Site Characteristics Report

Former PCP Mixing Area
Northwest Terminal
Portland, Oregon

August 30, 1993

Prepared for

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SITE CHARACTERISTICS REPORT

INTRODUCTION

This site characteristics report summarizes past and known current environmental conditions at the former pentachlorophenol (PCP) mixing area (the site) at Time Oil's Northwest Terminal. The intent of this report is to provide Time Oil Company (Time) and the Oregon Department of Environmental Quality (DEQ) with a clear basis for the planned RCRA Facility Investigation (RFI and related activities). This report is based in part on, and supplements, the discussion of previous investigations in ECOVA's 1991 *Preliminary Assessment/Data Evaluation and Proposed Remediation Plan for Pentachlorophenol Contaminated Soil at Time Oil Co. (Preliminary Assessment Report)* (applicable portions reproduced as Appendix A). Time's files also were reviewed in the development of this report.

SITE DESCRIPTION

The site is a former pentachlorophenol (PCP) mixing area located within a small portion of Time's Northwest Terminal, in the industrialized Rivergate area of north Portland, Oregon (Figure 1). The site currently consists of a former PCP storage warehouse, the adjacent former PCP mixing area from which soil has been excavated (currently backfilled), a stockpile of the excavated PCP-containing soil located south-southwest of the excavation area, and an inactive soil treatment area (Figure 2).

SITE HISTORY

Former site operations consisted of PCP blending services that were operated by Time under a lease agreement with Koppers Company, from 1967 through 1982. Operations included import of solid PCP, the various carrier liquids into which the PCP would be mixed, and various additives; interim storage of the chemicals in the former pentachlorophenol warehouse and in product tanks within the site; transfer and mixture of the chemicals to formulations specified by Koppers Company; interim storage of the PCP products; and transfer of the products to drums for offsite transport. No PCP blending activities have occurred at the site since 1982. Figure 3, reproduced from the ECOVA *Preliminary Assessment Report*, shows the relative arrangement of site equipment at the time of the PCP mixing operations.

Releases of PCP, carriers, additives, and PCP formulations to soil in the mixing area appear to have occurred through intermittent spillage from hoses, mixing vessels, and daily operations. Environmental investigations and remedial actions conducted by and for Time since 1984 resulted in the previously noted excavation of PCP-containing soil. The excavation area was filled and regraded; approximately 3,000 yd^3 of excavated soil remains stockpiled onsite and approximately 500,000 gallons of PCP-containing water is stored in a nearby tank. In addition, a limited but unquantified volume of PCP-containing soil remains unexcavated at the site.

SUMMARY OF PREVIOUS INVESTIGATIONS

Beginning in 1984, a series of investigations at the site have been conducted to evaluate the potential for contamination associated with former site operations. This section summarizes the previous investigations of soil and groundwater at the site. Previous investigations are discussed in more detail in the *Preliminary Assessment Report* as presented in Appendix A.

Soil

In 1984, DEQ collected one soil sample from the former pentachlorophenol mixing area, as part of a larger sampling program. The elevated concentration of PCP in the sample prompted Time to initiate excavation and offsite disposal (to the RCRA-permitted landfill at Arlington, Oregon) of PCP-contaminated soil from the PCP mixing area to a depth of approximately 1.5 ft (approximately 288 yd^3) in mid-1985. Shortly thereafter, the U.S. Environmental Protection Agency (EPA) banned land disposal of the soil (which EPA classified as F027 waste).

Subsequent soil testing in 1985-86 identified additional areas within the PCP mixing area that contained elevated PCP concentrations, generally ranging from about 1 to 8000 mg/kg. The highest reported PCP concentration (116,000 mg/kg) was in a soil sample collected from a well boring (MW-3) drilled underneath the southwest corner of the former PCP warehouse, at a true vertical depth of 3 ft (the well was drilled at a 45 degree angle).

These results led to an evaluation of remedial technologies and in 1989, to reduce the potential for groundwater contamination, additional excavation within the former PCP mixing area was accomplished, with the intent of biologically treating the soil. Approximately 3,000 yd^3 of PCP-contaminated soil were excavated in 1989 to depths ranging from less than 4 ft to a maximum of 12 ft below original grade (the approximate water table surface) within the former PCP mixing area (Figure 4). Despite promising bench scale results, the field studies of the

treatment system were unsuccessful. The excavated soil was stockpiled onsite in a bermed and lined storage area and the excavated area was backfilled to the present ground surface elevation. Time's file data from sidewall sampling at the time of excavation in 1989 indicate that soil containing PCP at or above 1,000 ppm potentially remains in isolated areas of the site (PCP at 1,007 ppm was reported from the southern sidewall at a depth of 7 ft) and beneath the former pentachlorophenol warehouse, which was initially left unexcavated to maintain the warehouse's structural integrity (one 1989 sample from below the slab contained 1,882 ppm PCP). Data for soil samples collected within the excavated area in 1989 and in the Well 4 boring prior to the excavation also indicate that elevated PCP concentrations likely still exist in soil below the vertical limit of excavation.

Additional soil samples were collected in 1989 for PCP analyses within a bermed tank area southeast of the excavation, within the area where excavated soil was to be stockpiled, and within the bioremediation process area. All sample results were reported to be nondetected except for samples collected near Tank 38K and near the pipelines for the old Tanks (5006 and 10002). These samples were reported to contain PCP concentrations ranging from about 5 to 2424 ppm (near Tank 38K).

Groundwater

Between 1985 and mid-1990, Time and/or its consultants installed 16 monitoring wells and seven well points at or near the site. Because well points were driven, no geologic data exists at those locations. Of the 16 monitoring wells installed, boring logs have been located for seven. Based on these logs, and the available water level information, a general understanding of site hydrogeology can be developed. Table 1 identifies construction details for the monitoring wells and well points, and Figure 5 identifies the approximate location of each. For convenience, well points and monitoring wells are both referred to as wells in the remainder of this report's text.

Available site data [Ecova 1991 (Appendix A) and Time's files] suggest that groundwater exists in alluvial sands of two shallow water-bearing zones underlying the site. The upper water-bearing zone, occurring at a depth interval between about 13 to 18 ft below ground surface, appears to be a discontinuous perched aquifer. A sandy silt aquitard ranging from about 2-5 ft thick reportedly separates the perched zone from a lower water-bearing zone, and is reported to terminate south of the site (toward the Willamette River). The lower water-bearing zone has been reported as both confined and unconfined (possibly due to seasonal or tidal

response in the aquifer); available data indicate that the average water level of the lower water-bearing zone is about 20 ft below the ground surface. Groundwater flow within the upper water-bearing zone has been reported to be to the southwest, toward the river. There is not sufficient information to determine the groundwater flow direction for the lower water-bearing zone at this time.

Test results from the onsite wells indicate the presence of elevated PCP concentrations in the upper water-bearing zone downgradient of the former PCP mixing area. The highest reported PCP concentration (60 mg/L) was detected in Well J1 during the most recent sampling event (March 1991). PCP also has been detected in groundwater from Wells B and M in the upper water-bearing zone, at 2.3 and 4 mg/L, respectively, and at Wells B2, G1A, and J2 in the lower water-bearing zone at the detection limit of 1 mg/L. Benzene, ethylbenzene, toluene, and xylenes (BETX), believed to be associated with the PCP carrier liquids, also were detected in wells B1 and J1 during 1991, at concentrations ranging from 0.005 to 1.8 mg/L.

POTENTIAL CONSTITUENTS OF CONCERN

Chemicals associated with PCP mixing operations at the site which, at elevated concentrations, could pose a threat to human health or the environment are the potential constituents of concern for the site. Based on current information, the potential constituents of concern include the following:

- Pentachlorophenol (PCP), and its breakdown products 2,3,4,6-tetrachlorophenol, 2,4,5-trichlorophenol, 2,4,6-trichlorophenol, 2,4-dichlorophenol, and 2-chlorophenol
- Tetrachlorodibenzo-dioxins and -furans, which are common trace contaminants in technical grade PCP
- Benzene, ethylbenzene, toluene, and xylenes (BETX) which may have been present in low proportions in several of the petroleum products used as carriers for the PCP
- Polynuclear aromatic hydrocarbons (PAHs; in particular, those designated by EPA as carcinogenic) which may have been present in low proportions in several of the petroleum products used as carriers for the PCP.

Because several carrier chemicals or additives used at the site were proprietary, the RFI will include priority pollutant analyses that will assist in evaluating whether carrier and additive chemicals used in the former blending operations also are present in soil and/or groundwater at concentrations of concern.

POTENTIAL MIGRATION PATHWAYS

Chemicals released during past operations at the site would be expected to leach into the subsurface soil and the water of the upper water-bearing zone in the dissolved phase and, perhaps, as a pure phase. Based on a review of the MSDS sheets available for components of the Koppers formulations and for the formulations themselves, the most likely forms of historical contamination in the subsurface at the site are the following:

- Pure (solid) PCP in near surface soil near the point of release (or deeper if surface disturbance or filling has occurred). Previous soil excavations at the site are expected to have addressed most soil affected by pure PCP.
- Dissolved phase PCP and carrier components. PCP exhibits a relatively high tendency to sorb to organic carbon in soil, thereby retarding its movement in the environment relative to both water and some of the constituents in the carriers and additives used in the various formulations. The extent to which this retardation actually occurs at the site is dependent upon, among other things, the amount of organic carbon in the subsurface soil.
- Pure phase carriers or PCP-containing formulations. If a pure phase exists at the site, it would be expected to exist near the point of release in the unsaturated zone as residual, or possibly at the top of the capillary zone of the upper water-bearing zone (because most of the carriers and formulations appear to have had densities less than that of water). Any pure phase that exists at the top of the capillary zone of the upper water-bearing unit would in fact be expected to be distributed over an interval that corresponds to the seasonal or tidal fluctuation of the groundwater.

There is also a potential at the site for a dense pure phase which could migrate downward under gravity through the saturated soil of the upper water-bearing zone, and accumulate on lenses or units of low permeability. This potential exists because one Koppers product produced at the site reportedly had a specific gravity greater than 1 (the volume of the denser PCP product produced at the site relative to that of the numerous other lighter PCP products is not known, but is believed to be significantly less). PCP itself is also denser than water, but at its solubility limit, would not form a solution denser than water (and it is unlikely that dissolved PCP could form a solution denser than water even if carriers were also dissolved in the water, thereby inducing a cosolvency effect).

CURRENT DATA GAPS

Previous investigations at the site provide important but limited information regarding the nature of the subsurface hydrogeology, and the occurrence of contamination at the site. Therefore, certain issues important in the evaluation of any further remedial action remain unresolved. These include the following:

- The nature and lateral extent of the confining layer between the upper and lower water-bearing zones
- The predominant flow directions in each of the water-bearing zones, and whether tidal fluctuations in the Willamette River or seasonal factors significantly influence groundwater flow at the site
- Whether nonaqueous phase contamination exists at the site
- Whether PCP is the primary constituent of concern, or whether carrier and additive chemicals used in the former blending operations also are present in soil and/or ground water at concentrations of concern
- Site-specific values for the aquifer properties that influence contaminant transport rates
- The lateral and vertical extent of contamination in unexcavated soil and in groundwater at the site

FUTURE SITE ACTIVITIES

The Oregon Department of Environmental Quality (DEQ) has determined that the soil contaminated with PCP formulations apparently spilled intermittently during former site operations are RCRA hazardous wastes (waste code F027). At present, approximately 3,000 yd^3 of soil previously excavated from the site remain stockpiled onsite. In addition, as noted in the previous section, the current condition of in-place soil and groundwater at the site requires further evaluation. And finally, Time is currently pursuing options to treat and dispose of water generated through previous site investigations and soil treatment tests and that is currently stored onsite. To address these issues, Time has retained Landau Associates, Inc. to perform the following activities:

- A RCRA Facility Investigation (RFI)
- Design of a RCRA containment building to store the stockpiled soil
- Design and implementation of a batch water treatment system.

Each of these activities is described briefly below.

RFI Site Characterization

Because information from previous investigations performed by DEQ and Time confirm that releases have occurred at the site, Time is ready to proceed directly to an RFI in lieu of waiting for a RCRA Facility Assessment.

RFI site characterization activities will be described in detail in the draft RFI Work Plan to be submitted to DEQ shortly after this report (currently expected to be on or before September 30, 1993). The RFI is being designed to fill the data gaps noted above. The information collected as part of the RFI site characterization activities will be used in conjunction with data collected during previous investigations to determine the nature and extent of contamination that currently remains at the site, and the risks that the current contamination poses. The data collected and the evaluations made during the RFI will subsequently be used to evaluate whether any additional corrective measures are needed and if so, in the evaluation of those measures.

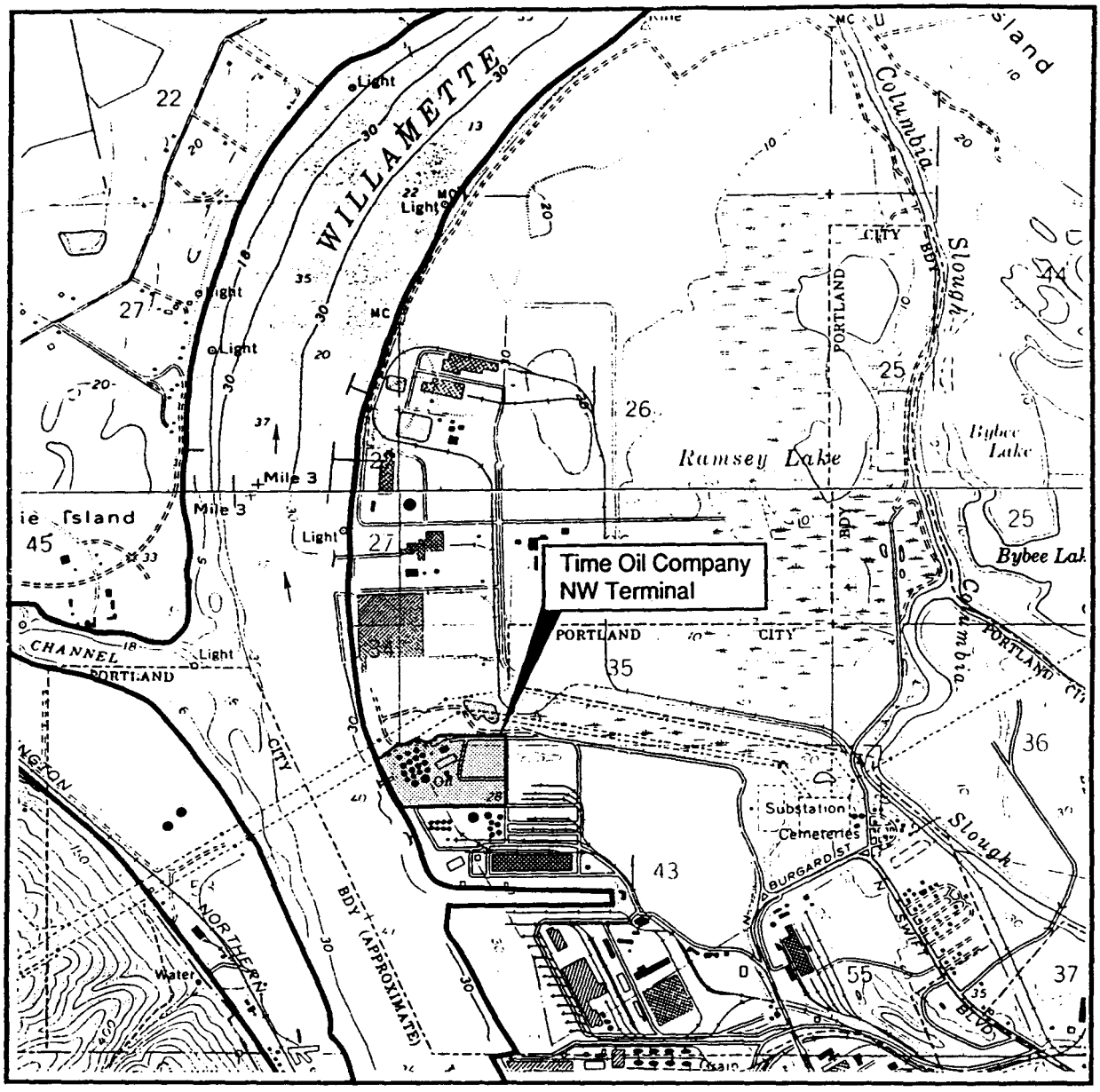
The RFI Work Plan describes planned field activities to be conducted as part of the RFI, including: 1) surface and subsurface soil sampling in and adjacent to areas previously identified as contaminated, 2) installation of monitoring wells and sampling of groundwater in and downgradient to previously identified contaminated areas, and 3) measurement of water levels and performance of aquifer tests to determine groundwater flow direction in both water-bearing units and aquifer parameters.

Soil Containment Building

Landau Associates recently completed an evaluation of a number of viable alternative designs for containment buildings for the currently stockpiled soil and is initiating preliminary design of that unit. Submittal of the draft design to DEQ for review is currently scheduled for fall, 1993.

Water Treatment

Landau Associates has completed an evaluation of water treatment alternatives for Time, and is proceeding with design of a portable batch carbon treatment system. Following treatment and verification of the treatment, the water is expected to be disposed to the local publicly owned treatment works (POTW).



Source: U.S.G.S., 7.5-min. series quadrangle map; Linnton and Sauvie Island, OR (1956; photorevised 1968 and 1973)

0 1/2 1

Scale in Miles

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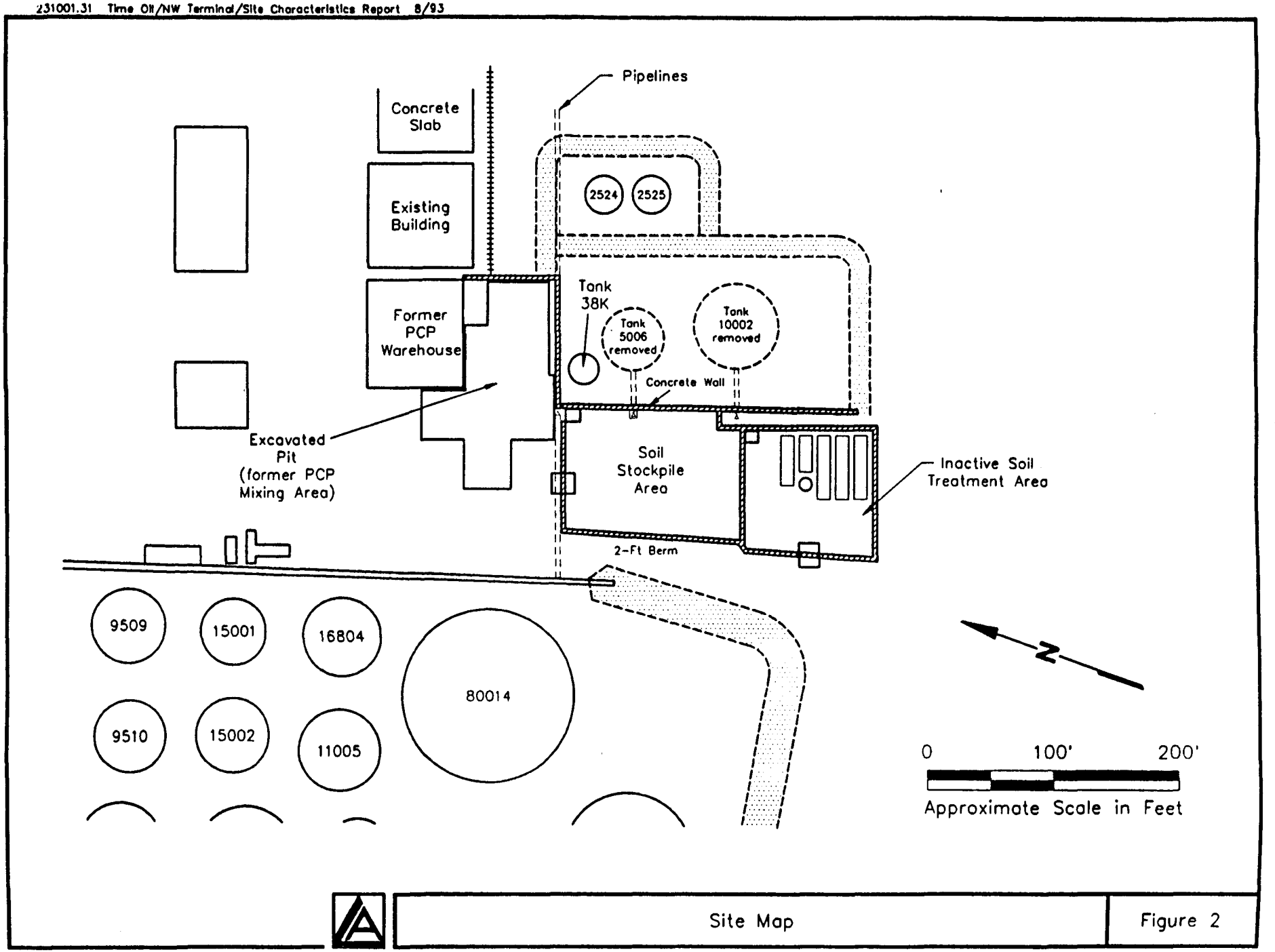
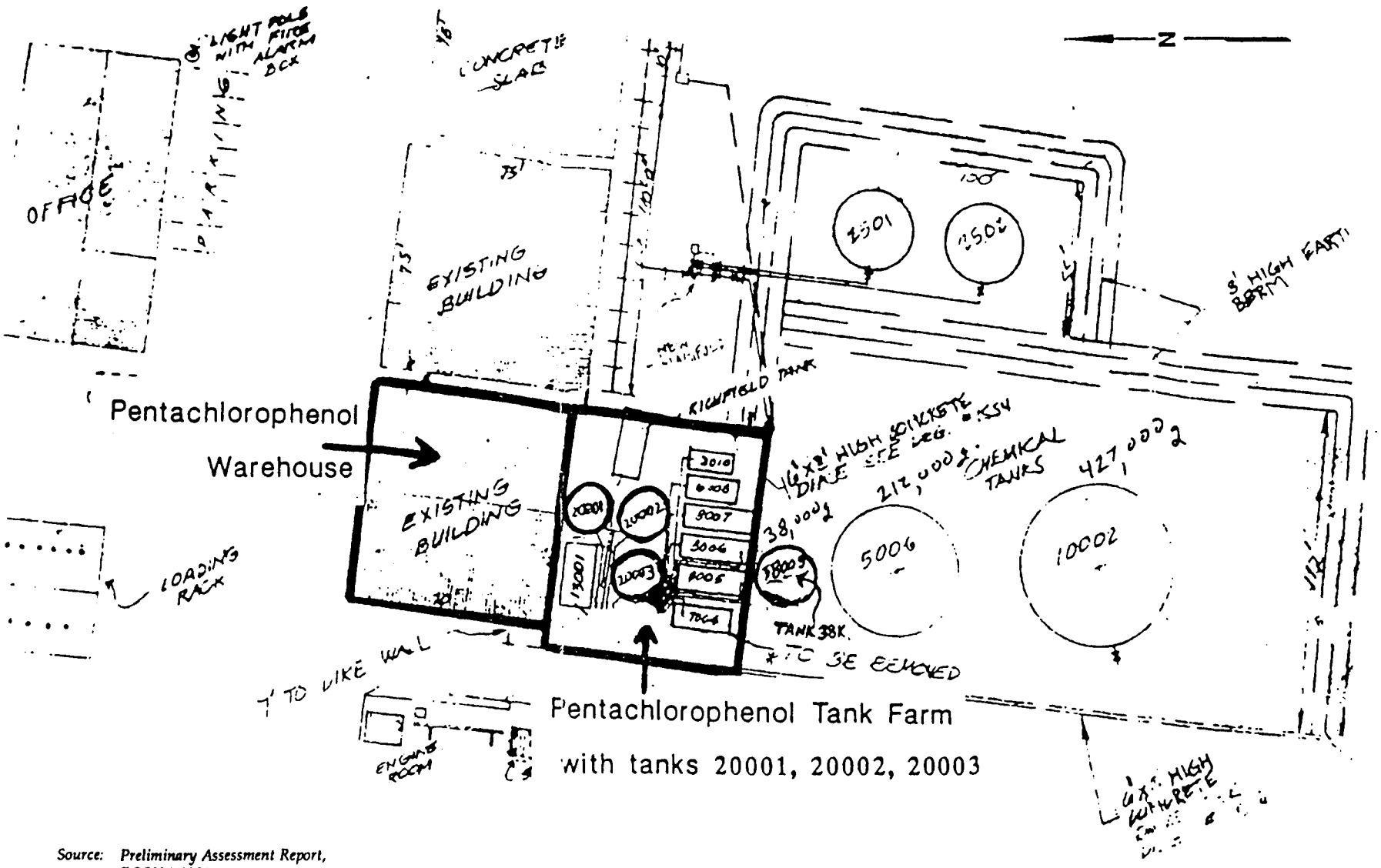
Vicinity Map | Figure 1



Site Map

Figure 2



Source: *Preliminary Assessment Report, ECOVA 1991.*

Site Operations

Figure 3

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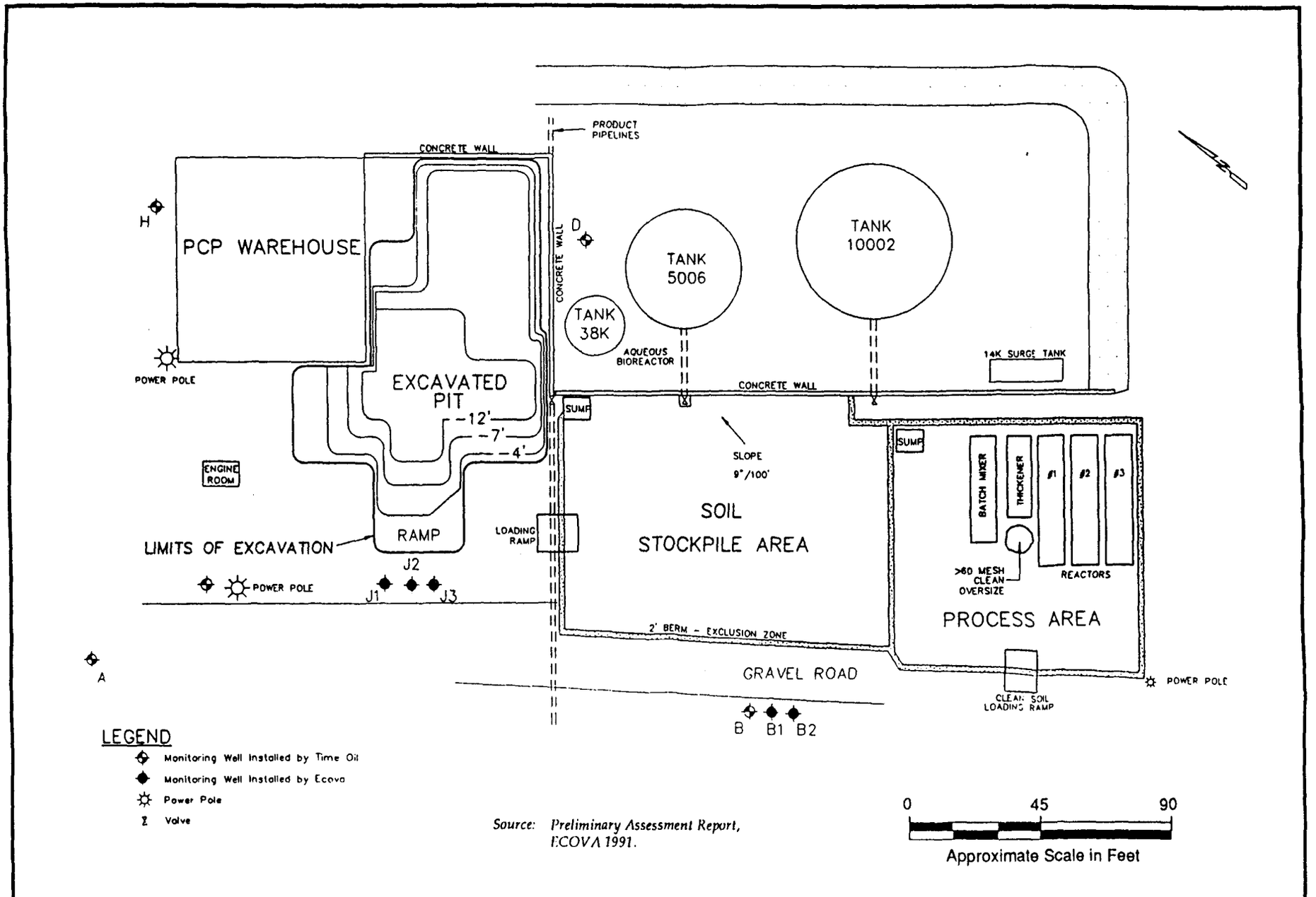
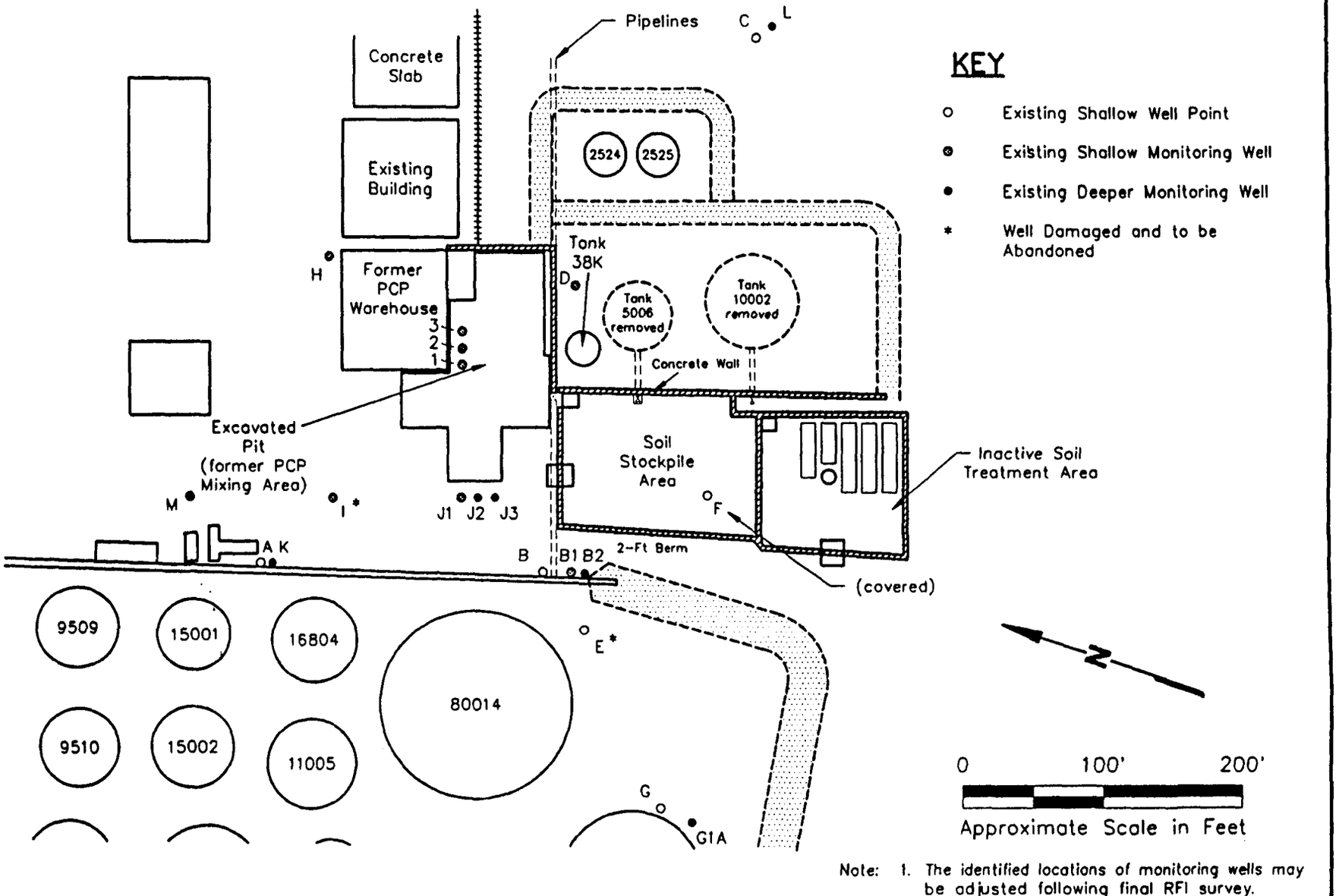


Source: *Preliminary Assessment Report, ECOVA 1991.*

Excavation Area

Figure 4



Note: 1. The identified locations of monitoring wells may be adjusted following final RFI survey.

Monitoring Well Locations

Figure 5

TABLE 1

SUMMARY OF WELL CONSTRUCTION DETAILS
FORMER PENTACHLOROPHENOL MIXING AREA
TIME OIL COMPANY NW TERMINAL SITE
PORTLAND OREGON

WELL	TYPE	WATER BEARING ZONE	DATE	INSTALLED BY	DIAMETER	RECORDED DEPTH	TOP OF SCREEN	BOTTOM OF SCREEN	SCREEN LENGTH	SLOT SIZE	TOP OF SANDPACK	REF ELEV(1)	NOTES
A	WP	Shallow	Feb 86	TIME	1.25	20	UNK	UNK	30	UNK	UNK	97.14	
B	WP	Shallow	Feb 86	TIME	1.25	20	UNK	UNK	30	UNK	UNK	96.83	REPLACED WITH B1, B2 NOV 86; CAP RUSTED ON
B1	MW	Shallow	Nov 86	ECOVA	4	20.5	10.5	20.5	10	0.02	9.5	97.54	LOG SHOWS TD 22 FT BUT SANDPACK ONLY TO 20.5; STICKUP 1.4 FT
B2	MW	Deep	Nov 86	ECOVA	4	41.75	30	40	10	0.02	27	98.02	CONDUCTOR CASING TO 19 FT
C(1)	WP	Shallow	Feb 86	TIME	1.25	8	UNK	UNK	30	UNK	UNK	98.73	RENAMED "C" MAR 86
C(2)	WP	Shallow	Feb 86	TIME	UNK	UNK	UNK	UNK	UNK	UNK	UNK	95.72	REMOVED MAR 86
D	MW	Shallow	May 86	REIDEL	2	UNK	UNK	UNK	UNK	UNK	UNK	97.93	
E	WP	Shallow	May 86	TIME	2	20	UNK	UNK	UNK	UNK	UNK	97.83	DAMAGED AND TO BE ABANDONED
F	WP	Shallow	May 86	TIME	2	19	UNK	UNK	UNK	UNK	UNK	97.97	COVERED BY SOIL STOCKPILE
G	WP	Shallow	May 86	TIME	2	13	UNK	35	10	UNK	24	98.05	REPLACED WITH G1A MAR 86
G1A	MW	Deep	Feb 89	ECOVA	2	35	25	UNK	UNK	UNK	UNK	UNK	STICKUP 1.5 FT; UPPER/LOWER WATER-BEARING ZONE INDISTINGUISHABLE; REFERRED TO AS "G" IN SOME DOCUMENTS
H	MW	Shallow	May 86	REIDEL	2	UNK	UNK	UNK	UNK	UNK	UNK	94.75	FLUSH MOUNT
I	MW	Shallow	May 86	REIDEL	2	UNK	UNK	20	10	0.02	8.5	98.00	DAMAGED AND TO BE ABANDONED
J1	MW	Shallow	Nov 86	ECOVA	4	20	10	40	10	0.02	28	97.48	LOG SHOWS TD 21.5 FT NATURAL BACKFILL TO 20
J2	MW	Deep	Dec 86	ECOVA	4	41.92	30	33	5	0.02	27	97.44	CONDUCTOR CASING TO 20 FT; JUST BELOW SILTY CONFINING LAYER
J3	MW	Deep	Jan 89	ECOVA	4	35.08	28	UNK	UNK	UNK	UNK	97.39	CONDUCTOR CASING TO 20 FT
K	MW	Shallow	1990	TIME	2	UNK	UNK	UNK	UNK	UNK	UNK	UNK	LOGS NOT AVAILABLE
L	MW	Shallow	1990	TIME	2	UNK	UNK	UNK	UNK	UNK	UNK	UNK	LOGS NOT AVAILABLE
M	EW	Shallow	1990	TIME	4	UNK	UNK	UNK	UNK	UNK	UNK	UNK	LOGS NOT AVAILABLE; SUBMERSIBLE PUMP IN WELL; FLUSH MOUNT
1	MW	Shallow	Nov 85	REIDEL	4	14	6.9	14	UNK	UNK	UNK	UNK	ANGLED AT 45 DEGREES; DEPTH IS TRUE VERTICAL
2	MW	Shallow	Nov 85	REIDEL	4	14	6.9	14	UNK	UNK	UNK	UNK	ANGLED AT 45 DEGREES; DEPTH IS TRUE VERTICAL
3	MW	Shallow	Nov 85	REIDEL	4	14	6.9	14	UNK	UNK	UNK	UNK	ANGLED AT 45 DEGREES; DEPTH IS TRUE VERTICAL
4	MW	Deep	Nov 85	REIDEL	4	50	35.8	40.8	UNK	UNK	6	96.48	LOG SHOWS BORING TO 49 FT; WELL OVERDRILLED AND GROUTED 14MAY86; SEAL FROM SURFACE TO 40 FT

KEY:

WP = well point

MW = monitoring well

EW = extraction well

(1) Historical reference elevations based on an onsite reference point assigned an elevation of 100 ft; to be verified by survey prior to RFI.

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APPENDIX

APPENDIX A

Preliminary Assessment/Data Evaluation and Proposed Remediation Plan for Pentachlorophenol Contaminated Soil at Time Oil Co.

(Applicable Portions Only)

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PRELIMINARY ASSESSMENT / DATA EVALUATION AND PROPOSED REMEDIATION PLAN FOR PENTACHLOROPHENOL CONTAMINATED SOIL AT:

TIME OIL CO.

NORTHWEST TERMINAL
12005 NORTH BURGARD ROAD
PORTLAND, OREGON

ECOVA Corporation
18640 NE 67th Court
Redmond, WA 98052

Project No. 1067

December, 1991

ECOVA

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EXECUTIVE SUMMARY

Since the 1940's, Time Oil Co. has operated a petroleum products terminal in the Rivergate area of northwest Portland, Oregon, which provides tank storage facilities for its products. Time Oil Co. has, on occasion, leased tanks to outside customers for storage of their (customers') products; in these cases, Time Oil Co. has also provided product handling and distribution services. In an arrangement of this type, Time Oil Co. ran a Pentachlorophenol (PCP) blending operation for Koppers Company on a portion of the subject property from March 1, 1967 to March 31, 1982. This operation consisted of heating and mixing PCP granules with paraffin wax, mineral spirits and other similar solvents to yield various woodtreating products per Koppers' specifications. These products were then stored in tanks on site and later shipped to Koppers' customers in 55 gallon drums.

PCP is a light brown material in the solid form, and with a melting point of 360 degrees F., is a solid under most conditions. It is largely water insoluble, although it can be dissolved in water with the pH elevated to 10 or more. Its primary use is as a wood preservative when blended with various types of oil products. Details of its characteristics, as well as the characteristics of the various solvents it was blended with, are given in the Material Safety Data Sheets included in Appendix C.

At some time during the lease agreement between Time Oil Co. and Koppers, PCP was released into the soil adjacent to the warehouse in the Mixing Area. This material was probably released in combination with the various solvents used in the process. The primary cause for these releases appears to have been intermittent spillage from hoses, mixing vessels and daily operations, rather than a specific, large spill event.

Since the termination of the agreement between Time Oil Co. and Koppers, Time Oil Co. has been actively pursuing remediation of the contaminated area.

In 1984 the Oregon Department of Environmental Quality inspected this site. At that time samples were taken from throughout the site which showed no lead contamination, no pesticide contamination, no PCP contamination outside the limits of the PCP Mixing Area and warehouse, and very limited contamination by selected hydrocarbon compounds.

In 1985 Time Oil Co. began a program to excavate the contaminated soil for disposal at an appropriate landfill. Early in that year, approximately 290 cubic yards of the most contaminated soil were removed from the site and disposed of at Arlington, Oregon. Investigations continued to determine the exact extent of the contamination. However, before the remaining contaminated soil could be removed, PCP was reclassified as a hazardous waste bearing the number F027, and thus became ineligible for disposal at hazardous waste facilities in the United States.

Pending resolution of acceptable soil disposal techniques, Time Oil Co. switched their focus to determining if the groundwater had been contaminated. This involved installing an extensive network of groundwater monitoring wells and repeated sampling and analysis. This work indicated low levels of groundwater contamination, however, the results are somewhat inconclusive. In an effort to limit any possible continuation of groundwater contamination, the contaminated soil was excavated and stock piled in a bermed, lined area, and covered.

Since 1988 Time Oil Co. has been working with ECOVA Corp. to remediate the contaminated soil on site. Efforts originally were focused on soil washing techniques. These efforts were halted when it became apparent that meeting a "background" cleanup level of 0.5 mg/kg would not be practicable.

Currently, Time Oil Co. would like to work with the Oregon Department of Environmental Quality to set an achievable cleanup level that would be considered safe to both the environment and personal health, so that the contamination problem at the site can be remediated.

From the time significant contamination at the site was verified, Time Oil Co. has continuously pursued voluntary cleanup of the site, and compliance with environmental regulations. This report is submitted in furtherance of that policy.

This document is divided into four sections. The Preliminary Assessment Part I is a general site overview discussing the site history, and a description of the contamination problem.

The Preliminary Assessment Part II is a more detailed analysis of the situation. Descriptions of soil and groundwater contamination are given along with the available analytical information that was obtained prior to 1989.

The Preliminary Assessment Part III is an account of the work ECOVA Corporation has performed on site since 1989 and describes the objectives of the current site activities.

The Preliminary Assessment Part IV is a recommendation of future actions.

PAI - PRELIMINARY ASSESSMENT PART I

I. GENERAL SITE DATA

A SITE NAME

Time Oil Co. Northwest Terminal

B SITE ADDRESS

12005 North Burgard Road
Portland, Oregon 97203

C SITE CONTACT

Dick Basney
Terminal Manager
12005 North Burgard Road
Portland, Oregon 97203
(503) 286-1611

D CURRENT LEGAL OWNER AND OPERATOR

Property is owned by Northwest Terminal Co., a wholly-owned subsidiary of Time Oil Co. located at 2737 West Commodore Way Seattle, Washington 98199-1233. Improvements are owned by Time Oil Co., which also operates the terminal. Contact for environmental affairs is Mr. Fred Proby at (206) 286-6444.

Northwest Terminal Co. has owned the property since 1943.

E CURRENT OPERATOR

Time Oil Co.

II. SITE DESCRIPTION

A LEGAL DESCRIPTION

The subject property is comprised of four parcels situated in Section 35 of Township 2N Range 1W: tax lot #18 (12.47 acres), #31 (32.40 acres), #63 (0.22 acres) and #38 (6.04 acres). Tax lots #18, #31, and #63 (45.09 acres total) are referred to as the "Northwest Terminal" and tax lot #38 is referred to as the "Bell Terminal"; both are operated by Time Oil Co.

B COORDINATES

The Time Oil Co. facilities are located at approximately the following (unsurveyed) coordinates:

Longitude	122 degrees, 47 minutes West
Latitude	45 degrees, 37 minutes North

C ROAD DIRECTIONS

From St. Johns, go north on Lombard, and turn left onto Burgard Road at the bend where Lombard turns into Columbia. Stay to the right at the first fork (approximately 1 block from Lombard), and follow the road around to the left (west). Where the road turns north, go straight (west) down driveway to Time Oil Co.

D TOTAL AREA OF SITE

The Time Oil Co. facilities cover an area that is approximately 51 acres, but the area of contamination covered an area that originally was approximately 100 feet by 100 feet.

E DESCRIPTION OF LAND USES IMMEDIATELY SURROUNDING SITE BOUNDARIES

The land surrounding the subject site is the Rivergate Industrial area. It is occupied by the Port of Portland facilities and heavy industrial complexes.

III. OWNERSHIP INFORMATION

A PAST LEGAL OWNER(S)

Northwest Terminal Co. acquired title to the approximately 12.5 acres on which the warehouse and Mixing Area is located from Oregon Shipbuilding Corp. on December 2, 1943. The current address, telephone number and years of ownership of Oregon Shipbuilding Corp. are not known.

The approximately 40 acres to the east of the Mixing Area was acquired from the United States of America on May 20, 1950.

The property comprising the Bell Oil Terminal was acquired from William Shenker and others on September 9, 1953. His current address, telephone number and years of ownership are not known.

B TYPE OF OWNERSHIP

Corporate, government and private

C PAST LESSEES OR OPERATORS

Unknown

IV. SITE HISTORY AND POTENTIAL PROBLEMS

A SITE OPERATIONS

Since the 1940's, Time Oil Co. has operated a petroleum products terminal in the Rivergate area of northwest Portland, Oregon, that provides tank storage facilities for its products. Time Oil Co. has, on occasion, leased tanks to outside customers for storage of their (the customers') products; in these cases, Time Oil Co. has also provided handling and distribution services. In an arrangement of this type, Time Oil Co. ran a PCP blending operation for Koppers Company on a portion of the subject property from March 1, 1967 to March 31, 1982. This operation consisted of heating and mixing PCP granules with paraffin wax, mineral spirits and other similar solvents to yield various woodtreating products per Koppers' specifications. These products were then stored in tanks on site and later shipped to Koppers' customers in 55 gallon drums. The 1972 site map in Appendix B, Figure 1, illustrates the Time Oil Co. facilities configuration and shows the contaminated site at the time of these operations. Tanks No. 20001, 20002, and 20003 were leased to Koppers, as well as several smaller, above ground, horizontal tanks.

At some time during the lease agreement between Time Oil Co. and Koppers, PCP was released into the soil adjacent to the warehouse and Mixing Area. This material was probably released in combination with the several hydrocarbon solvents used in the process. The primary cause for these releases appears to have been intermittent spillage from hoses, mixing vessels and daily operations, rather than a specific, large spill event.

Following termination of Time Oil Co.'s agreement with Koppers on March 31, 1982, the tanks, piping, and related equipment were removed and soil samples were collected. These samples indicated that PCP had been released.

Upon removal of the equipment used in the PCP operation, plans were made to excavate and dispose of the contaminated soil. This was to be a three phase effort, fully coordinated with the Oregon Department of Environmental Quality (ODEQ). Phase I consisted of initial soil excavation and transport to an authorized disposal facility. Phase II involved a thorough investigation to determine the extent of PCP contamination. Phase III planned the removal and disposal of all contaminated soil with concentrations above acceptable limits.

Phases I and II were completed, but the ban on landfilling PCP contaminated materials impeded progress toward completion of Phase III.

B SITE EMERGENCY/REMEDIAL ACTIONS

No "emergency" operations have been undertaken on the site with respect to the PCP operations. Remedial actions that have occurred at the site, and a summary of analytical information, are described in the following historical summary. A more thorough discussion of analytical information is included in Preliminary Assessment II under Soil Pathway and Groundwater Pathway.

1983

April

Bioassay tests indicated that surface soil from the PCP mixing area was toxic to juvinile Rainbow trout at soil concentrations of 100 and 1000 mg/l. The PCP concentration of this soil sample was not determined.

1984

April

Oregon Department of Environmental Quality (ODEQ) advised Time Oil Co. that the Northwest Terminal was to be inspected as part of ODEQ/EPA "hit list" of 44 companies.

October

ODEQ inspected the site and determined that soil samples should be collected and analyzed.

December

ODEQ collected 12 soil samples throughout the entire Mixing Area, of which one sample was in PCP area.

1985

January

Time Oil Co. received results of ODEQ soil sampling, showing 1820 mg/kg PCP in woodtreating area.

All 12 soil samples tested for EP Toxicity lead showed concentration of less than 0.1 mg/l.

All 12 soil samples were tested for 14 pesticides and showed concentrations of less than 5 mg/kg (the detection limit).

Samples tested for acid extractables (phenols) showed 10 of the 12 sites to contain less than 1 mg/kg (the detection limit). One sample contained 515 mg/kg PCP and 12 mg/kg tetrachlorophenol (this sample was taken near the site of tanks leased to Crosby and Overton).

The second sample which tested over the detection limit contained 1820 mg/kg PCP and 71 mg/kg tetrachlorophenol (this sample was taken at the site of the tanks leased to Koppers).

All 12 soil samples were tested for base-neutral extractables. Of these, nine of the 12 contained less than the detection limit (1 mg/kb).

February

On February 4, 1985, Time Oil Co. reiterated to the ODEQ its intent to excavate PCP contaminated soil and dispose of it at an approved disposal facility. This was done via a status update letter to ODEQ (Janet Gillespie).

Letter from John Smits of ODEQ to EPA describes history of site, waste handling practices, and recommendations for future actions (this letter is included in Appendix A).

May

DEQ approved "Disposal Request" for PCP contaminated soil at the hazardous waste facility at Arlington, Oregon.

June

"Waste Transportation and Disposal Agreement" executed with Chem-Security Systems, Inc. for disposal of soil at Arlington.

Between June 25 and June 28, 1985, 288 cubic yards (242 tons) of soil were removed and shipped to Arlington as part of the Phase I excavation described earlier. The soil was excavated to a depth of 2 to 4 feet in the northwest corner of the Mixing Area (documentation included in Appendix A).

On June 28, 1985, Time Oil Co. received a letter from the ODEQ laboratory concerning a previous interpretation by the agency. This letter stated that 600 mg/kg of total chlorophenols in soil and 0.15 mg/l in water represented the hazardous waste threshold. This conclusion was based on extraction and bio-toxicity tests performed by ODEQ. The letter did state that this was only to be used as guidance and did not necessarily reflect specific clean up requirements.

August

Following completion of the Phase I excavation, site characterization by Riedel Environmental Services showed that not all of the PCP contaminated soil had been removed. Samples were taken from 22 locations around the outside of the perimeter of the PCP Mixing Area south of the pentachlorophenol warehouse in an effort to determine the extent of contamination. Three composite samples were also taken in this area which showed concentrations up to 860 mg/kg. Additional samples were then taken from 81 sites just outside of the PCP Mixing Area and analyzed. Results indicated that PCP contamination was localized to the west and south of the warehouse, with little or no contamination occurring to the east of the site.

Soil was then collected from 14 locations at various depths from within the Mixing Area. Contamination contour maps indicated a maximum concentration of 26,500 mg/kg at the surface of the area where the loading of trucks had occurred during the Phase I excavation. A second point of high concentration was at the southwest corner of the PCP warehouse. These contour maps are presented in Appendix D. Analytical information for soil and groundwater is summarized in more detail in PA II under "Observed Releases" for Soil Pathway and Groundwater Pathway respectively.

November

Time Oil Co. retained Riedel Environmental Services to install four groundwater monitoring wells near the southwest corner of the PCP warehouse building (Wells 1, 2, 3 and 4). Soil samples were taken to expand the data from earlier analyses. Wells 1, 2 and 3 were slanted under the warehouse in an effort to determine the extent of contamination in that direction. Samples from the slant borings indicated PCP concentrations as high as 116,000 mg/kg at 2.5 to 4 feet below the surface; concentrations decreased with depth. A map of the well locations is provided in Appendix B, Figure 2.

December

On December 10, 1985, the Environmental Protection Agency, Region X, advised Time Oil Co. that soil contaminated with PCP had been reclassified from U242 to a hazardous waste bearing number F027. The EPA further advised that at that time there were no commercial hazardous waste facilities in the United States that would accept waste designated as F027.

Pending resolution of acceptable disposal techniques, Time Oil Co. switched the focus of its attention to determining if groundwater had been contaminated.

1986

January

In order to identify groundwater flow direction and gradient in the area of the site, Time Oil Co. installed well points at three locations surrounding the PCP warehouse and Mixing Area. On February 12 the report was received on the operations associated with those wells. Two of the wells (A and B) were installed to a depth of 20 feet, and two wells were installed at location C to a depth of 8 feet. Water level measurements were taken on nine occasions in Wells A, B, C1, C2, and 4. The data indicated unexpectedly lower water levels in Well 4.

To further the investigation, three additional well points, four observation pits and a river level reference point were installed by Time Oil Co. in March, 1986. Wells E, F, and G were 20, 19, and 13 feet deep, respectively. Well C2 was removed. Water levels were again measured and supported the data of the previous water level measurements.

Analysis of the data indicated a strong likelihood that Well 4 had penetrated a low permeability zone and had not been completed in such a way as to prevent the perched water table from draining through the well bore.

May

In May, 1986, at Time's direction, three additional groundwater monitoring wells were installed by Riedel (Wells D, H, and I). The purpose of these wells was to further define the upper piezometric surface and to obtain data on groundwater quality.

Time Oil Co. also retained Century Environmental Sciences to perform groundwater sampling and analysis. Water level readings in Wells 4, A, B, C, E, F, and G indicated a persistent zone of depression around Well 4. Well 4 was subsequently over-drilled and sealed.

Analysis of water samples from Wells 4, B, and F indicated PCP concentrations of 6.1, 2.6, and 1.4 ppb respectively. A second group of water samples was taken from Wells A, B, D, E, F, H, and I. The only well which indicated PCP concentrations above detection limits was Well I, with a concentration of 2.2 ppb.

August

In August of 1986 SRH Associates was retained to perform additional sampling and analysis of soil and groundwater at the Time Oil Co. facility. Time Oil Co. had regraded the surface of the Mixing Area gathering all suspected contaminated surface soil into a centralized area, reducing the area to about 60 feet by 60 feet. SRH then collected surface soil samples from the same 14 locations in the Mixing Area which had previously been sampled by Riedel. Additionally, six holes were drilled through the warehouse floor and sampled soil beneath the building. Groundwater samples were also obtained from seven existing monitoring wells and analyzed. The results of this work are summarized in Appendix D, pages 14 to 26.

October

SRH Associates, Inc. evaluated twelve alternative cleanup technologies and recommended soil washing as the most logical clean-up approach, followed by Surface Mounted Thermal Extraction and In-Situ Thermal Extraction. The report recommended performing bench and pilot scale evaluations. At the time, these technologies were still in the experimental stage, so Time Oil Co. chose to seek other treatment approaches.

<u>1988</u>

September

Time Oil Co. received a work plan from ECOVA for soil and groundwater remediation using biological treatment in above-ground reactors. Three alternative clean up levels were evaluated - 500, 100, and 50 mg/kg.

Time Oil Co. contacted ODEQ (Ed Woods and Tom Miller) to determine DEQ's role and was advised that ODEQ did not necessarily need to approve the treatment process, but would need to sign-off that the cleanup had been effectively completed.

October

ECOVA's Work Plan was amended to set a final cleanup level of 0.5 mg/kg PCP, the practical quantitation limit using standard test procedures. This concentration was selected to reflect ODEQ's goal of remediating to "background" levels.

December

Received notification from ODEQ (letter dated 11/30/88) that facility was listed on "Inventory of Confirmed Releases", site identification number 170.

1989

April - October

To reduce the potential for groundwater contamination, the contaminated soil was excavated and stock piled in a bermed, lined storage area next to site of original contamination. ECOVA performed biological slurry treatment on 10 yards of soil from the stock pile, and achieved reduction of PCP from approximately 250 to 50 mg/kg. Further biodegradation was inhibited by the presence of mineral spirits and related solvents used in the PCP formulation.

1990

January - March

Field studies by ECOVA indicated that, under the existing soil conditions, biodegradation of PCP to 0.5 mg/kg would not be practical. The lowest concentration that could be practically achieved was determined to be 100 mg/kg.

1991

December

Time Oil Co. submits plan to ODEQ for soil cleanup under the voluntary cleanup program.

C DESCRIPTION OF PRIOR SPILLS

As mentioned above, at some time during the lease agreement between Time Oil Co. and Koppers, PCP were released into the soil adjacent to the warehouse and Mixing Area. This material was probably released in combination with the minieral spirits and other solvents which were used in the process. The primary cause for these releases appears to have been intermittent spillage from hoses, mixing vessels and daily operations, rather than a specific, large spill event.

During an October 25, 1984 site visit by the ODEQ, the 20,000 gallon storage tanks were inspected. There was obvious visual contamination of the soil by incidental spills in this former handling area. The tanks were later removed.

D SAMPLING AND ANALYSIS DATA

Copies of all supporting documentation including sampling and analyses are contained in Appendix A in chronological order and are described briefly above in PA I, Section IV, Subsection B. Detailed descriptions of soil and groundwater sampling and analyses are included in PA II, Sections I and II.

E BIBLIOGRAPHY OF ALL FILES, REPORTS REVIEWED

The following documentation is included in Appendix A in support of this report under the referenced subsections of that appendix:

A "Northwest Terminal Woodtreating Chronology of Events"

A-1 Department of Environmental Quality "Request for Analysis" for samples taken, December 12, 1984.

A-2 Letter from John L. Smits (ODEQ) to Debbie Flood (EPA Region X) describing site conditions, February 12, 1985.

A-3 Letter from ODEQ (Richard F. Gates) to Time Oil Co. giving 600 mg/kg as the hazardous waste threshold, June 28, 1985.

A-4 Results of sample analysis for North West Vacuum Truck Service, February 19, 1985. Documentation for excavation of 240 tons of contaminated soil by Chem-Security systems, July 29, 1985.

A-5 Letter from Riedel Environmental Services. Inc. to Time Oil Co. giving sample results, August 15, 1985.

Report to Time Oil Co. from Riedel Environmental Services, October 18, 1985.

A-6 Letter from George C. Hofer (EPA - RCRA Permits Section) to Time Oil Co. giving notice that PCP will no longer be accepted at hazardous waste facilities, December 10, 1985.

A-7 Report to Time Oil Co. from Riedel Environmental Services, February 4, 1986.

A-8 Time Oil Co. internal memo from Fred Proby on groundwater investigation, May 2, 1986.

A-9 Report to Time Oil Co. from Century Environment Sciences, June 4, 1986.

A-10 Report to Time Oil Co. from SRH Associates, Inc., October 1, 1986.

A-11 Report to Time Oil Co. from SRH Associates, Inc., November 5, 1987.

V. HAZARDOUS WASTE CHARACTERIZATION

HAZARDOUS MATERIALS AND TYPES

PCP is a light brown material in the solid form, and with a melting point of 360 degrees F., is a solid under most conditions. It is largely water insoluble, although it can be dissolved in water with the pH elevated to 10 or more. Its primary use is as a wood preservative when blended with various types of oil products.

Appendix C describes all of the chemicals used in the wood treating operation. It contains the following:

- An industry brochure distributed by Koppers which describes the products which were produced at the site.
- A safety bulletin which describes "Safety Measures and Precautions for Handling Solutions Containing Pentachlorophenol."
- Material Safety Data Sheets for all of the Koppers products and ingredients, which includes formulas for their wood treating products. As these chemicals were used in the PCP operations on the site, they were released as part of the PCP mixture, and thus are be present in the PCP contamination areas.

B WASTE GENERATION

The volumes of hazardous materials and wastes generated annually is unknown. The total volume of PCP contaminated soils is estimated to be 3000 cubic yards based on a survey of the stock piled soil.

C WASTE TREATMENT SYSTEMS

No PCP waste treatment systems were in operation at the site.

D PERMITS

On August 11, 1980, Time Oil Co. completed EPA form 8700-12, Notification of Hazardous Waste Activity, as required by RCRA Section 3010. On February 22, 1982, Time Oil Co. requested assignment of a generator identification number by correspondence with the Department of Environmental Quality.

E PERMIT VIOLATIONS

There have been no known violations of the above-noted permits.

F HAZARDOUS WASTE DISPOSAL

On June 25, and 28, 1985, 243 tons of the most heavily contaminated soil were removed from the surface of the PCP mixing area. The Uniform Hazardous Waste Manifests documenting the removal and proper disposal of this material are provided in Appendix A, with the letter dated July 29, 1985 from Time Oil Co. to Chem-Security Systems, Inc. This constitutes the only removal of PCP contaminated soil from the site by Time Oil Co.

VI. WASTE CONTAINMENT

The PCP arrived at the site in granular form in 55 gallon drums. The solvents arrived in hogsheads. Materials were blended per Koppers specifications (Appendix C), and were stored in tanks 20001, 20002, and 20003, which were 20,000 gallon tanks, and several smaller horizontal, rectangular tanks. These tanks were located to the south of the PCP warehouse in the PCP Mixing Area, as shown on the map in Appendix B, Figure 1. All of these tanks and their associated piping were removed in 1984.

The area containing the PCP solution storage tanks was surrounded by a concrete bulkhead, which was approximately three feet high. This Mixing area was approximately 60 feet in the north-south direction, and 80 feet in the east-west direction. The wall on the west side was decontaminated and demolished in November, 1985, after the tanks were removed. This was the only known secondary containment structure.

The total volume of PCP material spilled at the site can not be accurately determined, since it was the result of an accumulation of small incidents, not a documented event. Excavation activities, subsequent sample taking and analysis, and surveying of the stock piled soil give an approximate volume of 3000 cubic yards of soil that have been impacted.

In July of 1985 Riedel International performed sampling and analysis services at the site. The results of this work is included in Appendix D. Using this data as a basis, an average concentration of 945 mg/kg has been calculated.

The activities that resulted in the contamination under investigation consisted of a simple operation wherein solvents were heated and mixed with PCP to produce a variety of wood treating products. The finished product was stored in tanks, as described above, and then shipped to customers of Koppers. The only waste materials produced by this operation were empty packaging, tanks, drums and buckets with residual PCP and the soil contaminated by spilled PCP.

VIL USGS TOPOGRAPHIC MAP

Topographic maps for the Time Oil Co. site and the surrounding region are included in Appendix B, Figures 3 and 4.

VIII. SITE MAPS

Detailed maps of the Time Oil Co. Northwest Terminal showing the location of the PCP blending area are included as Appendix B, and are described below:

- Figure 1 is a drawing from 1972 of the site which shows the PCP Mixing Area as it existed during the blending operations.
- Figure 2 is a drawing showing the area of contamination and the location of monitoring wells.
- Figures 3 and 4 are topographic maps showing the immediate vicinity around the Northwest Terminal Site.

IX. SUMMARY AND RECOMMENDATIONS

Pentachlorophenol has been spilled on the facilities of Time Oil Co. and has created a contaminated site. Work performed by several consulting groups consistently indicates that the extent of PCP contamination is limited to the PCP mixing area.

Time Oil Co. has, from the early stages of this problem, taken an active, self-motivated approach to cleaning up their facilities. The site has been thoroughly characterized and full-scale field trials have demonstrated that soil washing and biological degradation is an effective remediation method. It is therefore recommended that this method be used to remediate PCP contaminated soils to a level acceptable to the ODEQ.

PAII - PRELIMINARY ASSESSMENT PART II

I. SOIL PATHWAY

A OBSERVED RELEASES

As mentioned in PAI - Section VI Waste Containment, no specific incidents of PCP spills have been documented at the site. Accordingly, "observed releases" is best described through a discussion of analytical information indicating the extent of contamination. The following discussion summarizes the sampling and analytical work which was performed on the Time Oil Co. site prior to 1988. Work done on the site after 1988 by ECOVA is included in Preliminary Assessment Part III.

Analytical work began with fish bioassay tests performed in February of 1983. These tests indicated that the soil from the former PCP mixing area was toxic at the 100 to 1000 mg/kg levels.

During an October 25, 1984 site visit by Oregon Department of Environmental Quality, there was visual evidence of soil contamination in the former PCP Mixing Area. On that date, the DEQ advised their intent to collect soil samples throughout the facility. ODEQ laboratory personnel collected twelve soil samples on December 12, 1984 from the entire facility, using a soil core. The sample locations are shown on Figure 6 in Appendix B. Soil for a composite at each location was sampled at the ground surface, and at 1, 2, and 3 foot intervals. Analysis performed on each sample included base-neutral extractables, pesticides/PCBs, acid extractables, pesticides and EP Toxicity for lead. An effort was also made to identify and quantify any other organic chemicals observed with the extraction GC/MS (gas chromatograph/mass spectrometer) procedures.

All 12 soil samples showed concentrations of lead of less than 0.1 mg/l, the detection limit. Concentrations of 5 mg/l or greater for EPA Toxic lead are classified as hazardous waste.

Of 12 soil samples tested for fourteen pesticides(RCRA method 625, extracted by RCRA method 3540), all showed concentrations of less than 5 mg/kg, the detection limit for these pesticides.

Samples for acid extractables (RCRA method 625, extracted by RCRA method 3540) showed all 12 sites to contain less than the 1 mg/kg detection limit for these phenol species except for two samples from the PCP storage area - samples 9 and 10. The results are summarized in the following table.

ODEQ ANALYSIS FOR ACID AND BASE-NEUTRAL EXTRACTABLES

	Sample 4	Sample 8	Sample 9	Sample 10
ACID EXTRACTABLES				
Pentachlorophenol	-	-	515 mg/kg	1820 mg/kg
Tetrachlorophenol	-	-	12 mg/kg	71 mg/kg
BASE-NEUTRAL EXTR.				
Isophorone	1 mg/kg	-	-	-
2,4-dinitrotoluene	3 mg/kg	-	-	-
Fluorene	1 mg/kg	13 mg/kg	-	-
n-nitrosodiphenylamine	2 mg/kg	-	-	-
Phenanthrene	1 mg/kg	14 mg/kg	-	-
Anthracene	1 mg/kg	105 mg/kg	-	-
Chrysene	-	-	1 mg/kg	-
bis(2-ethyhexyl)phthalate	-	-	3 mg/kg	-

Also summarized in the above table are the results of the base-neutral extractables, method 625, extracted by RCRA method 3540. All showed non detectable concentrations except for samples 4, 8, and 9. Although polychlorinated biphenyls (PCBs) were detected at several soil sample sites, total PCBs were well below the 50 mg/kg concentration which requires handling. The analytical results from these samples are included in Appendix A.

Following coordination with the DEQ, the Arlington landfill, and local contractors, 24.76 tons (7781 cubic feet, or 288 cubic yards) of PCP contaminated soil were hauled to Arlington, Oregon. The contamination level of a sample of this soil was 1820 mg/kg PCP. Documentation of the soil removal is included in Appendix A. Continuation of this effort was later halted due to a moratorium on landfilling of PCP contaminated soils.

In October of 1985 Riedel Environmental Services submitted a report (included in Appendix A) detailing the results of their soil sampling operations conducted in July of 1985. A summary of the analytical results is also provided in Appendix D, pages 1 through 13. This contains a list of PCP concentrations in the samples and a contour map showing PCP distribution at various depths.

This data shows high concentrations of PCP immediately to the southwest of the PCP warehouse and a second area which was used as a loading area for blended products. PCP concentrations at these two areas were 13,500 and 26,550 mg/kg respectively. Page 13 gives the analytical results of three preliminary surface composite samples taken from outside the perimeter of the Mixing Area. The samples were collected from the west, south, and east directions and analysis indicated PCP concentrations of 660, 860, and 17 mg/kg respectively.

In February of 1986 Riedel Environmental Services submitted a report (included in Appendix A) on a November 1985 field investigation in which four wells were installed near the southwest corner of the PCP warehouse. Soil samples were taken during installation. The samples from Wells 1, 3, and 4 were analyzed for PCP. The results are summarized below. PCP concentrations are presented in parts per million.

Depth (feet)	Well #1	Well #3	Well #4
0 - 1.5	1690	65.3	-
2.5 - 4	16.8	116000	-
7.5 - 9	886	11000	-
16 - 17.5	110	-	-
17.5 - 19	-	1560	-
18.5 - 20	-	-	574
32.5 - 35	-	-	62.3
43.5 - 45	-	-	1.59
47.5 - 49	-	-	2.81

In August, 1986, Time Oil Co. re-graded the contaminated area in an effort to consolidate the contaminated soil and keep it localized. After re-grading, SRH Associates took samples from the same 14 locations in the Mixing Area as Riedel. SRH also drilled six holes in the warehouse floor and collected samples underneath the warehouse. The results of the analysis are given in Appendix D, pages 14 to 26. This analysis indicates that although the soil does contain some amounts of PCP, these amounts are very low - average concentration for 30 samples is .5 ppm with only 5 samples having detectable amounts of PCP.

Later, in 1989, Time Oil Co., through the services of ECOVA Corporation, excavated approximately 3,000 yards of contaminated soil and placed it in a bermed, protected area. Sampling of the excavated pit at the time indicated that all of the contaminated soil had be removed, except for soil under the southwest corner of the warehouse. This soil remained unexcavated due to fear of structural damage to the warehouse. This work is described in detail in Section PAIII.

B ACCESSIBILITY

Time Oil Co. site in Portland is a restricted access area. The site is completely fenced and access is controlled by a gate which can be opened only with a pass card. The site has a 24 hour guard and operations typically may occur at all hours of the day.

Currently, the possibility of exposure to contaminated soil is limited, since the contaminated soil has been excavated, placed in a lined, bermed, storage area and covered with a tarp.

Although site personnel have access to the area, there are no routine operations that would expose workers to the contaminants.

C CONTAINMENT

There were no containment facilities to prevent spilled PCP mixtures from reaching the soil. A cement bulkhead surrounding the PCP Mixing Area had served to contain spills to that immediate area.

Currently the contaminated soil is covered in a bermed and lined storage area.

D HAZARDOUS SUBSTANCE

The hazardous substances of concern at the site are PCP and various petroleum based solvents used in the blending process for making wood treating products. The solvents include mineral spirits, ketones, and other hydrocarbon products. Product and Material Safety Data Sheets are located in Appendix C. Also included with this material is "Safety Measures and Precautions for Handling Solutions Containing Pentachlorophenol."

PCP was the most hazardous substance used at the facility. A toxicity/persistence evaluation of the characteristics of PCP was conducted using the method described in Appendix G. PCP's combined toxicity/persistence rating factor, using that method, is 15. Persistence of each hazardous substance is evaluated on its biodegradability. PCP exhibits a ring compound structure, and is assigned a persistence value of 2. Toxicity of each hazardous substance being evaluated is given a value using the rating scheme of Sax or the National Fire Protection Association (NFPA). PCP has a rating of Level 3, and is assigned a toxicity value of 3. These values for toxicity and persistence give a combined rating of 15.

PCP's IDLH level (Immediately Dangerous to Life or Health) is 150 mg/m3. It is not considered a carcinogen by the National Institute for Occupational Safety and Health.

E SITE/SOIL GEOLOGY

It is believed that much of the site has been built up with hydraulic fill from dredging the Willamette River. Soil type consists of fine to medium grained sands and minor amounts of silts and gravels. These soils are normally associated with a former river channel deposit of the Willamette River. Little clay appears to be present near the surface, although lenses may occur at depth. Well Completion Forms for ECOVA Wells J1, J2, J3, B1, B2, G1, and G1A provide a more detailed description of subsurface soils (Appendix F).

F TARGETS

1 On-site Population

The total number of people employed at the Time Oil Co. Portland is approximately ten. Personnel do not routinely work or reside on or near the area of PCP contamination.

2 One Mile Population

United States Geological Survey Topographic Maps were inspected to determine the number of residences in the vicinity. The total residential population within a one-mile radius of the site is estimated at 35 people (approximately 15 residences), and appears to be concentrated near Harborton, on the opposite bank of the Willamette River. There are no residences on the contaminated property.

3 Terrestrial Sensitive Populations

The entire site has been disturbed, so there are no natural flora or fauna resident on the site, other than opportunistic species such as mice, rabbits, and birds.

II. GROUNDWATER PATHWAY

A OBSERVED RELEASES

The following discussion summarizes groundwater sampling and analysis work that has been conducted on the Time Oil Co. site prior to 1988. Work conducted after 1988 by ECOVA Corporation is included in Preliminary Assessment Part III.

1985

November, Riedel Environmental Services

In November, 1985 Riedel Environmental Services installed three shallow and one relatively deep well (Well 4) near the southwest corner of the PCP warehouse. A detailed evaluation of the boring log data for Well 4 showed that a series of clay lenses and silty sands were encountered between depths of 18.5 and 35 feet. This zone of low permeability (an aquitard) appeared to be separating a perched upper water-bearing zone from a separate underlying aquifer.

The boreholes were drilled with a 16-inch-diameter hollow-stem auger. Each well was constructed using 4-inch PVC casing and screen. Unfortunately, during construction of Well 4, the annular space was filled with coarse sand to a level extending above the aquitard. This provided a pathway for potentially contaminated water from the upper perched zone to flow into the lower aquifer. This also appeared to have altered the natural direction of groundwater flow within a zone of influence surrounding Well 4. Although the observed water table depression could represent a strong, natural vertical gradient in the vicinity of Well 4, the influence of this well on adjacent wells indicated a strong probability of an induced groundwater sink caused by the unsealed annulus of Well 4. This conclusion was reached by Time Oil Co. upon evaluation of the piezometric surface of the perched water, which indicated that wells in close proximity to Well 4 were apparently influenced by Well 4, showing water level depressions, while wells distant from Well 4 were unaffected. The water level in Well 4 was also found to fluctuate with levels in the Wilamette River, whereas water in the other wells did not.

In an effort to reinstate natural groundwater flow patterns in the area and to eliminate possible intercommunication between upper and lower water bearing zones, Well 4 was removed by overdrilling and the hole sealed on May 14, 1986.

1986

April, Century Environmental Sciences

Century Environmental Services performed water level measurements and collected samples for PCP analysis on wells which had been installed by Time Oil Co. The results are summarized in the table at the end of this section.

May 28, Century Environmental Sciences

Following abandonment of Well 4, a second group of groundwater samples were collected from Wells A, B, D, E, F, H, and I. Of the seven wells sampled, only Well I showed a detectible PCP concentration (2.2 ppb). The analytical results are listed in the table at the end of this section.

August 29, SRH Associates

Groundwater was sampled at seven monitoring points and was analyzed for pH and PCP. Static water levels were determined in these wells and at a monitoring station for the measurement of Willamette River level elevations. Of the seven wells sampled, only Well D showed detectable PCP concentrations (44 ppb). Wells C and G were dry and could not be sampled. The sample analytical data are included in Appendix E and are summarized in the table at the end of this section.

1987

August 20, SRH Associates

Groundwater was sampled at the nine monitoring points (Wells A through I) and analyzed for PCP. Static water levels were determined in these wells and at a monitoring station for the measurement of Willamette River water elevations. A PCP concentration of 2300 ppb was detected in Well B. No contamination was observed in Wells A, D, F, H, and I. Wells C, E, and

G were dry and could not be sampled. Results of the sampling analyses are provided in Appendix E and are summarized in the table at the end of this section.

October 16, SRH Associates

Well B was resampled to verify the August 20 analysis. A PCP concentration of 1000 ppb was subsequently determined.

SUMMARY OF WELL SAMPLING AND GROUNDWATER ANALYSIS

Well No.	April '86	May '86	Aug '86	Aug '87
A	-	N.D.	N.D.	N.D.
B	2.6	N.D.	N.D.	2300
C	-	N.D.	N.A.	N.A.
D	-	N.D.	44	N.D.
E	<1.0	N.D.	N.D.	N.A.
F	1.4	N.D.	N.D.	N.D.
G	-	-	N.A.	N.A.
H	-	N.D.	N.D.	N.D.
I	-	2.2	N.D.	N.D.
4	6.1	-	-	-
RIVER	-	-	N.S.	N.S.

B ROUTE CHARACTERISTICS

Shallow groundwater exists in the alluvial sands of two aquifers underlying the site. An unconfined upper zone of perched groundwater occurs at a depth interval between about 13 and 18 feet below ground surface. A silt to clay aquitard, about two feet thick, separates the perched zone from a lower, confined zone that maintains an average water level of approximately 20 feet below ground surface. Groundwater flow is towards the Willamette River, with fluctuations related to tides and seasonal river stages. The aquitard appears to pinch out or terminate toward the river. It is likely that the perched water flows somewhat downward and laterally before entering the river.

As subsurface soils appear to be generally quite permeable, groundwater flow can be expected to be fairly rapid (100-200 feet/year). In August and October 1987, water levels and groundwater samples were obtained from the site wells. These measurements confirmed that groundwater was flowing in a southerly direction under an average gradient of 0.008 ft/ft. The estimated annual net precipitation averaged over 20-30 years is approximately 36 inches.

The physical state of the PCP-containing wood-treating chemical at the time of release was that of a liquid, approximately the consistency of a light oil.

C CONTAINMENT

To halt the migration of PCP contamination from the contaminated soil into the groundwater, ECOVA Corporation excavated the contaminated soils. The soils were screened and placed in lifts on a stockpiled area lined with a 12 mil polyethylene plastic liner. A low earthen berm surrounds the stockpile and contains any contaminated rainfall runoff, and a plastic lined sump area catches and accumulates water. Any captured groundwater is pumped into the recovered groundwater storage tank. An equipment decontamination area is located within the bermed, lined area to provide for cleaning of the earthmoving equipment. A steamcleaner is used to assure that decontamination is thorough. Decontamination fluids accumulated in the sump will be treated in the treatment system after startup.

The stockpiled soil was covered by six mil polyethylene plastic sheeting to control airborne dust emissions during storage. The sheeting has been carefully weighted to prevent damage by the high winds occurring periodically in the Willamette River valley.

D HAZARDOUS SUBSTANCES

PCP is the most hazardous substance at the facility. Its presence in the groundwater is low and inconsistent. The mobility of PCP in groundwater is limited to the mobility of the solvents, as it is generally not water soluble at a pH less than 10.

E TARGETS

The shallow water-bearing sediments directly underlying the site are not a source of drinking water in the area. Monitoring well data indicates that groundwater in the shallow units appears to flow toward the

Willamette River. Users of water from the Willamette may, therefore, be indirect receptors of any site groundwater contamination. The potential for vertical (downward) migration of groundwater contaminants is not known.

There are three possible alternatives for attaining groundwater standards at the site:

- Maintain present PCP concentrations
- Reduce levels of PCP concentration
- Prevent any contaminant migration

Present concentrations in the site groundwater pose no direct threats to human health and the environment. The degree of variation in current levels is unknown due to the lack of long-term monitoring data; it is expected that these levels will decline as the source (soil) is treated.

III. SURFACE WATER PATHWAY

The major surface water feature of the site is the adjacent Willamette River. No tributary streams run through the site and/or drain to the Willamette. Other than the immediate shoreline area, no portion of the site drains to the Willamette River.

The area of contamination is approximately 1/4 of a mile from the banks of the Willamette River. Because the site is composed of sandy soils of high permeability, all surface waters percolate into the soil and become groundwater immediately.

There have been no direct releases to surface water features (the Willamette River) at the site. Therefore, any communication between the area of contamination and the river must occur via groundwater pathways.

Due to the lack of surface water features at the site, there are no direct receptors of potentially contaminated surface water runoff.

No analytical testing for hazardous substances has been performed on any adjacent water features.

IV. AIR PATHWAY

PCP is a solid at room temperature. Possibility of air borne contaminants come primarily from wind blown particles such as dust. The stock piled, contaminated soil is currently covered and poses no threat to air quality.

No program of ambient (background) air quality monitoring has been performed for the site. The currently stock piled soil has been covered by six mil polyethylene plastic sheeting to control airborne dust emissions during storage. The sheeting has been carefully weighted to prevent damage by the high winds occurring periodically in the Willamette River valley.

With regard to on-site volatile organic emissions and possible fugitive dust, the long-term objective is to keep any air contaminant concentrations to background concentrations. During remedial actions, however, the objective will be to limit concentrations to OSHA standards.

As mentioned earlier, the only potential targets for volatile emissions are the staff of Time Oil Co. who work on site. Their exposure is being minimized by covering the contaminated soil with tarps.

V. SUMMARY AND RECOMMENDATIONS

Time Oil Co. owns and operates a petroleum products terminal in Portland, Oregon, that provides tank storage facilities for its own and customers' products. From 1967 to 1982 Time Oil Co. ran a PCP blending operation for Koppers Company on a portion of Portland facility. PCP was heated and mixed with a variety of petroleum based carriers to meet Koppers' specifications; the finished product was then shipped off-site.

Following an inspection of the overall facility in 1984, the Oregon DEQ collected and analyzed soil samples from twelve locations including the PCP mixing area.

In 1985, 288 cubic yards of soil were removed from the PCP area and disposed of at the hazardous waste landfill in Arlington, Oregon. Further site sampling revealed that not all of the PCP contaminated soil had been removed. Before additional quantities could be excavated and disposed of, however, the EPA banned the landfill of PCP contaminated soils (1985).

In 1986 and 1987, Time Oil Co. installed groundwater monitoring wells in the area surrounding the PCP Mixing Area to investigate possible groundwater contamination, performed additional soil sampling and initiated an evaluation of site cleanup alternatives. Analysis of water samples indicated limited, low, and inconsistent concentrations of groundwater contamination.

Sample analyses have shown that PCP contamination in soil is limited to the mixing area. This area was excavated in 1989 and approximately 3,000 cubic yards of contaminated soil has been stockpiled in a bermed and line area on site.

Sufficient site characterization has been performed to identify all contaminants and pathways and it has been determined that exposure is limited to on site personnel. Remediation will reduce this exposure to an acceptable level.

PAIV - DATA EVALUATION REPORT

I. BACKGROUND AND OBJECTIVES

The purpose of the Data Evaluation Report in this document, and in fact, the purpose of this entire submittal, is to determine, with support from proper authorities, a cleanup level for PCP at the Time Oil Co. - Portland Terminal site.

Much of the contaminated soil containing PCP and associated solvents has been excavated, and there is little room to stock pile additional soil, if necessary. Some PCP-contaminated soil was left in place, as its removal may have destabilized nearby structures. It is assumed that this unexcavated soil also contains solvents.

Time Oil Co.'s primary interest, as it has been since the PCP-contaminated soil was discovered in 1984, is to remediate the site. Time Oil Co. would like to establish an achievable and appropriate cleanup level which reflects the safety and health conditions at the site so that soil processing can begin. If further sampling and analysis is deemed necessary, it can be performed after processing of the stockpiled soil has begun.

The following discussion proposes potential soil cleanup levels for the Time Oil Co. site. Site location, potential for contaminant migration, and remediation feasibility are among the considerations essential to establishing an appropriate cleanup level.

II. SOILS

Time Oil Co. would like to work with ODEQ to establish a cleanup criteria for soil at this site which is safe to health and the environment, that is based on the characteristics that exist at the site and that is consistent with cleanup levels established at other similar sites.

The Time Oil Co. Northwest Terminal has restricted access, 24 hour a day security and is completely surrounded by low population density industrial areas.

PCP is a non volatile compound with very low solubility in water. It is our understanding that a health-based cleanup level for PCP as established by Oregon's Department of Environmental Quality in soils is currently 2000 mg/kg.

There has been a precedent set at other Oregon and national sites to treat or remove PCP contaminated soils to less than 500 mg/kg. In a similar situation concerning Cascade Wood Products, a cleanup level was authorized which seemed technically achievable and environmentally safe. They were required to excavate and dispose of all soil with greater than 500 mg/kg PCP (prior to the restriction on land disposal of PCP) and consolidate and cap soil between 20 mg/kg and 500 mg/kg.

Based on full scale treatment tests at the site, it has been demonstrated that PCP can be biodegraded to at least as low as 500 mg/kg. Time Oil Co. therefore proposes that the soil stockpile at the Northwest Terminal site be treated to a level no greater than 500 mg/kg and that the residual soil then be left on site. Soil washing in conjunction with a biological process will be utilized to achieve that cleanup level.

III. GROUNDWATER

Groundwater sampling has indicated no widespread contamination. However, there does appear to be some consistent contamination of groundwater immediately downgradient of the contaminated area. Therefore, quarterly groundwater monitoring is proposed for one year following treatment.

IV & V. SURFACE WATER AND AIR

As mentioned in Part III, surface water and air contamination does not appear at this time to be a significant problem, assuming reasonable safety precautions are taken. Currently the contaminated soil has been placed in a lined, bermed, storage area and covered with a tarp.

VI. SUMMARY AND RECOMMENDATIONS

Time Oil Co. has identified and excavated approximately 3000 yards of PCP-contaminated soil. This soil has been stored in a bermed, lined, and covered area awaiting processing. While portions of the soil had contained high concentrations of PCP, the process of excavation and stock piling has blended the soil to an average concentration in the range of 950 mg/kg.

Concerted efforts were made to excavate all soils with PCP contamination, yet some contaminated soil remains. Some of this soil lies beneath the PCP Warehouse. Removal of this soil would require demolition of the warehouse. However, this soil is effectively capped and should be safe from leaching by surface waters. Other soil of a lesser degree of contamination was left in situ near Tank 38009. This low volume of soil remains unexcavated for fear of causing structural damage to the tank.

There does appear to be evidence of groundwater contamination at the site; it is limited to low concentrations in wells directly down gradient from the contaminated site.

Time Oil Co. recommends the following:

- The excavated soil should be treated to 500 mg/kg PCP concentration.
- Soil cleanup should be performed through biological remediation methods.
- The soil should be left on site after remediation.
- Groundwater should be monitored on a quarterly basis for one year.

TABLE OF CONTENTS FOR APPENDIX A

A "Northwest Terminal Woodtreating Chronology of Events"

A-1 Department of Environmental Quality "Request for Analysis" for samples taken, December 12, 1984.

A-2 Letter from John L. Smits (ODEQ) to Debbie Flood (EPA Region X) describing site conditions, February 12, 1985.

A-3 Letter from ODEQ (Richard F. Gates) to Time Oil Co. giving 600 mg/kg as the hazardous waste threshold, June 28, 1985.

A-4 Results of sample analysis for North West Vacuum Truck Service, February 19, 1985. Documentation for excavation of 240 tons of contaminated soil by Chem-Security systems, July 29, 1985.

A-5 Letter from Riedel Environmental Services. Inc. to Time Oil Co. giving sample results, August 15, 1985. Report to Time Oil Co. from Riedel Environmental Services, October 18, 1985.

A-6 Letter from George C. Hofer (EPA - RCRA Permits Section) to Time Oil Co. giving notice that PCP will no longer be accepted at hazardous waste facilities, December 10, 1985.

A-7 Report to Time Oil Co. from Riedel Environmental Services, February 4, 1986.

A-8 Time Oil Co. internal memo from Fred Proby on groundwater investigation, May 2, 1986.

A-9 Report to Time Oil Co. from Century Environment Sciences, June 4, 1986.

A-10 Report to Time Oil Co. from SRH Associates, Inc., October 1, 1986.

A-11 Report to Time Oil Co. from SRH Associates, Inc., November 5, 1987.

117E

NORTHWEST TERMINAL WOODTREATING
CHRONOLOGY OF EVENTS

1981

Jan 28	Notice given to Koppers terminating 3/1/67 agreement effective March 31, 1982.

1983

April 18	Bioassay results show soil sample is toxic.
Oct. 5	Meeting with Koppers at terminal to formulate tank and soil removal agreement.
Nov. 15	Koppers removed all penta product and raw material from terminal.

1984

April 27	DEQ advised that terminal was to be inspected as part of DEQ/EPA "hit list" of 44 companies.
June 28	DEQ denied 5/24/84 TOC request to be deleted from inspection list.
Oct. 25	DEQ inspection and determination to collect samples.
Nov. 7	Information on terminal provided per DEQ request.
Dec. 12	DEQ collected 12 soil samples throughout tank farm, of which one was in penta area.

1985

Jan. 11	Status meeting with Koppers in St. Louis.
Jan. 24	Received results of DEQ soil sampling, showing 1820 ppm penta in woodtreating area.
Feb. 4	Status update letter to DEQ (Janet Gillaspie).
Feb. 19	Contract executed with Northwest Vacuum Truck Service, Inc. for removal of soil and transport to Arlington.
May 14	DEQ approved "Disposal Request" for penta contaminated soil at Arlington.
June 24	"Waste Transportation and Disposal Agreement" executed with Chem-Security Systems, Inc. for disposal of soil at Arlington.
June 25-28	242.76 tons (7781 cubic feet, 288 cubic yards) of soil removed to Arlington.

June 28	Contract executed with Riedel for penta sampling and analysis.
June 28	Received DEQ interpretation of maximum allowable penta concentration in soil (600 ppm) and water (0.15 ppm).
July 17	Received composite sample results showing maximum of 860 ppm penta.
Aug. 15	Received individual sample results and contour maps from Riedel showing maximum of 26,550 ppm penta (on ground surface where trucks were loaded).
Nov. 5	Amendment 2 to Riedel contract calling for decontamination of wall and installation of groundwater monitoring wells.
Dec.13	Received letter from EPA advising that there were no commercial facilities that would accept penta.

1986

Jan. 8	Northwest vacuum truck contract cancelled.
Feb. 12	Received Riedel report on well installation and soil sampling showing maximum penta concentration of 116,000 ppm beneath warehouse.
Feb. 26	Received sample analysis results from ATW/Cadweld.
Feb. 28	TOC installed 3 well points (A,B,C) to measure water table gradient.
March 6	Submitted invoice to Koppers for their share of clean up costs.
April 1	TOC completed installation of 3 additional well points (E,F,G). Water level measurements indicated drainage through Riedel Well #4.
April ?	Century Environmental Services collected water samples from wells B,E,F, and 4.
May 8	Riedel completed installation of 3 monitoring wells (D,H,I).
May 9	TOC collected water sample from well #4.
May 14	Riedel completed removal and sealing of well #4.
May ?	Century collected water samples from wells A,B,D,E,F,H and I.
June 4	Received results of April water samples showing maximum of 6.1 ppb of penta in well #4.
June 11	Paid $3,500 fee to Oregon DEQ for June 1985 movement of soil to Arlington.

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July 7	Received results of May water samples showing only well #1 having detectable concentration (0.0022 ppm) of penta.
Aug. 8	Letter to Koppers briefly summarizing action to date.
Aug. 14	Contract with SRH Assoc. to collect and analyse soil samples and evaluate clean-up alternatives.
Aug. 20	Consolidated shallow "hot spots" of penta contamination into one pile.
Oct. 1	Received report from SRH on project history, remedial alternatives and analysis results. "Soil Washing" recommended as clean-up approach. Bench scale studies suggested as first step in design of system.

1987

Jan. 6	Received SRH proposal for bench scale studies of soil washing technique.
Feb. 27	Inquiry into on-site incineration by Waste Tech Inc.: project would cost $2 million and take more than one year to complete.
Mar. 25	Soil sample sent to Keystone Environmental Resources (per Koppers instructions) for analysis of treatment alternatives.
Apr. 1	Invoice for $54,780.28 sent to Koppers to cover their share of expenditures to date.
Aug. 13	Koppers advised that Jim Campbell (Keystone Environmental Resources) and Billy Nolan assigned to replace Jay Stebbins on this project. Results of soil tests and payment of invoice not yet received.
Oct. 2	Koppers reminded of obligation not yet paid.
Nov. 5	Received SRH report on samples collected 8/20 and 10/16 showing penta contamination in Well B of 2300 ppm and 1000 ppm, respectively. Highest levels found in groundwater to date.
Nov. 9	Koppers reminded of obligation. Jim Campbell agreed to provide soil test results and payment of April invoice. Campbell advised Koppers wishes to buy out of future liability.
Dec. 17	Received SRH proposal for treatment by excavation and soil washing. Treatment technique to be developed by bench scale tests.

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1988

Feb. 2	Received SRH proposal for excavation and temporay stockpile of soil while treatment approach is being developed.
June 14	Revised SRH proposal and cost estimate for development of soil washing techniques.
July 21	Requested cleanup proposal from Ecova Corp.
Sept. 12	Received Ecova Work Plan for soil and groundwater remediation using biological treatment in above-ground reactors. Three alternative treatment levels - 500 ppm, 100 ppm & 50 ppm - were evaluated.
Sept 19-22	Contacted Oregon DEQ (Ed Woods and Tom Miller) to determine DEQ's role. Was advised that DEQ does not necessarily need to approve the treatment process, but does need to sign-off that the cleanup was effectively completed.
Oct. 12	Ammended Ecova Work PLan to achieve final cleanup level of 0.5 ppm pentachlorophenol.
Oct. 18	Ammended Ecova Work PLan to include installation of additional monitoring wells.
Nov. 9	Signed contract with Ecova. Cost for cleanup of penta in soil and water to 0.5 ppm is fixed at $445,000 for 3,440 cubic yards of soil. Excavation and treatment of additional volumes of soil will cost $90 per cubic yard.
Dec. 2	Received notification from DEQ (letter dated 11/30/88) that facility was listed on "Inventory of Confirmed Releases" (site identification number 170).
Dec. 5	Ecova commenced site mobilization.

1989

Jan. 13	Received $59,185.55 from Koppers for their share of investigation and cleanup costs through September 19, 1988.

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LL . L

DEPARTMEN . IRONMENTAL QUALITY
Request for Analysis

Laboratory : 84-1020

Location/Site: Time Oil Date: 13 Dec 84 Date Received Lab: DEC 13 1984 1245

Collected By: RFG, JLS Program: 4290 Date Reported: JAN 15 1985

Purpose: RCRA Site Survey Report Data To: Yates, Smith

Comments: Samples locked in Refrigerator # 120B overnight and removed for log-in 13 Dec 84 lab prepar

* Basic (P) unpreserved; Nutrient (R) add H_2SO_4 in field; Metals (Tm) HNO_3 added in lab--don't rinse; Organic(X) mason jar

Item No.	Sampling Point Description (include time)	*Sample Container (bottle) #'s Nutrients / Basic	DO / BOD	Metals / Organic		Test Required
1	Composite soil core (surface + 1' + 2' & 3') See map for location				Z1020	EP Lead GC/MS - Acids, BN PCB's
2	"				Z1007	"
3	"				Z1019	"
4	"				Z1008	"
5	"				Z1009	"
6	"				Z1010	"

Laboratory comments

BZTO104(e)012291

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Reque for Analysis

Laboratory No. -1020

Location/Site: Time Oil Date: 12 Dec 84 Date Received Lab: DEC 13 1984 1245

Collected By: RFG, JLS Program: 4290 Date Reported: JAN 15 1985

Purpose: Report Data To:

Comments:

Basic (P) unpreserved; Nutrient (R) add H_2SO_4 in field; Metals (Tm) HNO_3 added in lab--don't rinse; Organic(X) lab prepared mason jar

Item No.	Sampling Point Description (include time)	*Sample Container (bottle) #'s Nutrients Basic	DO BOD	Metals Organic		Test Required
7 ~~1~~	"				Z1011	EP tox Pb " GC/MS acid/BN PCB's
8 ~~2~~	"				Z1012	"
9 ~~3~~	"				Z1018	"
10 ~~4~~	"				Z1017	"
11 ~~5~~	"				Z1016	"
12 ~~6~~	"				Z1004	"

Laboratory comments

BZTO104(e)012292

GTL

DEPARTMENT OF ENVIRONMENTAL QUALITY
Laboratory Data Sheet

Laboratory No: .20
Program Code: 1290
Page: 1 of: 49
Analysis Completed: JAN 0.

Time Oil RFG

Test Results (All units in mg/l or ug/m³)

Item No.	bag #	EP Tox Pb										
1	Z1020	<0.1										
2	Z1007	<0.1										
3	Z1019	<0.1										
4	Z1008	<0.1										
5	Z1009	<0.1										
6	Z1010	<0.1										
7	Z1011	<0.1										
8	Z1012	<0.1										
9	Z1018	<0.1										
10	Z1017	<0.1										
11	Z1016	<0.1										
12	Z1004	<0.1										

Comments:

BZTO104(e)012293

DATE: 31 DEC 84

LAB #: 84-1020
ITEM #: 1
SAMPLE: Z1020

LEGAL

7/49

ACID EXTRACTABLES
METHOD 625
EXTRACTED BY RCRA METHOD 3540

AMOUNT MG/KG	PARAMETER
<1	PHENOL
<1	2-CHLOROPHENOL
<1	2-NITROPHENOL
<1	2,4-DIMETHYLPHENOL
<1	2,4-DICHLOROPHENOL
<1	4-CHLORO-3-METHYLPHENOL

AMOUNT MG/KG	PARAMETER
<1	2,4,6-TRICHLOROPHENOL
<1	2,4-DINITROPHENOL
<1	4-NITROPHENOL
<1	2-METHYL-4,6-DINITROPHENOL
<1	PENTACHLOROPHENOL
<1	TETRACHLOROPHENOL **

** REPORTED AS
2,3,4,6-TETRACHLOROPHENOL

BASE/NEUTRAL EXTRACTABLES
METHOD 625

AMOUNT MG/KG	PARAMETER
<1	BIS(2-CHLOROETHYL) ETHER
<1	1,3-DICHLOROBENZENE
<1	1,4-DICHLOROBENZENE
<1	1,2-DICHLOROBENZENE
<1	HEXACHLOROETHANE
<1	N-NITROSO-DI-N-PROPYLAMINE
<1	NITROBENZENE
<1	ISOPHORONE
<1	BIS(2-CHLOROETHOXY) METHANE
<1	1,2,4-TRICHLOROBENZENE
<1	NAPHTHALENE
<1	HEXACHLOROBUTADIENE
<1	HEXACHLOROCYCLOPENTADIENE
<1	2-CHLORONAPHTHALENE
<1	ACENAPHTHYLENE
<1	DIMETHYLPHTHALATE
<1	2,6-DINITROTOLUENE

AMOUNT MG/KG	PARAMETER
<1	ACENAPHTHENE
<1	2,4-DINITROTOLUENE
<1	FLUORENE
<1	DIETHYLPHTHALATE
<1	N-NITROSODIPHENYLAMINE
<1	4-BROMOPHENYL PHENYL ETHER
<1	HEXACHLOROBENZENE
<1	PHENANTHRENE
<1	ANTHRACENE
<1	DIBUTYL PHTHALATE
<1	FLUORANTHENE
<1	PYRENE
<1	BUTYL BENZYL PHTHALATE
<1	BENZ(A)ANTHRACENE
<1	CHRYSENE
<1	3,3'-DICHLOROBENZIDINE
<1	BIS(2-ETHYLHEXYL) PHTHALATE
<1	BENZ(A)PYRENE

LEGAL

3149

DATE: 31 DEC 84 3/41

LAB #: 48-1020
ITEM #: 1
SAMPLE: Z1020

PESTICIDES
METHOD 625
EXTRACTED BY RCRA 3540

AMOUNT MG/KG	PARAMETER
<5	ALPHA-BHC
<5	HEPTACHLOR
<5	ALDRIN
<5	HEPTACHLOR EPOXIDE
<5	ENDOSULFAN I
<5	TRANS-NONACHLOR
<5	P,P'-DDE
<5	DIELDRIN
<5	ENDRIN
<5	ENDOSULFAN II
<5	P,P'-DDD
<5	ENDOSULFAN CYCLIC SULFATE
<5	P,P'-DDT
<5	GAMMA-BHC (LINDANE)

LEGAL

4/49

31 DEC 84

GC/MS SCAN ID

84-1020 Z1020

THE WATER SAMPLE WAS EXTRACTED BY EPA RCRA PROCEDURE 3540 (ACETONE/HEXANE) AND ANALYZED BY GC/MS. IN ADDITION TO THE PRIORITY POLLUTANT CHEMICALS, THE SAMPLE WAS SCANNED FOR ANY OTHER UNKNOWNS ABOVE THE DETECTION LIMIT OF 1.0 MG/KG. NO UNKNOWNS WERE IDENTIFIED ABOVE THAT DETECTION LIMIT.

DATE: 02 JAN 84

LAB #: 84-1020
ITEM #: 2
SAMPLE: Z1007

LEGAL

5/49

ACID EXTRACTABLES
METHOD 625
EXTRACTED BY RCRA METHOD 3540

AMOUNT MG/KG	PARAMETER
<1	PHENOL
<1	2-CHLOROPHENOL
<1	2-NITROPHENOL
<1	2,4-DIMETHYLPHENOL
<1	2,4-DICHLOROPHENOL
<1	4-CHLORO-3-METHYLPHENOL

AMOUNT MG/KG	PARAMETER
<1	2,4,6-TRICHLOROPHENOL
<1	2,4-DINITROPHENOL
<1	4-NITROPHENOL
<1	2-METHYL-4,6-DINITROPHENOL
<1	PENTACHLOROPHENOL
<1	TETRACHLOROPHENOL **

** REPORTED AS
2,3,4,6-TETRACHLOROPHENOL

BASE/NEUTRAL EXTRACTABLES
METHOD 625

AMOUNT MG/KG	PARAMETER
<1	BIS(2-CHLOROETHYL) ETHER
<1	1,3-DICHLOROBENZENE
<1	1,4-DICHLOROBENZENE
<1	1,2-DICHLOROBENZENE
<1	HEXACHLOROETHANE
<1	N-NITROSO-DI-N-PROPYLAMINE
<1	NITROBENZENE
<1	ISOPHORONE
<1	BIS(2-CHLOROETHOXY) METHANE
<1	1,2,4-TRICHLOROBENZENE
<1	NAPHTHALENE
<1	HEXACHLOROBUTADIENE
<1	HEXACHLOROCYCLOPENTADIENE
<1	2-CHLORONAPHTHALENE
<1	ACENAPHTHYLENE
<1	DIMETHYLPHTHALATE
<1	2,6-DINITROTOLUENE

AMOUNT MG/KG	PARAMETER
<1	ACENAPHTHENE
<1	2,4-DINITROTOLUENE
<1	FLUORENE
<1	DIETHYLPHTHALATE
<1	N-NITROSODIPHENYLAMINE
<1	4-BROMOPHENYL PHENYL ETHER
<1	HEXACHLOROBENZENE
<1	PHENANTHRENE
<1	ANTHRACENE
<1	DIBUTYL PHTHALATE
<1	FLUORANTHENE
<1	PYRENE
<1	BUTYL BENZYL PHTHALATE
<1	BENZ(A)ANTHRACENE
<1	CHRYSENE
<1	3,3'-DICHLOROBENZIDINE
<1	BIS(2-ETHYLHEXYL) PHTHALATE
<1	BENZ(A)PYRENE

DATE: 02 JAN 95 DH

LEGAL

6/49

LAB #: 84-1020
ITEM #: 2
SAMPLE: 21007

PESTICIDES
METHOD 625
EXTRACTED BY RCRA 3540

AMOUNT MG/KG	PARAMETER
<5	ALPHA-BHC
<5	HEPTACHLOR
<5	ALDRIN
<5	HEPTACHLOR EPOXIDE
<5	ENDOSULFAN I
<5	TRANS-NONACHLOR
<5	P,P'-DDE
<5	DIELDRIN
<5	ENDRIN
<5	ENDOSULFAN II
<5	P,P'-DDD
<5	ENDOSULFAN CYCLIC SULFATE
<5	P,P'-DDT
<5	GAMMA-BHC (LINDANE)

LEGAL

7/49

02 JAN 85

GC/MS SCAN ID

84-1020 Z1007

THE WATER SAMPLE WAS EXTRACTED BY EPA RCRA PROCEDURE 3540 (ACETONE/HEXANE) AND ANALYZED BY GC/MS. IN ADDITION TO THE PRIORITY POLLUTANT CHEMICALS, THE SAMPLE WAS SCANNED FOR ANY OTHER UNKNOWNS ABOVE THE DETECTION LIMIT OF 1.0 MG/KG. NO UNKNOWNS WERE IDENTIFIED ABOVE THAT DETECTION LIMIT.

