FMC Corporation

1735 Market Street
Philadelphia Pennsylvania 19103
215 299 6000

September 25, 1998

FMC

State of California
Regional water quality Control Board
San Francisco Bay Region
1515 Clay Street, Suite 1400
Oakland, California 94612

To: Loretta Barsamian
Executive Officer

Att: Mr. Ade Fagorala
Associate Engineering Geologist

Re: Submittal of the Remedial Investigation Workplan
Task B.1. Order No. 98-066
FMC Corporation
8787 Enterprise Drive
Newark, Alameda County, California 94560

Dear Ms. Barsamian:

By the present letter and enclosed report, FMC Corporation (FMC) is submitting the "Remedial Investigation Workplan, FMC Corporation, 8787 Enterprise Drive, Newark, Alameda County, California" to the State of California Regional Water Quality Control Board, San Francisco Bay Region (RWQCB) as required under Task B.1. of Order No. 98-066, "Revision of Site Cleanup Requirements and Rescission of Order No. 89-055" For: FMC Corporation for the property located at 8787 Enterprise Drive, Newark, Alameda County, California. The RWQCB adopted Order No. 98-066 on July 15, 1998.

As discussed with Mr. Fagorala on August 27, 1998, and as stated in our "Request for Extension" letter dated August 31, 1998, FMC required an extension relative to submittal of the abovementioned document due to additional time required to enable review and compilation of the voluminous data and investigation reports for this site over the past twenty years.

Ms. Loretta Barsamian
September 25, 1998
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If you have any questions or require further information, please call me at (408) 289-3141.

Sincerely,

Zahra M. Zahiraleslamzadeh
Project Manager

cc: City of Newark Fire Department (Jacqueline Bretschneider)
Department of Toxic Substances Control (Barbara Cook)
Alameda County Water District (Steven Inn)
~~Alameda County Health Agency~~ (Thomas Peacock)
Regional Water Quality Control Board (Steven Hill)*

* Cover Letter Only

McLaren Hart, Inc.

September 24, 1998

Ms. Zahra M. Zahiraleslamzadeh
FMC Corporation
1125 Coleman Avenue, Gate 1 Annex
San Jose, California 95103

SUBJECT: REMEDIAL INVESTIGATION WORKPLAN, FMC CORPORATION, 8787 ENTERPRISE DRIVE, NEWARK, ALAMEDA COUNTY, CALIFORNIA

Dear Ms. Zahiraleslamzadeh:

Enclosed is the "Remedial Investigation Workplan" for the above-referenced site. This report is being submitted in accordance with the State of California Regional Water Quality Control Board (RWQCB), Site Cleanup Requirements Order Number 98-066 (Order), Task B.1..

Please call either of us at (510) 521-5200 if you have any questions regarding the workplan.

Sincerely,

Douglas O. Beadle, REA
Supervising Environmental Scientist
Project Manager

Stephen M. Carlton, CHG
Principal Hydrologist

REGISTERED GEOLOGIST
STEPHEN M. CARLTON
No. 4730
Expires: 1/31/00
STATE OF CALIFORNIA

Enclosure

REMEDIAL INVESTIGATION WORKPLAN

VOLUME I

TEXT, TABLES AND FIGURES

FMC CORPORATION
8787 ENTERPRISE DRIVE
NEWARK, CALIFORNIA

SEPTEMBER 1998

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FMC Corporation
8787 Enterprise Drive
Newark, California

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1.0 INTRODUCTION

In accordance with Task B.1. of the State of California Regional Water Quality Control Board, San Francisco Bay Region (RWQCB) Order No. 98-066 Revision of Site Cleanup Requirements and Rescission of Order No. 89-055 For: FMC Corporation (FMC) for the property located at 8787 Enterprise Drive Newark, Alameda County, California (Site), adopted by the RWQCB on July 15, 1998, this workplan is proposed "to further define the horizontal and vertical extent of pollution in soil and groundwater" for the Site. The workplan describes the Site use history, summarizes previous investigations and remedial measures completed at the Site, and identifies proposed additional soil and groundwater investigations designed to further define the horizontal and vertical extent of chemicals in soil and groundwater with respect to the entire Site. The data collected during the additional investigation and those data from the previous investigations will be used to establish Site specific risk based cleanup standards for soil and groundwater and propose a final remedial action plan with respect to the entire Site.

1.1 SITE BACKGROUND

The Site location and history are described in the following subsections.

1.1.1 Location

The Site is located west of I-880 and east of salt evaporation ponds in an area with various industrial and commercial uses. Figure 1 shows the location of the Site, and Figure 2 presents a detailed Site map. The parcels formerly used for manufacturing at the Site (Parcels A, B, C, D, and I) comprise 39.3 acres and are located at the western end of Enterprise Drive in Newark, Alameda County, California. This portion of the Site is bounded by the Southern Pacific Railroad and portions of the Hetch-Hetchy Pipeline Right-of-Way to the north, Willow Street to the east, Enterprise Drive and undeveloped land owned by Cargill, Incorporated - Salt Division to the south, and undeveloped land including present or former salt evaporation ponds and one engineered barge canal connected to the Newark Slough to the west.

1.1.2 History

FMC and predecessor companies manufactured chemicals at this Site from 1929 through 1995. At present, FMC only operates a facility for storage and distribution of hydrogen peroxide on the Site.

Sierra Magnesite Company first began chemical production at the Site in 1929. Quick lime was manufactured from oyster shells (Parcel C) and bromine and ethylene dibromide (EDB) were made from seawater bittern (Parcels B and I). Sierra Magnesite became California Chemical Company in 1934. California Chemical Company merged into Westvaco Chlorine Products Corporation in 1937. A magnesia plant was constructed at that time on Parcel C. In 1942, a pilot plant for a copper-based catalyst was built on Parcel I, which was leased from Leslie Salt Company, and a plant for the full production of the catalyst was constructed on Parcel A. These catalyst plants were closed in 1944. Westvaco Chlorine Products Corporation merged with Food Machinery Corporation in 1948 to form Food Machinery and Chemical Corporation (later shortened to FMC Corporation). A phosphoric acid plant and a phosphate plant were constructed on Parcel A in 1950. Between 1955 and 1959, full scale manufacturing of the 1707 Catalyst was performed at the location of the former pilot plant on Parcel I. The magnesia plant, bromine towers, and EDB plant were shutdown and the manufacturing facilities were removed in 1968. In the mid 1960s, a small catalyst plant was constructed on Parcel B for manufacture of a proprietary catalyst; this facility was shutdown in 1976. During that same year, a hydrogen peroxide (and other chemical) distribution area was constructed on Parcel B. FMC acquired the adjacent site (Parcel I where part of the former EDB plant was located) from Designed Building Systems, Inc. (DBS) on August 16, 1988. The phosphate plant and phosphoric acid plant were shutdown in 1994 and 1995, respectively. All former manufacturing facilities were removed by the end of 1996 (Redeker, July 27, 1998; Delucchi, July 27, 1998; Woodward-Clyde, April 1994; ESI, January 1988). The City of San Francisco maintains a right of way for the Hetch-Hetchy water pipeline that bisects the eastern portion of the Site from the southeast to the northwest and borders the western portion to the north (San Francisco Water Department, September 30, 1987).

A discussion of specific areas is presented within the following subsections.

1.1.2.1 Parcel A (Former Phosphoric Acid Plant and Phosphate Plant Area)

Parcel A formerly contained the phosphoric acid plant and the phosphate plant, the phossy pond and the first 1707 catalyst plant. These areas are described below.

1.1.2.1.1 Former Phosphoric Acid Plant and Phosphate Plant

A phosphoric acid plant and phosphate plant were constructed on Parcel A in 1950. Phosphoric acid was manufactured by burning elemental phosphorus (P_4), and phosphate products by processing phosphoric acid and sodium carbonate. The plant was subsequently retrofitted for purposes of manufacturing additional phosphate products using sodium and potassium hydroxide (Redeker, July 27, 1998). Elemental phosphorus was originally stored in steel aboveground storage tanks. In the 1960's, FMC constructed two below grade pits of steel reinforced concrete in Parcel A for storage of elemental phosphorus and removed the tanks from service. The pits were taken out of service, decontaminated, and closed in place (i.e., the concrete floors and walls remain) under the Newark Fire Department (NFD) oversight by backfilling in 1993-1994. Sampling in the mid-1970's and 1996 has revealed the presence of elemental phosphorus in soil immediately outside the walls of the pits, suggesting that leaks or spills have occurred (Woodward-Clyde, April 1994, June 1996). Sampling of the shallow zone groundwater beneath Parcel A has shown levels of arsenic above the State of California, Environmental Protection Agency (CAL EPA) Maximum Contaminant Levels (MCLs) (Woodward-Clyde, April 1994). All phosphate manufacturing concluded in 1994 and that plant was shutdown. Manufacturing of phosphoric acid concluded in June 1995, and that plant was shutdown at that time. FMC completed dismantling and removal of the equipment and structures for the plants by the end of 1996.

In the late 1960's, approximately 20,000 gallons of phosphoric acid, stored in lead lined redwood aboveground storage tanks, either spilled or leaked in the area south of the former air compressors that were located outside the southern portion of the former warehouse (PES, April 10, 1998). The acid was thought to have flowed toward the west (Woodward-Clyde, 1994). The tanks were subsequently sealed with plastic liners (Delucchi, July 27, 1998).

1.1.2.1.2 Former Phossy Water Pond

FMC operated a surface impoundment, known as the "phossy water pond", from early 1950 until the late 1970's for water that had come into contact with elemental phosphorus (e.g., water used to cover the elemental phosphorus during shipment in railcars or used to displace the elemental phosphorus during unloading) on the east side of Parcel A, north of the Hetch Hetchy Right of Way (FMC Letter to DHS, June 26, 1984). The pond was approximately 140 feet wide, 180 feet long, and 4 feet deep (FMC Letter to DHS, May 3, 1985). Water was kept in the pond at all times. Discarded pipes, valves, etc. that had contained P_4 were occasionally discarded into the pond to prevent ignition. The pond was unlined and not connected into any surface drainage. The phossy pond was closed in 1985 under the authority of the California Department of Health Services (DHS) (now the Department of Toxic Substances Control, or DTSC) (Woodward-Clyde, 1994). The DHS acknowledged the completion of the phossy water pond closure in a letter dated January 29, 1987 (DHS, 1987).

1.1.2.1.3 Former 1707 Catalyst Plant

The "1707" catalyst plant was located on the western half of Parcel A and operated from 1942 to 1944 to produce a catalyst used in the production of synthetic rubber for the United States Government during World War II. The catalyst contained magnesia, potassium chloride, copper sulfate, and iron sulfate (Woodward-Clyde, 1994; ESI, January 1988; Chang, July 15, 1998; Redeker, July 16, 1998).

1.1.2.2 Parcels B & I (Former EDB Plant and DBS Property Area)

Parcels B and I formerly contained the EDB plant and bromine towers, the "Petro-Tex" catalyst pilot plant, the 1707 catalyst pilot plant, the research pilot plant, the soda ash transloading area, an effluent pond (E-1 pond), the quality control laboratory, and stores buildings. Additionally, Parcel B still contains an aboveground storage tank area, a less than 90-day hazardous waste storage area, the hydrogen peroxide distribution facility, the paint shed and garage, several warehouses, and the groundwater treatment system. These areas are described below.

1.1.2.2.1 Former EDB and Bromine Plants

The bromine towers and adjoining EDB plant were constructed in 1929 (Redeker, July 16, 1998; Westvaco Digest, January 1953) on Parcels B and I (ESI, January 1988; Chang, July 15, 1998). Bromine was extracted from seawater bittern in the bromine towers and then was reacted with ethylene gas to produce EDB (Chang, July 15, 1998). EDB was manufactured primarily for agricultural use as a soil fumigant. Over the years of operations, it is likely that there were minor leaks and spills in the course of routine manufacturing and handling. The only known significant spill occurred in 1967 when a steel tank used to store EDB ruptured, spilling approximately 6,000 gallons of product onto the ground. Other than flushing with water, there is no record of specific cleanup actions taken at the time (Woodward-Clyde, 1994).

There was an underground diesel tank that overflowed and/or leaked in the 1960's. The tank was removed. Additionally, a small underground gasoline storage tank was removed from the area in 1986 in accordance with the City of Newark Fire Department requirements and oversight. The adjacent soil was impacted with total petroleum hydrocarbons and was excavated, treated, and placed back into the pit (Woodward-Clyde, 1994).

1.1.2.2.2 Former Petro-Tex Catalyst Plant

A "Petro-Tex" catalyst plant operated at the location of the current warehouse on Parcel B beginning in the mid 1960s. The plant was owned 50% by FMC and used iron and zinc oxide, barium carbonate, and polyvinyl alcohol for manufacturing a proprietary catalyst. The plant operated through 1976 (ESI, 1988; Chang, July 15, 1998; Redeker, July 16, 1998; Delucchi, July 27, 1998).

1.1.2.2.3 Former 1707 Catalyst Pilot Plant and Manufacturing Plant

Parcel I contained a 1707 catalyst pilot plant that operated for a few months prior to the operation of the 1707 catalyst plant on Parcel A during World War II. The pilot plant's purpose was to conduct research necessary for the development of the 1707 catalyst plant (Redeker, July 16, 1998). Between 1955 and 1959 full scale manufacturing of 1707 catalyst was conducted on Parcel I at the location of the former pilot plant (Delucchi, July 27, 1998).

1.1.2.2.4 Former Research Pilot Plant

A small magnesia research pilot plant existed at the location of the later training center during the 1950s and early 1960s. The pilot plant's purpose was to conduct research necessary for the development of magnesia products (Redeker, July 16, 1998).

1.1.2.2.5 Former Soda Ash Transloading Area

A soda ash transloading area was present on Parcel B, northwest of the EDB area. Soda ash was transferred from railcars to trucks, and some soda ash spilled onto the ground and railroad tracks. The area was paved in 1992. This area is equipped with a below-grade screw conveyor, a product elevator, and a dust collector. This area was also used for transferring sodium phosphates as well, through 1980 (Woodward-Clyde, 1994).

1.1.2.2.6 Former Effluent (E-1) Pond

Parcel B contained a clay lined pond (E-1 Pond) which was operated from the mid-1970's to 1995 as part of the plant's effluent management and treatment system under a National Pollutant Discharge Elimination System (NPDES) permit. Effluent from the plant, consisting primarily of cooling tower blowdown, boiler blowdown, softener regeneration brines, and stormwater runoff, was collected in this pond and adjusted for pH prior to discharge (Woodward-Clyde, 1994). The effluent pond was taken out of service and backfilled with clean fill in mid-1996 (Woodward-Clyde, April 1996).

1.1.2.2.7 Former Laboratory

A laboratory operated on Parcel B from approximately 1941 through 1994 as a product quality control lab for the magnesia and phosphate products produced on Parcels C and A, respectively. All sample material was recycled with the exception of gypsum and magnesia which was transferred off-site (Delucchi, July 27, 1998).

1.1.2.2.8 Former Stores and Former Engineering Stores Buildings

The former stores building located on Parcel B was used as a parts warehouse for storage of pumps, motors, valves, etc.. The former engineering stores building located on the same Parcel was used for office space for maintenance personnel and later for storage of files (Chang, July 15, 1998).

1.1.2.2.9 Aboveground Storage Tank Area

Diesel and solvents were stored in aboveground storage tanks in this area beginning in the 1950s (Redeker, July 16, 1998). These tanks will be closed under the authority of NFD. Additionally, a 500-gallon aboveground gasoline storage tank is located near this area. The gasoline tank is currently used by the Hydrogen Peroxide Transloading facility. This tank is permitted by the NFD and Bay Area Air Quality Management District (BAAQMD).

1.1.2.2.10 Hazardous Waste Storage Area

The hazardous waste storage area was operated as a less than 90-day storage facility beginning in January 1987 under DHS oversight until July 1997 when the NFD Certified Unified Program Administrator (CUPA) Program assumed authority. Hazardous waste stored at the facility is limited to spent filters and carbon generated by the Site's groundwater treatment system.

1.1.2.2.11 Existing Hydrogen Peroxide Transloading Facility

A hydrogen peroxide transloading and chemical warehousing distribution facility was constructed on Parcel B in 1976. FMC has ceased warehousing and distribution of chemical products, but continues to operate the hydrogen peroxide transloading facility.

1.1.2.2.12 Existing Paint Shed and Garage

A paint shed and a garage are located on the northern portion of Parcel B. These facilities have been utilized as storage areas for paints and maintenance of vehicles, respectively, since the 1950s (Chang, July 1998; Redeker, July 1998). Currently, these areas are not in use.

1.1.2.2.13 Existing Groundwater Treatment System

Following the adoption of RWQCB Order No. 85-113 on September 18, 1985, FMC implemented a remedial measures program based on the EDB concentrations detected in the Newark aquifer. The Newark aquifer remediation program was initiated in January and February 1986. Currently, the program consists of extracting groundwater from Well DW-2, filtering to remove suspended solids, and treating by granular activated carbon (GAC) to remove VOCs prior to discharge. Previously, the program included extraction form Wells DW-2 and DW-8. Following the adoption of RWQCB Order No. 87-049 and based on the results of site investigations, FMC installed and commenced operation of a shallow zone extraction system in August 1989. The shallow zone system was comprised on 26 extraction wells (W-7, W-20, W-29, W-33, and W-37 through W-58) from which groundwater was pumped under negative pressure. In September 1989, Wells W-7 and W-52 through W-58 were isolated from the extraction system to minimize the possibility of accelerating the migration of 1,2-dichloroethane (1,2-DCA) and other compounds to the Site from upgradient sources. With the concurrence of the RWQCB, methods for discharging treated groundwater have been reinjection into the Newark aquifer, discharge to surface waters, and since October 1988, discharge to the USD sanitary sewer system (Geosystem, August 1998). The system is discussed in detail in Section 2.2.5.

1.1.2.2.14 Former DBS Property

Parcel I was leased by FMC from Leslie Salt Company (or its predecessor companies) from 1929 through 1969. Subsequent to 1969 the property was purchased by DBS. DBS used the area for customizing mobile buildings, and portions of the property were leased to a number of small businesses which included, a pallet repair business (north side), truck repair station (south side), trailer remodeling business (south side), junk car dealer (south side) and equipment storage yard (south side). FMC purchased land owned by DBS on Parcel I in 1988.

1.1.2.3 Parcel C (Former Magnesia Plant Area)

Parcel C formerly contained the magnesia plant, as described below.

1.1.2.3.1 Former Magnesia Plant

Between 1929 and 1937 a kiln was operated on Parcel C which roasted oyster shells for the production of quick lime. The magnesia plant was constructed in 1937 on approximately 15 acres adjacent to an engineered barge canal connected to the Newark Slough. Prior to its construction, a pilot plant performed research on the magnesia process (Redeker, July 16 and 27, 1998). Upon the magnesia plant's completion, barges with clams and oyster shells (used as a source of calcium) were brought from the San Francisco Bay into the Newark Slough and barge canal and unloaded at the magnesia plant. Magnesia compounds were produced and gypsum was a coproduct. Additionally, debrominated seawater bittern was used as a raw material. In the early 1940's, dolomite replaced the oyster shells as the source of calcium and magnesite (Redeker, July 27, 1998). The magnesia compounds were used in refactory brick, pulp, and paper. The gypsum was primarily used in wallboard manufacture and as a soil amendment. The manufacturing equipment, which consisted of five kilns, crushers, burners, and fuel oil storage, was removed with the closure of the plant in 1968. Two Bunker C fuel oil storage tanks were located at the plant (Redeker, July 27, 1998).

1.1.2.4 Parcel D (Former Maintenance and Parking Area)

Parcel D formerly contained the stormwater pond, tetrapotassium pyrophosphate (TKPP) pond, and filter aid pit. These areas are described below.

1.1.2.4.1 Former Stormwater Pond

Stormwater runoff from areas outside the containment portions of the phosphoric acid and the phosphate plant was collected and contained in an earthen impoundment near the southeastern corner of the Site in order to meet NPDES permit requirements specifying capture and retention of the first 90,000 gallons of any rainfall event. The pond, constructed in 1978-1979, was approximately 3-4 feet deep, had a capacity of approximately 300,000 gallons, and was lined with native clay soil. Samples of sludge and underlying soil were collected from the pond in 1985-1986 and the pond was subsequently closed in 1987 by excavation and off-site disposal, with the excavated soils manifested as a hazardous waste due to arsenic (toxicity characteristic). The area was subsequently backfilled (Woodward-Clyde, 1994). After closure of the pond, stormwater runoff was collected in a 200,000 gallon aboveground storage tank located near the former pond. The 200,000-gallon tank was closed in 1995 under the authority of the NFD.

1.1.2.4.2 Former TKPP Pond

Activated carbon and backwash slurry generated from the filtration step used in the production of tetrapotassium pyrophosphate (TKPP) were disposed of in an earthen impoundment, known as the "TKPP Pond", located immediately south of the Hetch-Hetchy right-of-way. The unlined and undrained pond was constructed in 1972 and measured approximately 22 feet wide, 52 feet long, and 3 feet deep. The pond was utilized through 1980 (PES, April 1998). It was closed pursuant with notifications to the RWQCB and the DHS in 1983 by excavation and off-site disposal, and the area backfilled. The DHS approved the closure of the TKPP Pond in a letter dated April 12, 1984 (DHS, 1984).

1.1.2.4.3 Former Filter Aid Pit

Prior to about 1972, the effluent ditch E-1 began in the middle of Parcel D, with a pit located at the head of the ditch used for disposal of filter cake. The filter cake contained dicalite (diatomaceous earth) and arsenic sulfide, generated during the production of food grade phosphoric acid. Along with 700-800 feet of ditch, the pit was closed by excavation and off-site disposal in 1972, and the area backfilled with clean fill and graded (Woodward-Clyde, 1994).

1.1.2.5 Parcels E, F, and G (Undeveloped Parcels)

There are three undeveloped parcels (E, F, and G), owned by FMC, that are located to the southeast, northeast, and east of Willow Street, respectively. These properties comprise 7.9 acres, have not been used for manufacturing activities, and have remained undeveloped. However, groundwater beneath these parcels have been polluted with volatile organic compounds (VOCs) from off-site source areas located on neighboring sites.

1.1.2.6 Hetch-Hetchy Right-of-Way

The City of San Francisco Water Department owns a right of way at the Site for the Hetch Hetchy water pipeline. The right of way bisects the eastern portion of the Site from the southeast to the northwest and borders the western portion to the north. FMC has a Land Use Permit with the San Francisco Water Department for access to this property (San Francisco Water Department, September 1987).

1.1.2.7 Neighboring Sites

Four neighboring sites are currently conducting groundwater cleanup under RWQCB Orders, including: Ashland Chemical Company, Romic Environmental Technologies (Romic), Jones-Hamilton Chemical Company, and the Baron-Blakeslee (now part of Allied Signal Corporation) solvent processing facility. Three of these sites are located immediately upgradient of the Site, with Ashland being up- to cross-gradient of the Site. Pollutants from the sites have commingled to some extent in the shallow groundwater zone. A discussion of each facility is presented below.

The Ashland Chemical Company is located directly southeast of the Site (8610 Enterprise Drive) and has operated under Site Cleanup Requirements Order No. 89-109 to cleanup released VOCs in the shallow zone groundwater. A groundwater extraction and treatment system has been installed. Groundwater flow within the shallow zone at the site is variable, with flows observed toward the southwest, west, and northwest. VOCs are generally confined to the Ashland property, with the exception of 1,2-dichloroethane (1,2-DCA). Vinyl chloride, TCE, 1,1-DCE, 1,1-DCA, and cis-1,2-DCE have consistently been detected above MCLs in downgradient monitoring well W-22, located on FMC's Site. 1,1-DCA, cis-1,2-DCE, and 1,2-DCA have all been detected in FMC monitoring well W-26, at concentrations above their respective MCLs (Fluor Daniel GTI, February 1998).

Romic is located to the west of Willow Street (37445 Willow Street), southeast of the Ashland Chemical Company site. The RWQCB issued Consent Order No. 89-111 to Romic (the site was then owned by Foster Chemicals) to investigate and remediate soil and groundwater contamination at the site. 1,2-DCA is the primary contaminant of concern, although other VOCs have been detected. 1,2-DCA has impacted shallow groundwater at this site at concentrations up to 22,000 ppb. Romic has performed a soil investigation, installed groundwater monitoring wells, and installed a groundwater extraction and treatment system for the shallow zone (Harza, April 1998).

Jones-Hamilton Company is located at 8400 Enterprise Drive, southeast of the intersection of Willow Street and Enterprise Drive. The site has operated under Site Cleanup Requirements Order No. 89-110 to undertake measures to address chemicals in shallow zone groundwater beneath the site. Contaminants of concern include pentachlorophenol (PCP), tetrachlorophenol (TCP), 1,2-DCA, and gasoline. A slurry wall, and groundwater extraction and treatment system have been installed at the site. Some chemicals appear to have migrated from the site (Emcon, April 1998).

Baron-Blakeslee (now Division of Allied-Signal) operated a solvent processing facility for a number of years at 8333 Enterprise Drive, located approximately 0.4 miles east of the FMC Site. The facility was shutdown in 1994, but is currently being leased to another solvent distributor. The Board issued Site Cleanup Requirements Order No. 95-132 to cleanup VOCs released to soil and groundwater. The area of impact is widespread. VOCs (including TCE, tetrachloroethene [PCE], 1,1-DCE, 1,1,1,-trichloroethane [1,1,1-TCA], and trichloroflouromethane [TCFM]) have migrated offsite to a significant distance in the westerly direction. First quarter 1998 monitoring data under this Order showed high levels (>10,000 parts per billion [ppb]) of VOCs present in monitoring wells on or near FMC Parcels F and G (Radian, April 1998).

1.2 REGULATORY STATUS

1.2.1 RWQCB

This Site is subject to the RWQCB Site Cleanup Requirements Order Number 98-066 (Order) adopted on July 15, 1998. The purpose of the Order is to evaluate the effectiveness of the ongoing groundwater remediation system with respect to the EDB Area, undertake a remedial investigation and evaluation of remedial alternatives with respect to the entire Site, and to develop cleanup standards and propose a final remedial action plan with respect to the entire Site.

The Site was previously subject to the following RWQCB Orders:

- Order No. 85-113, Waste Discharge Requirements, adopted December 18, 1985 (rescinded by Order No. 89-055);
- Order No. 87-049, Amendment to Waste Discharge Requirements, adopted May 20, 1987 (rescinded by Order No. 89-055);
- Order No. 89-055, Site Cleanup Requirements, adopted April 19, 1989 (rescinded by Order No. 98-066);
- Order No. 92-048, Waste Discharge Requirements (NPDES Permit No. CA0005177), adopted May 20, 1992 (expired without renewal May 20, 1997) and predecessor orders going back to 1976 adopting NPDES permits; and
- WDID #2 01S011253, General NPDES Permit for Discharge of Storm Water Associated with Industrial Activity, Notice of Intent (NOI) submitted September 29, 1994 (Notice of Termination submitted on November 21, 1996).

1.2.2 Alameda County Water District

Historic correspondence with the Alameda County Water District (ACWD) includes groundwater injection letters, Statements of Operator Production Facilities, soil boring and well drilling permits, and copies of investigation reports. In addition, FMC pays quarterly fees for groundwater extracted by the Site's extraction system.

1.2.3 Newark Fire Department

FMC currently maintains a permit issued by the NFD for operation of the gasoline storage tank located on Parcel B. In addition, FMC maintains a Hazardous Materials Business Plan with the NFD.

Historic correspondence with the NFD includes closure plans and closure certification reports, hazardous material incident reports, and inspection reports.

1.2.4 Bay Area Air Quality Management District

FMC currently maintains a permit issued by the BAAQMD for operation of the gasoline storage tank located on Parcel B.

1.2.5 Union Sanitary District

Discharge of the treated groundwater has been occurring to the Union Sanitary District (USD) sanitary sewer since 1988 in accordance with USD Groundwater Permit No. GW-94-042. In addition, FMC's hydrogen peroxide distribution facility is permitted to discharge facility rinsewater to the sanitary sewer. All of the plant's sanitary wastes have been discharged and continue to discharge to the USD.

1.3 WORKPLAN ORGANIZATION

This workplan and the proposed activities are consistent with the United States Environmental Protection Agency (USEPA) and applicable Resource Conservation and Recovery Act (RCRA) guidelines presented in the following documents:

- Environmental Investigations, Standard Operating Procedures and Quality Assurance Manual, USEPA, May 1996;
- Test Methods for Evaluating Solid Wastes - Physical/Chemical Methods, USEPA SW-846, 3rd Edition, Version 2.0, USEPA, December 1997; and
- 40 Code of Federal Regulations (CFR) Part 264 – Standard for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities, Revised April 22, 1998.

The remaining components of Volume I of this workplan are as follows:

- Section 2.0 describes the previous Site investigations and remedial actions completed to date;
- Section 3.0 describes the current remedial investigation objectives and details the Site characterization efforts proposed in this workplan (Sampling and Analysis Plan [SAP]);
- Section 4.0 presents waste handling methods;
- Section 5.0 describes surveying methods;
- Section 6.0 presents the Quality Assurance Project Plan (QAPP);
- Section 7.0 presents the implementation schedule;
- Section 8.0 presents the references;
- Appendix A includes all historic Site chemical data;
- Appendix B presents the summary report "Subsurface Characterization and Remediation, FMC Corporation, Newark, California, August 1998"
- Appendix C presents the Site-specific Health and Safety Plan (HASP);
- Appendix D presents the laboratory quality assurance/quality control (QA/QC) manuals, including health and safety procedures.

2.0 PREVIOUS SITE INVESTIGATIONS

FMC initiated soil and groundwater investigations at the Site in 1980 (Geosystem, February 1998). Extensive remedial measures have been completed since 1985. A figure showing all soil borings, groundwater monitoring wells, groundwater extractions wells, and the groundwater conveyance and treatment system is shown as Figure 3. A reference list of the documents, which present the results of the soil and groundwater investigations and remedial measures, completed at the Site follows:

Report Date	Report Title	Report Generator
Aug 98	Additional Soil Characterization in EDB Area	PES
Aug 98	Summary Report, Subsurface Characterization and Remediation	Geosystem
July 98	Ground Water & Extraction/Treatment System Monitoring – 2nd Quarter 1998	Geosystem
Apr 98	Closure Certification Report	PES
Feb 98	Ground Water & Extraction/Treatment System Monitoring – 4th Quarter 1997	Geosystem
Oct 97	Work Plan For Additional Characterization For The EDB Area	PES
Feb 97	Annual Report 1996/Evaluation of Remedial Actions	Geosystem
Jun 96	Report of Sampling Results, FMC Former Phosphoric Acid Plant And Other Areas	Woodward Clyde
May 96	Addendum To Sampling Plan (Covering Phosphoric Acid Plant)	Woodward Clyde
May 96	Evaluation Of Soil Heave	Woodward Clyde
Apr 96	E-1 Pond Closure Sampling	Woodward Clyde
Mar 96	Report Of Soil Sampling Results, Former Phosphate Plant	Woodward Clyde
Feb 96	Annual Report 1995/Evaluation of Remedial Actions	Geosystem
Jan 96	Report Of Soils Study For Phosphoric Acid Plant Site	Woodward Clyde
Dec 95	Letter Report, Chemical Explanation For Swelling Of Soil In Phosphoric Acid Plant	Woodward Clyde
Dec 95	Phosphorus Storage Pit Closure Report	Woodward Clyde
Oct 95	Sampling Plan, FMC Newark- Phosphate Plant	Woodward Clyde
Aug 95	Sampling Plan, Closure Of Hazardous Materials Storage Facilities	Woodward Clyde

Report Date	Report Title	Report Generator
May 95	Closure Plan For Hazardous Materials Storage Facilities	Woodward Clyde
Feb 95	Annual Report 1994/Evaluation of Remedial Actions	Geosystem
Apr 94	Report Of Site Investigation, FMC, Newark	Woodward Clyde
Feb 94	Annual Report 1993/Evaluation of Remedial Actions	Geosystem
Oct 93	Phosphate Plant And Phosphorus Storage Pit Closure Plan	Woodward Clyde
Apr 93	Modifications To Shallow Zone Containment System	Geosystem
Feb 93	Annual Report 1992/Evaluation of Remedial Actions	Geosystem
Feb 92	Annual Report 1991/Evaluation of Remedial Actions	Geosystem
Sep 91	Evaluation Of Treated Groundwater Injection	Geosystem
Feb 91	Annual Report 1990/Evaluation of Remedial Actions	Geosystem
Aug 90	Evaluation Of Discharge Alternatives For Treated Groundwater	Geosystem
Feb 90	Newark Aquifer Characterization Study	Geosystem
Feb 90	Annual Report 1989/Evaluation of Remedial Actions	Geosystem
Nov 89	Shallow Zone Characterization Study	Geosystem
Oct 89	Completion of Shallow Zone Containment System	Geosystem
Jan 89	1988 Annual Report	Geosystem
Jul 88	Development Of Shallow Zone Containment System Design	Geosystem
Jan 88	1987 Annual Report	Geosystem
Dec 87	Shallow Zone Containment System Design	Geosystem
Aug 87	Evaluation Of Groundwater Injection	Geosystem
Mar 87	Rehabilitation Of Injection Well Dw-10	Geosystem
Aug 86	Evaluation Of Extraction/Injection System	IT
Jul 86	Evaluation Of Newark Aquifer Remediation	Geosystem
May 86	Shallow Zone Compliance Boundary Monitoring Wells	Geosystem
Apr 86	Report Evaluation Of Shallow Zone Containment Measures	IT
Mar 86	Addendum to the Health and Environmental Risk Assessment	Arthur D. Little, Inc.
Feb 86	Final Report, EDB Remedial Measures Program	IT
Feb 86	Carbon Treatment System Operation And Maintenance Manual	IT
Mar 85	Investigation Of EDB Distribution In Soil	IT
Apr 85	Health and Environmental Risk Assessment	IT
Jan 85	Evaluation Of Selected Mitigation Alternatives	IT
Nov 84	Investigation Of EDB Distribution In Soil	IT
Oct 84	Progress Report, Sorption/Desorption Studies	IT
Sep 84	Evaluation Of Contaminated Soil Treatment Technologies	IT
Aug 84	Evaluation Of Groundwater Treatment Technologies	FMC
Jul 84	Progress Report, Evaluation Of Selected Mitigation Alternatives	IT

Report Date	Report Title	Report Generator
Jun 84	Additional Soil Sampling For The Soil And Groundwater Investigation (Phase II B Report)	David Keith Todd
Feb 84	Remedial Action Feasibility Study EDB Project	D'Appolonia
Aug 83	Additional Soil Sampling For The Soil And Groundwater Investigation (Phase II A Report)	David Keith Todd
Jun 82	Soil And Groundwater Investigation FMC Chemical Group Plant, Phase II	David Keith Todd
Mar 81	Groundwater Investigation, FMC Industrial Chem Group Plant, Phase I	David Keith Todd

The complete reference for each of the documents listed above is included in Section 8.0. A discussion of the investigations and remedial measures conducted to date is presented below.

2.1 SOIL INVESTIGATIONS

Initial soil investigations were performed between 1981 and 1985 in the EDB Area (Parcel B) and over three hundred soil samples were analyzed for chemicals of concern. Numerous additional soil investigations have occurred over the entire Site, through 1998 in conjunction with closure activities under the authority of the DHS and NFD, to further characterize EDB in Parcels B and I, and in anticipation of future property reuse. Results of all soil analyses are presented in Appendix A. Discussions of the findings are presented by parcels in the following subsections.

2.1.1 Parcels A & D

Soil investigations conducted on Parcel A were performed in conjunction with the closure of the former Phosphoric Acid Plant and former Phosphate Plant under the authority of the NFD. In addition, samples were collected and analyzed throughout the Parcel and in the vicinity of the former Phossy Pond and 1707 Catalyst Plant in anticipation of future property reuse. Various analyses were performed on the samples, including orthophosphate (PO_4), P_4, petroleum hydrocarbons, metals, and pH.

Soil investigations conducted on Parcel D were performed in conjunction with the closure of the former 200,000 gallon aboveground storage tank under the authority of the NFD (a closure certification report was submitted to the NFD on April 10, 1998 and this tank was designated as T-134 on Plate 3 of that report [PES, April 1998]). Additionally, soil investigations were conducted in conjunction with the closure of the former stormwater pond. In addition, samples were collected throughout the Parcel and in the vicinity of the former Filter Aid Pit, former TKPP Pond, and former E-1 Ditch in anticipation of future property reuse. Various analyses were performed on the samples, including orthophosphate (PO_4), P_4, petroleum hydrocarbons, metals, and pH.

Figure 4 presents the results of the soil analyses within "chem boxes" located on the soil boring location map for Parcels A and D. As noted, concentrations of P_4 were detected within soils beneath Parcel A. The extent of P_4 concentrations in soil, defined by the previous investigation, is limited to the area surrounding the former phosphorus pits. Concentrations of metals detected in soil were below Total Threshold Limit Concentrations (TTLC) and VOCs and hydrocarbons were below laboratory reporting limits.

2.1.2 Parcels B & I

Soil investigations conducted on Parcels B and I were initiated in 1981 primarily to define the extent of VOCs associated with EDB manufacturing. Between 1981 and 1983 over 300 soil samples were analyzed to determine the extent of VOCs on these parcels. Results from the early soil quality studies were used to develop the understanding of EDB migration to groundwater to assist in the design of the groundwater extraction system. Between 1993 and 1994, an additional 17 soil borings were installed in anticipation of future property reuse and 3 soil borings were installed in conjunction with the closure of the former effluent pond. In 1997, twenty soil borings were installed in accordance with the "Workplan for Additional Soil Characterization in the EDB Area" (PES, 1997). The workplan was submitted to the RWQCB on October 13, 1997, and was approved by letter dated December 11, 1997. The results of this investigation have been summarized in a report titled "Additional Soil Characterization in EDB Area, FMC Corporation, Enterprise Drive, Newark, California", dated August 1998. The samples from the above-mentioned investigations have been analyzed for EDB, 1,2-DCA, bromoform, PO_4, petroleum hydrocarbons, metals, and pH. Figure 5 presents the results of the soil analyses within chem boxes located on the soil boring location map for Parcels B and I. As noted EDB has been the primary compound detected during the analyses with lesser detection of 1,2-DCA and bromoform. Total VOC concentrations in soil within these parcels have been contoured and are included as Figure 6.

2.1.3 Parcel C

In anticipation of future property reuse, six soil borings were installed within Parcel C from 1993 through 1994. Soil samples were collected from multiple depths in most of the borings. Analyses performed on the samples included petroleum hydrocarbons, arsenic and pH. A chem box map showing concentrations within soil at this parcel is included as Figure 7.

2.2 GROUNDWATER INVESTIGATIONS

Soil and groundwater investigations were initiated at the Site in 1980. In accordance with the 1985 Waste Discharge Requirements Order No. 85-113, the 1989 Site Cleanup Requirements Order No. 89-055 and the 1998 Site Cleanup Requirements Order No. 98-066, routine monitoring including quarterly, semi-annual and annual groundwater monitoring has been conducted on-site since 1985. Self-monitoring and reporting under NPDES permits have been conducted since 1976, and monitoring and reporting under the USD permit since 1988. A summary report of the groundwater characterization and remediation conducted at the Site from 1980 through mid-1998 has been prepared by Geosystem Consultants, Inc. and is included as Appendix B. Discussions of the findings are presented within the following subsections.

2.2.1 Regional Hydrogeology

The Site is located within the Niles Cone groundwater area. The Newark Aquitard is the uppermost clay unit covering nearly all of the Niles subarea, and is underlain by three identified aquifers, namely, the Newark Aquifer, Centerville-Fremont and the Deep Aquifer. Each of these aquifers is separated by an extensive clay aquitard. The Newark Aquifer is the uppermost aquifer within the Niles subarea and ranges between 50 to 70 feet below ground surface (bgs). Lithologically, the Site is characterized by a thin layer of fill materials underlain by three alluvial deposits units. These units are collectively termed as the shallow zone for the purpose of this workplan. The shallow zone occurs at depths of approximately 5 to 20 feet below ground surface and is underlain by the Newark aquitard, which is locally comprised of blue-gray, silty clay, and clay deposits, that extend to depths ranging from 45 to 50 feet. This clay sequence which ranges from 25 to 30 feet in thickness separates the shallow zone from the deeper Newark Aquifer. The Newark aquifer is approximately 20 feet thick beneath the site and extends from about 50 to 70 feet below ground surface. An isolated bedrock outcrop of serpentinite occurs near the southwestern corner of the Site and acts as a barrier to groundwater movement in the shallow zone and the underlying Newark aquifer, especially near the southwestern portion of the site. In both cases, the net result is a deflection of the westerly groundwater flow direction to the north or northwest. Topographically, the Site is relatively horizontal with an elevation of approximately 11 feet above Mean Sea Level (MSL). Groundwater levels in the shallow zone below the Site generally range between 0.5 and 8 feet bgs.

2.2.2 Site Hydrogeology

The Site is underlain by unconsolidated alluvial and estuarine sediments of Quaternary origin deposited over basement rocks. A description of the various stratigraphic units of relevance is presented below.

Bedrock

An isolated bedrock outcrop of serpentine, corresponding to basement rocks of the Mesozoic Franciscan Assemblage, occurs near the southwestern corner of the Site. Borings W-19 and DW-7, located about 100 feet away from the outcrop, encountered bedrock at depths of 20 to 28 feet below grade. Boring DW-1, which at 115 feet depth is the deepest on-site boring, did not encounter bedrock. The subsurface bedrock configuration connecting the isolated outcrop adjacent to the Site with the main body of the Coyote Hills, 4,000 feet to the northwest, is inferred from the continuity of aquifers on either side of this barrier. The absence of the Fremont aquifer west of the Coyote Hills indicates a bedrock saddle approximately 300 feet deep.

The bedrock outcrop immediately adjacent to the Site acts as a barrier to groundwater movement in the shallow zone and the underlying Newark aquifer. In both cases, the net result is a deflection of the westerly groundwater flow direction to the north or northwest.

Shallow Zone

Numerous borings drilled in previous investigations have shown that the Site is generally underlain by a fill layer which varies in thickness from 0 to 5 feet. The fill layer consists primarily of gravel, sand, clay, crushed rock, concrete, brick, and asphalt. Below the fill layer, a predominantly silty clay layer is encountered which extends on the average to 8 feet below ground surface. The silty clay layer is moist in most of the borings. Previous studies suggest that the silty clay layer has a confining effect on the underlying saturated zones.

The silty clay layer is underlain by a layer consisting of varying amounts of fine sand, silt, and clay. This layer extends to about 18 to 20 feet below the surface and is generally wet to saturated, especially at lower depths. This layer has been termed the "shallow water-bearing zone" or shallow zone. Locally, as in Boring W-26, the shallow zone may include coarse sands and gravels. A stiff, wet, blue-gray, clayey silt layer has been encountered at a depth of 18 to 20 feet below the surface. Borings that have penetrated the blue-gray, clayey silt layer indicate that this layer is 5 to 7 feet thick. The blue-gray, clayey silt layer is believed to be the major barrier to downward migration of EDB from the shallow zone to the underlying Newark aquifer. The blue-gray clayey silt is underlain by silty clay and clay layers to a depth of about 40 to 45 feet, where the Newark aquifer is encountered.

Numerous monitoring wells have been installed in the shallow zone. Groundwater in the shallow zone is encountered at depths ranging from 2 to 5 feet below grade. The depth to groundwater depends, to some extent, on the proximity to recharge areas. The depth to groundwater also varies seasonally and responds rapidly to direct precipitation. Although flow in the shallow zone is influenced by recharge, the bedrock barrier to the southwest, and other artificial stresses, the overall direction of flow is from southeast to northwest, with a deflection to the north in the western portion of the Site. The hydraulic conductivity of the shallow zone varies from 2.7 to 6.8 feet per day. The seepage velocities have generally varied from 0.02 and 0.20 feet per day. At and in the vicinity of the EDB area, the shallow zone water table is depressed as a result of extraction from the shallow zone.

Newark Aquifer

At the Site, the Newark aquifer is encountered at depths ranging from 45 to 50 feet and varies in thickness from 10 to 35 feet. The sediments are loose to medium dense, gray to brown, well graded, clean sand and gravel. The sand is generally fine to medium-grained, and occasionally coarse. The gravel features clasts from 0.5 to 1.5 inches in diameter. Layers of silty clay up to 3 feet thick occur within the coarser-grained material.

The Newark aquifer is fairly continuous laterally, with a decrease in thickness and pinching out of the unit to the southwest because of the presence of the barrier of basement rock. It appears that very little detrital material originating from the bedrock outcrops has been carried eastward, although there is some evidence to suggest that limited recharge to the Newark aquifer occurs at or near the bedrock/alluvium interface.

The piezometric surface in the Newark aquifer is similar to that in the shallow zone. The direction of flow in the Newark aquifer is generally to the west, except where influenced by the extraction system. Based on historical data, the hydraulic gradient in the Newark aquifer has varied from 0.0031 to 0.0052. The corresponding seepage velocities were estimated at 0.70 to 1.2 feet per day. The estimates of seepage velocity are based on an average hydraulic conductivity of 67.5 feet per day and an effective porosity of 0.30. Locally, the seepage velocities may vary depending on specific hydraulic parameters.

The Newark aquifer is separated from the deeper Centerville aquifer by at least 85 feet of low permeability material referred to as the Irvington aquitard. Degradation of the Centerville aquifer by migration from the Newark aquifer through the Irvington aquitard near the Site is unlikely, based on conclusions from investigations conducted by the California Department of Water Resources (DWR). Additionally, the Centerville aquifer may not be present beneath the former EDB area and the deeper Fremont aquifer is believed to be absent beneath the Site (Geosystem, August 1998).

2.2.3 Groundwater Movement

Groundwater flow direction within the shallow zone across the Site is heavily influenced by the groundwater extraction system. Due to the bedrock outcrop on the western portion of the Site, shallow zone flow direction is toward the north and northwest in this area. A significant zone of groundwater capture is generally observed in the area surrounding the extraction well network. Pre-extraction flow direction was generally westerly. Flow direction within the Newark aquifer is toward the west, with influence from extraction wells DW-2 and DW-8 (when actively extracting) noted. Groundwater flow direction contour maps for the shallow zone and Newark aquifer in April 1998 are presented as Figures 8 and 9, respectively.

2.2.4 Groundwater Quality

The current groundwater monitoring well network comprises 29 shallow zone monitoring wells and 6 monitoring wells completed in the Newark aquifer, installed at the Site from 1980 through 1989. Analyses performed include VOCs (including EDB), metals, major cations/anions, and total dissolved solids (TDS). Routine (i.e., quarterly) sampling of many of these wells for

VOCs and EDB has occurred since 1981-82. Results of all groundwater analyses are presented in Appendix A. Shallow zone EDB isoconcentration contours for January 1998 are included as Figure 10, and isoconcentration contours for all other VOCs are shown on Figure 11. Figure 12 presents metal concentrations in monitoring wells and grab groundwater borings. Isoconcentration contours of EDB within the Newark aquifer in January 1998 are included as Figure 13, and Figure 14 presents isoconcentration contours for all other VOCs within the Newark aquifer during the same period.

2.2.4.1 VOCs in Groundwater

In general, EDB was discovered in soil and groundwater at Parcels B and I, where EDB was historically manufactured. EDB was detected at concentrations of up to 490 parts per million (ppm) in monitoring well W-23 in 1984 in the shallow groundwater zone (0-20 feet) beneath the EDB area. 1,2-DCA has also been detected at elevated concentrations in the shallow zone. Chemical compounds found at lower concentrations in the shallow groundwater zone beneath the EDB area include bromoform, dibromochloromethane, diethyl ether, bromochloromethane, methylene bromide, 1-chloro-2-bromoethane, benzene, bromodichloromethane, chloroform, carbon tetrachloride, and TCE. EDB concentrations have generally decreased over time due to extraction efforts. The highest concentration of EDB detected in the shallow groundwater zone during the second quarter 1998 was 3.9 ppm in monitoring well W-48.

Lower levels of EDB, 1,2-DCA and other chemicals have been found in the deeper Newark Aquifer. 1,2-DCA concentrations have decreased since the beginning of the investigations, while the EDB concentrations have significantly decreased since 1980. In the vicinity of the Site the Newark Aquifer is located approximately 50-70 feet below the ground surface and is separated from the shallow zone by the Newark Aquitard (20-50 feet thick). The uppermost segment of this aquitard consists of a layer of heavy gray clay approximately 5 feet thick. This clay layer has halted the migration of EDB in the vertical direction across most of the Site. However, because EDB has been detected in the Newark Aquifer, there appears to be some interconnection between the two zones. The possible mechanisms for the migration of EDB to the Newark Aquifer are described in the various reports summarized in the Geosystem summary report in Appendix B (Geosystem, August 1998). Based on hydrologic and water quality evidence, it was concluded that the one-time introduction of EDB through a failed well completion and subsequent abandonment in 1981 was not the major cause of EDB contamination in the Newark aquifer. However, this abandoned well may have acted as a pathway between the two zones. Other most probable pathways include poorly constructed and/or abandoned wells, transport through "windows" in the confining layer, and migration through the confining layer. Some of the nearby Alameda County Water District wells are perforated in both the shallow zone and Newark aquifer, although these are not located on the Site where EDB contamination is found. Two of the ACWD wells are located upgradient.

2.2.4.2 Metals in Groundwater

Arsenic has been detected above MCLs in historic (early 1980s) and limited 1993 sampling in shallow groundwater monitoring wells in Parcel A. In addition, grab groundwater samples collected in 1995 from Parcel A during closure of the former phosphate and phosphoric acid plants showed arsenic levels over MCLs. It should be noted that groundwater samples submitted for metals analysis were not filtered prior to preservation or extraction preparation. Therefore, these concentrations are not soluble levels and are in part associated with concentrations sorbed onto soil particles present within the water samples.

2.2.4.3 Salt Water Intrusion

The groundwater within the Newark aquifer has also been impacted by salt water intrusion, attributable to historical overpumping. Up to 112,300 ppm of TDS have been measured in Newark aquifer monitoring wells, making the water unsuitable for most beneficial uses (Geosystem, August 1998).

The Alameda County Water District (ACWD) manages groundwater resources in the Newark, Union City, and Fremont areas. On average 35% of the residents' water supply comes from groundwater, most of this from well fields located about 5 miles east of the Site. ACWD's management activities address saltwater intrusion caused by past overdrafting of the Newark Aquifer and deeper aquifers for domestic and agricultural uses. ACWD has reversed the overdrafting by recharging imported water and operates several extraction wells to remove high salinity groundwater from the Newark Aquifer and deeper aquifers within the Niles Cone (Aquifer Reclamation Program or ARP). ACWD is planning on treating a portion of its ARP pumpage for potable use with a proposed desalination plant about 1.5 miles southeast of the site.

In the late 1970s, ACWD initiated construction of an alignment of extraction wells in the Newark Aquifer to serve as salinity barrier curtain. The curtain has been planned to expand in a north-south direction, just inland of the salt evaporation ponds, for the entire width of the Niles Cone. The Salinity Barrier Project (SBP) wells would serve two functions: 1) prevent salt water intrusion during drought periods; and 2) hasten the removal of saline groundwater in the Newark Aquifer east of the SBP wells. At this time, ACWD has completed construction of five wells, including one within 1,500 feet of the Site. Installation of additional wells has been postponed pending a re-evaluation of the project.

Chloride concentrations in the Newark Aquifer beneath the Site range from 15,000 to 20,000 ppm, mainly as a result of saltwater intrusion. The Site is located west (or bayward) of the proposed SBP wells alignment. Chloride concentrations are therefore not expected to decline and may in fact increase, even after extended operation of SBP wells.

Implementing the SBP may accelerate the migration of VOCs in shallow groundwater, both laterally and vertically. If significant VOC concentrations migrate to the SBP wells, then ACWD may be required to treat SBP well pumpage prior to discharging it to surface waters or blending it with raw water for beneficial use.

RWQCB Order No. 85-113 required FMC to: 1) assess the effect of its extraction/injection program on 1,2-DCA transport in the Newark aquifer and protection of SBP wells from 1,2-DCA contamination (Provision C-7); 2) Evaluate the water quality of deeper aquifers and the possible interconnection of these aquifer with the Newark aquifer (Provision C-8); and 3) assess shallow zone extraction and the possible connection between the shallow zone and the Newark aquifer (Provision C-9). FMC submitted a report (Geosystem, July 1986) related to this evaluation which concluded: 1) off-site migration of 1,2-DCA would not be significant; 2) the Centerville aquifer may not exist under the western portion of the FMC Site and degradation of the Centerville aquifer by migration from the Newark aquifer through the Irvington aquifer near the FMC Site was unlikely; 3) the one-time introduction of EDB through a failed well completion and subsequent abandonment was not the major cause of EDB contamination in the Newark aquifer.

2.2.5 Groundwater Remedial Measures

Pursuant to the specifications in Board Waste Discharge Requirements Order Number 85-113, FMC capped the EDB area (areas with the highest soil EDB concentration) with asphalt in late 1985/early 1986 and installed a concrete lined perimeter drainage ditch to minimize precipitation infiltration and surface run-on, and to control surface runoff. FMC also installed a system for extraction, treatment (by granular activated carbon) and reinjection of Newark aquifer groundwater, and began operation of this system, consisting of extraction wells DW-2 and DW-8 in January 1986. FMC also installed 26 additional extraction wells (W-7, W-20, W-29, W-33, and W-37 through W-58) for groundwater in the shallow groundwater bearing zone in 1989. The reinjection wells were shutdown in 1987 due to operational difficulties. These wells have subsequently been closed in accordance with regulatory requirements. From July 1987 through January 1988, FMC directed the treated groundwater to the NPDES permit system at the plant. However, this resulted in exceedances of the settable matter limits in the permit due to the chemical reaction between the hardness of the treated water and residual phosphate in the stormwater runoff from the plant site. Since October 1988, FMC has discharged the treated groundwater to the Union Sanitary District (USD) sewer system under a USD permit.

Through June 1998, a total of 77,801,115 gallons of groundwater have been extracted and treated, and 3,991 pounds of 1,2-DCA and 766 pounds of EDB have been removed (Geosystem, August 1998).

2.3 CLOSURES

The following closures were conducted under the direction of the Newark Fire Department (NFD):

- Phosphorus Storage Pit Closure – 1993-1994;
- Hazardous Materials Storage Tanks, Phosphoric Acid and Phosphate Plant Area–1995-1996;
- Former Phosphoric Acid Plant Elevator – 1995-1996;
- Final Phosphoric Acid Plant Closure Activities – 1995-1996; and
- Removal of an approximate 1,000-gallon underground gasoline storage tank in 1986.

A Closure Certification Report was submitted to the NFD on April 10, 1998, summarizing closure activities and reports for the former Phosphoric Acid Plant and Phosphate Plant. This report included discussions of the closure of the former phosphorus storage pits and remediation of areas of soil that apparently had been affected by phosphoric acid, resulting in "heaving" conditions.

FMC closed the former phossy water pond in 1985-86 under the direction of the DHS. This pond had been taken out of service and filled with sand in the late 1970s. It was closed and remediated in 1986 under a plan approved by the DHS. The closure of the phossy water pond was acknowledged by the DHS in a letter dated January 27, 1986.

The former effluent pond was taken out of service and backfilled with clean fill in mid-1996.

The former stormwater pond was closed in 1986 by excavation and off-site disposal, with excavated soils manifested as a hazardous waste due to high arsenic concentrations. Prior to closure, confirmational soil samples of sludge and underlying soil from the pond were obtained (1985 – 1986) and analyzed. The area was subsequently backfilled. After closure of the pond, stormwater runoff was collected in a 200,000-gallon aboveground storage tank located near the former pond. The 200,000-gallon tank was closed in 1995 under the authority of the NFD.

The former TKPP pond was closed in 1983 pursuant to notifications to the RWQCB and DHS by excavation and off-site disposal, and the area was backfilled. The DHS approved the closure of the TKPP pond in a letter dated April 12, 1984.

The former filter aid pit, along with 700-800 feet of ditch, was closed by excavation and off-site disposal in 1972, and the area backfilled with clean fill and graded.

3.0 SAMPLING AND ANALYSIS PLAN

The primary objective of the additional Site characterization activities is to complete the definition of the horizontal and vertical extent of chemicals in soil and groundwater with respect to the entire Site. The data collected during the additional investigation and those data from the previous investigations will be used to establish Site specific risk based cleanup standards for soil and groundwater and propose a final remedial action plan with respect to the entire Site.

The Sampling and Analysis Plan (SAP) identifies the number and location of soil borings, grab groundwater sample borings and monitoring wells to be installed or sampled during additional Site characterization and includes the following:

- identification, location and rationale for additional soil borings, grab groundwater sample borings and monitoring wells;
- depth of sample collection;
- analytical methods;
- soil boring and well installation procedures;
- sampling procedures; and
- equipment decontamination.

All fieldwork will be performed in accordance with the QAPP (Section 4.0) and HASP (Appendix C).

The following documents have been used as guidelines for the development of this SAP:

- State Water Resources Control Board (SWRCB), October 1989. Leaking Underground Fuel Tank (LUFT) Field Manual: Guidelines for Site Assessment, Cleanup, and Underground Storage Tank Closure. State of California, State Water Resources Control Board, LUFT Task Force;

- USEPA, April 1986. Standard Operating Procedures and Quality Assurance Manual, Engineering Support Branch, Region IV, Environmental Services Division, Athens, Georgia;
- USEPA, March 1987. Data Quality Objectives for Remedial Response Activities, USEPA-540/G-87/003;
- USEPA, October 1988. Guidance for Conducting Remedial Investigations and Feasibility Studies Under Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), USEPA 540 G-89 004; and
- USEPA, December 1997. Test Methods for Evaluating Solid Wastes - Physical/Chemical Methods, USEPA SW-846, 3rd Edition, Version 2.0.

3.1 SCOPE OF WORK

Data collected during the previous Site characterization investigations discussed in Section 2.0 were evaluated to determine the appropriate scope of work to satisfy the requirements of Task B.1. of Order No. 98-066 and future use of the property. The additional soil and groundwater samples described in this section will be located in those areas determined to either require additional data to further define the vertical and lateral extent of chemicals in soil and groundwater or to confirm those data collected during previous Site investigations. Figures 4 through 14 graphically display soil and/or groundwater data collected during previous Site investigations. Results of chemical analyses performed on soil samples collected on Parcels A and D are shown on Figure 4, while Figures 5 and 6 show the results of chemical analyses performed on soil samples collected on Parcels B and I. Figure 7 displays the results of chemical analyses performed on soil samples collected on Parcel C. Groundwater flow contours are presented on Figures 8 and 9. Figures 10 through 14 show groundwater chemical data collected during the first quarter 1998 monitoring event. Proposed soil boring and monitoring well locations are shown on Figures 15 through 18.

3.2 SAMPLING LOCATIONS

Proposed sampling locations and chemical analytes were based on extensive review of previous Site investigation data. Soil borings, grab groundwater, and monitoring well locations were chosen based on the need for further definition (vertical or lateral) or confirmational data. Further definition and/or confirmational data will be obtained from the following areas: 1) phosphorus storage pits; 2) stormwater pond; 3) filter aid pit; 4) E-1 ditch; 5) phosphate plant; 6) phosphoric acid plant; 7) EDB plant; 8) soda ash transloading area; and 9) magnesia plant. Additionally, data will be obtained from the undeveloped lots on Parcel I (part of the former DBS property) and in the vicinity of the existing railroad spur.

The rationale for each proposed soil boring is summarized in Table 1. The table includes the proposed boring number, identifies the parcel and chemical use area, and defines the sample depths and laboratory analyses. Table 2 presents the rationale for additional groundwater monitoring well installation and existing well sampling. Proposed sampling locations are presented on Figures 15 through 18. All laboratory analyses will be performed according to the guidelines referenced in the QAPP (Section 6.0) and within the laboratory Quality Assurance/Quality Control (QA/QC) manuals (Volume III).

