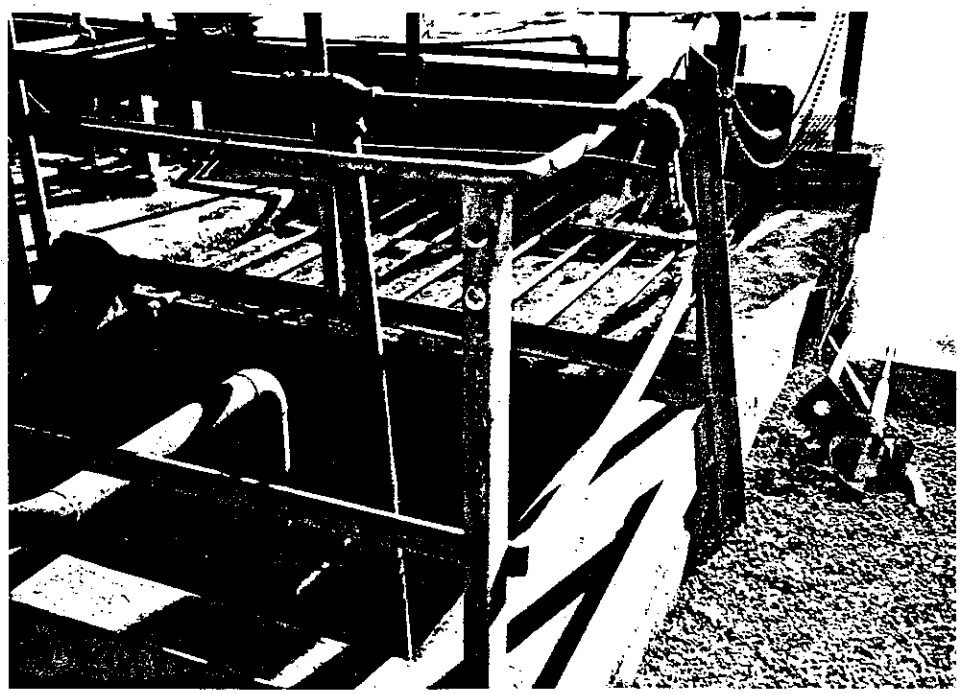
10.1 View of Container Storage Area (SWMU 10), facing west.

10.2 View of Container Storage Area (SWMU 10), facing northeast. Note the concrete pad.

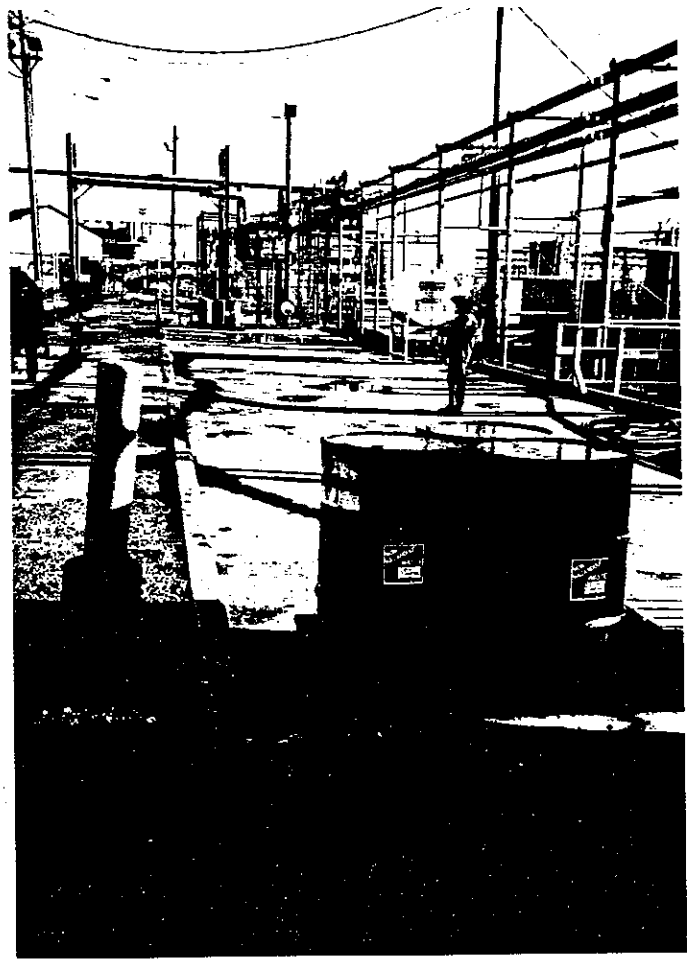


10.3 Close-up view of Container Storage Area (SWMU 10), facing north.

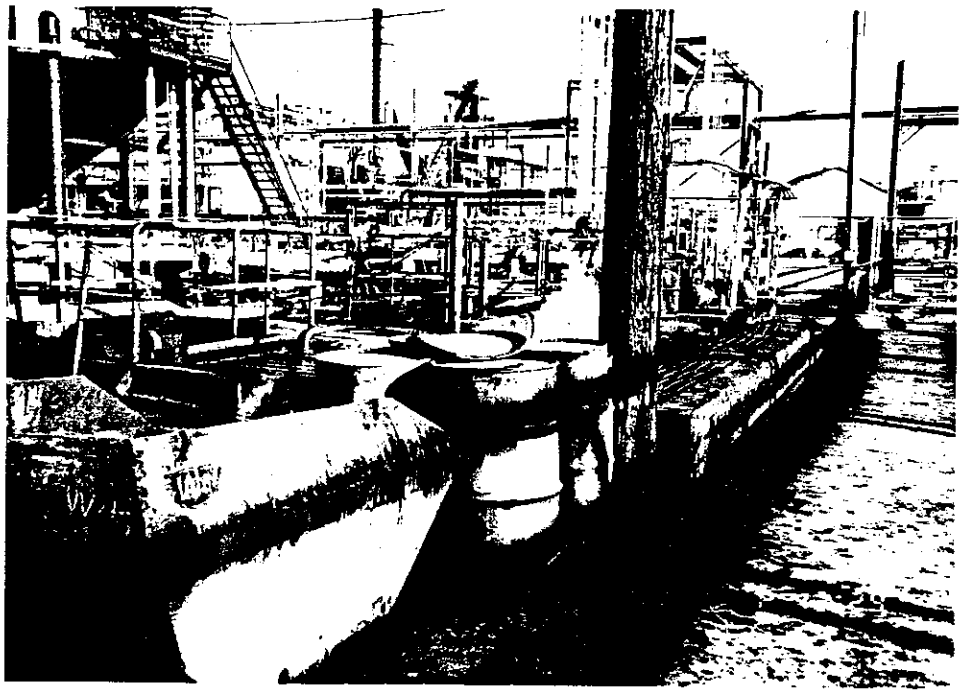
11. View of Past Lagoon (SWMU 11) and Previous Acid Unit
12. (SWMU 12), facing north. These units are located underneath the gravel.



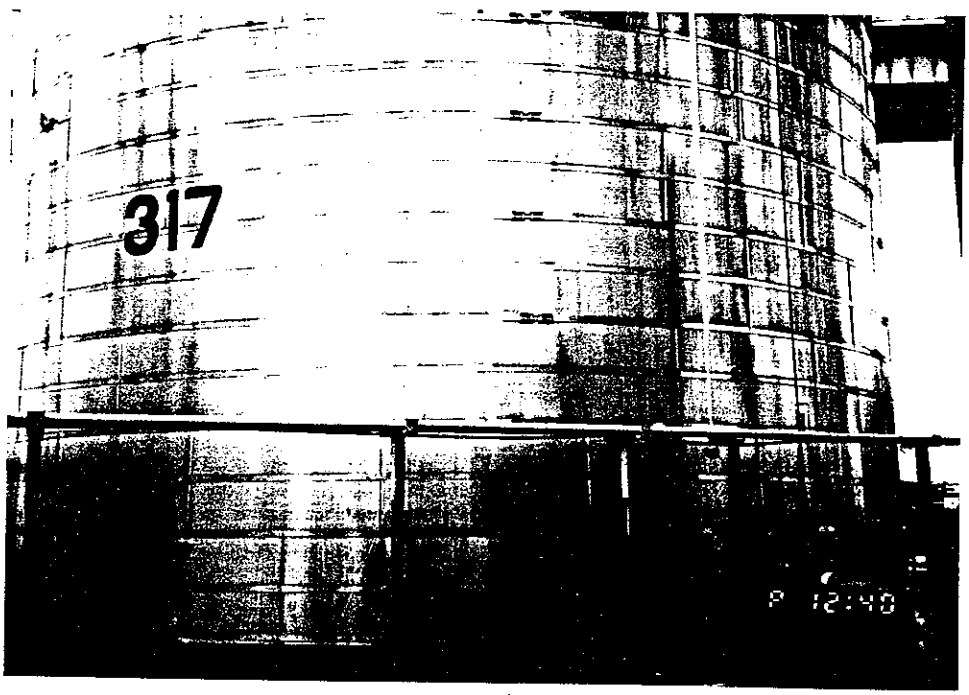
13. View of Tank 355 (SWMU 13), facing southwest.



14.1 View of Waste Oil Drum Storage Area (SWMU 14), facing south. Note the concrete pad and berm.

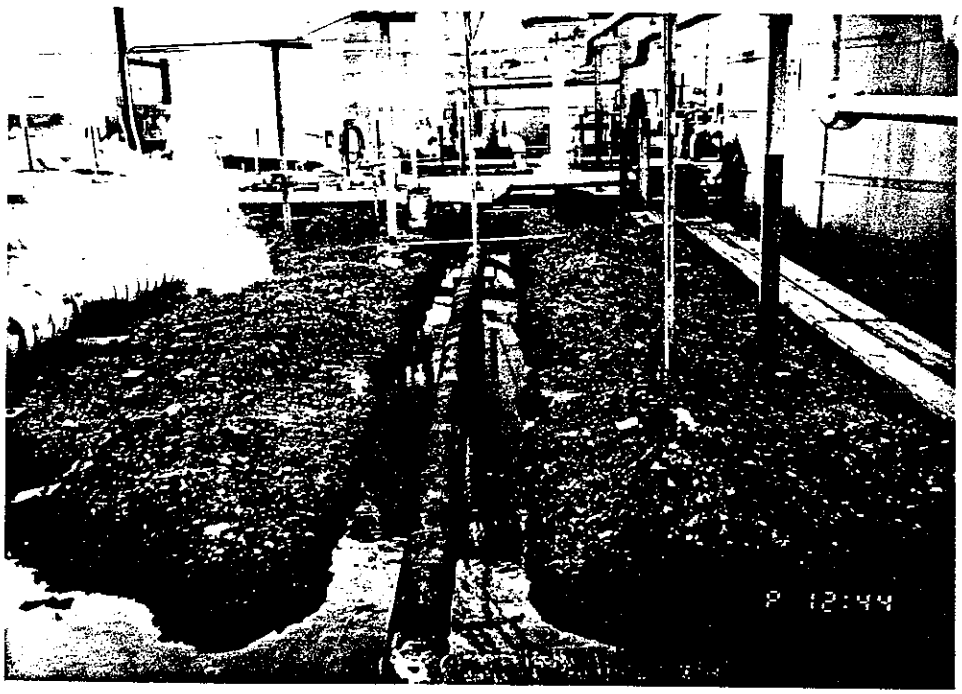


14.2 View of Waste Oil Drum Storage Area (SWMU 14), facing southwest. Tank 355 (SWMU 13) is located in the background. Note the staining on the concrete.

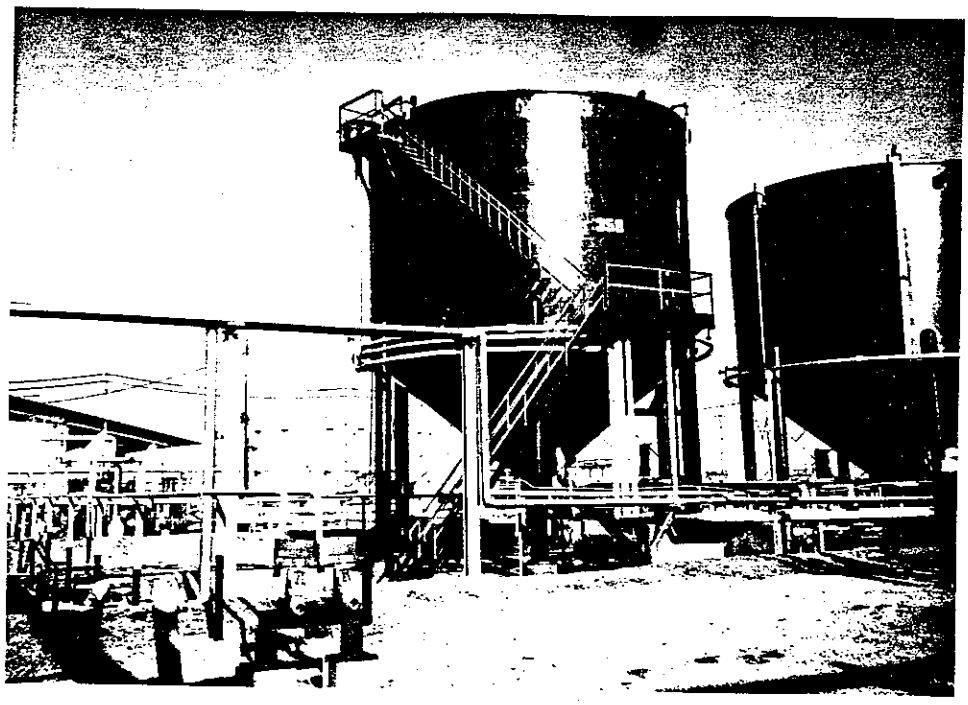


15.1 View of Tank 317 (SWMU 15), facing west.

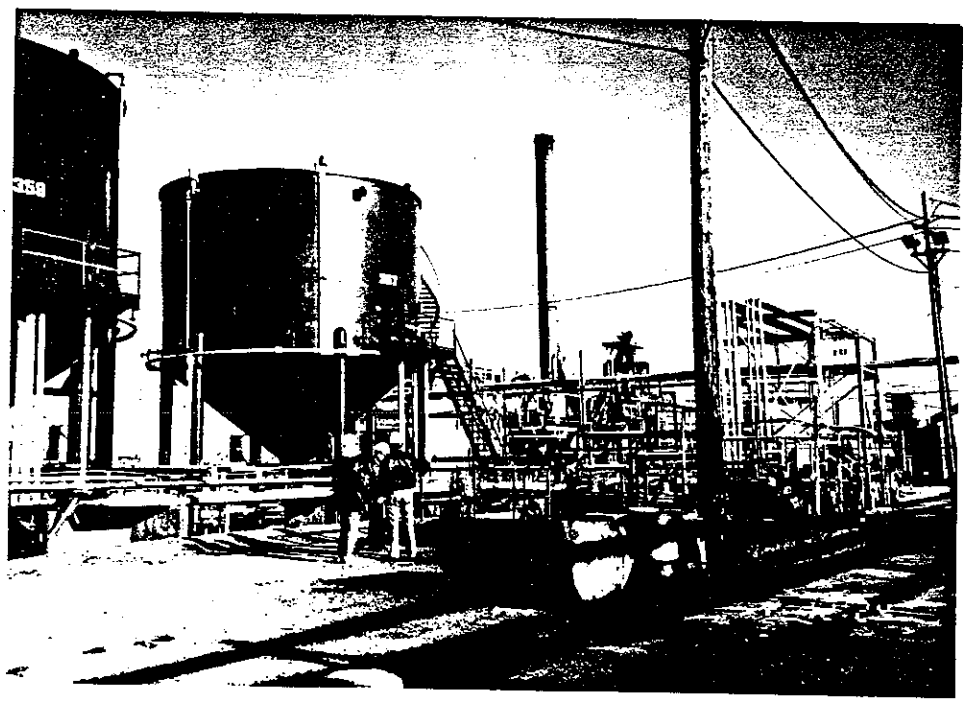
15.2 Close-up view of Tank 317 (SWMU 15), facing west. Note the extensive soil staining.



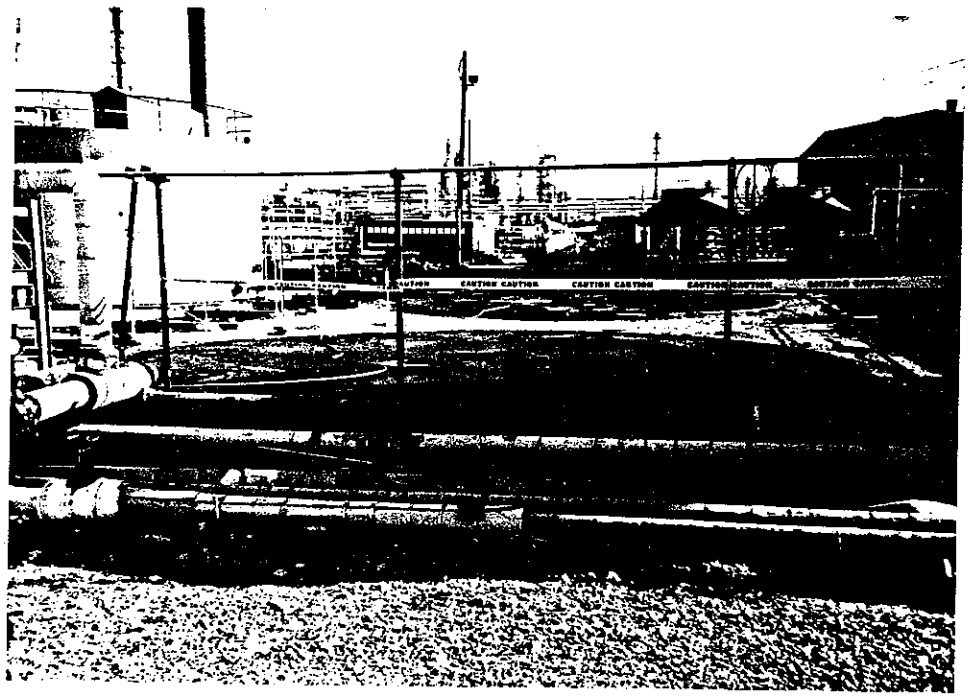
15.3 View of waste oil line feeders to Tank 317 (SWMU 15), from Tanks 357 and 358 (SWMUs 6 and 7), facing west.



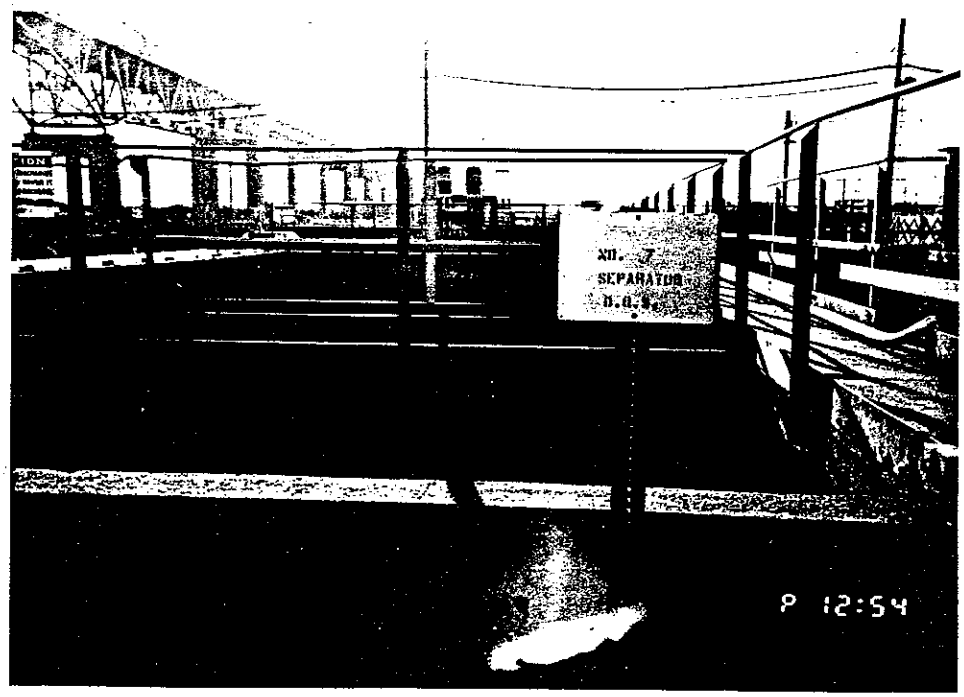
16. View of Tank 357 (SWMU 16), facing east. Tank 358 (SWMU 17), is located south of the unit.



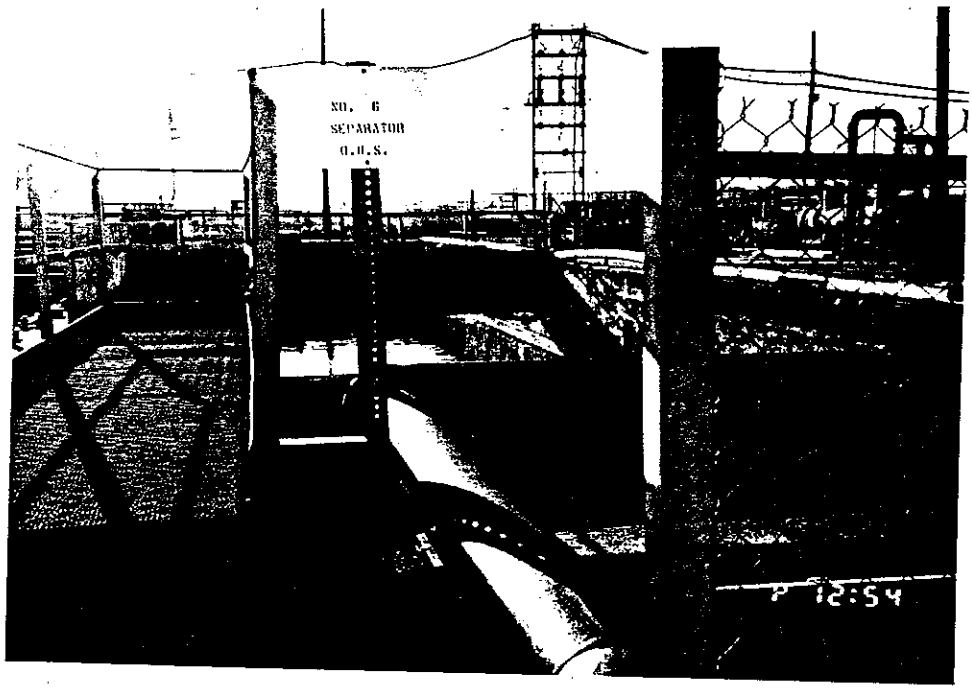
17. View of Tank 358 (SWMU 17), facing west. Tank 357 (SWMU 16), is located north of the unit.