DATE: 28 DEC 84

LEGAL

8/49

LAB #: 84-1033
ITEM #: 3
SAMPLE: Z1019

ACID EXTRACTABLES
METHOD 625
EXTRACTED BY RCRA METHOD 3540

AMOUNT MG/KG	PARAMETER
<1	PHENOL
<1	2-CHLOROPHENOL
<1	2-NITROPHENOL
<1	2,4-DIMETHYLPHENOL
<1	2,4-DICHLOROPHENOL
<1	4-CHLORO-3-METHYLPHENOL

AMOUNT MG/KG	PARAMETER
<1	2,4,6-TRICHLOROPHENOL
<1	2,4-DINITROPHENOL
<1	4-NITROPHENOL
<1	2-METHYL-4,6-DINITROPHENOL
<1	PENTACHLOROPHENOL
<1	TETRACHLOROPHENOL **

** REPORTED AS
2,3,4,6-TETRACHLOROPHENOL

BASE/NEUTRAL EXTRACTABLES
METHOD 625

AMOUNT MG/KG	PARAMETER
<1	BIS(2-CHLOROETHYL) ETHER
<1	1,3-DICHLOROBENZENE
<1	1,4-DICHLOROBENZENE
<1	1,2-DICHLOROBENZENE
<1	HEXACHLOROETHANE
<1	N-NITROSO-DI-N-PROPYLAMINE
<1	NITROBENZENE
<1	ISOPHORONE
<1	BIS(2-CHLOROETHOXY) METHANE
<1	1,2,4-TRICHLOROBENZENE
<1	NAPHTHALENE
<1	HEXACHLOROBUTADIENE
<1	HEXACHLOROCYCLOPENTADIENE
<1	2-CHLORONAPHTHALENE
<1	ACENAPHTHYLENE
<1	DIMETHYLPHTHALATE
<1	2,6-DINITROTOLUENE

AMOUNT MG/KG	PARAMETER
<1	ACENAPHTHENE
<1	2,4-DINITROTOLUENE
<1	FLUORENE
<1	DIETHYLPHTHALATE
<1	N-NITROSODIPHENYLAMINE
<1	4-BROMOPHENYL PHENYL ETHER
<1	HEXACHLOROBENZENE
<1	PHENANTHRENE
<1	ANTHRACENE
<1	DIBUTYL PHTHALATE
<1	FLUORANTHENE
<1	PYRENE
<1	BUTYL BENZYL PHTHALATE
<1	BENZ(A)ANTHRACENE
<1	CHRYSENE
<1	3,3'-DICHLROBENZIDINE
<1	BIS(2-ETHYLHEXYL) PHTHALATE
<1	BENZ(A)PYRENE

LEGAL

9/49

DATE: 28 DEC 84

LAB #: 84-1033
ITEM #: 3
SAMPLE: I1019

PESTICIDES
METHOD 625
EITRACTED BY RCRA 3540

AMOUNT MG/KG	PARAMETER
<5	ALPHA-BHC
<5	HEPTACHLOR
<5	ALDRIN
<5	HEPTACHLOR EPOXIDE
<5	ENDOSULFAN I
<5	TRANS-NONACHLOR
<5	P,P'-DDE
<5	DIELDRIN
<5	ENDRIN
<5	ENDOSULFAN II
<5	P,P'-DDD
<5	ENDOSULFAN CYCLIC SULFATE
<5	P,P'-DDT
<5	GAMMA-BHC (LINDANE)

LEGAL

10/49

28 DEC 84

GC/MS SCAN ID

84-1020 Z1019

THE WATER SAMPLE WAS EXTRACTED BY EPA RCRA PROCEDURE 3540 (ACETONE/HEXANE) AND ANALYZED BY GC/MS. IN ADDITION TO THE PRIORITY POLLUTANT CHEMICALS, THE SAMPLE WAS SCANNED FOR ANY OTHER UNKNOWNS ABOVE THE DETECTION LIMIT OF 10 MG/KG. NO UNKNOWNS WERE IDENTIFIED ABOVE THAT DETECTION LIMIT.

LEGAL

11/49

DATE: 31 DEC 84 DJH

LAB #: 84-1020
ITEM #: 4
SAMPLE: Z1008

ACID EXTRACTABLES
METHOD 625
EXTRACTED BY RCRA METHOD 3540

AMOUNT MG/KG	PARAMETER
<1	PHENOL
<1	2-CHLOROPHENOL
<1	2-NITROPHENOL
<1	2,4-DIMETHYLPHENOL
<1	2,4-DICHLOROPHENOL
<1	4-CHLORO-3-METHYLPHENOL

AMOUNT MG/KG	PARAMETER
<1	2,4,6-TRICHLOROPHENOL
<1	2,4-DINITROPHENOL
<1	4-NITROPHENOL
<1	2-METHYL-4,6-DINITROPHENOL
<1	PENTACHLOROPHENOL
<1	TETRACHLOROPHENOL **

** REPORTED AS
2,3,4,6-TETRACHLOROPHENOL

BASE/NEUTRAL EXTRACTABLES
METHOD 625

AMOUNT MG/KG	PARAMETER
<1	BIS(2-CHLOROETHYL) ETHER
<1	1,3-DICHLOROBENZENE
<1	1,4-DICHLOROBENZENE
<1	1,2-DICHLOROBENZENE
<1	HEXACHLOROETHANE
<1	N-NITROSO-DI-N-PROPYLAMINE
<1	NITROBENZENE
1	ISOPHORONE
<1	BIS(2-CHLOROETHOXY) METHANE
<1	1,2,4-TRICHLOROBENZENE
<1	NAPHTHALENE
<1	HEXACHLOROBUTADIENE
<1	HEXACHLOROCYCLOPENTADIENE
<1	2-CHLORONAPHTHALENE
<1	ACENAPHTHYLENE
<1	DIMETHYLPHTHALATE
<1	2,6-DINITROTOLUENE

AMOUNT MG/KG	PARAMETER
<1	ACENAPHTHENE
3	2,4-DINITROTOLUENE
1	FLUORENE
<1	DIETHYLPHTHALATE
2	N-NITROSODIPHENYLAMINE
<1	4-BROMOPHENYL PHENYL ETHER
<1	HEXACHLOROBENZENE
1	PHENANTHRENE
1	ANTHRACENE
<1	DIBUTYL PHTHALATE
<1	FLUORANTHENE
<1	PYRENE
<1	BUTYL BENZYL PHTHALATE
<1	BENZ(A)ANTHRACENE
<1	CHRYSENE
<1	3,3'-DICHLOROBENZIDINE
<1	BIS(2-ETHYLHEXYL) PHTHALATE
<1	BENZ(A)PYRENE

Trace only not significant not a problem

LEGAL

12/49

DATE: 31 DEC 84 DJH

LAB #: 84-1020
ITEM #: 4
SAMPLE: Z1008

PESTICIDES
METHOD 625
EXTRACTED BY RCRA 3540

AMOUNT MG/KG	PARAMETER
<5	ALPHA-BHC
<5	HEPTACHLOR
<5	ALDRIN
<5	HEPTACHLOR EPOXIDE
<5	ENDOSULFAN I
<5	TRANS-NONACHLOR
<5	P,P'-DDE
<5	DIELDRIN
<5	ENDRIN
<5	ENDOSULFAN II
<5	P,P'-DDD
<5	ENDOSULFAN CYCLIC SULFATE
<5	P,P'-DDT
<5	GAMMA-BHC (LINDANE)

LEGAL

13/49

31 DEC 84

GC/MS SCAN ID

84-1020 Z1008

THE WATER SAMPLE WAS EXTRACTED BY EPA RCRA PROCEDURE 3540 (ACETONE/HEXANE) AND ANALYZED BY GC/MS. IN ADDITION TO THE PRIORITY POLLUTANT CHEMICALS, THE SAMPLE WAS SCANNED FOR ANY OTHER UNKNOWNS ABOVE THE DETECTION LIMIT OF 1.0 MG/L. THE FOLLOWING COMPOUNDS WERE TENTATIVELY IDENTIFIED WITH THE ESTIMATED CONCENTRATIONS SHOWN.

COMPOUND	MG/KG
NONANE	1
DECANE	4
4-METHYLDECANE	3
UNDECANE	19
2-METHYLUNDECANE	8
DODECANE	46
TRIDECANE	67
7-METHYLTRIDECANE	38
HENEICOSANE	37

LEGAL

14/49

DATE: 28 DEC 84

DJH

LAB #: 84-1020
ITEM #: 5
SAMPLE: Z1009

ACID EXTRACTABLES
METHOD 625
EXTRACTED BY RCRA METHOD 3540

AMOUNT MG/KG	PARAMETER
<1	PHENOL
<1	2-CHLOROPHENOL
<1	2-NITROPHENOL
<1	2,4-DIMETHYLPHENOL
<1	2,4-DICHLOROPHENOL
<1	4-CHLORO-3-METHYLPHENOL

AMOUNT MG/KG	PARAMETER
<1	2,4,6-TRICHLOROPHENOL
<1	2,4-DINITROPHENOL
<1	4-NITROPHENOL
<1	2-METHYL-4,6-DINITROPHENOL
<1	PENTACHLOROPHENOL
<1	TETRACHLOROPHENOL **

** REPORTED AS
2,3,4,6-TETRACHLOROPHENOL

BASE/NEUTRAL EXTRACTABLES
METHOD 625

AMOUNT MG/KG	PARAMETER
<1	BIS(2-CHLOROETHYL) ETHER
<1	1,3-DICHLOROBENZENE
<1	1,4-DICHLOROBENZENE
<1	1,2-DICHLOROBENZENE
<1	HEXACHLOROETHANE
<1	N-NITROSO-DI-N-PROPYLAMINE
<1	NITROBENZENE
<1	ISOPHORONE
<1	BIS(2-CHLOROETHOXY) METHANE
<1	1,2,4-TRICHLOROBENZENE
<1	NAPHTHALENE
<1	HEXACHLOROBUTADIENE
<1	HEXACHLOROCYCLOPENTADIENE
<1	2-CHLORONAPHTHALENE
<1	ACENAPHTHYLENE
<1	DIMETHYLPHTHALATE
<1	2,6-DINITROTOLUENE

AMOUNT MG/KG	PARAMETER
<1	ACENAPHTHENE
<1	2,4-DINITROTOLUENE
<1	FLUORENE
<1	DIETHYLPHTHALATE
<1	N-NITROSODIPHENYLAMINE
<1	4-BROMOPHENYL PHENYL ETHER
<1	HEXACHLOROBENZENE
<1	PHENANTHRENE
<1	ANTHRACENE
<1	DIBUTYL PHTHALATE
<1	FLUORANTHENE
<1	PYRENE
<1	BUTYL BENZYL PHTHALATE
<1	BENZ(A)ANTHRACENE
<1	CHRYSENE
<1	3,3'-DICHLROBENZIDINE
<1	BIS(2-ETHYLHEXYL) PHTHALATE
<1	BENZ(A)PYRENE

LEGAL

15/49

DATE: 28 DEC 84

DJM

LAB #: 84-1033
ITEM #:5
SAMPLE:I1009

PESTICIDES
METHOD 625.
EXTRACTED BY RCRA 3540

AMOUNT MG/KG	PARAMETER
<5	ALPHA-BHC
<5	HEPTACHLOR
<5	ALDRIN
<5	HEPTACHLOR EPOXIDE
<5	ENDOSULFAN I
<5	TRANS-NONACHLOR
<5	P,P'-DDE
<5	DIELDRIN
<5	ENDRIN
<5	ENDOSULFAN II
<5	P,P'-DDD
<5	ENDOSULFAN CYCLIC SULFATE
<5	P,P'-DDT
<5	GAMMA-BHC (LINDANE)

LEGAL

16/49

28 DEC 84

GC/MS SCAN ID

84-1020 Z1009

THE WATER SAMPLE WAS EXTRACTED BY EPA RCRA PROCEDURE 3540 (ACETONE/HEXANE) AND ANALYZED BY GC/MS. IN ADDITION TO THE PRIORITY POLLUTANT CHEMICALS, THE SAMPLE WAS SCANNED FOR ANY OTHER UNKNOWNS ABOVE THE DETECTION LIMIT OF 10 MG/KG. NO UNKNOWNS WERE IDENTIFIED ABOVE THAT DETECTION LIMIT.

LEGAL

17/49

DATE: 28 DEC 84 DJH

LAB #: 84-1033
ITEM #: 6
SAMPLE: Z1010

ACID EXTRACTABLES
METHOD 625
EXTRACTED BY RCRA METHOD 3540

AMOUNT MG/KG	PARAMETER
<1	PHENOL
<1	2-CHLOROPHENOL
<1	2-NITROPHENOL
<1	2,4-DIMETHYLPHENOL
<1	2,4-DICHLOROPHENOL
<1	4-CHLORO-3-METHYLPHENOL

AMOUNT MG/KG	PARAMETER
<1	2,4,6-TRICHLOROPHENOL
<1	2,4-DINITROPHENOL
<1	4-NITROPHENOL
<1	2-METHYL-4,6-DINITROPHENOL
<1	PENTACHLOROPHENOL
<1	TETRACHLOROPHENOL **

** REPORTED AS
2,3,4,6-TETRACHLOROPHENOL

BASE/NEUTRAL EXTRACTABLES
METHOD 625

AMOUNT MG/KG	PARAMETER
<1	BIS(2-CHLOROETHYL) ETHER
<1	1,3-DICHLOROBENZENE
<1	1,4-DICHLOROBENZENE
<1	1,2-DICHLOROBENZENE
<1	HEXACHLOROETHANE
<1	N-NITROSO-DI-N-PROPYLAMINE
<1	NITROBENZENE
<1	ISOPHORONE
<1	BIS(2-CHLOROETHOXY) METHANE
<1	1,2,4-TRICHLOROBENZENE
<1	NAPHTHALENE
<1	HEXACHLOROBUTADIENE
<1	HEXACHLOROCYCLOPENTADIENE
<1	2-CHLORONAPHTHALENE
<1	ACENAPHTHYLENE
<1	DIMETHYLPHTHALATE
<1	2,6-DINITROTOLUENE

AMOUNT MG/KG	PARAMETER
<1	ACENAPHTHENE
<1	2,4-DINITROTOLUENE
<1	FLUORENE
<1	DIETHYLPHTHALATE
<1	N-NITROSODIPHENYLAMINE
<1	4-BROMOPHENYL PHENYL ETHER
<1	HEXACHLOROBENZENE
<1	PHENANTHRENE
<1	ANTHRACENE
<1	DIBUTYL PHTHALATE
<1	FLUORANTHENE
<1	PYRENE
<1	BUTYL BENZYL PHTHALATE
<1	BENZ(A)ANTHRACENE
<1	CHRYSENE
<1	3,3'-DICHLOROBENZIDINE
<1	BIS(2-ETHYLHEXYL) PHTHALATE
<1	BENZ(A)PYRENE

LEGAL

18/49

DATE: 28 DEC 84 DJH

LAB #: 84-1033
ITEM #: 6
SAMPLE: I1010

PESTICIDES
METHOD 625
EXTRACTED BY RCRA 3540

AMOUNT MG/KG	PARAMETER
<5	ALPHA-BHC
<5	HEPTACHLOR
<5	ALDRIN
<5	HEPTACHLOR EPOXIDE
<5	ENDOSULFAN I
<5	TRANS-NONACHLOR
<5	P,P'-DDE
<5	DIELDRIN
<5	ENDRIN
<5	ENDOSULFAN II
<5	P,P'-DDD
<5	ENDOSULFAN CYCLIC SULFATE
<5	P,P'-DDT
<5	GAMMA-BHC (LINDANE)

LEGAL

19/49

DM

28 DEC 84

GC/MS SCAN ID

84-1020 Z1010

THE WATER SAMPLE WAS EXTRACTED BY EPA RCRA PROCEDURE 3540 (ACETONE/HEXANE) AND ANALYZED BY GC/MS. IN ADDITION TO THE PRIORITY POLLUTANT CHEMICALS, THE SAMPLE WAS SCANNED FOR ANY OTHER UNKNOWNS ABOVE THE DETECTION LIMIT OF 10 MG/KG. NO UNKNOWNS WERE IDENTIFIED ABOVE THAT DETECTION LIMIT.

LEGAL

DATE: 03 JAN 85 3/11

20/49

LAB #: 84-1020
ITEM #: 7
SAMPLE: Z1011

ACID EXTRACTABLES
METHOD 625
EXTRACTED BY RCRA METHOD 3540

AMOUNT MG/KG	PARAMETER
<1	PHENOL
<1	2-CHLOROPHENOL
<1	2-NITROPHENOL
<1	2,4-DIMETHYLPHENOL
<1	2,4-DICHLOROPHENOL
<1	4-CHLORO-3-METHYLPHENOL

AMOUNT MG/KG	PARAMETER
<1	2,4,6-TRICHLOROPHENOL
<1	2,4-DINITROPHENOL
<1	4-NITROPHENOL
<1	2-METHYL-4,6-DINITROPHENOL
<1	PENTACHLOROPHENOL
<1	TETRACHLOROPHENOL **

** REPORTED AS
2,3,4,6-TETRACHLOROPHENOL

BASE/NEUTRAL EXTRACTABLES
METHOD 625

AMOUNT MG/KG	PARAMETER
<1	BIS(2-CHLOROETHYL) ETHER
<1	1,3-DICHLOROBENZENE
<1	1,4-DICHLOROBENZENE
<1	1,2-DICHLOROBENZENE
<1	HEXACHLOROETHANE
<1	N-NITROSO-DI-N-PROPYLAMINE
<1	NITROBENZENE
<1	ISOPHORONE
<1	BIS(2-CHLOROETHOXY) METHANE
<1	1,2,4-TRICHLOROBENZENE
<1	NAPHTHALENE
<1	HEXACHLOROBUTADIENE
<1	HEXACHLOROCYCLOPENTADIENE
<1	2-CHLORONAPHTHALENE
<1	ACENAPHTHYLENE
<1	DIMETHYLPHTHALATE
<1	2,6-DINITROTOLUENE

AMOUNT MG/KG	PARAMETER
<1	ACENAPHTHENE
<1	2,4-DINITROTOLUENE
<1	FLUORENE
<1	DIETHYLPHTHALATE
<1	N-NITROSODIPHENYLAMINE
<1	4-BROMOPHENYL PHENYL ETHER
<1	HEXACHLOROBENZENE
<1	PHENANTHRENE
<1	ANTHRACENE
<1	DIBUTYL PHTHALATE
<1	FLUORANTHENE
<1	PYRENE
<1	BUTYL BENZYL PHTHALATE
<1	BENZ(A)ANTHRACENE
<1	CHRYSENE
<1	3,3'-DICHLOROBENZIDINE
<1	BIS(2-ETHYLHEXYL) PHTHALATE
<1	BENZ(A)PYRENE

LEGAL

21/49

DATE: 03 JAN 85

DJH

LAB #: 84-1020
ITEM #: 7
SAMPLE: Z1011

PESTICIDES
METHOD 625
EXTRACTED BY RCRA 3540

AMOUNT MG/KG	PARAMETER
<5	ALPHA-BHC
<5	HEPTACHLOR
<5	ALDRIN
<5	HEPTACHLOR EPOXIDE
<5	ENDOSULFAN I
<5	TRANS-NONACHLOR
<5	P,P'-DDE
<5	DIELDRIN
<5	ENDRIN
<5	ENDOSULFAN II
<5	P,P'-DDD
<5	ENDOSULFAN CYCLIC SULFATE
<5	P,P'-DDT
<5	GAMMA-BHC (LINDANE)

LEGAL

27/49

8/11

03 JAN 85

GC/MS SCAN ID

84-1020 Z1011

THE WATER SAMPLE WAS EXTRACTED BY EPA RCRA PROCEDURE 3540 (ACETONE/HEXANE) AND ANALYZED BY GC/MS. IN ADDITION TO THE PRIORITY POLLUTANT CHEMICALS, THE SAMPLE WAS SCANNED FOR ANY OTHER UNKNOWNS ABOVE THE DETECTION LIMIT OF 1.0 MG/KG. NO UNKNOWNS WERE IDENTIFIED ABOVE THAT DETECTION LIMIT.

DATE: 03 JAN 85

LAB #: 84-1020
ITEM #: 8
SAMPLE: I1012

LEGAL

23/49

ACID EXTRACTABLES
METHOD 625
EXTRACTED BY RCRA METHOD 3540

AMOUNT MG/KG	PARAMETER
<1	PHENOL
<1	2-CHLOROPHENOL
<1	2-NITROPHENOL
<1	2,4-DIMETHYLPHENOL
<1	2,4-DICHLOROPHENOL
<1	4-CHLORO-3-METHYLPHENOL

AMOUNT MG/KG	PARAMETER
<1	2,4,6-TRICHLOROPHENOL
<1	2,4-DINITROPHENOL
<1	4-NITROPHENOL
<1	2-METHYL-4,6-DINITROPHENOL
<1	PENTACHLOROPHENOL
<1	TETRACHLOROPHENOL **

** REPORTED AS
2,3,4,6-TETRACHLOROPHENOL

BASE/NEUTRAL EXTRACTABLES
METHOD 625

AMOUNT MG/KG	PARAMETER
<1	BIS(2-CHLOROETHYL) ETHER
<1	1,3-DICHLOROBENZENE
<1	1,4-DICHLOROBENZENE
<1	1,2-DICHLOROBENZENE
<1	HEXACHLOROETHANE
<1	N-NITROSO-DI-N-PROPYLAMINE
<1	NITROBENZENE
<1	ISOPHORONE
<1	BIS(2-CHLOROETHOXY) METHANE
<1	1,2,4-TRICHLOROBENZENE
<1	NAPHTHALENE
<1	HEXACHLOROBUTADIENE
<1	HEXACHLOROCYCLOPENTADIENE
<1	2-CHLORONAPHTHALENE
<1	ACENAPHTHYLENE
<1	DIMETHYLPHTHALATE
<1	2,6-DINITROTOLUENE

AMOUNT MG/KG	PARAMETER
<1	ACENAPHTHENE
<1	2,4-DINITROTOLUENE
13	FLUORENE
<1	DIETHYLPHTHALATE
<1	N-NITROSODIPHENYLAMINE
<1	4-BROMOPHENYL PHENYL ETHER
<1	HEXACHLOROBENZENE
14	PHENANTHRENE
105	ANTHRACENE
<1	DIBUTYL PHTHALATE
<1	FLUORANTHENE
<1	PYRENE
<1	BUTYL BENZYL PHTHALATE
<1	BENZ(A)ANTHRACENE
<1	CHRYSENE
<1	3,3'-DICHLOROBENZIDINE
<1	BIS(2-ETHYLHEXYL) PHTHALATE
<1	BENZ(A)PYRENE

LEGAL

24/49

DATE: 03 JAN 85 DH

LAB #: 84-1020
ITEM #: 8
SAMPLE: Z1912

PESTICIDES
METHOD 625
EXTRACTED BY RCRA 3540

AMOUNT MG/KG	PARAMETER
<5	ALPHA-BHC
<5	HEPTACHLOR
<5	ALDRIN
<5	HEPTACHLOR EPOXIDE
<5	ENDOSULFAN I
<5	TRANS-NONACHLOR
<5	P,P'-DDE
<5	DIELDRIN
<5	ENDRIN
<5	ENDOSULFAN II
<5	P,P'-DDD
<5	ENDOSULFAN CYCLIC SULFATE
<5	P,P'-DDT
<5	GAMMA-BHC (LINDANE)

LEGAL

25/49

DJH

03 JAN 85

GC/MS SCAN ID

84-1020 Z1012

THE WATER SAMPLE WAS EXTRACTED BY EPA RCRA PROCEDURE 3540 (ACETONE/HEXANE) AND ANALYZED BY GC/MS. IN ADDITION TO THE PRIORITY POLLUTANT CHEMICALS, THE SAMPLE WAS SCANNED FOR ANY OTHER UNKNOWNS ABOVE THE DETECTION LIMIT OF 1.0 MG/KG. NO UNKNOWNS WERE IDENTIFIED ABOVE THAT DETECTION LIMIT.

LEGAL

26/49

DATE: 03 JAN 85 DJH

LAB #: 84-1020
ITEM #: 9
SAMPLE: Z1018

ACID EXTRACTABLES
METHOD 625
EXTRACTED BY RCRA METHOD 3540

AMOUNT MG/KG	PARAMETER
<1	PHENOL
<1	2-CHLOROPHENOL
<1	2-NITROPHENOL
<1	2,4-DIMETHYLPHENOL
<1	2,4-DICHLOROPHENOL
<1	4-CHLORO-3-METHYLPHENOL

AMOUNT MG/KG	PARAMETER
<1	2,4,6-TRICHLOROPHENOL
<1	2,4-DINITROPHENOL
<1	4-NITROPHENOL
<1	2-METHYL-4,6-DINITROPHENOL
515	PENTACHLOROPHENOL
12	TETRACHLOROPHENOL **

** REPORTED AS
2,3,4,6-TETRACHLOROPHENOL

BASE/NEUTRAL EXTRACTABLES
METHOD 625

AMOUNT MG/KG	PARAMETER
<1	BIS(2-CHLOROETHYL) ETHER
<1	1,3-DICHLOROBENZENE
<1	1,4-DICHLOROBENZENE
<1	1,2-DICHLOROBENZENE
<1	HEXACHLOROETHANE
<1	N-NITROSO-DI-N-PROPYLAMINE
<1	NITROBENZENE
<1	ISOPHORONE
<1	BIS(2-CHLOROETHOXY) METHANE
<1	1,2,4-TRICHLOROBENZENE
<1	NAPHTHALENE
<1	HEXACHLOROBUTADIENE
<1	HEXACHLOROCYCLOPENTADIENE
<1	2-CHLORONAPHTHALENE
<1	ACENAPHTHYLENE
<1	DIMETHYLPHTHALATE
<1	2,6-DINITROTOLUENE

AMOUNT MG/KG	PARAMETER
<1	ACENAPHTHENE
<1	2,4-DINITROTOLUENE
<1	FLUORENE
<1	DIETHYLPHTHALATE
<1	N-NITROSODIPHENYLAMINE
<1	4-BROMOPHENYL PHENYL ETHER
<1	HEXACHLOROBENZENE
<1	PHENANTHRENE
<1	ANTHRACENE
<1	DIBUTYL PHTHALATE
<1	FLUORANTHENE
<1	PYRENE
<1	BUTYL BENZYL PHTHALATE
<1	BENZ(A)ANTHRACENE
1	CHRYSENE
<1	3,3'-DICHLOROBENZIDINE
3	BIS(2-ETHYLHEXYL) PHTHALATE
<1	BENZ(A)PYRENE

LEGAL

27/49

DATE: 03 JAN 85

LAB #: 84-1020
ITEM #: 9
SAMPLE: Z1018

PESTICIDES
METHOD 625
EXTRACTED BY RCRA 3540

AMOUNT MG/KG	PARAMETER
<5	ALPHA-BHC
<5	HEPTACHLOR
<5	ALDRIN
<5	HEPTACHLOR EPOXIDE
<5	ENDOSULFAN I
<5	TRANS-NONACHLOR
<5	P,P'-DDE
<5	DIELDRIN
<5	ENDRIN
<5	ENDOSULFAN II
<5	P,P'-DDD
<5	ENDOSULFAN CYCLIC SULFATE
<5	P,P'-DDT
<5	GAMMA-BHC (LINDANE)

LEGAL

28/49

DJH

03 JAN 85

GC/MS SCAN ID

84-1020 Z1018

THE WATER SAMPLE WAS EXTRACTED BY EPA RCRA PROCEDURE 3540 (ACETONE/HEXANE) AND ANALYZED BY GC/MS. IN ADDITION TO THE PRIORITY POLLUTANT CHEMICALS, THE SAMPLE WAS SCANNED FOR ANY OTHER UNKNOWNS ABOVE THE DETECTION LIMIT OF 1.0 MG/L. THE FOLLOWING COMPOUNDS WERE TENTATIVELY IDENTIFIED WITH THE ESTIMATED CONCENTRATIONS SHOWN.

COMPOUND	MG/KG
DODECANE	6
TRIDECANE	8
PENTADECANE	6

DATE: 03 JAN 85

LAB #: 84-1020
ITEM #: 10
SAMPLE: Z1017

DJH

LEGAL

29/49

ACID EXTRACTABLES
METHOD 625
EXTRACTED BY RCRA METHOD 3540

AMOUNT MG/KG	PARAMETER
<1	PHENOL
<1	2-CHLOROPHENOL
<1	2-NITROPHENOL
<1	2,4-DIMETHYLPHENOL
<1	2,4-DICHLOROPHENOL
<1	4-CHLORO-3-METHYLPHENOL

AMOUNT MG/KG	PARAMETER
<1	2,4,6-TRICHLOROPHENOL
<1	2,4-DINITROPHENOL
<1	4-NITROPHENOL
<1	2-METHYL-4,6-DINITROPHENOL
1820	PENTACHLOROPHENOL
71	TETRACHLOROPHENOL **

** REPORTED AS
2,3,4,6-TETRACHLOROPHENOL

BASE/NEUTRAL EXTRACTABLES
METHOD 625

AMOUNT MG/KG	PARAMETER
<1	BIS(2-CHLOROETHYL) ETHER
<1	1,3-DICHLOROBENZENE
<1	1,4-DICHLOROBENZENE
<1	1,2-DICHLOROBENZENE
<1	HEXACHLOROETHANE
<1	N-NITROSO-DI-N-PROPYLAMINE
<1	NITROBENZENE
<1	ISOPHORONE
<1	BIS(2-CHLOROETHOXY) METHANE
<1	1,2,4-TRICHLOROBENZENE
<1	NAPHTHALENE
<1	HEXACHLOROBUTADIENE
<1	HEXACHLOROCYCLOPENTADIENE
<1	2-CHLORONAPHTHALENE
<1	ACENAPHTHYLENE
<1	DIMETHYLPHTHALATE
<1	2,6-DINITROTOLUENE

AMOUNT MG/KG	PARAMETER
<1	ACENAPHTHENE
<1	2,4-DINITROTOLUENE
<1	FLUORENE
<1	DIETHYLPHTHALATE
<1	N-NITROSODIPHENYLAMINE
<1	4-BROMOPHENYL PHENYL ETHER
<1	HEXACHLOROBENZENE
<1	PHENANTHRENE
<1	ANTHRACENE
<1	DIBUTYL PHTHALATE
<1	FLUORANTHENE
<1	PYRENE
<1	BUTYL BENZYL PHTHALATE
<1	BENZ(A)ANTHRACENE
<1	CHRYSENE
<1	3,3'-DICHLROBENZIDINE
<1	BIS(2-ETHYLHEXYL) PHTHALATE
<1	BENZ(A)PYRENE

LEGAL

30/49

DATE: 03 JAN 85 DM

LAB #: 84-1020
ITEM #: 10
SAMPLE: Z1017

PESTICIDES
METHOD 625
EXTRACTED BY RCRA 3540

AMOUNT MG/KG	PARAMETER
<5	ALPHA-BHC
<5	HEPTACHLOR
<5	ALDRIN
<5	HEPTACHLOR EPOXIDE
<5	ENDOSULFAN I
<5	TRANS-NONACHLOR
<5	P,P'-DDE
<5	DIELDRIN
<5	ENDRIN
<5	ENDOSULFAN II
<5	P,P'-DDD
<5	ENDOSULFAN CYCLIC SULFATE
<5	P,P'-DDT
<5	GAMMA-BHC (LINDANE)

LEGAL

31/49

DM

03 JAN 85

GC/MS SCAN ID

84-1020 Z1017

THE WATER SAMPLE WAS EXTRACTED BY EPA RCRA PROCEDURE 3540 (ACETONE/HEXANE) AND ANALYZED BY GC/MS. IN ADDITION TO THE PRIORITY POLLUTANT CHEMICALS, THE SAMPLE WAS SCANNED FOR ANY OTHER UNKNOWNS ABOVE THE DETECTION LIMIT OF 1.0 MG/L. THE FOLLOWING COMPOUNDS WERE TENTATIVELY IDENTIFIED WITH THE ESTIMATED CONCENTRATIONS SHOWN.

COMPOUND	MG/KG
1-ETHYL-4-METHYLCYCLOHEXANE	10
2,6-DIMETHYLOCTANE	10
4-METHYLNONANE	8
1-METHYL-4-(1-METHYLETHYL)CYCLOHEXANE	12
4-METHYLDECANE	36
BUTYLCYCLOHEXANE	14
5-METHYLDECANE	15
3-METHYLDECANE	8
UNDECANE	18
OCTYLCYCLOPROPANE	53

THE SAMPLE ALSO CONTAINED NUMEROUS OTHER COMPOUNDS NOT IDENTIFIED. THE PATTERN, HOWEVER, WAS INDICATIVE OF A SOLVENT MIXTURE SIMILAR TO PAINT THINNER.

DATE: 02 JAN 85

LAB #: 84-1020
ITEM #: 11
SAMPLE: 11016

DJM

LEGAL

32/49

ACID EXTRACTABLES
METHOD 625
EXTRACTED BY RCRA METHOD 3540

AMOUNT MG/KG	PARAMETER
<1	PHENOL
<1	2-CHLOROPHENOL
<1	2-NITROPHENOL
<1	2,4-DIMETHYLPHENOL
<1	2,4-DICHLOROPHENOL
<1	4-CHLORO-3-METHYLPHENOL

AMOUNT MG/KG	PARAMETER
<1	2,4,6-TRICHLOROPHENOL
<1	2,4-DINITROPHENOL
<1	4-NITROPHENOL
<1	2-METHYL-4,6-DINITROPHENOL
<1	PENTACHLOROPHENOL
<1	TETRACHLOROPHENOL **

** REPORTED AS
2,3,4,6-TETRACHLOROPHENOL

BASE/NEUTRAL EXTRACTABLES
METHOD 625

AMOUNT MG/KG	PARAMETER
<1	BIS(2-CHLOROETHYL) ETHER
<1	1,3-DICHLOROBENZENE
<1	1,4-DICHLOROBENZENE
<1	1,2-DICHLOROBENZENE
<1	HEXACHLOROETHANE
<1	N-NITROSO-DI-N-PROPYLAMINE
<1	NITROBENZENE
<1	ISOPHORONE
<1	BIS(2-CHLOROETHOXY) METHANE
<1	1,2,4-TRICHLOROBENZENE
<1	NAPHTHALENE
<1	HEXACHLOROBUTADIENE
<1	HEXACHLOROCYCLOPENTADIENE
<1	2-CHLORONAPHTHALENE
<1	ACENAPHTHYLENE
<1	DIMETHYLPHTHALATE
<1	2,6-DINITROTOLUENE

AMOUNT MG/KG	PARAMETER
<1	ACENAPHTHENE
<1	2,4-DINITROTOLUENE
<1	FLUORENE
<1	DIETHYLPHTHALATE
<1	N-NITROSODIPHENYLAMINE
<1	4-BROMOPHENYL PHENYL ETHER
<1	HEXACHLOROBENZENE
<1	PHENANTHRENE
<1	ANTHRACENE
<1	DIBUTYL PHTHALATE
<1	FLUORANTHENE
<1	PYRENE
<1	BUTYL BENZYL PHTHALATE
<1	BENZ(A)ANTHRACENE
<1	CHRYSENE
<1	3,3'-DICHLROBENZIDINE
<1	BIS(2-ETHYLHEXYL) PHTHALATE
<1	BENZ(A)PYRENE

33/49

DATE: 02 JAN 85

LEGAL

LAB #: 84-1020
ITEM #: 11
SAMPLE: 11016

PESTICIDES
METHOD 625
EXTRACTED BY RCRA 3540

AMOUNT MG/KG	PARAMETER
<5	ALPHA-BHC
<5	HEPTACHLOR
<5	ALDRIN
<5	HEPTACHLOR EPOXIDE
<5	ENDOSULFAN I
<5	TRANS-NONACHLOR
<5	P,P'-DDE
<5	DIELDRIN
<5	ENDRIN
<5	ENDOSULFAN II
<5	P,P'-DDD
<5	ENDOSULFAN CYCLIC SULFATE
<5	P,P'-DDT
<5	GAMMA-BHC (LINDANE)

LEGAL

34/39

DJH

02 JAN 85

GC/MS SCAN ID

84-1020 Z1016

THE WATER SAMPLE WAS EXTRACTED BY EPA RCRA PROCEDURE 3540 (ACETONE/HEXANE) AND ANALYZED BY GC/MS. IN ADDITION TO THE PRIORITY POLLUTANT CHEMICALS, THE SAMPLE WAS SCANNED FOR ANY OTHER UNKNOWNS ABOVE THE DETECTION LIMIT OF 1.0 MG/KG. NO UNKNOWNS WERE IDENTIFIED ABOVE THAT DETECTION LIMIT.

DATE: 02 JAN 85

LEGAL

35/89

LAB #: 84-1020
ITEM #: 12
SAMPLE: Z1004

DJH

ACID EXTRACTABLES
METHOD 625
EXTRACTED BY RCRA METHOD 3540

AMOUNT MG/KG	PARAMETER
<1	PHENOL
<1	2-CHLOROPHENOL
<1	2-NITROPHENOL
<1	2,4-DIMETHYLPHENOL
<1	2,4-DICHLOROPHENOL
<1	4-CHLORO-3-METHYLPHENOL

AMOUNT MG/KG	PARAMETER
<1	2,4,6-TRICHLOROPHENOL
<1	2,4-DINITROPHENOL
<1	4-NITROPHENOL
<1	2-METHYL-4,6-DINITROPHENOL
<1	PENTACHLOROPHENOL
<1	TETRACHLOROPHENOL **

** REPORTED AS
2,3,4,6-TETRACHLOROPHENOL

BASE/NEUTRAL EXTRACTABLES
METHOD 625

AMOUNT MG/KG	PARAMETER
<1	BIS(2-CHLOROETHYL) ETHER
<1	1,3-DICHLOROBENZENE
<1	1,4-DICHLOROBENZENE
<1	1,2-DICHLOROBENZENE
<1	HEXACHLOROETHANE
<1	N-NITROSO-DI-N-PROPYLAMINE
<1	NITROBENZENE
<1	ISOPHORONE
<1	BIS(2-CHLOROETHOXY) METHANE
<1	1,2,4-TRICHLOROBENZENE
<1	NAPHTHALENE
<1	HEXACHLOROBUTADIENE
<1	HEXACHLOROCYCLOPENTADIENE
<1	2-CHLORONAPHTHALENE
<1	ACENAPHTHYLENE
<1	DIMETHYLPHTHALATE
<1	2,6-DINITROTOLUENE

AMOUNT MG/KG	PARAMETER
<1	ACENAPHTHENE
<1	2,4-DINITROTOLUENE
<1	FLUORENE
<1	DIETHYLPHTHALATE
<1	N-NITROSODIPHENYLAMINE
<1	4-BROMOPHENYL PHENYL ETHER
<1	HEXACHLOROBENZENE
<1	PHENANTHRENE
<1	ANTHRACENE
<1	DIBUTYL PHTHALATE
<1	FLUORANTHENE
<1	PYRENE
<1	BUTYL BENZYL PHTHALATE
<1	BENZ(A)ANTHRACENE
<1	CHRYSENE
<1	3,3'-DICHLOROBENZIDINE
<1	BIS(2-ETHYLHEXYL) PHTHALATE
<1	BENZ(A)PYRENE

LEGAL

36/49

DATE: 02 JAN 85

DJH

LAB #: 84-1020
ITEM #: 12
SAMPLE: Z1004

PESTICIDES
METHOD 625
EXTRACTED BY RCRA 3540

AMOUNT MG/KG	PARAMETER
<5	ALPHA-BHC
<5	HEPTACHLOR
<5	ALDRIN
<5	HEPTACHLOR EPOXIDE
<5	ENDOSULFAN I
<5	TRANS-NONACHLOR
<5	P,P'-DDE
<5	DIELDRIN
<5	ENDRIN
<5	ENDOSULFAN II
<5	P,P'-DDD
<5	ENDOSULFAN CYCLIC SULFATE
<5	P,P'-DDT
<5	GAMMA-BHC (LINDANE)

LEGAL

37/49

8/1

02 JAN 85

GC/MS SCAN ID

84-1020 Z1004

THE WATER SAMPLE WAS EXTRACTED BY EPA RCRA PROCEDURE 3540 (ACETONE/HEXANE) AND ANALYZED BY GC/MS. IN ADDITION TO THE PRIORITY POLLUTANT CHEMICALS, THE SAMPLE WAS SCANNED FOR ANY OTHER UNKNOWNS ABOVE THE DETECTION LIMIT OF 1.0 MG/KG. NO UNKNOWNS WERE IDENTIFIED ABOVE THAT DETECTION LIMIT.

LEGAL

38/49

DATE: 14 JAN 85

LAB #: 84-1020
ITEM #: 1
SAMPLE: Z1020

PCB'S
METHOD 608

AMOUNT MG/KG	PARAMETER
<0.5	PCB GROUP 1
<0.1	PCB GROUP 2
<0.05	PCB GROUP 3
<0.05	PCB GROUP 4
<0.05	PCB GROUP 5
0	TOTAL PCB

PCB GROUP 1 INCLUDES PCB 1221 AND IS CALCULATED AS 1221.
PCB GROUP 2 INCLUDES PCB 1232 AND IS CALCULATED AS 1232.
PCB GROUP 3 INCLUDES PCB'S 1016, 1242, AND 1248 AND IS CALCULATED AS 1242.
PCB GROUP 4 INCLUDES PCB 1254 AND IS CALCULATED AS 1254.
PCB GROUP 5 INCLUDES PCB'S 1260 AND 1262 AND IS CALCULATED AS 1260.

LEGAL

39/49

DATE: 14 JAN 85

LAB #: 84-1020
ITEM #: 2
SAMPLE: Z1207

PCB'S
METHOD 608

AMOUNT MG/KG	PARAMETER
<0.25	PCB GROUP 1
<0.1	PCB GROUP 2
<0.05	PCB GROUP 3
<0.05	PCB GROUP 4
<0.05	PCB GROUP 5
0	TOTAL PCB

PCB GROUP 1 INCLUDES PCB 1221 AND IS CALCULATED AS 1221.
PCB GROUP 2 INCLUDES PCB 1232 AND IS CALCULATED AS 1232.
PCB GROUP 3 INCLUDES PCB'S 1016, 1242, AND 1248 AND IS CALCULATED AS 1242.
PCB GROUP 4 INCLUDES PCB 1254 AND IS CALCULATED AS 1254.
PCB GROUP 5 INCLUDES PCB'S 1260 AND 1262 AND IS CALCULATED AS 1260.

LEGAL

40/89

DATE: 14 JAN 85

LAB #: 84-1020
ITEM #: 3
SAMPLE: Z1019

PCB'S
METHOD 608

AMOUNT MG/KG	PARAMETER
<0.5	PCB GROUP 1
<0.1	PCB GROUP 2
<0.05	PCB GROUP 3
<0.05	PCB GROUP 4
<0.05	PCB GROUP 5
0	TOTAL PCB

PCB GROUP 1 INCLUDES PCB 1221 AND IS CALCULATED AS 1221.
PCB GROUP 2 INCLUDES PCB 1232 AND IS CALCULATED AS 1232.
PCB GROUP 3 INCLUDES PCB'S 1016, 1242, AND 1248 AND IS CALCULATED AS 1242.
PCB GROUP 4 INCLUDES PCB 1254 AND IS CALCULATED AS 1254.
PCB GROUP 5 INCLUDES PCB'S 1260 AND 1262 AND IS CALCULATED AS 1260.

LEGAL

41/49

DATE: 14 JAN 85

LAB #: 84-1020
ITEM #: 4
SAMPLE: Z1008

PCB'S
METHOD 608

AMOUNT MG/KG	PARAMETER
<0.25	PCB GROUP 1
<0.1	PCB GROUP 2
<0.05	PCB GROUP 3
<0.05	PCB GROUP 4
<0.05	PCB GROUP 5
0	TOTAL PCB

PCB GROUP 1 INCLUDES PCB 1221 AND IS CALCULATED AS 1221.
PCB GROUP 2 INCLUDES PCB 1232 AND IS CALCULATED AS 1232.
PCB GROUP 3 INCLUDES PCB'S 1016, 1242, AND 1248 AND IS CALCULATED AS 1242.
PCB GROUP 4 INCLUDES PCB 1254 AND IS CALCULATED AS 1254.
PCB GROUP 5 INCLUDES PCB'S 1260 AND 1262 AND IS CALCULATED AS 1260.

LEGAL

42/49

DATE: 14 JAN 85

LAB #: 84-1020
ITEM #: 5
SAMPLE: Z1009

PCB'S
METHOD 608

AMOUNT MG/KG	PARAMETER
<0.25	PCB GROUP 1
<0.1	PCB GROUP 2
<0.05	PCB GROUP 3
<0.05	PCB GROUP 4
<0.05	PCB GROUP 5
0	TOTAL PCB

PCB GROUP 1 INCLUDES PCB 1221 AND IS CALCULATED AS 1221.
PCB GROUP 2 INCLUDES PCB 1232 AND IS CALCULATED AS 1232.
PCB GROUP 3 INCLUDES PCB'S 1016, 1242, AND 1248 AND IS CALCULATED AS 1242.
PCB GROUP 4 INCLUDES PCB 1254 AND IS CALCULATED AS 1254.
PCB GROUP 5 INCLUDES PCB'S 1260 AND 1262 AND IS CALCULATED AS 1260.

LEGAL

43/49

DATE: 14 JAN 85

LAB #: 84-1020 fck
ITEM #: 6
SAMPLE: I1010

PCB'S
METHOD 608

AMOUNT MG/KG	PARAMETER
<0.25	PCB GROUP 1
<0.1	PCB GROUP 2
.09	PCB GROUP 3
<0.05	PCB GROUP 4
<0.05	PCB GROUP 5
.09	TOTAL PCB

PCB GROUP 1 INCLUDES PCB 1221 AND IS CALCULATED AS 1221.
PCB GROUP 2 INCLUDES PCB 1232 AND IS CALCULATED AS 1232.
PCB GROUP 3 INCLUDES PCB'S 1016, 1242, AND 1248 AND IS CALCULATED AS 1242.
PCB GROUP 4 INCLUDES PCB 1254 AND IS CALCULATED AS 1254.
PCB GROUP 5 INCLUDES PCB'S 1260 AND 1262 AND IS CALCULATED AS 1260.

LEGAL

44/49

DATE: 14 JAN 85

LAB #: 84-1020
ITEM #: 7
SAMPLE: Z1011

PCB'S
METHOD 608

AMOUNT MG/KG	PARAMETER
<0.25	PCB GROUP 1
<0.1	PCB GROUP 2
<0.05	PCB GROUP 3
<0.05	PCB GROUP 4
<0.05	PCB GROUP 5
0	TOTAL PCB

PCB GROUP 1 INCLUDES PCB 1221 AND IS CALCULATED AS 1221.
PCB GROUP 2 INCLUDES PCB 1232 AND IS CALCULATED AS 1232.
PCB GROUP 3 INCLUDES PCB'S 1016, 1242, AND 1248 AND IS CALCULATED AS 1242.
PCB GROUP 4 INCLUDES PCB 1254 AND IS CALCULATED AS 1254.
PCB GROUP 5 INCLUDES PCB'S 1260 AND 1262 AND IS CALCULATED AS 1260.

LEGAL

45/49

DATE: 14 JAN 85

LAB #: 84-1020
ITEM #: 8
SAMPLE: Z1012

PCB'S
METHOD 608

AMOUNT MG/KG	PARAMETER
<0.75	PCB GROUP 1
<0.25	PCB GROUP 2
<0.15	PCB GROUP 3
<0.15	PCB GROUP 4
<0.15	PCB GROUP 5
0	TOTAL PCB

PCB GROUP 1 INCLUDES PCB 1221 AND IS CALCULATED AS 1221.
PCB GROUP 2 INCLUDES PCB 1232 AND IS CALCULATED AS 1232.
PCB GROUP 3 INCLUDES PCB'S 1016, 1242, AND 1248 AND IS CALCULATED AS 1242.
PCB GROUP 4 INCLUDES PCB 1254 AND IS CALCULATED AS 1254.
PCB GROUP 5 INCLUDES PCB'S 1260 AND 1262 AND IS CALCULATED AS 1260.

LEGAL

46/49

DATE: 14 JAN 85

LAB #: 84-1020
ITEM #: 9
SAMPLE: Z1018

PCB'S
METHOD 608

AMOUNT UG/KG	PARAMETER
<10	PCB GROUP 1
<10	PCB GROUP 2
<5	PCB GROUP 3
<5	PCB GROUP 4
<5	PCB GROUP 5
0	TOTAL PCB

PCB GROUP 1 INCLUDES PCB 1221 AND IS CALCULATED AS 1221.
PCB GROUP 2 INCLUDES PCB 1232 AND IS CALCULATED AS 1232.
PCB GROUP 3 INCLUDES PCB'S 1016, 1242, AND 1248 AND IS CALCULATED AS 1242.
PCB GROUP 4 INCLUDES PCB 1254 AND IS CALCULATED AS 1254.
PCB GROUP 5 INCLUDES PCB'S 1260 AND 1262 AND IS CALCULATED AS 1260.

LEGAL

47/49

DATE: 14 JAN 85

LAB #: 84-1020
ITEM #: 10
SAMPLE: I1017

REK

PCB'S
METHOD 608

AMOUNT MG/KG	PARAMETER
<100	PCB GROUP 1
<100	PCB GROUP 2
<50	PCB GROUP 3
<50	PCB GROUP 4
<50	PCB GROUP 5
0	TOTAL PCB

PCB GROUP 1 INCLUDES PCB 1221 AND IS CALCULATED AS 1221.
PCB GROUP 2 INCLUDES PCB 1232 AND IS CALCULATED AS 1232.
PCB GROUP 3 INCLUDES PCB'S 1016, 1242, AND 1248 AND IS CALCULATED AS 1242.
PCB GROUP 4 INCLUDES PCB 1254 AND IS CALCULATED AS 1254.
PCB GROUP 5 INCLUDES PCB'S 1260 AND 1262 AND IS CALCULATED AS 1260.

LEGAL

48/49

DATE: 14 JAN 85

LAB #: 84-1020
ITEM #: 11
SAMPLE: Z1016

PCB'S
METHOD 608

AMOUNT MG/KG	PARAMETER
<0.25	PCB GROUP 1
<0.1	PCB GROUP 2
<0.05	PCB GROUP 3
<0.05	PCB GROUP 4
<0.05	PCB GROUP 5
0	TOTAL PCB

PCB GROUP 1 INCLUDES PCB 1221 AND IS CALCULATED AS 1221.
PCB GROUP 2 INCLUDES PCB 1232 AND IS CALCULATED AS 1232.
PCB GROUP 3 INCLUDES PCB'S 1016, 1242, AND 1248 AND IS CALCULATED AS 1242.
PCB GROUP 4 INCLUDES PCB 1254 AND IS CALCULATED AS 1254.
PCB GROUP 5 INCLUDES PCB'S 1260 AND 1262 AND IS CALCULATED AS 1260.

LEGAL

49/49

DATE: 14 JAN 85

LAB #: 84-1020
ITEM #: 12
SAMPLE: Z1004

PCB'S
METHOD 608

AMOUNT MG/KG	PARAMETER
<0.5	PCB GROUP 1
<0.1	PCB GROUP 2
<0.05	PCB GROUP 3
<0.05	PCB GROUP 4
<0.05	PCB GROUP 5
0	TOTAL PCB

PCB GROUP 1 INCLUDES PCB 1221 AND IS CALCULATED AS 1221.
PCB GROUP 2 INCLUDES PCB 1232 AND IS CALCULATED AS 1232.
PCB GROUP 3 INCLUDES PCB'S 1016, 1242, AND 1248 AND IS CALCULATED AS 1242.
PCB GROUP 4 INCLUDES PCB 1254 AND IS CALCULATED AS 1254.
PCB GROUP 5 INCLUDES PCB'S 1260 AND 1262 AND IS CALCULATED AS 1260.

STATE OF OREGON

DEPARTMENT OF ENVIRONMENTAL QUALITY

INTEROFFICE MEMO

TO: Debbie Flood, Superfund Program Management Section, EPA-Region X

DATE: February 12, 1985

FROM: John L. Smits
Northwest Region, DEQ

SUBJECT: HW - 3012 Superfund
Time Oil Company
ORD 009597543
Multnomah County

Time Oil Company operates a petroleum products storage terminal at 12005 N. Burgard, Portland, Oregon 97203. The terminal occupies a 51.53-acre site along the east bank of the Willamette River and is owned by Time Oil Co., PO Box 24447 Terminal Annex, Seattle, Washington 98124. The present capacity of the terminal in 30+ tanks is 770,000 barrels.

The on-site inspection was conducted on Oct. 25, 1984. John Denham, environmental manager who has worked for Time Oil since 1970 and Neil Wallis, terminal manager employed by Time Oil since 1979 were interviewed. Time Oil Co. acquired the site during 1959. Mr. Denham provided by letter dated Nov. 7, 1984, the attached chart which lists the tanks by number and indicates the types of chemicals stored in each since 1973. As can be seen from the chart, most tanks have held a number of different chemicals at different times. For example, tank no. 4408 held the following during the period:

1973	Methanol
1974	Jet fuel
1975	Premium gasoline
1976-78	Unleaded gasoline
1979-80	Fuel oil no. 2
1981-83	Empty

The terminal has handled the following chemicals:

Fatty acid (wood byproduct)	Liquid fertilizer (ammonium nitrate)
Isobutanol	Lignin liquor
Jet fuel	Lube oil
Methanol	Methyl 10
Premium gasoline	Pentachlorophenol
Regular gasoline	Solvent (xylene, toluene)
Turpentine	Unleaded gasoline
Butyl alcohol	

A number of the substances that have been and are stored at this Time Oil terminal are hazardous substances due to ignitability or toxicity.

It appears that several arrangements have been made at the terminal related to product handling. Time Oil may lease a tank to a company like Chevron with the stored product owned by Chevron and handling, distribution and storage services performed by Time Oil. Time may control the tank, own the product and distribute the product, or rent a tank for storage only.

In the case of tanks 50067 and 10002, Time Oil Co. leased the tanks and possibly that portion of the tank farm site to Crosby and Overton of 5420 N. Lagoon, Portland, Oregon 97217. The same tanks appear to have been leased prior to this time by Pac-Mar, the previous name of Crosby and Overton. The Department has been unable to obtain a copy of the lease agreement. Crosby and Overton provides the service of collecting and then storing waste oils from separators, oil slop tanks, ship tank cleaning, etc. The two tanks appear to have been leased to Crosby and Overton since 1973.

Several smaller tanks, no. 20001, 20002 and 20003 having a capacity of 20,000 gal. each were leased to Koppers Co., Inc., of 5137 Southwest Ave., St. Louis, MO 63110. Several smaller, above-ground, horizontal oriented tanks in this area belong to Koppers Co. as well. According to Mr. Denham, Time Oil Co. formulated pentachlorophenol for Koppers to Koppers specifications and then handled or stored the formulations for later pickup by customers of Koppers.

The 20,000-gal. tanks were present during the Oct. 25, 1984 site inspection (reportedly empty) but had been removed from the site prior to the Dec. 12, 1984 soil sampling event. There was visually obvious contamination of the soil by incidental spills and slops in this former pentachlorophenol handling area. The level of contamination will be discussed later in this narrative.

Present Waste Management Practices

Since around December 1972, all tanks (except 50067 and 10002 leased to Crosby and Overton and the smaller tanks leased to or belonging to Koppers Company), the loading rack area and the pump house have been connected to a water draw system. A water draw box and water draw fittings are located beside each tank. These in turn are connected to a drainage piping network in place throughout the terminal. About once each year, water is drawn from the bottom of each tank and pumped to slop tank 3007 located in the northwest terminal area, or to tank 1406 in the area known as the Bell Oil Terminal. A portable Fram-Akers oil/water separator is periodically connected to the slop tank. The separated oil is either piped back to the appropriate storage tank or to an underground 3000-gal. separator tank near tank 3007 or an above-ground separator tank no. 1407 beside tank 1506. Water removed by the separator which contains less than 100 ppm ether soluble oil is by agreement discharged by a piping system to the City of Portland sanitary sewer system for treatment at the publicly owned treatment works (POTW). Two sampling manholes associated with two sewer lines are periodically monitored by staff with the City Dept. of Public Works. Waste oil from the separator is periodically removed from the underground 3000-gal. tank and above-ground tank 1507, and taken by Crosby and Overton to the tanks 50067 or 10002 that they lease from Time Oil on

the same site area. Alternately, a vacuum truck may be connected directly to the oil/water separator with waste oils transported to the Crosby and Overton tanks.

There is also an underground 6000-gal. spill prevention control and countermeasure (SPCC) tank associated with the off-shore pier to hold any spills and storm water that may be collected during ship loading/unloading. An 8000-gal. underground SPCC tank is located near the pump house and truck loading rack to collect any spills and storm water from those areas. The rail spur line recently constructed with curbing and spill drains has an underground 12,000-gal. tank for containment of any spills in that area. The loading rack area of the Bell Oil Terminal section was proposed to be equipped with an underground 4000-gal. slop and water tank. This section of the terminal has not been in use for quite some time.

Time Oil Co. on Aug. 11, 1980, completed EPA Form 8700-12, Notification of Hazardous Waste Activity, as required by RCRA 3010 listing specific source wastes, K051 - API separator sludge, K052 - tank bottoms (leaded) and P090 - pentachlorophenol. On Feb. 22, 1982, Time Oil requested assignment of a generator identification number by correspondence with the Department of Environmental Quality.

Past Waste Management Practices

According to Mr. Denham, there are no retrievable inventory records of product storage for the period 1959 to 1973. He agreed that it can be assumed similar products were stored on-site in a pattern like that shown on the 1973 to 1983 chart provided by Time Oil Co.

Prior to the installation of the draw water system for each tank, associated piping and use of the portable oil/water separator in late 1972, wastewater from tank bottoms was allowed to spill onto the ground around the site. This practice was apparently common to oil terminal facilities in the area until Oregon DEQ began to work in 1970-71 with terminals to discontinue discharge into public waters and onto ground surfaces. This practice apparently occurred at the Time Oil terminal during the period from 1959 to late 1972. A Feb. 16, 1971 internal memo describes a conversation with the plant engineer employed by Time Oil at that time that confirms the discharge of draw water from tank bottoms onto the ground but states further that the company maintained no such effluent discharged to the river, drainage ditch or storm sewer.

In view of the wasting of water from tank bottoms onto the soil surface for a period of up to 13 years, and the storage of leaded gasoline at one time or another in most of the tanks, a decision was made to collect soil samples in a somewhat random grid fashion throughout the terminal area. Samples were also collected in the area near tanks used by Crosby and Overton and those leased to Koppers to store pentachlorophenol formulations.

Sampling

At each of 12 locations, a composite soil sample using a soil core was collected. The composite was made up of the surface and 1, 2 and 3 foot intervals. Samples were collected and analyzed by the DEQ laboratory. Analysis of each sample included base-neutral extractables, pesticides/PCBs (method 608), acid extractables, pesticides (method 625) and EP Toxicity for lead. An effort was also made to identify and quantify any other organic chemical observed with the extraction/GC (gas chromatograph) MS (mass spectrometer) procedures.

All 12 soil samples tested for EP Toxicity lead showed concentrations of <0.1 mg/l. Concentrations of 5 mg/l or greater for EPA Toxic lead are classified as hazardous waste. The detection limit for this procedure is 0.1 mg/l.

Of 12 soil samples tested for pesticides, method 625, extracted by RCRA method 3540, all showed concentrations of <5 mg/kg (the detection limit) of these pesticides.

Samples tested for acid extractables method 625, extracted by RCRA method 3540 (acetone/hexane) showed all 12 sites to contain <1 mg/kg (detection limit) for these phenol species except item 9, sample Z1018 collected 19 ft. NE of tank 50067 (Crosby and Overton leased tank) contained 515 mg/kg pentachlorophenol and 12 mg/kg tetrachlorophenol. Item 10, sample Z1017 contained 1820 mg/kg pentachlorophenol and 71 mg/kg tetrachlorophenol collected at the site of the tanks leased to Koppers for storage of pentachlorophenol formulations.

Of the soil samples collected and analyzed for base-neutral extractables, method 625, extracted by RCRA method 3540 all showed concentrations of this group of pollutants to be less than the detection limit (< 1 mg/kg) except the following tanks showed:

No. 20511 - Item 4, soil bag Z1008

Isophorone	1 mg/kg
2,4-dinitrotoluene	3 mg/kg
Fluorene	1 mg/kg
n-nitrosodiphenylamine	2 mg/kg
Phenanthrene	1 mg/kg
Anthracene	1 mg/kg

No. 15002 - Item 8, soil bag Z1012

Fluorene	13 mg/kg
Phenanthrene	14 mg/kg
Anthracene	105 mg/kg

Crosby and Overton

No. 50067 - Item 9, soil bag Z1018

Chrysene	1 mg/kg
Bis(2-ethylhexyl)phthalate	3 mg/kg

Although polychlorinated biphenyls (PCBs) were detected at several soil sample sites, total PCBs were well below the 50 mg/kg concentration which requires handling.

At each sample site, in addition to the priority pollutant chemicals, the sample was scanned for any other unknowns above the detection limit of 1.0 mg/l. In the case of 3 sample sites, 4 (Z1008), 9 (Z1018) and 10 (Z1017), a number of other chemicals were tentatively identified and estimated concentrations determined. These results are shown on the attached lab sheets.

Crosby and Overton Leased Tanks

During 1983 on an as yet unspecified date, an individual was allegedly exposed to a substance while cutting an access hole into tank no. 10002 leased to Crosby and Overton by Time Oil Co. The hole was reportedly cut to remove the substance inside. Allegedly, the individual developed immediate symptoms involving skin irritation. Reportedly, the individual returned to the tank some time later and collected three (3) soil samples near the tank. Those soil samples were said analyzed by CH2M/Hill. CH2M/Hill reported PCB concentrations of 29.4 mg/kg, 584, mg/kg and 1060 mg/kg (disposal restrictions apply when PCB concentrations exceed 50 mg/kg).

On May 2, 1984, DEQ laboratory staff collected samples at the Crosby and Overton tank in question. A soil sample 10 ft. from the apparent access hole cut into the tank showed a total PCB concentration of 59.7 mg/kg. Sludge collected on a surface 4 ft. from the edge of the tank entry hole showed a total PCB concentration of 1357 mg/kg.

Detection of PCB near the tank resulted in review of past waste oil disposal records involving the Crosby and Overton tank. The records showed disposal of 210,000 gal. of petroleum-based sludge by Crosby and Overton at the St. Johns Municipal Landfill located on Columbia Blvd. in Portland, Oregon. An application for disposal of special wastes at the landfill was approved by the Metropolitan Service District (Metro) Aug. 10, 1983, following review of sample analysis of the tank contents which showed PCB concentrations to be <1 ppm.

During Sept. 1984, the area at the St. Johns Landfill believed to contain the 210,000 gal. of petroleum sludge was extensively sampled and analyzed for PCBs. The presence of PCBs in the areas tested was not confirmed.

Assessment

There are problems at the Time Oil Co. terminal associated with the past handling of hazardous substances. The long-time discharge of tank bottom draw water onto the ground surface within the terminal area may have impacted groundwater below the site. This could not be confirmed using the sampling equipment available. Surface soil samples did not detect any significant concentrations of priority pollutants to depths of three (3) feet that might be expected within a tank farm that had discharged wastewater onto the ground. As mentioned above under the Sampling section, priority pollutants and other organic chemicals were found in some areas.

The soil on-site appears to be dredge sand that has been in place for many years. Lenses of silt were observed within the 3-ft. sample. The silt appeared to perch water at some sample sites. The permanent groundwater table is apparently about 20 ft. below the land surface. Downgradient groundwater usage could not be confirmed.

Based on past practices of draw water disposal, presence of some contaminants within the upper surface and shallow depth of groundwater, it is recommended that construction of groundwater monitoring wells be seriously considered to better characterize the extent of pollution.

Pentachlorophenol is present in high concentrations within the soil in the area of the tanks leased to Koppers Co. and those leased to Crosby and Overton. These areas need cleanup of the spilled hazardous wastes. Cleanup should include careful evaluation of the effectiveness of the removal including groundwater sampling. Further review of the alleged incident involving presence of PCB at the Crosby and Overton tanks appears to be warranted.

During a Jan. 28, 1985, phone conversation with John Denham of Time Oil, the detection of pentachlorophenol was discussed. He told me the company realized the waste was present on the ground and soil some time ago. Denham also told me that after this information became available, Time had cancelled the contract to handle pentachlorophenol and its ingredients for Koppers as well as the lease of tanks. Denham stated that tanks have been cleaned out and removed and the remaining tanks will be moved out soon and cleanup of the area will start. It was suggested that this information be sent by letter to the Northwest Region of DEQ including proposed cleanup methods and time schedule. He said he would do that after reviewing sampling results.

Backlog Reduction

It is recommended that Time Oil Co. (ORD 009597543) be placed into backlog reduction category B-5. Problems involving hazardous wastes are present. The State of Oregon DEQ, Northwest Region, has the regulatory authority to investigate hazardous waste handling/disposal and to require remedial cleanup action. Northwest Region of DEQ fully intends to follow up this assessment and work with the company to establish necessary monitoring and cleanup.

The site does not appear to present a hazard to the health of the general public by direct contact with wastes present due to the security of fences, 24-hr/day staffing of the site and a watchman service. The threat to the environment appears to be related to the potential impact to groundwater. Groundwater impact needs to be further evaluated.

At this time, it does not appear that further involvement of the RCRA 3012 program will be necessary.

RC2044
Attachment
cc: Northwest Region, DEQ
Hazardous Waste Operations, DEQ
Time Oil Co.
Crosby and Overton

FEB. 1, 1987

~~Jan 24 (?) 1987~~

NNN F13588

GENERAL INFORMATION

GENERATOR NAME: Time Oil Co.

FACILITY ADDRESS: 12005 N. Burgard Rd.
Portland, OR

TRANSPORTER: Gresham Transfer Inc.

TRANSPORTER PHONE: (503) 255-7900

GENERATOR USEPA ID: O R D 0 0 9 5 9 7 5

GENERATOR STATE ID.

TECHNICAL CONTACT: John P. Denham TITLE: Environmental Manager PHONE: (206) 285-2400

NAME OF WASTE: PCP contaminated soil

PROCESS GENERATING WASTE: Clean up of contaminated site at 12005 N. Burgard Road

B PHYSICAL CHARACTERISTICS OF WASTE

COLOR

ODOR: ☐ NONE ☐ MILD ☐ STRONG DESCRIBE

PHYSICAL STATE @ 70°F: ☒ SOLID ☐ SEMI SOLID ☐ LIQUID ☐ POWDER

LAYERS: ☐ MULTILAYERED ☐ BILAYERED ☒ SINGLE PHASED

FREE LIQUIDS: ☐ YES ☒ NO VOLUME

pH: ☐ < 2 ☐ 7.1-10 ☒ N/A ☐ 2-4 ☐ 10.1-12.5 ☐ 4.1-6.9 ☐ > 12.5 ☐ 7 ☐ EXACT

SPECIFIC GRAVITY: ☐ < .8 ☐ 1.3-1.4 ☐ .8-1.0 ☐ 1.5-1.7 ☒ 1.1-1.2 ☐ > 1.7 ☐ EXACT

FLASH POINT: ☐ < 70°F ☐ > 200°F ☐ CLOSED CUP ☐ 70°F-100°F ☒ NO FLASH ☐ OPEN CUP ☐ 101°F-139°F ☐ EXACT ☐ 140°F-200°F

C CHEMICAL COMPOSITION (TOTALS MUST ADD TO 100%)

Contaminated soil	
pentachlorophenol	.1820
tetrachlorophenol	.0071
trace amounts of other	
chlorinated chemicals less than	.0001
Non-contaminated soil	99.812

D METALS ☐ TOTAL (PPM) ☐ EPA EXTRACTION PROCEDURE (mg/L)

ARSENIC (As)	-0-	SELENIUM (Se)	-0-
BARIUM (Ba)	-0-	SILVER (Ag)	
CADMIUM (Cd)	-0-	COPPER (Cu)	-0-
CHROMIUM (Cr)	-0-	NICKEL (Ni)	-0-
MERCURY (Hg)	-0-	ZINC (Zn)	-0-
LEAD (Pb)	-0-	THALLIUM (Tl)	-0-
CHROMIUM-HEX (Cr + 6)	-0-		

E OTHER COMPONENTS - TOTAL (PPM)

CYANIDES	-0-	PCB'S	-0-
SULFIDES	-0-	PHENOLICS	-0-

F SHIPPING INFORMATION

DOT HAZARDOUS MATERIAL? ☒ YES ☐ NO

PROPER SHIPPING NAME: Waste pentachlorophenol mixture

HAZARD CLASS: ORM-E ID NO: NA 2020 RQ: 10 lbs

METHOD OF SHIPMENT: ☐ BULK LIQUID ☒ BULK SOLID ☐ DRUM (TYPE SIZE)

ANTICIPATED VOLUME: GALS 260 CUBIC YARDS OTHER

PER: ☒ ONE TIME ☐ WEEK ☐ MONTH ☐ QUARTER ☐ YEAR ☐

G HAZARDOUS CHARACTERISTICS

REACTIVITY: ☒ NONE ☐ PYROPHORIC ☐ SHOCK SENSITIVE ☐ EXPLOSIVE ☐ WATER REACTIVE ☐ OTHER

OTHER HAZARDOUS CHARACTERISTICS: ☒ NONE ☐ RADIOACTIVE ☐ ETIOLOGICAL ☐ PESTICIDE MANUFACTURING WASTE ☐ OTHER

USEPA HAZARDOUS WASTE? ☒ YES ☐ NO

USEPA HAZARDOUS CODE(S): U242

STATE HAZARDOUS WASTE? ☒ YES ☐ NO

STATE CODE(S): U 242

SPECIAL HANDLING INFORMATION

☐ ADDITIONAL PAGES ATTA

I HEREBY CERTIFY THAT ALL INFORMATION SUBMITTED IN THIS AND ALL ATTACHED DOCUMENTS IS COMPLETE AND ACCURATE, AND THAT ALL KNOWN OR SUSPECTED HAZARDS HAVE BEEN DISCLOSED

AUTHORIZED SIGNATURE TITLE DATE

BZTO104(e)012348

WASTE PROFILE SHEET

CERTIFICATION OF REPRESENTATIVE SAMPLE

GENERAL DIRECTIONS: IN ORDER TO DETERMINE WHETHER WE CAN ACCEPT THE SPECIAL WASTE DESCRIBED IN THE ABOVE NUMBERED PROFILE SHEET, WE MUST OBTAIN A REPRESENTATIVE SAMPLE OF THE WASTE. WE WILL ANALYZE THE SAMPLE TO VERIFY THE INFORMATION YOU HAVE PROVIDED US, SO IT IS PARTICULARLY IMPORTANT THAT THE SAMPLE BE TRULY REPRESENTATIVE. IN MOST CIRCUMSTANCES YOU WILL BE OBTAINING THE SAMPLE. HOWEVER, IN THOSE CASES IN WHICH WE OBTAIN THE SAMPLE, WE MUST ASK THAT ONE OF YOUR EMPLOYEES BE PRESENT TO DIRECT THE PARTICULAR SOURCE TO BE SAMPLED AND TO WITNESS THE SAMPLING. IN SUCH CASE, YOUR EMPLOYEE MUST SIGN THIS CERTIFICATION AS A WITNESS.

THIS CERTIFICATION MUST BE RETURNED, WITH THE REPRESENTATIVE WASTE SAMPLE, TO:

THE UNDERSIGNED CERTIFIES THAT HE/SHE OBTAINED A REPRESENTATIVE SAMPLE OF THE WASTE MATERIAL DESCRIBED IN THE "GENERATOR'S WASTE MATERIAL PROFILE SHEET" ABOVE REFERENCED, AND THAT THE FOLLOWING REPRESENTATIONS ARE TRUE AND CORRECT:

1. HOUR AND DATE OF SAMPLING: 0930 Hours, February 19, 1985
2. SOURCE FROM WHICH SAMPLE TAKEN: 12005 N. Burgard Road, Portland Oregon, pentachlorophenol area shown on attached plot plan.
3. EQUIPMENT AND SAMPLING METHOD USED: Shovel and can used. Surface, one foot and two foot representative samples obtained, mixed together and placed in can.
4. AMOUNT OF SAMPLE OBTAINED: One (1) gallon.
5. TYPE OF CONTAINER INTO WHICH SAMPLE WAS PLACED: New one gallon paint can
6. THE SAMPLING EQUIPMENT USED, AND THE CONTAINER INTO WHICH THE SAMPLE WAS PLACED, WERE THEMSELVES UNCONTAMINATED BEFORE USE. Yes.
7. AT THE TIME OF SAMPLING I AFFIXED A LABEL TO THE CONTAINER IN THE FOLLOWING FORM WITH THE FOLLOWING INFORMATION (FILL IN THIS PORTION, INCLUDING YOUR SIGNATURE, JUST AS IT APPEARS ON THE LABEL YOU PREPARED):

GENERATOR: Time Oil Co.
WASTE NAME: Pentachlorophenol mixture.
SAMPLE HOUR/DATE: 0930 Hours, Feb. 19, 1985
PROFILE SHEET CODE: E 13588
SAMPLER SIGNATURE: Neil E. Wallis

WITNESS VERIFICATION: I WAS PERSONALLY PRESENT DURING THE SAMPLING DESCRIBED; I DIRECTED THE WASTE SOURCE TO BE SAMPLED; AND I VERIFY THE INFORMATION ABOVE NOTED.

WITNESS: John H. Somes

SIGNATURE: J. H. Somes

TITLE: General Manager

EMPLOYER: North West Vacuum Truck Service

DATE: February 19, 1985

SAMPLER NAME: Neil E. Wallis

SIGNATURE: Neil E. Wallis

TITLE: Terminal Manager

EMPLOYER: Time Oil Co.

DATE: February 19, 1985

LABORATORY REVIEW OF SAMPLING PROTOCOL

BASED UPON MY REVIEW OF THE ABOVE PROFILE SHEET, I CONCLUDE THAT THE ABOVE METHODOLOGY IS:

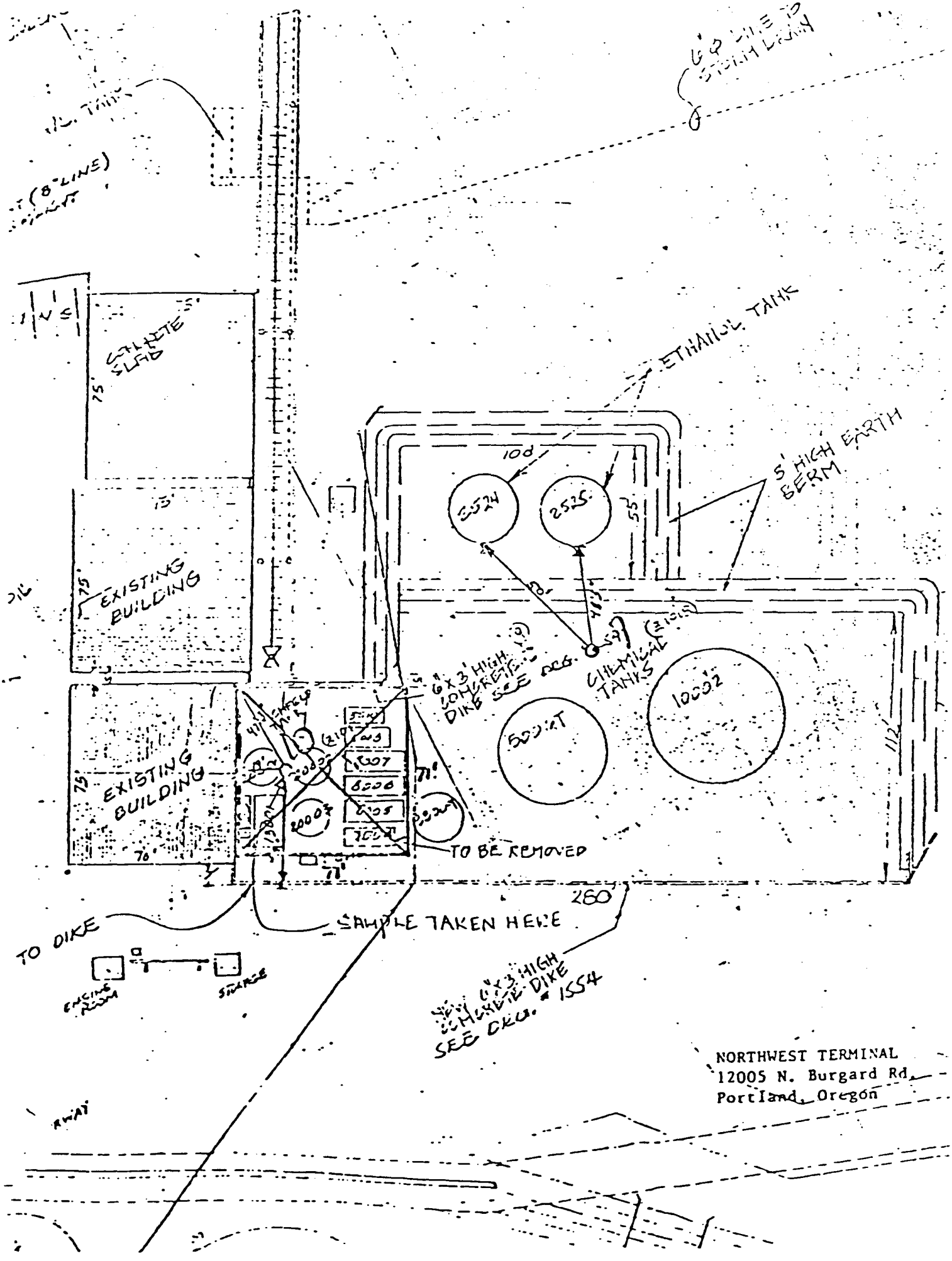
☐ ADEQUATE FOR YIELDING A REPRESENTATIVE SAMPLE.

☐ INADEQUATE FOR THE REASONS NOTED HEREON.

DATE: _____

LAB MGR: _____

© 1982 WASTE MANAGEMENT, INC


ETHANOL TANK
5' HIGH EARTH BERM
EXISTING BUILDING
EXISTING BUILDING
CHEMICAL TANKS
TO BE REMOVED
SAMPLE TAKEN HERE
TO DIKE
ENGINE ROOM
STORAGE
NORTHWEST TERMINAL
12005 N. Burgard Rd.
Portland, Oregon

HOME 793-5949

JOHN L. SMITS
Environmental Analyst
NORTH COAST BRANCH OFFICE, ASTORIA

Department of Environmental Quality
Clatsop County Courthouse
P.O. Box 869
Astoria 97103

229-5245
Phone 325-8660

Solo

3/15/85

Coffee lab

BASE/NEUTRAL EXTRACTABLES
METHOD 625
8270

PARAMETER	PARAMETI
BIS(2-CHLOROETHYL) ETHER	
1,3-DICHLOROBENZENE	
1,4-DICHLOROBENZENE	
1,2-DICHLOROBENZENE	
HEXACHLOROETHANE	
N-NITROSO-DI-N-PROPYLAM.	
NITROBENZENE	
ISOPHORONE	
BIS(2-CHLOROETHOXY) METH	
1,2,4-TRICHLOROBENZENE	
NAPHTHALENE	
HEXACHLOROBUTADIENE	
HEXACHLOROCYCLOPENTADIENE	
2-CHLORONAPHTHALENE	
ACENAPHTHYLENE	
DIMETHYLPHTHALATE	
2,6-DINITROTOLUENE	

Sample Z 1017
penta 275 mg/kg
tetra
2345 3.1 ppm
2346 10.6 ppm
2356 0.35 ppm

PESTICIDES/PCB'S
METHOD 608

Sample Z 1018
penta 167.5 ppm
tetra
2345 1.3 ppm
2346 1.9 ppm
2356 7.1 ppm

PARAMETER
ALPHA-BHC
BETA-BHC
LINDANE
HEPTACHLOR
ALDRIN
P,P'-DDE
P,P'-DDD
P,P'-DDT

PCB GROUP 1 INCLUDES PCB'S 1
1242 AND IS CALCULATE
PCB GROUP 2 INCLUDES PCB'S 1
AND IS CALCULATED AS
PCB GROUP 3 INCLUDES PCB'S 1
AND IS CALCULATED AS 1

1

Solv

HOME 733-5949

JOHN L. SMITS
Environmental Analyst
NORTH COAST BRANCH OFFICE ASTO

Department of Environmental Quality
Clatsop County Courthouse
P O Box 869 Astoria 971

BASE/NEUTRAL EXTRACTABLES
METHOD 625
8270

PARAMETER	PARAMETER
BIS(2-CHLOROETHYL) ETHER	ACENAPHTHENE
1,3-DICHLOROBENZENE	2,4-DINITROTOLUENE
1,4-DICHLOROBENZENE	FLUORENE
1,2-DICHLOROBENZENE	DIETHYLPHTHALATE
HEXACHLOROETHANE	N-NITROSODIPHENYLAMINE
N-NITROSO-DI-N-PROPYLAMINE	4-BROMOPHENYL PHENYL ETHER
NITROBENZENE	HEXACHLOROBENZENE
ISOPHORONE	PHENANTHRENE
BIS(2-CHLOROETHOXY) METHANE	ANTHRACENE
1,2,4-TRICHLOROBENZENE	DIBUTYL PHTHALATE
NAPHTHALENE	FLUORANTHENE
HEXACHLOROBUTADIENE	PYRENE
HEXACHLOROCYCLOPENTADIENE	BUTYL BENZYL PHTHALATE
2-CHLORONAPHTHALENE	BENZ(A)ANTHRACENE
ACENAPHTHYLENE	CHRYSENE
DIMETHYLPHTHALATE	3,3'-DICHLROBENZIDINE
2,6-DINITROTOLUENE	BIS(2-ETHYLHEXYL) PHTHALATE
	BENZ(A)PYRENE

PESTICIDES/PCB'S
METHOD 608

PARAMETER	PARAMETER
ALPHA-BHC	TOXAPHENE
BETA-BHC	
LINDANE	PCB GROUP 1
HEPTACHLOR	PCB GROUP 2
ALDRIN	PCB GROUP 3
P,P'-DDE	TOTAL PCB
P,P'-DDD	
P,P'-DDT	

PCB GROUP 1 INCLUDES PCB'S 1221, 1232,
1242 AND IS CALCULATED AS 1242.
PCB GROUP 2 INCLUDES PCB'S 1248, 1254
AND IS CALCULATED AS 1254
PCB GROUP 3 INCLUDES PCB'S 1260, 1262
AND IS CALCULATED AS 1260

1

ACID EXTRACTABLES
METHOD 625
8270

PARAMETER	PARAMETER
PHENOL	2,4,6-TRICHLOROPHENOL
2-CHLOROPHENOL	2,4-DINITROPHENOL
2-NITROPHENOL	4-NITROPHENOL
2,4-DIMETHYLPHENOL	2-METHYL-4,6-DINITROPHENOL
2,4-DICHLOROPHENOL	PENTACHLOROPHENOL
4-CHLORO-3-METHYLPHENOL	TETRACHLOROPHENOLS **

** REPORTED AS
2,3,4,6-TETRACHLOROPHENOL

PESTICIDES
METHOD 625
8270

PARAMETER	PARAMETER
ALPHA-BHC	DIELDRIN
HEPTACHLOR	ENDRIN
ALDRIN	ENDOSULFAN II
HEPTACHLOR EPOXIDE	P,P'-DDD
ENDOSULFAN I	ENDOSULFAN CYCLIC SULFATE
TRANS-NONACHLOR	P,P'-DDT
P,P'-DDE	GAMMA-BHC (LINDANE)

EP Tox Lead

In addition to these specific chemicals we will identify and quantitate any other organic that is observed with the extraction /GC/MS procedure.

TIME OIL COMPANY

2737 WEST COMMODORE WAY
P.O. BOX 24447 TERMINAL STATION

SEATTLE WASHINGTON 98199
SEATTLE WASHINGTON 98124

July 29, 1985

Chem-Security Systems, Inc.
P.O. Box 1866
Bellevue, WA 98009

Dear Sirs:

Attached is check 24607 as payment in full for disposal services as shown on your invoice 1447 dated June 30, 1985.

Sincerely,

John P. Denham
Environmental Manager

Attachment a/s

JPD/ch

(Kick Yates Lab) ~~Jeff Dresser~~, Salem

~~PEP~~ FF

VICTOR ATIYEH
Governor

Department of Environmental Quality

522 S.W. FIFTH AVENUE, BOX 1760, PORTLAND, OREGON 97207 PHONE: (503) 229-5696

January 17, 1985

[redacted]

Re: Your Letter of 1/3/85

The actual rule that the leach test is intended to simulate is OAR 340-101-034(1)(d) (enclosed). As you can see, the rule refers to conducting a bioassay on pesticide residue, the results of which determine whether or not the residue is a hazardous waste.

In a June 7, 1984 letter to industry, we cited 600 mg/l total chlorophenols as the hazardous waste threshold. This was meant to include -phenates as well. It was derived from some recent EPA data which indicated an average LC_{50} of 0.15 mg/l for salmonid with little toxicological difference between penta- or tetrachlorophenol or -phenate. Thus, if you place 250 mg/l of a residue containing 600 mg/l penta in water, and the penta is 100% leached, you will get a solution of 0.15 mg/l penta. Hence, the 600 mg/l number. However, we would emphasize that the 600 mg/l total chlorophenols is only an approximation which we suggest as being routinely acceptable for determining proper waste disposal. If there is any reason to contest a generator's characterization of his waste, or any reason to suspect improper waste disposal, we would go back to the required bioassay to make a definitive determination.

[redacted] Our data suggest that [redacted] (-phenates) are usually leached from sawdust, dirt, planer shavings, etc.

Please call if me at area code (503) 229-6210 if you wish further discussion. We would appreciate receiving any information you may care to share with us on this subject.

Sincerely,

FB

Fred S. Bromfeld
Senior Environmental Engineer
Hazardous Waste Operations
Solid Waste Division

State of Oregon
Department of Environmental Quality
RECEIVED
JAN 28 1985
Environmental Quality Laboratories

FSB:b
ZB4168
Enclosure(s)

RECEIVE
JAN 18 1985
State of Oregon
DEPARTMENT OF ENVIRONMENTAL Q
SALEM, OFFICE

BZTO104(e)012355

TIME OIL CO.

P.O. BOX 24447
TERMINAL ANNEX
SEATTLE, WASHINGTON 98124
(206) 285-2400

TO: JOHN DENHAM
FROM: N. WALLIS / PORTLAND

SUBJECT: SOIL SAMPLE / CHEM SECURITY

DATE: Feb. 19 '85

PER YOUR REQUEST ARE FINAL COPIES SENT TO CHEM SECURITY WITH THE SOIL SAMPLE TAKEN FROM WOODTREATING AREA.

RETURN TO → SIGNED N Wallis

DATE

SIGNED

THIS COPY FOR PERSON ADDRESSED

[illegible], Inc.

GENERATOR'S WASTE MATERIAL PROFILE SHEET

NWP E13588

A GENERAL INFORMATION

GENERATOR NAME: Time Oil Co.

TRANSPORTER: Gresham Transfer Inc.

FACILITY ADDRESS: 12005 N. Burgard Rd.
Portland, OR

TRANSPORTER PHONE: (503) 255-7900

GENERATOR USEPA I.D.: O R D 0 0 9 5 9 7 5 4

GENERATOR STATE I.D.:

TECHNICAL CONTACT: John P. Denham

TITLE: Environmental Manager

PHONE: (206) 285-2400

NAME OF WASTE: PCP contaminated soil

PROCESS GENERATING WASTE: Clean up of contaminated site at 12005 N. Burgard Road

B PHYSICAL CHARACTERISTICS OF WASTE

COLOR

~~ODOR: ☐ NONE ☐ MILD ☐ STRONG DESCRIBE~~

PHYSICAL STATE @ 70°F: ☒ SOLID ☐ SEMI-SOLID ☐ LIQUID ☐ POWDER

LAYERS: ☐ MULTILAYERED ☐ BI-LAYERED ☒ SINGLE PHASED

FREE LIQUIDS: ☐ YES ☒ NO

VOLUME: %

H: ☐ < 2 ☐ 7.1-10 ☒ N/A ☐ 2-4 ☐ 10.1-12.5 ☐ 4.1-9 ☐ > 12.5 ☐ 7 ☐ EXACT

SPECIFIC GRAVITY: ☐ < .8 ☐ 1.3-1.4 ☐ .8-1.0 ☐ 1.5-1.7 ☒ 1.1-1.2 ☐ > 1.7 ☐ EXACT

FLASH POINT: ☐ < 70°F ☐ > 200°F ☐ CLOSED CUP ☐ 70°F-100°F ☒ NO FLASH ☐ OPEN CUP ☐ 101°F-139°F ☐ EXACT ☐ 140°F-200°F

C CHEMICAL COMPOSITION (TOTALS MUST ADD TO 100%)

ontaminated soil	
pentachlorophenol	.1820
tetrachlorophenol	.0071
trace amounts of other	
chlorinated chemicals less than	.0001
Non-contaminated soil	99.812

D METALS ☐ TOTAL (PPM) ☐ EPA EXTRACTION PROCEDURE (mg/L)

ARSENIC (As)	-0-	SELENIUM (Se)	-0-
BARIUM (Ba)	-0-	SILVER (Ag)	-0-
CADMIUM (Cd)	-0-	COPPER (Cu)	-0-
CHROMIUM (Cr)	-0-	NICKEL (Ni)	-0-
MERCURY (Hg)	-0-	ZINC (Zn)	-0-
LEAD (Pb)	-0-	THALLIUM (Tl)	-0-
CHROMIUM-HEX (Cr + 6)	-0-		

E OTHER COMPONENTS - TOTAL (PPM)

CYANIDES	-0-	PCB'S	-0-
SULFIDES	-0-	PHENOLICS	-0-

F SHIPPING INFORMATION

D.O.T. HAZARDOUS MATERIAL? ☒ YES ☐ NO

PROPER SHIPPING NAME: Waste pentachlorophenol mixture

HAZARD CLASS: ORM-E I.D. NO: NA 2020 R.Q.: 10 lbs

METHOD OF SHIPMENT: ☐ BULK LIQUID ☒ BULK SOLID ☐ DRUM (TYPE/SIZE)

ANTICIPATED VOLUME: GALS 260 CUBIC YARDS OTHER

PER ☒ ONE TIME ☐ WEEK ☐ MONTH ☐ QUARTER ☐ YEAR ☐

G HAZARDOUS CHARACTERISTICS

REACTIVITY: ☒ NONE ☐ PYROPHORIC ☐ SHOCK SENSITIVE ☐ EXPLOSIVE ☐ WATER REACTIVE ☐ OTHER

OTHER HAZARDOUS CHARACTERISTICS: ☒ NONE ☐ RADIOACTIVE ☐ ETIOLOGICAL ☐ PESTICIDE MANUFACTURING WASTE ☐ OTHER

USEPA HAZARDOUS WASTE? ☒ YES ☐ NO

USEPA HAZARDOUS CODE(S): U242

STATE HAZARDOUS WASTE? ☒ YES ☐ NO

STATE CODE(S): U 242

H SPECIAL HANDLING INFORMATION

☐ ADDITIONAL PAGE(S) ATTAC

I HEREBY CERTIFY THAT ALL INFORMATION SUBMITTED IN THIS AND ALL ATTACHED DOCUMENTS IS COMPLETE AND ACCURATE, AND THAT ALL KNOWN OR SUSPECTED HAZARDS HAVE BEEN DISCLOSED

AUTHORIZED SIGNATURE TITLE DATE

BZTO104(e)012357

E13588

WASTE PROFILE SHEET CODE

CERTIFICATION OF REPRESENTATIVE SAMPLE

GENERAL DIRECTIONS: IN ORDER TO DETERMINE WHETHER WE CAN ACCEPT THE SPECIAL WASTE DESCRIBED IN THE ABOVE NUMBERED PROFILE SHEET, WE MUST OBTAIN A REPRESENTATIVE SAMPLE OF THE WASTE. WE WILL ANALYZE THE SAMPLE TO VERIFY THE INFORMATION YOU HAVE PROVIDED US, SO IT IS PARTICULARLY IMPORTANT THAT THE SAMPLE BE TRULY REPRESENTATIVE. IN MOST CIRCUMSTANCES YOU WILL BE OBTAINING THE SAMPLE. HOWEVER, IN THOSE CASES IN WHICH WE OBTAIN THE SAMPLE, WE MUST ASK THAT ONE OF YOUR EMPLOYEES BE PRESENT TO DIRECT THE PARTICULAR SOURCE TO BE SAMPLED AND TO WITNESS THE SAMPLING. IN SUCH CASE, YOUR EMPLOYEE MUST SIGN THIS CERTIFICATION AS A WITNESS.

THIS CERTIFICATION MUST BE RETURNED, WITH THE REPRESENTATIVE WASTE SAMPLE, TO:

THE UNDERSIGNED CERTIFIES THAT HE/SHE OBTAINED A REPRESENTATIVE SAMPLE OF THE WASTE MATERIAL DESCRIBED IN THE "GENERATOR'S WASTE MATERIAL PROFILE SHEET" ABOVE REFERENCED, AND THAT THE FOLLOWING REPRESENTATIONS ARE TRUE AND CORRECT:

1. HOUR AND DATE OF SAMPLING: 0930 Hours, February 19, 1985
2. SOURCE FROM WHICH SAMPLE TAKEN: 12005 N. Burgard Road, Portland Oregon, pentachlorophenol area shown on attached plot plan.
3. EQUIPMENT AND SAMPLING METHOD USED: Shovel and can used. Surface, one foot and two foot representative samples obtained, mixed together and placed in can.
4. AMOUNT OF SAMPLE OBTAINED: One (1) gallon.
5. TYPE OF CONTAINER INTO WHICH SAMPLE WAS PLACED: New one gallon paint can.
6. THE SAMPLING EQUIPMENT USED, AND THE CONTAINER INTO WHICH THE SAMPLE WAS PLACED, WERE THEMSELVES UNCONTAMINATED BEFORE USE. Yes.
7. AT THE TIME OF SAMPLING I AFFIXED A LABEL TO THE CONTAINER IN THE FOLLOWING FORM WITH THE FOLLOWING INFORMATION (FILL IN THIS PORTION, INCLUDING YOUR SIGNATURE, JUST AS IT APPEARS ON THE LABEL YOU PREPARED):

GENERATOR: Time Oil Co.
WASTE NAME: Pentachlorophenol mixture.
SAMPLE HOUR/DATE: 0930 Hours, Feb. 19, 1985
PROFILE SHEET CODE: E 13588
SAMPLER SIGNATURE: Neil E. Wallis

WITNESS VERIFICATION: I WAS PERSONALLY PRESENT DURING THE SAMPLING DESCRIBED; I DIRECTED THE WASTE SOURCE TO BE SAMPLED; AND I VERIFY THE INFORMATION ABOVE NOTED.

WITNESS: John H. Somes

SIGNATURE: J. H. Somes

TITLE: General Manager

EMPLOYER: North West Vacuum Truck Service

DATE: February 19, 1985

SAMPLER NAME: Neil E. Wallis

SIGNATURE: Neil E. Wallis

TITLE: Terminal Manager

EMPLOYER: Time Oil Co.

DATE: February 19, 1985

LABORATORY REVIEW OF SAMPLING PROTOCOL

BASED UPON MY REVIEW OF THE ABOVE PROFILE SHEET, I CONCLUDE THAT THE ABOVE METHODOLOGY IS:

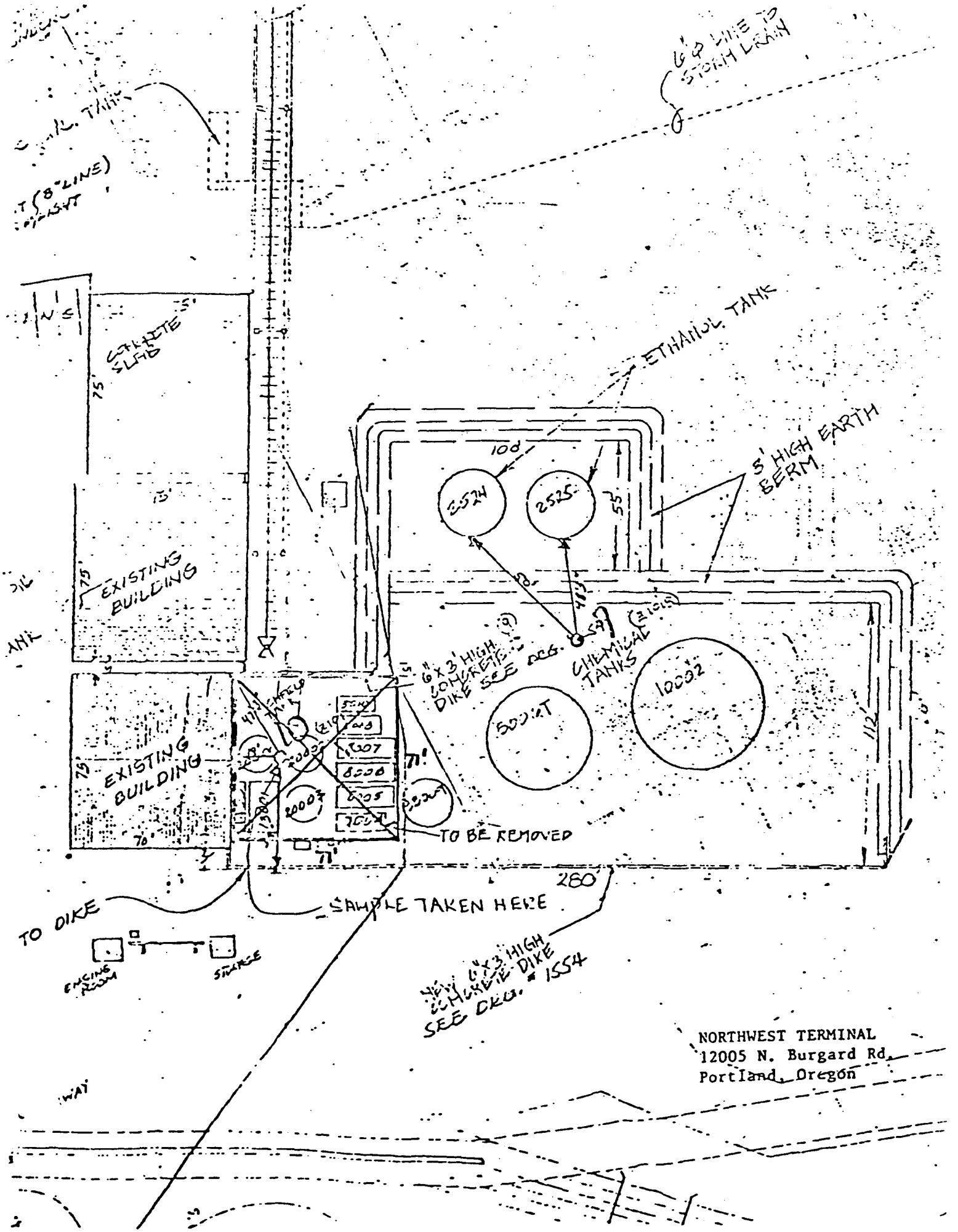
☐ ADEQUATE FOR YIELDING A REPRESENTATIVE SAMPLE.

☐ INADEQUATE FOR THE REASONS NOTED HEREON.

DATE:

LAB MGR:

FORM WM-51 (Rev. 6-83)
© 1982 WASTE MANAGEMENT, INC



BZTO104(e)012359

DATE: 23 JAN 85

LAB #: 84-1720
ITEM #: 10
SAMPLE: 21017

LEGAL

29/49

ACID EXTRACTABLES
METHOD 625
EXTRACTED BY RCRA METHOD 3540

AMOUNT MG/KG	PARAMETER
<1	PHENOL
<1	2-CHLOROPHENOL
<1	2-NITROPHENOL
<1	2,4-DIMETHYLPHENOL
<1	2,4-DICHLOROPHENOL
<1	4-CHLORO-3-METHYLPHENOL

AMOUNT MG/KG	PARAMETER
<1	2,4,6-TRICHLOROPHENOL
<1	2,4-DINITROPHENOL
<1	4-NITROPHENOL
<1	2-METHYL-4,6-DINITROPHENOL
1820	PENTACHLOROPHENOL
71	TETRACHLOROPHENOL **

** REPORTED AS
2,3,4,6-TETRACHLOROPHENOL

BASE/NEUTRAL EXTRACTABLES
METHOD 625

AMOUNT MG/KG	PARAMETER
<1	BIS(2-CHLOROETHYL) ETHER
<1	1,3-DICHLOROBENZENE
<1	1,4-DICHLOROBENZENE
<1	1,2-DICHLOROBENZENE
<1	HEXACHLOROETHANE
<1	N-NITROSO-DI-N-PROPYLAMINE
<1	NITROBENZENE
<1	ISOPHORONE
<1	BIS(2-CHLOROETHOXY) METHANE
<1	1,2,4-TRICHLOROBENZENE
<1	NAPHTHALENE
<1	HEXACHLOROBUTADIENE
<1	HEXACHLOROCYCLOPENTADIENE
<1	2-CHLORONAPHTHALENE
<1	ACENAPHTHYLENE
<1	DIMETHYLPHTHALATE
<1	2,6-DINITROTOLUENE

AMOUNT MG/KG	PARAMETER
<1	ACENAPHTHENE
<1	2,4-DINITROTOLUENE
<1	FLUORENE
<1	DIETHYLPHTHALATE
<1	N-NITROSODIPHENYLAMINE
<1	4-BROMOPHENYL PHENYL ETHER
<1	HEXACHLOROBENZENE
<1	PHENANTHRENE
<1	ANTHRACENE
<1	DIBUTYL PHTHALATE
<1	FLUORANTHENE
<1	PYRENE
<1	BUTYL BENZYL PHTHALATE
<1	BENZ(A)ANTHRACENE
<1	CHRYSENE
<1	3,3'-DICHLROBENZIDINE
<1	BIS(2-ETHYLHEXYL) PHTHALATE
<1	BENZ(A)PYRENE

TIME OIL CO.