The former phossy pond and the former TKPP pond located on Parcels A and D, respectively, were closed under the authority of the DHS, and the closures were acknowledged through letters received from the DHS in January 1987 (DHS, 1997) and April 1984 (DHS, 1984), respectively. Therefore, no additional sampling is proposed in these areas.

The areal extent of elemental phosphorus in the area where the former phosphorus storage pits are located has previously been defined. However, four soil borings have been proposed for this area to confirm the delineation of P_4 using USEPA Method SW-846 7580 analysis.

No additional sampling has been proposed for the former effluent pond which was located on Parcel B. Prior to closure of the pond, soil samples were obtained by FMC and analyzed for metals. The results are shown on Figure 5.

3.3 SAMPLING METHODOLOGY

This section describes the drilling and sampling equipment to be used to install additional borings and collect samples to be submitted for laboratory analysis.

3.3.1 Pre-mobilization

Prior to mobilization of drilling and sampling equipment, a Site inspection will be performed to assess the feasibility of installing the soil borings at the proposed locations. During the Site inspection physical restrictions will be noted, including landscape, vegetation, fences, overhead powerlines, concrete, etc. As required by law, Underground Service Alert (USA) will be notified of each drilling location at least 48-hours (yet no more than 2 weeks) in advance so that they may alert operators of underground utilities in the area. In addition, an independent underground utility locator will be used to verify that each drilling location is clear of underground utilities. As required, soil boring well permits will be obtained through the ACWD.

3.3.2 Soil Borings

The proposed soil borings will be installed using two possible sampling systems, hollow stem augers or hydraulically driven cores. Borings to be installed to depths of less than 25 feet in fine-grained material will be installed using the hydraulically driven core system. Soil borings to be installed to depths greater than 25 feet and those encountering coarse-grained material may require a truck mounted hollow stem auger drilling rig.

3.3.2.1 Hydraulically Driven Core System

The hydraulically driven core system (Geoprobe) involves driving a two-foot long soil core lined with acetate sleeves into undisturbed soil. As the core is driven through the interval to be sampled, undisturbed soil collects within an acetate sleeve. This process is repeated until the total desired depth of the boring is reached. The soil core will be cleaned, and a new clear acetate liner will be inserted, between each sample interval. The samples contained within the acetate liner will be removed from the sampling core upon retrieval. Each sample will be described by the on-site geologist using the Unified Soil Classification System and under the supervision of a State of California registered geologist. The soil description will be entered into a soil-boring logbook. Additional information entered into the soil-boring logbook will include the boring location, date and time of drilling, equipment used and interval of samples to be submitted for laboratory analysis.

For those borings where P_4 is suspected, the core will be immediately placed into a tub of clean water to prevent ignition according to the procedures described in the HASP (Appendix C). Soil cores will immediately be capped under water and brought to the surface where the end caps will be sealed to the acetate sleeve with tape.

3.3.2.2 Hollow Stem Auger System

The hollow stem auger system involves advancing eight-inch diameter hollow stem augers equipped with either a continuous core barrel sampler or California modified split spoon sampler to the desired depth. The continuous core barrel sampler consist of a two-inch inside diameter by 5-foot long stainless steel core barrel which is lined with 20 2x6-inch brass sleeves. The cutting edge of the core barrel is mounted approximately 6-inches ahead on the auger bit and a relatively undisturbed core enters the barrel as the augers are advanced. The core barrel is then retrieved, split longitudinally and the brass sleeves removed. The California modified split-spoon sampler consist of a two-inch inside diameter by 18-inch long stainless steel core barrel lined with three 2x6-inch brass sleeves. After reaching the desired depth with the augers the split-spoon sampler is driven 18-inches ahead of the borehole using a 140-pound drop hammer. The split-spoon sampler is then withdrawn and the brass sleeves removed. Each sample will be described by the on-site geologist using the Unified Soil Classification System and under the supervision of a State of California registered geologist.

For those borings where P_4 is suspected, the core will be immediately placed into a tub of clean water to prevent ignition according to the procedures described in the HASP (Appendix C). Soil cores will immediately be capped under water and brought to the surface where the end caps will be sealed to the brass tubes with tape.

3.3.2.3 Core Samples

Lithologic description of core samples will include the interval encountered, Unified Soil Classification System and name of unit, percentages of grain sizes, color according to the Munsell color chart, relative degree of plasticity, grain size and grading, density, moisture content, pedological features, and any other relevant observations. The description will be recorded in a field drilling logbook by a field geologist. Additional information entered into the soil boring logbook will include the boring location, date and time of drilling, equipment used and interval of samples to be submitted for laboratory analysis.

During boring installation, soil sample headspace readings will be measured for VOCs using a photo ionization detector (PID). Approximately 200 grams of soil will be placed in a ziplock bag and allowed to rest in direct sunlight for approximately five minutes. The PID probe will then be inserted into the ziplock bag and a measurement recorded in the field drilling logbook. Additional soil samples may be submitted for laboratory analyses, dependent on positive PID reading and physical observations, including chemical odors, textural variations, and other visual observations.

Acetate and brass liners containing soil, collected for laboratory analysis, will be sealed with Teflon tape and polyethylene caps. A label containing a unique sample identification number will be attached to the tube, which will be placed in a cooler filled with ice. All samples will be shipped to a California State-Certified laboratory under chain-of-custody documentation.

3.3.2.4 Soil Boring Abandonment

Upon completion, each soil boring will be backfilled with neat cement from total completion depth to ground surface. Excess drill cuttings and decontamination fluids will be stored in 55-gallon closed top drums pending analytical results from the samples submitted to the laboratory. Drums containing drill cuttings from P_4 areas will by topped with a layer of water to prevent ignition.

3.3.3 Definition of Groundwater Contamination

Previous characterization studies performed at the Site have determined that the vertical extent of VOCs in groundwater has been defined in both the shallow zone and Newark aquifers. Therefore, additional definition of VOCs in groundwater is designed to complete definition of the lateral extent. With respect to VOCs in the shallow zone aquifer, monitoring wells W-21 and W-25 will be sampled to determine the extent of VOCs in the southern portion of the Site. With respect to the Newark aquifer, the lateral extent of VOCs will be defined by installing a monitoring well at the southwestern portion of Parcel I and by locating and sampling existing off-site Newark aquifer monitoring well DW-5, located northwest of the Site (Table 2 and Figure 18).

To assess metal concentrations in the shallow zone aquifer, temporary monitoring wells will be installed within Parcel A (Table 2 and Figure 18) and background metal concentrations will be assessed, including sampling monitoring wells at the upgradient extent of the Site. Metal concentrations within the Newark aquifer will also be assessed, as shown in Table 2.

3.3.4 Baseline Groundwater Sampling

As previously discussed, routine groundwater monitoring has been performed at the Site since 1981-82. The routine groundwater monitoring involves the measurement of potentiometeric groundwater surfaces in all Site monitoring wells and sampling and analysis for VOCs in selected monitoring wells. To assist in defining the lateral extent of VOCs in the shallow zone and to determine the extent of metals in both the shallow zone and Newark aquifer, a baseline groundwater monitoring event will be conducted. Table 2 includes a listing of the monitoring wells to be sampled and analysis to be performed during the baseline sampling event.

Prior to the collection of groundwater samples, all Site monitoring wells will be inspected to determine their integrity. This will include verifying that the wells are secured in locked vault boxes or above grade "stove pipe" type protective coverings that are not damaged. The total depth of each well will be compared to that presented on the original well completion logs to insure that they do not have obstructions or significant silting within the casing. If damage is observed, the monitoring wells will be repaired or abandoned if the damage is considered beyond repair.

The baseline event will include the following:

1) Collection of samples for VOC analyses from shallow zone monitoring wells W-21 and W-25, in order to provide definition of the southern extent of VOCs in the shallow zone;

2) Collection of samples from selected shallow zone and Newark aquifer monitoring wells for metals analyses to determine the soluble concentration of California Assessment Manual (CAM) metals; and

3) Sampling of shallow zone monitoring wells on the upgradient side of the Site for metals analyses to determine levels of metals which may be migrating on-Site in the shallow zone from upgradient properties.

Grab groundwater samples collected from soil borings near the former phosphorus storage pits located on Parcel A will be analyzed for P_4 using USEPA SW-846 Method 7580. Dissolved oxygen and redox potential (eH) will be measured using field meters during the sample collection for P_4 analysis. Elemental phosphorus has a low solubility in water and a relatively short half-life in water under oxidizing conditions. Therefore, possible low concentrations of P_4 in groundwater would not be expected to persist if oxidizing conditions are present.

3.3.5 Monitoring Well Construction Methods

Monitoring wells will be installed to provide groundwater level measurements and to provide points for groundwater sample collection. Well construction methods and materials vary according to geologic conditions, intended monitoring depth, available equipment, and intended well use. Monitoring wells will be constructed in accordance with USEPA and Alameda County Water District guidelines.

3.3.5.1 Soil Borings Converted into Temporary Wells

Temporary monitoring wells will be constructed within Parcel A to assess concentrations of metals within the shallow aquifer. The temporary wells will be constructed by inserting ¾-inch diameter Poly Vinyl Chloride (PVC) well screen and blank casing down soil borings installed with the Geoprobe. After the casing has been installed to the desired depth, the well will be developed using either a bailer or peristaltic pump and a sample will be collected using a disposable bailer. Upon completion of sample collection the casing can be removed and the borehole abandoned or the well can be capped at the surface and remain in place for future sampling. However, since the wells do not have sanitary seals, abandonment will occur shortly after collection of the desired sample.

3.3.5.2 Newark Aquifer Monitoring Well

When monitoring wells are constructed in a deeper aquifer, sealing of the upper aquifer(s) is necessary prior to well completion to prevent cross-contamination between aquifers. The new deep monitoring well will be constructed in the following manner:

An initial pilot hole will be drilled with six-inch diameter drilling equipment and a 94 mm continuous core sampler to determine the depth of the shallow groundwater zone at each proposed deep well location;

- The borehole for the surface cased boring will be reamed open with a 14-3/4 inch diameter mud rotary drilling equipment and will terminate in the clay layer immediately below the A-level aquifer;
- New 10-inch low carbon steel surface casing will be installed in the borehole and cemented in place with a mixture of neat cement and five percent added bentonite. The inside of the conductor casing will be flushed prior to the continuance of drilling;
- The cased borehole will be re-entered with the 94-mm continuous core sampler and drilled to the desired depth. Soil samples will be taken continuously beneath the surface casing for lithologic description. Upon completion of drilling, one four-inch inside diameter (ID) Schedule 40 PVC monitoring well will be constructed in each borehole. All cuttings generated during drilling will be contained in bins and stored at an area designated by FMC;
- The well will consist of new four-inch I.D. flush joint, Schedule 40 PVC blank casing, and machine slotted, flush joint Schedule 40 PVC well screen. The well screen slot size will be determined by performing sieve analyses on a representative number of soil samples from the geologic deposits to be screened. The screen length will normally be 10 feet or less;
- The filter pack will consist of the appropriate mesh silica sand which will be placed through a tremie pipe to approximately two feet above the well screen. A bentonite bridge, approximately three feet thick, will be placed via tremie above the filter pack. A sanitary seal of cement grout (neat cement with five percent bentonite) will then be pumped via tremie from the bentonite bridge to ground surface;

- The well will be developed after the sanitary seal has cured. One of three well development methods (bailing, air lift method, or pumping) will be used in conjunction with surging for developing the deep well. Well development will proceed until at least 10 well volumes of fluid and all residual sediment has been removed and turbidity reaches a value of <100 nephelometeric turbidity units (NTUs); and
- Soil cuttings and samples will be monitored for organic vapors using a photoionization detector. The wells will be lithologically logged by a geologist under the supervision of a State of California Registered Geologist.

3.3.5.2.1 Monitoring Well Construction Materials

The blank pipe for monitoring wells is Schedule 40 PVC flush- jointed pipe in 5- or 10-foot lengths. Perforated pipe is 3/4-inch to 4-inch ID PVC Schedule 40, machine-cut or continuous wrap slotted pipe. All blank and perforated pipe used in well construction is flush-jointed (threaded) and free of all glues or oils.

Drilling mud used in the mud rotary method is mixed from pure sodium bentonite and potable water from city spigots. Drilling mud viscosity and weight will be carefully controlled and measured to minimize penetration into the aquifer.

In mud-rotary-drilled wells, the annulus around the perforated interval is packed with suitable gravel pack material. Grout used in the annulus and strata seal is mixed 5.5 gallons of water to 94 pounds cement. In the surface seal the grout used is a mixture of water and concrete mix.

3.3.6 Monitoring Well Development

All monitoring wells are developed by bailing or pumping and surging until the turbidity of the water is less than regulatory requirements (typically 100 NTUs). Pumping of the well is performed after surging to remove aerated water before sampling. Well development will proceed until at least 10 well volumes of fluid and all residual sediment has been removed.

3.3.7 Drilling Equipment Decontamination

Prior to entering the Site, all drilling equipment will be steam-cleaned to remove oils, chemicals, soils and other debris and to prevent cross-contamination. Additional steam-cleaning will be performed on-site to prevent cross-contamination between borings. The steam-cleaning water will be disposed appropriately by FMC.

3.3.8 Monitoring Well Sampling

The objective of groundwater sampling is to obtain a volume of water that is as representative (i.e., as chemically close) to water in the aquifer as possible. To meet this objective, the following minimum criteria will be observed:

- All stagnant water from the casing is removed so that fresh water from the aquifer is entering the well at the time of sample collection;
- The sample is extracted from the well with as little disturbance and as little exposure to the atmosphere as possible;
- The sample is not allowed to come into contact with any materials that may adsorb or leach constituents in solution, or alter the sample in any way;
- Physical parameters which would change with exposure to the air during containerization, transport, storage or laboratory analysis and cannot be preserved are measured at the time of sample collection; and
- Portions of the sample are treated to preserve those parameters that would otherwise be altered in transport to the laboratory.

Prior to sampling, the static water level the well will be measured to within 0.01 feet using an electric water level measuring device. Static water level measurements will be entered onto a hydrologic data sheet and sampling event data sheet along with perforation interval and total well depth (obtained from the well log). This level is checked against previous data and remeasured if disparity between past and present elevations exists. From this information, the well volume (or volume of standing water in the well) is calculated and recorded on the data sheet, and the appropriate sampling method determined.

After measuring the water level, a pump will be used to evacuate the equivalent of three casing volumes from the well. Purging will continue after three casing volumes, if pH, conductivity, and temperature readings have not stabilized (results are reproducible within 5%). Turbidity measurements will also be taken during well purging, as it is desirable to collect a sample with a turbidity measurement less than 100 NTUs. If the well has a very slow recharge capacity, the pump will be operated until the water level drops to the top of the pump intake and the well will be sampled when it has recovered to 80% of its original static water level. Purge water will be disposed of at the on-site groundwater treatment system.

After well purging, a disposable polyethylene bailer will be lowered into the well for purposes of collecting a represented water sample. After the bailer has filled with water it will be brought to the surface and the sample discharged from the bottom of the bailer through a port into appropriate sample bottles. As the bottle fills to overflowing, the port will be slowly removed and the bottle capped with no air bubbles. This procedure minimizes the chance of aeration while collecting the sample. Disposable bailers will be discarded after each use.

More specific information on sampling protocol and laboratory QA/QC is presented in the QAPP (Section 6.0) and within Appendix D.

4.0 WASTE HANDLING METHODS

Decontamination fluids and excess core samples will be contained on-site in 55-gallon drums with lids. Drums containing drill cuttings from P_4 areas will by topped with a layer of water to prevent ignition. The drums will be labeled as to their contents, generator, and date of generation. A composite sample of the contents will be analyzed and an appropriate disposal option will be determined based on the analytical results, pursuant to federal, state, and local regulations.

5.0 SURVEYING

The location of each soil boring and monitoring will be surveyed for northing, easting, and elevation data by a State of California licensed surveyor, according to the North American Datum-87 (NAD-87) coordinate system. All survey data will be stored in an AutoCAD database.

6.0 QUALITY ASSURANCE PROJECT PLAN

The QAPP addresses QA/QC methods for collection and analysis of soil and groundwater samples as required for the Site. QA/QC methods will be integrated into field sampling procedures, sample handling and custody, laboratory procedures, project management, and data management as discussed in the following sections.

6.1 SAMPLE HANDLING AND ANALYSES

Sample documentation, transportation and laboratory login procedures are discussed in the following subsections.

6.1.1 Sample Handling and Documentation

Soil and groundwater samples will be collected from the Site in accordance with the SAP (Section 3.0). Soil and groundwater sampling activities are summarized here to ensure that the sample collection objectives are met.

Before a sample is collected, careful consideration will be given to the type of analytical testing required so that precautions can be taken to prevent loss or contamination of the sample and to preserve the sample for subsequent analysis. Detailed procedures for soil and water sample collection have been outlined in Section 3.0.

Written tracking of each sample will be completed during sampling which includes the following, as appropriate: field documentation, boring logs, hydrologic data sheet, sampling event data sheet, chain-of-custody documentation, and sample labels.

The field data that will be recorded at the time of sample collection will provide an unambiguous identification of each sample. Field data will be recorded in ink in a bound, hard-covered, consecutively pre-numbered page notebook in ink. These field data will include the following, as appropriate:

- Date of entry;
- Description of sample;
- Number and size of sample taken;
- Description of sampling point;
- Date and time of sample collection;
- Field sample identification number(s);
- References such as maps or photographs of the sampling site;
- Field observations; and
- Any field measurements such as pH, temperature, conductivity, air monitoring readings, or resistance to penetration.

Because sampling situations vary widely, field notes will be as descriptive and inclusive as possible; anyone reading the entries should be able to reconstruct the sampling situation from the recorded information. Language will be objective, factual, and free of inappropriate terminology. All field personnel will date and sign any data entries. All field documentation will be retained.

To supplement the information recorded in the field log book(s), a sample event data sheet will also be completed for each sampling location. Sampling event data sheets will include information on specific activities related to collection of a single sample. The sample event data sheet will be completed in the field at the time of the sample collection by the sampling personnel.

The written procedures that are followed whenever samples are collected, transferred, stored, analyzed or destroyed are designed to create an accurate written record which can be used to trace the possession and handling of the sample from the moment of its collection through analysis and reporting of analytical values. This written record, the chain-of-custody (COC) documentation, will be filled out by the field sampling team at the time the sample is obtained. It is the responsibility of the Field QA Coordinator/Technical Supervisors to coordinate sample collection and delivery to the analytical laboratories. The COC documentation will accompany the sample through all transportation functions until it is received at the laboratory, where it is filed. The COC form will include the following information: Site address, sample identification number (assigned by the sampler in the field), sample date, sample location, and type of analysis required. Whenever the sample is transferred from one party to another, both parties will sign the COC and record the date and time of the transfer. A copy of each COC form will be retained by the field sampler for the project file. The original COC will be sent with the samples.

A sample numbering system will be utilized to distinguish each sample with respect to retrieval of the sample, sample information, sampling location and depth. The following numbering system will be utilized: for borings, boring number-depth; for groundwater monitoring wells, W-well number.

After sample collection, samples will be placed in a cooler with ice to keep sample temperatures between 2 to 4 degrees Celsius until delivered to the lab, where samples will be stored under refrigeration. The laboratory will retain volatile organic samples for a minimum of 14 days from the date the sample is collected and will dispose of the samples 30 days after the laboratory report is prepared. Duplicate vials and sample blanks will be provided to the laboratory by the sampler for all volatile organic analyses. Samples being analyzed for constituents other than volatile organics will follow the hold times indicated in Table 3.

All samples submitted to laboratories will be accompanied by the COC documentation. The COC form will be checked for accuracy and completeness, and then signed and dated by the laboratory sample custodian accepting the sample. At the laboratory, each sample will be assigned a unique sequential laboratory identification number that will be stamped or written on the COC form.

All samples will be placed in appropriate refrigerators by the sample custodian, and will be signed out by refrigerator on internal COC sheets. The laboratory project manager assigned to this project will be responsible for tracking the status of the samples throughout the laboratory. Samples will be signed out of the Sample Control room in a sample control logbook by the analyst preparing the samples for analysis. Samples for organic volatile analysis will be kept in secure storage in the laboratory area where the analysis is to be performed.

6.1.2 Soil Sampling and Analyses

Detailed soil sampling and analytical procedures are described in Section 3.0 and within Volume II.

6.1.3 Groundwater Sampling and Analyses

Detailed groundwater sampling and analytical procedures are described in Section 3.0 and within Volume II.

6.1.4 Selected Laboratories

All samples will be delivered under chain-of-custody to either California Laboratory Services (CLS) in Rancho Cordova, California or Mountain States Laboratory (MSL) in Salt Lake City, Utah. Both CLS and MSL are certified within the State of California to perform the analyses presented herein.

6.2 PROJECT MANAGEMENT PLAN

An FMC selected contractor will perform the remedial investigation, with support provided by subcontractors on an as-needed basis under the direction of the prime contractor Project Manager. The personnel involved with this project will be made aware of their individual responsibilities and understand that quality assurance must be applied throughout the entire investigation. All project work will be overseen and approved by the FMC Project Manager. All project personnel have read and are familiar with this document. Specific responsibilities of individual project personnel are described below.

6.2.1 FMC Project Manager

Ms. Zahra M. Zahiraleslamzadeh, FMC Corporation, will act as the Project Manager for this remedial investigation. Ms. Zahiraleslamzadeh will be responsible for directing and authorizing the prime contractor Project Manager to conduct the work necessary to complete the investigation. Ms. Zahiraleslamzadeh will review and approve all documents and correspondence prepared as part of the investigation program.

6.2.2 Prime Contractor Project Manager

The prime contractor Project Manager for this investigation will be responsible for coordinating project activities, and maintaining full and orderly project documentation and day-to-day management of technical, financial, and administrative aspects of the project, the Project Manager will be responsible for implementing the quality assurance program to ensure that established sampling and analysis procedures are properly followed. The project manager will coordinate the necessary technical reviews, report preparation and reviews, and provide quality assurance audits. The prime contractor Project Manager will report directly to the FMC Project Manager regarding soil and groundwater sampling, and financial and administrative issues.

6.2.3 Technical Supervisor

The Technical Supervisor will review sampling plans and technical reports to ensure that all work is conducted and reported in a manner consistent with standard hydrogeologic principles. The Technical Supervisor will also coordinate field personnel and sub-contractors in the sampling and any drilling efforts including preparing sub-contract agreements and scheduling.

The Technical Supervisor will report directly to the FMC Project Manager regarding well installation, abandonment and related technical issues. The Technical Supervisor is responsible for the quality assurance and proper execution of all sampling in accordance with the procedures described in Sections 3.0 and 6.0 are followed.

The Technical Supervisor has the authority to:

- Stop any sampling activity that is not following acceptable protocols;
- Discard any sample that is not taken, transported, or preserved according to acceptable protocol;
- Invalidate any data obtained from an improperly collected sample; and
- Invalidate any data if the proper sample handling and documentation protocols have not been followed.

The Technical Supervisor is also responsible for coordinating activities with drilling sub-contractors including scheduling.

6.2.4 Soil and Groundwater Sampling Personnel

Soil and groundwater sampling personnel are responsible for conducting field work in accordance with procedures identified in this work plan, as directed by either the Project Manager or the Technical Supervisor.

6.2.5 Site Health and Safety Coordinator

The Project Health and Safety Coordinator will be responsible for implementing the project specific health and safety directives detailed in the Site Health and Safety Plan (Appendix C), documenting all health and safety related activities, and the proper calibration and maintenance of all health and safety equipment.

The Project Health and Safety Coordinator will ensure that the field personnel have adequate job specific training. Everyone working in the field has received adequate health and safety training in accordance with Federal Occupational Safety and Health Administration (OSHA) Regulatory Requirements for hazardous waste site workers as delineated in 29 CFR 1910.120 (e).

6.3 DATA MANAGEMENT PLAN

This section describes how data obtained will be managed, preserved, and reported. Procedures for obtaining and recording field measurements and sample collection and tracking procedures including sample number, sample labeling, and chain-of-custody procedures are presented in Section 6.1.1.

6.3.1 Field Measurements

Measurements made in the field will be recorded on data sheets as described in Section 6.1.1. These measurements will include soil logs, and depth to water in monitoring wells, temperature, pH, conductivity and turbidity measured during well sampling. Sampling personnel will provide the Technical Supervisor with the original data sheets used in the field, and are responsible to ensure such information is referenced in the field notebooks. The Technical Supervisor will maintain a complete file of data sheets, and will submit copies of the data sheets to the Project Manager and to the prime contractor Project Manager.

6.3.2 Analytical Results

The Laboratory Manager will send all soil and groundwater analytical results to the prime contractor Project Manager. The Project Manager will maintain a file of all analytical results, including laboratory letters and results for quality assurance samples, and provide the FMC Project Manager with copies of all communications.

6.3.3 Data Management

All data will be reviewed for accuracy, including cross-referencing field sheets to COCs and laboratory analytical data sheets. All laboratory analytical data sheets will be thoroughly reviewed for accuracy and completeness, including sample number, sample date, analysis date, chemicals detected, reporting limits, surrogate recoveries, and supporting QA/QC data.

All laboratory data will be entered into an Access Database system electronically, using diskettes provided by the laboratory. Upon completion of entry, the data will be printed out and a minimum of 20% of the data will be compared to the laboratory hard copies to confirm accuracy.

6.3.4 Data Reporting

Data will be presented in technical reports submitted in accordance with the project schedule (Section 7.0). The technical reports will include a summary (tables or figures) of analytical results for soil and groundwater samples. The technical reports will also include, as appendices, soil boring logs, laboratory data sheets, all laboratory QA/QC data, cover letters, and chain-of-custody forms for all soil and groundwater analyses.

7.0 IMPLEMENTATION SCHEDULE

A schedule has been prepared for implementing the work proposed in this workplan. Figure 19 presents a timeline with the major tasks identified, including:

1. Pre-mobilization activities;
2. Mobilize field equipment and personnel;
3. Perform soil investigation;
4. Perform soil analyses;
5. Perform soil data QA/QC and data entry;
6. Sample existing groundwater wells;
7. Perform groundwater analyses;
8. Perform groundwater data QA/QC;
9. Install groundwater monitoring wells;
10. Perform groundwater analyses;
11. Perform groundwater data QA/QC;
12. Review results of field investigation; and
13. Prepare remedial investigation.

Upon receipt of RWQCB approval of this workplan, work will be initiated and the Remedial Investigation (RI) Report will be submitted within 180 days of the approval date.

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TABLE 1
PROPOSED SOIL SAMPLING LOCATIONS
FMC - Newark

PARCEL(s)	CHEMICAL USE AREA	PROPOSED BORING NUMBER (s)	SAMPLE DEPTHS (ft bgs)	LABORATORY ANALYSES	RATIONALE
A&D	Phosphorus Pits	1-4	1.5, 5, 10, 15	P_4, Metals, pH	Confirm the vertical and lateral extent of P_4.
	Phosphoric Acid Plant	5-12	1.5, 5, above first water	Metals, pH	Assess concentrations below Phosphoric Acid Plant.
	Phosphoric Acid Plant	13, 14	1.5, 5, above first water	P_4, Metals, pH	Assess concentrations below Phosphoric Acid Plant.
	Stormwater Pond	15-18	1.5, 5, above first water	Metals, pH	Assess concentrations below former pond.
	Phosphate Plant	19, 20	1.5, 5, above first water	Metals, pH	Assess concentrations below Phosphate Plant.
	Filter Aid Pit	21	1.5, 5, above first water	Metals, pH	Assess concentrations below former pit.
	E-1 Ditch	22-24	1.5, 5, above first water	Metals, pH	Assess concentrations below former E-1 Ditch.
B&I	E-1 Ditch	25-27	1.5, 5, above first water	Metals, pH	Assess concentrations below former E-1 Ditch.
	EDB Plant	28-36	1.5, 5, 10, 15, 20	VOCs	Assess concentrations in vicinity of warehouse and obtain data consistent with previous investigations.
	Undeveloped Lots on Parcel I	37-46	1.5, 5, above first water	TPH, Metals	Assess concentrations in areas that historically have been used for miscellaneous activities such as the storage of junk cars.
	Railroad Spur	47, 48	1.5, 5, above first water	TPH, Metals	Assess concentrations in vicinity of railroad tie.
	Soda Ash Transloading Area	49, 50	1.5, 5, above first water	Metals, pH	Assess concentrations in vicinity of transloading area.
C	Magnesia Plant	51-54	1.5, 5, above first water	TPH, Metals	Assess petroleum impact.

P_4 - Elemental phosphorus according to USEPA SW-846 Method 7580
VOCs - Volatile organic compounds according to USEPA SW-846 Method 8021 and/or 8260
TPH - Petroleum hydrocarbon fuel fingerprint according to USEPA SW-846 Method 8015M
Metals - CAM 17 Metals according to USEPA SW-846 Series 6000 and 7000

TABLE 2
PROPOSED GROUNDWATER SAMPLING LOCATIONS
FMC - Newark

PARCEL(s)	CHEMICAL USE AREA	MONITORING WELL OR SAMPLING LOCATION	LABORATORY ANALYSES	RATIONALE
A&D	Phosphate Plant	W-8	Metals	Quantify metals present.
	Phosphate Plant	W-9	Metals	Quantify metals present.
	Phosphate Plant	W-10	Metals	Quantify metals present.
	-	W-11	Metals	Quantify impacts to groundwater.
	Phosphoric Acid Plant	W-12	Metals	Quantify impacts to groundwater.
	-	W-13	Metals	Determine upgradient groundwater quality.
	-	W-15	Metals	Quantify metals present.
	Filter Aid Pit	DW-11	Metals	Quantify impacts to groundwater.
	Phosphate/ Phosphoric Acid Plants	Temporary Shallow Zone Wells (3)	Metals	Quantify metals present.
	Phosphorus Pits	Soil Borings 1-4	P_4, Metals, pH	Quantify P_4/metals present.
	Phosphate/ Phosphoric Acid Plants	Soil Borings 6-12, 20	Metals, pH	Quantify metals present.
B&I	(Downgradient of) EDB Area	W-4	Metals	Quantify metals present.
	EDB Area	W-5	Metals	Quantify metals present.
	EDB Area	W-6	Metals	Quantify metals present.
	Former DBS Property	W-21	VOCs, Metals	Define lateral extent; quantify metals present.
	-	W-22	Metals	Quantify metals present.
	EDB Area	W-24	Metals	Quantify metals present.
	Former DBS Property	W-25	VOCs, Metals	Define lateral extent; quantify metals present.
	(Downgradient of) Phosphate Plant	W-27	Metals	Quantify metals present.
	(Downgradient of) EDB Area	W-28	Metals	Quantify metals present.
	EDB Area	W-30	Metals	Quantify metals present.
	Former DBS Property	W-34	Metals	Quantify metals present.
	Former DBS Property	W-35	Metals	Quantify metals present.
	EDB Area	DW-2	Metals	Quantify metals present.
	(Downgradient of) EDB Area	DW-7	VOCs, Metals	Determine downgradient VOC data; quantify metals present.
	EDB Area	DW-8	Metals	Quantify metals present.
	SW Corner of Parcel I	Proposed Newark Well	VOCs, Metals	Define lateral extent; quantify metals present.
C	Magnesia Plant, Fuel Oil Tanks	W-1	VOCs, Metals	Determine downgradient VOC data; assess metals.
	Magnesia Plant	W-2	VOCs, Metals	Quantify metals present; determine downgradient VOC data.
	Magnesia Plant	W-3	VOCs, Metals	Quantify metals present; determine downgradient VOC data.
-	-	DW-5	Metals, VOCs	Assess off-site metals and VOCs.

P_4 - Elemental phosphorus according to USEPA SW-846 Method 7580
VOCs - Volatile organic compounds according to USEPA SW-846 Method 8021 and/or 8260
Metals - CAM 17 Metals according to USEPA SW-846 Series 6000 and 7000
Note: SB-2 and SB-5 will be converted to temporary shallow zone monitoring wells.

TABLE 3
SAMPLING PRESERVATION PARAMETERS
FMC - Newark

Analysis	Container	Preservation	Hold Time
SOIL:			
P_4	Brass Tube	4 °C	28 Days
CAM 17 Metals	Brass tube/Glass jar	4 °C	6 months
VOCs	Brass tube/Glass jar	4 °C	14 days
pH	Brass tube/Glass jar	4 °C	ASAP
TPH -Fuel Fingerprint	Brass tube/Glass jar	4 °C	28 Days
WATER:			
P_4	1 L amber bottle	None	28 Days
CAM 17 Metals	1 L poly bottle	HNO_3	6 Months
VOCs	40 ml VOA vials	4 °C	14 Days
pH	250 ml poly bottle	None	ASAP
TPH -Fuel Fingerprint	1 L amber bottle	H_2SO_4	28 Days

Laboratory: CLS Laboratory or Mountain States Laboratory

* 14 days for extraction/40 days for analysis
** 7 days for extraction/40 days for analysis

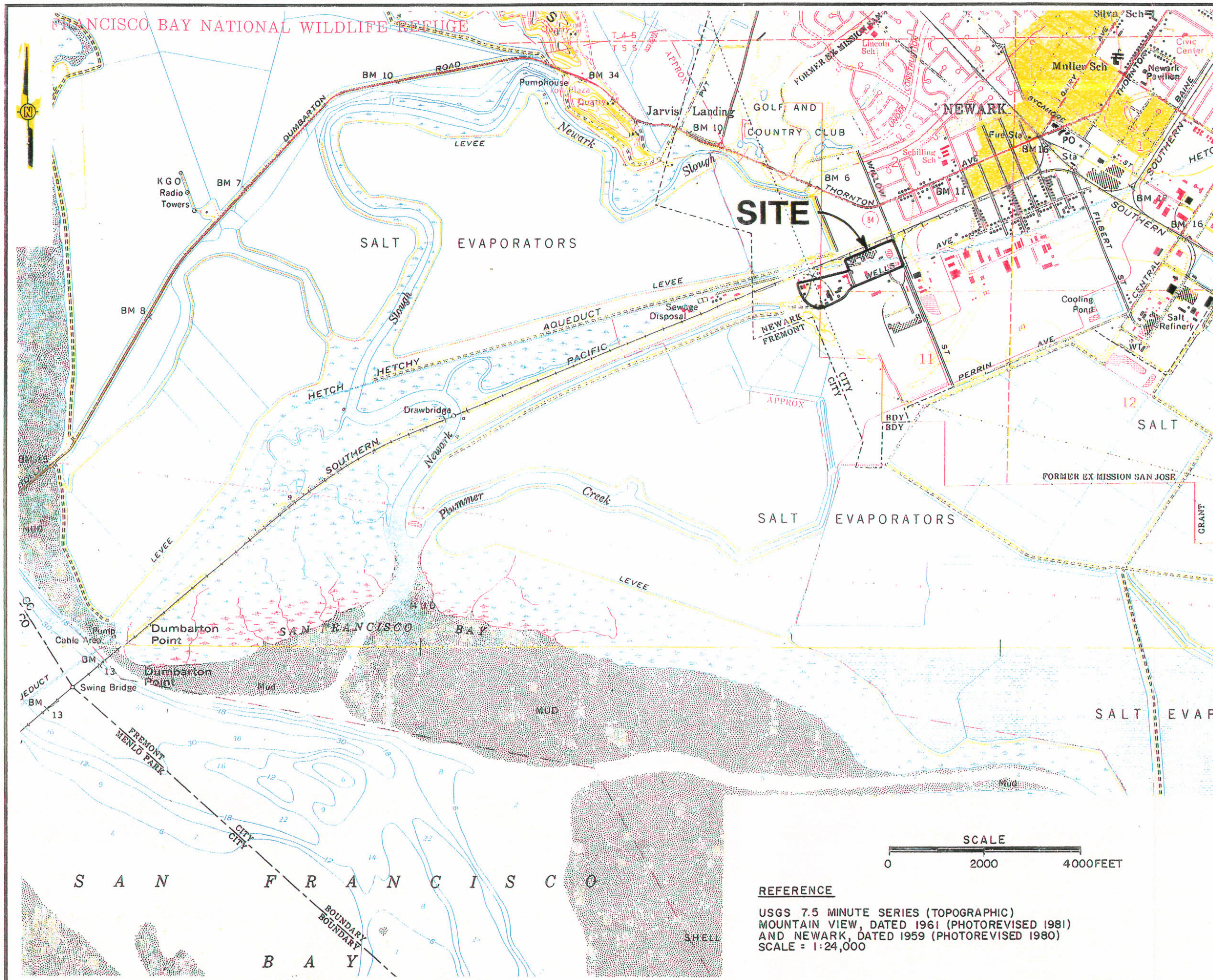
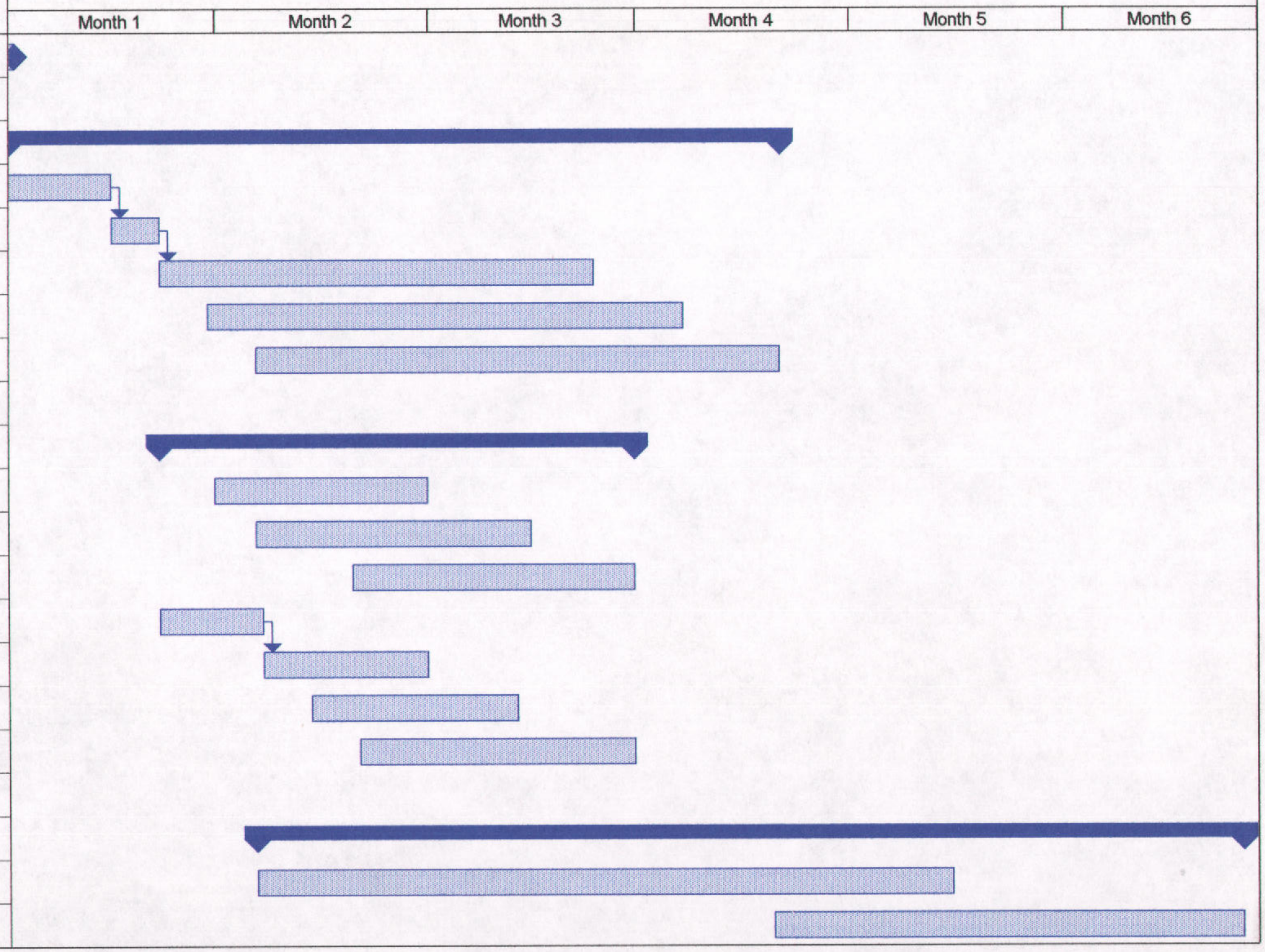


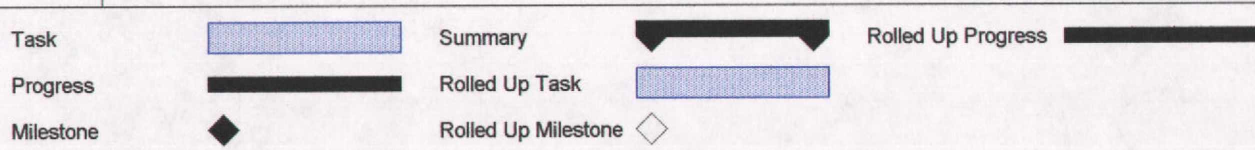
FIGURE 1
SITE LOCATION MAP
FMC CORPORATION
NEWARK, CALIFORNIA

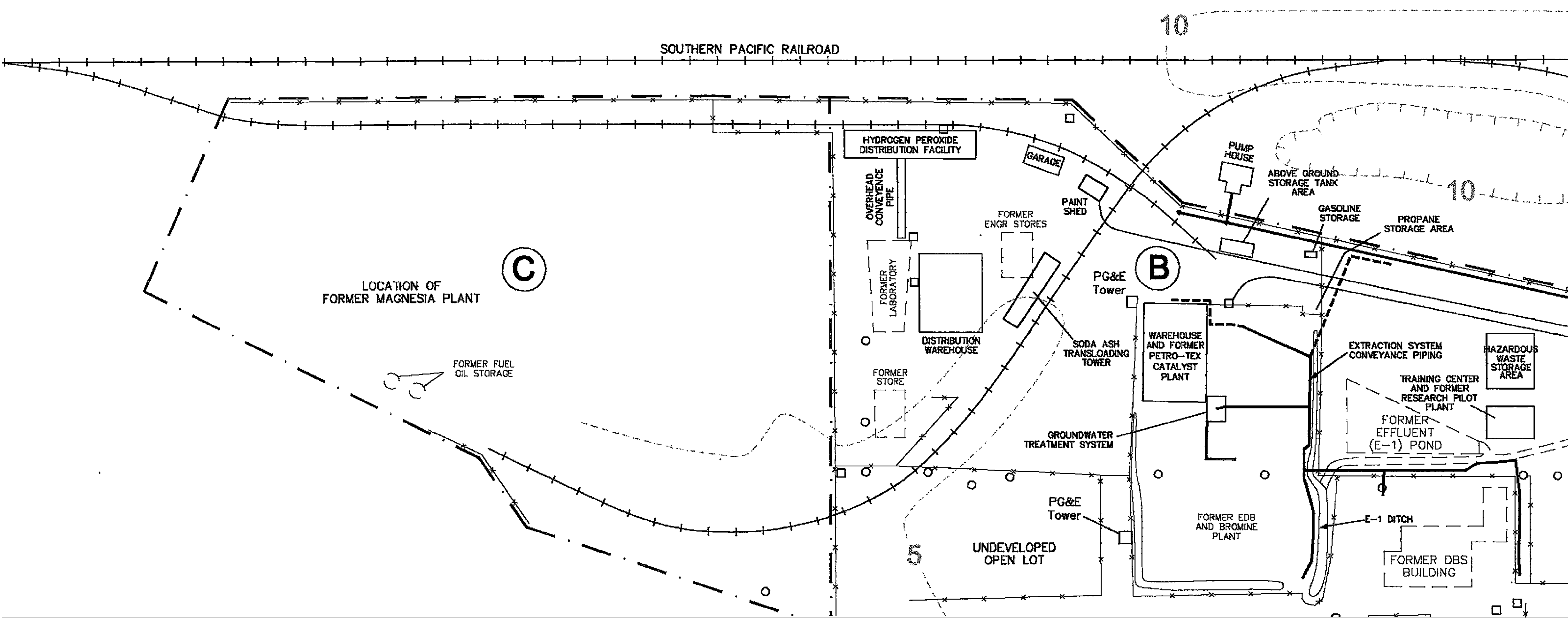
FMC Corporation
8787 Enterprise Drive
Newark, California

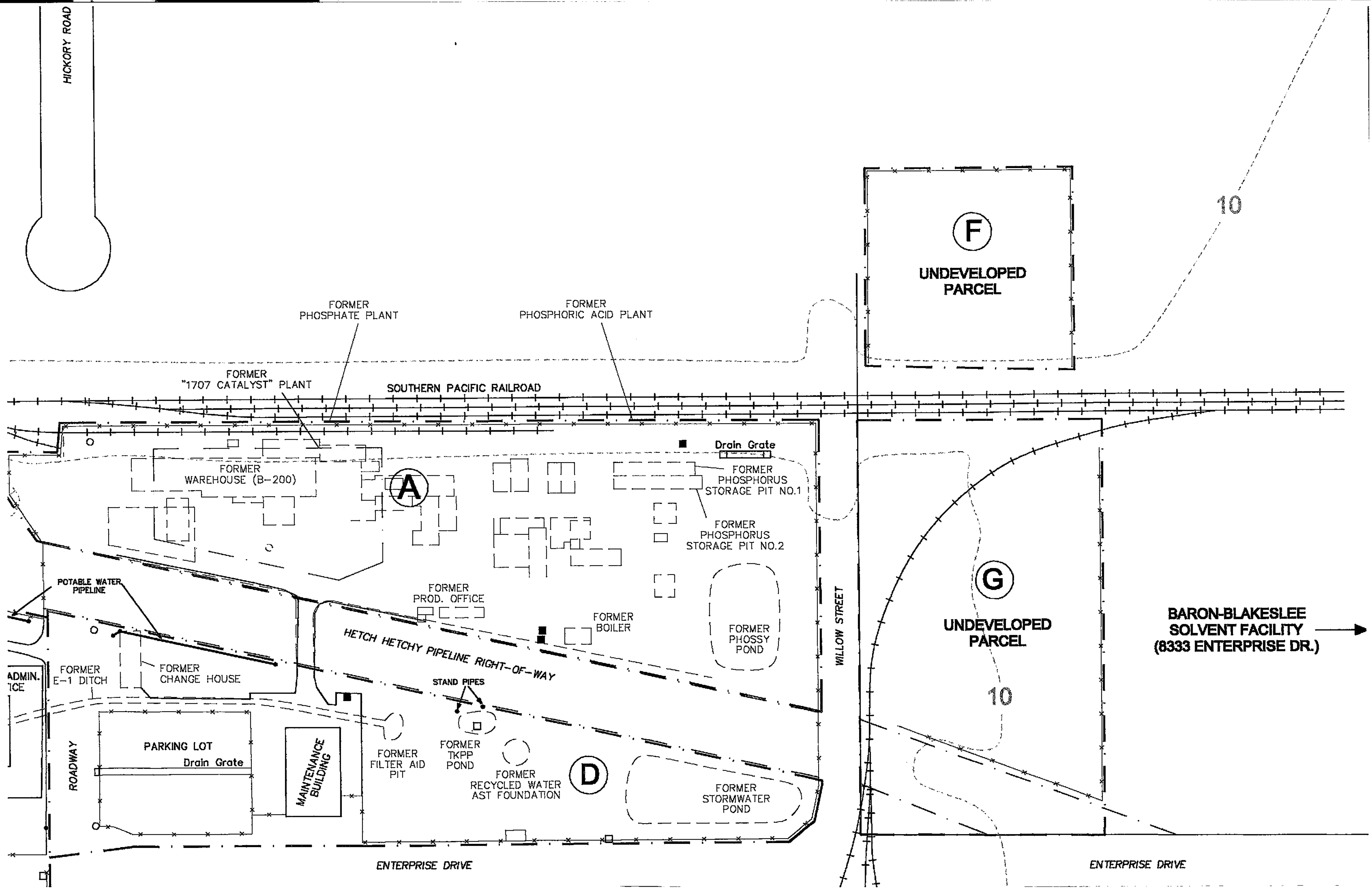
FIGURE 19
FMC - NEWARK REMEDIAL INVESTIGATION SCHEDULE

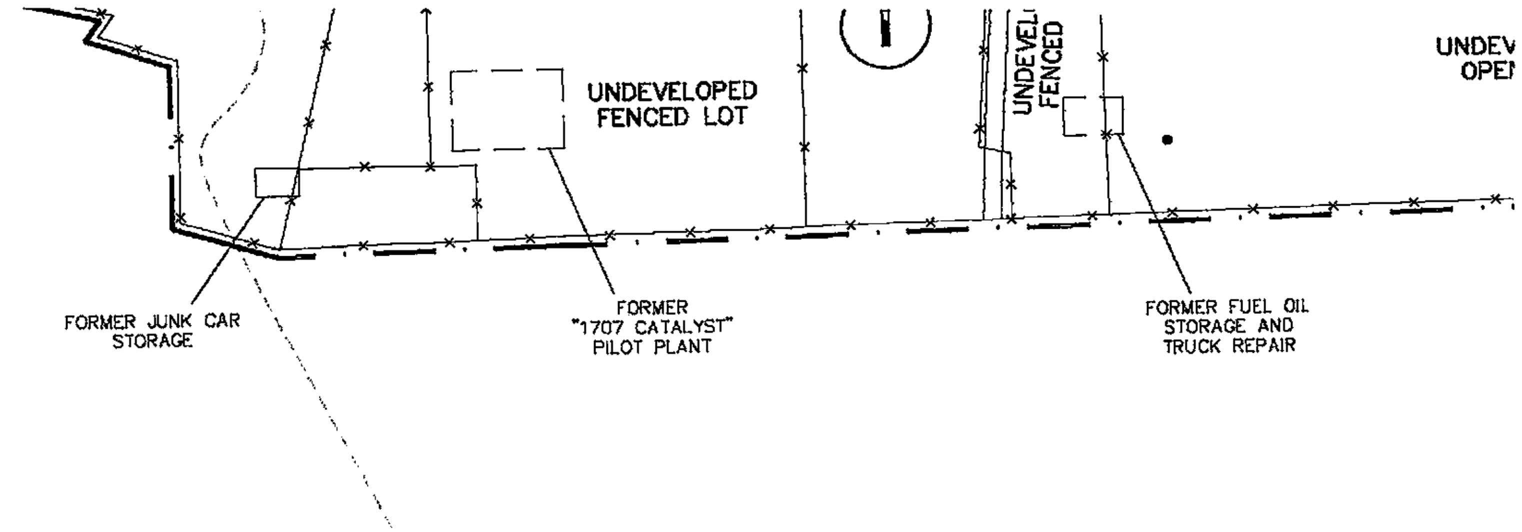
ID	Task Name
1	**RWQCB WORKPLAN APPROVAL**
2	
3	**SOIL INVESTIGATION**
4	Pre-Mobilization Activities
5	Mobilize Field Equipment and Personnel
6	Perform Soil Investigation
7	Perform Sample Analyses
8	Perform Data QA/QC and Data Entry
9	
10	**GROUNDWATER INVESTIGATION**
11	Sample Existing Groundwater Wells
12	Perform Groundwater Analyses
13	Perform Data QA/QC and Data Entry
14	Install Groundwater Monitoring Wells
15	Sample New Groundwater Monitoring Wells
16	Perform Groundwater Analyses
17	Perform Data QA/QC and Data Entry
18	
19	**REPORT**
20	Review Results of Field Investigation
21	Prepare Remedial Investigation Report






SOUTHERN PACIFIC RAILROAD
10
HYDROGEN PEROXIDE DISTRIBUTION FACILITY
GARAGE
PUMP HOUSE
ABOVE GROUND STORAGE TANK AREA
GASOLINE STORAGE
PROPANE STORAGE AREA
PAINT SHED
OVERHEAD CONVEYENCE PIPE
FORMER ENGR STORES
FORMER LABORATORY
DISTRIBUTION WAREHOUSE
SODA ASH TRANSLOADING TOWER
PG&E Tower
B
C
LOCATION OF FORMER MAGNESIA PLANT
FORMER FUEL OIL STORAGE
FORMER STORE
WAREHOUSE AND FORMER PETRO-TEX CATALYST PLANT
EXTRACTION SYSTEM CONVEYANCE PIPING
HAZARDOUS WASTE STORAGE AREA
TRAINING CENTER AND FORMER RESEARCH PILOT PLANT
FORMER EFFLUENT (E-1) POND
GROUNDWATER TREATMENT SYSTEM
PG&E Tower
FORMER EDB AND BROMINE PLANT
E-1 DITCH
FORMER DBS BUILDING
UNDEVELOPED OPEN LOT
5


HICKORY ROAD
10
F
UNDEVELOPED PARCEL
FORMER PHOSPHATE PLANT
FORMER PHOSPHORIC ACID PLANT
FORMER "1707 CATALYST" PLANT
SOUTHERN PACIFIC RAILROAD
Drain Grate
FORMER WAREHOUSE (B-200)
A
FORMER PHOSPHORUS STORAGE PIT NO.1
FORMER PHOSPHORUS STORAGE PIT NO.2
G
UNDEVELOPED PARCEL
POTABLE WATER PIPELINE
FORMER PROD. OFFICE
FORMER BOILER
FORMER PHOSSY POND
WILLOW STREET
BARON-BLAKESLEE SOLVENT FACILITY (8333 ENTERPRISE DR.)
HETCH HETCHY PIPELINE RIGHT-OF-WAY
ADMIN. ICE
FORMER E-1 DITCH
FORMER CHANGE HOUSE
STAND PIPES
10
PARKING LOT
Drain Grate
MAINTENANCE BUILDING
FORMER FILTER AID PIT
FORMER TKPP POND
FORMER RECYCLED WATER AST FOUNDATION
D
FORMER STORMWATER POND
ROADWAY
ENTERPRISE DRIVE
ENTERPRISE DRIVE



POWER/TELEPHONE POLE

STORM DRAIN

PIPE

SUMP

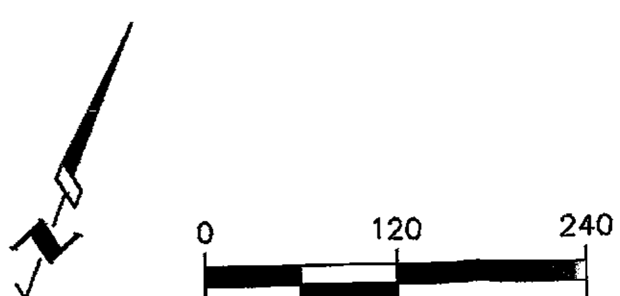
PARCEL DESIGNATION

FORMER STRUCTURE

EXISTING STRUCTURE

APPROXIMATE LOCATION OF ELEVATION CONTOUR (USGS Topographic Map)