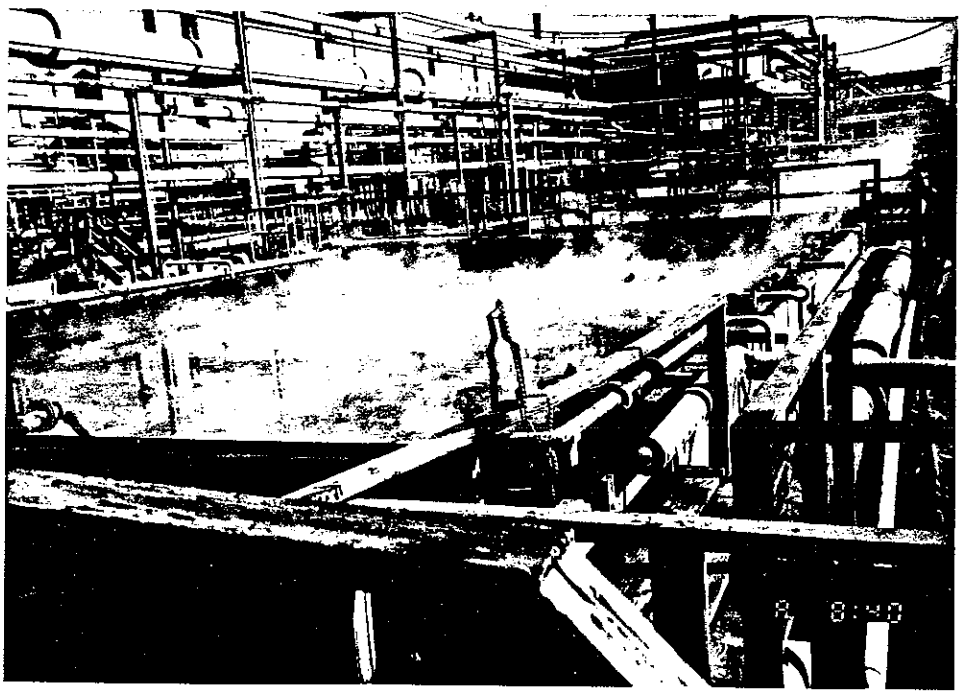
18. View of the location of Tanks 1004 and 1005 (SWMUs 18 and
19. 19), facing northeast. These tanks were removed in 1988 and will be replaced in kind.



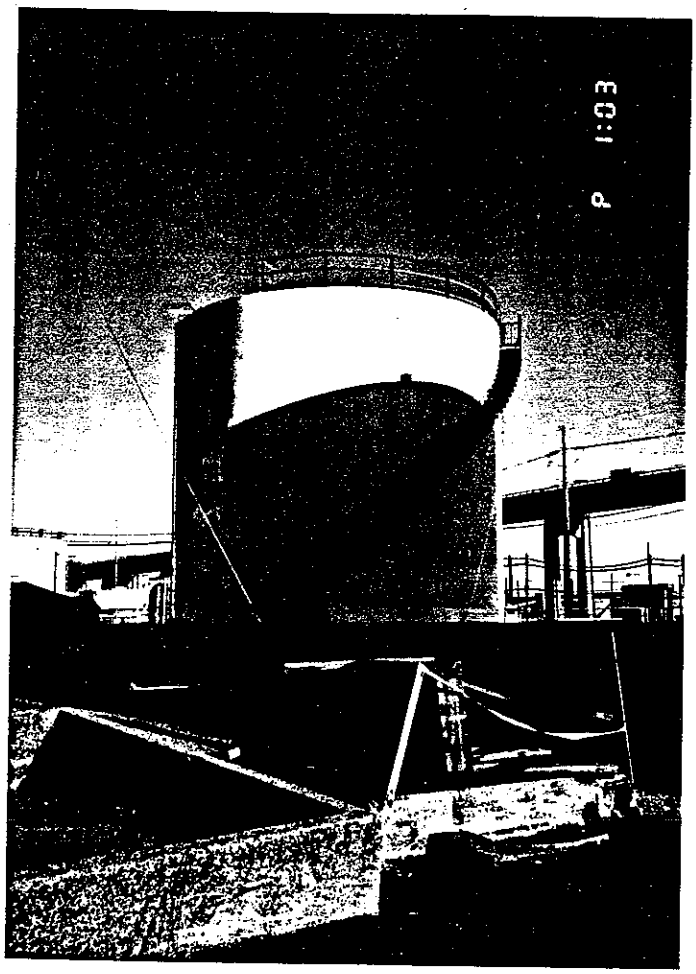
20. View of No. 7 Separator (SWMU 20), facing west.



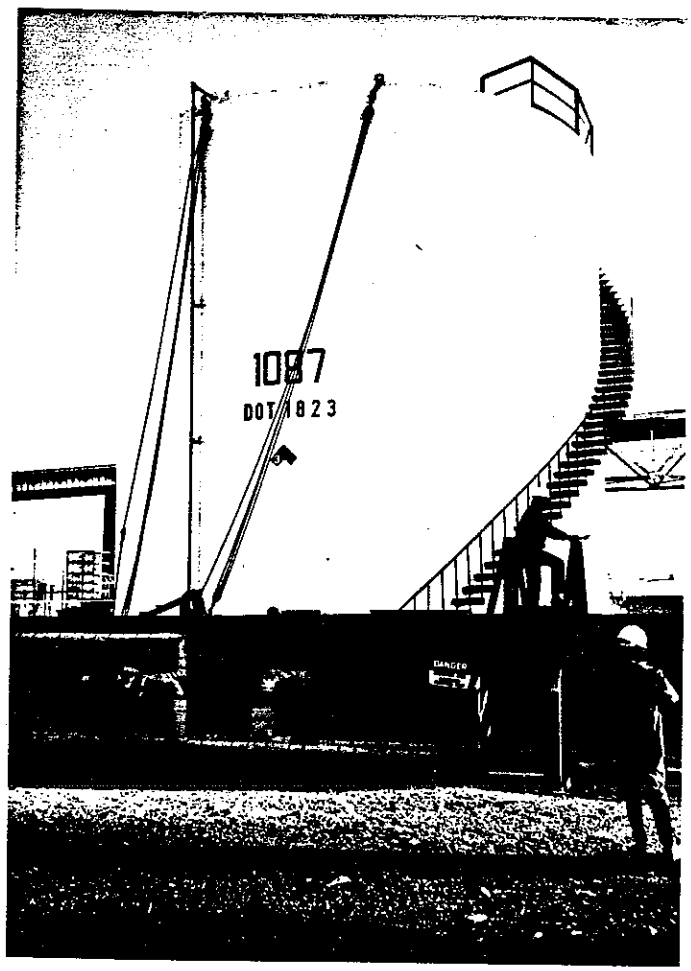
21. View of No. 6 Separator (Tank No. 599) (SWMU 21), facing west.



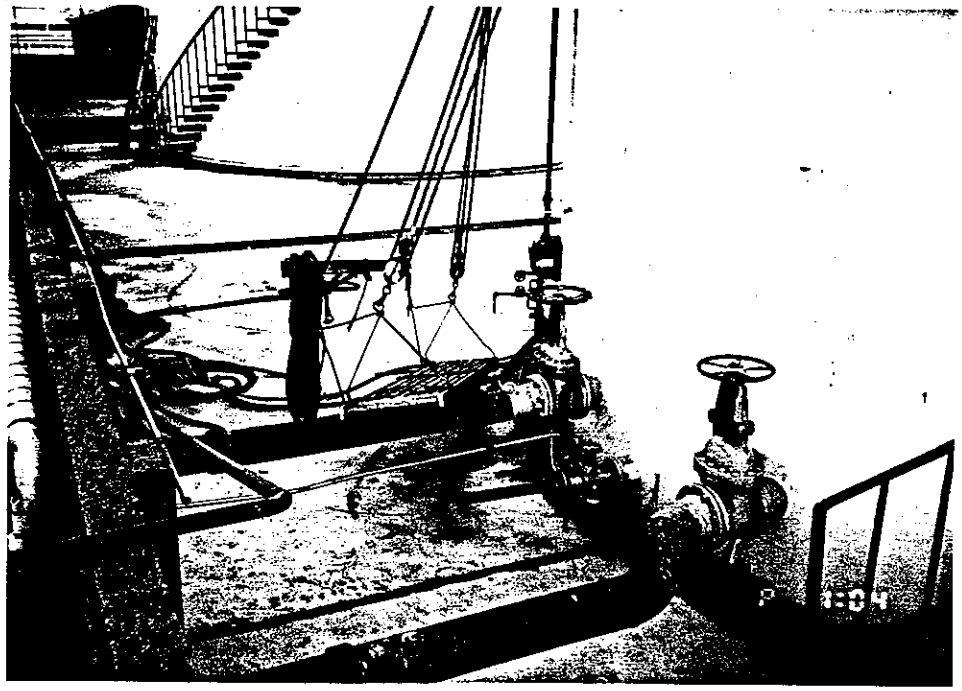
22. View of Separator No. 5 (SWMU 22), facing east. Note the condensate emanating from the unit.



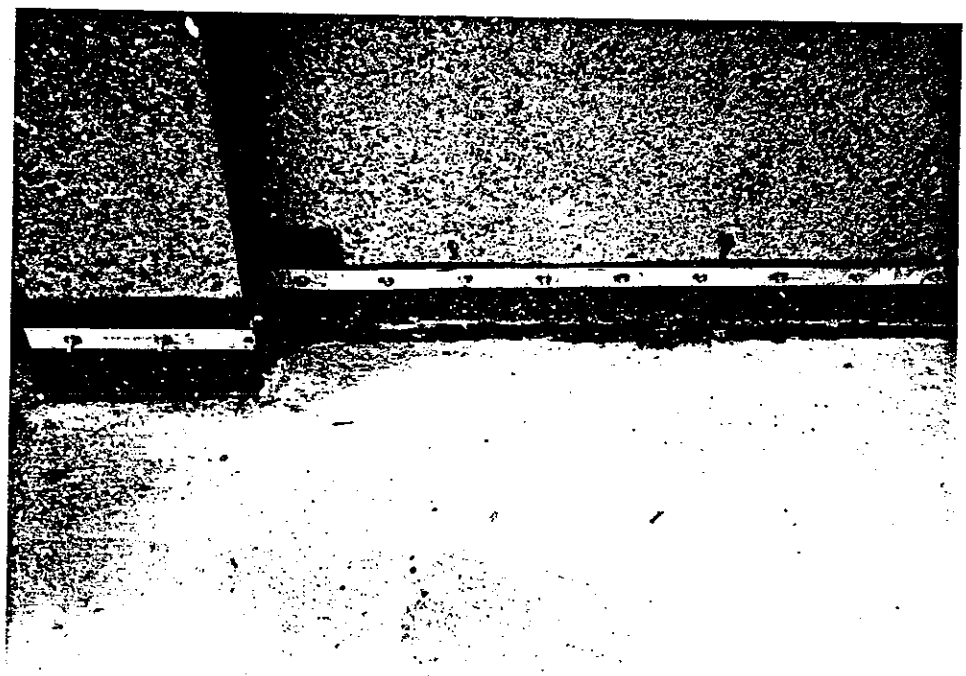
23. View of Tank 1086 (SWMU 23), facing south.



24.1 View of Tank 1087 (SWMU 24), facing south.

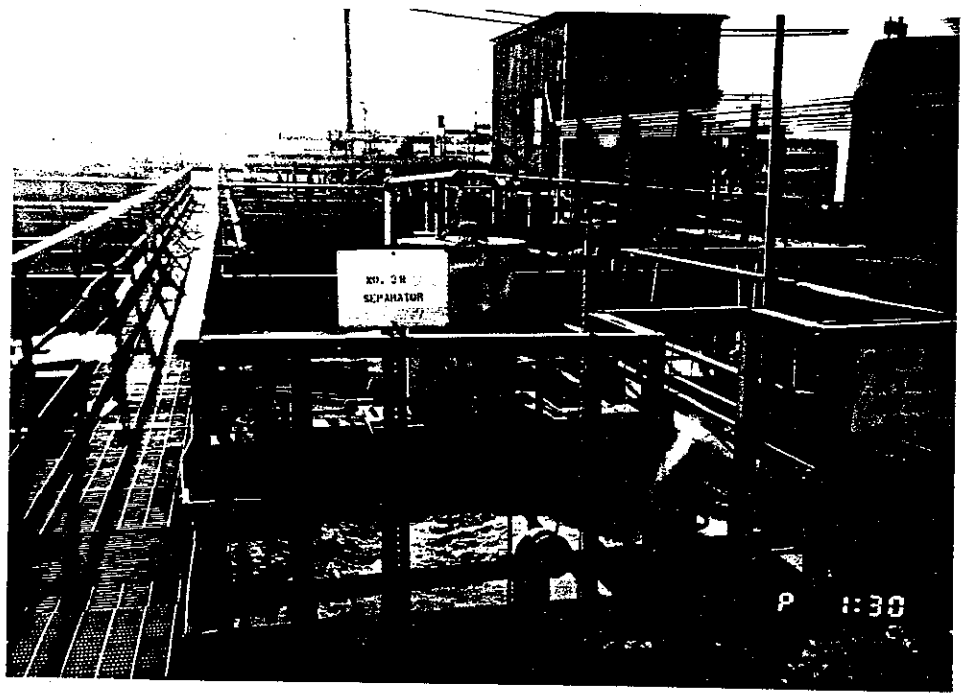


24.2 Close-up view of the secondary containment at Tanks 1086 and 1087 (SWMU 23 and 24). Tank 1087 (SWMU 24) is in the foreground and Tank 1086 (SWMU 23) in the foreground.



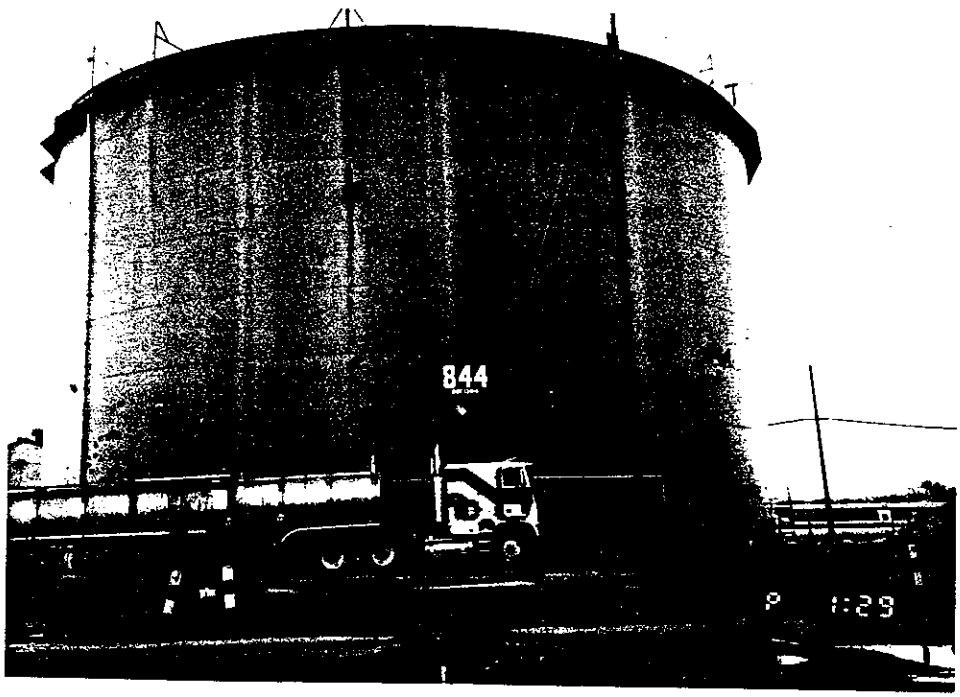
24.3 Close-up view of HDPE liner in the secondary containment for Tank 1086 (SWMU 23) and Tank 1087 (SWMU 24).

25. View of area where Former No. 2 Separator (SWMU 25) was located, facing southwest.

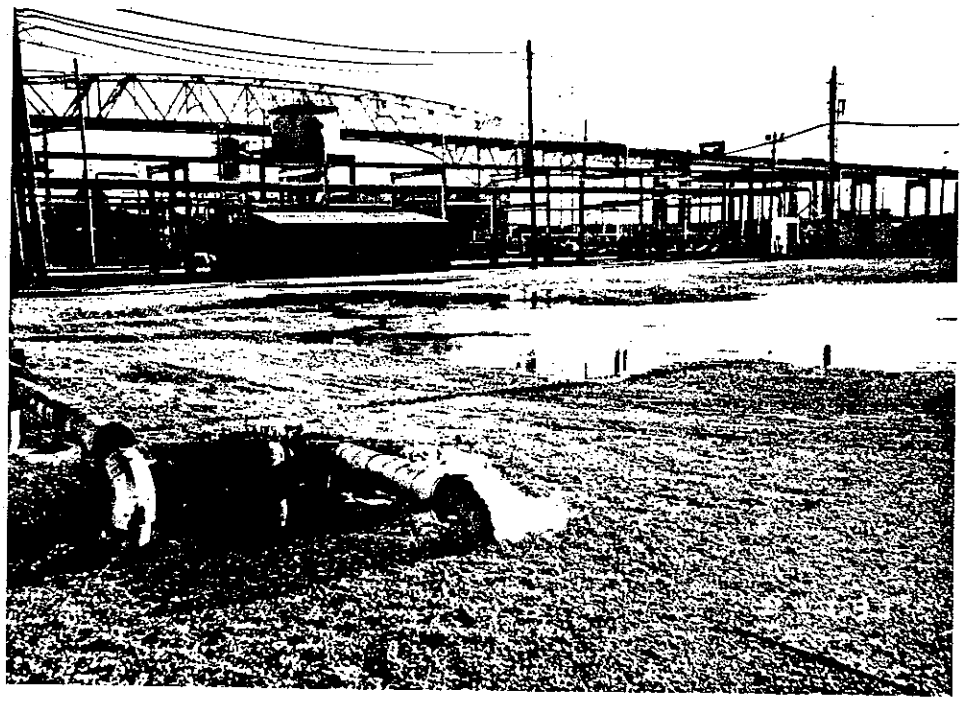


26. View of Separator No. 2B (SWMU 23), facing southwest.

27. View of Separator No. 2A (SWMU 27), facing southwest.

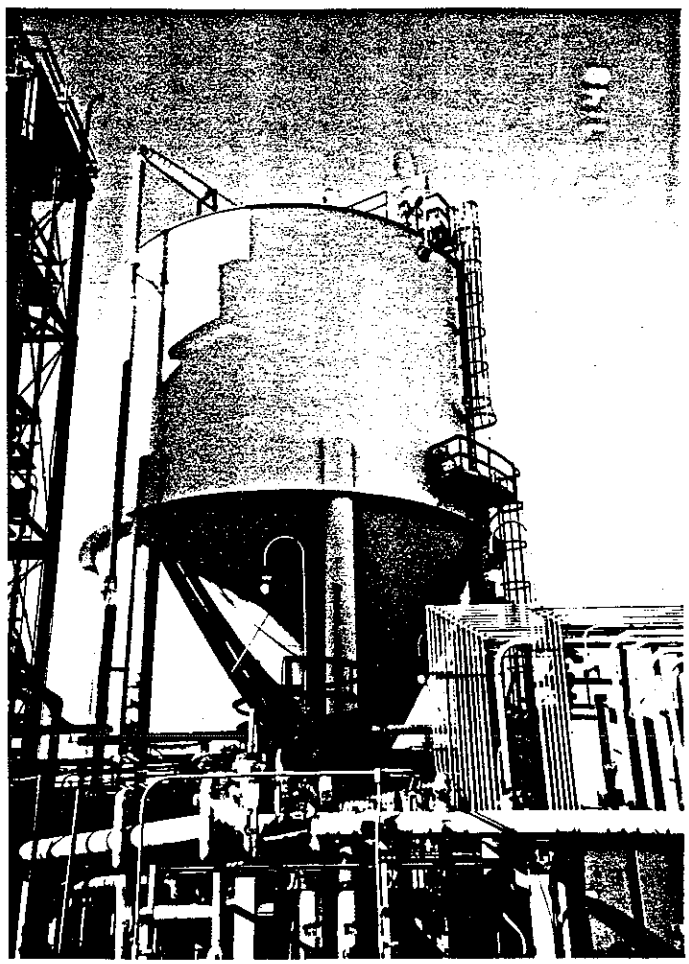


28. View of Tank 200 (Separator No. 844) (SWMU 28).

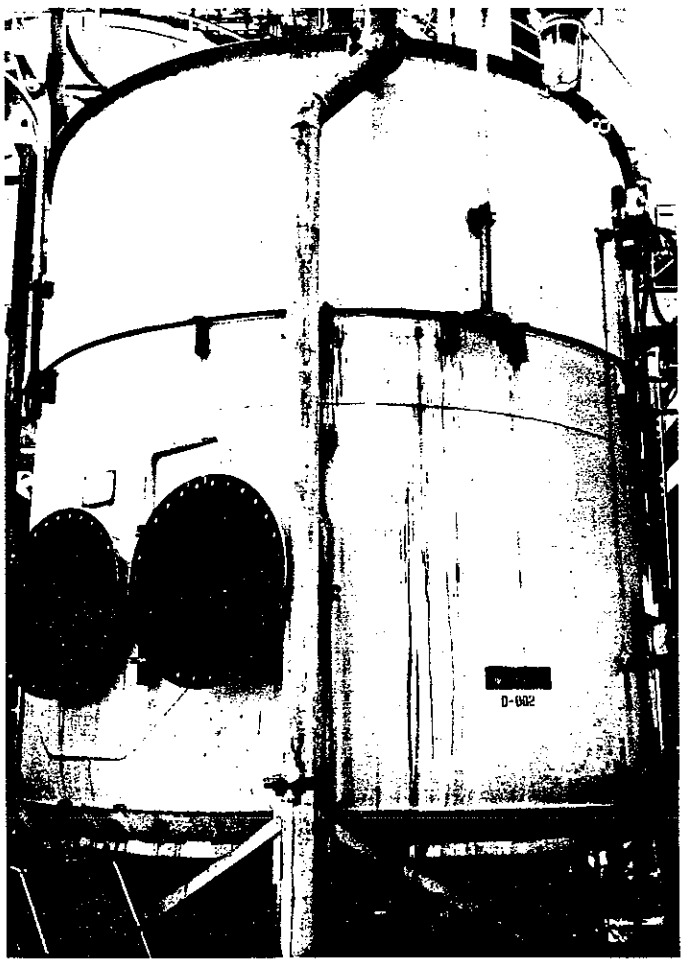


29. View of Tank 200 Past Lagoon (SWMU 29), facing southwest.

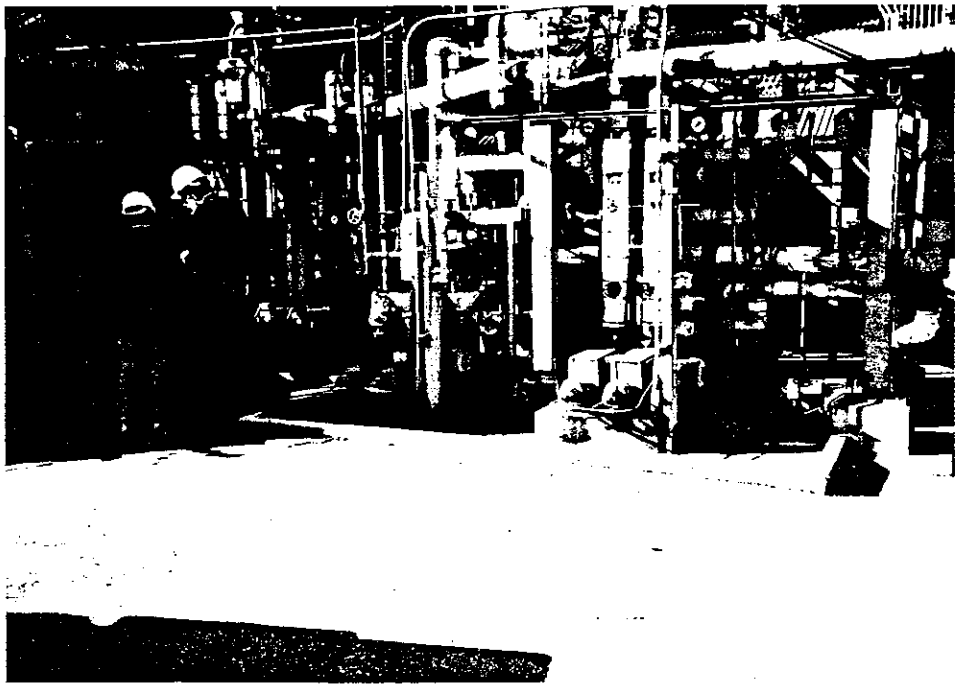
30. View of area where the Additive Plant Drum Storage Area (SWMU 20) was located, facing west.