PAY TO THE ORDER OF

7-29-85

	RECEIVED AMOUNT	AMOUNT
CHEM-SECURITY SYSTEMS, INC. P.O. BX 1966 BELLEVUE, WA 98009	$ ***27,270.88***	$ ***27,270.88***

BY

BY

⑈024607⑈ ⑆021308176⑆ 30991597⑈

TIME OIL CO.

24607

INVOICE	REFERENCE NO.	AMOUNT	INVOICE	REFERENCE NO.	AMOUNT
	Inv. # 1447				

CHECK DATE	7-29-85	DISCOUNT	
CHECK NO.	24607	TOTAL	$27,270.88

WHEN DETACHED AND PAID, THIS CHECK BECOMES A RECEIPT IN FULL PAYMENT OF THE ITEMIZED ACCOUNT

CHEM-SECURITY SYSTEMS, INC.
STAR ROUTE
ARLINGTON OR 97812
503/454-2643

SERVICE PROVIDED BY:
FACILITY:

INVOICE

NET 30 DAYS AFTER
INVOICE DATE

ALL PAST DUE INVOICES ARE SUBJECT TO INTEREST AT 1.50 PERCENT PER MONTH THE MAXIMUM RATE ALLOWED BY LAW WHICHEVER IS LESS

TIME OIL CO
12005 N BURGARD RD
PORTLAND OR 97203

CUSTOMER ACCOUNT NUMBER		
450	450	4010607

INVOICE NUMBER	INVOICE DATE	PAGE
1447	06/30/85	1

350703

INVOICE DATE	REFERENCE NO./DESC	UNIT	QUANTITY	RATE	AMOUNT
/25/85	0000073813-01	PCP CONTAMINATED SOIL		PDX-E13588	
	DISPOSAL SERVICES	OR TONS	25.22	110.0000	2,774.20
	FEDERAL TAX	OR DRY TON	24.72	2.1300	52.65
				SUBTOTAL	2,826.85 *
26/85	0000073825-01	PCP CONTAMINATED SOIL		PDX-E13588	
	DISPOSAL SERVICES	OR TONS	27.05	110.0000	2,975.50
	FEDERAL TAX	OR DRY TON	26.51	2.1300	56.47
				SUBTOTAL	3,031.97 *
6/85	0000073826-01	PCP CONTAMINATED SOIL		PDX-E13588	
	DISPOSAL SERVICES	OR TONS	26.83	110.0000	2,951.30
	FEDERAL TAX	OR DRY TON	26.29	2.1300	56.00
				SUBTOTAL	3,007.30 *
26/85	0000073848-01	PCP CONTAMINATED SOIL		PDX-E13588	
	DISPOSAL SERVICES	OR TONS	26.96	110.0000	2,965.60
	FEDERAL TAX	OR DRY TON	26.42	2.1300	56.27
				SUBTOTAL	3,021.87 *
/27/85	0000073850-01	PCP CONTAMINATED SOIL		PDX-E13588	
	DISPOSAL SERVICES	OR TONS	27.71	110.0000	3,048.10
	FEDERAL TAX	OR DRY TON	27.16	2.1300	57.85
				SUBTOTAL	3,105.95 *
27/85	0000073851-01	PCP CONTAMINATED SOIL		PDX-E13588	
	DISPOSAL SERVICES	OR TONS	27.14	110.0000	2,985.40
	FEDERAL TAX	OR DRY TON	26.60	2.1300	56.66
				SUBTOTAL	3,042.06 *
/28/85	0000073873-01	PCP CONTAMINATED SOIL		PDX-E13588	
	DISPOSAL SERVICES	OR TONS	27.36	110.0000	3,009.60
	FEDERAL TAX	OR DRY TON	26.81	2.1300	57.11
				SUBTOTAL	3,066.71 *

TO ADDRESS: P. O. BOX 1866 BELLEVUE WA 98009

PLEASE PAY THIS AMOUNT

CONTINUED

NK YOU FOR YOUR BUSINESS!

ORIGINAL INVOICE

CHEM-SECURITY SYSTEMS, INC.
STAR ROUTE
ARLINGTON OR 97812
503/454-2643

NET 30 DAYS AFTER
INVOICE DATE

SERVICE PROVIDED BY:
ARLINGTON FACILITY

TIME OIL CO
12005 N BURGARD RD
PORTLAND OR 97203

450 450 401060
INVOICE NUMBER
1447 06/30/85

850703

SERVICE DATE	REFERENCE NO./DESC	UNIT	QUANTITY	RATE	AMOUNT
06/28/85	0000073874-01	PCP CONTAMINATED SOIL		PDX-E13588	
	DISPOSAL SERVICES	OR TONS	27.95	110.0000	3,074.50
	FEDERAL TAX	OR DRY TON	27.39	2.1300	58.34
				SUBTOTAL	3,132.84
06/28/85	0000073876-01	PCP CONTAMINATED SOIL		PDX-E13588	
	DISPOSAL SERVICES	OR TONS	27.08	110.0000	2,978.80
	FEDERAL TAX	OR DRY TON	26.54	2.1300	56.53
				SUBTOTAL	3,035.33

REMIT TO ADDRESS P. O. BOX 1866
BELLEVUE WA 98009

PLEASE PAY THIS AMOUNT 27,270.88

THANK YOU FOR YOUR BUSINESS!

UNIFORM HAZARDOUS WASTE MANIFEST

1. Generator's US EPA ID No.: ORD009597543 | Manifest Document No.: [illegible]
2. Page 1 of 1 | Information in the shaded area is not required by Federal law

3. Generator's Name and Mailing Address:
Time Oil Co.
12005 N. Burgard Road Portland, Oregon 97203

4. Generator's Phone: 206 / 285-2400

A. State Manifest Document Number:

B. State Generator's ID:

5. Transporter 1 Company Name: Gresham Transfer Inc.
6. US EPA ID Number: ORD050973437

C. State Transporter's ID:
D. Transporter's Phone: (503) [illegible]

7. Transporter 2 Company Name:
8. US EPA ID Number:

E. State Transporter's ID:
F. Transporter's Phone:

9. Designated Facility Name and Site Address:
Chem-Security Systems, Inc.
Star Route
Arlington, Oregon 97812

10. US EPA ID Number: ORD 089 452 353

G. State Facility's ID:
H. Facility's Phone: 503-454-2643

11. US DOT Description (Including Proper Shipping Name, Hazard Class, and ID Number)	12. Containers No.	Type	13. Total Quantity	14. Unit Wt/Vol	EPA/I Waste No.
a. EQ Solid Waste Pentachlorophenol Mixture, ORM-E, NA 2020 (EQ 10)	001	DT	50280	P	U242
b.					
c.					
d.					

J. Additional Descriptions for Materials Listed Above
a. PCP Contaminated Soil, Solid
b.
c.
d.

K. Handling Codes for Wastes Listed Above: E13588 | 23

AREA	S	D	C	FR	LBS
F10	23	Q	C	4	GAL

15. Special Handling Instructions and Additional Information — Waste Profile Sheet Number(s): D-81
a. E13588
b.
c.
d.

16. GENERATOR'S CERTIFICATION: I hereby declare that the contents of this consignment are fully and accurately described above by proper shipping name and are classified, packed, marked, and labeled, and are in all respects in proper condition for transport by highway according to applicable international and national governmental regulations.

Printed/Typed Name: John P. Denham Enviornmental Manager | Signature: John P. Denham | Date: Month 06 Day 25 Year 8

17. Transporter 1 Acknowledgement of Receipt of Materials

Printed/Typed Name: Gerald Schafer | Signature: Gerald Schafer | Date: Month 06 Day 25 Year 8

18. Transporter 2 Acknowledgement of Receipt of Materials

Printed/Typed Name: | Signature: | Date: Month Day Year

19. Discrepancy Indication Space

20. Facility Owner or Operator: Certification of receipt of hazardous materials covered by this manifest except as noted in Item 19.

Printed/Typed Name: Barb Trullinger | Signature: Barb Trullinger | Date: Month 6 Day 25 Year 8

GENERATOR

TRANSPORTER

FACILITY

ORIGINAL - RETURN TO GENERATOR

BZTO104(e)012364

UNIFORM HAZARDOUS WASTE MANIFEST

1. Generator's US EPA ID No. ORD 009597543 — Manifest Document No. [illegible]
2. Page 1 of 1

3. Generator's Name and Mailing Address
Time Oil Co.
12005 N. Burgard Road Portland, Oregon 97203

4. Generator's Phone (206) 285-2400

A. State Manifest Document Number

B. State Generator's ID

5. Transporter 1 Company Name: Gresham Transfer Inc.
6. US EPA ID Number: ORD 050973437
C. State Transporter's ID
D. Transporter's Phone (503) [illegible]

7. Transporter 2 Company Name
8. US EPA ID Number
E. State Transporter's ID
F. Transporter's Phone

9. Designated Facility Name and Site Address
Chem-Security Systems, Inc.
Star Route
Arlington, Oregon 97812

10. US EPA ID Number: ORD 089 452 353
G. State Facility's ID
H. Facility's Phone: 503-454-2643

11. US DOT Description (Including Proper Shipping Name, Hazard Class, and ID Number)	HM		12. Containers No.	Type	13. Total Quantity	14. Unit Wt/Vol	EPA/ Waste
a.	RQ	Solid Waste Pentachlorophenol Mixture, CRM-E, NA 2020 (RQ 10)	~~002~~ 1 BT	DT	54320	P	U242
b.							
c.							
d.							

J. Additional Descriptions for Materials Listed Above
a. PCP Contaiminated Soil, Solid
b.
c.
d.

K. Handling Codes for Wastes Listed Above
WPS: E13588 — CU. FT. — DJ: 23
AREA: T-10 — S: 23 — D: Q — Q: C — PR: 4 — LBS: 5[illegible] — GAL

15. Special Handling Instructions and Additional Information — Waste Profile Sheet Number(s)
a. E13588
b.
c.
d.

D-81

16. GENERATOR'S CERTIFICATION: I hereby declare that the contents of this consignment are fully and accurately described above by proper shipping name and are classified, packed, marked, and labeled, and are in all respects in proper condition for transport by highway according to applicable international and national governmental regulations.

Printed/Typed Name: John P. Denham Enviornmental Manager — Signature: John P. Denham — Date: Month 06 Day 25

17. Transporter 1 Acknowledgement of Receipt of Materials
Printed/Typed Name: ~~[illegible]~~ Elgin Taylor — Signature: Elgin Taylor — Date: Month 06 Day 25

18. Transporter 2 Acknowledgement of Receipt of Materials
Printed/Typed Name — Signature — Date: Month Day

19. Discrepancy Indication Space: There was only 1 DT rec'd, not 2 rec'd. Manifest chgd with John Denham's permission pe[illegible] Joyce Johnson. BT

20. Facility Owner or Operator: Certification of receipt of hazardous materials covered by this manifest except as noted in Item 19.
Printed/Typed Name: Barb Trullinger — Signature: Barb Trullinger — Date: Month 10 Day 26

ORIGINAL - RETURN TO GENERATOR

BZTO104(e)012365

UNIFORM HAZARDOUS WASTE MANIFEST

1. Generator's US EPA ID No. ORD009597543 — Manifest Document No. [illegible]
2. Page 1 of 1

3. Generator's Name and Mailing Address
Pine Oil Co.
12005 N. Burgard Road Portland, Oregon 97203

4. Generator's Phone (206) 285-2400

A. State Manifest Document Number
B. State Generator's ID

5. Transporter 1 Company Name: Gresham Transfer Inc.
6. US EPA ID Number: ORD075097343
C. State Transporter's ID
D. Transporter's Phone [illegible]

7. Transporter 2 Company Name
8. US EPA ID Number
E. State Transporter's ID
F. Transporter's Phone

9. Designated Facility Name and Site Address
Chem-Security Systems, Inc.
Star Route
Arlington, Oregon 97812
10. US EPA ID Number: ORD 089 452 353
G. State Facility's ID
H. Facility's Phone: 503-454-2643

11. US DOT Description (Including Proper Shipping Name, Hazard Class, and ID Number)	12. Containers No.	Type	13. Total Quantity	14. Unit Wt/Vol	EPA/I. Waste No
a. RQ Solid Waste Pentachlorophenol Mixture, CPM-E, NA 2020 (RQ 10)	001	DT	55700	P	[illegible]
b.					
c.					
d.					

GENERATOR

J. Additional Descriptions for Materials Listed Above
a. PCP Contaminated Soil, Solid
b.
c.
d.

K. Handling Codes for Wastes Listed Above: E13588 23.
AREA: I-10 23 Q C 4 FR LSS 53 GAL

15. Special Handling Instructions and Additional Information — Waste Profile Sheet Number(s)
a. E13588
b.
c.
d.

D-81

16. GENERATOR'S CERTIFICATION: I hereby declare that the contents of this consignment are fully and accurately described above by proper shipping name and are classified, packed, marked, and labeled, and are in all respects in proper condition for transport by highway according to applicable international and national governmental regulations.

Printed/Typed Name: John F. Denham Environmental Manager — Signature: John F. Denham — Date: Month 06 Day 25 Year 8

TRANSPORTER

17. Transporter 1 Acknowledgement of Receipt of Materials
Printed/Typed Name: Bill Morrison — Signature: Bill Morrison — Date: Month 06 Day 25 Year 8

18. Transporter 2 Acknowledgement of Receipt of Materials
Printed/Typed Name — Signature — Date: Month Day Year

FACILITY

19. Discrepancy Indication Space: There was only 1 DT rec'd, not 3 rec'd. Manifest chgd with John Denham's permission per Joyce Johnson. (BT)

20. Facility Owner or Operator: Certification of receipt of hazardous materials covered by this manifest except as noted in Item 19.
Printed/Typed Name: Barb Trullinger — Signature: Barb Trullinger — Date: Month 7 Day 2 Year 8

ORIGINAL - RETURN TO GENERATOR

BZTO104(e)012366

UNIFORM HAZARDOUS WASTE MANIFEST

1. Generator's US EPA ID No: ORD009597543 | Manifest Document No.: [illegible]

2. Page 1 of 1 | Information in the shaded area is not required by Federal law.

3. Generator's Name and Mailing Address
Time Oil Co.
12005 N. Burgard Road Portland, Oregon 97203

4. Generator's Phone (206) 285-2400

A. State Manifest Document Number

B. State Generator's ID

5. Transporter 1 Company Name: Gresham Transfer Inc.

6. US EPA ID Number: ORD050973437

C. State Transporter's ID

D. Transporter's Phone: (503) 255-

7. Transporter 2 Company Name

8. US EPA ID Number

E. State Transporter's ID

F. Transporter's Phone

9. Designated Facility Name and Site Address
Chem-Security Systems, Inc.
Star Route
Arlington, Oregon 97812

10. US EPA ID Number: ORD 089 452 353

G. State Facility's ID

H. Facility's Phone: 503-454-2643

11. US DOT Description (Including Proper Shipping Name, Hazard Class, and ID Number)	12. Containers No.	Type	13. Total Quantity	14. Unit Wt/Vol	EPA/ Waste
a. RQ Solid Waste Pentachlorophenol Mixture, CRM-E, NA 2020 (RQ 10)	0 0 ~~4~~ 1	DT (BT)	53840	P	U242
b.					
c.					
d.					

J. Additional Descriptions for Materials Listed Above
a. PCP Contaminated Soil, Solid
b.
c.
d.

K. Handling Codes for Wastes Listed Above: E13588

AREA	S	D	Q	F	[illegible]
T-10	22	G	F	4	

15. Special Handling Instructions and Additional Information — Waste Profile Sheet Number(s): D-81
a.
b. E13588
c.
d.

16. GENERATOR'S CERTIFICATION: I hereby declare that the contents of this consignment are fully and accurately described above by proper shipping name and are classified, packed, marked, and labeled, and are in all respects in proper condition for transport by highway according to applicable international and national governmental regulations.

Printed/Typed Name: John P. Denham Enviornmental Manager | Signature: John P. Denham | Date: Month 06 Day 26

17. Transporter 1 Acknowledgement of Receipt of Materials

Printed/Typed Name: Gerald Schafer | Signature: [illegible] | Date: Month 06 Day 26

18. Transporter 2 Acknowledgement of Receipt of Materials

Printed/Typed Name | Signature | Date: Month Day

19. Discrepancy Indication Space: There was only 1 DT rec'd, not 4 rec'd. Manifest chgd with John Denham's permission per Joyce Johnson. (BT)

20. Facility Owner or Operator: Certification of receipt of hazardous materials covered by this manifest except as noted in Item 19.

Printed/Typed Name: Barb Trullinger | Signature: Barb Trullinger | Date: Month 10 Day 26

ORIGINAL - RETURN TO GENERATOR

BZTO104(e)012367

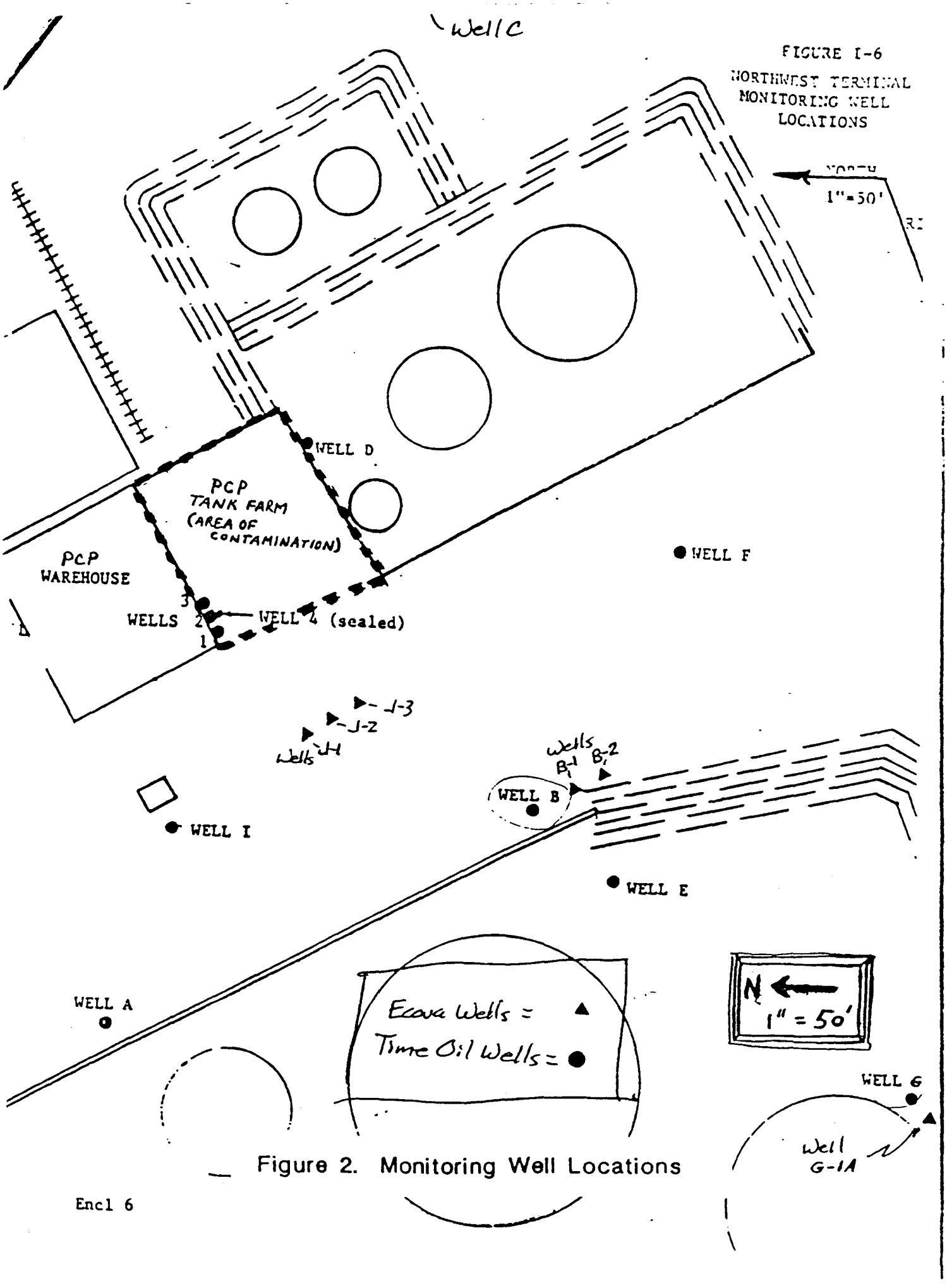


Figure 2. Monitoring Well Locations

Encl 6

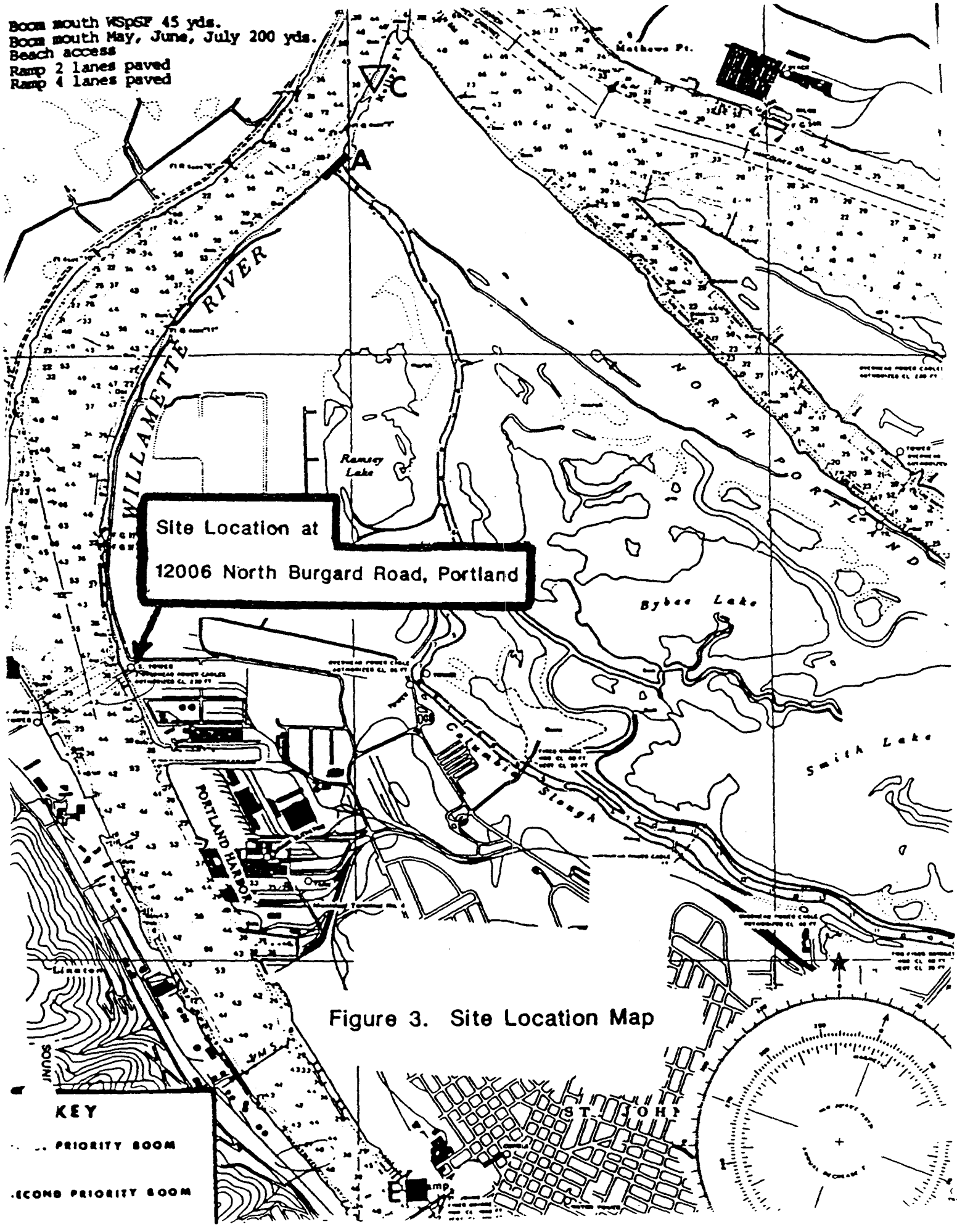


Figure 3. Site Location Map

UNIFORM HAZARDOUS WASTE MANIFEST

1. Generator's US EPA ID No. ORD 0 0 9 5 9 7 5 4 3 | Manifest Document No.

2. Page 1 of 1 | Information in the shaded area is not required by Federal law

3. Generator's Name and Mailing Address
Time Oil Co.
12005 N. Burgard Road Portland, Oregon 97203

4. Generator's Phone (206) 285-2400

A. State Manifest Document Number

B. State Generator's ID

5. Transporter 1 Company Name: Gresham Transfer Inc.

6. US EPA ID Number: ORD 0 5 0 9 7 3 4 3 7

C. State Transporter's ID

D. Transporter's Phone (503) [illegible]

7. Transporter 2 Company Name

8. US EPA ID Number

E. State Transporter's ID

F. Transporter's Phone

9. Designated Facility Name and Site Address
Chem-Security Systems, Inc.
Star Route
Arlington, Oregon 97812

10. US EPA ID Number: ORD 089 452 353

G. State Facility's ID

H. Facility's Phone: 503-454-2643

11. US DOT Description (Including Proper Shipping Name, Hazard Class, and ID Number)	12. Containers No.	Type	13. Total Quantity	14. Unit Wt/Vol	EPA/1 Waste No.
a. RQ Solid Waste Pentachlorophenol Mixture, ORM-E, NA 2020 (RQ 10)	0 0 1	DT	54620	P	U242
b.					
c.					
d.					

J. Additional Descriptions for Materials Listed Above
a. PCP Contaminated Soil, Solid
b.
c.
d.

K. Handling Codes for Wastes Listed Above

WPS	CU. FT	CU. YD.
E13588		2316

AREA	S	D	Q	PR	LBS
T-10	3	Q	C	4	5472

15. Special Handling Instructions and Additional Information — Waste Profile Sheet Number(s)
a. E13588
b.
c.
d.

D-81

16. GENERATOR'S CERTIFICATION: I hereby declare that the contents of this consignment are fully and accurately described above by proper shipping name and are classified, packed, marked, and labeled, and are in all respects in proper condition for transport by highway according to applicable international and national governmental regulations.

Printed/Typed Name: John P. Denham Environmental Manager | Signature: John P. Denham | Date: Month 06 Day 28

17. Transporter 1 Acknowledgement of Receipt of Materials

Printed/Typed Name: Gerald Schafer | Signature: Gerald Schafer | Date: Month 06 Day 28

18. Transporter 2 Acknowledgement of Receipt of Materials

Printed/Typed Name | Signature | Date: Month Day

19. Discrepancy Indication Space

20. Facility Owner or Operator: Certification of receipt of hazardous materials covered by this manifest except as noted in Item 19.

Printed/Typed Name: Danelle Clough | Signature: Danelle Clough | Date: Month 06 Day 28

GENERATOR

TRANSPORTER

FACILITY

ORIGINAL-RETURN TO GENERATOR

BZTO104(e)012370

UNIFORM HAZARDOUS WASTE MANIFEST

1. Generator's US EPA ID No: ORD009597543 | Manifest Document No: [illegible]
2. Page 1 of 1 | Information in the shaded area not required by Federal law

3. Generator's Name and Mailing Address
Time Oil Co.
12005 N. Burgard Road Portland, Oregon 97203
4. Generator's Phone (206) 285-2400

A. State Manifest Document Number
B. State Generator's ID

5. Transporter 1 Company Name: Gresham Transfer Inc.
6. US EPA ID Number: ORD050973437
C. State Transporter's ID
D. Transporter's Phone (503) 455-[illegible]

7. Transporter 2 Company Name
8. US EPA ID Number
E. State Transporter's ID
F. Transporter's Phone

9. Designated Facility Name and Site Address
Chem-Security Systems, Inc.
Star Route
Arlington, Oregon 97812
10. US EPA ID Number: ORD 039 452 353
G. State Facility's ID
H. Facility's Phone: 503-454-2643

11. US DOT Description (Including Proper Shipping Name, Hazard Class, and ID Number)	12. Containers No.	Type	13. Total Quantity	14. Unit Wt/Vol	EPA/ Waste
a. RQ Solid Waste Pentachlorophenol Mixture, ORM-E, NA 2020 (RQ 10)	~~006~~ 1 (BT)	DT	53250	P	U242
b.					
c.					
d.					

J. Additional Descriptions for Materials Listed Above
a.
b. PCP Contaminated Soil, Solid
c.
d.

K. Handling Codes for Wastes Listed Above: WPS E13588 | CU FT | GU 22
AREA T-10 | S 23 | D Q | Q I | PR 4 | LB | GAL

15. Special Handling Instructions and Additional Information — Waste Profile Sheet Number(s)
a. E13588
b.
c.
d.

D-81

16. GENERATOR'S CERTIFICATION: I hereby declare that the contents of this consignment are fully and accurately described above by proper shipping name and are classified, packed, marked, and labeled, and are in all respects in proper condition for transport by highway according to applicable international and national governmental regulations.

Printed/Typed Name: John P. Denham Envoirnmental Manager | Signature: John P. Denham | Date: Month 06 Day 26

17. Transporter 1 Acknowledgement of Receipt of Materials
Printed/Typed Name: Elgin Taylor | Signature: Elgin Taylor | Date: Month 06 Day 26

18. Transporter 2 Acknowledgement of Receipt of Materials
Printed/Typed Name | Signature | Date: Month Day

19. Discrepancy Indication Space: There was only 1 DT rec'd, not 6. Manifest chgd with John Denham's permission, Joyce Johnson. (BT)

20. Facility Owner or Operator: Certification of receipt of hazardous materials covered by this manifest except as noted in Item 19.
Printed/Typed Name: Barb Trullinger | Signature: Barb Trullinger | Date: Month 6 Day 2

ORIGINAL - RETURN TO GENERATOR

BZTO104(e)012371

12010

UNIFORM HAZARDOUS WASTE MANIFEST

1. Generator's US EPA ID No.: OR D 0 0 9 5 9 7 5 4 3 | Manifest Document No.: [illegible] | Page 1 of 1 | Information in the shaded area is not required by Federal law.

3. Generator's Name and Mailing Address:
Time Oil Co.
12005 N. Burgard Road Portland, Oregon 97203

4. Generator's Phone: (206) 285-2400

5. State Generator's ID:

5. Transporter 1 Company Name: Brecham Transfer Inc.
6. US EPA ID Number: O R D 0 5 0 9 7 3 4 3 7
C. State Transporter's ID:
D. Transporter's Phone: [illegible]

7. Transporter 2 Company Name:
8. US EPA ID Number:
E. State Transporter's ID:
F. Transporter's Phone:

9. Designated Facility Name and Site Address:
Chem-Security Systems, Inc.
Star Route
Arlington, Oregon 97812
10. US EPA ID Number: ORD 089 452 353
G. State Facility's ID:
H. Facility's Phone: 503-454-2643

11. US DOT Description (Including Proper Shipping Name, Hazard Class, and ID Number)	12. Containers No.	Type	13. Total Quantity	14. Unit Wt/Vol	EPA/ Waste No.
a. RQ Solid Waste Pentachlorophenol Mixture, ORM-E, NA 2020 (RQ 10)	0 0 1	DT	54280	P	U242
b.					
c.					
d.					

J. Additional Descriptions for Materials Listed Above
a. PCP Contaminated Soil, Solid
b.
c.
d.

K. Handling Codes for Wastes Listed Above

WPS	CU. FT	CU. YD.
E13588		24.53

AREA	S	D	Q	PR	LBS
T-10	33	Q	C	4	54120

GAL

15. Special Handling Instructions and Additional Information — Waste Profile Sheet Number(s)
a. E13588
b.
c.
d.

0-81

16. GENERATOR'S CERTIFICATION: I hereby declare that the contents of this consignment are fully and accurately described above by proper shipping name and are classified, packed, marked, and labeled, and are in all respects in proper condition for transport by highway according to applicable international and national governmental regulations.

Printed/Typed Name: John P. Denham Envoirnmental Manager
Signature: John P. Denham
Date: Month 0 6 Day 2 8 8

17. Transporter 1 Acknowledgement of Receipt of Materials
Printed/Typed Name: Elgin Taylor
Signature: Elgin Taylor
Date: Month 0 6 Day 2 8 8

18. Transporter 2 Acknowledgement of Receipt of Materials
Printed/Typed Name:
Signature:
Date: Month Day

19. Discrepancy Indication Space

20. Facility Owner or Operator: Certification of receipt of hazardous materials covered by this manifest except as noted in Item 19.
Printed/Typed Name: Danielle Clough
Signature: Danielle Clough
Date: Month 6 Day 2 8 8

GENERATOR

TRANSPORTER

FACILITY

ORIGINAL-RETURN TO GENERATOR

BZTO104(e)012372

UNIFORM HAZARDOUS WASTE MANIFEST

1. Generator's US EPA ID No.: C R D 0 0 9 5 9 7 5 4 3
2. Page 1 of 1
Information in the shaded area is not required by Federal law.

3. Generator's Name and Mailing Address:
Tire Oil Co.
12005 N. Burgard Road Portland, Oregon 97203
4. Generator's Phone (206) 285-2400

A. State Manifest Document Number
B. State Generator's ID

5. Transporter 1 Company Name: Gresham Transfer Inc.
6. US EPA ID Number: C R D 0 5 0 9 7 3 4 3 7
C. State Transporter's ID
D. Transporter's Phone (503) 2[illegible]

7. Transporter 2 Company Name
8. US EPA ID Number
E. State Transporter's ID
F. Transporter's Phone

9. Designated Facility Name and Site Address:
Chem-Security Systems, Inc.
Star Route
Arlington, Oregon 97812
10. US EPA ID Number: ORD 089 452 353
G. State Facility's ID
H. Facility's Phone: 503-454-2643

11. US DOT Description (Including Proper Shipping Name, Hazard Class, and ID Number)	HM		12. Containers No.	Type	13. Total Quantity	14. Unit Wt/Vol	EPA/ Waste
a.	RQ	Solid Waste Pentachlorophenol Mixture, CRM-E, NA 2020 (RQ 10)	0 0 1	DT	56[illegible]20	P	U2[illegible]2
b.							
c.							
d.							

J. Additional Descriptions for Materials Listed Above
a. PCP Contaminated Soil, Solid
b.
c.
d.

K. Handling Codes for Wastes Listed Above

WPS	CU. FT	CU. YD
E13588		2[illegible]

AREA	S	D	Q	PR	LBS
F10	23	Q	C	4	55[illegible]

15. Special Handling Instructions and Additional Information — Waste Profile Sheet Number(s)
a. E13588
b.
c.
d.

D-81

16. GENERATOR'S CERTIFICATION: I hereby declare that the contents of this consignment are fully and accurately described above by proper shipping name and are classified, packed, marked, and labeled, and are in all respects in proper condition for transport by highway according to applicable international and national governmental regulations.

Printed/Typed Name: John P. Denham Environmental Manager
Signature: John P. Denham
Date: Month 0 6 Day 2 8

17. Transporter 1 Acknowledgement of Receipt of Materials
Printed/Typed Name: Bill Morrison
Signature: [illegible]
Date: Month 0 6 Day 2 8

18. Transporter 2 Acknowledgement of Receipt of Materials
Printed/Typed Name
Signature
Date: Month Day

19. Discrepancy Indication Space

20. Facility Owner or Operator: Certification of receipt of hazardous materials covered by this manifest except as noted in Item 19.
Printed/Typed Name: Danelle Clough
Signature: Danelle Clough
Date: Month 6 Day 2

GENERATOR

TRANSPORTER

FACILITY

ORIGINAL - RETURN TO GENERATOR

BZTO104(e)012373

DATE	LOADED AT NW	UNLOADED AT CSS	CHANGE ENROUTE
6/25/85	25.14	25.22	-.08
6/25/85	27.16	27.05	+.11
6/25/85	26.85	26.83	+.02
6/26/85	26.92	26.96	-.04
6/26/85	27.64	27.71	-.07
6/26/85	26.64	27.14	-.50
6/28/85	27.13	27.36	-.23
6/28/85	28.14	27.95	+.19
6/28/85	27.14	27.08	+.06
Total Tons	242.76	243.30	
Average Tons	26.97	27.03	-.54

Nine truckloads shipped. Total quantity received at destination was within 1/2 ton of quantity loaded. Good show.

	DRY TON	TONS
50,280·00 ÷	24.72	25.22
2,000·00 =	26.51	27.05
25·14 *	26.29	26.83
	26.42	26.96
54,320·00 ÷	27.16	27.71
2,000·00 =	26.60	27.14
27·16 *	26.81	27.36
	27.39	27.95
53,700·00 ÷	26.54	27.08
2,000·00 =	238.44*	243.30*
26·85 *		
53,840·00 ÷		
2,000·00 =		
26·92 *		
55,280·00 ÷		
2,000·00 =		
27·64 *		
53,280·00 ÷		
2,000·00 =		
26·64 *		
54,260·00 ÷		
2,000·00 =		
27·13 *		
56,820·00 ÷		
2,000·00 =		
28·41 *		
54,280·00 ÷		
2,000·00 =		
27·14 *		

"Imagineering a cleaner world"

RIEDEL
ENVIRONMENTAL SERVICES, INC.

☑ [illegible]

☐ [illegible]

☐ [illegible]

☐ [illegible]

August 15, 1985

Mr. John P. Denham
Environmental Manager
Time Oil Company
2737 W. Commodore Way
PO Box 24447 Terminal Annex
Seattle, WA 98124

Dear John:

Enclosed are the sample results and contour maps as you requested.

I hope to see you soon.

Sincerely,

John H Ruddick /JH

John H. Ruddick
Microbiologist

JHR:rrh
Enclosures

VICTOR ATIYEH
GOVERNOR

Department of Environmental Quality

522 S.W. FIFTH AVENUE, BOX 1760, PORTLAND, OREGON 97207 PHONE (503) 229-56

June 28, 1985

John Denham
Time Oil Co.,
2737 W. Commodore Way
Seattle, Washington 98199

Dear John:

Attached is a copy of a letter describing our 600 ppm interpretation of the hazardous waste pesticide rule for chlorophenolics.

Please note that it is used as a guidance for the determination of hazardous waste material and does not reflect subsequent clean-up level requirements. The clean-up criteria should be available from our Northwest Regional Office or our Hazardous Waste Program.

Sincerely,

Richard F. Gates
Supervising Chemist - Organic Laboratory
Environmental Quality Laboratories
and Applied Research
1712 SW Eleventh Avenue
Portland, Oregon 97201

RFG:mm

cc: Janet Gillaspie
Gary Calaba

Encls.

TIME OIL CO. - PORTLAND, OREGON
PENTACHLOROPHENOL IN SOIL

Two Foot Contour Data

Core #	Coordinates X	Coordinates Y	Concentration Mg/Kg
J	142.5	161	3
K	117.5	161	8.8
L	92.5	161	N/A
M	67.5	161	87
N	155	143	3.1
O	130	143	59
P	105	143	16
Q	80	143	N/A
R	142.5	125	34
S	117.5	125	252
T	92.5	125	123
U	67.5	125	44
V	155	107	260
W	130	107	15
X	105	107	4.5
Y	80	107	N/A
Z	80	179	14

N/A = Not Available

TIME OIL CO. - PORTLAND, OREGON
PENTACHLOROPHENOL IN SOIL

Surface Contour Data

Sample #	Coordinates X	Coordinates Y	Concentration Mg/Kg
1	81	171	13500
2	71	171	29
3	71	161	500
4	71	151	5450
5	71	141	5560
6	71	131	8760
7	71	121	4870
8	71	111	92
9	71	101	20
10	81	181	16
11	71	181	7
12	61	181	9
13	61	171	95
14	61	161	175
15	61	151	18
16	61	141	229
17	61	131	88
18	61	121	6
19	61	111	3
20	61	101	2.5
21	61	91	5.2
37	81	95	857
38	91	96	1130
39	101	97	17
40	111	98	3.5
41	121	98	3.1
42	131	99	3.2
43	141	100	2.4
44	151	100	1.8
45	161	101	171
46	71	84	3
47	81	85	3.6
48	91	86	6.1
49	121	87	3.2
50	131	88	1.5
51	141	89	2.3
52	151	90	1.7
53	161	91	1.9
54	171	92	1.2

Core #	Coordinates X	Coordinates Y	Concentration Mg/Kg
J	142.5	161	1400
K	117.5	161	N/A
L	92.5	161	N/A
M	67.5	161	4720
N	155	143	4280
O	130	143	3000
P	105	143	N/A
Q	80	143	N/A
R	142.5	125	1712
S	117.5	125	522
T	92.5	125	123
U	67.5	125	26550
V	155	107	317
W	130	107	3385
X	105	107	N/A
Y	80	107	N/A
Z	80	179	21

N/A = Not Available

Calweld Analysis
of treatment facility
- pentachlorophenol

WEST COAST ANALYTICAL SERVICE, INC
9840 Alburtis Ave.
Santa Fe Springs, CA 90670

Calweld/ATW
11212 S. Norwalk Blvd.
Santa Fe Springs, CA 90670

ATTN: Frank Manchak

October 8, 1985

Job Number 2153

LABORATORY REPORT

Samples: 24 soil samples
Date Received: 9-16-85
Purchase Order No.: 9771/Frank Manchak

The samples were analyzed for the following parameters:

	EPA Method
Permeability	-
Volatile Organics	8240
Semivolatile Organics	8270
PCBs	8080
Priority Pollutant Metals	7000
EP Toxicity Leachate	1310
Sulfur Dioxide	Draeger Tube

The results are summarized in the following tables. Detailed reports are enclosed on Organics Analysis Data Sheets.

Joe Bramblett
Laboratory Manager

D. J. Northington, Ph.D.
Technical Director

We would appreciate a telephone call if you have any questions about this report. (213)948-2225

TIME OIL CO. - PORTLAND, OREGON
PENTACHLOROPHENOL IN SOIL

Four Foot Contour Data

Core #	Coordinates X	Coordinates Y	Concentration Mg/Kg
J	142.5	161	3.6
K	117.5	161	10.5
L	92.5	161	7200
M	67.5	161	22
N	155	143	238
O	130	143	23
P	105	143	15
Q	80	143	2205
R	142.5	125	50
S	117.5	125	184
T	92.5	125	534
U	67.5	125	55
V	155	107	380
W	130	107	8.1
X	105	107	1.3
Y	80	107	598
Z	80	179	2

ORGANICS ANALYSIS DATA SHEET SAMPLE #: TIME B RAW

LABORATORY: WCAS
LABORATORY ID: 2153B14
DATE RECEIVED: 09/16/85

SEMIVOLATILE COMPOUNDS (PAGE 1)

LEVEL:	MEDIUM
MATRIX:	SOIL
DATE EXT/PREP:	09/18/85
DATE ANALYZED:	9/25/85
SPL-->EXTRACT:	5G: 1ML: : 0.01ML: 1ML
STANDARD ID:	BNA46
SENSITIVITY ID:	
UNITS:	UG/G (PPM)

CAS #		CONC
62-75-9	N-NITROSODIMETHYLAMINE	20. ND
18-95-2	PHENOL	20. ND
62-53-3	ANILINE	20. ND
111-44-4	BIS(2-CHLOROETHYL)ETHER	20. ND
95-57-8	2-CHLOROPHENOL	20. ND
541-73-1	1,3-DICHLOROBENZENE	20. ND
106-46-7	1,4-DICHLOROBENZENE	20. ND
100-51-6	BENZYL ALCOHOL	20. ND
95-50-1	1,2-DICHLOROBENZENE	20. ND
95-48-7	2-METHYLPHENOL	20. ND
39638-32-9	BIS(2-CHLOROISOPROPYL)ETHER	20. ND
106-44-5	4-METHYLPHENOL	20. ND
621-64-7	N-NITROSODIPROPLYAMINE	20. ND
67-72-1	HEXACHLOROETHANE	20. ND
98-95-3	NITROBENZENE	20. ND
78-59-1	ISOPHORONE	20. ND
88-75-5	2-NITROPHENOL	20. ND
105-67-9	2,4-DIMETHYLPHENOL	20. ND
65-85-0	BENZOIC ACID	100. ND
111-91-1	BIS(2-CHLOROETHOXY)METHANE	20. ND
120-33-2	2,4-DICHLOROPHENOL	20. ND
120-82-1	1,2,4-TRICHLOROBENZENE	20. ND
91-20-3	NAPHTHALENE	20. ND
106-47-8	4-CHLOROANILINE	20. ND
87-68-3	HEXACHLOROBUTADIENE	20. ND
59-50-7	4-CHLORO-3-METHYLPHENOL	20. ND
91-57-6	2-METHYLNAPHTHALENE	20. ND
77-47-4	HEXACHLOROCYCLOPENTADIENE	20. ND
88-06-2	2,4,6-TRICHLOROPHENOL	20. ND
95-95-4	2,4,5-TRICHLOROPHENOL	100. ND
91-58-7	2-CHLORONAPHTHALENE	20. ND
88-74-4	2-NITROANILINE	100. ND
131-11-3	DIMETHYL PHTHALATE	20. ND
208-96-8	ACENAPHTHYLENE	20. ND
99-09-2	3-NITROANILINE	100. ND

Data Reporting Qualifiers

Value - If the result is a value greater than or equal to the Detection Limit (DL), the value is reported.

ND - Indicates that the compound was analyzed for but not detected. The minimum DL for the sample with the ND (e.g. 10.ND) is reported based on necessary concentration or dilution actions.

TR - Indicates an estimated value. This flag is used when the mass spectral data indicates the presence of a compound that meets the identification criteria but the result is less than the specified DL but greater than zero.

J - Indicates an estimated value. This flag is used when estimating a concentration for tentatively identified compounds where a 1:1 response factor is assumed.

ORGANICS ANALYSIS DATA SHEET SAMPLE #: TIME B RAW

LABORATORY: WCAS
BORATORY ID: 2153B14

Tentatively Identified Compounds

	CAS Number	Compound Name	Fraction	Scan	Estimated Conc(J)
1.		C18-30 ALIPHATIC HYDROCARBONS	BNA		2000
2.		UNIDENTIFIED COMPOUNDS	BNA		900
3.					
4.					
5.					
6.					
7.					
8.					
9.					
10.					
11.					
12.					
13.					
14.					
15.					
3.					
19.					
20.					
21.					
22.					
23.					
24.					
25.					
26.					
27.					
28.					
29.					
30.					

ORGANICS ANALYSIS DATA SHEET SAMPLE #: TIME B RAW

LABORATORY: WCAS
LABORATORY ID: 2153B14
DATE RECEIVED: 09/16/85

SEMIVOLATILE COMPOUNDS (PAGE 2)

LEVEL:	MEDIUM
MATRIX:	SOIL
DATE EXT/PREP:	09/18/85
DATE ANALYZED:	9/25/85
SPL-->EXTRACT:	5G: 1ML: : 0. 01ML: 1ML
STANDARD ID:	BNA46
SENSITIVITY ID:	
UNITS:	UG/G (PPM)

CAS #		CONC
83-32-9	ACENAPHTHENE	20. ND
51-28-5	2, 4-DINITROPHENOL	100. ND
100-02-7	4-NITROPHENOL	100. ND
132-64-9	DIBENZOFURAN	20. ND
121-14-2	2, 4-DINITROTOLUENE	20. ND
606-20-2	2, 6-DINITROTOLUENE	20. ND
84-66-2	DIETHYL PHTHALATE	20. ND
7005-72-3	4-CHLOROPHENYL PHENYL ETHER	20. ND
86-73-7	FLUORENE	20. ND
100-01-6	4-NITROANILINE	100. ND
534-52-1	4, 6-DINITRO-2-METHYLPHENOL	100. ND
86-30-6	N-NITROSODIPHENYLAMINE	20. ND
101-55-3	4-BROMOPHENYL PHENYL ETHER	20. ND
118-74-1	HEXACHLOROBENZENE	20. ND
87-86-5	PENTACHLOROPHENOL	11000.
85-01-8	PHENANTHRENE	20. ND
120-12-7	ANTHRACENE	20. ND
84-74-2	DI-N-BUTYL PHTHALATE	20. ND
206-44-0	FLUORANTHENE	20. ND
92-87-5	BENZIDINE	100. ND
129-00-0	PYRENE	20. ND
85-68-7	BUTYL BENZYL PHTHALATE	20. ND
91-94-1	3, 3'-DICHLOROBENZIDINE	40. ND
56-55-3	BENZO(A)ANTHRACENE	20. ND
117-81-7	BIS(2-ETHYLHEXYL)PHTHALATE	20. ND
218-01-9	CHRYSENE	20. ND
117-84-0	DI-N-OCTYL PHTHALATE	20. ND
205-99-2	BENZO(B & K)FLUORANTHENES	20. ND
50-32-8	BENZO(A)PYRENE	20. ND
193-39-5	INDENO(1, 2, 3-CD)PYRENE	20. ND
53-70-3	DIBENZO(A, H)ANTHRACENE	20. ND
191-24-2	BENZO(GHI)PERYLENE	20. ND

RESULTS ARE REPORTED ON A WET WEIGHT BASIS.

ORGANICS ANALYSIS DATA SHEET SAMPLE #: TIME B TREATED

LABORATORY: WCAS
LABORATORY ID: 2153B10
TE RECEIVED: 09/16/85

SEMIVOLATILE COMPOUNDS (PAGE 2)

LEVEL:	MEDIUM
MATRIX:	SOIL
DATE EXT/PREP:	09/18/85
DATE ANALYZED:	9/25/85
SPL-->EXTRACT:	5G: 1ML: : 0. 2ML: 1ML
STANDARD ID:	BNA46
SENSITIVITY ID:	
UNITS:	UG/G (PPM)

CAS #		CONC
83-32-9	ACENAPHTHENE	1. ND
51-28-5	2, 4-DINITROPHENOL	5. ND
100-02-7	4-NITROPHENOL	5. ND
132-64-9	DIBENZOFURAN	1. ND
121-14-2	2, 4-DINITROTOLUENE	1. ND
606-20-2	2, 6-DINITROTOLUENE	1. ND
84-66-2	DIETHYL PHTHALATE	1. ND
7005-72-3	4-CHLOROPHENYL PHENYL ETHER	1. ND
86-73-7	FLUORENE	1. ND
100-01-6	4-NITROANILINE	5. ND
534-52-1	4, 6-DINITRO-2-METHYLPHENOL	5. ND
86-30-6	N-NITROSODIPHENYLAMINE	1. ND
101-55-3	4-BROMOPHENYL PHENYL ETHER	1. ND
118-74-1	HEXACHLOROBENZENE	1. ND
87-86-5	PENTACHLOROPHENOL	460.
85-01-8	PHENANTHRENE	1. ND
120-12-7	ANTHRACENE	1. ND
84-74-2	DI-N-BUTYL PHTHALATE	1. ND
206-44-0	FLUORANTHENE	1. ND
92-87-5	BENZIDINE	5. ND
129-00-0	PYRENE	1. ND
85-68-7	BUTYL BENZYL PHTHALATE	1. ND
91-94-1	3, 3'-DICHLOROBENZIDINE	2. ND
56-55-3	BENZO(A)ANTHRACENE	1. ND
117-81-7	BIS(2-ETHYLHEXYL)PHTHALATE	1. ND
218-01-9	CHRYSENE	1. ND
117-84-0	DI-N-OCTYL PHTHALATE	1. ND
205-99-2	BENZO(B & K)FLUORANTHENES	1. ND
50-32-8	BENZO(A)PYRENE	1. ND
193-39-5	INDENO(1, 2, 3-CD)PYRENE	1. ND
53-70-3	DIBENZO(A, H)ANTHRACENE	1. ND
191-24-2	BENZO(GHI)PERYLENE	1. ND

RESULTS ARE REPORTED ON A WET WEIGHT BASIS.

ORGANICS ANALYSIS DATA SHEET SAMPLE #: TIME B TREATED

LABORATORY: WCAS
LABORATORY ID: 2153B10
DATE RECEIVED: 09/16/85

SEMIVOLATILE COMPOUNDS (PAGE 1)

LEVEL:	MEDIUM
MATRIX:	SOIL
DATE EXT/PREP:	09/18/85
DATE ANALYZED:	9/25/85
SPL-->EXTRACT:	5G: 1ML: : 0. 2ML: 1ML
STANDARD ID:	BNA46
SENSITIVITY ID:	
UNITS:	UG/G (PPM)

CAS #		CONC
62-75-9	N-NITROSODIMETHYLAMINE	1. ND
18-95-2	PHENOL	1. ND
62-53-3	ANILINE	1. ND
111-44-4	BIS(2-CHLOROETHYL)ETHER	1. ND
95-57-8	2-CHLOROPHENOL	1. ND
541-73-1	1,3-DICHLOROBENZENE	1. ND
106-46-7	1,4-DICHLOROBENZENE	1. ND
100-51-6	BENZYL ALCOHOL	1. ND
95-50-1	1,2-DICHLOROBENZENE	1. ND
95-48-7	2-METHYLPHENOL	1. ND
39638-32-9	BIS(2-CHLOROISOPROPYL)ETHER	1. ND
106-44-5	4-METHYLPHENOL	1. ND
621-64-7	N-NITROSODIPROPLYAMINE	1. ND
67-72-1	HEXACHLOROETHANE	1. ND
98-95-3	NITROBENZENE	1. ND
78-59-1	ISOPHORONE	5.
88-75-5	2-NITROPHENOL	1. ND
105-67-9	2,4-DIMETHYLPHENOL	1. ND
65-85-0	BENZOIC ACID	5. ND
111-91-1	BIS(2-CHLOROETHOXY)METHANE	1. ND
120-33-2	2,4-DICHLOROPHENOL	1. ND
120-82-1	1,2,4-TRICHLOROBENZENE	1. ND
91-20-3	NAPHTHALENE	1. ND
106-47-8	4-CHLOROANILINE	1. ND
87-68-3	HEXACHLOROBUTADIENE	1. ND
59-50-7	4-CHLORO-3-METHYLPHENOL	1. ND
91-57-6	2-METHYLNAPHTHALENE	1. ND
77-47-4	HEXACHLOROCYCLOPENTADIENE	1. ND
88-06-2	2,4,6-TRICHLOROPHENOL	1. ND
95-95-4	2,4,5-TRICHLOROPHENOL	5. ND
91-58-7	2-CHLORONAPHTHALENE	1. ND
88-74-4	2-NITROANILINE	5. ND
131-11-3	DIMETHYL PHTHALATE	1. ND
208-96-8	ACENAPHTHYLENE	1. ND
99-09-2	3-NITROANILINE	5. ND

ORGANICS ANALYSIS DATA SHEET SAMPLE #: TIME B RAW DUPLICATE

LABORATORY: WCAS
L^BORATORY ID: 2153B15
E RECEIVED: 09/16/85

SEMIVOLATILE COMPOUNDS (PAGE 1)

LEVEL:	MEDIUM
MATRIX:	SOIL
DATE EXT/PREP:	09/18/85
DATE ANALYZED:	9/25/85
SPL-->EXTRACT:	5G: 1ML: : 0. 01ML: 1ML
STANDARD ID:	BNA46
SENSITIVITY ID:	
UNITS:	UG/G (PPM)

CAS #		CONC
62-75-9	N-NITROSODIMETHYLAMINE	20. ND
18-95-2	PHENOL	20. ND
62-53-3	ANILINE	20. ND
111-44-4	BIS(2-CHLOROETHYL)ETHER	20. ND
95-57-8	2-CHLOROPHENOL	20. ND
541-73-1	1, 3-DICHLOROBENZENE	20. ND
106-46-7	1, 4-DICHLOROBENZENE	20. ND
100-51-6	BENZYL ALCOHOL	20. ND
95-50-1	1, 2-DICHLOROBENZENE	20. ND
95-48-7	2-METHYLPHENOL	20. ND
39638-32-9	BIS(2-CHLOROISOPROPYL)ETHER	20. ND
106-44-5	4-METHYLPHENOL	20. ND
621-64-7	N-NITROSODIPROPLYAMINE	20. ND
67-72-1	HEXACHLOROETHANE	20. ND
98-95-3	NITROBENZENE	20. ND
78-59-1	ISOPHORONE	20. ND
88-75-5	2-NITROPHENOL	20. ND
105-67-9	2, 4-DIMETHYLPHENOL	20. ND
65-85-0	BENZOIC ACID	100. ND
111-91-1	BIS(2-CHLOROETHOXY)METHANE	20. ND
120-33-2	2, 4-DICHLOROPHENOL	20. ND
120-82-1	1, 2, 4-TRICHLOROBENZENE	20. ND
91-20-3	NAPHTHALENE	20. ND
106-47-8	4-CHLOROANILINE	20. ND
87-68-3	HEXACHLOROBUTADIENE	20. ND
59-50-7	4-CHLORO-3-METHYLPHENOL	20. ND
91-57-6	2-METHYLNAPHTHALENE	20. ND
77-47-4	HEXACHLOROCYCLOPENTADIENE	20. ND
88-06-2	2, 4, 6-TRICHLOROPHENOL	20. ND
95-95-4	2, 4, 5-TRICHLOROPHENOL	100. ND
91-58-7	2-CHLORONAPHTHALENE	20. ND
88-74-4	2-NITROANILINE	100. ND
131-11-3	DIMETHYL PHTHALATE	20. ND
208-96-8	ACENAPHTHYLENE	20. ND
99-09-2	3-NITROANILINE	100. ND

ORGANICS ANALYSIS DATA SHEET SAMPLE #: TIME B TREATED

LABORATORY: WCAS
LABORATORY ID: 2153B10

Tentatively Identified Compounds

	CAS Number	Compound Name	Fraction	Scan	Estimated Conc(J) (PPM)
1.	1825-21-4	PENTACHLOROANISOLE	B/N	959	20
2.		C_{14-35} AROMATIC HYDROCARBONS	B/N		2000
3.		UNIDENTIFIED COMPOUNDS	B/N		1000
4.					
5.					
6.					
7.					
8.					
9.					
10.					
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29.					
30.					

ORGANICS ANALYSIS DATA SHEET SAMPLE #: TIME B RAW DUPLICATE

LABORATORY: WCAS
BORATORY ID: 2153B15

Tentatively Identified Compounds

	CAS Number	Compound Name	Fraction	Scan	Estimated Conc(J)
1.		C14-35 ALIPHATIC HYDROCARBONS	BNA		2000
2.		UNIDENTIFIED COMPOUNDS	BNA		900
3.					
4.					
5.					
6.					
7.					
8.					
9.					
10.					
11.					
12.					
13.					
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28.					
29.					
30.					

ORGANICS ANALYSIS DATA SHEET SAMPLE #: TIME B RAW DUPLICATE

LABORATORY: WCAS
LABORATORY ID: 2153B15
DATE RECEIVED: 09/16/85

SEMIVOLATILE COMPOUNDS (PAGE 2)

LEVEL:	MEDIUM
MATRIX:	SOIL
DATE EXT/PREP:	09/18/85
DATE ANALYZED:	9/25/85
SPL-->EXTRACT:	5G: 1ML: : 0. 01ML: 1ML
STANDARD ID:	BNA46
SENSITIVITY ID:	
UNITS:	UG/G (PPM)

CAS #		CONC
83-32-9	ACENAPHTHENE	20. ND
51-28-5	2, 4-DINITROPHENOL	100. ND
100-02-7	4-NITROPHENOL	100. ND
132-64-9	DIBENZOFURAN	20. ND
121-14-2	2, 4-DINITROTOLUENE	20. ND
606-20-2	2, 6-DINITROTOLUENE	20. ND
84-66-2	DIETHYL PHTHALATE	20. ND
7005-72-3	4-CHLOROPHENYL PHENYL ETHER	20. ND
86-73-7	FLUORENE	20. ND
100-01-6	4-NITROANILINE	100. ND
534-52-1	4, 6-DINITRO-2-METHYLPHENOL	100. ND
86-30-6	N-NITROSODIPHENYLAMINE	20. ND
101-55-3	4-BROMOPHENYL PHENYL ETHER	20. ND
118-74-1	HEXACHLOROBENZENE	20. ND
87-86-5	PENTACHLOROPHENOL	10000.
85-01-8	PHENANTHRENE	20. ND
120-12-7	ANTHRACENE	20. ND
84-74-2	DI-N-BUTYL PHTHALATE	20. ND
206-44-0	FLUORANTHENE	20. ND
92-87-5	BENZIDINE	100. ND
129-00-0	PYRENE	20. ND
85-68-7	BUTYL BENZYL PHTHALATE	20. ND
91-94-1	3, 3'-DICHLOROBENZIDINE	40. ND
56-55-3	BENZO(A)ANTHRACENE	20. ND
117-81-7	BIS(2-ETHYLHEXYL)PHTHALATE	20. ND
218-01-9	CHRYSENE	20. ND
117-84-0	DI-N-OCTYL PHTHALATE	20. ND
205-99-2	BENZO(B & K)FLUORANTHENES	20. ND
50-32-8	BENZO(A)PYRENE	20. ND
193-39-5	INDENO(1, 2, 3-CD)PYRENE	20. ND
53-70-3	DIBENZO(A, H)ANTHRACENE	20. ND
191-24-2	BENZO(GHI)PERYLENE	20. ND

RESULTS ARE REPORTED ON A WET WEIGHT BASIS.

ORGANICS ANALYSIS DATA SHEET SAMPLE #: TIME B TREATED
DUPLICATE

LABORATORY: WCAS
LABORATORY ID: 2153B11
TE RECEIVED: 09/16/85

SEMIVOLATILE COMPOUNDS (PAGE 2)

LEVEL: MEDIUM
MATRIX: SOIL
DATE EXT/PREP: 09/18/85
DATE ANALYZED: 9/25/85
SPL-->EXTRACT: 5G: 1ML: : 0. 2ML: 1ML
STANDARD ID: BNA46
SENSITIVITY ID:
UNITS: UG/G (PPM)

CAS #		CONC
83-32-9	ACENAPHTHENE	1. ND
51-28-5	2, 4-DINITROPHENOL	5. ND
100-02-7	4-NITROPHENOL	5. ND
132-64-9	DIBENZOFURAN	1. ND
121-14-2	2, 4-DINITROTOLUENE	1. ND
606-20-2	2, 6-DINITROTOLUENE	1. ND
84-66-2	DIETHYL PHTHALATE	1. ND
7005-72-3	4-CHLOROPHENYL PHENYL ETHER	1. ND
86-73-7	FLUORENE	1. ND
100-01-6	4-NITROANILINE	5. ND
534-52-1	4, 6-DINITRO-2-METHYLPHENOL	5. ND
86-30-6	N-NITROSODIPHENYLAMINE	1. ND
101-55-3	4-BROMOPHENYL PHENYL ETHER	1. ND
118-74-1	HEXACHLOROBENZENE	1. ND
87-86-5	PENTACHLOROPHENOL	490.
85-01-8	PHENANTHRENE	1. ND
120-12-7	ANTHRACENE	1. ND
84-74-2	DI-N-BUTYL PHTHALATE	1. ND
206-44-0	FLUORANTHENE	1. ND
92-87-5	BENZIDINE	5. ND
129-00-0	PYRENE	1. ND
85-68-7	BUTYL BENZYL PHTHALATE	1. ND
91-94-1	3, 3'-DICHLOROBENZIDINE	2. ND
56-55-3	BENZO(A)ANTHRACENE	1. ND
117-81-7	BIS(2-ETHYLHEXYL)PHTHALATE	1. ND
218-01-9	CHRYSENE	1. ND
117-84-0	DI-N-OCTYL PHTHALATE	1. ND
205-99-2	BENZO(B & K)FLUORANTHENES	1. ND
50-32-8	BENZO(A)PYRENE	1. ND
193-39-5	INDENO(1, 2, 3-CD)PYRENE	1. ND
53-70-3	DIBENZO(A, H)ANTHRACENE	1. ND
191-24-2	BENZO(GHI)PERYLENE	1. ND

RESULTS ARE REPORTED ON A WET WEIGHT BASIS.

ORGANICS ANALYSIS DATA SHEET SAMPLE #: TIME B TREATED DUPLICATE

LABORATORY: WCAS
LABORATORY ID: 2153811
DATE RECEIVED: 09/16/85

SEMIVOLATILE COMPOUNDS (PAGE 1)

LEVEL: MEDIUM
MATRIX: SOIL
DATE EXT/PREP: 09/18/85
DATE ANALYZED: 9/25/85
SPL-->EXTRACT: 5G: 1ML: : 0. 2ML: 1ML
STANDARD ID: BNA46
SENSITIVITY ID:
UNITS: UG/G (PPM)

CAS #		CONC
62-75-9	N-NITROSODIMETHYLAMINE	1. ND
18-95-2	PHENOL	1. ND
62-53-3	ANILINE	1. ND
111-44-4	BIS(2-CHLOROETHYL)ETHER	1. ND
95-57-8	2-CHLOROPHENOL	1. ND
541-73-1	1,3-DICHLOROBENZENE	1. ND
106-46-7	1,4-DICHLOROBENZENE	1. ND
100-51-6	BENZYL ALCOHOL	1. ND
95-50-1	1,2-DICHLOROBENZENE	1. ND
95-48-7	2-METHYLPHENOL	1. ND
39638-32-9	BIS(2-CHLOROISOPROPYL)ETHER	1. ND
106-44-5	4-METHYLPHENOL	1. ND
621-64-7	N-NITROSODIPROPLYAMINE	1. ND
67-72-1	HEXACHLOROETHANE	1. ND
98-95-3	NITROBENZENE	1. ND
78-59-1	ISOPHORONE	6.
88-75-5	2-NITROPHENOL	1. ND
105-67-9	2,4-DIMETHYLPHENOL	1. ND
65-85-0	BENZOIC ACID	5. ND
111-91-1	BIS(2-CHLOROETHOXY)METHANE	1. ND
120-33-2	2,4-DICHLOROPHENOL	1. ND
120-82-1	1,2,4-TRICHLOROBENZENE	1. ND
91-20-3	NAPHTHALENE	1. ND
106-47-8	4-CHLOROANILINE	1. ND
87-68-3	HEXACHLOROBUTADIENE	1. ND
59-50-7	4-CHLORO-3-METHYLPHENOL	1. ND
91-57-6	2-METHYLNAPHTHALENE	1. ND
77-47-4	HEXACHLOROCYCLOPENTADIENE	1. ND
88-06-2	2,4,6-TRICHLOROPHENOL	1. ND
95-95-4	2,4,5-TRICHLOROPHENOL	5. ND
91-58-7	2-CHLORONAPHTHALENE	1. ND
88-74-4	2-NITROANILINE	5. ND
131-11-3	DIMETHYL PHTHALATE	1. ND
208-96-8	ACENAPHTHYLENE	1. ND
99-09-2	3-NITROANILINE	5. ND

LABORATORY REPORT

Sample: Time B (Duplicate analyses)

	Treated Mix 1	Dup.	Treated Mix 2	Dup.
Permeability(ft/day)	7 E-07	2 E-06	7 E-07	3 E-05

	ug/g (PPM)			
			Treated	
Base Neutral/Acids	Raw	Dup.	Mix 1	Dup.
Pentachlorophenol	11,000	10,000	460	490
C18-C30 Hydrocarbons *	2,000	2,000	2,000	2,000
Isophorone	ND<20	ND<20	5	6
Pentachloroanisole *	ND<20	ND<20	20	40

NA = Not analyzed
* = Approximate

ORGANICS ANALYSIS DATA SHEET

SAMPLE #: TIME B TREATED
DUPLICATE

LABORATORY: WCAS
LABORATORY ID: 2153B11

Tentatively Identified Compounds

	CAS Number	Compound Name	Fraction	Scan	Estimated Conc(J)
1.		PENTACHLOROANISOLE	BNA	950	40
2.		C14-35 ALIPHATIC HYDROCARBONS	BNA		2000
3.		UNIDENTIFIED COMPOUNDS	BNA		900
4.					
5.					
6.					
7.					
8.					
9.					
10.					
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TIME OIL COMPANY
PORTLAND, OREGON

PENTACHLOROPHENOL SAMPLING & ANALYSIS

Prepared by
RIEDEL ENVIRONMENTAL SERVICES
P.O. Box 5007
Portland, Oregon 97208

October 18, 1985

Sampling

All sampling was performed in accordance with EPA publication SW846, "Test Methods for Evaluating Solid Waste". Surface soil sampling was achieved using a small trier and/or sampling scoop. Subsurface samples were obtained using a 6" continuous flight hollow stemmed auger fitted with a 2" split-spoon sampler. All sampling equipment was decontaminated between samples with a trisodium phosphate wash, water rinse, hexane wash and a triple rinse with distilled, deionized water. Auger flights were decontaminated by high pressure steam cleaning between bore holes.

Samples were obtained from two areas. Area 1 consisted of a peripheral surface margin surrounding the containment areas on all of the available sides (see Figure 1). Area 2 consisted of the area inside the containment wall. All samples from each site were placed in new 16-ounce wide-mouthed glass jars previously washed with laboratory cleaner, water rinsed, hexane washed, air dried and rinsed three times with distilled, deionized water, then fitted with teflon-lined caps under clean conditions. Samples were labelled with client identification, sample number, date, time, sampler's name, sample location, and other pertinent information. Containers were sealed and placed in portable, refrigerated ice chests for transportation to the laboratory. Samples were delivered to the laboratory by RES courier within 48 hours after collection. Chain of custody forms accompanied all samples from original field sampling to final analysis and are included in this report (Appendix A). A field log of each sample was generated on site during sampling and retained for future reference.

Preliminary surface sampling in Area 1 was performed by preparation of a composite sample obtained from sub-areas A, D and F by pooling grab samples taken with triers or spoons at 10-foot intervals, five feet away from the containment area.

Secondary surface sampling was conducted in Area 1 by obtaining individual grab samples using triers or spoons. The sample sites are numbered 1-81 and are indicated on Figure 1. Secondary samples were obtained in response to the detection of significant concentrations of PCP in preliminary composite samples from sub-areas A and D, above, and were used solely to estimate the limits of contamination beyond the containment area. As stated earlier, no attempt was made in this sampling and analytical protocol to determine average (mean) values of PCP contamination.

Introduction

Between 1967 and 1982 Time Oil Company operated a pentachlorophenol (PCP) facility at its North Portland, Oregon, terminal. This facility consisted of blending and storage operations used to prepare commercial pentachlorophenol solutions. The facility consisted of various storage and mixing tanks, a warehouse, a bermed, unpaved containment area, various pumps and a truck loading area.

The facility geography is essentially flat and is located less than 1/4 mile from the Willamette River. The soil is principally fine to medium sand with some silt. Ground water is reportedly found from 10 to 20 feet below the surface in this area. During June of 1985, a portion of visibly contaminated soil in the containment area was excavated and disposed of as a hazardous waste. This excavation left a depression in the northwest corner of the containment area sloping gradually to approximately four feet below the adjacent grade. Surface soil was disturbed during this process and, as such, surface sampling was not expected to be representative of conditions existing prior to excavation.

During the years of operation, several intermittent PCP discharges were known to occur, especially during mixing and transfer operations. These discharges resulted in soil contamination in and around the containment area. Initial site visits in April 1985 indicated visible PCP contamination of soils in this vicinity. A sampling plan for surface and subsurface soils extending through the vadose zone was designed and initiated in July 1985.

This sampling and analytical protocol was designed to estimate the spatial limits of PCP contaminant migration in the vadose zone of the soil in and immediately adjacent to the PCP containment area facility. As such, a systematical gridding array was used in lieu of random or other types of probability sampling. No attempt was made to sample underneath structures or paved areas. The protocol was not intended to determine the average concentration of PCP in soil at the facility since the area sampled was not expected to be homogeneous nor to represent a specific population of PCP concentrations. Therefore, statistical evaluations such as mean and standard deviation, have only academic significance in respect to these data.

However, since the origin points in the regular sampling arrays were randomly selected (i.e., a systematic random sampling procedure), there is no reason why some or all of this data could not be used for this purpose at a future time.

triangle with an east-west base of 25 feet and a north-south height of 18 feet. The maximum distance from any point on the grid to the nearest sample point in this case is 13.34 feet as opposed to 14.14 feet for a standard 20-foot x 20-foot rectangular array. This selection allowed for the placement of additional wells just outside the containment wall without increased cost, thereby improving coverage with fewer sampling points (reference: Parkhurst, D.F., Optimal Sampling Geometry for Hazardous Waste Sites; Environmental Science & Technology, 18 No. 7, p. 521 [1984]). The triangular grid is indicated on Figure 1. Bore holes are indicated by the symbol "■" and are labeled with alpha symbols J-Z. A table of samples so obtained is given in Table III.

Following sampling, borings were sealed with bentonite grout in accordance with state well sealing standards under the direction of a registered geologist. Decontamination water, collected into tubs, was analyzed and, following receipt of negative results for PCP, disposed of on site.

Results

Samples were analyzed by Coffee Laboratories, Portland, Oregon, using EPA SW-846 protocols. Soil samples were Sohxlet extracted using EPA protocol #3540. Procedure #8040 was utilized with electron capture quantification for PCP analysis. Results are expressed in milligrams of PCP per kilogram soil (ppm, dry weight). At sites where results could be expected to approach zero (based on results from adjacent sites), samples were held but not analyzed. The results are listed in Table IVA-E. Preliminary composite results are shown in Table IVF and confirm PCP contamination beyond the containment wall.

These tables list PCP concentrations at each sample site as well as the X and Y coordinates used to locate these sites on the plan drawing (Figure 1). These coordinates are tied to an arbitrary grid as shown on Figure 1. The northwest corner of the containment wall is located at coordinates X=76, Y=166 (76,166), for sake of reference. Each sampling depth is listed on a separate table. Copies of the laboratory reports are listed in Appendix B.

The coordinate data and concentration results were plotted using an interpolating contouring program (In-Situ Corp., Laramie WY). This package performs smoothed contouring of the data using a triangularization method and bivariate interpolation. Contours were generated from surface samples (regardless of elevation below grade) and 2-, 4-, 7- and 12-foot depths below grade. The contours are plotted on Figures 2A-E. These contour diagrams have been reduced and printed on mylar sheets in addition to the attached figures.

Sampling in Area 1, peripheral samples, was performed to ascertain the surface margins of the contaminated area. It was arbitrarily assumed that the area within the containment walls was contaminated with PCP and the peripheral margins of this area established as consisting of the warehouse south wall, the east and west concrete walls and the southern edge of a pipeline transecting the containment area as indicated in Figure 1. Three concentric, 10-foot-wide marginal strips were staked out surrounding this boundary and are indicated by broken lines in Figure 1. The 10 foot marginal strips were subdivided into areas A, B and C to the west, D, E and F to the south, and G, H, and I to the east (see Figure 1).

Sampling of Area 2, the containment area proper, was performed to evaluate PCP concentrations at the surface and at depth in subsoils to the saturated zone. Grab samples were obtained from a 2-foot x 2-inch split spoon sampler pressed through a 6-inch hollow-stem augered bore hole, and were placed in 16-ounce sample containers as previously described. Decontamination procedures, chain of custody, labelling and logging were identical to Area 1 samples. Auger flights were decontaminated at the completion of each coring to prevent cross contamination. Samples were taken at a maximum depth of 0, 2, 4, 7 and 12 feet below the surface elevation of the unexcavated portion of the containment area.

Due to the sloping contour of the containment area caused by the excavation, the surface elevation below grade was measured from a string line pulled tightly between two unexcavated surface points and spanning the sampling point. Elevation of sampling site surfaces below this grade line was measured using a rigid ruler and is shown in Table I. Data from this table was used to calculate the actual auger depth below the surface required to obtain the split spoon samples to align all samples in the same respective horizontal plane. This data is listed in Table II and indicates the actual depth drilled below the surface required to obtain a sample at the nominal depth listed (0, 2, 4, 7, or 12 feet). In cases where it was deemed practical, soil was hand excavated to the depth corresponding to the first sampling depth indicated and the sample obtained manually with a small trier or spoon.

The horizontal array of borings was selected to minimize the maximum distance from any given point in the sampling area to the nearest boring. To do this most effectively, a triangular grid was staked off. The array was based on a

TABLE II

TIME OIL CO. - PORTLAND, OREGON

Actual Split-Spoon Sample Depths Below Grade

	Nominal Depth				
Boring	0	2	4	7	12
J	0	0-2'	2-4'	5-7'	10-12'
K	NA	0-1 1/2	1 1/2-3 1/2	4 1/2-6 1/2	9 1/2-11 1/2
L	NA	NA	Surf (11")	2-4'	7-9'
M	0	0-2'	2-4'	5-7'	10-12'
N	0	0-2'	2-4'	5-7'	10-12'
O	0	0-2'	2-4'	5-7'	10-12'
P	NA	Surf (4")	0-2'	3-5'	8-10'
Q	NA	NA	0-1 1/2	2 1/2-4 1/2	7 1/2-9 1/2
R	0	0-2'	2-4'	5-7'	10-12'
S	0	0-2'	2-4'	5-7'	10-12'
T	NA	Surf	0-2'	3-5'	8-10'
U	0	0-2'	2-4'	5-7'	10-12'
V	0	0-2'	2-4'	5-7'	10-12'
W	0	0-2'	2-4'	5-7'	10-12'
X	NA	Surf	0-2'	3-5'	8-10'
Y	NA	NA	Surf (11")	2-4'	7- 9'
Z	0	0-2'	2-4'	5-7'	10-12'

NOTE:

Actual depths indicate depth of bottom of split-spoon.

NA = Not available

Surf = Surface sample obtained by hand excavation at depth indicated in parentheses

TABLE I

TIME OIL CO. - PORTLAND, OREGON

Depth of Boring Site Surface Sample Below Grade
(Horiz. String Line)

Boring	Depth
J	0
K	6"
L	3'
M	0
N	0
O	0
P	1'8"
Q	2'6"
R	0
S	0
T	2'
U	0
V	0
W	0
X	2'
Y	3'
Z	0

TABLE IVA
TIME OIL CO. - PORTLAND, OREGON
PENTACHLOROPHENOL IN SOIL

Surface Contour Data

Sample #	Coordinates X	Coordinates Y	Concentration Mg/Kg
1	81	171	13500
2	71	171	29
3	71	161	500
4	71	151	5450
5	71	141	5560
6	71	131	8760
7	71	121	4870
8	71	111	92
9	71	101	20
10	81	181	16
11	71	181	7
12	61	181	9
13	61	171	95
14	61	161	175
15	61	151	18
16	61	141	229
17	61	131	88
18	61	121	6
19	61	111	3
20	61	101	2.5
21	61	91	5.2
37	81	95	857
38	91	96	1130
39	101	97	17
40	111	98	3.5
41	121	98	3.1
42	131	99	3.2
43	141	100	2.4
44	151	100	1.8
45	161	101	171
46	71	84	3
47	81	85	3.6
48	91	86	6.1
49	121	87	3.2
50	131	88	1.5
51	141	89	2.3
52	151	90	1.7
53	161	91	1.9
54	171	92	1.2

Core #	Coordinates X	Coordinates Y	Concentration Mg/Kg
J	142.5	161	1400
K	117.5	161	N/A
L	92.5	161	N/A
M	67.5	161	4720
N	155	143	4280
O	130	143	3000
P	105	143	N/A
Q	80	143	N/A
R	142.5	125	1712
S	117.5	125	522
T	92.5	125	123
U	67.5	125	26550
V	155	107	317
W	130	107	3385
X	105	107	N/A
Y	80	107	N/A
Z	80	179	21

N/A = Not Available

TABLE III

TIME OIL CO. - PORTLAND, OREGON

Nominal Split-Spoon Sample Depths

Boring	0 Surface	2 0-2'	4 2-4'	7 5-7'	12 10-12'
J	X	X	X	X	X
K	-	X	X	X	X
L	-	-	X	X	X
M	X	X	X	X	X
N	X	X	X	X	X
O	X	X	X	X	X
P	-	X	X	X	X
Q	-	-	X	X	X
R	X	X	X	X	X
S	X	X	X	X	X
T	-	X	X	X	X
U	X	X	X	X	X
V	X	X	X	X	X
W	X	X	X	X	X
X	-	X	X	X	X
Y	-	-	X	X	X
Z	X	X	X	X	X

NOTE: X = Sample
- = Not available due to excavation
ND = Not sampled due to presence of groundwater

TABLE IVC

TIME OIL CO. - PORTLAND, OREGON
PENTACHLOROPHENOL IN SOIL

Four Foot Contour Data

Core #	Coordinates X	Coordinates Y	Concentration Mg/Kg
J	142.5	161	3.6
K	117.5	161	10.5
L	92.5	161	7200
M	67.5	161	22
N	155	143	238
O	130	143	23
P	105	143	15
Q	80	143	2205
R	142.5	125	50
S	117.5	125	184
T	92.5	125	534
U	67.5	125	55
V	155	107	380
W	130	107	8.1
X	105	107	1.3
Y	80	107	598
Z	80	179	2

TABLE IVB

TIME OIL CO. - PORTLAND, OREGON
PENTACHLOROPHENOL IN SOIL

Two Foot Contour Data

Core #	Coordinates X	Coordinates Y	Concentration Mg/Kg
J	142.5	161	3
K	117.5	161	8.8
L	92.5	161	N/A
M	67.5	161	87*
N	155	143	3.1
O	130	143	59
P	105	143	16
Q	80	143	N/A
R	142.5	125	34
S	117.5	125	252
T	92.5	125	123
U	67.5	125	44
V	155	107	260
W	130	107	15
X	105	107	4.5
Y	80	107	N/A
Z	80	179	14*

N/A = Not Available
* = Data points omitted from contouring program to reduce extrapolation error

TABLE IVE

TIME OIL CO. - PORTLAND, OREGON

Pentachlorophenol in Soil

12 Foot Contour Data

CORE #	COORDINATES X	COORDINATES Y	CONCENTRATION mg/kg
J	142.5	161	NA
K	117.5	161	2.3
L	92.5	161	2030
M	67.5	161	690
N	155	143	NA
O	130	143	38
P	105	143	450
Q	80	143	1150
R	142.5	125	1
S	117.5	125	217
T	92.5	125	90
U	67.5	125	NA
V	155	107	3.4
W	130	107	1.9
X	105	107	1.0
Y	80	107	720
Z	80	179	1.0

TABLE IVD

TIME OIL CO. - PORTLAND, OREGON

Pentachlorophenol in Soil

7 Foot Contour Data

CORE #	COORDINATES X	COORDINATES Y	CONCENTRATION mg/kg
J	142.5	161	(NA)
K	117.5	161	3
L	92.5	161	8400
M	67.5	161	1
N	155	143	(NA)
O	130	143	13
P	105	143	130
Q	80	143	700
R	142.5	125	500
S	117.5	125	1130
T	92.5	125	75
U	67.5	125	5
V	155	107	1
W	130	107	1
X	105	107	1.9
Y	80	107	700
Z	80	179	7

The scale on the mylar prints is such that the contours are superimposable on Figure 1 (site plan). This allows for facile comparison of PCP concentration profiles at depth with surface features of the facility. A reference point on Figures 1 and 2(a-e) is located at (76,166) for ease of alignment.

Conclusions

As seen in Tables IVA-E, PCP concentrations range from 1 ppm to 26,550 ppm. Two foci of contamination are seen at the surface. One is located at coordinates (83,168) in the northwest corner of the containment area. A second focus occurs just outside the containment wall to the west at coordinates (65,125). Additional minor contamination sites occur at the surface in various positions throughout the sample area; however, no prominent concentration peaks are evident. This may be due, in part, to the partial excavation mentioned previously or to vehicle traffic or other activity in this area.

No evidence of penetration of the "loading area" focus below 2 feet was observed. Note that the results of the 2-foot contouring fail to demonstrate a continuation of the foci found at the surface. This is due, in part, to the excavation which removed the 2-foot material and to the definition of surface samples as surface material regardless of relationship to elevation (i.e. surface samples are not equivalent to "Ø foot" samples). This phenomenon is indicated by the lack of sample sites on the 2-foot contour at boring sites L, M, Q, Y and Z. The lack of high PCP concentrations at boring site U, 2-foot contour, implies that no significant penetration occurred at this site and that PCP contamination at this site is restricted to narrowly distributed but high concentration surface contamination.

Contours at 4, 7 and 12 feet indicate appreciable attenuation of PCP concentrations with increasing depth. The maximum concentration at 12 feet is 2030 ppm located at boring "L". Note that no samples were analyzed at boring sites "J" and "N" at 7- or 12-foot depths, since concentrations above these depths indicated that concentrations near zero could be expected. No sample was obtained at "U" due to loss of sample when groundwater was encountered.

The slight tendency of the PCP plume to tail off to the south implies that groundwater flux may be diffusing the plume in this direction. This conclusion can only be substantiated by hydrogeologic evaluations of the site, however.

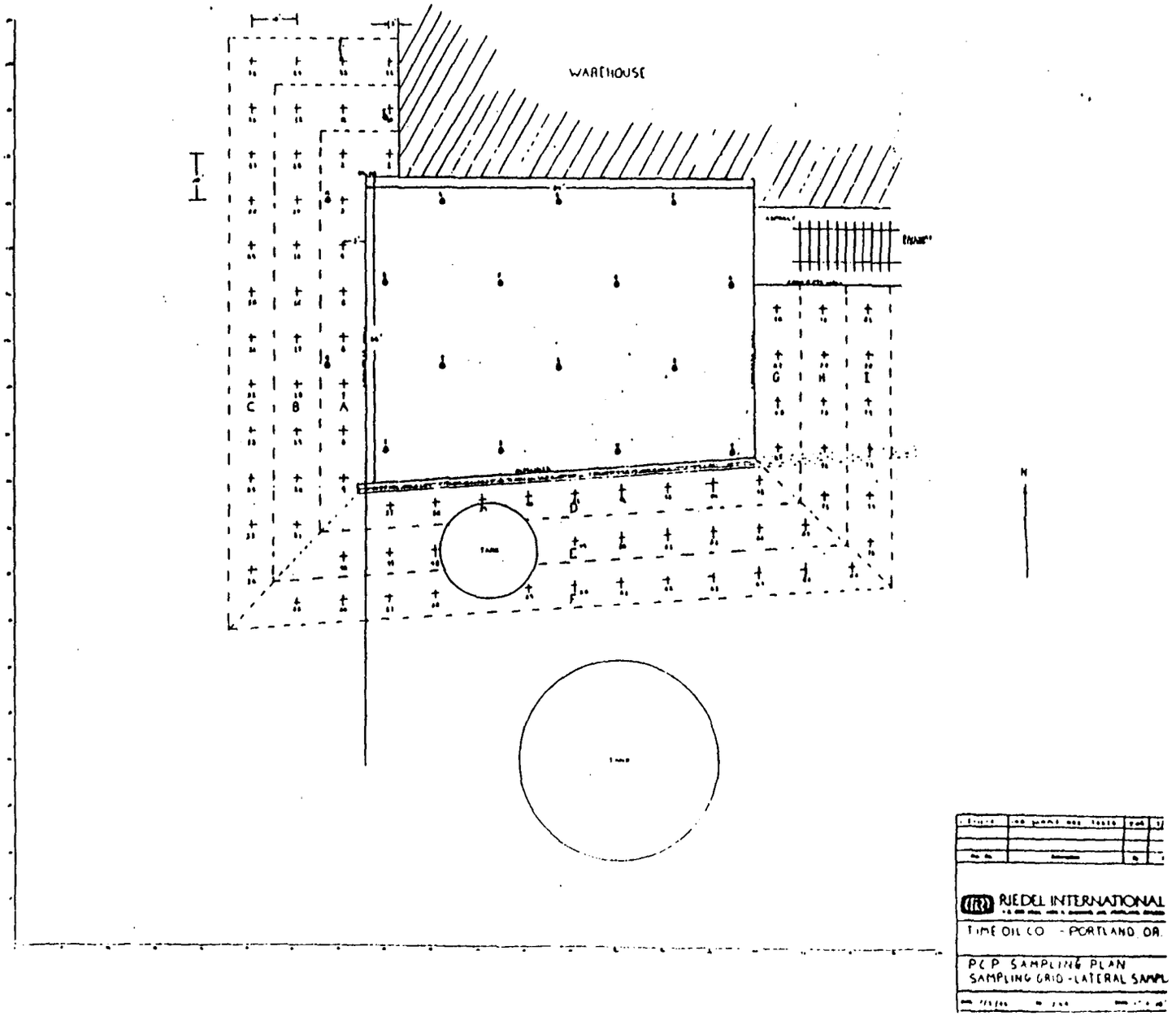
TABLE IVF

TIME OIL CO. - PORTLAND, OREGON
PENTACHLOROPHENOL IN SOIL

Preliminary Surface Composites

Area	PCP (mg/kg)
A	660
D	860
G	17

FIGURE 1



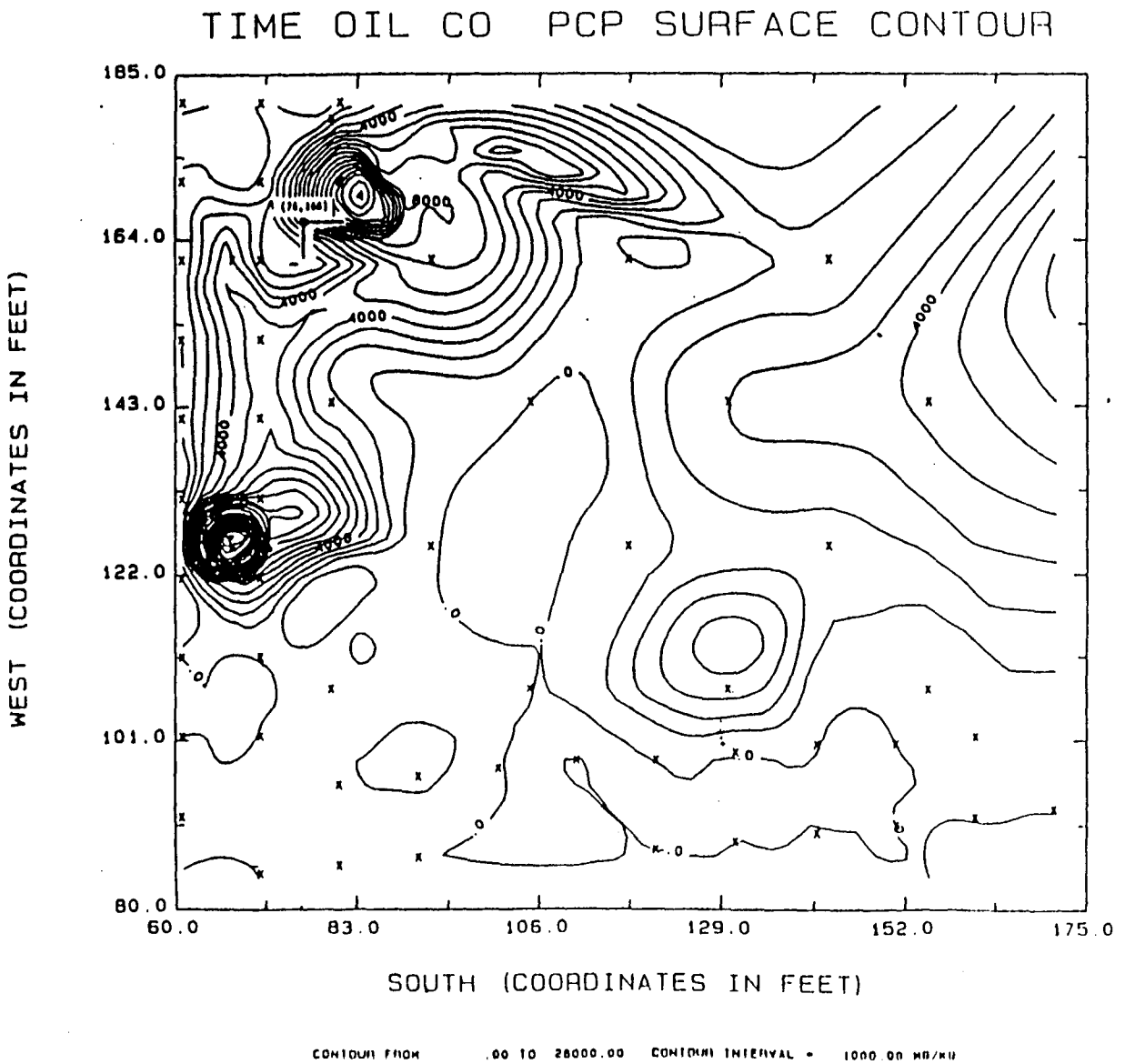
BZTO104(e)012411

The contaminant plume may be restricted at the surface by the presence of the warehouse foundation. This structure could be expected to prevent diffusion of the PCP plume to the north by presenting a physical barrier to contaminant migration. Identification of concentrations of PCP beneath the building on contour plots is a function of the contouring program and may not be indicative of actual plume morphology in this area.

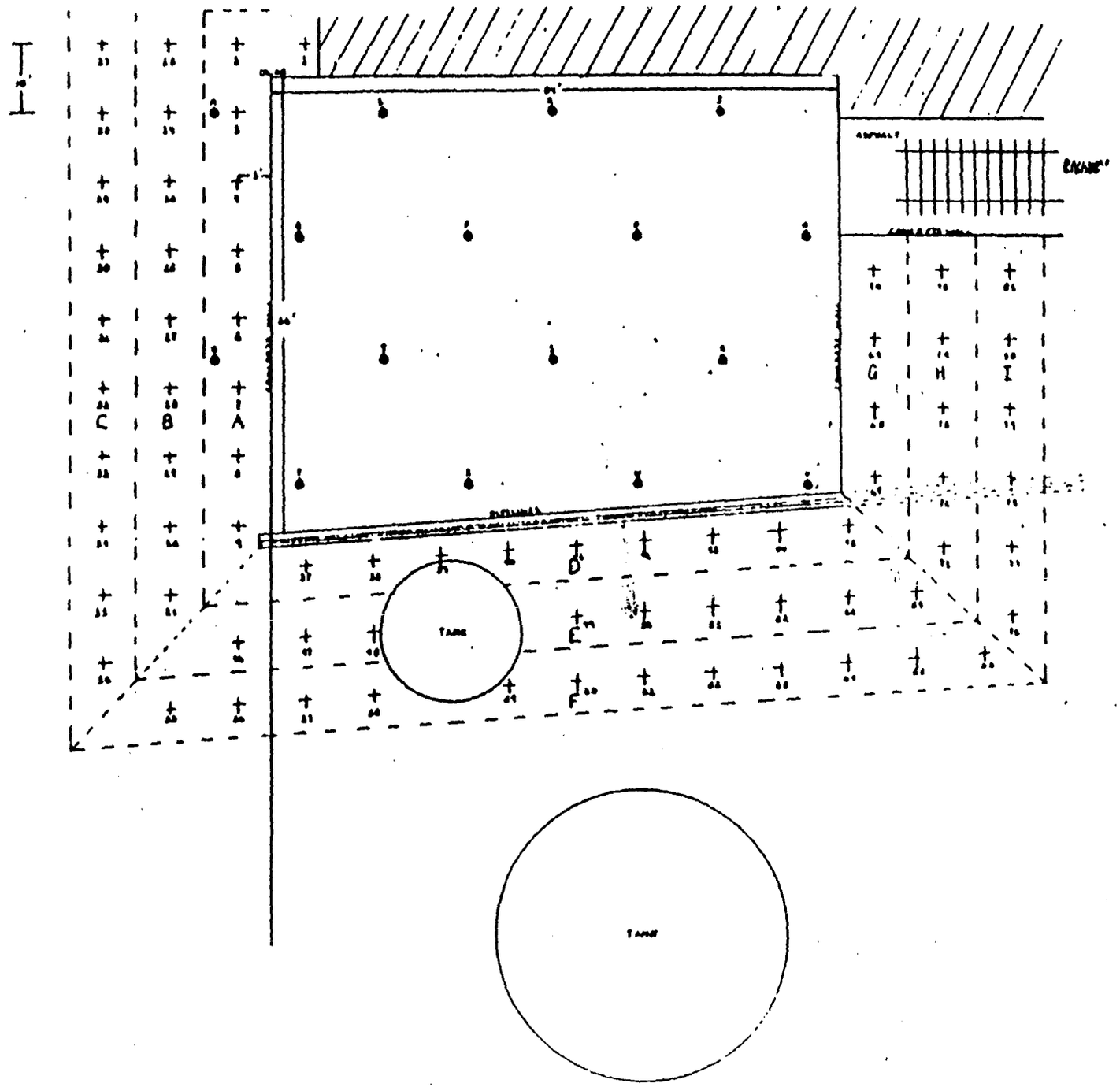
Summary

Significant PCP concentrations were detected in soil at Time Oil Co.'s north Portland operation. Contamination was pronounced at two focal sites, one at the northwest corner of the containment area and one at the west side of the containment area. Surface concentrations ranged from 1.2 mg/kg to 26,500 mg/kg. Sampling at depth indicated significant PCP concentrations at the northwest focus descending to the saturated zone and approximately 8-12 feet. Concentrations at 12 feet ranged from 1.0 mg/kg to 2,030 mg/kg. Analytical data from surface, 2-, 4- 7- and 12-foot samples were contoured and plotted and may be related to an area plan drawing of the same scale.