PROPERTY LINE



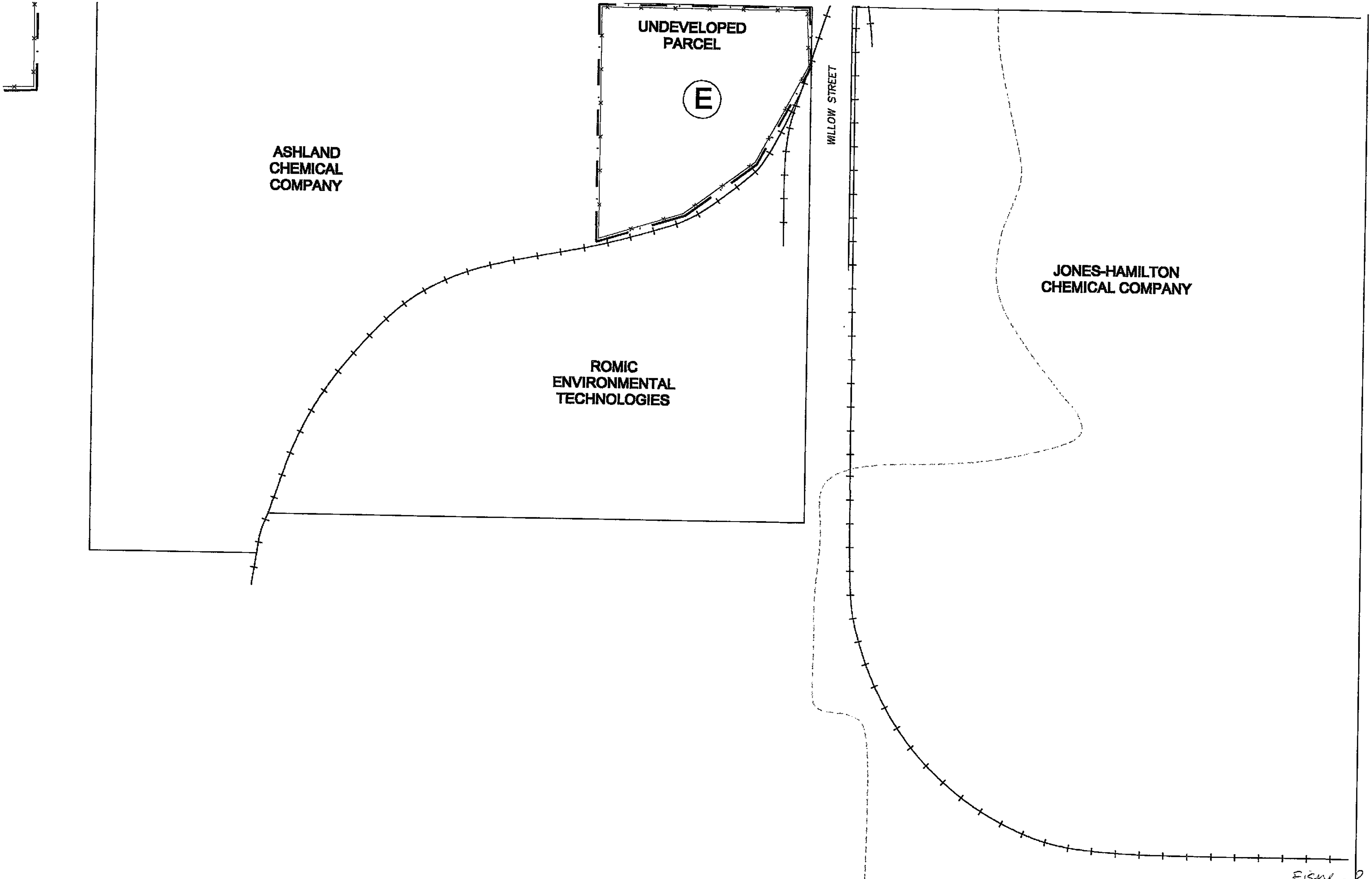
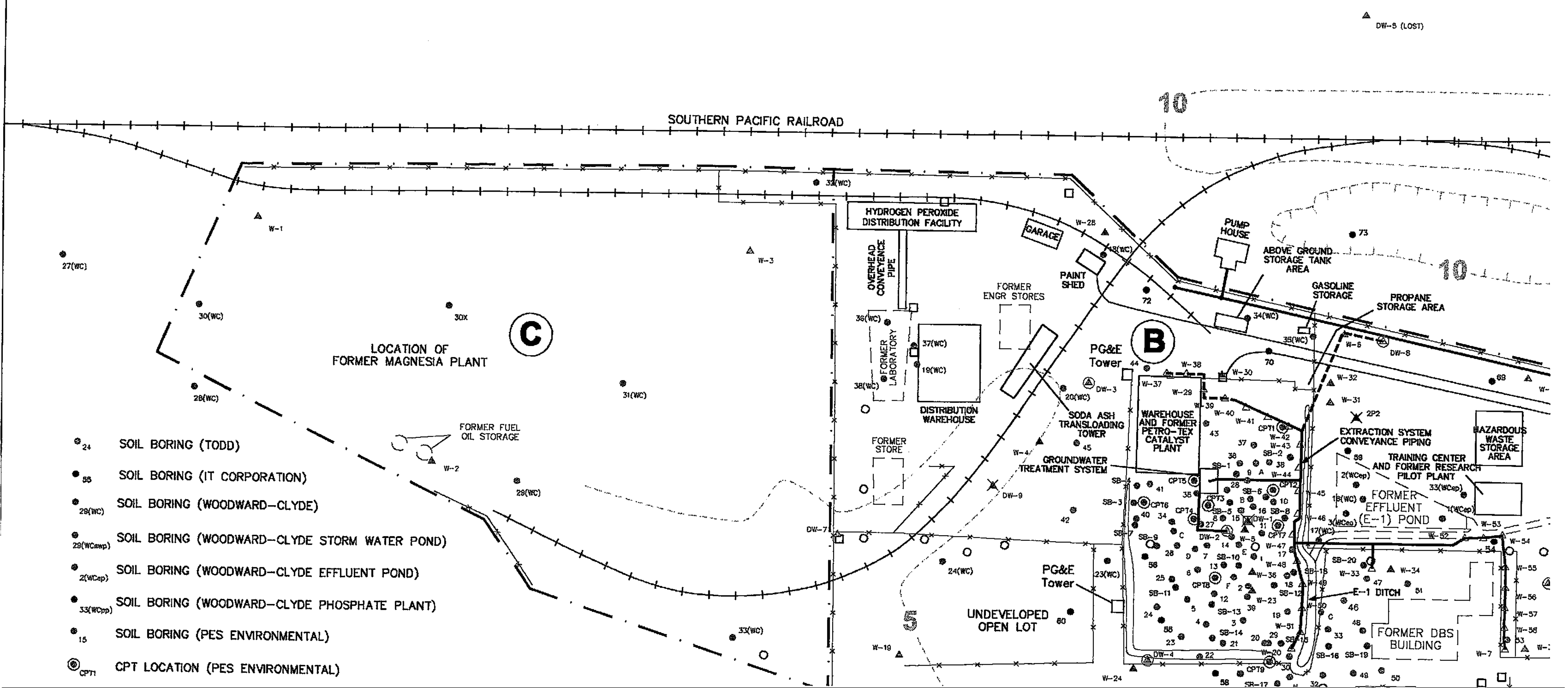
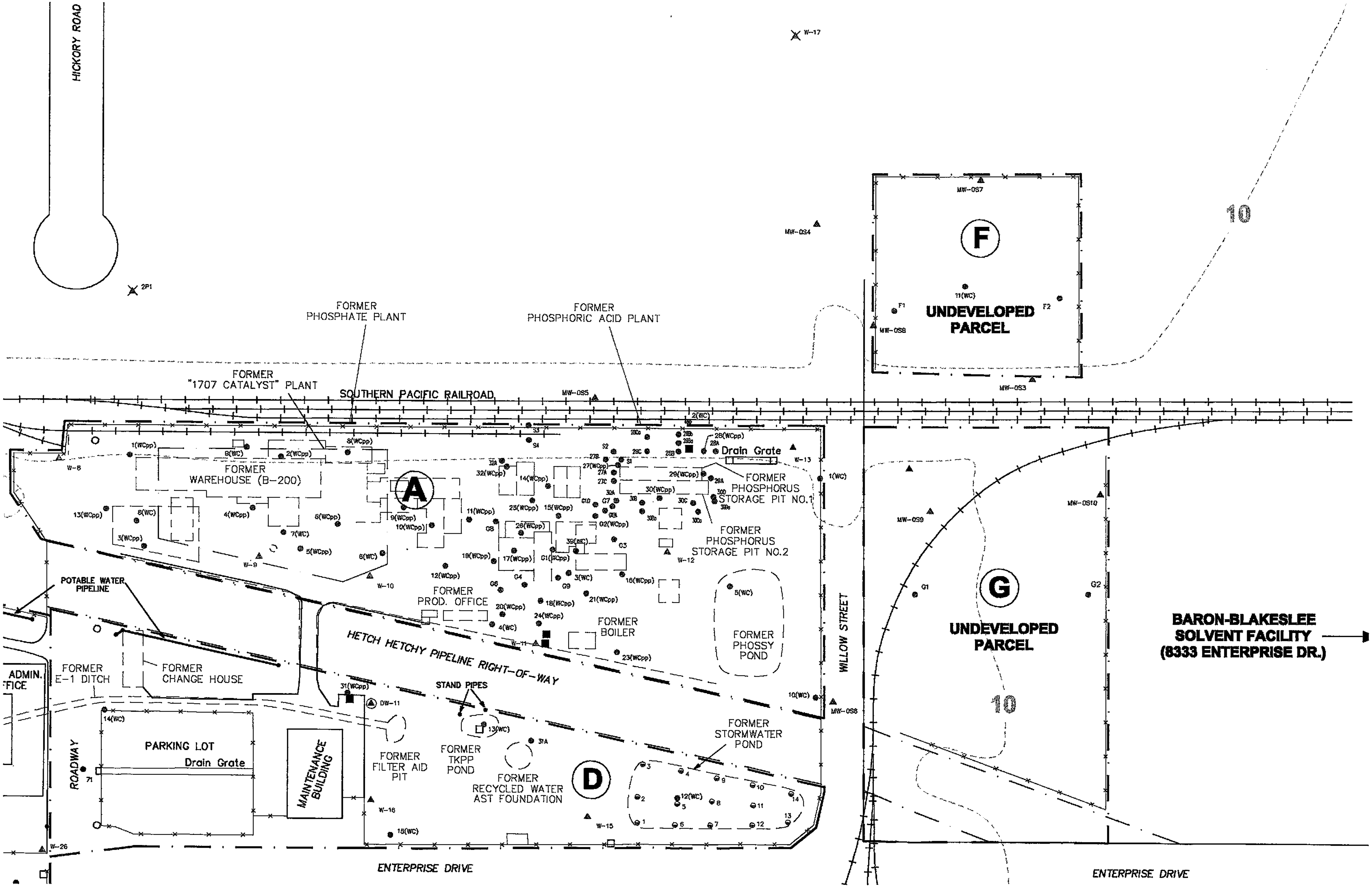

UNDEVELOPED PARCEL
E
ASHLAND CHEMICAL COMPANY
WILLOW STREET
ROMIC ENVIRONMENTAL TECHNOLOGIES
JONES-HAMILTON CHEMICAL COMPANY

Figure 2



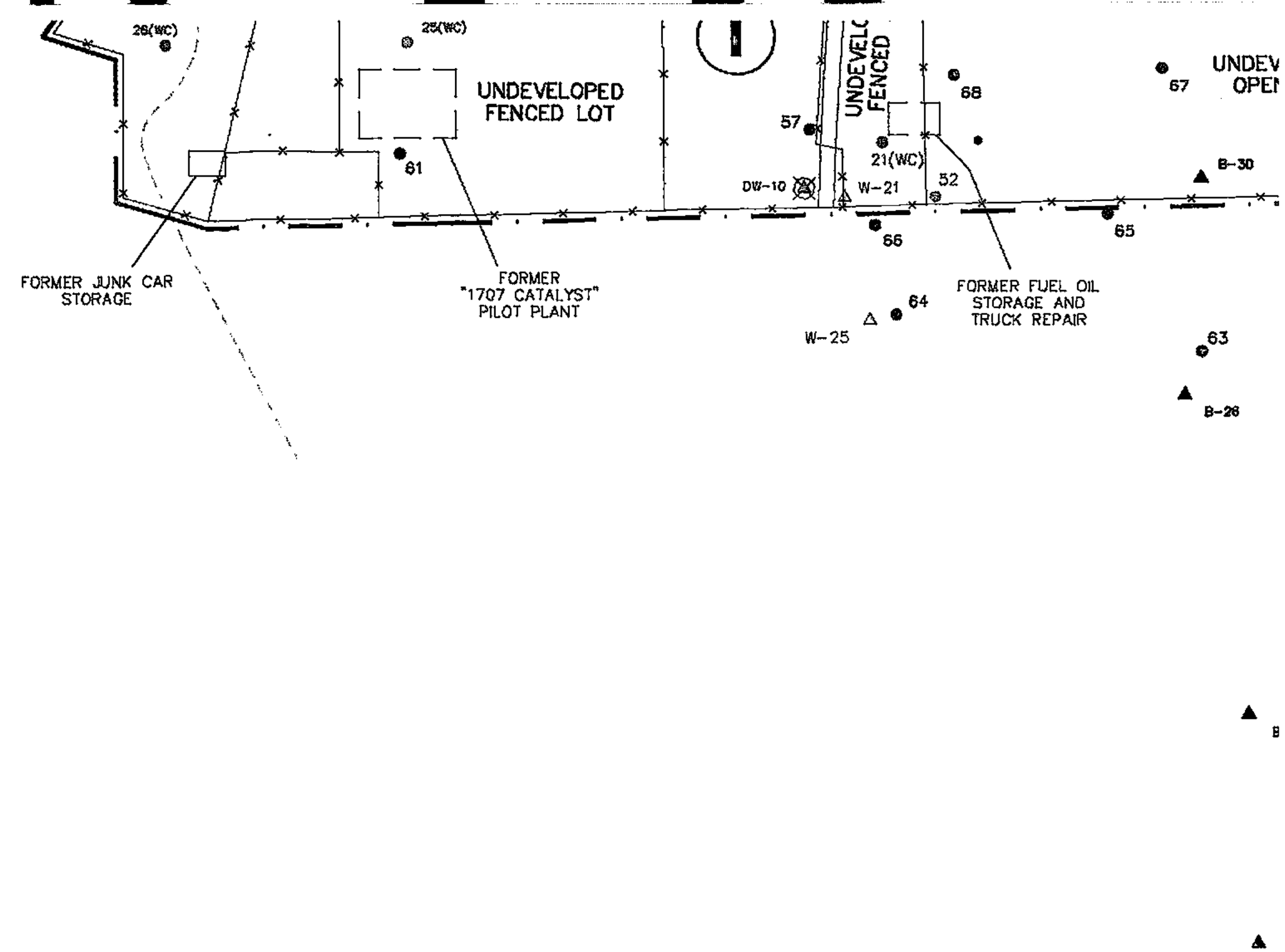
SOUTHERN PACIFIC RAILROAD
DW-8 (LOST)
10
10
5
C
LOCATION OF
FORMER MAGNESIA PLANT
FORMER FUEL
OIL STORAGE
B
HYDROGEN PEROXIDE
DISTRIBUTION FACILITY
OVERHEAD
CONVEYENCE
PIPE
GARAGE
PAINT
SHED
FORMER
ENGR STORES
FORMER
LABORATORY
DISTRIBUTION
WAREHOUSE
FORMER
STORE
SODA ASH
TRANSLOADING
TOWER
GROUNDWATER
TREATMENT SYSTEM
PG&E
Tower
PG&E
Tower
UNDEVELOPED
OPEN LOT
PUMP
HOUSE
ABOVE GROUND
STORAGE TANK
AREA
GASOLINE
STORAGE
PROPANE
STORAGE AREA
WAREHOUSE
AND FORMER
PETRO-TEX
CATALYST
PLANT
EXTRACTION SYSTEM
CONVEYANCE PIPING
TRAINING CENTER
AND FORMER RESEARCH
PILOT PLANT
HAZARDOUS
WASTE
STORAGE
AREA
FORMER
EFFLUENT
(E-1) POND
E-1 DITCH
FORMER DBS
BUILDING
SOIL BORING (TODD)
SOIL BORING (IT CORPORATION)
SOIL BORING (WOODWARD-CLYDE)
SOIL BORING (WOODWARD-CLYDE STORM WATER POND)
SOIL BORING (WOODWARD-CLYDE EFFLUENT POND)
SOIL BORING (WOODWARD-CLYDE PHOSPHATE PLANT)
SOIL BORING (PES ENVIRONMENTAL)
CPT LOCATION (PES ENVIRONMENTAL)


HICKORY ROAD
W-17
2P1
FORMER
PHOSPHATE PLANT
FORMER
PHOSPHORIC ACID PLANT
FORMER
"1707 CATALYST" PLANT
SOUTHERN PACIFIC RAILROAD
MW-OS5
MW-OS4
MW-OS7
MW-OS8
MW-OS3
F
UNDEVELOPED
PARCEL
10
FORMER
WAREHOUSE (B-200)
A
Drain Grate
FORMER
PHOSPHORUS
STORAGE PIT NO.1
FORMER
PHOSPHORUS
STORAGE PIT NO.2
FORMER
PROD. OFFICE
FORMER
BOILER
FORMER
PHOSSY
POND
WILLOW STREET
MW-OS9
MW-OS10
G
UNDEVELOPED
PARCEL
BARON-BLAKESLEE
SOLVENT FACILITY
(8333 ENTERPRISE DR.)
POTABLE WATER
PIPELINE
HETCH HETCHY PIPELINE RIGHT-OF-WAY
ADMIN.
FFICE
FORMER
E-1 DITCH
FORMER
CHANGE HOUSE
STAND PIPES
PARKING LOT
Drain Grate
ROADWAY
MAINTENANCE
BUILDING
FORMER
FILTER AID
PIT
FORMER
TKPP
POND
FORMER
RECYCLED WATER
AST FOUNDATION
D
FORMER
STORMWATER
POND
ENTERPRISE DRIVE
ENTERPRISE DRIVE

- 2P3 — ABANDONED MONITORING WELL (ALAMEDA COUNTY WATER DISTRICT)
- E6B — MONITORING WELL (ALAMEDA COUNTY WATER DISTRICT)
- 3 — STORM WATER POND SAMPLES (FMC)
- W-4 — SHALLOW ZONE MONITORING WELL (FMC)
- DW-9 — ABANDONED SHALLOW ZONE MONITORING WELL (FMC)
- DW-3 — NEWARK AQUIFER MONITORING WELL (FMC)
- DW-10 — ABANDONED NEWARK AQUIFER MONITORING WELL (FMC)
- W-7 — SHALLOW ZONE EXTRACTION WELL (FMC)
- DW-2 — NEWARK AQUIFER EXTRACTION WELL (FMC)
- DW-1 — ABANDONED IRVINGTON AQUITARD MONITORING WELL (FMC)
- B-25 — MONITORING WELL (ASHLAND CHEMICAL)
- MW-0S9 — MONITORING WELL (BARON-BLAKESLEE)
- J10 — MONITORING WELL (JONES-HAMILTON Co.)
- P-3 — MONITORING WELL (ROMIC ENVIRONMENTAL TECHNOLOGIES)
- POWER/TELEPHONE POLE
- STORM DRAIN
- PIPE
- SUMP
- A — PARCEL DESIGNATION
- FORMER STRUCTURE
- EXISTING STRUCTURE
- 10 — APPROXIMATE LOCATION OF ELEVATION CONTOUR (USGS Topographic Map)
- PROPERTY LINE

N

0 120 240



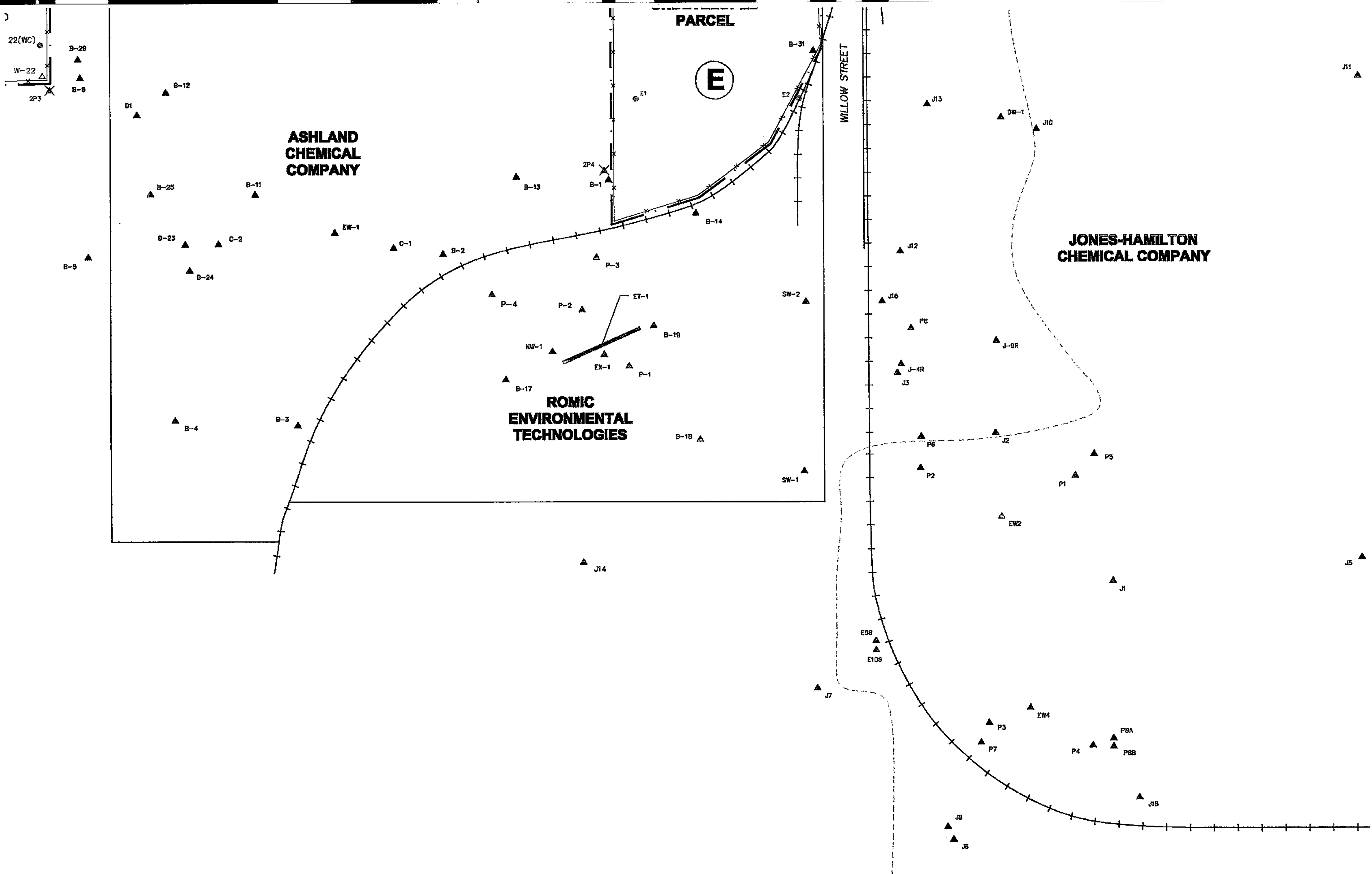
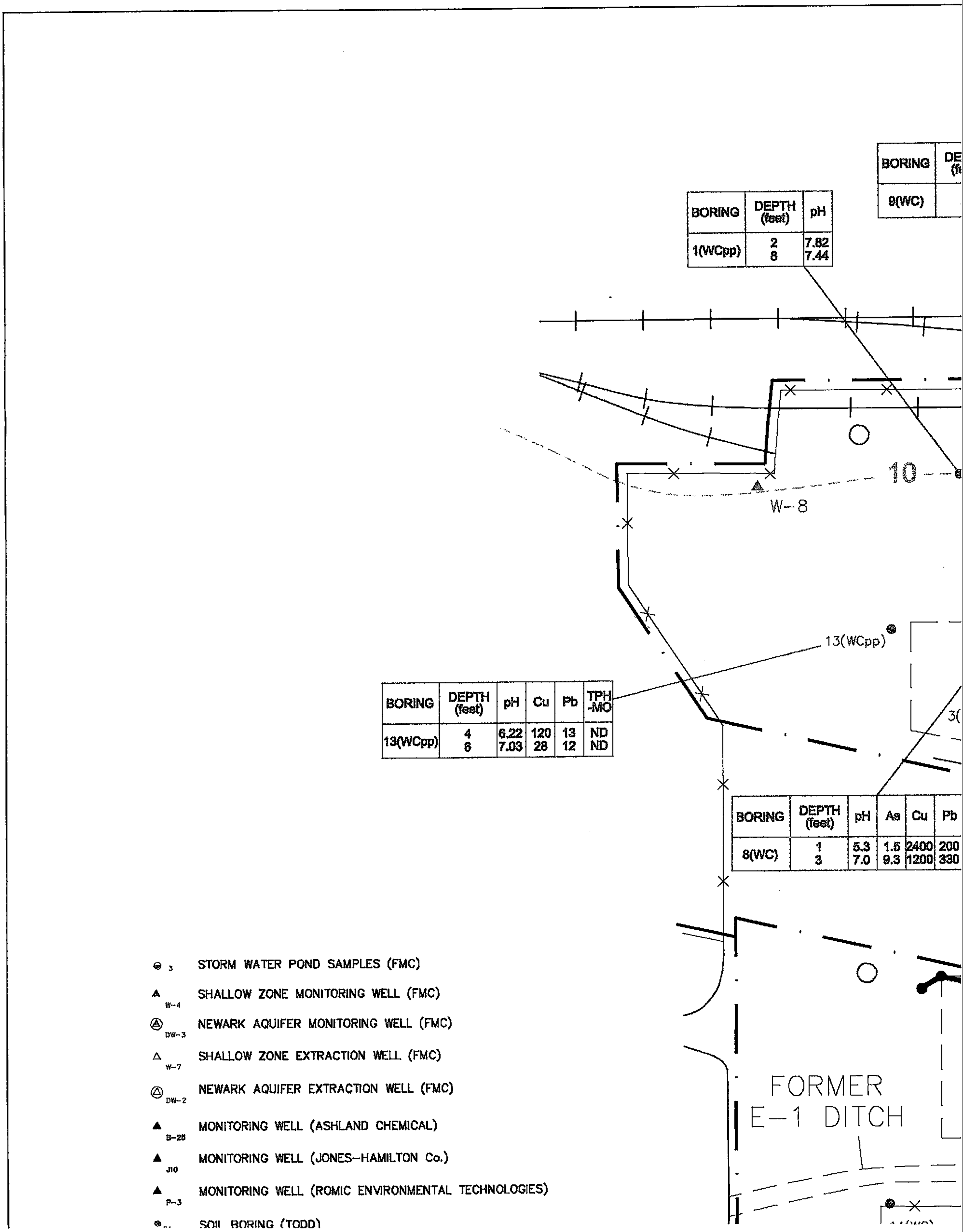

PARCEL
E
WILLOW STREET
ASHLAND CHEMICAL COMPANY
ROMIC ENVIRONMENTAL TECHNOLOGIES
JONES-HAMILTON CHEMICAL COMPANY
22(WC)
W-22
2P3
2P4
B-29
B-9
B-12
D1
B-25
B-11
B-13
B-1
B-31
E1
E2
B-14
B-23
C-2
EW-1
C-1
B-2
B-5
B-24
P-3
P-4
P-2
ET-1
B-19
NW-1
EX-1
P-1
B-17
B-4
B-3
B-18
SW-2
SW-1
J14
J11
J13
DW-1
J10
J12
J16
P8
J-9R
J-4R
J3
P6
J2
P5
P2
P1
EW2
J5
J1
E58
E108
J7
EW4
P3
P8A
P7
P4
P8B
J15
J8
J6

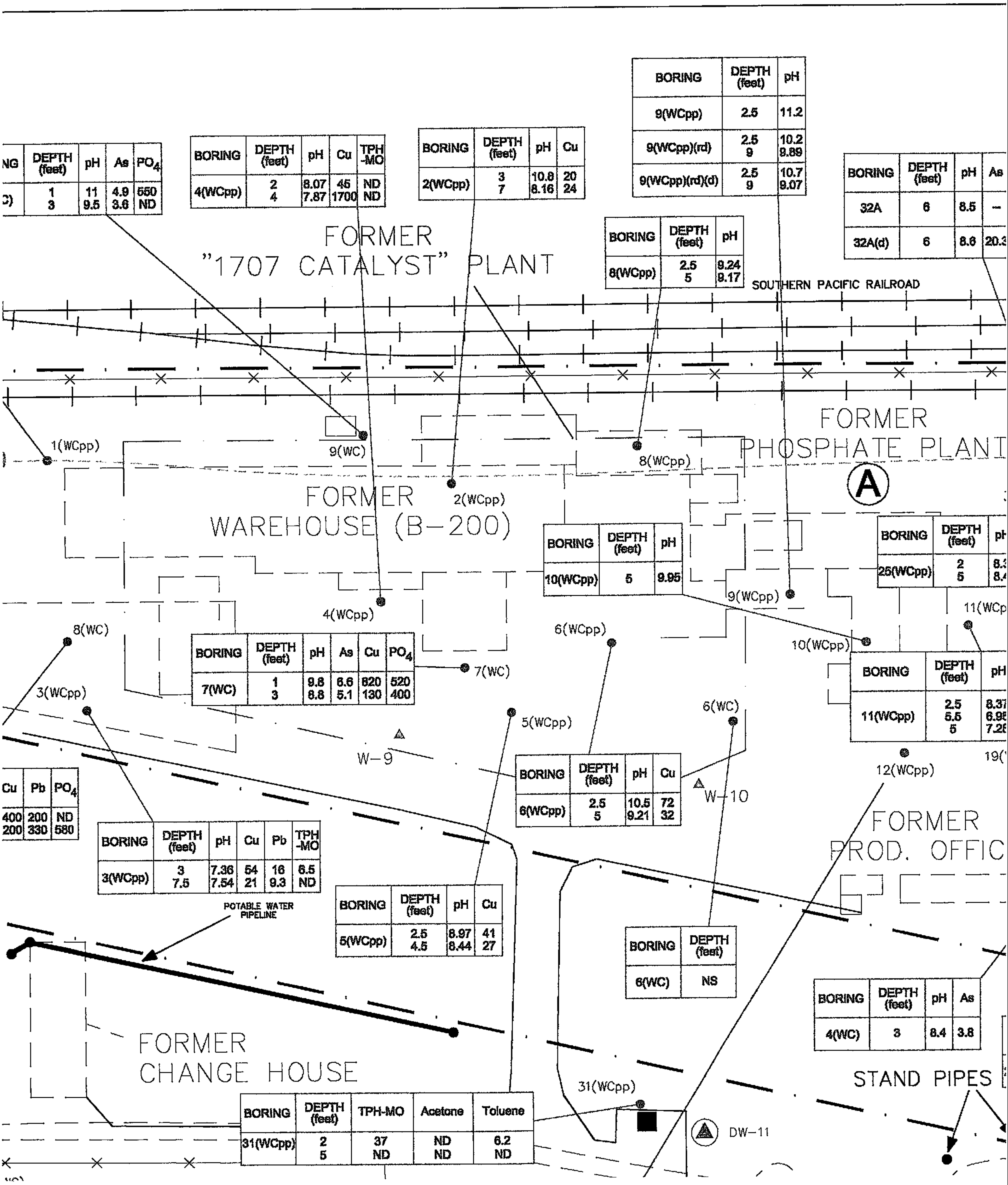
Figure 3



BORING	DEPTH (feet)	pH
1(WCpp)	2 8	7.82 7.44

BORING	DEPTH (feet)	pH	Cu	Pb	TPH-MO
13(WCpp)	4 6	6.22 7.03	120 28	13 12	ND ND

BORING	DEPTH (feet)	pH	As	Cu	Pb
8(WC)	1 3	5.3 7.0	1.5 9.3	2400 1200	200 330



NG	DEPTH (feet)	pH	As	PO_4
C)	1 3	11 9.5	4.9 3.6	550 ND

BORING	DEPTH (feet)	pH	Cu	TPH -MO
4(WCpp)	2 4	8.07 7.87	45 1700	ND ND

BORING	DEPTH (feet)	pH	Cu
2(WCpp)	3 7	10.8 8.16	20 24

BORING	DEPTH (feet)	pH
9(WCpp)	2.5	11.2
9(WCpp)(rd)	2.5 9	10.2 9.89
9(WCpp)(rd)(d)	2.5 9	10.7 9.07

BORING	DEPTH (feet)	pH	As
32A	6	8.5	--
32A(d)	6	8.6	20.3

BORING	DEPTH (feet)	pH
8(WCpp)	2.5 5	9.24 9.17

BORING	DEPTH (feet)	pH
10(WCpp)	5	9.95

BORING	DEPTH (feet)	pH
25(WCpp)	2 5	8.3 8.4

BORING	DEPTH (feet)	pH
11(WCpp)	2.5 5.5 5	8.37 6.95 7.28

BORING	DEPTH (feet)	pH	As	Cu	PO_4
7(WC)	1 3	9.8 8.8	6.6 5.1	820 130	520 400

Cu	Pb	PO_4
400 200	200 330	ND 580

BORING	DEPTH (feet)	pH	Cu	Pb	TPH -MO
3(WCpp)	3 7.5	7.36 7.54	54 21	16 9.3	6.5 ND

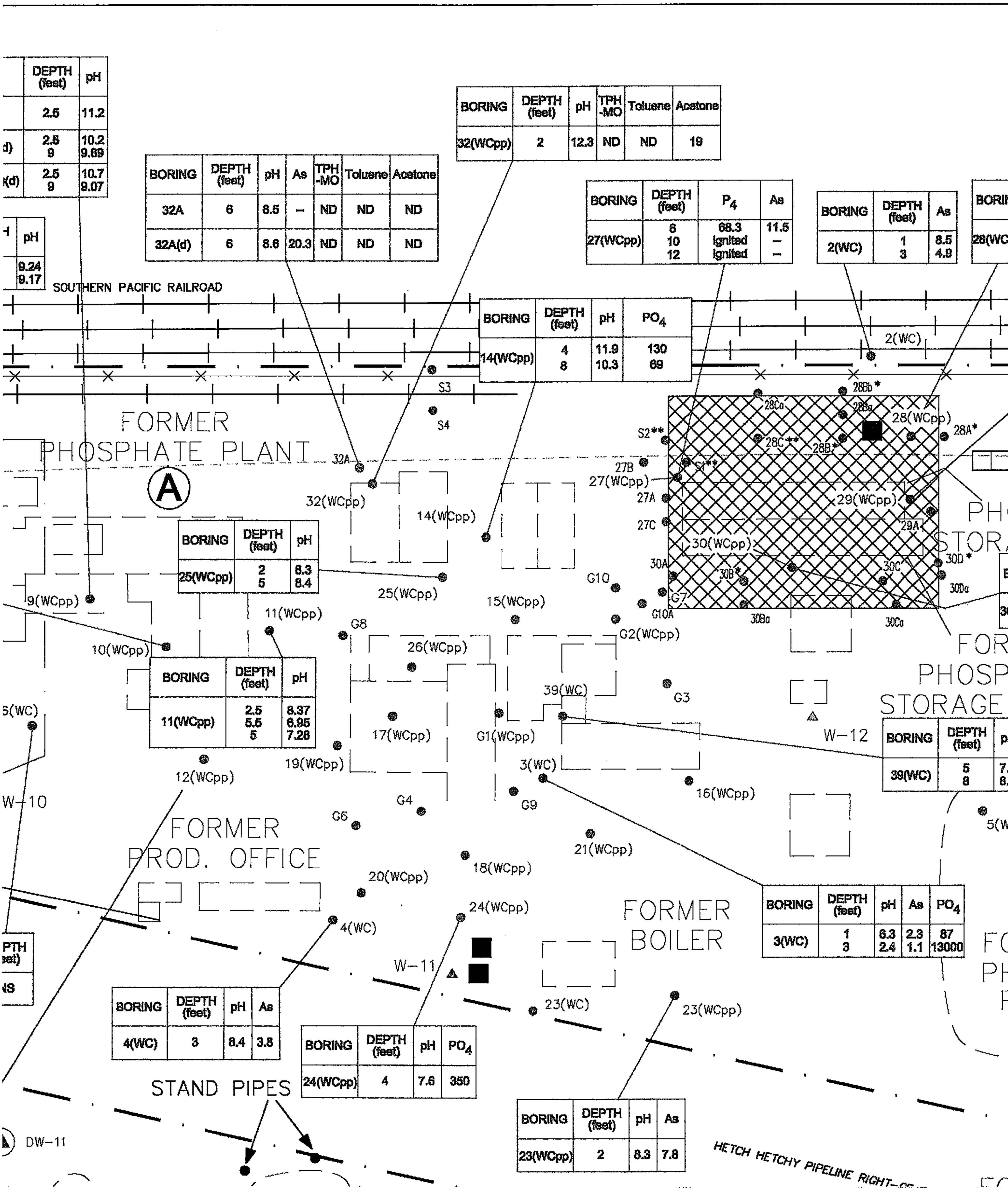
BORING	DEPTH (feet)	pH	Cu
6(WCpp)	2.5 5	10.5 9.21	72 32

BORING	DEPTH (feet)	pH	Cu
5(WCpp)	2.5 4.5	8.97 8.44	41 27

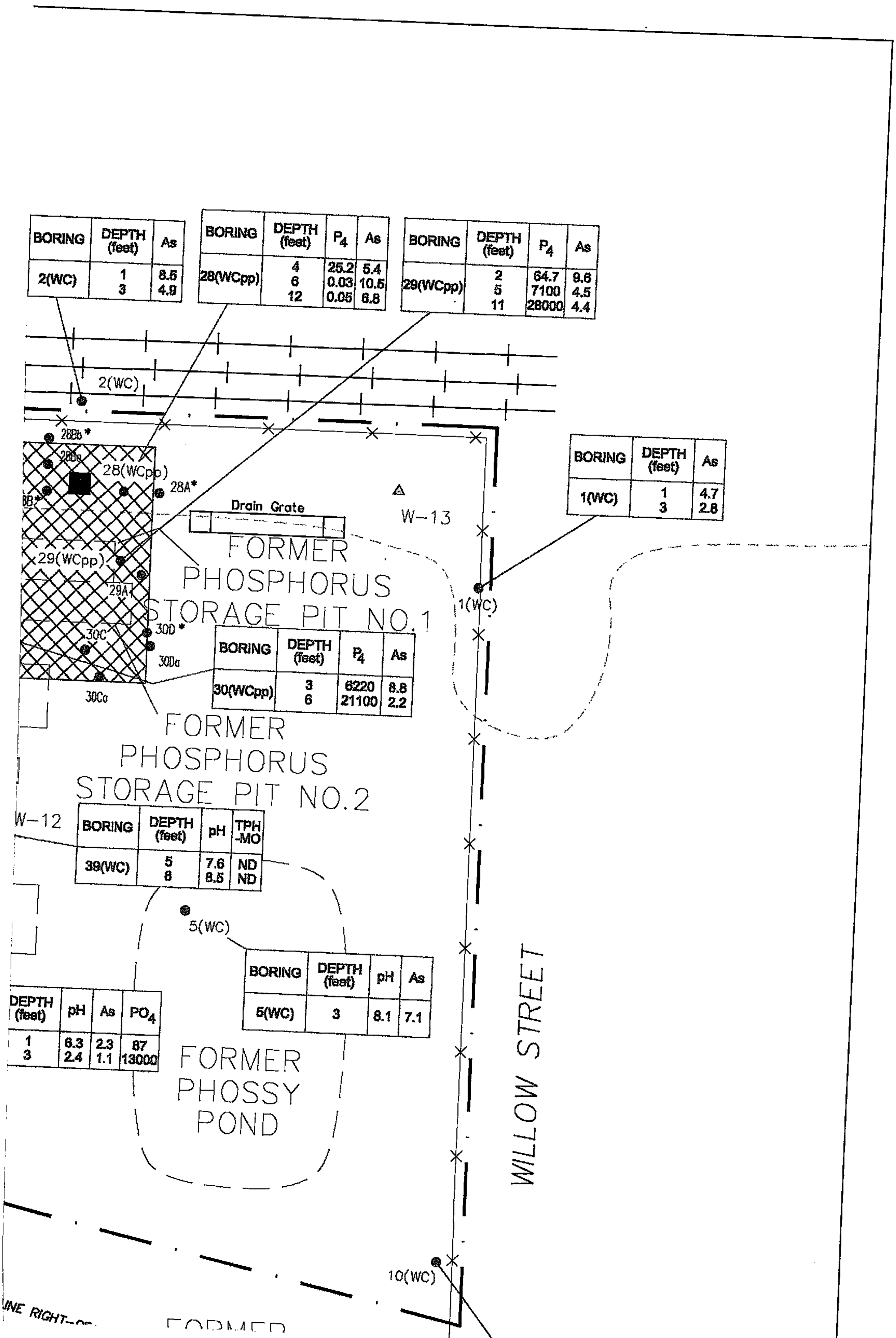
BORING	DEPTH (feet)
6(WC)	NS

BORING	DEPTH (feet)	pH	As
4(WC)	3	8.4	3.8

BORING	DEPTH (feet)	TPH-MO	Acetone	Toluene
31(WCpp)	2 5	37 ND	ND ND	6.2 ND



DEPTH (feet) | pH
2.5 | 11.2
2.5 9 | 10.2 9.89
2.5 9 | 10.7 9.07
pH
9.24 9.17
SOUTHERN PACIFIC RAILROAD
BORING | DEPTH (feet) | pH | As | TPH -MO | Toluene | Acetone
32A | 6 | 8.5 | -- | ND | ND | ND
32A(d) | 6 | 8.6 | 20.3 | ND | ND | ND
BORING | DEPTH (feet) | pH | TPH -MO | Toluene | Acetone
32(WCpp) | 2 | 12.3 | ND | ND | 19
BORING | DEPTH (feet) | P4 | As
27(WCpp) | 6 10 12 | 68.3 Ignited Ignited | 11.5 -- --
BORING | DEPTH (feet) | As
2(WC) | 1 3 | 8.5 4.9
BORING | DEPTH (feet) | pH | PO4
14(WCpp) | 4 8 | 11.9 10.3 | 130 69
FORMER PHOSPHATE PLANT
A
BORING | DEPTH (feet) | pH
25(WCpp) | 2 5 | 8.3 8.4
BORING | DEPTH (feet) | pH
11(WCpp) | 2.5 5.5 5 | 8.37 6.95 7.28
BORING | DEPTH (feet) | pH
39(WC) | 5 8 | 7.6 8.5
BORING | DEPTH (feet) | pH | As | PO4
3(WC) | 1 3 | 6.3 2.4 | 2.3 1.1 | 87 13000
BORING | DEPTH (feet) | pH | As
4(WC) | 3 | 8.4 | 3.8
BORING | DEPTH (feet) | pH | PO4
24(WCpp) | 4 | 7.6 | 350
BORING | DEPTH (feet) | pH | As
23(WCpp) | 2 | 8.3 | 7.8
S3
S4
32A
32(WCpp)
14(WCpp)
2(WC)
28Bb*
28Ca
28Ba
28(WCpp)
28A*
S2**
28C**
28B*
S1**
27B
27(WCpp)
27A
27C
29(WCpp)
29A
30(WCpp)
30A
30B*
30C
30D*
30Da
30Ba
30Ca
G7
G10A
G10
G2(WCpp)
G8
G3
G1(WCpp)
G4
G6
G9
9(WCpp)
10(WCpp)
11(WCpp)
12(WCpp)
15(WCpp)
16(WCpp)
17(WCpp)
18(WCpp)
19(WCpp)
20(WCpp)
21(WCpp)
23(WC)
23(WCpp)
24(WCpp)
25(WCpp)
26(WCpp)
39(WC)
3(WC)
4(WC)
5(WC)
6(WC)
W-10
W-11
W-12
DW-11
FORMER PHOSPHATE STORAGE
FORMER PROD. OFFICE
FORMER BOILER
STAND PIPES
HETCH HETCHY PIPELINE RIGHT-OF



BORING | DEPTH (feet) | As
2(WC) | 1 3 | 8.5 4.9
BORING | DEPTH (feet) | P4 | As
28(WCpp) | 4 6 12 | 25.2 0.03 0.05 | 5.4 10.5 6.8
BORING | DEPTH (feet) | P4 | As
29(WCpp) | 2 5 11 | 64.7 7100 28000 | 9.6 4.5 4.4
2(WC)
28Bb*
28(WCpp)
28A*
Drain Grate
W-13
BORING | DEPTH (feet) | As
1(WC) | 1 3 | 4.7 2.8
FORMER PHOSPHORUS STORAGE PIT NO.1
29(WCpp)
29A
1(WC)
30D*
30C
30Da
30Ca
BORING | DEPTH (feet) | P4 | As
30(WCpp) | 3 6 | 6220 21100 | 8.8 2.2
FORMER PHOSPHORUS STORAGE PIT NO.2
W-12
BORING | DEPTH (feet) | pH | TPH-MO
39(WC) | 5 8 | 7.6 8.5 | ND ND
5(WC)
BORING | DEPTH (feet) | pH | As
5(WC) | 3 | 8.1 | 7.1
DEPTH (feet) | pH | As | PO4
1 3 | 6.3 2.4 | 2.3 1.1 | 87 13000
FORMER PHOSSY POND
WILLOW STREET
10(WC)

SOIL BORING (IT CORPORATION)

SOIL BORING (WOODWARD-CLYDE SAMPLING LOCATION)

FORMER PHOSPHATE PLANT SAMPLING LOCATION (WOODWARD-CLYDE)

SOIL BORING (PES ENVIRONMENTAL)

CPT LOCATION (PES ENVIRONMENTAL)

SOIL BORING (UNKNOWN)

POWER/TELEPHONE POLE

STORM DRAIN

PIPE

SUMP

PARCEL DESIGNATION

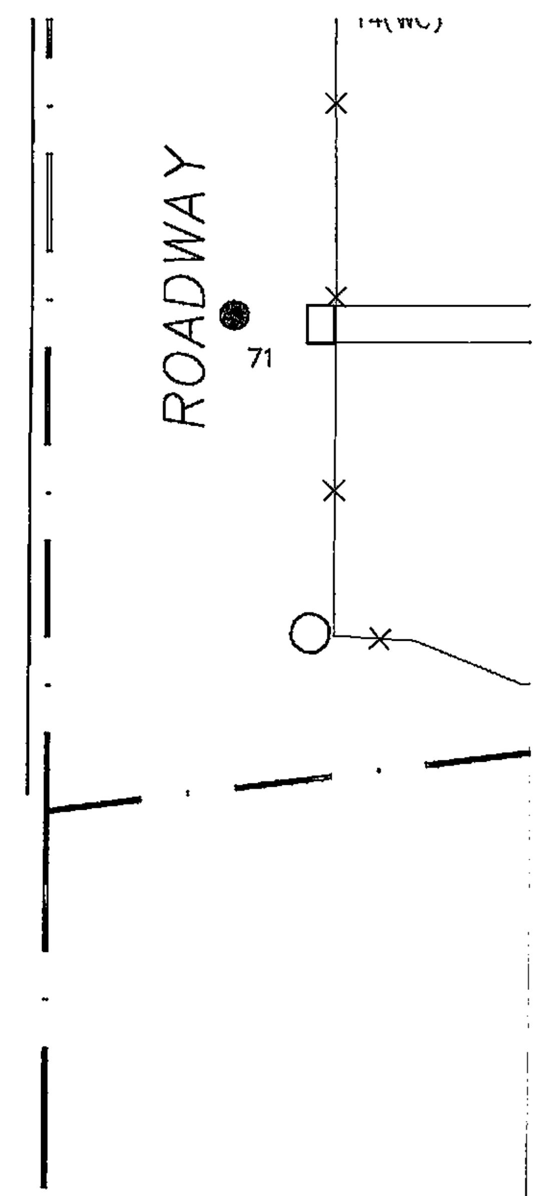
AREA POTENTIALLY IMPACTED WITH ELEMENTAL PHOSPHORUS

FORMER STRUCTURE

EXISTING STRUCTURE

APPROXIMATE LOCATION OF ELEVATION CONTOUR (USGS Topography Map)

PROPERTY LINE



(d)	DUPLICATE
(rd)	REDRILL
NS	NOT SAMPLED
ND	NOT DETECTED AT OR ABOVE LABORATORY REPORTING LIMITS
TPH-MO	TOTAL PETROLEUM HYDROCARBONS, MOTOR OIL
*	BORINGS 28A, 28B, 28Bb, 30B, AND 30D WERE SAMPLED FOR GROUNDWATER ONLY
**	NO SAMPLE RESULTS WERE REPORTED FOR BORINGS S1, S2, 28C

0 50' 100'

FMC Corporation
8787 Enterprise Drive
Newark, California

NEWA

J:\CAD_DATA\FMC\NEWARK\WP_0798\F4_0798.DWG

AMPLING LOCATION)

ING LOCATION (WOODWARD-CLYDE)

)

AL)

ELEMENTAL PHOSPHORUS

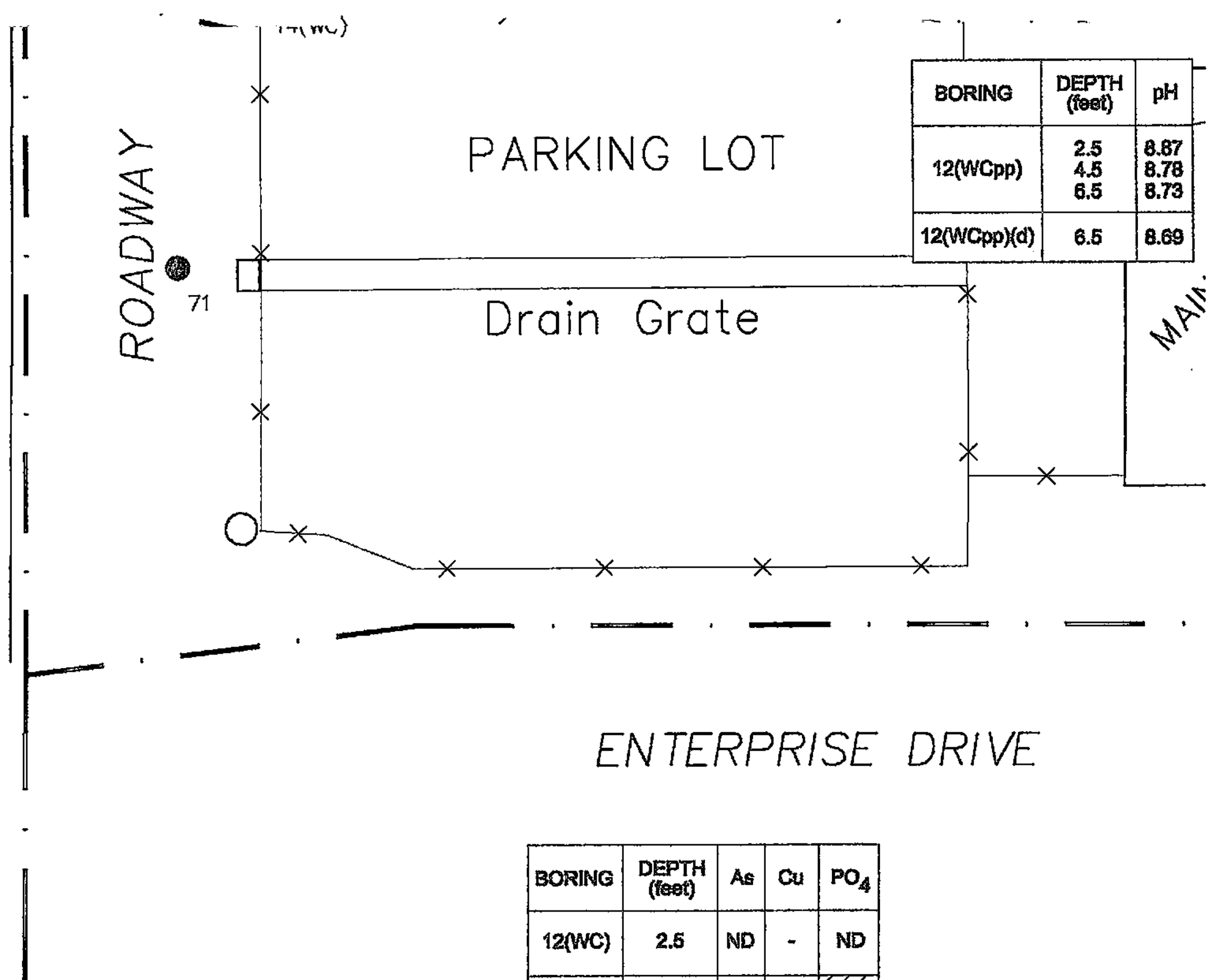
TION CONTOUR (USGS Topography Map)

ATORY

MOTOR OIL

30D WERE SAMPLED FOR GROUNDWATER ONLY

D FOR BORINGS S1, S2, 28C



BORING	DEPTH (feet)	pH
12(WCpp)	2.5 4.5 6.5	8.67 8.78 8.73
12(WCpp)(d)	6.5	8.69

BORING	DEPTH (feet)	As	Cu	PO_4
12(WC)	2.5	ND	-	ND
13(WC)	3	ND	42	
14(WC)	3	6.9	45	
15(WC)	1 3	5.3 5.1	41 40	23 41
23(WC)	1 3	3.0 4.8	- 74	

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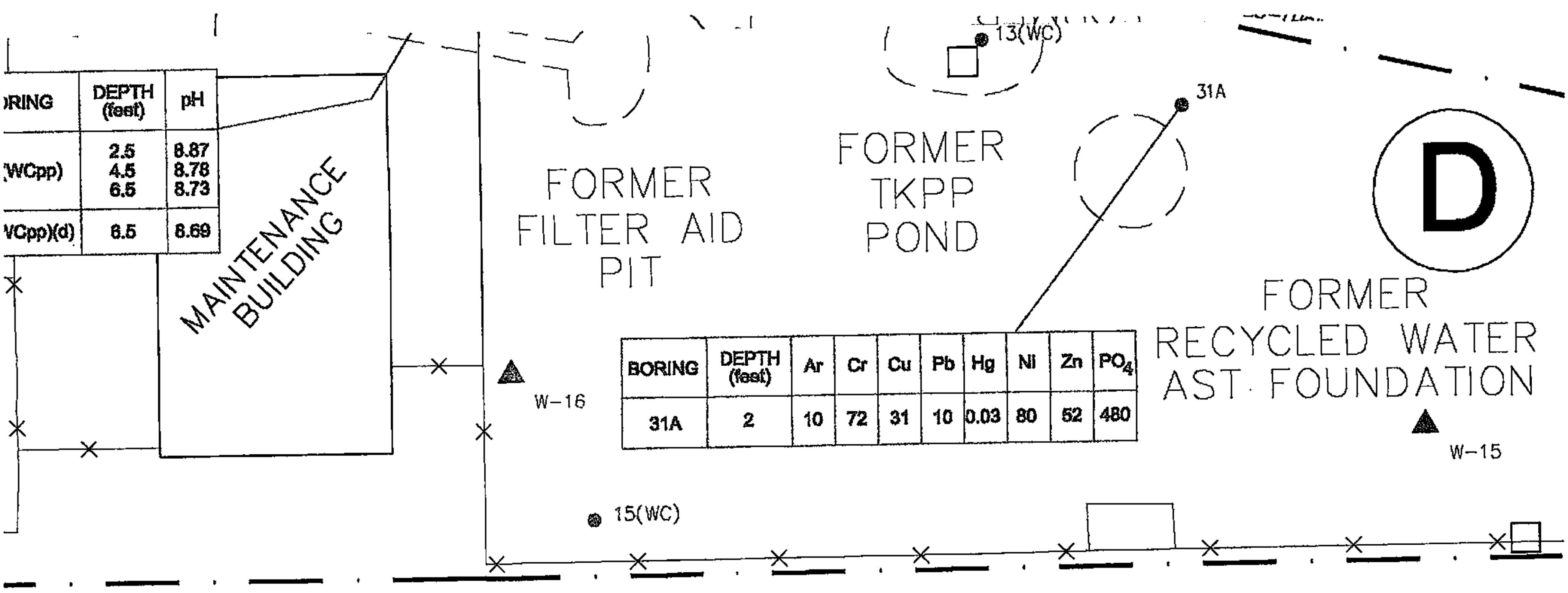
NEWARK, CALIFORNIA



...RING	DEPTH (feet)	pH
...WCpp)	2.5 4.5 6.5	8.87 8.78 8.73
...WCpp)(d)	6.5	8.69

BORING	DEPTH (feet)	Ar	Cr	Cu	Pb	Hg	Ni	Zn	PO_4
31A	2	10	72	31	10	0.03	80	52	480

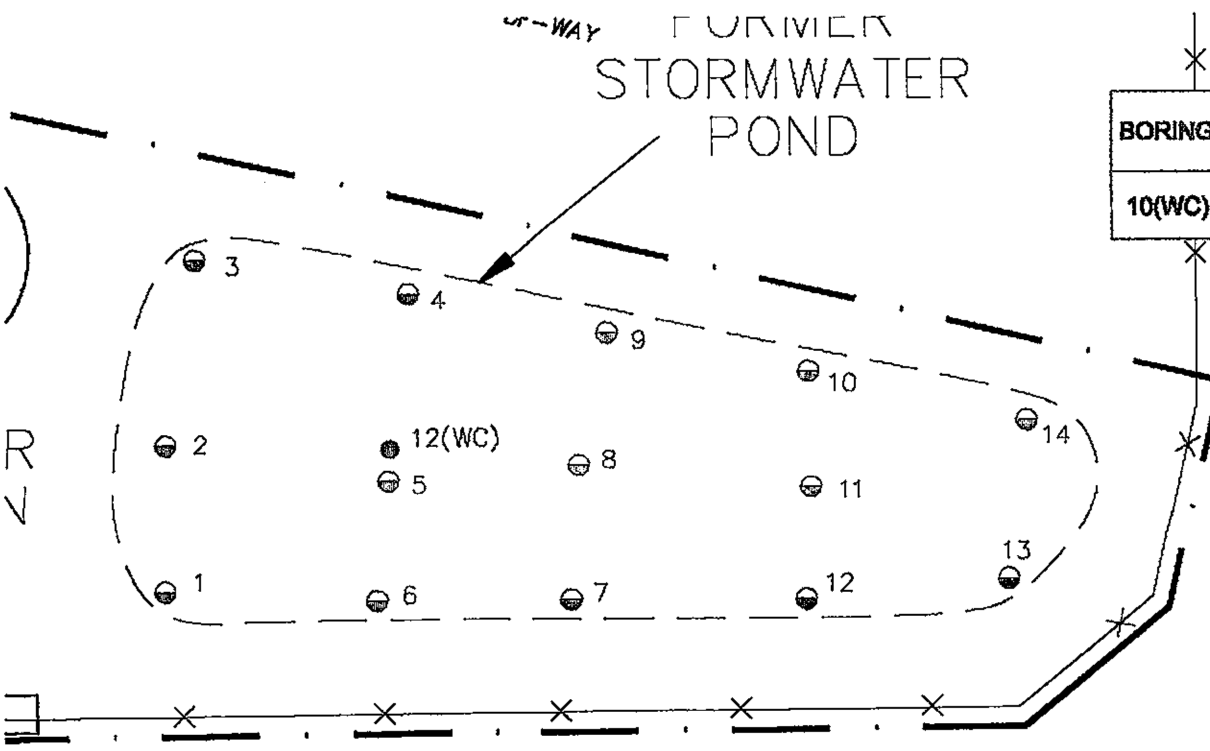
BORING	DEPTH (feet)	pH	PO_4	As
15(WCpp)	7 8	7.1 6.8	560 560	10 24
16(WCpp)	2 4 10	12.4 12.3 8.2	7.8 2.8 68	1.4 2 5.6
17(WCpp)	8 9	6.9 7.5	320 190	15 8.5
18(WCpp)	2 5	1.6 1.3	1300 1400	
19(WCpp)	5 6	8 7.9	660 700	
20(WCpp)	2 6	8.6 7.4	68 390	
21(WCpp)	3 7	8.1 8.3		
26(WCpp)	6 8	7.8 7.8	300 170	12 8.4

BORING	DEPTH (feet)	pH
G1(WCpp)	2 4	9.4 8.8
G1(WCpp)*	5 7 8	6.8 9.3 8.5
G2(WCpp)	2	8.3
G2(WCpp)*	4 8 11	2.4 3.7 6
G3*	4 7	6.8 9
G4	4 8	7.6 6.6
G4*	2 6	6.5 7.1
G6	8	8.6
G6*	6	7.9
G7	2 4	11.2 10.6
G7*	8	9.5
G8	2 8	9.3 9.1
G8*	4 6	11.9 12.1
G9*	1 3.5	8.1 8.1
G10*	2 4	7.9 7.9
G10A*	2.5 3.5	6.6 3.5

* SAMPLE ANALYSES PERFORMED BY FMC LABORATORY, NEWARK, CA

A

EXISTING SOIL ANALYTICAL



BORING	DEPTH (feet)	pH	As	Cu	PO_4
10(WC)	1 3	7.0 8.3	4.3 5.1	29 36	ND 9.7

BORING	DEPTH (feet)	P4
27A	5 10	(ND) (ND)
27B	5	(ND)
27C	10 15 20	(ND) (ND) (ND)
28Ba	5 15	(ND) (ND)
28Ca	10 20	(ND) (ND)
29A	5 10 15 20	(ND) (ND) (ND) (ND)
30A	5	(ND)
30Ba	10 20	(ND) (ND)
30C	10 15 20	(ND) 15200 7.8
30Ca	5	(ND)
30Da	10	(ND)
S3	2-4	(ND)
S4	2-4	0.09

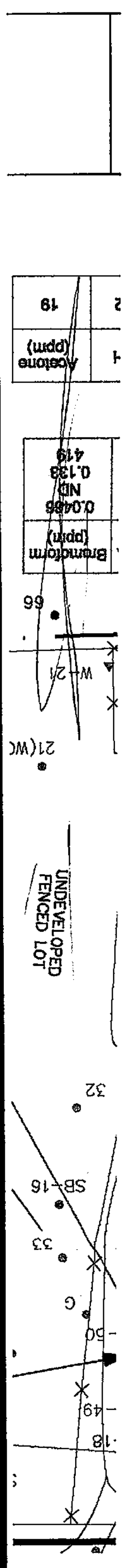
STORMWATER POND SAMPLES		
BORING	DEPTH (feet)	TOTAL ARSENIC (TTLC)
1	.5 2.5	18 28
2	.5 2.5	18 29
3	.5 2.5	14 23
4	.5 2.5	19 17
5	.5 2.5	21 22
6	.5 2.5	23 23
7	.5 2.5	19 25
8	.5 2.5	18 12
9	.5 2.5	3.6 22
10	.5 2.5	19 20
11	.5 2.5	18 21
12	.5 2.5	10 10
13	.5 2.5	21 13
14	.5 2.5	20 23

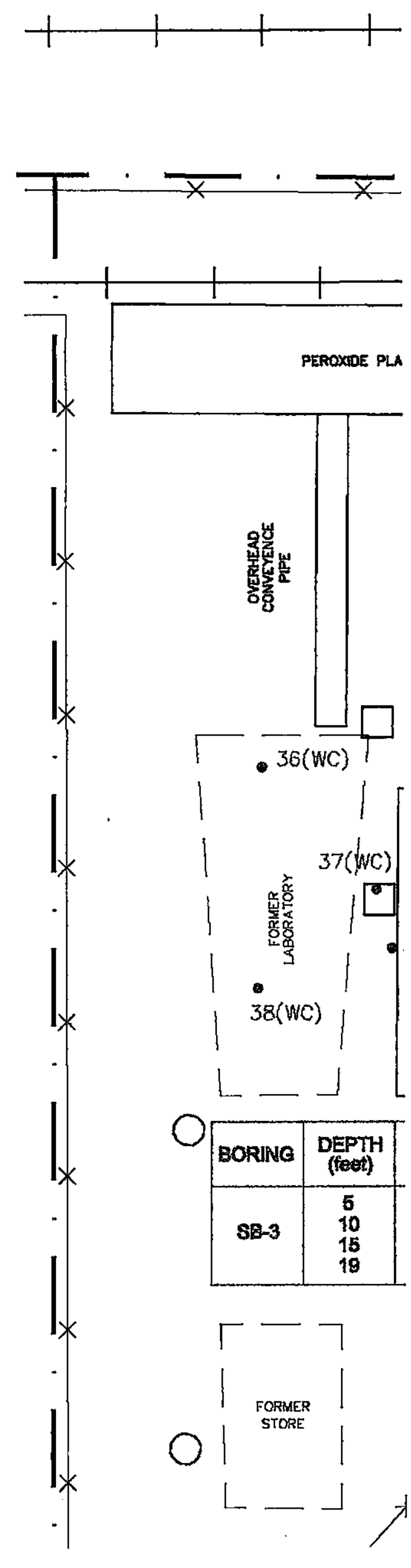
FIGURE 4

L DATA (ppm AND pH UNITS), PARCEL 'A' AND 'D'

