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KEYSTONE
ENVIRONMENTAL RESOURCES, INC.

MAR 13 1987

Interoffice Correspondence

To	J. K. Fu	From	J. W. Adams
Location	Monroeville	Location	Monroeville
Subject	Time Oil Soil Washing	Date	March 13, 1987

I had a brief discussion with Bill Baldwin of Koppers' Protection Products Group today, regarding the potential for soil washing of material from the Time Oil site. Based upon this discussion, Bill is having a 5-gallon sample of soil, from the site, sent to your attention at the Monroeville Center.

I offered to evaluate this sample with a single 'go/no go' test to determine the potential for a soil washing process at this site. Keystone will provide this test (phase 1), along with the grease and oil analysis and pentachlorophenol analysis, at no cost to Protection Products Group.

Please notify me when you have received the sample and are ready to begin the test. The appropriate project number is BSOP-00-W0OD0023.

J. W. Adams/pb
J. W. Adams

JWA/pb

cc: B.Baldwin

John Denham 3/20/87
Joe Fu 4/8
Sample received last week - should have results by late May or early June
advised Denham

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KEYSTONE
ENVIRONMENTAL RESOURCES, INC.

FEB 09 1987

Interoffice Correspondence

To	W.J. Baldwin	From	M.J. Dvorsky
Location	K-1350	Location	K-1940
Subject	Time Oil - 460100	Date	February 6, 1987

The correspondence dated January 14, 1987, on the Time Oil Company has been forwarded for review to the Environmental Engineering Group of Keystone as per your request of February 3, 1987. We have set up project number 460100 under the Protection Products section of the Building Products Sector to track costs of this review.

In a quick review of the information, nothing is said of how the effluent streams from the various process streams would be rendered non-toxic. Dilution below toxic levels and discharge to a POTW may not be acceptable to the regulatory authorities. Should the liquid stream be passed through activated charcoal, what is to be done with the spent charcoal? It cannot be classified K001.

These are a few preliminary comments. Once all the reviews, both technical and regulatorial, have been accomplished, a meeting will be scheduled to discuss our comments with you.

Mike

MD/smg

cc: J. Sebbens
J. Smith
J. Fu

Jack Adams 55gal dirt
soil wash
need do - out analytical only

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BZTO104(e)039102

PHONE 285-2400
CABLE ADDRESS: TIMOIL

SEATTLE
TACOMA
PORTLAND
STOCKTON
RENO
RICHMOND
LOS ANGELES

TIME OIL COMPANY

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

SEATTLE, WASHINGTON 98199-1233
SEATTLE, WASHINGTON 98124-0447

JAN 20 1987

January 14, 1987

Koppers Company Inc.
Attn: J. Sebbens
Koppers Building
Pittsburg, PA 15219

Dear Mr. Sebbens:

Enclosed is copy of the latest (October 1, 1986) update regarding Time/Koppers voluntary efforts to clean up the pentachlorophenol contamination at our Northwest Terminal in Portland, Oregon. The purpose of this paper, in addition to serving as an update for Koppers, is to have data documented by a third party which is suitable to gain approval from necessary regulatory agencies for acceptable remedial actions as next step accomplishment.

Also enclosed is copy of December 19, 1986 proposal and cost estimate by SRH for performance of bench scale evaluations of recommended "soil washing" technique. Request your comments on this matter as soon as possible.

Sincerely,

John P. Denham

John P. Denham
Environmental Manager

Enclosures a/s

JPD/ch

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PROPOSAL AND COST ESTIMATE

BENCH SCALE FEASIBILITY STUDIES FOR THE ELUTION OF PCP FROM CONTAMINATED SOIL

DECEMBER 19, 1986

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

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INTRODUCTION

Time Oil Co. has been investigating the nature and extent of soil and groundwater contamination at its Northwest Terminal facility located in Portland, Or. as a result of pentachlorophenol (PCP) releases which occurred at that site over a period of several years. The results of this investigation indicate that the sandy soils to the south of the wood treating chemicals warehouse are contaminated with PCP at concentrations ranging up to several thousand parts per million.

As a result of these findings, Time has performed a preliminary analysis of potential remedial alternatives for the contaminated soils at the site. Due to existing bans on landfilling of the waste (categorized by EPA as listed hazardous waste number F027) and due to Time's expressed interest in preventing further environmental impairment from this site, few alternatives were concluded to be viable. In October of 1986, SRH Associates conduoted a review of all available alternatives for the disposal or treatment of Time's PCP contaminated soil. Since this evaluation, the residual soils from the incineration or thermal treatment of F027 contaminated soils have been upheld as being a separately listed hazardous waste (F028), making such thermal processes unsatisfactory remedial alternatives for Time since the resulting soils could not reasonably be expected to be easily delisted from hazardous status.

On the basis of these cumulative findings, no commercially available, licensed process was identified that was capable of treating or disposing of Time's PCP contaminated soils. Several developmental technologies were identified that appeared to have the capability to achieve Time's objectives but which had not been commercialized or demonstrated under conditions found at the Northwest Terminal facility.

On the basis of Time's evaluation of the available remedial alternatives and the above information, a site specific assessment of soil washing technology was recommended. (See Report "Pentachlorophenol Contamination, Northwest Terminal, Section II, pg. 20) Soil washing involves the extraction of wastes from soils using solvents, surfactants or other solutions. The current status of soil washing technology is generally regarded as developmental, however it represents one of the more advanced technologies available to Time in light of the restrictions placed on landfilling, incineration, and closure of the wastes in place. Assessment of this process is consistent with EPA's Research, Development and Demonstration (RD&D) protocols which ultimately require a demonstration to the agency of the effectiveness and limitations of a waste treatment technology prior to its implementation.

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The Northwest Terminal contamination is of such a nature that some degree of demonstration to the regulatory agencies of any cleanup process can be expected to be required prior to the implementation of cleanup efforts. This requirement can be expected due to existing regulations, the extent of contamination at Northwest Terminal, and the potential for the presence of dioxin in the wastes.

The following is a proposed scope of work and cost estimate for a bench scale evaluation of soil washing protocols for application to Time's PCP contaminated soil. The proposal defines the work necessary to review existing literature and to perform bench scale studies to generate data which confirm or reject the assumption that soil washing technologies can successfully clean up Time's contaminated soils. The proposed scope of work does not, at this time, include pilot scale studies, which ordinarily follow bench scale determinations, since it is misleading to attempt to define the scope of work or costs associated with the pilot phase of the project until such time as bench scale results define an appropriate process for scale-up considerations.

SCOPE OF WORK

OVERVIEW

The complete investigation of the feasibility of using soil washing procedures to remediate soils at Time's Northwest Terminal includes the following tasks:

- Review of existing literature and regulations.
- Performance of bench scale experiments.
- Evaluation of bench scale results and execution of a decision to continue or terminate the investigation.
- Performance of pilot scale experiments.
- Determination of the economic feasibility of the projected process and execution of a decision to proceed or terminate the investigation.
- Engineering and design of process equipment, if not commercially available.
- Fabrication of unavailable equipment and implementation of the process for EPA demonstration and subsequent cleanup activities.