FIGURE 2A:



BZTO104(e)012413



BZTO104(e)01241

FIGURE 2C

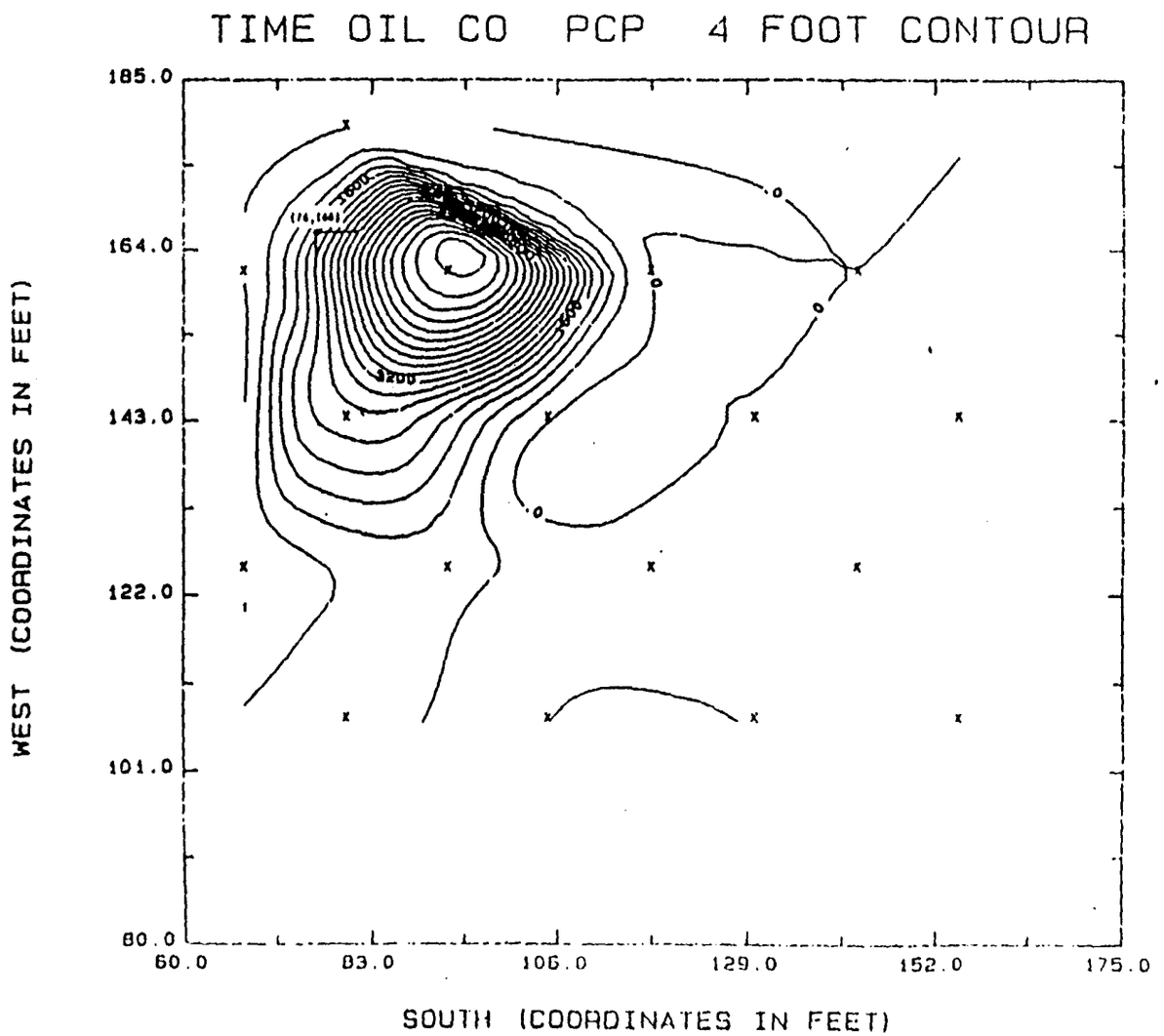
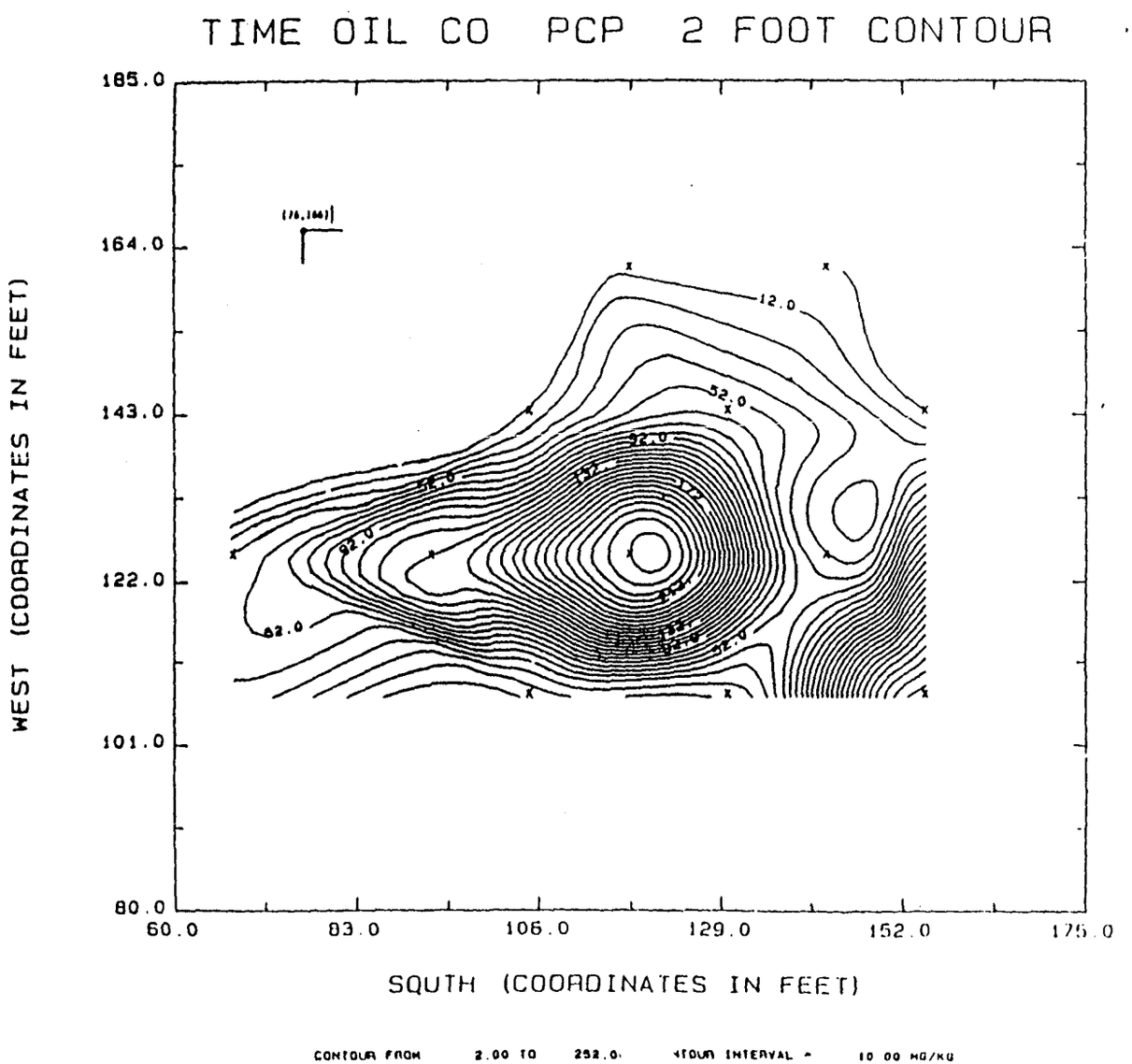
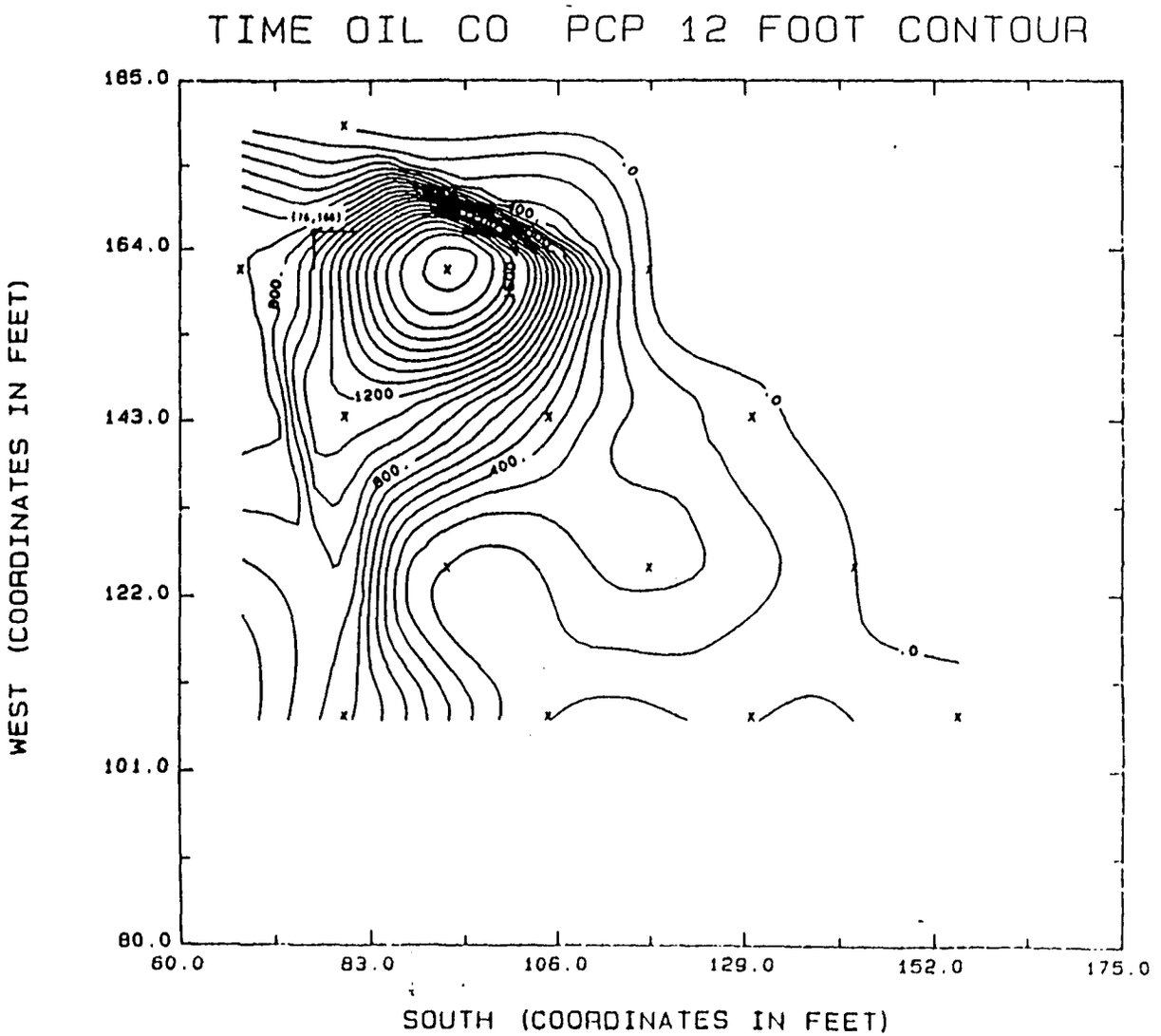

TIME OIL CO PCP 4 FOOT CONTOUR
185.0
164.0
143.0
122.0
101.0
80.0
60.0
83.0
106.0
129.0
152.0
175.0
WEST (COORDINATES IN FEET)
SOUTH (COORDINATES IN FEET)
1000
3200
0

FIGURE 2B



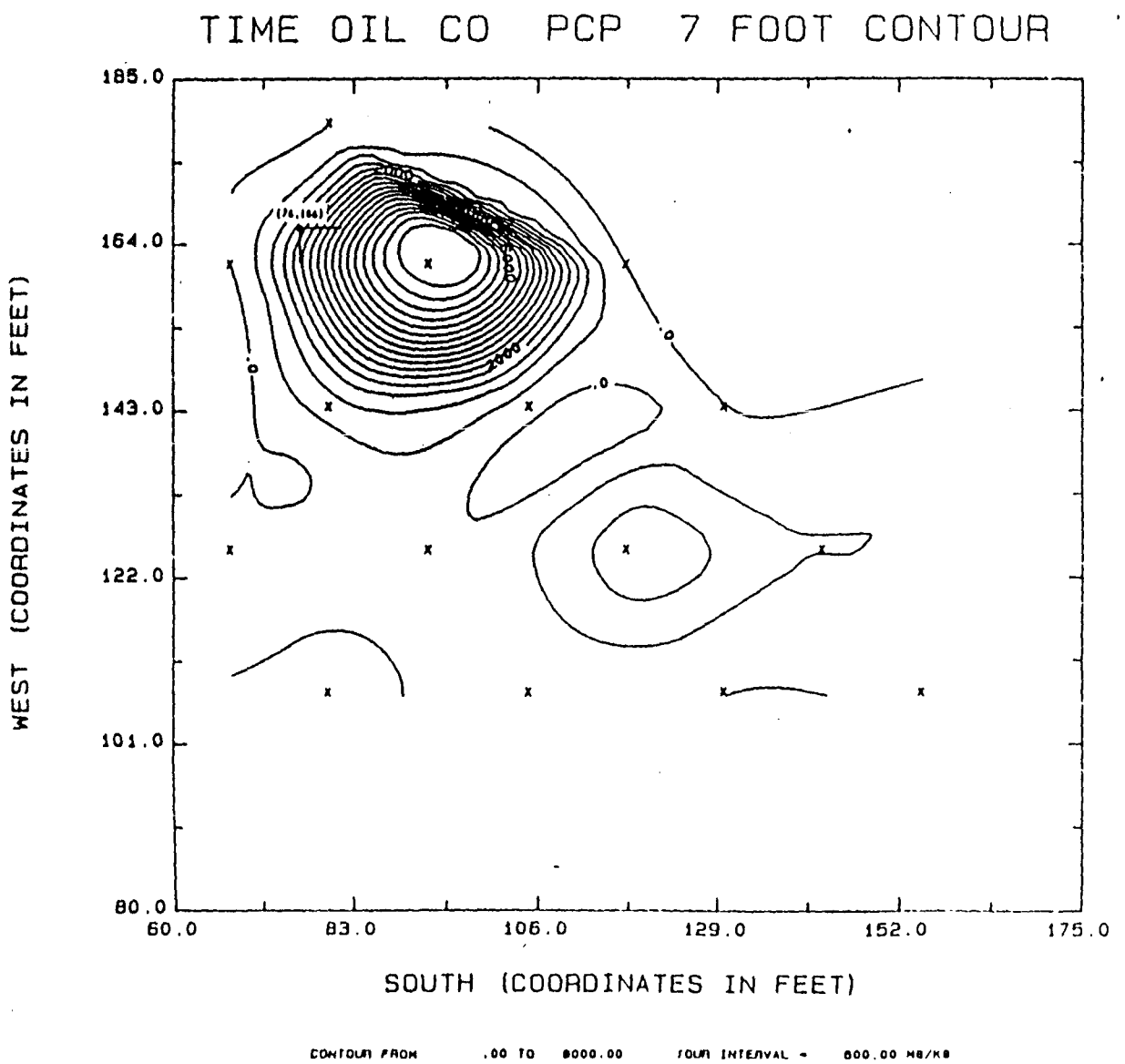
BZTO104(e)012416

FIGURE 2E



BZTO104(e)012417

FIGURE 2 D



BZT0104(e)012418

MENTAL PROTECTION AGENCY
Office of Enforcement

CHAIN OF CUSTODY RECORD

PROJ. NO. 8227/901

PROJECT NAME: Time Oil PCP Sampling

SAMPLERS: (Signature) Robert L. Keese

STA. NO.	DATE	TIME	COMP.	GRAB	STATION LOCATION	NO OF CONTAINERS							REMARKS
1	7/16	12:00			Area "A"								
2		12:02											
3		12:04											
4		12:06											
5		12:08											
6		12:10											
7		12:12											
8		12:14											
9		12:16											
10		12:18			Area "B"								
11		12:20											
12		12:22											
13		12:24											
14		12:26											
15		12:28											

Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
[illegible]	7/16 1549	[illegible]	[illegible]	7-17-85 16:31	Sharon M. Coffey
[illegible]	7/16 1716	[illegible]			
[illegible]	7/17 0925	[illegible]			

Date / Time	Remarks

Distribution: Original Accompanies Shipment; Copy to Coordinator Field Files

3-0605

Figure 3. Example of chain-of-custody record.

APPENDIX A

CHAIN OF CUSTODY RECORDS

...ITAL PROTECTION AGENCY
Office of Enforcement

CHAIN OF CUSTODY RECORD

PROJ. NO. 8124/3011
PROJECT NAME Time Oil PCP Sampling
SAMPLERS: (Signature) Robert Keese

STA. NO.	DATE	TIME	COMP.	GRAB	STATION LOCATION	NO OF CONTAINERS							REMARKS
31	7/16	12:58			Area C								
32		13:00											
33		13:02											
34		13:04											
35		13:06											
36		13:08											
37		13:30			Area D								
38		13:32											
39		13:34											
40		13:36											
41		13:38											
42		13:40											
43		13:42											
44		13:44											
46		13:46											

Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
Neil Wallis	7/16/85 1549	R. L. Keese	[illegible]	7-17-85 1035	Susan M. Coffey
R L Keese	7/16 1716	John F Ruddick			
Ruddick	7/17 1935	[illegible]			

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3-0605

Figure 3. Example of chain-of-custody record.

MENTAL PROTECTION AGENCY
Office of Enforcement

CHAIN OF CUSTODY RECORD

PROJ. NO.	PROJECT NAME
8/24/3011	Time 0.1 PCP Sampling

SAMPLERS: (Signature) Robert L Keese

STA. NO.	DATE	TIME	COMP.	GRAB	STATION LOCATION	NO OF CONTAINERS							REMARKS
16	7/16	12:30			Area B								
17		12:32											
18		12:34											
19		12:36											
20		12:38											
21		12:40											
22		12:42			Area C								
23		12:43											
24		12:44											
25		12:46											
26		12:48											
27		12:50											
28		12:52											
29		12:54											
30		12:56											

Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
Neil Wallis	7/16/85 1549	R. L. Keese	[illegible]	7-17-85 16:35	Susan A. Gillen
R. L. Keese	7/16 1716	[illegible]			
[illegible]	7/17 0935	Received for Laboratory by: (Signature) [illegible]	Date / Time	Remarks	

Distribution: Original Accompanies Shipment; Copy to Coordinator Field Files

3-0605

Figure 3. Example of chain custody record.

E: :NTAL PROTECTION AGENCY
·lice of Enforcement

CHAIN OF CUSTODY RECORD

PROJ. NO. 8121/30M

PROJECT NAME: Tire Oil - PCP Sampling

SAMPLERS: (Signature) Robert L Keese

STA. NO.	DATE	TIME	COMP.	GRAB	STATION LOCATION	NO OF CONTAINERS							REMARKS
61	7/16	14:18			Area F								
62		14:20											
63		14:22											
64		14:24											
65		14:26											
66		14:28											
67		14:30			Area G								
68		14:32											
69		14:34											
70		14:36											
71		14:38			Area H								
72		14:40											
73		14:42											
74		14:44											
75		14:46											

Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
[signature]	7/16/85 1549	[signature]	[signature]	7-17-85 035	[signature]
[signature]	7/16 1716	[signature]			
[signature]	7/17 0935	[signature]			

Remarks

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3- 0605

Figure 3. Example of chain-of-custody record.

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CHAIN OF CUSTODY RECORD

PROJ. NO. 8121/3011

PROJECT NAME: Time Oil - PCP Sampling

SAMPLERS: (Signature) Robert L. Keese

STA. NO.	DATE	TIME	COMP.	GRAB	STATION LOCATION	NO OF CONTAINERS							REMARKS
46	7/16	13:48			Area F								
47		13:50											
48		13:52											
49		13:54											
50		13:56											
51		13:58											
52		14:00											
53		14:02											
54		14:04											
55		14:06			Area F								
56		14:08											
57		14:10											
58		14:12											
59		14:14											
60		14:16											

Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
Neil Wallis	7/16/85 1549	R. L. Keese	[illegible]	7-17-85 1635	Susan M. Coffey
R. L. Keese	7/16 1716	[illegible]			
J. Reddick	7/17 0935	[illegible]			

Distribution: Original Accompanies Shipment; Copy to Coordinator Field Files

3-0605

Figure 3. Example of chain- custody record.

ENTAL PROTECTION AGENCY
Office of Enforcement

CHAIN OF CUSTODY RECORD

PROJ. NO.: 3011
PROJECT NAME: Time Oil
SAMPLERS: (Signature) R Sebelin

STA. NO.	DATE	TIME	COMP.	GRAB	STATION LOCATION	NO. OF CONTAINERS							REMARKS
R-2	7-23	1555											
R-4	7-23	1600											
R-7	7-23	1610											bright sample (Not much)
R-12	7-23	1620											water 11'
W-2	7-24	0800											
W-4	7-24	0810											
W-7	7-24	0820											
W-12	7-24	0830											water 11'
S-2	7-24	0900											
S-4	7-24	0910											
S-7	7-24	0915											
S-12	7-24	0920											water 11'

Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
R Sebelin	7-25-85 1000	SS			
Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
Relinquished by: (Signature)	Date / Time	Received for Laboratory by: (Signature)	Date / Time	Remarks	

Distribution: Original Accompanies Shipment; Copy to Coordinator Field Files

3 - 0605

Figure 3. Example of chain-of-custody record.

ENTAL PROTECTION AGENCY
Office of Enforcement

CHAIN OF CUSTODY RECORD

PROJ. NO.	PROJECT NAME
8124/8011	Tine Oil PCP Sampling

SAMPLERS (Signature): Robert L. Keese

STA. NO.	DATE	TIME	COMP.	GRAB	STATION LOCATION	NO. OF CONTAINERS							REMARKS
76	7/16	14:48			Area I								
77	↓	14:50											
78		14:52											
79		14:59											
80		14:56											
81		15:00											

Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
Neil Wallis	7/16/85 1549	R. L. Keese	Howell	7-17-85 1035	Susan M. Coffey
R. L. Keese	7/16 1716	[illegible]			
J. Ruddick	7/17 0935	Received for Laboratory by: (Signature) Howell			

Remarks

Distribution: Original Accompanies Shipment; Copy to Coordinator Field Files

3-0605

Figure 3. Example of chain-of custody record.

BZTO104(e)01242

CHAIN OF CUS RECORD

Sull	PROJECT NAME: Time Oil					NO OF CONTAINERS							REMARKS
SAMPLERS: (Signature) R Selesdich													
STA. NO.	DATE	TIME	COMP.	GRAB	STATION LOCATION								
V-0	7-24	1605				1							
V-2	7-24	1620				1							
V-4	7-24	1625				1							
V-7	7-24	1640				1							
V-12	7-24	1650				1							Water Sand/Brown/Blackgrey
water run	7-25	0930				1							Decon Water

Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
R Selesdich	7-25-85 1000	[signature]			
Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
Relinquished by: (Signature)	Date / Time	Received for Laboratory by: (Signature)	Date / Time	Remarks	

Distribution: Original Accompanies Shipment; Copy to Coordinator Field Files

3-0605

Figure 3. Example of chain-of-custody record.

INMENTAL PROTECTION AGENCY
Office of Enforcement

CHAIN OF CUSTODY RECORD

PROJ. NO. 3011 | PROJECT NAME Time Oil

SAMPLERS: (Signature) R Schoelin

STA. NO.	DATE	TIME	COMP.	GRAB	STATION LOCATION	NO OF CONTAINERS							REMARKS
T-0	7-24												~~Not Approx~~ Below grade
T-2	7-24	0930											
T-4	7-24	0935											
T-7	7-24	0945											
T-12	7-24	955											Water Aprox 8½ 9'
Y-4	7-24	1045											
Y-7	7-24	1050											Water 8½ - 9'
Y-12	7-24	1100											
X-2	7-24	1115											
X-4	7-24	1120											
X-7	7-24	1150											
X-12	7-24	1190											

Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
R Schoelin	7-25-85/1000	[illegible]			
Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
Relinquished by: (Signature)	Date / Time	Received for Laboratory by: (Signature)	Date / Time	Remarks	

Distribution: Original Accompanies Shipment; Copy to Coordinator Field Files

3 - 0605

Figure 3. Example of chain custody record.

IMENTAL PROTECTION AGENCY
Office of Enforcement

CHAIN OF CUSTODY RECORD

PROJ. NO.	PROJECT NAME
3011	Time Oil

SAMPLERS: (Signature) [signature]

STA. NO.	DATE	TIME	COMP.	GRAB	STATION LOCATION	NO. OF CONTAINERS							REMARKS
Z-0	7-22-85	1505				1							
Z-2	7-23	0820				1							
Z-4	7-23	0830				1							
Z-7	7-23	838				1							into water
Z-12	7-23	846				1							
R-0	7/22	1440				1							
W-0	7/22	1500				1							
S-0	7/22	1515				1							

Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
[signature]	7-23-85 1500	[signature]			
Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
Relinquished by: (Signature)	Date / Time	Received for Laboratory by: (Signature)	Date / Time	Remarks	
[signature]	7/23/85 1540	[signature]			

Distribution: Original Accompanies Shipment; Copy to Coordinator Field Files

3-0605

Figure 3. Example of chain-of-custody record.

MENTAL PROTECTION AGENCY
Office of Enforcement

CHAIN OF CUSTODY RECORD

PROJ. NO.	PROJECT NAME
3011	Time Oil

SAMPLERS: (Signature)

STA. NO.	DATE	TIME	COMP.	GRAB	STATION LOCATION	NO. OF CONTAINERS							REMARKS
P-2	7-24	1330											
P-4	7-24	1405											
P 7	7-24	1410											
P-12	7-24	1420											water 10½ - 11 ft.
L-4	7-24	1345											
L-7	7-24	1505											
L-12	7-24	1515											Water 3/4 sample
	~~7-24~~												Approx 7½ - 9'
Q-4	7-24	1435											Sample appears wet
Q-7	7-24	1445											Sample ~~colorless water~~ ~~brown to black~~ appears water
Q 12	7-24	1455											Water whole sample

Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
R Sebelin	7-25-85 1000	[signature]			
Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
Relinquished by: (Signature)	Date / Time	Received for Laboratory by: (Signature)	Date / Time	Remarks	

Distribution: Original Accompanies Shipment; Copy to Coordinator Field Files

3 - 0605

Figure 3. Example of chain-of-custody record.

NTAL TECT... AGENC...
Office of Enforcement

CHAIN OF CUSTODY RECORD

PROJ. NO.: 3011
PROJECT NAME: Time Oil
SAMPLERS: (Signature) R Schoelich

STA. NO.	DATE	TIME	COMP.	GRAB	STATION LOCATION	NO. OF CONTAINERS						REMARKS
K-0	7-23	1405		X								NA Below Grade
K-2	7-23	1415		X								
K-4	7-23	1420		X								
K-7	7-23	1425		X								
K-12	7-23	1435		X								Water Approx 11½'

Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
R Schoelich	7-23-85 1500	[signature]			
Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by (Signature)
Relinquished by: (Signature)	Date / Time	Received for Laboratory by: (Signature)	Date / Time	Remarks	
[signature]	7/23/85 1540	[signature]			

Distribution: Original Accompanies Shipment; Copy to Coordinator Field Files

3-- 0605

Figure 3. Example of chain-of-custody record.

NMENTAL PROTECTION AGENCY
Office of Enforcement

CHAIN OF CUSTODY RECORD

PROJ. NO.: 3011
PROJECT NAME: Time Oil
SAMPLERS: (Signature) Pam Schoelich

STA. NO.	DATE	TIME	COMP.	GRAB	STATION LOCATION	NO. OF CONTAINERS	REMARKS
M-0	7-22-85	1500		X		1	
M-02	7-23-85	0720		X		1	
M-04	7-23	0735		X		1	
M-7	7-23	0750		X		1	
M-12	7-23	0800		X		1	

Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
R Schoelich	7-23-85 1500	Todd Freitag			
Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
Relinquished by: (Signature) Todd Freitag	Date / Time 7/23/85 1540	Received for Laboratory by: (Signature)	Date / Time	Remarks	

Distribution: Original Accompanies Shipment; Copy to Coordinator Field Files

3-060

Figure 3. Example of cha' of-custody record.

...MENTAL PROTECTION AGENCY
Office of Enforcement

CHAIN OF CUSTODY RECORD

PROJ. NO. 3011 | PROJECT NAME Time Oil

SAMPLERS: (Signature) R Schedlich

STA. NO.	DATE	TIME	COMP.	GRAB	STATION LOCATION	NO. OF CONTAINERS							REMARKS
J-0	7-22	1440		X		1							
J-2	7-23	1035		X		1							
J-4	7-23	1040		X		1							
J-7	7-23	1045		X		1							
J-12	7-23	1055		X		1							water apox 11'

Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
R Schedlich	7-23-85 1500	Todd Fraley			
Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
Relinquished by: (Signature) Todd Fraley	Date / Time 7/23/85 1540	Received for Laboratory by: (Signature)	Date / Time	Remarks	

Distribution: Original Accompanies Shipment; Copy to Coordinator Field Files

3-0605

Figure 3. Example of chain-of-custody record.

NMENTAL PROTECTION AGENCY
Office of Enforcement

CHAIN OF CUSTODY RECORD

PROJ. NO.: 3011
PROJECT NAME: Time Oil
SAMPLERS: (Signature) R Schoeler

STA. NO.	DATE	TIME	COMP.	GRAB	STATION LOCATION	NO. OF CONTAINERS							REMARKS
0-0	7-22	1445		X		1							
0-2	7-23	1115		X		1							Asphalt/Rock 6-8" below Surface
0-4	7-23	1315		X		1							
0-7	7-23	1325		X		1							
0-12	7-23	1340		X		1							

Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
R Schoeler	7-23-85 1500	Todd Fratag			
Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
Relinquished by: (Signature)	Date / Time	Received for Laboratory by: (Signature)	Date / Time	Remarks	
Todd Fratag	7/23/85 1540	[illegible]			

Distribution: Original Accompanies Shipment; Copy to Coordinator Field Files

3-060

Figure 3. Example of chai f-custody record.

I. ...ENTAL PROTECTION AGENCY
Office of Enforcement

CHAIN OF CUSTODY RECORD

PROJ. NO.	PROJECT NAME
3011	TIME OIL CO

SAMPLERS: (Signature) Ron Sobolich

STA. NO.	DATE	TIME	COMP.	GRAB	STATION LOCATION	NO OF CONTAINERS							REMARKS
U-0	7/22	1220		X	SURFACE SAMPLE HOLE "U"	1							
U-2	"	1435		X		1							
U-4	"	1445		X		1							
U-7	"	1455		X		1							
U-12	"	1515		X	~~water~~	1							water
U-17	"	1530		X	~~water~~	1							hit water

Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
R. Sobolich	7-23-85 1500	[signature]			
Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
Relinquished by: (Signature)	Date / Time	Received for Laboratory by: (Signature)	Date / Time	Remarks	
[signature]	7/23/85 1540	[signature]			

Distribution: Original Accompanies Shipment; Copy to Coordinator Field Files

3-0605

Figure 3. Example of chain-of-custody record.

IMENTAL PROTECTION AGENCY
Office of Enforcement

CHAIN OF CUSTODY RECORD

PROJ. NO.: 3011
PROJECT NAME: Time Oil
SAMPLERS: (Signature) R Schoelich

STA. NO.	DATE	TIME	COMP	GRAB	STATION LOCATION	NO OF CONTAINERS							REMARKS
N-0	7-22	1430		X		1							
N-2	7-23	0750		X		1							
N-4	7-23	1005		X		1							
N-7	7-23	1015		X		1							
N-12	7-23	1025		X		1							water 10-11'

Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
R Schoelich	7-23-85 1500	[illegible]			
Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
Relinquished by: (Signature) [illegible]	Date / Time 7/23/85 1540	Received for Laboratory by: (Signature) [illegible]	Date / Time	Remarks	

Distribution: Original Accompanies Shipment; Copy to Coordinator Field Files

3-0605

Figure 3. Example of chain-of-custody record.

YIME OIL

COFFEY LABORATORIES, INC.

4914 N.E. 122ND AVE.
PORTLAND, OREGON 97230
(503) 254-1794

RECEIVED
JUL 19 1985
Foot of North Portsmouth

July 17, 1985

Log #A850701-E

PRELIMINARY SURFACE SAMPL

Fiedel Environmental Services
P. O. Box 3320
Portland, Oregon 97023
Attention: John Rugaick

Analyses Requested: Pentachlorophenol

SAMPLE ID	RESULTS
A-West Primary Lateral	550 mg/Kg
B-South Primary Lateral	860 mg/Kg
C-East Primary Lateral	17 mg/Kg

Sincerely,

Susan M. Coffey

Susan M. Coffey
President

SMC/sb

APPENDIX B

LABORATORY RESULTS

COFFEY LABORATORIES, INC.

4914 N.E. 122ND AVE.
PORTLAND, OREGON 97230
(503) 254-1794

Riedel Environmental Services
Page Two
Attention: John Ruddick

July 25, 1985
Log #A850717-L

Analysis Requested: Pentachlorophenol (PCP) Analysis of Soil Samples

Method: EPA SW 846 with Electron Capture Quantitation

SAMPLE ID		RESULTS	SAMPLE ID		RESULTS
STATION	TIME	PCP mg/kg	STATION	TIME	PCP mg/kg
Area E			Area G		
46	13:48	3.0	67	14:30	Hold
47	13:50	3.6	68	14:32	Hold
48	13:52	6.1	69	14:34	Hold
49	13:54	3.2	70	14:36	Hold
50	13:56	1.5	Area H		
51	13:58	2.3	71	14:38	Hold
52	14:00	1.7	72	14:40	Hold
53	14:02	1.9	73	14:42	Hold
54	14:04	1.2	74	14:44	Hold
Area F			75	14:46	Hold
55	14:06	Hold	Area I		
56	14:08	Hold	76	14:48	Hold
57	14:10	Hold	77	14:50	Hold
58	14:12	Hold	78	14:52	Hold
59	14:14	Hold	79	14:54	Hold
60	14:16	Hold	80	14:56	Hold
61	14:18	Hold	81	15:00	Hold
62	14:20	Hold			
63	14:22	Hold			
64	14:24	Hold			
65	14:26	Hold			
66	14:28	Hold			

Sincerely,

Susan M. Coffey,
President

SMC/gs

COFFEY LABORATORIES, INC.

4914 N.E. 122ND AVE.
PORTLAND, OREGON 97230
(503) 254-1794

RECEIVED
SEP 27 1985
Foot of North Portsmou

July 25, 1985
Log #A850717-L

Riedel Environmental Services
P.O. Box 3320
Portland, Oregon 97023
Attention: John Ruddick

Analysis Requested: Pentachlorophenol (PCP) Analysis of Soil Samples

Method: EPA SW 846 with Electron Capture Quantitation

SAMPLE ID		RESULTS	SAMPLE ID		RESULTS
STATION	TIME	PCP mg/Kg	STATION	TIME	PCP mg/Kg
Area A			Area C		
1	12:00	13,500	23	12:43	Hold
2	12:02	29	24	12:44	Hold
3	12:04	500	25	12:46	Hold
4	12:06	5,450	26	12:48	Hold
5	12:08	5,560	27	12:50	Hold
6	12:10	8,760	28	12:52	Hold
7	12:12	4,870	29	12:54	Hold
8	12:14	92	30	12:56	Hold
9	12:16	20	31	12:58	Hold
Area B			32	13:00	Hold
10	12:18	16	33	13:02	Hold
11	12:20	7	34	13:04	Hold
12	12:22	9	35	13:06	Hold
13	12:24	95	36	13:08	Hold
14	12:26	175	37	13:30	857
15	12:28	18	Area D		
16	12:30	229	38	13:32	1,130
17	12:32	88	39	13:34	17
18	12:34	6	40	13:36	3.5
19	12:36	3	41	13:38	3.1
20	12:38	2.5	42	13:40	3.2
21	12:40	5.2	43	13:42	2.4
			44	13:44	1.8
			45	13:46	171

THIS REPORT CONTINUES

COFFEY LABORATORIES, INC.
4914 N.E. 122nd Ave.
Portland, OR 97230
Phone: (503) 254-1794

August 1, 1985
Log #A850725-Z

Riedel Environmental Services
P.O. Box 3320
Portland, Oregon 97023
Attention: John Ruddick

Analysis Requested: Pentachlorophenol (PCP) Analysis of Soil Samples

Method: EPA SW 846 with Electron Capture Quantitation

SAMPLE ID		RESULTS	SAMPLE ID		RESULTS
STATION	TIME	PCP mg/kg	STATION	TIME	PCP mg/kg
P-2	1330	16	S-2	0900	252
P-4	1405	15	S-4	0910	124
P-7	1410	Hold	S-7	0915	Hold
P-12	1420	Hold	S-12	0920	Hold
L-4	1345	7200	T-0		No Sample
-7	1505	Hold	T-2	0930	123
-12	1515	Hold	T-4	0935	534
			T-7	0945	Hold
Q-4	1435	2205	T-12	0955	Hold
Q-7	1445	Hold			
Q-12	1455	Hold	Y-4	1045	598
			Y-7	1050	Hold
R-2	1555	34	Y-12	1100	Hold
R-4	1600	50			
R-7	1610	Hold	X-2	1115	- 4.5
R-12	1620	Hold	X-4	1120	1.3
			X-7	1130	Hold
W-2	0800	15	X-12	1140	Hold
W-4	0810	8.1			
W-7	0820	Hold	V-0	1605	317
W-12	0830	Hold	V-2	1620	260
			V-4	1625	380
Water Tub	0930	106 µg/l	V-7	1645	Hold
			V-12	1650	Hold

Results in mg/kg unless otherwise stated.

Sincerely,

Susan M. Coffey

Susan M. Coffey,
President

SMC/gs

COFFEY LABORATORIES, INC.
4914 N.E. 122nd Ave.
Portland, OR 97230
Phone: (503) 254-1794

July 30, 1985
Log #A850723-I

Riedel Environmental Services
P.O. Box 3320
Portland, Oregon 97023
Attention: John Ruddick

Analysis Requested: Pentachlorophenol (PCP) Analysis of Soil Samples

Method: EPA SW 846 with Electron Capture Quantitation

SAMPLE ID		RESULTS	SAMPLE ID		RESULTS
STATION	TIME	PCP mg/kg	STATION	TIME	PCP mg/kg
S-0	1505	522	O-0	1445	3000
R-0	1440	1712	O-2	1115	59
W-0	1500	3885	O-4	1315	23
			O-7	1325	Hold
I-0	1505	21	O-12	1340	Hold
I-2	0820	14			
I-4	0830	2	J-0	1440	1400
I-7	0838	Hold	J-2	1035	3.0
I-12	0846	Hold	J-4	1040	3.6
			J-7	1045	Hold
M-0	1500	4720	J-12	1035	Hold
M-2	0720	87			
M-4	0725	22	N-0	1430	4380
M-7	0750	Hold	N-2	0950	3.1
M-12	0800	Hold	N-4	1005	208
			N-7	1015	Hold
K-0	1405	No Sample Taken	N-12	1025	Hold
K-2	1415	3.9			
K-4	1420	10.5	U-0	1420	28,550
K-7	1425	Hold	U-2	1435	44
K-12	1435	Hold	U-4	1445	55
			U-7	1455	Hold
			U-12	1515	Hold
			U-17	1530	Hold

Sincerely,

Susan M. Coffey,
President

SMC/gs

COFFEY LABORATORIES, INC.
4914 N.E. 122nd Ave.
Portland, OR 97230
Phone: (503) 254-1794

September 5, 1985
Log #A850723-Q

Riedel Environmental Services
P.O. Box 5007
Portland, Oregon 97208

Attention: John Ruddick

Analysis Requested: Pentachlorophenol (PCP)

Sample Description: Time-Oil Site

SAMPLE ID	PCP	
R7	500	
V7	1.0	
W7	< 1.0, < 1	
X7	1.9	
K12	2.3	
L12	2030	
M12	690	
O12	38	
P12	450	
Q12	1150	
R12	< 1	
S12	212, 222	$\bar{x}$ = 217
T12	90	
V12	3.4	
W12	1.9	
X12	1.0	
Y12	720	
Z12	1.0	

< denotes "less than"

Results in mg/Kg

Sincerely,

Susan M. Coffey

Susan M. Coffey
President

SMC/gs

COFFEY LABORATORIES, INC.
4914 N.E. 122nd Ave.
Portland, OR 97230
Phone: (503) 254-1794

RECEIVED
SEP 27 1985
Foot of North Portsmouth

August 27, 1985
Log #A850813-F

Riedel Environmental Services
P. O. Box 5007
Portland, Oregon 97208
Attention: John Ruddick

Sample ID: Time Oil Sample Description: Soil

Analysis Requested: Pentachlorophenol

SAMPLE NUMBER	PENTACHLOROPHENOL
K-7	3
L-7	8,400
M-7	< 1.0
O-7	13
P-7	150
Q-7	700
S-7	1,130
T-7	75
U-7	5
Y-7	700
Z-7	7

Results in mg/kg

< denotes "less than"

Sincerely,

Susan M. Coffey

Susan M. Coffey,
President

SMC/db

U.S. ENVIRONMENTAL PROTECTION AGENCY
REGION 10
1200 SIXTH AVENUE
SEATTLE, WASHINGTON 98101

DEC 1 1985

REPLY TO ATTN OF M/S 533

John P. Denham
Time Oil Company
2737 West Commodore Way
Seattle, Washington 98199

Re: Time Oil, Environmental Protection Agency ID. No. ORD009597543

Dear Mr. Denham:

Based upon the description you have given the Environmental Protection Agency (EPA) of the activities that have occurred at the facility referenced above, the soil contaminated with leaked pentachlorophenol is classified as hazardous waste F027. F027 designates discarded unused formulations containing pentachlorophenol, and soil contaminated with this waste is a hazardous waste by virtue of the mixture rule of 40 CFR 261.3 (a)(2)(iv).

There are presently no commercial hazardous waste facilities in the United States that will accept waste designated as F027, and it will be approximately six months before any commercial facilities will be certified to accept such waste. In light of this fact, you will have to work closely with the Oregon Department of Environmental Quality (DEQ) in determining the proper way to handle the contaminated soil at your site.

You have told Janet O'Hara of my staff that the storage tanks were completely emptied by approximately the end of January 1985. Therefore, you will be responsible for closing the facility (e.g., removing the hazardous waste) in accordance with the applicable closure and post-closure rules of 40 CFR Part 265. We realize that you have begun this closure process by cleaning and removing the storage tanks and associated piping. Because of the two factors we have discussed with you in telephone conversations, those being the potentially highly toxic nature of the contaminated soil and the lack of storage or disposal sites for it, it would be in your best interest to consult with DEQ personnel before you continue with clean up operations.

Sincerely,

George C. Hofer

George C. Hofer, Chief
RCRA Permits Section

cc: J. Gillespie, DEQ
J. Whitworth, DEQ
C. Rice

Rec'd 8/12/86 gpp

REPORT ON FIELD ACTIVITIES
CONDUCTED IN LATE 1985 AT
TIME OIL COMPANY
12005 NORTH BURGARD STREET
PORTLAND, OREGON 97203

February 4, 1986

Well construction diagrams for existing Wells 1-4 are contained in Figures 6 and 7. Table 2 is a geologic log of Well 4.

PCP concentrations in the soil above the water table may decrease downward in areas of surface spillage where the spillage event occurred in sufficiently small quantities such that the spill does not completely saturate the unsaturated zone above the water table. This is the mechanism by which low volume spills may fail to directly reach the water table. A portion of the PCP in the unsaturated zone will be soluble in rainwater percolating through the soils.

Upon reaching the water table, PCP will be diffused as it is transported by groundwater flow and, to a lesser extent, by molecular diffusion and downward movement under gravity.

The rate and direction of movement of PCP in the groundwater environment is principally dependent on the natural flow of groundwater. Proposed Wells 5 through 9, depicted in Figure 5, are recommended for installation in order to determine the lateral direction of groundwater flow and the concentration of PCP in groundwater near the water table. Proposed monitoring Well 5 is placed away from the anticipated direction of groundwater flow to obtain background water quality. Proposed monitoring Wells 6 and 9 are placed outside of but adjacent to the zone of soil contamination and are located laterally to the anticipated groundwater flow direction. Proposed Wells 7 and 8 are planned to intercept groundwater flow leaving the area of soil contamination.

The proposed wells are planned to be constructed of 4" diameter polyvinylchloride (PVC) and have a locking cover placed over the exposed casing. Bumper posts would be placed around proposed Well 9, since this well is in a loading area.

Soil samples will be obtained at 5' intervals. The soil samples will be used to describe soil texture. The first soil samples would be taken at 2-1/2 feet below the land surface for PCP analysis. The second soil sample taken at each location will be obtained at a depth of 5' below the land surface. Additional soil samples will be taken at 5' intervals thereafter. The presence of PCP at the near surface depth would be used to identify areas of surface spillage and possible source areas for PCP in the groundwater.

The groundwater in existing Wells 1-4 would be sampled for PCP along with the sampling at proposed Wells 5 through 9. This would be done upon the completion of the installation of proposed Wells 5 through 9.

"Imagineering a cleaner world"

☑ Portland Division
Foot of N. Portsmouth Ave
P.O. Box 5007
Portland, OR 97208
(503) 286 4656

☐ St. Louis Division
529 Spirit of St. Louis
Chesterfield, MO 63005
(314) 532 7660

☐ San Francisco Division
230 Cutting Blvd
Richmond, CA 94802
(415) 234-7400

☐ Seattle Division
901 Fairview Ave. No
P.O. Box 1730
Seattle, WA 98111
(206) 622 2900

RIEDEL
ENVIRONMENTAL SERVICES, INC.

February 4, 1986

Mr. John P. Denham, PE
Time Oil Company
2737 W. Commodore Way
Seattle, WA 98199

Dear John:

Enclosed for your consideration are analytical results from the November, 1985 field investigation of Time Oil's facility at 12005 North Burgard Street in Portland, Oregon. Preliminary pentachlorophenol (PCP) concentration contour maps have been prepared. Well construction diagrams have been provided for existing Wells 1 through 4, and a preliminary field log has been prepared for Well 4.

Some preliminary conclusions are as follows:

- There are high levels of PCP below the southwest corner of the warehouse.
- The concentration of PCP in the soils is generally highest above the water table.
- Based on analyses of saturated soil samples, the concentration of PCP in groundwater appears highest at the water table and decreases with depth.

Table 1 contains the analytical data from soil samples gathered during the November field work. This data has been compiled with previous analytical data on the soil to produce the four PCP concentration contour plots contained in Figures 1, 2, 3 and 4. The contour lines of the plots are in mg/kg, or ppm (parts per million). The contour interval is 100 ppm.

The two-foot contour plot (Figure 1) identifies the highest PCP concentrations at that level as being near the southeast corner of the warehouse. The four-foot depth contouring is identified in Figure 2. The highest concentration of PCP (116,000 ppm) found anywhere on site was identified in the soil sample obtained from 2-1/2 to 4 feet below the land surface in Well 3. This is illustrated by the closely spaced contour lines depicted in Figure 2. The high levels of PCP identified at Well 3 fall off approximately 15 feet to the west at Well 1 (see Table 1). The seven-foot contour plot is shown in Figure 3. The figure illustrates a decrease in the PCP levels from the four-foot contour.

Figure 4 illustrates the PCP in the soil below the water table at a depth of 12 feet below the land surface. The approximate depth to groundwater is 10 feet. The concentration of PCP as shown in this plot is less than that identified above the water table in the contour plot of the 7 foot depth.

TABLE 1

SOIL SAMPLE RESULTS

Well Number	Depth, in Feet	Pentachlorophenol, ppm
1	0 - 1-1/2	1690
1	2-1/2 - 4	16.8
1	7-1/2 - 9	886
1	16 - 17-1/2	110
2*		
3	0 - 1-1/2	65.3
3	2-1/2 - 4	116000
3	7-1/2 - 9	11000
3	17-1/2 - 19	1560
4	18-1/2 - 20	574
4	32-1/2 - 35	62.3
4	43-1/2 - 45	1.59
4	47-1/2 - 49	2.81

* Soil samples from Well 2 were not analyzed.

RRF:kps

As we discussed on January 24th, I would like to meet with you to discuss the proposed monitoring well installation. The network can be expanded if you need to minimize the time spent defining the extent of PCP in the groundwater. The additional wells would be located based on best technical judgment using minimal preliminary groundwater information. This usually results in accelerating the definition of the contaminant spread but requires more wells due to their less efficient location.

Please contact me at your earliest convenience should you have any questions about this report.

Sincerely,

RIEDEL ENVIRONMENTAL SERVICES, INC.

Richard R. Ferguson

Richard R. Ferguson
Hydrogeologist

RRF:kps

M E M O R A N D U M

May 2, 1986

TO: File

FROM: Fred Proby

SUBJECT: NORTHWEST TERMINAL GROUNDWATER INVESTIGATION

Purpose of investigation was to establish depth and flow direction of groundwater. Location of groundwater measurement points are shown on attachment 1.

Riedel Environmental Services Inc. installed four 4" diameter PVC wells at the pentachlorophenol mixing site in November, 1985. Wells 1 - 3 were installed at an angle beneath the warehouse. Their vertical depth is 14'. Well number 4 was installed vertically to a depth of 40 feet. The boring log for well 4 is shown on attachment 2.

In February, 1986, Time Oil Co. (Ken McAlpine) installed well points at three locations for the purpose of measuring water table elevation. The well points consisted of 1 1/4" diameter steel pipe attached to a 30" drive point well screen which was driven in with a jackhammer. Wells A and B were driven to a depth of 20 feet. Two wells, designated C1 and C2, were placed at location C. Well C1 could only be driven to a depth of 8'. An attempt to go deeper with well C2 was unsuccessful. The elevation of each well was surveyed relative to an arbitrarily selected benchmark of 100.0'.

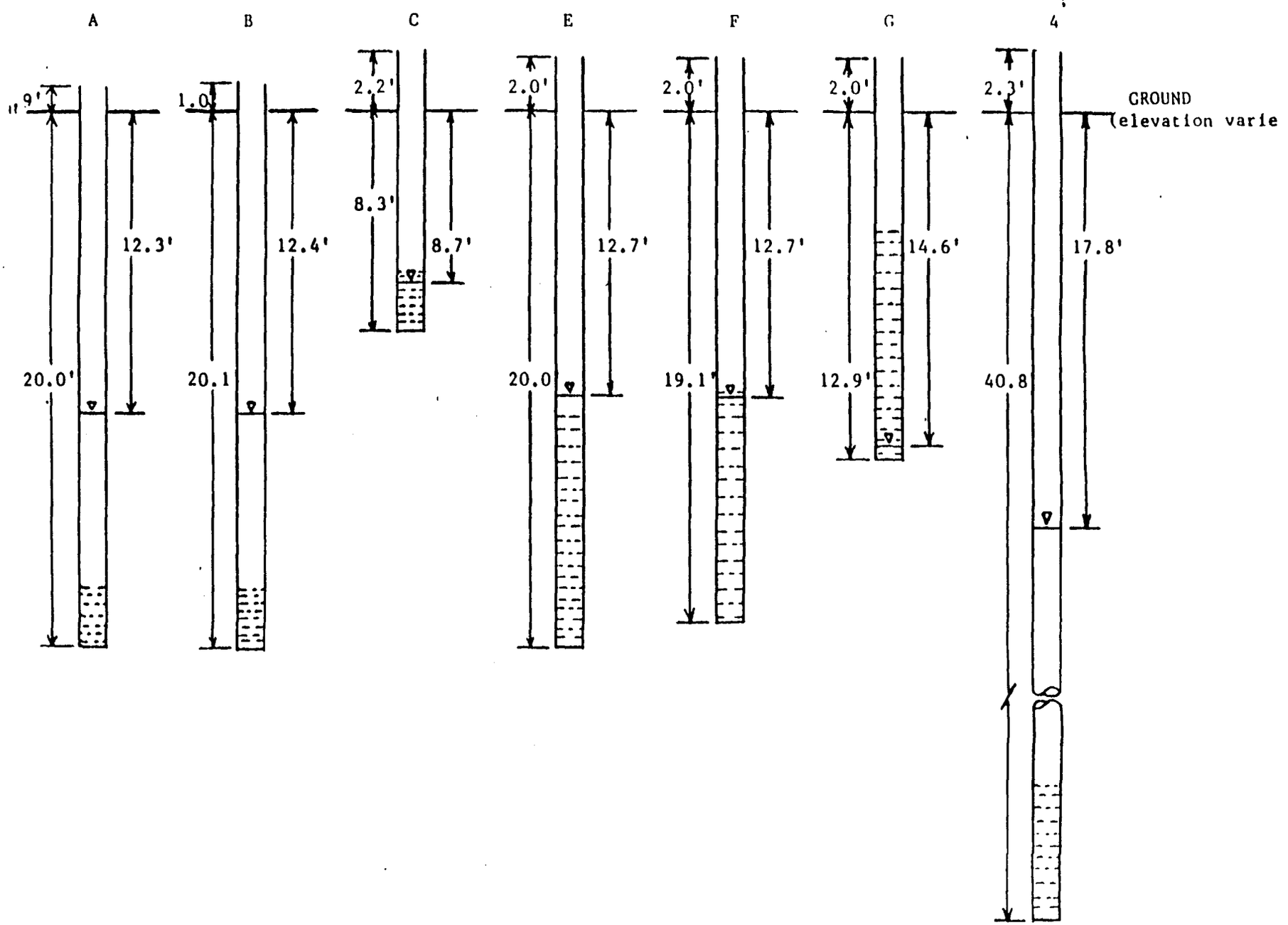
Water level measurements from wells A, B, C1, C2 and 4 were taken on nine occasions between 2/28/86 and 3/11/86. Analysis of this data showed a peculiarity between Well 4 and the well points, in that the water table measured at well 4 was as much as 7 feet lower than that measured by the well points. Furthermore, the water level in well 4 was dropping whereas the well points had a stable level.

In late March, 1986, Time Oil Co. (Fred Proby) installed three more well points (E, F and G), dug four pits, (P1 - P4) and established a river measurement point on the dock. The well points consisted of 2" PVC pipe attached to an 8.5' stainless steel drive point well screen which was driven in with a jackhammer. Wells E and F were driven to 20' and 19', respectively. Well G could only be driven to a depth of 13'. The pits were dug in the back portion of the terminal where it was found that water could be encountered at a depth of approximately 6'. Reference elevations were surveyed for the wells, pits and dock. Water level measurements were taken from all locations over a period of several days. Well point C2 was removed and C1 was redesignated as well C. Construction details of the wells are shown on attachment 3.

The water level measurements from the new well points (E, F and G) and the pits were consistent with those from the old well points (A, B, C). However, the water table elevation in well 4 matched the river elevation. River elevations for March, obtained from the National Weather Service [Mr. Steiger, (503) 249-0666], showed that the water table drop in well 4 observed between 2/28 and 3/11 closely corresponded with a drop in the river elevation. When the wells are plotted in cross section, spaced according to their distance from well 4, the water table depression around well 4 can be clearly seen (attachment 4). Attachment 5 shows water table contours.

Attachment 3

WELL CONSTRUCTION DETAILS



The boring log for well 4 (attachment 2) shows a series of clay lenses and silty sand between the depths of 18.5' and 25'. Above this zone is gravelly sand and below is medium to fine sand. The clay lenses form a 6.5' thick zone of relatively low permeability.

From these observations it is apparent that there are two aquifers, an upper and a lower, beneath the Northwest terminal. The upper aquifer is "perched" on the clay zone. The water table for this aquifer slopes from the rear fence line of the terminal, where water ponds in winter, to the Willamette River. The lower aquifer is "confined" by the clay zone, as shown by the fact that the water in well 4 rises above the top of the clay zone. This zone can therefore be termed a "confining layer". Only well 4 taps the lower aquifer so the slope and direction of flow can not be determined. Since the lower aquifer is fed by the Willamette River, groundwater flow can be expected to change direction with the seasonal rise and fall of the river.

Since the water level in well 4 is lower than in the surrounding wells, groundwater from the upper aquifer flows toward well 4. This well was drilled with a 16" diameter auger and the annulus was filled with coarse sand to within 6 feet of the surface. Consequently, water from the upper aquifer can flow down through the confining layer via the well annulus. (Water can not flow down through the well itself since it is screened below the confining layer.) This is an undesirable situation, in that contaminant could reach the lower aquifer at a higher rate than would otherwise occur.

The drainage through well 4 creates a cone of depression that extends nearly 200' and forms a groundwater divide between wells B and E. The normal direction of groundwater flow in the upper aquifer should be toward the river. However, this is reversed in the area between well 4 and wells A and B. The actual shape of the cone of depression can not be determined since there are no wells closer than 150 feet from well 4.

Conclusions

Well 4 was improperly installed in that it connected two aquifers which are separated under natural conditions. The result is a depression of the water table around well 4 and a reversal of the normal groundwater flow direction.

Sealing the annulus of well 4 would stop drainage from the upper to the lower aquifer.

Installing additional monitoring wells closer to well 4 would enable better definition of the cone of depression and would allow recovery of the upper aquifer to be observed. Without this, the success of the sealing operation could not be verified.

Recommendations

1. Seal the well 4 annulus.
2. Install additional monitoring wells closer to well 4 to verify that the well 4 annulus has been sealed.

Attachments a/s

FLP/ch

Century Environmental Sciences

June 4, 1986

Mr. John Denham
Time Oil Company
2737 W. Commodore Way
Seattle, Washington 98199

Dear Mr. Denham:

Century Environmental Sciences (Century) is pleased to transmit herein to Time Oil Company (Time) the results of chemical analyses performed on groundwater samples obtained from the Portland facility.

BACKGROUND
In early 1986 Time installed a monitoring well network at this facility. Subsequently, Time retained Century to measure static water levels, purge the wells and obtain groundwater samples using EPA approved sampling protocols, and analyze the samples. The results of this investigation are discussed below.

FIELD ACTIVITIES
Prior to monitoring well purging and groundwater sampling, Century obtained static water level measurements in the Time monitoring wells. These measurements were performed in accordance with EPA approved procedures.

The following results are identified by the letter designation of the well preceeded by either MW (monitoring well) or WP (well point):

RESULTS

WELL NO.	STATIC WATER LEVEL (FEET BELOW TOP OF CASING)
WP-A	13.65
WP-B	13.70
WP-C	8.90 (Filled with sand to 9.20 ft.)
WP-E	12.90
WP-F	13.00
WP-G	Dry
MW-4	18.98

One S.W. Columbia Street Suite 1222 Portland, Oregon 97258 Phone (503) 224-4334
Century Environmental Sciences Century West Engineering Corporation Century Testing Laboratories, Inc. Century West Development Services
Portland and Bend, Oregon Spokane and Pasco, Washington Bozeman, Montana

BZTO104(e)012454

Attachment 1 contains the laboratory report for this investigation. Analytical method 8270 described in the EPA publication SW-846 ("Test Methods for Evaluating Solid Waste") was utilized to analyze the Time groundwater samples for penta concentration. This method is equivalent to EPA method 625.

Century appreciates the opportunity to complete this work for Time. If you have any questions or comments regarding the data enclosed herein, please do not hesitate to call me.

Yours truly,
CENTURY ENVIRONMENTAL SCIENCES

Samuel R. Rothermel

Sam Rothermel
Environmental Engineer, Hydrogeologist

SR/js

BZTO104(e)012455

Century Testing Laboratories (CTL) provided Century with appropriately preserved sample containers. Three well volumes of water were removed from each well and well point prior to sampling so that native aquifer groundwater was sampled as opposed to standing well water. In order to purge the wells and well points, a temporary water treatment system was designed to dispose of the purged groundwater. Essentially, this system involved partially filling a 55-gallon drum with 75-pounds of activated charcoal. Activated charcoal has been proven to be very effective in treatment of Penta contaminated groundwater. A discharge hose was attached to the bottom of the 55-gallon drum and the pre-treated groundwater was directed to the sanitary sewer. A pump was utilized to purge the four-inch monitoring well. Groundwater was discharged directly from the pump line into the treatment drum. The remaining wells were either pumped using a small, nitrogen activated sampling pump (for the 2-inch well points), or bailed using a 3/4-inch outside diameter (OD) 39-inch long stainless steel bailer. Groundwater from the smaller pump and bailer was discharged temporarily into a 5-gallon bucket and subsequently poured into the treatment barrel. After each well that contained groundwater was purged and the static water level was allowed to recover to near its original level, the samples were obtained. The pumps and bailer were steam cleaned between wells following sampling.

Dates, times and locations of sampling were documented on the sample containers, on a field log form and on the sample chain of custody form. Samples were immediately chilled after they were obtained, packed and shipped to CTL on the last day of sampling. Chain of custody documentation accompanied the samples. The chain of custody form documents each individual who was in possession of the sample from the time they were obtained to the time they arrived in the lab. Chain of custody aids in tracking sample possession and assures that the samples were not tampered with enroute from the field to the lab.

WELL NO.	PENTACHLOROPHENOL CONCENTRATION (in ug/l or ppb)
WP-B	2.6
WP-E	<1.0
WP-F	1.4
MW-4	6.1

BZTO104(e)012456

Century Testing Laboratories, Inc.

RECEIVED

MAY 22 1986

May 21, 1986

John Ruddick
Century Environmental Sciences
One S. W. Columbia, Suite 1222
Portland, OR 97258

Dear John:

Here are the Penta results from Time oil:

CES #	Pentachlorophenol conc. ug/l (ppb)
WP-B	2.6
MW-4"	6.1
WP-E	<1.0
WP-F	1.4

If you have any questions, please phone.

Sincerely,

CENTURY TESTING LABORATORIES, INC.

Walter F. Burns

Walter F. Burns
Organic Chemistry Supervisor

WFB:lk

P.O. BOX 1174 • BEND, OR 97709 • (503) 382-6432
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ATTACHMENT 1

GROUNDWATER ANALYTICAL RESULTS

Century Environmental Sciences

July 7 , 1986

Mr. John Denham
Time Oil Company
2737 W. Commodore Way
Seattle, Washington 98199

Dear John:

Attached is a copy of the report of field sampling and analytical results for groundwater samples taken at the north Portland terminal. The only detectable concentrations of pentachlorophenol in groundwater was at Well "I" located to the west of the warehouse building. The pH of the groundwater at this site was 5.74.

According to comments made in the Tuesday, March 11, 1986, Federal Register, Volume 51, No. 47, Page 8361, the EPA has proposed water quality criteria for pentachlorophenol. The criteria for fresh water aquatic life for pentachlorophenol indicates that the four day average concentration in parts per billion of pentachlorophenol which should not unacceptably affect fresh water aquatic organisms and their uses, may be calculated by an equation based on the pH of the groundwater. A second equation is given to determine the no-effect concentrations for one hour average values as well.

Based on these equations, the four day average concentration at pH 5.74 is 1.49 parts per billion. The one hour average concentration limit is 2.36 parts per billion. On this basis, the detected concentration in Well "I" is below the one hour average concentration limit cited above. The one hour concentration limit rather than the four day average limit is appropriate since this Well "I" value of 2.2 ppb is a single sample result.

I hope the information provided in this report is helpful to you. Should you have any comments or questions, please don't hesitate to contact me.

Sincerely,
CENTURY ENVIRONMENTAL SCIENCES

John Ruddick
Manager/Senior Scientist

Enclosure

One S.W. Columbia Street Suite 1222 Portland, Oregon 97258 Phone (503) 224-4334
Century Environmental Sciences Century West Engineering Corporation Century Testing Laboratories, Inc. Century West Development Services
Portland and Bend, Oregon Spokane and Pasco, Washington Bozeman, Montana

Property No.: 03-123 Name and Address: NW Terminal

Sampler: Fred Proby 12005 N Burgard

Date and Time: 5/9/86 1300 Portland OR

ITEM	SAMPLE NUMBER	DESCRIPTION	ITEM	SAMPLE NUMBER	DESCRIPTION
1	03-123-4A	Well #4 water	11		
2	03-123-4B	Well #4 Water (duplicate)	12		
3			13		
4			14		
5			15		
6			16		
7			17		
8			18		
9			19		
10			20		

Sample Collection and Preservation: Purge 3 vols (35 gal) sample w/ bailer, kept in refrigerator until picked up by Century Envir. Sci.

Laboratory Name and Address: (c/o Century Envir. Sci.) Phone No.: ( )

Instructions for Analysis: Pentachlorophenol (<10 ppb) P.O. No.:

CHAIN OF CUSTODY RECORD

Relinquished By	Received By	Date & Time
Fred Proby	TOC - NW Terminal	5/9/86 1330

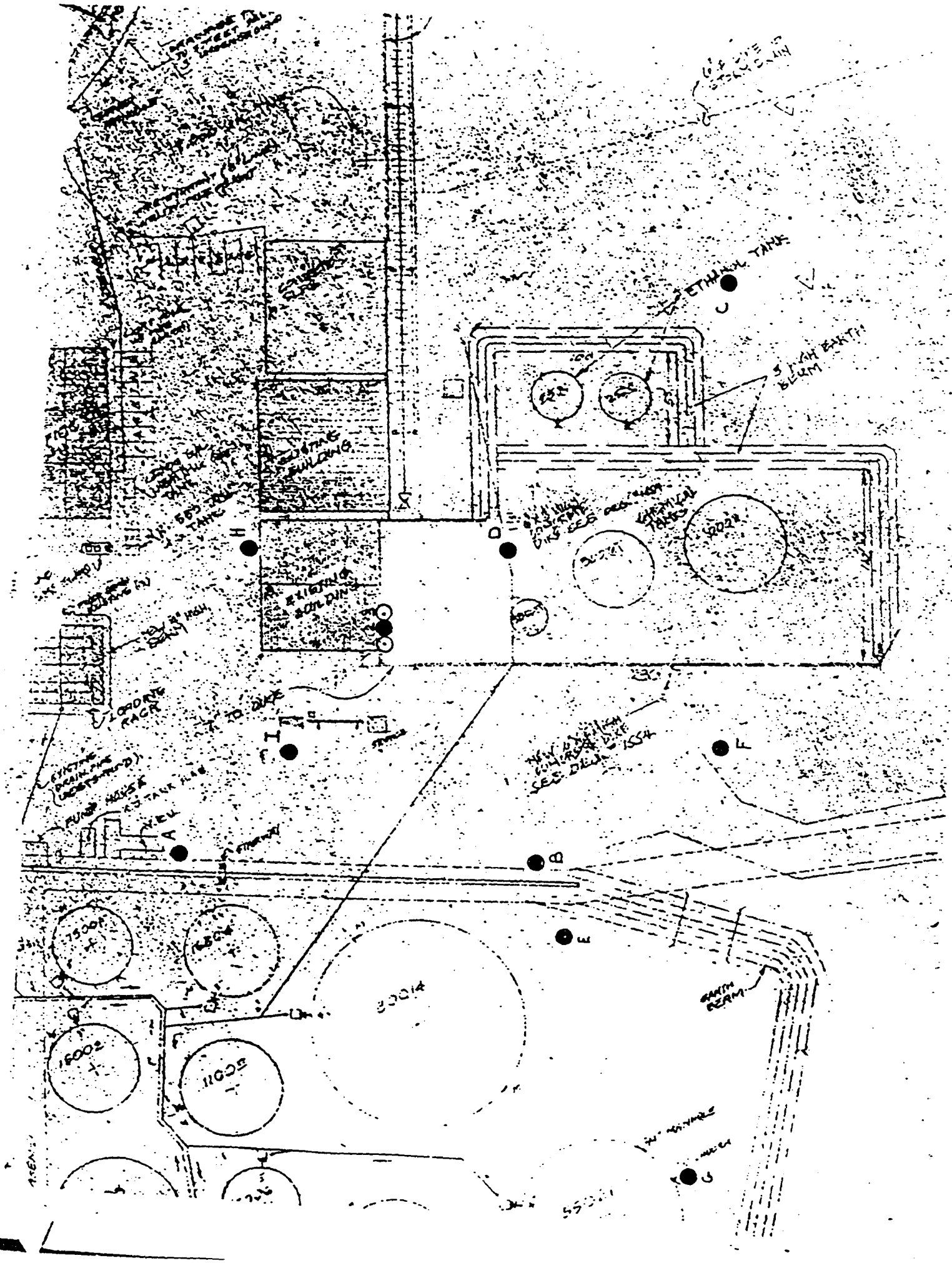
TO BE FILLED OUT BY LABORATORY: Sample ID Numbers:

Person Performing Analysis: Analysis Date:

Methods Used:

Final Disposition of Samples:

IMPORTANT: Return original completed Sample Log and analysis results to Time Oil Co. 2737 W. Commodore Way, Seattle, WA 98199 Attention: John P. Denham, Environmental Manager (206)285-2400



BZTO104(e)012461

TIME OIL CO.
SUMMARY OF FIELD AND ANALYTICAL RESULTS
GROUNDWATER SAMPLING AND ANALYSIS

Sampling procedures meet EPA Pub. SW846.
Time Oil groundwater samples were analyzed by GC/MS using EPA Method.
The submitted sample from well No. 4 contained an insufficient amount of material for analysis.

WELL NO.	STATIC WATER LEVEL (FEET) (5-28-86)	FIELD Ph	PENTACHLOROPHENOL mg/L (ppm) (1)	STATIC WATER LEVEL (6-5-86)
A	13.17	6.56	N.D.	12.15
B	13.16	6.29	N.D.	13.18
D	12.52	6.49	N.D.	12.65
E	13.65	7.70	N.D.	13.75
F	13.90	6.73	N.D.	13.93
H	9.31	6.32	N.D.	9.46
I	12.89	5.74	.0022	13.02
QA/QC (Duplicate B)			N.D.	
Field Blank			N.D.	
2	15.00			15.11
River	18.52			14.54

NOTE: (1) Samples collected on May 28, 1986;
Laboratory analysis reported on June 9, 1986.
Detection Limit of 002 ppm.

Regulatory Flexibility Analysis

Pursuant to the Regulatory Flexibility Act of 1980 (5 U.S.C. 601, *et seq.*) each agency, when required by 5 U.S.C. 553 to publish a proposed rule, is further required to prepare and make available for public comment an initial regulatory flexibility analysis to describe the impact of the proposed rule on small entities. In this instance, the proposal relates to nonregulatory services provided by Western. Under 5 U.S.C. 601(2), a proposal with particular applicability is not considered "a rule" within the meaning the Act. Since this proposal is of limited applicability and is being set in accordance with specific regulations and legislation under particular circumstances, Western believes that no flexibility analysis is required.

Determination Under Executive Order 12291

The Department of Energy has determined that this is not a major rule because it does not meet the criteria of section 1(b) of Executive Order 12291, 46 FR 13193 (February 19, 1981). Western has an exemption from sections 3, 4, and 7 of Executive Order 12291.

Issued at Golden, Colorado, February 24, 1986.

William H. Clagett,

Administrator.

[FR Doc. 86-4717 Filed 3-10-86; 8:45 am]

BILLING CODE 6450-01-M

ENVIRONMENTAL PROTECTION AGENCY

[OW-FRL-2981-8]

Management Advisory Group Meeting

Under Pub. L. 92-463, notice is hereby given that a one and a half day meeting of the Management Advisory Group to the EPA Construction Grant Program (MAG) will be held on March 26-27, 1986, in Washington, DC, at EPA Headquarters, 401 M Street SW., Washington, DC 20460. The meeting room will be Conference Room 2, at the EPA Washington Information Center located on the ground floor of the Waterside Mall area. The time of the meeting will be 9 a.m. to 5 p.m. on March 26, and 8 a.m. to 1 p.m. on March 27.

The principal agenda item will be work on a MAG report on compliance and operation and maintenance of publicly owned wastewater treatment works, specifically on recommendations to be made by MAG. The agenda will also include briefings and discussions on other topics of current or future interest to MAG. Any member of the public wishing to make comments is invited to submit them in writing to the Executive Secretary at the meeting.

The meeting will be open to the public. For additional information, contact Georgette Brown at (202) 382-5859.

Dated: March 5, 1986.

Edwin L. Johnson,

Assistant Administrator for Water.

[FR Doc. 86-5243 Filed 3-10-86; 8:45 am]

BILLING CODE 6560-50-M

[OW-FRL-2981-4]

Water Quality Criteria; Ambient Aquatic Life Water Quality Criteria Documents

AGENCY: Environmental Protection Agency.

ACTION: Notice of request for comments on ambient aquatic life water quality criteria documents.

SUMMARY: EPA announces the availability for public comment, and provides summaries of four ambient aquatic life water quality criteria documents. When published in final form after the review of public comments, these water quality criteria may form the basis for enforceable standards. These criteria are published pursuant to section 304(a)(1) of the Clean Water Act.

DATE: Written comments should be submitted to the person listed directly below by May 12, 1986.

FOR FURTHER INFORMATION CONTACT: Dr. Frank Gostomski, Criteria and Standards Division (WH-585), U.S. Environmental Protection Agency, 401 M Street, SW., Washington, DC 20460. (202) 245-3030.

Availability of Documents

This notice contains summaries of four documents containing proposed ambient water quality criteria for the protection of aquatic life and its uses. Copies of the complete criteria documents may be obtained upon request from the person listed above. These documents are also available for public inspection and copying during normal business hours at: Public Information Reference Unit, U.S. Environmental Protection Agency, Room 2404 (rear), 401 M St., SW., Washington, DC 20460. As provided in 40 CFR Part 2, a reasonable fee may be charged for copying services. Copies of these documents are also available for review in the EPA Regional Office libraries. A list of the proposed documents is presented below:

1. Ambient Water Quality Criteria for Aluminum.
2. Ambient Water Quality Criteria for Chlorpyrifos.
3. Ambient Water Quality Criteria for Nickel.
4. Ambient Water Quality Criteria for Pentachlorophenol.

SUPPLEMENTARY INFORMATION:

Background

Section 304(a)(1) of the Clean Water Act (33 U.S.C. 1314(a)(1)) requires EPA to publish and periodically update ambient water quality criteria. These criteria are to reflect the latest scientific knowledge on the identifiable effects of pollutants on public health and welfare, aquatic life, and recreation.

EPA has periodically issued ambient water quality criteria beginning in 1973 with the publication of the "Blue Book" (Water Quality Criteria 1972). In 1976, the "Red Book" (Quality Criteria for Water) was published. On November 28, 1980 (45 FR 79318), EPA announced the publication of 64 individual ambient water quality criteria documents for pollutants listed as toxic under section 307(a)(1) of the Clean Water Act. A document addressing 2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD) was announced on February 15, 1984 (FR 49 5831) completing the coverage of the 65 priority pollutants listed in 307(a)(1). Nine ambient water quality documents, including revision of seven of the 1980 documents, were released on July 29, 1985 (50 FR 30784).

Today EPA is announcing the availability for comment four proposed individual ambient aquatic life water quality criteria documents. Two of the documents, nickel and pentachlorophenol, upon final publication, will update and revise appropriate sections of the 1980 criteria documents. The other two, aluminum and chlorpyrifos, will address chemicals which have not been covered before.

The documents announced today will not contain information on the effects of these pollutants on human health. EPA anticipates the release of water quality advisories on aluminum and chlorpyrifos to specifically address human health concerns. Advisories will also be issued to update the human health section of the 1980 ambient water quality criteria documents for nickel and pentachlorophenol if a review of the available information indicate that such a revision is necessary. Both the criteria documents announced today and the water quality advisories addressing human health may form the basis for enforceable standards, when published in final form.

interest to MAG. Any member of the public wishing to make comments is invited to submit them in writing to the Executive Secretary at the meeting.

The meeting will be open to the public. For additional information, contact Georgette Brown at (202) 382-5859.

Dated: March 5, 1986.

Edwin L. Johnson,

Assistant Administrator for Water.

[FR Doc. 86-5243 Filed 3-10-86; 8:45 am]

BILLING CODE 6560-50-M

[OW-FRL-2981-4]

Water Quality Criteria; Ambient Aquatic Life Water Quality Criteria Documents

AGENCY: Environmental Protection Agency.

ACTION: Notice of request for comments on ambient aquatic life water quality criteria documents.

SUMMARY: EPA announces the availability for public comment, and provides summaries of four ambient aquatic life water quality criteria documents. When published in final form after the review of public comments, these water quality criteria may form the basis for enforceable standards. These criteria are published pursuant to section 304(a)(1) of the Clean Water Act.

DATE: Written comments should be submitted to the person listed directly below by May 12, 1986.

FOR FURTHER INFORMATION CONTACT: Dr. Frank Gostomski, Criteria and Standards Division (WH-585), U.S. Environmental Protection Agency, 401 M Street, SW., Washington, DC 20460. (202) 245-3030.

Availability of Documents

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3. Ambient Water Quality Criteria for Nickel.
4. Ambient Water Quality Criteria for Pentachlorophenol.

SUPPLEMENTARY INFORMATION:

Background

Section 304(a)(1) of the Clean Water Act (33 U.S.C. 1314(a)(1)) requires EPA to publish and periodically update ambient water quality criteria. These criteria are to reflect the latest scientific knowledge on the identifiable effects of pollutants on public health and welfare, aquatic life, and recreation.

EPA has periodically issued ambient water quality criteria beginning in 1973 with the publication of the "Blue Book" (Water Quality Criteria 1972). In 1976, the "Red Book" (Quality Criteria for Water) was published. On November 28, 1980 (45 FR 79318), EPA announced the publication of 64 individual ambient water quality criteria documents for pollutants listed as toxic under section 307(a)(1) of the Clean Water Act. A document addressing 2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD) was announced on February 15, 1984 (FR 49 5831) completing the coverage of the 65 priority pollutants listed in 307(a)(1). Nine ambient water quality documents, including revision of seven of the 1980 documents, were released on July 29, 1985 (50 FR 30784).

Today EPA is announcing the availability for comment four proposed individual ambient aquatic life water quality criteria documents. Two of the documents, nickel and pentachlorophenol, upon final publication, will update and revise appropriate sections of the 1980 criteria documents. The other two, aluminum and chlorpyrifos, will address chemicals which have not been covered before.

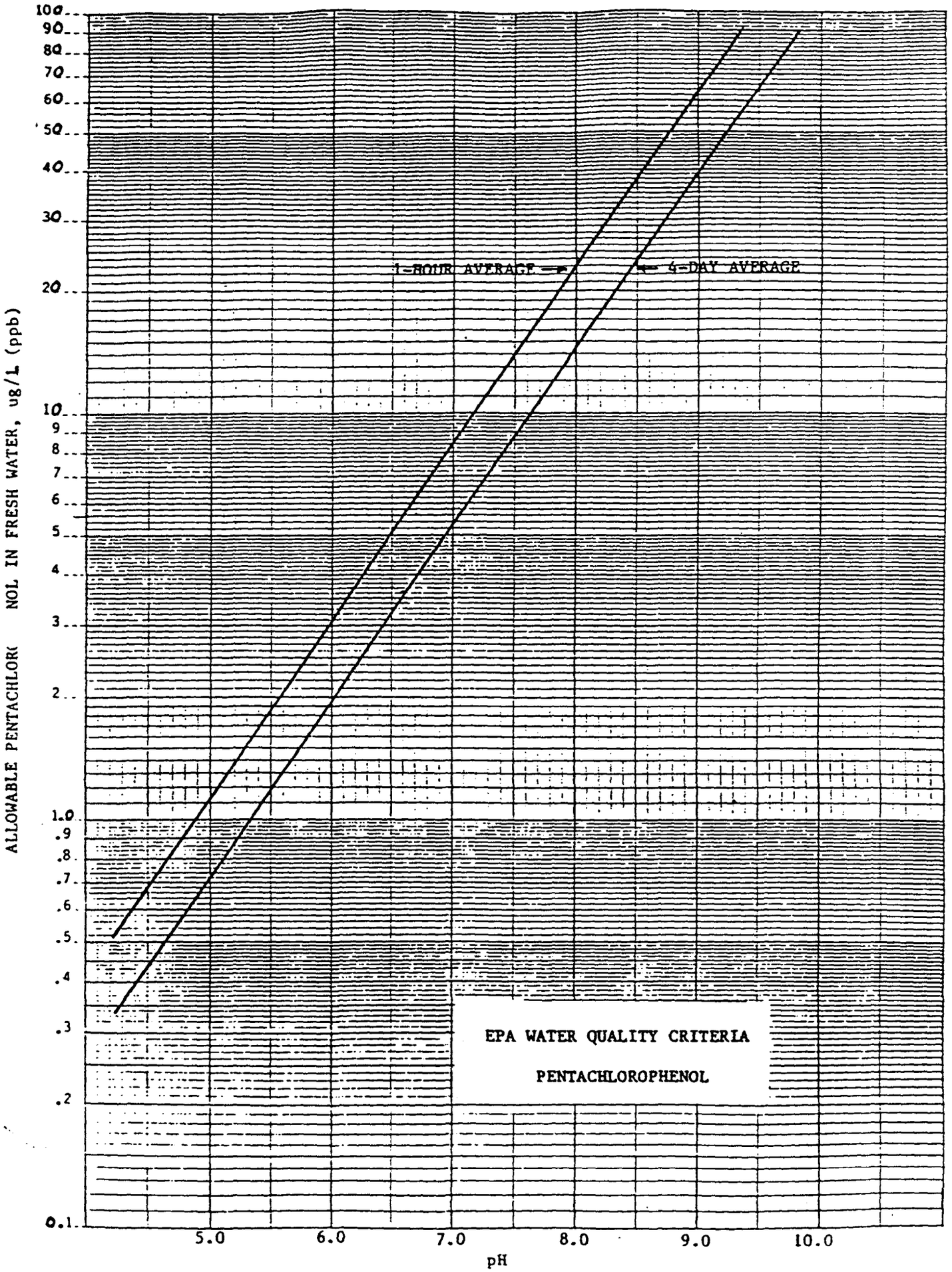
The documents announced today will not contain information on the effects of these pollutants on human health. EPA anticipates the release of water quality advisories on aluminum and chlorpyrifos to specifically address human health concerns. Advisories will also be issued to update the human health section of the 1980 ambient water quality criteria documents for nickel and pentachlorophenol if a review of the available information indicate that such a revision is necessary. Both the criteria documents announced today and the water quality advisories addressing human health may form the basis for enforceable standards, when published in final form.

TIME OIL CO.
SUMMARY OF FIELD AND ANALYTICAL RESULTS
GROUNDWATER SAMPLING AND ANALYSIS

Sampling procedures meet EPA Pub. SW846.
Time Oil groundwater samples were analyzed by GC/MS using EPA Method.
The submitted sample from well No. 4 contained an insufficient amount of material for analysis.

Ref Elev	WELL NO.	WT Elev	STATIC WATER LEVEL (FEET) (5-28-86)	FIELD Ph	PENTACHLOROPHENOL mg/L (ppm) (1)	STATIC WATER LEVEL (6-5-86)	WT Elev
97.14	A	83.97	13.17	6.56	N.D.	12.15	84.99
96.83	B	83.67	13.16	6.29	N.D.	13.18	83.65
97.93	D	85.41	12.52	6.49	N.D.	12.65	85.28
97.83	E	84.18	13.65	7.70	N.D.	13.75	84.08
97.97	F	84.07	13.90	6.73	N.D.	13.93	84.04
94.75	H	85.44	9.31	6.32	N.D.	9.46	85.29
98.00	I	85.11	12.89	5.74	.0022	13.02	84.98
	QA/QC (Duplicate B)				N.D.		
	Field Blank				N.D.		
	2		15.00			15.11	
96.30	River	77.58	18.52			14.54	81.76

NOTE: (1) Samples collected on May 28, 1986;
Laboratory analysis reported on June 9, 1986.
Detection Limit of 002 ppm.


ALLOWABLE PENTACHLOROPHENOL IN FRESH WATER, ug/L (ppb)
100
90
80
70
60
50
40
30
20
10
9
8
7
6
5
4
3
2
1.0
.9
.8
.7
.6
.5
.4
.3
.2
0.1
1-HOUR AVERAGE
4-DAY AVERAGE
EPA WATER QUALITY CRITERIA
PENTACHLOROPHENOL
5.0
6.0
7.0
8.0
9.0
10.0
pH

established if adequate justifications is provided.

Use of criteria for developing water quality-based permit limits and for designing waste treatment facilities requires selection of an appropriate wasteload allocation model. Dynamic models are preferred for the application of these criteria. Limited data or other considerations might make their use impractical, in which case one must rely on a steady-state model. The Agency recommends the interim use of 1Q5 or 1Q10 for the Criterion Maximum Concentration (CMC) design flow and 7Q5 or 7Q10 for the Criterion Continuous Concentration (CCC) design flow in steady-state model for unstressed and stressed systems respectively. These matters are discussed in more detail in the Technical Support Document for Water Quality-Based Toxics Control (U.S. EPA, 1985).

Saltwater Aquatic Life. Saltwater aquatic organisms and their uses should not be affected unacceptably, except possibly where a locally important species is very sensitive, if the four-day average concentration of nickel does not exceed 7.9 μg/L more than once every three years on the average, and if the one-hour average concentration of nickel does not exceed 71 μg/L more than once every three years on the average.

EPA recommends applying the criteria for metals using the total recoverable method until a protocol for the measurement of "acid-soluble" metals is approved.

The allowed average excursion frequency of three years is the Agency's best scientific judgement of the amount of time it will take an unstressed system to recover from a pollution event in which exposure to these pollutants exceeds the criteria. Stressed systems, for example one in which several outfalls occur in a limited area, would be expected to require more time for recovery. The resilience of ecosystems and their ability to recover differ greatly, however, and site-specific excursion frequencies may be established if adequate justification is provided.

Use of criteria for developing water quality-based permit limits and for designing waste treatment facilities requires selection of an appropriate wasteload allocation model. Dynamic models are preferred for the application of these criteria. Limited data or other considerations might make their use impractical, in which case one must rely on a steady-state model. The Agency recommends the interim use of 1Q5 or 1Q10 for the Criterion Maximum Concentration (CMC) design flow and 7Q5 or 7Q10 for the Criterion Continuous Concentration (CCC) design flow in steady-state model for unstressed and stressed systems respectively. These matters are discussed in more detail in the Technical Support Document for Water Quality-Based Toxics Control (U.S. EPA, 1985).

4. Pentachlorophenol

Freshwater Aquatic Life. Freshwater aquatic organisms and their uses should not be affected unacceptably, except possibly where a locally important species is very sensitive, if the four-day average concentration (in μg/L) of pentachlorophenol does not exceed the numerical value given by $e^{(1.005[pH]-5.368)}$ more than once every three years on the average, and if the one-hour average concentration (in μg/L) does not exceed the numerical value given by $e^{(1.005[pH]-4.908)}$ more than once every three years on the average. For example, at pH=6.5, 7.8, and 9.0, the four-day average concentrations of pentachlorophenol are 3.2, 12 and 40 μg/L, respectively, and the one-hour average concentrations are 5.1, 19 and 63 μg/L.

The allowed average excursion frequency of three years is the Agency's best scientific judgement of the amount of time it will take an unstressed system to recover from a pollution event in which exposure to these pollutants exceeds the criteria. Stressed systems, for example one in which several outfalls occur in a limited area, would be expected to require more time for recovery. The resilience of ecosystems and their ability to recover differ greatly, however, and site-specific excursion frequencies may be established if adequate justification is provided.

Use of criteria for developing water quality-based permit limits and for designing waste treatment facilities requires selection of an appropriate wasteload allocation model. Dynamic models are preferred for the application of these criteria. Limited data or other considerations might make their use impractical, in which case one must rely on a steady-state model. The Agency recommends the interim use of 1Q5 or 1Q10 for the Criterion Maximum Concentration (CMC) design flow and 7Q5 or 7Q10 for the Criterion Continuous Concentration (CCC) design flow in steady-state model for unstressed and stressed systems respectively. These matters are discussed in more detail in the Technical Support Document for Water Quality-Based Toxics Control (U.S. EPA, 1985).

Saltwater Aquatic Life. Saltwater aquatic organisms and their uses should not be affected unacceptably, except possibly where a locally important species is very sensitive, if the four-day average concentration of pentachlorophenol does not exceed 8.1 μg/L more than once every three years on the average, and if the one-hour average concentration does not exceed 13 μg/L more than once every three years on the average.

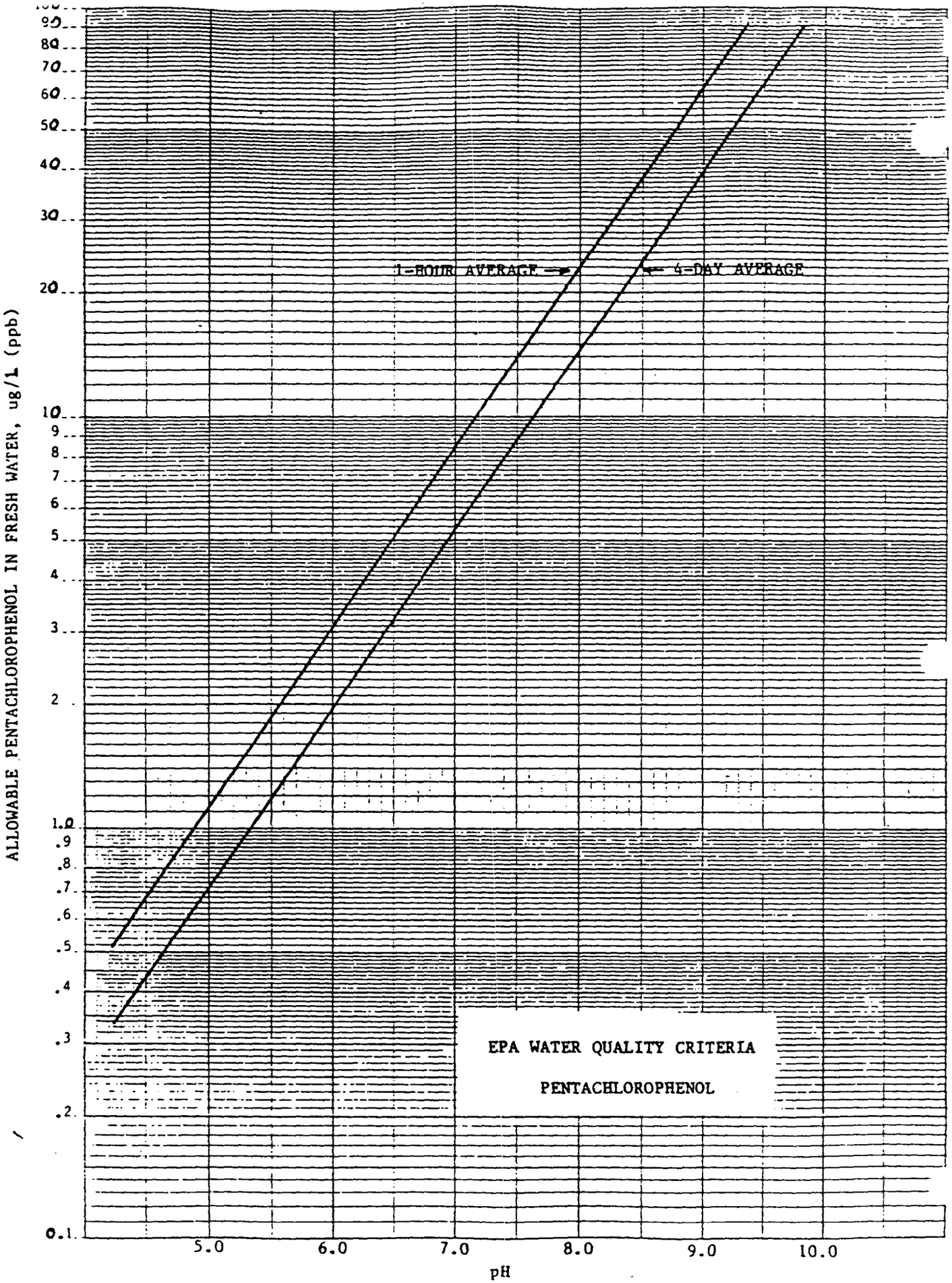
The allowed average excursion frequency of three years in the Agency's best scientific judgement of the amount of time it will take an unstressed system to recover from a pollution event in which exposure to these pollutants exceeds the criteria. Stressed systems, for example one in which several outfalls occur in a limited area, would be expected to require more time for recovery. The resilience of ecosystems and their ability to recover differ greatly, however, and site-specific excursion frequencies may be established if adequate justification is provided.

Use of criteria for developing water quality-based permit limits and for designing waste treatment facilities requires selection of an appropriate wasteload allocation model. Dynamic models are preferred for the application of these criteria. Limited data or other considerations might make their use impractical, in which case one must rely on a steady-state model. The Agency recommends the interim use of 1Q5 or 1Q10 for the Criterion Maximum Concentration (CMC) design flow and 7Q5 or 7Q10 for the Criterion Continuous Concentration (CCC) design flow in steady-state model for unstressed and stressed systems respectively. These matters are discussed in more detail in the Technical Support Document for Water Quality-Based Toxics Control (U.S. EPA, 1985).

[FR Doc. 86-5161 Filed 3-10-86; 8:45 am]

BILLING CODE 6560-50-M

BZTO104(e)012467


ALLOWABLE PENTACHLOROPHENOL IN FRESH WATER, ug/L (ppb)
100
90
80
70
60
50
40
30
20
10
9
8
7
6
5
4
3
2
1.0
.9
.8
.7
.6
.5
.4
.3
.2
0.1
1-HOUR AVERAGE
4-DAY AVERAGE
EPA WATER QUALITY CRITERIA
PENTACHLOROPHENOL
5.0
6.0
7.0
8.0
9.0
10.0
pH

COFFEY LABORATORIES, INC.
4914 N.E. 122nd Ave.
Portland, OR 97230
Phone: (503) 254-1794

September 3, 1986
Log #A860825-F

SRH Assocates, Inc.
Page Two

Attention: John Ruddick

Analysis Requested: Pentachlorophenol

Sample Location: Time Oil Co., Portland Terminal

SAMPLE ID	RESULTS
5-2 - Boring #5, S.W. Inside Warehouse 5'4" - 7'4" Below Concrete	5.6
5-4 - Boring #5, S.W. Inside Warehouse 7'4" - 9'4" Below Concrete	< 1
5.7 - Boring #5, S.W. Inside Warehouse 10'4" - 17'4" Below Concrete	< 1
5.12- Boring #5, S.W. Inside Warehouse 15'4" - 17'4" Below Concrete	< 1
6-0 - Boring #6, W. Central Inside Warehouse 3'5" - 5'5" Below Concrete	< 1
6-2 - Boring #6, W. Central Inside Warehouse 5'5" - 7'5" Below Concrete	< 1
6-4 - Boring #6, W. Central Inside Warehouse 7'5" - 9'5" Below Concrete	< 1
6-7 - Boring #6, W. Central Inside Warehouse 10'5" - 12'5" Below Concrete	< 1
6-12- Boring #6, W. Central Inside Warehouse 15'5" - 17'5" Below Concrete	0.94
D-2 - Waste Pile @ T-5, Duplicate of T-5	3420

Results in mg/kg

< denotes "less than"

REPORT CONTINUES

This report is for the sole and exclusive use of the above client. Samples are retained a maximum of 15 days from the date of this letter.

COFFEY LABORATORIES, INC.
4914 N.E. 122nd Ave.
Portland, OR 97230
Phone: (503) 254-1794

September 3, 1986
Log #A860825-F

SRH Assocates, Inc.
P.O. Box 14005
Portland, Oregon 97214
Attention: Jonn Ruddick

Analysis Requested: Pentachiorophenol

Sample Location: Time Oil Co., Portland Terminal

SAMPLE ID	RESULTS
J-0 - Surface-N.E. Tank Farm	2.3
K-0 - Surface-N. Tank Farm	2964
L-0 - Surface-N.W. Tank Farm	0.7
M-0 - Surface-N.W. Tank Farm	1.8
N-0 - Surface-E. Tank Farm	6.3
0-0 - Surface-N.E. Central Tank Farm	176
P-0 - Surface-N. Central Tank Farm	75.3
Q-0 - Surface-N.W. Central Tank Farm	620
R-0 - Surface-E. Central Tank Farm	891
S-0 - Surface-S.E. Central Tank Farm	736
T-0 - Surface-N. Central Tank Farm	1600
U-0 - Surface-W. Central Tank Farm	0.7
V-0 - Surface-S.E. Tank Farm	5.0
W-0 - Surface-S. Tank Farm	354
X-0 - Surface-S. Tank Farm	44.6
Y-0 - Surface-S.W. Tank Farm	19
Z-0 - Surface-N.W. Roadway	537
1-S - Boring #1, Warehouse Loading Dock, Surface Below Concrete	1.2
1-0 - Boring #1, Warehouse Loading Dock, 3.5 ft. Below Concrete	5.7
5-0 - Boring #5, S.W. Inside Warehouse #5, 3'4" - 5'4" Below Concrete	1.4

Results in mg/kg

REPORT CONTINUES

This report is for the sole and exclusive use of the above client. Samples are retained a maximum of 15 days from the date of this letr

COFFEY LABORATORIES, INC.
4914 N.E. 122nd Ave.
Portland, OR 97230
Phone: (503) 254-1794

September 3, 1986
Log #A860825-F

SRH Assocates, Inc.
Page Four

Attention: John Ruddick

Analysis Requested: Pentachlorophenol

Sample Location: Time Oil Co., Portland Terminal

SAMPLE ID	RESULTS	% Recovery
6-4 - Boring #6, W. Central Inside Warehouse 7'5" - 9'5" Below Concrete (Duplicate)	< 1	
4-4 - Boring #4, S.E. Warehouse 7'5" - 9'5" Below Concrete (Duplicate)	< 1	
3-12- Boring #3, E. Central Warehouse 15'5" - 17'5" Below Concrete (Duplicate)	< 1	
6-4 - Boring #6, W. Central Inside Warehouse 7'5" - 9'5" Below Concrete (Spike)	399	101
4-4 - Boring #4, S.E. Warehouse 7'5" - 9'5" Below Concrete (Spike)	373	96

Results in mg/kg

< denotes "less than"

Analysis by soxhlet extraction, capillary GC/FID, EPA Method 8040

Sincerely,

Susan M. Coffey

Susan M. Coffey,
President

SMC/gs

This report is for the sole and exclusive use of the above client. Samples are retained a maximum of 15 days from the date of this letter.

COFFEY LABORATORIES, INC.
4914 N.E. 122nd Ave.
Portland, OR 97230
Phone: (503) 254-1794

September 3, 1986
Log #A860825-F

SRH Assocates, Inc.
Page Three

Attention: Jonn Rudaick

Analysis Requested: Pentachlorophenol

Sample Location: Time Oil Co., Portland Terminal

SAMPLE ID	RESULTS
T-S - Waste Pile, Feet Below Top of Pile	1280
Q-S - Waste Pile, Feet Below Top of Pile	298
D-1 - Boring #6, Duplicate of G-S	< 1
4-0 - Boring #4, S.E. Warehouse 3'5" - 5'5" Below Concrete	< 1
4-2 - Boring #4, S.E. Warehouse 5'5" - 7'5" Below Concrete	< 1
4-4 - Boring #4, S.E. Warehouse 7'5" - 9'5" Below Concrete	< 1
4-7 - Boring #4, S.E. Warehouse 10'5" - 12'5" Below Concrete	0.96
4-12- Boring #4, S.E. Warehouse 15'5" - 17'5" Below Concrete	< 1
3-0 - Boring #3, E. Central Warehouse 3'5" - 5'5" Below Concrete	< 1
3-2 - Boring #3, E. Central Warehouse 5'5" - 7'5" Below Concrete	< 1
3-4 - Boring #3, E. Central Warehouse 7'5" - 9'5" Below Concrete	< 1
3-7 - Boring #3, E. Central Warehouse 10'5" - 12'5" Below Concrete	< 1
3-12- Boring #3, E. Central Warehouse 15'5" - 17'5" Below Concrete	< 1

Results in mg/kg

REPORT CONTINUES

This report is for the sole and exclusive use of the above client.
Samples are retained a maximum of 15 days from the date of this letter.

COFFEY LABORATORIES, INC.
4914 N.E. 122nd Ave.
Portland, OR 97230
Phone: (503) 254-1794

September 5, 1986
Lab # A8608294-1
P.O. None

SRM Associates Incorporated
P.O. Box 14005
Portland, Oregon 97214

Attention: John Ruddick

Subject: Pentachlorophenol and pH Analysis

Sample Type: Ground Water
Sample Collected by: John Ruddick
Sample Collection Date: August 29, 1986

SAMPLE NAME	PENTACHLOROPHENOL	pH
MW-D	0.04 mg/L	6.53 SU
MW-E	< 0.01 mg/L	6.54 SU
MW-F	< 0.01 mg/L	6.57 SU
MW-H	< 0.01 mg/L	6.81 SU
MW-I	< 0.01 mg/L	6.77 SU

Pentachorophenol analysis by extraction and capillary GC/FID. The symbol "<" means less than and denotes none detected at or above the level indicated.

Sincerely,

Susan M. Coffey

Susan M. Coffey
President

SMC:hh

This report for the sole and exclusive use of the above named client. Samples are held for a maximum of 30 days from the date of this report.

COFFEY LABORATORIES, INC.
4914 N.E. 122nd Ave.
Portland, OR 97230
Phone: (503) 254-1794

September 3, 1986
Log #A860826-C

SRH Assocates, Inc.
P.O. Box 14005
Portland, Oregon 97214

Attention: John Ruddick

Analysis Requested: Pentachlorophenol

Sample Location: Time Oil Co., Portland

Sample Date: 8/25/86

SAMPLE ID	RESULTS
2-0	< 1.0
2-2	< 1.0
2-4	< 1.0
2-7	< 1.0
2-12	< 1.0
1-2	< 1.0
1-4	< 1.0
1-7	< 1.0
1-12	< 1.0

Results in mg/kg

< denotes "less than"

Analysis by soxhlet extraction, capillary GC/FID, EPA Method 8040

Sincerely,

Susan M. Coffey
President

SMC/gs

This report is for the sole and exclusive use of the above client
Samples are retained a maximum of 15 days from the date of this letter

COFFEY LABORATORIES, INC.
4914 N.E. 122nd Ave.
Portland, OR 97230
Phone: (503) 254-1794

September 18, 1986
Log #A860916-F

SRH Associates, Inc.
P.O. Box 14005
Portland, Oregon 97214

Attention: John Ruddick

Analysis Requested: Pentachlorophenol

SAMPLE ID	RESULTS
#20 SS	< 0.3 mg/kg

Analysis by extraction, capillary GC/FID and comparison with solutions of standards.

Approved by,

Susan M. Brillante

Susan M. Brillante,
Mgr., Organic Laboratories

Sincerely,

Susan M. Coffey

Susan M. Coffey,
President

SMC/ps

This report is for the sole and exclusive use of the above client. Samples are retained a maximum of 15 days from the date of this letter.

COFFEY LABORATORIES, INC.
4914 N.E. 122nd Ave.
Portland, OR 97230
Phone: (503) 254-1794

September 9, 1986
Log #A860905-J

SFH Associates, Inc.
P.O. Box 14005
Portland, Oregon 97214

Attention: John Ruddick

Analyses Requested: Pentachlorophenol (PCP) and pH

SAMPLE ID	PCP*	pH
MWA, 9/3/86, 1030	< 0.01 mg/L	6.8 S.U.
MWA, 9/3/86, 1110	< 0.01 mg/L	6.7 S.U.

< denotes "less than"

* Analysis by extraction, capillary GC/FID, Method 604.

Approved by,

Susan M. Brillante

Susan M. Brillante,
Mgr., Organic Laboratories

Sincerely,

Susan M. Coffey

Susan M. Coffey,
President

SMC/gs

This report is for the sole and exclusive use of the above client. Samples are retained a maximum of 15 days from the date of this lett

CHAIN OF CUSTODY RECORD (5010)

PROJ. NO.: 1003

SITE/LOCATION: Time Oil Co

SAMPLERS: (Signature) [illegible] / SRH

STA. NO.	DATE	TIME	SAMPLE TYPE	MEDIA	SAMPLE IDENTIFICATION	NO. OF CONTAINERS	AMOUNT/PRESERVATIVE Formaldehyde	AMOUNT/PRESERVATIVE FH					SEAL NO.	SEAL INTACT? (Y or N)	REMARKS (with initials)
MW A	7/1/92	1030	BAILED	WATER	NEAR W TANK FARM	2	[illegible]	[illegible]							
MW A	"	1030	↓	↓	" "	1	[illegible]	[illegible]							
MW B	"	1110			" "	2	[illegible]	[illegible]							
MW B	"	1110	↓	↓	" "	1	[illegible]	[illegible]							

Relinquished by: (Signature/Firm)	Date/Time	Received by: (Signature/Firm)	Relinquished by: (Signature/Firm)	Date/Time	Received by: (Signature/Firm)
[illegible]	7/3/92 1415	[illegible]			
Relinquished by: (Signature/Firm)	Date/Time	Received by: (Signature/Firm)	Relinquished by: (Signature/Firm)	Date/Time	Received by: (Signature/Firm)
Relinquished by: (Signature/Firm)	Date/Time	Received by: (Signature/Firm)	Date/Time	Remarks (attachments if necessary)	

BZTO104(e)012477

COFFEY LABORATORIES, INC.
4914 N.E. 122nd Ave.
Portland, OR 97230
Phone: (503) 254-1794

October 1, 1986
Log #A860926-A

SRH Associates, Inc.
123 N.E. Third/Suite 230
P.O. Box 14005
Portland, Oregon 97214

Attention: John Ruddick

Analysis Requested: Pentachlorophenol

SAMPLE ID	RESULTS
K-O, 9/26 0915, Soil	1200 mg/kg

Analysis by EPA Method 8040, capillary GC/FID.

Approved by,

Susan M. Brillante

Susan M. Brillante,
Mgr., Organic Laboratories

Sincerely,

Susan M. Coffey

Susan M. Coffey,
President

SMC/gs

This report is for the sole and exclusive use of the above client. Samples are retained a maximum of 15 days from the date of this letter

CHAIN OF CUSTODY RECORD

PROJ. NO.: 1003

SITE/LOCATION: Time Oil Co - Portland

SAMPLERS: (Signature) [illegible] - SRH Assoc.