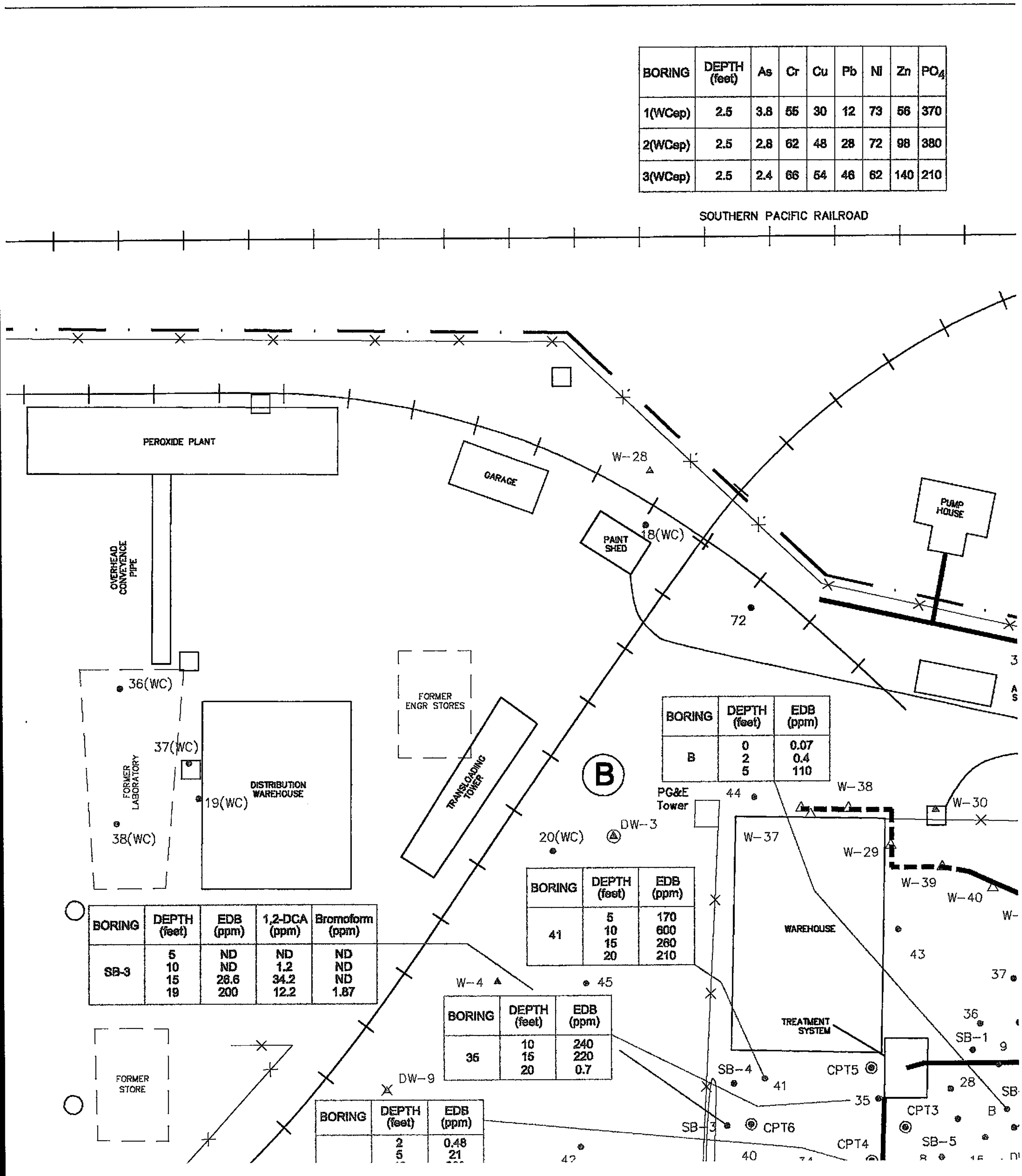
BORING	DEPTH (feet)	EDB (ppm)
A	0 2 5	0.34 0.02 0.03
C	0 2 5	0.02 0.02 0.05
D	0 2 5	9.7 0.1 0.7
G	0 2 5	0.03 0.17 0.95
H	0 2 5	0.05 0.16 0.05
3	2 5 10 15 20A 20B	ND 19 0.97 350 280 500
4	2 5 10 15 20	0.02 0.02 0.1 19 0.16
5	2 5 10 15 20	0.02 0.02 0.08 0.19 0.05
6	2 5 10 15 20	0.03 ND 0.08 0.03 ND
7	2 5 10 15 20	0.07 ND 26 34 0.06
8	2 5 10 15 20	ND ND 0.02 17 0.03
9	2 6 10 15 20	0.06 ND 6.5 50 0.38
10	2 5 10 15 20	ND ND ND ND ND
11	2 5 10 15 20	ND ND ND 0.26 ND
12	2.5 5 10 15 20A 20B	0.06 ND 13 18 17 0.19
13	2 5 7.5 10 12.5 15 20.5-21.5 25 30	ND ND ND 0.19 2.4 2.3 ND 0.29 ND
14	2 5 10 15 20	ND ND 0.18 0.68 ND
15	2 5 10 15 20	ND ND 1.3 2.8 0.04
17	2 5 10 15 20	0.53 0.94 4.4 2.8 ND

BORING	DEPTH (feet)	EDB (ppm)	1,2-DCA (ppm)	Bromoform (ppm)
SB-11	5 10 15 20	ND ND ND ND	ND ND 0.019 1.91	ND ND ND ND
SB-13	5 10 15 20	ND ND ND ND	ND ND ND 6.77	ND ND 2.8 ND
SB-14	4.5 10 15 20	ND ND ND ND	ND ND 0.107 2.26	ND ND ND ND
SB-15	4.5 10 15 20	ND ND 0.11 ND	ND ND 0.048 6.27	ND ND ND ND
SB-16	5 10 15 19	1.13 16.5 9.04 ND	0.00693 ND ND 23.2	ND ND ND ND
SB-17	5 10 15 20	ND ND ND ND	ND ND 0.0635 0.43	ND ND ND ND
SB-18	5 10 15 19	ND ND ND 11.1	ND ND ND ND	ND ND ND 67
SB-19	5 9.5 15 20	ND ND ND ND	ND ND 0.234 2.93	ND ND ND ND
SB-20	5 10 15 19	ND ND ND ND	ND ND ND 0.085	ND ND ND ND





BORING	DEPTH (feet)
SB-3	5 10 15 19



BORING	DEPTH (feet)	As	Cr	Cu	Pb	Ni	Zn	PO_4
1(WCep)	2.5	3.8	55	30	12	73	56	370
2(WCep)	2.5	2.8	62	48	28	72	98	380
3(WCep)	2.5	2.4	66	54	46	62	140	210

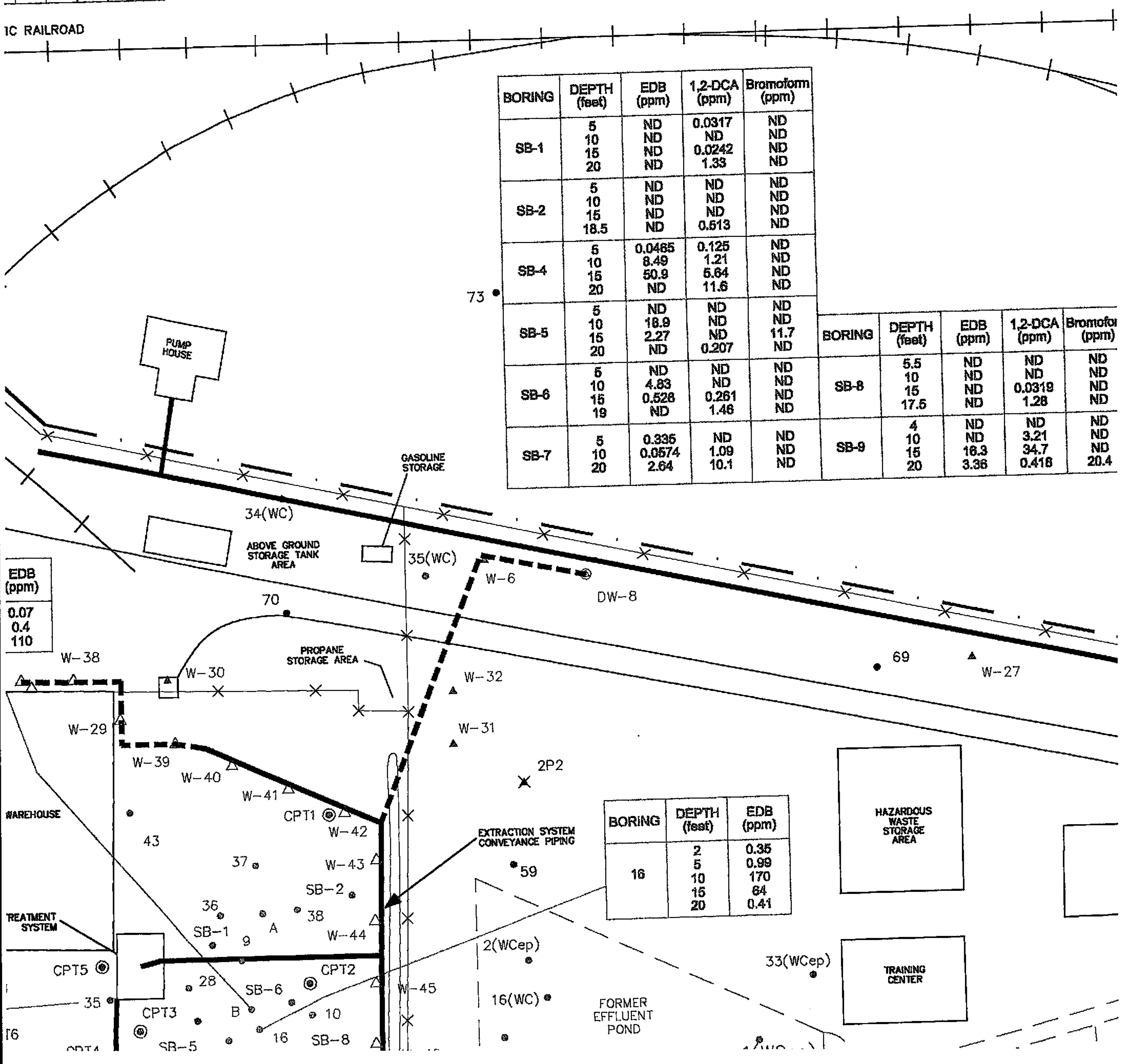
BORING	DEPTH (feet)	EDB (ppm)
B	0 2 5	0.07 0.4 110

BORING	DEPTH (feet)	EDB (ppm)
41	5 10 15 20	170 600 260 210

BORING	DEPTH (feet)	EDB (ppm)	1,2-DCA (ppm)	Bromoform (ppm)
SB-3	5 10 15 19	ND ND 26.6 200	ND 1.2 34.2 12.2	ND ND ND 1.87

BORING	DEPTH (feet)	EDB (ppm)
35	10 15 20	240 220 0.7

BORING	DEPTH (feet)	EDB (ppm)
	2 5	0.48 21



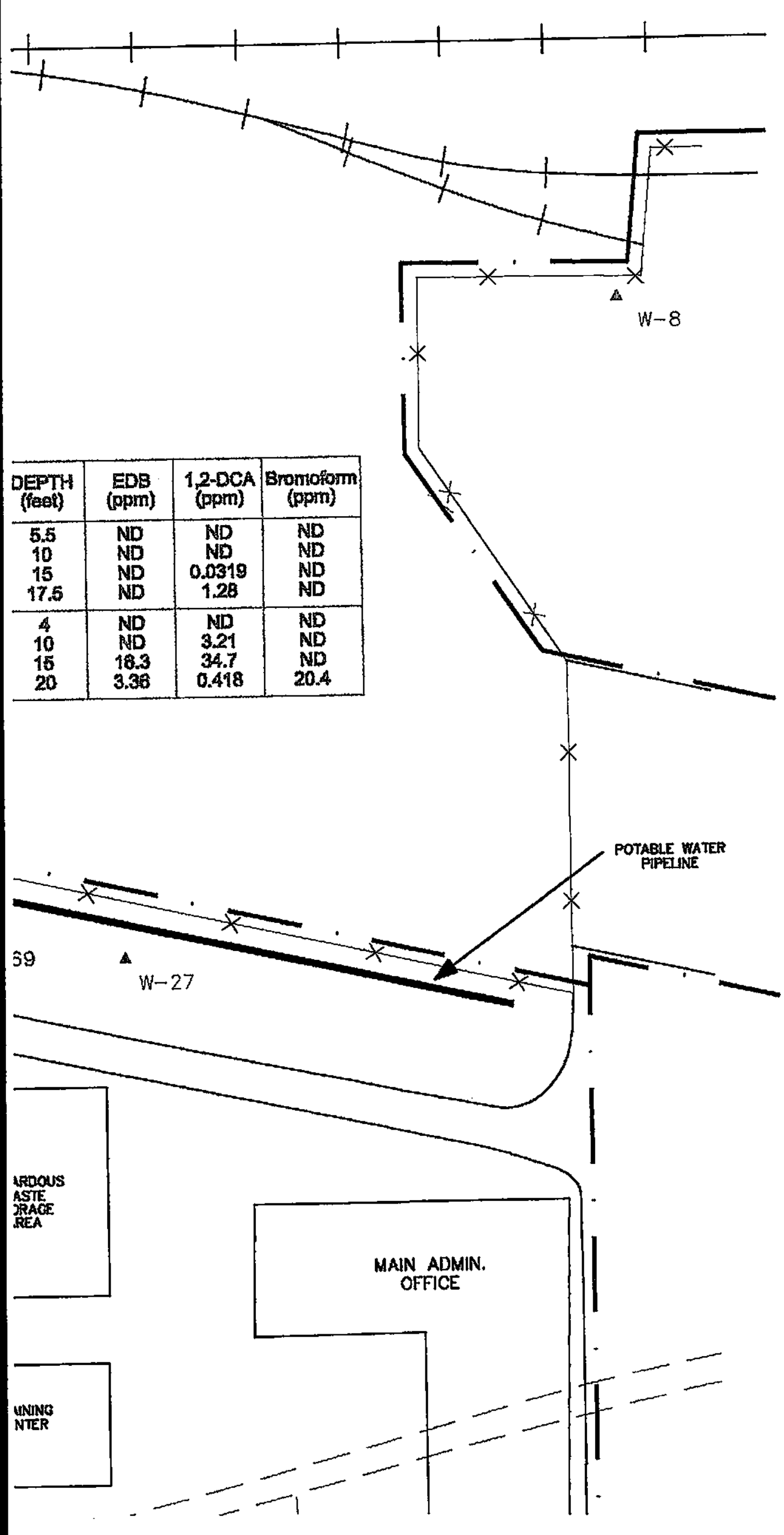
Cu	Pb	Ni	Zn	PO_4
30	12	73	56	370
48	28	72	98	380
54	46	62	140	210

BORING	DEPTH (feet)	EDB (ppm)	1,2-DCA (ppm)	Bromoform (ppm)
SB-1	5	ND	0.0317	ND
	10	ND	ND	ND
	15	ND	0.0242	ND
	20	ND	1.33	ND
SB-2	5	ND	ND	ND
	10	ND	ND	ND
	15	ND	ND	ND
	18.5	ND	0.513	ND
SB-4	5	0.0465	0.125	ND
	10	8.49	1.21	ND
	15	50.9	5.64	ND
	20	ND	11.6	ND
SB-5	5	ND	ND	ND
	10	18.9	ND	ND
	15	2.27	ND	11.7
	20	ND	0.207	ND
SB-6	5	ND	ND	ND
	10	4.83	ND	ND
	15	0.528	0.261	ND
	19	ND	1.46	ND
SB-7	5	0.335	ND	ND
	10	0.0574	1.09	ND
	20	2.64	10.1	ND

BORING	DEPTH (feet)	EDB (ppm)	1,2-DCA (ppm)	Bromofor (ppm)
SB-8	5.5	ND	ND	ND
	10	ND	ND	ND
	15	ND	0.0319	ND
	17.5	ND	1.28	ND
SB-9	4	ND	ND	ND
	10	ND	3.21	ND
	15	16.3	34.7	ND
	20	3.36	0.418	20.4

EDB (ppm)
0.07
0.4
110

BORING	DEPTH (feet)	EDB (ppm)
16	2	0.35
	5	0.99
	10	170
	15	64
	20	0.41

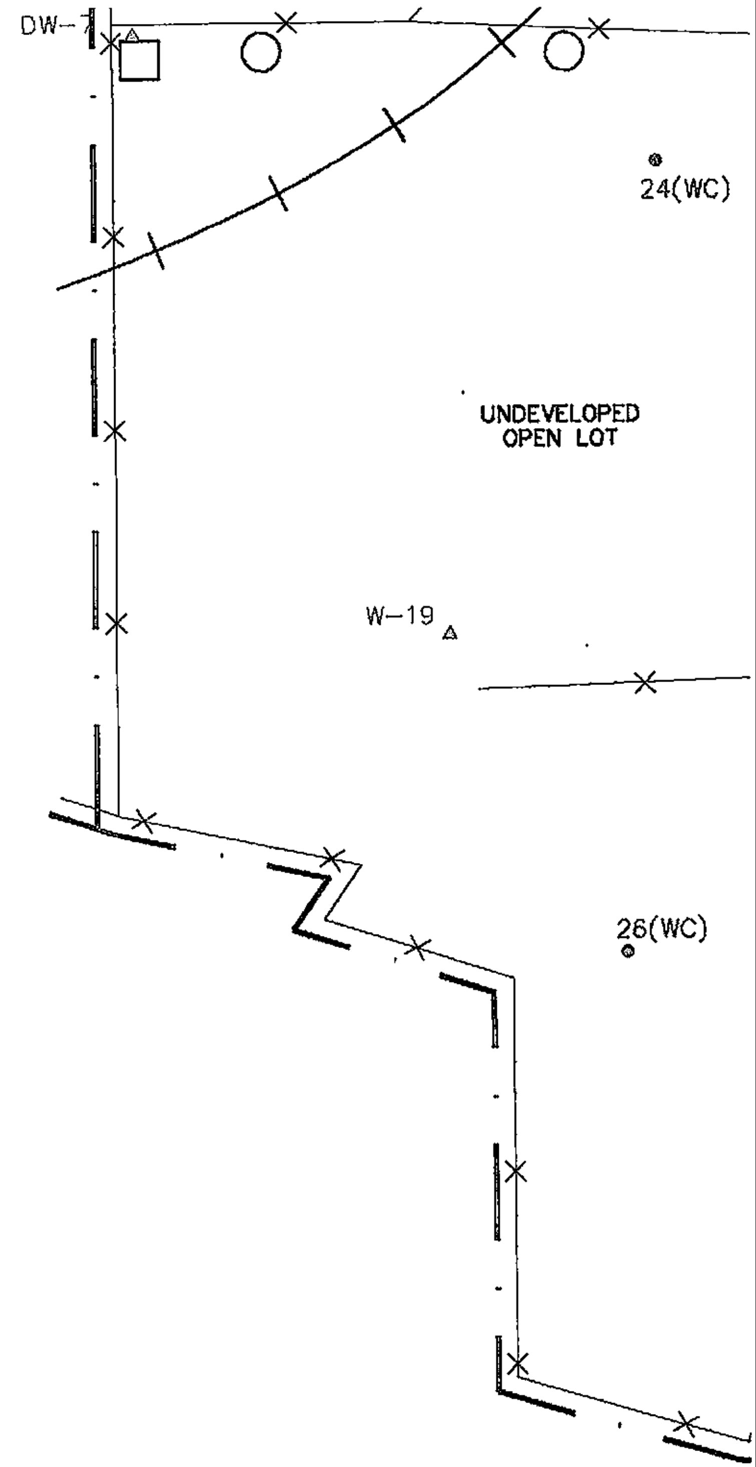


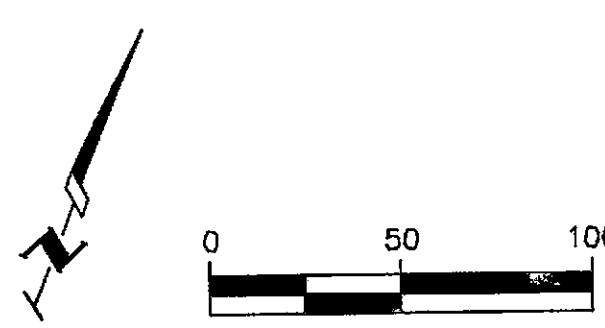
DEPTH (feet)	EDB (ppm)	1,2-DCA (ppm)	Bromoform (ppm)
5.5 10 15 17.5	ND ND ND ND	ND ND 0.0319 1.28	ND ND ND ND
4 10 15 20	ND ND 16.3 3.36	ND 3.21 34.7 0.418	ND ND ND 20.4

BORING	DEPTH (feet)	EDB (ppm)
18	2 5 10 15 20	0.05 ND ND 4 7.8
19	2 5 10 15 20	0.15 ND ND ND 4.2
20	5 10 15 20	ND ND 2.2 86
21	2 5 10 15 20	ND ND 0.69 22 0.28
22	5 10 15 20	-- -- -- --
23	5 10 15 20	-- -- -- --
24	5 10 15 20	-- -- -- --
25	5 10 15 20	-- -- -- --
26	2 5 10 15 20	0.05 ND ND 3.6 0.67
28	2 5 10 15 20	ND ND 2.5 47 0.82
29	15 20 25 30	12 160 0.6 24.3
30	2 5 10 15 20	ND ND 14 51 0.27
31	5 10 15 20	0.1 1.2 2.6 0.8
32	5 10 15 20	2.6 0.3 0.5 3.7
36	5 10 15 20 22	0.3 0.8 14 0.2 ND
37	5 10 15 20	ND ND 7.2 0.1
38	5 10 15 20	ND ND 8.6 0.1
42	5 10 15 20	0.09 ND 0.05 ND
43	5 10 15 20	0.1 0.1 ND ND
	5	ND

"--" NOT ANALYZED
(ppm) PARTS PER MILLION
EDB ETHYLENE DIBROMIDE
TPH-G TOTAL PETROLEUM HYDROCARBONS, GASOLINE
TPH-D TOTAL PETROLEUM HYDROCARBONS, DIESEL
TPH-K TOTAL PETROLEUM HYDROCARBONS, KEROSENE
TPH-MO TOTAL PETROLEUM HYDROCARBONS, MOTOR OIL

W-4 SHALLOW ZONE MONITORING WELL (FMC)
DW-3 NEWARK AQUIFER MONITORING WELL (FMC)
W-7 SHALLOW ZONE EXTRACTION WELL (FMC)
DW-2 NEWARK AQUIFER EXTRACTION WELL (FMC)
B-25 MONITORING WELL (ASHLAND CHEMICAL)
J10 MONITORING WELL (JONES-HAMILTON Co.)
P-3 MONITORING WELL (ROMIC ENVIRONMENTAL TECHNOLOGIES)
24 SOIL BORING (TODD)
55 SOIL BORING (IT CORPORATION)
1(WCep) SOIL BORING (WOODWARD-CLYDE EFFLUENT POND SAMPLING LOCATION)
26(WC) SOIL BORING (WOODWARD-CLYDE SAMPLING LOCATION)
15 SOIL BORING (PES ENVIRONMENTAL)
CPT1 CPT LOCATION (PES ENVIRONMENTAL)
38 SOIL BORING (UNKNOWN)
POWER/TELEPHONE POLE
STORM DRAIN
PIPE
SUMP
A PARCEL DESIGNATION
FORMER STRUCTURE
EXISTING STRUCTURE
PROPERTY LINE





BORING	DEPTH (feet)	As	Cd	Cr	Cu
16(WC)	0.5	5.0	–	–	130
17(WC)	1	3.9	–	–	34
18(WC)	1 3	– –	1.4 0.75	72 43	– –
19(WC)	1 3	– –	– –	– –	– –
20(WC)	1	4.4	–	–	–
21(WC)	1 3 3(D)	1.2 4.5 4.8	– – –	– – –	200 66 46

FMC

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Newark, California

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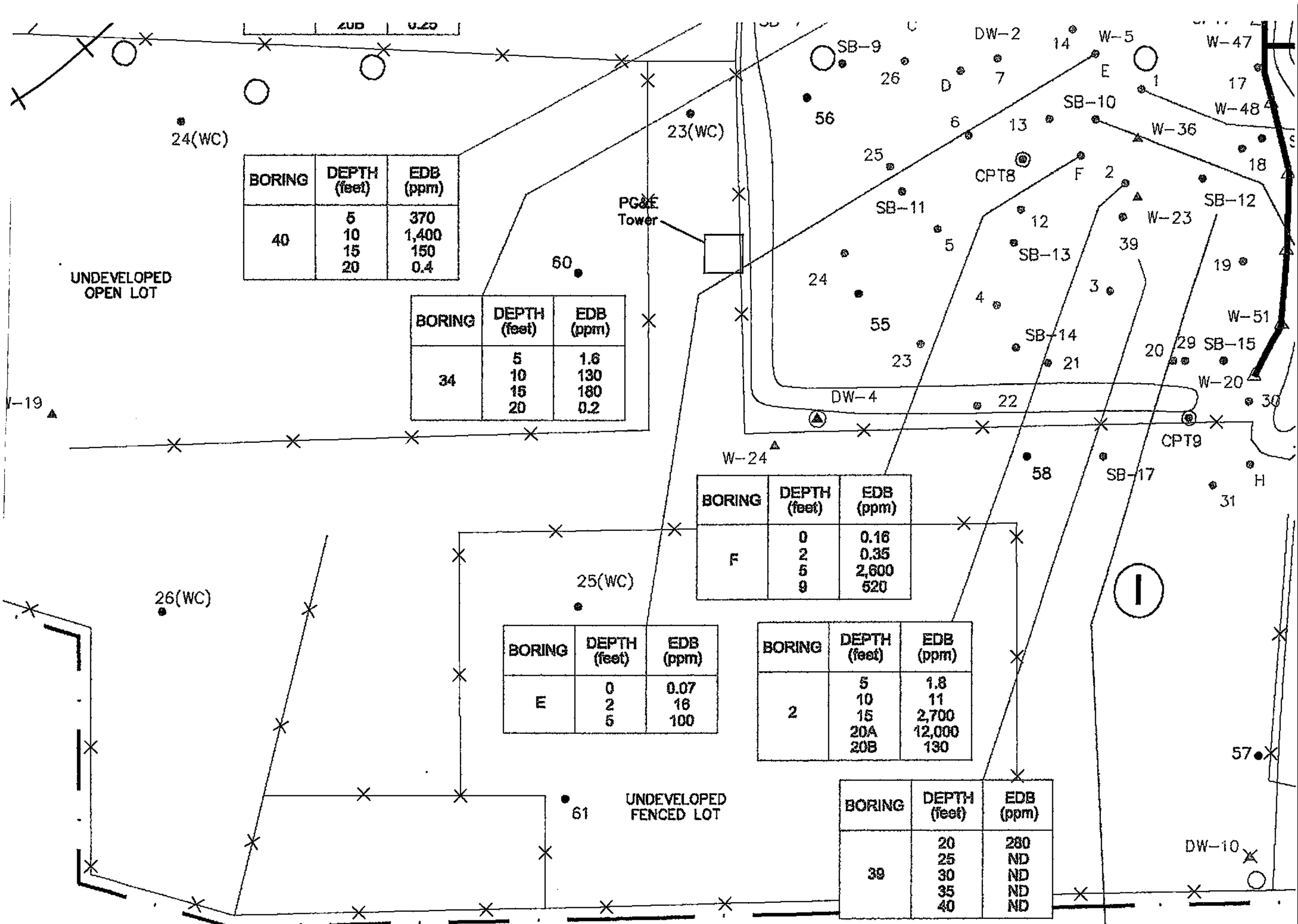


BORING	DEPTH (feet)	EDB (ppm)
40	5 10 15 20	370 1,400 150 0.4

BORING	DEPTH (feet)	EDB (ppm)
34	5 10 15 20	1.6 130 180 0.2

BORING	DEPTH (feet)	EDB (ppm)
F	0 2 5 9	0.16 0.35 2,600 520

BORING	DEPTH (feet)	EDB (ppm)
E	0 2 5	0.07 16 100

BORING	DEPTH (feet)	EDB (ppm)
2	5 10 15 20A 20B	1.8 11 2,700 12,000 130

BORING	DEPTH (feet)	EDB (ppm)
39	20 25 30 35 40	280 ND ND ND ND

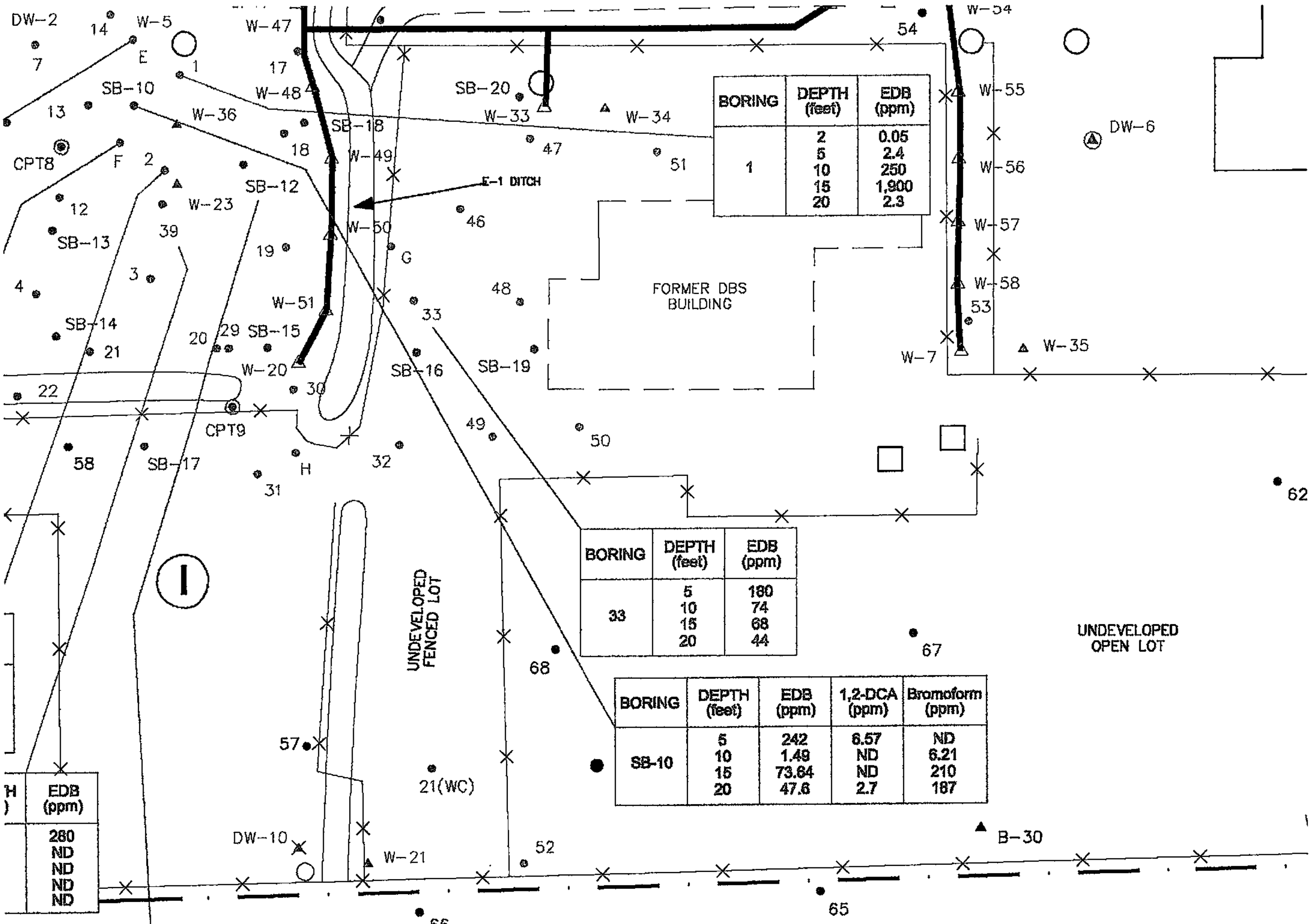
NG	DEPTH (feet)	As	Cd	Cr	Cu	Pb	PO_4	TPH-G	TPH-D	TPH-K	TPH-MO
C)	0.5	5.0	–	–	130	–	–	–	–	–	–
C)	1	3.9	–	–	34	–	–	–	–	–	–
C)	1 3	– –	1.4 0.75	72 43	– –	16 17	– –	ND ND	1.8 49	– –	– –
C)	1 3	– –	– –	– –	– –	– –	– –	– –	ND ND	ND ND	20 ND
C)	1	4.4	–	–	–	–	78	–	–	–	–
C)	1 3 3(D)	1.2 4.5 4.8	– – –	– – –	200 66 46	– – –	– – –	ND ND ND	– – –	– – –	– – –

BORING	DEPTH (feet)	As	Cd	Cr	Cu	Pb	PO_4	TPH-G	TPH-D	TPH-K	TPH-MO
22(WC)	1 1(D) 3	4.6 5.7 6.5	– – –	– – –	46 36 36	– – –	– – –	– – –	– – –	– – –	– – –
23(WC)	1 3	3.0 4.8	– –	– –	86 74	– –	– –	– –	ND ND	ND ND	ND ND
24(WC)	1 3	2.8 2.1	– –	– –	180 61	– –	– –	– –	ND ND	ND ND	75 43
25(WC)	1 1(D) 3	– – –	– – –	– – –	40 46 40	– – –	ND ND ND	– – –	– – –	– – –	– – –
26(WC)	1 3	– –	– –	– –	42 160	– –	ND ND	– –	– ND	– ND	– 400

BORING	DEPTH (feet)	EDB (ppm)	1,2-DC (ppm
SB-12	4 10 15 20	ND ND 0.631 226	0.103 0.0457 0.623 ND

BORING	DEPTH (feet)	P
32(WCpp)	2	8

NEWARK, CALIFORNIA



BORING	DEPTH (feet)	EDB (ppm)
1	2 5 10 15 20	0.05 2.4 250 1,900 2.3

BORING	DEPTH (feet)	EDB (ppm)
33	5 10 15 20	180 74 68 44

BORING	DEPTH (feet)	EDB (ppm)	1,2-DCA (ppm)	Bromoform (ppm)
SB-10	5 10 15 20	242 1.49 73.64 47.6	6.57 ND ND 2.7	ND 6.21 210 187

H)	EDB (ppm)
	280 ND ND ND ND

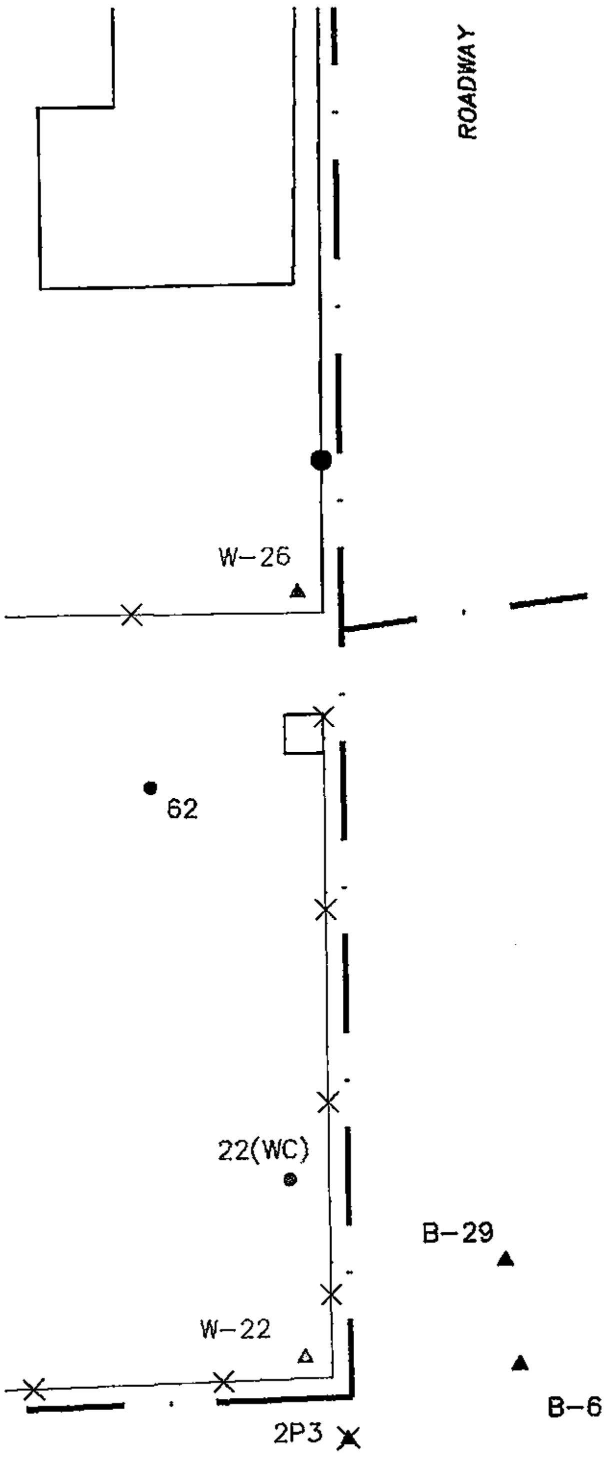
BORING	DEPTH (feet)	EDB (ppm)	1,2-DCA (ppm)	Bromoform (ppm)
SB-12	4 10 15 20	ND ND 0.631 226	0.103 0.0457 0.623 ND	0.0466 ND 0.133 419

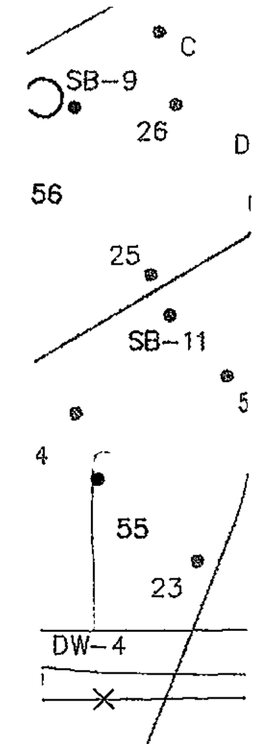
BORING	DEPTH (feet)	PH	Acetone (ppm)
32(WCpp)	2	8.2	19

BORING	DEPTH (feet)	EDB (ppm)
71	5 10 20	ND ND ND
72	5 10 15 20	ND ND 0.0058 ND
73	5 10 15 20	ND ND ND ND

BORING	DEPTH (feet)	TPH-MO	Ag	As	Ba	Co	Cr	Cu	Pb
34(WC)	2	16	–	–	–	–	–	–	–
36(WC)	4	–	ND	7.5	300	12	62	31	9.2
37(WC)	2 4	– –	ND ND	5.1 5.4	– –	ND ND	60 60	29 30	9.5 10
38(WC)	3	–	ND	4.6	–	ND	59	33	9.3
35(WC)	2	ND	–	–	–	–	–	–	–

EXISTING SOIL ANALYTICAL





	25	ND
45	5 10 15 20	ND ND ND ND
46	5 10 15 20	ND ND ND ND
47	5 10 15 20	ND 0.02 ND ND
48	5 10 15 20	ND 0.8 3.6 0.2
49	5 10 15 20	0.01 60 46 0.2
50	5 10 15 20	0.04 1.0 24 0.1
51	5 10 15 20	0.18 0.39 0.96 0.36
52	5 10 15 20	0.07 0.44 0.17 ND
53	5 10 15 20	ND 0.13 0.45 0.21

54	5 10 15 20	ND ND ND ND
55	5 10 15 20	ND ND ND ND
56	5 10 15 20	ND ND 0.081 ND
57	5 10 15 20	ND ND 0.041 ND
58	5 10 15 20	ND ND 0.046 ND
59	5 10 15 20	ND ND ND ND
60	5 10 15 20	ND ND ND ND
61	5 10 15 20	ND ND ND ND
62	5 10 15 20	ND ND ND ND
63	5 10 15 20	ND ND ND ND
64	5 10 15 20	ND ND ND ND
65	5 10 15 20	ND ND ND ND
66	5 10 15 20	ND ND ND ND
67	5 10 15 20	ND ND ND ND
68	5 10 15 20	ND ND ND ND
69	5 10 15 20	ND ND 0.001 ND
70	5 10 15 20	ND ND ND ND

Co	Cr	Cu	Pb	Hg	Ni	Vd	Zn	Toluene	Acetone
–	–	–	–	–	–	–	–	ND	ND
12	62	31	9.2	0.11	74	36	54	ND	ND
ND ND	60 60	29 30	9.5 10	0.03 0.05	71 79	ND ND	47 55	ND ND	ND ND
ND	59	33	9.3	0.04	68	ND	48	ND	ND
–	–	–	–	–	–	–	–	–	–

EDB (ppm)
0.16 0.35 2,600 520

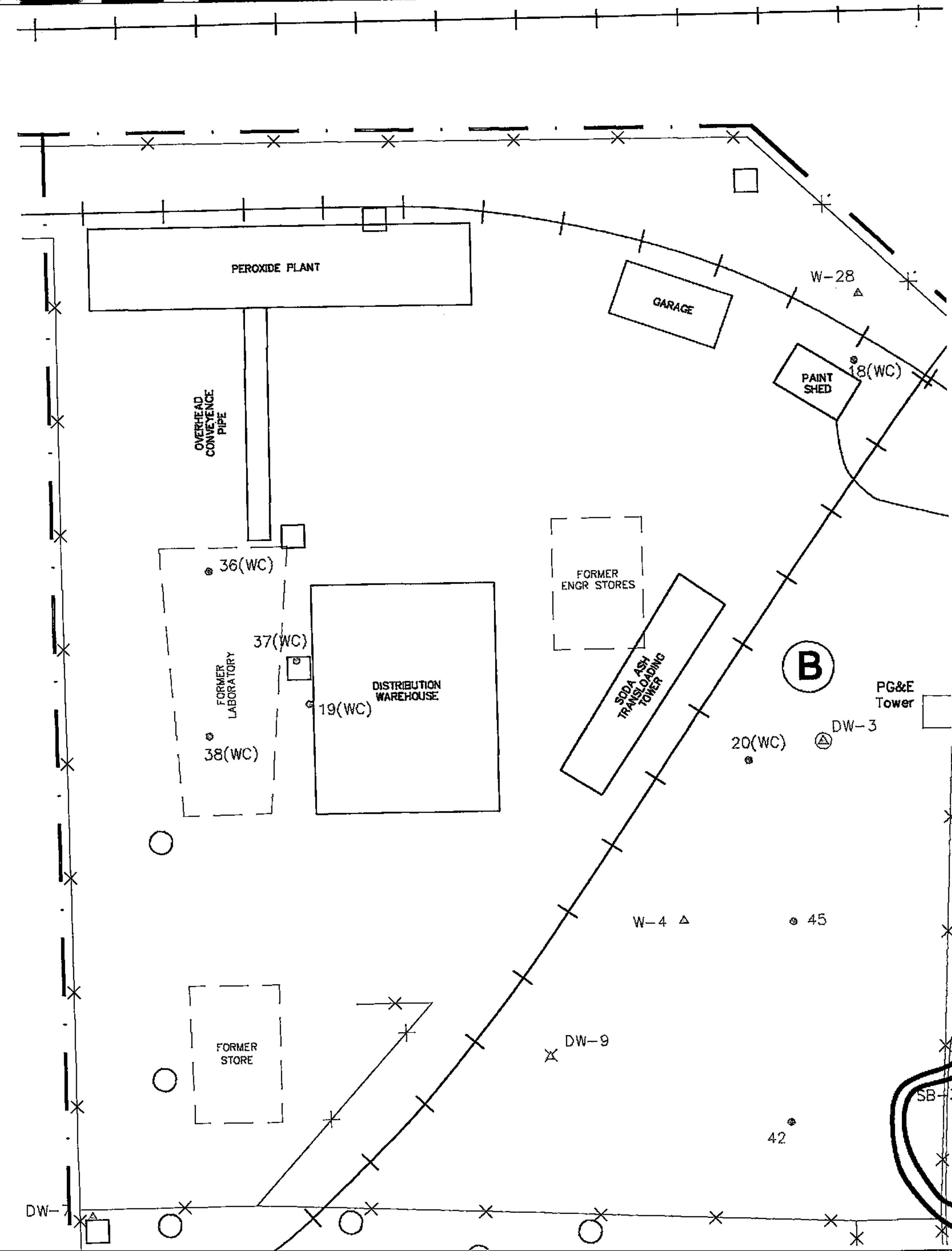
DEPTH (feet)	EDB (ppm)
5 10 15 20A 20B	1.8 11 2,700 12,000 130

BORING	DEPTH (feet)
39	20 25 30 35 40

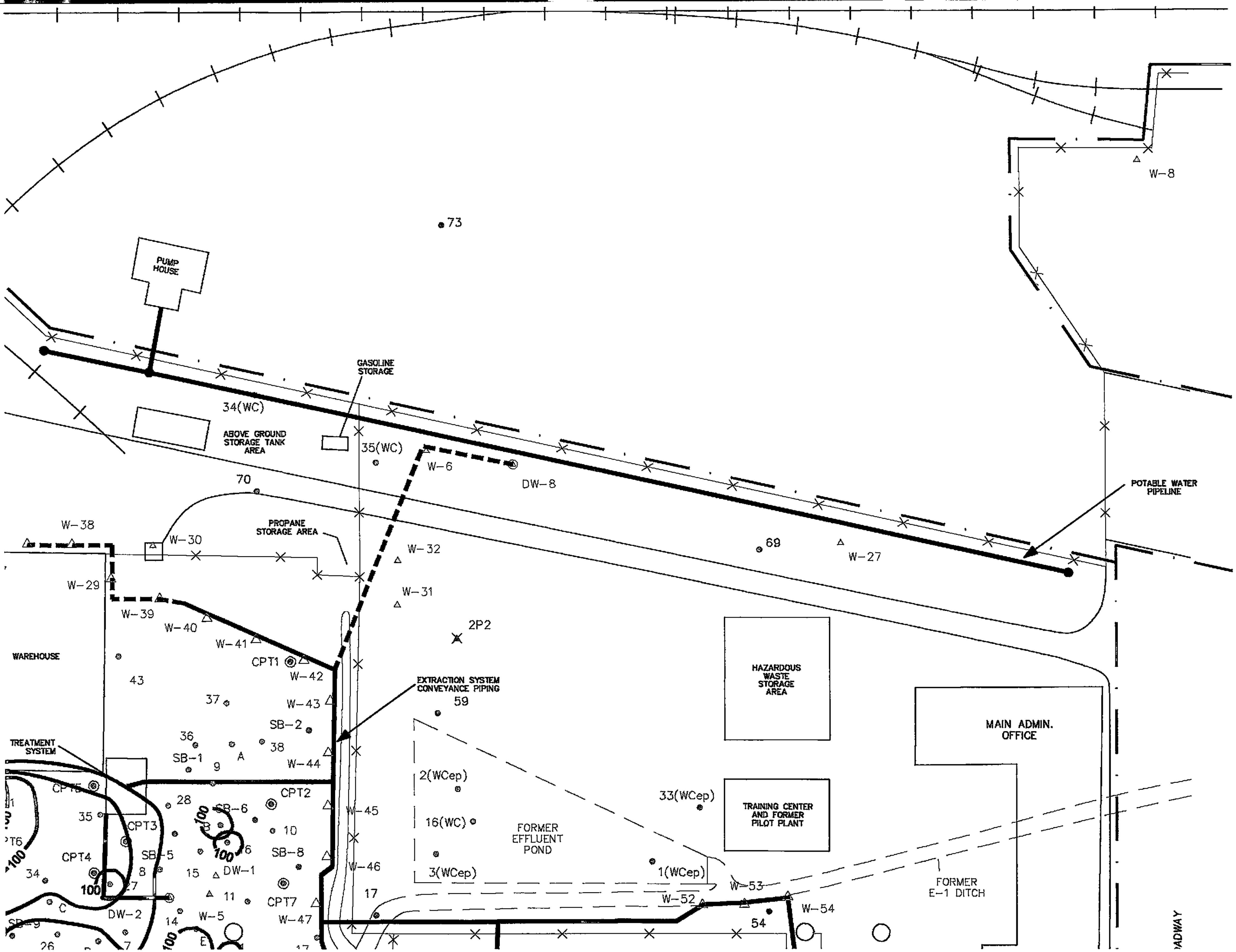
TPH-D	TPH-K	TPH-MO
– – –	– – –	– – –
ND ND	ND ND	ND ND
ND ND	ND ND	75 43
– –	– –	– –
– ND	– ND	– 400

FIGURE 5

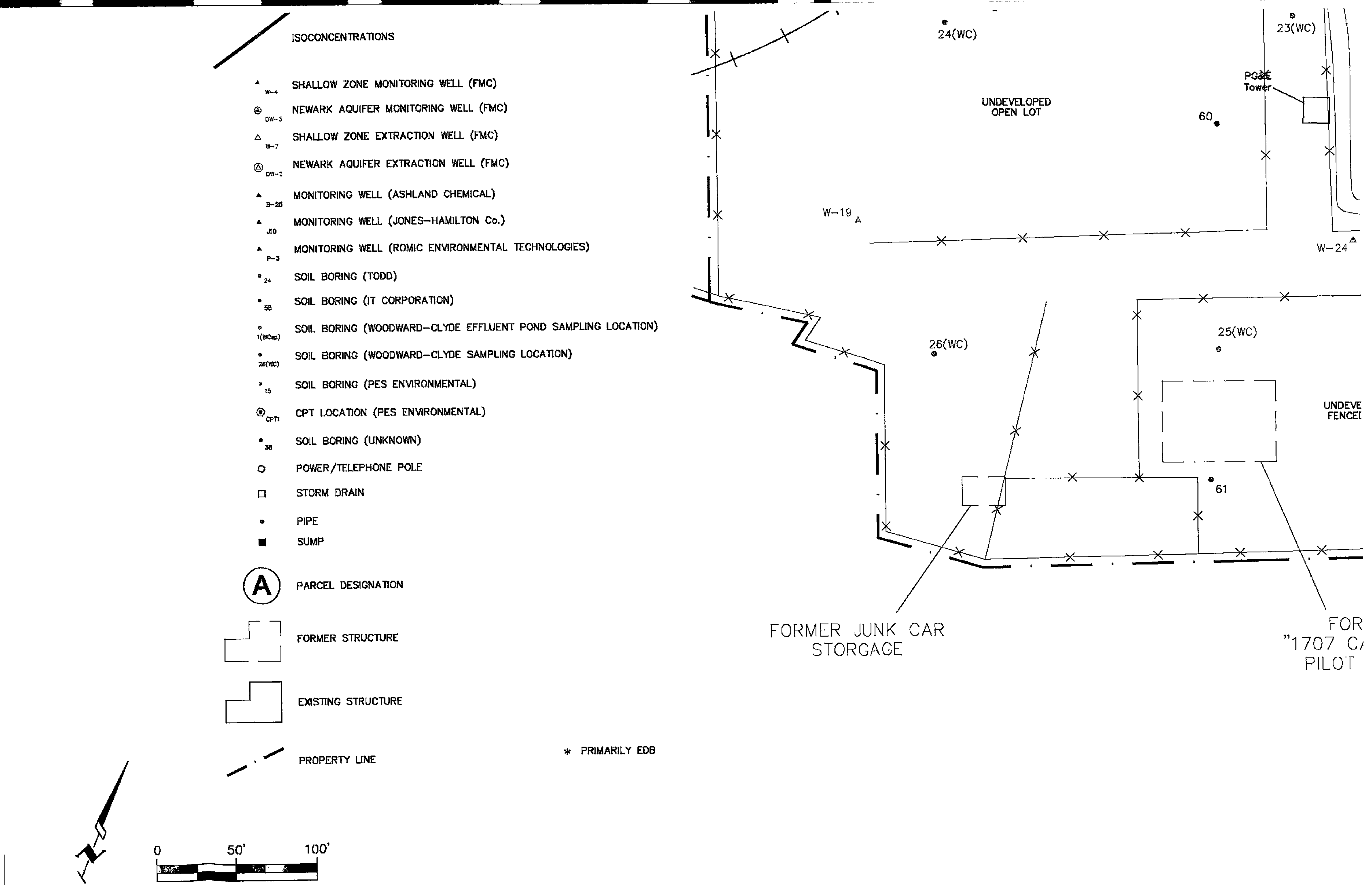
TICAL DATA (ppm), PARCELS 'B' AND 'I'


PEROXIDE PLANT
GARAGE
W-28
PAINT SHED
18(WC)
OVERHEAD CONVEYENCE PIPE
36(WC)
37(WC)
FORMER LABORATORY
DISTRIBUTION WAREHOUSE
19(WC)
38(WC)
FORMER ENGR STORES
SODA ASH TRANSLOADING TOWER
B
PG&E Tower
20(WC)
DW-3
W-4
45
FORMER STORE
DW-9
SB-3
42
DW-7

5'
10'
20'



PUMP HOUSE
GASOLINE STORAGE
ABOVE GROUND STORAGE TANK AREA
34(WC)
35(WC)
73
W-8
W-6
DW-8
70
POTABLE WATER PIPELINE
W-38
W-30
PROPANE STORAGE AREA
W-32
69
W-27
W-29
W-39
W-40
W-41
W-31
2P2
WAREHOUSE
CPT1
W-42
43
37
W-43
EXTRACTION SYSTEM CONVEYANCE PIPING
59
HAZARDOUS WASTE STORAGE AREA
MAIN ADMIN. OFFICE
TREATMENT SYSTEM
SB-2
36
38
SB-1
9
A
W-44
CPT2
2(WCep)
33(WCep)
TRAINING CENTER AND FORMER PILOT PLANT
CPT5
35
CPT3
28
SB-6
10
W-45
16(WC)
FORMER EFFLUENT POND
CPT4
SB-5
SB-8
W-46
3(WCep)
1(WCep)
W-53
FORMER E-1 DITCH
34
8
15
DW-1
CPT7
17
W-52
W-54
DW-2
11
14
W-5
W-47
54
26
C
E


ISOCONCENTRATIONS
SHALLOW ZONE MONITORING WELL (FMC)
NEWARK AQUIFER MONITORING WELL (FMC)
SHALLOW ZONE EXTRACTION WELL (FMC)
NEWARK AQUIFER EXTRACTION WELL (FMC)
MONITORING WELL (ASHLAND CHEMICAL)
MONITORING WELL (JONES-HAMILTON Co.)
MONITORING WELL (ROMIC ENVIRONMENTAL TECHNOLOGIES)
SOIL BORING (TODD)
SOIL BORING (IT CORPORATION)
SOIL BORING (WOODWARD-CLYDE EFFLUENT POND SAMPLING LOCATION)
SOIL BORING (WOODWARD-CLYDE SAMPLING LOCATION)
SOIL BORING (PES ENVIRONMENTAL)
CPT LOCATION (PES ENVIRONMENTAL)
SOIL BORING (UNKNOWN)
POWER/TELEPHONE POLE
STORM DRAIN
PIPE
SUMP
A
PARCEL DESIGNATION
FORMER STRUCTURE
EXISTING STRUCTURE
PROPERTY LINE
* PRIMARILY EDB
0
50'
100'
24(WC)
23(WC)
PG&E Tower
UNDEVELOPED OPEN LOT
60
W-19
W-24
25(WC)
26(WC)
61
FORMER JUNK CAR STORGAGE