This proposal addresses only the first phase of the project which includes the first three tasks. Segmenting the project into rational phases with decision points at which to appraise the value of proceeding following completion of each phase, permits stricter control over the project and allows better estimation of the scope of work and costs involved with each phase. The phases may be described as follows:

- o Bench scale studies
- o Pilot scale studies
- o Engineering and Implementation

The detailed scope of work and cost estimate for the bench scale study phase of this project is presented below.

BENCH SCALE STUDIES

The bench scale studies are intended to generate sufficient data to allow Time to make an informed decision to proceed with or abandon the project with a minimal amount of capital expended. The tasks associated with this phase are designed to evaluate three different soil washing procedures, to define the parameters associated with their use, to characterize the soil chemistry and the spectrum of contaminants in the PCP contaminated soil at Time's Northwest Terminal facility, to select the most effective soil washing procedure based on bench study results, to define the nature of the recovered elutriate solution generated during soil washing, and to assess methods for destruction of the contaminants found in that elutriate. The following is a detailed task breakdown to accomplish these objectives.

Task 1 - Review Current Regulations

To reduce the risk of new regulations or new interpretations of existing regulations unfavorably impacting this study, SRH will appraise the status of regulations affecting soil washing technology. These evaluations are necessary to prevent the expenditure of time investigating technologies which are generally regarded as unpermittable and to preclude the potential for regulatory violations and fines. Perhaps the most functional purpose of this task is to provide Time with both regulatory and political data to properly prepare submittals to EPA and DEQ in order to expedite acceptance of plans, permits and other communications.

EPA representatives from Region X, Waste Management Branch, Hazardous Waste Division, Seattle; EPA Headquarters, Office of Solid Waste, Washington, D.C.; and the Office of Research and

Development (ORD), Cincinnati, OH., will be queried regarding the current and pending status of regulations regarding PCP treatment technologies. SRH proposes to solicit and evaluate the information received from these agencies in a confidential manner to allow Time Oil Co. access to unbiased information and to develop strategies which are expeditious due to their regulatory and political acceptability. Emphasis will be placed on extraction procedures. Particular effort will be placed on discussions with representatives from the Alternative Treatment Technologies Section of ORD to not only review the regulations associated with extraction of PCP contaminated soils, but to also determine the status of research being performed by EPA in this area.

This task is expected to require 2 weeks for completion with an estimated cost of $2,336.

Task 2 - Review Current Extraction Literature

SRH will review existing extraction technology by examining literature in the fields of hazardous waste extraction, food processing technology (specifically edible oils) and metal recovery and mining (ore leaching). In addition to the discussions with ORD described under task 1, EPA's list of internal publications will be reviewed to identify, obtain copies of, and subsequently review EPA literature in this field. General extraction theory will be reviewed using current texts. U.S. patent literature will be reviewed to appraise the status of engineering in this field. Manufacturers of extraction equipment will be contacted to determine the commercial availability of extraction equipment and to allow initial estimates of potential costs.

SRH will present the results of tasks 1 through 3 to Time Oil Company representatives at Time's offices in Seattle as a part of task 2. This meeting will be conducted to review findings and to refine the scope of work relative to the development of the bench scale study plan.

This task is expected to require 2 weeks for completion with an estimated cost of $4,316.

Task 3 - Evaluate the Nature of the Wastes to be Treated

SRH will determine the porosity, grain size distribution, organic carbon content and other critical parameters of Time's contaminated soil which affect the extraction of PCP and any other identified contaminants from the soil. Analyses performed to date have indicated the presence of unidentified contaminants

in addition to PCP in the soil at Northwest Terminal. SRH will determine the presence and nature of contaminants other than PCP in the soil to allow determination of their impact on the extraction process. Samples of soil from the Northwest Terminal PCP site will be taken and evaluated for priority pollutants by GC/MS, ICP and other appropriate analytical techniques with identification of other major peaks as indicated. Specifically, soil will be evaluated for grain size (particle size distribution), soil type, porosity, specific gravity, moisture content, pH, total organic carbon and oil and grease levels. Two samples are proposed for each test to allow for an estimation of the range of concentration of the contaminants found.

This task is expected to require 3 weeks for completion (including 2 weeks for laboratory analyses) with an estimated cost of $6781.

Task 4 - Develop an Initial Plan for Bench Scale Studies

The information generated in tasks 1 through 3 will be used to refine the experimental approaches needed to complete bench scale studies. The following proposed plan is expected to undergo modification based on those results.

This investigatory plan is based on extraction theory and the existing literature but is heavily weighted towards existing and available technology and equipment. It is intended to quickly produce sufficient results to allow Time to determine if further pursuit of the project is warranted.

Extractability of soil contaminants will be initially evaluated using simple jar tests. Jar tests will be performed by introducing a known amount of contaminated soil into a beaker containing a fixed volume of extracting solution. The material will be agitated for a fixed period of time at a known temperature. Following this protocol, the filtered solution and the extracted soil will be analyzed for PCP and the extraction ratio determined.

Organic solvents, elevated pH solutions and aqueous solutions of surfactants will be evaluated. Up to four solvents, four different pH levels and four different surfactants will be evaluated. Based on the observed results, relative costs, safety and environmental considerations, two different elutriating solutions will be selected for further evaluation, including optimization of extraction conditions. The effect of the extraction procedure on contaminants other than PCP which have been determined to be present in the soil will be assessed by

analysis of the extract and the residual soil for these materials. Conditions indicative of a potentially successful soil cleaning process will be pursued for optimization of the batch process. To optimize the process, the extracting conditions will be varied with respect to surfactant concentration, extraction time, temperature and/or pH, as appropriate, to maximize the removal of PCP and other contaminants from the soil. It should be noted that different contaminants may require different extraction solutions (or combinations of solutions). SRH believes that PCP and oil are the principal contaminants and a single extraction solution may be used to remove both substances from Time's soil.

When the batch process has been optimized in the above fashion, samples of the elutriate will be analyzed for all identified contaminants. A description of the elutriate solution will be prepared to allow for evaluation of elutriate treatment alternatives. At this time, it is expected that oxidation or reduction of the waste material represents a potential treatment option but that final selection of a suitable treatment will require a precise understanding of what contaminating materials, other than PCP, may be present.

The optimized solution will be used to compare three extraction procedures, as appropriate, i.e. sequenced batch, counterourrent, and reflux (Soxhlet) extractions. These processes can be conducted in SRH's bench scale, laboratory apparatus. The objective of this set of tests is to optimize the extraction procedure by improving efficiency and minimizing the quantities of solution required. This study will necessarily be contingent upon the extraction solutions selected. For example, since caustic and surfactant solutions are not generally volatile, Soxhlet procedures would not be applicable to these solutions and therefore would not be evaluated. Conversely, if an organic solvent is indicated as the elutriating solution, it may be necessary to remove the residual solvent from the extracted soil prior to discharge from the extractor. In this case, sequenced batch extraction may be favored while continuous processes such as counterourrent or soxhlet extraction would be contraindicated.