STA. NO.	DATE	TIME	SAMPLE TYPE	MEDIA	SAMPLE IDENTIFICATION	NO. OF CONTAINERS	O2 AMOUNT/PRESERVATIVE (Preservatives (Hours))								SEAL NO.	SEAL INTACT? (Y or N)	REMARKS (with initials)
2-5	8/25	1130	GRAB	SOIL	NW Wineland Hole 2 Surface	1	8/0										HOLD
2-0		1145	SPLIT SPOON		" " 3'5"-5'5"	1	8/0										
2-2		1450			" " 5'5"-7'5"	1	8/0										
2-4		1520			7'5"-9'5"	1	8/0										
2-7		1545			10'5"-12'5"	1	8/0										
2-12		1720			15'5"-17'5"	1	8/0										Saturated
1-2		1915	SPLIT SPOON		Hole 1 outside cabins Dock 5'5"-7'5"	1	8/0										
1-4		1950			" 7'5"-9'5"	1	8/0										
1-7		2030			" 10'5"-12'5"	1	8/0										
1-12		2130			Hole 1 outside cabins Dock 15'5"-17'5"	1	8/0										SAT-AGED Residual [illegible]

Relinquished by: (Signature/Firm)	Date/Time	Received by: (Signature/Firm)	Relinquished by: (Signature/Firm)	Date/Time	Received by: (Signature/Firm)
[illegible] - SRH	8/26/82 1225				
Relinquished by: (Signature/Firm)	Date/Time	Received by: (Signature/Firm)	Relinquished by: (Signature/Firm)	Date/Time	Received by: (Signature/Firm)
				8/26 1226	[illegible]
Relinquished by: (Signature/Firm)	Date/Time	Received by: (Signature/Firm)	Date/Time	Remarks (attachments if necessary)	

BZT0104(e)012479

CHAIN OF CUSTODY RECORD

PROJ. NO.	SITE/LOCATION
1003	Time Oil Co PDX

SAMPLERS: (Signature) John H Ruddick

STA. NO.	DATE	TIME	SAMPLE TYPE	MEDIA	SAMPLE IDENTIFICATION	NO. OF CONTAINERS	AMOUNT/PRESERVATIVE	PENTACHLOROPHENOL (8040)	pH				SEAL NO.	SEAL INTACT? (Y or N)	REMARKS (with initials)
MW-D	8/29	1600	Bailer	Water	SE Tank Farm	3	[illegible]	[illegible]	[illegible]						
MW-E	↓	1430	↓	↓	SW Tank Farm	↓	[illegible]	[illegible]	[illegible]						
MW-F	↓	1615	↓	↓	Roadway (S)	↓	[illegible]	[illegible]	[illegible]						
MW-H	↓	1500	↓	↓	Near Loading Dock	↓	[illegible]	[illegible]	[illegible]						
MW-I	↓	1650	↓	↓	Roadway (N)	↓	[illegible]	[illegible]	[illegible]						

Relinquished by: (Signature/Firm)	Date/Time	Received by: (Signature/Firm)	Relinquished by: (Signature/Firm)	Date/Time	Received by: (Signature/Firm)
John H Ruddick / SRH	8/29/06 1800	Susan M Coffey Coffey Labs			
Relinquished by: (Signature/Firm)	Date/Time	Received by: (Signature/Firm)	Relinquished by: (Signature/Firm)	Date/Time	Received by: (Signature/Firm)
Relinquished by: (Signature/Firm)	Date/Time	Received by: (Signature/Firm)	Date/Time	Remarks (attachments if necessary)	

BZTO104(e)012480

CHAIN OF CUSTODY RECORD (8040)

PROJ. NO.: 1003

SITE/LOCATION: Time Oil Co - Portland Terminal

SAMPLERS (Signature): [signature] SRH Assoc

STA. NO.	DATE	TIME	SAMPLE TYPE	MEDIA	SAMPLE IDENTIFICATION	NO. OF CONTAINERS	AMOUNT/PRESERVATIVE (Preservatives: NONE)	PH/TPH/CHLORINATED HYDROCARBONS						SEAL NO.	SEAL INTACT? (Y/N)	REMARKS (with Initials)
6-2	8/24	11:40	SPLIT SPOON	SOIL	BORING #6 [illegible] 5'-7'5" BELOW [illegible]	1	8/0									
6-4	↑	12:00	↓	↓	7'5" - 9'5" " " "	1	8/0									
6-7		12:30			10'5" - 12'5" " " "	1	8/0									
6-12	↓	14:20	↓	↓	15'5" - 17'5" " " "	1	2/0									SATURATED SAMPLE ONLY PART RECEIVED
D-2	8/24	15:30	GRAB	SOIL	WASTE PILE @ T-5 DUPLICATE OF T-5	1	8/0									
T-5	↓	15:30	↓	↓	WASTE PILE FEET BELOW PIPE	1	8/0									
Q-5	↓	16:15	↓	↓	WASTE PILE FEET BELOW TOP OF PIPE	1	8/0									
2-1	8/24	10:50	GRAB	SOIL	BORING #6 DUPLICATE OF 6-5	1	8/0									
4-5	8/24	16:10	grab	SOIL	BORING #4 SE WASE SURFACE BELOW [illegible]	1	8/0									HOLD
4-0	↓	1650	SPLIT SPOON	↓	BORING #4 SE WASE 2'5"-5'5" BELOW SURFACE	1	8/0									
4-2	↓	1715	↓	↓	5'5" - 7'5" " " "	1	8/0									
4-4	↓	1745	↓	↓	7'5" - 9'5" " " "	1	8/0									
4-7	↓	1820	↓	↓	10'5" - 12'5" " " "	1	8/0									

Relinquished by: (Signature/Firm)	Date / Time	Received by: (Signature/Firm)	Relinquished by: (Signature/Firm)	Date / Time	Received by: (Signature/Firm)
[signature] / SRH	8/25/02 1045				
Relinquished by: (Signature/Firm)	Date / Time	Received by: (Signature/Firm)	Relinquished by: (Signature/Firm)	Date / Time	Received by: (Signature/Firm)
				8/25 1051	[signature]
Relinquished by: (Signature/Firm)	Date / Time	Received by: (Signature/Firm)	Date / Time	Remarks (attachments if necessary)	

BZTO104(e)012481

CHAIN OF CUSTODY RECORD

PROJ. NO.: 1003

SITE/LOCATION: Tim Oil Co - Portland Terminal

SAMPLERS: (Signature) [illegible] SRH Assoc.

STA. NO.	DATE	TIME	SAMPLE TYPE	MEDIA	SAMPLE IDENTIFICATION	NO. OF CONTAINERS	Preservative	SEAL NO.	SEAL INTACT? (Y or N)	REMARKS (with initials)
J-0	8/23	1015	GRAB	SOIL	SURFACE - NE - Tank Farm	1	8/0			
K-0		1030			" - N "	1	8/0			
L-0		1045			" - NW "	1	8/0			
M-0		1055			" - NW "	1	8/0			
N-0		1105			" - E "	1	8/0			
O-0		1110			" - NE Central "	1	8/0			
P-0		1115			" - N Central "	1	8/0			
Q-0		1120			" - NW Central "	1	8/0			
R-0		1125			" - E Central "	1	8/0			
S-0		1130			" - SE Central "	1	8/0			
T-0		1135			" - Central "	1	8/0			
U-0		1140			" - W Central "	1	8/0			
V-0		1145			" - SE "	1	8/0			
W-0		1150			" - S "	1	8/0			
X-0		1200			" - S "	1	8/0			

Relinquished by: (Signature/Firm)	Date/Time	Received by: (Signature/Firm)	Relinquished by: (Signature/Firm)	Date/Time	Received by: (Signature/Firm)
[illegible] SRH	8/25/92 1045				
Relinquished by: (Signature/Firm)	Date/Time	Received by: (Signature/Firm)	Relinquished by: (Signature/Firm)	Date/Time	Received by: (Signature/Firm)
				8/26 1051	[illegible]
Relinquished by: (Signature/Firm)	Date/Time	Received by: (Signature/Firm)	Date/Time	Remarks (attachments if necessary)	

BZT0104(e)012482

CHAIN OF CUSTODY RECORD 50401

PROJ. NO.	SITE/LOCATION
1003	TIME OIL CO – PORTLAND TERM.

SAMPLERS: (Signature) John H [signature] – SRH ASSOC.

STA. NO.	DATE	TIME	SAMPLE TYPE	MEDIA	SAMPLE IDENTIFICATION	NO. OF CONTAINERS	AMOUNT/PRESERVATIVE	SEAL NO.	SEAL INTACT? (Y or N)	REMARKS (with initials)
Y-0	8/23	1205	GRAB	SOIL	SURFACE – SW TANK FARM	1	8/0			
Z-0	"	1210	"	"	SURFACE – NW ROADWAY	1	8/0			
1-S	8/23	1255	GRAB	SOIL	BORING #1 WAREHOUSE LOADING DOCK SURFACE BELOW CONCRETE	1	8/0			
1-0		1635	SPLIT SPOON	"	3.5 FT BELOW CONCRETE BORING #1	1	8/0			HIT CONCRETE OR ASPHALT
5-S	8/23	1655	GRAB	SOIL	BORING #5 SW INSIDE WALL SURFACE BELOW CONCRETE	1	8/0			HOLD
5-0	↓	1710	SPLIT SPOON	↓	BORING #5 3.4-5.4' BELOW CONCRETE	1	8/0			
5-2	↓	1745	↓	↓	BORING #5 SW INSIDE WALL 5.4-7.4' " "	1	8/0			
5-4	↓	1805	↓	↓	BORING #5 7.4-9.4' " "	1	8/0			
5-7	↓	1825	↓	↓	BORING #5 10.4-12.4' " "	1	7/0			
5-12	↓	1900	↓	↓	BORING #5 15.4-17.4' " "	1	8/0			Saturated Sample JHR
6-S	8/24	1050	GRAB	SOIL	BORING #6 W CENTRAL SURFACE BELOW CONCRETE	1	8/0			HOLD
6-0	8/24	1130	SPLIT SPOON	SOIL	BORING #6 " 3.5' TO 5.5' BELOW CONCRETE	1	8/0			

Relinquished by: (Signature/Firm)	Date/Time	Received by: (Signature/Firm)	Relinquished by: (Signature/Firm)	Date/Time	Received by: (Signature/Firm)
John H [signature] SRH	8/25/86 1045				
Relinquished by: (Signature/Firm)	Date/Time	Received by: (Signature/Firm)	Relinquished by: (Signature/Firm)	Date/Time	Received by: (Signature/Firm)
				8/25 1051	[signature]
Relinquished by: (Signature/Firm)	Date/Time	Received by: (Signature/Firm)	Date/Time	Remarks (attachments if necessary)	

BZTO104(e)012483

CHAIN OF CUSTODY RECORD (8040)

PROJ. NO.	SITE/LOCATION
1003	Time Oil Co - PDX Terminal

SAMPLERS: (Signature) [signature] SRH Assoc.

STA. NO.	DATE	TIME	SAMPLE TYPE	MEDIA	SAMPLE IDENTIFICATION	NO. OF CONTAINERS	AMOUNT/PRESERVATIVE (0 = None) Pentachlorophenol						SEAL NO.	SEAL INTACT? (Y or N)	REMARKS (with initials)
4-12	8/24	1900	Split Spoon	Soil	Boring #4, SE WHSE 15'5"-17'5" Below Concrete	1	8/0								Saturated Sample
3-5	8/24	1915	Grab	Soil	Boring #3 E-Central Surface Below Concrete	1	8/0								HOLD
3-0	↓	1955	Split Spoon	↓	3.5'-5'5" " "	1	8/0								
3-2		2010			5.5'-7.5" " "	1	8/0								
3-4		2015			7.5'-9.5" " "	1	8/0								
3-7		2025			10'5"-12'5" " "	1	8/0								
3-12		2100			15'5"-17'5" " "	1	8/0								Sat'd Sample

Relinquished by: (Signature/Firm)	Date/Time	Received by: (Signature/Firm)	Relinquished by: (Signature/Firm)	Date/Time	Received by: (Signature/Firm)
[signature] SRH	8/25/84 1045				
Relinquished by: (Signature/Firm)	Date/Time	Received by: (Signature/Firm)	Relinquished by: (Signature/Firm)	Date/Time	Received by: (Signature/Firm)
				8/25 1051	[signature]
Relinquished by: (Signature/Firm)	Date/Time	Received by: (Signature/Firm)	Date/Time	Remarks (attachments if necessary)	

BZTO104(e)012484

CLIENT
ANALYSIS
REQUEST

COFFEY LABORATORIES, INC.
4914 N.E. 122nd Ave.
Portland, OR 97230
Phone: (503) 254-1794

COMPANY NAME SRH ASSOCIATE TELEPHONE# 232-0824

ADDRESS 123 NE 3RD STE 230 PURCHASE ORDER # VERBAL

ADDRESS 14005 LAB PRICE QUOTE # [redacted]

CITY/STATE/ZIP PORTLAND OR 97214 BILLING ADDRESS:

ATTENTION JOHN RUDDICK

SAMPLE COLLECTION DATE 8/29/86 DUE DATE ASAP RUSH

SAMPLE COLLECTED BY J. RUDDICK DELIVERED BY JHR

CLIENT COMMENTS-(SPECIAL INSTRUCTIONS, SPECIFIC METHOD ETC):

Penta by EPA 8040 (SW-846)

ID/Field ID	Date	Time	Media	Pres	cntnr	Analysis requested	
MW-D	8/29	1600	GROUND WATER	1:1 HEAT PH2	2 L 1 LAMBER GLASS	PENTACHLORO/PHENOL	(EPA 8040)
MW-E		1430					
MW-F		1615					
MW-H		1500					
MW-I		1650					
MW-D		1600		NONE	250 ml PLASTIC	PH	
MW-E		1430					
MW-F		1615					
MW-H		1500					
MW-I		1650					

Relinquished by: John H Ruddick Date 8/29/86 Time 1800 Received for Coffey Labs by: Susan M Coffey

CLIENT INTEGRITY COMMENTS:

LAB LOG # A860829 N 1-10 LOGGED IN BY: S Coffey DATE: 8-29-86 TIME: 175

BZTO104(e)012485

LIENT
ANALYSIS
REQUEST

COFFEY LABORATORIES, INC.
4914 N.E. 122nd Ave.
Portland, OR 97230
Phone: (503) 254-1794

OMPANY NAME SHR ASSOCIATES TELEPHONE# 232 0824

DDRESS 123 NE 3RD SUITE 230 PURCHASE ORDER # VERBAL

DDRESS PO BOX 14005 LAB PRICE QUOTE # $60 / sample

ITY/STATE/ZIP PORTLAND OR 97205 BILLING ADDRESS: SAME

TTENTION John Ruddick

AMPLE COLLECTION DATE 9/3/86 DUE DATE ASAP RUSH

AMPLE COLLECTED BY [signature] DELEVERED BY J Ruddick

LIENT COMMENTS-(SPECIAL INSTRUCTIONS, SPECIFIC METHOD ETC):
PENTA BY EPA 8040 (SW846)
(DONT FILTER — DECANT WATER OFF ANY SEDIMENT)

ID	FieldID	Date	Time	Media	Pres	cntnr	Analysis requested
	MWA	9/3/86	1030	WATER	1:1 H_2SO_4 TO PH2	2 EA 1L AMBER GLASS	PENTACHLOROPHENOL
	MWA	"	1030	"	NONE	250 ml PLASTIC	PH
	MWB	"	1110	"	1:1 H_2SO_4 TO PH2	2 EA 1L AMBER GLASS	PENTACHLOROPHENOL
	MWB	"	1110	"	NONE	250 ml PLASTIC	PH

Relinquished by:	Date	Time	Received for Coffey Labs b
[signature] / SRH	9/3/86	1450	[signature]

PLE INTEGRITY COMMENTS:

AB LOG # 86 0903-J LOGGED IN BY: DATE: TIM

:\wp\clom\form\log\login.log

BZTO104(e)012486

CLIENT
ANALYSIS
REQUEST

COFFEY LABORATORIES, INC.
4914 N.E. 122nd Ave.
Portland, OR 97230
Phone: (503) 254-1794

COMPANY NAME SRH ASSOCIATES TELEPHONE# 503 232 0824

ADDRESS 125 NE 3RD STE 230 PURCHASE ORDER # VERBAL

ADDRESS PO Box 14005 LAB PRICE QUOTE # 60.00/sample

CITY/STATE/ZIP PORTLAND OR 97214 BILLING ADDRESS:

ATTENTION JOHN RUDDICK

SAMPLE COLLECTION DATE 8/24/86 + 8/23 DUE DATE 9/2/86 RUSH

SAMPLE COLLECTED BY J RUDDICK DELIVERED BY JHR

CLIENT COMMENTS-(SPECIAL INSTRUCTIONS, SPECIFIC METHOD ETC):
PENTACHLOROPHENOL BY EPA 8040 (SW 846)

Sample	Date	Time	Media	Pres	Cntnr	Analysis requested
4-4	8/24	1745	Soil	None	803 Glass	Pentachlorophenol (EPA 8040)
4-7	8/24	1820				
J-0	8/23	1015				
K-0		1030				
L-0		1045				
M-0		1055				
N-0		1105				
Ø-0		1110				
P-0		1115				
Q-0		1120				

Relinquished by: John H Ruddick / SRH Date 8/25/86 Time 1045 Received for Coffey Labs [signature]

CLIENT SECURITY COMMENTS:

LAB LOG: LOGGED IN BY: DATE: TIME:

BZTO104(e)012487

COFFEY LABORATORIES, INC.
4814 N.E. 122nd Ave.
Portland, OR 97230
Phone: (503) 254-1794

COMPANY: SRH Associates TELEPHONE# 503 232 0824
ADDRESS: 123 SW 3rd STE 230 PURCHASE ORDER # Verbal
ADDRESS: PO Box 14005 LAB PRICE QUOTE # 60.00/sample
CITY/STATE: Portland OR 97214 BILLING ADDRESS:
ATTENTION: John Rudnick
SAMPLE COLLECTION DATE: 8/23/86 DUE DATE: 9/2/86 RUSH
SAMPLE COLLECTED BY: J Rudnick DELIVERED BY: JHR

CLIENT COMMENTS-(SPECIAL INSTRUCTIONS, SPECIFIC METHOD ETC):
Pentachlorophenol by EPA 8040 (SW 846)

Sample	Date	Time	Matrix	Preservative	Container	Analysis requested
R-0	8/23	1125	Soil	None	8 oz Glass	Pentachlorophenol (EPA 8040)
S-0		1130				
T-0		1135				
U-0		1140				
V-0		1145				
W-0		1150				
X-0		1200				

Relinquished by: John H Rudnick Date: 8/25/86 Time: 1045 Received for Coffey Labs by: [signature]

SPECIAL QUALITY COMMENTS:

LAB LOG LOGGED IN BY: DATE: TIME:

BZTO104(e)012488

COFFEY LABORATORIES, INC.
4014 N.E. 122nd Ave.
Portland, OR 97230
Phone: (503) 254-1794

COMPANY NAME: SRH ASSOCIATES
TELEPHONE#: 503 232 0824
ADDRESS: 123 NE 3RD STE 230
PURCHASE ORDER #: VERBAL
ADDRESS: PO BOX 14005
LAB PRICE QUOTE #: 60.00/sample
CITY/STATE: PORTLAND OR 97214
BILLING ADDRESS:
ATTENTION: JOHN RUDDICK
SAMPLE COLLECTION DATE: 8/24/86
DUE DATE: 9/2/86
RUSH:
SAMPLE COLLECTED BY: J RUDDICK
DELIVERED BY: JHR
CLIENT COMMENTS-(SPECIAL INSTRUCTIONS, SPECIFIC METHOD ETC):
PENTACHLOROPHENOL BY EPA 8040 (SW 846)

D/P	Date	Time	Media	Pres	cntnr	Analysis requested	
6-S	8/24	1050	Soil	None	80z glass	Penta (EPA 8040)	(HOLD)
6-0		1130					
4-12		1900					
3-S		1915					(HOLD)
3-0		1955					
3-2		2010					
3-4		2015					
3-7		2025					
3-12		2100					
6-2		1140					

RELINQUISHED BY: John H Ruddick /SRH
Date: 8/25/86
Time: 1045
Received for Coffey Labs: [signature]

SAMPLE CONSISTENCY COMMENTS:

LAB LOG: PROCESSED IN BY: DATE: TIME:

BZTO104(e)012489

CLIENT
ANALYSIS
REQUEST

COFFEY LABORATORIES, INC.

4914 N.E. 122nd Ave.
Portland, OR 97230
Phone: (503) 254-1794

COMPANY NAME: SRH ASSOCIATES TELEPHONE# 503 232 0824

ADDRESS: 123 NE 3RD STE 230 PURCHASE ORDER # VERBAL

ADDRESS: PO BOX 14005 LAB PRICE QUOTE # 60.00/SAMPLE

CITY/STATE/ZIP: PORTLAND OR 97214 BILLING ADDRESS:

ATTENTION: JOHN RUDDICK

SAMPLE COLLECTION DATE: 8/25/86 DUE DATE: 9/2/86 RUSH:

SAMPLE COLLECTED BY: J RUDDICK DELIVERED BY: JHR

CLIENT COMMENTS-(SPECIAL INSTRUCTIONS, SPECIFIC METHOD ETC):
PENTACHLOROPHENOL BY EPA 8040 (SW 846)

Lab	Date	Time	Media	Pres	Cntnr	Analysis requested
6-4	8/24	1200	Soil	None	802 Glass	Penta (EPA 8040)
6-7		1230				
6-12		1420				
D-2		1530				
T-S		1530				
Q-S		1615				
D-1		1050				
4-S		1610				(HOLD)
4-0		1650				
4-2		1715				

Relinquished by: John H Ruddick / SRH Date: 8/25/86 Time: 1045 Received for Coffey Labs by: [signature]

SPECIAL LOGISTICS COMMENTS:

LAB LOG LOGGED IN BY: DATE: TIME:

COFFEY LABORATORIES, INC.
4914 N.E. 122nd Ave.
Portland, OR 97230
Phone: (503) 254-1794

COMPANY NAME: SRH ASSOCIATES
TELEPHONE#: 503 232 0824
ADDRESS: 123 NE 3RD STE 230
PURCHASE ORDER #: VERBAL
ADDRESS: PO BOX 14005
LAB PRICE QUOTE #: 60.00/SAMPLE
CITY/STATE: PORTLAND OR 97214
BILLING ADDRESS:
ATTENTION: JOHN RUDDICK
SAMPLE COLLECTION DATE: 8/23/86
DUE DATE: 9/2/86
RUSH:
SAMPLE COLLECTED BY: J RUDDICK
DELIVERED BY: JHR

CLIENT COMMENTS-(SPECIAL INSTRUCTIONS, SPECIFIC METHOD ETC):
PENTACHLOROPHENOL BY EPA 8040 (SW 846)

ID	Date	Time	Media	Pres	Cntnr	Analysis requested
Y-0	8/23	1205	SOIL	NONE	802 Glass	PENTACHLOROPHENOL (EPA 8040)
Z-0		1210				
1-S		1255				(HOLD)
1-0		1635				
5-S		1655				(HOLD)
5-0		1710				
5-2		1745				
5-4		1805				
5-7		1825				
5-12		1900				

RELINQUISHED BY: John H Ruddick
Date: 8/25
Time: 1045
Received for Coffey Labs: [signature]

SAMPLE INTEGRITY COMMENTS:

LAB LOG: LOGGED IN BY: DATE: TIME:

BZTO104(e)012491

LIE
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REQU

COFFEY LABORATORIES, INC.
4014 N.E. 122nd Ave.
Portland, OR 97230
Phone: (503) 254-1794

COMPANY NAME SRH ASSOCIATES TELEPHONE# 503 232 0824
ADDRESS 123 NE 3RD STE 230 PURCHASE ORDER # VERBAL
ADDRESS PO BOX 14005 LAB PRICE QUOTE # 60.00/SAMPLE
CITY/STATE ZIP PORTLAND OR 97214 BILLING ADDRESS:
ATTENTION JOHN RUDDICK
SAMPLE COLLECTION DATE 8/25/86 DUE DATE 9/2/86 RUSH
SAMPLE COLLECTED BY J RUDDICK DELIVERED BY JHR
CLIENT COMMENTS-(SPECIAL INSTRUCTIONS, SPECIFIC METHOD ETC):
PENTACHLOROPHENOL BY EPA 8040 (SW 846)

ID/F	Date	Time	Media	res	cntnr	Analysis requested	
2-S	8/25	1130	SOIL	NONE	GLASS 8OZ	PENTA BY EPA 8040	HOLD
2-0		1145					RUN
2-2		1450					RUN
2-4		1520					RUN
2-7		1545					RUN
2-12		1720					RUN
1-2		1915					RUN
1-4		1950					RUN
1-7		2030					RUN
1-12		2130					RUN

RELINQUISHED BY: Date 8/26 Time 1225 Received for Coffey Labs b

SAMPLE QUALITY COMMENTS.

LAB LOG # LOGGED IN BY: DATE: TIME:

BZTO104(e)012492

PENTACHLOROPHENOL

CONTAMINATION

AT

TIME OIL COMPANY

NORTHWEST TERMINAL

12005 NORTH BURGARD ROAD

PORTLAND, OREGON

OCTOBER 1, 1986

PREPARED FOR:

TIME OIL COMPANY
2737 WEST COMMODORE WAY
SEATTLE, WASHINGTON

PREPARED BY:

SRH ASSOCIATES, INC.
123 N.E. THIRD AVENUE, SUITE 230
PORTLAND, OREGON 97232
(503) 232-0824

At the end of 1985, the EPA advised Time that soil contaminated with leaked PCP had been reclassified as hazardous waste (number F027) and that there were currently no hazardous waste facilities in the U.S. that would accept this waste.

Pending resolution of EPA/DEQ acceptable disposal methods for PCP contaminated soil, efforts were directed toward the determination of possible groundwater contamination. Fourteen wells were installed and developed during 1986. Two were subsequently closed due to inefficient operation. Remaining wells have been repeatedly sampled and those samples analyzed for PCP. Concentrations have not exceeded .044 ppm at the highest reading. While well water analysis is scheduled to continue quarterly until the project is completed, to ensure no groundwater migration goes undetected, there appears to be no real groundwater problem.

Since there was no regulatory relief in sight, which would permit off-site disposal of PCP contaminated soil, Time initiated an assessment of on-site remedial alternatives. Recommended actions are:

a. Select the "Surface Mounted Soil Washing" technique as the most logical remedial approach.

b. Perform bench scale and pilot level evaluations.

c. Determine necessary destruction steps of recovered extracts.

d. Ascertain technical permitting and economic feasibility of technique for final disposal action.

e. Compare results with repeat step by step examination of next most logical remedial approaches which are: "Surface Mounted Thermal Extraction" and "In-Situ Thermal Extraction".

EXECUTIVE SUMMARY

On March 1, 1967, Time Oil Co. and Koppers Company entered into an agreement wherein Time would provide certain labor and services connected with the receipt, storage, handling and blending of specified woodtreating products, including pentachlorophenol. All products were owned by Koppers. The site selected for this activity included a warehouse and tank farm on a small (70' x 70') portion of Time's 45 acre Northwest Terminal located at 12005 North Burgard Road in Portland, OR.

The operation started up and continued routinely until January 28, 1981. Time then advised Koppers of its election to terminate the project effective March 31, 1982, the scheduled agreement expiration date. Various in-house inspections had indicated the possibility of soil contamination. Subsequent bioassay tests confirmed the existence of pentachlorophenol in the soil adjacent to the warehouse. Both companies concurred to close the site. Operations ceased. Orderly phase out actions were established and begun.

It is noteworthy that this entire closure effort was jointly planned and undertaken by the two companies to voluntarily correct what both felt may become a future problem.

By February 1985, on hand product inventory had been blended off and shipped out. All tanks and piping had been cleaned, with cleaning wastes being shipped to Arlington. Piping and tanks had been disassembled, removed and scrapped. In short, the site was cleared to ground level.

Soil clean-up began. Following coordination with the DEQ, the Arlington landfill and local contractors, some 242 tons of soil were shipped to Arlington. A sampling matrix was prepared and more than 150 soil samples were collected and analyzed for PCP. Concentration isopleths were generated, which depicted remaining contamination locations and degrees of contamination, the highest of which was 116,000 ppm. Isopleths showed site size had now expanded to about 70' x 140' in area. The concrete wall along the western edge of the site was removed, decontaminated and disposed of to facilitate removal of this newly discovered increased area of soil contamination. To aid in reducing the physical size of this newly defined area, the extremities of site soil were centralized to the one spot having the highest known contaminant concentration. Soil relocation actions were based on previously plotted contour determinations. They were successful in that the area was reduced to about 60' x 60'.

BZTO104(e)012495

SECTION I

HISTORY

Section I provides a sequential summary of those activities relating to pentachlorophenol (PCP) operations within the Time Oil Company Northwest Terminal located at 12005 North Burgard Road in Portland, Oregon. The information was gathered from Time Oil files at the firm's Seattle headquarters. Data was extracted from reports, memos and other correspondence from Time employees, the Oregon Department of Environmental Quality (DEQ), the US Environmental Protection Agency (EPA) and private consultants.

BACKGROUND

Agreement with Koppers Company, Inc. (1967-1982)

On March 1, 1967, Time Oil Company reached an agreement with the Koppers Company, whereby Time would provide the storage, handling and distribution of Koppers owned specialty woodtreating chemicals, including PCP. The operating area included a warehouse building and an adjacent tank farm area (about 70' x 70') with an earthern surface. This small site was to become known collectively as the woodtreating chemicals area. Early in 1981, Time notified Koppers of their intent to terminate the agreement on March 31, 1982. Time and Koppers jointly agreed to immediately cease all PCP operations at the site, to remove all products, to clean all tanks and pipelines, to remove and dispose of all tanks and pipelines, to effect clean up of whatever contamination existed and to do it all within existing regulatory guidelines.

Various Site Inspections (1971-1984)

A summary of in-house site inspections, over the ten year period (1971-1981), identified the following problems related to the PCP operation.

- No spill control system in warehouse. Spilled liquid was able to run unrestricted through the warehouse area and drain out through doors. Sloping of the warehouse floor and installation of drains was recommended.

BZTO104(e)012496

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SECTION V Chain-Of-Custody Forms

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BZTO104(e)012497

physical removal, plans were made to excavate and dispose of soil to a depth below that where PCP contamination was found to exist. This was to be a three phase effort, fully coordinated with the DEQ and the disposal facility. Phase I consisted of initial soil removal and its transport to an authorized disposal facility. Phase II involved a thorough investigation to determine the extent of PCP contamination and its degree of concentration. Phase III was to remove and dispose of any remaining soil which was detected, by laboratory analysis, to be contaminated above acceptable limits.

On November 1, 1983, a delay in Phase I of the planned removal occurred because ownership of the hazardous waste facility at Arlington changed and some period of time was needed for the new management to reach full operational status. Further, an agreement from the new owners (Chemical Waste Management) to accept the soil at Arlington prior to any excavation was absolutely essential to ensure that Time did not become classified as a hazardous waste storage facility.

Removal and Disposal of Contaminated Soil (February - June, 1985)

On February 4, 1985, Time reiterated to the DEQ, its intent to excavate PCP-contaminated soil and dispose of it at an approved disposal facility. On February 19, Time executed a contract with Northwest Vacuum Truck Service, Inc. for removal and transport of the contaminated soil. On May 14, the DEQ granted approval for disposal of the PCP-contaminated soil at the Arlington landfill. On June 24, an agreement covering disposal was reached with Chem-Security Systems, Inc., operator of the Arlington facility.

Between June 25 and June 28, 1985, 288 cubic yards (242.76 tons) of soil were removed and shipped to Arlington. The soil was excavated to a depth of 2 to 4 feet below grade in the northwest corner of the woodtreating chemicals tank farm.

Soil Sampling (June - July, 1985)

On June 28, 1985, following completion of contaminated soil excavation, Time retained Riedel Environmental Services to perform sampling and analysis of the remaining soil. Samples of surface soils were initially collected from 22 locations around the perimeter of the woodtreating chemicals tank farm area. Three composite samples were formed and analyzed, showing PCP concentrations of up to 860 ppm. Samples of the soil from 81 individual sample sites surrounding the woodtreating tank farm area were then collected and analyzed for PCP. The results indicated that the contamination was localized to the west and south of the warehouse with little or no contamination occurring to the east of the site.

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- Floor of warehouse work area caked with product. Steam cleaning recommended.

- No warning signs were posted which call attention to hazards in the area where PCP was stored and mixed.

- Ground near end of pipelines saturated with product to a dept. of 12 inches.

During February 1983, Time contracted with the AM-Test Corporation to conduct a fish bioassay test on the site soil. Analysis resulted in a finding of the soil (only) being toxic at the 100 and 1000 ppm levels.

On a subject matter completely unrelated to the pentachlorophenol operation and Time/Koppers planned actions, the DEQ conducted an inspection of the entire Northwest Terminal facility on October 25, 1984. On that date, the DEQ advised their intent to collect soil samples throughout the facility. It is because of this latter DEQ advisory that the following soil test results are included since two samples were taken from the woodtreating chemicals area.

On December 12, 1984, DEQ personnel collected twelve soil samples from the entire facility. Splits of each sample were provided to Time. DEQ analytical results were received by Time on January 24, 1985. The DEQ samples were analyzed for EPA Priority Pollutants and for other substances identifiable through GC/MS scan, with a specific interest in lead content. No samples were found to have lead concentrations above the detection limit. The samples were also analyzed for fourteen pesticides, but no concentrations above the detection limit were found. Non-priority GC/MS scans indicated the presence of low concentrations of petroleum hydrocarbons in three of the twelve samples. In the analysis for EPA Priority Pollutants, ten of twelve samples were found to contain either no concentrations of any organics above the detection limit, or only trace amounts of polynuclear aromatics. One sample, taken from the woodtreating chemicals tank farm, contained 515 ppm of PCP and 12 ppm of tetrachlorophenol (TCP). The second sample from this area contained 1820 ppm of PCP and 71 ppm of TCP.

Sample splits, which had been provided to Time, were then submitted to Coffey Laboratories for analysis in order to confirm DEQ findings. Results of these analyses were received on March 15, 1986 and showed no PCP concentrations higher than 275 ppm. No pentachlorophenol was detected in any sample outside of the woodtreating chemicals area.

INITIAL CLEAN UP EFFORTS

Proposal for Removal of Contaminated Soil (1983)

In October of 1983, pending completion of site tank and pipeline

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to a hazardous waste bearing number F027. Referring to a moratorium on landfilling of such wastes, the EPA letter stated that at that time there were "no commercial hazardous waste facilities in the United States that would accept waste designated as F027." EPA also suggested that Time consult with the DEQ before continuing with clean-up operations at the site.

Wells 1, 2, 3 and 4 Installation (November, 1985)

Pending resolution of acceptable disposal techniques for contaminated soil containing PCP, Time concentrated on determination of possible groundwater contamination.

In November, 1985, Time again retained Riedel Environmental Services to install four groundwater monitoring wells near the southwest corner of the warehouse building. Wells 1, 2 and 3 were placed in 16-inch (O.D.) 45° slant borings which penetrated soil beneath the building to a vertical depth of 14 feet. Well 4 was installed in a 16-inch (O.D.) vertical hole drilled to a depth of 50 feet. Samples for PCP analysis were taken to advance and further earlier analyses, particularly to determine if contamination existed beneath the woodtreating chemicals warehouse.

Samples from the slant borings indicated PCP concentrations as high as 116,000 ppm at 2.5 to 4 feet below the surface, with surface concentrations ranging from 65.3 to 1,690 ppm. The concentrations generally decreased with depth. The vertical boring (Well #4) showed concentrations descreasing with depth from 574 ppm at 18.5 to 20 feet below the soil surface to a low of 1.59 ppm at 43.5 to 45 feet below the surface. The conclusion of this report was that contamination exists below the southwest corner of the woodtreating warehouse floor, although the horizontal limits of contamination were not definable with the existing data.

Geologic logging of the soil at Well #4 indicated a minor layer of low permeability about 18 to 35 feet below the surface. The well was completed by installing 4-inch PVC well casing and screen to a depth of 40 feet in the 16-inch auger hole and sand packing the well annulus to within 6 feet of the surface. A well construction diagram is shown in Figure I-3. The geologic log of this boring is shown in Figure I-4. A well construction diagram of the slant borings is shown in Figure I-5.

Installation of Well Points (February - May, 1986)

In February, 1986, in order to identify groundwater flow direction and gradient beneath the Northwest Terminal facility, Time installed well points at three locations surrounding the woodtreating chemicals warehouse and tank farm area. Two of the wells (A and B) were installed to a depth of 20 feet. Two wells were installed at a depth of 8 feet at location C (see Figure I-6).

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Soil was then collected from fourteen locations at depths of 0, 2, 4, 7 and 12 feet below the surface on a triangular grid across the tank farm area. Samples were taken by the split spoon technique using a hollow stem auger drill rig, and analyses were performed in accordance with EPA procedure #8040 (SW-846). Contaminant contour maps were developed from the data which showed a maximum PCP concentration of 26,500 ppm at the surface in the area where the loading of trucks had occurred. This finding of soil contamination caused an increase of the site size to about 70' x 140'. A second focus of contamination was at the southwest corner of the warehouse. The vertical column of contamination at the second location extended to the lowest sampling interval (12-14 feet below the surface), which was noted as being in the saturated zone at the time of sampling. The highest concentration at this depth was 2,030 ppm.

The two focal points of contamination are indicated on the surface contour isopleth map generated by Riedel and presented as Figure I-1 of this report. Figure I-2 indicates the 12 foot contaminant isopleth. (Note: the southwest corner of the warehouse is indicated by the reference mark at coordinates (76,166)).

600 ppm Chlorophenol Toxicity Level Interpretation (June, 1985)

On June 28, 1985, Time received a letter from the DEQ laboratory, concerning previous interpretations by the agency, that 600 ppm of total chlorophenols in soil represented the hazardous waste threshold. This conclusion was based on extraction and bio-toxicity tests peformed by DEQ. The letter stated, however, that this was only used as guidance and did not necessarily reflect specific clean up requirements.

Removal of Concrete Wall (November, 1985)

Time retained Riedel Environmental Services in November, 1985 to remove and decontaminate a concrete wall which stood along the west perimeter of the woodtreating chemicals tank farm area. The intent of the removal of the wall was to allow for easy sample analysis, contaminant containment and future removal of the contaminated soil adjacent to the wall. This project included wall steam cleaning, subsequent testing of the wall for residual PCP and wall demolition following certification of decontamination to background levels of PCP. The wall was broken into pieces by Riedel and disposed of by Time.

Classification of Contaminated Soil as Hazardous Waste (December, 1985)

On December 10, 1985, the EPA Region X office advised Time that soil contaminated with leaked PCP had been reclassified (from U242)

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In an effort to reinstate natural groundwater flow patterns in the area and to eliminate possible intercommunication between upper and lower water bearing zones, Well 4 was removed by overdrilling and the hole sealed on May 14, 1986. Prior to choosing this method of abandonment, Time evaluated several possibilities, including pressure grouting and two different overdrilling processes, with input from Hart Crowser and Associates, Century Environmental Sciences and Riedel.

Groundwater Sampling (April - May, 1986)

Time retained Century Environmental Sciences to perform groundwater sampling and analysis of the wells and well points at the Northwest Terminal facility. In April, 1986, Century measured static water levels in Well 4, in Wells A-C and Wells E-G. These measurements again showed that the water level in Well 4 was lower than in surrounding wells. Samples collected from each well were analyzed and .0061 ppm, .0026 ppm and .0014 ppm of PCP were detected in Wells 4, B and F, respectively.

On May 28, following abandonment of Well 4, a second group of groundwater samples were collected from Wells A, B, D, E, F, H and I. The locations of these wells is indicated in Figure 6. The analytical results showed PCP in a concentration just slightly above the detection level (.0002 ppm) in Well I. Other wells contained no detectable levels of PCP.

Additional Soil and Groundwater Sampling (August, 1986)

In August, 1986, Time retained SRH Associates to perform additional sampling and analysis of soil and groundwater at the Northwest Terminal facility. Based on previous contour map determinations, Time re-graded the surface of the woodtreating chemicals tank farm area, gathering all suspected contaminated surface soil in a centralized area, reducing the area to about 60' x 60'. SRH then collected surface soil samples from the same 14 locations in the tank farm area which had been sampled earlier by Riedel, drilled six holes through the warehouse floor and sampled soil from beneath the building. Samples were collected from the surface of the soil underlying the concrete floor of the warehouse as well as the same five subsurface intervals sampled by Riedel in 1985. These borings were made in an effort to determine the extent of contamination underlying the warehouse.

SRH also collected groundwater samples for PCP analysis and pH, and made measurements of static water levels from all monitoring wells in existence. The results of these analyses are supplied in Section III of this report.

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Water level measurements were taken on nine occasions between February 28 and March 11 in Wells A, B, C_1, C_2 and 4. The data collected indicated an unexpectedly lower water level in well 4 as compared with the other well locations.

To further investigate this unusual circumstance, three additiona well points, four observation pits and a river level reference point were installed by Time in late March, 1986. Wells E and F were driven to depths of 20 and 19 feet, respectively, while Well G was driven to a depth of 13 feet where advancement of the point was halted by cobbles. Well C_2 was removed, and Well C_1 was henceforth known simply as Well C. Water levels in Well 4 and Wells A-G were again measured repeatedly over a period of several days. The data confirmed earlier indications that a water table depression existed in the area of Well 4.

A detailed evaluation of the boring log data for Well 4 showed that a series of clay lenses and silty sands had been penetrated by the bore hole between the depths of 18.5 and 35 feet.

Gravelly sand lies above this zone and medium to fine sand predominates below it. The clay lenses appear to have formed a zone of relatively low permeability separating a perched upper water bearing zone from a lower aquifer. This zone of low permeability was apparently breached by the installation of Well 4. The boring was drilled with a 16-inch diameter auger while the well consisted of 4-inch PVC pipe. The annulus was filled with coarse sand, violating the integrity of the low permeability layer and providing a potential pathway for water from the upper perched water bearing zone to flow down the hole to the lower aquifer, creating a depression in the natural groundwater flow. This appeared to have altered the natural direction of groundwater flow (toward the Willamette River) within a zone of influence surrounding Well 4.

Although the observed water table depression could represent a strong, natural vertical gradient in the vicinity of Well 4, the influence of this well on adjacent wells indicated a strong probability of an induced groundwater sink caused by an unsealed annulus of Well 4. This conclusion was reached by Time upon evaluation of the piezometric surface of the perched water, which indicated that wells in close proximity to Well 4 were apparently influenced by Well 4, showing water level depressions, while wells distant from Well 4 were unaffected.

Additional Groundwater Monitoring Wells and Well 4 Abandonment (May, 1986)

At Time's direction, three additional groundwater monitoring wells (D, H and I) were installed by Riedel in early May, 1986. The purpose of these wells was to further define the upper piezometric surface and to obtain data on groundwater quality.

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SECTION II

REMEDIAL ALTERNATIVE ASSESSMENT

INTRODUCTION

A small portion of Time's 45 acre property at 12005 N. Burgard Road in Portland, Oregon has been identified as being contaminated with pentachlorophenol (PCP). Contamination at this site has been found to extend to approximately 70' x 140' in area and to depths of about 15 feet below the surface in one spot. The site was used for the formulation and storage of woodtreating chemicals under an agreement between Time and Koppers from 1967 until 1982. In addition to pentachlorophenol, a number of hydrocarbon solvents and petroleum products were used in this process.

Concentrations of PCP, ranging from below detectable limits to 116,000 ppm, have been detected in the soil, with concentrations generally decreasing with depth and distance from the southwest corner of the woodtreating chemicals warehouse. Concentration data has been used to generate equiconcentration isopleths which indicate that soil contamination is generally restricted to the upper 3 feet of soil, with the exception of a major vertical column of contamination located at the corner of the warehouse.

Perched groundwater underlies the site at a depth of approximately 13 feet below the surface. This water appears to be continuous with and potentially discharging to, the Willamette River. The surface soil consists predominantly of medium-grained sands with occasional minor clay lenses and/or gravels. The soil is characteristically homogeneous from the surface to the perched water table. A layer of somewhat lower permeability underlies the perched water and consists of silty sands with clay lenses. Fine-grained sands predominate below this layer.

Concentrations of PCP in groundwater below the known contaminated zone have not exceeded .044 ppm. Most wells indicate no detectable concentrations of PCP, and outside of the contaminated zone, concentrations have not exceeded .003 ppm in any well. Contamination does not appear to have migrated extensively from the known contaminated zone. Analyses of groundwater are continuing on a quarterly basis.

A water well monitoring network consisting of shallow wells and well points has been installed to monitor the upper perched water. A total of nine vertical and three slanted (45°) wells have been installed and are regularly sampled for pH and PCP plus being measured for static water levels.

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SUMMARY

During the duration of the agreement between Time and Koppers, pentachlorophenol and probably some tetrachlorophenol were released into the sandy soil adjacent to the woodtreating chemical warehouse. This material may have been released in combination with various hydrocarbon solvents used as a part of the process. The primary cause for these releases appears to have been intermittent spillage from hoses and mixing vessels during end product formulation and transfer operations, rather than a one-time spill event.

Upon investigation of these findings, Time and Koppers terminated their agreement, ceased all pentachlorophenol operations and began clean up operations at the site.

In investigating the extent of soil contamination, Time has obtained assistance from several consulting firms and clean up contractors, and has analyzed sufficient soil samples to determine the vertical and horizontal extent of contamination. The contamination is localized in the northwest corner of the woodtreating chemicals tank farm, with some slight penetration below the warehouse. An estimated 2,000 cubic yards of soil, a portion of which extends down to the first water bearing zone, is contaminated.

Time has installed an extensive water well monitoring network at the site and is continuously acquiring data on the flow direction and rates of flow of the first water bearing zone, as well as on water quality and PCP concentrations. Early data indicates that gross contamination of the groundwater has not occurred outside of the contaminated zone. PCP can barely be detected in wells in, or immediately adjacent to, the contaminant zone. Groundwater flow is generally in the direction of the Willametter River. Vertical gradients in the vicinity of the contaminant zone have not been determined at this time.

Time attempted to minimize the risk of contaminant migration by disposing of some material at Chemical Waste Management's Arlington facility. This effort was thwarted due to a moratorium on landfilling of PCP subsequently disallowing further such disposal. Time has consolidated the bulk of the contaminated soil into one spot within the woodtreating chemicals tank farm area to facilitate containment and minimize the risk of off-site migration.

Time has now retained SRH Associates to identify available alternatives to destroy or immobilize the PCP contaminated soil and is presently evaluating additionally generated data regarding groundwater quality and soil contamination.

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Adsorption Onto Polymers or Activated Carbon

Should contaminating PCP, at some point, be removed from the soil by soil washing, thermal extraction or other processes, final treatment of the recovered wastes will be required. Although not a destructive process, sorption of the recovered PCP onto carbon or other polymeric substrates utilizing hydrophobic interactions as a sorptive process, will reduce the volume of PCP contaminated material.

Activated carbon and a variety of organic and silicaceous polymeric adsorbents have been utilized to bind PCP and other phenols. The sorptive process, however, is usually reversible under appropriate conditions (usually temperature elevation or through the use of non-polar solvents) and therefore may not be suitable for long term stabilization of PCP wastes under uncontrolled conditions.

These sorbents may be used to concentrate PCP from a waste stream (i.e. soil washing eluates or thermal extraction scrubber liquors) which could then be recycled or disposed of as a non-hazardous waste. The adsorbent may then be regenerated for reuse and the concentrated PCP solutions so generated, collected for disposal by destructive methods such as incineration or chemical decomposition. Such an approach may be a logical consideration for the Time site.

Biodegradation

Biodegradation of man-made compounds has been observed for many years and the results of aerobic sewage treatment systems have been documented in detail. Aerobic landfarming of oily wastes from the petroleum industry has also been in general use for years. Biodegradation occurs under essentially two basic conditions: aerobic (respiratory) and anaerobic (fermentative). Many compounds have been observed to be degraded, either partially or completely to carbon dioxide and water, by one or both of these pathways.

Pentachlorophenol has been observed to undergo degradation by bacteria and fungi. Although PCP degradation has been observed under aerobic conditions, it occurs at a more rapid rate and with fewer complications under anaerobic conditions.

In addition to the biodegradation of pentachlorophenol in soil, it has been documented that fungal enzymes promote the binding of PCP to humic acids in soils, resulting in immobilization of the PCP.

Bench scale studies by SRH Associates scientists have indicated that, under controlled conditions, PCP can be degraded in both aerobic and anaerobic soil environments. Controlling conditions for biodegradation include soil porosity, pH, moisture content, inorganic nutrients (including nitrogen, phosphorus and potassium,

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Time is concerned with potential off-site migration of PCP from this source and is determined to eliminate this risk by remediating the site. Due to an existing ban on the land disposal of soil containing pentachlorophenol, excavation and landfilling is not an available remediation alternative (the material at Time has recently been designated by the EPA as RCRA-listed waste F027 vs. its previous U242 designation). Time does not desire to either leave the material in place without corrective action, cap the contaminated area without first eliminating the contamination or excavate and store the waste on site due to the long-term risks associated with these alternatives. Time has performed emergency phase stabilization and containment measures to minimize the risks of contaminant migration.

The following discussion identifies and describes several remedial alternatives which are potentially capable of destroying or immobilizing PCP in sandy soils such as those found at Time. Comments are made regarding soil and groundwater treatment, economics, availability and technical feasibility. This discussion is not intended to represent an indepth feasibility analysis of remediation options, but rather presents a summary review of options which Time may wish to investigate in greater detail.

ALTERNATIVES

The following alternatives were identified during the preliminary evaluation as remedial methods potentially capable of achieving effective results at Time:

- Adsorption onto Polymers or Activated Carbon
- Biodegradation
- Capping in Place
- Chemical Reduction
- Closure in Place with Monitoring (No Remedial Actions)
- Encapsulation
- Excavation and Disposal
- High Temperature, Catalyzed Oxidation
- Incineration
- In-Situ Soil Washing and Surface-Mounted Soil Washing
- In-Situ Thermal Extraction and Surface-Mounted Thermal Extraction
- Sodium Dehalogenation

Of these listed alternatives, excavation and disposal, capping in place, and closure in place are either unavailable due to the regulatory moratorium on landfilling of F027 material, or do not satisfy Time's requirements for long-term risk reduction. The remaining alternatives are discussed below.

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the use of indigenous microorganisms. The effect on the overall cost of the project is similar for both methods. Effective preparations range from $20 to $50 per pound of material. Microbial requirements depend on a variety of soil and waste-specific parameters that have not yet been determined at the site.

Costs not directly associated with the on-site remediation include bench and pilot scale tests, engineering, permitting, chemical, biological and physical analyses, agency negotiations, waste delisting and management. These costs are expected to be similar for all of the alternative technologies evaluated here.

Chemical Reduction

Oxidation and reduction reactions have been utilized to destroy organic wastes under a variety of circumstances. Due to its high degree of chlorination, PCP is not readily oxidized by such mild oxidants as ozone or hydrogen peroxide. Stronger oxidants present such a great hazard in and of themselves as to be unsuitable for treating wastes (See High Temperature Catalyzed Oxidation).

PCP is, however, readily reduced by sodium borohydride solutions. Staiff (1981) and Sweeney (1981) have both demonstrated the use of catalyzed metal powders and/or borohydride solutions in the oxidation of chlorinated aryls. In-situ techniques have been demonstrated, however competition from reducible soil components may severely limit the reaction, requiring retreatment. This soil reduction chemistry must be identified to allow for proper selection and application of reducing agents.

Reduction, either in-situ or in surface-mounted reactors, has realistic potential for remediating the contamination at Time. The low organic content of the naturally occuring sands in the area, their homogeneity, the low trafficability of the soil, and the nature of the contaminants all support this alternative. Bench and pilot analyses would be required to determine the reduction potential and the products of reduction formed by this process. If technically successful, implementation costs should be moderate.

Encapsulation

One method of encapsulation of organic material is through the application of sorbents to the contaminated soil. Sorbents may include carbon granules, polymeric materials or substances in which the waste is soluble. All sorbents must be insoluble in water, inert and not readily degradable in order to achieve long term stabilization of the wastes in question.

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Eh (oxidation reduction potential), microbial populations and PCP concentrations. Elevated concentrations of PCP are inhibitory or toxic to microbial populations, even under conditions of acclimatization.

The application of biodegradation to the treatment of soils from the site is severely limited due to the existence of high concentration material. PCP degradation, even under optimal conditions, ceases when PCP concentrations are in excess of 1000 ppm. Typically 500 ppm is considered the maximum effective limit. Between 500 and 1000 ppm, degredation effectiveness decreases. Since some material at the site contains PCP in excess of 1000 ppm, not all of the material would be considered ammenable to this treatment without significant dilution or pretreatment to reduce the contaminant concentrations. A large amount of the soil contains PCP at low concentrations however and may be treatable if it can be successfully isolated from the high concentration material found nearby.

Biodegradation may be performed either in-situ or in surface-mounted fermentation reactors. Due to the highly permeable soil at Time, the shallow groundwater table and the possible adsorption of PCP in co-contaminating hydrocarbons which tend to immobilize the PCP, in-situ degradation is considered to present an excessive risk of PCP migration to off-site locations. Additionally, generation of anaerobic conditions in sandy soils is highly difficult. Should a biological process be initiated in-situ, significant risk of PCP mobilization through partial decomposition, preferential degradation of stabilizing hydrocarbon absorbents, or bio-emulsification of the PCP could be expected. For these reasons a surface-mounted fermenter would be the preferred method for soil treatment at the site.

A surface reactor may be used to directly treat a soil/water suspension, or may be used to treat extracted and diluted contaminants removed from the soil by other technologies. A surface fermenter allows for control of pH, nutrients, Eh, and other critical parameters, as well as preventing the release and migration of waste or waste products.

Nutrients, pH and Eh control are parameters that are easily controlled once optimal process conditions have been identified by bench and pilot scale studies. Co-metabolities or other nutrient augmentation is also easily regulated. Fermenters capable of handling soils such as those found at Time are commercially available, but may be constructed on site for considerable less cost. The requirements of this equipment vary with the amount of material to be treated, the reaction kinetics and the degree of control required.

Much debate currently exists over the benefits obtained by using PCP acclimated, commercially available bacterial preparations to promote degradation vs. using cultures of indigenous bacteria obtained from the site. There is considerable evidence to support

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Incineration

Incineration represents a tested and proven method for the destruction of chlorinated hazardous wastes, including PCP. Several types of incineration capacity exist in the U.S. Ordinary incineration, which is not acceptable for chlorinated organics, does not incorporate the appropriate acid scrubbers needed to produce an acceptable air discharge from wastes such as PCP. High efficiency incinerators, (often referred to as "6 nine" incinerators, based on their destruction and removal efficiencies) are capable of treating pentachlorophenol in high concentrations. Incinerators of this type are available in the U.S. as both fixed and mobile units. However, there is not sufficient capacity at this time in either type of unit, to satisfy domestic demands. Although most incinerators can handle liquids, few are equipped to handle solids such as contaminated soil.

Incineration can easily satisfy Time's objectives of reducing long term risk related to the contamination found on site. However, since no small mobile units are available nearby, Time must either absorb significant mobilization, siting and permitting costs or ship its waste to a fixed unit. The attendant risks in shipping must be weighed against those associated with leaving the soil on site.

The nearest incinerator for solid hazardous wastes such as those at the Time facility, is located in Deer Park, TX and is operated by Rollins Environmental. A primary concern with disposal by this alternative is cost. Rollins current price for incineration of contaminated soils is approximately $0.50 per pound. Based on Time's estimate of 2000 cubic yards of contaminated soil, incineration costs may approach $2.5 million. This figure does not include excavation, shipping and other associated costs. For comparison purposes, this amount is on the order of five times the cost of landfilling, if this alternative were available to Time.

In-Situ Soil Washing and Surface Mounted Soil Washing

Removal of contaminants from soil may be accomplished through extraction with a variety of elutriating solutions. The choice of the proper solution must be based on the physico-chemical nature of the contaminants, the effect of the elutriate on the soil geochemistry and its permeability, plus the method by which the eluted contaminants are to be treated for destruction or disposal. Ordinarily, aqueous solutions of acids, bases, surfactants or other compounds are selected (US EPA, 1982).

The effect of washing contaminated soils with water alone, or with mixtures of non-ionic surfactants was investigated by Science Applications International Corp. Their findings indicate that surfactants greatly increased the effectiveness of soil washing when the contaminant of concern was either PCP or a high boiling

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Pentachlorophenol is readily adsorbed by activated carbon granules and is soluble (absorbed) in a variety of organic substances including high molecular weight hydrocarbons such as tar or asphalt. Since both of these materials meet the criteria listed above for acceptable sorbents, they offer a feasible alternative for PCP immobilization. Additionally, both materials are capable of sorbing any petroleum hydrocarbons which may exist in the soil in addition to PCP.

An attractive alternative for immobilization of Time's wastes is the admixing of the PCP contaminated soil with asphalt to form a structurally sound paving material which could then be used to seal the soil surface in the vicinity of the woodtreating chemicals tank farm. This alternative would require an analysis of the leachability of the wastes from the surfacing material and a determination of the structural integrity of the asphalt so produced at various levels of waste incorporation.

High Temperature, Catalyzed Oxidation

PCP is not ordinarily oxidized by readily available, easily handled oxidizers such as ozone or hydrogen peroxide. Although permanganate, dichromate or other strong oxidizers have been reported to successfully oxidize PCP, their cost, side reactions with soil components, and the environmental hazards generated by them restrict their use in treating contaminated soils. Zimpro has developed a process, commonly referred to as wet air oxidation, which has been successful in destroying phenols and other hazardous compounds in aqueous media.

The Zimpro, Wetox and other processes based on this same principle, employ high temperature and elevated pressures in an oxygen enriched aqueous environment to oxidize and thereby destroy hazardous organics. PCP and other extensively chlorinated organics are refractile to this process without the addition of suitable catalysts which can facilitate the dechlorination of these compounds, rendering them retreatable. Once dechlorinated, the resulting intermediates have increased susceptibility to oxidation by the wet air oxidation process and are degraded to either carbon dioxide and water or to non-toxic biodegradable intermediates.

All wet air oxidation processes are provided as packaged systems by the supplier. Included are the reactor, reagents and operators. Additional support and feasibility testing of representative media can ordinarily be negotiated. Cost of the system, which is provided on a lease basis, is variable dependent upon the volume of material to be treated, the size of the required reactor and the type of process necessary.

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submersion and agitation of batches of contaminated soil in large tanks fitted with a filtration stage to separate the cleaned soil from the eluate. This step is usually repeated until a suitable clean-up standard is achieved.

Countercurrent extractors involve the introduction of contaminated soil into an upwardly moving extraction bed while the elutriating solution is introduced at the top of the bed and allowed to migrate downwards. In this latter process, the cleanest soil (already partially extracted) contacts the cleanest solvent just prior to exiting the column at the top. This continuous process has the advantage of generating less spent solvent requiring subsequent treatment than does the batch process. It requires a higher degree of process control but is generally less labor and energy intensive than a batch process. A continuous process also allows for the fitting of a second solvent stage to elute any residual surfactant from the treated soil where water was used.

The cost of soil washing is expected to be moderate, however this process does not address the final destruction and/or disposal of the recoverd solutions. These solutions, containing PCP, water, surfactants, and possibly hydrocarbons, must be treated by incineration, biodegradation, immobilization, recycling or by chemical processes prior to completion of the project. The extraction process and the treatment process should be determined in conjunction with one another in order to maximize their mutual effectiveness.

In-Situ Thermal Extraction and Surface Mounted Thermal Extraction

Thermal extraction processes involve the introduction of heat to the contaminated soil mass to increase the vapor pressure of the contaminants, rendering them sufficiently volatile to allow their recovery as a vapor. As might be expected, these processes work best with relatively volatile contaminants that tend to remain free, rather than binding to soil components. Additionally, the processes work best in friable or loose-grained soils which allow free permeation of the vapors and their subsequent release to the recovery system.

Coia (1985) has presented a system for recovery of volatiles from contaminated soils using an in-situ process. This system consists of a network of thermal injection wells and extraction wells connected to injection and extraction blowers, respectively. Although the system was intended for extraction of TCE from glacial sands, any compound that can be brought to exert a significant vapor pressure can be recovered with this system.

A similar system utilizing a modified drilling rig has been developed by ATW Calweld. This firm, a manufacturer of drilling equipment has modified the kelly of a drilling rig to incorporate several channels which allow the introduction of hot air, steam and various chemicals, if appropriate. The equipment rapidly

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oil fraction. With pentachlorophenol alone, or when used in conjunction with other chlorinated phenols, plain water provided effective washing of the contaminants from a relatively sandy soil (83% sand, 10% silt and clay).

Since the contaminants at Time initially appear to be refractile to natural elution with precipitation or groundwater, surfactants appear to be desirable at this site. The use of alkaline solutions, while ordinarily effective with phenols, may be ineffective at Time due to the possibility of co-contamination with oils or hydrocarbon solvents. Extraction with other hydrocarbon solvents, while likely to effectively extract the contaminating PCP from the soil, will result in the formation of a hydrocarbon contaminated soil requiring an additional purification step.

Two means of applying soil washing methodologies have been identified: in-situ techniques and surface-mounted techniques, (including batch or continuous flow apparatus). In-situ techniques involve the treatment of soil without excavation and provide for the application of the elutriating solvent to the soil surface and recovery of the eluate by using recovery wells in the treatment zone. Surface-mounted systems involve the use of batch extraction tanks or counter-current extraction columns which extract the contaminants under controlled conditions.

In-situ techniques are effective in extracting contaminants only where the soil geology is known to be uniform and where the permeability is high enough to permit adequate percolation of the elutriating solutions through the soil. Additionally, in cases where the distance from the lower limit of the contaminants to groundwater (or alternatively to either a natural or induced low permeability soil layer) is great, excessive amounts of solution are required. Control is reduced and the potential for uncontrolled release of the eluate is great. The technique is well suited for situations where contamination is not generally accessible by ordinary excavation techniques (i.e. below buildings, in developed or heavily utilized areas).

The in-situ process is generally implemented by applying the solution through trickle irrigation or infiltration galleries, and recovering the product through judiciously placed recovery wells. The recovered eluate is treated and, if possible, recycled. A thorough evaluation of all waste components and soil chemistry must be performed to facilitate the selection of a proper surfactant, determine application rates, evaluate recovery potential and to provide information regarding eluate characteristics for the determination of treatment alternatives.

Surface mounted processes are indicated where the distance to groundwater, extraction requirements or heterogeneity of the soil (i.e. channelling, lenses, etc.) require a higher degree of control on the process. In these cases, soil is excavated by suitable procedures and placed into batch or countercurrent continuous extractors. Batch extractors usually involve the

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SUMMARY

Twelve alternative processes have been identified for isolation, immobilization, separation and/or destruction of PCP contaminated soil found at Time. The selection of any one or a combination of these alternatives requires additional characterization of the wastes found at the site. Among the additional data that may be required are:

- Adsorption Isotherms of Wastes on Soil and Carbon
- Biodegradability of Waste Constituents (Half-life and Rate Constant)
- Biodegradation Products
- Bioinhibition Threshold Concentration of Waste Constituents
- Characterization of Co-contaminants (if any)
- Climatic Conditions
- Determination of Soil pH
- Determination of Soil Particle Size Distribution
- Groundwater Parameters (Flow Rates, Storage Coefficient)
- Organic Carbon and Octanol/Water Partition Coefficients of Waste Components
- Oxidation/Reduction Potentials of Waste Constituents
- Required Clean-up Levels
- Soil Microflora
- Soil Moisture Content
- Soil Nutrient Concentrations (N, P & K ratios)
- Soil Organic Matter
- Soil Oxygen Concentration
- Soil Permeability
- Soil Temperature
- Surfactant Solvation Efficiency (for Each Waste Constituent)
- Trafficability of Soil and Site
- Waste Constituent Vapor Pressure Curves

While other information may be needed for each specific alternative, some of the above data may also be necessary, depending on method selected.

It should be remembered that separatory procedures such as soil washing or thermal extraction will require additional disposal or destructive treatment processes as a final step. Surface mounted separatory or treatment processes will require excavation, containment and storage steps prior to implementation.

A recommended course of action for the determination and selection of a remedial technique for the Time site involves additional definition of the waste constituents, clarification of soil parameters, further definition of groundwater conditions and determination of site specific conditions listed above. Following

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agitates the soil while applying heat and volatilizes contaminants which are then recovered in a negative pressure hood surrounding the surface of the rig. Contaminant vapors are drawn off to a cyclone and scrubber system. Although the device has only been demonstrated on hydrocarbon spills (gasoline and diesel oil), ATW Calweld suggests that the process is applicable to lower volatility compounds such as pentachlorophenol.

Thermal extraction in surface units has been advanced by several firms. American Toxic Disposal in Waukegan illinois, has operated a 10-ton-per-day unit which has successfully removed PCB's from contaminated soils and sludges. This system has been demonstrated to the EPA and is currently being used to treat material containing PCB's in Gary, Indiana.

As with soil washing techniques, thermal extraction techniques do not destroy contaminants, which must be recovered and treated or immobilized by other techniques. The process does, however, result in a volumetric reduction of the contaminated soil by 10 to 100 fold, allowing consideration of incineration as a final destruction alternative.

Thermal extraction processes are viable candidates for treating Time's contaminated soils since the soil at Time is friable and loose-grained. A preliminary consideration to be addressed before selecting this process is the degree of volatility of the contaminants in the matrix found at Time. Since moisture does not present a major deterrent to thermal processes, saturated material may also be successfully treated.

Sodium Dehalogenation

Both Acurex and the Franklin Institute have developed processes whereby soils are extracted (similar to Soil Washing, above) and subjected to dehalogenation using sodium based proprietary compounds. Although the process has been primarily utilized for PCB destruction, it appears to be ammenable to chlorinated phenols as well.

The Acurex process is less stable and more sensitive to interference from water than is the Franklin Institute process, which uses a specially modified sodium/polyethylene glycol complex. The Franklin Institute process has been applied directly to soils in an in-situ operation.

These procedures have been used primarily in the destruction of PCB oils and have only recently been used to treat contaminated soils. PCP has not been treated by this process. Adaptation to the Time site may be possible but should be pursued only if other demonstrated technologies do not prove successful in pilot demonstrations.

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The actual process consists of the physical excavation of contaminated soil using classical techniques and the temporary storage of the excavated soils on an impervious, protected surface. Material from this location would be transferred to an infeed hopper connected to a primary extractor or soil washer. The soil would be introduced into the lower section of the extractor via a screw feed auger. Once in the extractor, the soil would be agitated and conveyed upwards while extracting solvent [an aqueous solution of nontoxic, nonionic detergents (surfactants)] is introduced into the top of the extractor. The extraction would take place in a countercurrent fashion, producing a cleaned soil product and contaminated elutriate in a continuous process.

Cleaned soil would then be subject to rinsing with clean water in a secondary extractor, operated similarly to the primary extractor, to reduce or eliminate residual surfactant concentrations, allowing the soil to be returned to the site. The contaminated fluids would be stored, tested and treated to effect ultimate disposal. Analytical decision points are noted as diamonds in Figure II-1. There are three. It is possible that surfactant solutions with suitably low or undetectable levels of PCP could be discharged to the sanitary sewer.

The process can easily be modelled in bench scale experiments and the technical feasibility of the process can be accurately determined. The nature and required concentrations of the surfactants, soil retention times, elution rates and contaminant loading factors can all be determined to allow approximation of full scale process operating parameters. Following determination of these parameters, scale up protocols and economic feasibility may accurately be determined.

Soil washing is recommended since it has been successfully applied to soils contaminated with PCP in pilot studies on similar soil types and does not use hazardous materials which may interact with or be retained by the soil. The process should be directed towards a surface, rather than in-situ technology to improve process control and to minimize the chance of uncontrolled releases to the environment. Residual surfactants may be eliminated from the soil using only water, and surfactants can be modified to remove PCP as well as co-contaminating hydrocarbons, which may also be present.

The aqueous extracts so produced may be subjected to a variety of concentrating and destructive steps to remove the entrained PCP and hydrocarbons, placing a wider array of treatment alternatives at Time's disposal.

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these determinations, the specific questions of technical feasibility of the various alternatives listed above can be addressed.

With this information, alternatives may then be selected with a greater degree of confidence and further pursued by performir bench scale tests to evaluate their applicability to the contaminated soils found at Time. Bench scale conditions can then be scaled up to pilot level demonstrations, either on-site or at supplier's test facilities. Finally, these data may then be used to develop and obtain required treatment permits from appropriate State/Federal agencies. The generally accepted approach to selecting an operational treatment procedure is to evaluate the most logical alternative first and if it proves unsatisfactory due to site specific or economic factors, evaluate the next logical option.

RECOMMENDATIONS

Based on existing information, the following is recommended:

a. Select the "Surface Mounted Soil Washing" technique as the most logical remedial approach.

b. Perform bench scale and pilot level evaluations.

c. Determine necessary destruction steps of recovered extracts.

d. Ascertain technical permitting and economic feasibility of technique for final disposal action.

e. Compare results with repeat step by step examination of next most logical remedial approaches which are: "Surface Mounted Thermal Extraction" and "In-Situ Thermal Extraction".

Bench scale evaluations of a surface mounted, countercurrent soil washing process involve the excavation of contaminated soils, temporary storage of the soils on an impervious slab, extraction of the contaminants with an aqueous solution of nonionic surfactants, removal of the surfactants by countercurrent washing with water, recovery and treatment of the rinsates, their analysis and on-site placement of the purified soils. The contaminated rinsates would then be subjected to a destruction step that can only be determined based on the constituents in the recovered extracts, but may include chemical reduction, incineration, biodegradation or other processes outlined earlier. A schematic drawing of a proposed process is shown in Figure II-1.

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SECTION III

ANALYSIS RESULTS

INTRODUCTION

During August of 1986, Time retained SRH Associates to collect samples of surface and subsurface soil and groundwater from the Time Facility located in Portland, Oregon. The samples were analyzed for pentachlorophenol (PCP) in an effort to further existing data concerning past releases of this chemical from a woodtreating chemicals formulating operation at this site.

Samples of surface soils were collected from an earthen tank farm area located south of the woodtreating chemicals warehouse and from six locations below the concrete floor of the warehouse itself. Additional samples were taken from five other depths below the warehouse floor from the same holes as the surface samples. Groundwater was sampled at seven existing monitoring wells surrounding the woodtreating chemicals area and was analyzed for PCP and pH. Static water levels were determined in these wells and at a monitoring station for the measurement of Willamette River water elevations located on the Northwest Terminal Facility pier.

SURFACE SOIL SAMPLING AND ANALYSIS

Following the contaminated soil relocation to one pile, surface soils were collected from 17 locations in the woodtreating tank farm area. The locations were identical to those sampled by Riedel Environmental Services during initial samplings performed in 1985. Samples were obtained from 2 to 3 inches below the soil surface to reduce the risk of contamination arising during set up procedures at the sample site.

Additionally, six locations inside the warehouse were sampled by coring through the concrete with abrasive saws. The six locations were selected by Time and represent an extension of the triangular sampling grid employed by Riedel in the 1985 study. Samples were obtained from an interval of 3.5 to 5.5 feet below the lower

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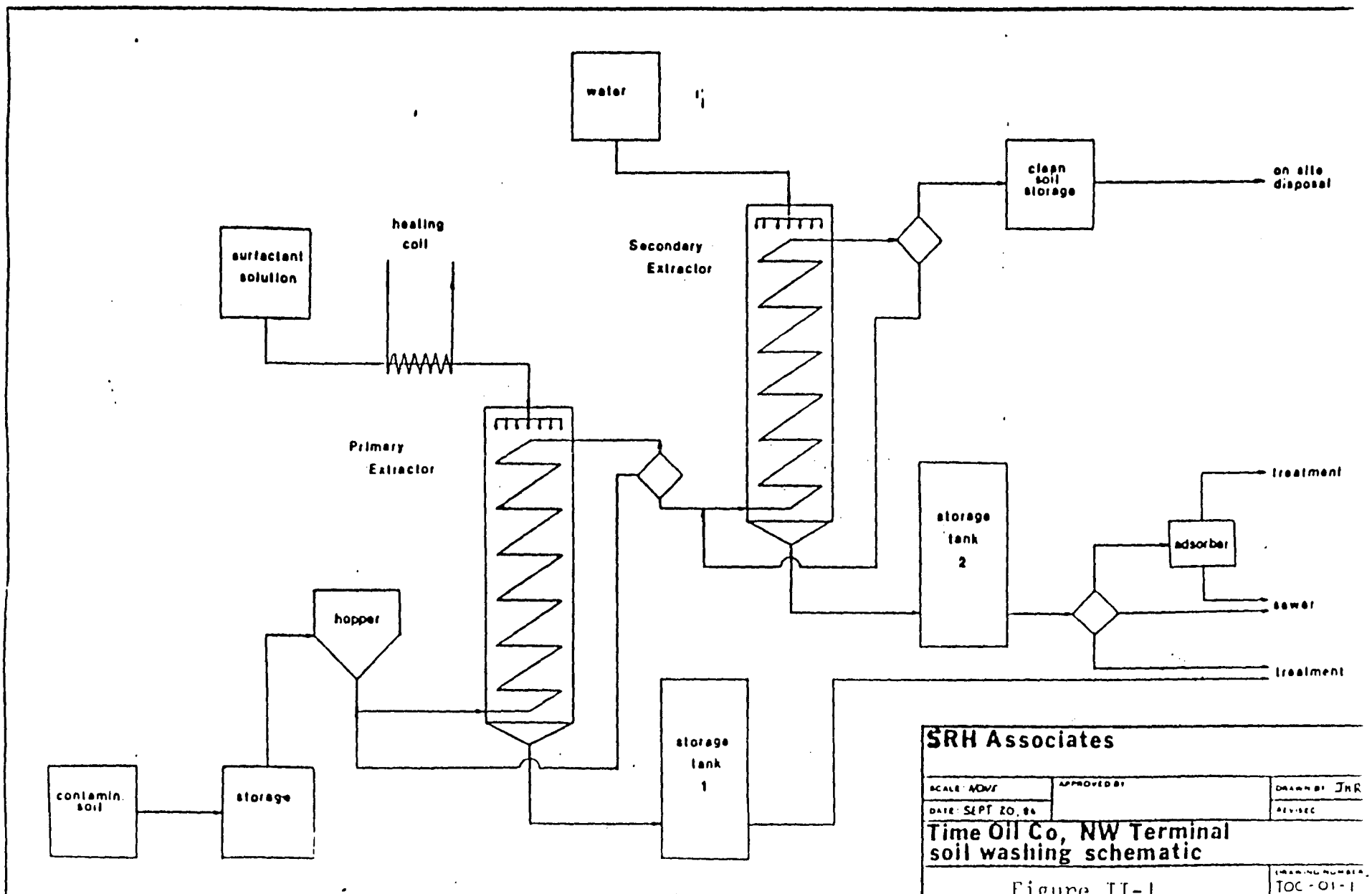
water
clean soil storage
on site disposal
heating coil
surfactant solution
Secondary Extractor
Primary Extractor
storage tank 2
treatment
adsorber
sewer
hopper
treatment
storage tank 1
contamin. soil
storage
SRH Associates
SCALE: NONE
APPROVED BY:
DRAWN BY: JNR
DATE: SEPT 20, 86
REVISED
Time Oil Co, NW Terminal
soil washing schematic
DRAWING NUMBER
TOC-01-1

Figure II-1

scale (1" = 20 feet) and can be overlaid on the associated plan drawing of the sampled area. (Figure III-5).

The results indicate that the bulk of the surface contamination exists in a pile of material located in the vicinity of sample point S. Additional contamination is located to the east of point S, continuing to approximately the concrete wall bordering the tank farm on the east. The strong focal point of contamination located at point K has generated a broad area of calculated contamination on the Kriging generated contour maps. Due to the lack of supporting high concentrations of PCP adjacent to point K, it is concluded that this contour is primarily artifactual, generated by the data reducing program in response to the single very high concentration detected at K. It is more likely that K represents a small focus of high concentration, rather than the large area implied by the contours.

Most contamination that had been previously detected to the west of the woodtreating tank farm area appears to have been removed during recent excavation activities performed by Time. This is reflected by the low results found at points M and U.

Two locations beneath the warehouse floor were found to contain low levels of PCP. Borings 1 and 5 contained 5.7 and 1.4 ppm of PCP, respectively. It should be noted, however, that despite stringent efforts to prevent contamination, blowing winds and "dust devils" were noted during sampling and were observed picking up soil from the tank farm area and warehouse floor. Because of these concerns, the low levels noted in these samples are probably a result of field contamination.

SUBSURFACE SAMPLES

Samples were obtained from six depths below the lower surface of the concrete floor in the woodtreating chemicals warehouse. Six locations, determined by Time and located at extensions of the triangular sampling grid developed by Riedel, were sampled. The approximately 6 inch thick concrete floor was cored using an abrasive wheel. Twelve inch diameter holes were cut. The surface of the concrete within a 6 foot radius of the hole was swept clean and covered with .005 inch thick polyethylene film to minimize contamination from residue found in the warehouse.

The upper 2 to 3 inches of soil in the hole was removed to eliminate contamination with cuttings generated during the coring and set up operations. A sample was subsequently obtained using the technique given above, from the exposed surface of the hole. The holes were designated as numbers 1 through 6. The surface sample was collected and held for future analysis.

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surface of the concrete using split spoon samplers. The sampling procedure used will be described in the next (Subsurface Samples) part. The selected depth was chosen to position the samples at the same true elevation as the surface samples taken from the tank farm area. Samples of soil from 2 to 6 inches below the lower surface of the concrete floor were obtained and held for possible future analysis.

Samples were obtained using stainless steel sampling spoons which had been previously cleaned with sequential washings of laboratory detergent, tap water, hexane, tap water, trisodium phosphate and sodium carbonate in water, tap water and distilled water (3X). Samples were screened through 0.10 inch stainless steel mesh which had been similarly cleaned. The screened material was allowed to fall directly from the screens into pre-washed 8 ounce glass jars fitted with screw cap closures and teflon liners. The containers had been cleaned to EPA specifications and were not opened prior to receiving the sampled material.

Samples were field logged and containers were marked with the date, time, location, sample code, requested analyses and other relevant data. Lids were replaced with care being taken to ensure that no interference with the hermetic seal occurred. Tamper indicating seals were applied, chain of custody and analysis request forms were completed and the samples placed on ice prior to transport to the laboratory. Samples were delivered to the laboratory within 48 hours of collection in all cases. No preservatives were added to soil samples.

Samples were extracted in the laboratory using method number 3540, Soxhlet Extraction, as described in EPA publication SW 846, Test Methods for Evaluating Solid Waste, Physical/Chemical Methods. The extract so obtained was analyzed for pentachlorophenol by method 8040, Phenols, as described in EPA publication SW 846. Field and laboratory duplicates were analyzed and spiked sample recovery efficiencies were determined. Laboratory blanks were analyzed. No field blanks of soil were submitted. All quality control results indicated acceptable performance of sampling and analysis.

The results of the surface soil samples are listed, along with the X and Y coordinates of their respective sampling locations, in Table III-1. The coordinates are referred to a temporary bench mark located at the end of a concrete wall at the southeast corner of the woodtreating tank farm area. The coordinates are given in feet. The X axis is aligned in an approximately northeast - southwest plane while the Y axis is aligned in an approximately northwest - southeast plane at at 90° to the X axis.

The results listed in Table III-1 were subjected to Kriging analysis to generate lines of equal concentration (equiconcentration isopleths). A .95 smoothing ratio and a search radius of 213 feet was used for generation of the contours which are shown in Figures III- 1 to III-4. The sample sites and their respective concentrations are indicated. The contours are to

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III-1 through III-4. The data from these analyses have been combined with the results obtained by Riedel at the sample locations labelled J through Z in 1985, for the nominal sampling depths 2, 4, 7 and 12, to generate concentration isopleths at these depths.

The data listed in these tables was analyzed by Kriging analysis according to the procedure given above. The results of the contouring are shown in Figures III-1 through III-4. Figure III-5 shows the sample locations on a plan drawing of the woodtreating chemicals warehouse. Figure III-6 incorporates the X and Y coordinates of the sample locations on this drawing.

The results indicate that contamination is restricted to the woodtreating tank farm area with virtually no contamination being found beneath the central and northern portions of the warehouse. There is significant PCP contamination below the surface of the southwest corner of the warehouse, which appears to be continuous with a vertical column of contamination located immediately adjacent to this area in the tank farm.

Excavations in the woodtreating tank farm area have perturbed the original conditions of the site, and therefore the surface and 2 foot contours are not expected to be representative of conditions existing prior to the movement of soil. This can be seen by the distortion of the vertical column of contamination at the surface and two foot intervals, due to the fact that soil at these sites had been removed and replaced with soils from other areas within the woodtreating tank farm. A computer generated topographic grid net of the woodtreating tank farm and warehouse area can be seen in Figure III-7.

The 4, 7 and 12 foot contours reflect the strong vertical plume of PCP contamination which decreases to about 2000 ppm at the 12 foot depth. A minor lobe of this plume appears to extend to the southeast into the lower corner of the woodtreating tank farm area at or around the seven foot interval. The vertical plume appears to widen and diffuse to the south at the 12 foot contour, presumedly due to the presence of groundwater at or near this sampling depth.

GROUNDWATER ANALYSES

The nine vertical groundwater monitoring points at Time (See Figure I-6, Section I) were measured for static water levels and tested for pH and PCP. The three slant borings located at the southwest corner of the warehouse were not examined. The wells, which had been previously installed by Time employees or other contractors, consist of 1 1/4 and 2 inch (I.D.) stainless steel well points and 2 inch (I.D.) PVC screen and casing.

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Following collection of the surface sample, the hole was advanced using a hand operated, 2 1/2 inch (O.D.) continuous flight auger. Samples were obtained at the following intervals below the upper surface of the concrete floor using a 2 inch (O.D.) split spoon sampler:

3.5 to 5.5 feet	(0)
5.5 to 7.5 feet	(2)
7.5 to 9.5 feet	(4)
10.5 to 12.5 feet	(7)
15.5 to 17.5 feet	(12)

Since the upper surface of the concrete floor was 3.5 feet above the surrounding soil surface, the five depths listed above were equivalent to the 0 to 2 foot, 2 to 4 foot, 4 to 6 foot, 7 to 9 foot and 12 to 14 foot intervals sampled in the woodtreating tank farm area by Riedel in 1985.

Samples were taken by removing the drill from the bore hole and inserting the split spoon sampler into the bore hole taking care not to dislodge any material from the surface or walls of the hole. The sampler was driven into the soil using a 20 lb. hammer. Hand drilling and driving of the penetrometer/sampler was required due to the inaccessibility of the site to conventional drill rigs and to the low overhanging roof of the warehouse.

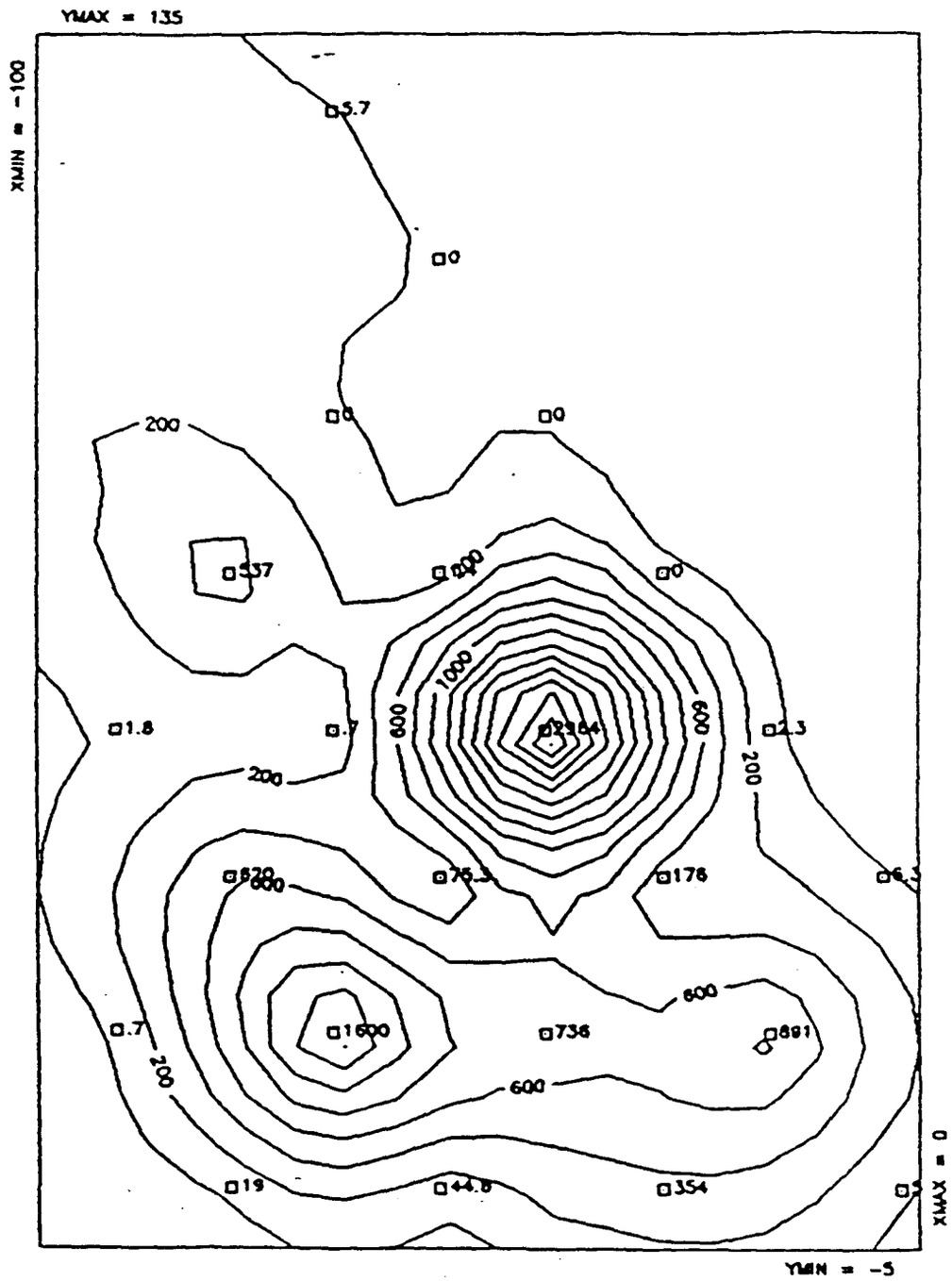
Samples were extruded by gently tapping the soils out of the sampler onto stainless steel screens, which were cleaned as indicated above. The samples were screened, placed into jars, labelled, logged and handled as described above. Samplers were cleaned after each use, using the decontamination procedure described above. The drilling equipment was decontaminated between holes and prior to leaving the site. All decontamination water was impounded in D.O.T. 17 E drums until proper disposal requirements could be established based on analytical results.

During drilling, saturated conditions were encountered at the 12 foot interval in all holes. No groundwater samples were taken from any location. All soil samples consisted of medium grained grey - brown to blue sands. Cobbles were encountered in holes number 1 and 2 at a depth of approximately 3 feet below the floor surface. The cobbles were associated with a minor clay lens approximately 2 inches thick.

Following drilling, holes were abandoned through the addition of bentonite pellets to a depth of 13 feet below the concrete floor. The remainder of the hole was filled with bentonite grout to the surface. The concrete core plugs removed during coring of the warehouse floor were replaced in the hole and bedded with bentonite in accordance with Time's request.

The samples were refrigerated and shipped to the laboratory for PCP analysis as outlined above. The results, together with the X and Y coordinates of the sample points, are presented in Tables

FIGURE III-1



TIME OIL CO. – SURFACE PCP CONTOURS

The water level elevations in the wells, labelled A through I, were measured to the nearest .01 foot from the top edge of the casing at a scribed mark located on the north side of the casing. A Fisher M-Scope previously calibrated against a steel tape was used to obtain the measurements. Standing bore volumes of well water were calculated based on these measurements and wel construction drawings provided by Time. A measurement of the Willamette River water elevation relative to a mark located by Time on its unloading pier was also taken.

Stainless steel weighted bailers were used to remove at least 4 standing bore volumes of water prior to collecting representative samples of groundwater. The bailers had been previously cleaned by the procedure described above, and were re-cleaned after each well was sampled. The purged water was collected into D.O.T. 17 E drums until proper disposal could be determined based on analytical results.

The samples were dispensed directly from the bailer into two 1 liter amber glass bottles fitted with screw cap closures and teflon liners for PCP analysis. Samples were adjusted to pH 2 with 1:1 Sulfuric Acid in distilled water and checked with pH paper prior to refrigeration and delivery to the lab. Samples for pH analyses were dispensed directly into 250 ml polyethylene wide mouthed bottles without preservatives. pH analyses were performed within 2 hours of sample collection using a silver-silver chloride reference electrode standardized against two NBS traceable reference buffer solutions. Samples were logged, labelled, sealed and transferred to the laboratory within 6 hours of collection. Analyses for PCP were performed as above, except that the sample was not filtered prior to analysis, and was extracted by method 3510, Separatory Funnel Liquid - Liquid Extraction, as described in EPA publication SW 846.

The results of the groundwater investigation are shown in Table III-6. Wells C and G were dry and could not be sampled. The pH ranged from 6.53 to 6.91. The only well showing detectable PCP was well D, in which .044 ppm was detected. Well D is located southeast of the woodtreating chemicals warehouse.

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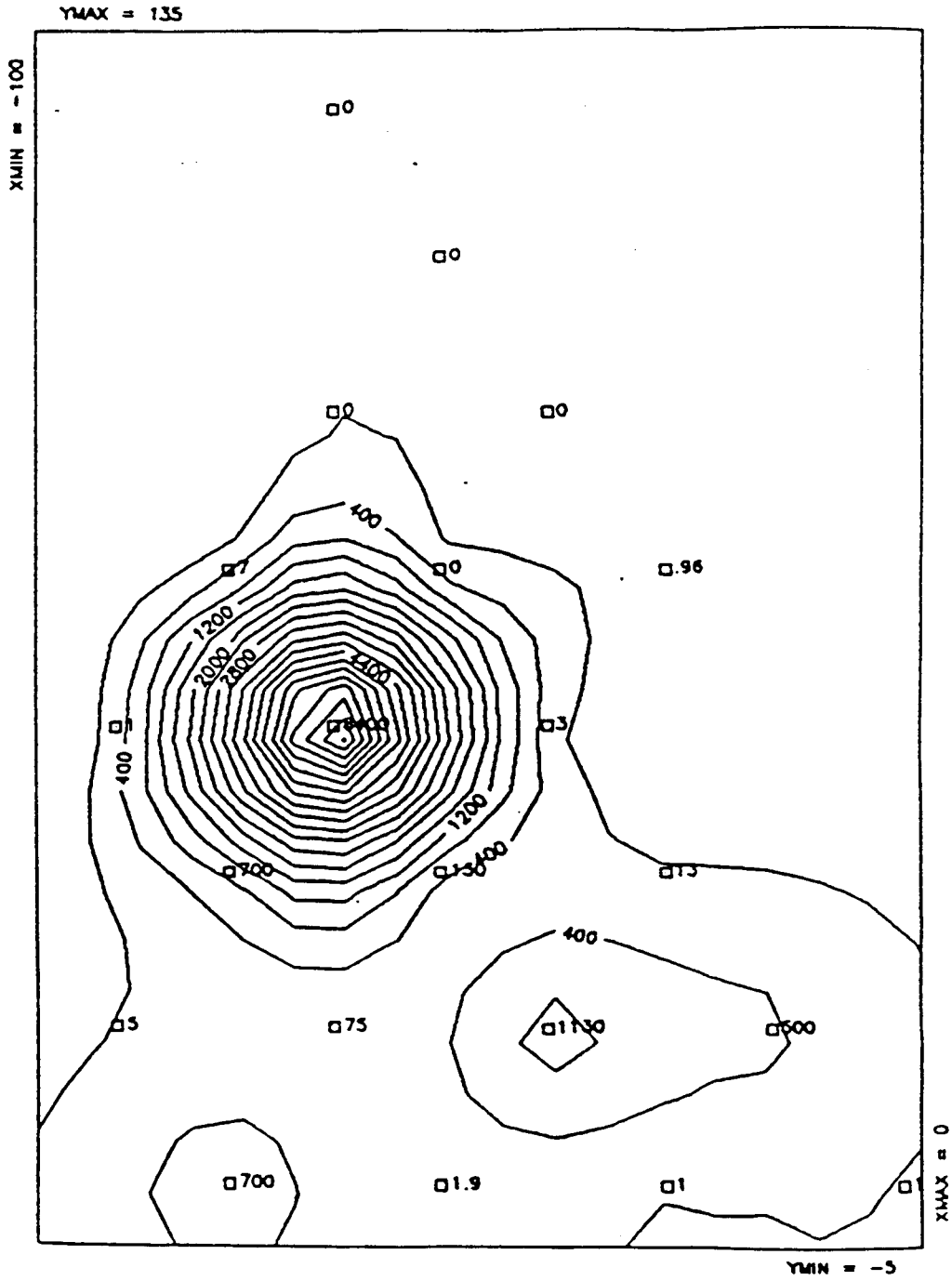
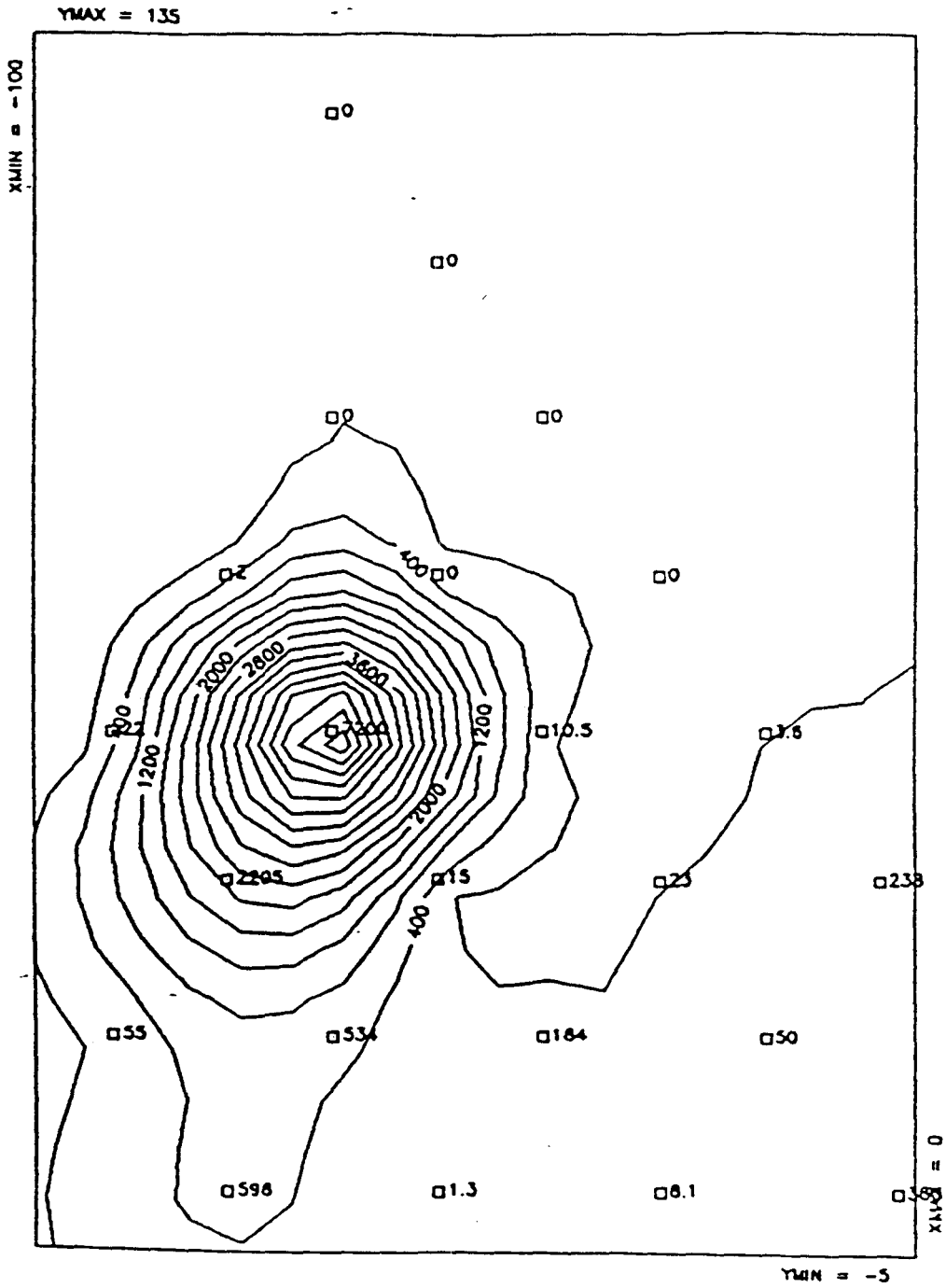
FIGURE III- 3



TIME OIL CO. — 7 FOOT PCP CONTOURS

FIGURE III- 2

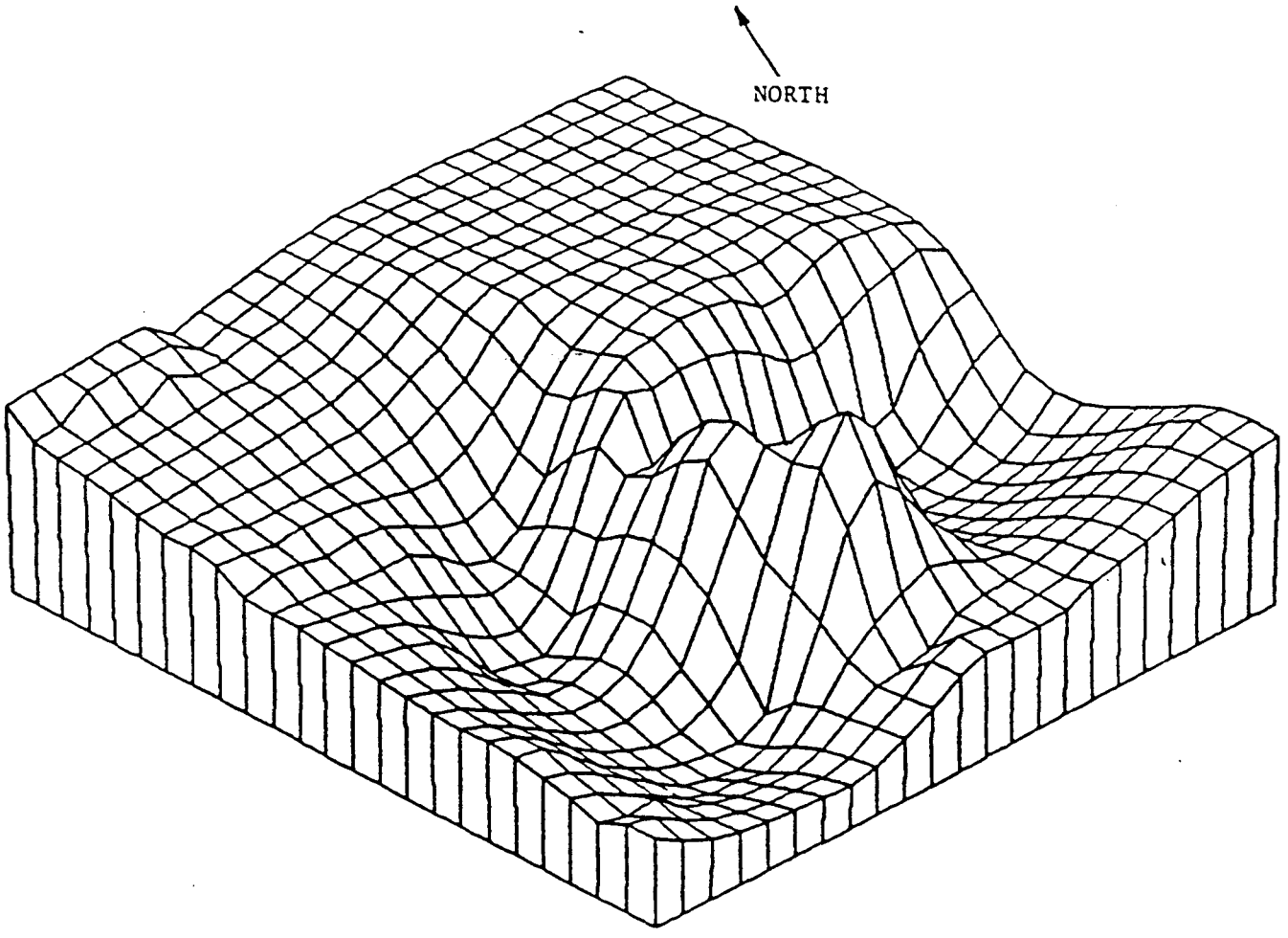


TIME OIL CO. — 4 FOOT PCP CONTOURS

FIGURE III- 7

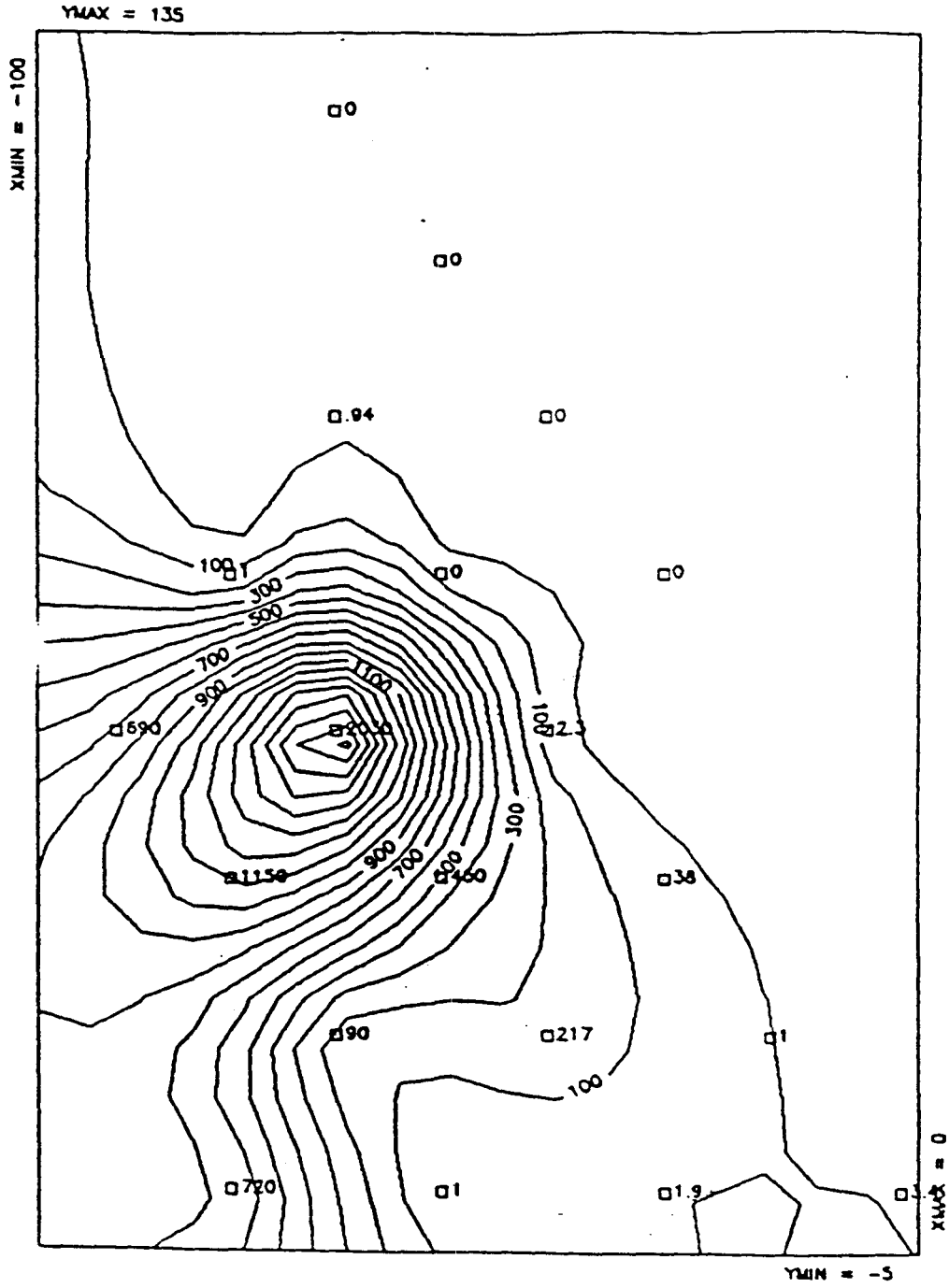
APPROXIMATE SURFACE TOPOGRAPHY

WOOD TREATING CHEMICALS AREA



TIME OIL CO. - TOPOGRAPHY

FIGURE III-4



TIME OIL CO. — 12 FOOT PCP CONTOURS

TABLE III-2

TIME OIL CO.