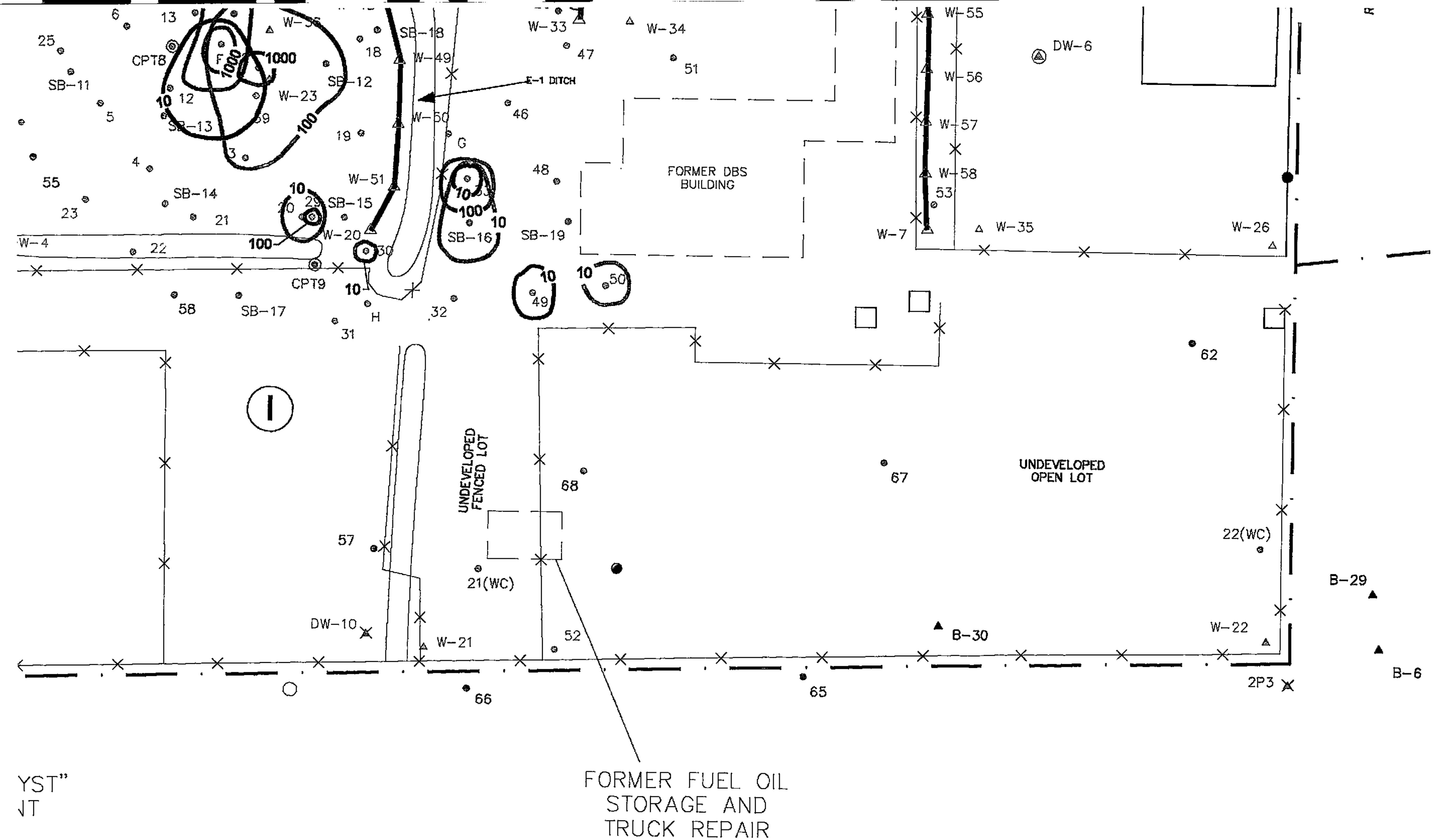
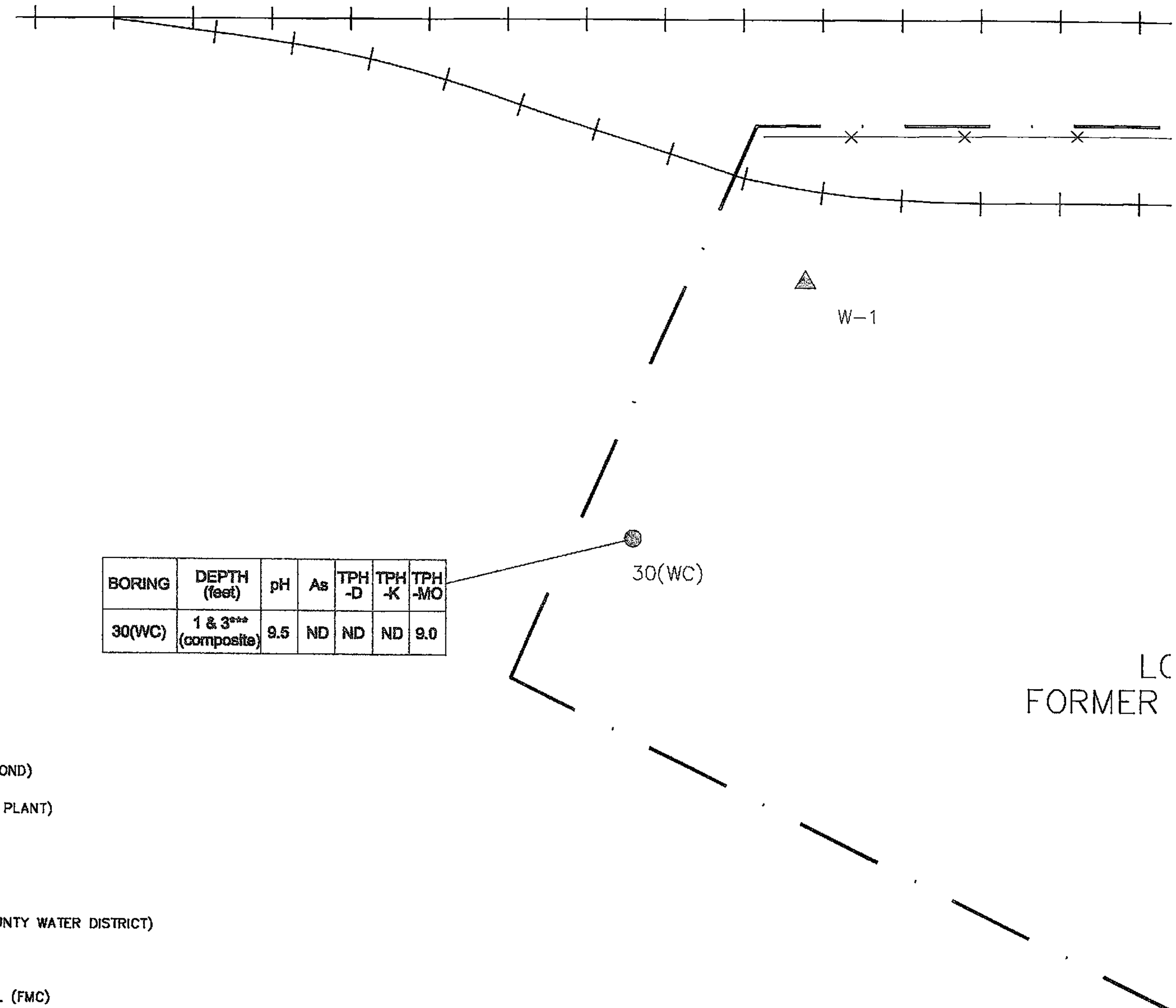
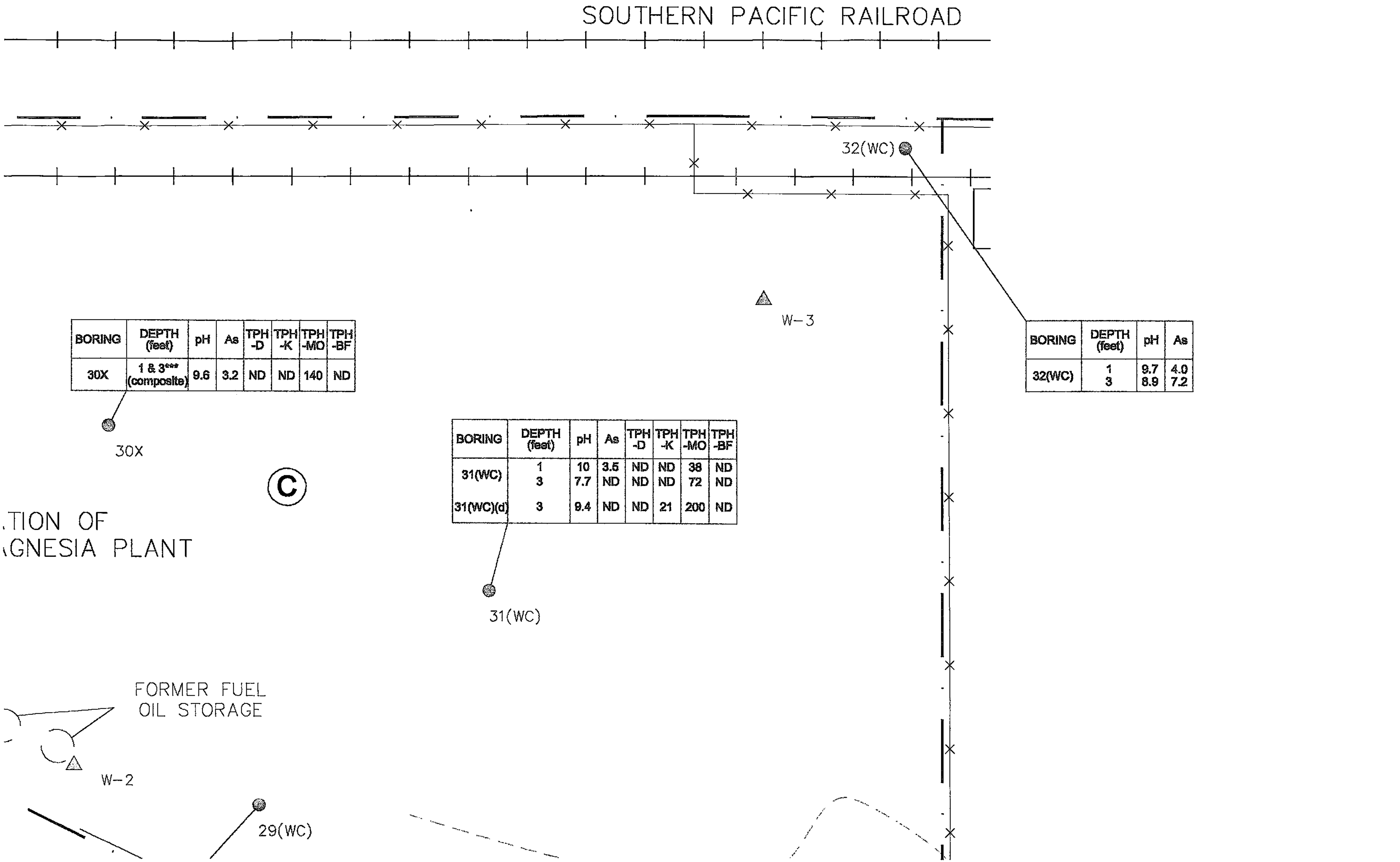

W-36
SB-18
W-33
W-34
W-55
DW-6
CPT8
1000
18
W-49
E-1 DITCH
47
51
W-56
SB-11
SB-12
W-23
SB-13
W-50
46
W-57
19
G
55
SB-14
W-51
48
FORMER DBS BUILDING
W-58
53
23
21
SB-15
SB-16
SB-19
W-7
W-35
W-26
W-4
22
W-20
CPT9
58
SB-17
H
32
31
62
UNDEVELOPED FENCED LOT
68
67
UNDEVELOPED OPEN LOT
57
22(WC)
21(WC)
B-29
DW-10
W-21
52
B-30
W-22
B-6
66
65
2P3
YST"
NT
FORMER FUEL OIL STORAGE AND TRUCK REPAIR

Figure 6



BORING	DEPTH (feet)	pH	As	TPH -D	TPH -K	TPH -MO
30(WC)	1 & 3*** (composite)	9.5	ND	ND	ND	9.0

24 SOIL BORING (TODD)
58 SOIL BORING (IT CORPORATION)
29(WC) SOIL BORING (WOODWARD–CLYDE)
2(WCep) SOIL BORING (WOODWARD–CLYDE EFFLUENT POND)
33(WCpp) SOIL BORING (WOODWARD–CLYDE PHOSPHATE PLANT)
15 SOIL BORING (PES ENVIRONMENTAL)
CPT1 CPT LOCATION (PES ENVIRONMENTAL)
2P3 ABANDONED MONITORING WELL (ALAMEDA COUNTY WATER DISTRICT)
W-4 SHALLOW ZONE MONITORING WELL (FMC)
DW-9 ABANDONED SHALLOW ZONE MONITORING WELL (FMC)
DW-3 NEWARK AQUIFER MONITORING WELL (FMC)
DW-10 ABANDONED NEWARK AQUIFER MONITORING WELL (FMC)



BORING	DEPTH (feet)	pH	As	TPH -D	TPH -K	TPH -MO	TPH -BF
30X	1 & 3*** (composite)	9.6	3.2	ND	ND	140	ND

BORING	DEPTH (feet)	pH	As	TPH -D	TPH -K	TPH -MO	TPH -BF
31(WC)	1	10	3.5	ND	ND	38	ND
	3	7.7	ND	ND	ND	72	ND
31(WC)(d)	3	9.4	ND	ND	21	200	ND

BORING	DEPTH (feet)	pH	As
32(WC)	1	9.7	4.0
	3	8.9	7.2

W-7

DW-2 NEWARK AQUIFER EXTRACTION WELL (FMC)

B-28 MONITORING WELL (ASHLAND CHEMICAL)

MW-059 MONITORING WELL (BARON-BLAKESLEE)

J10 MONITORING WELL (JONES-HAMILTON Co.)

P-3 MONITORING WELL (ROMIC ENVIRONMENTAL TECHNOLOGIES)

POWER/TELEPHONE POLE

STORM DRAIN

PIPE

SUMP

(A) PARCEL DESIGNATION

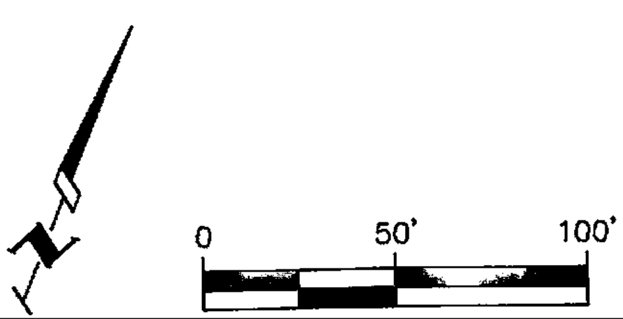
FORMER STRUCTURE

EXISTING STRUCTURE

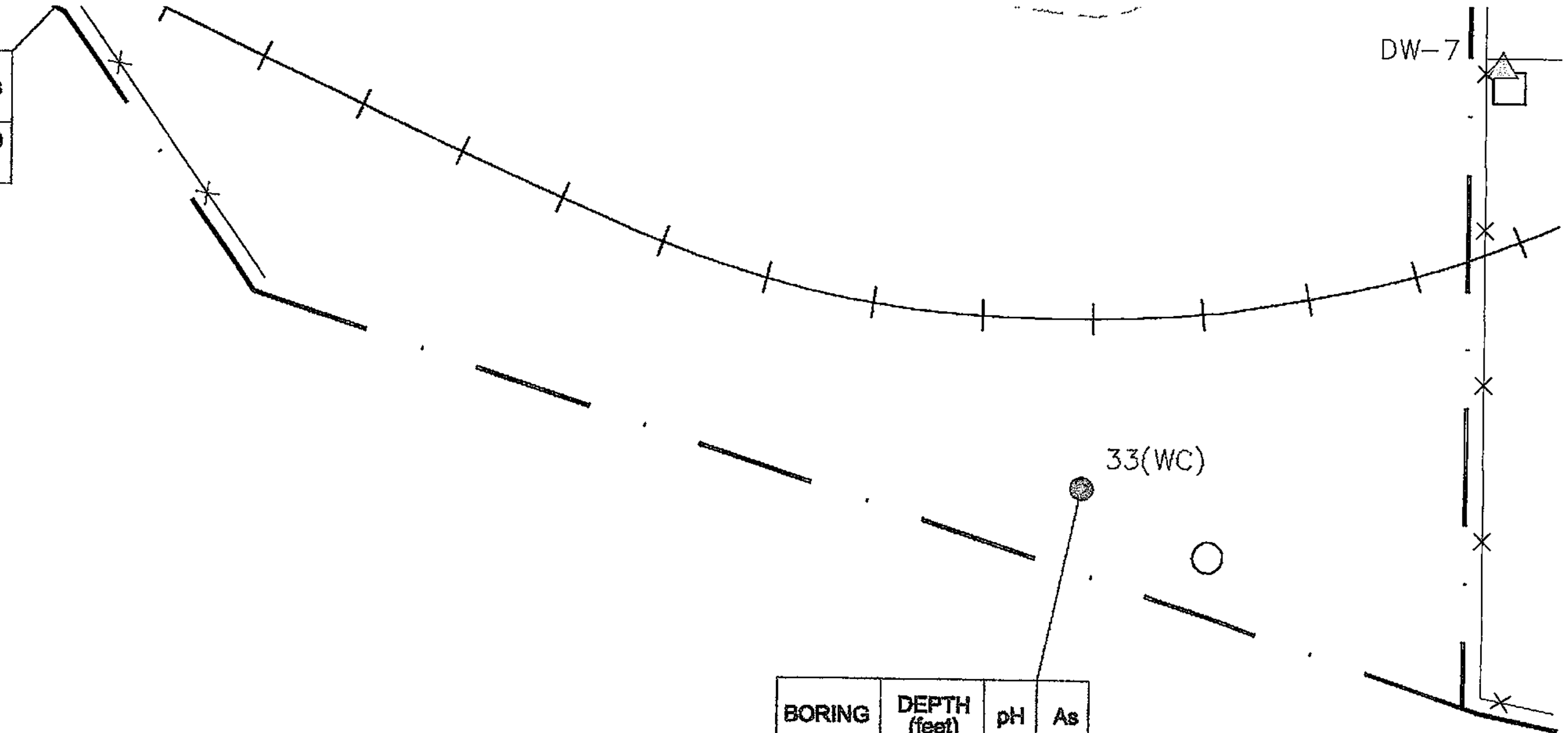
10 APPROXIMATE LOCATION OF ELEVATION CONTOUR (USGS Topography Map)

PROPERTY LINE

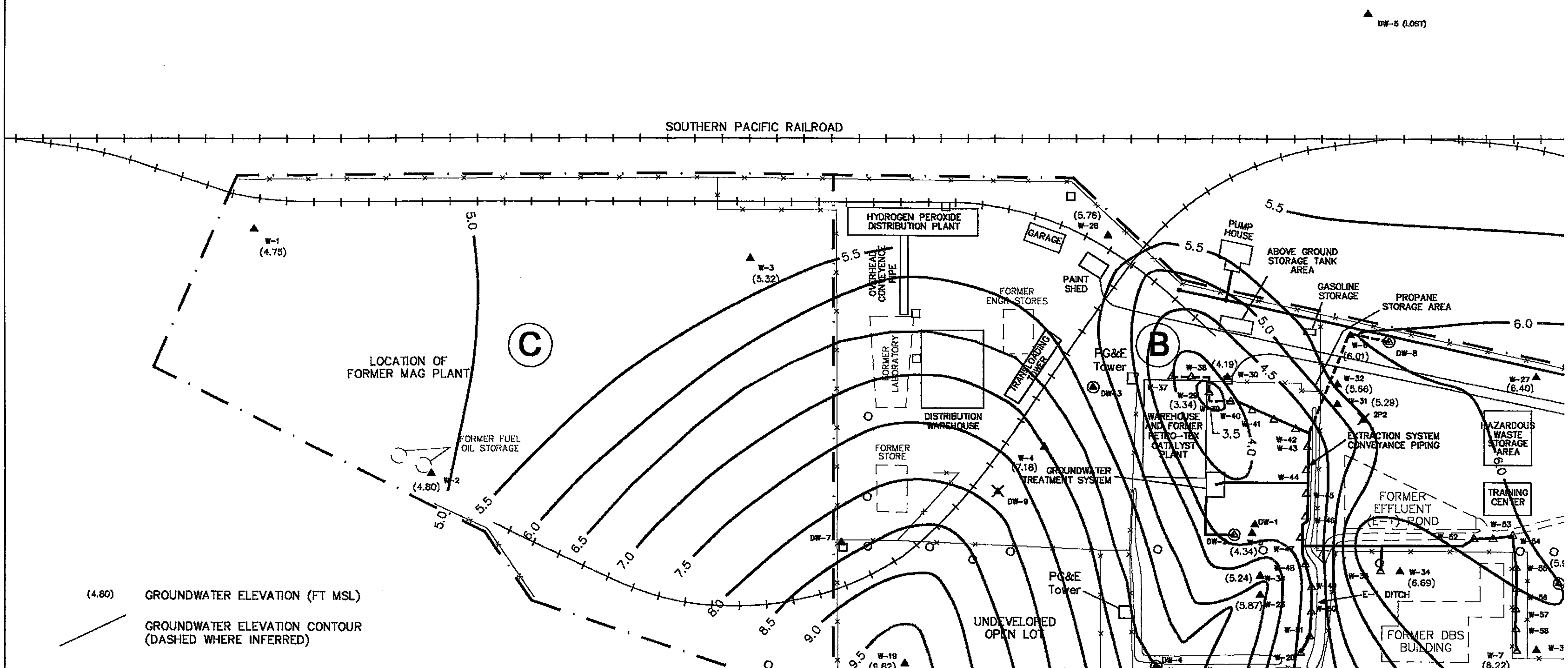
TPH-MO	TOTAL PETROLEUM HYDROCARBONS, MOTOR OIL
TPH-K	TOTAL PETROLEUM HYDROCARBONS, KEROSENE
TPH-D	TOTAL PETROLEUM HYDROCARBONS, DIESEL
TPH-BF	TOTAL PETROLEUM HYDROCARBONS, BUNKER FUEL
ND	NOT DETECTED, AT OR ABOVE LABORATORY REPORTING LIMITS
(d)	DUPLICATE

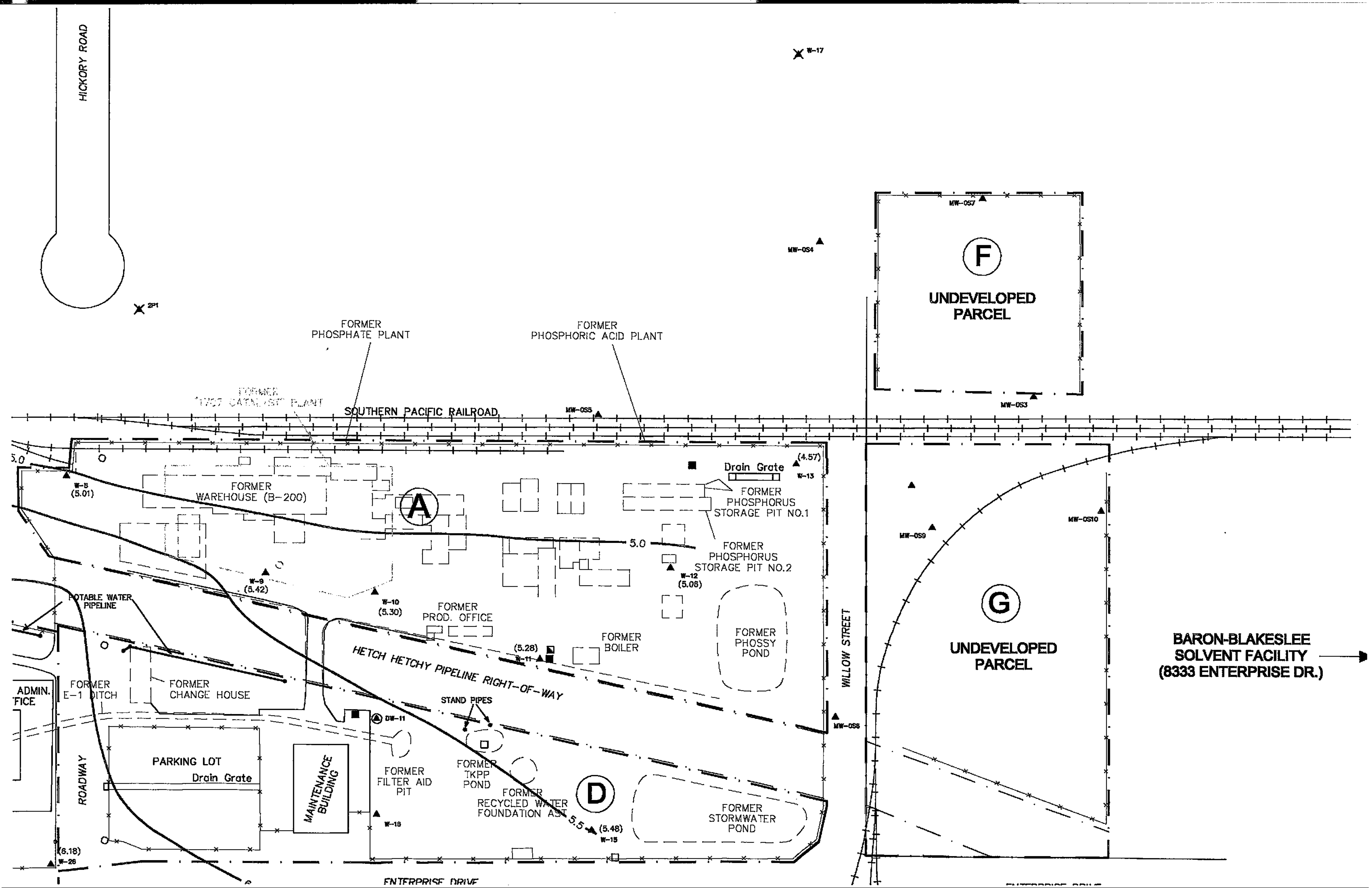


BORING	DEPTH (feet)	pH	As
29(WC)	1 3	9.9 9.9	ND 13



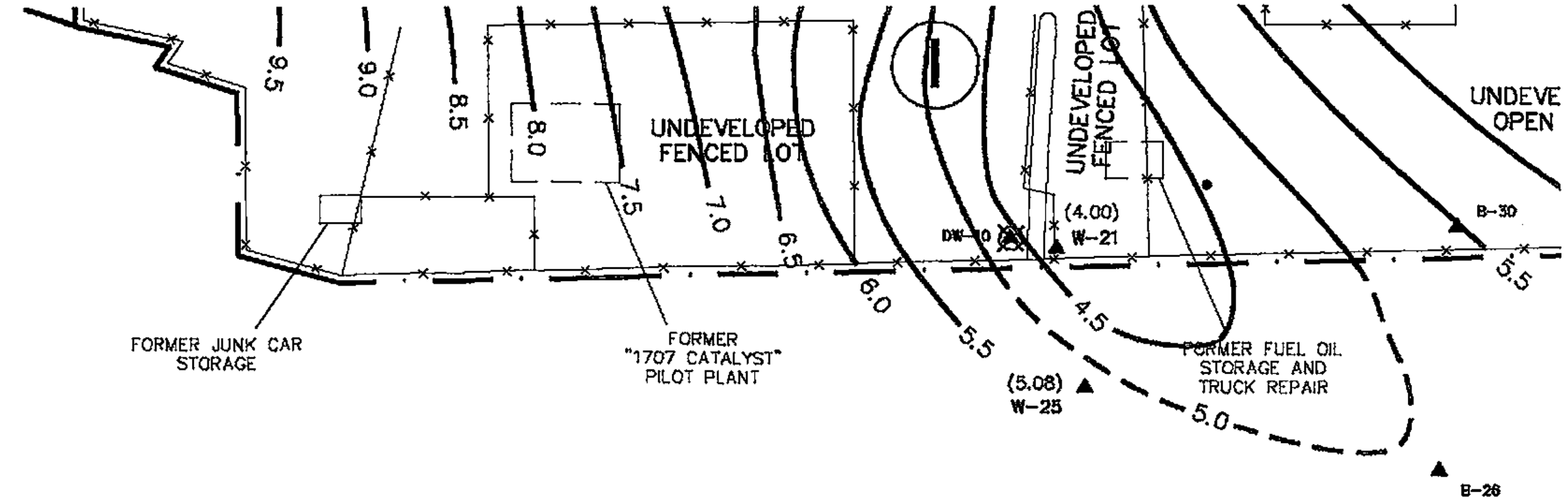
BORING	DEPTH (feet)	pH	As
33(WC)	1 3	9.8 7.8	1.2 7.6

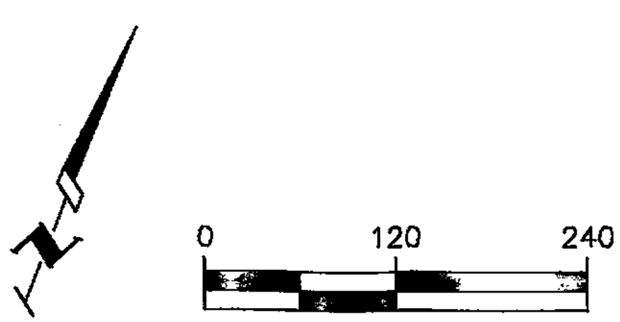

DW-5 (LOST)
SOUTHERN PACIFIC RAILROAD
W-1
(4.75)
W-3
(5.32)
HYDROGEN PEROXIDE DISTRIBUTION PLANT
OVERHEAD CONVEYENCE PIPE
GARAGE
(5.76)
W-28
PAINT SHED
PUMP HOUSE
ABOVE GROUND STORAGE TANK AREA
GASOLINE STORAGE
PROPANE STORAGE AREA
FORMER ENGR STORES
FORMER LABORATORY
DISTRIBUTION WAREHOUSE
TRANSLOADING TOWER
C
B
LOCATION OF FORMER MAG PLANT
FORMER FUEL OIL STORAGE
(4.80)
W-2
PG&E Tower
DW-3
W-4
(7.18)
GROUNDWATER TREATMENT SYSTEM
DW-9
FORMER STORE
DW-7
WAREHOUSE AND FORMER PETRO-TEX CATALYST PLANT
(4.19)
(3.34)
W-6
(6.01)
DW-8
W-32
(5.66)
W-31 (5.29)
2P2
EXTRACTION SYSTEM CONVEYANCE PIPING
W-27
(6.40)
HAZARDOUS WASTE STORAGE AREA
TRAINING CENTER
FORMER EFFLUENT (E-1) POND
DW-1
(4.34)
(5.24)
(5.87)
W-34
(6.69)
E-1 DITCH
FORMER DBS BUILDING
W-7
(6.22)
UNDEVELOPED OPEN LOT
W-18
(9.82)
DW-4
(4.80) GROUNDWATER ELEVATION (FT MSL)
GROUNDWATER ELEVATION CONTOUR (DASHED WHERE INFERRED)

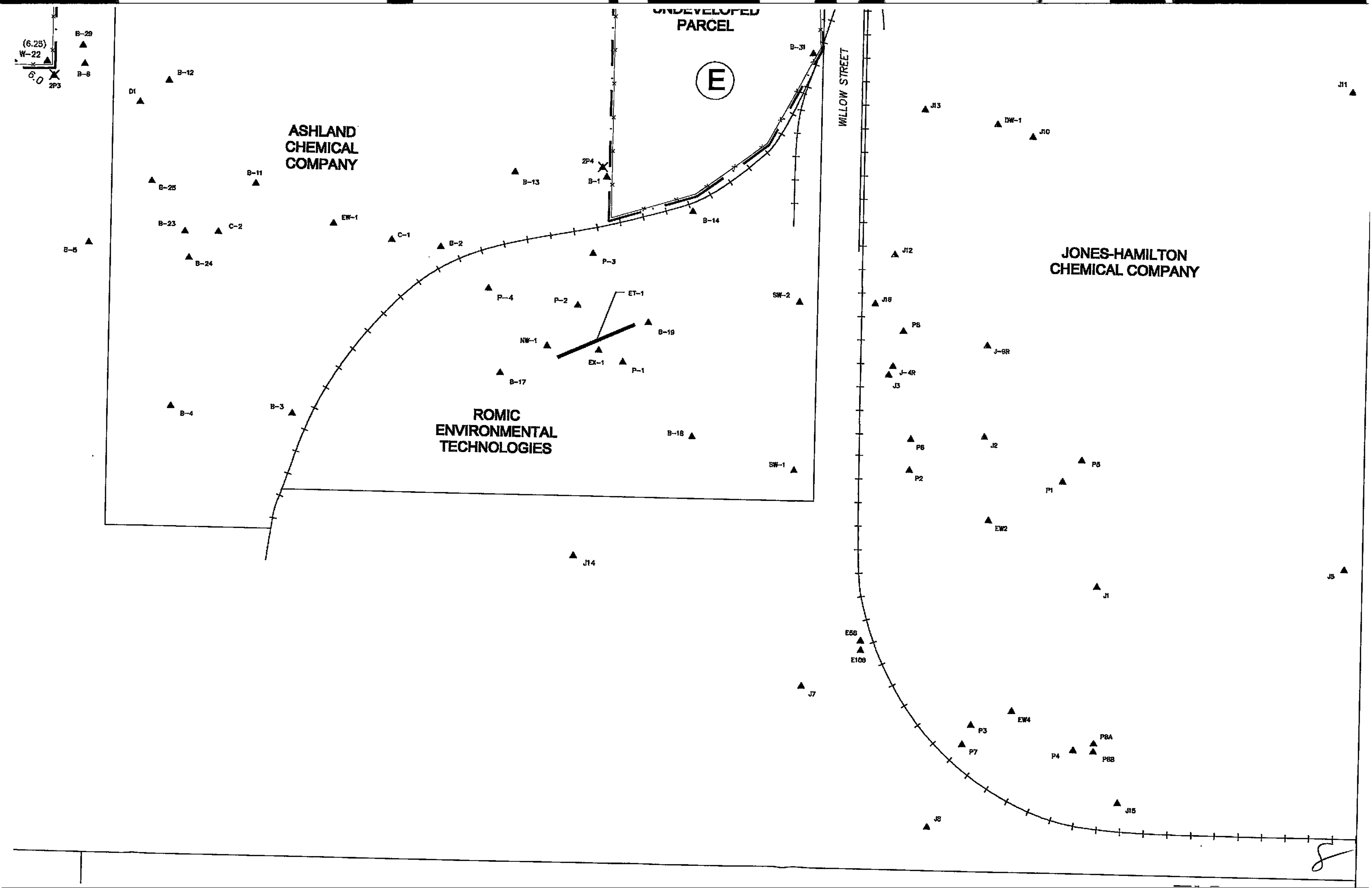

HICKORY ROAD
W-17
2P1
MW-OS7
MW-OS4
F
UNDEVELOPED PARCEL
FORMER PHOSPHATE PLANT
FORMER PHOSPHORIC ACID PLANT
SOUTHERN PACIFIC RAILROAD
MW-OS5
MW-OS3
5.0
Drain Grate
(4.57)
W-13
W-8 (5.01)
FORMER WAREHOUSE (B-200)
A
FORMER PHOSPHORUS STORAGE PIT NO.1
FORMER PHOSPHORUS STORAGE PIT NO.2
5.0
MW-OS9
MW-OS10
W-9 (5.42)
W-10 (5.30)
W-12 (5.06)
POTABLE WATER PIPELINE
FORMER PROD. OFFICE
FORMER BOILER
FORMER PHOSSY POND
G
UNDEVELOPED PARCEL
BARON-BLAKESLEE SOLVENT FACILITY (8333 ENTERPRISE DR.)
(5.28)
W-11
HETCH HETCHY PIPELINE RIGHT-OF-WAY
WILLOW STREET
ADMIN. OFFICE
FORMER E-1 DITCH
FORMER CHANGE HOUSE
STAND PIPES
DW-11
MW-OS6
PARKING LOT
Drain Grate
ROADWAY
MAINTENANCE BUILDING
FORMER FILTER AID PIT
FORMER TKPP POND
FORMER RECYCLED WATER FOUNDATION AST
D
FORMER STORMWATER POND
W-16
5.5
(5.48)
W-15
(6.18)
W-26
ENTERPRISE DRIVE

2P3

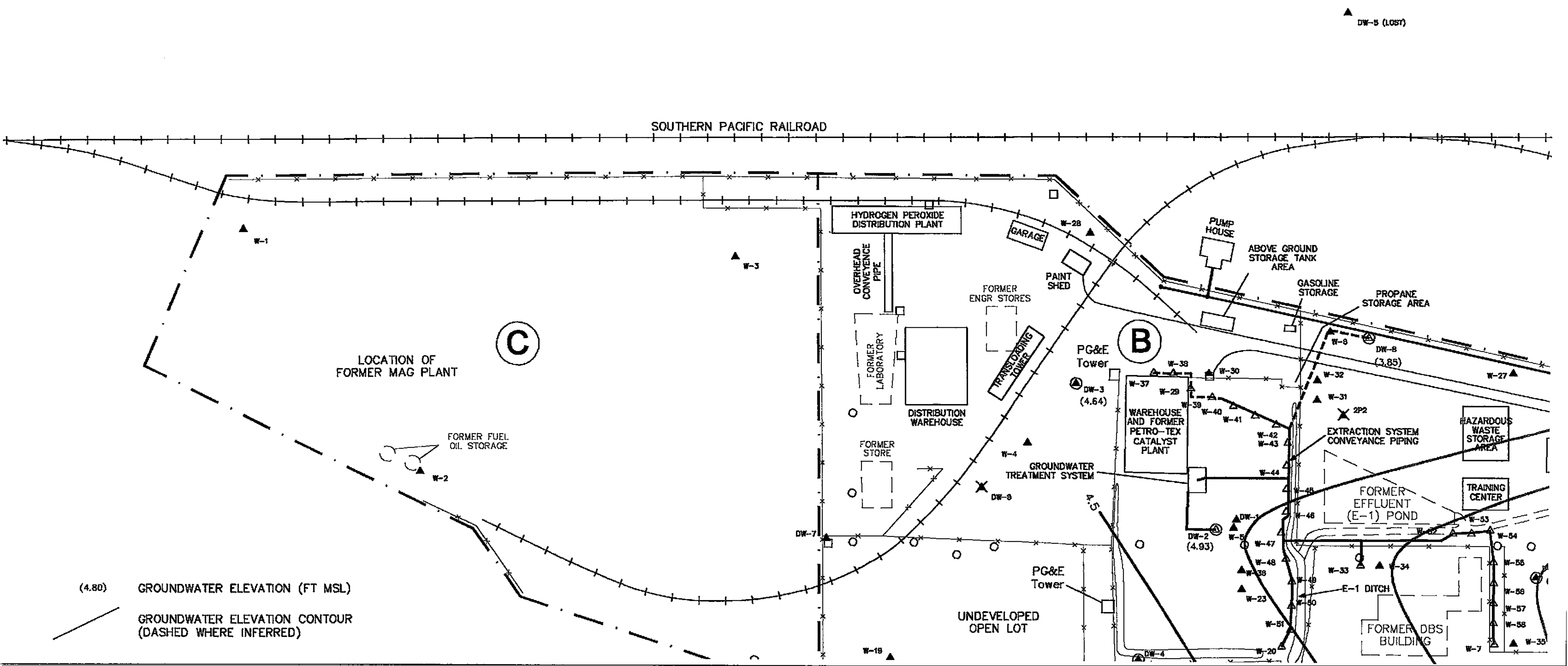
▲ E58	MONITORING WELL (ALAMEDA COUNTY WATER DISTRICT)
▲ W-4	SHALLOW ZONE MONITORING WELL (FMC)
✖ DW-9	ABANDONED SHALLOW ZONE MONITORING WELL (FMC)
Ⓐ DW-3	NEWARK AQUIFER MONITORING WELL (FMC)
⊠ DW-10	ABANDONED NEWARK AQUIFER MONITORING WELL (FMC)
△ W-7	SHALLOW ZONE EXTRACTION WELL (FMC)
◎ DW-2	NEWARK AQUIFER EXTRACTION WELL (FMC)
▲ B-25	MONITORING WELL (ASHLAND CHEMICAL)
▲ MW-059	MONITORING WELL (BARON-BLAKESLEE)
▲ J10	MONITORING WELL (JONES-HAMILTON Co.)
▲ P-3	MONITORING WELL (ROMIC ENVIRONMENTAL TECHNOLOGIES)
○	POWER/TELEPHONE POLE
□	STORM DRAIN
•	PIPE
■	SUMP
(A)	PARCEL DESIGNATION
	FORMER STRUCTURE
	EXISTING STRUCTURE
	PROPERTY LINE



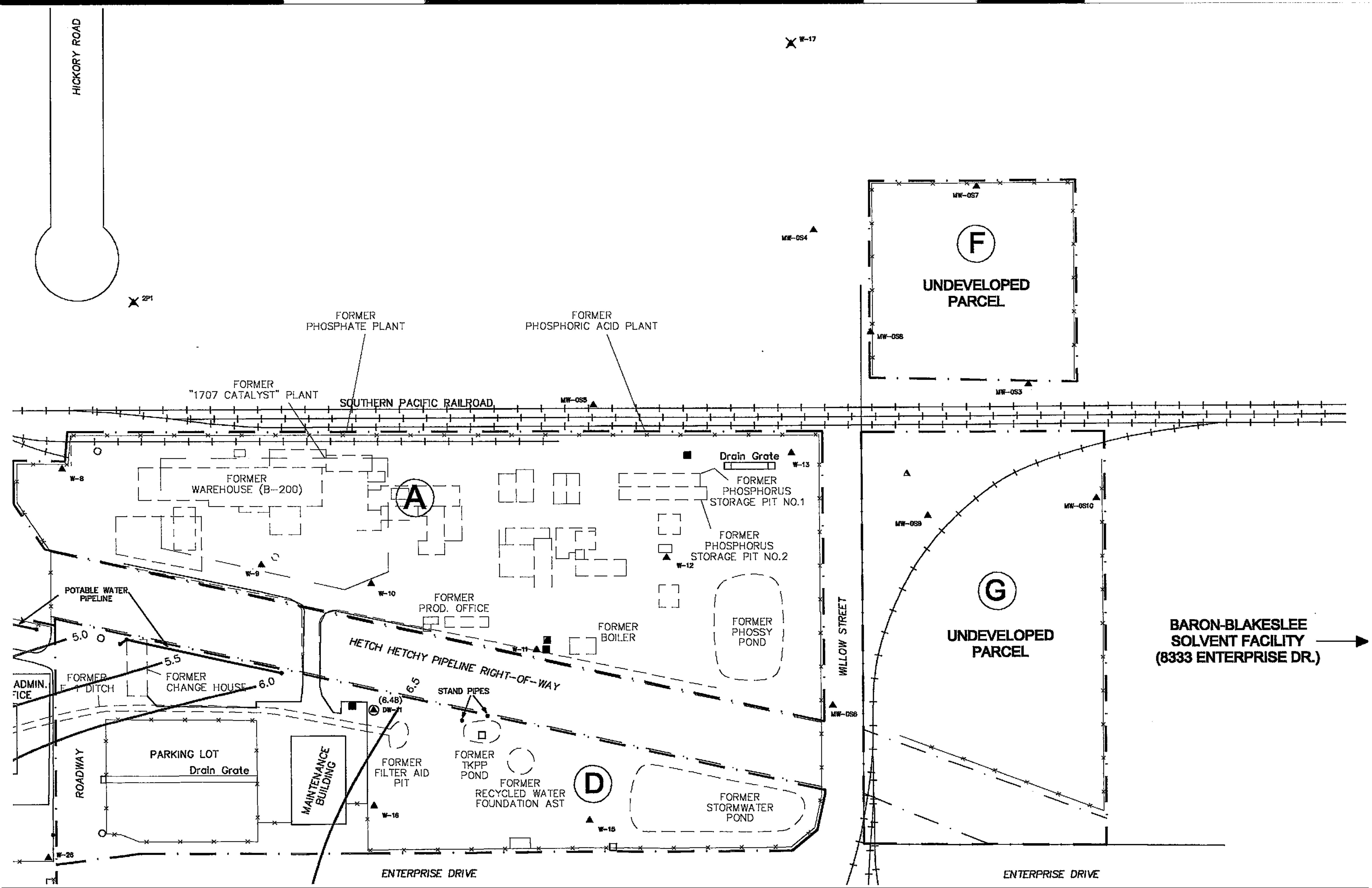




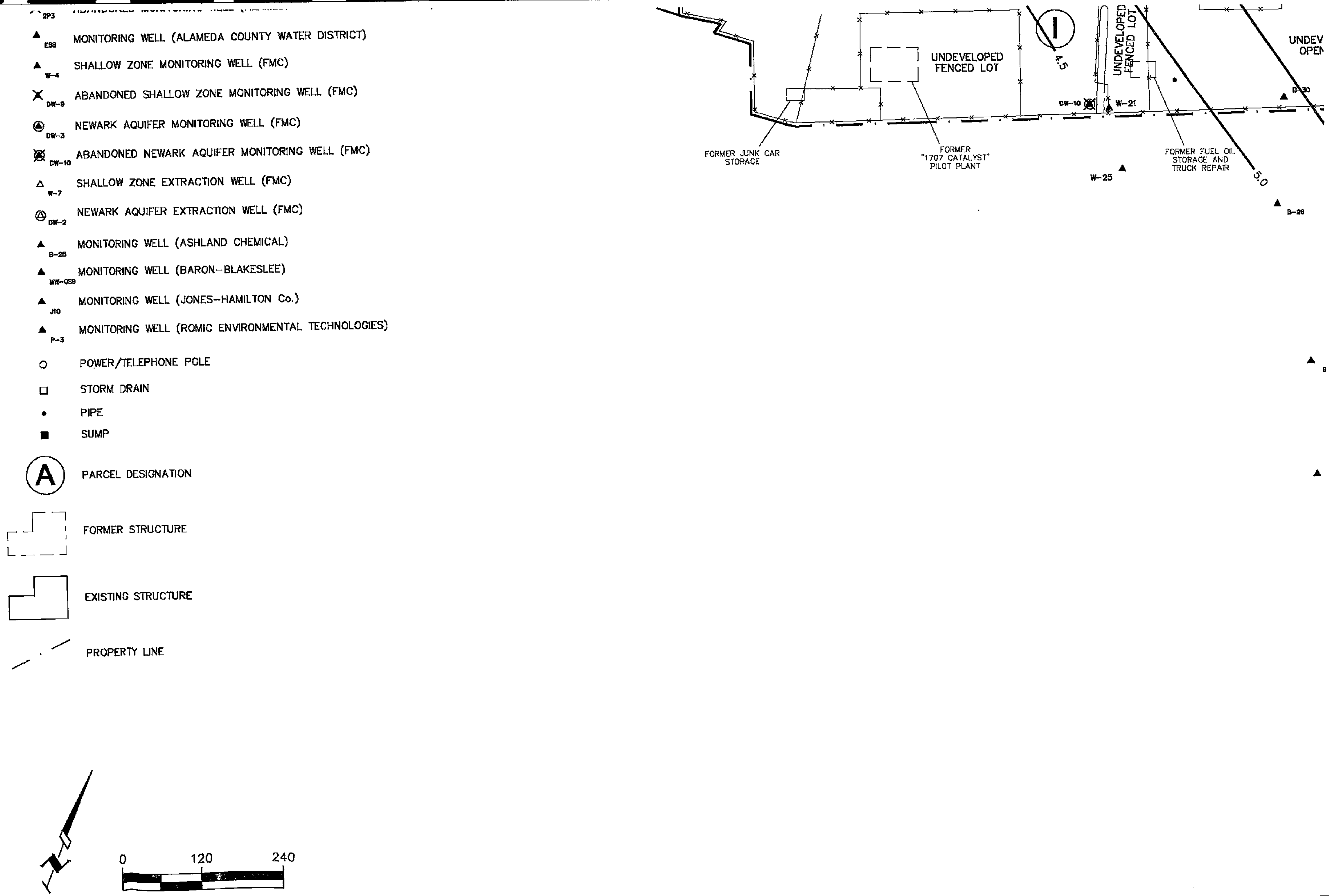
PARCEL
E
WILLOW STREET
ASHLAND CHEMICAL COMPANY
JONES-HAMILTON CHEMICAL COMPANY
ROMIC ENVIRONMENTAL TECHNOLOGIES
(6.25)
W-22
6.0
2P3
2P4
B-29
B-8
B-12
D1
B-25
B-11
B-13
B-1
B-31
B-14
B-23
C-2
EW-1
C-1
B-2
B-5
B-24
P-3
P-4
P-2
ET-1
SW-2
B-19
NW-1
EX-1
P-1
B-17
B-4
B-3
B-18
SW-1
J14
J13
DW-1
J10
J11
J12
J16
P8
J-9R
J-4R
J3
P6
J2
P5
P2
P1
EW2
J5
J1
E5S
E10S
J7
EW4
P3
P7
P8A
P4
P8B
J15
J8



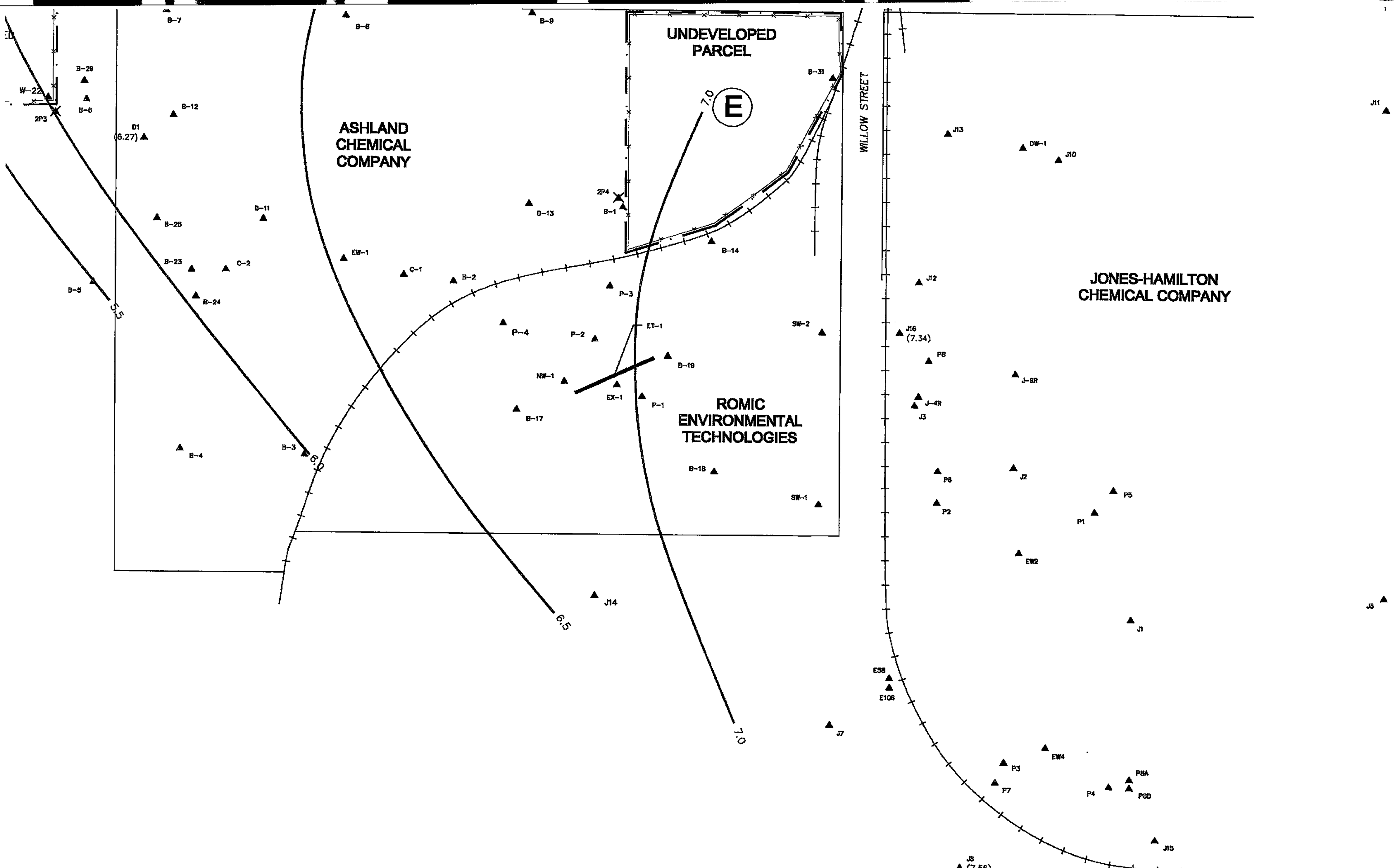
DW-5 (LOST)
SOUTHERN PACIFIC RAILROAD
W-1
W-3
HYDROGEN PEROXIDE DISTRIBUTION PLANT
OVERHEAD CONVEYENCE PIPE
GARAGE
W-28
PAINT SHED
PUMP HOUSE
ABOVE GROUND STORAGE TANK AREA
GASOLINE STORAGE
PROPANE STORAGE AREA
FORMER ENGR STORES
FORMER LABORATORY
DISTRIBUTION WAREHOUSE
TRANSLOADING TOWER
C
LOCATION OF FORMER MAG PLANT
B
PG&E Tower
DW-3 (4.64)
W-37
W-38
W-29
W-30
W-39
W-40
W-41
W-42
W-43
W-44
W-45
W-46
W-47
W-48
W-49
W-50
W-51
W-20
W-23
W-8
DW-8 (3.85)
W-27
W-32
W-31
2P2
EXTRACTION SYSTEM CONVEYANCE PIPING
HAZARDOUS WASTE STORAGE AREA
TRAINING CENTER
WAREHOUSE AND FORMER PETRO-TEX CATALYST PLANT
GROUNDWATER TREATMENT SYSTEM
FORMER FUEL OIL STORAGE
W-2
FORMER STORE
W-4
DW-9
4.5
DW-1
DW-2 (4.93)
FORMER EFFLUENT (E-1) POND
W-53
W-54
W-33
W-34
E-1 DITCH
W-55
W-56
W-57
W-58
W-7
W-35
FORMER DBS BUILDING
DW-7
PG&E Tower
UNDEVELOPED OPEN LOT
W-19
DW-4
(4.80) GROUNDWATER ELEVATION (FT MSL)
GROUNDWATER ELEVATION CONTOUR (DASHED WHERE INFERRED)

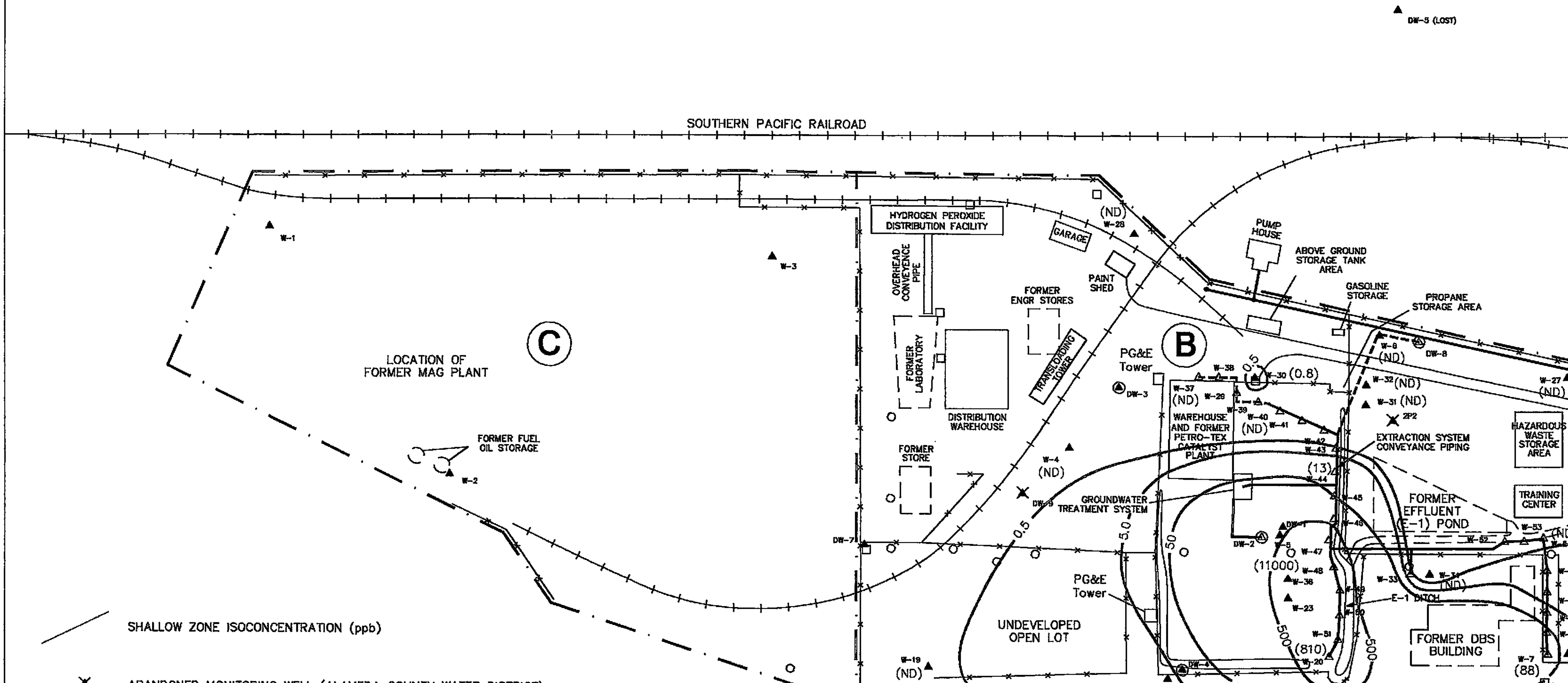


HICKORY ROAD
W-17
2P1
MW-0S7
MW-0S4
F
UNDEVELOPED PARCEL
MW-0S8
FORMER PHOSPHATE PLANT
FORMER PHOSPHORIC ACID PLANT
FORMER "1707 CATALYST" PLANT
SOUTHERN PACIFIC RAILROAD
MW-0S5
MW-0S3
Drain Grate
W-13
W-8
FORMER WAREHOUSE (B-200)
A
FORMER PHOSPHORUS STORAGE PIT NO.1
FORMER PHOSPHORUS STORAGE PIT NO.2
W-12
W-9
W-10
MW-0S9
MW-0S10
G
UNDEVELOPED PARCEL
POTABLE WATER PIPELINE
FORMER PROD. OFFICE
FORMER BOILER
FORMER PHOSSY POND
WILLOW STREET
BARON-BLAKESLEE SOLVENT FACILITY (8333 ENTERPRISE DR.)
5.0
5.5
6.0
6.5
HETCH HETCHY PIPELINE RIGHT-OF-WAY
W-11
ADMIN. FICE
FORMER DITCH
FORMER CHANGE HOUSE
STAND PIPES
(6.48)
DW-11
MW-0S6
PARKING LOT
Drain Grate
ROADWAY
MAINTENANCE BUILDING
FORMER FILTER AID PIT
FORMER TKPP POND
FORMER RECYCLED WATER FOUNDATION AST
D
FORMER STORMWATER POND
W-16
W-15
W-26
ENTERPRISE DRIVE
ENTERPRISE DRIVE



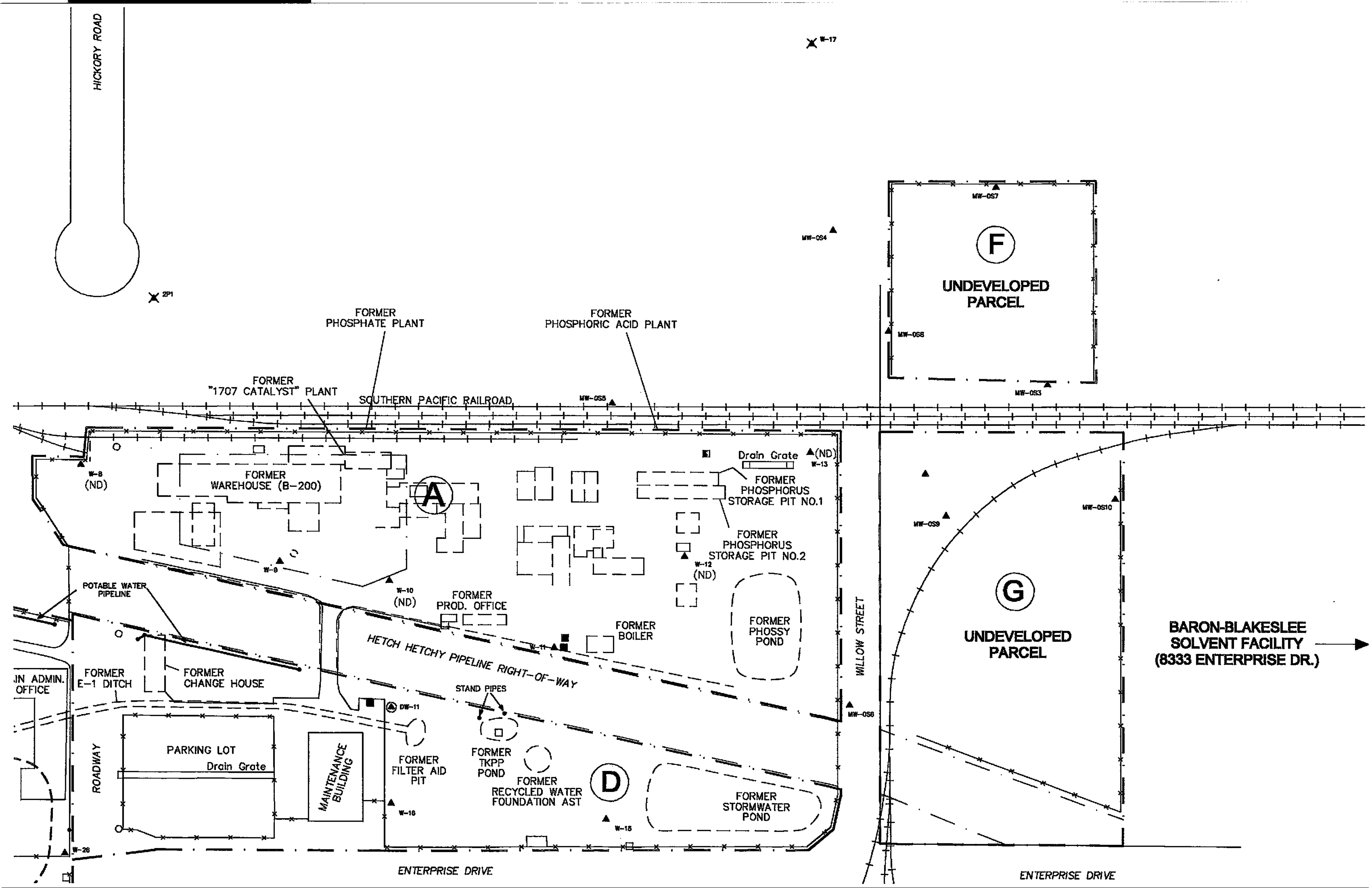
MONITORING WELL (ALAMEDA COUNTY WATER DISTRICT)
SHALLOW ZONE MONITORING WELL (FMC)
ABANDONED SHALLOW ZONE MONITORING WELL (FMC)
NEWARK AQUIFER MONITORING WELL (FMC)
ABANDONED NEWARK AQUIFER MONITORING WELL (FMC)
SHALLOW ZONE EXTRACTION WELL (FMC)
NEWARK AQUIFER EXTRACTION WELL (FMC)
MONITORING WELL (ASHLAND CHEMICAL)
MONITORING WELL (BARON–BLAKESLEE)
MONITORING WELL (JONES–HAMILTON Co.)
MONITORING WELL (ROMIC ENVIRONMENTAL TECHNOLOGIES)
POWER/TELEPHONE POLE
STORM DRAIN
PIPE
SUMP
PARCEL DESIGNATION
FORMER STRUCTURE
EXISTING STRUCTURE
PROPERTY LINE
0
120
240
UNDEVELOPED FENCED LOT
UNDEVELOPED FENCED LOT
FORMER JUNK CAR STORAGE
FORMER "1707 CATALYST" PILOT PLANT
FORMER FUEL OIL STORAGE AND TRUCK REPAIR
DW-10
W-21
W-25
B-26
4.5
5.0