The last evaluation in the bench scale phase of the project is the determination of a treatment method for the extracted material. Although this evaluation will ultimately depend on the nature of the material as produced, it is believed that oxidation/reduction or separatory methods represent likely candidates. For example, if the extraction is performed using caustic solutions, acidification of the extract to a pH < 5.0 may precipitate significant amounts of

PCP due to the reduced solubility of this compound in its acid form. Conversely, if large amounts of oil are present, it may be necessary to utilize a solvent as the extractant, in which case removal of the solvent and treatment of the residual material through peroxide, permanganate, or other chemical oxidation process, chemical reduction, or physical adsorption onto organic or inorganic substrates may be preferred.

The plan will be developed in close association with Time Oil Co. personnel to ensure that the resultant plan meets Time's expectations and requirements.

This task is expected to require 1 week for completion, with an estimated cost of $2290.

Task 5 - Implement Bench Scale Study Plan

SRH will conduct the implementation of the study as planned in task 4, above. The plan, which will have been developed in close coordination with Time Oil Company, will have the following components for the sake of discussion and cost estimation:

- perform 12 initial jar tests
- analyze 24 PCP samples from initial jar tests
- perform 6 secondary jar tests
- analyze 12 PCP samples from secondary jar tests
- perform 4 jar tests for optimization
- analyze 8 PCP samples from optimization jar tests
- perform 3 process emulating extractions (i.e. soxhlet, countercurrent, etc)
- analyze 6 PCP samples from process emulating extractions
- analyze optimized extract from optimized jar test for all identified contaminants
- perform 4 separatory tests on optimized extract
- perform 3 oxidation tests on optimized extract
- perform 2 reduction tests on optimized extract
- analyze effluent from the above extract destruction tests (9 PCP analyses)
- analyze 1 effluent sample for all identified contaminants

The results of the bench scale study will be a summary report to Time Oil Co. indicating the success or failure of the soil washing process at the bench scale level and projecting the probability for success of a pilot level scale-up.

SRH has evaluated the topic of PCP extraction from soil and is aware that extensive work has already been performed in assessing

the extraction efficiency of this material from soils in an EPA directed extraction procedure for preparing samples for quantitative analysis. This work, done to provide a means for analyzing contaminated soil, has direct bearing on this project, and leads SRH to conclude that reflux extractions may pose a viable and well documented process for PCP contaminated soil remediation. To date, SRH is unaware of any commercial effort to decontaminate soils by this process.

This task is expected to require approximately 12 weeks for completion, including laboratory turn around time. The estimate cost for this task is $23,680, including analytical costs.

Task 6 - Prepare Report and Submit Recommendations

SRH will prepare a summary report presenting the data, conclusions and its recommendations to Time Oil Company. The report will include copies of experimental protocols and analytical results and will present a summary of the results and their significance to allow Time Oil Company to determine if further pursuit of this project is warranted. SRH will also attend a one day meeting at Time's offices in Seattle to review the results and conclusions with Time's representatives.

This task is expected to require 1 week for completion with an estimated cost of $2,626.

COST ESTIMATE

Although the precise determination of the costs associated with any developmental process is difficult due to the large potential for project reorientation based on new results and findings, SRH believes that the following cost estimates provide a good foundation for project assessment. SRH proposes to perform the work on a time and materials basis according to its current rate schedule. The estimated costs presented herein would not be exceeded without prior authorization from Time.

A detailed cost estimate breakdown is presented in figure 1. SRH suggests that the estimate be reviewed following the completion of tasks 1 - 3, to reflect information obtained during these activities which could impact the assumptions made in estimated tasks 4 through 6. SRH estimates the total bench scale phase costs to be $37,868 including labor and expenses.

TABLE 1 - COST ESTIMATE DETAIL

TASK	PERSONNEL	HOURS	COST
TASK 1 - REVIEW CURRENT REGULATIONS			
LABOR	REG. SPEC.	24.0	$1,920.00
	CLER	8.0	$216.00
	TOTAL	32.0	$2,136.00
EXPENSES	MISC.		$200.00
	TOTAL		$200.00
TOTAL			$2,336.00
TASK 2 - REVIEW CURRENT EXTRACTION LITERATURE			
TASK 2A - REVIEW LITERATURE			
LABOR	SR. SCI	32.0	$2,560.00
	CLER	8.0	$216.00
	CHEM	10.0	$500.00
	TOTAL	50.0	$3,276.00
EXPENSES	MISC.		$200.00
	TOTAL		$200.00
TOTAL			$3,476.00
TASK 2B - MEETING WITH TIME OIL CO			
LABOR	PRIN	8.0	$640.00
	TOTAL	8.0	$640.00
EXPENSES	MISC.		$200.00
	TOTAL		$200.00
TOTAL			$840.00

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	TOTAL TASK 2			$4,316.00
TASK 3 - EVALUATE NATURE OF WASTES				
	LABOR	SR. SCI	16.0	$1,280.00
		CLER	8.0	$216.00
		CHEM	8.0	$400.00
		GEOL	8.0	$480.00
		TOTAL	40.0	$2,376.00
	EXPENSES	MISC.		$300.00
		ANALYTICAL		$4,105.50
		TOTAL		$4,405.50
	TOTAL			$6,781.50
TASK 4 - DEVELOP STUDY PLAN				
	LABOR	SR. SCI	24.0	$1,920.00
		CLER	10.0	$270.00
		TOTAL	34.0	$2,190.00
	EXPENSES	MISC.		$100.00
		TOTAL		$100.00
	TOTAL			$2,290.00
TASK 5 - IMPLEMENT BENCH SCALE STUDY				
	LABOR	SR. SCI	40.0	$3,200.00
		CLER	16.0	$432.00
		CHEM	72.0	$3,600.00
		GEOL	24.0	$1,440.00
		TECH	40.0	$1,600.00
		TOTAL	192.0	$10,272.00
	EXPENSES	MISC.		$350.00
		ANALYTICAL		$9,487.50
		COMPUTER		$150.00
		OTHER LABORATORY		$3,421.25
		TOTAL		$13,408.75
	TOTAL			$23,680.75

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TASK 6 - REPORT AND RECOMMENDATIONS

TASK 6A - PREPARE REPORT

LABOR	SR. SCI	8.0	$640.00
	ADMIN	8.0	$480.00
	CHEM	5.0	$250.00
	CLER	8.0	$216.00
	TOTAL	29.0	$1,586.00
EXPENSES	MISC.		$200.00
	TOTAL		$200.00
TOTAL			$1,786.00

TASK 6B - MEETING WITH TIME OIL CO

LABOR	PRIN	8.0	$640.00
	TOTAL	8.0	$640.00
EXPENSES	MISC.		$200.00
	TOTAL		$200.00
TOTAL			$840.00
TOTAL TASK 6			$2,626.00

PROJECT TOTAL $42,030.25

NOTES:

REG. SPEC	REGULATORY SPECIALIST
CLER	CLERICAL
SR. SCI	SENIOR SCIENTIST
CHEM	CHEMIST
PRIN	PRINCIPAL
ADMIN	ADMINISTRATIVE ASSISTANT
GEOL	GEOLOGIST

PENTACHLOROPHENOL

CONTAMINATION

NORTHWEST TERMINAL

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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
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(503) 232-0824

TOLS002296

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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'.