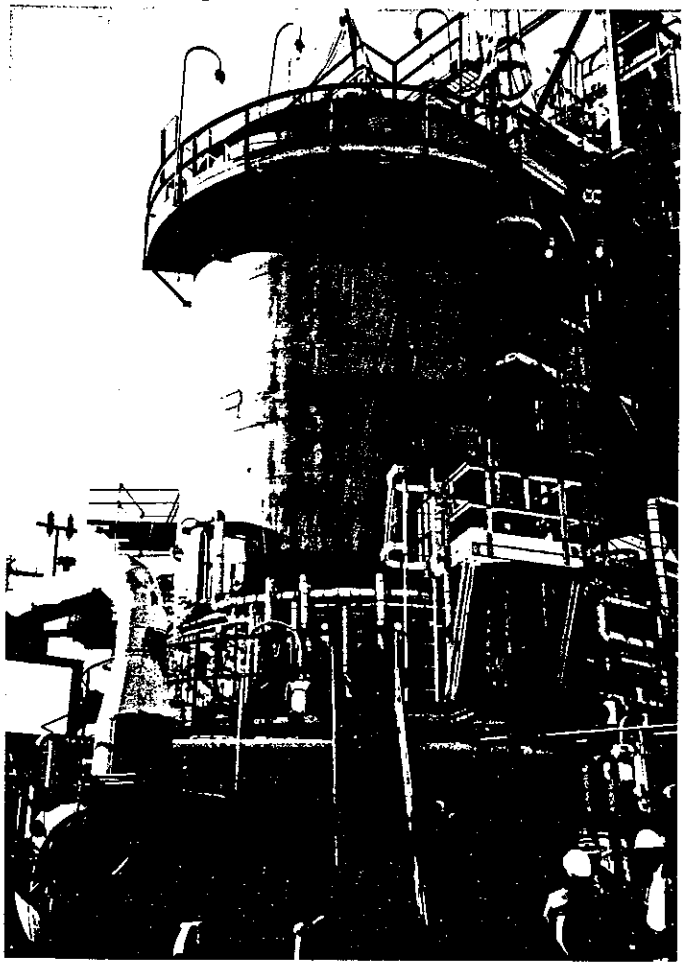
31. View of Tank 104 (SWMU 31), facing west.



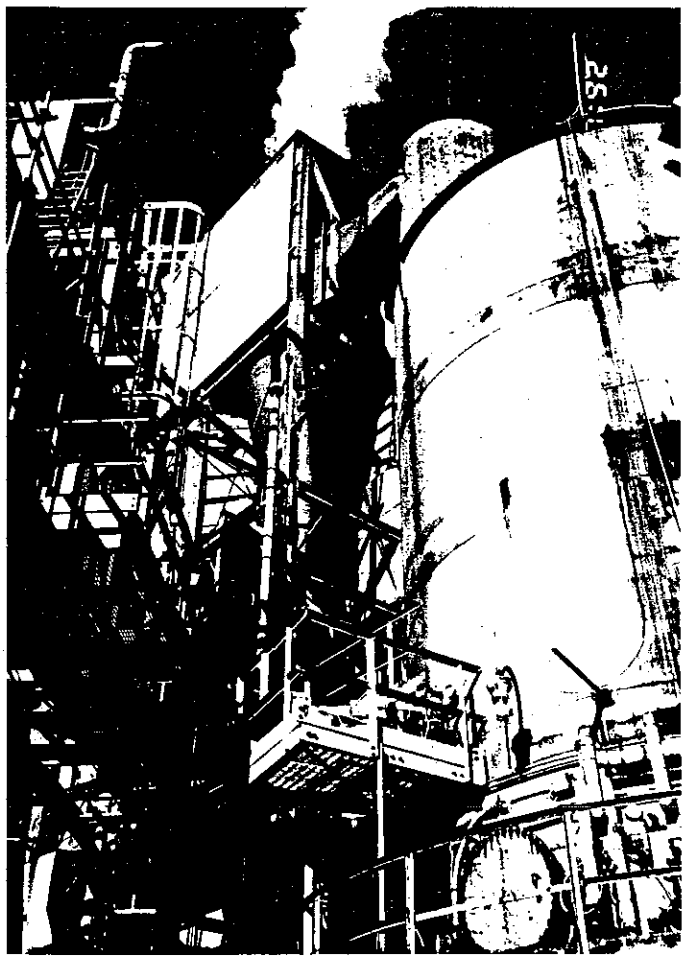
32. View of Tank 103 (SWMU 32), facing south. A closure plan for this unit was submitted to PaDER in 1986.



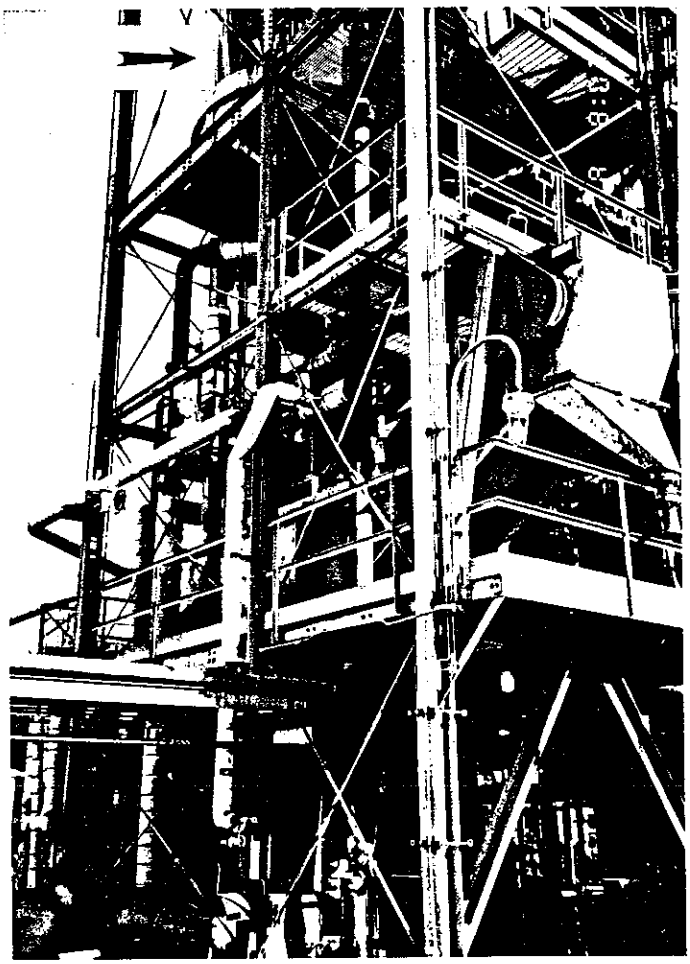
33.1 View of the feed pumps to the fluidized bed of the Fluidactor (SWMU 33), facing west.



33.2 View of the Fluidactor (SWMU 33), facing southwest. This unit is a domed roof steel vessel.

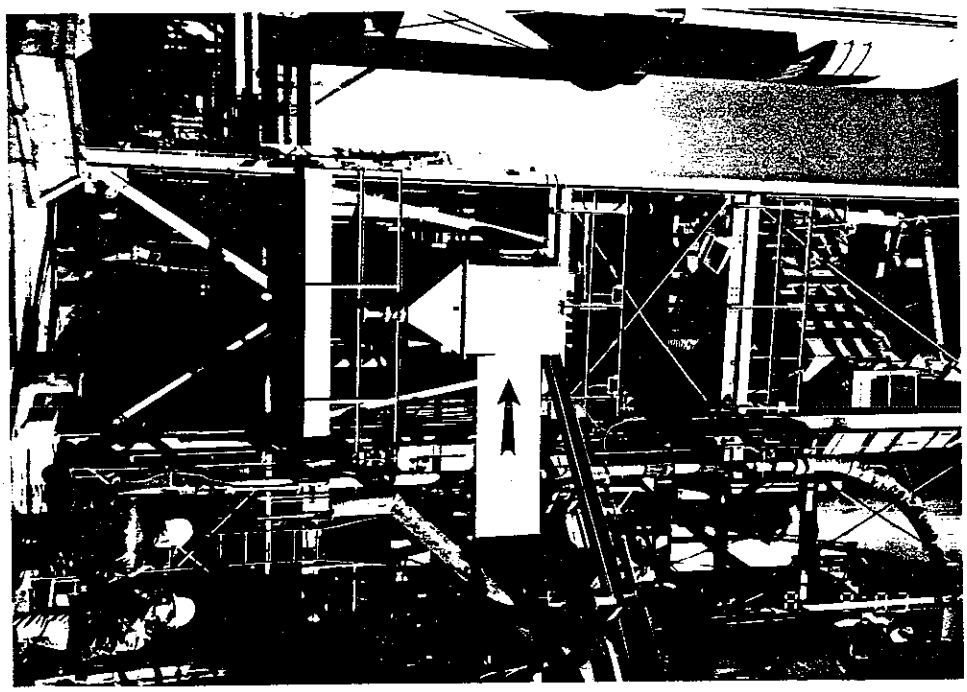


34. View of the Gas Cyclone (SWMU 34), facing north. The Ash Transport Vessel (SWMU 36) is located underneath the unit. The Gas Cyclone (SWMU 34) is the black vertically mounted steel unit.

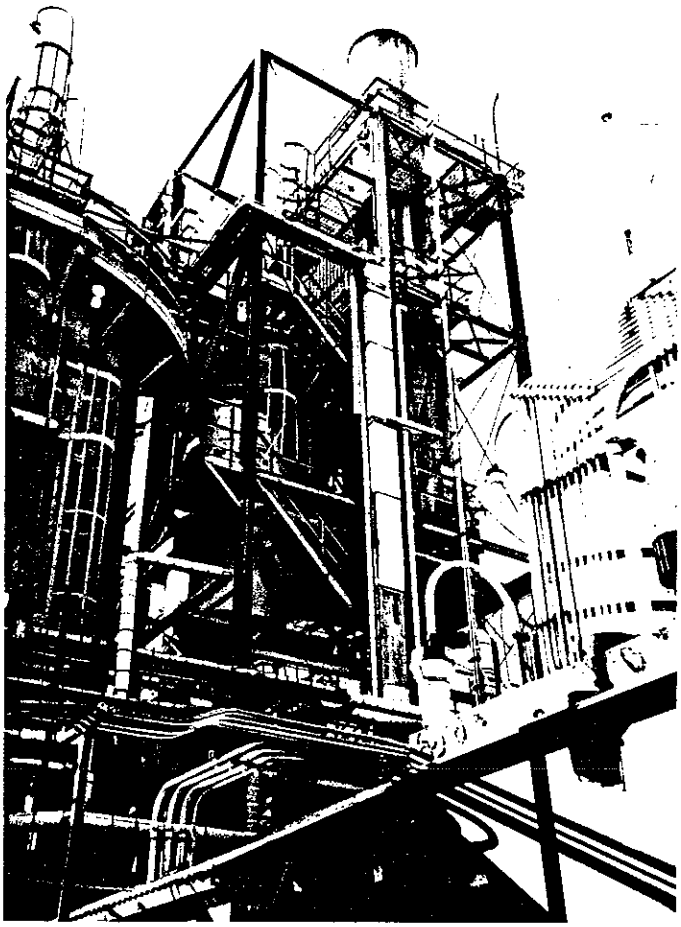


35. View of the Venturi Scrubber (SWMU 35) (indicated by arrow), facing northwest.

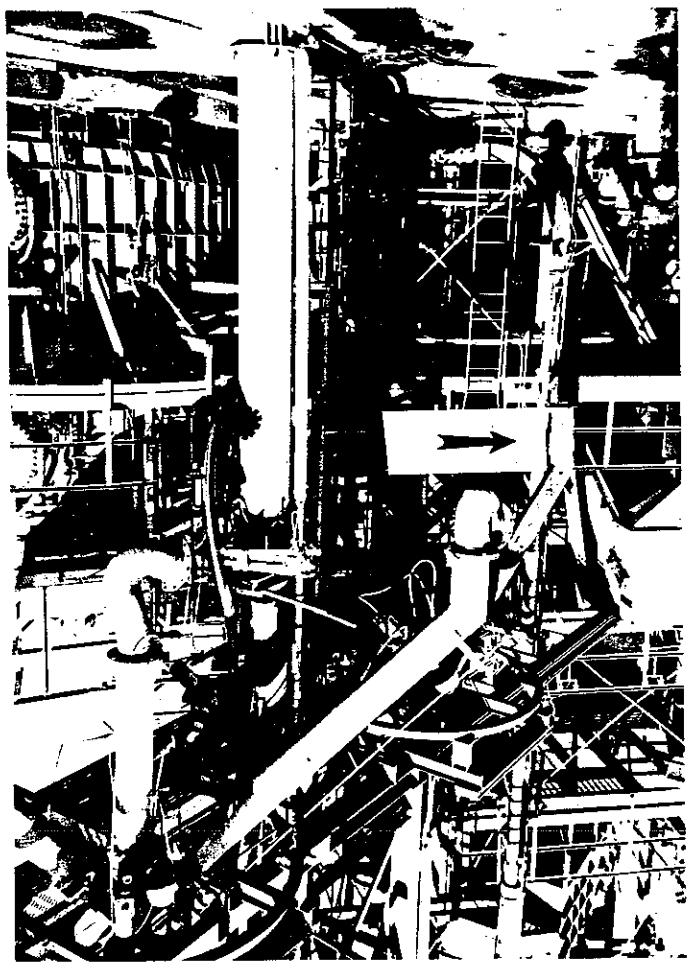
36. See photograph 34.1.



37. View of Ash Classifier (SWMU 37) (indicated by arrow), facing northwest. This unit is no longer active.

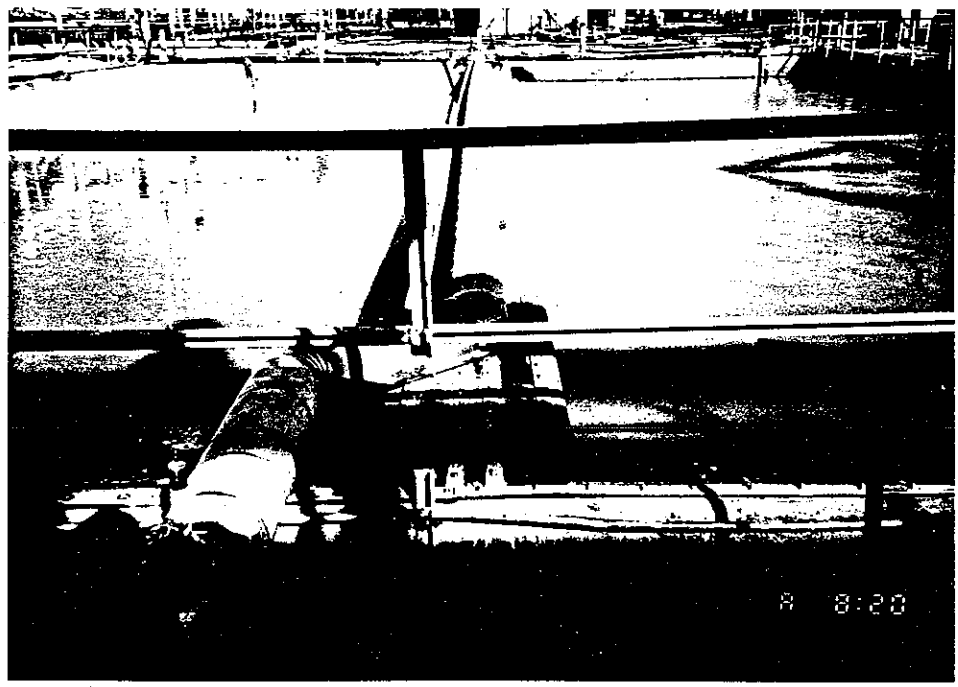


38. View of the air pollution equipment, including the Bag House (SWMU 38), facing southwest.

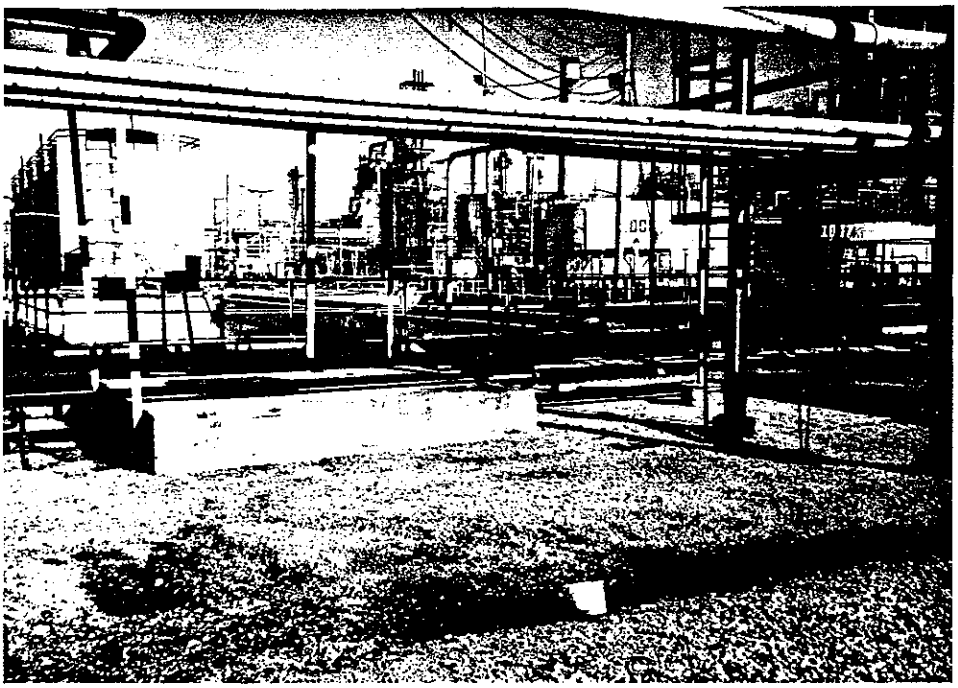


39. The Ash Dumpster (SWMU 39) was not present during the VSI. This unit receives waste from the Ash Hopper (SWMU 40) at this location. The dry ash is discharged through the red pipe (indicated by arrow) to the Ash Dumpster (SWMU 39).

40. See photograph 39.1

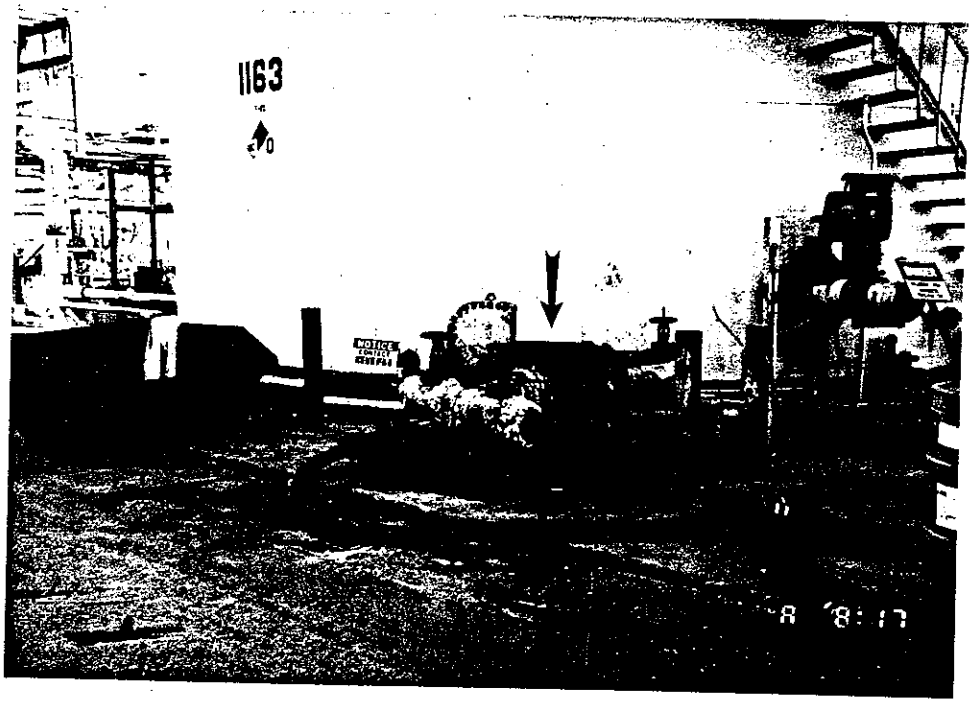


41. View of Tank 388 (East and West Basin) (SWMU 41), facing north.

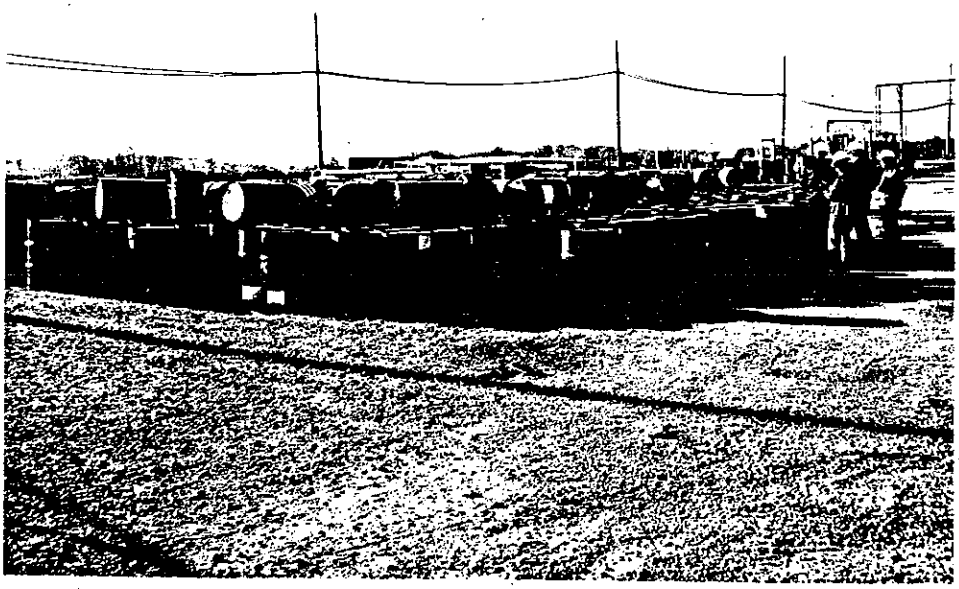


41.2 View of Tank 388 (East and West Basin) (SWMU 41), facing northwest. The concrete sump in the foreground discharges wastewater to the wastewater treatment system.