UNDEVELOPED PARCEL
ASHLAND CHEMICAL COMPANY
ROMIC ENVIRONMENTAL TECHNOLOGIES
JONES-HAMILTON CHEMICAL COMPANY
WILLOW STREET
E
5.5
6.0
6.5
7.0
7.0
W-22
2P3
2P4
B-1
B-2
B-3
B-4
B-5
B-6
B-7
B-8
B-9
B-11
B-12
B-13
B-14
B-17
B-18
B-19
B-23
B-24
B-25
B-29
B-31
D1 (6.27)
C-1
C-2
EW-1
P-1
P-2
P-3
P-4
NW-1
EX-1
ET-1
SW-1
SW-2
J1
J2
J3
J5
J7
J8 (7.56)
J10
J11
J12
J13
J14
J15
J16 (7.34)
J-2R
J-4R
DW-1
P1
P2
P3
P4
P5
P6
P7
P8
P8A
P8B
EW2
EW4
E58
E106



SHALLOW ZONE ISOCONCENTRATION (ppb)

ABANDONED MONITORING WELL (ALAMEDA COUNTY WATER DISTRICT)


HICKORY ROAD
W-17
2P1
MW-OS7
MW-OS4
F
UNDEVELOPED PARCEL
MW-OS8
MW-OS3
FORMER PHOSPHATE PLANT
FORMER PHOSPHORIC ACID PLANT
FORMER "1707 CATALYST" PLANT
SOUTHERN PACIFIC RAILROAD
MW-OS5
Drain Grate
(ND)
W-13
W-8
(ND)
FORMER WAREHOUSE (B-200)
A
FORMER PHOSPHORUS STORAGE PIT NO.1
FORMER PHOSPHORUS STORAGE PIT NO.2
W-12
(ND)
W-9
W-10
(ND)
MW-OS10
MW-OS9
G
UNDEVELOPED PARCEL
BARON-BLAKESLEE SOLVENT FACILITY (8333 ENTERPRISE DR.)
POTABLE WATER PIPELINE
FORMER PROD. OFFICE
FORMER BOILER
W-11
FORMER PHOSSY POND
HETCH HETCHY PIPELINE RIGHT-OF-WAY
WILLOW STREET
ADMIN. OFFICE
FORMER E-1 DITCH
FORMER CHANGE HOUSE
STAND PIPES
DW-11
MW-OS6
PARKING LOT
Drain Grate
ROADWAY
MAINTENANCE BUILDING
FORMER FILTER AID PIT
FORMER TKPP POND
FORMER RECYCLED WATER FOUNDATION AST
D
FORMER STORMWATER POND
W-16
W-15
W-26
ENTERPRISE DRIVE
ENTERPRISE DRIVE

MONITORING WELL (ALAMEDA COUNTY WATER DISTRICT) — E58

SHALLOW ZONE MONITORING WELL (FMC) — W-4

ABANDONED SHALLOW ZONE MONITORING WELL (FMC) — DW-8

NEWARK AQUIFER MONITORING WELL (FMC) — DW-3

ABANDONED NEWARK AQUIFER MONITORING WELL (FMC) — DW-10

SHALLOW ZONE EXTRACTION WELL (FMC) — W-7

NEWARK AQUIFER EXTRACTION WELL (FMC) — DW-2

MONITORING WELL (ASHLAND CHEMICAL) — B-25

MONITORING WELL (BARON-BLAKESLEE) — MW-0S9

MONITORING WELL (JONES-HAMILTON Co.) — J10

MONITORING WELL (ROMIC ENVIRONMENTAL TECHNOLOGIES) — P-3

POWER/TELEPHONE POLE

STORM DRAIN

PIPE

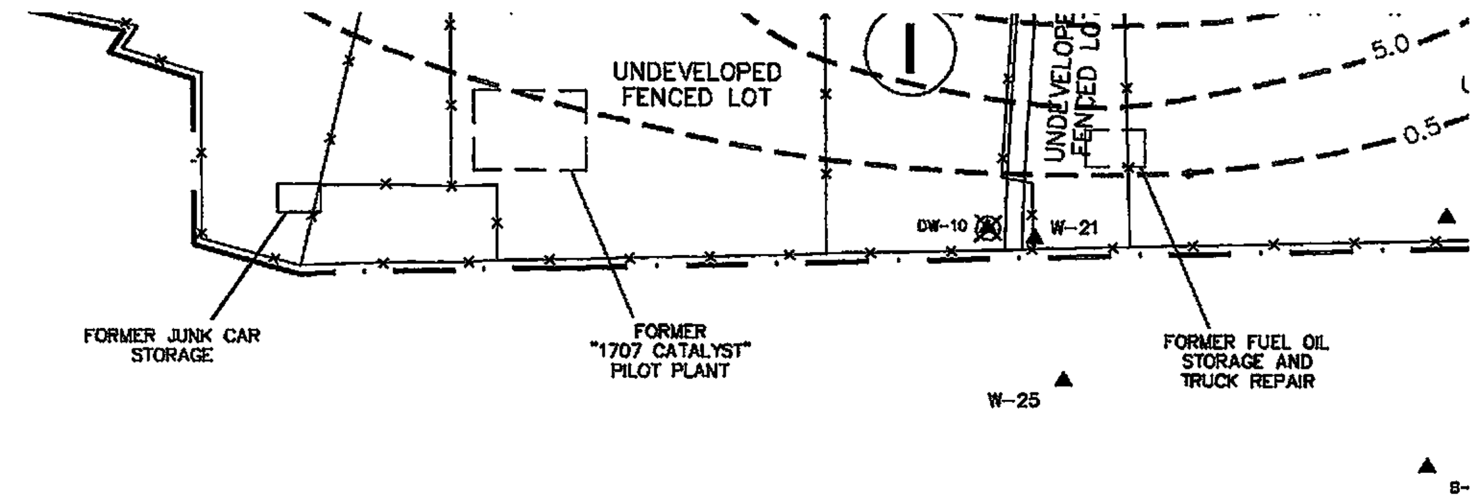
SUMP

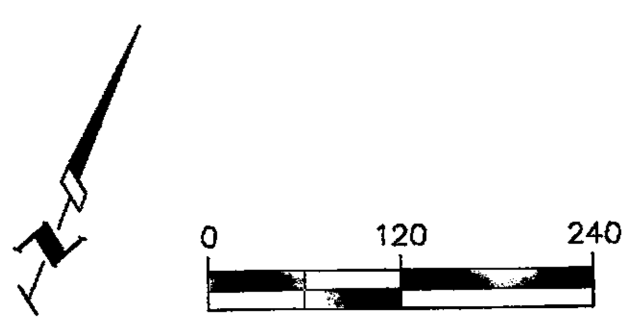
(A) PARCEL DESIGNATION

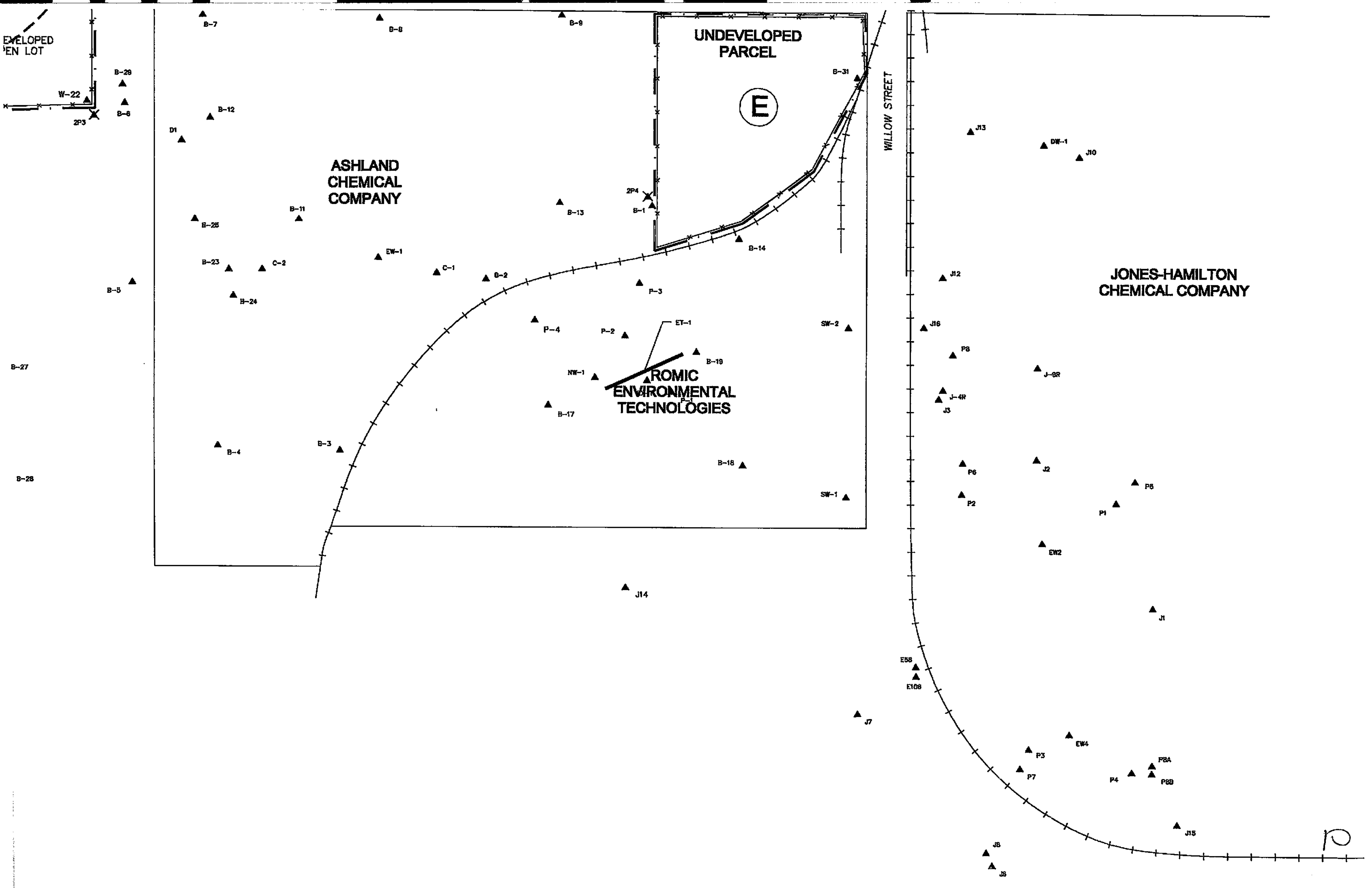
FORMER STRUCTURE

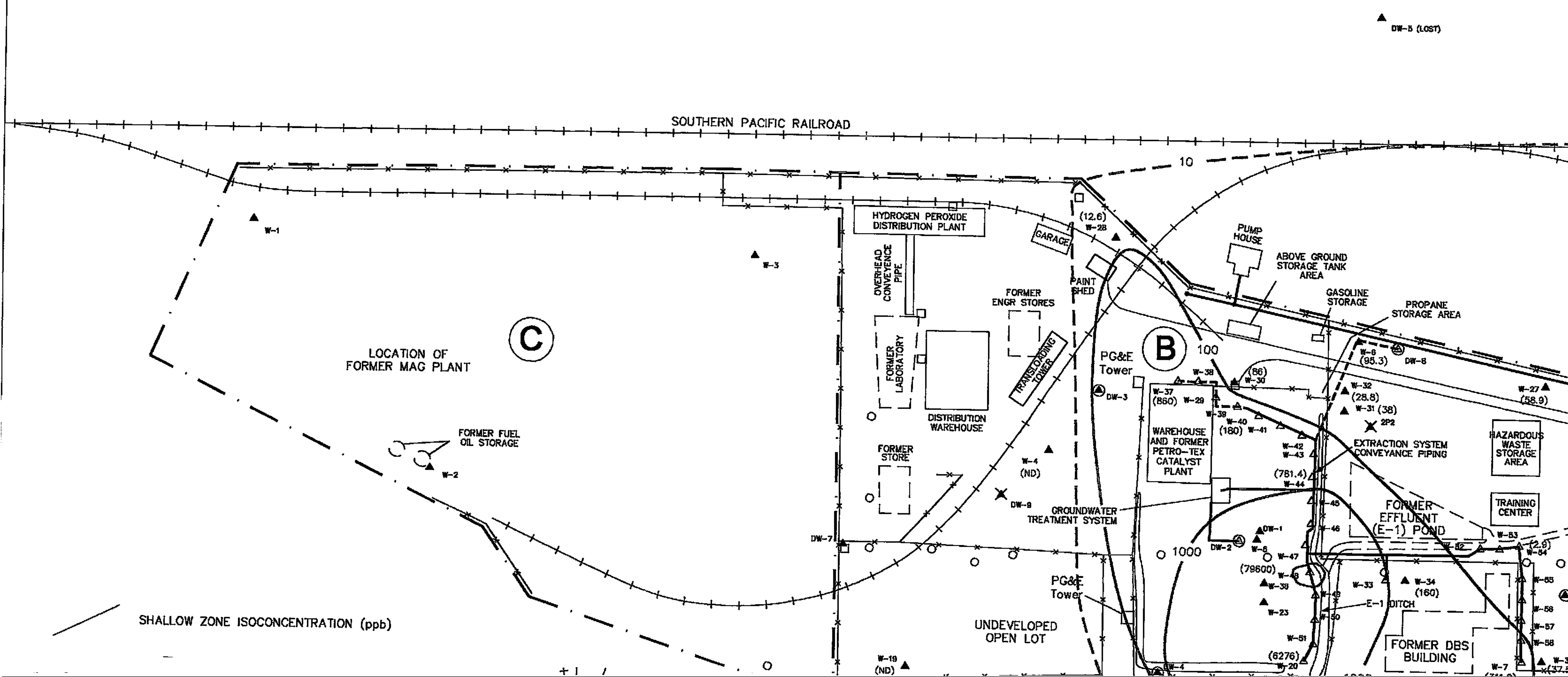
EXISTING STRUCTURE

PROPERTY LINE

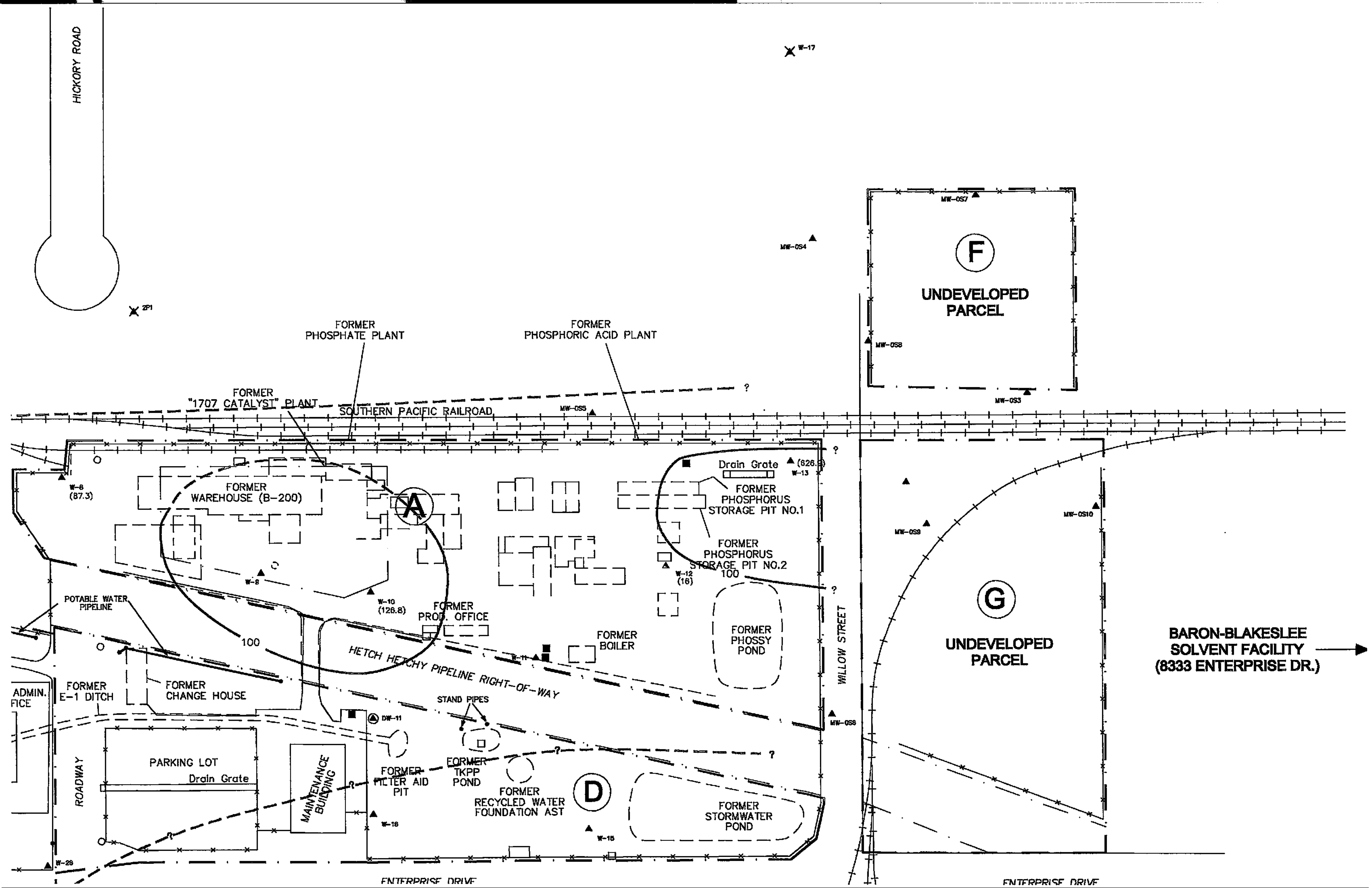


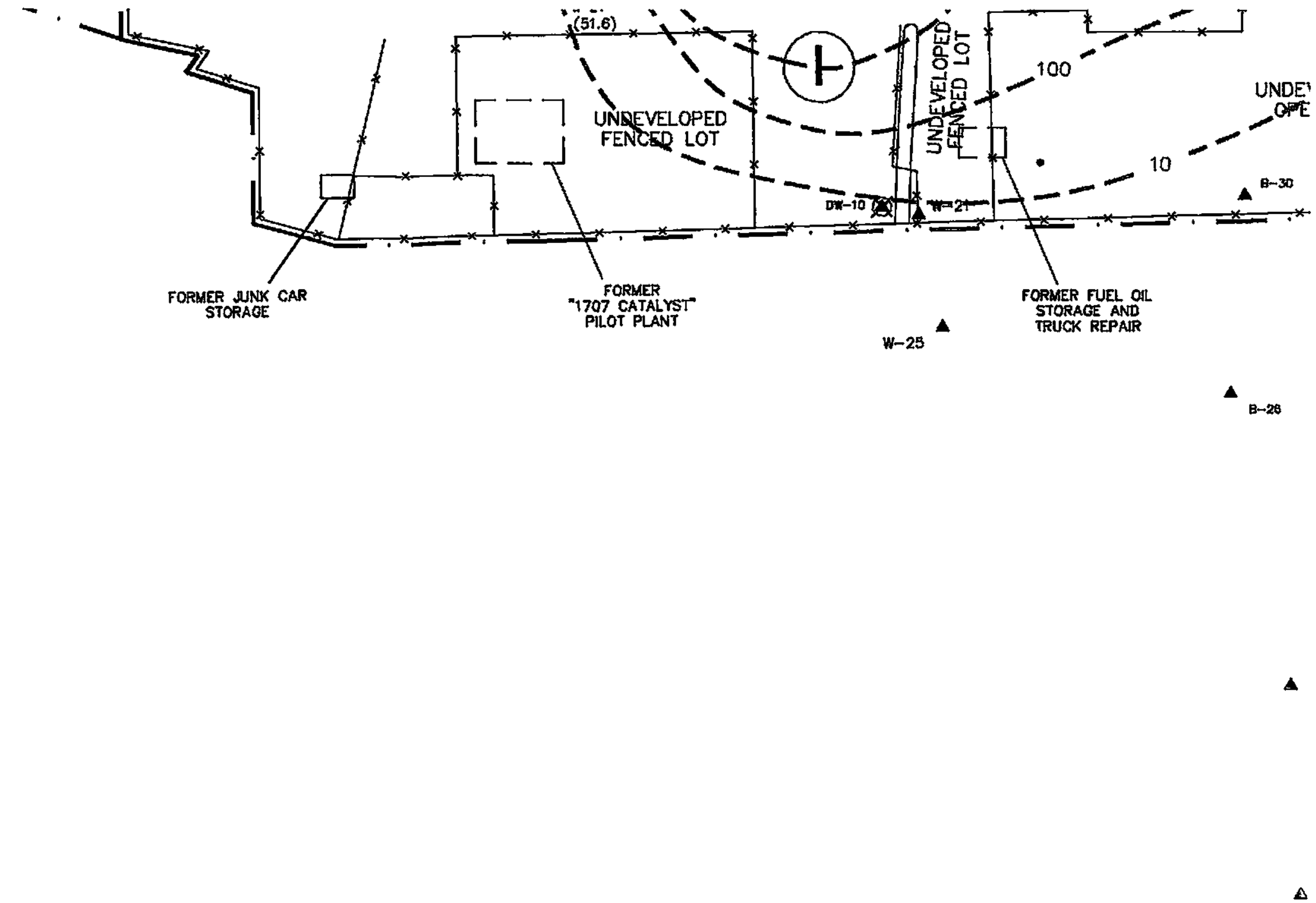



EVELOPED
EN LOT
B-7
B-8
B-9
UNDEVELOPED PARCEL
E
B-31
WILLOW STREET
B-29
W-22
B-6
2P3
B-12
D1
J13
DW-1
J10
ASHLAND CHEMICAL COMPANY
2P4
B-1
B-13
B-11
B-25
B-14
EW-1
B-23
C-2
C-1
B-2
J12
JONES-HAMILTON CHEMICAL COMPANY
B-5
B-24
P-3
ET-1
SW-2
J16
P-4
P-2
P8
B-19
B-27
NW-1
ROMIC ENVIRONMENTAL TECHNOLOGIES
J-6R
J-4R
J3
B-17
B-3
B-4
B-18
P6
J2
P5
B-28
SW-1
P2
P1
EW2
J14
J1
E58
E108
J7
EW4
P3
P8A
P7
P4
P8B
J15
J8



DW-5 (LOST)
SOUTHERN PACIFIC RAILROAD
10
100
1000
W-1
W-3
W-2
C
LOCATION OF
FORMER MAG PLANT
FORMER FUEL
OIL STORAGE
HYDROGEN PEROXIDE
DISTRIBUTION PLANT
OVERHEAD
CONVEYENCE
PIPE
FORMER
LABORATORY
DISTRIBUTION
WAREHOUSE
FORMER
ENGR STORES
TRANSLOADING
TOWER
GARAGE
PAINT
SHED
FORMER
STORE
W-4
(ND)
DW-9
DW-7
(12.6)
W-28
B
PG&E
Tower
DW-3
PUMP
HOUSE
ABOVE GROUND
STORAGE TANK
AREA
GASOLINE
STORAGE
PROPANE
STORAGE AREA
W-6
(95.3)
DW-8
W-27
(58.9)
W-37
(860)
W-29
W-38
(86)
W-30
W-39
W-40
(180)
W-41
W-32
(28.8)
W-31 (38)
2P2
WAREHOUSE
AND FORMER
PETRO-TEX
CATALYST
PLANT
W-42
W-43
(781.4)
W-44
EXTRACTION SYSTEM
CONVEYANCE PIPING
HAZARDOUS
WASTE
STORAGE
AREA
TRAINING
CENTER
GROUNDWATER
TREATMENT SYSTEM
W-45
W-46
FORMER
EFFLUENT
(E-1) POND
W-53
(2.9)
W-54
DW-1
DW-2
W-5
W-47
(79600)
W-48
W-36
W-33
W-34
(160)
W-49
E-1 DITCH
W-23
W-50
W-55
W-56
W-57
W-58
W-51
(6276)
W-20
DW-4
FORMER DBS
BUILDING
W-7
W-35
(37.8)
PG&E
Tower
UNDEVELOPED
OPEN LOT
W-19
(ND)
SHALLOW ZONE ISOCONCENTRATION (ppb)


HICKORY ROAD
W-17
2P1
MW-OS7
MW-OS4
F
UNDEVELOPED PARCEL
MW-OS8
FORMER PHOSPHATE PLANT
FORMER PHOSPHORIC ACID PLANT
FORMER "1707 CATALYST" PLANT
SOUTHERN PACIFIC RAILROAD
MW-OS5
MW-OS3
Drain Grate
(626.
W-13
FORMER WAREHOUSE (B-200)
A
W-8 (87.3)
FORMER PHOSPHORUS STORAGE PIT NO.1
FORMER PHOSPHORUS STORAGE PIT NO.2
W-12 (16)
100
MW-OS9
MW-OS10
W-9
W-10 (126.8)
POTABLE WATER PIPELINE
FORMER PROD. OFFICE
FORMER BOILER
FORMER PHOSSY POND
WILLOW STREET
G
UNDEVELOPED PARCEL
BARON-BLAKESLEE SOLVENT FACILITY (8333 ENTERPRISE DR.)
100
HETCH HETCHY PIPELINE RIGHT-OF-WAY
W-11
ADMIN. FICE
FORMER E-1 DITCH
FORMER CHANGE HOUSE
STAND PIPES
DW-11
MW-OS6
PARKING LOT
Drain Grate
ROADWAY
MAINTENANCE BUILDING
FORMER FILTER AID PIT
FORMER TKPP POND
FORMER RECYCLED WATER FOUNDATION AST
D
FORMER STORMWATER POND
W-16
W-15
W-28
ENTERPRISE DRIVE
ENTERPRISE DRIVE



2P3 ABANDONED MONITORING WELL (ALAMEDA COUNTY WATER DISTRICT)

E58 MONITORING WELL (ALAMEDA COUNTY WATER DISTRICT)

W-4 SHALLOW ZONE MONITORING WELL (FMC)

DW-9 ABANDONED SHALLOW ZONE MONITORING WELL (FMC)

DW-3 NEWARK AQUIFER MONITORING WELL (FMC)

DW-10 ABANDONED NEWARK AQUIFER MONITORING WELL (FMC)

W-7 SHALLOW ZONE EXTRACTION WELL (FMC)

DW-2 NEWARK AQUIFER EXTRACTION WELL (FMC)

B-25 MONITORING WELL (ASHLAND CHEMICAL)

MW-OS9 MONITORING WELL (BARON-BLAKESLEE)

J10 MONITORING WELL (JONES-HAMILTON Co.)

P-3 MONITORING WELL (ROMIC ENVIRONMENTAL TECHNOLOGIES)

POWER/TELEPHONE POLE

STORM DRAIN

PIPE

SUMP

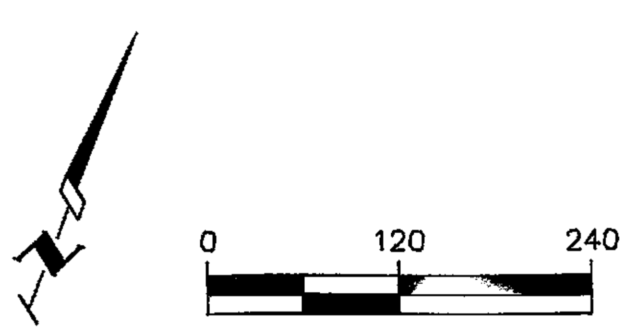
(A) PARCEL DESIGNATION

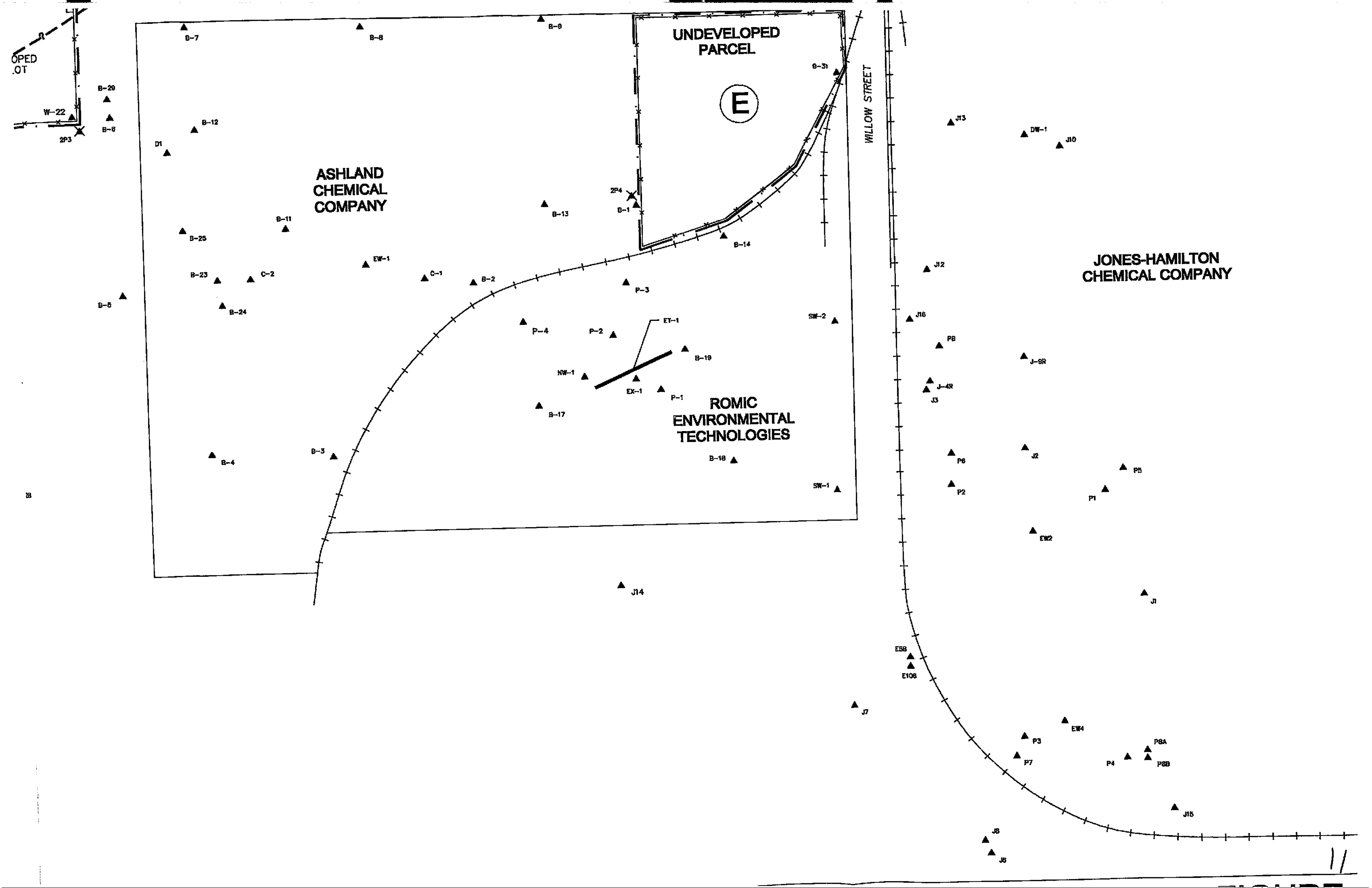
FORMER STRUCTURE

EXISTING STRUCTURE

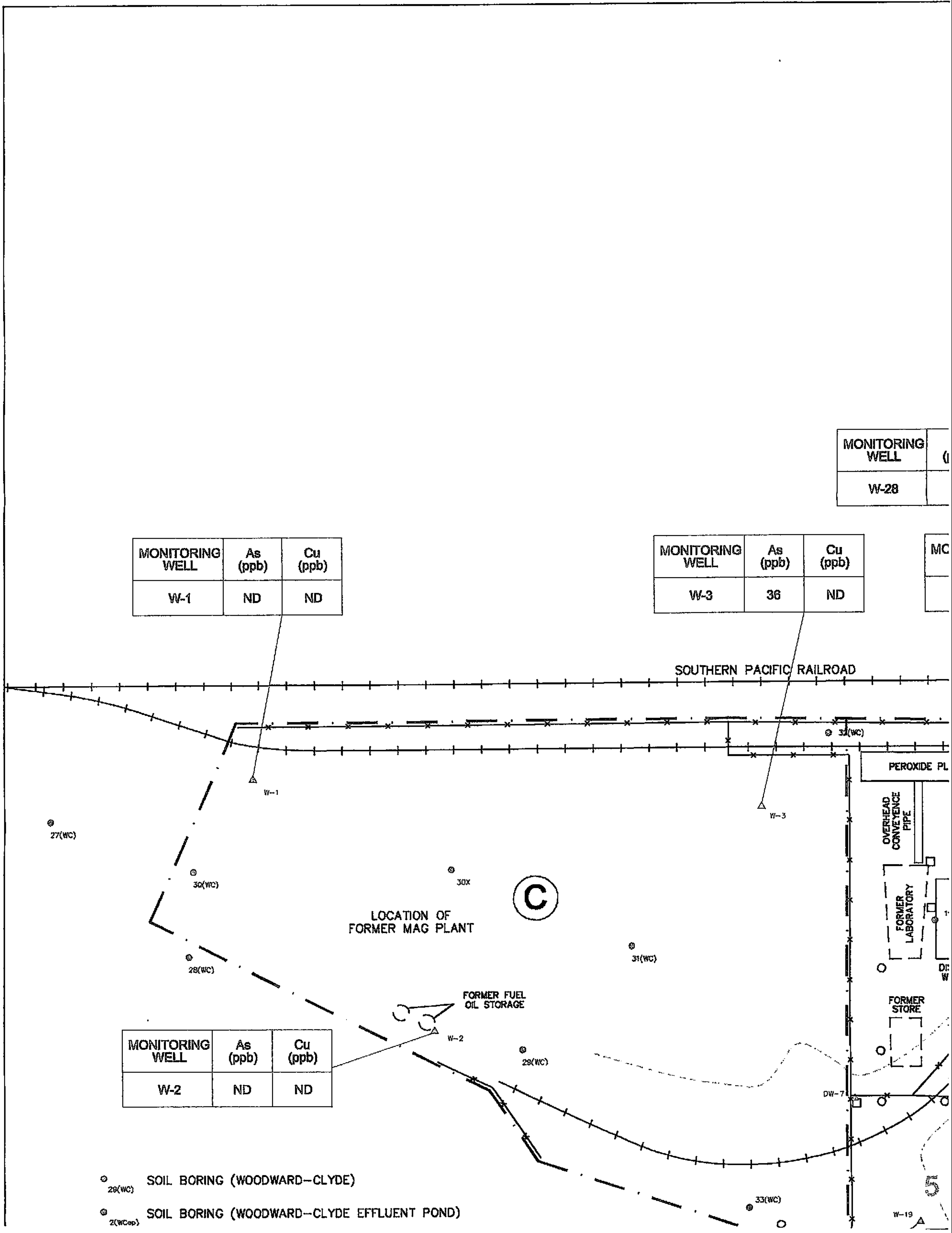
PROPERTY LINE

*** OTHER VOCs (PRIMARILY 1,2-DCA) INCLUDE ALL COMPOUNDS ANALYZED BY USEPA SW-846 METHOD 8010 (DOES NOT INCLUDE EDB)**

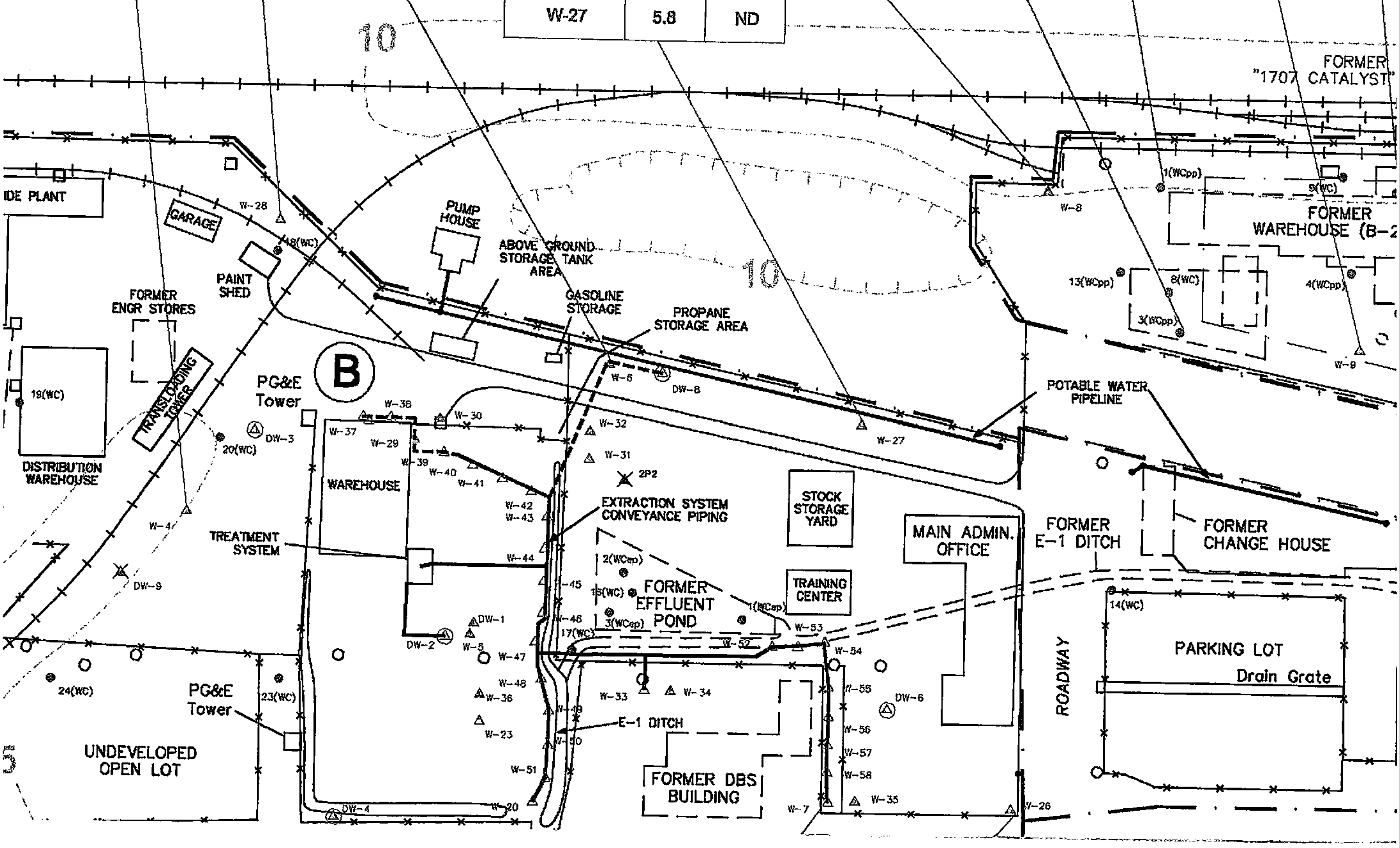




UNDEVELOPED PARCEL
E
WILLOW STREET
ASHLAND CHEMICAL COMPANY
JONES-HAMILTON CHEMICAL COMPANY
ROMIC ENVIRONMENTAL TECHNOLOGIES
B-7
B-8
B-9
B-31
B-29
W-22
B-6
2P3
B-12
D1
2P4
B-1
B-13
B-11
B-25
B-14
EW-1
C-1
B-2
B-23
C-2
P-3
B-5
B-24
ET-1
P-4
P-2
SW-2
B-19
NW-1
EX-1
P-1
B-17
B-3
B-4
B-18
SW-1
J14
J13
DW-1
J10
J12
J16
P8
J-9R
J-4R
J3
P6
J2
P5
P2
P1
EW2
J1
E58
E106
J7
EW4
P3
P9A
P7
P4
P9B
J15
J8
J6


MONITORING WELL | As (ppb) | Cu (ppb)
W-1 | ND | ND
MONITORING WELL | As (ppb) | Cu (ppb)
W-3 | 36 | ND
MONITORING WELL
W-28
MONITORING WELL | As (ppb) | Cu (ppb)
W-2 | ND | ND
SOUTHERN PACIFIC RAILROAD
PEROXIDE PL
OVERHEAD CONVEYENCE PIPE
FORMER LABORATORY
FORMER STORE
LOCATION OF FORMER MAG PLANT
C
FORMER FUEL OIL STORAGE
W-1
W-2
W-3
W-19
DW-7
27(WC)
30(WC)
30X
28(WC)
31(WC)
29(WC)
32(WC)
33(WC)
SOIL BORING (WOODWARD-CLYDE)
SOIL BORING (WOODWARD-CLYDE EFFLUENT POND)

U.S.D.



MONITORING WELL	
W-10	

MONITORING WELL	As (ppb)	Cu (ppb)	Pb (ppb)
W-9	360	ND	ND

GRAB GROUNDWATER BORING	pH	Cu	Pb
3(WCpp)	7.66	4800	3200

GRAB GROUNDWATE BORING
2(WCpp)

…NG	As (ppb)	Cd (ppb)	Cr (ppb)	Cu (ppb)	Pb (ppb)
	12	ND	ND	ND	ND

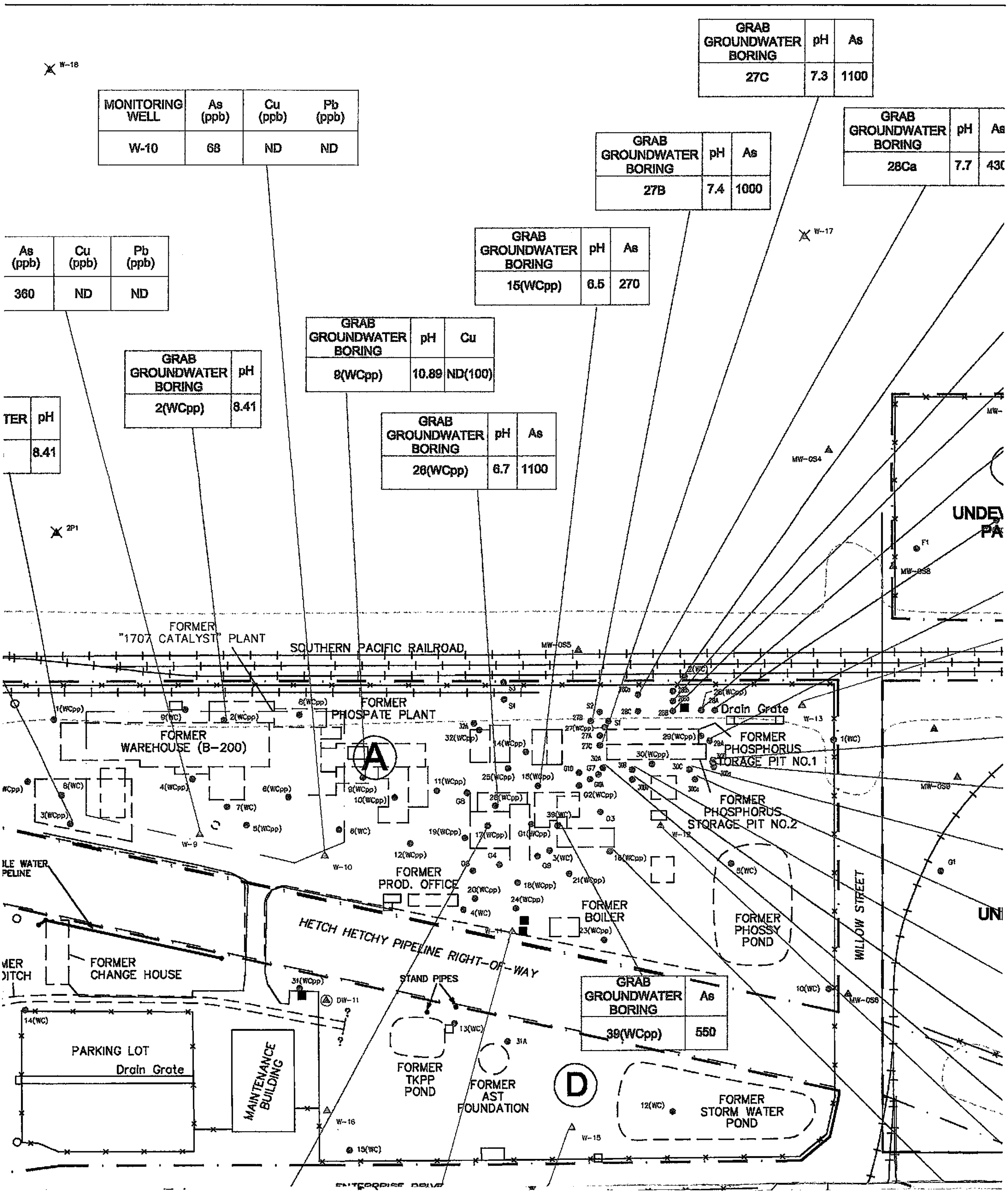
MONITORING WELL	As (ppb)	Cu (ppb)	Pb (ppb)
W-8	42	ND	ND

GRAB GROUNDWATER BORING	pH
1(WCpp)	8.41

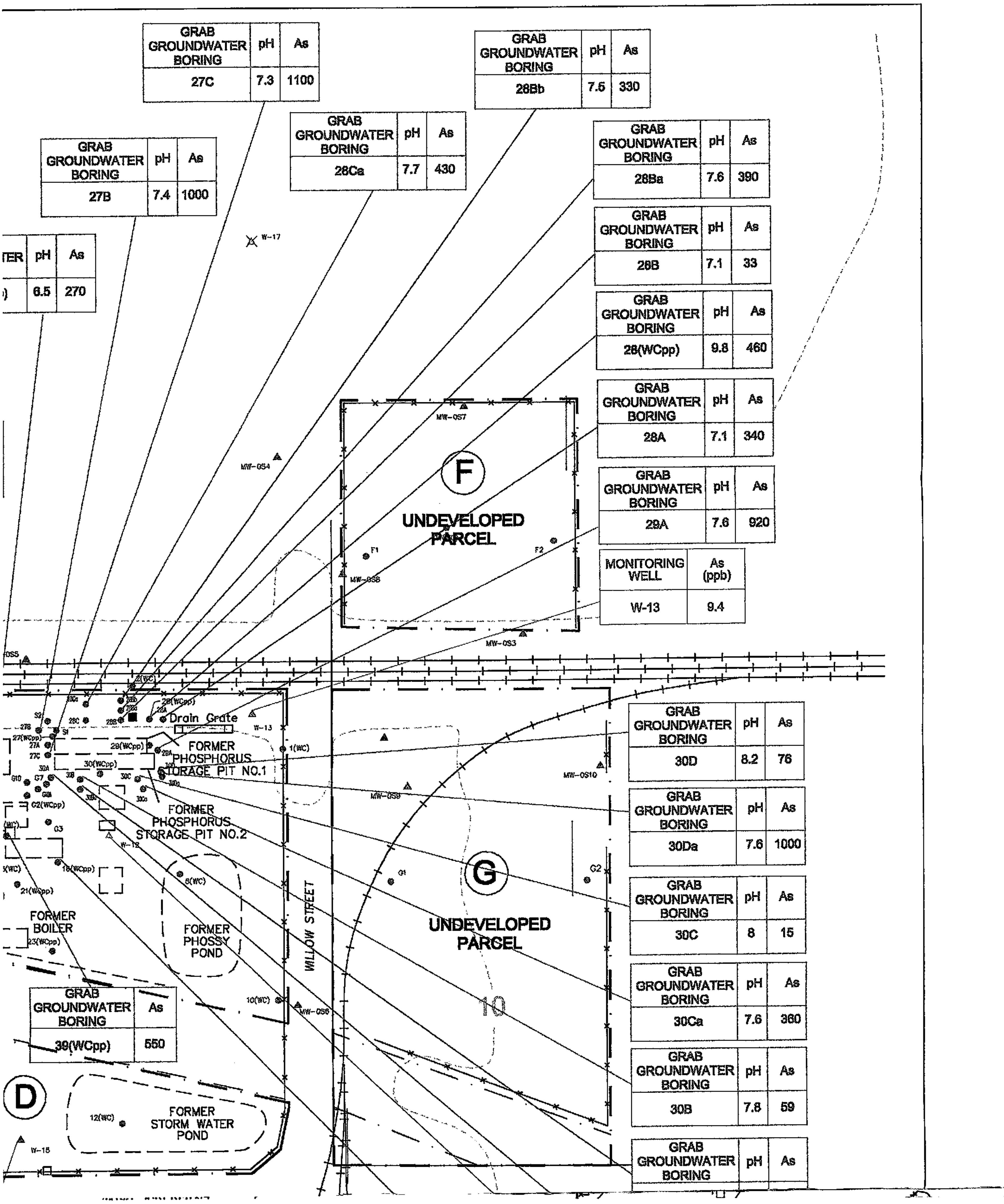
MONITORING WELL	As (ppb)
W-4	ND

MONITORING WELL	As (ppb)
W-6	42

MONITORING WELL	As (ppb)	Cu (ppb)
W-27	5.8	ND

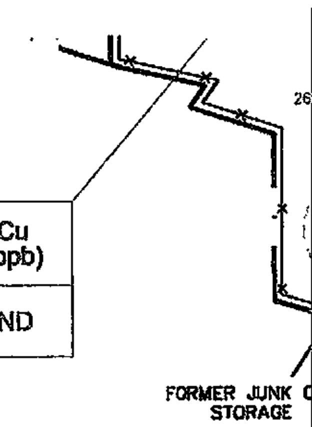


GRAB GROUNDWATER BORING | pH | As
27C | 7.3 | 1100
MONITORING WELL | As (ppb) | Cu (ppb) | Pb (ppb)
W-10 | 68 | ND | ND
GRAB GROUNDWATER BORING | pH | As
27B | 7.4 | 1000
GRAB GROUNDWATER BORING | pH | As
28Ca | 7.7 | 430
GRAB GROUNDWATER BORING | pH | As
15(WCpp) | 6.5 | 270
As (ppb) | Cu (ppb) | Pb (ppb)
360 | ND | ND
GRAB GROUNDWATER BORING | pH | Cu
8(WCpp) | 10.89 | ND(100)
GRAB GROUNDWATER BORING | pH
2(WCpp) | 8.41
TER | pH
8.41
GRAB GROUNDWATER BORING | pH | As
26(WCpp) | 6.7 | 1100
GRAB GROUNDWATER BORING | As
39(WCpp) | 550
W-18
W-17
2P1
MW-0S4
MW-0S8
UNDE
PA
FORMER "1707 CATALYST" PLANT
SOUTHERN PACIFIC RAILROAD
MW-0S5
FORMER PHOSPATE PLANT
FORMER WAREHOUSE (B-200)
Drain Grate
FORMER PHOSPHORUS STORAGE PIT NO.1
FORMER PHOSPHORUS STORAGE PIT NO.2
W-13
MW-0S9
W-9
W-10
W-12
FORMER PROD. OFFICE
FORMER BOILER
FORMER PHOSSY POND
WILLOW STREET
UN
HETCH HETCHY PIPELINE RIGHT-OF-WAY
FORMER CHANGE HOUSE
STAND PIPES
DW-11
MW-0S6
PARKING LOT
Drain Grate
MAINTENANCE BUILDING
FORMER TKPP POND
FORMER AST FOUNDATION
FORMER STORM WATER POND
W-16
W-15
ENTERPRISE DRIVE



GRAB GROUNDWATER BORING 27C pH 7.3 As 1100
GRAB GROUNDWATER BORING 28Bb pH 7.5 As 330
GRAB GROUNDWATER BORING 28Ca pH 7.7 As 430
GRAB GROUNDWATER BORING 27B pH 7.4 As 1000
GRAB GROUNDWATER BORING 28Ba pH 7.6 As 390
GRAB GROUNDWATER BORING 28B pH 7.1 As 33
GRAB GROUNDWATER BORING 28(WCpp) pH 9.8 As 460
GRAB GROUNDWATER BORING 28A pH 7.1 As 340
GRAB GROUNDWATER BORING 29A pH 7.6 As 920
MONITORING WELL W-13 As (ppb) 9.4
GRAB GROUNDWATER BORING 30D pH 8.2 As 76
GRAB GROUNDWATER BORING 30Da pH 7.6 As 1000
GRAB GROUNDWATER BORING 30C pH 8 As 15
GRAB GROUNDWATER BORING 30Ca pH 7.6 As 360
GRAB GROUNDWATER BORING 30B pH 7.8 As 59
GRAB GROUNDWATER BORING 39(WCpp) As 550
F
UNDEVELOPED PARCEL
G
UNDEVELOPED PARCEL
D
Drain Grate
FORMER PHOSPHORUS STORAGE PIT NO.1
FORMER PHOSPHORUS STORAGE PIT NO.2
FORMER BOILER
FORMER PHOSSY POND
FORMER STORM WATER POND
WILLOW STREET
MW-OS7
MW-OS4
MW-OS8
MW-OS3
MW-OS10
MW-OS9
MW-OS6
W-17
W-13
W-12
W-15
F1
F2
G1
G2
10

MONITORING WELL	As (ppb)	Cu (ppb)
W-19	ND	ND



33(WCpp) SOIL BORING (WOODWARD–CLYDE PHOSPHATE PLANT)

2P3 ABANDONED MONITORING WELL (ALAMEDA COUNTY WATER DISTRICT)

E58 MONITORING WELL (ALAMEDA COUNTY WATER DISTRICT)

W-4 SHALLOW ZONE MONITORING WELL (FMC)

DW-9 ABANDONED SHALLOW ZONE MONITORING WELL (FMC)

DW-3 NEWARK AQUIFER MONITORING WELL (FMC)

DW-10 ABANDONED NEWARK AQUIFER MONITORING WELL (FMC)

W-7 SHALLOW ZONE EXTRACTION WELL (FMC)

DW-2 NEWARK AQUIFER EXTRACTION WELL (FMC)

B-25 MONITORING WELL (ASHLAND CHEMICAL)

MW-059 MONITORING WELL (BARON–BLAKESLEE)

J10 MONITORING WELL (JONES–HAMILTON Co.)