COORDINATES - 2 FOOT PCP CONTOURS

CODE	X	Y	[PCP]
J	-17	55	3
K	-42	55	8.8
M	-91	55	87
N	-4	38	3.1
O	-29	38	59
P	-54	38	16
R	-17	20	34
S	-42	20	252
T	-66	20	123
U	-91	20	44
V	-2	2	260
W	-29	2	15
X	-54	2	4.5
Z	-78	73	14
6	-66	91	0
5	-54	73	5.6
4	-29	73	0
3	-42	91	0
2	-54	109	0
1	-66	126	0

NOTE: [PCP] = CONCENTRATION OF PCP (mg/Kg) or (ppm)

TABLE III-1

TIME OIL CO.

COORDINATES - SURFACE PCP CONTOUR

CODE	X	Y	[PCP]
J	-17	55	2.3
K	-42	55	1200
L	-66	55	0.7
M	-91	55	1.8
N	-4	38	6.3
O	-29	38	176
P	-54	38	75.3
Q	-78	38	620
R	-17	20	891
S	-42	20	736
T	-66	20	1600
U	-91	20	0.7
V	-2	2	5
W	-29	2	354
X	-54	2	44.5
Y	-78	2	19
Z	-78	73	537
6	-66	91	0
5	-54	73	1.4
4	-29	73	0
3	-42	91	0
2	-54	109	0
1	-66	126	5.7

NOTE: [PCP] = CONCENTRATION OF PCP (mg/Kg) or (ppm)

TABLE III-4

TIME OIL CO.

COORDINATES - 7 FOOT PCP CONTOURS

CODE	X	Y	[PCP]
K	-42	55	3
L	-66	55	8400
M	-91	55	1
O	-29	38	13
P	-54	38	130
Q	-78	38	700
R	-17	20	500
S	-42	20	1130
T	-66	20	75
U	-91	20	5
V	-2	2	1
W	-29	2	1
X	-54	2	1.9
Y	-78	2	700
Z	-78	73	7
6	-66	91	0
5	-54	73	0
4	-29	73	0.96
3	-42	91	0
2	-54	109	0
1	-66	126	0

NOTE: [PCP] = CONCENTRATION OF PCP (mg/Kg) or (ppm)

TABLE III-3

TIME OIL CO.

COORDINATES - 4 FOOT PCP CONTOURS

CODE	X	Y	[PCP]
J	-17	55	3.6
K	-42	55	10.5
L	-66	55	7200
M	-91	55	22
N	-4	38	238
O	-29	38	23
P	-54	38	15
Q	-78	38	2205
R	-17	20	50
S	-42	20	184
T	-66	20	534
U	-91	20	55
V	-2	2	380
W	-29	2	8.1
X	-54	2	1.3
Y	-78	2	598
Z	-78	73	2
6	-66	91	0
5	-54	73	0
4	-29	73	0
3	-42	91	0
2	-54	109	0
1	-66	126	0

NOTE: [PCP] = CONCENTRATION OF PCP (mg/Kg) or (ppm)

TABLE III-6

TIME OIL CO.

GROUNDWATER ANALYTICAL RESULTS

(AUGUST 29, 1986)

WELL NUMBER	STATIC WATER LEVEL (FT BELOW TOP OF CASING)	pH	[PCP] (ppm)
MW-A	14.06	6.80	N.D.
MW-B	15.07	6.70	N.D.
MW-C	DRY	N.A.	N.A.
MW-D	14.48	6.53	.044
MW-E	15.22	6.54	N.D.
MW-F	15.44	6.57	N.D.
MW-G	DRY	N.A.	N.A.
MW-H	11.28	6.91	N.D.
MW-I	14.75	6.77	N.D.
RIVER	25.70	N.A.	N.A.

NOTES:

[PCP] = CONCENTRATION OF PENTACHLOROPHENOL
ppm = PARTS PER MILLION
N.A. = NOT AVAILABLE
N.D. = NOT DETECTED

TABLE III-5

TIME OIL CO.

COORDINATES - 12 FOOT PCP CONTOURS

CODE	X	Y	[PCP]
K	-42	55	2.3
L	-66	55	2030
M	-91	55	690
O	-29	38	38
P	-54	38	450
Q	-78	38	1150
R	-17	20	1
S	-42	20	217
T	-66	20	90
V	-2	2	3.4
W	-29	2	1.9
X	-54	2	1
Y	-78	2	720
Z	-78	73	1
6	-66	91	0.94
5	-54	73	0
4	-29	73	0
3	-42	91	0
2	-54	109	0
1	-66	126	0

NOTE: [PCP] = CONCENTRATION OF PCP (mg/Kg) or (ppm)

GROUNDWATER MONITORING

AT

TIME OIL COMPANY

NORTHWEST TERMINAL

PORTLAND, OREGON

November 5, 1987

Prepared For:

Time Oil Company
2737 West Commodore Way
Seattle, Washington

Prepared By:

SRH Associates, Inc.
123 NE Third Ave. Suite 230
Portland, Oregon 97232
(503) 232-0824

The samples were dispensed directly from the bailer into two 1 liter amber glass bottles fitted with screw cap closures and teflon liners for PCP analysis. Samples were adjusted to pH 2 with 1:1 Sulfuric Acid in distilled water and checked with pH paper prior to refrigeration and delivery to the lab. Samples for pH analyses were dispensed directly into 250 ml polyethylene wide mouthed bottles without preservatives. All samples were logged, labelled, sealed and transferred to the laboratory within 6 hours of collection.

pH analyses were performed within 2 hours of sample collection using a silver - silver chloride reference electrode standardized against two NBS traceable reference buffer solutions. PCP analyses were performed by first extracting the samples in the laboratory using method 3510, Separatory Funnel Liquid - Liquid Extraction, as described in EPA publication SW 846. The extract was then analyzed for PCP by method 8040, Phenols, as described in EPA publication SW 846. Field duplicates and laboratory and field blanks were analyzed. All quality control results indicated acceptable performance of sampling and analysis.

SAMPLE ANALYSIS

On August 20, a PCP concentration of 2300 ppb was detected in Well B. Well B was re-sampled on October 16 at which time a concentration of 1000 ppb was detected. No contamination has been observed in Wells A, D, F, H, and I. Wells C, E, and G were dry and could not be sampled. The locations of the wells are shown in Figure 1. The results of the groundwater investigation are summarized in Table 1.

RECOMMENDATIONS

- Define the rate and extent of contaminated groundwater migration by drilling 2 - 4 lateral downgradient wells near Well B.

- Pursue the remediation plan outlined in our October 1, 1986 correspondence to you. This plan included:

  a) Selecting the "Surface Mounted Soil Washing" technique as the most logical remedial plan.
  b) Performing bench scale and pilot level evaluations.
  c) Determining necessary destruction steps of recovered extracts.
  d) Ascertaining technical permitting and economic feasibility of technique for final disposal action.

BZTO104(e)012537

INTRODUCTION

SRH Associates collected groundwater samples on August 20 and October 16, 1987, from Time Oil Co.'s Northwest Terminal Facility located in Portland, Oregon. The samples were analyzed for pentachlorophenol (PCP) in an effort to further existing data concerning past releases of this chemical from a wood treating chemicals formulating operation at this site.

The groundwater was sampled at nine existing monitoring wells surrounding the wood treating chemicals area and was analyzed for PCP and pH. Static water levels were determined in these wells and at a monitoring station for the measurement of Willamette River water elevations located on the Northwest Terminal facility's unloading pier.

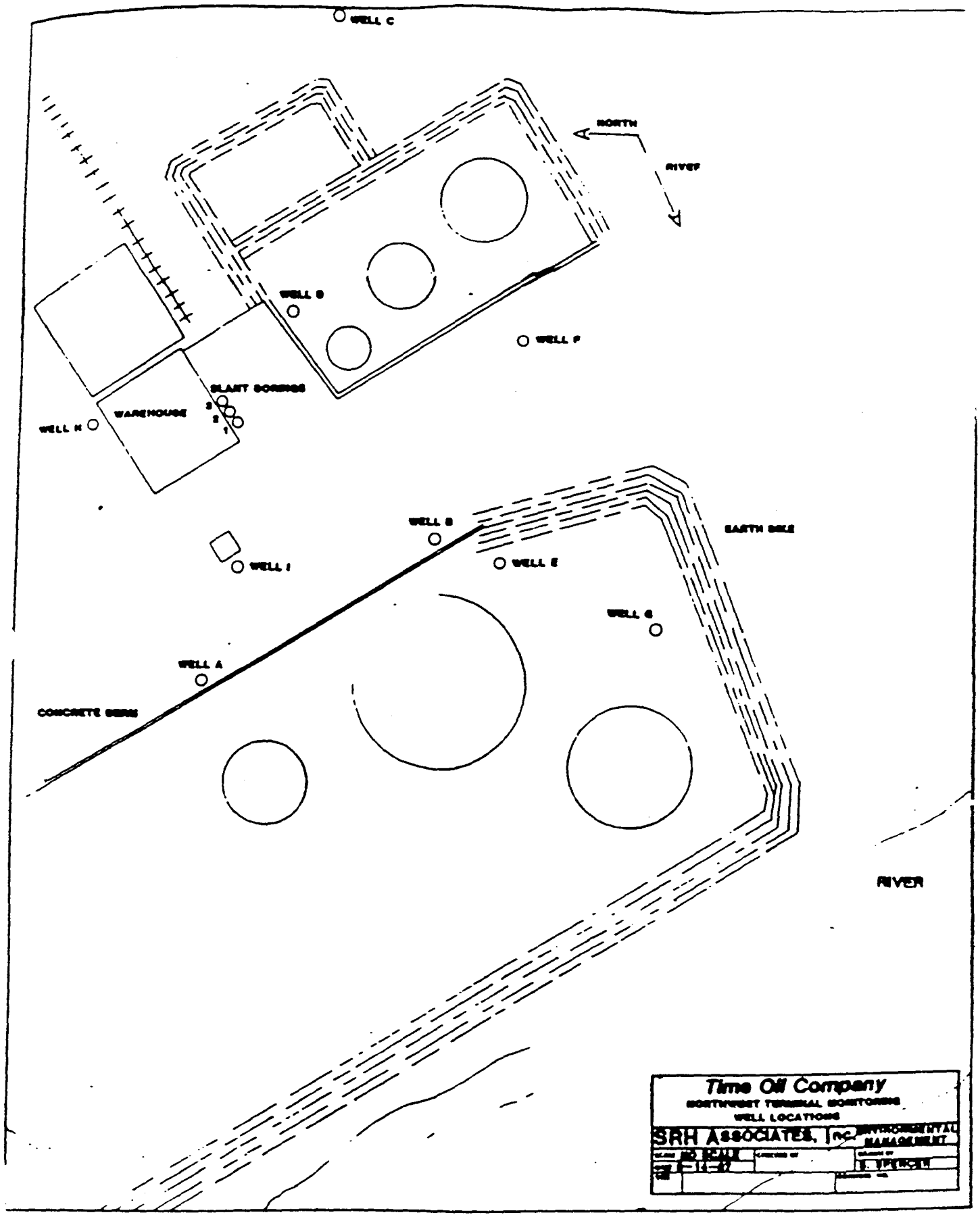
GROUNDWATER SAMPLING

Nine vertical groundwater monitoring points at Time were measured for static water levels and tested for pH and PCP. The wells had been previously installed by Time employees or other contractors and consisted of 2 inch and 1 1/4 inch (I.D.) PVC screen or stainless steel drive points and PVC casing.

The water level elevations in the wells were measured to the nearest 0.01 foot from the top edge of the casing at a scribed mark located on the north side of the casing. A Fisher M-Scope previously calibrated against a steel tape was used to obtain the measurements. Standing bore volumes of well water were calculated based on these measurements and construction drawings provided by Time. A measurement of the Willamette River water elevation relative to a mark located by Time on its unloading pier was also taken.

Stainless steel weighted bailers were used to remove at least 4 standing bore volumes of water prior to collecting representative samples of groundwater. The bailers had been previously cleaned with sequential washings of laboratory detergent, tap water, hexane, tap water, trisodium phosphate and sodium carbonate in water, tap water, and distilled water (3X). The bailers were recleaned after each well was sampled and new, clean strings were attached. The purged water was collected into D.O.T. 17 E drums until proper disposal could be determined based on analytical results.

BZTO104(e)012538


WELL C
NORTH
RIVER
WELL B
WELL F
PLANT BORINGS
3
2
1
WAREHOUSE
WELL H
WELL B
EARTH DIKE
WELL I
WELL E
WELL G
WELL A
CONCRETE BERM
RIVER
Time Oil Company
NORTHWEST TERMINAL MONITORING
WELL LOCATIONS
SRH ASSOCIATES, INC. ENVIRONMENTAL MANAGEMENT

e) Comparing results with repeat step by step examination of next most logical remedial approaches which are: "Surface Mounted Thermal Extraction" and "In-Situ Thermal Extraction".

- Evaluate the vertical gradient of groundwater flux in an uncontaminated zone immediately adjacent to the soil pile by installing one well cluster with multiple completion depths.

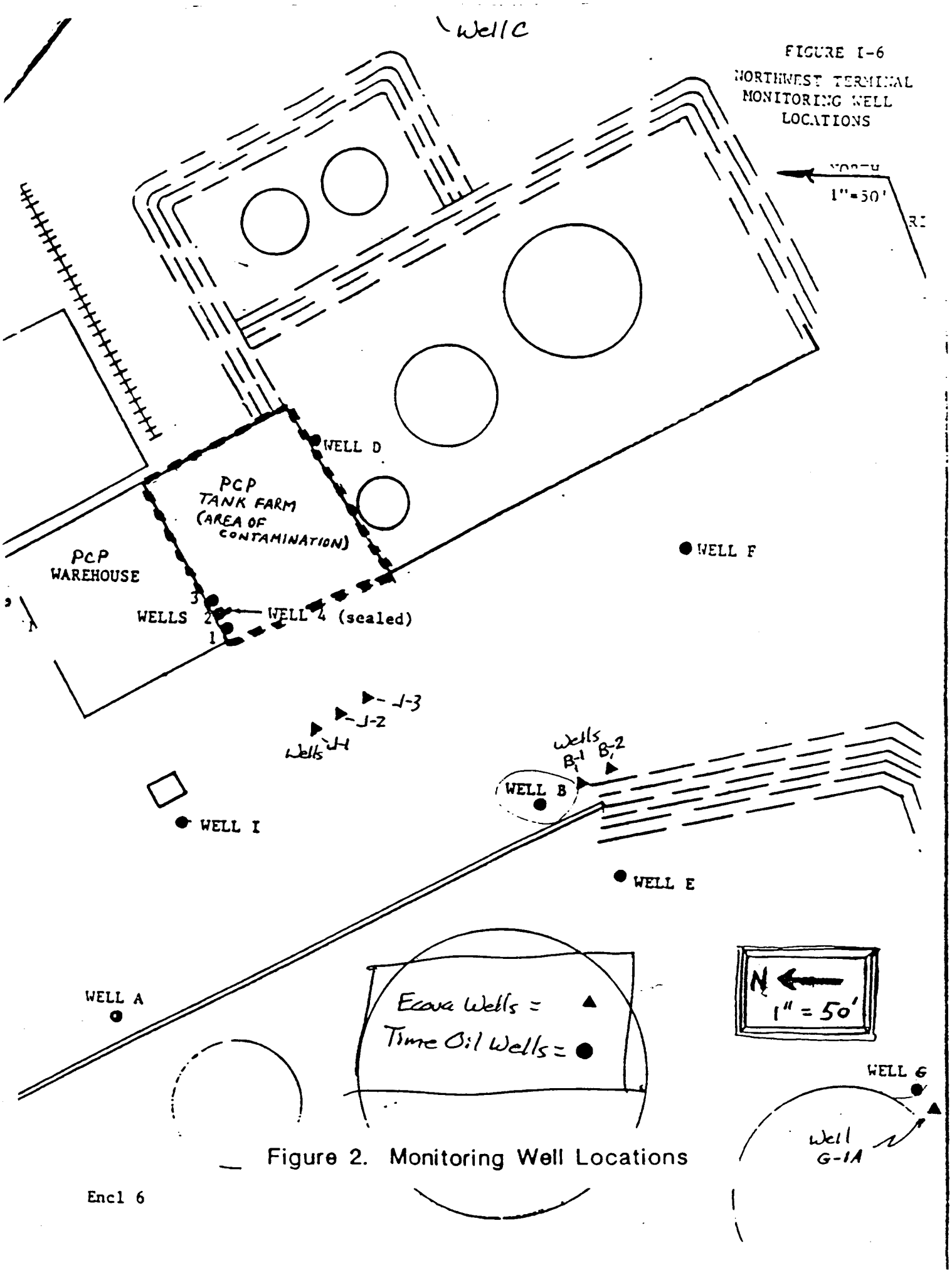


Figure 2. Monitoring Well Locations

Encl 6

TABLE 1 - GROUNDWATER SAMPLE RESULTS

Sample	ug/l PCP (1)	ug/l PCP (2)	pH	Depth to Water, Ft* (1)	Depth to Water, Ft* (2)	Static Water Level (ft. MSL) ** (1)	Static Water Level (ft. MSL) ** (2)
MW-A	<20	NA	6.61	13.78	14.74	83.36	82.40
MW-B	2300	1000	6.57	14.79	15.54	82.04	81.29
MW-C				(Dry)			
MW-D	<20	NA	6.60	14.29	15.24	83.64	82.69
MW-E				(Dry)			
MW-F	<20	NA	6.43	15.27	16.02	82.70	81.95
MW-G				(Dry)			
MW-H	<20	NA	6.64	13.78	12.10	83.71	82.65
MW-I	<20	NA	6.38	14.57	15.23	83.43	82.77
River				25.67	24.67		

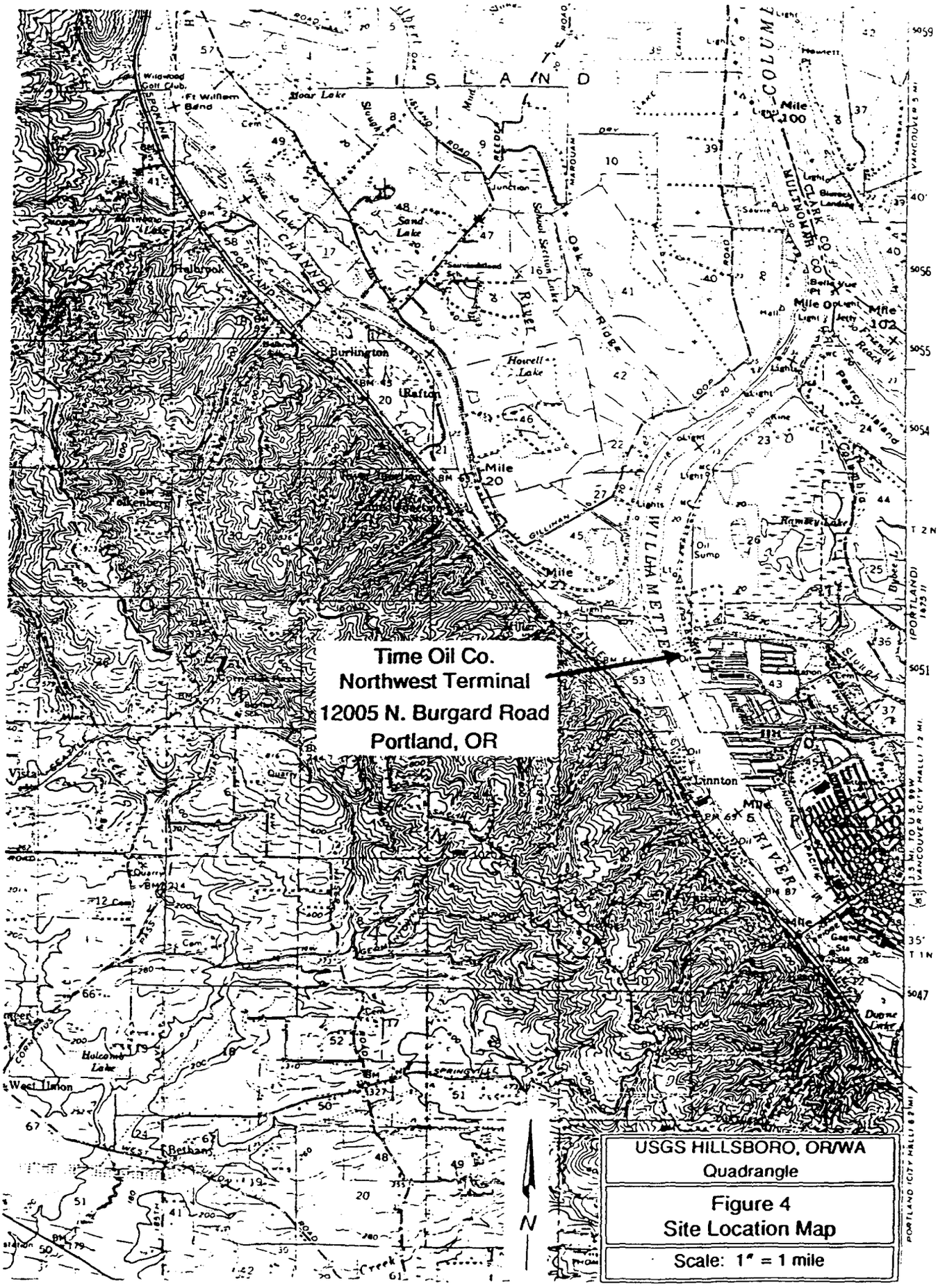
(1) As measured on 8/20/87

(2) As measured on 10/16/87

* Distance from well stickup (or pier reference point) to water.

** Relative to TBM established by TOC

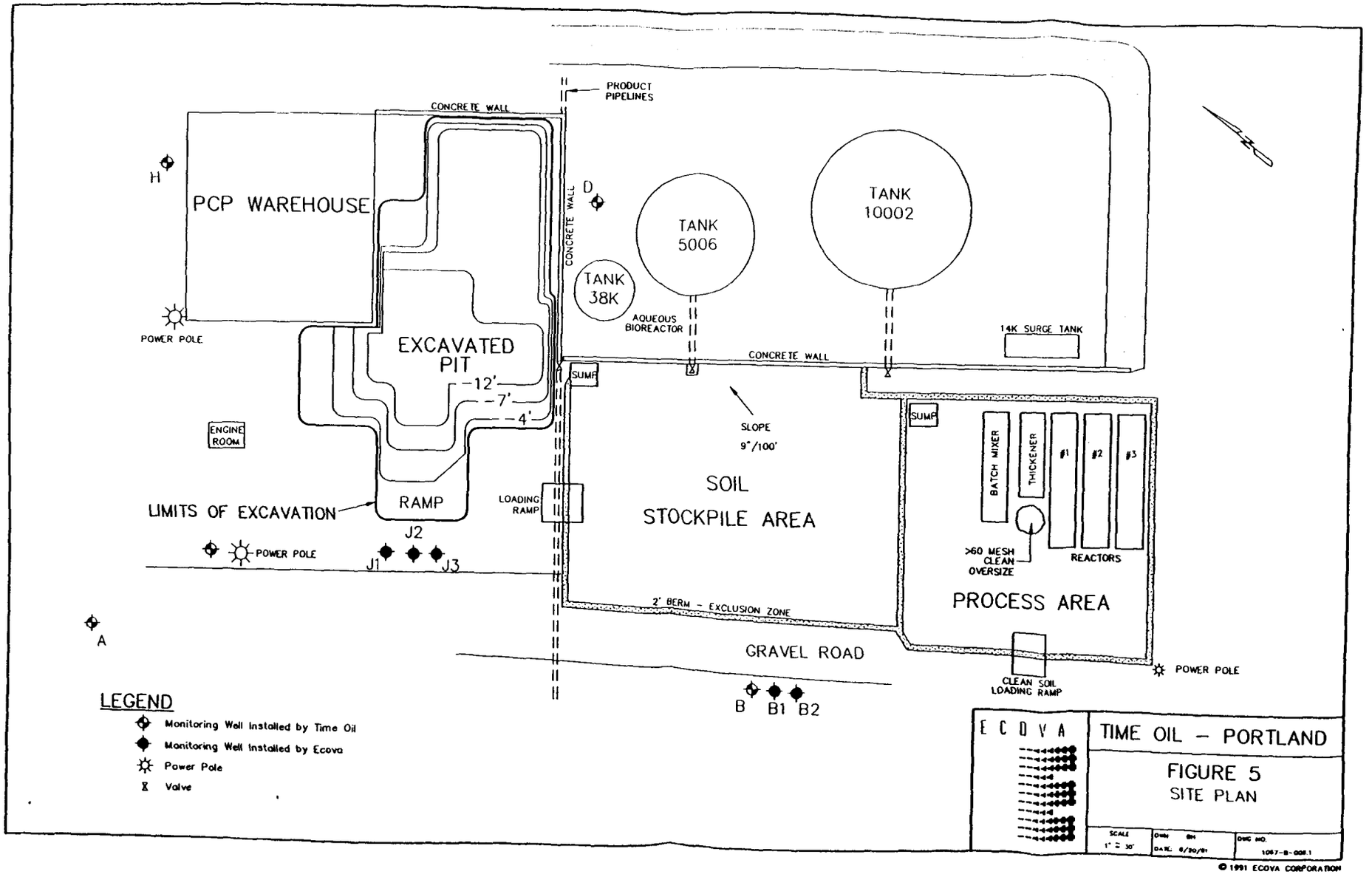
NA = Not Analyzed



USGS HILLSBORO, OR/WA
Quadrangle

Figure 4
Site Location Map

Scale: 1" = 1 mile



BZTO104(e)012544

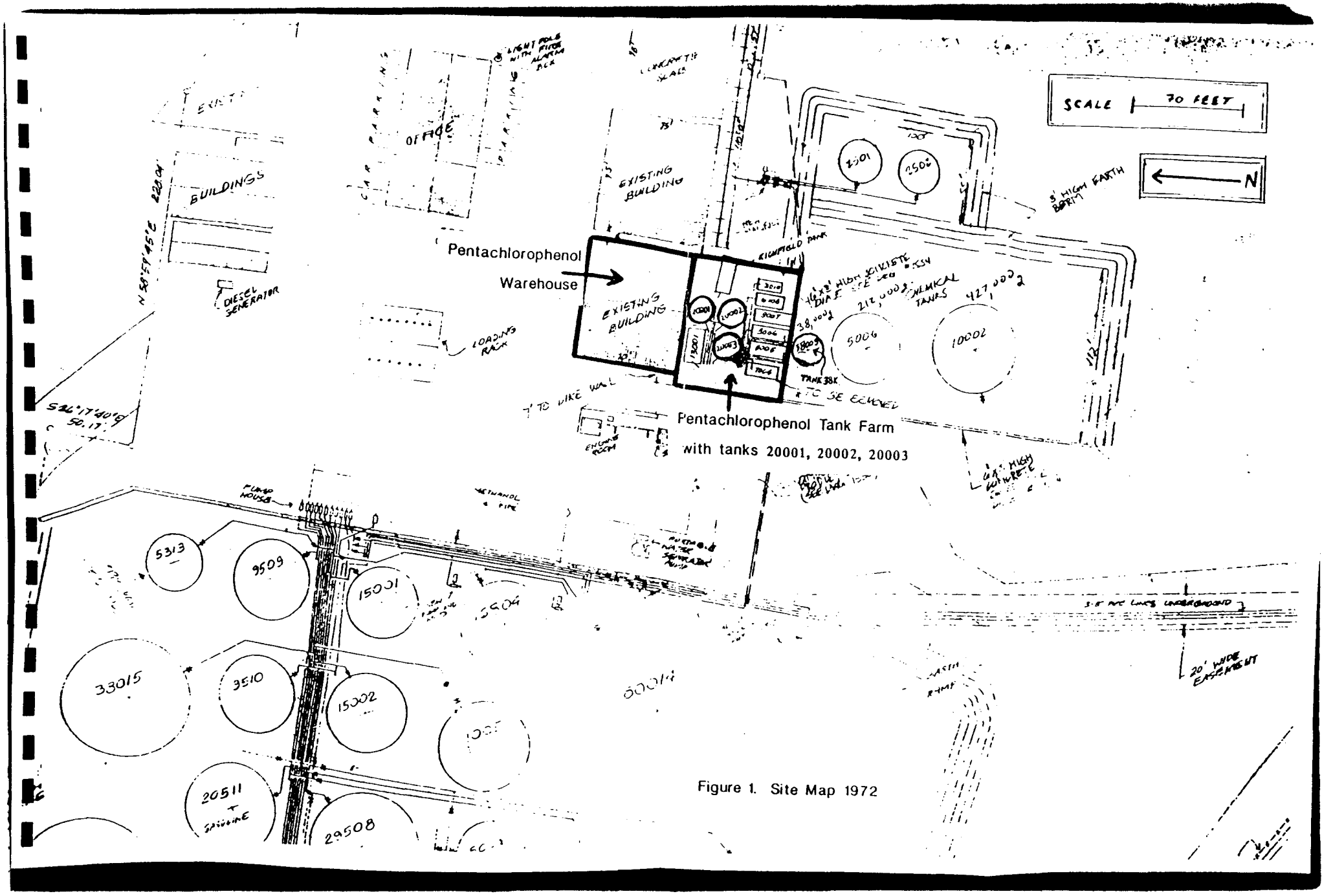


Figure 1. Site Map 1972

BZTO104(e)012545

Wood Treating Chemicals

A complete line of high quality wood preservative chemicals for:

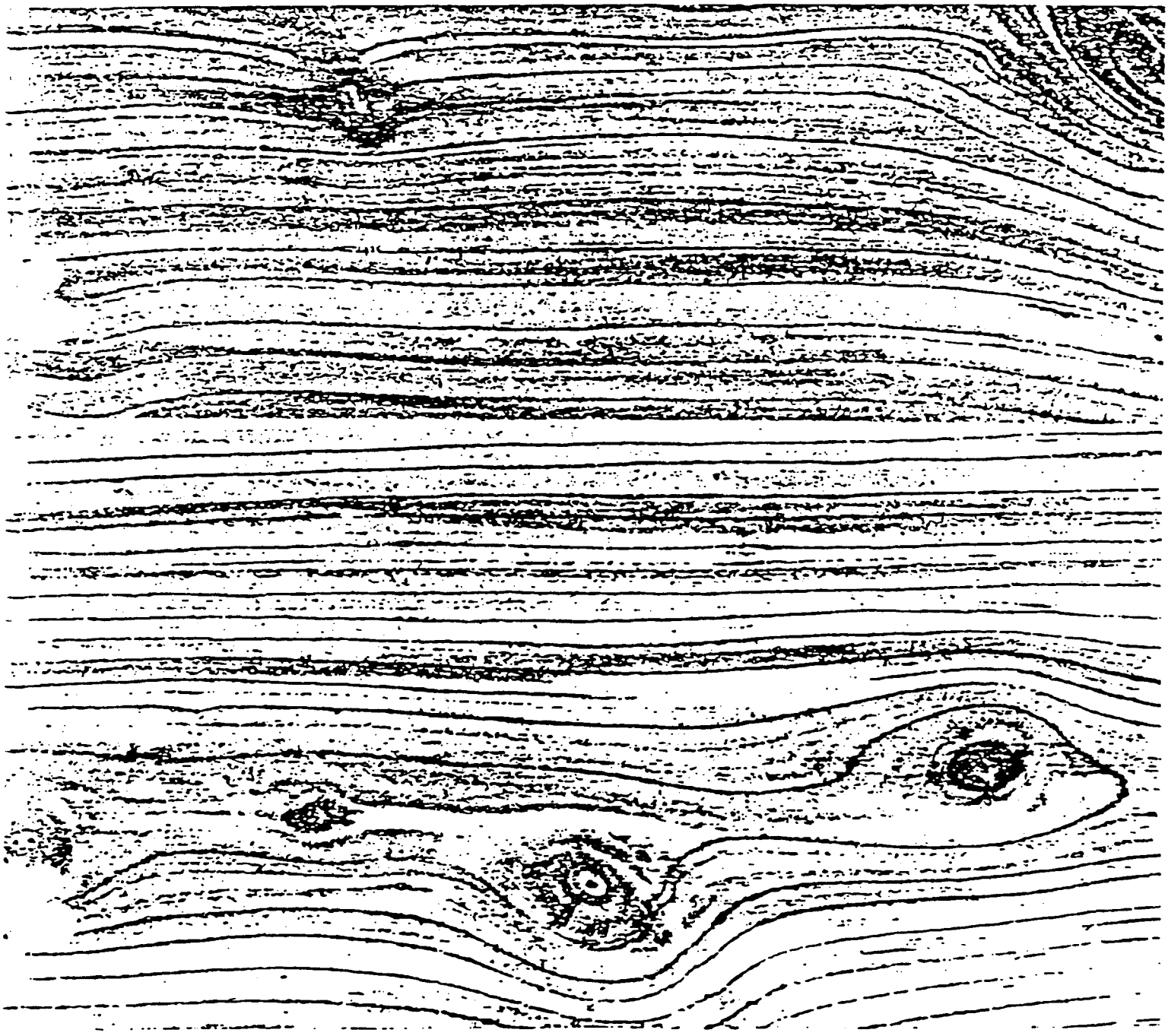
Lumber Industry

Industrial Products

Utility Industry

Commercial Wood Preserving Industry

KOPPERS



BZTO104(e)012546

Lumber Industry Chemicals

End Coatings

End Sealer. A fast-drying heavy wax emulsion, provides maximum protection for green lumber against end splitting and checking while drying during seasoning. Available in clear and a number of colors. Do not freeze.

End Spray 400 Green and Red. Pigmented color concentrate for application to lumber ends and plywood edges to give uniform color coating to enhance the product appearance. Water reducible—do not freeze. Can be applied to wood by brush or spray. Normally applied at ratio of 1 gallon 400 End Spray to 7-12 gallons of water, depending on the desired color intensity.

Wood Seal Wax. A light-lemon color, highly refined wax end sealer free of oil and tackiness. Provides maximum protection for green lumber against end splitting and checking during seasoning. Do not freeze.

Sap Stain Control

Liquid Azide 200. A 200-1 concentrate chemical specially designed to prevent "enzymatic brown stain" on sugar pine. Can be used alone or with other sap stain control chemicals adaptable for mixing with proportioning equipment.

Liquid Noxtane® SS-1. A specially formulated sapstain chemical concentrate for the prevention of blue stain end mold in lumber operations of southern and western wood species. Can be mixed with automatic proportioning equipment. Dilute before use either 100 to1, 66 to 1 or 50 to 1 depending on stain hazard.

Super Noxtane®. A dry powder. General purpose chemical to control sap stain and mold in freshly cut lumber. Buffered for dip tank use or used at double strength in spray systems.

Liquid Noxtane® 1. Liquid sapstain control chemical concentrate dilutable at a rate of 80 to1 or 50 to1, depending on stain hazard. Liquid Noxtane 1 contains sodium pentachlorophenate and sodium metaborate mixed in a water-organic hydrocarbon solvent system.

Dimension Lumber Protection

Lumbrella® Coating. A specially formulated weather protective coating. Provides water repellency and dimensional stability. Replaces paper wrap in protecting quality lumber from sawmill to building site or lumber yard. Available in clear, yellow, brown and redwood colors. Dilutable in water in accordance with the recommended mixtures.

Timbertreat™ Chemicals—Concentrate. Protects freshly cut logs and lumber against insect attack. Dilutes at a rate of one gallon to 160 gallons of water, specific protection against Ambrosia and Lyctus beetles. Active ingredient—Gamma Isomer of BHC.

Dowicide G-ST Beads—Sodium Pentachlorophenate. A water soluble fungicide for control of sap stain on lumber when used with buffering agents.

Industrial Products

Penta Stain® Coating. A top quality, quickly penetrating outdoor wood stain, containing 5% pentachlorophenol by weight. Also, contains quality resins to give good water repellency. Available in nine basic colors which can be intermixed by the buyer for wider color selection.

Penta Wood Preservative—Concentrate (East of the Rockies). A concentrated solution of pentachlorophenol to be diluted with fuel oil, kerosene, range oil, or diesel fuel. Contains 41% technical pentachlorophenol. Use on wood in contact with ground or other severe exposure applications.

Timbertox 40 Preservative—Concentrate (West of the Rockies). A concentrated solution of pentachlorophenol to be diluted with fuel oil, kerosene, range oil, or diesel fuel. Contains 40.5% technical pentachlorophenol. Use on wood in contact with ground or other severe exposure applications.

Penta Wood Preservative—Ready-to-Use. A clear, ready-to-use liquid containing 5% pentachlorophenol by weight. Solvents used are residual in the wood and do not provide a paintable surface. Use on wood in contact with ground or other severe exposure applications.

Woodtox® Preservative—Ready-to Use. A clear water repellent preservative. Use on wood where cleanliness and paintability are desired. Contains 5% pentachlorophenol by weight.

Woodtox® Preprime Preservative. A high quality water repellent preservative for treatment of millwork prior to factory paint priming. Available as a 1:4 concentrate or a ready-to-use solution. Meets National Woodwork Manufacturers Association Standards for water repellency and preservative effectiveness.

Woodtox® 140 Preservative. An economical water repellent preservative for dip treatment of millwork, boxes and pallets. Available in a 1:4 concentrate or ready-to-use solution. Meets Federal Specification TT-W-572B and National Woodwork Manufacturers Association Standards for water repellency and preservative effectiveness.

Woodtox® 152 Preservative—Ready-to-Use. Water repellent wood preservative with dark brown color added. For treatment of wood parts used in truck or wagon body construction, other miscellaneous fabricated lumber items.

Coppertreat® 00 Preservative. Copper naphthenate specially formulated to meet MIL-W-18142B, Amendment 3. Assay 2% copper metal by weight in ready-to-use solution. Use on wood in contact with ground or other severe decay hazard areas.

Utility Industry Chemicals

Pole-Life.® Ready-to-use, grease-like penetrating coating for ground line remedial treatment of standing poles, poles to be relocated, or poles stored for prolonged periods. Can also be used to treat piling cut-offs. Conforms to Bell Laboratories Specification for C Wood Preservative. There are two formulations: one contains 15% Sodium Fluoride and the other containing 15% Sodium Borate, in addition to 10% penta and 15% creosote.

Pole-Treat® 15. A preservative grease for use in ground line remedial treatment of standing poles, relocated poles held too long in storage, piling cut-offs, and other wood maintenance uses. Contains 15% pentachlorophenol and 15% creosote.

Tritox. Tritox Preservative Paste is a ready-to-use, grease-like preservative for remedial treatment of standing poles, relocated poles, poles stored too long, and piling cut-offs. It has a combination of oil soluble and water soluble preservative materials. The mixture of preservatives (10% penta, 35% creosote, 40% sodium fluoride) provides the combined preservative effect considered more effective by some authorities than a single preservative. The water soluble salts are considered necessary by many people for fast penetration results in poles with high moisture content.

Woodtreat® AA Preservative. A paste-like, tan colored emulsion preservative for remedial treatment of dry wood in buildings and structures. This product is useful for the treatment of gains and holes made in poles after treatment that expose untreated wood such as pile cut-offs; for treatment of bridge timbers and other uses where a "loading" of preservative is desired. This product contains 10% pentachlorophenol.

Groundline Treating Accessories. Kraft Paper and dating tags and nails, are available as accessories to groundline products.

Commercial Wood Preserving Industry

Prilled and Block Monsanto Pentachlorophenol. Highly toxic to fungi, termites, many forms of bacteria. Use for pressure and thermal treatment of utility transmission poles, fence posts, guard rails, timber and other industrial wood products. Meets American Wood Preservers' Specification and Fed. Spec. TT-W-570.

Flocculating Agents. WTC-71 and WTC-74 are products designed for the treatment of oil in water emulsions to allow the removal of oil, wood extractives and suspended solids from effluents found in recovery and waste disposal systems, wood treating plant operations.

WTC 7-11 Emulsion Prevention Aid. This product is designed to prevent the formation of oil-water emulsions in penta solutions used in pressure treating. It is added in small quantities to the treating solution.

WR-340. Straw-colored liquid containing a blend of resins and solvents. Combined with pentachlorophenol and mineral spirits, it produces a paintable preservative water-repellent solution.

Timbertox D-5. 5% penta in petroleum solvent which meets AWPA Standard P-9 hydrocarbon solvent Type A. Dark amber color solution.

LST Cosolvent II. Anti-blooming additive and co-solvent for light solvent pentachlorophenol solutions. Meets AWPA Standard P-9 for hydrocarbon solvent Type C cosolvent system.

Petroset II. This product is a blend of solubilizers, inhibitors and antioxidants designed to prevent the oxidation, sludging, polymerization, and darkening of pentachlorophenol solutions employed in thermal or pressure treating or Boulton drying of wood poles, piling, and lumber. This product is oil soluble and water insoluble.

Woodtox® Pre-Prime

Ready-to-Use

Product Data

Specialty Wood Chemicals Group
Forest Products Division
Koppers Company, Inc.
5137 Southwest Avenue
St. Louis, Missouri 63110
Telephone: 314—772-2200

Product Description Woodtox Pre-Prime Ready-to-Use is a liquid water repellent chemical. This water repellent wood preservative has been specially formulated for treatment of millwork prior to factory or field priming. Woodtox Pre-Prime Ready-to-Use meets National Woodwork Manufacturers Association (NWMA) standards.

Physical Description Clear, light amber colored solution.

Penta Content 5.2% by weight technical pentachlorophenol meeting Federal Specification TT-W-570. Contains minimum of 154 gm of penta/gallon as determined by AWPA A-5, Section 5 method.

Flash Point Minimum 100°F. (Tag Closed Cup) (Typical).

Dilution Data DO NOT DILUTE. This is a 5% Ready-to-Use solution.

Swellometer Efficiency Meets or exceeds NWMA Swellometer test of 60% minimum.

Paintability Woodtox Pre-Prime has been specially formulated for maximum compatibility with paint primer and finish coatings applied at the factory. The mineral spirits carrier may be "trapped" when sash parts are bulk stacked or bundled too tightly and dip treated; doors or plywood flat stacked is another problem. However, where there is free air circulation to volatize the light solvent from the wood surfaces, Woodtox Pre-Prime open tank treated millwork, lumber or plywood can usually be finished within 24-60 hours after treatment.

Corrosion Contains corrosion inhibitor to aid in the prevention of color formation in shipping containers or storage tanks, and to minimize corrosion and/or discoloration of metal fasteners.

Storage Precautions None, other than to keep out water. Stable over the normal range of storage conditions.

Uses of WOODTOX PRE-PRIME Ready-to-Use Woodtox Pre-Prime is used for the treatment of sash and other millwork to meet the Seal of Approval program of the NWMA for a preservative water repellent (IS-4). It is also useful for the treatment of other wood products where the benefits of a preservative and water repellent solution are desired that will help control stain, decay (rot), termites, and other wood boring insects; that will not cause grain raising, and that will leave the wood paintable.

Treating Data	Woodtox Pre-Prime may be applied by the vacuum, immersion, brush, or spray methods. The effectiveness of the treatment is in proportion to the distribution and retention of solution in the treated item.
Safe Handling of Pentachlorophenol Solutions	See Koppers Company, Inc. Bulletin – "Safety Measures & Precautions for Handling Solutions Containing Pentachlorophenol".
Packaging	Bulk – 4,000 to 10,000 gallon tank cars; or in minimum tariff tank truck transports. Also available in 5 gallon and 55 gallon drums.
Shipping Classification	Chlorinated phenol petroleum solution – Wood Preservative Liquid, Not Exceeding 5% of chlorinated phenol by weight.
Production points and shipping points	St. Louis, Missouri, Portland, Oregon

KOPPERS
Chemicals and Coatings

The information given herein is based on our experience, represents our best judgment in the matter, and is intended to be helpful. But we cannot assume responsibility for any loss or accident that may result from its use.

Woodtox is a registered trademark of Koppers Company, Inc.

FP-879
October, 1976

Litho in U.S.A.

WOOD TREATING CHEMICALS DEPT.
KOPPERS COMPANY, INC.
5137 SOUTHWEST AVENUE, ST. LOUIS, MISSOURI 63110
314 - 772-2200

PRODUCT INFORMATION DATA

WOODTOX* PRE-PRIME CONCENTRATE

October 1, 1969

Trade Name	Penta water repellent preservative concentrate
Wood Treating Name	Woodtox* Pre-Prime Concentrate
Chemical Name	Penta water repellent preservative concentrate
Description	Clear, medium amber color solution
Penta Content	21.2% by weight technical pentachlorophenol meeting Federal Specification TT-W-570
Non-Volatile Content	53.0% by weight
Specific Gravity	0.9784 at 15.5 deg. C. (typical)
Weight per Gallon	8.15 pounds at 15.5 deg. C. (typical)
Pour Point	Plus 18 deg. F.
Flash Point	100 deg. F. (Tag. Closed Cup) (minimum)
Dilution Instructions	Woodtox* Pre-Prime concentrate is readily miscible with mineral spirits or other light petroleum solvents without heat or special agitation. To cut back to the normal 5% pentachlorophenol ready-to-use strength, one gallon or part by volume of the concentrate should be diluted with four gallons or parts by volume of mineral spirits to make five gallons of Woodtox* Pre-Prime. Heavier petroleum solvents than mineral spirits are not recommended as diluents since paintability of the treated wood would be affected. Federal Specification TT-T-0291a, Grade 1, or ASTM Standard D-235-39 can be used for procurement of a suitable mineral spirits diluent. A distillation range of 330 to 385 deg. F. for this type of light petroleum solvent is typical of current refinery production, but in many areas and for a small price differential LEP mineral spirits with an end point as low as 350 deg. F. is readily available. The LEP mineral spirits is also readily miscible with Woodtox* Pre-Prime concentrate and the speed upon drying of the treated wood may be as much as 25%. Xylol and other lighter solvents are not recommended.

*Trade Mark Registered U.S. Patent Office

THE INFORMATION GIVEN HEREIN IS BASED ON OUR EXPERIENCE, REPRESENTS OUR BEST JUDGMENT IN THE MATTER, AND IS INTENDED TO BE HELPFUL BUT WE CANNOT ASSUME RESPONSIBILITY FOR ANY LOSS OR ACCIDENT THAT MAY RESULT FROM ITS USE

WOODTOX* PRE-PRIME CONCENTRATE

Swellometer Efficiency	This concentrate, when properly diluted, will make a water repellent solution having a swellometer efficiency of 60% minimum.
Paintability	The ready-to-use solution made with this concentrate dries to a firm film and contains a minimum of paraffin or other water repellent ingredients that tend to interfere with paintability. The length of time that should elapse between the time the wood is treated and the time that paint, varnish, or other finishes are applied depends upon how soon the excess mineral spirits used as a carrier can get out of the wood. The mineral spirits carrier may be "trapped" when sash parts are bulk stacked or bundled too tightly and dip treated; doors and plywood flat stacked are another problem. However, where there is free air circulation to volatilize the light solvent from the wood surfaces, Woodtox* Pre-Prime open tank treated millwork, lumber, or plywood can usually be finished within 48 to 72 hours after the treatment. Woodtox* Pre-Prime Concentrate meets paintability tests or standards of Federal Specification TT-W-00572a, the NWMA, and CS 262-63.
Storage Precautions	Some sedimentation may occur after long standing, but this is relatively insignificant on a weight basis and should not reduce the efficiency of the product after dilution. This concentrate thickens when exposed to low temperature, but returns to normal fluidity when stored at ordinary room temperatures. Containers should be thoroughly agitated before removing contents when temperature of the concentrate is below 40 deg. F.
Safe Handling of Pentachlorophenol	See Wood Treating Chemicals Co. Bulletin 1049 entitled "Safety Measures and Precautions for Handling Solutions Containing Pentachlorophenol."
Packaging	5 gallon and 55 gallon drums, and bulk shipments in tank cars
Shipping Class	Wood Preservative, Liquid NOIBN
Production Points	Saint Louis, Missouri and Portland, Oregon
›ing Points	Saint Louis, Missouri and Portland, Oregon

Printed in U. S. A.

Woodtox® 140 Ready-to-Use
Liquid Water Repellent Solution

Product Data

Specialty Wood Chemicals Group
Forest Products Division
Koppers Company, Inc.
5137 Southwest Avenue
St. Louis, Missouri 63110
Telephone: 314—772-2200

Product Description	Woodtox 140 Ready-to-Use is a liquid water repellent solution. This water repellent wood preservative has been specially formulated for the treatment of ammunition boxes, millwork and other exterior wood. Woodtox 140 meets NWMA Standards and Federal Specification TT-W-572B.
Physical Description	Clear, light amber colored solution.
Penta Content	5:2% by weight technical pentachlorophenol meeting Specification TT-W-570.
Flash Point	Minimum 100°F (Tag Closed Cup)
Dilution Data	DO NOT DILUTE. This is a 5% Ready-to-Use solution.
Swellometer Efficiency	Meets or exceeds NWMA Swellometer test of 60% efficiency.
Paintability	Woodtox 140 Ready-to-Use has been formulated for good compatibility with most finishes, including those used for finishing by the millwork industry.
Corrosion	Contains corrosion inhibitor to aid in the prevention of color formation in shipping containers or storage tanks, and to minimize corrosion and/or discoloration of metal fasteners.
Storage Precautions	None other than to keep out water. Stable over the normal range of storage conditions.
Uses of Woodtox 140 Ready-to-Use	Woodtox 140 Ready-to-Use is used for the treatment of ammunition boxes, millwork and exterior wood, where the benefits of a preservative and water repellent solution are desired that will help control stain, decay (rot), termites, and other wood boring insects; that will not cause grain raising, and that will leave the wood still paintable.
Treating Data	Woodtox 140 Ready-to-Use may be applied by conventional methods such as vacuum, immersion, brush, etc. The effectiveness of the treatment is in proportion to the distribution and retention of solution in the treated item.

Safe Handling of Pentachlorophenol Solutions	See Koppers Company, Inc., Wood Treating Chemicals Dept. Bulletin — "Safety Measures & Precautions for Handling Solutions Containing Pentachlorophenol". Do not use this product indoors.
Packaging	Bulk — 4,000 to 10,000 gallon tank cars; or in minimum tariff tank truck transports. Also available in 5 gallon and 55 gallon drums.
Shipping Classification	Chlorinated phenol petroleum solution — Wood Preservative Liquid, Not Exceeding 5% of chlorinated phenol by weight.
Product Points and Shipping Points	St. Louis, Missouri Warehouse Portland, Oregon

Koppers Company, Inc.
Pittsburgh, Pa. 15219
KOPPERS
Chemicals and Coatings

The information given herein is based on our experience, represents our best judgment in the matter, and is intended to be helpful. But we cannot assume responsibility for any loss or accident that may result from its use.

Woodtox is a registered trademark of Koppers Company, Inc.

WOL-15
October, 1976

Litho in U.S.A.

Woodtox® 140 Concentrate

Water Repellent Pentachlorophenol Preservative

Product Data

Specialty Wood Chemicals Group
Forest Products Division
Koppers Company, Inc.
5137 Southwest Avenue
St. Louis, Missouri 63110
Telephone: 314—772-2200

Product Description	Woodtox 140 — Concentrate is a water repellent pentachlorophenol preservative.
Physical Description	Clear — Reddish-Amber colored solution.
Penta Content	22.0% by weight Technical Pentachlorophenol meeting Federal Spec. TT-W-570.
Specific Gravity	.959 at 15.5°C (60°F.) (Typical)
Weight per Gallon	7.99 lbs. at 15.5°C (60°F.) (Typical)
Pour Point	−1°C (30°F.)
Flash Point	43°C (110°F.) (Typical)
Dilution Data	Before using, dilute at the ratio of one part this product to four parts by volume of a mineral spirits, naphtha, or equivalent solvent weighing not more than 6.46 lbs/gal. to make a ready-to-use solution containing not less than 5.2% Technical Pentachlorophenol by weight. The diluent should have an end point no greater than 360°F. for quick drying and paintability. Agitate thoroughly before using. It is recommended that the solvent used should be L.A. Rule 66 exempt.
Swellometer Efficiency	Woodtox 140 Concentrate when diluted at the rate of one to four as suggested above and with a suitable mineral spirits will exceed swellometer efficiency of 60%.
Storage Precautions	As Woodtox 140 Concentrate is made with technical grade materials, upon long standing some sedimentation may occur. This sedimentation is relatively insignificant on a weight basis and does not reduce the efficiency of the product after dilution. This concentrate increases in viscosity when exposed to low temperatures, but returns to normal fluidity if stored or used at ordinary room temperatures.

Use Data	This concentration is to be used for the preparation of a ready-to-use solution which conforms to NWMA IS-4 and Federal Specification TT-W-572B when diluted according to label directions.
Safe Handling of Pentachlorophenol	For additional information see: "Safety Measures & Precautions for Handling Solutions Containing Pentachlorophenol".
Packaging	55 gallon drums, 5 gallon drums and tank cars.
Shipping Classification	Wood Preservative, NOI LIQUID OR PASTE
Production Point	St. Louis, Missouri Portland, Oregon
Shipping Point	St. Louis, Missouri Portland, Oregon

Koppers Company, Inc.
Pittsburgh, Pa. 15219
KOPPERS
Chemicals and Coatings

The information given herein is based on our experience, represents our best judgment in the matter, and is intended to be helpful. But we cannot assume responsibility for any loss or accident that may result from its use.

Woodtox is a registered trademark of Koppers Company, Inc.

WOL-14
October, 1976

Litho in U.S.A.

WOOD TREATING CHEMICALS CO.

5137 Southwest Avenue / St. Louis, Missouri 63110 / 314 PR 2-2200

PRODUCT INFORMATION DATA

Sheet No. 125
March 15, 1967

WR CONCENTRATE 340

Trade Name	Water Repellent Concentrate
Wood Treating Name	WR CONCENTRATE 340
Chemical Name	Same as Trade Name
Description	Straw colored liquid containing the proper blend of water repellents and co-solvents so that when blended with Monsanto Penta and with mineral spirits, meeting specifications indicated below, a non-blooming, paintable preservative water repellent solution will result which will meet the requirements of Federal Specification TT-W-572 and AWPI Standard LP-3.
Penta Content	None
Specific Gravity	0.889 at 15.5° C. (60° F.) (typical)
ight per Gallon	7.49 pounds at 15.5° C. (60° F.) (typical)
Pour Point	65° F. (approximate for homogeneity)
Flash Point	105° F. minimum - Tag. Closed Cup
Mixing Data	The following mixing instructions are given in units of 405 lbs. of WR CONCENTRATE 340 as that is the weight of the concentrate packed in 55-gallon drums:

WR CONCENTRATE 340	405 pounds
Monsanto Technical Penta	200 pounds
Mineral Spirits (500 Gals.)	3241 pounds

This will yield 566 gallons of water repellent solution containing 5% by weight of Pentachlorophenol if the Mineral Spirits has a weight of 6.5 lbs. per gallon which is typical. Weight of treating solution will be approximately 6.80 pounds per gallon. The volume yield will vary with the weight of the Mineral Spirits or equivalent light petroleum solvent used.

See Wood Treating Chemicals Company Bulletin 1108 and 1513

THE INFORMATION GIVEN HEREIN IS BASED ON OUR EXPERIENCE, REPRESENTS OUR BEST JUDGMENT IN THE MATTER, AND IS INTENDED TO BE HELPFUL; BUT WE CANNOT ASSUME RESPONSIBILITY FOR ANY LOSS OR ACCIDENT THAT MAY RESULT FROM ITS USE.

	for typical specifications for a suitable Mineral Spirits.
Mixing Procedure	Mixing will be facilitated by bringing the WR CONCENTRATE 340 to a temperature of 65° F., or higher, to insure homogeneity and to facilitate removal from drums or to pump from tank cars or storage tanks. In blending, first add Mineral Spirits or equivalent light petroleum solvent to the blending tank. Heat to 90° F., or higher; then add the WR CONCENTRATE 340 and before adding penta. Mix thoroughly and then add the Monsanto Penta. Mix until dissolved. Agitation and/or heating while mixing the penta will greatly hasten the rate of solution.
Treating Data	See Wood Treating Chemicals Co. Bulletin #1513 entitled "Pressure Treatment with Penta Water Repellent Preservative."
Safe Handling of Penta and Penta Solutions	See Wood Treating Chemicals Co. Bulletin #1049 entitled "Safety Measures And Precautions For Handling Solutions Containing Pentachlorophenol."
'ackaging	8,000 gallon tank cars 6,000 gallon tank cars 4,000 gallon tank cars 55-gallon open-head drums (net 405 pounds)
Shipping Classification	Wood Preservative Liquid, N. O. I.
Production Point	St. Louis, Missouri
Shipping Point	St. Louis, Missouri

Printed in U. S. A.

Timbertox 40
Penta Wood Preservative Concentrate

Product Data

Specialty Wood Chemicals Group
Forest Products Division
Koppers Company, Inc.
5137 Southwest Avenue
St. Louis, Missouri 63110
Telephone: 314—772-2200

Product Description Timbertox 40 Penta Wood Preservative Concentrate contains pentachlorophenol and solvents. This product was designed as a freight saving method of supplying pentachlorophenol so that ready-to-use penta solutions could be prepared with locally available diluents and without the necessity of heat or special mixing equipment.

Physical Description Timbertox 40 penta wood preservative concentrate is a clear-dark amber colored solution.

Penta Content 40.5% by weight technical pentachlorophenol meeting federal specification TTW-570.

Specific Gravity 1.12 at 15.5°C (60°F.) (Typical)

Weight per Gallon 9.32 lb./gallon at 15.5°C (60°F.) (Typical)

Pour Point Below –26°C (15°F.)

Flash Point 85°C (185°F.) (Typical)

Dilution Data The amount of diluent used with this concentrate depends upon the concentration of penta desired in the ready-to-use solution and on the weight per gallon of the diluent. Furthermore, the choice of diluent depends upon the end use for the diluted material. It should be recognized that if light oils such as mineral spirits are used as a diluent, the penta may bloom (crystallize on the surface of the wood). Any oil with over 50% of its distillation range falling under 500°F. will probably allow blooming.

Since a 5.2% solution is generally desired for wood preservation the following formulation will show how much diluent oil is required:

$$\frac{\text{\% active ingredient in concentrate} \quad \text{Minus} \quad \text{\% active ingredient desired}}{\text{\% of active ingredient desired}} \times$$

$$\frac{\text{Weight of concentrate per gallon}}{\text{Weight of solvent per gallon}} = \text{Gallons of solvent desired.}$$

Dilution Data (Continued) Using the foregoing formula as an example, and using a fuel oil weighing 7.0 pounds per gallon, to make a 5.2% ready-to-use solution would require:

$$\frac{40.5 - 5.2}{5.2} \times \frac{9.32}{7.0} = 9.04 \text{ gallons of oil}$$

Timbertox 40 penta wood preservative concentrate is made with technical grade materials; therefore, when this concentrate is diluted with certain low aromatic petroleum products, a slight sedimentation in the finished solution may appear. This sedimentation is relatively insignificant on a weight basis, and if it is detrimental it can be removed by filtration or by settling for 48 hours and drawing it off the bottom of the container.

Uses Follow detailed instructions on the label for the use of Timbertox 40 penta wood preservative concentrate in wood preservation, and termite control.

Storage Timbertox 40 penta wood preservative concentrate has a very good low temperature stability. Its viscosity increases as the temperature decreases, and it finally becomes so viscous that it will not pour. Upon return to room temperature it again becomes fluid. If it is known that it has been chilled to, or near, the solidification point, it is always good practice to agitate the container (roll the drums) to insure uniformity of product each time before any product is withdrawn from the container.

Safe Handling For additional information please see Koppers bulletin titled "Safety Measures and Precautions for Handling Solutions Containing Pentachlorophenol".

Packaging 55 gallon drums and bulk shipment in tank trucks.

Shipping Classification Wood Preservative NOI Liquid or Paste

Production and Shipping Point Portland, Oregon

Koppers Company, Inc.
Pittsburgh, Pa. 15219
KOPPERS
Chemicals and Coatings

The information given herein is based on our experience, represents our best judgment in the matter, and is intended to be helpful. But we cannot assume responsibility for any loss or accident that may result from its use.

WOL-22
January, 1977 1M

Litho in U.S.A.

Safety Measures and Precautions for Handling Solutions Containing Pentachlorophenol

Safety Bulletin

Specialty Wood Chemicals Group
Forest Products Division
Koppers Company, Inc.
5137 Southwest Avenue
St. Louis, Missouri 63110
Telephone: 314—772-2200

All users of Koppers pentachlorophenol solutions should give careful attention to these safe handling instructions to avoid unnecessary exposure that might cause skin irritation or other health hazards.

Chemicals which are sufficiently toxic to control various wood degrading organisms and insects may generally be considered as substances which should be handled with due care to avoid irritation or other harmful effects to human beings and to prevent contamination of food stuffs. Although millions of pounds of pentachlorophenol has been sold since its commercial manufacture was started in the United States in 1936, and billions of pounds of penta solutions have been used, occasionally troubles arise because of the improper handling of the dry chemical or solution. The purpose of this bulletin is to give information that will help prevent health hazards and to also suggest action to be taken if the product has caused a health hazard.

For toxicological information on pentachlorophenol crystals, or prills, refer to Monsanto Chemical Company — Technical Bulletin No. IC/PS-3 titled "Handling Precautions for Penta and Santobrite".

Safe Handling Penta Formulations

In general, there are two types of penta formulations, Concentrates and 5% Ready-to-Use Solutions. Most of these solutions contain alcohols and/or aromatic petroleum oils as the solvents and carriers, and these materials as well as the penta can cause health problems if not handled properly.

The greatest chance for harmful amounts of penta formulations to get into the body is through the skin. Of course, swallowing could occur, but this is rare. The oils and solvents used to dissolve penta are usually nasal or respiratory irritants, so they also often cause sneezing, coughing or eye irritation; so a person tends to get out of the areas causing these health discomforts. The chief method of body damage is apt to come from the solutions that get on the skin. Since individuals vary considerably as to their susceptibility to skin irritation, no set rules can be devised, but a very simple rule can be followed: Keep the solutions off the skin, and if they get on the skin wash them off with soap and water. Do not allow the solutions to saturate clothing and then continue to wear such contaminated clothing.

Koppers sells a number of penta formulations under such trademarks as Woodtox®, Timbertox®, Woodtreat® and Liquid Noxtane® to name some of the most common ones. These materials may be for use as preservatives in or on wood, as termite control materials, or for the control of other insects or fungi. Safe handling data can be divided into two parts — health and use practices.

Health and First Aid Measures in Connection With The Use of Penta Formulations

Users of any of Koppers formulations should give careful consideration to the safety measures and precautions given on the label for each product. Since these products are registered with the EPA under the Federal Insecticide, Fungicide and Rodenticide Act, the labels on each package must carry an approved caution statement. (Since penta is not defined as a highly toxic poison, the skull and cross bones marking is not required. This marking is a DOT requirement but is not required on EPA registered labels.) The precaution on any Penta containing product contains in essence all or some part of the following information, depending upon the product:

> Do not breathe vapor. Do not get in eyes, on skin or on clothing. Keep away from foodstuffs, children, pets and livestock. If swallowed, induce vomiting by administering emetic — call a physician. To remove from skin, wash with plenty of soap and warm water. Flammable — keep away from fire and flame.

Solutions of pentachlorophenol are irritating to the skin of most individuals and will be absorbed on contact, and if repeated contacts occur, the rate of absorption varies depending on the solvent used and the individual's susceptibility. Some

of the lighter petroleum solvents are irritating to the skin with or without an admixture of pentachlorophenol to the oil solution. However, the safety and comfort of the worker handling pentachlorophenol solution such as Woodtox, Timbertox, Woodtreat or Liquid Noxtane will be assured if he follows such precautionary measures as his particular application makes necessary. These measures will vary from simple washing of the hands with soap and water at the completion of the handling operations to the wearing of protective garments and accessories for a workman continually on duty at a treating tank is subject to possible contact with the preservation formulations. Rubber gloves and protective clothing should be worn when handling the freshly treated wood.

Safe handling measures may be summarized briefly:

DO NOT SWALLOW

Solutions containing penta should not be taken internally. They should not be placed so that children or animals will get into them, and opened or discarded containers should not be left where the contents could cause a health hazard. If any penta solution is swallowed, vomiting should be induced by administering mustard and water, and a physician should be called.

PROTECT EYES, NOSE AND THROAT

Formulations containing penta should not be used in enclosed areas without adequate ventilation. Eyes should be protected from splash, drip or spray by the use of goggles. If any penta solutions get into the eyes, flood the eyes with water (do not rub the material into the eyes!), and if irritation continues after thorough bathing of the eyes, call a physician. Workmen handling penta solutions should be taught to cleanse the face and hands promptly after working with penta formulations to avoid having the material get in or on sensitive body parts or be absorbed by the skin.

DO NOT GET ON SKIN

Pentachlorophenol solutions are irritating to the skin of most individuals. Whether the irritation comes from the carriers or the penta is immaterial – penta formulations should not be left in contact with the skin. Long exposures or frequent short contacts can result in Penta being absorbed through the skin. This hazard can be avoided by the use of synthetic rubber gloves and/or other protective garments.

IT IS EASIER TO AVOID TROUBLE THAN CORRECT IT

Commercial wood treating plants, formulations manufacturers, and termite and other pest control operators are accustomed to handling chemicals and formulations of them, and usually take precautions to protect themselves, their workmen and their clients. The above precautionary measures are reviewed in order to help maintain the good records that have accompanied the successful use of penta formulations.

Simple precautions as given above include washing the exposed body parts with soap and water at the completion of a handling operation and the wearing of adequate protective garments. Clothing that becomes contaminated with solutions containing penta should be changed to avoid skin contamination.

Washing with soap and water should be routine practice before eating, drinking or smoking and at the close of the working period. It may be advisable at other times, under particular conditions, and should always be practiced in cases of contact. The secret of safe handling of penta preparation is simply to avoid direct physical contact with them.

PRECAUTIONS RELATIVE TO THE USE OF PENTA FORMULATIONS

Besides health hazards, there are problems that can arise because of the misuse of penta formulations. Know your product! Know what it was designed to be used for, and read the directions for use on the label. It is a violation of Federal Law to use any EPA registered product in a manner inconsistent with its labeling.

Wood preservations formulations can affect subsequent paint coats, therefore select the proper formulations and use them properly.

Termite control or wood preservation solutions containing penta can kill vegetation unless properly used. They may also impart odors. Follow the manufacturer's recommendations for use. Pentachlorophenol is toxic to fish, therefore, do not dispose of near water drainage to streams or bodies of water. Consult the label for pesticide disposal and container disposal directions.

Free access of air should be provided for all surfaces of wood after its treatment with pentachlorophenol solutions and before the wood is used so that the preservation liquids will not be on the wood surfaces when the wood is put in use.

Woodtox, Timbertox, Woodtreat and Noxtane are registered trademarks of Koppers Company, Inc.

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Litho in U. S. A. October, 1976

KOPPERS
Chemicals and Coatings

Oil-Penta

1. **Fire Hazards:** This solution will burn if exposed to an open flame. Tanks or lines must be thoroughly cleaned before burning or welding may take place. Clean up spills promptly and observe good housekeeping practices.

   The location and operation of fire fighting equipment should be known to all employees. Definite procedures to be followed in case of a fire should be prepared and posted.

2. **Personnel Hazards:** Oil-Penta will cause skin irritation on contact. Oil-Penta solutions are more hazardous than penta alone.

3. **Protective Equipment:** Wear rubber gloves and goggles when handling Oil-Penta solutions. Rubber overshoes should be worn when foot contamination is possible.

4. **First Aid:** Eye Contact: Flush the eye with water and see a physician immediately.

   Skin Contact: Wash the affected area with soap and water. Launder clothing before re-use. Discard contaminated shoes.

   See Pentachlorophenol.

Pentachlorophenol (Penta)

1. **Fire Hazards:** None

2. **Personnel Hazards:**

   A. *Do not swallow.* Penta should not be taken internally. If it is accidentally swallowed, either as solid or in solution, vomiting should be induced by administration of mustard and water, or other emetic, and a physician should be called.

   B. *Protect eyes, nose, throat.* Penta dust is irritating to the mucous membranes of the eyes, nose and throat It may provide violent sneezing and coughing when inhaled. For prolonged exposure to the dust, a respirator or a folded gauze should be worn over the nose and mouth. The eyes should be protected by goggles. Indoors a forced-draft ventilating system is highly desirable. The worker should be taught to wash his face and hands promptly of any penta dust since this might later find its way into sensitive regions such as the eyes, or be absorbed by the skin.

   C. *Do not inhale vapors.* Penta formulations should not be breathed or allowed to contact mucous membranes of the eyes, nose, throat or skin. Where formulations are being used in weed control work, for example, the worker's respiratory system should be fully protected from inhalation of the spray and his body protected with suitable clothing.

   D. *Avoid skin contact.* Both the solid penta and its solutions are irritating to the skin of most individuals. They may be absorbed if contact is prolonged beyond five to ten minutes, or if repeated contacts occur for shorter periods.

   Protective Equipment: Wear gloves whenever handling penta, penta solutions or penta treated wood. Wear goggles whenever there is the possibility of penta or penta solutions coming in contact with the eye. Wear a face mask when handling dry penta to prevent inhalation of the dust.

   Wear protective garments and accessories. Clothing which becomes wet with penta preparations should be promptly changed for clean items since skin absorption can take place even from diluted solutions.

   Finally, washing with soap and water should be routine practice before eating, drinking or smoking and at the close of the working period. The secret of safe handling of penta preparations is simply to avoid direct physical contact.

4. **First Aid:** For external exposure, wash affected area with soap and water. For internal exposure, induce vomiting if conscious. Contact a physician at once.

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PROCEDURES FOR ENTERING AND CLEANING TANKS AND OTHER ENCLOSED SPACES

A. **Responsibility**

Responsibility for safety rests with the SUPERVISOR at all times. This responsibility covers conditions of work for contractors' employees, workmen from other divisions, and his own men. He must make sure that adequate steps have been taken to eliminate or control the hazards. He must also make sure that all personnel understand the nature of such hazards which remain and the precautions to follow.

B. **Description**

"Enclosed spaces" is defined as, but not limited to, the following:

1. Enclosures with limited access openings for personnel, such as closed storage tanks, tank cars, process vessels (usually with only a man-hole for entering).
2. Tanks, pits, tubs, vaults, vessels, or other confined spaces with one side open to the air but so deep as to require entrance and aid of an assistant in case of emergency.
3. Confined spaces, such as ventilation or exhaust ducts, sewers, underground utility tunnels or pipelines.

C. **Hazards**

The hazards commonly encountered are:

1. Toxic vapors in fatal concentrations. This may result from known material in the tank, by gradual release from sludge or scale, or by leakage from interconnected systems due to failure to blank off or disconnect pipelines or ducts.
2. Inflammable gases, with potential of fire or explosion.
3. Lack of oxygen, causing asphyxiation. This may result from chemicals absorbing or replacing oxygen in the tank air, or from inert gas often used to exclude oxygen to reduce the possibility of explosions. Air in clean tanks closed for an extended period may become deficient in oxygen because of rusting (or oxidation) of the metal of the tank. Improper or inadequate ventilation during tank work may also result in a lack of oxygen.
4. Electric shock from portable lights, tools, or associated electrical equipment.
5. Injury from mechanical equipment such as mixers, conveyors, etc., that are inadvertently activated.
6. Bodily injury from direct contact with corrosives or dermatitis-producing chemicals.
7. Physical hazards such as slipping, falling, and falling objects.
8. Burns resulting from accidental opening of a steam valve in a line which has not been blanked off or disconnected.

D. **Procedures**

The hazards inherent in tank entry can be avoided or overcome if the following principles are applied properly each and every time a tank is entered.

No one is to be allowed to enter a treating cylinder, work tank or mix tank which has contained Cellon solution without prior permission from the Manager of Plant Operations, Manager of Engineering or the Division Safety Director. This permission may be requested verbally but written confirmation is to be made. At the conclusion of the project, a written report will be made to the Division Safety Director including the following information:

1. Description of the work done.
2. Names of employees involved.
3. Total exposure time of each employee.
4. Personal protective equipment that was used.
5. Any other pertinent comments or occurrences.

Provisions for bathing or showering must be provided. The use of the bathing facility is mandatory at the end of the shift or the finish of the job, whichever comes first.

1. **Pre-Planning and Education**

Survey all tanks requiring entry. Evaluate the hazard potential. All concerned should agree to the detailed standards and procedures established. Be sure everyone understands exactly what is meant.

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be fully informed both as to fundamentals and specific requirements. There should be appropriate follow-up to insure that the system is being followed exactly. It is not sufficient merely to set standards; follow-up is necessary for full compliance. Close liaison and job planning between various groups such as production and maintenance is essential. Have specific instructions and a pertinent check list printed on a permit which must be displayed at the job site.

2. Preparation of Tank

A. Cleaning: According to the nature of the product, clean and void the tank of residual product by hot or cold water flush, by steaming, by chemical neutralization or by air purge. Harmful vapors should be vented safely to the outdoors.

If the tank is steamed, allow it to cool before entry. Do not steam below liquid surfaces in tanks being cleaned. Non-miscible solvents sometimes stratify and bump out at almost explosive pressures due to the difference in boiling point temperatures between the water layer and the solvents.

After the material in the tank has been evacuated to a safe point of discharge, the sludge or incrustation should be removed, to the greatest degree, by operation from outside of the tank. If the tank contained radioactive materials, ascertain in the type and magnitude of radioactivity remaining after cleaning. A time limit for exposure may then be established. Protective clothing and respiratory protection should not be used as a substitute for cleaning and ventilating. Except in extreme emergency-for example, saving of a life-no one should enter a tank containing a flammable atmosphere or one which because of oxygen deficiency or contamination may be so immediately harmful as to prevent escape from the tank in case of failure of the respiratory equipment.

be thoroughly ventilated. Make sure that the mechanical exhaust ventilation is arranged to avoid recirculation of contaminated air. After the tank is cleaned and ventilated, keep the mechanical exhaust ventilation equipment operating to provide secondary protection in case of accidental introduction of harmful chemicals; to remove contamination that may be produced by work in the tank such as welding and cutting, painting, coating; and to cool the tank and improve working conditions.

Should decontamination involve flammable liquids, vapors, gases, or dusts, all sources of ignition should be eliminated. For example, to eliminate any accumulation of static electricity and prevent autogenous ignition of flammables which may be in the tank, steam should be introduced at relatively low pressure and velocity. Steam lines should be electrically bonded to the tank if it contains any flammable material.

C. **Isolation:** The tank should be completely isolated from all other systems and equipment. For example, lines connected to the tanks should be physically disconnected and blanked off. Positive and adequate measures must be taken to prevent harmful material-solid, liquid, or vapor-from entering the tank while workmen are inside or after cleaning. This work should be coordinated with cleaning operations to prevent re-contamination. In all cases where lines have contained hazardous fluids or inert gas, or where they contain fluids at high pressures or temperatures, the lines should be physically disconnected by removal of valves, spool pieces, or expansion joints, and blank flanges placed in the lines. Exceptions to normal blanking procedure, such as bleeder valves tagged in the open position, should be approved only

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by qualified supervision. Exceptions should be made only when thoroughly justified and not as a matter of expediency. In these cases, adequate alternative measures must be taken to protect the worker.

Experience has shown that valves although "closed, may leak dangerous liquid or gas. This will require either disconnecting, capping, or blanking all service, process, vent, or overflow lines on a given unit to prevent entrance of material by leakage through (or accidental opening of) a valve. This should include steam connections to a jacket. In case of welding on the wall between the inner tank and jacket, it should also include water, brine, or air lines to the jacket. Open ends of disconnected lines should be blanked or capped to prevent any flow from the disconnected end of the line entering a tank opening or draining onto assistants on the outside. Blanks should be installed as close to the tank as practicable to prevent drainage from trapped sections. Drains or overflow lines should be disconnected or blanked if they extend into a sewer from which steam or fumes could be conducted back to the tank, or if they connect to other equipment or extend to a remote location. All blanks should be of materials which are not susceptible to corrosion by the chemicals to which they are exposed with different types adequately identified. Blanks should be of such thickness and tensile strength as to satisfy the maximum pressure which may be imposed upon them without distortion or failure.

D. **Lock Out.** (See MCA Safety Guide No. 8- Electrical Switch Lock-Out Procedure.) Line-disconnect switches supplying power to any mechanical apparatus in the tank such as mixers, conveyors, etc. should be tagged and locked in the "off" position. It is not adequate to lock a push button station as it still may be possible to energize the circuit. The key shuld be kept by the man in the tank, and he alone should be authorized to unlock the switch and remove the tag on completion of the job. Where more than one man is exposed, each should place his own lock on the switch. In certain cases it may be advisable, as further protection, to have a plant electrician pull the line fuses in the electrical circuit involved or take other positive steps to guard against accidental energization. Where there is a line shaft, the belt or chain drive should be removed or similar positive measures provided, such as mechanical latches.

E. **Testing:** If the tank has held any flammable or harmful product before flushing; if it contains any residue or sludge which may release flammable or harmful gases or vapors; or if oxygen deficiency or excess is suspected or even possible, a test of the atmosphere in the tank should be made immediately before entering and before performing any hot work such as the lighting of torches. Presence of flammable or toxic vapors, excess oxygen or oxygen deficiency should be determined by direct reading instruments or chemical analysis. Single-fluid instruments which absorb both oxygen and carbon dioxide should not be used for oxygen determination. Interim tests of the atmosphere in the tank should be made as often as necessary while the work is in progress. Continuous sampling and analysis with automatic alarm may be indicated.

3. Issuance of Safety Work Permit for Entry

The Safety Work Permit is authorization and approval in writing. It serves as a method of formalizing agreed upon procedures. It is also a check list to insure that all existing hazards are considered, evaluated, and correct protective measures taken.

No employee should enter any tank without reporting to and securing

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visor. The supervisor in turn secures entry approval from the supervisor to whom the tank is assigned. The tank supervisor should then discuss the project in detail with those entering the tank. He should review the hazards of the product or other materials to which they may be exposed and furnish all the safety information he may be able to provide. Then supervisors of the men involved should review and complete the permit form jointly. Appropriate supervisors must be certain by personal investigation, immediately before entry and before signing the permit, that the entry and its incidental work will be safe. If a pause of appreciable duration occurs during the carrying out of a job, the site must be re-investigated by the authorized signer before the job can be allowed to resume. Commencement of a new shift should always require re-investigation and a new permit. No permit should be valid except for the job, location, persons, and time specified.

E. Precautions

1. Tools

Hand tools should be clean, in good condition, and selected carefully according to the uses intended. Spark-resistant hand tools are preferred where a possibility of flammable vapors or gases exists unless the area is well wetted down with water. Portable power tools and equipment should be clean and in good condition. Electrical tools and equipment (such as hand lamps and extension cords) should be grounded. If the tank is a "Hazardous Location" under the definitions of the National Electrical Code, it should be of the explosion proof type. If any Class I exposure (also Class II in dangerous flammable dust concentrations) it may be found preferable to use air-operated power tools. Even in these circumstances, careful thought must be given to the possibility of fire or explosion arising from struck sparks, overheating of the tool (as in drilling), electrostatic generation from discharge of compressed air, or other mechanical sources. The use of low voltage (32 volts or less) lighting and e- minimize further the possible hazard of electric shock.

Ladders used in tanks should be lashed at the top, and, if possible, at the bottom. Employees performing electrical welding in tanks should be provided and required to use rubber blankets and such other personal protective equipment as may be required. Welding and cutting torches must not be taken into the tank until ready to be used. They must be removed from the tank immediately after use. Cylinders of oxygen or other gas should never be taken into tanks, and should be turned off at the cylinder valve when not in use.

Special signs posted near the tank help keep unnecessary people away. They insure that potentially harmful operations will not be started independently nearby. And they help guide rescuers should they be necessary.

2. Personal Protective Equipment

Proper protection may range from complete coverage suits to chemical goggles, hard hats, gloves, and safety shoes.

Employees should never unduly expose the skin when working in tanks. They should wear full coverage of clothing at all times. When burning or welding is done inside a tank, supervision should consider the use of flame-proofed clothing by the employees involved. Working bareheaded, with shirt sleeves rolled up, or in an undershirt is considered hazardous.

Certified breathing air, from self-contained units, central systems such as cylinders of air, or suitable compressors should be supplied if a safe atmosphere cannot be guaranteed and if there is any possibility of air contamination or if there is oxygen deficiency while employees are within an enclosed vessel. The use of canister type masks (which operate on the principle of chemical absorption of mechanical filtration) may not afford adequate protection and should.

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therefore, not be used.

Equipment should bear Bureau of Mines approval. It should be suited specifically to the type of exposure and protect against the worst condition that might be encountered. For specifically recommended protection refer to MCA Chemical Safety Data Sheets or another authoritative source. The best type of respiratory protection should be ascertained in advance according to the specific exposure involved.

3. Emergency and Rescue

Where the potential exposure in the tank is acute, or requires an employee to wear respiratory protection, or rescue may be difficult, a body harness with lifeline must be provided. It is good practice to use a body harness for any vessel entry work. A safety harness or safety coveralls with a built-in harness and lifeline shall be used when tank space permits the safe emergency removal of personnel by standby manual personnel without requiring entry of the tank.

When the tank space does not meet this requirement a specific procedure for the rescue of personnel must be developed in the pre-planning stage of the tank entry work. It must be made a specific part of the Safety Work Permit. In some cases it is advisable to have a block and tackle positioned on a tripod or otherwise fastened above the manhole. For obvious reasons, manholes large enough to accommodate the man and his safety gear should be provided, such as a 24" diameter for circular ones. If manholes are smaller than 20" in the largest dimension, wrist harnesses often are practical. The free end of the lifeline should be secured to a fixed object. It should be attended by an observer who will keep the man in the tank always within his vision. The observer may pass tools. He must have no other job which will take his attention away from the man in the tank; which will interfere with his attempts to withdraw the victim by use of the lifeline; or which will require his leaving the vicinity of the tank for any time whatever.

In case of emergency, the outside observer must never enter the tank until he is relieved at his post. It is his job to summon aid immediately (various alarms, such as a whistle, may be used); to attempt to remove the victim by use of the lifeline, and to perform all other necessary rescue functions from outside. Upon the arrival of help, he may enter the tank for rescue work only when he is assured that his outside assistance is adequate. Such safety observers should be well trained in basic First Aid principles, such as rescue breathing techniques. Rescuers entering tank must be protected with the safety facilities required by the situation, i.e., lifeline and harness, and proper personal protective equipment. For rescue purposes at least one unit of self-contained breathing equipment should be located outside and convenient to the tank together with harness, rope, and such other emergency equipment as may be indicated. It is better to have too much equipment at the job site than too little-too late! Where hazardous chemicals may be contacted in the course of tank work or where the possibility of fire is involved, a charged hose line with spray nozzle should be available nearby. The number of men in a tank, particularly at the time of burning or welding, must be reduced to the absolute minimum necessary for the work itself.

The supervisors concerned must be trained to be on the alert, before and during the job to detect and correct immediately new and different hazards or to stop the work until the new hazards are corrected.

F. Cleaning Tanks Containing Flammable Materials

1. General Precautions

A. Workmen must be familiar with fire and accident prevention regulations and comply with them in every respect. These regulations cover fire, explosion, as-

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phyxiation, and possible poisoning from toxic material.

B. Before tank cleaning operations are started, all sources of ignition such as open fires, trucks, automobiles, etc., must be removed or eliminated from the vicinity. Wind and weather conditions must be considered. Work must not be started if the wind might carry highly inflammable vapors into an area where they could create a fire hazard. No matches or lighters may be carried, and smoking must be strictly prohibited.

C. Workmen will be provided with proper equipment, including suitable clothing, proper eye or face protection, tools, safety belts, safety lines, and fresh air hose masks when required. The foreman should see that the equipment is of proper type, clean, and in good condition, and that the workmen are properly instructed in its use.

D. Workmen are not permitted to enter tanks until the tank has been tested and it is definitely determined that the vapor concentration has been reduced to the point where there is no danger. At all times flammable or toxic mixtures must be assumed to be present until tests have been proven otherwise.

NOTE: Tank vapor concentrations should be tested with an approved gas detector only such as the EXPLOSIMETER. See Proper Operation of Explosimeters.

E. While working in the tanks, the atmosphere inside must be rechecked periodically for dangerous vapor mixtures.

REMEMBER: Combustible mixtures may again be formed through admission of flammable vapors or liquids from other sources such as an unblanked line or connection, a break in the tank bottom, sludge, sediment, sidewall scale, etc.

F. Workers must always have a clear path of escape from the tank. They should bear in mind that they may have to use it in a hurry. Ladders should be used when a tank must be entered from above. They should be left secure until the last man is out the tank.

G. A safety man (commonly called "fire watch") must be outside the tank anytime anyone is inside. In case of an emergency, the safety man must not enter the tank until he secures more help.

H. Where lights are needed, use only lights approved for combustible atmospheres by Underwriters Laboratories.

I. Where power tools are used to clean tanks, extreme care must be exercised to keep from damaging or marring the tank.

J. Goggles must be worn when cutting rivets, scraping scale, operating power tools, and digging residue with a pick or shovel.

K. Where gas or vapor may be present and where a spark may cause ignition, use tools and equipment of non sparking material such as wood, fiber, bronze or beryllium copper.

L. Steam lines, if used for heating and ventilating the tank, must be grounded to the tank shell to prevent static accumulation.

M. Hot work (welding, riveting, etc.) shall be permitted in tanks only after the tanks are reasonably clean and tests have determined it to be free of flammable and toxic mixtures.

N. If a possibility of an oxygen deficiency exists in a tank, blow fresh air into it. When a tank has been closed for some time, rusting (oxidation) of the tank metal or materials in the tank may cause a deficiency. In that case, no one may enter the tank without a supplied air hose mask before the tank has been properly ventilated. Do not use Canister masks where there is a

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possible oxygen deficiency.

O. Tank workers overcome by vapors must be removed to fresh air immediately and artificial respiration administered until breathing resumes. Call a doctor at once and keep the resuscitated man quiet and warm until breathing and circulation become normal.

P. Report all injuries to your foreman immediately.

Q. A work order must be properly authorized before work of any kind is performed where there is a possible explosive vapor concentration.

R. Adequate fire fighting equipment must be on hand for any fire which may result from any phase of the tank cleaning operation. OBSERVE THE PLANT FIRE RULES.

S. When the tank is clean, care must be exercised to see that all foreign material such as tools, pieces of pipe, etc., are removed from the tank before it is placed back in service.

2. Proper Use of Fresh-Air Hose Masks:

When fresh-air hose masks are used, the following safety precautions must be observed:

A. Approved fresh-air hose masks and lifelines must be worn by men entering tanks unless ventilation has reduced flammable vapors to 0.1%.

B. The mask must be thoroughly inspected and found to be in safe operating condition before using.

C. Hats or caps should be removed. The mouth shall be cleared of tobacco, etc., before adjusting mask to the head.

D. All fittings on the hose and mask must be tight. There should be no leaks around the face piece.

E. The air intake to the hose leading to the mask must be kept in fresh uncontaminated air.

F. Any person wearing the gas constant observation by another man while he is in the tank. Two or more men should be available to aid in his rescue should he become unconscious.

G. If a workman is overcome by vapors, he must be removed to fresh air immediately. Artificial respiration must be administered until he resumes breathing.

H. A doctor must be called at once. The resuscitated man must be kept quiet and warm until breathing and circulation have become normal.

I. When it is necessary for the rescuer to go inside the tank, the rescuer first must get help and then equip himself with adequate respiratory protection before entering the tank.

J. Gas-mask face pieces must be cleaned and sterilized after use and put into condition for use again.

K. Workmen are not permitted to enter tanks containing toxic or inflammable mixtures without the expressed permission of the plant superintendent or a supervisor delegated by him.

L. All injuries must be reported to your foreman immediately.

3. Proper Operation of Explosimeters:

The individual making tests with the Explosimeter must be thoroughly familiar with the instrument and be satisfied that it is in proper working order. The following recommendations should be observed to insure proper operation of the Explosimeter:

A. The batteries in the Explosimeter should be replaced monthly with fresh batteries, or more often if used frequently.

B. The instrument should be checked before it is used by placing the open end of the sample line into the neck of a bottle containing benzol. (CAUTION: Do not allow the open end of the sample

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benzol.) The aspirator bulb should be squeezed until the instrument definitely shows an explosive material. The sample line should then be removed to normal atmosphere and the instrument purged, by squeezing the aspirator, until the needle goes back to zero.

C. After checking the Explosimeter, the needle is again adjusted to zero, by means of the rheostat, and the tank is then tested.

D. Tank tests should not be made in the presence of steam.

E. After testing the tank, the Explosimeter should be again recalibrated and rechecked by sampling the benzol bottle.

4. **Tank Preparation:**

A. Contents of the tank must be pumped out as completely as possible through the regular pump-out line. When desirable, water can be added to raise the liquid level to the pump suction to remove additional or possibly all of the liquid contents.

B. Supply lines and swing lines must be thoroughly washed out and either blanked off close to the tank with slip blanks between flanges, or disconnected and provided with bull plugs or blank flanges. Do not rely on valves for positive shutoff.

C. The tank must be purged of all toxic or explosive vapors before workmen may enter the tank to remove residue, perform repair work, etc.

D. Preparing Underground Storage Tanks:

This type of vessel requires extra care to prevent leakage of flammable liquids or vapors from the outside ground area into the tank after it has been tested and found vapor-free. Lines into or from the tank should be isolated so that vapors cannot drift into the area or into the tank.

for shore tanks are not applicable for tank barges. Such vessels are all subject to the regulations of the U.S. Coast Guard for tank vessels.

F. Preparing Tank Cars:

The material in tank cars can be divided roughly into two divisions; those containing oils such as creosote, etc., and those containing the heavier material such as tars, pitches, etc.

The cars containing oils should be thoroughly steamed. Then the steam should be shut off; the tank car should be permitted to cool; it should be ventilated, and gas tests should be made.

Tank cars, which have been used for tar or similar material, should be ventilated for at least five hours before gas tests are made. Steaming should be used if desirable.

G. Tank cars must be steamed clean when welding and cutting operations are done inside the car. When welding is performed on the outside of the car, the tank should be live steamed for 20 minutes and steam should be left in car while welding.

H. A safety man must be placed in attendance until the operation is proven safe.

I. When the cars are not provided with a permanent inside ladder, a removable ladder must be used. It should be a well constructed light metal ladder that will extend from the bottom of the car into the dome. However, it should not protrude through the hole in the dome of the car. This would not allow a man to enter through the dome into the car.

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5. Ventilating

Before workmen enter tanks, satisfactory ventilation must be established in the tank. Quite often natural ventilation is not satisfactory. This is true in underground storage tanks and tank cars which normally are equipped with one opening. Therefore, the use of wind sails, steam or air operated exhausters, or electrically driven blowers may be required. Air movers or exhausters should be bonded to the tank and all electric motors must be spark-proof.

Additional ventilation may be obtained in tank cars by the use of water. With a "bare-back" shell car, water may be sprayed on the outside of the car. With an insulated car, cold water may be sprayed on the inside of the car shell, or the car filled with cold water and then drained. Cold water running through steam coils in the cars will considerably reduce the temperature in the car.

6. Sweetening Tanks

After a tank has been purged and tested to be free of all dangerous gas, some plants have distributed slaked lime on the remaining residue (before workmen enter the tank) with good results. The slaked lime tends to rid the tank of undesirable odors. It has also been found desirable to add lime to the water when boiling out tanks.

7. Cylinder Entry

A. Entry of a cylinder is prohibited until the bridge rail has been removed or the track taken out of service by posting signs or blue flags.
B. The door secured to prevent closure.

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KOPPERS
Chemicals and Coatings

MATERIAL SAFETY DATA SHEET

(Approved by U.S. Department of Labor "Essentially Similar" to Form LSB-005-4)

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Specialty Wood Chemica

DATE OF PREP.
y 25, 1977

Section I — PRODUCT IDENTIFICATION

MANUFACTURER'S NAME: Koppers Company., Inc.. Wood Treating Chemicals Dept.

EMERGENCY TELEPHONE NO.: 314/772-2200

STREET ADDRESS: 5137 Southwest Avenue

CITY, STATE, AND ZIP CODE: St. Louis, Missouri 63110

MANUFACTURER'S CODE IDENTIFICATION:

PRODUCT CLASS: Wood Preservative (Water Repellent)

TRADE NAME: Woodtox Preprime T-RTU

Section II — HAZARDOUS INGREDIENTS

INGREDIENT	PERCENT	TLV PPM	TLV mg/M³	REMARKS
Pentachlorophenol	5		0.5	
Mineral Spirits	85	500	2000	

Section III — PHYSICAL DATA

BOILING RANGE (760 mm Hg): 300-700°F

FREEZING POINT: < -10°F

PERCENT VOLATILE BY VOLUME: 85

VAPOR PRESSURE AT 20° C: mineral spirits <2mm; pentachlorophenal <1mm

SPECIFIC GRAVITY (H_2O = 1): .808

EVAPORATION RATE (BUTYL ACETATE = 1): slower than ether

VAPOR DENSITY: heavier than air

SOLUBLE IN WATER - % WT.: Insoluble

APPEARANCE AND ODOR: Amber; mild solvent odor

Section IV — FIRE AND EXPLOSION HAZARD DATA

FLASH POINT (METHOD USED): 115°F

FLAMMABLE LIMITS: mineral spirits — Lel: 0.7 — Uel: 6.0

EXTINGUISHING MEDIA:
Class B Extinguisher, Water fog, foam, Co_2. Dry Chemical

UNUSUAL FIRE AND EXPLOSION HAZARDS:
NA

SPECIAL FIRE FIGHTING PROCEDURES:
Wear full protection clothing. Do not allow any exposed body surfaces. Toxic vapors given off from a fire. Use self-contained breathing apparatus. Burning may produce hydrochloric acid, carbon monoxide.

MATERIAL SAFETY DATA SHEET

Section V — HEALTH HAZARD DATA

ESHOLD LIMIT VALUE

ec ction II

F OVEREXPOSURE

ing, coughing, irritation of nose, throat, eyes, respiratory difficulty. This product a etabolic stimulant, causes hyperthermia.

ERGENCY AND FIRST AID PROCEDURES

case of inhalation, remove to fresh air. In case of eye contact, flush eyes with water or at least 15 minutes. Get medical attention. Wash off skin immediately. If swallowed, duce vomiting by sticking finger down throat or giving mustard, soapy, or strong salty ater. AVOID ASPIRATION. Repeat until vomit is clear. Get medical attention.

Section VI — REACTIVITY DATA

ABILITY (eck One)		CONDITIONS TO AVOID
	[ ] UNSTABLE	Keep contents and freshly treated articles away from flame, food,
	[X] STABLE	and living plants.

OMPATABILITY (materials to avoid)

xidizing agents

ZARDOUS DECOMPOSITION PRODUCTS

O, CO_2, HCL, Phenolics

ZARDOUS LYMERIZATION (eck One)		CONDITIONS TO AVOID
	[ ] MAY OCCUR	
	[X] WILL NOT OCCUR	

Section VII — SPILL OR LEAK PROCEDURES

EPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED

er e sources of ignition. Avoid contact, avoid breathing vapors. Use protective mea- outlined in Section VIII below. Absorb spills with an absorbant such as Speedi-Dry ro sed clay. Large spills can be diked and pumped into a waste container. See ection IX below.

STE DISPOSAL METHOD

Disposal must be carried out in accordance with local, state and federal regulations. Pentachlorophenol is toxic to fish. Do not dispose near water drainage to streams or odies of water. Bury absorbant material in an approved chemical landfill, or high emperature incineration may be used. Do not incinerate closed containers.

Section VIII — SPECIAL PROTECTION INFORMATION

SPIRATORY PROTECTION (specify type)

, S. Bureau of Mines approved organic vapor and particulate matter masks (Type BE)

ENTILATION	LOCAL EXHAUST	SPECIAL
	To control vapors to concentrations below TLV in Section II.	
	MECHANICAL (general)	OTHER

OTECTIVE GLOVES	EYE PROTECTION
Rubber gloves	Chemical goggles

HER PROTECTIVE EQUIPMENT

Section IX — SPECIAL PRECAUTIONS

ECAUTIONS TO BE TAKEN IN HANDLING AND STORING

tore in closed, properly labeled containers. Avoid prolonged and/or repeated breathing f mist, vapors, or substantially saturated atmosphere. Avoid contact with skin. Wear pproved goggles. Do not atomize. Use only in well ventilated area. Keep contents and y treated articles away from flame, food and living plants.

RECAUTIONS

Do t take internally. Wash contaminated clothing before reusing. Discard contaminated hoes. Approved (USBM) respirators can be used if oxygen level above 16% and vapor con- entration below 1%, otherwise use self-contained units. Do not use when temperature xceeds 120°F. If spilled, blot up with an absorbant material such as Speedi-Dry absorbant, processed clay sold by Mineral & Chemicals Co., Edison, N.J.

KOPPERS
Chemicals and Coatings

MATERIAL SAFETY DATA SHEET

(Approved by U.S. Department of Labor "Essentially Similar" to Form LSB-005-4)

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Specialty Wood Chemic

DATE OF PREP.
May 25, 1977

Section I — PRODUCT IDENTIFICATION

MANUFACTURER'S NAME: Koppers Company, Inc., Wood Treating Chemicals Dept.

EMERGENCY TELEPHONE NO.: 314/772-2200

STREET ADDRESS: 5137 Southwest Avenue

CITY, STATE, AND ZIP CODE: St. Louis, Missouri 63110

MANUFACTURER'S CODE IDENTIFICATION:

PRODUCT CLASS: Wood Preservative (Conc.)

TRADE NAME: Woodtox Preprime Conc. T

Section II — HAZARDOUS INGREDIENTS

INGREDIENT	PERCENT	TLV PPM	TLV mg/M³	REMARKS
Pentachlorophenol	22.5		0.5	
Solvents	70	500		
Ketone Mixture	< 5	50	230	suggested

Section III — PHYSICAL DATA

BOILING RANGE (760 mm Hg): 175-700

FREEZING POINT: 10-15°F

PERCENT VOLATILE BY VOLUME: 75

VAPOR PRESSURE AT 20° C: Pentachlorophenol < 1mm

SPECIFIC GRAVITY (H_2O = 1): .97

EVAPORATION RATE (BUTYL ACETATE = 1): slower than ether

VAPOR DENSITY: > 4.7

SOLUBLE IN WATER - % WT.: Insoluble

APPEARANCE AND ODOR: Amber; mild solvent odor

Section IV — FIRE AND EXPLOSION HAZARD DATA

FLASH POINT (METHOD USED): 120°

FLAMMABLE LIMITS: mineral spirits — LEL: 0.7 — UEL: 6.0

EXTINGUISHING MEDIA: Class B Extinguisher, Water fog, foam, CO_2, Dry Chemical

UNUSUAL FIRE AND EXPLOSION HAZARDS: N.A.

SPECIAL FIRE FIGHTING PROCEDURES: Wear full protection clothing. Do not allow any exposed body surfaces. Toxic vapors given off from a fire. Use self-contained breathing apparatus. Burning may produce hydrochloric acid, carbon monoxide.

MATERIAL SAFETY DATA SHEET

Section V — HEALTH HAZARD DATA

ESHOLD LIMIT VALUE
ee tion II

EFFECTS OF OVEREXPOSURE
ing, coughing, irritation of nose, throat, eyes, respiratory difficulty. This product metabolic stimulant, causes hyperthermia.

olvents: irritating to eyes and mucous membranes. Inhalation may cause headache rowsiness, and nausea.

EMERGENCY AND FIRST AID PROCEDURES
n case of inhalation, remove to fresh air. In case of eye contact, flush eyes with water or at least 15 minutes, Get medical attention. Wash off skin immediately. If swallowed, induce vomiting by sticking finger down throat or giving mustard, soapy, or strong salty water. AVOID ASPIRATION. Repeat until vomit is clear. Get medical attention.

Section VI — REACTIVITY DATA

STABILITY (Check One)		CONDITIONS TO AVOID
	[ ] UNSTABLE	Keep contents and freshly treated articles away from flame, food, and living plants.
	[X] STABLE	

INCOMPATIBILITY (materials to avoid)
Oxidizing agents

HAZARDOUS DECOMPOSITION PRODUCTS
CO, CO_2, HCL, Phenolics

HAZARDOUS POLYMERIZATION (Check One)		CONDITIONS TO AVOID
	[ ] MAY OCCUR	
	[X] WILL NOT OCCUR	

Section VII — SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED
Re ve sources of ignition. Avoid contact, avoid breathing vapors. Use protective measures outlined in Section VIII below. Absorb spills with an absorbant such as Speedi-Dry processed clay. Large spills can be diked and pumped into a waste container. See Section IX below.

WASTE DISPOSAL METHOD
Disposal must be carried out in accordance with local, state and federal regulations. Pentachlorophenal is toxic to fish. Do not dispose near water drainage to streams or bodies of water. Bury absorbant material in an approved chemical landfill, or high temperature incineration may be used. Do not incinerate closed containers.

Section VIII — SPECIAL PROTECTION INFORMATION

RESPIRATORY PROTECTION (specify type)
U.S. Bureau of Mines approved organic vapor and particulate matter masks (Type BE)

VENTILATION		
LOCAL EXHAUST: To control vapors to concentrations below TLV in Section II.	SPECIAL	
MECHANICAL (General)	OTHER	

PROTECTIVE GLOVES	EYE PROTECTION
Rubber gloves	Chemical goggles

OTHER PROTECTIVE EQUIPMENT

Section IX — SPECIAL PRECAUTIONS

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORING
Store in closed, properly labeled containers. Avoid prolonged and/or repeated breathing of mist, vapors, or substantially saturated atmosphere. Avoid contact with skin. Wear approved goggles. Do not atomize. Use only in well ventilated area. Keep contents and freshly treated articles away from flame, food and living plants.