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".

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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.

- 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 depth 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

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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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)

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, 1986, 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 decreasing 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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Water level measurements were taken on nine occasions between February 26 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 additional 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.

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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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.

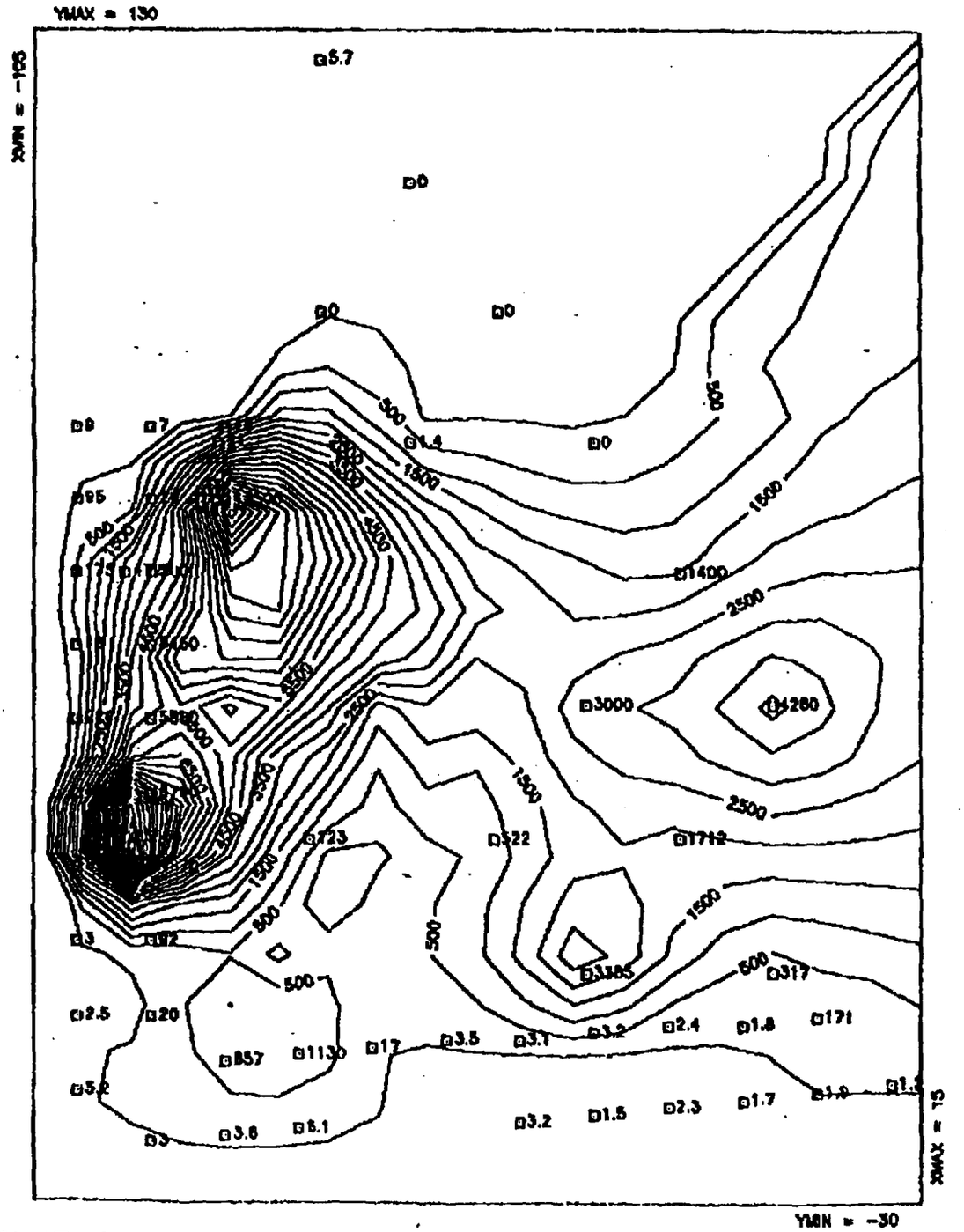
In investigating the extent of soil contamination, Time has obtained assistance from several consulting firms and clean up contractors, and has analyzed sufficient soil samples to determine the vertical and horizontal extent of contamination. The contamination is localized in the northwest corner of 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 directions 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 Willamette 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.

FIGURE I-1



TIME OIL CO - ORIGINAL SURFACE PCP CONTOURS

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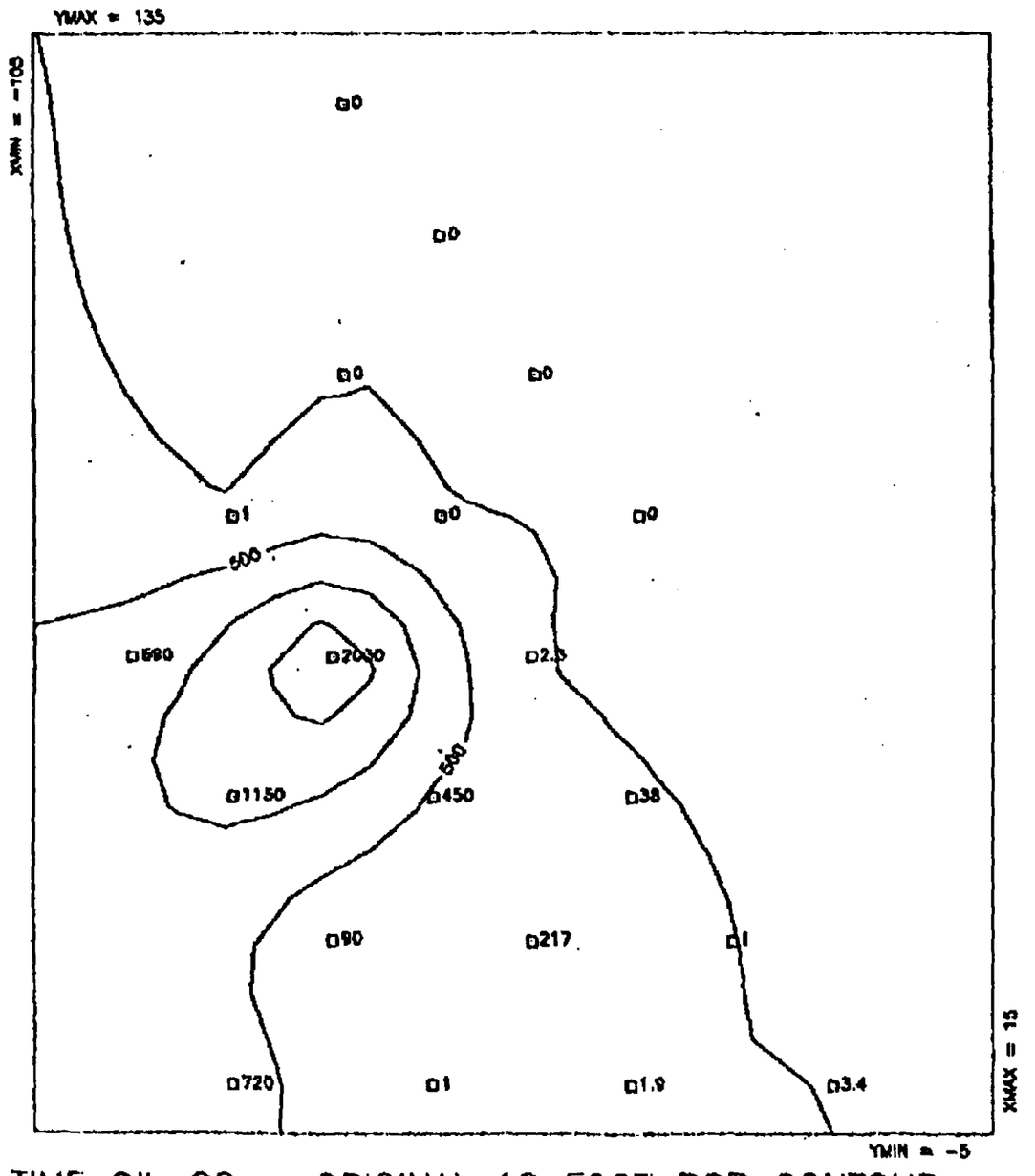
FIGURE I-2