42. View of Tank 1163 (T-100) (SWMU 42), facing south. Tank 104 (SWMU 31) is located west of the unit.

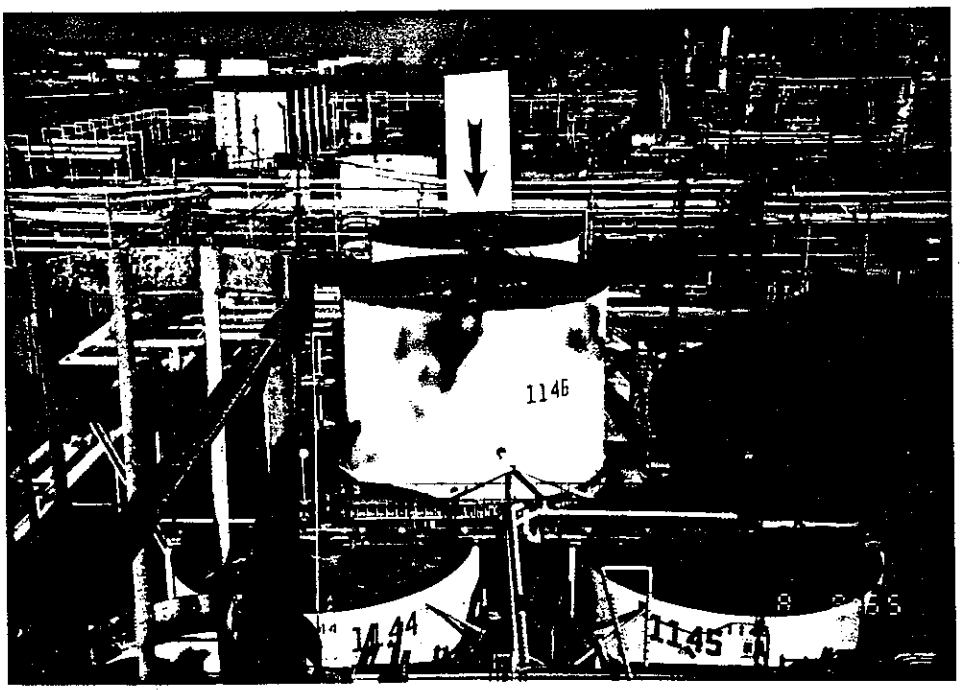


43.
44. View of T-100 Double-Basket Strainer (SWMU 43) (indicated by an arrow), facing south. The T-100 Dumpster (SWMU 44) is the red dumpster located southwest of the unit.

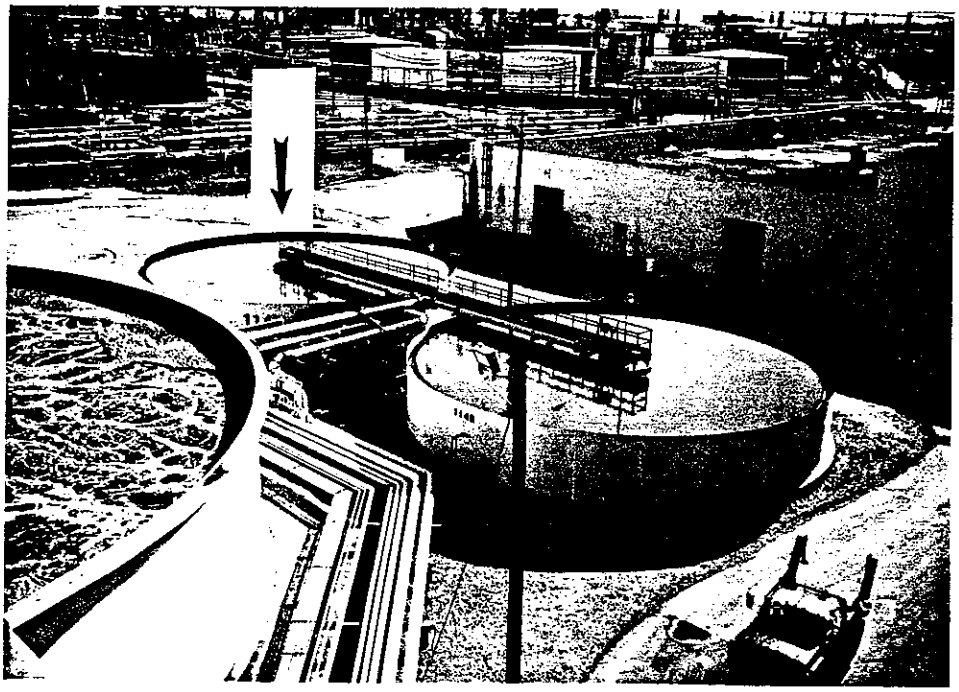


45.1 View of Empty Drum Storage Area (SWMU 45), facing west. Note that some of the drums are on other drums.

45.2 View of Empty Drum Storage Area (SWMU 45), facing west. Note the staining on the gravel.

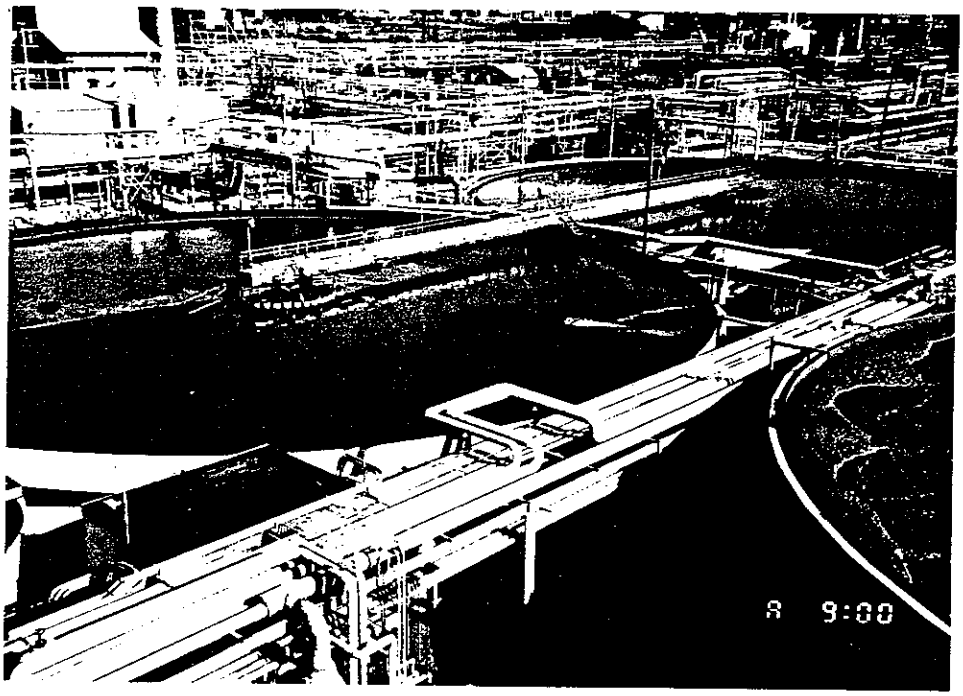


46. View of 1146 Roughing Filter (SWMU 46) and 1147 Roughing
47. Filter (SWMU 47) (indicated by arrow), facing northwest. 1144 and 1145 Thickeners (SWMUs 64 and 65) and located in the foreground.

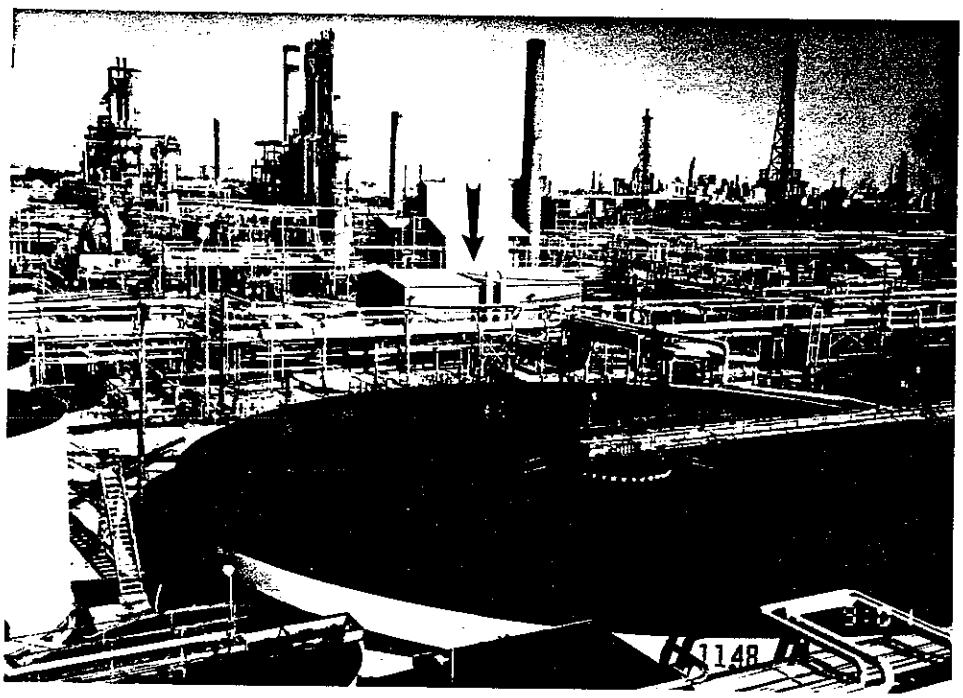


48. View of 1140 Primary Clarifier (SWMU 45) and 1141 Primary
49. Clarifier (SWMU 49) (indicated by arrow), facing east. 1142 Oxidation Tank (SWMU 50) is located in the left foreground.

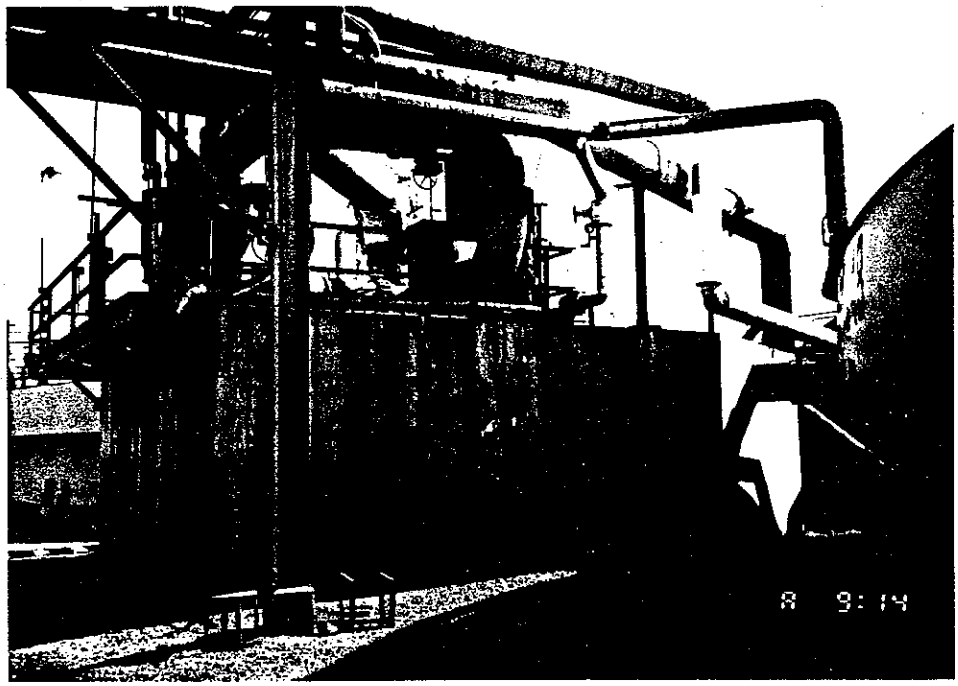
50. View of 1142 Oxidation Tank (SWMU 50) in the foreground and
51. 1143 Oxidation Tank (SWMU 51) in the background, facing northeast.



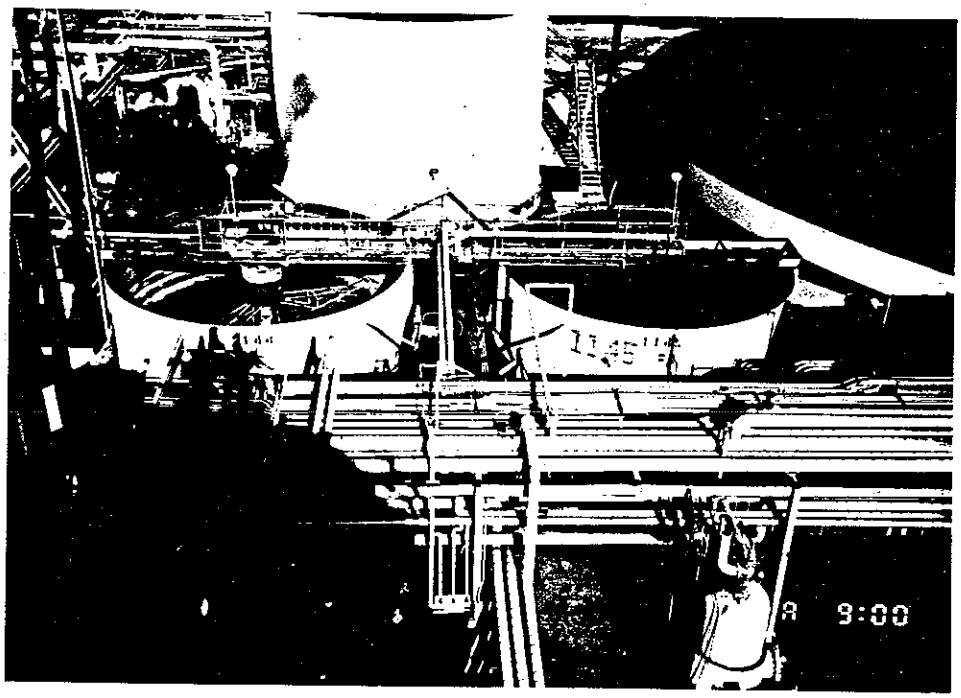
52. 53. View of 1148 Final Clarifier (SWMU 52) in the west and 1149 Final Clarifier (SWMU 53) to the west, facing north.



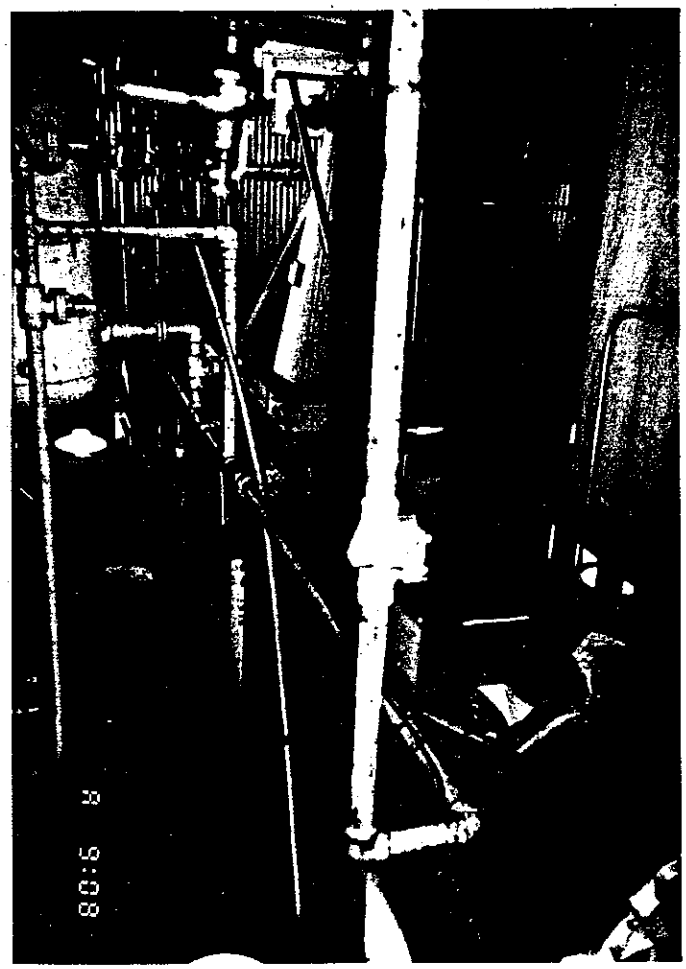
54. to 61. View of the building (indicated by arrow) which contains Tertiary Sand Filter Beds 1 to 8 (SWMUs 54 to 61), facing north. 1148 Final Clarifier (SWMU 32), is located in the foreground.



62. View of Wastewater Sump (SWMU 62) and Process Wastewater
63. Pipes (SWMU 63), facing east.



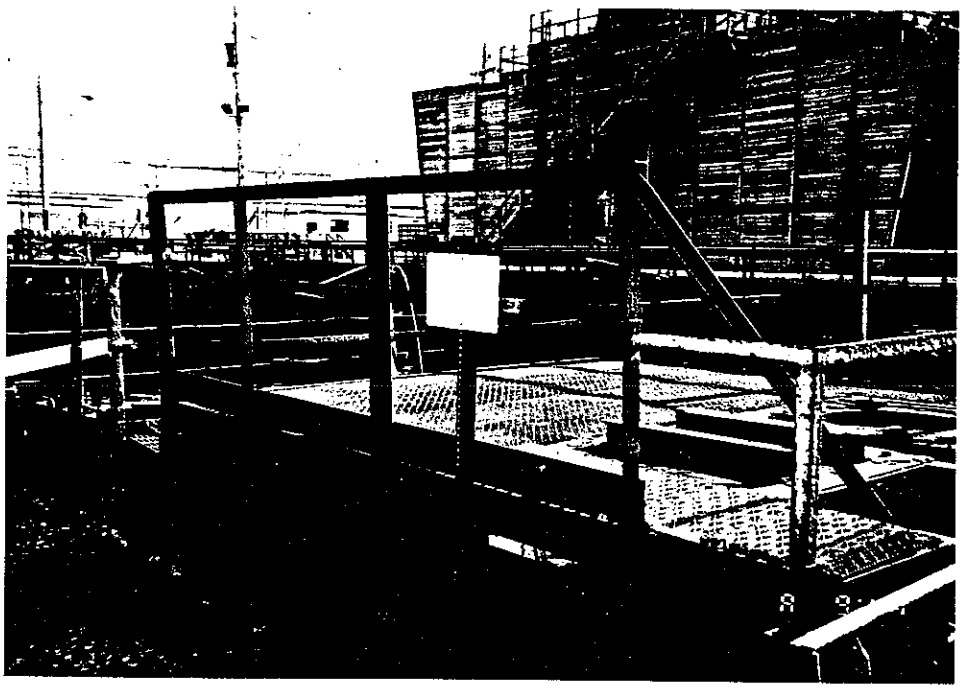
64. View of 1144 Thickener (SWMU 64) and 1145 Thickener
65. (SWMU 65), facing northwest. 1148 Final Clarifier (SWMU 52) is located in the right background and 1148 Roughing Filter (SWMU 46) is located in the center background.



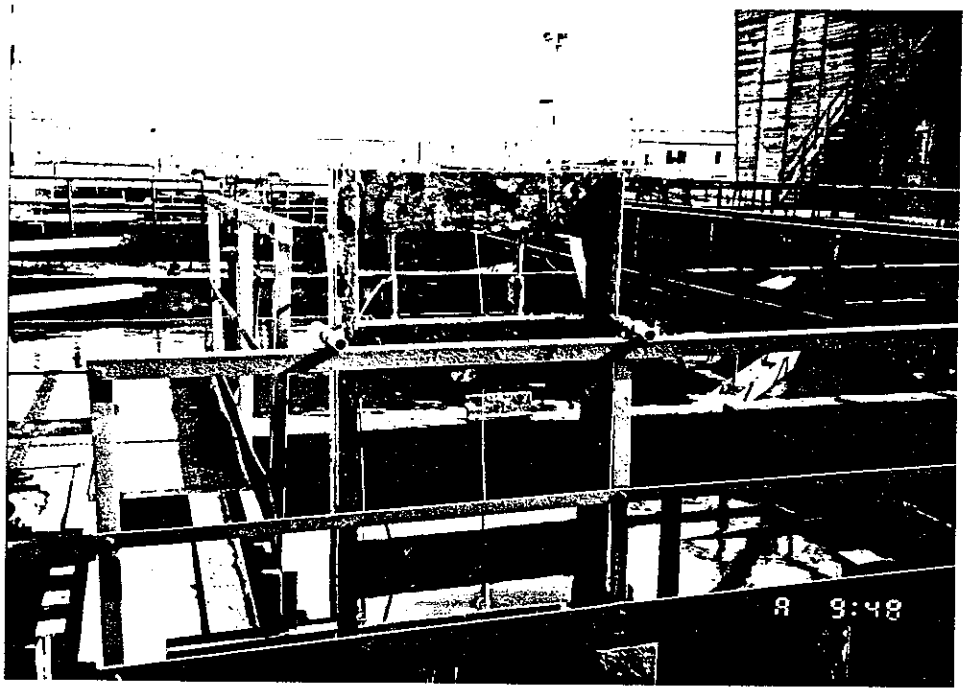
66. to 70. Close-up view of Centrifuges 1 to 5 (SWMUs 66 to 70). All the centrifuges are above ground and located in a building.