P-3 MONITORING WELL (ROMIC ENVIRONMENTAL TECHNOLOGIES)

E68 MONITORING WELL (UNKNOWN)

POWER/TELEPHONE POLE

STORM DRAIN

PIPE

SUMP

(A) PARCEL DESIGNATION

FORMER STRUCTURE

EXISTING STRUCTURE

10 APPROXIMATE LOCATION OF ELEVATION CONTOUR (USGS Topography Map)

PROPERTY LINE

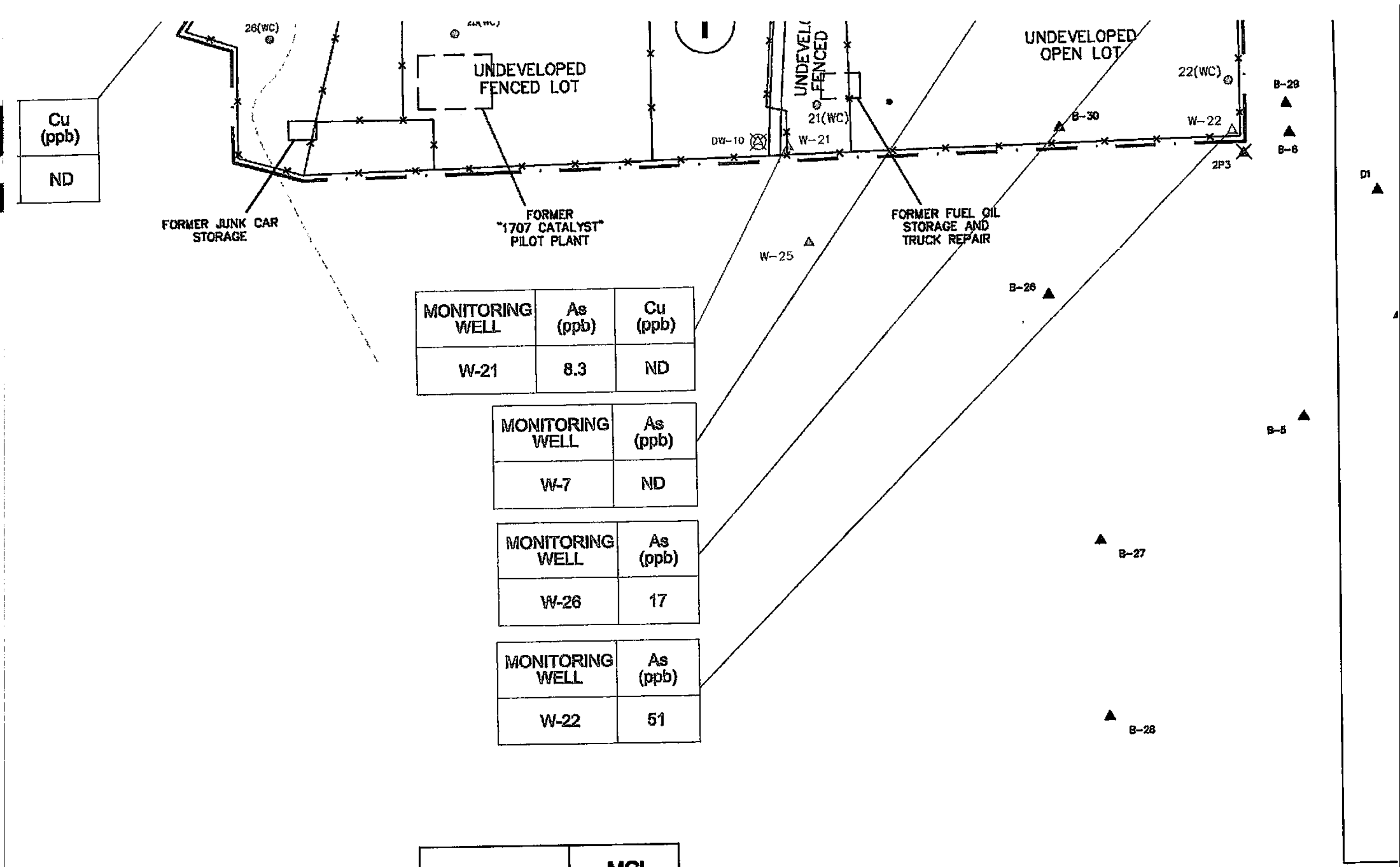
CONCENTRATIONS IN PARTS PER BILLION (ppb)

0 120 240

FMC Corporation
8787 Enterprise Drive
Newark, California

NEWARK, CAL

J:\CAD_DATA\FMC\NEWARK\WP_0798\F12_0798.DWG



Cu (ppb)
ND

MONITORING WELL	As (ppb)	Cu (ppb)
W-21	8.3	ND

MONITORING WELL	As (ppb)
W-7	ND

MONITORING WELL	As (ppb)
W-26	17

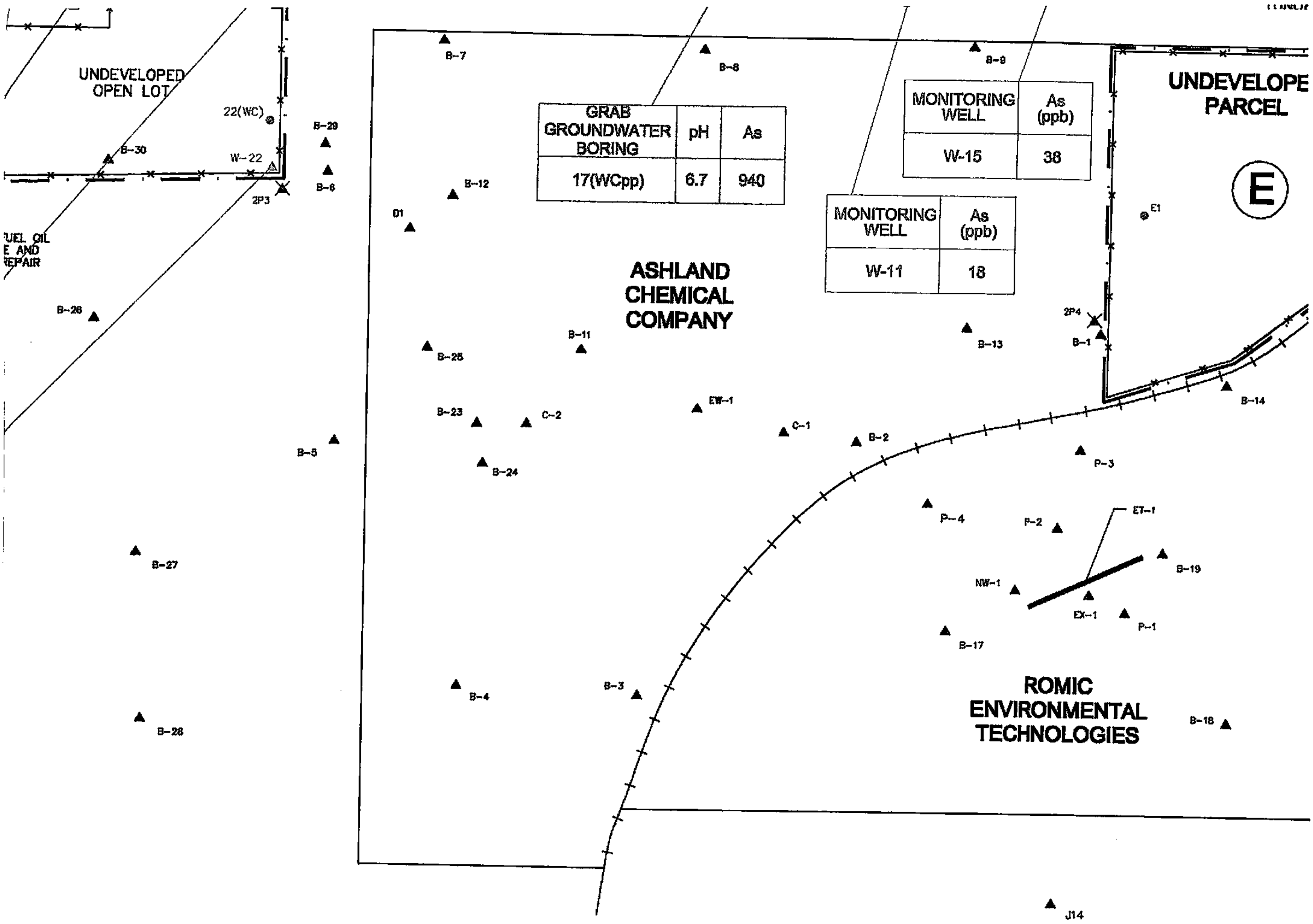
MONITORING WELL	As (ppb)
W-22	51

COMPOUND	MCL (ppb)
Al	1000
As	50
Ba	1000
Be	4
Cd	5
Cr	50
Hg	2
Ni	100
Pb	50
Sb	6
Se	50
Tl	2

MCL - Maximum contaminant level in parts per million (ppb)

VARK, CALIFORNIA

METAL CONCENTRAT



L CONCENTRATIONS (ppb) IN MONITORING WELLS AN

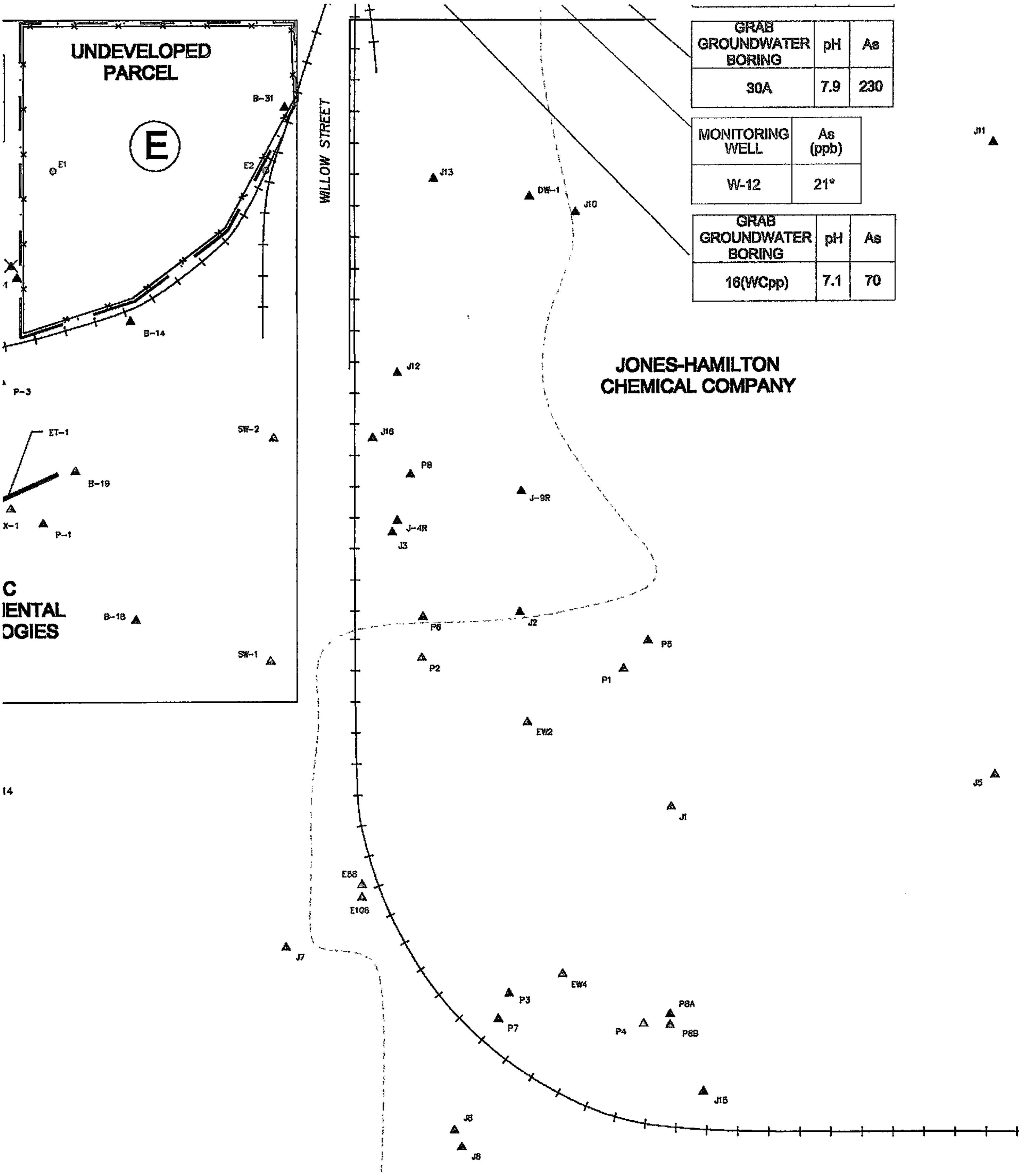
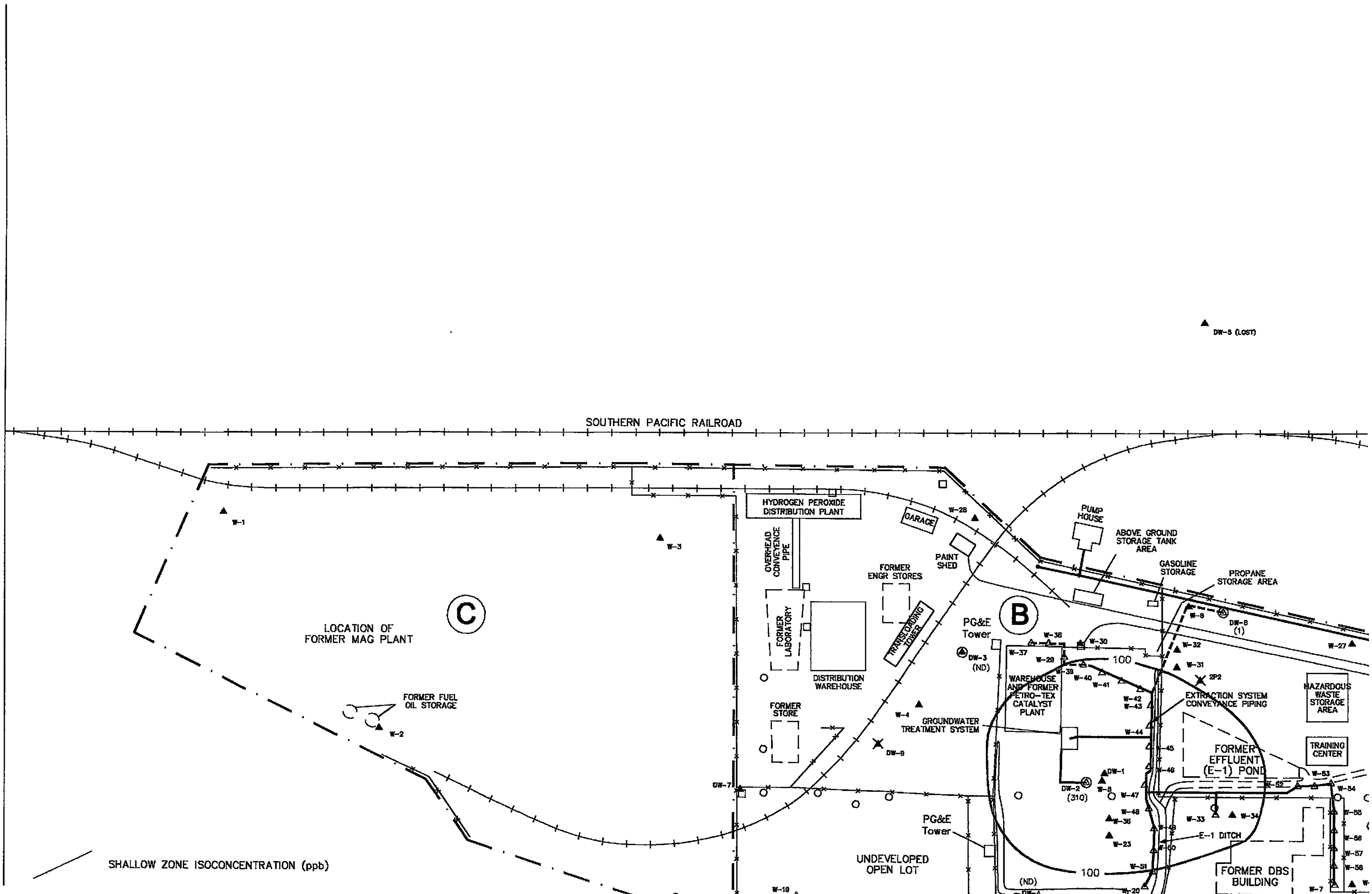
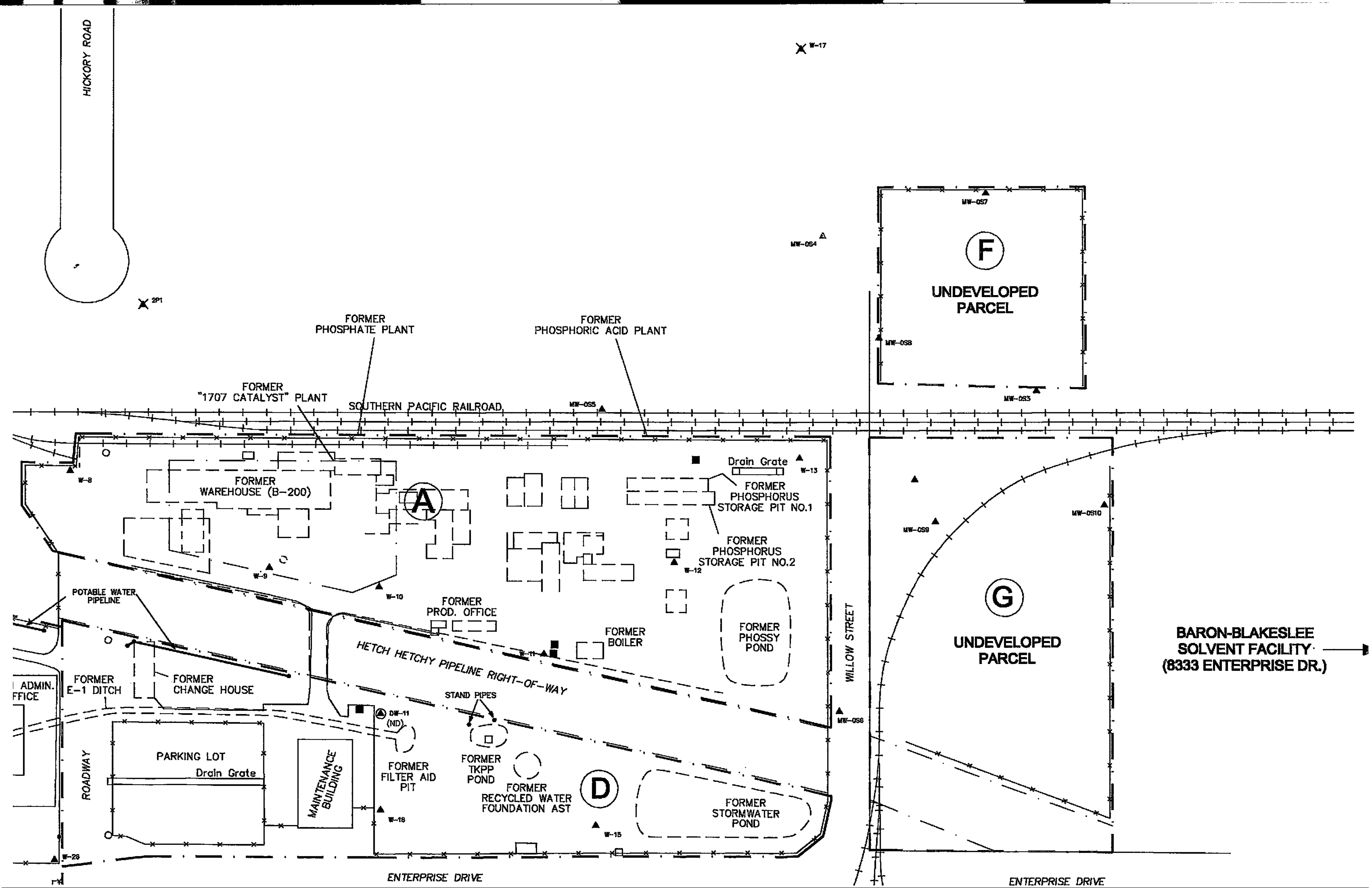


FIGURE 12
WELLS AND GRAB GROUNDWATER BORINGS

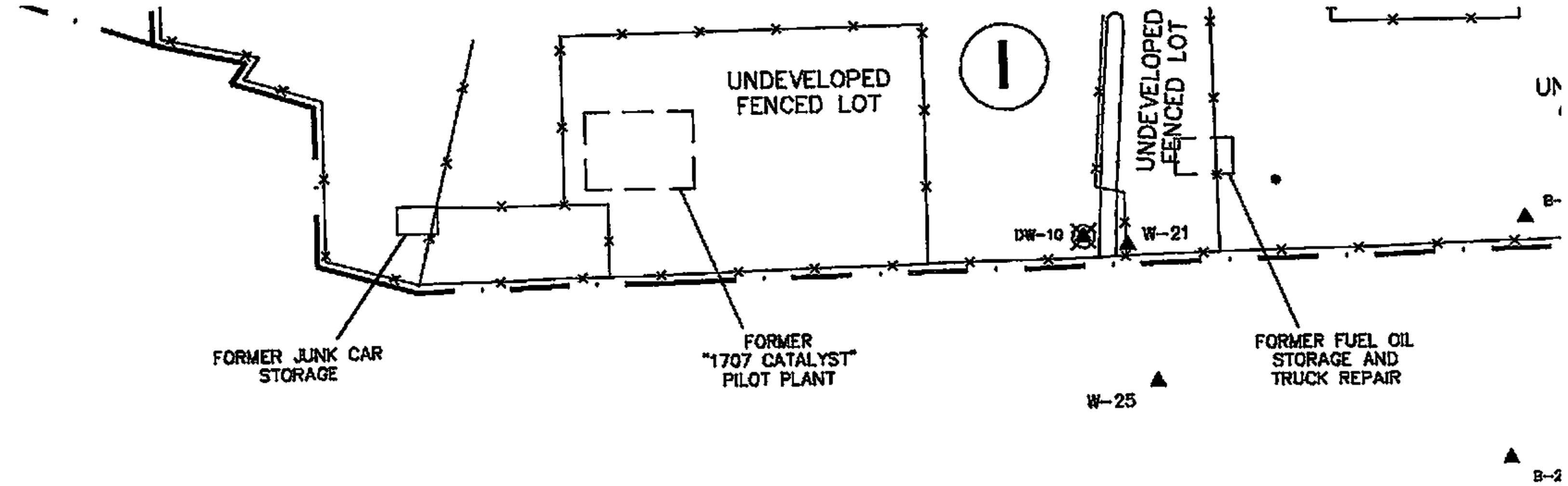


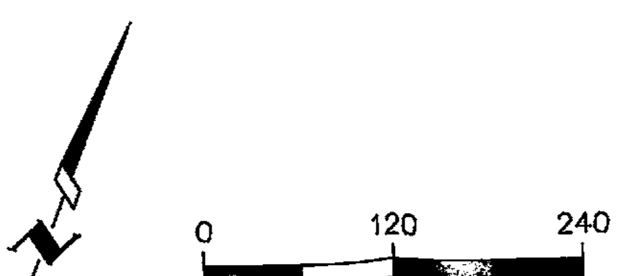
DW-5 (LOST)
SOUTHERN PACIFIC RAILROAD
W-1
W-3
HYDROGEN PEROXIDE DISTRIBUTION PLANT
OVERHEAD CONVEYENCE PIPE
GARAGE
W-28
PAINT SHED
PUMP HOUSE
ABOVE GROUND STORAGE TANK AREA
GASOLINE STORAGE
PROPANE STORAGE AREA
FORMER ENGR STORES
LOCATION OF FORMER MAG PLANT
C
B
FORMER LABORATORY
DISTRIBUTION WAREHOUSE
TRANSLOADING TOWER
PG&E Tower
W-8
DW-8 (1)
W-27
W-38
W-30
W-37
W-29
DW-3 (ND)
100
W-32
W-31
2P2
W-39
W-40
W-41
W-42
W-43
WAREHOUSE AND FORMER PETRO-TEX CATALYST PLANT
EXTRACTION SYSTEM CONVEYANCE PIPING
HAZARDOUS WASTE STORAGE AREA
FORMER FUEL OIL STORAGE
W-2
FORMER STORE
W-4
GROUNDWATER TREATMENT SYSTEM
W-44
DW-9
W-45
FORMER EFFLUENT (E-1) POND
TRAINING CENTER
W-46
W-53
DW-1
DW-2 (310)
W-5
W-47
W-52
W-54
DW-7
W-48
W-36
W-33
W-34
W-55
PG&E Tower
W-49
W-23
E-1 DITCH
W-56
W-50
W-57
UNDEVELOPED OPEN LOT
W-51
100
W-58
FORMER DBS BUILDING
SHALLOW ZONE ISOCONCENTRATION (ppb)
(ND)
W-19
DW-4
W-20
W-7

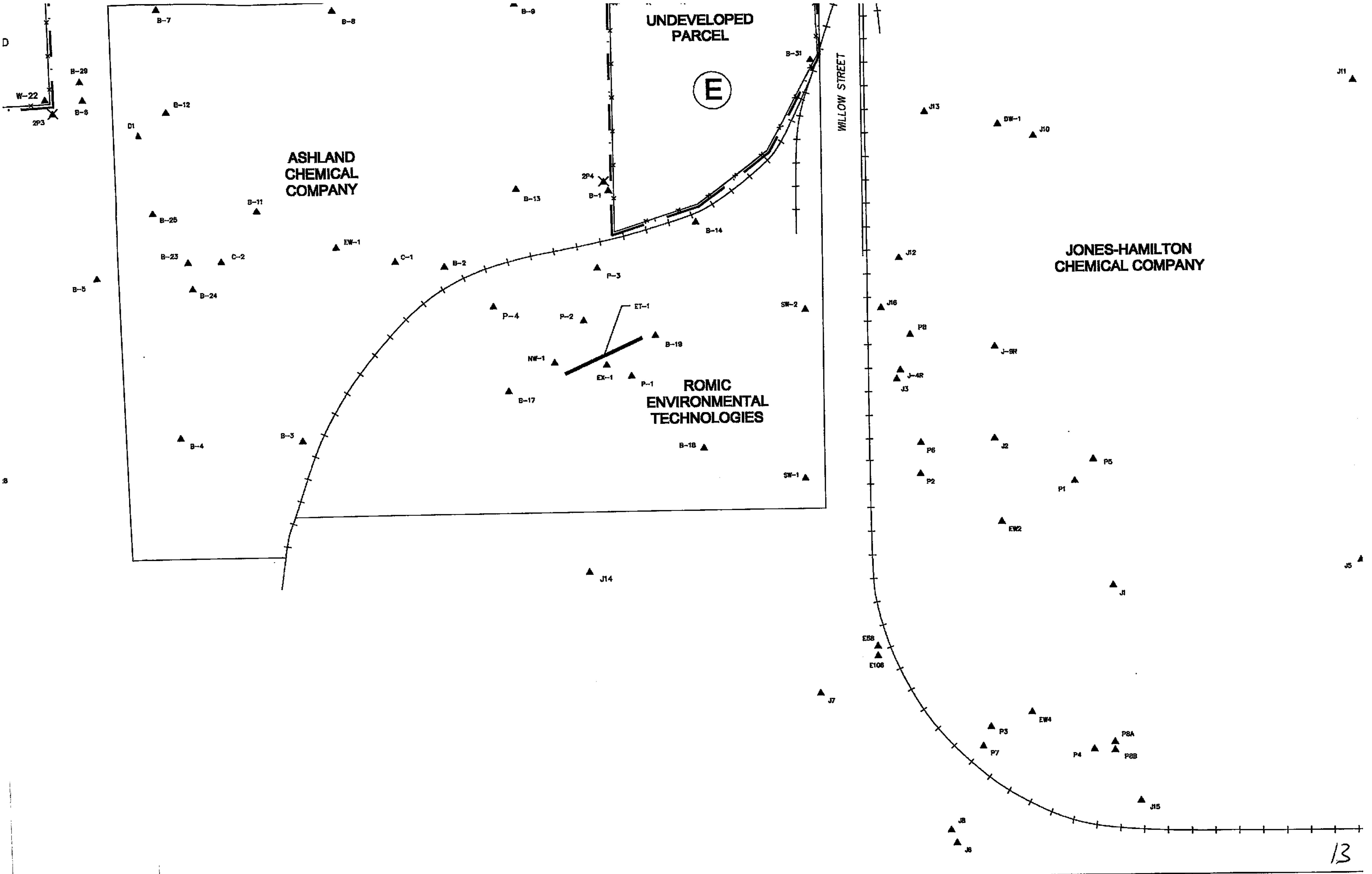


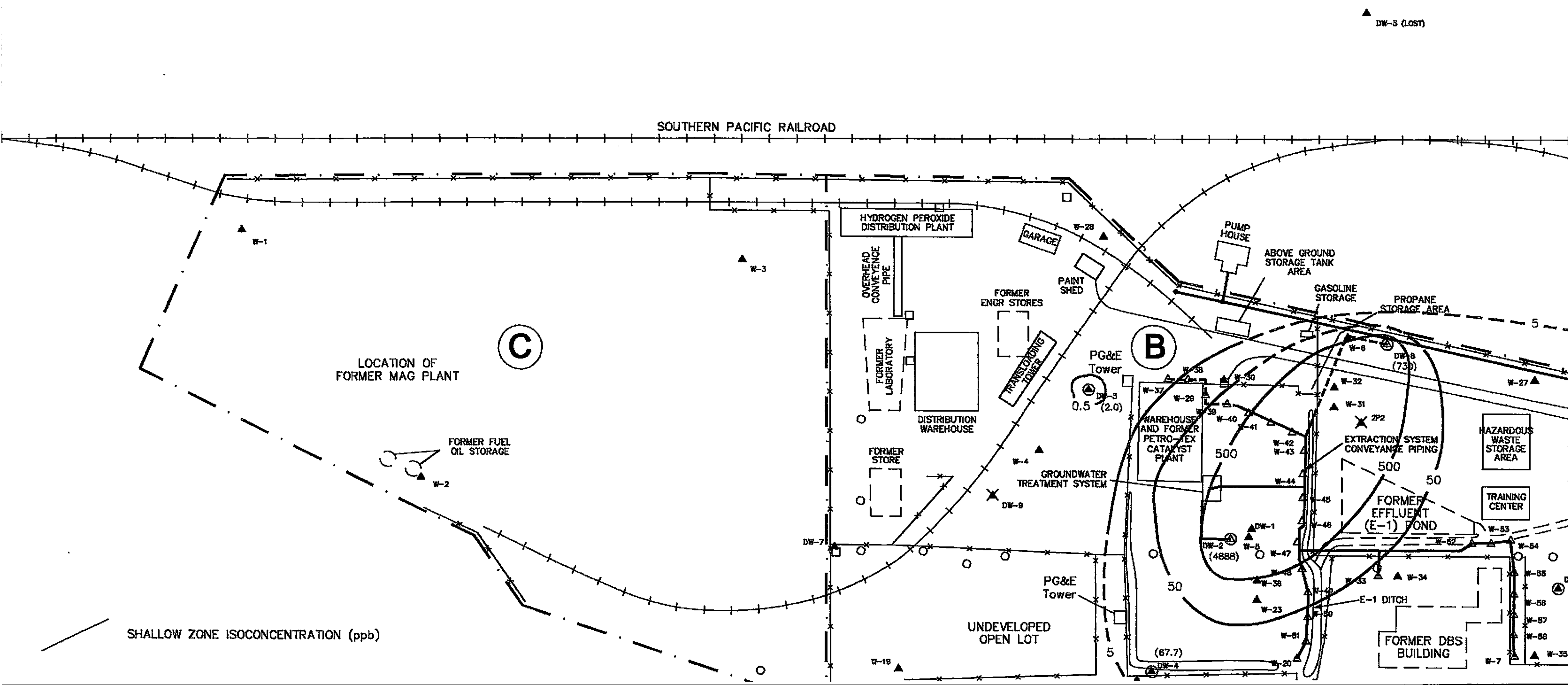
HICKORY ROAD
W-17
2P1
MW-OS7
MW-OS4
F
UNDEVELOPED PARCEL
MW-OS8
FORMER PHOSPHATE PLANT
FORMER PHOSPHORIC ACID PLANT
FORMER "1707 CATALYST" PLANT
SOUTHERN PACIFIC RAILROAD
MW-OS5
MW-OS3
W-8
FORMER WAREHOUSE (B-200)
A
Drain Grate
W-13
FORMER PHOSPHORUS STORAGE PIT NO.1
FORMER PHOSPHORUS STORAGE PIT NO.2
W-12
MW-OS9
MW-OS10
W-9
W-10
POTABLE WATER PIPELINE
FORMER PROD. OFFICE
FORMER BOILER
FORMER PHOSSY POND
WILLOW STREET
G
UNDEVELOPED PARCEL
BARON-BLAKESLEE SOLVENT FACILITY (8333 ENTERPRISE DR.)
HETCH HETCHY PIPELINE RIGHT-OF-WAY
W-11
ADMIN. OFFICE
FORMER E-1 DITCH
FORMER CHANGE HOUSE
STAND PIPES
DW-11 (ND)
MW-OS6
PARKING LOT
Drain Grate
ROADWAY
MAINTENANCE BUILDING
FORMER FILTER AID PIT
FORMER TKPP POND
FORMER RECYCLED WATER FOUNDATION AST
D
FORMER STORMWATER POND
W-18
W-15
W-26
ENTERPRISE DRIVE
ENTERPRISE DRIVE

- 2P3 — ABANDONED MONITORING WELL (ALAMEDA COUNTY WATER DISTRICT)
- E58 — MONITORING WELL (ALAMEDA COUNTY WATER DISTRICT)
- W-4 — SHALLOW ZONE MONITORING WELL (FMC)
- DW-8 — ABANDONED SHALLOW ZONE MONITORING WELL (FMC)
- DW-3 — NEWARK AQUIFER MONITORING WELL (FMC)
- DW-10 — ABANDONED NEWARK AQUIFER MONITORING WELL (FMC)
- W-7 — SHALLOW ZONE EXTRACTION WELL (FMC)
- DW-2 — NEWARK AQUIFER EXTRACTION WELL (FMC)
- B-25 — MONITORING WELL (ASHLAND CHEMICAL)
- MW-059 — MONITORING WELL (BARON-BLAKESLEE)
- J10 — MONITORING WELL (JONES-HAMILTON Co.)
- P-3 — MONITORING WELL (ROMIC ENVIRONMENTAL TECHNOLOGIES)
- POWER/TELEPHONE POLE
- STORM DRAIN
- PIPE
- SUMP
- (A) PARCEL DESIGNATION
- FORMER STRUCTURE
- EXISTING STRUCTURE
- PROPERTY LINE
- EDB ETHYLENE DIBROMIDE

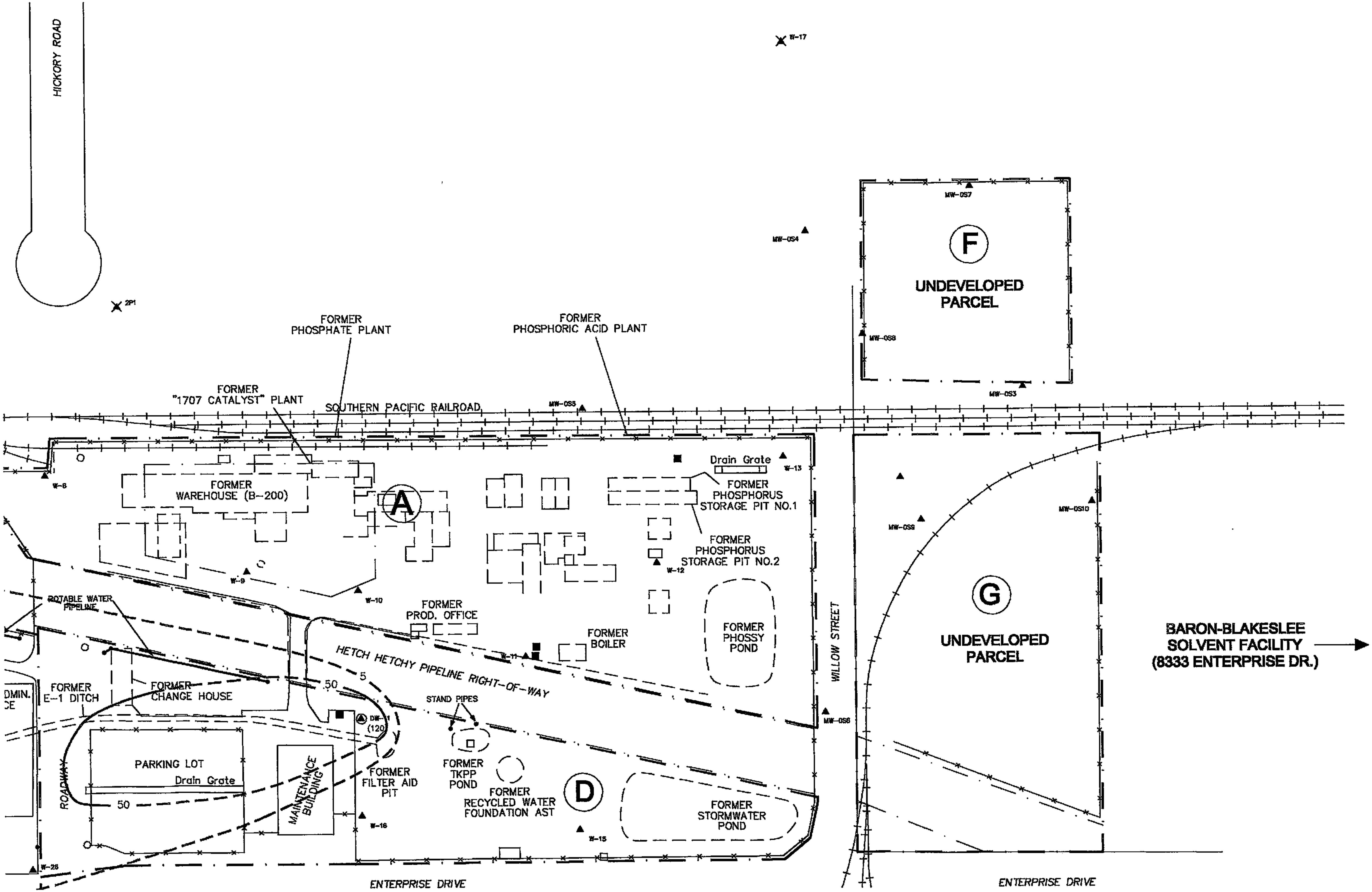





UNDEVELOPED PARCEL
E
ASHLAND CHEMICAL COMPANY
ROMIC ENVIRONMENTAL TECHNOLOGIES
WILLOW STREET
JONES-HAMILTON CHEMICAL COMPANY
B-7
B-8
B-9
B-29
W-22
B-6
2P3
B-12
D1
B-13
2P4
B-1
B-31
B-11
B-25
B-14
EW-1
B-23
C-2
C-1
B-2
P-3
B-5
B-24
ET-1
SW-2
P-4
P-2
B-19
NW-1
EX-1
P-1
B-17
B-3
B-4
B-18
SW-1
J14
J11
J13
DW-1
J10
J12
J16
P8
J-5R
J-4R
J3
P6
J2
P5
P2
P1
EW2
J5
J1
E58
E106
J7
EW4
P3
P8A
P7
P4
P8B
J15
J8
J6



DW-5 (LOST)
SOUTHERN PACIFIC RAILROAD
W-1
W-3
HYDROGEN PEROXIDE DISTRIBUTION PLANT
OVERHEAD CONVEYENCE PIPE
GARAGE
W-28
PUMP HOUSE
ABOVE GROUND STORAGE TANK AREA
PAINT SHED
GASOLINE STORAGE
PROPANE STORAGE AREA
FORMER ENGR STORES
C
LOCATION OF FORMER MAG PLANT
FORMER LABORATORY
DISTRIBUTION WAREHOUSE
TRANSLOADING TOWER
B
PG&E Tower
DW-3 (2.0)
0.5
W-37
W-29
WAREHOUSE AND FORMER PETRO-TEX CATALYST PLANT
DW-8 (730)
W-6
W-27
W-32
W-31
2P2
EXTRACTION SYSTEM CONVEYANCE PIPING
500
50
5
HAZARDOUS WASTE STORAGE AREA
FORMER FUEL OIL STORAGE
W-2
FORMER STORE
W-4
GROUNDWATER TREATMENT SYSTEM
DW-9
TRAINING CENTER
FORMER EFFLUENT (E-1) POND
DW-1
DW-2 (4888)
W-47
W-44
W-42
W-43
W-40
W-41
W-39
W-30
W-38
W-33
W-34
W-53
W-52
W-54
W-55
W-56
W-57
W-58
W-7
W-35
DW-7
PG&E Tower
UNDEVELOPED OPEN LOT
E-1 DITCH
W-23
W-36
W-50
W-51
W-20
W-19
(67.7)
DW-4
FORMER DBS BUILDING
SHALLOW ZONE ISOCONCENTRATION (ppb)


HICKORY ROAD
W-17
2P1
MW-OS4
MW-OS7
F
UNDEVELOPED
PARCEL
MW-OS8
MW-OS3
FORMER
PHOSPHATE PLANT
FORMER
PHOSPHORIC ACID PLANT
FORMER
"1707 CATALYST" PLANT
SOUTHERN PACIFIC RAILROAD
MW-OS5
W-8
FORMER
WAREHOUSE (B-200)
A
Drain Grate
W-13
FORMER
PHOSPHORUS
STORAGE PIT NO.1
FORMER
PHOSPHORUS
STORAGE PIT NO.2
W-12
W-9
W-10
MW-OS9
MW-OS10
G
UNDEVELOPED
PARCEL
BARON-BLAKESLEE
SOLVENT FACILITY
(8333 ENTERPRISE DR.)
POTABLE WATER
PIPELINE
FORMER
PROD. OFFICE
FORMER
BOILER
FORMER
PHOSSY
POND
WILLOW STREET
HETCH HETCHY PIPELINE RIGHT-OF-WAY
W-11
5
50
FORMER
E-1 DITCH
FORMER
CHANGE HOUSE
DMIN.
CE
STAND PIPES
DW-1
(120
MW-OS6
PARKING LOT
Drain Grate
ROADWAY
50
MAINTENANCE
BUILDING
FORMER
FILTER AID
PIT
FORMER
TKPP
POND
FORMER
RECYCLED WATER
FOUNDATION AST
D
FORMER
STORMWATER
POND
W-16
W-15
W-28
ENTERPRISE DRIVE
ENTERPRISE DRIVE

2P3 ABANDONED MONITORING WELL (ALAMEDA COUNTY WATER DISTRICT)

E58 MONITORING WELL (ALAMEDA COUNTY WATER DISTRICT)

W-4 SHALLOW ZONE MONITORING WELL (FMC)

DW-9 ABANDONED SHALLOW ZONE MONITORING WELL (FMC)

DW-3 NEWARK AQUIFER MONITORING WELL (FMC)

DW-10 ABANDONED NEWARK AQUIFER MONITORING WELL (FMC)

W-7 SHALLOW ZONE EXTRACTION WELL (FMC)

DW-2 NEWARK AQUIFER EXTRACTION WELL (FMC)

B-25 MONITORING WELL (ASHLAND CHEMICAL)

MW-0S9 MONITORING WELL (BARON-BLAKESLEE)

J10 MONITORING WELL (JONES-HAMILTON Co.)

P-3 MONITORING WELL (ROMIC ENVIRONMENTAL TECHNOLOGIES)

POWER/TELEPHONE POLE

STORM DRAIN

PIPE

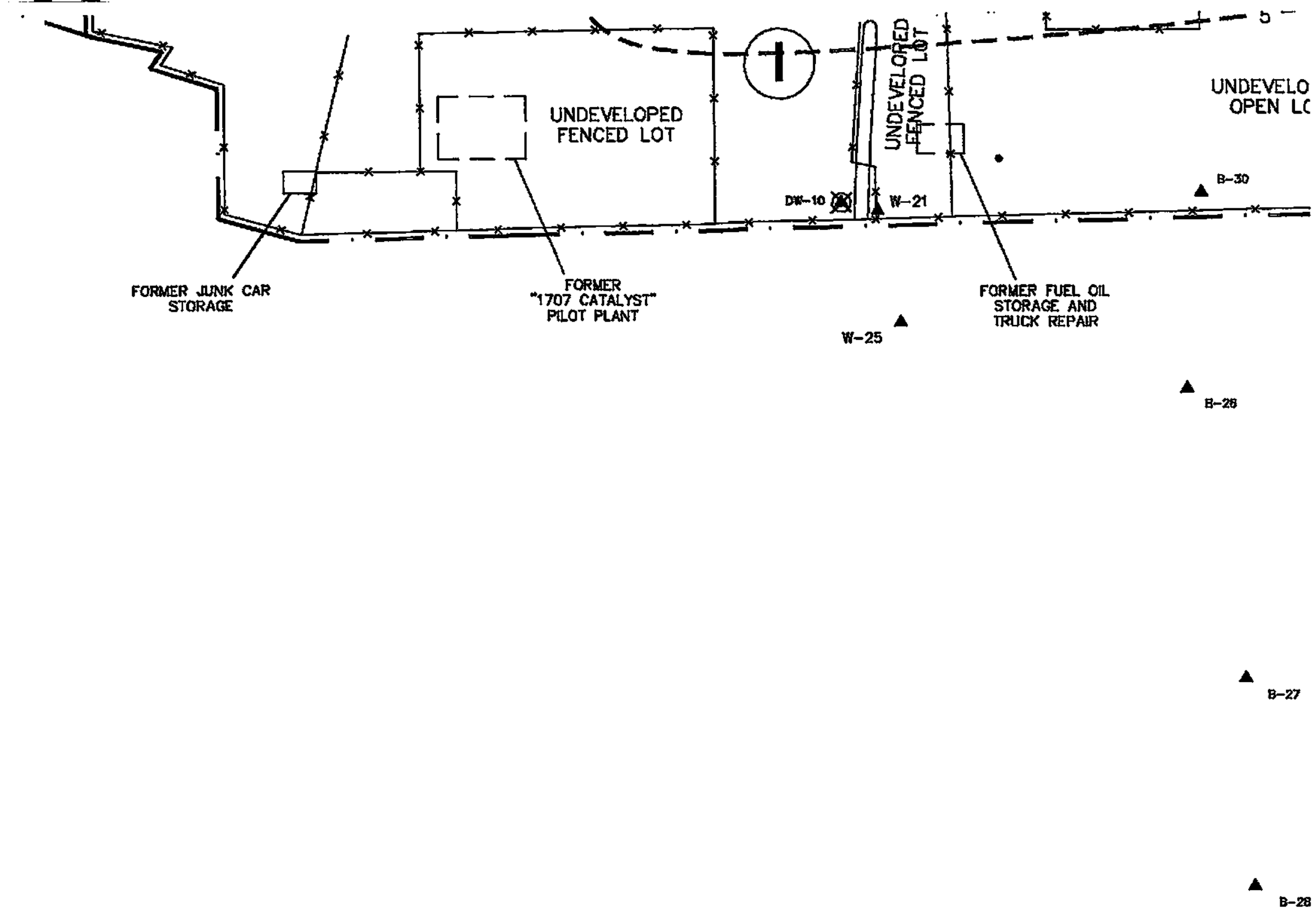
SUMP

A PARCEL DESIGNATION

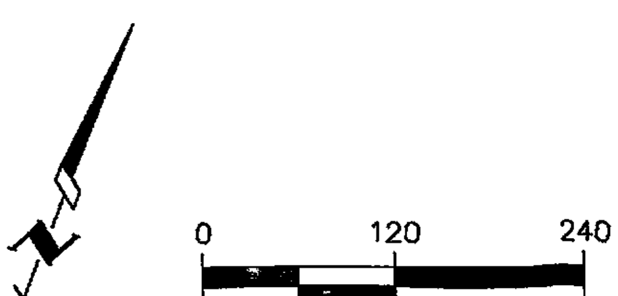
FORMER STRUCTURE

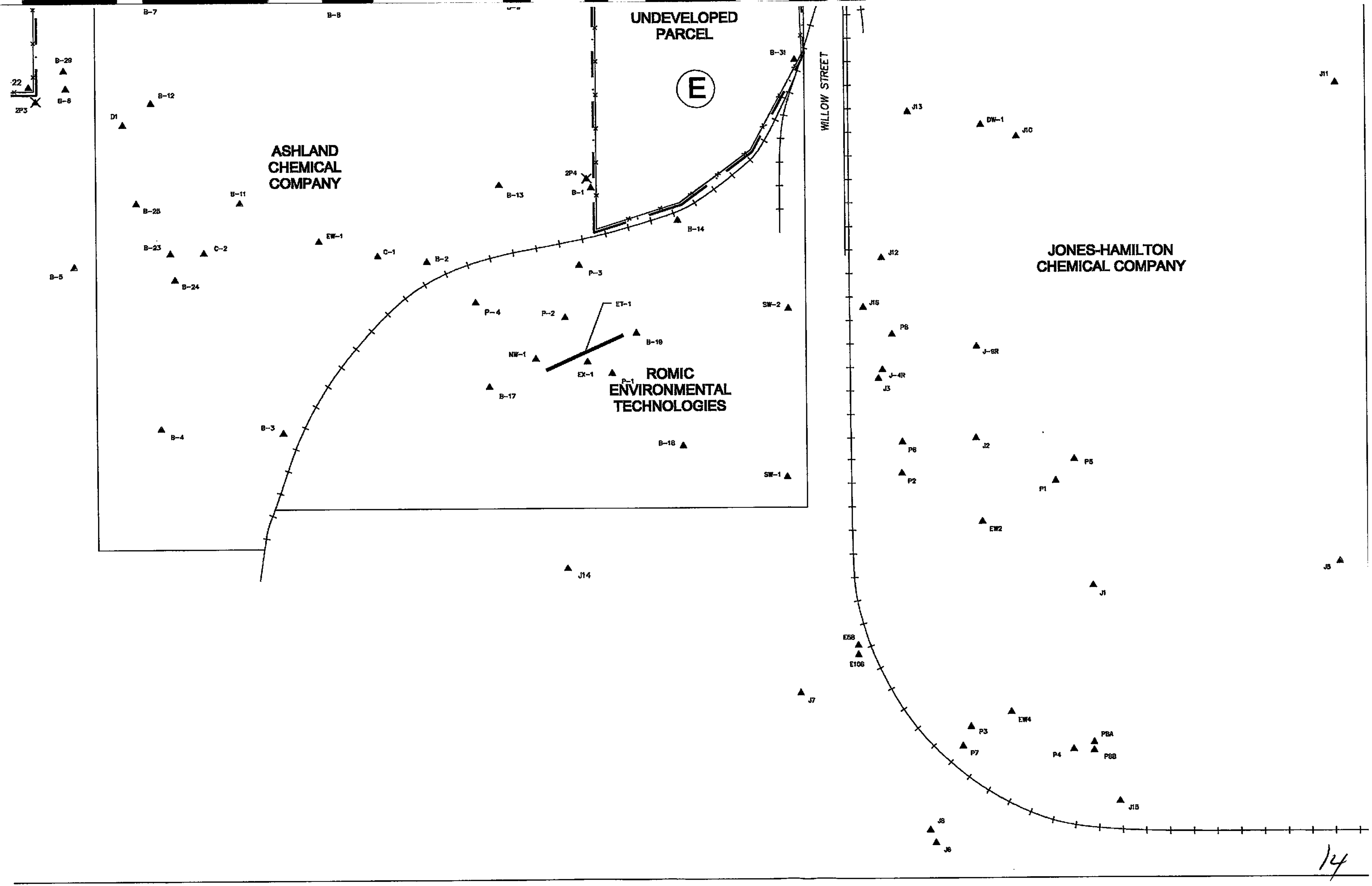
EXISTING STRUCTURE

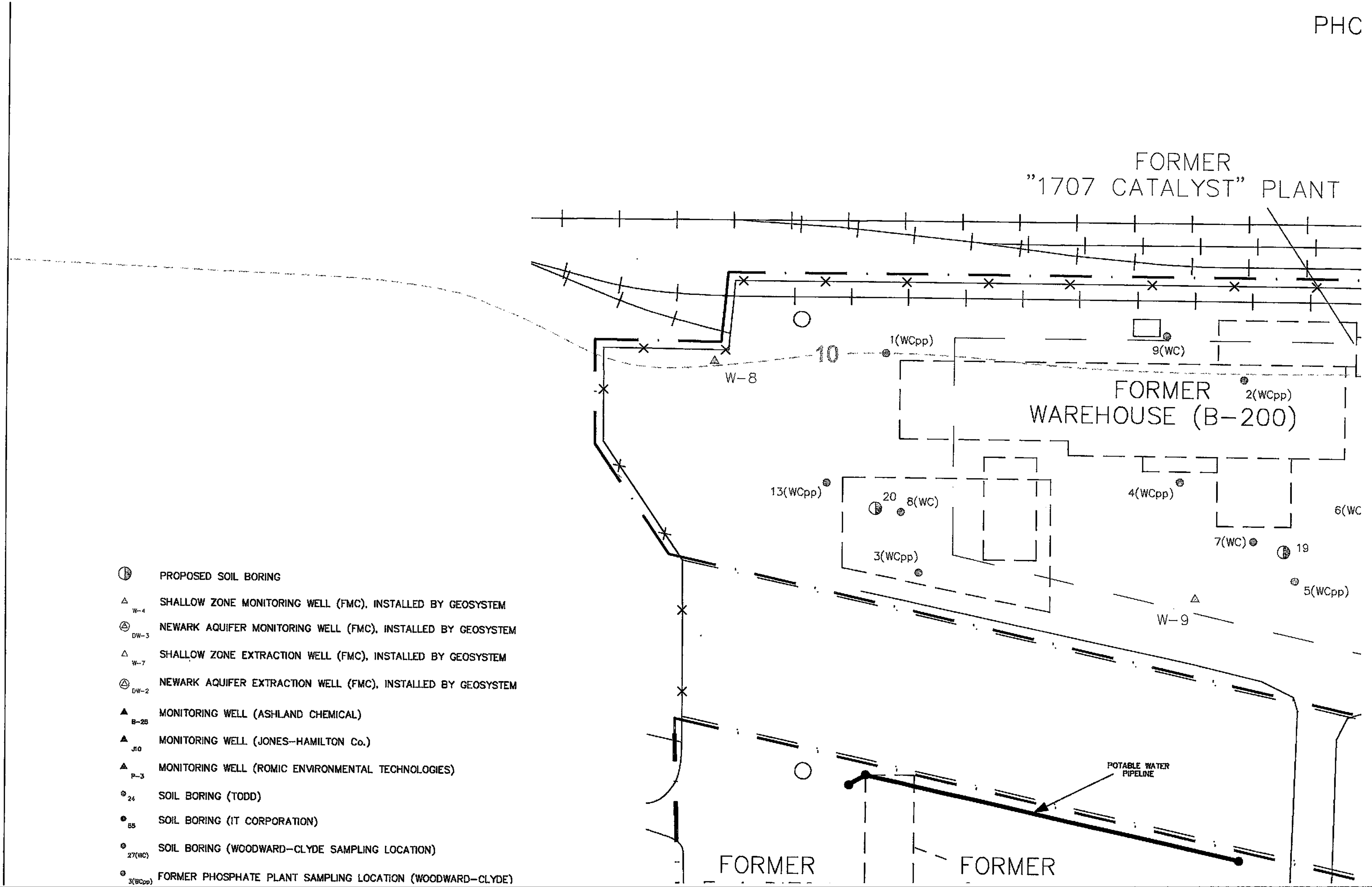
PROPERTY LINE

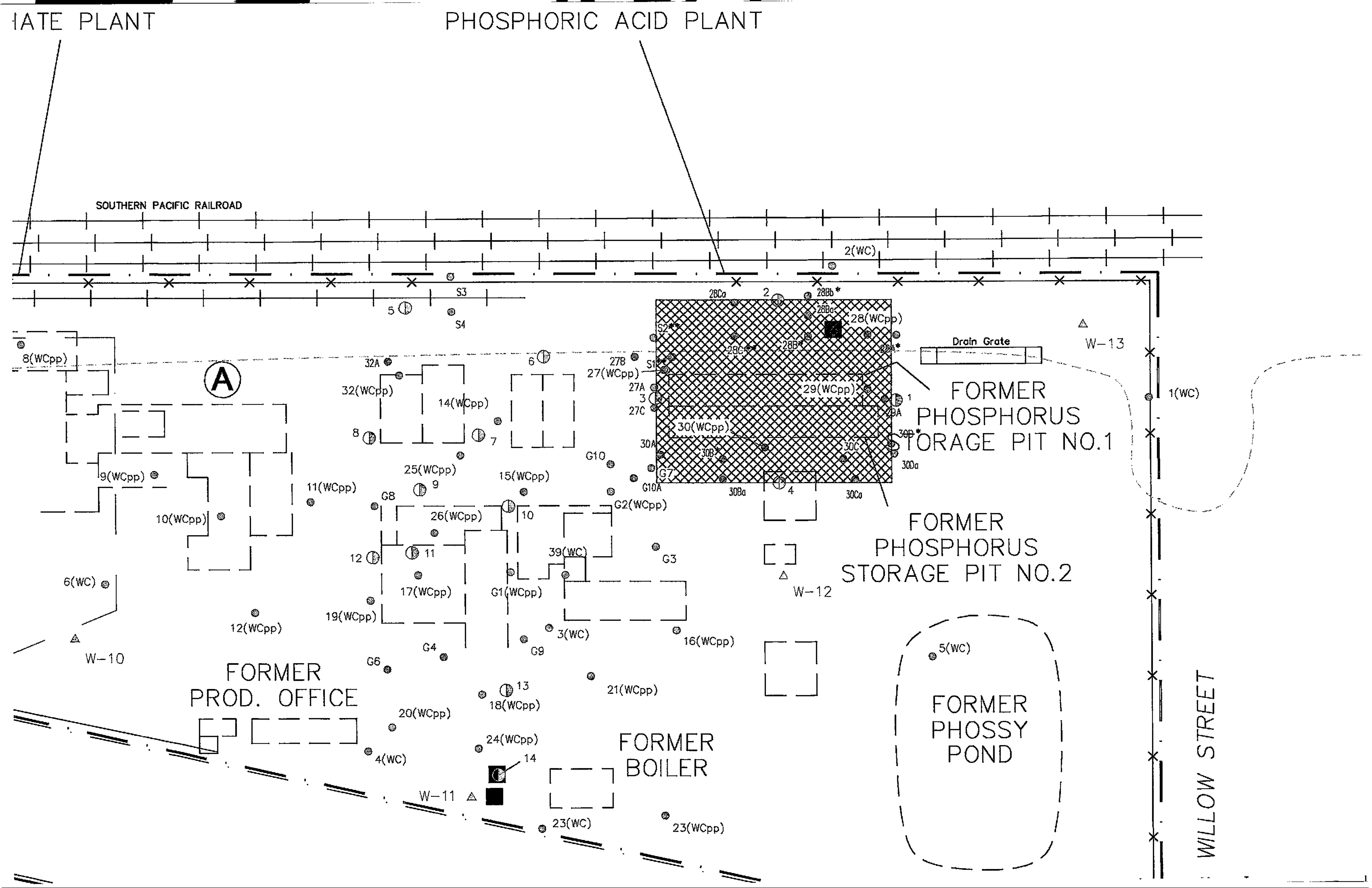


* OTHER VOCs (PRIMARILY 1,2-DCA) INCLUDE ALL COMPOUNDS ANALYZED BY USEPA SW-846 METHOD 8010 (DOES NOT INCLUDE EDB)




UNDEVELOPED PARCEL
E
WILLOW STREET
ASHLAND CHEMICAL COMPANY
ROMIC ENVIRONMENTAL TECHNOLOGIES
JONES-HAMILTON CHEMICAL COMPANY
B-7
B-8
B-29
22
B-6
2P3
B-12
D1
B-11
B-25
B-23
C-2
B-5
B-24
EW-1
C-1
B-2
B-13
2P4
B-1
B-31
B-14
P-3
ET-1
SW-2
P-4
P-2
B-19
NW-1
EX-1
P-1
B-17
B-3
B-4
B-18
SW-1
J14
J11
J13
DW-1
J10
J12
J16
P8
J-9R
J-4R
J3
P6
J2
P5
P2
P1
EW2
J5
J1
E58
E106
J7
EW4
P3
P9A
P7
P4
P9B
J15
J8
J6


PHC
FORMER
"1707 CATALYST" PLANT
FORMER
WAREHOUSE (B-200)
W-8
W-9
10
1(WCpp)
2(WCpp)
3(WCpp)
4(WCpp)
5(WCpp)
6(WC
7(WC)
8(WC)
9(WC)
13(WCpp)
19
20
POTABLE WATER PIPELINE
FORMER
FORMER
PROPOSED SOIL BORING
W-4 SHALLOW ZONE MONITORING WELL (FMC), INSTALLED BY GEOSYSTEM
DW-3 NEWARK AQUIFER MONITORING WELL (FMC), INSTALLED BY GEOSYSTEM
W-7 SHALLOW ZONE EXTRACTION WELL (FMC), INSTALLED BY GEOSYSTEM
DW-2 NEWARK AQUIFER EXTRACTION WELL (FMC), INSTALLED BY GEOSYSTEM
B-28 MONITORING WELL (ASHLAND CHEMICAL)
J10 MONITORING WELL (JONES-HAMILTON Co.)
P-3 MONITORING WELL (ROMIC ENVIRONMENTAL TECHNOLOGIES)
24 SOIL BORING (TODD)
55 SOIL BORING (IT CORPORATION)
27(WC) SOIL BORING (WOODWARD-CLYDE SAMPLING LOCATION)
3(WCpp) FORMER PHOSPHATE PLANT SAMPLING LOCATION (WOODWARD-CLYDE)


ATE PLANT
PHOSPHORIC ACID PLANT
SOUTHERN PACIFIC RAILROAD
2(WC)
S3
S4
5
28Ca
2
28Bb*
28Ba
28(WCpp)
S2**
28C*
28B*
28A*
Drain Grate
W-13
8(WCpp)
A
32A
6
27B
S1
27(WCpp)
32(WCpp)
14(WCpp)
27A
3
27C
29(WCpp)
1
29A
FORMER PHOSPHORUS STORAGE PIT NO.1
1(WC)
8
7
30(WCpp)
30B*
30A
30B
30C
30a
G10
25(WCpp)
15(WCpp)
G7
G10A
30Ba
4
30Ca
9(WCpp)
9
11(WCpp)
G8
10
G2(WCpp)
26(WCpp)
10(WCpp)
FORMER PHOSPHORUS STORAGE PIT NO.2
39(WC)
G3
12
11
W-12
6(WC)
17(WCpp)
G1(WCpp)
12(WCpp)
19(WCpp)
3(WC)
16(WCpp)
W-10
G4
G9
5(WC)
G6
FORMER PROD. OFFICE
13
21(WCpp)
18(WCpp)
20(WCpp)
24(WCpp)
4(WC)
14
FORMER BOILER
FORMER PHOSSY POND
W-11
23(WC)
23(WCpp)
WILLOW STREET

SOIL BORING (PES ENVIRONMENTAL)

CPT LOCATION (PES ENVIRONMENTAL)

SOIL BORING (UNKNOWN)