TIME OIL CO - ORIGINAL 12 FOOT PCP CONTOUR

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FIGURE I-3

CONSTRUCTION DIAGRAM FOR

WELL 4

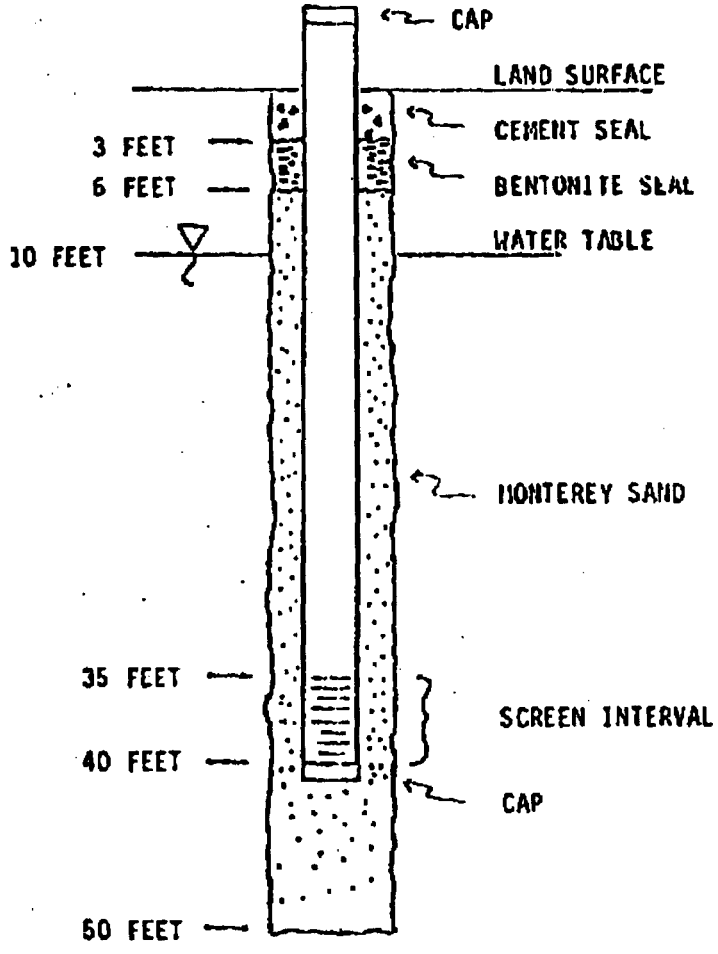

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FIGURE I-4

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)

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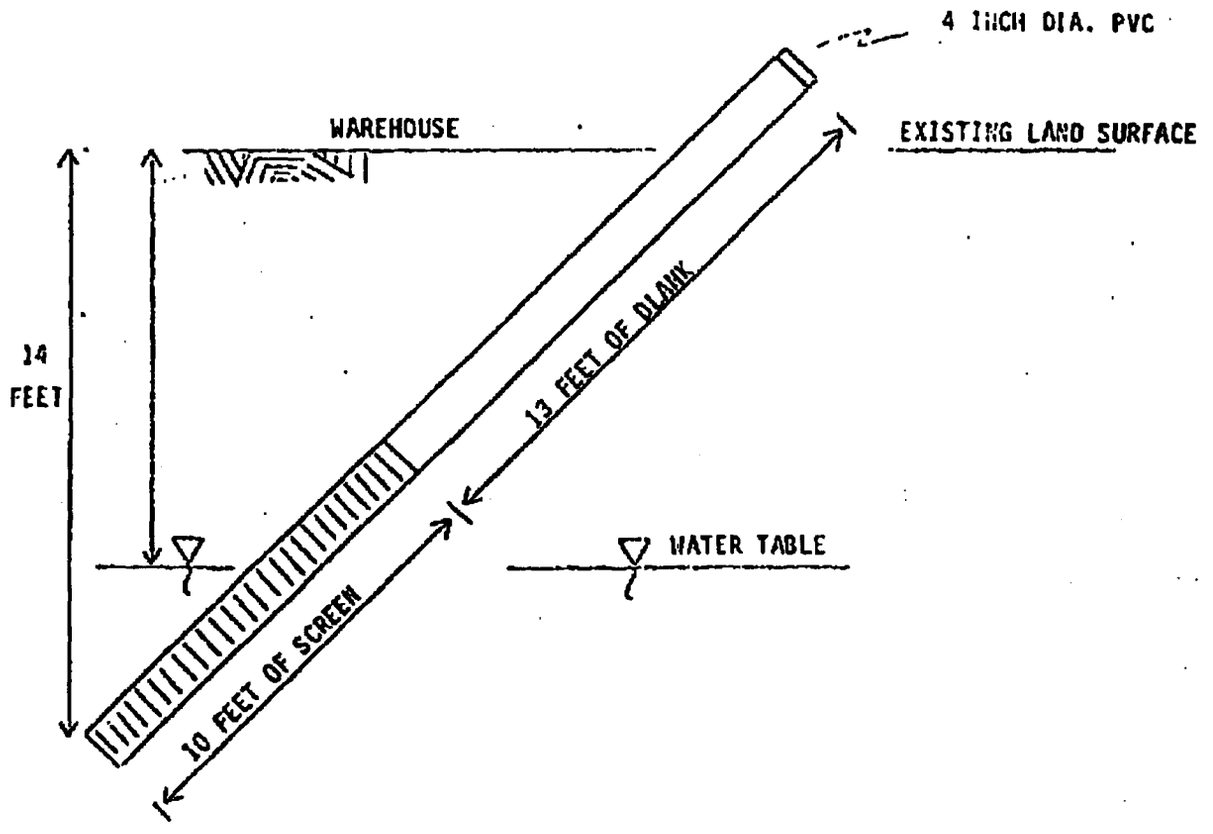
FIGURE I-5