71. View of Bundle Cleaning Area (SWMU 72), facing southeast.
72. Past Lagoon B (SWMU 72) is located under this unit.

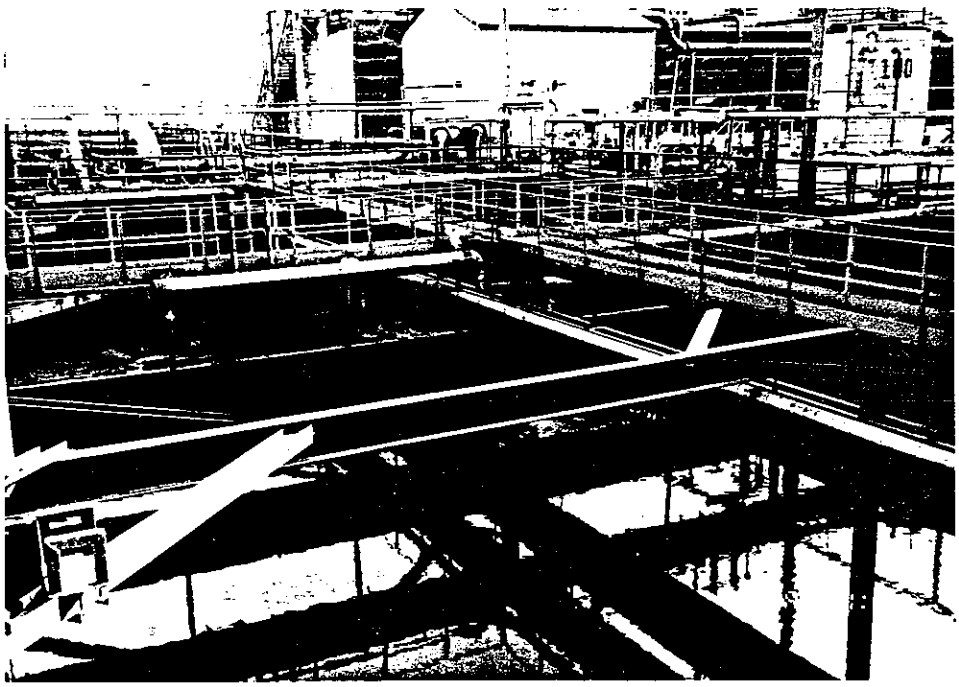
73. There is no photograph for Old Bundle Cleaning Area (SWMU 73) because this unit was identified after the VSI.



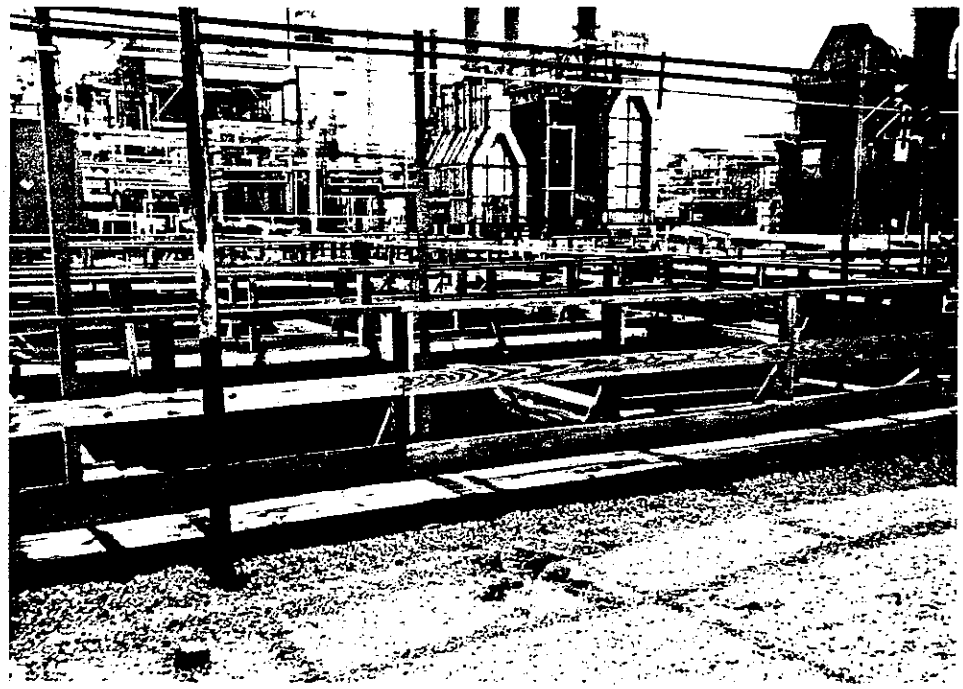
74.1 View of Separator No. 4B (SWMU 74), facing southeast.



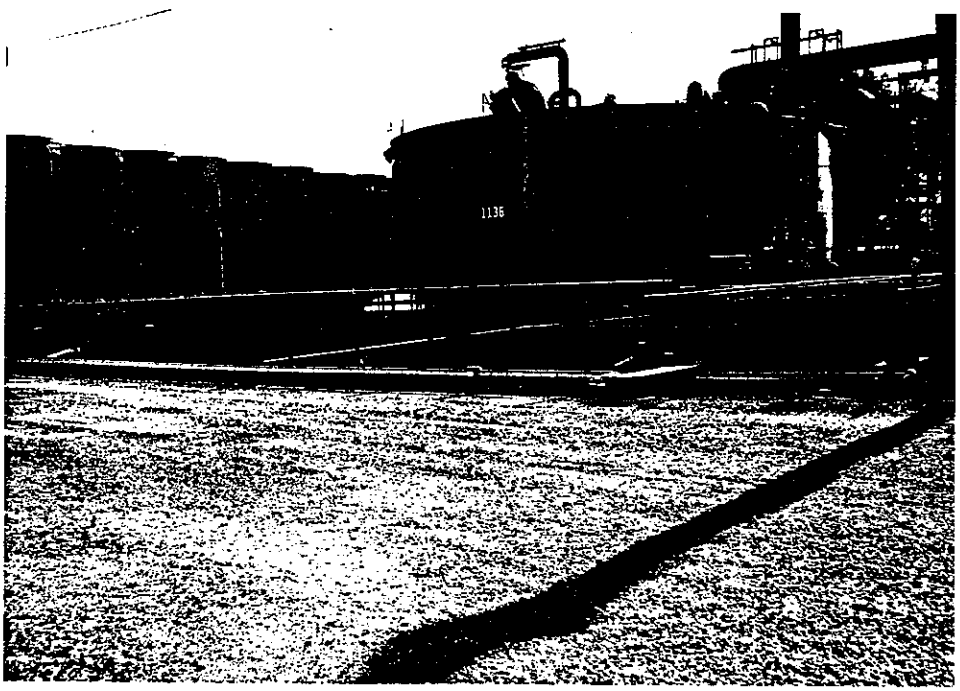
74.2 Close–up view of Separator No. 4B (SWMU 74). Note the wastewater in the unit.



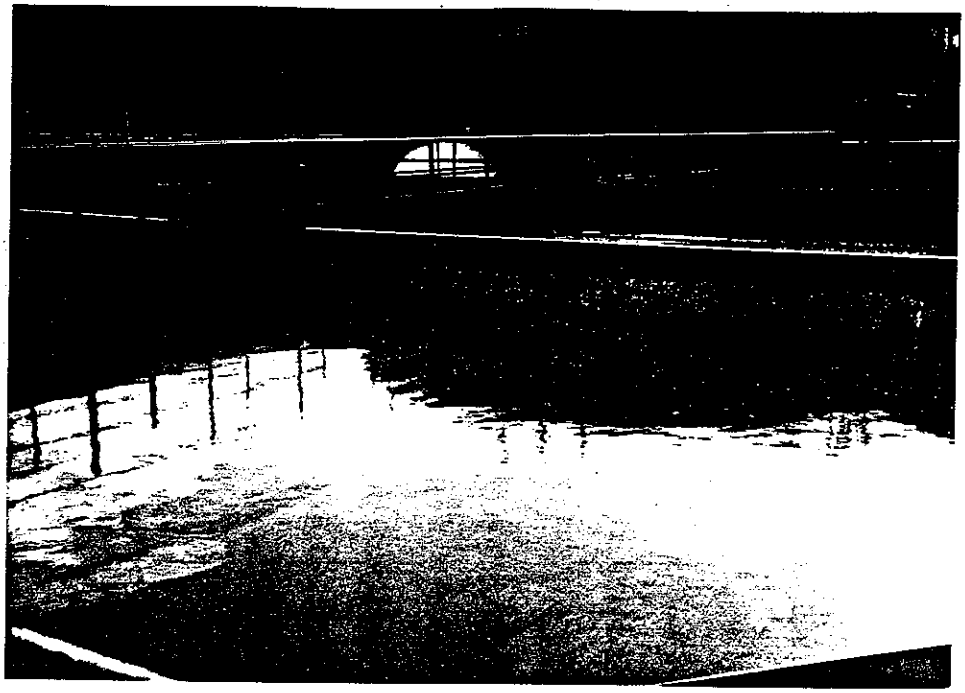
75. Close–up view of Separator No. 4A (SWMU 75), facing southeast.



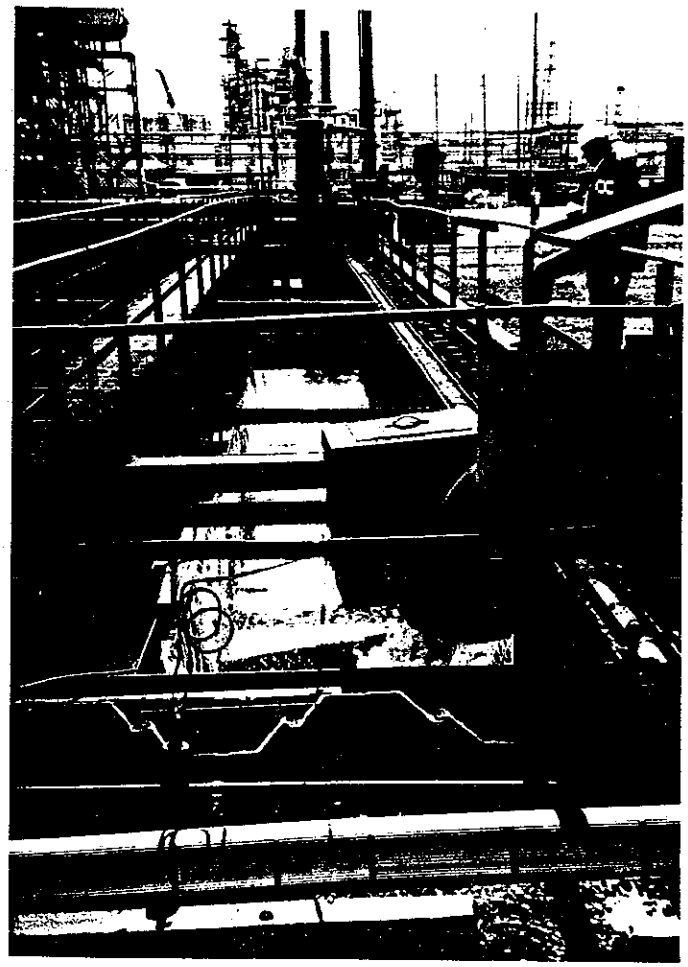
76. View of Separator No. 3 (SWMU 76), facing south.



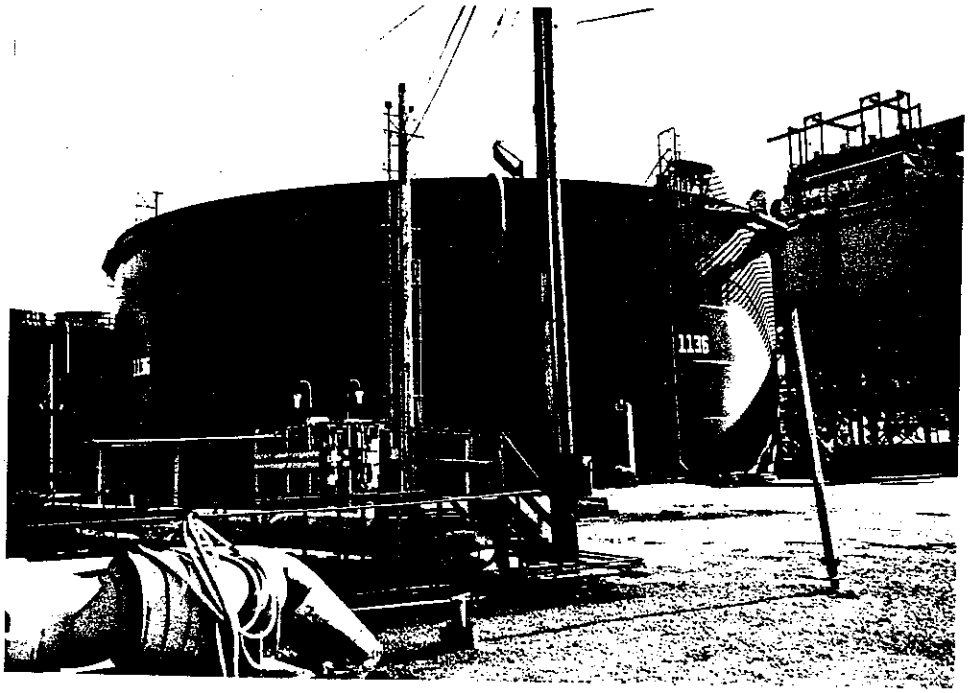
77.1 View of Separator No. 4 (SWMU 77), facing southeast. Tank 400 (SWMU 78) is located in the background.



77.2 Close-up of Separator No. 4 (SWMU 77).



77.3 View of Separator No. 4 (SWMU 77) overflow weir, facing southeast.



78. View of Tank 400 (SWMU 78), facing southeast. This unit is also called Separator 1136.

79.1 View of Drum Storage Area (SWMU 79), facing northwest. Tank 400 (SWMU 78) is in the right background.

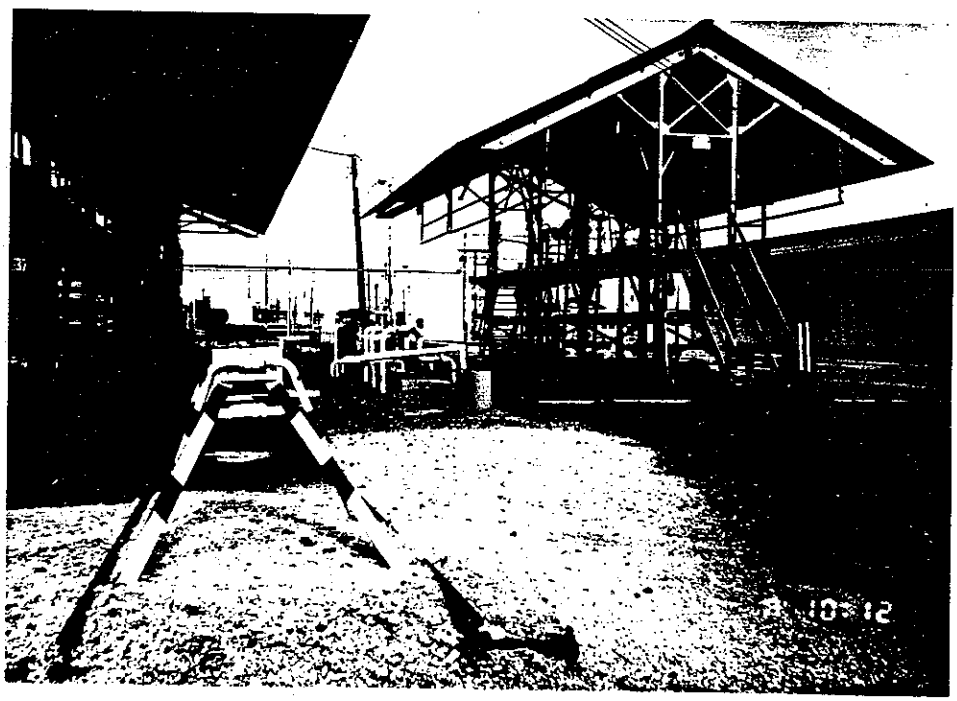
79.2 Close-up view of the open drums with liquids in Drum Storage Area (SWMU 79).

79.3 View of Drum Storage Area (SWMU 79), facing west. The Asbestos Storage Area (SWMU 80) is located west of the unit.

80. View of the Asbestos Storage Area (SWMU 80), facing west.

81. View of Petrochemical Loading Area (SWMU 81), facing north. Note the staining near the catch basin.

82. View of Lube Oil Unloading Area (SWMU 82), facing east. Note the soil staining in the foreground.



83. View of Agent Unloading Area (SWMU 83), facing north.

84. View of WEMCO Unloading Area (SWMU 84), facing north.

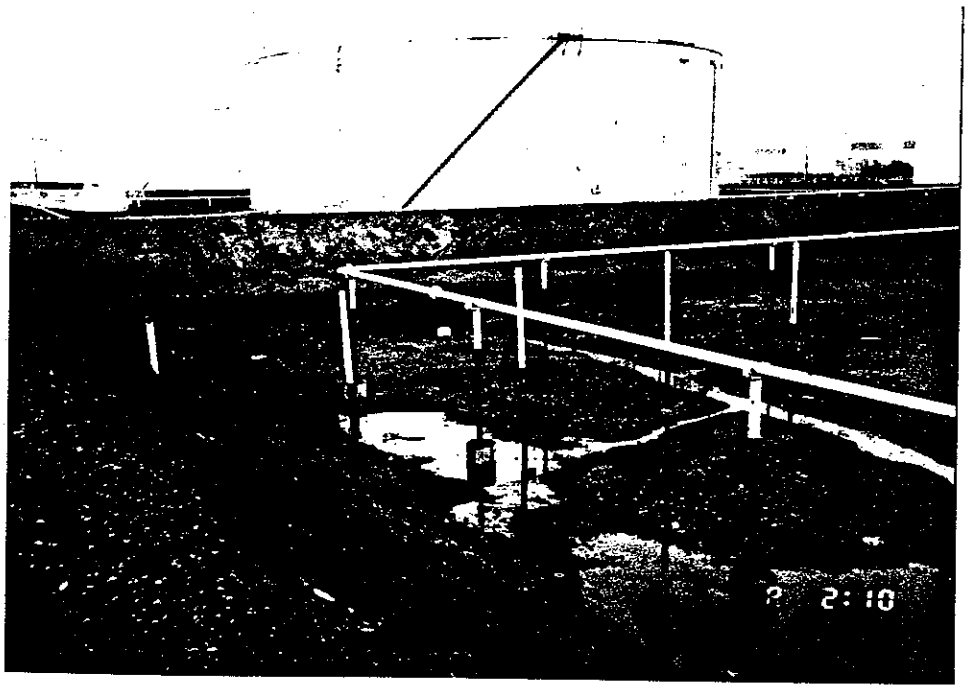
85. View of Oldest Loading Area (SWMU 85), facing north.

85.2 Close-up view of Oldest Loading Area (SWMU 85). Note the cracking and staining of the concrete in the unit.

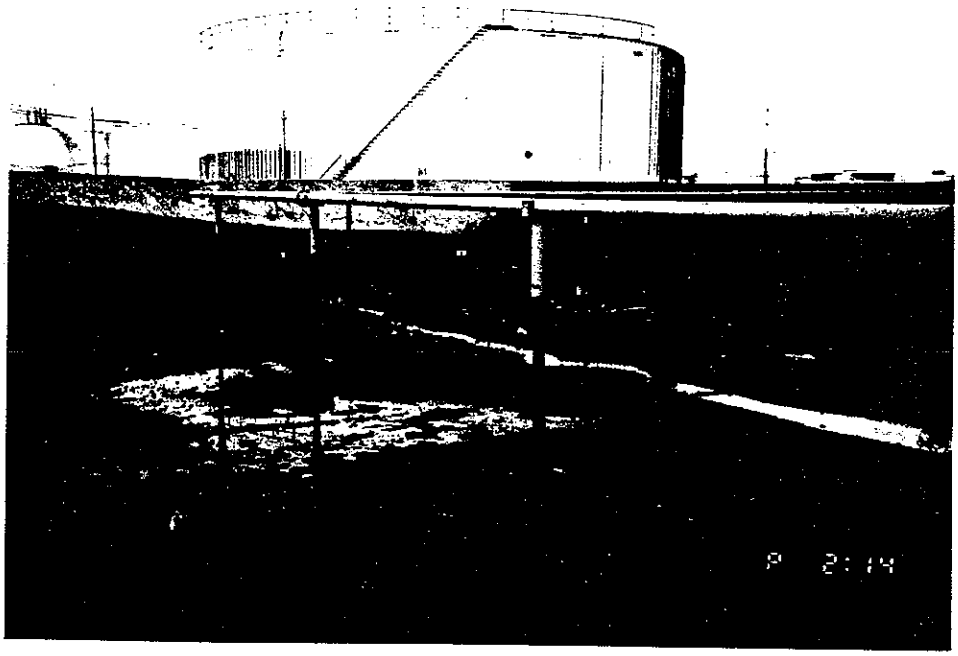
86. View of Spent Caustic Loading Area (SWMU 86) facing east. Note the staining on the gravel.

87, 88, 89. No photographs were taken of these units. These units are covered with gravel.

90. View of "hot spot" located east of Tank 289 (SWMU 90), facing southwest.

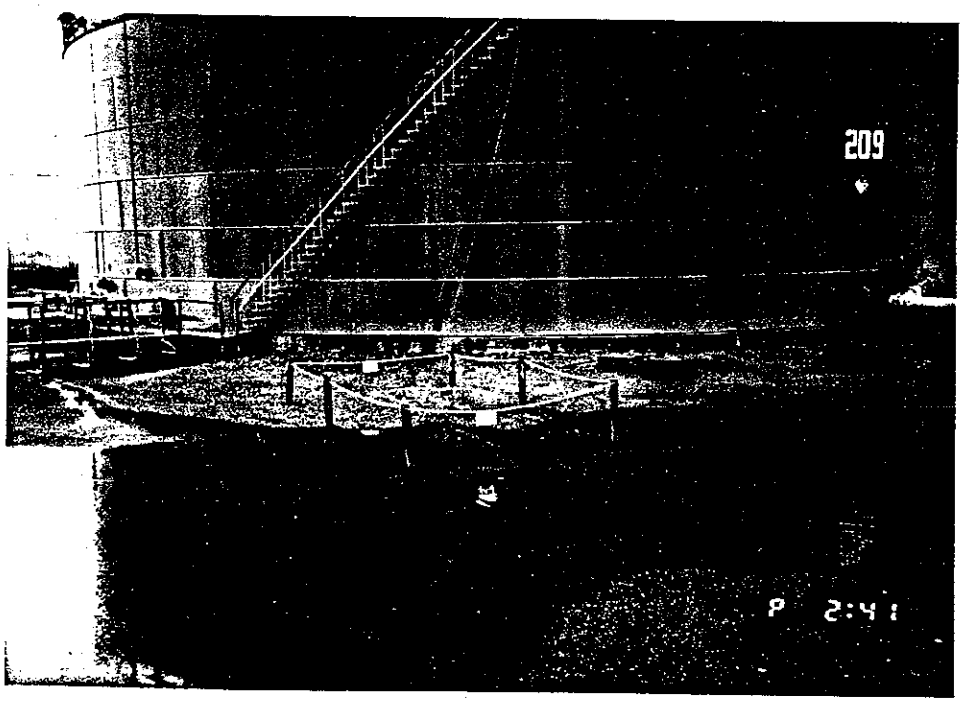


91.1 View of "hot spot" located west of Tank 276 in Buried Lead Storage Area 5 (SWMU 91), facing west.



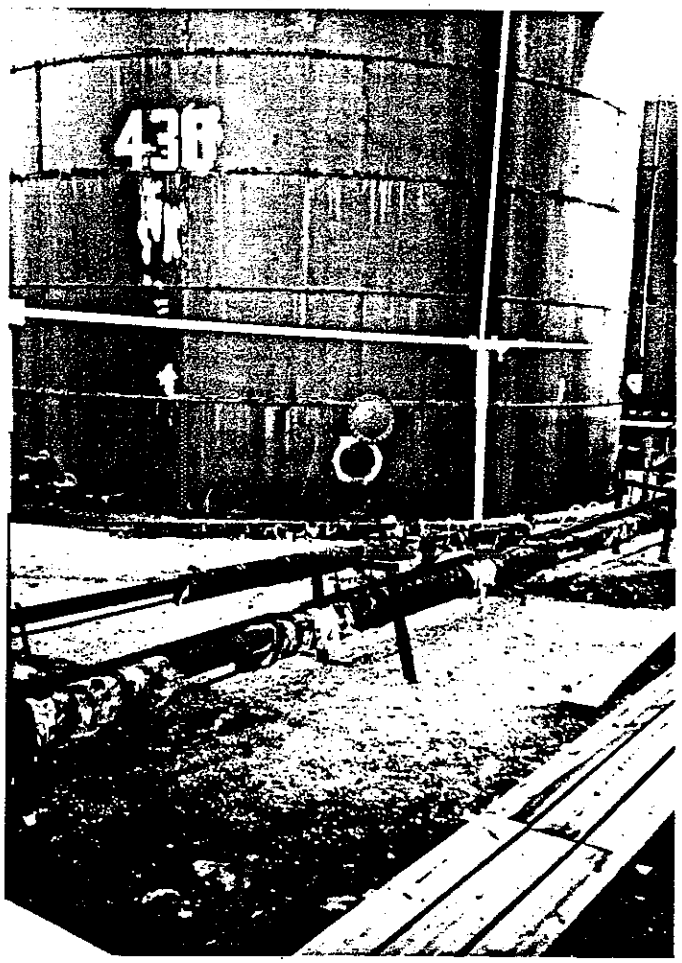
91.2 View of "hot spot" located west of Tank 277 in Buried Lead Sludge Area 5 (SWMU 91), facing west.