POWER/TELEPHONE POLE

STORM DRAIN

PIPE

SUMP

PARCEL DESIGNATION

AREA POTENTIALLY IMPACTED WITH ELEMENTAL PHOSPHORUS

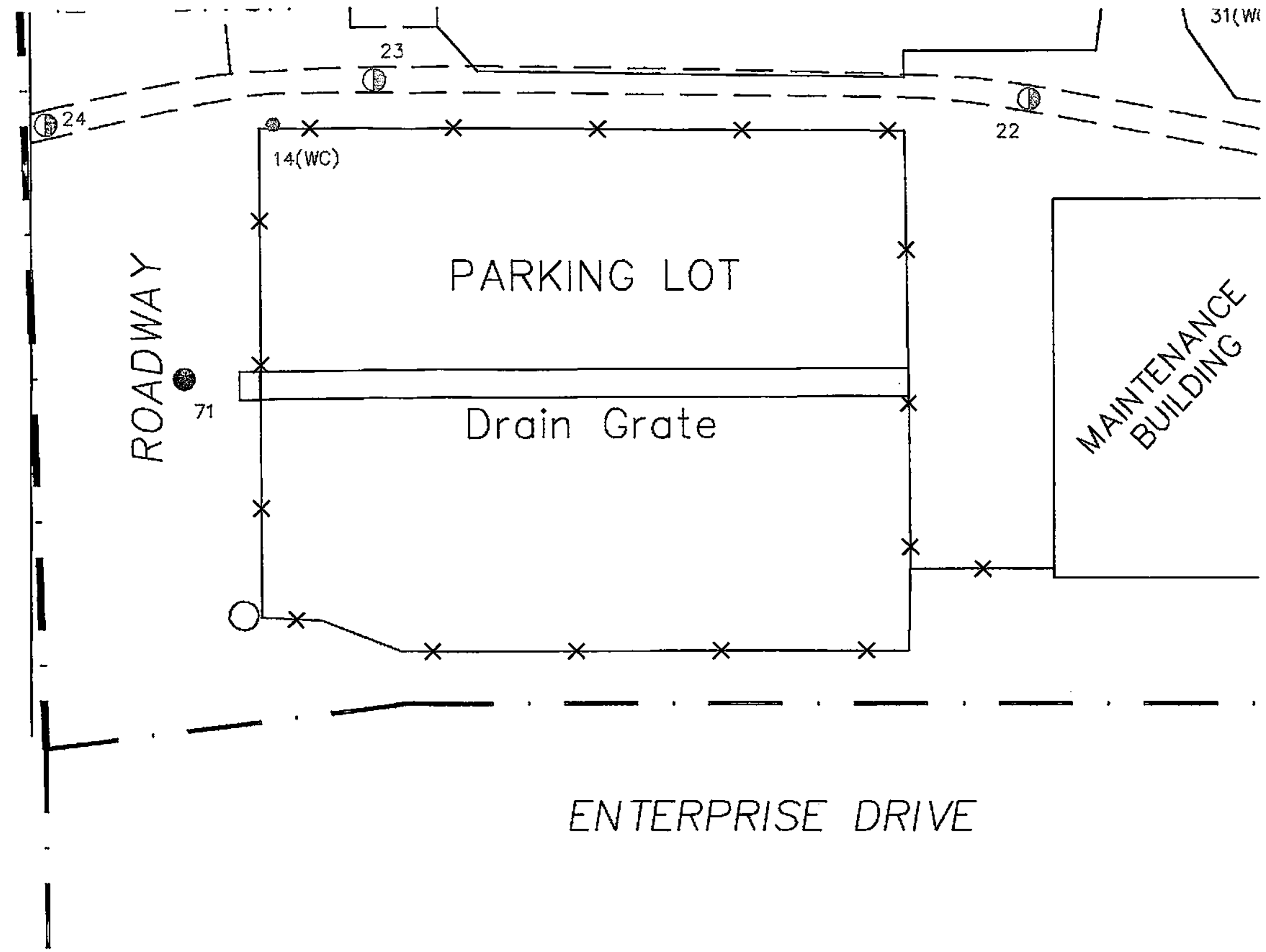
FORMER STRUCTURE

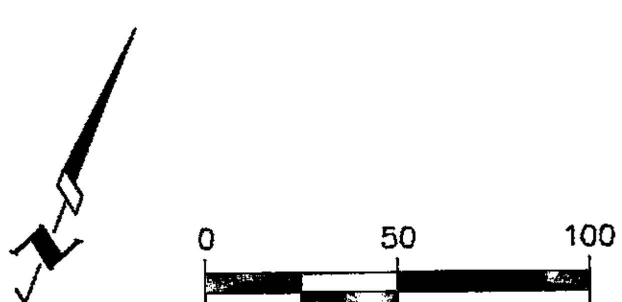
EXISTING STRUCTURE

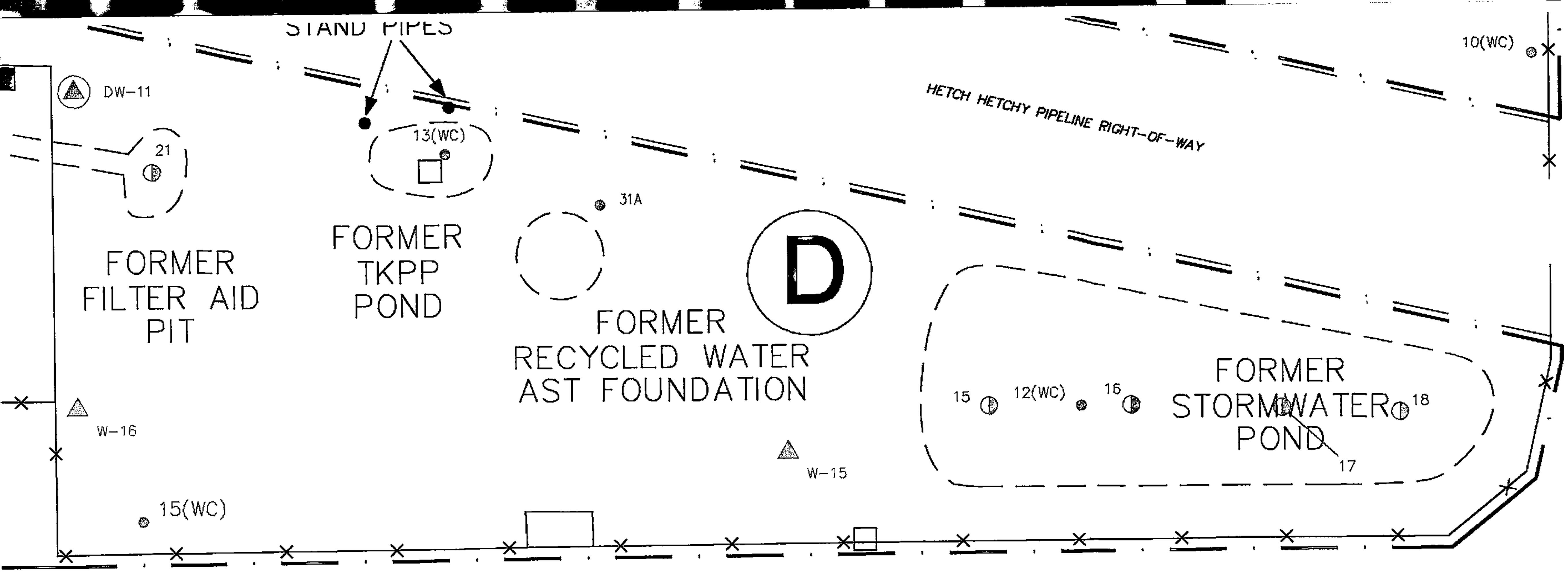
APPROXIMATE LOCATION OF ELEVATION CONTOUR (USGS Topography Map)

PROPERTY LINE

(d)	DUPLICATE
(rd)	REDRILL
NS	NOT SAMPLED
ND	NOT DETECTED AT OR ABOVE LABORATORY REPORTING LIMITS
TPH-MO	TOTAL PETROLEUM HYDROCARBONS, MOTOR OIL
*	BORINGS 28A, 28B, 28Bb, 30B, AND 30D WERE SAMPLED FOR GROUNDWATER ONLY
**	NO SAMPLE RESULTS WERE REPORTED FOR BORINGS S1, S2, 28C

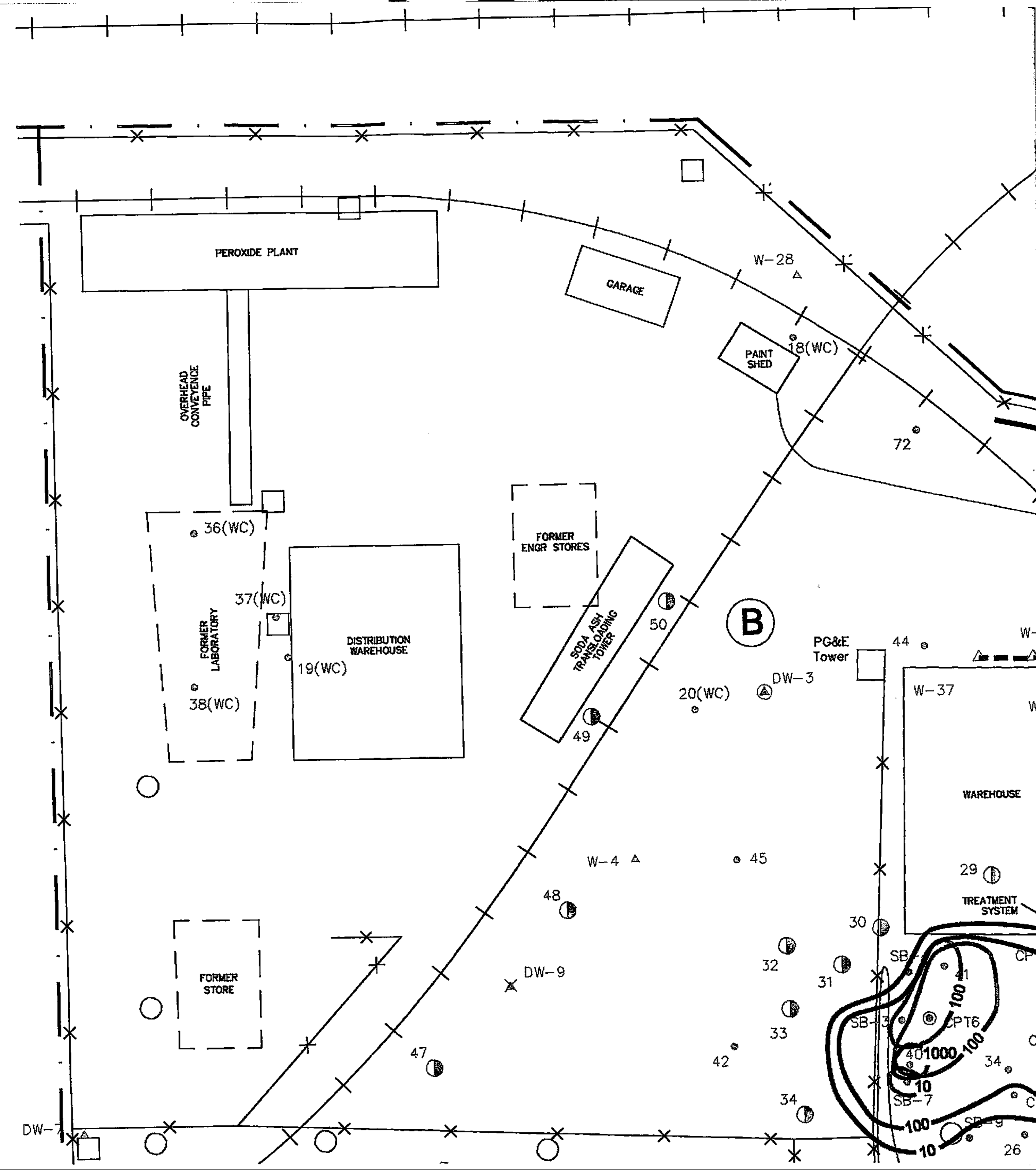






STAND PIPES
DW-11
21
FORMER FILTER AID PIT
13(WC)
FORMER TKPP POND
31A
FORMER RECYCLED WATER AST FOUNDATION
D
HETCH HETCHY PIPELINE RIGHT-OF-WAY
10(WC)
15
12(WC)
16
FORMER STORMWATER POND
18
17
W-16
W-15
15(WC)

15

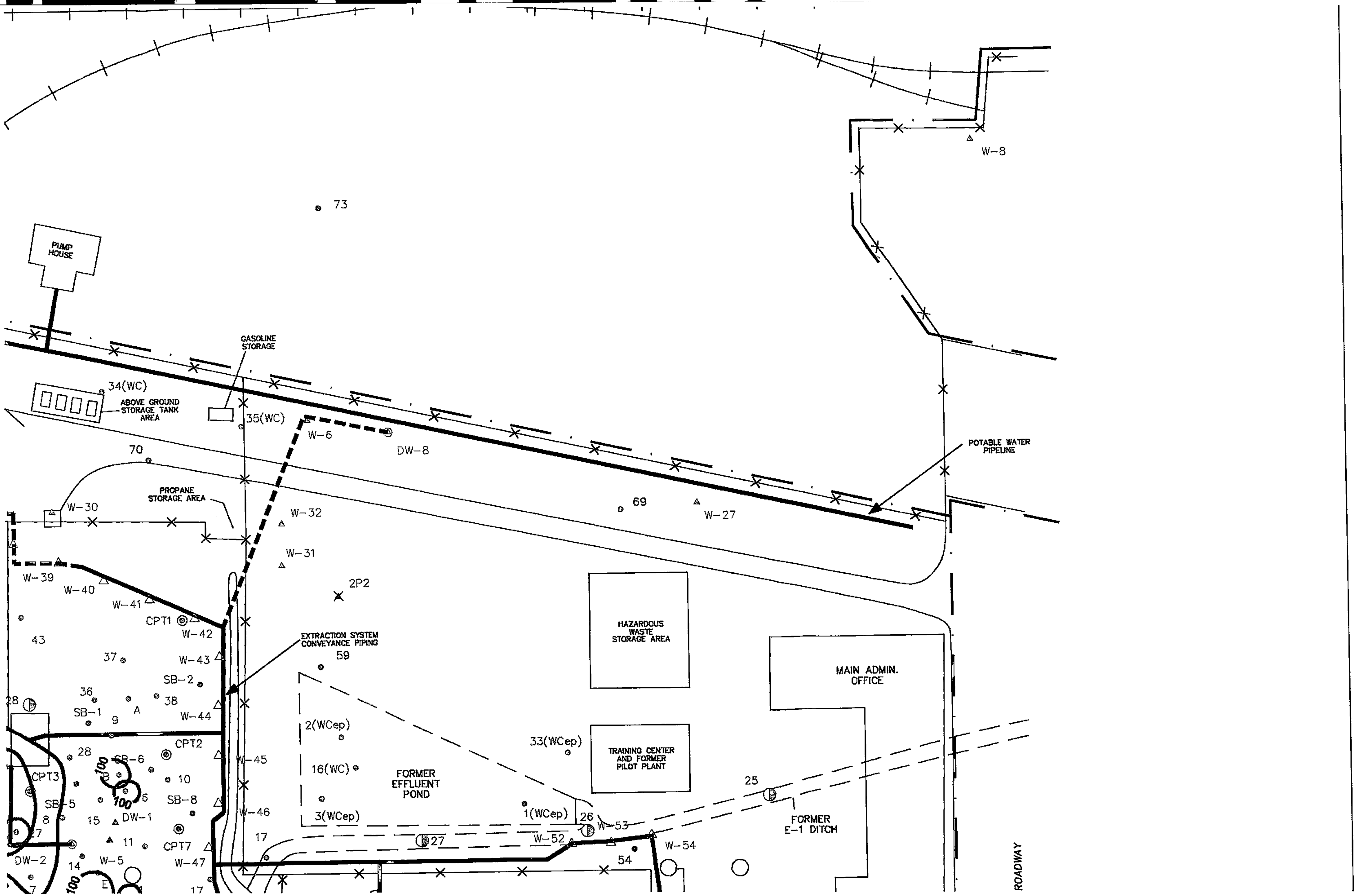


PROPOSED SOIL BORING

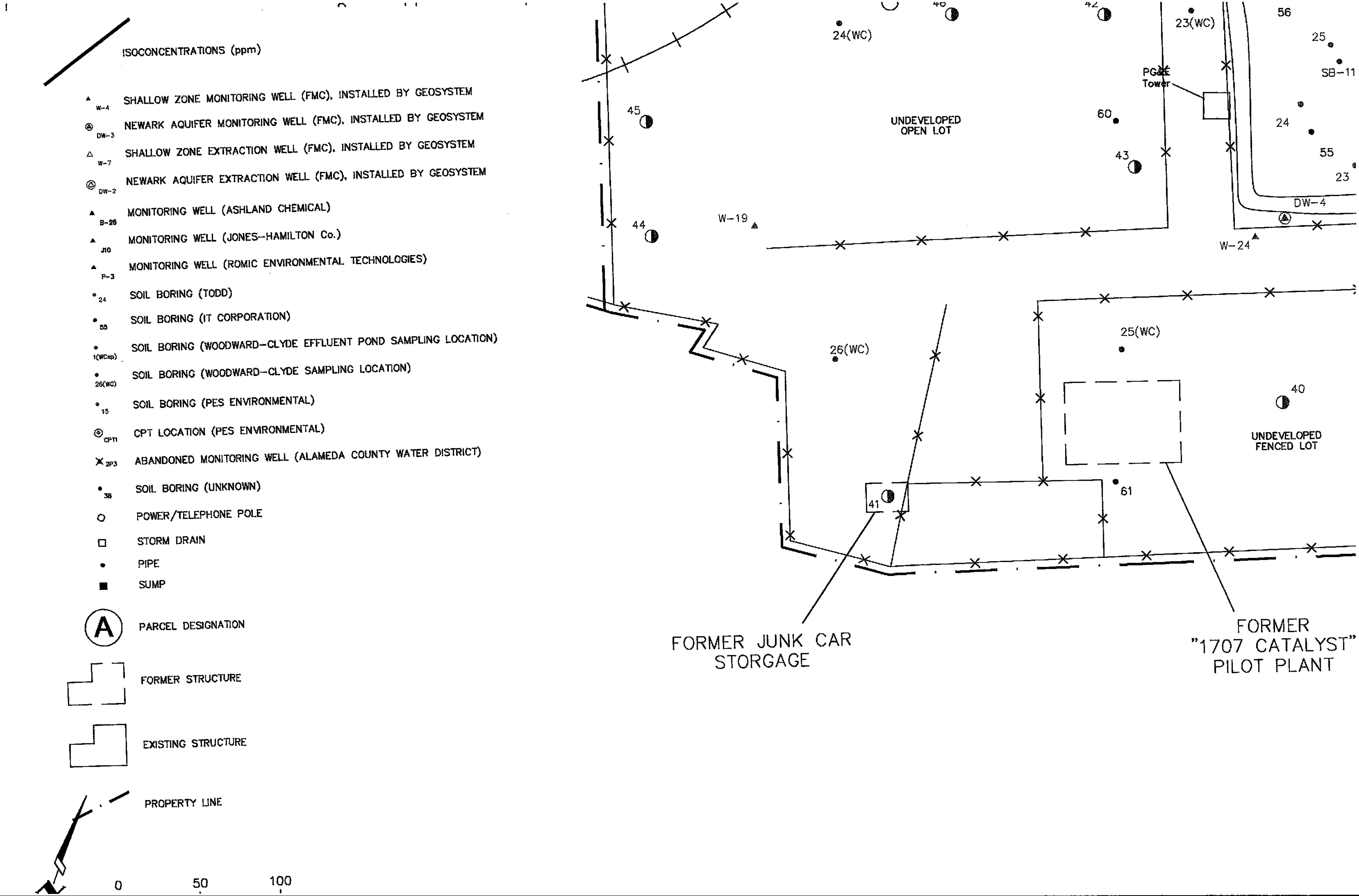
0–5'

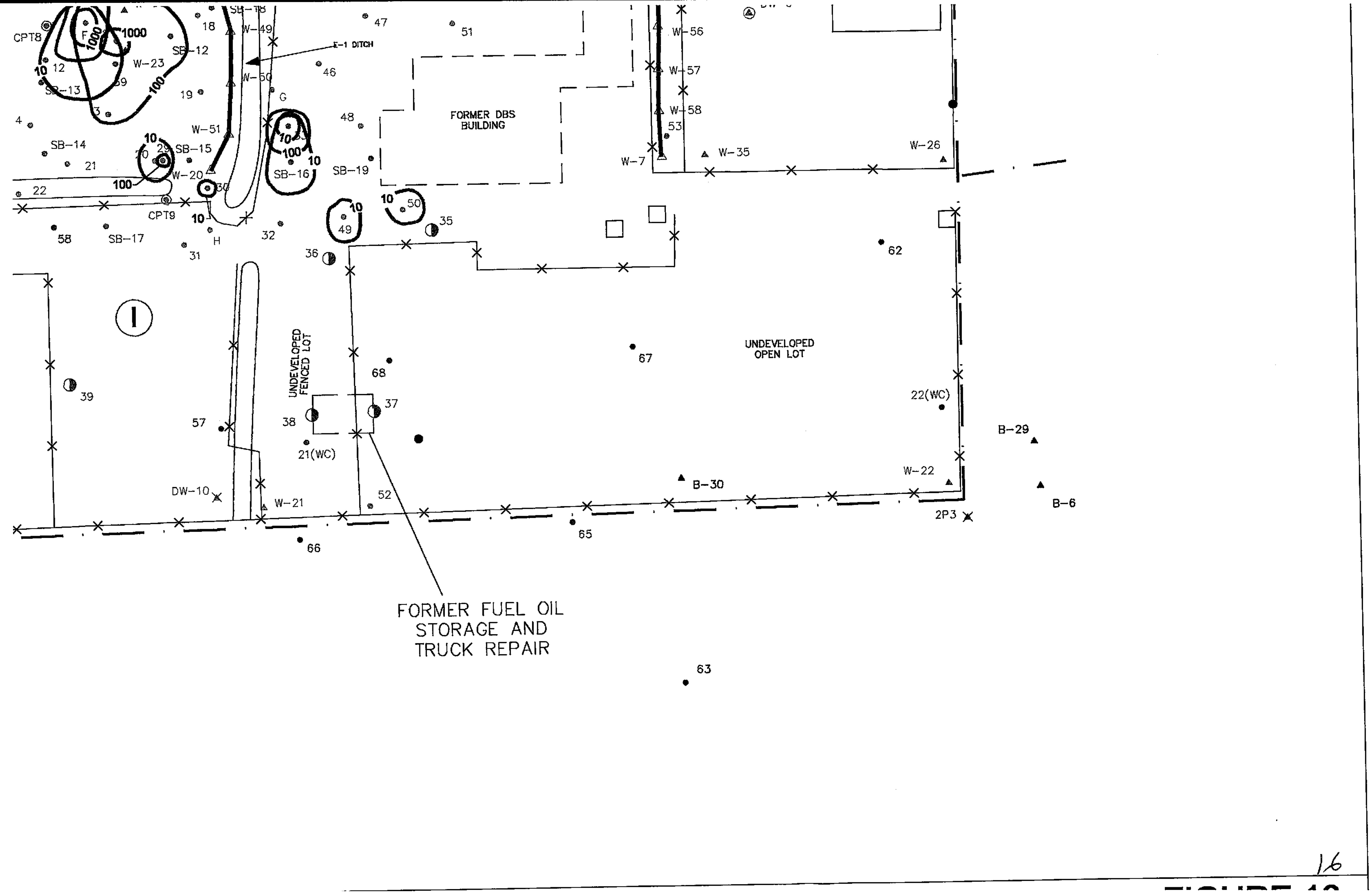
6–10'

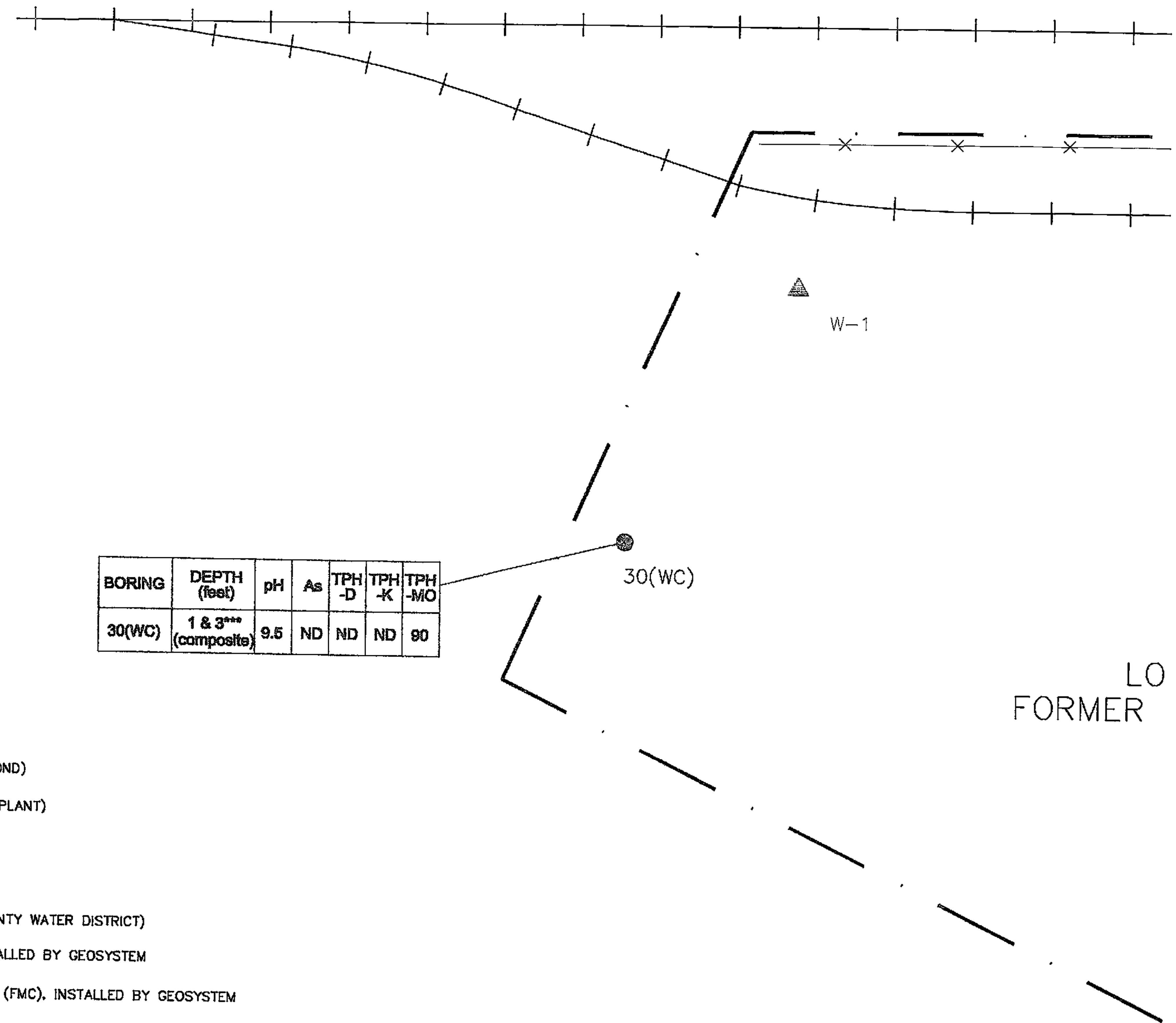
11–20'



W-8
73
PUMP HOUSE
GASOLINE STORAGE
34(WC)
ABOVE GROUND STORAGE TANK AREA
35(WC)
W-6
DW-8
POTABLE WATER PIPELINE
70
PROPANE STORAGE AREA
W-30
W-32
69
W-27
W-31
W-39
W-40
W-41
2P2
CPT1
W-42
43
EXTRACTION SYSTEM CONVEYANCE PIPING
37
W-43
59
HAZARDOUS WASTE STORAGE AREA
MAIN ADMIN. OFFICE
SB-2
36
38
28
SB-1
A
9
W-44
2(WCep)
CPT2
28
SB-6
33(WCep)
TRAINING CENTER AND FORMER PILOT PLANT
W-45
CPT3
10
16(WC)
FORMER EFFLUENT POND
25
SB-5
SB-8
8
15
DW-1
W-46
3(WCep)
1(WCep)
26
W-53
FORMER E-1 DITCH
11
CPT7
17
27
W-52
W-54
DW-2
14
W-5
W-47
54
17
ROADWAY

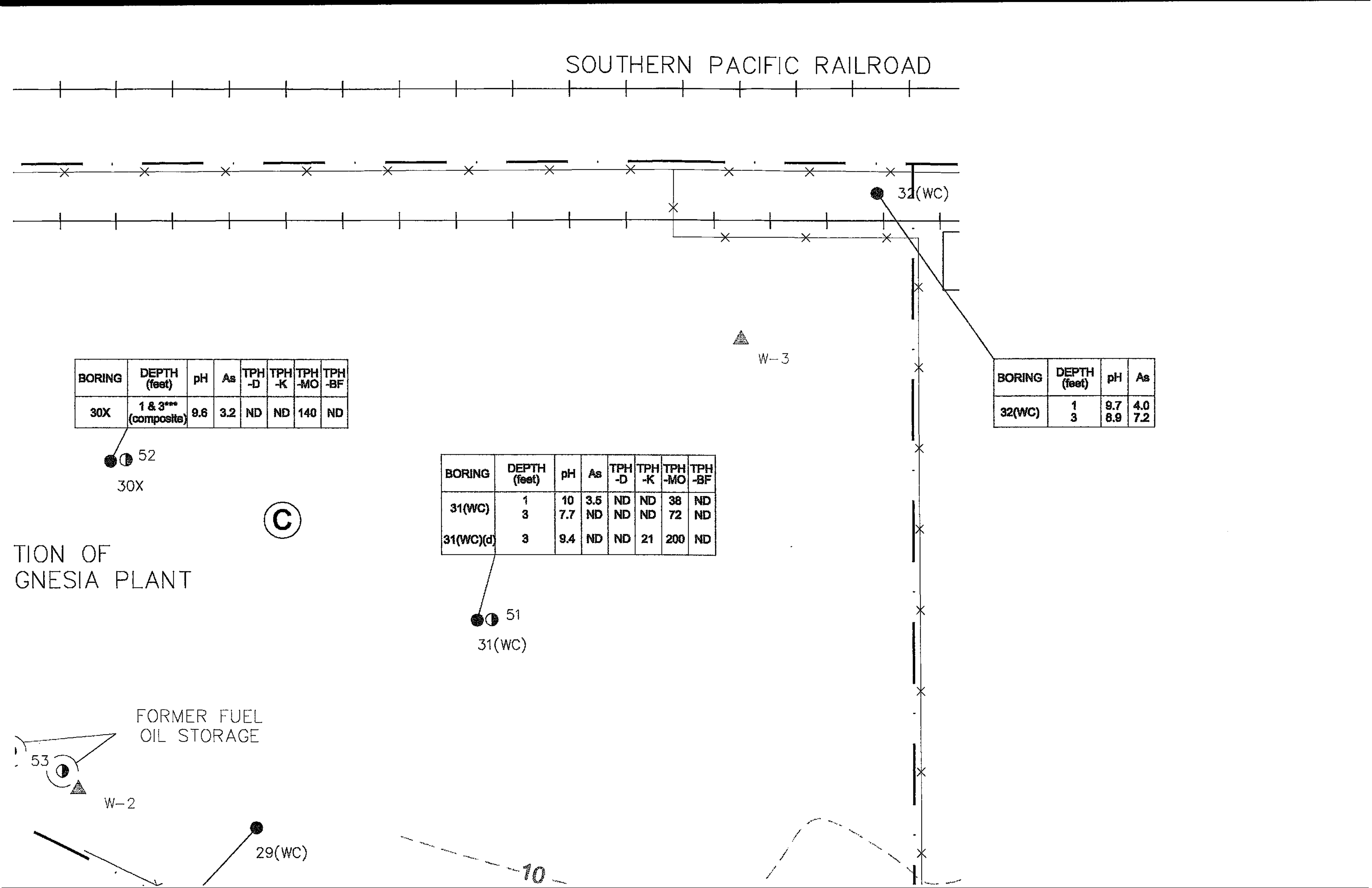

ISOCONCENTRATIONS (ppm)
W-4 SHALLOW ZONE MONITORING WELL (FMC), INSTALLED BY GEOSYSTEM
DW-3 NEWARK AQUIFER MONITORING WELL (FMC), INSTALLED BY GEOSYSTEM
W-7 SHALLOW ZONE EXTRACTION WELL (FMC), INSTALLED BY GEOSYSTEM
DW-2 NEWARK AQUIFER EXTRACTION WELL (FMC), INSTALLED BY GEOSYSTEM
B-26 MONITORING WELL (ASHLAND CHEMICAL)
J10 MONITORING WELL (JONES-HAMILTON Co.)
P-3 MONITORING WELL (ROMIC ENVIRONMENTAL TECHNOLOGIES)
24 SOIL BORING (TODD)
55 SOIL BORING (IT CORPORATION)
1(WCep) SOIL BORING (WOODWARD-CLYDE EFFLUENT POND SAMPLING LOCATION)
26(WC) SOIL BORING (WOODWARD-CLYDE SAMPLING LOCATION)
15 SOIL BORING (PES ENVIRONMENTAL)
CPT1 CPT LOCATION (PES ENVIRONMENTAL)
2P3 ABANDONED MONITORING WELL (ALAMEDA COUNTY WATER DISTRICT)
38 SOIL BORING (UNKNOWN)
POWER/TELEPHONE POLE
STORM DRAIN
PIPE
SUMP
A PARCEL DESIGNATION
FORMER STRUCTURE
EXISTING STRUCTURE
PROPERTY LINE
0
50
100
24(WC)
23(WC)
56
25
SB-11
PG&E Tower
45
UNDEVELOPED OPEN LOT
60
24
43
55
23
DW-4
44
W-19
W-24
25(WC)
26(WC)
40
UNDEVELOPED FENCED LOT
41
61
FORMER JUNK CAR STORGAGE
FORMER "1707 CATALYST" PILOT PLANT


CPT8
F
1000
10
12
SB-13
W-23
SB-12
100
18
SB-18
W-49
E-1 DITCH
W-50
47
51
46
G
19
4
SB-14
21
22
W-51
10
100
29
SB-15
W-20
30
CPT9
SB-16
SB-19
48
FORMER DBS
BUILDING
W-56
W-57
W-58
53
W-7
W-35
W-26
50
35
49
58
SB-17
31
H
32
36
62
I
39
57
UNDEVELOPED
FENCED LOT
68
67
UNDEVELOPED
OPEN LOT
22(WC)
38
37
21(WC)
B-29
W-22
B-30
B-6
DW-10
W-21
52
2P3
65
66
FORMER FUEL OIL
STORAGE AND
TRUCK REPAIR
63



BORING	DEPTH (feet)	pH	As	TPH -D	TPH -K	TPH -MO
30(WC)	1 & 3*** (composite)	9.5	ND	ND	ND	90

- PROPOSED SOIL BORING
- 24 SOIL BORING (TODD)
- 66 SOIL BORING (IT CORPORATION)
- 29(WC) SOIL BORING (WOODWARD-CLYDE)
- 2(WCep) SOIL BORING (WOODWARD-CLYDE EFFLUENT POND)
- 33(WCpp) SOIL BORING (WOODWARD-CLYDE PHOSPHATE PLANT)
- 15 SOIL BORING (PES ENVIRONMENTAL)
- CPT1 CPT LOCATION (PES ENVIRONMENTAL)
- 2P3 ABANDONED MONITORING WELL (ALAMEDA COUNTY WATER DISTRICT)
- W-4 SHALLOW ZONE MONITORING WELL (FMC). INSTALLED BY GEOSYSTEM
- DW-9 ABANDONED SHALLOW ZONE MONITORING WELL (FMC). INSTALLED BY GEOSYSTEM
- DW-3 NEWARK AQUIFER MONITORING WELL (FMC). INSTALLED BY GEOSYSTEM
- DW-10 ABANDONED NEWARK AQUIFER MONITORING WELL (FMC). INSTALLED BY GEOSYSTEM



BORING	DEPTH (feet)	pH	As	TPH -D	TPH -K	TPH -MO	TPH -BF
30X	1 & 3*** (composite)	9.6	3.2	ND	ND	140	ND

BORING	DEPTH (feet)	pH	As	TPH -D	TPH -K	TPH -MO	TPH -BF
31(WC)	1	10	3.5	ND	ND	38	ND
	3	7.7	ND	ND	ND	72	ND
31(WC)(d)	3	9.4	ND	ND	21	200	ND

BORING	DEPTH (feet)	pH	As
32(WC)	1	9.7	4.0
	3	8.9	7.2

DW-2 NEWARK AQUIFER EXTRACTION WELL (FMC), INSTALLED BY GEOSYSTEM

B-25 MONITORING WELL (ASHLAND CHEMICAL)

MW-OS9 MONITORING WELL (BARON-BLAKESLEE)

J10 MONITORING WELL (JONES-HAMILTON Co.)

P-3 MONITORING WELL (ROMIC ENVIRONMENTAL TECHNOLOGIES)

POWER/TELEPHONE POLE

STORM DRAIN

PIPE

SUMP

(A) PARCEL DESIGNATION

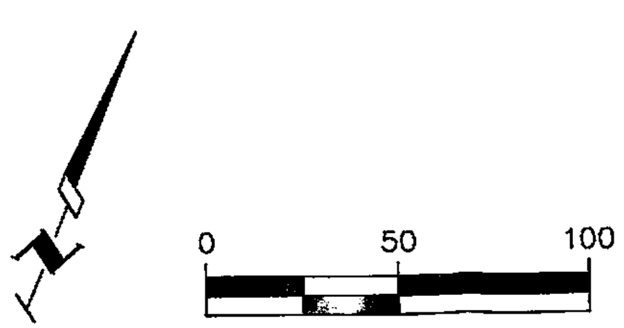
FORMER STRUCTURE

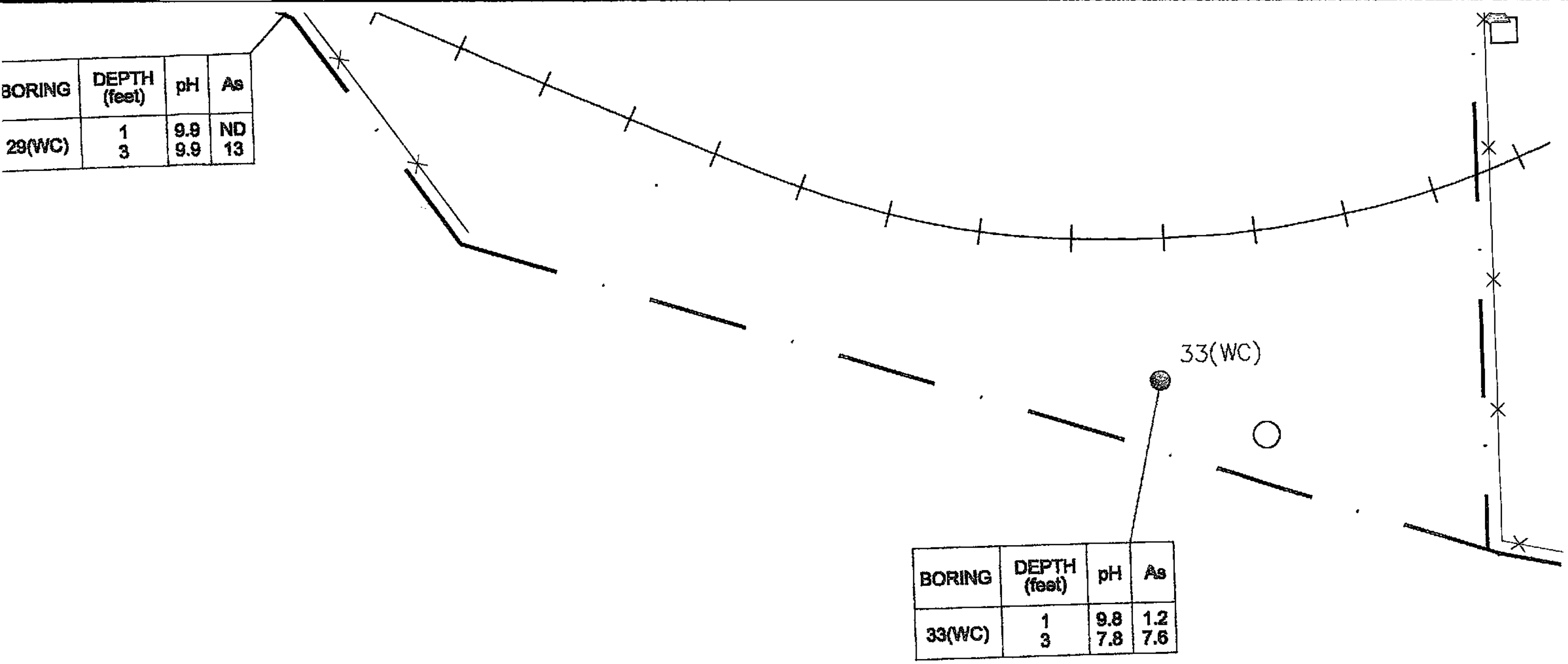
EXISTING STRUCTURE

10 APPROXIMATE LOCATION OF ELEVATION CONTOUR (USGS Topography Map)

PROPERTY LINE

TPH-MO TOTAL PETROLEUM HYDROCARBONS, MOTOR OIL
TPH-K TOTAL PETROLEUM HYDROCARBONS, KEROSENE
TPH-D TOTAL PETROLEUM HYDROCARBONS, DIESEL
TPH-BF TOTAL PETROLEUM HYDROCARBONS, BUNKER FUEL

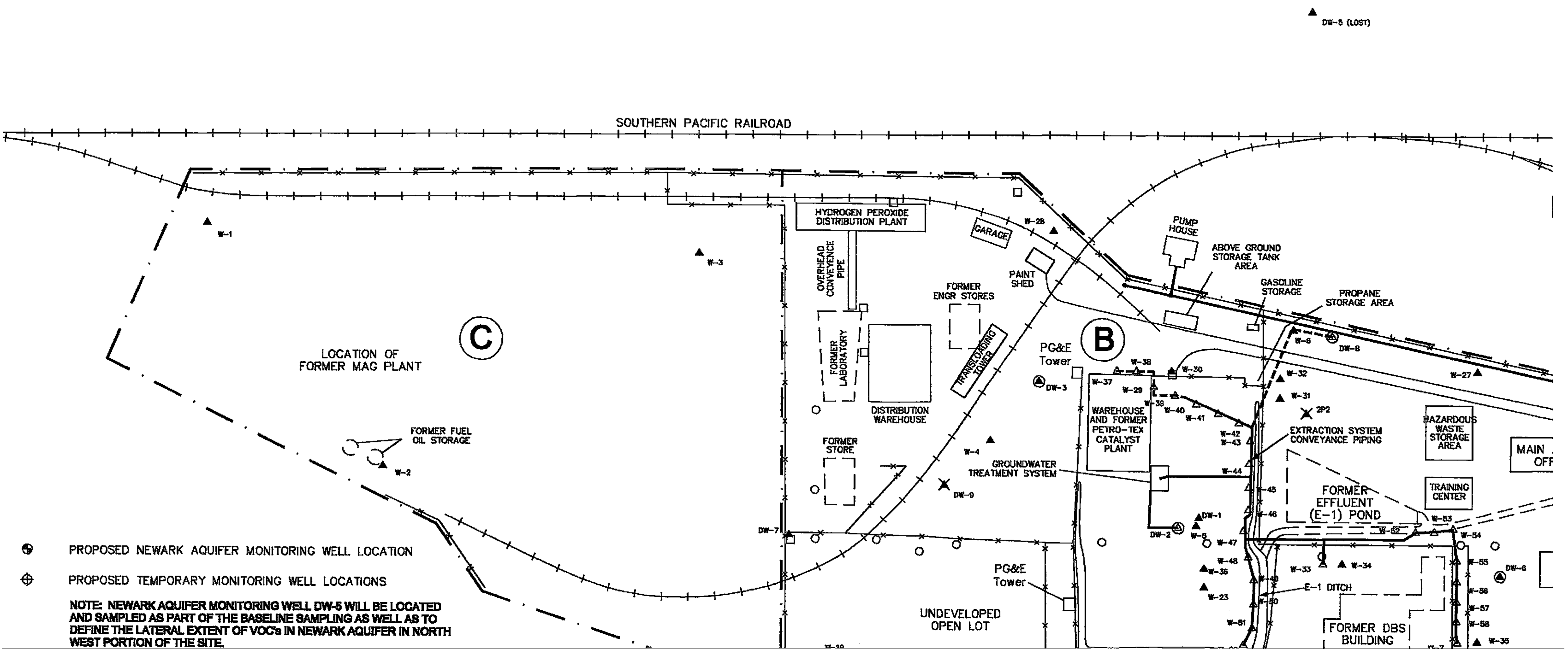




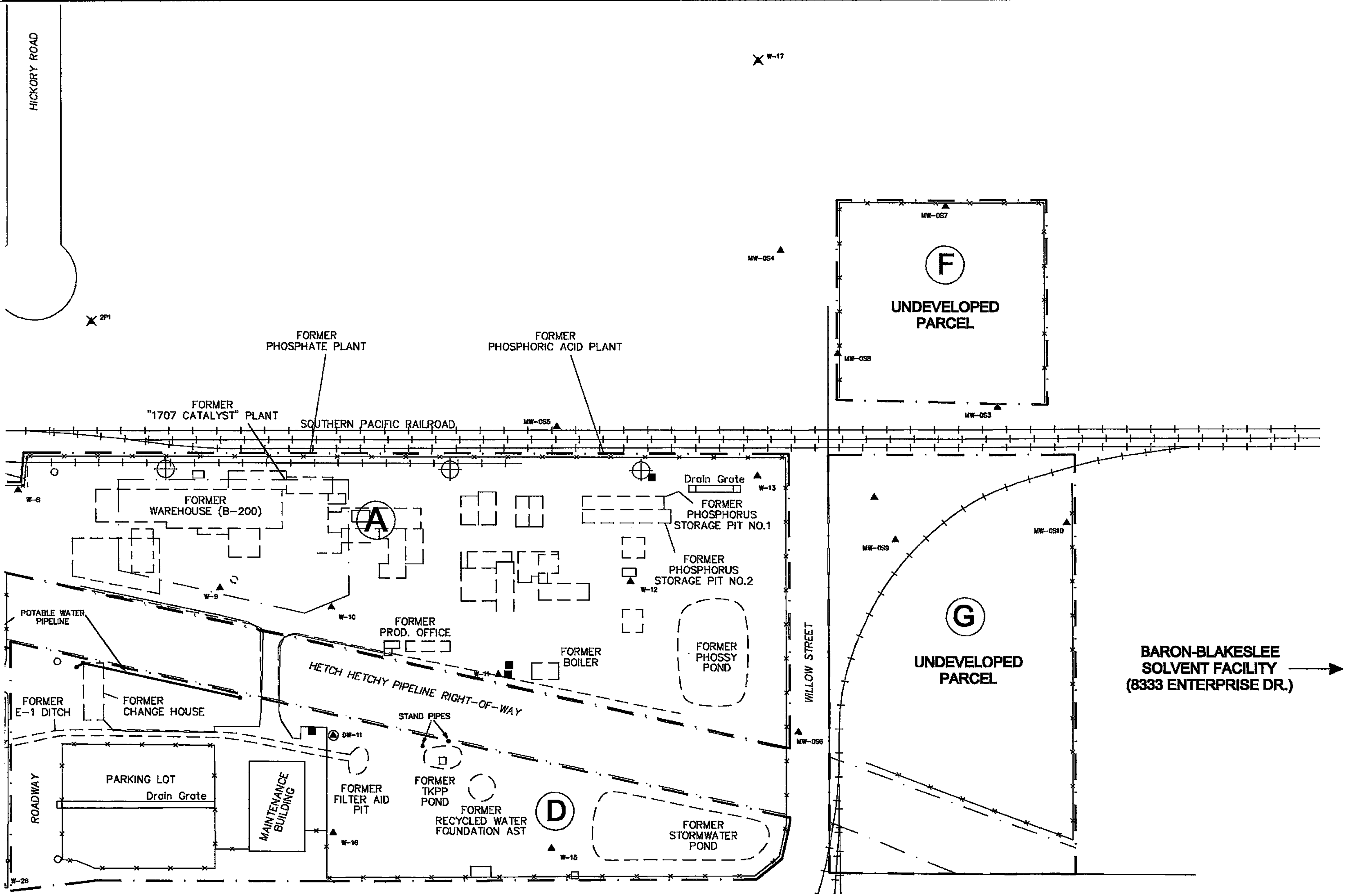
BORING	DEPTH (feet)	pH	As
29(WC)	1 3	9.9 9.9	ND 13

BORING	DEPTH (feet)	pH	As
33(WC)	1 3	9.8 7.8	1.2 7.6

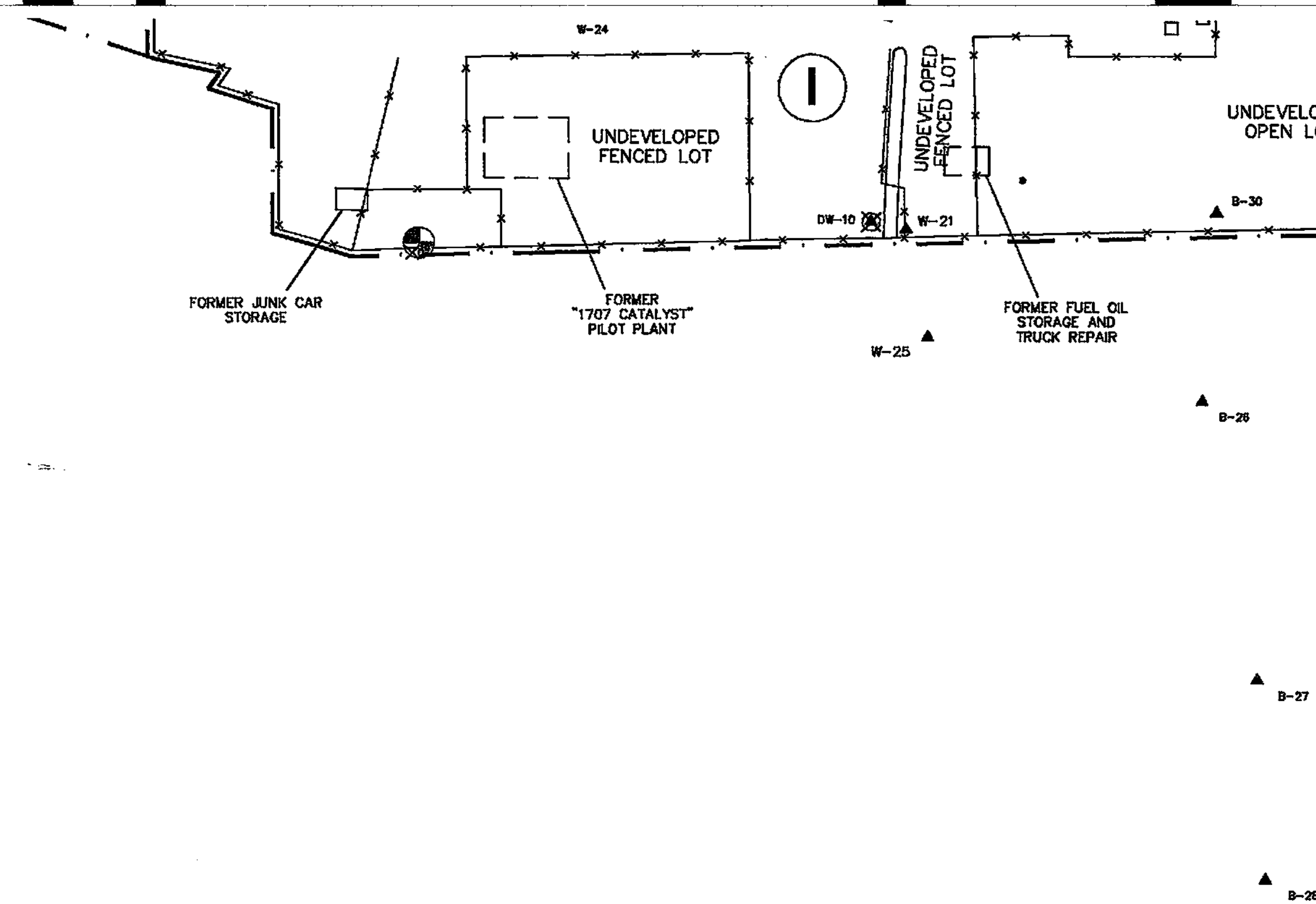
FIGURE 17

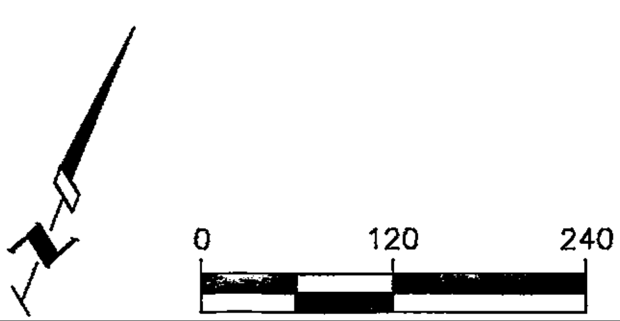


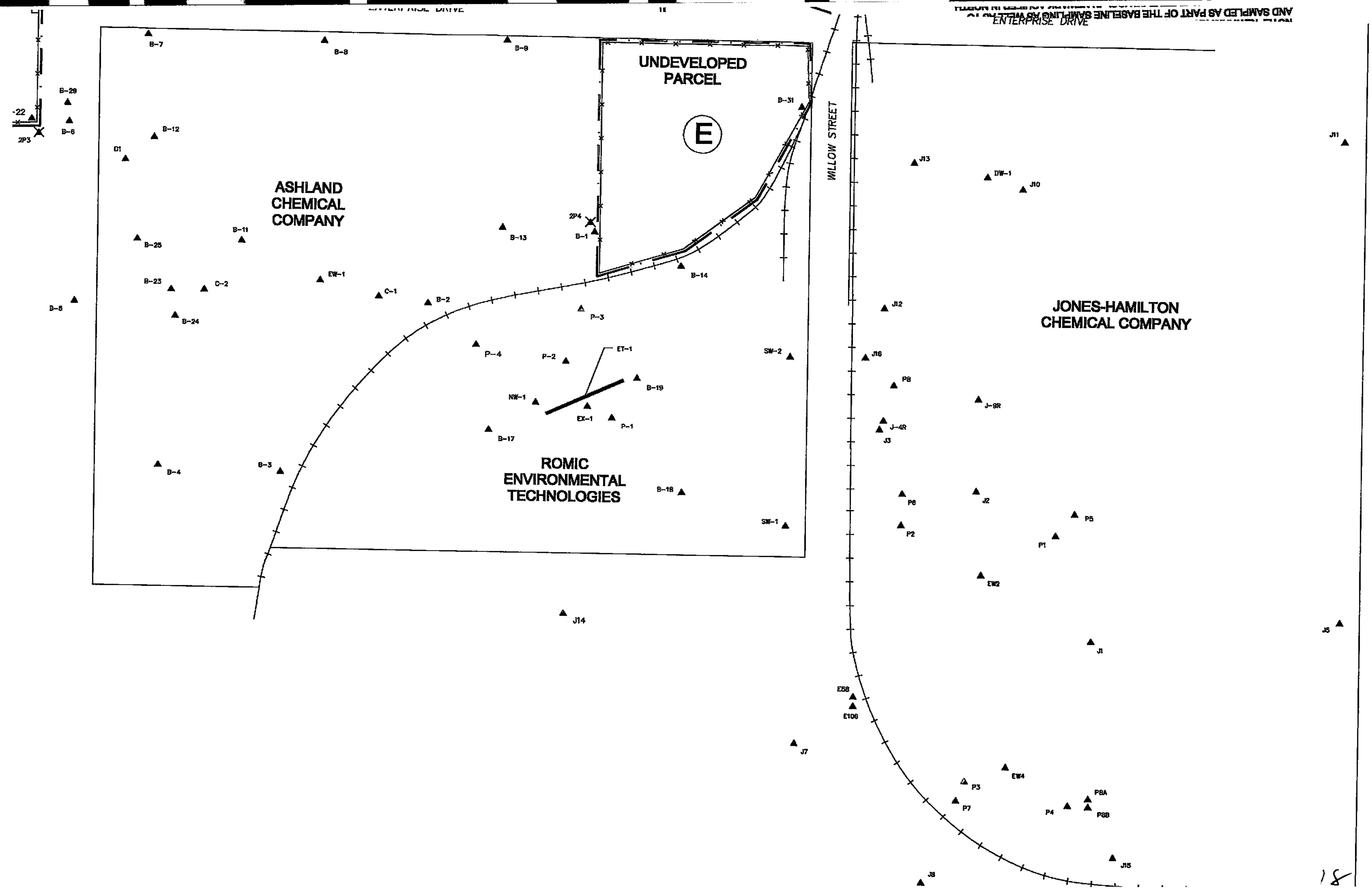
DW-5 (LOST)
SOUTHERN PACIFIC RAILROAD
W-1
W-3
LOCATION OF FORMER MAG PLANT
C
FORMER FUEL OIL STORAGE
W-2
HYDROGEN PEROXIDE DISTRIBUTION PLANT
OVERHEAD CONVEYENCE PIPE
FORMER LABORATORY
DISTRIBUTION WAREHOUSE
FORMER STORE
FORMER ENGR STORES
GARAGE
PAINT SHED
TRANSLOADING TOWER
W-28
W-4
DW-9
DW-7
GROUNDWATER TREATMENT SYSTEM
PG&E Tower
DW-3
B
PUMP HOUSE
ABOVE GROUND STORAGE TANK AREA
GASOLINE STORAGE
PROPANE STORAGE AREA
W-6
DW-8
W-27
W-32
W-31
2P2
WAREHOUSE AND FORMER PETRO-TEX CATALYST PLANT
EXTRACTION SYSTEM CONVEYANCE PIPING
HAZARDOUS WASTE STORAGE AREA
TRAINING CENTER
MAIN OFF
FORMER EFFLUENT (E-1) POND
E-1 DITCH
FORMER DBS BUILDING
UNDEVELOPED OPEN LOT
PG&E Tower
DW-1
DW-2
DW-6
W-23
W-33
W-34
PROPOSED NEWARK AQUIFER MONITORING WELL LOCATION
PROPOSED TEMPORARY MONITORING WELL LOCATIONS
NOTE: NEWARK AQUIFER MONITORING WELL DW-5 WILL BE LOCATED AND SAMPLED AS PART OF THE BASELINE SAMPLING AS WELL AS TO DEFINE THE LATERAL EXTENT OF VOC's IN NEWARK AQUIFER IN NORTH WEST PORTION OF THE SITE.


HICKORY ROAD
W-17
2P1
MW-OS7
MW-OS4
F
UNDEVELOPED PARCEL
MW-OS8
MW-OS3
FORMER PHOSPHATE PLANT
FORMER PHOSPHORIC ACID PLANT
FORMER "1707 CATALYST" PLANT
SOUTHERN PACIFIC RAILROAD
MW-OS5
Drain Grate
W-13
W-8
FORMER WAREHOUSE (B-200)
A
FORMER PHOSPHORUS STORAGE PIT NO.1
FORMER PHOSPHORUS STORAGE PIT NO.2
W-12
W-9
W-10
MW-OS9
MW-OS10
G
UNDEVELOPED PARCEL
BARON-BLAKESLEE SOLVENT FACILITY (8333 ENTERPRISE DR.)
POTABLE WATER PIPELINE
FORMER PROD. OFFICE
FORMER BOILER
FORMER PHOSSY POND
W-11
WILLOW STREET
HETCH HETCHY PIPELINE RIGHT-OF-WAY
FORMER E-1 DITCH
FORMER CHANGE HOUSE
STAND PIPES
DW-11
MW-OS6
PARKING LOT
Drain Grate
ROADWAY
MAINTENANCE BUILDING
FORMER FILTER AID PIT
FORMER TKPP POND
FORMER RECYCLED WATER FOUNDATION AST
D
FORMER STORMWATER POND
W-16
W-15
W-26

- 2P5 ABANDONED MONITORING WELL (ALAMEDA COUNTY WATER DISTRICT)
- E58 MONITORING WELL (ALAMEDA COUNTY WATER DISTRICT)
- W-4 SHALLOW ZONE MONITORING WELL (FMC)
- DW-9 ABANDONED SHALLOW ZONE MONITORING WELL (FMC)
- DW-3 NEWARK AQUIFER MONITORING WELL (FMC)
- DW-10 ABANDONED NEWARK AQUIFER MONITORING WELL (FMC)
- W-7 SHALLOW ZONE EXTRACTION WELL (FMC)
- DW-2 NEWARK AQUIFER EXTRACTION WELL (FMC)
- B-25 MONITORING WELL (ASHLAND CHEMICAL)
- MW-05S MONITORING WELL (BARON-BLAKESLEE)
- J10 MONITORING WELL (JONES-HAMILTON Co.)
- P-3 MONITORING WELL (ROMIC ENVIRONMENTAL TECHNOLOGIES)
- POWER/TELEPHONE POLE
- STORM DRAIN
- PIPE
- SUMP
- A PARCEL DESIGNATION
- FORMER STRUCTURE
- EXISTING STRUCTURE
- PROPERTY LINE






ENTERPRISE DRIVE
UNDEVELOPED PARCEL
E
ASHLAND CHEMICAL COMPANY
ROMIC ENVIRONMENTAL TECHNOLOGIES
JONES-HAMILTON CHEMICAL COMPANY
WILLOW STREET
B-7
B-8
B-9
B-29
B-6
B-5
B-12
D1
2P3
2P4
B-31
B-1
B-11
B-25
B-13
B-14
B-23
C-2
EW-1
C-1
B-2
B-24
P-3
P-4
P-2
ET-1
SW-2
B-19
NW-1
EX-1
P-1
B-17
B-4
B-3
B-18
SW-1
J14
J13
DW-1
J10
J11
J12
J16
P8
J-9R
J-4R
J3
P6
J2
P5
P2
P1
EW2
J5
J1
E58
E106
J7
EW4
P3
P7
P4
P8A
P8B
J15
J8
18