OTHER PRECAUTIONS
Do not take internally. Wash contaminated clothing before reusing. Discard contaminated shoes. Approved (USBM) respirators can be used if oxygen level above 16% and vapor concentration below 2%, otherwise use self-contained units. Do not use when temperature exceeds 120°F. If spilled, blot up with an absorbant material such as Speedi-Dry absorbant, a processed clay sold by Mineral & Chemicals Co., Edison, N.J.

KOPPERS Chemicals and Coatings

MATERIAL SAFETY DATA SHEET

(Approved by U.S. Department of Labor "Essentially Similar" to Form LSB-005-4)

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Specialty Wood Chemical

DATE OF PREP.: y 25, 1977

Section I — PRODUCT IDENTIFICATION

MANUFACTURER'S NAME: Koppers Company, Inc., Wood Treating Chemicals Dept.

EMERGENCY TELEPHONE NO.: 314/772-2200

STREET ADDRESS: 5137 Southwest Avenue

CITY, STATE, AND ZIP CODE: St. Louis, Missouri 63110

MANUFACTURER'S CODE IDENTIFICATION:

PRODUCT CLASS: Wood Preservative (Water Repellent)

TRADE NAME: Woodtox 140T - Ready to Use

Section II — HAZARDOUS INGREDIENTS

INGREDIENT	PERCENT	TLV PPM	TLV mg/M³	REMARKS
Pentachlorophenol	5		0.5	
Mineral Spirits	85	500	2000	

Section III — PHYSICAL DATA

BOILING RANGE 760 mm Hg	300-700	FREEZING POINT	< -10°F
PERCENT VOLATILE BY VOLUME	85%	VAPOR PRESSURE AT 20° C	mineral spirits 2mm; pentachlorophenol < 1mm
SPECIFIC GRAVITY (H_2O = 1)	.837	EVAPORATION RATE (BUTYL ACETATE = 1)	slower than ether
VAPOR DENSITY	heavier than air	SOLUBLE IN WATER - % WT.	Insoluble
APPEARANCE AND ODOR	Amber; mild solvent odor		

Section IV — FIRE AND EXPLOSION HAZARD DATA

FLASH POINT (METHOD USED)	FLAMMABLE LIMITS	LEL	UEL
104° F PMCC (Mineral Spirits)	mineral spirits	0.7	6.0

EXTINGUISHING MEDIA

Class B: Water Fog, Alcohol Foam, CO_2, Dry Chemical

UNUSUAL FIRE AND EXPLOSION HAZARDS

None

SPECIAL FIRE FIGHTING PROCEDURES

Wear full protection clothing. Do not allow any exposed body surfaces. Toxic vapors given off from a fire. Use self-contained breathing apparatus. Burning may produce hydrochloric acid, carbon monoxide.

MATERIAL SAFETY DATA SHEET

Section V — HEALTH HAZARD DATA

HOLD LIMIT VALUE

ection II.

OVEREXPOSURE

ıg, coughin, irritation of nose, throat, eyes, respiratory difficulty. This product

metabolic stimulant, causes hyperthermia.

ENCY AND FIRST AID PROCEDURES

case of inhalation, remove to fresh air. In case of eye contact, flush eyes with water

r at least 15 minutes. Get medical attention. Wash off skin immediately. If swallowed,

nduce vomiting by sticking finger down throat or giving mustard, soapy, or strong salty

er. AVOID ASPIRATION. Repeat until vomit is clear. Get medical attention.

Section VI — REACTIVITY DATA

ITY	[ ]	UNSTABLE	CONDITIONS TO AVOID Keep contents and freshly treated articles away from flame,
One)	[X]	STABLE	food, and living plants.

MPATABILITY (materials to avoid)

xidizing agents

ZOUS DECOMPOSITION PRODUCTS

CO, CO_2, HCL, Phenolics

IDOUS	[ ]	MAY OCCUR	CONDITIONS TO AVOID
MERIZATION			
k One)	[X]	WILL NOT OCCUR	

Section VII — SPILL OR LEAK PROCEDURES

S TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED

e ıve sources of ignition. Avoid contact, avoid breathing vapors. Use protective mea-

outlined in Section VIII below. Absorb spills with an absorbant such as Speedi-Dry

essed clay. Large spills can be dike and pumped into a waste container. See

ction IX below.

DISPOSAL METHOD

isposal must be carried out in accordance with local, state and federal regulations.

entachlorophenol is toxic to fish. Do not dispose near water drainage to streams or

dies of water. Bury absorbant material in an approved chemical landfill, or high

nperature incineration may be used. Do not incinerate closed containers.

Section VIII — SPECIAL PROTECTION INFORMATION

IATORY PROTECTION (specify type)

.S. Bureau of Mines approved organic vapor and particulate matter masks (Type BE)

ILATION	LOCAL EXHAUST To control vapors to concentrations below TLV in Section II.	SPECIAL
	MECHANICAL (general)	OTHER

TECTIVE GLOVES Rubber gloves	EYE PROTECTION Chemical goggles

T PROTECTIVE EQUIPMENT

Section IX — SPECIAL PRECAUTIONS

CAUTIONS TO BE TAKEN IN HANDLING AND STORING

tore in closed, properly labeled containers. Avoid prolonged and/or repeated breathing

f mist, vapors, or substantially saturated atmosphere. Avoid contact with skin. Wear

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ly treated articles away from flame, food and living plants.

CAUTIONS

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KOPPERS
Chemicals and Coatings

MATERIAL SAFETY DATA SHEET

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Specialty Wood Chemic

E OF PREP.
May 25, 1977

Section I — PRODUCT IDENTIFICATION

MANUFACTURER'S NAME: Koppers Company., Inc., Wood Treating Chemicals Dept.

EMERGENCY TELEPHONE NO.: 314/772-2200

STREET ADDRESS: 5137 Southwest Avenue

CITY, STATE, AND ZIP CODE: St. Louis, Missouri 63110

MANUFACTURER'S CODE IDENTIFICATION:

PRODUCT CLASS: Wood Preservative (Water Repellent)

TRADE NAME: Woodtox 140T (Concentrate)

Section II — HAZARDOUS INGREDIENTS

INGREDIENT	PERCENT	TLV PPM	TLV mg/M³	REMARKS
Pentachlorophenol	22		0.5	
Mineral Spirits	20-30	500	2000	

Section III — PHYSICAL DATA

BOILING RANGE 760 mm Hg: 300 - 700

FREEZING POINT: 10-15°F

PERCENT VOLATILE BY VOLUME: 30

VAPOR PRESSURE AT 20° C: mineral spirits 2mm; pentachlorophenol <1mm

SPECIFIC GRAVITY (H_2O = 1): .97

EVAPORATION RATE (BUTYL ACETATE = 1): slower than ether

VAPOR DENSITY: heavier than air

SOLUBLE IN WATER - % WT.: Insoluble

APPEARANCE AND ODOR: Amber; mild solvent odor

Section IV — FIRE AND EXPLOSION HAZARD DATA

FLASH POINT (METHOD USED): 104°F PMCC (mineral spirits)

FLAMMABLE LIMITS: mineral spirits — Lel: 0.7, Uel: 6.0

EXTINGUISHING MEDIA: Class B Extinguisher, Water fog, foam, CO_2, Dry Chemical

UNUSUAL FIRE AND EXPLOSION HAZARDS: NA

ECIAL FIRE FIGHTING PROCEDURES: Wear full protection clothing. Do not allow any exposed body surfaces. Toxic vapors given off from a fire. Use self-contained breathing apparatus. Burning may produc hydrochloric acid, carbon monoxide.

MATERIAL SAFETY DATA SHEET

Section V — HEALTH HAZARD DATA

LIMIT VALUE
ction II

OVEREXPOSURE
g, coughing, irritation of nose, throat, eyes, respiratory difficulty. This product
n etabolic stimulant, causes hyperthermia.
ivents: dizziness, narcosis at high exposure levels

NCY AND FIRST AID PROCEDURES
case of inhalation, remove to fresh air. In case of eye contact, flush eyes with water
at least 15 minutes. Get medical attention. Wash off skin immediately. If swallowed,
ice vomiting by sticking finger down throat or giving mustard, soapy, or strong salty
er. AVOID ASPIRATION. Repeat until vomit is clear. Get medical attention.

Section VI — REACTIVITY DATA

ITY One)			CONDITIONS TO AVOID
	[ ]	UNSTABLE	Keep contents and freshly treated articles away from flame, food,
	[x]	STABLE	and living plants.

STABILITY (materials to avoid)
dizing agents

OUS DECOMPOSITION PRODUCTS
O, CO_2, Phenolics

DOUS MERIZATION One)			CONDITIONS TO AVOID
	[ ]	MAY OCCUR	
	[x]	WILL NOT OCCUR	

Section VII — SPILL OR LEAK PROCEDURES

S TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED
re sources of ignition. Avoid contact, avoid breathing vapors. Use protective mea-
outlined in Section VIII below. Absorb spills with an absorbant such as Speedi-Dry
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tion IX below.

DISPOSAL METHOD
isposal must be carried out in accordance with local, state and federal regulations.
ntachlorophenol is toxic to fish. Do not dispose near water drainage to streams or
ies of water. Bury absorbant material in an approved chemical landfill, or high
iperature incineration may be used. Do not incinerate closed containers.

Section VIII — SPECIAL PROTECTION INFORMATION

ATORY PROTECTION (specify type)
ormally not needed; USBM approved organic vapor and particulate matter masks (type BE)

LATION	LOCAL EXHAUST	SPECIAL
	MECHANICAL (General)	OTHER

TECTIVE GLOVES	EYE PROTECTION
Rubber gloves	Chemical goggles

PROTECTIVE EQUIPMENT

Section IX — SPECIAL PRECAUTIONS

UTIONS TO BE TAKEN IN HANDLING AND STORING
re in closed, properly labeled containers. Avoid prolonged and/or repeated breathing of
ist, vapors, or substantially saturated atmosphere. Avoid contact with skin. Wear ap-
oved goggles. Do not atomize. Use only in well ventilated area. Keep contents and
v treated articles away from flame, food and living plants.

AUTIONS
take internally. Wash contaminated clothing before reusing. Discard contaminated
es. Approved (USBM) respirators can be used if oxygen level above 16% and vapor
oncentration below 2%, otherwise use self-contained units. Do not use when temperature
ceeds 120°F. If spilled, blot up with an absorbant material such as Speedi-Dry absorbant,
processed clay sold by Minerals & Chemical Co., Edison, N. J.

Chemicals and Coatings

(Approved by U.S. Department of Labor "Essentially Similar" to Form LSU-005-4)

WHILE THE INFORMATION AND RECOMMENDATIONS SET FORTH HEREIN ARE BELIEVED TO BE ACCURATE AS OF THE DATE HEREOF, KOPPERS COMPANY MAKES NO WARRANTY WITH RESPECT THERETO AND DISCLAIMS ALL LIABILITY FROM RELIANCE THEREON.

Specialty Wood Chem

DATE OF PREP.
June 3, 1977

Section I — PRODUCT IDENTIFICATION

MANUFACTURER'S NAME: Koppers Company, Inc., Wood Treating Chemicals Dept.

EMERGENCY TELEPHONE NO.: 314/772-2200

STREET ADDRESS: 5137 Southwest Avenue

CITY, STATE, AND ZIP CODE: St. Louis, Missouri 63110

MANUFACTURER'S CODE IDENTIFICATION:

PRODUCT CLASS: Water Repellent

TRADE NAME: WR 340 CONCENTRATE

Section II — HAZARDOUS INGREDIENTS

INGREDIENT	PERCENT	TLV ppm	TLV mg/m³	REMARKS
Ketone Mixture	95	200	700	These are sug ted levels only

Section III — PHYSICAL DATA

BOILING RANGE (760 mm Hg) 216°F	FREEZING POINT
PERCENT VOLATILE BY VOLUME 95%	VAPOR PRESSURE AT 20° C
SPECIFIC GRAVITY (H_2O = 1)	EVAPORATION RATE (BUTYL ACETATE = 1) Slower than ether
VAPOR DENSITY	SOLUBLE IN WATER - % WT. < 5%

APPEARANCE AND ODOR

Section IV — FIRE AND EXPLOSION HAZARD DATA

FLASH POINT (METHOD USED): 185°F PMCC

FLAMMABLE LIMITS: Lower: 15,000 ppm | LEL | UEL

EXTINGUISHING MEDIA: Dry Chemical, CO_2, Alcohol foam

UNUSUAL FIRE AND EXPLOSION HAZARDS: None

SPECIAL FIRE FIGHTING PROCEDURES: Self-contained breathing apparatus with a full facepiece operated in the pressure demand (positive pressure) mode.

Section V — HEALTH HAZARD DATA

SHOLD LIMIT VALUE
ne established: See Section II

TS OF OVEREXPOSURE
mild skin and eye irritant. Inhalation: nose irritation, drowsiness, loss of ousness

GENCY AND FIRST AID PROCEDURES
h affected area with water, use soap or mild detergent. If swallowed, DO NOT induce niting. For inhalation exposure, remove to fresh air. If breathing has stopped, use icial respiration. Get Medical attention.

Section VI — REACTIVITY DATA

			CONDITIONS TO AVOID
ITY	[ ]	UNSTABLE	
One)	[X]	STABLE	

PATIBILITY (materials to avoid)
id oxidizers and sources of igniting.

OUS DECOMPOSITION PRODUCTS
c gases and vapors (such as CO) released in fire.

			CONDITIONS TO AVOID
DOUS ERIZATION	[ ]	MAY OCCUR	
One)	[X]	WILL NOT OCCUR	

Section VII — SPILL OR LEAK PROCEDURES

BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED
up spill or leaks on absorbant paper; burn paper in incinerator; absorb in vermiculite.

ISPOSAL METHOD
eration is best method, or absorb in vermiculite and dispose in landfill. Do not aminate water.

Section VIII — SPECIAL PROTECTION INFORMATION

TORY PROTECTION (specify type)
ecessary <200 ppm Organic vapor canister gas mask; self-contained or supplied air respirator.

ILATION	LOCAL EXHAUST	SPECIAL
	MECHANICAL (General) XX	OTHER

IVE GLOVES	EYE PROTECTION
er gloves	Chemical goggles (splash safety)

PROTECTIVE EQUIPMENT

Section IX — SPECIAL PRECAUTIONS

UTIONS TO BE TAKEN IN HANDLING AND STORING
d skin contact. Avoid prolonged breathing of vapors. Do not use near a source of on. Avoid contamination of feed or food stuffs. Store in tightly closed containers in a location. Ventilated area.

UTIONS
aminated clothing before reuse. Do not reuse containers. Read label thoroughly, product is to be mixed with other toxic materials.

KOPPERS Chemicals and Coatings

MATERIAL SAFETY DATA SHEET

(Approved by U.S. Department of Labor "Essentially Similar" to Form LSB-005-4)

WHILE THE INFORMATION AND RECOMMENDATIONS SET FORTH HEREIN ARE BELIEVED TO BE ACCURATE AS OF THE DATE HEREOF, KOPPERS COMPANY MAKES NO WARRANTY WITH RESPECT THERETO AND DISCLAIMS ALL LIABILITY FROM RELIANCE THEREON.

Specialty Wood Chemi

DATE OF PREP.: May 25, 1977

Section I — PRODUCT IDENTIFICATION

MANUFACTURER'S NAME: Koppers Company, Inc., Wood Treating Chemicals Dept.

EMERGENCY TELEPHONE NO.: 314/772-2200

STREET ADDRESS: 5137 Southwest Avenue

CITY, STATE, AND ZIP CODE: St. Louis, Missouri 63110

MANUFACTURER'S CODE IDENTIFICATION:

PRODUCT CLASS: Wood Preservative (concentrate)

TRADE NAME: Timbertox 40 Concentrate

Section II — HAZARDOUS INGREDIENTS

INGREDIENT	PERCENT	TLV PPM	TLV mg/M³	REMARKS
Pentachlorophenol	40		0.5	
Ketone Mixture	40	80	230	suggested
Hydrocarbon Solvent	20	500		

Section III — PHYSICAL DATA

BOILING RANGE (760 mm Hg)	175+	FREEZING POINT	>-10°F
PERCENT VOLATILE BY VOLUME	60	VAPOR PRESSURE AT 20° C	pentachlorophenol < 1mm
SPECIFIC GRAVITY (H_2O = 1)	1.12	EVAPORATION RATE (BUTYL ACETATE = 1)	slower than ether
VAPOR DENSITY	heavier than air	SOLUBLE IN WATER - % WT.	Insoluble
APPEARANCE AND ODOR	Dark; mild solvent odor		

Section IV — FIRE AND EXPLOSION HAZARD DATA

FLASH POINT (METHOD USED)	FLAMMABLE LIMITS	LEL	UEL
> 100°F	Mineral spirits	0.7	6.0

EXTINGUISHING MEDIA: Class B Extinguisher, Water fog, foam, CO_2, Dry Chemical

UNUSUAL FIRE AND EXPLOSION HAZARDS: Ketone vapors can form explosive vapors at elevated temperatures. Control all ignition sources when in use. Ketone vapors are heavier than air.

SPECIAL FIRE FIGHTING PROCEDURES: Wear full protection clothing. Do not allow any exposed body surfaces. Toxic vapors given off from a fire. Use self-contained breathing apparatus. Burning may produce hydrochloric acid, carbon monoxide.

MATERIAL SAFETY DATA SHEET

Section V — HEALTH HAZARD DATA

LIMIT VALUE
tion II

EREXPOSURE
, coughing, irritation of nose, throat, eyes, respiratory difficulty. This product
etabolic stimulant, causes hyperthermia.

vents: irritating to eyes and mucous membranes. Inhalation may cause headache,
siness, and nausea.

ICY AND FIRST AID PROCEDURES
case of inhalation, remove to fresh air. In case of eye contact, flush eyes with water
at least 15 minutes. Get medical attention. Wash off skin immediately. If swallowed,
ce vomiting by sticking finger down throat or giving mustard, soapy, or strong salty
er. AVOID ASPIRATION. Repeat until vomit is clear. Get medical attention.

Section VI — REACTIVITY DATA

TY One)	☐ UNSTABLE	CONDITIONS TO AVOID: Keep contents and freshly treated articles away from flame, food
	☒ STABLE	and living plants.

STABILITY (materials to avoid)
dizing agents

ODOUS DECOMPOSITION PRODUCTS
O, CO_2, HCL, Phenolics

RDOUS MERIZATION One)	☐ MAY OCCUR	CONDITIONS TO AVOID
	☒ WILL NOT OCCUR	

Section VII — SPILL OR LEAK PROCEDURES

E TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED
e sources of ignition. Avoid contact, avoid breathing vapors. Use protective mea-
, outlined in Section VIII below.. Absorb spills with an absorbant such as Speedi-Dry
ocessed clay. Large spills can be diked and pumped into a waste container. See
tion IX below.

E DISPOSAL METHOD
Disposal must be carried out in accordance with local, state and federal regulations.
ntachlorophenol is toxic to fish. Do not dispose near water drainage to streams or
dies of water. Bury absorbant material in an approved chemical landfill, or high
emperature incineration may be used. Do not incinerate closed containers.

Section VIII — SPECIAL PROTECTION INFORMATION

RATORY PROTECTION (specify type)
. S. Bureau of Mines approved organic vapor and particulate matter masks (Type BE)

ILATION	LOCAL EXHAUST: To control vapors to concentrations below TLV in Section II.	SPECIAL
	MECHANICAL (general)	OTHER

TECTIVE GLOVES: Rubber gloves	EYE PROTECTION: Chemical goggles

R PROTECTIVE EQUIPMENT

Section IX — SPECIAL PRECAUTIONS

AUTIONS TO BE TAKEN IN HANDLING AND STORING
ore in closed, properly labeled containers. Avoid prolonged and/or repeated breathing
of mist, vapors, or substantially saturated atmosphere. Avoid contact with skin. Wear
pproved goggles. Do not atomized. Use only in well ventilated area. Keep contents and
ly treated articles away from flame, food and living plants.

ECAUTIONS
not take internally. Wash contaminated clothing before reusing. Discard contaminated
shoes. Approved (USBM) respirators can be used if oxygen level above 16% and vapor con-
centration below 2%, otherwise use self-contained units. Do not use when temperature
exceeds 120°F. If spilled, blot up with an absorbant material such as Speedi-Dry absorbant
. processed clay sold by Mineral & Chemicals Co., Edison, N.J.

Chemicals
and Coatings

MATERIAL SAFETY DATA SHEET

(Approved by U.S. Department of Labor "Especially Similar" in Form LSB-005-4)

WHILE THE INFORMATION AND RECOMMENDATIONS SET FORTH HEREIN ARE BELIEVED TO BE ACCURATE AS OF THE DATE HEREOF, KOPPERS COMPANY MAKES NO WARRANTY WITH RESPECT THERETO AND DISCLAIMS ALL LIABILITY FROM RELIANCE THEREON

DATE OF PREP.: December 13, 1976

Section I — PRODUCT IDENTIFICATION

MANUFACTURER'S NAME: Koppers Company, Inc. - Wood Treating Chemicals Dept.

EMERGENCY TELEPHONE NO.: 314-772-2200

STREET ADDRESS: 5137 Southwest Avenue

CITY, STATE, AND ZIP CODE: St. Louis, Missouri 63110

MANUFACTURER'S CODE IDENTIFICATION:

PRODUCT CLASS:

TRADE NAME: PETROSET II

Section II — HAZARDOUS INGREDIENTS

INGREDIENT	PERCENT	TLV PPM	TLV mg/M³	REMARKS
No hazardous ingredients as defined in section 0.57 of the regulations promulgated under Public Law 85-742 and incorporated in MIL - Standard - 1341A and Fed. Standard 313 of U.S. Department of Labor definition 29CFR 1501.2(S).				

Section III — PHYSICAL DATA

BOILING RANGE 760 mm Hg	Not defined	FREEZING POINT	Not defined
PERCENT VOLATILE BY VOLUME	Not defined	VAPOR PRESSURE AT 20° C	Not defined
SPECIFIC GRAVITY (H_2O = 1)	1.03	EVAPORATION RATE (BUTYL ACETATE = 1)	Not defined
VAPOR DENSITY	Not defined	SOLUBLE IN WATER - % WT.	Not defined

APPEARANCE AND ODOR: Dark Liquid

Section IV — FIRE AND EXPLOSION HAZARD DATA

FLASH POINT (METHOD USED): (COL) 375°F.

FLAMMABLE LIMITS: Not defined — LEL: — UEL:

EXTINGUISHING MEDIA: CO_2, Dry Chemical, Foam

UNUSUAL FIRE AND EXPLOSION HAZARDS: CO, Oxides of sulfur, Barium and Calcium may be formed

SPECIAL FIRE FIGHTING PROCEDURES:

MATERIAL SAFETY DATA SHEET

Section V — HEALTH HAZARD DATA

LIMIT VALUE
Not defined

OF OVEREXPOSURE
Not defined

EMERGENCY AND FIRST AID PROCEDURES
Not defined

Section VI — REACTIVITY DATA

STABILITY (Check One)		CONDITIONS TO AVOID
	UNSTABLE	Avoid excessive heat and strong oxidizers.
	XXX STABLE	

INCOMPATABILITY (materials to avoid)
Avoid strong oxidizers.

HAZARDOUS DECOMPOSITION PRODUCTS

HAZARDOUS POLYMERIZATION (Check One)		CONDITIONS TO AVOID
	MAY OCCUR	
	XX WILL NOT OCCUR	under normal operating conditions.

Section VII — SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED
Handle as an oil spill.

WASTE DISPOSAL METHOD
Incineration.

Section VIII — SPECIAL PROTECTION INFORMATION

RESPIRATORY PROTECTION (specify type)

VENTILATION	LOCAL EXHAUST	SPECIAL
	MECHANICAL (General) X	OTHER

PROTECTIVE GLOVES
Impervious Material

EYE PROTECTION
Face mask or safety goggles.

OTHER PROTECTIVE EQUIPMENT
Impervious outer clothing.

Section IX — SPECIAL PRECAUTIONS

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORING
ndard Precautions should be observed when handling materials of this type.
o not store at temperatures above 150°F.

CAUTIONS
prolonged or repeated contact with the skin.

Occupational Safety and Health Administration

MATERIAL SAFETY DATA SHEET

Required under USDL Safety and Health Regulations for Ship Repairing, Shipbuilding, and Shipbreaking (29 CFR 1915, 1916, 1917)

SECTION I

MANUFACTURER'S NAME: REICHHOLD CHEMICALS, INC.	EMERGENCY TELEPHONE NO.: (206) 572-5600
ADDRESS (Number, Street, City, State, and ZIP Code): 2340 Taylor Way (P. O. Box 1482), Tacoma, Wa. 98401	
CHEMICAL NAME AND SYNONYMS: Pentachlorophenol	TRADE NAME AND SYNONYMS: RCL 49 - 162 Pentachlorophenol
CHEMICAL FAMILY: Chlorinated phenols	FORMULA: C_6Cl_5OH

SECTION II - HAZARDOUS INGREDIENTS

PAINTS, PRESERVATIVES, & SOLVENTS	%	TLV (Units)	ALLOYS AND METALLIC COATINGS	%	TLV (Units)
PIGMENTS			BASE METAL		
CATALYST			ALLOYS		
VEHICLE			METALLIC COATINGS		
SOLVENTS			FILLER METAL PLUS COATING OR CORE FLUX		
ADDITIVES			OTHERS		
OTHERS					

HAZARDOUS MIXTURES OF OTHER LIQUIDS, SOLIDS, OR GASES	%	TLV (Units)

SECTION III - PHYSICAL DATA

BOILING POINT (°F.) 309° C.	754° F.	SPECIFIC GRAVITY (H_2O=1)	~1.86@25° C.
VAPOR PRESSURE (mm Hg.) 0.00011 20° C.	(68° F.)	PERCENT, VOLATILE BY VOLUME (%)	Negative
VAPOR DENSITY (AIR=1)	-----	EVAPORATION RATE (=1)	Negative
SOLUBILITY IN WATER 14 ppm at	68° F.		
APPEARANCE AND ODOR Hollow shot or solid blocks Buff colored			

SECTION IV - FIRE AND EXPLOSION HAZARD DATA

FLASH POINT (Method used) >300° C. Tagged closed cup	FLAMMABLE LIMITS	Lel	Uel
EXTINGUISHING MEDIA: Foam, water or carbon dioxide			
SPECIAL FIRE FIGHTING PROCEDURES: Blanket with foam, water or carbon dioxide			

UNUSUAL FIRE AND EXPLOSION HAZARDS

When subjected to high temperatures, decomposes. Decomposed products are acidic and corrosive. Volatile in steam.

(Continued on reverse side)

BZTO104(e)012589

SECTION V - HEALTH HAZARD DATA

THRESHOLD LIMIT VALUE: LD_{ce} ~ 29 mg/Kg man, LD_{50} ~ 146 mg/Kg Rats.

EFFECTS OF OVEREXPOSURE: Acute poisoning is marked by weakness, convulsion and collapse.

EMERGENCY AND FIRST AID PROCEDURES

EXTERNAL: Eyes–Immediately flush with copious quantities of clear water until physician arrives. Skin–Remove contaminated clothing; wash with copious amounts of soap and water. INTERNAL: Call a physician or poison Control Center immediately. CONTAMINATED CLOTHING: Thoroughly wash before re–use.

SECTION VI - REACTIVITY DATA

STABILITY			CONDITIONS TO AVOID
	UNSTABLE		Decomposes at high temperatures; avoid exposure to
	STABLE	X	temperatures above 300° C.

INCOMPATABILITY *(Materials to avoid)*: Dissolves in alkaline solutions

HAZARDOUS DECOMPOSITION PRODUCTS: Acid fumes containing organic chlorides

HAZARDOUS POLYMERIZATION			CONDITIONS TO AVOID
	MAY OCCUR		
	WILL NOT OCCUR	X	

SECTION VII - SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED

Wet down spilled material to prevent dusting

Sweep up and put back into container.

WASTE DISPOSAL METHOD

Take to chemical disposal area and cover with dirt.

SECTION VIII - SPECIAL PROTECTION INFORMATION

RESPIRATORY PROTECTION *(Specify type)*: Wear air purifying respirator for dust and vapors.

VENTILATION		
	LOCAL EXHAUST	SPECIAL
	MECHANICAL *(General)* Rubber gloves required.	OTHER Full safety goggles recommended

PROTECTIVE GLOVES	EYE PROTECTION

OTHER PROTECTIVE EQUIPMENT

SECTION IX - SPECIAL PRECAUTIONS

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORING

Avoid puncturing container.

Avoid temperatures above 300° C.

OTHER PRECAUTIONS: KEEP OUT OF REACH OF CHILDREN

Form OSHA-20

This information is furnished without warranty, representation, inducement or license of any kind, except that it is accurate to the best of Reichhold Chemicals, Inc.'s knowledge, or obtained from sources believed by Reichhold Chemicals, Inc. to be accurate, and Reichhold Chemicals, Inc. does not assume any legal responsibility for use or reliance upon same. Customers are encouraged to conduct their own tests. Before using any product, read its label.

Form Approved
Budget Bureau No. 44-R1367
Approval Expires April 30, 1971

Form No. LSB-005
May 1

U.S. DEPARTMENT OF LABOR

WORKPLACE STANDARDS ADMINISTRATION

Bureau of Labor Standards

MATERIAL SAFETY DATA SHEET

SECTION I

MANUFACTURER'S NAME: MONSANTO COMPANY	EMERGENCY TELEPHONE NO.: (314) 694-1000
ADDRESS (Number, Street, City, State, and ZIP Code): 800 NORTH LINDBERGH BLVD., St. Louis, Mo. 63166	
CHEMICAL NAME AND SYNONYMS: Pentachlorophenol	TRADE NAME AND SYNONYMS: PENTA
CHEMICAL FAMILY: Phenol	FORMULA: C_6Cl_5OH

SECTION II HAZARDOUS INGREDIENTS

PAINTS, PRESERVATIVES, & SOLVENTS	%	TLV (Units)	ALLOYS AND METALLIC COATINGS	%	TLV (Units)
PIGMENTS			BASE METAL		
CATALYST			ALLOYS		
VEHICLE			METALLIC COATINGS		
SOLVENTS			FILLER METAL PLUS COATING OR CORE FLUX		
ADDITIVES			OTHERS		
OTHERS					

HAZARDOUS MIXTURES OF OTHER LIQUIDS, SOLIDS, OR GASES	%	TLV (Units)

SECTION III PHYSICAL DATA

BOILING POINT (°F.) °C at 760 mm	310 (Decomp)	SPECIFIC GRAVITY (H_2O=1)	>1
VAPOR PRESSURE (mm Hg.) at 50°C	<1mm	PERCENT VOLATILE BY VOLUME (%)	N.A.
VAPOR DENSITY (AIR=1)	N.A.	EVAPORATION RATE (BUAC =1)	<1
SOLUBILITY IN WATER at 25°C Negligible	16ppm		
APPEARANCE AND ODOR Brown solid, characteristic odor			

SECTION IV FIRE AND EXPLOSION HAZARD DATA

FLASH POINT (Method used) N.A.	FLAMMABLE LIMITS N.A.	Lel	Uel
EXTINGUISHING MEDIA Water fog, foam, CO_2			
SPECIAL FIRE FIGHTING PROCEDURES N.A.			
UNUSUAL FIRE AND EXPLOSION HAZARDS N.A.			

BZTO104(e)012591

PENTACHLOROPHENOL

SECTION V HEALTH HAZARD DATA

THRESHOLD LIMIT VALUE 0.5 mg/cu.m.

EFFECTS OF OVEREXPOSURE Sneezing, coughing, irritation of nose, throat, eyes, respiratory difficulty, liver damage.

EMERGENCY AND FIRST AID PROCEDURES Wash off immediately with soap and water. Change out of contaminated clothing. If accidentally swallowed, cause vomiting and refer to physician for systematic treatment.

SECTION VI REACTIVITY DATA

STABILITY			CONDITIONS TO AVOID
	UNSTABLE		
	STABLE	x	

INCOMPATABILITY (Materials to avoid) None

HAZARDOUS DECOMPOSITION PRODUCTS CO, CO_2, HCl, Phenolics

HAZARDOUS POLYMERIZATION			CONDITIONS TO AVOID
	MAY OCCUR		
	WILL NOT OCCUR	x	

SECTION VII SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED Sweep up and dispose of in approved chemical landfill in accordance with local and state regulations.

WASTE DISPOSAL METHOD Bury in chemical landfill

SECTION VIII SPECIAL PROTECTION INFORMATION

RESPIRATORY PROTECTION (Specify type) Bureau of Mines dust respirator

VENTILATION	LOCAL EXHAUST	SPECIAL
	To control dust (or vapors if in solution)	
	MECHANICAL (General)	OTHER

PROTECTIVE GLOVES Rubber

EYE PROTECTION Chemical goggles

OTHER PROTECTIVE EQUIPMENT Do not wear contaminated clothing.

SECTION IX SPECIAL PRECAUTIONS

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORING Keep off skin. Keep away from mouth. Avoid dust, vapor, mist (inhalation). Wear approved goggles

OTHER PRECAUTIONS

HOH:EPW 12/2/71

I PRODUCT IDENTIFICATION

MANUFACTURER'S NAME	Monsanto Industrial Chemical Co.	REGULAR TELEPHONE NO. / EMERGENCY TELEPHONE NO.	314-694-1000
ADDRESS	800 North Lindbergh Blvd., St. Louis, Missouri 63166		
TRADE NAME	Pentachlorophenol		
SYNONYMS	Penta, Technical Penta, PCP		
SHIPPING NAME[1]	DOT: Not Restricted IATA: Not Restricted		

II HAZARDOUS INGREDIENTS[2]

MATERIAL OR COMPONENT	CAS NO.	%	HAZARD DATA
Pentachlorophenol (and other chlorinated phenols)		96	29 CFR Part 1910 40 CFR Part 129

III PHYSICAL DATA

BOILING POINT, 760 MM HG	310°C (Decomp.)	MELTING POINT	174°C Min.
SPECIFIC GRAVITY (H_2O = 1)	1.8500	VAPOR PRESSURE	0.00011 mm Hg. @ 20°C
VAPOR DENSITY (AIR = 1)	Nagative	SOLUBILITY IN H_2O % BY WT	14 ppm @ 20°C
% VOLATILES BY VOL.	Negative	EVAPORATION RATE (BUTYL ACETATE = 1)	<1
APPEARANCE AND ODOR	Brown Solid Chlorophenolic Odor	Ph (AS IS) Ph (1% SOLN.)	Ka = $.10^{-5}$ NA

IV FIRE AND EXPLOSION DATA

FLASH POINT (TEST METHOD)	Negative		AUTOIGNITION TEMPERATURE	Negative	
FLAMMABLE LIMITS IN AIR, % BY VOL.	Negative	LOWER		UPPER	
EXTINGUISHING MEDIA	Water, Fog, Foam, CO_2				
SPECIAL FIRE FIGHTING PROCEDURES	Wear full protection clothing. Do not allow exposed body surfaces. Toxic vapors given off from a fire. Use self-contained breathing apparatus. Blanket with extinguishing media.				
UNUSUAL FIRE AND EXPLOSION HAZARD	When subjected to high temperatures it decomposes to hydrochloric acid and water. Highly toxic gases (Chlorides and Chlorine) can be evolved when burned.				

1. See references 1 and 2 2. See instructions and references 1 to 8.

V HEALTH HAZARD INFORMATION

HEALTH HAZARD DATA	HAZARD CLASSIFICATION	BASIS FOR CLASSIFICATION	SOURCE
ROUTES OF EXPOSURE INHALATION	TLV 0.5 mg/cu. M Skin Notation		ACG, IH 29 CFR Part 1
SKIN CONTACT	(Mild) Sensitizer		16CFR 1500.3 (C)(5)
SKIN ABSORPTION	Toxic	200 < LD < 1000 mg/kg	ANSI 2-129.1 1976
EYE CONTACT	Mild Irritant		
INGESTION	Toxic	50 < LD_{50} < 500 mg/kg	ANSI 2-129.1 1976

EFFECTS OF OVEREXPOSURE ACUTE OVEREXPOSURE	Sneezing, irritation of nose, throat, eyes, respiratory difficulty liver damage. Hyperthemia, Liver, Kidney failure and death.
CHRONIC OVEREXPOSURE	Penta is expelled quite rapidly in sub acute doseages and chronic exposure over prolonged periods can lead to liver & kidney failure and death.

EMERGENCY AND FIRST AID PROCEDURES

EYES	Rinse eyes with clean water and apply eye ointment to prevent infection and ease irritation.
SKIN	Wash with plenty of soap and water.
INHALATION	Remove patient from source.
INGESTION	Induce vomiting by drinking mustard or salt water or finger in throat. Avoid Aspiration.

NOTES TO PHYSICIAN

This product is a metabolic stimulant. Causes hyperthemia treat symtomatically.

VI REACTIVITY DATA

CONDITIONS CONTRIBUTING TO INSTABILITY

Stable at temperatures $< 310^{\circ}C$.

COMPATIBILITY

Dissolves in alkaline solution

HAZARDOUS DECOMPOSITION PRODUCTS

CO, CO_2, HCL and phenolics

CONDITIONS CONTRIBUTING TO HAZARDOUS POLYMERIZATION

Will not occur.

VII DISPOSAL, SPILL OR LEAK PROCEDURES

AQUATIC TOXICITY (E.G. 96 HR TLM):

Highly toxic to fish, especially sensitive species such as trout. Safe at 0.05 ppm in water

WASTE DISPOSAL METHOD

Disposal must be carried out in accordance with local, state, and Federal regulations. Do not incinerate closed containers. Do not dispose near water drainage to stream or bodies of water. Bury in sanitary landfill and high temperature incineration (870°C Min

STEPS TO BE TAKEN IF MATERIAL IS RELEASED OR SPILLED

Wet down spilled material to prevent dusting and sweep up and dispose in approved manner. Avoid contact, avoid breathing vapors.

NEUTRALIZING CHEMICALS

None.

VIII SPECIAL PROTECTION INFORMATION

VENTILATION REQUIREMENTS

Not requiredin storage areas. In work areas use solvent type dust collectors. Maintain level below the TLV.

SPECIFIC PERSONAL PROTECTIVE EQUIPMENT

Rubber Gloves, Chemical Goggles,

RESPIRATORY (SPECIFY IN DETAIL)

Bureau of Mines approved respirator (Type BE) Approved organic vapor and particulate r

EYE

Chemical Goggles

GLOVES

Rubber, Neoprene

OTHER CLOTHING AND EQUIPMENT

Clean clothing fully covering body changed at least daily if in contact with penta.

Discard contaminated shoes.

IX SPECIAL PRECAUTIONS

CAUTIONARY STATEMENTS

Keep out of reach of children. Avoid prolonged and/or repeated breathing of vapors or dust. Avoid contact with skin. Keep contents and freshly treated articles away from flame, food, and living plants. Do not use contaminated sawdust for animal bedding.

OTHER HANDLING AND STORAGE REQUIREMENTS

Store in closed, properly labeled containers.
Do not reuse containers. Drums should be returned to drum reconditioner. Bags should be buried in sanitary landfill. Bags should be stored out of weather. Shelf life indefinite under good storage conditions.

ADDITIONAL REGULATORY CONCERNS

GENERAL:

FDA

USDA

CPSC

TSCA IS THIS PRODUCT, OR ALL ITS INGREDIENTS, BEING CERTIFIED FOR INCLUSION ON THE TOXIC SUBSTANCES CONTROL ACT INVENTORY OF CHEMICAL SUBSTANCES? As a registered pesticide, this product exempt.

OTHER EPA { FWPCA / FIFRA

STATE Water quality, Air quality and Health Departments in some states.

PREPARED BY J. M. Montgomery

TITLE: General Sales Manager

COMPANY: Koppers Company, Inc.

ADDRESS: 5137 Southwest Avenue
St. Louis, Missouri 63110

rm Approved OMB
. 44-21387.
roval Expires:
ugly 30, 1972

U.S. Department of Labor

Form No. OSHA-20
May, 1971

MATERIAL SAFETY DATA SHEET

SECTION I

MANUFACTURER'S NAME: MONSANTO COMPANY	EMERGENCY TELEPHONE NO
ADDRESS (Number, Street, City, State, and ZIP Code): 800 North Lindbergh Boulevard, St. Louis, Missouri 63166	
CHEMICAL NAME AND SYNONYMS	TRADE NAME AND SYNONYMS: MONSANTO HEAVY OXO [illegible] (HOE
CHEMICAL FAMILY: OXO ALCOHOL HIGH BOILERS	FORMULA

SECTION II HAZARDOUS INGREDIENTS

PAINTS, PRESERVATIVES, & SOLVENTS	%	TLV (Units)	ALLOYS AND METALLIC COATINGS	%	TLV (Units)
PIGMENTS			BASE METAL		
CATALYST			ALLOYS		
VEHICLE			METALLIC COATINGS		
SOLVENTS			FILLER METAL PLUS COATING OR CORE FLUX		
ADDITIVES			OTHERS		
OTHERS					

HAZARDOUS MIXTURES OF OTHER LIQUIDS, SOLIDS, OR GASES	%	TLV (Units)

SECTION III PHYSICAL DATA

BOILING POINT (°F.) @ 20 mm Hg	290	SPECIFIC GRAVITY (H_2O=1) @ 25/25°C	0.857
VAPOR PRESSURE (mm Hg.)	<0.1	PERCENT VOLATILE BY VOLUME (%)	NA
VAPOR DENSITY (AIR=1)	NA	EVAPORATION RATE (_____=1)	< 1
SOLUBILITY IN WATER %	<0.1		

APPEARANCE AND ODOR: Clear, straw-colored liquid; mild characteristic odor

SECTION IV FIRE AND EXPLOSION HAZARD DATA

FLASH POINT (Method used): COC - 305°F	FLAMMABLE LIMITS	Lel	Uel

EXTINGUISHING MEDIA: Dry powder, CO_2, Foam, Fog

SPECIAL FIRE FIGHTING PROCEDURES

UAL FIRE AND EXPLOSION HAZARDS

BZTO104(e)012597

SECTION V HEALTH HAZARD DATA

THRESHOLD LIMIT VALUE

EFFECTS OF OVEREXPOSURE

EMERGENCY AND FIRST AID PROCEDURES

SECTION VI REACTIVITY DATA

STABILITY			CONDITIONS TO AVOID
	UNSTABLE		
	STABLE	X	

INCOMPATABILITY (Materials to avoid) Strong oxidizing agents

HAZARDOUS DECOMPOSITION PRODUCTS

HAZARDOUS POLYMERIZATION			CONDITIONS TO AVOID
	MAY OCCUR		
	WILL NOT OCCUR	X	

SECTION VII SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED
Adsorb on clay, sawdust or filter-cel

WASTE DISPOSAL METHOD

Incinerate or dispose of in sanitary landfill according to local or state regulations.

SECTION VIII SPECIAL PROTECTION INFORMATION

RESPIRATORY PROTECTION (Specify type)

VENTILATION		
	LOCAL EXHAUST	SPECIAL
	MECHANICAL (General)	OTHER

PROTECTIVE GLOVES | EYE PROTECTION

OTHER PROTECTIVE EQUIPMENT

SECTION IX SPECIAL PRECAUTIONS

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORING

OTHER PRECAUTIONS

. the information and recommendations set forth herein are believed be accurate as of the date hereof, MONSANTO COMPANY MAKES NO WARRANTY WITH RESPECT THERETO AND DISCLAIMS ALL LIABILITY FROM RELIANCE THEREON.

R 9/8/75

/ / P

EASTMAN KODAK COMPANY
APPROVED BY U.S. DEPARTMENT OF LABOR
"ESSENTIALLY SIMILAR" TO FORM OSHA-20

ECP 2079-1F (8-79)

MATERIAL SAFETY DATA SHEET

SECTION I

PRODUCT NAME:	Solvent B-11	SIZE:	--
CHEMICAL NAME:	Mixture		
FORMULA:	Mixture		
MANUFACTURER:	Marketed by Eastman Chemical Products, Inc.		
ADDRESS:	Kingsport, Tennessee 37662		
FOR INFORMATION ON HEALTH HAZARDS CALL:	Monday thru Friday, 8 a.m.-5 p.m. (Eastern), (615) 247-0411, Ext. 3613, all other times (615) 247-0411, Ext. 4666.		
FOR OTHER INFORMATION CALL:	Same number as above Extension 5831	INFORMATION EFFECTIVE AS OF:	February, 1980

SECTION II HAZARDOUS INGREDIENTS OF MIXTURES

PRINCIPAL HAZARDOUS COMPONENT (S)	%	TLV (Units)
None known to Eastman.		

SECTION III PHYSICAL DATA

BOILING POINT (°F.)	Approx. 275-330°F (135-166°C)	SPECIFIC GRAVITY ($H_2O = 1$)	0.87-0.91 @ 20°/20°C
VAPOR PRESSURE (mm Hg.)	Not applicable.	PERCENT VOLATILE BY VOLUME (%)	Not applicable.
VAPOR DENSITY (AIR = 1)	Not applicable.	EVAPORATION RATE (__ __ . _ = 1)	Not applicable.
SOLUBILITY IN WATER	Negligible.		
APPEARANCE AND ODOR	Yellow to dark brown liquid; slightly unpleasant odor.		

SECTION IV FIRE AND EXPLOSION HAZARD DATA

FLASH POINT (Method used)	215°F (102°C) COC	FLAMMABLE LIMITS Not applicable.	Lel	Uel
EXTINGUISHING MEDIA	Foam, Water spray, Dry chemical, CO_2			
SPECIAL FIRE FIGHTING PROCEDURES	Wear self-contained breathing apparatus and protective clothing to prevent contact with skin or eyes.			
UNUSUAL FIRE AND EXPLOSION HAZARDS	None known to Eastman.			

SECTION V HEALTH HAZARD DATA

THRESHOLD LIMIT VALUE	Not established.
EFFECTS OF OVEREXPOSURE	May cause skin irritation or allergic skin reaction.
EMERGENCY AND FIRST AID PROCEDURES	Skin contact: wash thoroughly with soap and water.

SECTION VI REACTIVITY DATA

STABILITY	UNSTABLE		CONDITIONS TO AVOID
	STABLE	X	Not applicable.

INCOMPATIBILITY (Materials to avoid)	Oxidizing materials can cause a vigorous reaction.
HAZARDOUS DECOMPOSITION PRODUCTS	As with any other organic material, combustion will produce carbon dioxide and probably carbon monoxide.

HAZARDOUS POLYMERIZATION		CONDITIONS TO AVOID
May Occur	Will Not Occur X	Not applicable.

SECTION VII SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED	Eliminate all ignition sources. Flush spill away with water spray. Small spills may be collected with absorbent material.
WASTE DISPOSAL METHOD	Incineration. Observe all Federal, state, and local laws concerning health and environment.

SECTION VIII SPECIAL PROTECTION INFORMATION

RESPIRATORY PROTECTION (Specify type)	An appropriate NIOSH-approved respirator for organic vapor should be worn if needed.			
VENTILATION	LOCAL EXHAUST	As needed to control mist or vapor.	SPECIAL	None known to Eastman.
	MECHANICAL (general)	Recommended.	OTHER	None known to Eastman.
PROTECTIVE GLOVES	Should be worn.	EYE PROTECTION Safety glasses should be worn in any type of industrial operation.		
OTHER PROTECTIVE EQUIPMENT	Eye bath; safety shower.			

SECTION IX SPECIAL PRECAUTIONS

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORING	Avoid prolonged or repeated contact with skin. Use with adequate ventilation.
OTHER PRECAUTIONS	Good industrial hygiene practice should be followed which includes preventing eye contact, minimizing skin contact, and minimizing inhalation of mists and vapors. No eye hazard known to Eastman; however, any material gotten into the eye should be washed out immediately and medical attention obtained if symptoms persist after washing. Hazardous residue may remain in "empty" package; do not reuse or alter package without proper industrial cleaning.

The information contained herein is furnished without warranty of any kind. Employers should use this information only as a supplement to other information gathered by them and must make independent determinations of suitability and completeness of information from all sources to assure proper use of these materials and the safety and health of employees.

EASTMAN KODAK COMPANY
APPROVED BY U.S. DEPARTMENT OF LABOR
"ESSENTIALLY EQUAL" TO FORM OSHA-20

MATERIAL SAFETY DATA SHEET

SECTION I

PRODUCT NAME: Solvent KB-3	SIZE:
CHEMICAL NAME: Mixed Aliphatic Ketones	
FORMULA: Mixture	
MANUFACTURER: Marketed by Eastman Chemical Products, Inc.	
ADDRESS: Kingsport, Tennessee 37662	
FOR INFORMATION ON HEALTH HAZARDS CALL: Area 615-247-0411 Ext. 3613	
FOR OTHER INFORMATION CALL: Ext. 3103	SIGNATURE AND DATE: Information effective as of May, 1975

SECTION II HAZARDOUS INGREDIENTS OF MIXTURES

PRINCIPAL HAZARDOUS COMPONENT (S)	%	TLV (Units)

SECTION III PHYSICAL DATA

BOILING POINT (°F.)	Approx. 175°C	SPECIFIC GRAVITY ($H_2O = 1$)	Approx. .863
VAPOR PRESSURE (mm Hg.)		PERCENT VOLATILE BY VOLUME (%)	
VAPOR DENSITY (AIR = 1)		EVAPORATION RATE (_____ = 1)	
SOLUBILITY IN WATER	Slightly soluble in water		
APPEARANCE AND ODOR	Dark liquid - solvent odor		

SECTION IV FIRE AND EXPLOSION HAZARD DATA

FLASH POINT (Method used)	155°F C.O.C.	FLAMMABLE LIMITS	Lel	Uel

EXTINGUISHING MEDIA: Water, CO_2, Dry Chemical

SPECIAL FIRE FIGHTING PROCEDURES: None

UNUSUAL FIRE AND EXPLOSION HAZARDS: None

ECP 2070-1

SECTION V HEALTH HAZARD DATA

THRESHOLD LIMIT VALUE

Not established.

EFFECTS OF OVEREXPOSURE

Prolonged contact may cause skin irritation. Repeated contact may result in skin sensitization in susceptible individuals. High vapor concentrations may cause mucous membrane and respiratory tract irritation.

EMERGENCY AND FIRST AID PROCEDURES

Skin Contact: Flush affected areas thoroughly with water.
Eye Contact: Irrigate with water for 15 minutes and get medical attention.
Inhalation: Remove to fresh air.

SECTION VI REACTIVITY DATA

STABILITY	UNSTABLE		CONDITIONS TO AVOID
	STABLE	X	

INCOMPATIBILITY (Materials to avoid)

HAZARDOUS DECOMPOSITION PRODUCTS

HAZARDOUS POLYMERIZATION		CONDITIONS TO AVOID
May Occur	Will Not Occur	

SECTION VII SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED

Soak with absorbent material and incinerate.

WASTE DISPOSAL METHOD

Incinerate

SECTION VIII SPECIAL PROTECTION INFORMATION

RESPIRATORY PROTECTION (Specify type)

vapor at elevated temperatures

VENTILATION	LOCAL EXHAUST X if needed to control	SPECIAL
	MECHANICAL (general) X	OTHER

PROTECTIVE GLOVES X

EYE PROTECTION

OTHER PROTECTIVE EQUIPMENT

SECTION IX SPECIAL PRECAUTIONS

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORING

Avoid eye contact and prolonged or repeated skin contact. Avoid inhalation of vapor.

OTHER PRECAUTIONS

ECP 2070-2

Material Information Bulletin
Environmental Health & Toxicology

Chevron

Warning Statement	Name
DANGER! HARMFUL OR FATAL IF SWALLOWED COMBUSTIBLE	CHEVRON 325 SOLVENT

A. Typical Composition

	%
Paraffins (incl. naphthenes)	96%
Aromatics C_8+	4%

B. Physiological Effects and Health Information

Threshold Limit Value (TLV)	The suggested TLV is 250 ppm (Parts of vapor per million parts of air) for a daily 8-hour exposure. No OSHA exposure standard has been established for this material.
Eye Irritation	This material is not a primary eye irritant. However, minor irritation may be noted following contact. Application of the material into the eyes of rabbits produced a slight degree of membrane irritation.
Skin Irritation	This material may cause skin irritation on prolonged or frequently repeated contact. Application of the material onto the skin of rabbits produced a moderate degree of erythema and edema. The primary irritation score was 3.7 on a scale of 0 to 8. Prolonged or frequently repeated skin contact may cause the skin be become dry or cracked from the defatting action of the material.
Systemic Effects	From the results of animal studies, this material is not expected to be toxic by ingestion or by skin contact. The acute oral LD_{50} for rats was greater than 15.3 g/Kg, and the acute dermal LD_{50} for rabbits was greater than 19.1 g/Kg. Prolonged exposure to high vapor concentrations of this material may cause signs and symptoms of central nervous system depression such as, headache, dizziness, loss of appetite, weakness, and loss of coordination. Affected persons normally experience complete recovery when removed from the exposure area. Aspiration of the liquid can lead to chemical pneumonitis.

Note Disclaimer of Warranty, Page 4

Chevron Environmental Health Center/225 Bush Street, San Francisco, CA 94104
J. A. Spence, Ph. D. Reference Phone Number (415) 232-1514, Ext. 4178 or 2027

(Approved by U.S. Department of Labor, "Essentially similar to Form OSHA 20, Material Safety Data Sheet")
Rev. No. 47 - 1975

C. Emergency and First Aid Procedures

Eye Contact	Flush eyes with fresh water for at least 15 minutes. If irritation persists get medical attention.
Skin Contact	Use good personal hygiene practices while working with this material. Wash contaminated clothing before reuse.
Inhalation	If there are signs or symptoms of overexposure to mist or vapor of this material (as described in Section B - Systemic Effects), move the individual to an uncontaminated area. If breathing has stopped, apply artificial respiration. Get medical attention immediately.
Ingestion	If this material is swallowed and aspirated, chemical pneumonitis may result. If swallowed, DO NOT induce vomiting; get medical attention immediately.

D. Special Protection Information

Eye Protection	Avoid eye contact with this material. If the conditions or frequency of use increase the danger of exposure, eye contact can best be avoided by wearing chemical-safety goggles.
Respiratory Protection	The vapor or mist concentrations of this material must be kept below applicable standards (see Section B - TLV). If this cannot be achieved, the use of an approved respirator for organic vapor and mist, supplied-air or self-contained breathing equipment is recommended.
Skin Protection	Avoid prolonged or frequently repeated skin contact with this material. If the conditions or frequency of use increase the danger of exposure, skin contact can best be avoided by wearing impervious neoprene or rubber gloves.
Ventilation	Use adequate ventilation to keep the vapor or mist concentrations of this material below applicable standards.
Other	If eye or skin contact with this material can occur, washing facilities for eyes and skin should be available nearby.

E. Fire Protection Information

Flash Point (test method)	(TCC)100°F	Flammable Limits (by volume in air)	lower limit		upper limit	
Autoignition Temperature	610°F	Extinguishing Media	CO_2, Dry Chemical, Foam, Water Spray			
Special Fire Fighting Procedures	For fires involving this material, do not enter any enclosed or confined fire space without proper protective equipment. This may include self-contained breathing apparatus to protect against the hazardous effects of normal products of combustion or oxygen deficiency. Read the entire Bulletin.					

F. Reactivity Data

Stability (thermal, light, etc.)	Stable	X	Conditions to Avoid	
	Unstable			
Incompatibility (materials to avoid)	May react with strong oxidizing materials.			
Hazardous Decomposition Products	Normal combustion forms carbon dioxide and water vapor; incomplete combustion can produce carbon monoxide.			
Hazardous Polymerization	May Occur		Conditions to Avoid	
	Will not Occur	X		

G. Environmental Protection

Environmental Impact	Certain geographical areas have air pollution restrictions concerning the use of thinners and solvents in work situations where the material would be released into the atmosphere. Air pollution regulations should be studied to determine if this material is exempt in that area where it is to be used.
Precautions if Material is Released or Spilled	Eliminate all sources of ignition in vicinity of spill or released vapor. Clean up spills as soon as possible, observing precautions in Section D. Absorb large spills with absorbent clay, diatomaceous earth or other suitable material. A fire or vapor hazard may exist since these cleanup materials will only absorb liquids and will not absorb the vapor.
Waste Disposal Methods	Place contaminated material in disposable containers and bury in an approved dumping area.

H. Special Precautions

Handling and Storing	READ AND OBSERVE PRECAUTIONS ON PRODUCT LABEL Keep away from heat or open flame. KEEP OUT OF REACH OF CHILDREN.

II Physical Properties

Boiling Point (°F)	302-370°F	Melting Point (°F)		Solubility Miscible with hydrocarbons; insoluble in water.
Vapor Pressure (mm Hg & temp)	6 mm Hg @ 100°F	Specific Gravity (H_2O = 1)	0.78	Appearance, Color, Odor, etc. Colorless liquid
Molecular Weight	139 (avg.)	Percent Volatile by Volume (%)	99%+	
Vapor Density (air = 1)	4.8	Evaporation (BuAc = 1)	0.24	Other Viscosity — <32 SUS @ 77°F

ve information is based on data available to us and is believed to be correct. However, NO WARRANTY of MERCHANTABILITY, FITNESS for r any other warranty is expressed or to be implied regarding the accuracy of these data, the results to be obtained from the use thereof, the us connected with the use of the material, or that any such use will not infringe any patent. Since the information contained herein may be applied r conditions beyond our control and with which we may be unfamiliar, we do not assume any responsibility for the results of its use. This information is furnished upon the condition that the person receiving it shall make his own determination of the suitability of the material for his particular purpose.

U.S. DEPARTMENT OF LABOR
Occupational Safety and Health Administration

Form Approved
OMB No. 44-R1367

MATERIAL SAFETY DATA SHEET

Required under USDL Safety and Health Regulations for Ship Repairing, Shipbuilding, and Shipbreaking (29 CFR 1915, 1916, 1917)

SECTION I

MANUFACTURER'S NAME Charter International Oil Company	EMERGENCY TELEPHONE NO. AC 713 / 923-1651
ADDRESS (Number, Street, City, State, and ZIP Code) P. O. Box 5008; Houston, TX 77012	Medical Emergency No. AC 713 / 225-0463
CHEMICAL NAME AND SYNONYMS Aliphatic Petroleum Hydrocarbons	TRADE NAME AND SYNONYMS Espesol 310-66 (Short Range Mineral Spirits)
CHEMICAL FAMILY Aliphatic Petroleum Hydrocarbons	FORMULA ----------

SECTION II - HAZARDOUS INGREDIENTS

PAINTS, PRESERVATIVES, & SOLVENTS	%	TLV (Units)	ALLOYS AND METALLIC COATINGS	%	TLV (Units)
PIGMENTS			BASE METAL		
CATALYST			ALLOYS		
VEHICLE			METALLIC COATINGS		
SOLVENTS Espesol 310-66	100	100ppm	FILLER METAL PLUS COATING OR CORE FLUX		
ADDITIVES			OTHERS		
OTHERS					

HAZARDOUS MIXTURES OF OTHER LIQUIDS, SOLIDS, OR GASES	%	TLV (Units)

SECTION III - PHYSICAL DATA

BOILING POINT (°F.) ASTM D-86°F	310/347	SPECIFIC GRAVITY (H_2O=1)	0.7669
VAPOR PRESSURE (mm Hg.) @60°F/100°F	2.0/8.5	PERCENT, VOLATILE BY VOLUME (%)	100%
VAPOR DENSITY (AIR=1)	4.73	EVAPORATION RATE (n-BuAc =1)	0.22
SOLUBILITY IN WATER	Negligible		
APPEARANCE AND ODOR Water White Liquid; mild aliphatic hydrocarbon odor.			

SECTION IV - FIRE AND EXPLOSION HAZARD DATA

FLASH POINT (Method used) TCC, °F 100	FLAMMABLE LIMITS	Lel	Uel
			6.0

EXTINGUISHING MEDIA
(1) Mechanical Foam, (2) Dry Chemical, (3) Water Fog, (4) CO_2

SPECIAL FIRE FIGHTING PROCEDURES
A straight water stream would spread oil fires.

UNUSUAL FIRE AND EXPLOSION HAZARDS
A vapor accumulation would flash and/or explode if ignited. Flash 100°F.

(Continued on reverse side)

BZTO104(e)012607

Bureau of Labor Standards

MATERIAL SAFETY DATA SHEET

SECTION I

6/2/75

..UFACTURER'S NAME Union Oil Company of California	EMERGENCY TELEPHONE NO. (213) 486-7600
DDRESS (Number, Street, City, State, and ZIP Code) nion Oil Center, 461 So. Boylston Ave., Los Angeles, California 90017	
EMICAL NAME AND SYNONYMS N. A.	TRADE NAME AND SYNONYMS Aristowax
HEMICAL FAMILY Hydrocarbon	FORMULA Petroleum Wax

SECTION II HAZARDOUS INGREDIENTS

PAINTS, PRESERVATIVES, & SOLVENTS	%	TLV (Units)	ALLOYS AND METALLIC COATINGS	%	TLV (Units)
IGMENTS			BASE METAL		
TALYST			ALLOYS		
EHICLE			METALLIC COATINGS		
VENTS			FILLER METAL PLUS COATING OR CORE FLUX		
DDITIVES			OTHERS		
IERS					

HAZARDOUS MIXTURES OF OTHER LIQUIDS, SOLIDS, OR GASES	%	TLV (Units)
duct not hazardous as defined by Sections 1501.2, 1502.2,		
503.2 of the Code of Federal Regulations.		

SECTION III PHYSICAL DATA

LING POINT (°F.)	over 600°F	SPECIFIC GRAVITY (H_2O=1)	0.9
APOR PRESSURE (mm Hg.)	N. A.	PERCENT VOLATILE BY VOLUME (%)	N. A.
OR DENSITY (AIR=1)	N. A.	EVAPORATION RATE (_____=1)	N. A.
OLUBILITY IN WATER	Insoluble		

EARANCE AND ODOR Water-white, odorless

SECTION IV FIRE AND EXPLOSION HAZARD DATA

SH POINT (Method used) 490°F typical ASTM D 92, COC, Flash Point	FLAMMABLE LIMITS N. A.	Lel	Uel

INGUISHING MEDIA
oam, Carbon Dioxide, Dry Chemical, Vaporizing Liquid Type Extinguishers

AL FIRE FIGHTING PROCEDURES
None

UAL FIRE AND EXPLOSION HAZARDS
Combination with paper, cloth, or wood wastes will increase flammability.

BZTO104(e)012608

SECTION V - HEALTH HAZARD DATA

THRESHOLD LIMIT VALUE
100 ppm (ACGIH)

EFFECTS OF OVEREXPOSURE
to vapor might affect central nervous system and cause respiratory irritation.

EMERGENCY AND FIRST AID PROCEDURES
Skin contact - Wash with soap and water. An emollient cream or lotion is beneficial. Eye contact - Wash with plenty of water for five minutes. Inhalation - Provide fresh air and rest. Ingestion: Do no induce vomiting; call a physician.

SECTION VI - REACTIVITY DATA

STABILITY			CONDITIONS TO AVOID
	UNSTABLE		
	STABLE	X	

INCOMPATABILITY *(Materials to avoid)*
Avoid strond oxidizing agents.

HAZARDOUS DECOMPOSITION PRODUCTS
Carbon monoxide is burned with insufficient air.

HAZARDOUS POLYMERIZATION			CONDITIONS TO AVOID
	MAY OCCUR		
	WILL NOT OCCUR	X	

SECTION VII - SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED
Avoid open flame. Provide adequate ventilation. Collect and dispose of all spilled liquid.

WASTE DISPOSAL METHOD
Use the same precautions for disposal as you would for kerosene. Espesol 310-66 (Mineral Spirits) is a combustible hydrocarbon and will burn if ignited.

SECTION VIII - SPECIAL PROTECTION INFORMATION

RESPIRATORY PROTECTION *(Specify type)*
In inadequately ventilated space, use self-contained breathing apparatus.

VENTILATION	LOCAL EXHAUST	SPECIAL
	To a fire-safe area.	
	MECHANICAL *(General)*	OTHER

PROTECTIVE GLOVES	EYE PROTECTION
Recommended.	Recommended.

OTHER PROTECTIVE EQUIPMENT
As required to avoid wetting clothes.

SECTION IX - SPECIAL PRECAUTIONS

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORING
Handle as a combustible liquid.

OTHER PRECAUTIONS

TOXICOLOGICAL & HANDLING
INFORMATION

PETROLEUM ...

Edwin Cooper, Inc.
1700 South Second Street
St. Louis, Missouri 63104
(314) 421-3930

1. Product Name HITEC E515

2. Chemical and Physical Properties:

a)	Specific gravity	.87
b)	Vapor pressure (mm Hg)	NA
c)	Boiling point, °F	NA
d)	Flash point, °F	150
e)	Water solubility	Practically insoluble
f)	Hazardous polymerization	☐ Yes ☒ No
g)	Stable	☒ Yes ☐ No
h)	Shock sensitive	☐ Yes ☒ No

3. Physiological Properties:

a) Acute oral toxicity (LD50 if available): Oral MLD (rats) 25000-30,000 mg/Kg

b) Local effects on eyes: Slight irritant

c) Local effects on skin: Slight irritant

d) Absorption through skin: MLD (rabbits) 35-40,000 mg/Kg.

e) Inhalation effects (vapors or dust): NA

4. First Aid Treatment:

a) Skin contact: Wash thoroughly with soap and water.

b) Eye contact: Flush with copious quantities of water and consult physician immediately.

c) Ingestion: Induce vomiting and consult physician immediately.

5. Protective Equipment:
Normal usage requires: Gloves and protective face shield or goggles

NAME: David J. Pitt
TITLE: Plant Chemist
DATE: 7/27/72

Sel.

MATERIAL SAFETY DATA SHEET

Product 6SJ-743

NALCO CHEMICAL COMPANY
2801 BUTTERFIELD ROAD, OAK BROOK, ILLINOIS 60521

Trade Name NALCO 6SJ-743 Formula No.

Synonyms Polyester

Chemical Family Organic

SECTION 2 – HAZARDOUS INGREDIENTS

MATERIAL OR COMPONENT	%
Butanol	10
Toluene	8

SECTION 3 – PHYSICAL PROPERTIES

Boiling Point, 760 MM HG	Melting Point
Specific Gravity (H_2O=1) .952 @ 60°F	Vapor Pressure
Vapor Density (Air=1)	Solubility in H_2O, % By Wt. Insoluble
% Volatiles By Vol.	pH (1% of solution) 6-8

Appearance and Odor
Dark reddish-black liquid with slight alcohol odor

SECTION 4 – FLAMMABILITY AND EXPLOSIVE PROPERTIES

Flash Point (Test Method)
105°F PMCC

Flammable Limits in Air, % By Vol.	Lower		Upper	

Extinguishing Media
Foam, CO_2, dry chemical

Special Fire Fighting Procedures
Fight as any hydrocarbon type fire

Unusual Fire and Explosion Hazard
May evolve toxic NO_2 fumes

SECTION 5 – HEALTH HAZARD DATA

Threshold Limit Value None established for product. Butanol - skin (ceiling) 50 ppm. Toluene - Skin 100 ppm

Effects of Overexposure May cause cornea and skin irritation. Prolonged inhalation may result in nausea, headaches and dizziness.

Narcosis may develop.

EMERGENCY AND FIRST AID PROCEDURES

Eyes
Flush with water for 15 min. Call a physician.

Skin
Wash with soap and rinse with plenty of water.

Ingestion
Do not induce vomiting. Give water or milk. Call a physician.

Inhalation
Remove to fresh air.

FORM 507 (7/75)

(Continued on Reverse Side)

SECTION 6 – REACTIVITY DATA

Stability: Stable ☐ Unstable XX Conditions to Avoid

Materials to Avoid

Hazardous Decomposition Products: Unburned hydrocarbons

Hazardous Polymerization: Will Not Occur XX May Occur ☐ Conditions to Avoid

SECTION 7 – SPILL OR LEAK PROCEDURES

Steps to Take in Case Material is Released or Spilled: Contain with absorbent material. Use detergent and water to relieve slippery conditions.

Waste Disposal Method: Complete combustion

SECTION 8 – SPECIAL PROTECTION INFORMATION

Type of Respiratory Protection Required: Organic canister may be used

Ventilation: Local Exhaust ☒; Mechanical (General) ☐; Special (Specify) ____ Other (Specify) ____

Protective Gloves: Rubber Eye Protection: Goggles

Other Protective Equipment: Impervious apron, eye wash fountains

SECTION 9 – SPECIAL PRECAUTIONS

Handling and Storage Precaution: Handle in adequately ventilated areas. Do not store near open flame.

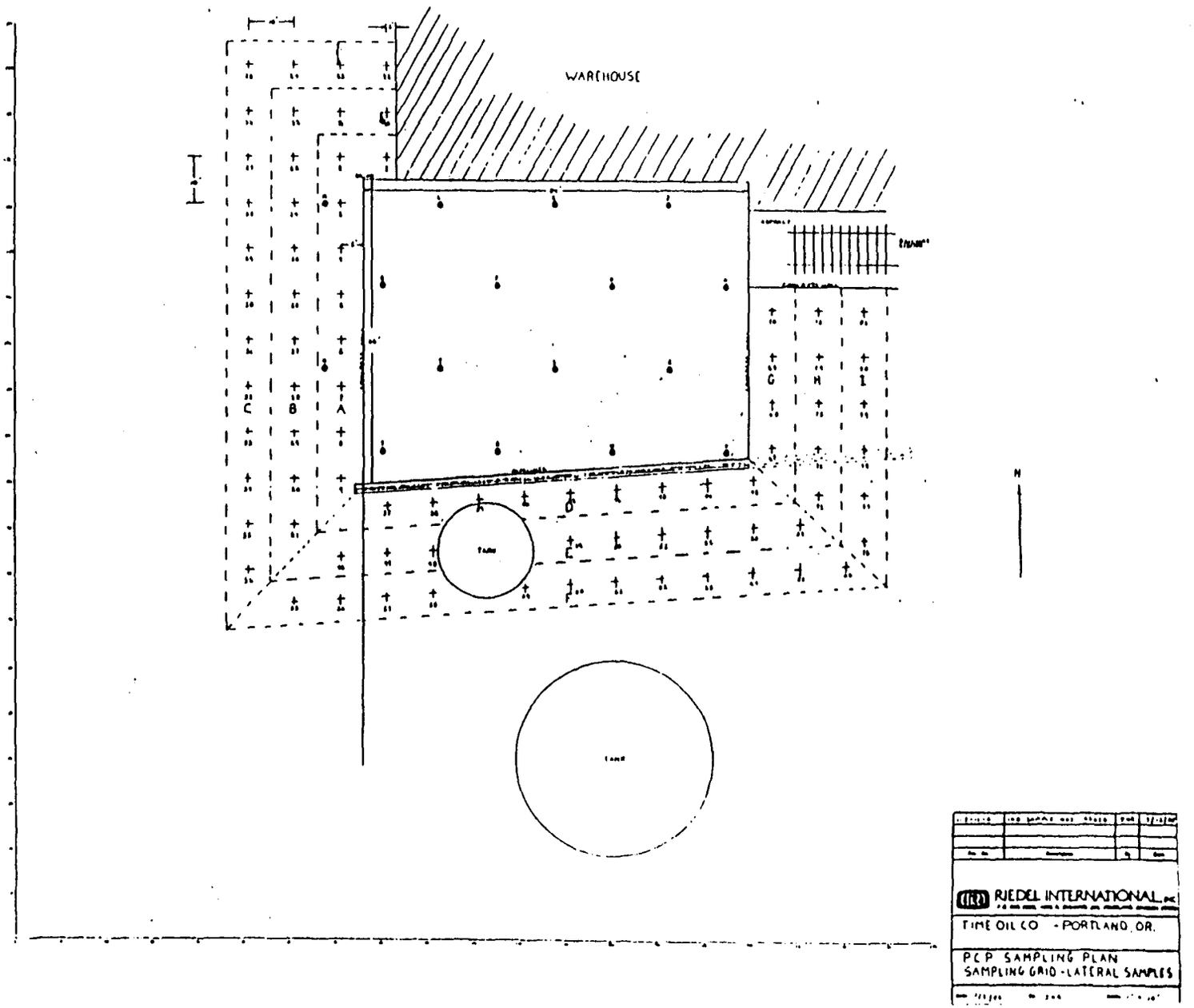
Other Precautions: Avoid prolonged inhalation of fumes. Avoid eye and skin contact. Do not take internally. Launder contaminated clothing before reuse.

Prepared By: [signature] Title: Toxicology & Industrial Hygiene Consultant Date: 2/76

Similar to Form OSHA-20 EMERGENCY TELEPHONE NUMBER – (312) 332-3560

NALCO CHEMICAL COMPANY
2901 BUTTERFIELD ROAD
OAKBROOK, ILLINOIS 60521
Product 6SJ-743
MATERIAL SAFETY DATA SHEET

FIGURE 1



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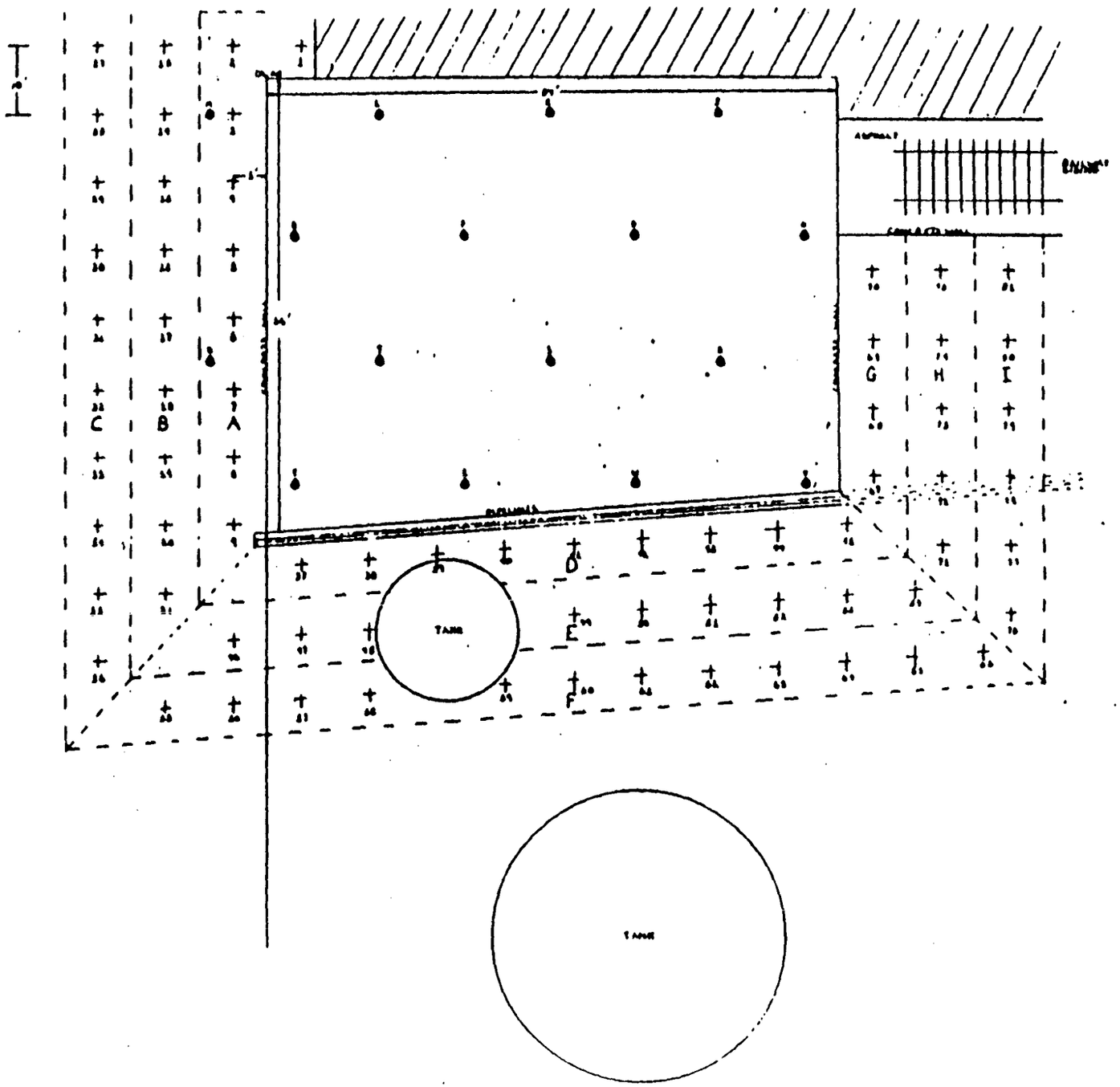

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BZTO104(e)012614

FIGURE 2A

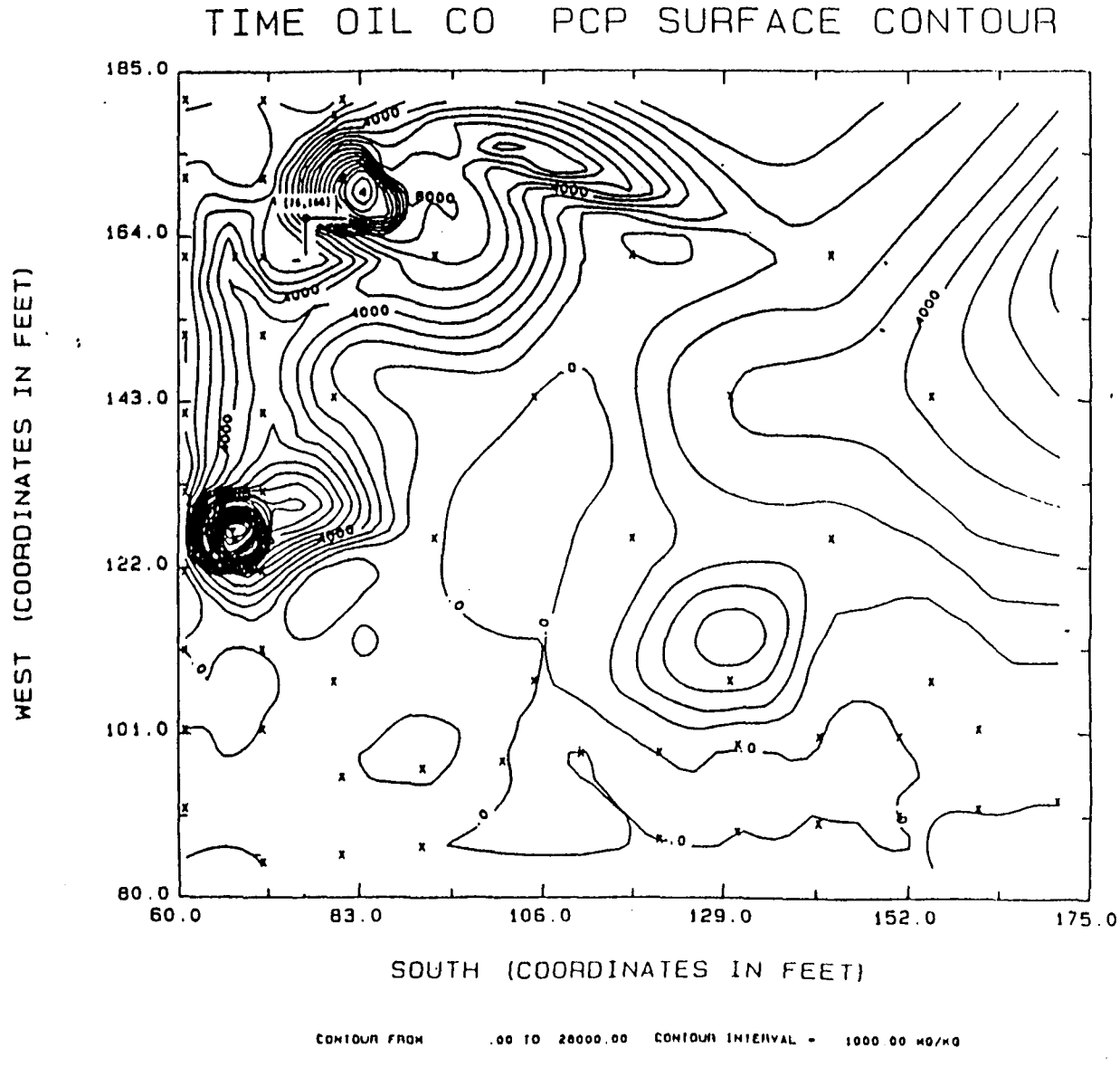
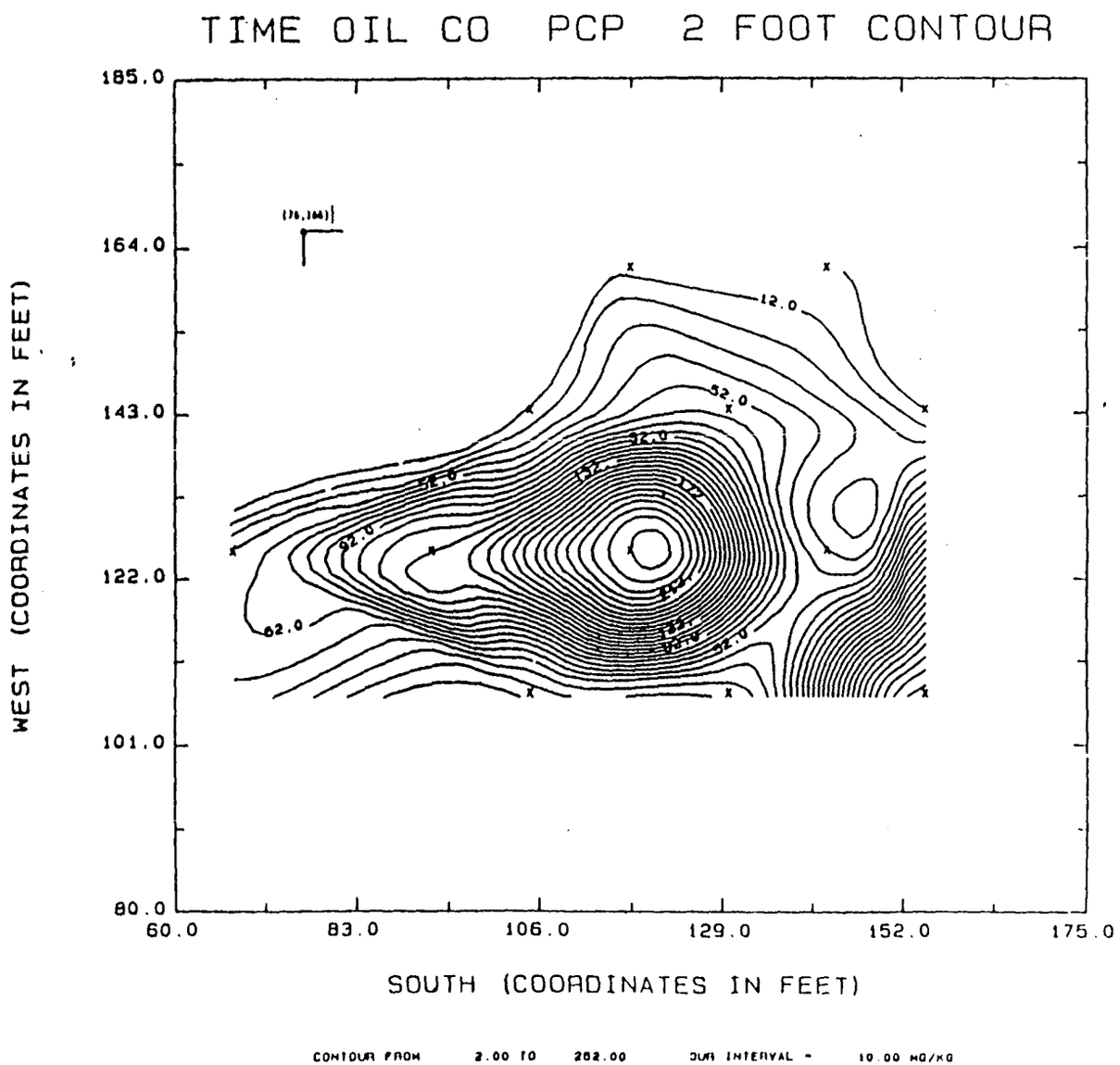
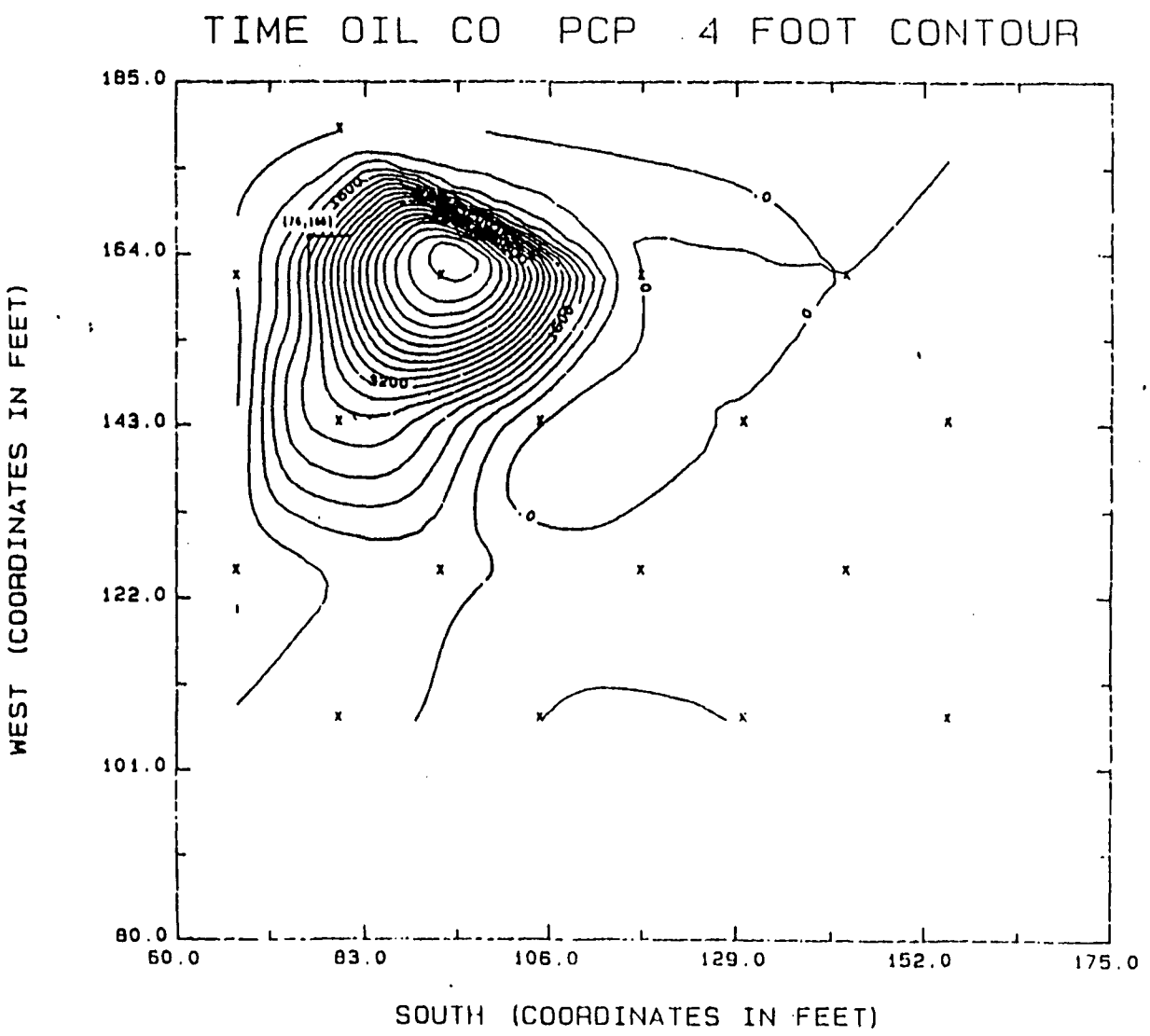

TIME OIL CO PCP SURFACE CONTOUR
185.0
164.0
143.0
122.0
101.0
80.0
60.0
83.0
106.0
129.0
152.0
175.0
WEST (COORDINATES IN FEET)
SOUTH (COORDINATES IN FEET)
8000
4000
0
CONTOUR FROM .00 TO 28000.00 CONTOUR INTERVAL = 1000.00 MG/KG

FIGURE 2B



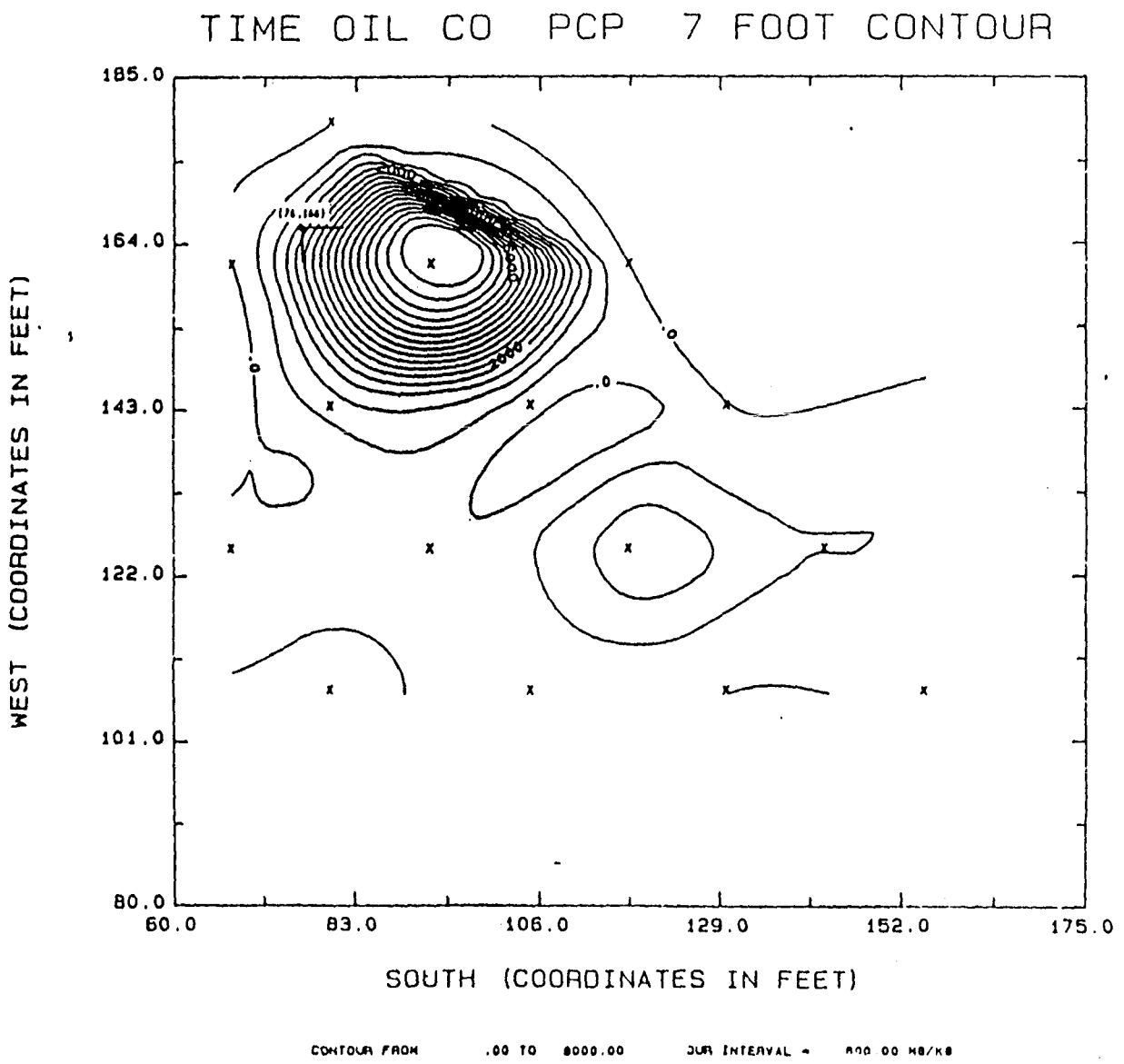
BZTO104(e)012616

FIGURE 2C



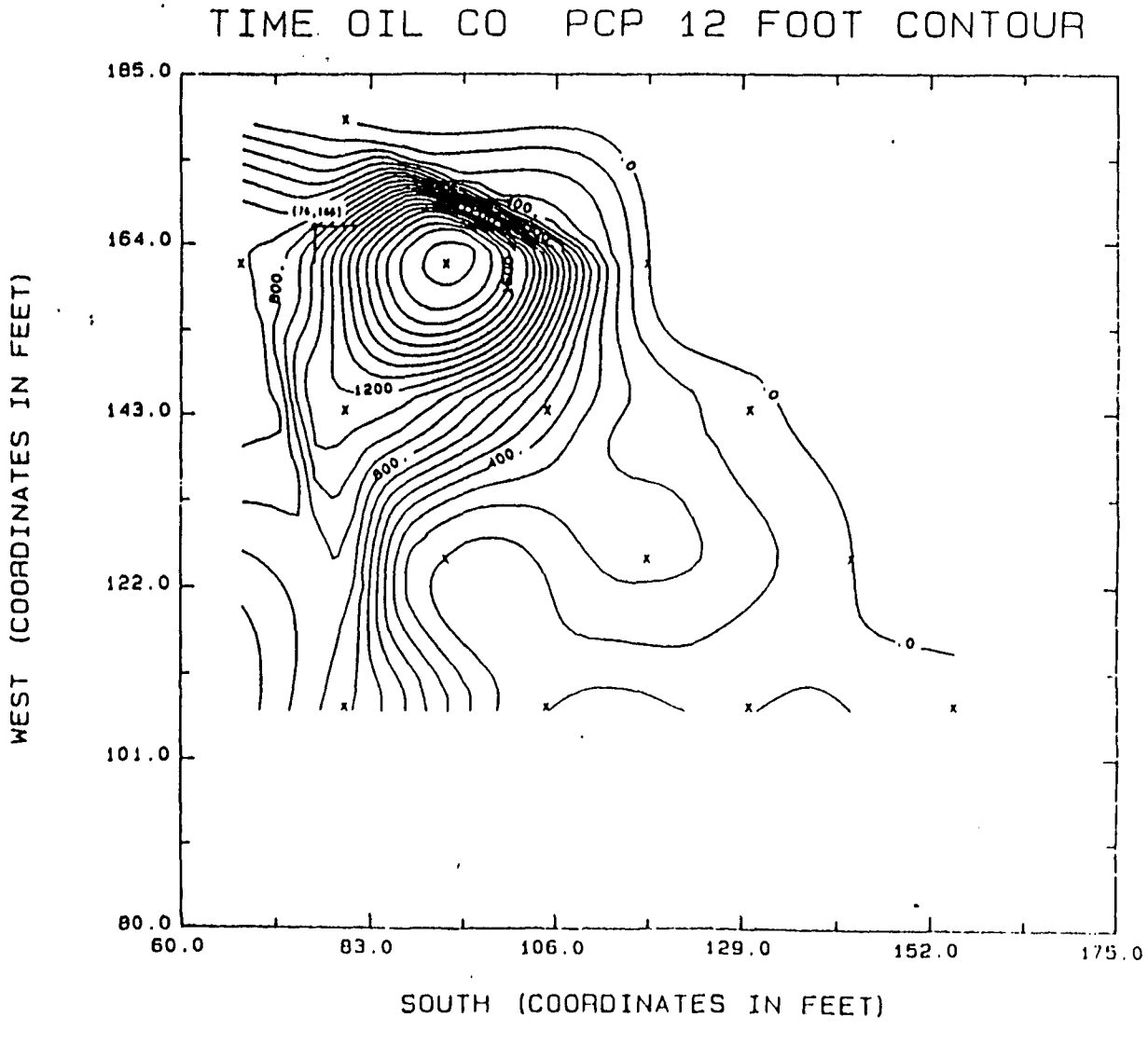
BZTO104(e)012617

FIGURE 2 D



BZTO104(e)012618

FIGURE 2E



BZTO104(e)012619

TABLE IVA
TIME OIL CO. - PORTLAND, OREGON
PENTACHLOROPHENOL IN SOIL

Surface Contour Data

Sample #	Coordinates X	Coordinates Y	Concentration Mg/Kg
1	81	171	13500
2	71	171	29
3	71	161	500
4	71	151	5450
5	71	141	5560
6	71	131	8760
7	71	121	4870
8	71	111	92
9	71	101	20
10	81	181	16
11	71	181	7
12	61	181	9
13	61	171	95
14	61	161	175
15	61	151	18
16	61	141	229
17	61	131	88
18	61	121	6
19	61	111	3
20	61	101	2.5
21	61	91	5.2
37	81	95	857
38	91	96	1130
39	101	97	17
40	111	98	3.5
41	121	98	3.1
42	131	99	3.2
43	141	100	2.4
44	151	100	1.8
45	161	101	171
46	71	84	3
47	81	85	3.6
48	91	86	6.1
49	121	87	3.2
50	131	88	1.5
51	141	89	2.3
52	151	90	1.7
53	161	91	1.9
54	171	92	1.2

Core #	Coordinates X	Coordinates Y	Concentration Mg/Kg
J	142.5	161	1400
K	117.5	161	N/A
L	92.5	161	N/A
M	67.5	161	4720
N	155	143	4280
O	130	143	3000
P	105	143	N/A
Q	80	143	N/A
R	142.5	125	1712
S	117.5	125	522
T	92.5	125	123
U	67.5	125	26550
V	155	107	317
W	130	107	3385
X	105	107	N/A
Y	80	107	N/A
Z	80	179	21

N/A = Not Available

BZTO104(e)012620

TABLE IVB

TIME OIL CO. - PORTLAND, OREGON
PENTACHLOROPHENOL IN SOIL

Two Foot Contour Data

Core #	Coordinates X	Coordinates Y	Concentration Mg/Kg
J	142.5	161	3
K	117.5	161	8.8
L	92.5	161	N/A
M	67.5	161	87*
N	155	143	3.1
O	130	143	59
P	105	143	16
Q	80	143	N/A
R	142.5	125	34
S	117.5	125	252
T	92.5	125	123
U	67.5	125	44
V	155	107	260
W	130	107	15
X	105	107	4.5
Y	80	107	N/A
Z	80	179	14*

N/A = Not Available
* = Data points omitted from contouring program to reduce extrapolation error

BZTO104(e)012621

TABLE IVC

TIME OIL CO. - PORTLAND, OREGON
PENTACHLOROPHENOL IN SOIL

Four Foot Contour Data

Core #	Coordinates X	Coordinates Y	Concentration Mg/Kg
J	142.5	161	3.6
K	117.5	161	10.5
L	92.5	161	7200
M	67.5	161	22
N	155	143	238
O	130	143	23
P	105	143	15
Q	80	143	2205
R	142.5	125	50
S	117.5	125	184
T	92.5	125	534
U	67.5	125	55
V	155	107	380
W	130	107	8.1
X	105	107	1.3
Y	80	107	598
Z	80	179	2

BZTO104(e)012622

TABLE IVD

TIME OIL CO. - PORTLAND, OREGON

Pentachlorophenol in Soil

7 Foot Contour Data

CORE #	COORDINATES X	COORDINATES Y	CONCENTRATION mg/kg
J	142.5	161	(NA)
K	117.5	161	3
L	92.5	161	8400
M	67.5	161	1
N	155	143	(NA)
O	130	143	13
P	105	143	130
Q	80	143	700
R	142.5	125	500
S	117.5	125	1130
T	92.5	125	75
U	67.5	125	5
V	155	107	1
W	130	107	1
X	105	107	1.9
Y	80	107	700
Z	80	179	7

BZTO104(e)012623

TABLE IVE

TIME OIL CO. - PORTLAND, OREGON

Pentachlorophenol in Soil

12 Foot Contour Data

CORE #	COORDINATES X	COORDINATES Y	CONCENTRATION mg/kg
J	142.5	161	NA
K	117.5	161	2.3
L	92.5	161	2030
M	67.5	161	690
N	155	143	NA
O	130	143	38
P	105	143	450
Q	80	143	1150
R	142.5	125	1
S	117.5	125	217
T	92.5	125	90
U	67.5	125	NA
V	155	107	3.4
W	130	107	1.9
X	105	107	1.0
Y	80	107	720
Z	80	179	1.0