92. View of "hot spot" located east of Tank 246 in Buried Lead Sludge Area 6 (SWMU 92), facing west.



93. View of "hot spot" located east of Tank 209, in Buried Lead Sludge Area (SWMU 93), facing west.

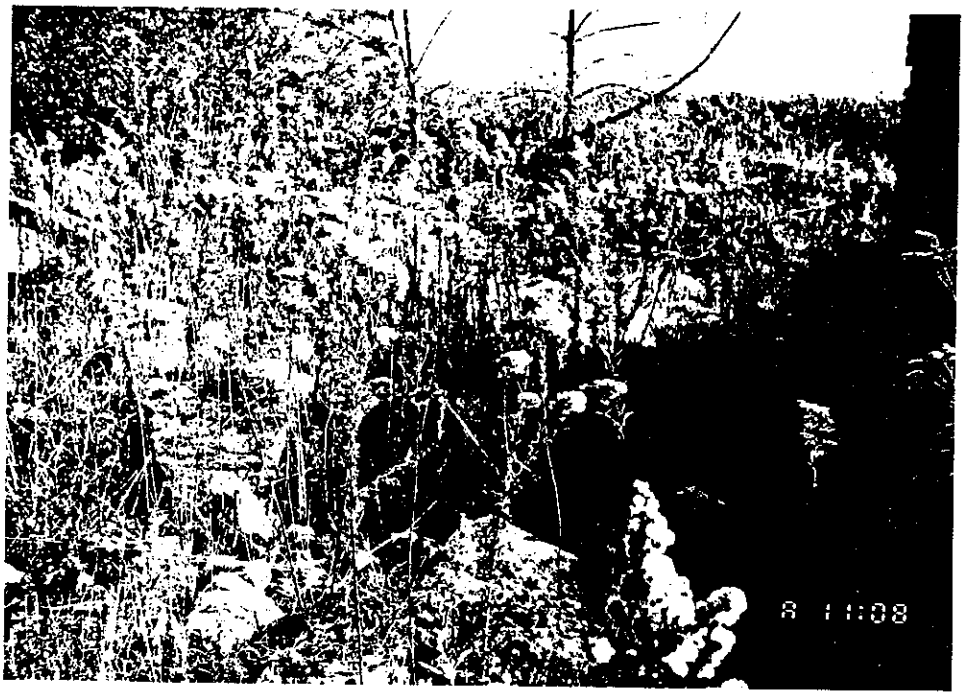
94. View of "hot spot" located west of Tank 224, in Buried Lead Sludge Area 8 (SWMU 94), facing west.



95. View of "hot spot" located west of Tank 430 in Buried Lead Sludge Area 9 (SWMU 95), facing west.

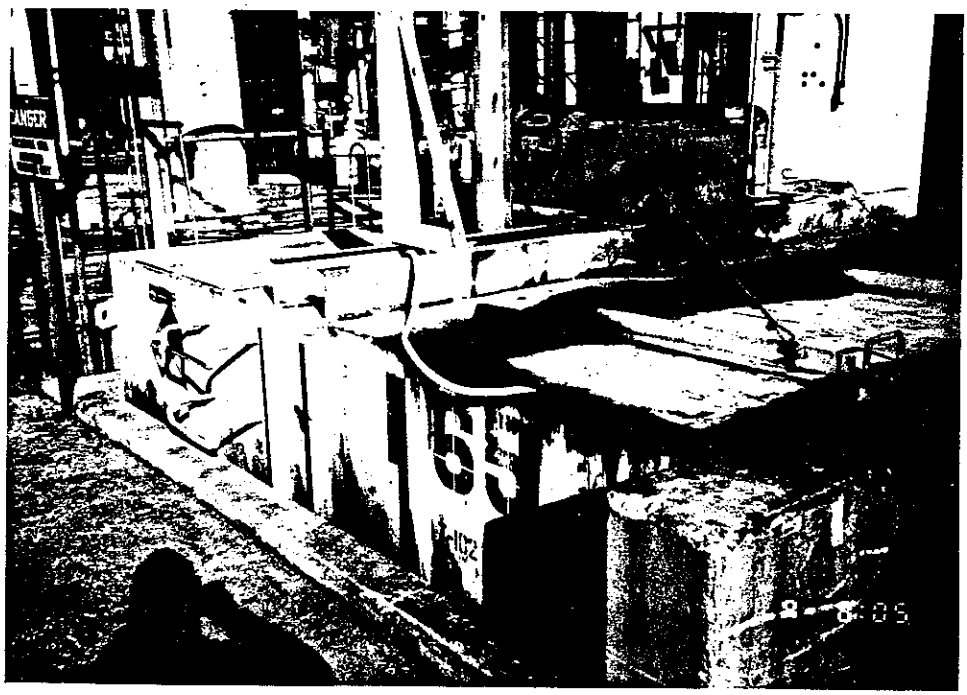
96. View of Area A Ballfields (SWMU 96), facing northeast. This unit is close to the facility boundary and the tanks in the background are on adjoining ARCO property.

97.1 View of Pile B Ballfields (SWMU 97), facing east.



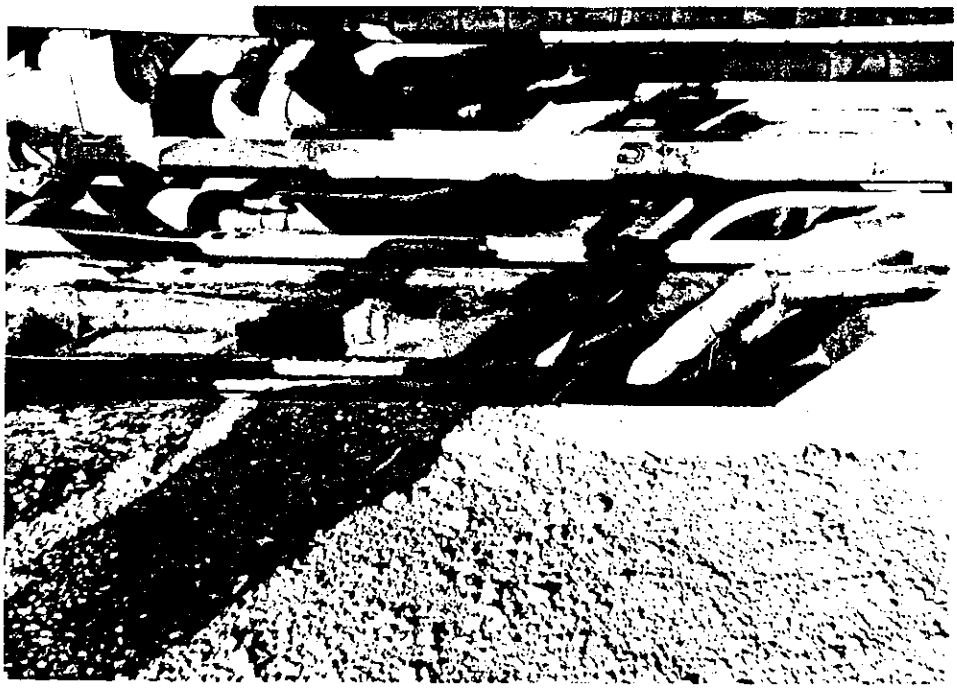
97.2 Close-up of the vegetation cover on Pile B Ballfields (SWMU 97).

97.3 View of top of Pile B Ballfields (SWMU 97), facing northwest.

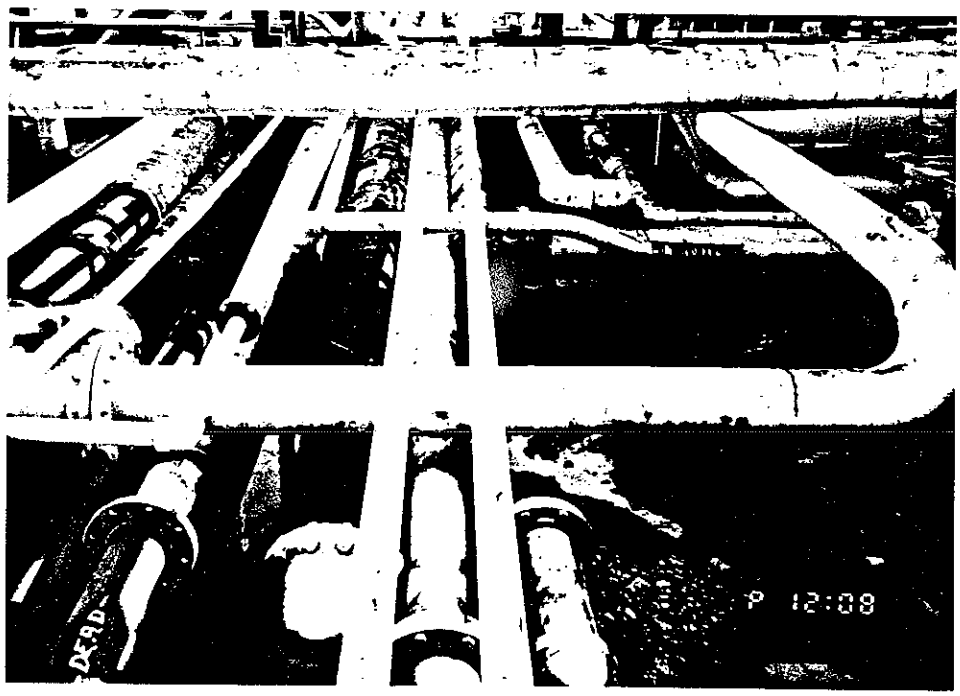


98. View of Tank 102 (SWMU 98), facing west. Note the concrete berm surrounding the unit. The unit is partially in-ground.

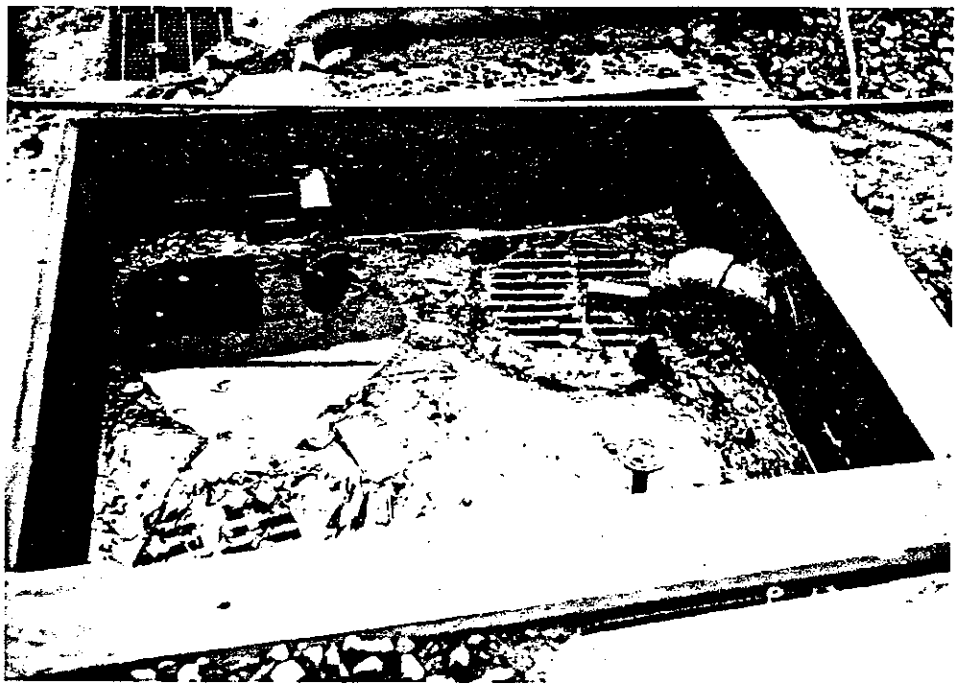
99. No photographs were taken of this unit. This unit was identified after the VSI.



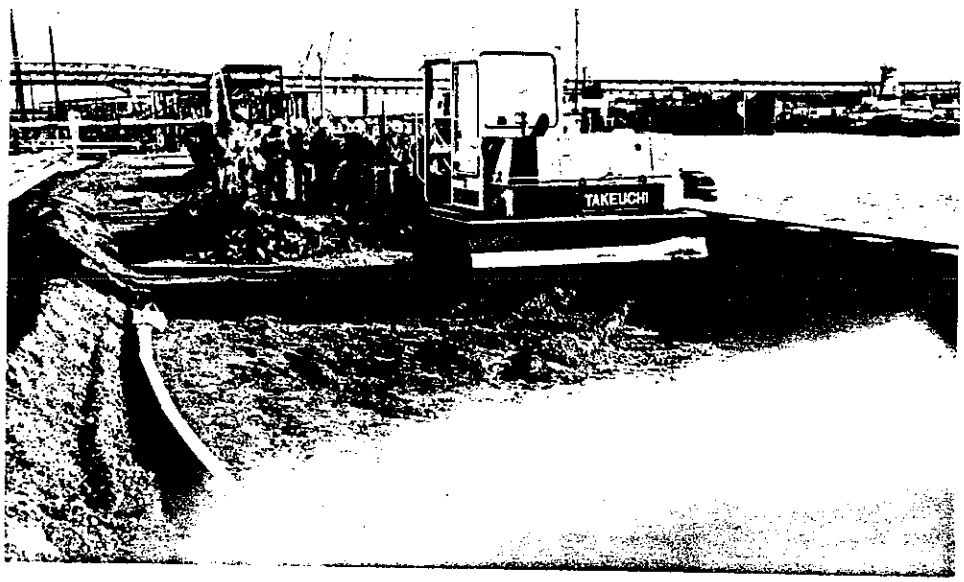
100.1 Close-up view of the pipes of Process Lines and Sumps (SWMU 100).



100.2 Close-up view of pipes of Process Lines and Sumps (SWMU 100) located off J-Street. Note the heavy soil staining underneath the pipes.



100.3 Close–up view of Process Lines and Sumps (SWMU 100). Note the heavy staining in and around the unit.



101. View of slurry wall constructed at Bulkhead Seepage Area (SWMU 101), facing east.

ATTACHMENT B

ANALYTICAL RESULTS OF THE SITE ASSESSMENT'S TETRAETHYL LEAD CONTAMINATION STUDY

(Source: Reference 61)

TABLE 3

RESULTS OF LEAD ANALYSIS FROM
BORINGS AND TEST PITS
CHEVRON/GULF PHILADELPHIA REFINERY
MAIN PLANT

Sample Location (Tank No.)	Sample I.D.	Sample Depth (ft)	Lead Concentration (ppm)	Sample Description
440	TB440A	0.0-1.0	140	Sandy Clay, Grayish-Black
	TB440B	2.0-2.5	99.8	Sandy Clay to Clayey Sand, Blackish-Brown, Wet, Strong Petroleum Odor
	TB440C	2.0-2.5	370	Silt, Sand and Sludge, Brownish-Gray
	TB440D	5.0-5.5	51.9	Silt, Sand and Sludge, Brownish-Gray
246	MTP11A	0.0-0.75	956	Clayey Sand with Silt, Dark Brown; Fill
	MTP11B	0.75-1.25	912	Silty Clay, Dark-Gray; Brick Fragments
205	MTP12A	0.0-0.5	652	Clayey Sand with Silt, Dark Brown; Some Orange Material and Coal
	MTP12B	0.5-1.0	1,080	Silty Clay, Dark-Gray

Key:

TP = Phase II Test Pit
TB = Phase II Test Boring
MTP = Phase I Test Pit

Note:

1. See Appendix D for Laboratory Reports

0610R

TABLE 3

RESULTS OF LEAD ANALYSIS FROM
BORINGS AND TEST PITS
CHEVRON/GULF PHILADELPHIA REFINERY
MAIN PLANT

Sample Location (Tank No.)	Sample I.D.	Sample Depth (ft)	Lead Concentration (ppm)	Sample Description
277	TB277A	0.0-0.5	1,120	Sand Silt, and Clay with Tank Bottoms, Brown
	TB277B	1.0-1.5	340	Silty, Sandy, Clay, Black; Strong Gas Odor
286	TB286A	0.5-1.0	1,630	Sand and Silt with Tank Bottoms, Brown, Strong Gas Odor
	TB286B	3.0-4.0	480	Silty Sandy Clay, Black
289	TB289A	2.0-2.5	1,970	Sandy Gravel, Black, Wet, Petroleum Odor
290	TB290A	0.0-0.25	857	Sand with Flakes, Reddish-Brown
	TB290B	0.75-1.25	370	Silty Clay and Sand, Blackish-Brown
309	TB309A	0.0-1.5	935	Sandy Clay with Gravel, Brownish-Gray
	TB309B	4.0-5.0	725	Sandy Gravel with Clay, Black, Oily
311	TB311	0.0-1.7	310	Gravelly Sand, Brown-Black, Strong Petroleum Odor
313	TB313A	0.0-1.5	370	Gravelly Sand, Brown-Black, Strong Petroleum Odor
	TB313B	4.0-4.5	130	Silty Clay, Grayish-Brown
328	TB328	0.0-1.7	735	Gravelly Sand, Brownish-Black
426	TB426A	0.0-0.75	631	Clayey to Sandy Gravel, Grayish-Brown
	TB426B	1.25-1.75	350	Silty Clay, Dark-Gray
430	TB430A	0.0-0.5	1,760	Silty Clay, Dark Brown; Rust Discoloration
	TB430B	1.5-2.0	170	Silty Clay, Blackish-Gray, Strong Petroleum Odor
438	TB438A	0.0-0.5	610	Clayey Sand, Reddish-Brown
	TB438B	1.0-2.0	50.2	Sandy Gravel, Medium to Dark Gray

TABLE 3

RESULTS OF LEAD ANALYSIS FROM
BORINGS AND TEST PITS
CHEVRON/GULF PHILADELPHIA REFINERY
MAIN PLANT

Sample Location (Tank No.)	Sample I.D.	Sample Depth (ft)	Lead Concentration (ppm)	Sample Description
226	TB226A	0.0-1.5	370	Gravel and Sand, Fill
	TB226B	0.0-1.5	130	Gravel and Sand, Fill
238	TB238	1.0-1.5	1,610	Fill (Glass, Brick, Wood), Some Silt and Sand, Brown-Black, Strong Gas Odor
242	TB242	1.0-1.5	2,970	Fill (Glass, Brick, Wood), Some Silt and Sand, Brown-Black, Strong Gas Odor
243	TB243A	1.0-1.5	1,370	Fill (Glass, Brick, Wood), Some Silt and Sand, Brown-Black, Strong Gas Odor
	TB243B	1.0-1.5	1,490	Fill (Glass, Brick, Wood), Some Silt and Sand, Brown-Black, Strong Gas Odor
244	TB244A	1.5-2.0	390	Silt and Sand with Tank Bottoms, Brown-Black; Gas Odor
	TB244B	3.0-4.0	360	Silty Clay, Brownish-Gray
245	TB245A	1.0-1.5	190	Fill (Glass, Brick, Wood), Some Silt and Clay, Brown-Black, Strong Gas Odor
	TB245B	1.0-1.5	230	Fill (Glass, Brick, Wood), Some Silt and Clay, Brown-Black, Strong Gas Odor
246	TB246A	1.0-2.0	1,440	Leaded Tank Bottom, Brownish-Gray; Gas Odor
	TB246B	3.5-4.5	1,390	Clay and Tank Bottoms, Brownish-Black, Strong Gas Odor
251	TB251A	1.0-1.5	370	Fill (Glass, Brick, Wood), Some Silt & Clay, Brown-Black, Strong Gas Odor
	TB251B	1.0-1.5	694	Fill (Glass, Brick, Wood), Some Silt & Clay, Brown-Black, Strong Gas Odor
276	TB276A	1.0-2.0	4,950	Sand and Silt with Tank Bottoms, Brown; Strong Gas Odor
	TB276B	4.0-5.0	3,220	Silty Clay, Black