CONSTRUCTION DIAGRAM FOR

WELLS 1, 2 AND 3



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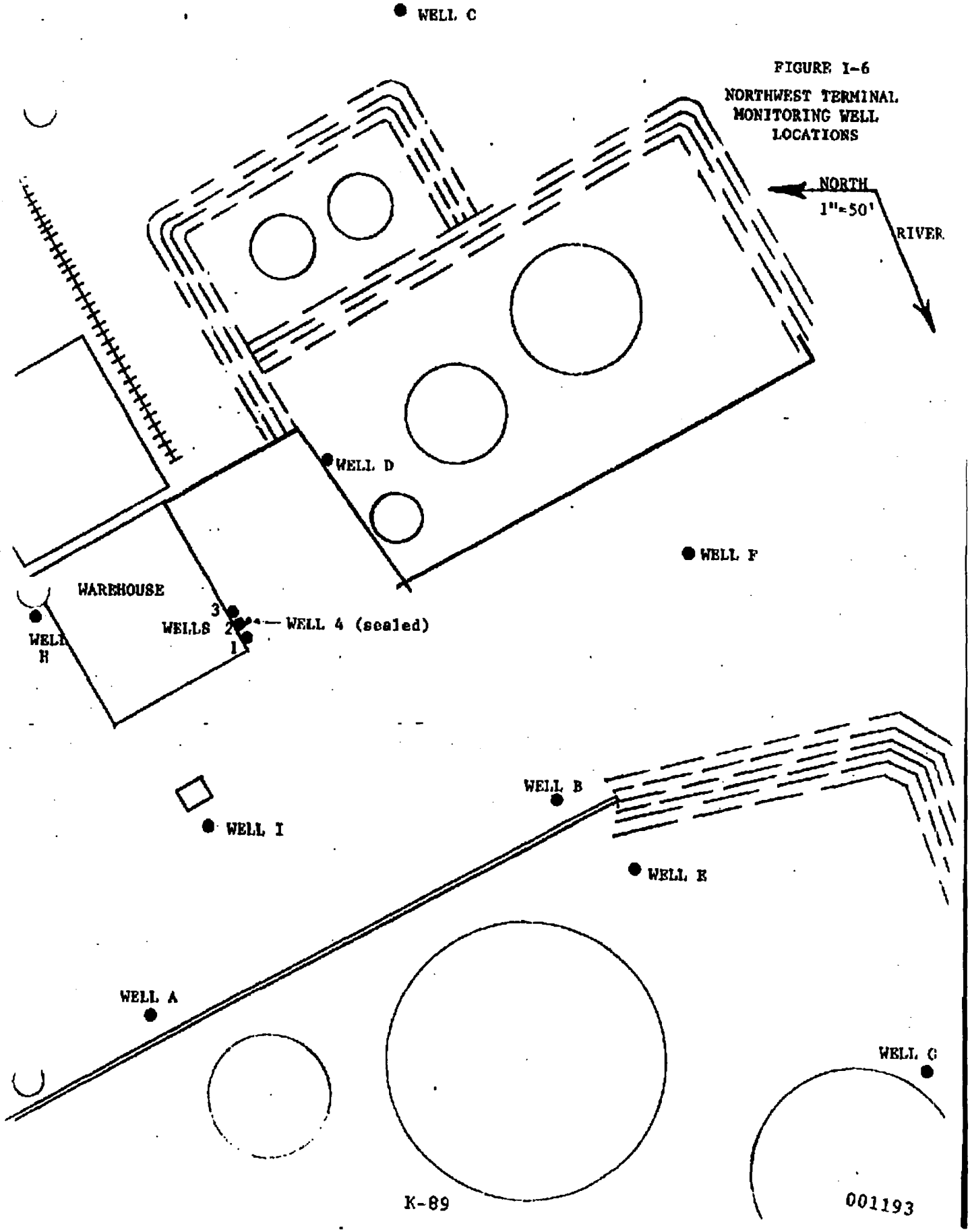

FIGURE I-6

NORTHWEST TERMINAL
MONITORING WELL
LOCATIONS

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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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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.

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 siliceaceous 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,

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 immobilise 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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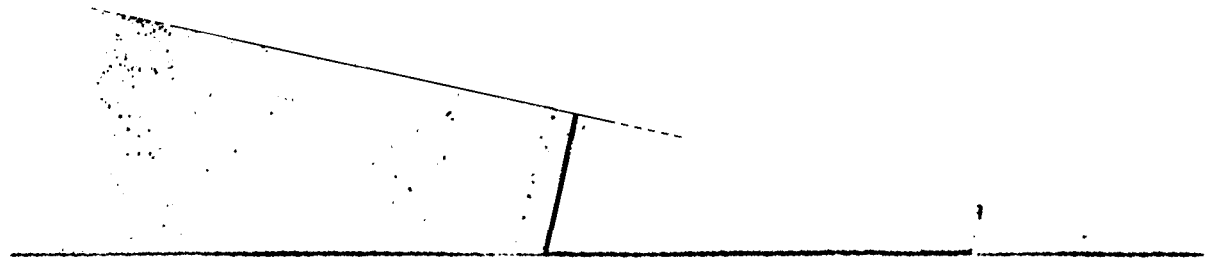

the use of indigenous microorganisms. The effect on the overall cost of the project is similar for both methods. Effective preparations range from $20 to $50 per pound of material. Microbial requirements depend on a variety of soil and waste-specific parameters that have not yet been determined at the 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 application of sorbents to the contaminated soil. Sorbents include carbon granules, polymeric materials or substances which the waste is soluble. All sorbents must be insoluble water, inert and not readily degradable in order to achieve term stabilization of the wastes in question.

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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.

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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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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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.