BZTO104(e)012624

TABLE IVF

TIME OIL CO. - PORTLAND, OREGON
PENTACHLOROPHENOL IN SOIL

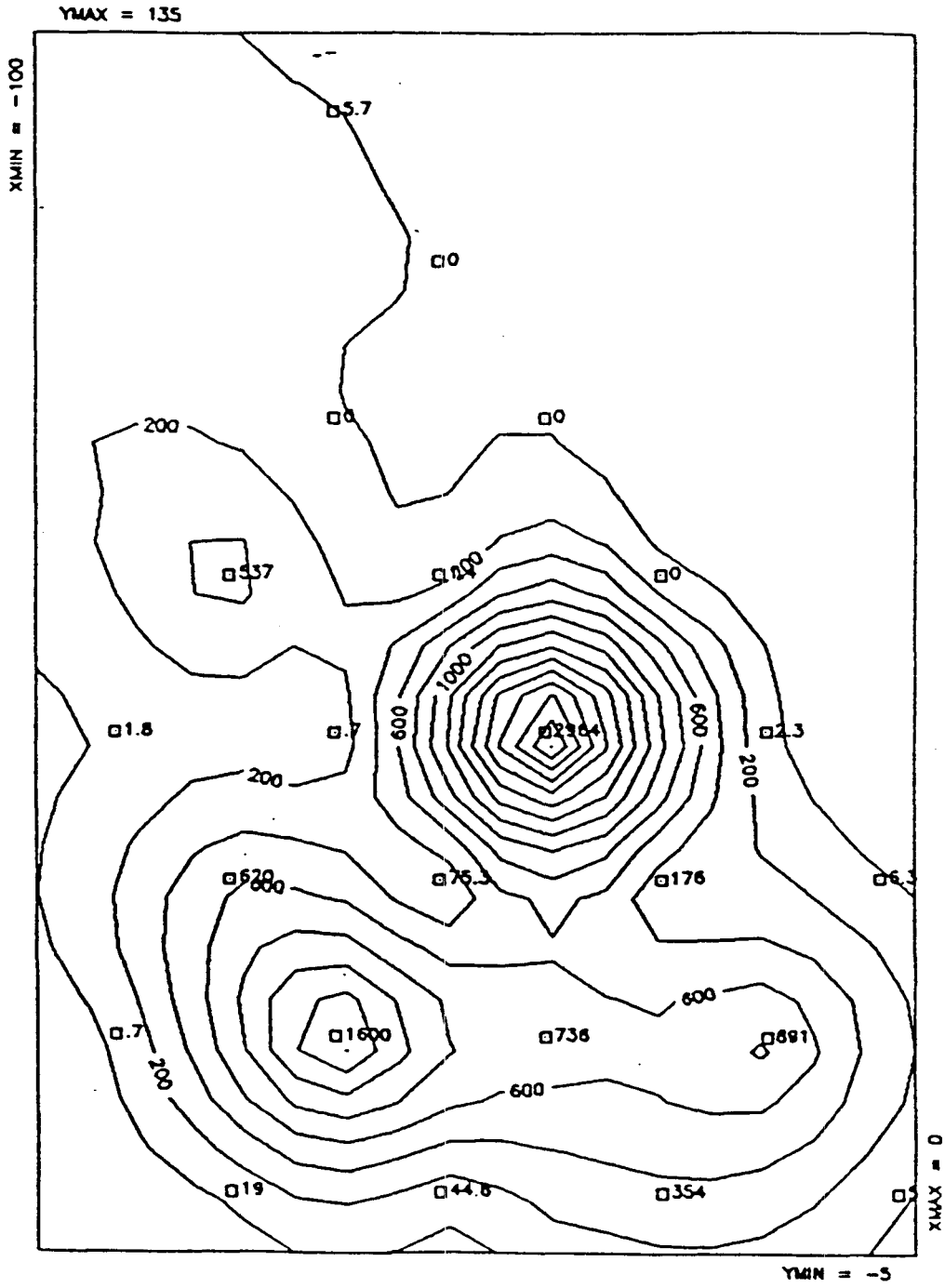
Preliminary Surface Composites

Area	PCP (mg/kg)
A	660
D	860
G	17

BZTO104(e)012625

FIGURE III-1

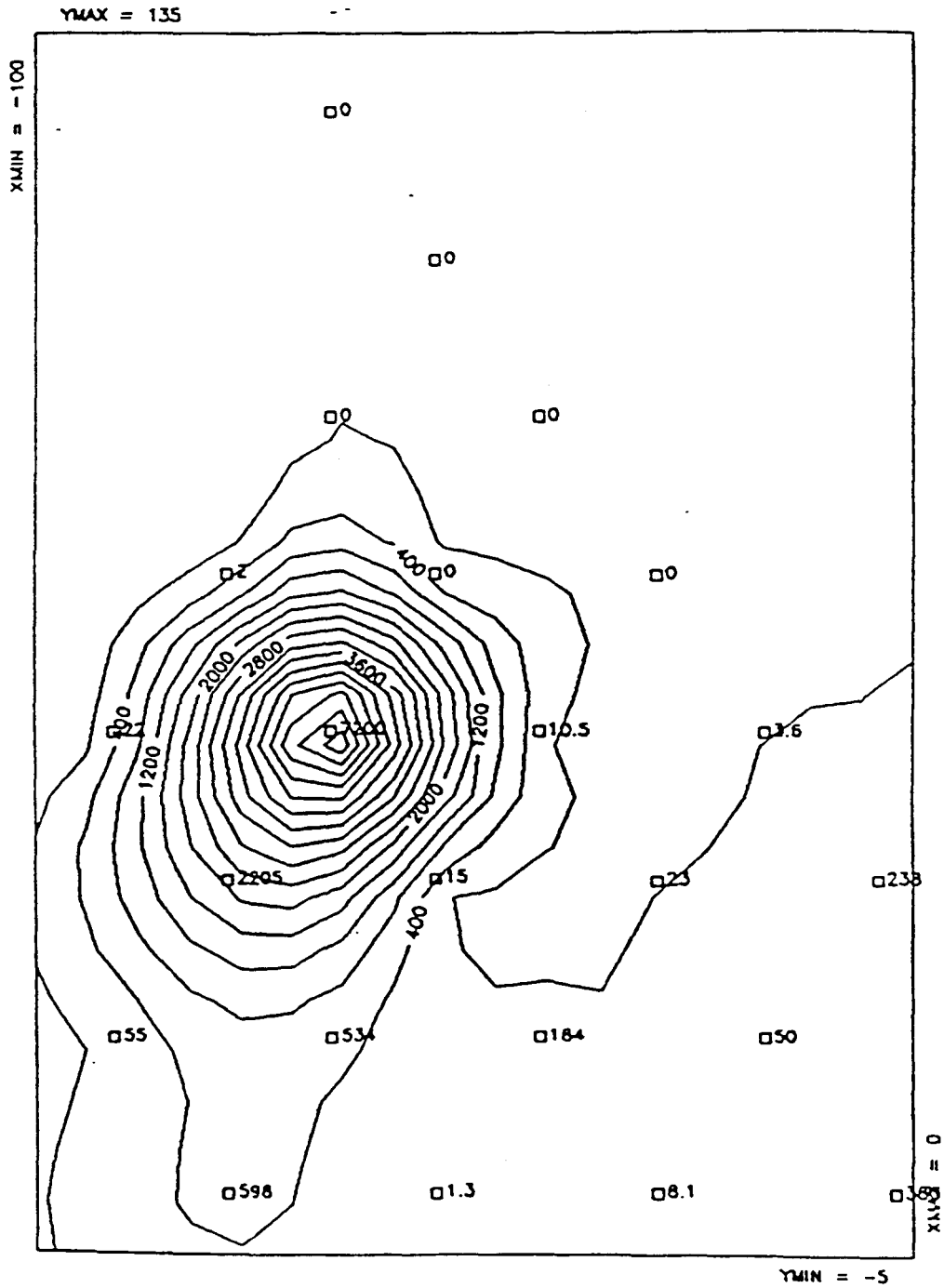
SRH '86



TIME OIL CO. – SURFACE PCP CONTOURS

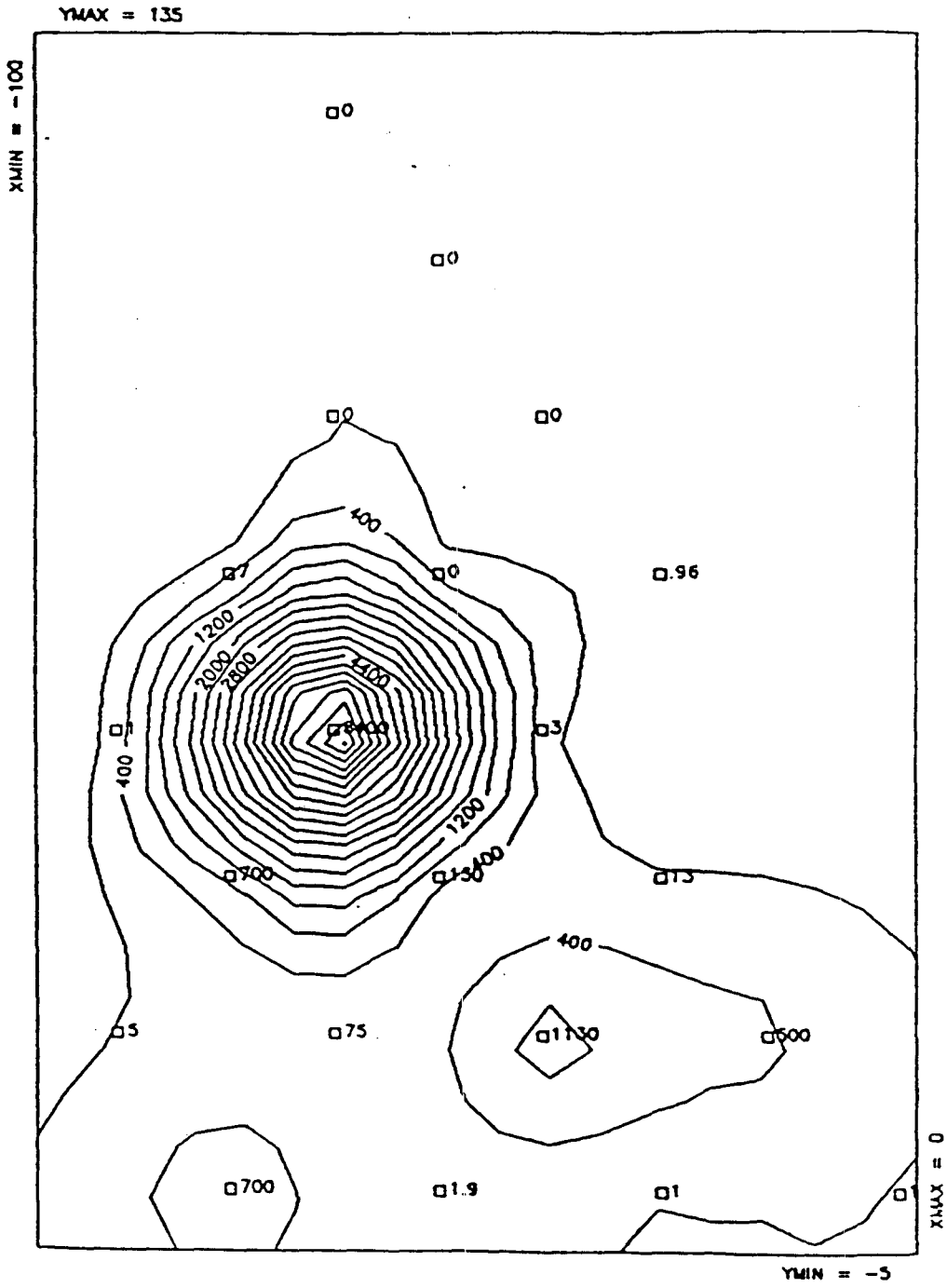
BZTO104(e)012626

FIGURE III- 2



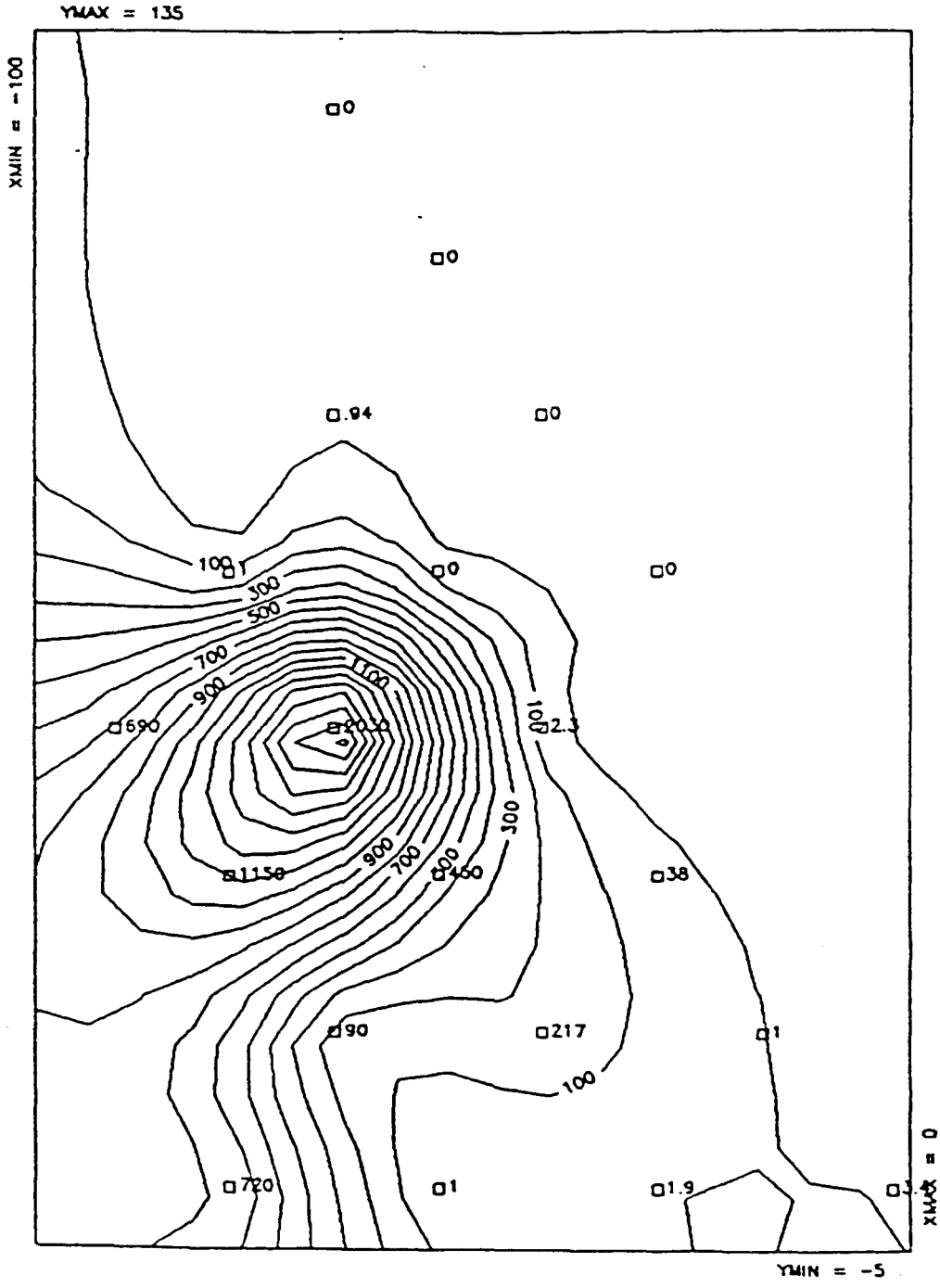
TIME OIL CO. — 4 FOOT PCP CONTOURS

FIGURE III- 3



TIME OIL CO. – 7 FOOT PCP CONTOURS

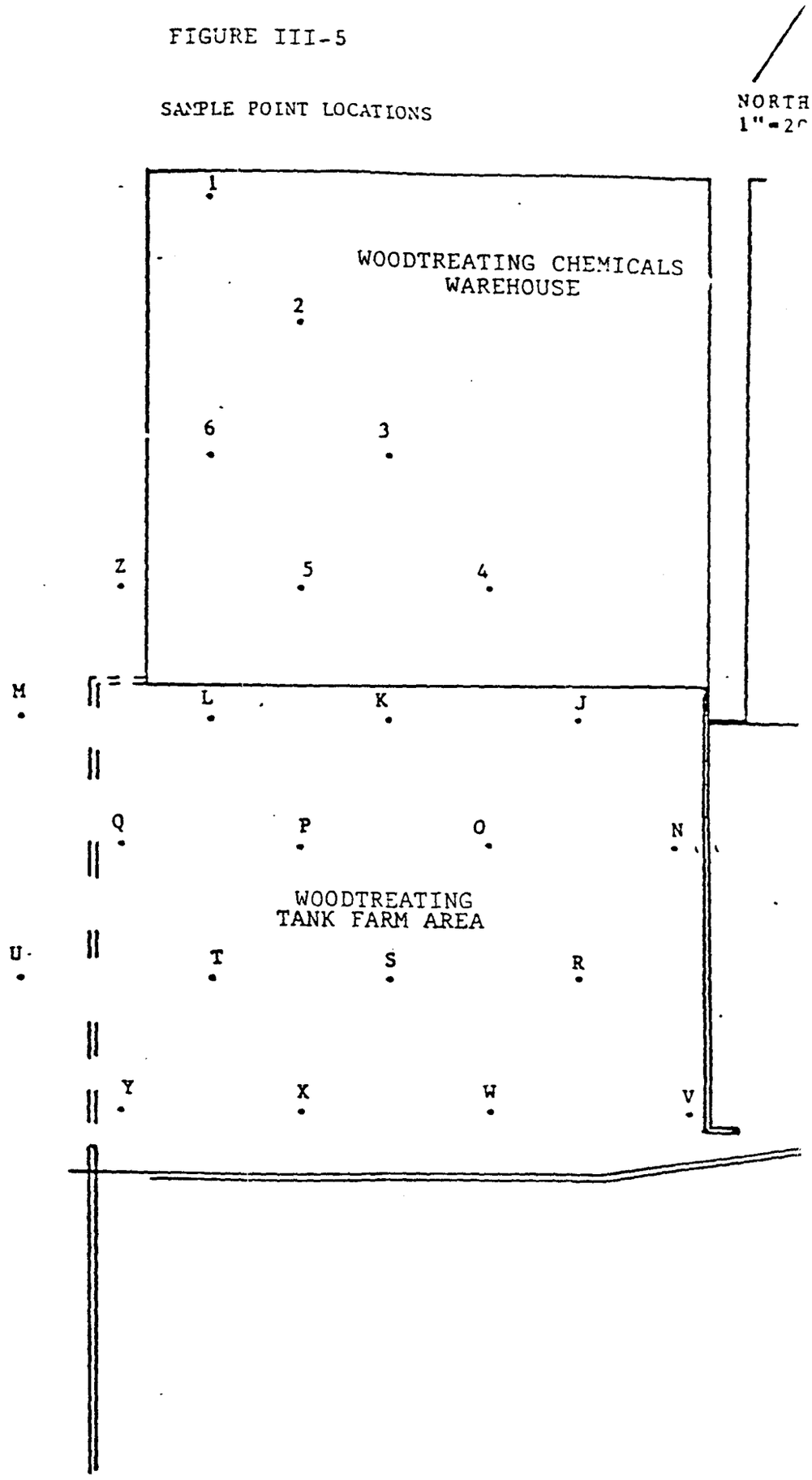
FIGURE III-4



TIME OIL CO. — 12 FOOT PCP CONTOURS

FIGURE III-5

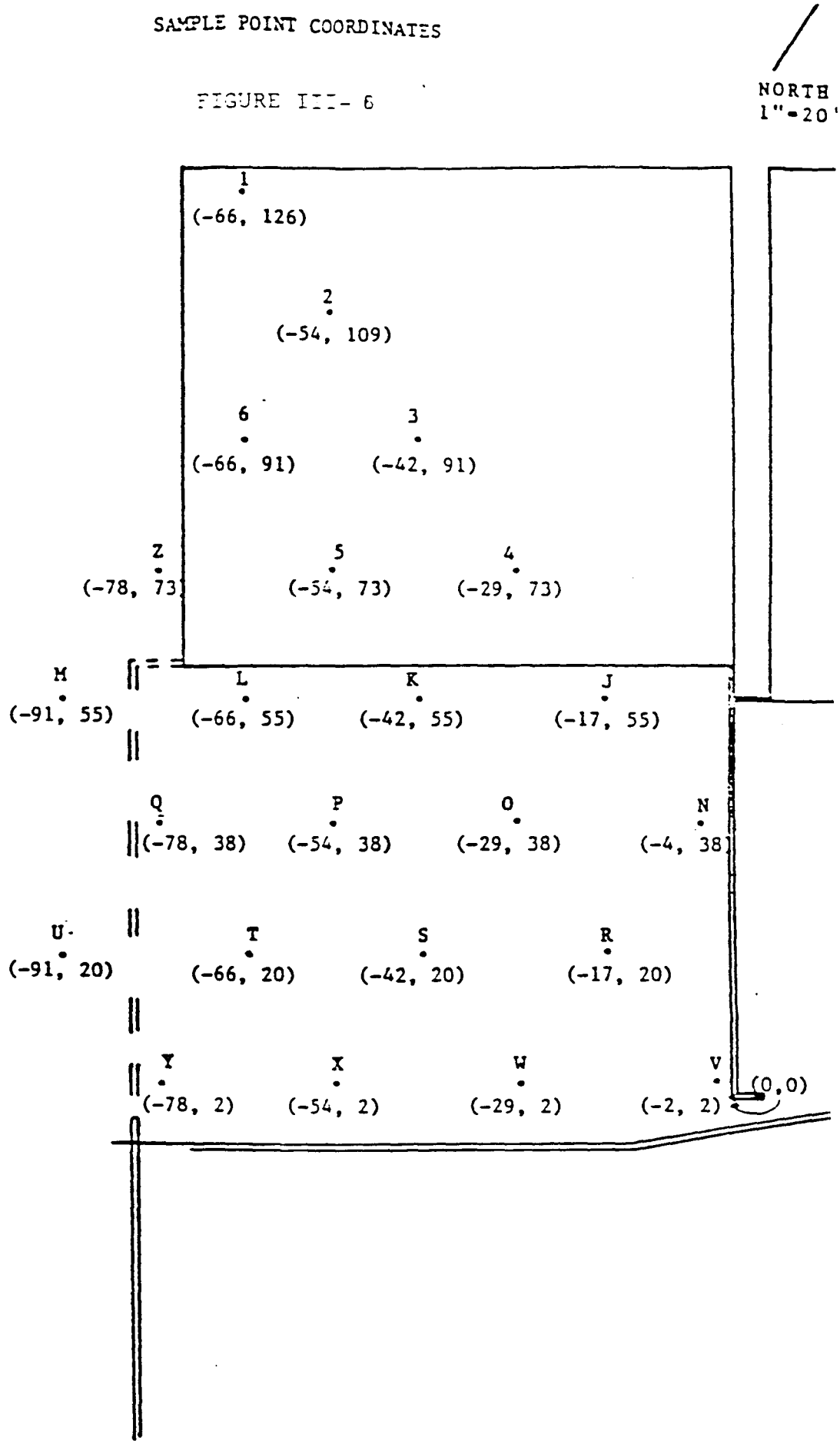
SAMPLE POINT LOCATIONS



BZTO104(e)012630

SAMPLE POINT COORDINATES

FIGURE III- 6

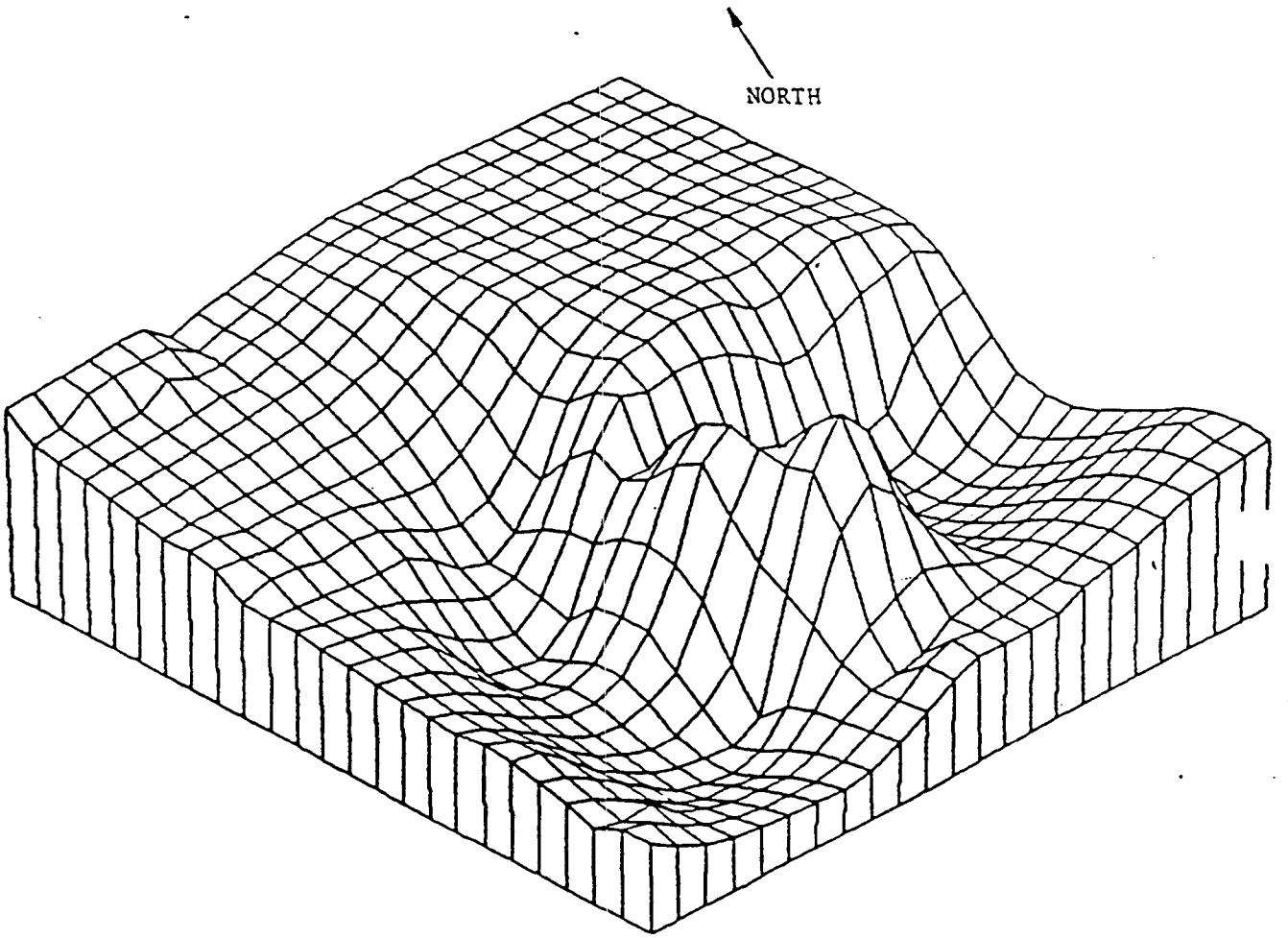


BZTO104(e)012631

FIGURE III- 7

APPROXIMATE SURFACE TOPOGRAPHY

WOOD TREATING CHEMICALS AREA



TIME OIL CO. - TOPOGRAPHY

TABLE III-1

TIME OIL CO.

COORDINATES - SURFACE PCP CONTOUR

CODE	X	Y	[PCP]
J	-17	55	2.3
K	-42	55	1200
L	-66	55	0.7
M	-91	55	1.8
N	-4	38	6.3
O	-29	38	176
P	-54	38	75.3
Q	-78	38	620
R	-17	20	891
S	-42	20	736
T	-66	20	1600
U	-91	20	0.7
V	-2	2	5
W	-29	2	354
X	-54	2	44.5
Y	-78	2	19
Z	-78	73	537
6	-66	91	0
5	-54	73	1.4
4	-29	73	0
3	-42	91	0
2	-54	109	0
1	-66	126	5.7

NOTE: [PCP] = CONCENTRATION OF PCP (mg/Kg) or (ppm)

BZTO104(e)012633

TABLE III-2

TIME OIL CO.

COORDINATES - 2 FOOT PCP CONTOURS

CODE	X	Y	[PCP]
J	-17	55	3
K	-42	55	8.8
M	-91	55	87
N	-4	38	3.1
O	-29	38	59
P	-54	38	16
R	-17	20	34
S	-42	20	252
T	-66	20	123
U	-91	20	44
V	-2	2	260
W	-29	2	15
X	-54	2	4.5
Z	-78	73	14
6	-66	91	0
5	-54	73	5.6
4	-29	73	0
3	-42	91	0
2	-54	109	0
1	-66	126	0

NOTE: [PCP] = CONCENTRATION OF PCP (mg/Kg) or (ppm)

BZTO104(e)012634

TABLE III-3

TIME OIL CO.

COORDINATES - 4 FOOT PCP CONTOURS

CODE	X	Y	[PCP]
J	-17	55	3.6
K	-42	55	10.5
L	-66	55	7200
M	-91	55	22
N	-4	38	238
O	-29	38	23
P	-54	38	15
Q	-78	38	2205
R	-17	20	50
S	-42	20	184
T	-66	20	534
U	-91	20	55
V	-2	2	380
W	-29	2	8.1
X	-54	2	1.3
Y	-78	2	598
Z	-78	73	2
6	-66	91	0
5	-54	73	0
4	-29	73	0
3	-42	91	0
2	-54	109	0
1	-66	126	0

NOTE: [PCP] = CONCENTRATION OF PCP (mg/Kg) or (ppm)

BZTO104(e)012635

TABLE III-4

TIME OIL CO.

COORDINATES - 7 FOOT PCP CONTOURS

CODE	X	Y	[PCP]
K	-42	55	3
L	-66	55	8400
M	-91	55	1
O	-29	38	13
P	-54	38	130
Q	-78	38	700
R	-17	20	500
S	-42	20	1130
T	-66	20	75
U	-91	20	5
V	-2	2	1
W	-29	2	1
X	-54	2	1.9
Y	-78	2	700
Z	-78	73	7
6	-66	91	0
5	-54	73	0
4	-29	73	0.96
3	-42	91	0
2	-54	109	0
1	-66	126	0

NOTE: [PCP] = CONCENTRATION OF PCP (mg/Kg) or (ppm)

BZTO104(e)012636

TABLE III-5

TIME OIL CO.

COORDINATES - 12 FOOT PCP CONTOURS

CODE	X	Y	[PCP]
K	-42	55	2.3
L	-66	55	2030
M	-91	55	690
O	-29	38	38
P	-54	38	450
Q	-78	38	1150
R	-17	20	1
S	-42	20	217
T	-66	20	90
V	-2	2	3.4
W	-29	2	1.9
X	-54	2	1
Y	-78	2	720
Z	-78	73	1
6	-66	91	0.94
5	-54	73	0
4	-29	73	0
3	-42	91	0
2	-54	109	0
1	-66	126	0

NOTE: [PCP] = CONCENTRATION OF PCP (mg/Kg) or (ppm)

BZTO104(e)012637

TABLE III-6

TIME OIL CO.

GROUNDWATER ANALYTICAL RESULTS

(AUGUST 29, 1986)

WELL NUMBER	STATIC WATER LEVEL (FT BELOW TOP OF CASING)	pH	[PCP] (ppm)
MW-A	14.06	6.80	N.D.
MW-B	15.07	6.70	N.D.
MW-C	DRY	N.A.	N.A.
MW-D	14.48	6.53	.044
MW-E	15.22	6.54	N.D.
MW-F	15.44	6.57	N.D.
MW-G	DRY	N.A.	N.A.
MW-H	11.28	6.91	N.D.
MW-I	14.75	6.77	N.D.
RIVER	25.70	N.A.	N.A.

NOTES:

[PCP] = CONCENTRATION OF PENTACHLOROPHENOL
ppm = PARTS PER MILLION
N.A. = NOT AVAILABLE
N.D. = NOT DETECTED

BZTO104(e)012638

TABLE 1 - GROUNDWATER SAMPLE RESULTS

Sample	ug/l PCP (1)	ug/l PCP (2)	pH	Depth to Water, Ft* (1)	Depth to Water, Ft* (2)	Static Water Level (ft. MSL) ** (1)	Static Water Level (ft. MSL) ** (2)
MW-A	<20	NA	6.61	13.78	14.74	83.36	82.40
MW-B	2300	1000	6.57	14.79	15.54	82.04	81.29
MW-C				(Dry)			
MW-D	<20	NA	6.60	14.29	15.24	83.64	82.69
MW-E				(Dry)			
MW-F	<20	NA	6.43	15.27	16.02	82.70	81.95
MW-G				(Dry)			
MW-H	<20	NA	6.64	13.78	12.10	83.71	82.65
MW-I	<20	NA	6.38	14.57	15.23	83.43	82.77
River				25.67	24.67		

(1) As measured on 8/20/87

(2) As measured on 10/16/87

* Distance from well stickup (or pier reference point) to water.

** Relative to TBM established by TOC

NA = Not Analyzed

Century Testing Laboratories, Inc.

RECEIVED

MAY 22 1986

May 21, 1986

John Ruddick
Century Environmental Sciences
One S. W. Columbia, Suite 1222
Portland, OR 97258

Dear John:

Here are the Penta results from Time oil:

CES #	Pentachlorophenol conc. ug/l (ppb)
WP-B	2.6
MW-4"	6.1
WP-E	<1.0
WP-F	1.4

If you have any questions, please phone.

Sincerely,

CENTURY TESTING LABORATORIES, INC.

Walter F. Burns

Walter F. Burns
Organic Chemistry Supervisor

WFB:lk

P.O. BOX 1174 • BEND, OR 97709 • (503) 382-6432
Water • Feed • Soils • Construction Materials • General Analytical Services

TIME OIL CO.
SUMMARY OF FIELD AND ANALYTICAL RESULTS
GROUNDWATER SAMPLING AND ANALYSIS

Sampling procedures meet EPA Pub. SW846.
Time Oil groundwater samples were analyzed by GC/MS using EPA Method.
The submitted sample from well No. 4 contained an insufficient amount of material for analysis.

WELL NO.	STATIC WATER LEVEL (FEET) (5-28-86)	FIELD Ph	PENTACHLOROPHENOL mg/L (ppm) (1)	STATIC WATER LEVEL (6-5-86)
A	13.17	6.56	N.D.	12.15
B	13.16	6.29	N.D.	13.18
D	12.52	6.49	N.D.	12.65
E	13.65	7.70	N.D.	13.75
F	13.90	6.73	N.D.	13.93
H	9.31	6.32	N.D.	9.46
I	12.89	5.74	.0022	13.02
QA/QC (Duplicate B)			N.D.	
Field Blank			N.D.	
2	15.00			15.11
River	18.52			14.54

NOTE: (1) Samples collected on May 28, 1986;
Laboratory analysis reported on June 9, 1986.
Detection Limit of 002 ppm.

TABLE III-6

TIME OIL CO.

GROUNDWATER ANALYTICAL RESULTS

(AUGUST 29, 1986)

WELL NUMBER	STATIC WATER LEVEL (FT BELOW TOP OF CASING)	pH	[PCP] (ppm)
MW-A	14.06	6.80	N.D.
MW-B	15.07	6.70	N.D.
MW-C	DRY	N.A.	N.A.
MW-D	14.48	6.53	.044
MW-E	15.22	6.54	N.D.
MW-F	15.44	6.57	N.D.
MW-G	DRY	N.A.	N.A.
MW-H	11.28	6.91	N.D.
MW-I	14.75	6.77	N.D.
RIVER	25.70	N.A.	N.A.

NOTES:

[PCP] = CONCENTRATION OF PENTACHLOROPHENOL
ppm = PARTS PER MILLION
N.A. = NOT AVAILABLE
N.D. = NOT DETECTED

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: March 13, 1991
Date Submitted: March 4, 1991
Project: 03-123 N.W. Terminal, P.O. #17241

RESULTS OF ANALYSES OF THE WATER SAMPLES
FOR PCP (PENTA)
Results Reported as mg/L (ppm)

Sample #	PCP (PENTA) (ppm)
3123-0227-MW-K	<1
3123-0227-MW-I	<1
3123-0227-MW-H	<1
3123-0228-MW-L	<1
3123-0228-MW-J1	60
3123-0228-MW-J2	1
3123-0228-MW-J3	<1
3123-0228-MW-B1	<1
3123-0228-MW-B2	1
3123-0228-MW-M	4
3123-0227-MW-G	1

Quality Assurance

Method Blank	<1
3123-0228-MW-M (Duplicate)	1
3123-0228-MW-M (Matrix Spike) Spiked @ 5 ppm Percent Recovery	135%
3123-0228-MW-M (Matrix Spike Duplicate) Spiked @ 5 ppm Percent Recovery	210%

FIGURE I-4

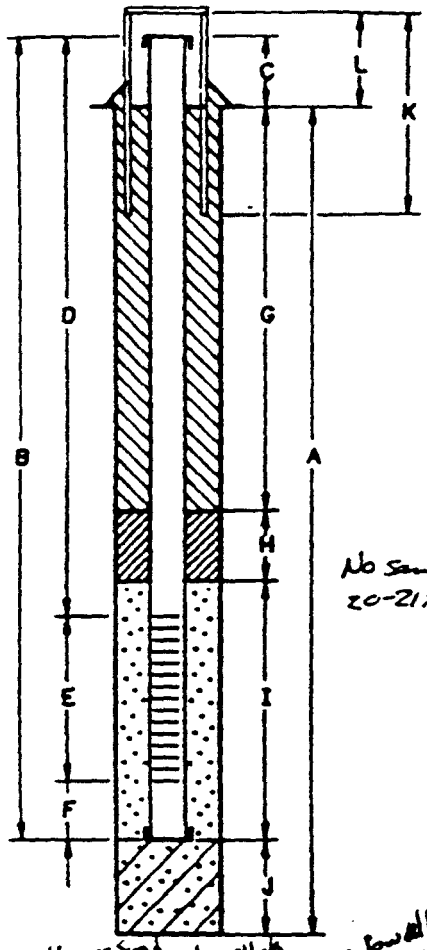
BORING LOG WELL 4

Depth in Feet	Soil Description
0 - 1-1/2	Light brown gravelly sand, moderately compacted, moist (shovel sample)
3-1/2 - 5	Dark brown gravelly sand, moderately compacted, moist, split spoon sample (S.S. sample)
8-1/2 - 10	Light brown gravelly sand, in contact with blue gray gravelly sand, moderately compacted, moist (S.S. sample)
10 - 13	Gravelly sand
13-1/2 - 15	Light blue gray gravelly sand, moderate compaction, saturated (S.S. sample)
15 - 18-1/2	Gravelly sand
18-1/2 - 20	Light blue gray gravelly silty sand with a clay lens, moderately compacted, saturated (S.S. sample)
20 - 23-1/2	Gravelly silty sand with clay lens
23-1/2 - 25	Light gray gravelly silty fine sand with minor clay lens, moderately compacted, saturated (S.S. sample)
25 - 28-1/2	Fine sand
28-1/2 - 30	Light gray medium to fine sand, 3-1/2" thick clay lens, saturated (S.S. sample)
30 - 32-1/2	Medium to fine sand with clay lenses
32-1/2 - 35	Light gray medium to fine sand, minor clay lenses, saturated (S.S. sample)
35 - 37-1/2	Medium to fine grained sand
37-1/2 - 39	Light gray medium to fine sand (S.S. sample)
39 - 42-1/2	Light gray medium to fine sand
42-1/2 - 45	Light gray medium sand grading to fine sand with depth, minor clay lens (S.S. sample)
45 - 47-1/2	Fine sand, saturated
47-1/2 - 49	Light gray sandy silt grading to light gray silty fine sand (S.S. sample)

DRILLING METHOD Hollow Stem Auger DATE 11-29-88

WELL COMPLETION

TOP OF CASING ELEVATION _____



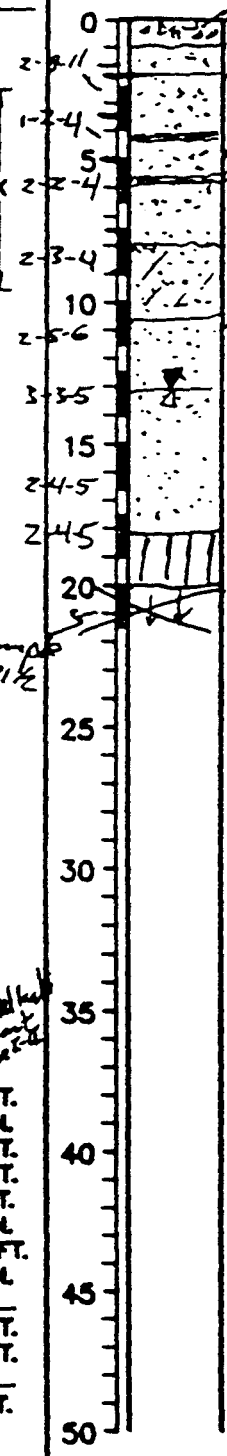
6/100# bags - Sand
1/50# bag - bentonite pellets
3/94# bags Low alkali cement Type I-II

A BORING DEPTH 20 FT.
BORING DIAMETER 14" IN.
B WELL DEPTH 20 FT.
C WELL STICKUP 19" FT.
D BLANK INTERVAL 0 FT. TO 10 FT.
BLANK DIAMETER 4 IN.
E SCREEN INTERVAL 10 FT. TO 20 FT.
SCREEN DIAMETER 4 IN.
TYPE/SLOT SIZE Slotted .002"
F SILT TRAP LENGTH N/A FT.
G WELL SEAL 7 FT.
MATERIAL: Type I-II cement
H BENTONITE SEAL 7 FT. TO 8½ FT.
I SANDPACK 8½ FT. TO 20 FT.
TYPE/SIZE 8-Aqua
J BOTTOM SEAL None FT. TO ___ FT.
MATERIAL: _____
K PROTECTIVE CASING 4 FT.
W/ LOCKING CAP
L STICKUP 20" FT.

GEOLOGIC LOG

GROUND SURFACE ELEVATION _____

road gravel



- Lt brown to greenish-grey, med to fine mixed sand; minor rock frags of basalt; gully poor grading; slightly damp
- Same; 6" section shows dk grey staining of sands; sand emits a mild sour, acrid odor; sand is damp
- Same; more stained sand; odor more pronounced; sand damp
- Same; half of interval is orderous stained sand; remaining sand also emits sour odor.
- Same fine to med. sand; sour odor giving way to petroleum (diesel) odor; sand is wet
- Same fine to med. sand; still emits petroleum odor
- Grey to grey brown silt to very fine sand; still emits petroleum odor; minor flecks of brown organic debris.

Total depth: 20' bgs

Time Oil Company

JOB NUMBER 821401 WELL/BORING NUMBER J-1

DRAWN APPROVED DATE ENGINEER/GEOLOGIST/HYDROLOGIST DML

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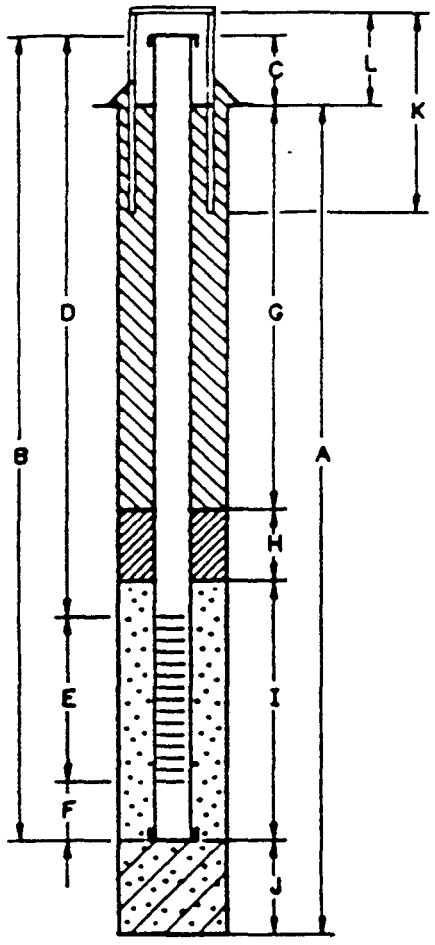
BZTO104(e)012645

WELL COMPLETION FORM

DRILLING METHOD Hollow Stem Auger DATE 12-1-88

WELL COMPLETION

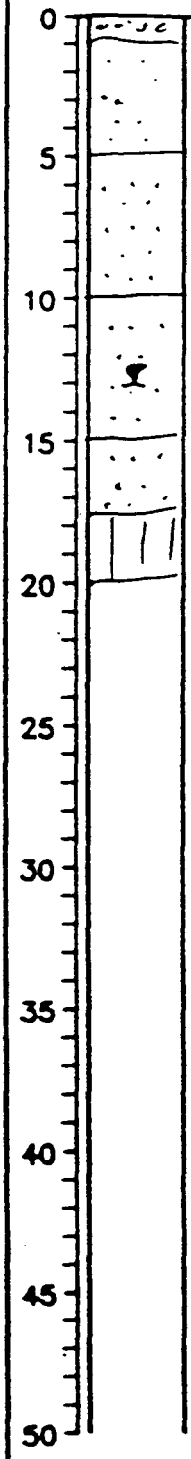
TOP OF CASING ELEVATION _____



A BORING DEPTH _____ FT.
BORING DIAMETER _____ IN.
B WELL DEPTH _____ FT.
C WELL STICKUP _____ FT.
D BLANK INTERVAL ___ FT. TO ___ FT.
BLANK DIAMETER _____ IN.
E SCREEN INTERVAL ___ FT. TO ___ FT.
SCREEN DIAMETER _____ IN.
TYPE/SLOT SIZE _____
F SILT TRAP LENGTH _____ FT.
G WELL SEAL _____ FT.
MATERIAL: _____
H BENTONITE SEAL ___ FT. TO ___ FT.
I SANDPACK ___ FT. TO ___ FT.
TYPE/SIZE _____
J BOTTOM SEAL ___ FT. TO ___ FT.
MATERIAL: _____
K PROTECTIVE CASING _____ FT.
W/ LOCKING CAP
L STICKUP _____ FT.

GEOLOGIC LOG

GROUND SURFACE ELEVATION _____



- Mainly coarse sand gravel
- Mix of grey-brown to brown, fine to med sand, minor pebbles & rock frags; sediment is damp
- Same; sediments have moderate sour-petroleum odor
- Same; moderate sour-petroleum odor; sediments are predominantly grey in color
- Same to about 17½', then encounter
- gray silt to soft fine sand with minor flecks of brown organic matter

Total depth = 20' bgs
- hole caved to 10' bgs

2/50# bags bentonite in rotary mud mix (100 gal)
3/~~[illegible]~~ bags Type I-II cement

Time Oil Co.

JOB NUMBER CZ1401 WELL/BORING NUMBER J-2

DRAWN APPROVED DATE ENGINEER/GEOLOGIST/HYDROLOGIST PM

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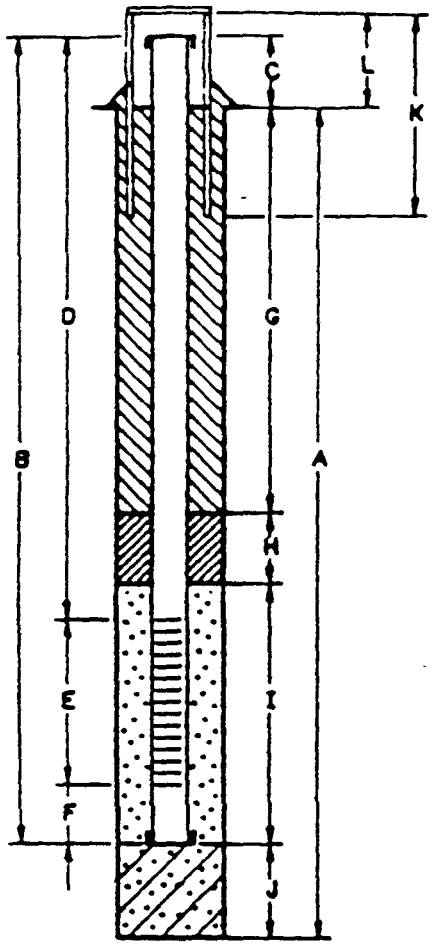
WELL COMPLETION FORM

DRILLING METHOD Cable Tool DATE 1-3-89

WELL COMPLETION

TOP OF CASING ELEVATION _____



A BORING DEPTH 40'6" FT.
BORING DIAMETER 8 IN.
B WELL DEPTH 41'11" FT.
C WELL STICKUP 1'5" FT.
D BLANK INTERVAL ___ FT. TO ___ FT.
BLANK DIAMETER ___ IN.
E SCREEN INTERVAL 30 FT. TO 40 FT.
SCREEN DIAMETER 4 IN.
TYPE/SLOT SIZE .20"
F SILT TRAP LENGTH 6" FT.
G WELL SEAL 20 FT.
MATERIAL: Portland Cement
H BENTONITE SEAL 20 FT. TO 27½ FT.
I SANDPACK 27½ FT. TO 40 FT.
TYPE/SIZE Aqua B
J BOTTOM SEAL ___ FT. TO ___ FT. None
MATERIAL: ___
K PROTECTIVE CASING 4 FT.
W/ LOCKING CAP
L STICKUP 1'8" FT.

GEOLOGIC LOG

GROUND SURFACE ELEVATION _____

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

Continuation or deepening of previous drilling to 20' bgs on 12-1-88.

Mixture of silt & sand. Drilling action of cable tool served to churn sediments & mix them thoroughly. Through column, from 20-40', very wet & sloppy (runny) mix of grey, fine to med. sand, and silt was bailed from boring. From 20-30', clumps of silt were evident. But from 30-40, the mix was of runny milkshake consistency.

Total depth = 40'

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Time Oil Co.

JOB NUMBER 821401 WELL/BORING NUMBER 1-2

DRAWN APPROVED DATE ENGINEER/GEOLOGIST/HYDROLOGIST DML

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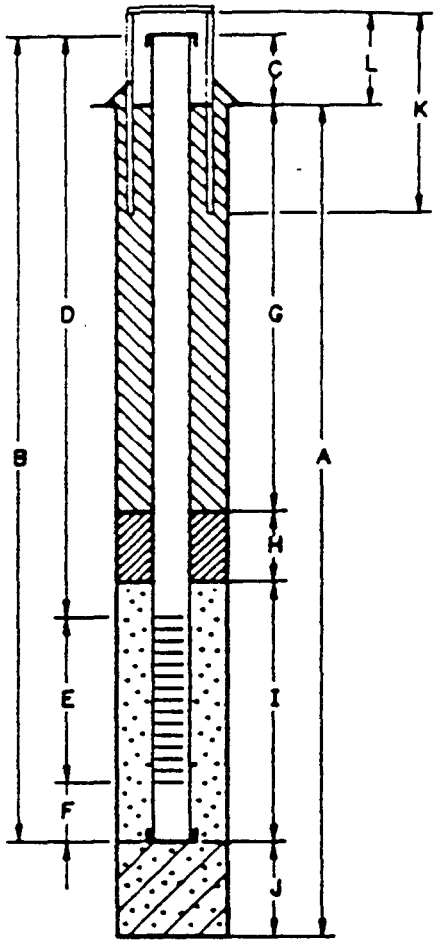
WELL COMPLETION FORM

DRILLING METHOD Hollow Stem Auger DATE 12-1-88

WELL COMPLETION

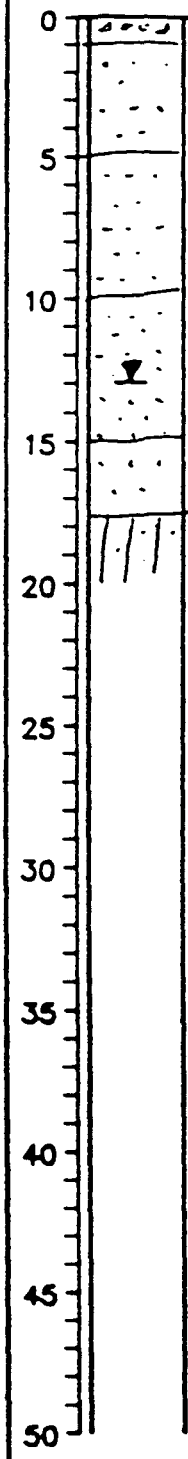
P OF CASING ELEVATION _____



A BORING DEPTH _____ FT.
BORING DIAMETER _____ IN.
B WELL DEPTH _____ FT.
C WELL STICKUP _____ FT.
D BLANK INTERVAL ___ FT. TO ___ FT.
BLANK DIAMETER _____ IN.
E SCREEN INTERVAL ___ FT. TO ___ FT.
SCREEN DIAMETER _____ IN.
TYPE/SLOT SIZE _____
F SILT TRAP LENGTH _____ FT.
G WELL SEAL _____ FT.
MATERIAL: _____
H BENTONITE SEAL ___ FT. TO ___ FT.
I SANDPACK ___ FT. TO ___ FT.
TYPE/SIZE _____
J BOTTOM SEAL ___ FT. TO ___ FT.
MATERIAL: _____
K PROTECTIVE CASING _____ FT.
W/ LOCKING CAP
STICKUP _____ FT.

GEOLOGIC LOG

GROUND SURFACE ELEVATION _____



Mainly coarse road gravel

- Mixture of grey brown to brown, fine to med sand; minor pebbles & rock frags; sediment is damp.
- Same; moderate sour-petroleum odor in sediment
- Same; moderate to strong odor
- Same; moderate to strong odor
- Gray silt to very fine sand; contains minor flecks of brown fibrous organic matter

Total depth = 20' bgs

2/50# bags bentonite in reaming mud mix (100 gal)

3/100# bags Type I-II cement

Top-off batch:
1/100# bag cement

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Time Oil Co

JOB NUMBER 821401 WELL/BORING NUMBER 1-3

DRAWN APPROVED DATE ENGINEER/GEOLOGIST/HYDROLOGIST DAL

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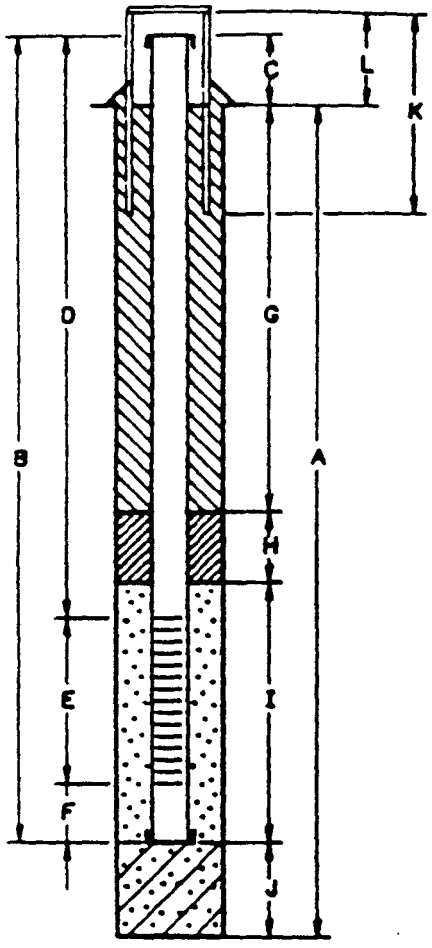
BZTO104(e)012648

DRILLING METHOD Cable Tool DATE 1-4&5-89

WELL COMPLETION

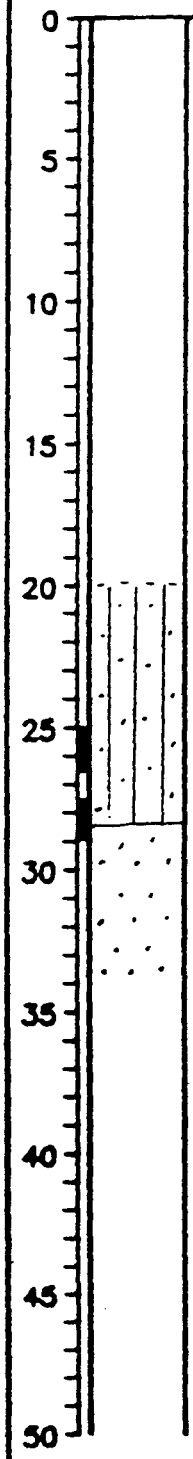
TOP OF CASING ELEVATION _____



A BORING DEPTH 33'6" FT.
BORING DIAMETER 8" IN.
B WELL DEPTH 35'1" FT.
C WELL STICKUP 19" FT.
D BLANK INTERVAL ___ FT. TO 28 FT.
BLANK DIAMETER 4" IN.
E SCREEN INTERVAL 28 FT. TO 33 FT.
SCREEN DIAMETER 4" IN.
TYPE/SLOT SIZE 0.020
F SILT TRAP LENGTH 6" FT.
G WELL SEAL 19'6" FT.
MATERIAL: Bentonite Cement
H BENTONITE SEAL 16" FT. TO 27 FT.
I SANDPACK 27 FT. TO 26" FT.
TYPE/SIZE Aqua 6
J BOTTOM SEAL None FT. TO ___ FT.
MATERIAL: None
K PROTECTIVE CASING W/ LOCKING CAP 4' FT.
L STICKUP 22" FT.

GEOLOGIC LOG

GROUND SURFACE ELEVATION _____



This work represents deepening of J-3 & installation of well. J-3 was drilled to 30' & reamed to accept 10" steel casing on 12-4-88.

Grey sandy silt w/ brown streaks of organic material. Slight petroleum odor.

Grey, fine to med. sand.

Total depth = 33'6"

Time Oil Co

JOB NUMBER 821401 WELL/BORING NUMBER J-3

DRAWN APPROVED DATE ENGINEER/GEOLOGIST/HYDROLOGIST DML

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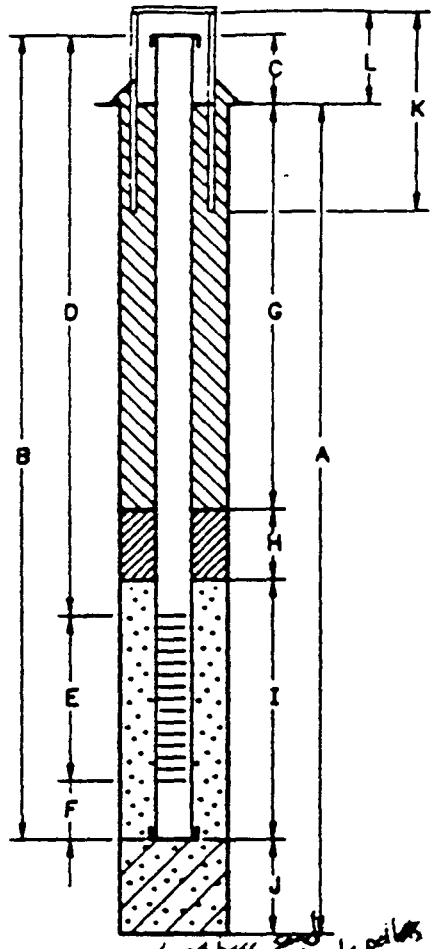
WELL COMPLETION FORM

DRILLING METHOD Hollow Stem Auger DATE 11-30-88

WELL COMPLETION

OP OF CASING ELEVATION _____

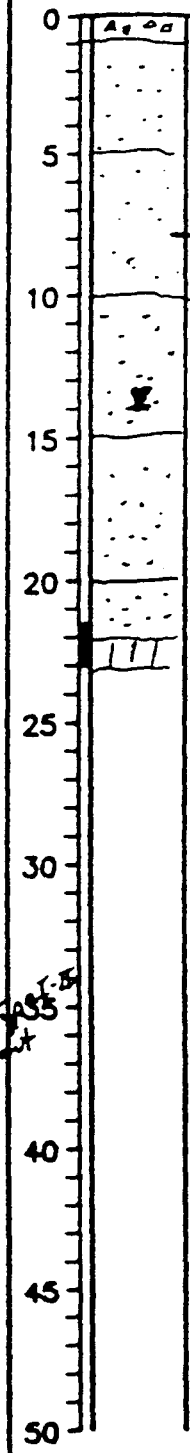


6/100# bags sand
1/50# bag bentonite pellets
3/94# bags Type I-II cement

A BORING DEPTH 21½ FT.
BORING DIAMETER 14 IN.
B WELL DEPTH 20½ FT.
C WELL STICKUP 16" FT.
D BLANK INTERVAL ½ FT. TO 10½ FT.
BLANK DIAMETER 4 IN.
E SCREEN INTERVAL 10½ FT. TO 20½ FT.
SCREEN DIAMETER ~~0.02~~ 4 IN.
TYPE/SLOT SIZE 0.02
F SILT TRAP LENGTH NA FT.
G WELL SEAL _____ FT.
MATERIAL: Type I-II Cement
H BENTONITE SEAL 5 FT. TO 9½ FT.
I SANDPACK 9½ FT. TO 20½ FT.
TYPE/SIZE 8 Aqua
J BOTTOM SEAL ___ FT. TO ___ FT.
MATERIAL: None
K PROTECTIVE CASING 4 FT.
W/ LOCKING CAP
STICKUP 18" FT.

GEOLOGIC LOG

GROUND SURFACE ELEVATION _____



Road gravel, minor brown organic-rich fine to med sand

Dk gray to brown-gray fine to med sand; minor rk frags & rounded pebbles; sediments are poorly graded; material is damp. S

Same; strong petroleum odor from 8-10'

Same; mod. strong petroleum odor

Same; mod. petroleum odor

Same

Gray-brown, silt to very fine sand; contains minor organic debris SM

Total depth = 21½' bgs

Time Oil Co.

JOB NUMBER 821401 WELL/BORING NUMBER B-1

DRAWN APPROVED DATE ENGINEER/GEOLOGIST/HYDROLOGIST

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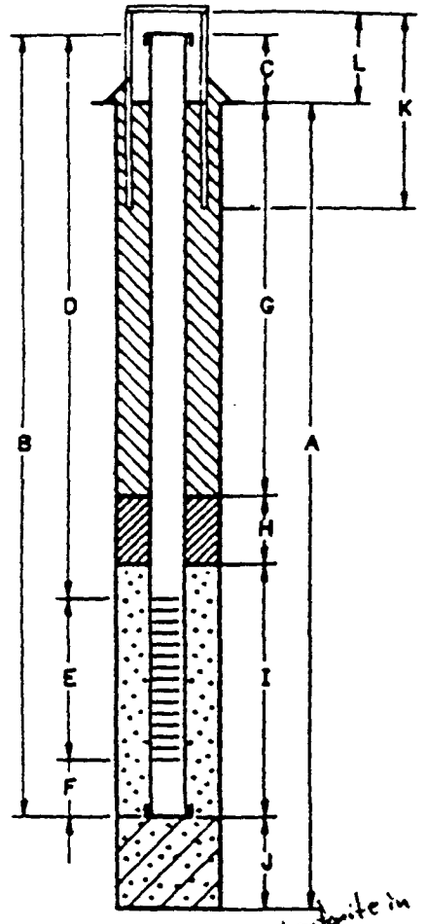
BZTO104(e)012650

DRILLING METHOD Hollow Stem Auger 9¼" ID - 14" OD DATE 11-30-88

WELL COMPLETION

TOP OF CASING ELEVATION _____



2/50# bags bentonite in mud mixture
3/100# bags Portland cement

A BORING DEPTH _____ FT.
BORING DIAMETER _____ IN.
B WELL DEPTH _____ FT.
C WELL STICKUP _____ FT.
D BLANK INTERVAL ___ FT. TO ___ FT.
BLANK DIAMETER _____ IN.
E SCREEN INTERVAL ___ FT. TO ___ FT.
SCREEN DIAMETER _____ IN.
TYPE/SLOT SIZE _____
F SILT TRAP LENGTH _____ FT.
G WELL SEAL _____ FT.
MATERIAL: _____
H BENTONITE SEAL ___ FT. TO ___ FT.
I SANDPACK ___ FT. TO ___ FT.
TYPE/SIZE _____
J BOTTOM SEAL ___ FT. TO ___ FT.
MATERIAL: _____
K PROTECTIVE CASING W/ LOCKING CAP _____ FT.
L STICKUP _____ FT.

GEOLOGIC LOG

GROUND SURFACE ELEVATION _____

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

- Road gravel & dark brown, fine to med sand
- Dk gray to brown-gray, fine to med. sand; minor rock frags & rounded pebbles; sediment is damp
- Same; at ~7-8' depth, picks up strong sour petroleum odor.
- Same; less sour, more distinct petroleum odor
- Same
- Grey-brown, silt to very fine sand with minor organic debris
- Total depth = 20' bgs
  Cave at 12' when augers pulled
- Conductor casing in hole from 1-20' bgs
  - Casing is 19' long & bottom is resting in silt unit

Time Oil Co

JOB NUMBER 821401 WELL/BORING NUMBER B-2

DRAWN APPROVED DATE ENGINEER/GEOLOGIST/HYDROLOGIST DML

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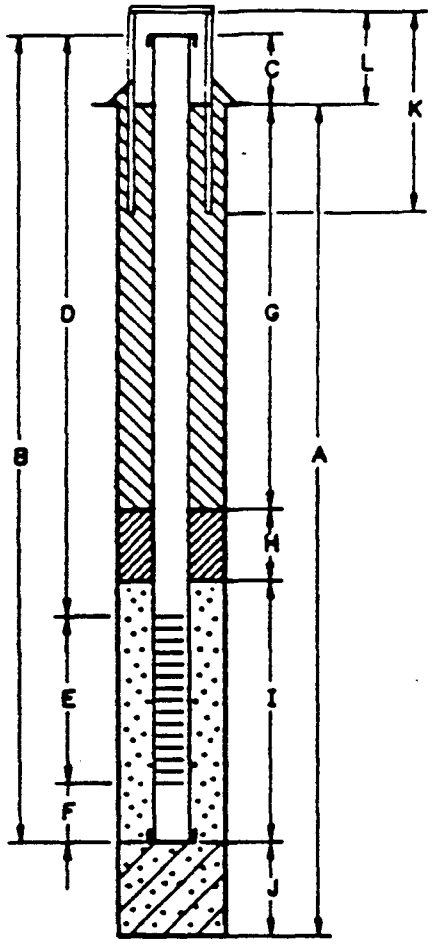
DRILLING METHOD Cable Tool DATE 1-5-89

WELL COMPLETION

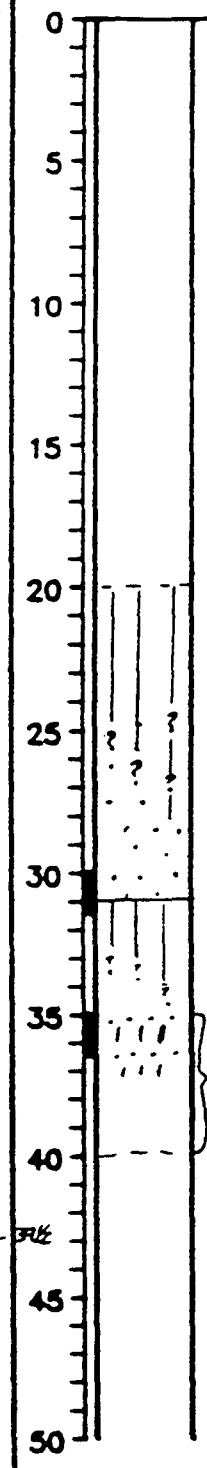
TOP OF CASING ELEVATION _____



A BORING DEPTH 40' FT.
BORING DIAMETER 8" IN.
B WELL DEPTH 41'9" FT.
C WELL STICKUP 21" FT.
D BLANK INTERVAL ___ FT. TO 24½ FT.
BLANK DIAMETER 4" IN.
E SCREEN INTERVAL 24½ FT. TO 34½ FT.
SCREEN DIAMETER 0.020 IN.
TYPE/SLOT SIZE 4" AKP
F SILT TRAP LENGTH 6" FT.
G WELL SEAL 20' FT.
MATERIAL: Portland Cement
H BENTONITE SEAL 20 FT. TO 22 FT.
I SANDPACK 22 FT. TO 40 FT.
TYPE/SIZE Aqua B
J BOTTOM SEAL ~~___ FT. TO ___ FT.~~
MATERIAL: None
K PROTECTIVE CASING 4 FT.
W/ LOCKING CAP
L STICKUP 24" FT.

GEOLOGIC LOG

GROUND SURFACE ELEVATION _____



This work is deepening and installation of well in B-2. B-2 was drilled to 20' & reamed to 10". 20', 10" steel conductor casing was installed & cemented

Gray, silt & sand layers. Specific disposition not known.

Gray, interbedded silts & sands. Beds 6" to 2¼" thick.

Total depth = 40' bgs

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Time Oil Co

JOB NUMBER 821401 WELL/BORING NUMBER B-2

DRAWN APPROVED DATE ENGINEER/GEOLOGIST/HYDROLOGIST DML

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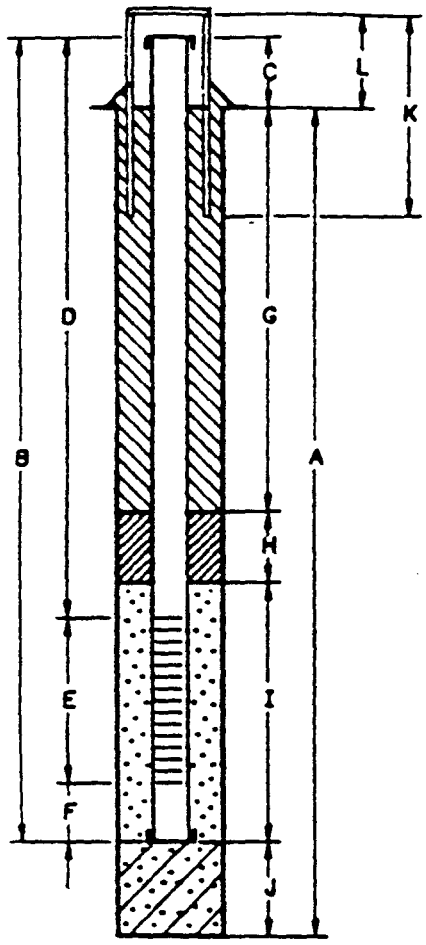
DRILLING METHOD Hollow Stem Auger DATE 11-29-88

WELL COMPLETION

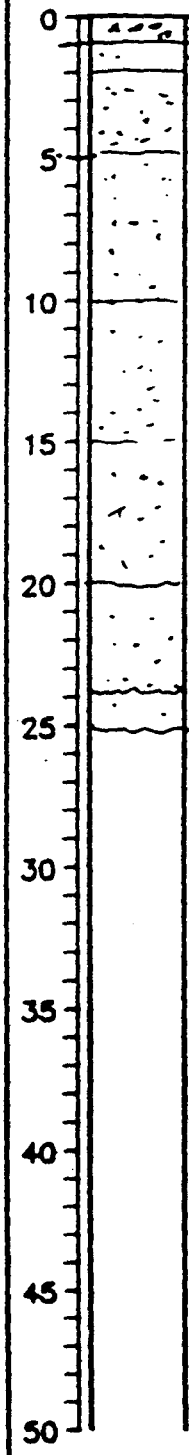
TOP OF CASING ELEVATION _____



A BORING DEPTH _____ FT.
BORING DIAMETER _____ IN.
B WELL DEPTH _____ FT.
C WELL STICKUP _____ FT.
D BLANK INTERVAL ___ FT. TO ___ FT.
BLANK DIAMETER _____ IN.
E SCREEN INTERVAL ___ FT. TO ___ FT.
SCREEN DIAMETER _____ IN.
TYPE/SLOT SIZE _____
F SILT TRAP LENGTH _____ FT.
G WELL SEAL _____ FT.
MATERIAL: _____
H BENTONITE SEAL ___ FT. TO ___ FT.
I SANDPACK ___ FT. TO ___ FT.
TYPE/SIZE _____
J BOTTOM SEAL ___ FT. TO ___ FT.
MATERIAL: _____
K PROTECTIVE CASING _____ FT.
W/ LOCKING CAP
L STICKUP _____ FT.

GEOLOGIC LOG

GROUND SURFACE ELEVATION _____



- Coarse gravel fill
- Dark brown silty sand w/abundant root material & other organic debris

DK Grey to brown, fine to medium sand, minor rock frags & pebbles

Same

Same

Same; some slight petroleum odor

Same; distinct to strong petroleum odor

- thin seam of brown organic silt & sand - considerable organic (plant) debris

Total depth = 25' bgs

Time Oil Company

JOB NUMBER 021401 WELL/BORING NUMBER Ga-1

DRAWN APPROVED DATE ENGINEER/GEOLOGIST/HYDROLOGIST DML

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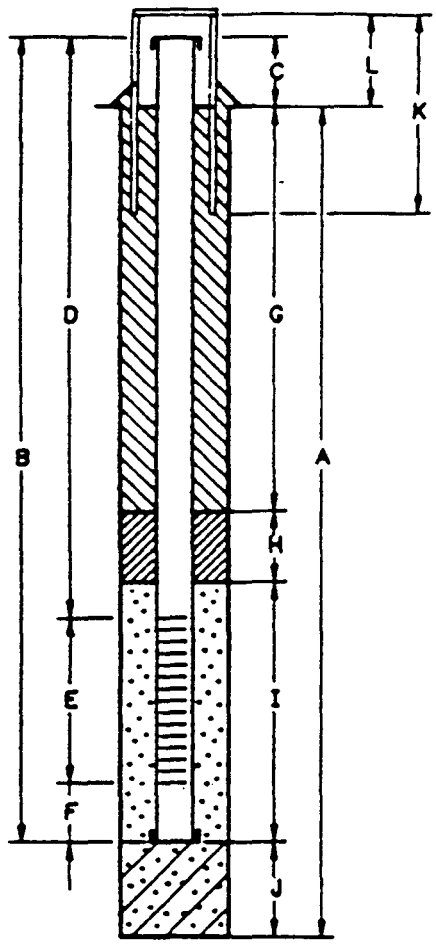
DRILLING METHOD Hollow Stem Auger DATE 12-2-88

WELL COMPLETION

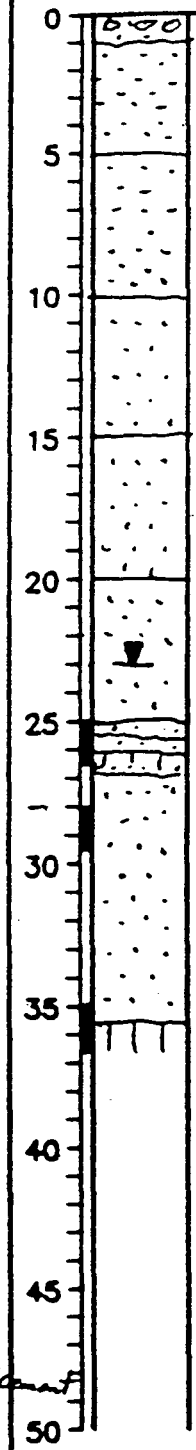
TOP OF CASING ELEVATION _____



A BORING DEPTH 35 FT.
BORING DIAMETER 6 IN.
B WELL DEPTH 35 FT.
C WELL STICKUP 17½" FT.
D BLANK INTERVAL 6 FT. TO 25 FT.
BLANK DIAMETER 2 IN.
E SCREEN INTERVAL 25 FT. TO 35 FT.
SCREEN DIAMETER 2 IN.
TYPE/SLOT SIZE 0.02"
F SILT TRAP LENGTH NA FT.
G WELL SEAL 22 FT.
MATERIAL: ~~Bentonite Pellets~~ Type I-II cement
H BENTONITE SEAL 22 FT. TO 24 FT.
I SANDPACK 24 FT. TO 35 FT.
TYPE/SIZE 8 Aqua
J BOTTOM SEAL ___ FT. TO ___ FT.
MATERIAL: _____
K PROTECTIVE CASING 4' FT.
W/ LOCKING CAP
L STICKUP 14' FT.

GEOLOGIC LOG

GROUND SURFACE ELEVATION _____



- Crushed road gravel & thin, brown organic-rich sand.
- Dark grey to grey-brown, fine to medium sand with minor rounded pebbles & rock fragments; sediments are damp.
- Same
- Same
- Same; slight petroleum odor evident
- Same; moderate petroleum odor; Water encountered ~ 23'
- Spoonsample shows & thin beds of grey, silt to very fine sand - max thickness of 3".
- Same fine to med. sand
- Grey, silt to very fine sand - to 36½', thickness not known. Some silt on auger flights in 20-25' interval

Total Depth = 35'

2½/100# bags 8 Aqua sand
4/100# bags Type I-II cement

Top off wells - another:
4/100# bags Type I & II cement
+4

Time Oil Co

JOB NUMBER 821401 WELL/BORING NUMBER G-1A

DRAWN APPROVED DATE ENGINEER/GEOLOGIST/HYDROLOGIST DML

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BZTO104(e)012654

Toxicity and Persistence Evaluation

The following guidance is based on the "Uncontrolled Hazardous Waste Site Ranking System, A Users Manual", originally published in the July 16, 1982, Federal Register (40 CFR, Part 300, Appendix A). This document should be consulted for a thorough explanation of the toxicity/persistence evaluation.

Toxicity and Persistence have been combined in the matrix below because of their important relationship. To determine the overall value for this combined factor, evaluate each factor individually as discussed below. Match the individual values assigned with the values in the matrix for the combined rating factor. Evaluate the toxicity and persistence of several of the most hazardous substances at the facility independently and enter only the highest score in the matrix below:

	Value for Persistence			
Value for Toxicity	0	1	2	3
0	0	0	0	0
1	3	6	9	12
2	6	9	12	15
3	9	12	15	18

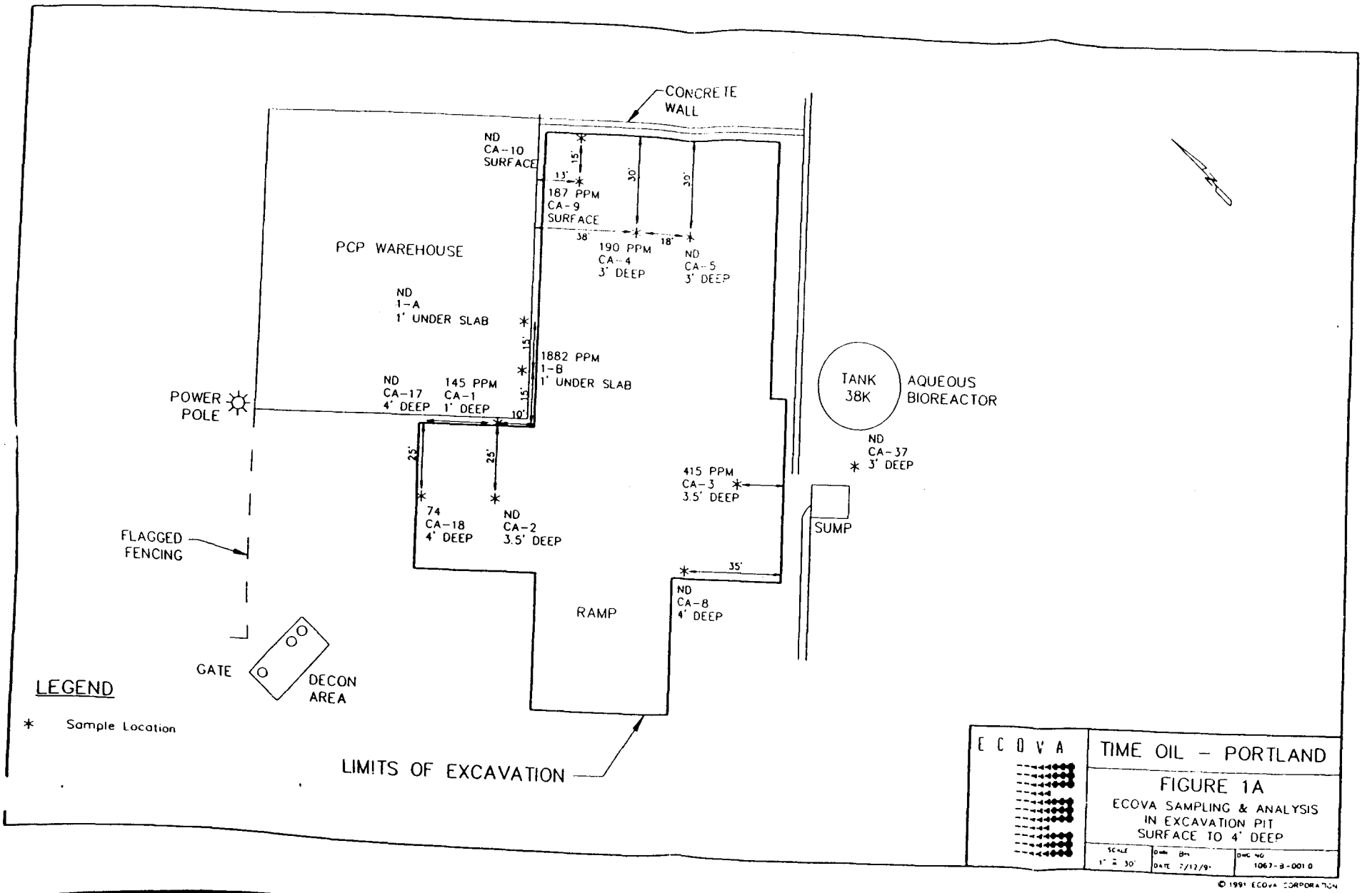
Persistence of each hazardous substance is evaluated on its biodegradability as follows:

Substance	Assigned Value[1]
Easily biodegradable compounds	0
Straight chain hydrocarbons	1
Substituted and other ring compounds	2
Metals, polycyclic compounds and halogenated hydrocarbons	3

Toxicity of each hazardous substance being evaluated is given a value using the rating scheme of Sax [2] or the National Fire Protection Association (NFPA) [3]. Assign a value as follows:

Toxicity	Assigned Value
Sax level 0 or NFPA level 0	0
Sax level 1 or NFPA level 1	1
Sax level 2 or NFPA level 2	2
Sax level 3 or NFPA level 3 or 4	3

[1] JRB Associates, Inc., Methodology for Rating the Hazard Potential for Waste Disposal Sites, May 5, 1980.
[2] Sax, N.I., Dangerous Properties of Industrial Materials, Van Nostrand Rheinhold Company, New York, 4th Edition, 1975.
Sax, N.I., Dangerous Properties of Industrial Materials, Van Nostrand Rheinhold Company, New York, 5th Edition, 1979.
[3] National Fire Protection Association. National Fire Codes, Vol. 13, No. 49, 1977.



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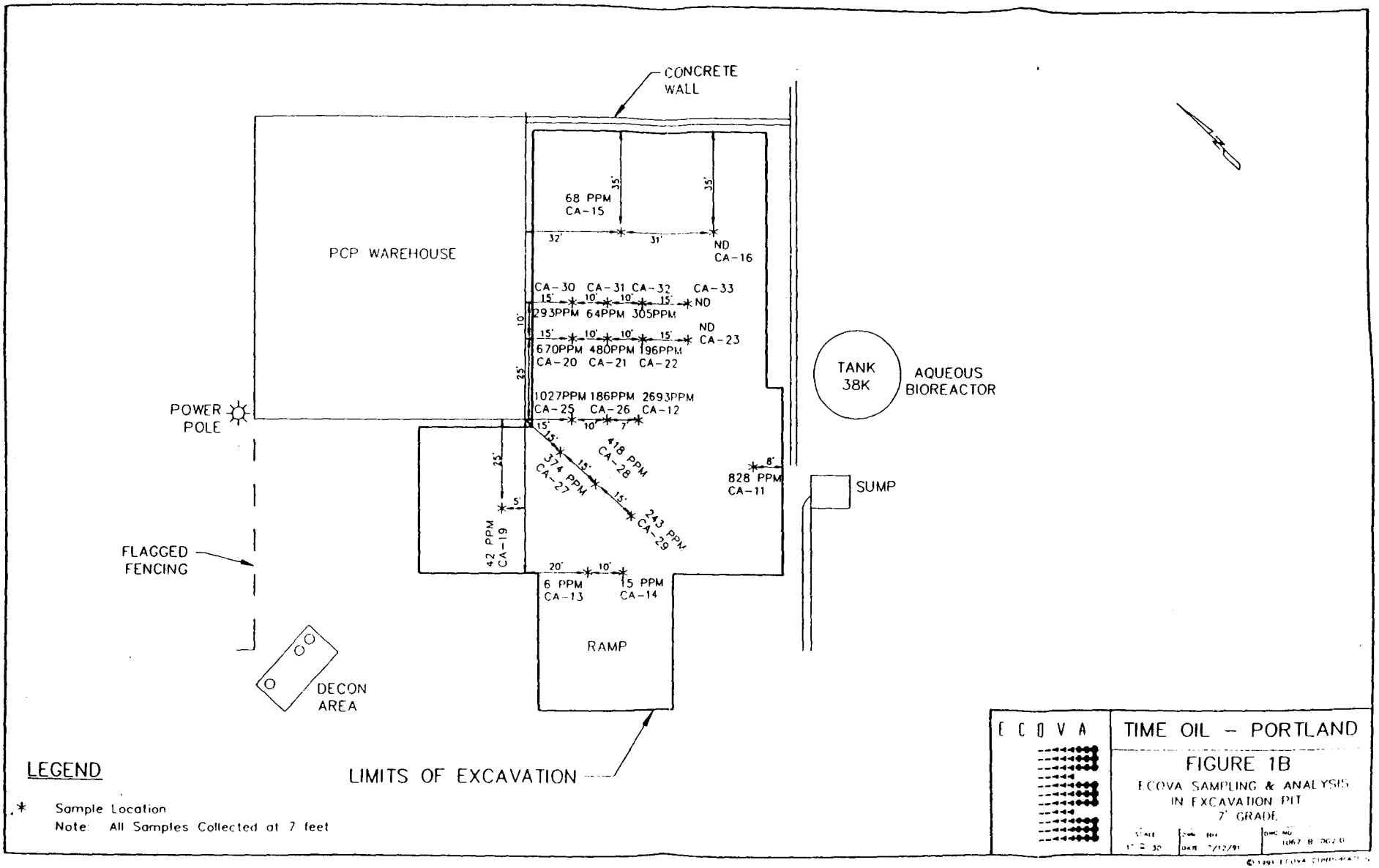

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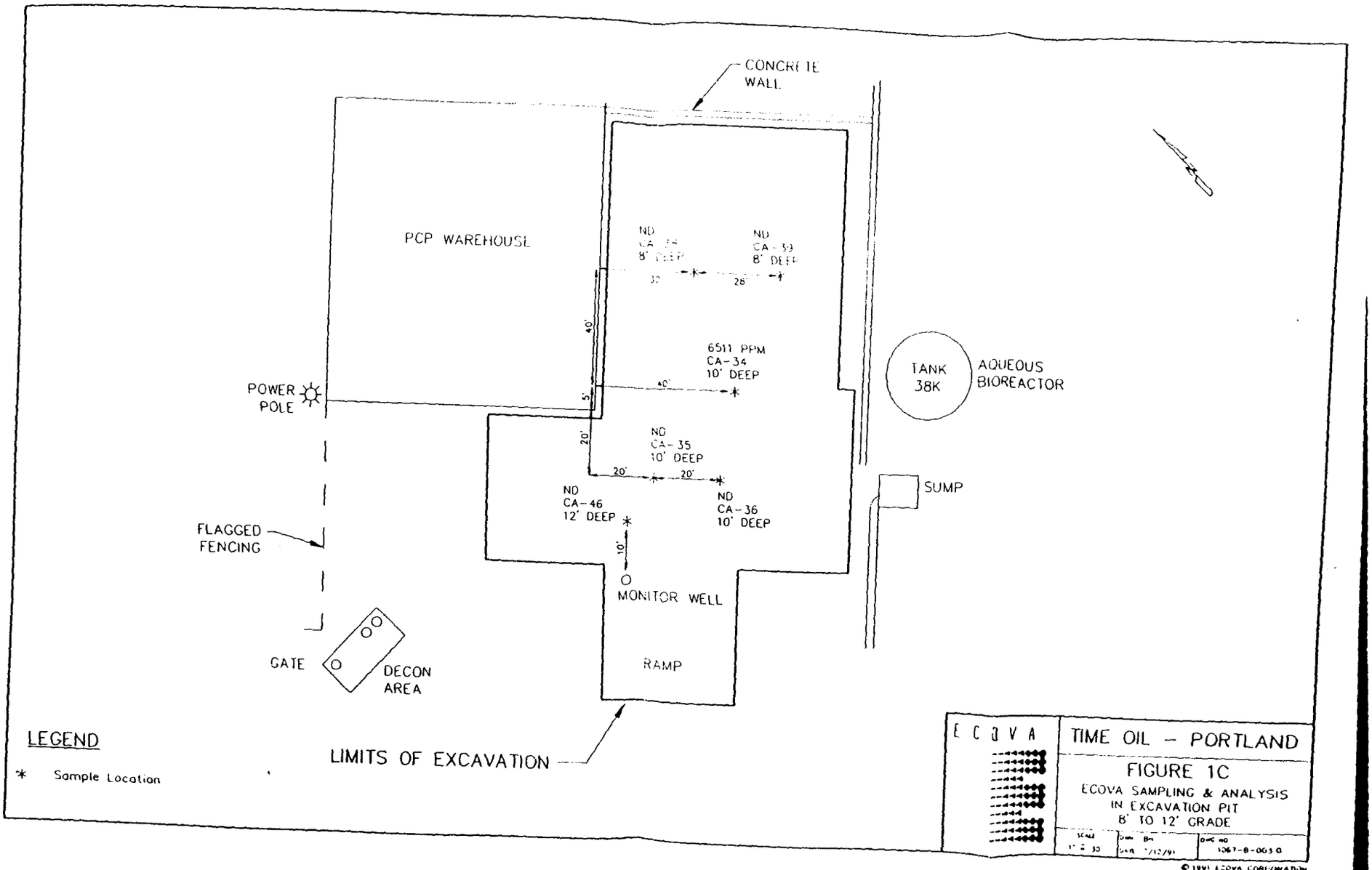

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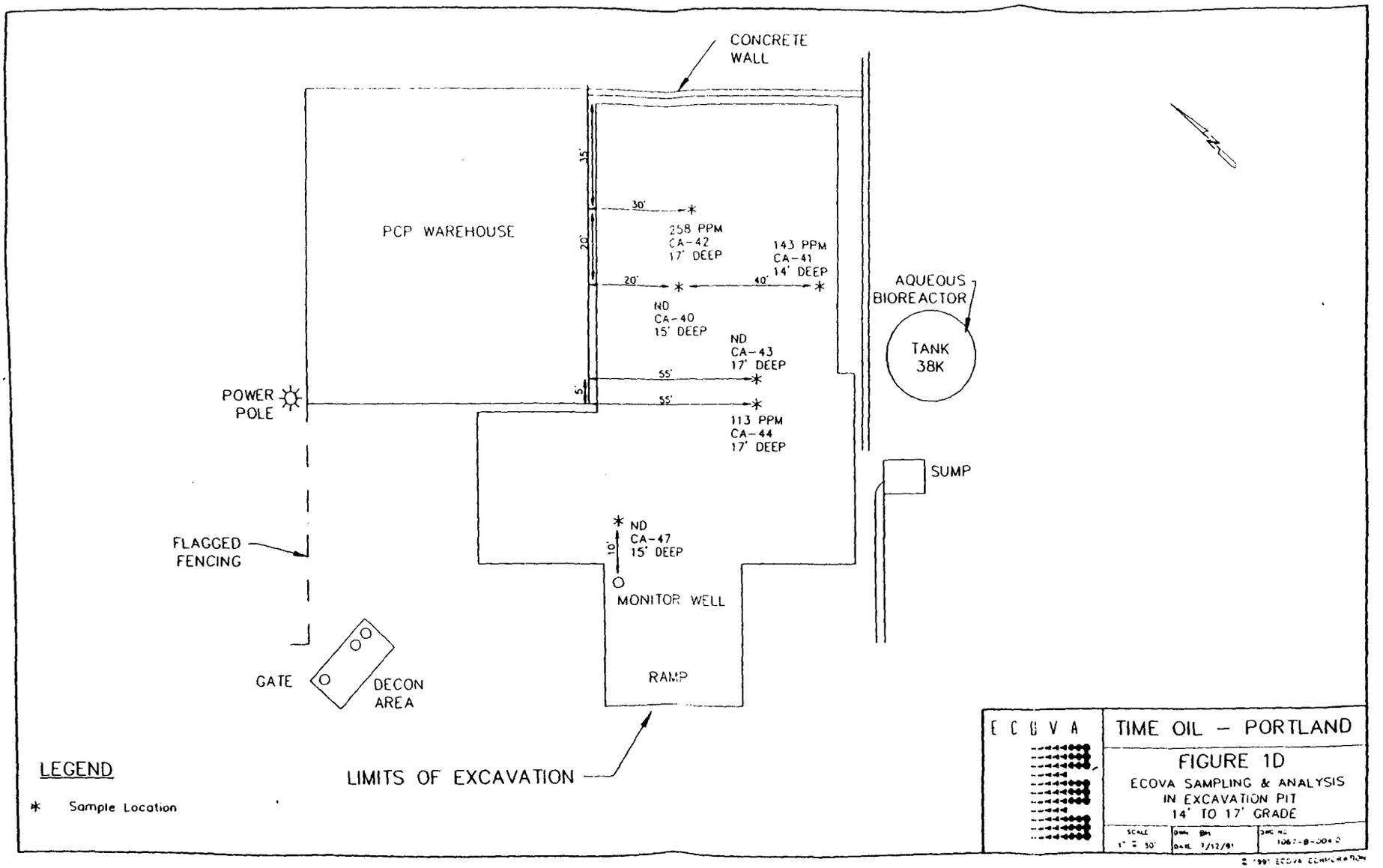

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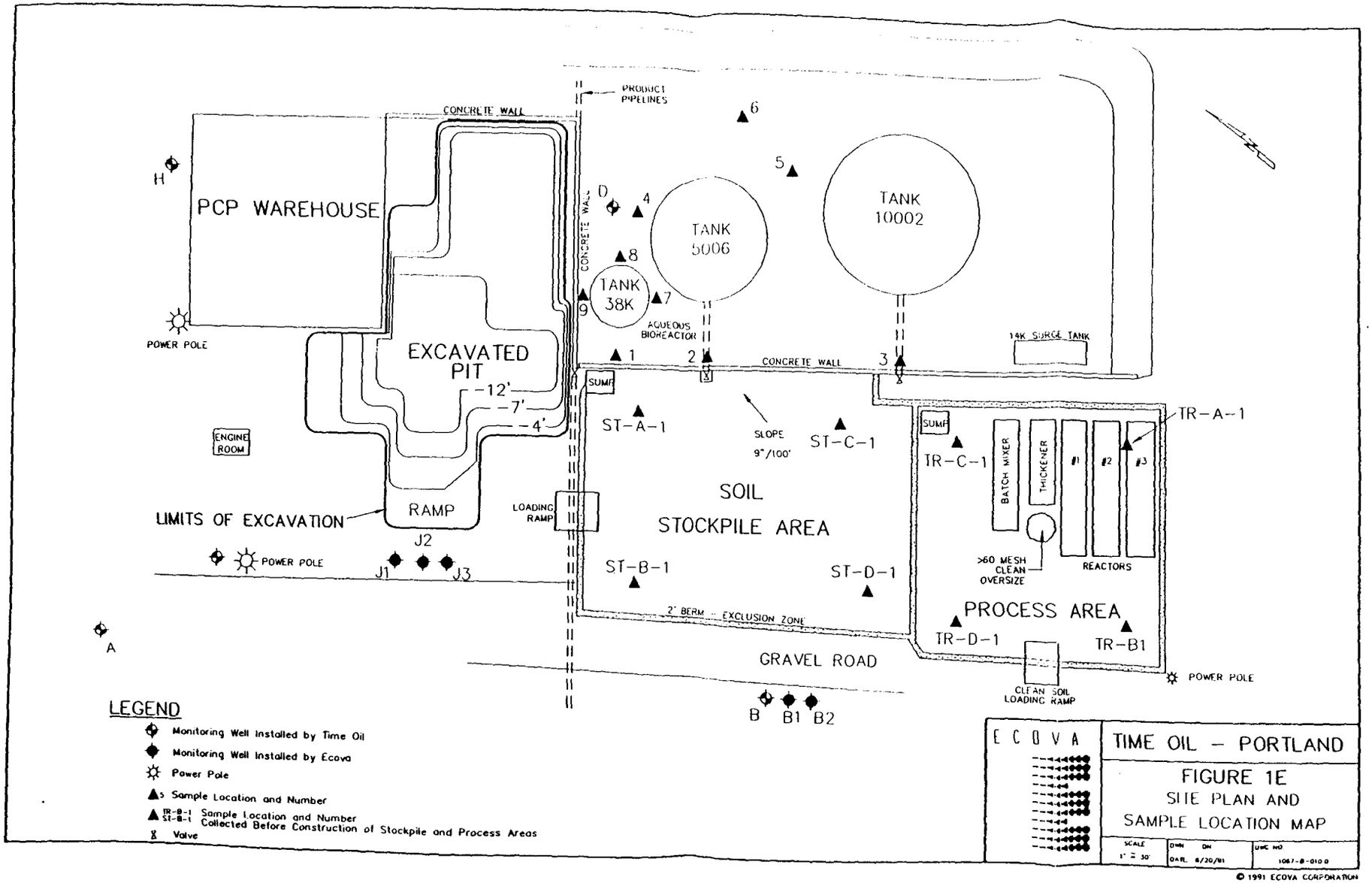
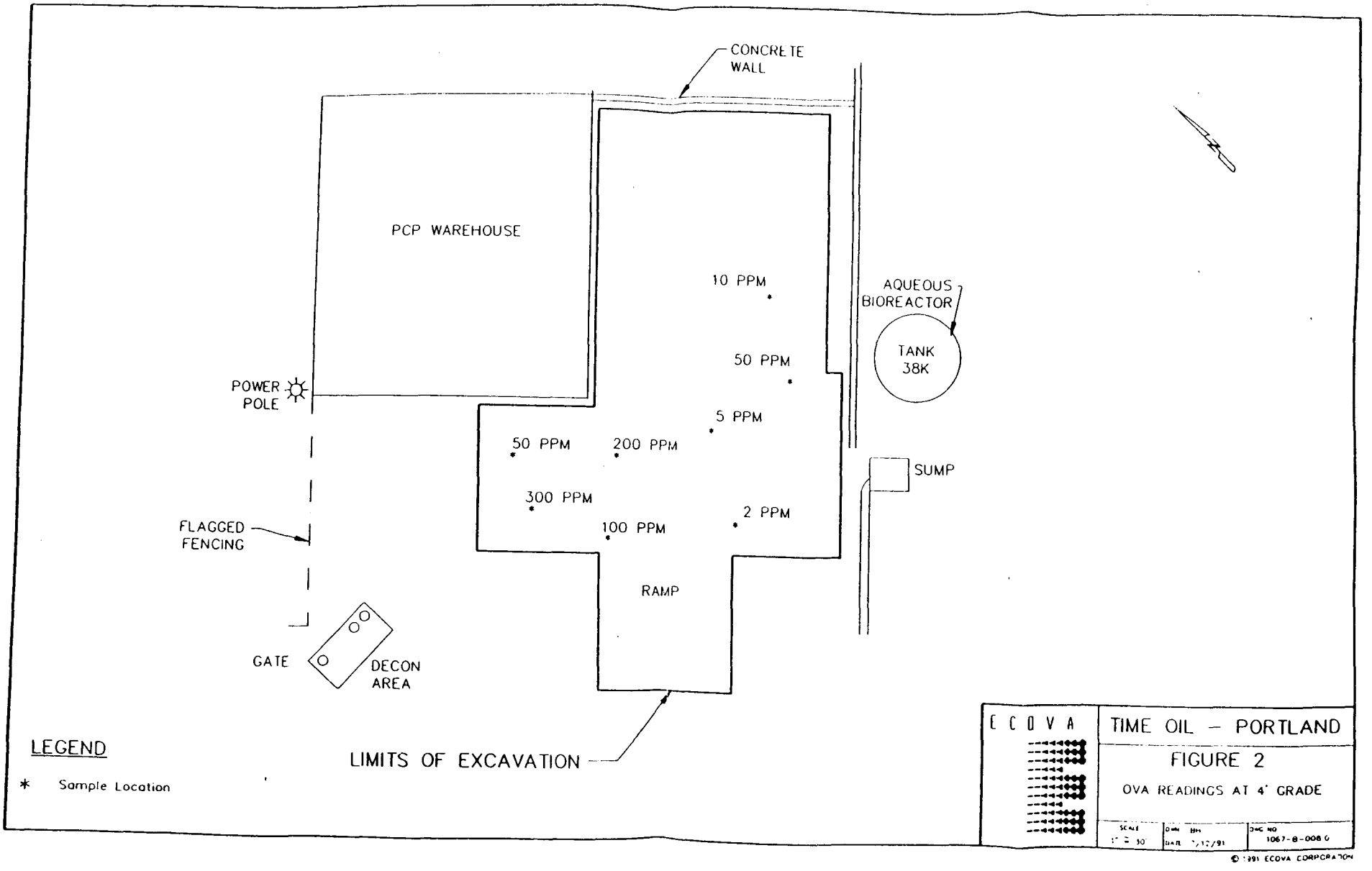


BZTO104(e)012660



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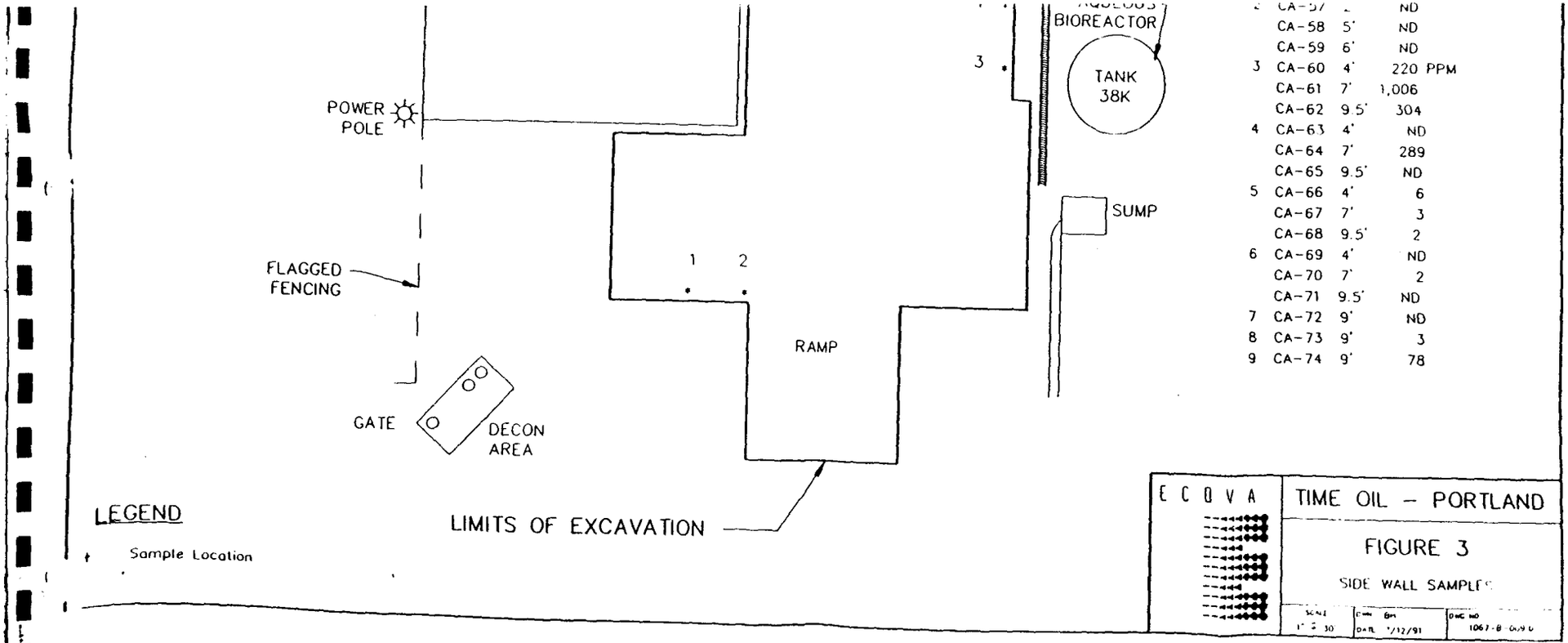

2	CA-57	2'	ND
	CA-58	5'	ND
	CA-59	6'	ND
3	CA-60	4'	220 PPM
	CA-61	7'	1,006
	CA-62	9.5'	304
4	CA-63	4'	ND
	CA-64	7'	289
	CA-65	9.5'	ND
5	CA-66	4'	6
	CA-67	7'	3
	CA-68	9.5'	2
6	CA-69	4'	ND
	CA-70	7'	2
	CA-71	9.5'	ND
7	CA-72	9'	ND
8	CA-73	9'	3
9	CA-74	9'	78

BZTO104(e)012662