TABLE 3

RESULTS OF LEAD ANALYSIS FROM
BORINGS AND TEST PITS
CHEVRON/GULF PHILADELPHIA REFINERY
MAIN PLANT

Sample Location (Tank No.)	Sample I.D.	Sample Depth (ft)	Lead Concentration (ppm)	Sample Description
202	TP202A	0.0-0.5	2,000	Fill, Brown
	TP202B	1.0-1.5	160	Silt, Dark Gray
203	TP203A	0.0-0.5	410	Clay, Brown.
	TP203B	1.5-2.0	29	Sand, Brown to Blackish-Brown; Sandblast Sand
205	TP205A	1.5-2.0	55	Fill, Brown
	TP205B	3.5-4.0	41	Fill, Bluish-Gray
207	TP207A	0.0-0.5	590	Clay, Brown, Rust
	TP207B	1.0-1.5	280	Clay, Dark Bluish-Gray
208	TP208A	0.5-1.0	925	Silty Clay, Brown
	TP208B	1.5-2.0	119	Fine-Medium Sand, Dark Gray
215	TP215A	0.0-0.5	501	Silty Clay, Dark Brown
	TP215B	1.5-2.0	15	Clayey Silt, Bluish-Gray
233	TP223A	0.0-0.5	180	Silty Clay, Medium Gray
	TP223B	1.0-1.5	120	Silty Clay, Dark Gray
202	TB202A	0.5-1.5	88.6	Fill (Glass, Brick, Wood), Some Silt and Sand, Brown Black
	TB202B	3.0-4.0	310	Silty Sandy Clay, Brownish-Green
206	TB206A	0.5-1.5	840	Silt and Sand with Sludge, Brownish-Gray
	TB206B	3.0-4.0	420	Silt and Sand with Sludge, Brownish-Gray
209	TB209A	1.0-1.5	330	Silty Sandy Clay, Gray; Lead Sludge
	TB209B	2.5-3.5	671	Lead Sludge
221	TB221A	0.0-1.0	589	Silt and Sand, Brownish-Gray; Lead Flakes on Surface
	TB221B	3.0-4.0	52.3	Silty Clay, Brownish-Gray
224	TB224A	0.5-1.0	17,000	Silt and Sand, Brown, Leaded Tank Bottom
	TB224B	3.0-4.0	558	Silty Clay, Brownish-Gray

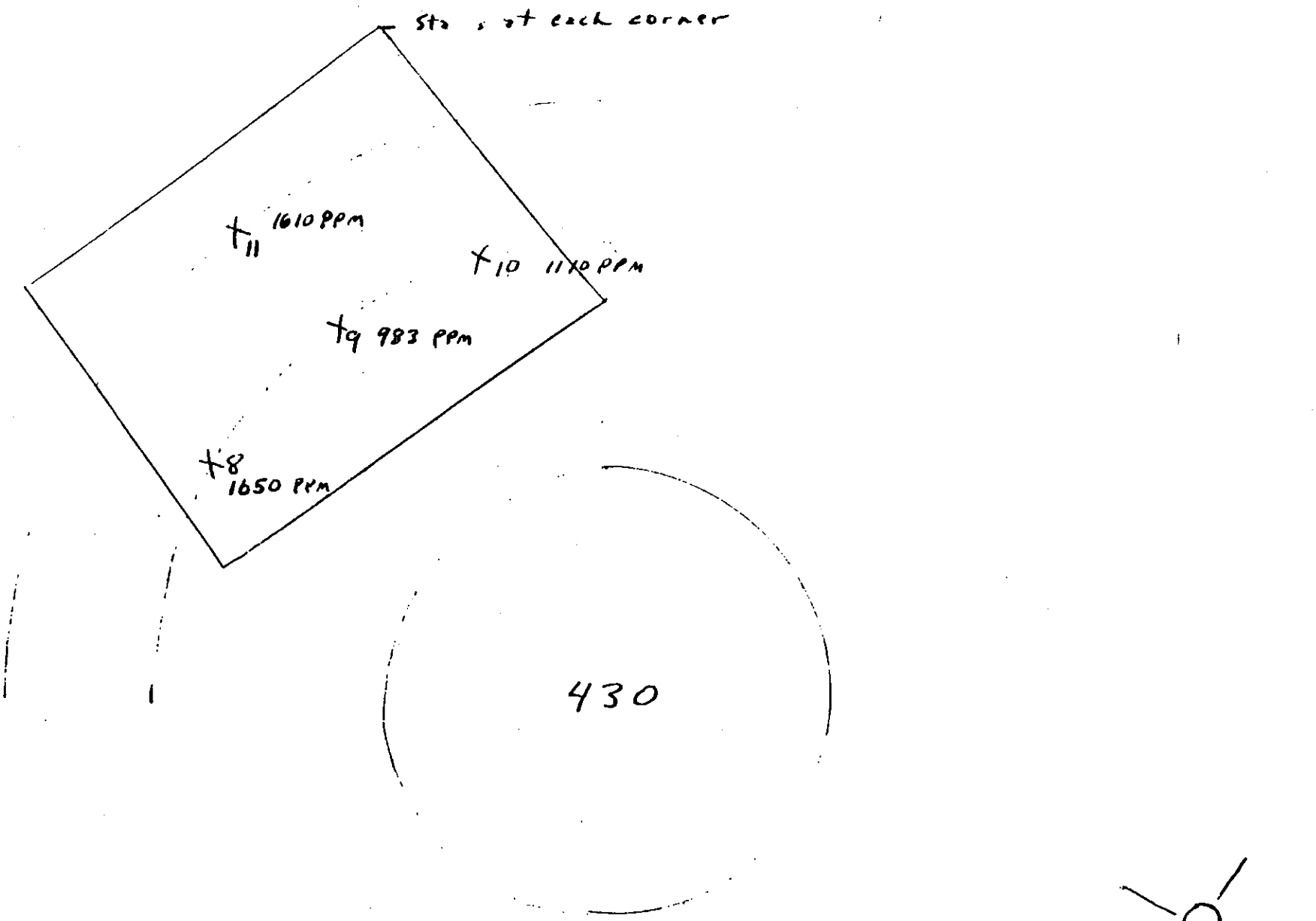
ATTACHMENT C

ANALYTICAL RESULTS FOR TETRAETHYL LEAD CONTAMINATION STUDY CONDUCTED BY CHEVRON, 1988

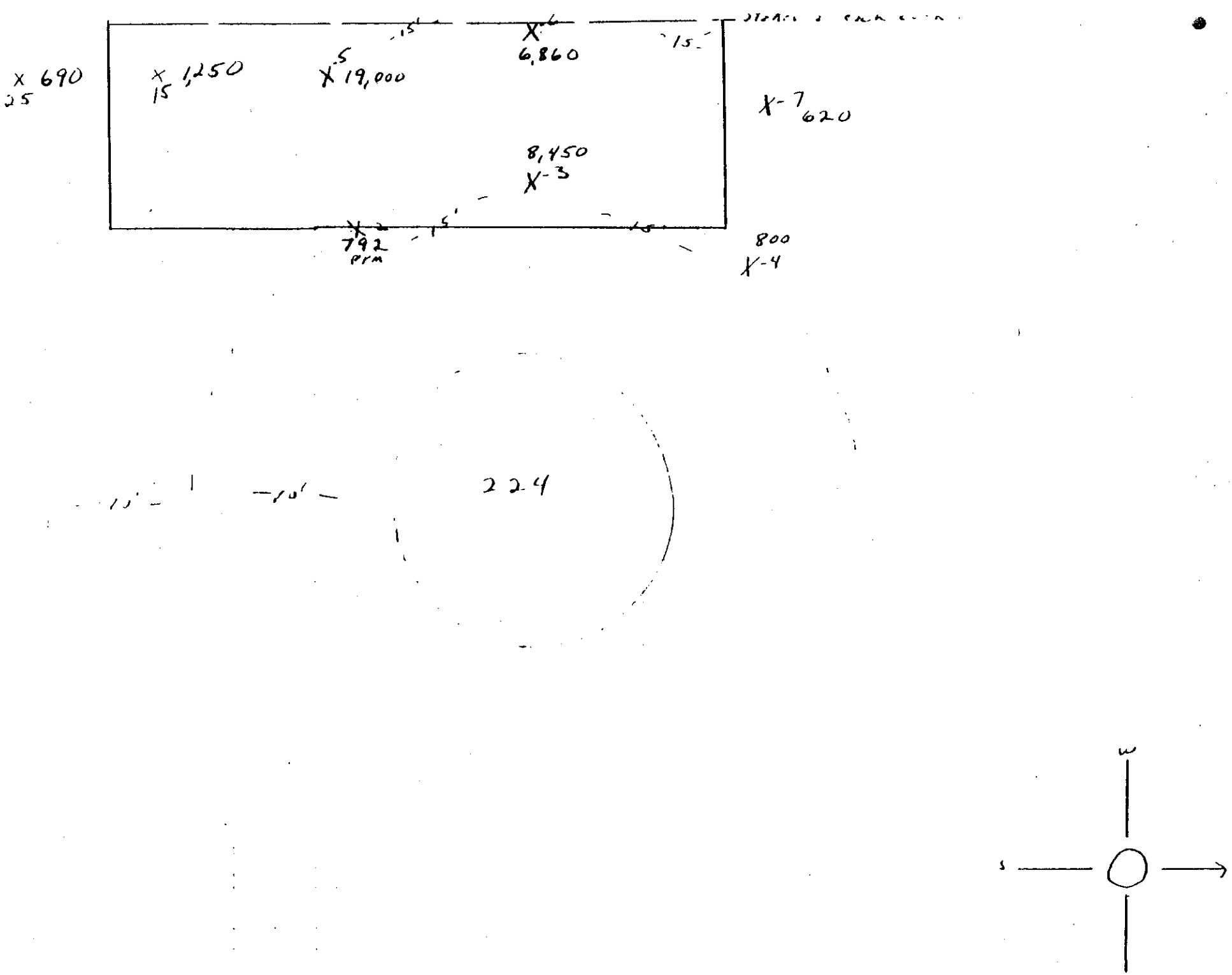
(Source: Reference 61)

	Leaded Soil Sample		Date Sampled
1	721 PPM	221 TK Field	
2	792 "	224 TK Field	
3	8,450 "	"	
4	800 "	"	
5	19,000 "	"	
6	6,860 "	"	
7	620 "	"	
8	1,650 "	430 TK Field	
9	983 "	"	
10	1,110 "	"	
11	1,610 "	"	
12	648 "	224 TK Field	
13	549 "	"	
14	[redacted]196 "	"	
15	1,250 "	"	
16	2,020	276 TK Field	2/9
17	355	277 TK Field	2/9
18	210	286 TK Field	2/11
19	740	"	"
20	70	"	"
21	210	"	"
22	55	289 TK Field	2/23
23	1100	202 "	"
24	480	202 "	"
25	690	224 "	"
26	537	246 "	4/20
27	2410	243 "	"
28	454	243 "	"

29	926	233 TK Fill	9/20
30	1230	243 TK Fill	"


Sta. at each corner
11 1610 PPM
10 1110 PPM
9 983 PPM
8 1650 PPM
1
430
N

STAKED 6/7


X 690
25
X 1,250
15
X 19,000
5
X 6,860
15
X-7 620
8,450
X-3
792
prm
800
X-4
224
W
S

ATTACHMENT D

ANALYTICAL RESULTS FOR SAMPLING CONDUCTED IN AREA A BALLFIELDS

(Source: Reference 73)

TABLE 1

GENERAL SOIL SAMPLING DATA

CHEVRON REFINERY
AREA A
PHILADELPHIA, PENNSYLVANIA
1/19/88 - 1/26/88

Sample Point I.D.	Approximate Depth (ft)	PID Headspace Readings (PID units)	Samples Composited For Phase I Laboratory Analysis*	Samples Composited For Phase II Laboratory Analysis*
A1 A	0-4	0		
B	4-8	0		+
				+
A2 A	3	4	X	
B	6	5	X	
C	9	6	X	
D	12	5	X	
E	15	14	X	
A3 A	0-4	0		
B	4-8	0		+
C	8-12	1		+
				+
A4 A	3	0	X	
B	6	3	X	
C	9	4	X	
D	12	9	X	
E	15	8		
A6 A	3	4		
B	6	3		+
C	9	2		+
D	12	5		+
E	15	14		+
A7 A	3	4		
B	6	5		+
C	9	15		+
D	12	20		+
E	16	30		+
F	18	11		
A8 A	3	6		
B	6	11	X	
C	9	16	X	
D	12	5	X	
E	15	10		

TABLE 1 (Cont'd)

GENERAL SOIL SAMPLING DATA

CHEVRON REFINERY
AREA A
PHILADELPHIA, PENNSYLVANIA
1/19/88 - 1/26/88

Sample Point I.D.	Approximate Depth (ft)	PID Headspace Readings (PID units)	Samples Composited For Phase I Laboratory Analysis*	Samples Composited For Phase II Laboratory Analysis*
A9 A	0-4	0		+
B	4-8	2		+
C	8-12	70		+
A10 A	3	0	X	
B	6	6	X	
C	9	2	X	
D	12	120	X	
E	15	110		
F	18	50		
A11 A	3	0		+
B	6	4		+
C	9	6		+
D	12	9		+
E	15	0		
A12 A	3	4		+
B	6	5		+
C	9	7		+
D	12	120		+
E	15	2		
A13 A	3	4	X	
B	6	4	X	
C	9	6	X	
D	12	8	X	
A14 A	0-4	1		+
B	4-8	2		+
C	8-12	3		+
A15 A	3	3	X	
B	6	3	X	
C	9	6	X	
D	12	9	X	
E	15	22		

TABLE 1 (Cont'd)

GENERAL SOIL SAMPLING DATA

CHEVRON REFINERY
AREA A
PHILADELPHIA, PENNSYLVANIA
1/19/88 - 1/26/88

Sample Point I.D.	Approximate Depth (ft)	PID Headspace Readings (PID units)	Samples Composited For Phase I Laboratory Analysis*	Samples Composited For Phase II Laboratory Analysis*
A16 A	3	2		
B	6	5		+
C	9	12		+
D	12	13		+
E	16	3		+
F	17-20	3		
A17 A	0-4	3		
B	4-8	7		+
C	8-12	7		+
				+
A18 A	0-4	0		
B	4-8	0		+
				+
A19 A	0-4	30		
B	4-8	14		+
				+

* Example - A8A + A8B + A8C = Composite Sample A8

TABLE 2

SUMMARY OF ANALYTICAL LABORATORY DATA
AREA A - PHASE I

CHEVRON REFINERY
PHILADELPHIA, PENNSYLVANIA
1/19/88 - 1/26/88

Composite Sample I.D.	A2	A4	A8	A10	A13	A15
Parameters						
Base/Neutral / Extractable Organics (ug/kg)						
Acenaphthene	U	U	U	U	120	U
Acenaphthylene	U	390	860	140	150	1,500
Anthracene	U	450	710	200	200	U
Benzo (a) Anthracene	U	1,200	1,100	430	960	J
Benzo (b) Fluoranthene	J	920	1,200	1,300	2,100	2,600
Benzo (g,h,i) Perylene	U	2,300	2,000	2,000	3,800	3,800
Benzo (a) Pyrene	190	1,400	1,400	850	1,900	2,000
Chrysene	190	1,500	1,400	540	1,400	1,700
Dibenz (a,h) Anthracene	U	U	U	U	U	J
Diethylphthalate	U	U	U	U	J	U
Di-n-Butylphthalate	U	U	U	U	100	U
Fluoranthene	120	1,500	2,200	560	880	2,300
Fluorene	U	240	450	100	85	U
Ideno (1,2,3-cd) Pyrene	U	820	1,600	1,600	2,800	2,500
Naphthalene	J	660	2,500	700	400	880
Phenanthrene	U	2,000	2,400	700	900	2,300
Pyrene	290	3,500	3,100	1,100	2,700	3,200
Total (ug/kg)	790	16,880	20,920	10,220	18,500	22,780

Composite Sample I.D.	A2	A4	A8	A10	A13	A15
Conventional Analysis Data(mg/kg)						
Cyanide, Total	3.4	U	U	U	13	4.9
Phenolics, Total	U	U	0.19	0.78	0.56	1.1

TABLE 2 (Cont'd)

SUMMARY OF ANALYTICAL LABORATORY DATA
AREA A - PHASE I

CHEVRON REFINERY
PHILADELPHIA, PENNSYLVANIA
1/19/88 - 1/26/88

Sample I.D.	BV0A	A9C	A10E	A12D	A15BV0A
Volatile Organics (ug/kg)					
Benzene	U	18	U	U	U
Ethylbenzene	U	45	940	U	11
Methylene Chloride	U	13	U	4	68
Toluene	J	110	990	J	J
Total (ug/kg)	0.00	186	1930	4	11

Sample I.D.	BPH	A12D	A15BPH
Total Petroleum Hydrocarbons(mg/kg)	210	740	24

Explanation:

U - Compound was analyzed for but not detected.
J - Indicates an estimated value based on assumption of a 1:1 responses for tentatively identified compounds, or when mass spectral data indicate the presence of a compound at levels below the specified detection limit.
B - Indicates that the analyte is found in the blank as well as a sample. It indicates possible/probable contamination and warns the data user to take appropriate action.

Note: 1. See Figures 3 and 4 for location of samples taken for volatile organic and total petroleum hydrocarbon analysis.
2. Only the compounds that were detected are present on this table. For the complete list of compounds analyzed see Section 4.0. For the complete laboratory reports see Appendix B.

TABLE 3

SUMMARY OF ANALYTICAL LABORATORY DATA
AREA A - PHASE II

CHEVRON REFINERY
PHILADELPHIA, PENNSYLVANIA
1/19/88 - 1/26/88

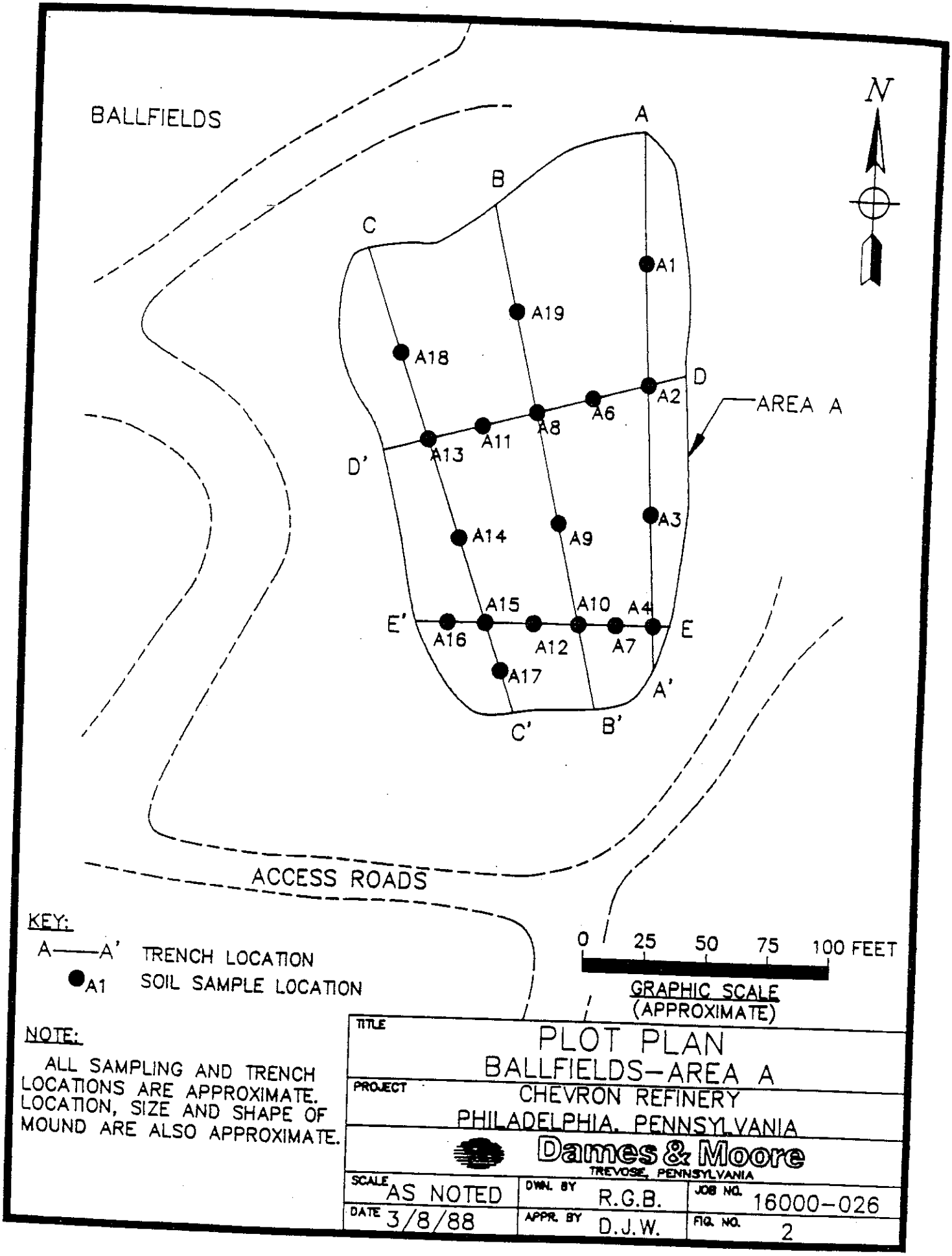
Composite Sample I.D.	A1	A3	A6	A7	A9	A11	A12	A14	A16	A17	A18	A19
Conventional Analysis Data (mg/kg)												
Cyanide, Total	U	U	0.27	6.0	4.7	0.17	7.2	16	14	16	2.9	2.5

Explanation:

U - Compound was analyzed for but not detected.

Note:

Laboratory reports are provided in Appendix B.



KEY:

A——A' TRENCH LOCATION

●A1 SOIL SAMPLE LOCATION

NOTE:

ALL SAMPLING AND TRENCH LOCATIONS ARE APPROXIMATE. LOCATION, SIZE AND SHAPE OF MOUND ARE ALSO APPROXIMATE.