Cole (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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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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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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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 performing 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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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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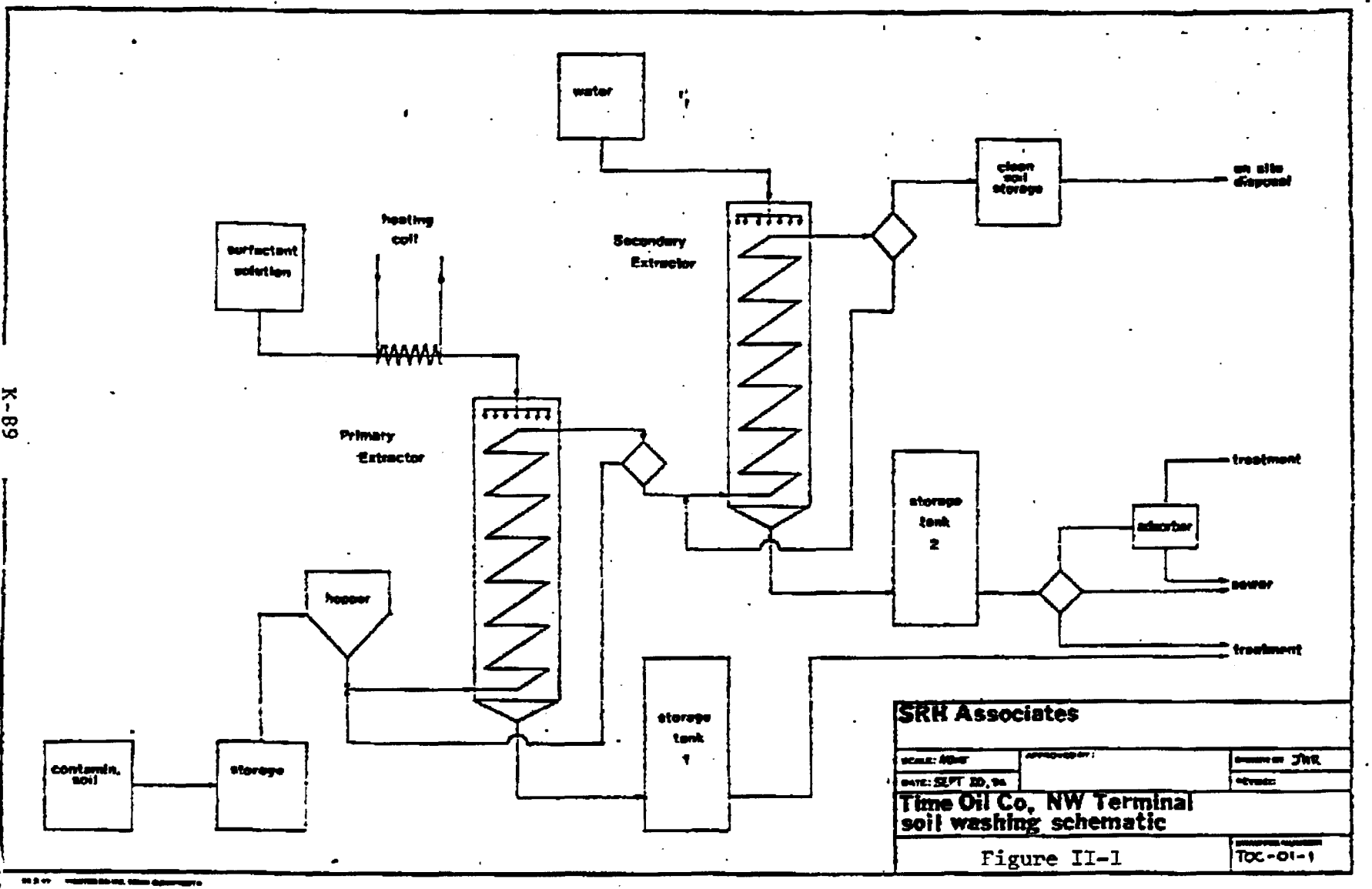

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SECTION III

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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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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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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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 procedures 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

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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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 well 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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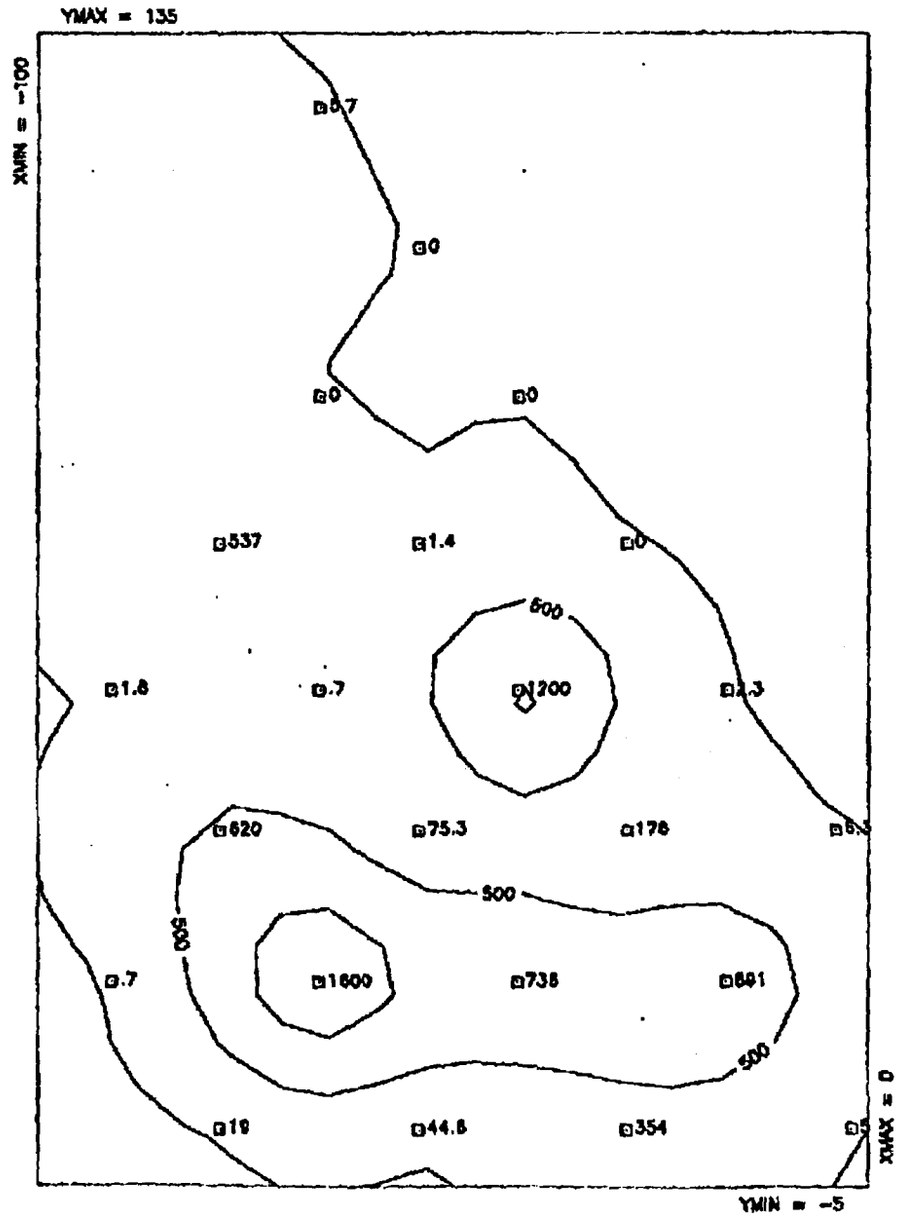
FIGURE III-1