TITLE: PLOT PLAN BALLFIELDS–AREA A		
PROJECT: CHEVRON REFINERY PHILADELPHIA, PENNSYLVANIA		
Dames & Moore TREVOSE, PENNSYLVANIA		
SCALE: AS NOTED	DWN. BY: R.G.B.	JOB NO.: 16000-026
DATE: 3/8/88	APPR. BY: D.J.W.	FIG. NO.: 2

ATTACHMENT E

ANALYTICAL RESULTS FOR SAMPLING CONDUCTED IN AREA B BALLFIELDS

(Source: Reference 72)

TABLE 1

GENERAL SOIL SAMPLING DATA
BALLFIELDS - AREA B
CHEVRON REFINERY
PHILADELPHIA, PENNSYLVANIA
MARCH 23, 1988

Sample Point I.D.	Approximate Depth (ft)	PID Headspace Readings - ppm (PID Units)
B1	3	40
	6	50
	9	25
B2	3	50
	6	30
B3	3	70
	6	115
B4	3	10
	6	15
B5	2.5	20
	3-5	30
	6	40
B6	2.5	0
	5	1
B7	3	35
	6	70
B8	3	15
	6	100
B9	3	50
	6	15
B10	3	95
	6	60
B11	3	0
	6	50
	9	70
B12	3	1
	6	70
	9	70
B13	3	0
	6	0
B14	2	150
	5	110
B15	3	0
	6	0
B16	3	0
	6	0
B18	3	0
	6	0

2812R

TABLE 2

SUMMARY OF ANALYTICAL LABORATORY DATA
BALLFIELDS - AREA B
CHEVRON REFINERY
PHILADELPHIA, PENNSYLVANIA
MARCH 23, 1988

Composite Sample I.D.	B1	B2	B3	B4	B5	B6	B7	B9	B10	B11	B12	B13	B14	B15	B16	B18	B18-R
Parameters																	
Base/Neutral Extractable Organics (ug/kg)																	
Flourene	970	58000	710	26000	34000	J	360000	U	14000	30000	J	U	16000	U	U	U	U
Flouranthene	390	U	110	77000	U	J	8600	5200	U	U	U	95	520	U	U	U	U
Pyrene	1600	38000	1300	160000	10000	590	32000	12000	U	60000	J	100	2000	U	180	130	U
Chrysene	1200	16000	400	38000	8700	J	18000	J	U	U	U	U	1300	U	U	U	U
Phenanthrene	2800	62000	770	62000	24000	J	160000	J	J	58000	J	U	10000	U	U	U	93
Naphthalene	420	46000	U	U	U	U	90000	U	U	U	U	U	2200	U	U	U	U
Benzo(a)Anthracene	J	U	J	41000	3600	U	U	U	U	U	U	J	U	U	U	U	U
Benzo(a)Pyrene	740	U	320	U	U	U	U	U	U	U	U	U	U	U	U	U	U
Anthracene	U	J	U	23000	U	U	U	U	U	U	U	U	U	U	U	U	U
Di-N-Butylphthalate	U	U	180	U	U	U	U	U	U	U	U	U	U	U	130	U	J,B
Bis(2-Ethylhexyl) Phthalate	U	U	470	U	U	U	U	U	U	U	U	J,B	U	J	U	U	U
Benzo(b)Flouranthene	U	U	U	32000	U	U	U	U	U	U	U	U	U	U	U	U	U
Indeno (1,2,3-cd)Pyrene	U	U	U	27000	U	U	U	U	U	U	U	U	U	U	U	U	U
Benzo(g,h,i) Perylene	U	U	U	8100	U	U	U	U	U	U	U	U	U	U	U	U	U
TOTAL*	8120	220000	4260	494100	80300	590	668600	17200	14000	148000	-	195	32020	-	310	130	93
Volatile Organics (ug/kg)																	
Benzene	140	60000	U	U	9000	U	2800	U	66000	J	J	U	U	NS	U	NS	U
Toluene	5	55000	J	J	U	U	J	U	U	U	U	U	U	NS	U	NS	U
Xylenes	88	330000	6	U	U	U	37000	U	110000	18000	7900	U	U	NS	U	NS	U
Ethylbenzene	62	47000	U	U	U	U	52000	U	30000	5200	2500	U	U	NS	U	NS	U
TOTAL*	295	492000	6	-	9000	-	91800	-	206000	23200	10400	-	-	NS	-	NS	-

TABLE 2 (Continued)

SUMMARY OF ANALYTICAL LABORATORY DATA
BALLFIELDS - AREA B
CHEVRON REFINERY
PHILADELPHIA, PENNSYLVANIA
MARCH 23, 1988

Composite Sample I.D.	B1	B2	B3	B4	B5	B6	B7	B9	B10	B11	B12	B13	B14	B15	B16	B18	B18-RRB
Parameters																	
Metals (mg/kg)																	
Antimony	3.24	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	21.2
Barium	101	383	9.40	143	86.0	112	225	141	178	210	182	51.9	89.2	40.7	58.1	34.8	41.5
Beryllium	U	U	U	U	1.36	U	1.61	U	1.29	2.51	U	U	U	U	U	U	U
Cadmium	U	3.00	U	1.93	3.00	2.64	3.50	1.62	2.33	2.41	2.70	1.42	2.18	1.33	1.67	1.44	U
Chromium	55.9	3710	99.2	165	103	73.7	1190	125	425	668	421	19.7	340	19.4	18.3	16.1	5.35
Cobalt	10.6	66.0	17.2	17.6	16.1	14.2	62.4	10.1	19.4	28.2	24.7	U	U	U	U	U	U
Mercury	0.507	2.64	0.751	1.77	1.78	0.867	3.08	1.31	2.48	2.52	1.35	0.269	0.218	0.217	0.333	U	U
Nickel	20.3	83.1	40.6	122	84.6	88.1	258	26.8	54.1	66.6	38.0	11.4	48.4	11.70	11.9	11.1	13.8
Vanadium	37.9	71.4	35.0	69.1	186	201	243	54.8	105	95.8	80.9	26.3	70.4	25.3	23.6	24.2	U
Arsenic	99.5	16.5	7.74	36.7	2.18	3.47	22.9	9.41	10.1	7.76	10.3	6.87	6.80	3.98	5.48	4.49	3.98
Lead	280	263	216	472	183	237	479	191	264	242	559	110	151	46.3	179	30.3	637
Selenium	0.926	1.01	U	0.942	2.46	U	5.38	1.88	3.62	3.10	2.94	1.89	3.81	2.11	2.82	2.37	2.68
Miscellaneous (mg/kg)																	
Total Cyanide	0.3	3.7	0.5	U	0.72	U	1.4	0.4	2.7	U	1.7	U	3.2	U	0.2	U	NS
Total Petroleum Hydrocarbons	5800	18000	580	5400	2200	1200	32000	13000	9800	82	13000	150	3500	82	740	170	NS
PCBs																	
Aroclor 1248	51	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U
Aroclor 1254	U	U	1.4	0.4	U	U	U	U	U	U	U	0.3	U	U	0.53	U	U

Key:

U - Indicates compound was analyzed for but not detected, based on necessary concentration/dilution

B - This flag is used when the analyte is found in the blank as well as the sample. It indicates possible/probable contamination and warns the data user to take appropriate action.

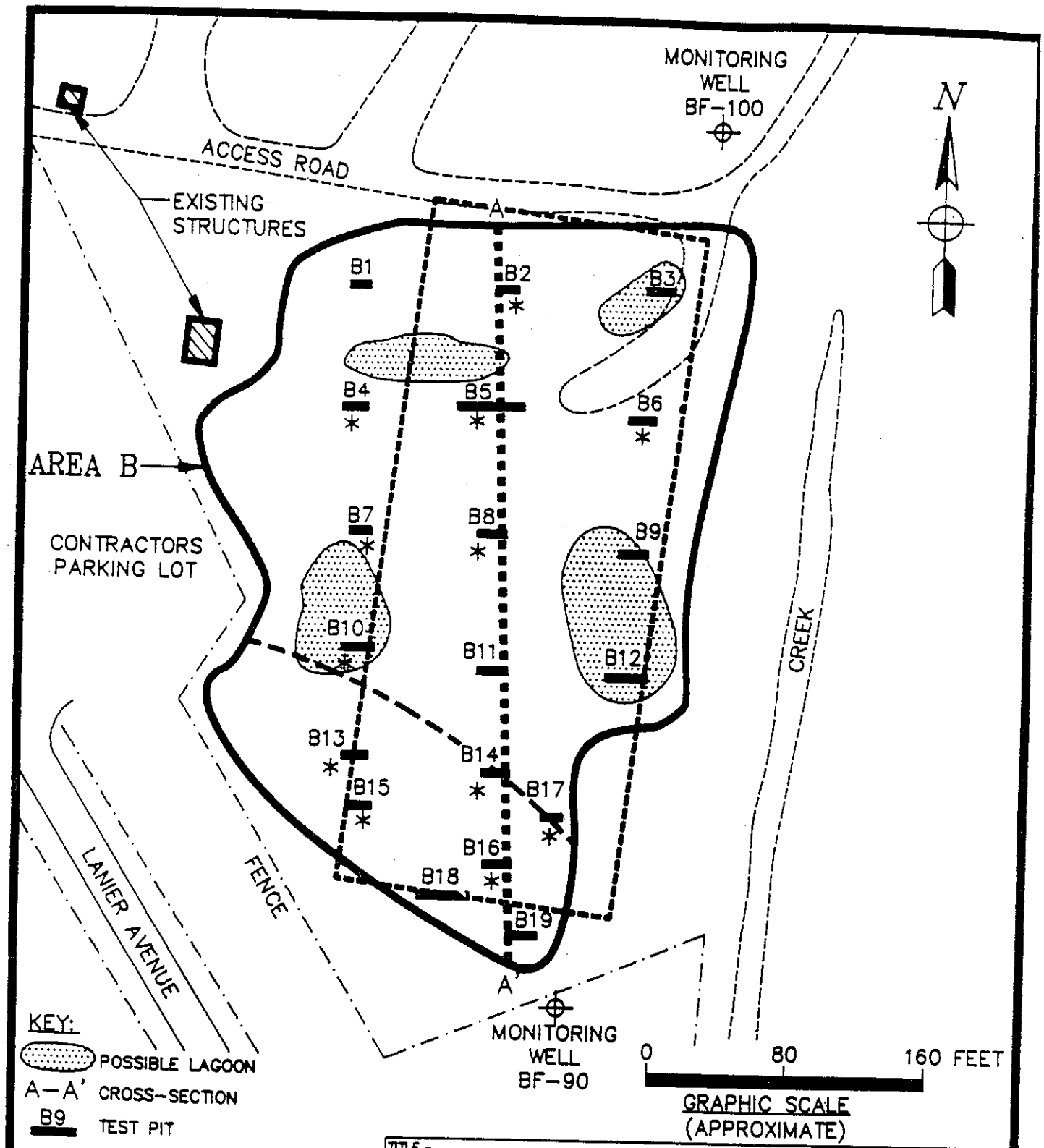
J - Indicates an estimated value, based on assumption of a 1:1 response for tentatively identified compounds, or when mass spectral data indicates the presence of a compound at levels below the specified detection limit.

NS - Not Sampled.

* - Total Excluding B & J

Sample B18-RRB was taken below the concrete from the bed of the old railroad yard.

2815R



TITLE: PLOT PLAN SHOWING TEST PIT LOCATIONS
BALLFIELDS - AREA B

PROJECT: CHEVRON REFINERY
PHILADELPHIA, PENNSYLVANIA

Dames & Moore
TREVOSE, PENNSYLVANIA

SCALE	AS NOTED	DWN. BY	R.G.B.	JOB NO.	16000-034
DATE	5-31-88	APPR. BY	D.J.W.	FIG. NO.	2

ATTACHMENT F

WASTEWATER STREAMS TO THE NPDES OUTFALLS

(Source: Reference 61)

CHEVRON U.S.A. INC.
PHILADELPHIA REFINERY

Discharges to Schuylkill River Between Outfalls 015 & 001

Stream No. (& Outfall)	Description
1 (002)	Once-through noncontact cooling water from Solvent Decarbonizing Unit No. 2031.
2 (002)	Surface runoff from area approximately bounded by the Schuylkill River, 2nd St., 3rd St., and "L" Ave.
3 (003)	Process water from Unit No. 2031 (emergency only).
1 (015)	Ballast water via surface drainage system.
2 (015)	Process water from terminal area, including all contaminated water from: Dock operations Packaging operations Pumphouse No. 1 Pumphouse No. 2 Tank car, tank truck and WEMCO loading racks Condensate from steam traps
3 (015)	Process water from the following sources: Unit No. 1732 (Udex Extraction) Boiler House No. 4 Unit No. 1733 (Cumene) Unit No. 1735 (Thermal Hydrodealkylation) Unit No. 1332 (Catalytic Reforming) Unit No. 1333 (Catalytic Reforming) Pumphouse No. 27 and tank field Gasoline Treating Plant No. 2 Units No. 231 and 232 (Desulfurization)
4 (015)	Boiler blowdown water from the following sources: Boiler House No. 3 No. 3 Water Treating Plant
3 & 4 (015)	Surface drainage from area approximately bounded by Pennypacker Ave., Penrose Ave., 4th St., and the Schuylkill River.
5 (015)	Floor drainage from service water pumphouse.

CHEVRON U.S.A. INC.
PHILADELPHIA REFINERY

Discharges to Schuylkill River Downstream of Outfall 015

Stream No. (& Outfall)	Description
1 (011)	Once-through noncontact cooling water from Unit No. 1331 (gasoline stabilization).
2 (011)	Once-through noncontact cooling water from surface condenser for steam from turbine driving air compressor yard.
3 (013)	Once-through cooling water from heavy fuel oil product coolers.
3 (014)	Segregated storm water from area bounded by Penrose Ave., Schuylkill River, and Gulf's southeastern property line (including marketing terminal, refinery product terminal, packaging area, canteen area, petrochemical loading rack area, and office area).

CHEVRON U.S.A. INC.
PHILADELPHIA REFINERY

Discharges to Schuylkill River Between Outfalls 015 & 001 (cont'd.)

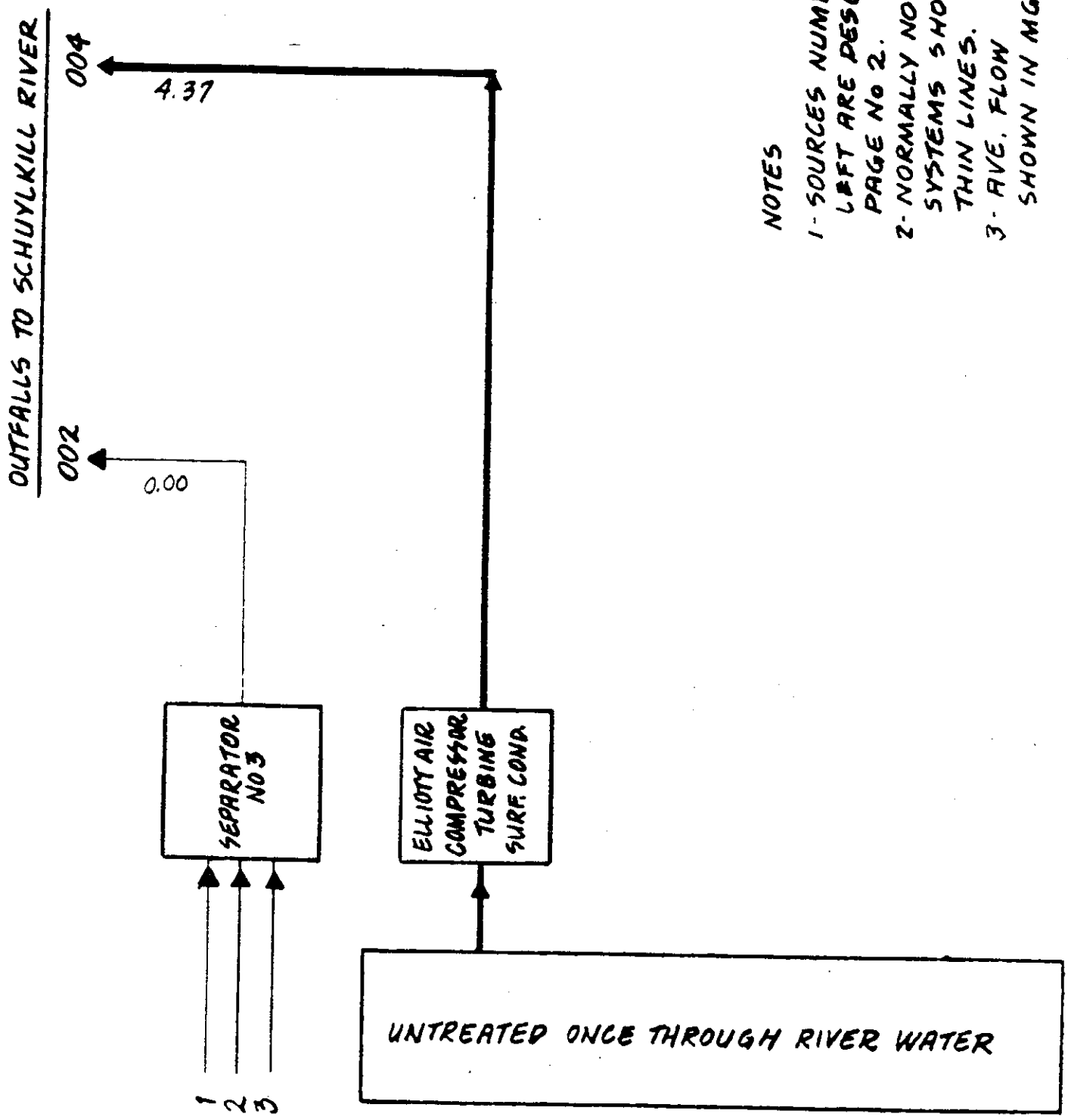
Stream No. (& Outfall)	Description
6 (015)	Drainage from yard air compressor area.
7 (015)	Desalter water from Crude Unit 137 (includes stripped foul condensates from Fluid Catalytic Cracking Units).
8 (015)	Process water from part of Alkylation Unit No. 433.
9 (015)	Treated spent caustic from Alkylation Unit No. 433.
10 (015)	Process water from Sludge Incinerator Unit No. 8832.
11 (015)	Process water from the following units: Unit No. 137 (Crude Unit) & Cooling Tower 455 Unit No. 2031 (Solvent Decarbonizing)
11 (015)	Surface drainage from area around Units No. 136 and 137
12 (015)	Process water from the following units: FCCU No. 1232 (Fluid Catalytic Cracking) Unit No. 532 (Sulfur Recovery Unit) Unit No. 1431 Deethanizer (LPG Stabilization) Cooling Tower No. 453 Surface drainage from the area bounded approximately by the Schuylkill River, 3rd Street, Avenue L, and 4th Street.
13 (015)	Process water from the following units: FCCU No. 1231 (Fluid Catalytic Cracking) Alkylation Unit No. 433 (Part) & Cooling Tower Cooling Tower No. 490 Unit No. 1331 (Gasoline Stabilization) Laboratory Maintenance Building Surface drainage and Cooling Tower 303

CHEVRON U.S.A. INC.
PHILADELPHIA REFINERY

Discharges to Schuylkill River Between Outfalls 015 & 001 (cont'd.)

Stream No. (& Outfall)	Description
13 (015) (cont.)	Surface drainage from areas bounded by the following: (1) Schulkill River, Lanier Ave., 4th Street, and Pennypacker Ave. (2) 3rd Street, 4th Street, L Ave., and Pennypacker Ave. (3) Pennypacker Ave., Lanier Ave., Penrose Ave., and 4th Street.
14 (001)	Once-through noncontact cooling water from heat exchangers at Unit No. 532.

Note: There is some overlapping of stormwater drainage areas.



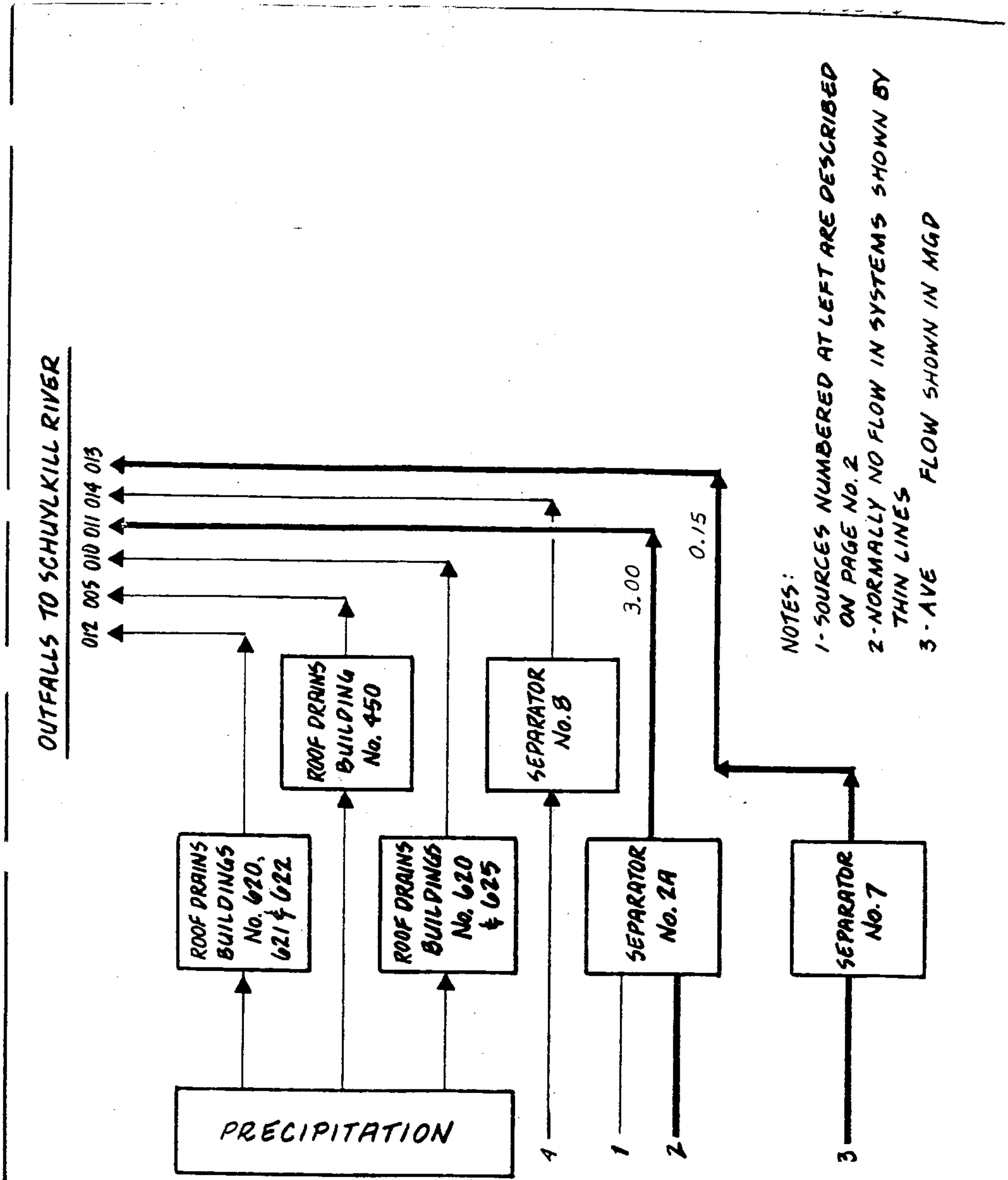
NOTES

1- SOURCES NUMBERED AT LEFT ARE DESCRIBED ON PAGE No 2.
2- NORMALLY NO FLOW IN SYSTEMS SHOWN BY THIN LINES.
3- AVE. FLOW SHOWN IN MGD

'ATER DISCHARGES TO SCHUYLKILL RIVER BETWEEN OUTFALLS 015 & 001

GULF OIL COMPANY - U.S.
A DIVISION OF GULF OIL CORPORATION
ENGINEERING DEPARTMENT
PHILADELPHIA REFINERY

DRAWN		REV.	1			SKETCH
BY	WHK	BY	TSP			SHEET 1 of 2
DATE	4/1/81	DATE	9-86			
APP'D.		APP'D.				G-5626
DATE		DATE				



WATER DISCHARGES TO SCHUYLKILL RIVER DOWNSTREAM OF OUTFALL No. 015

GULF OIL COMPANY - U.S.	DRAWN		REV.	1			SKETCH
A DIVISION OF GULF OIL CORPORATION	BY	WHK	BY	JSP			SHEET 1 OF 2
ENGINEERING DEPARTMENT	DATE	4/1/81	DATE	9-86			G-5627
PHILADELPHIA REFINERY 847	APP'D.		APP'D.				
	DATE		DATE				