TIME OIL CO - SURFACE PCP CONTOURS

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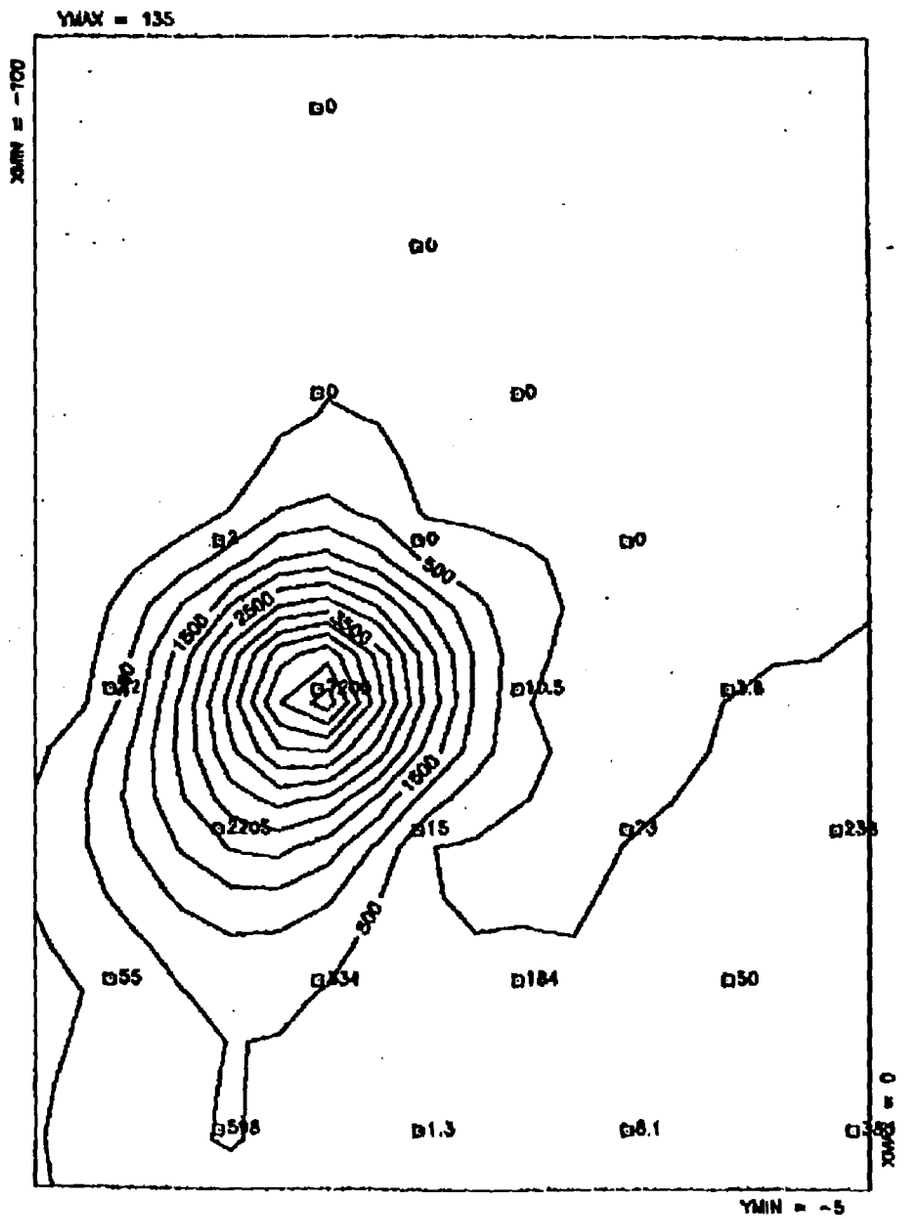
FIGURE III-2



TIME OIL CO - 4' FOOT PCP CONTOURS

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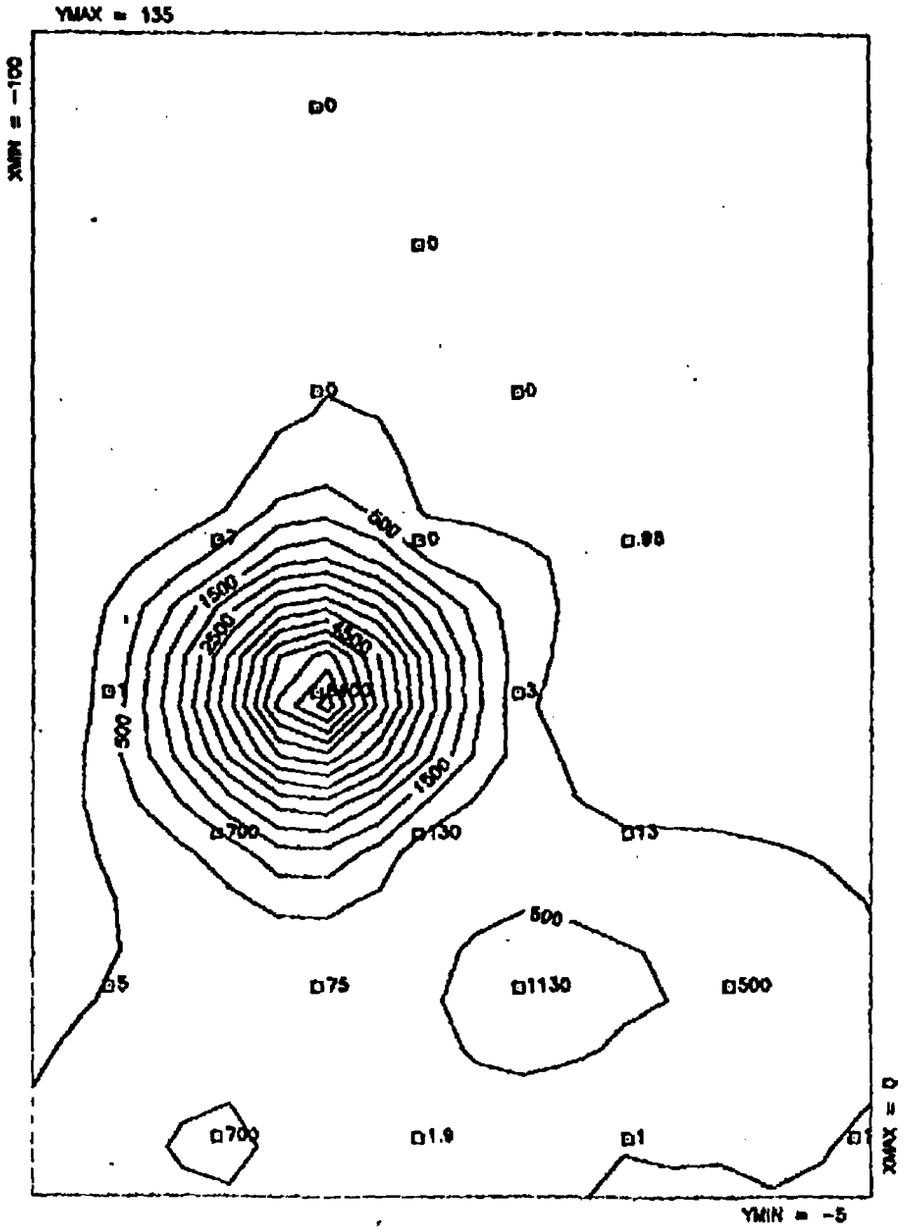
FIGURE III-3



TIME OIL CO - 7 FOOT PCP CONTOURS

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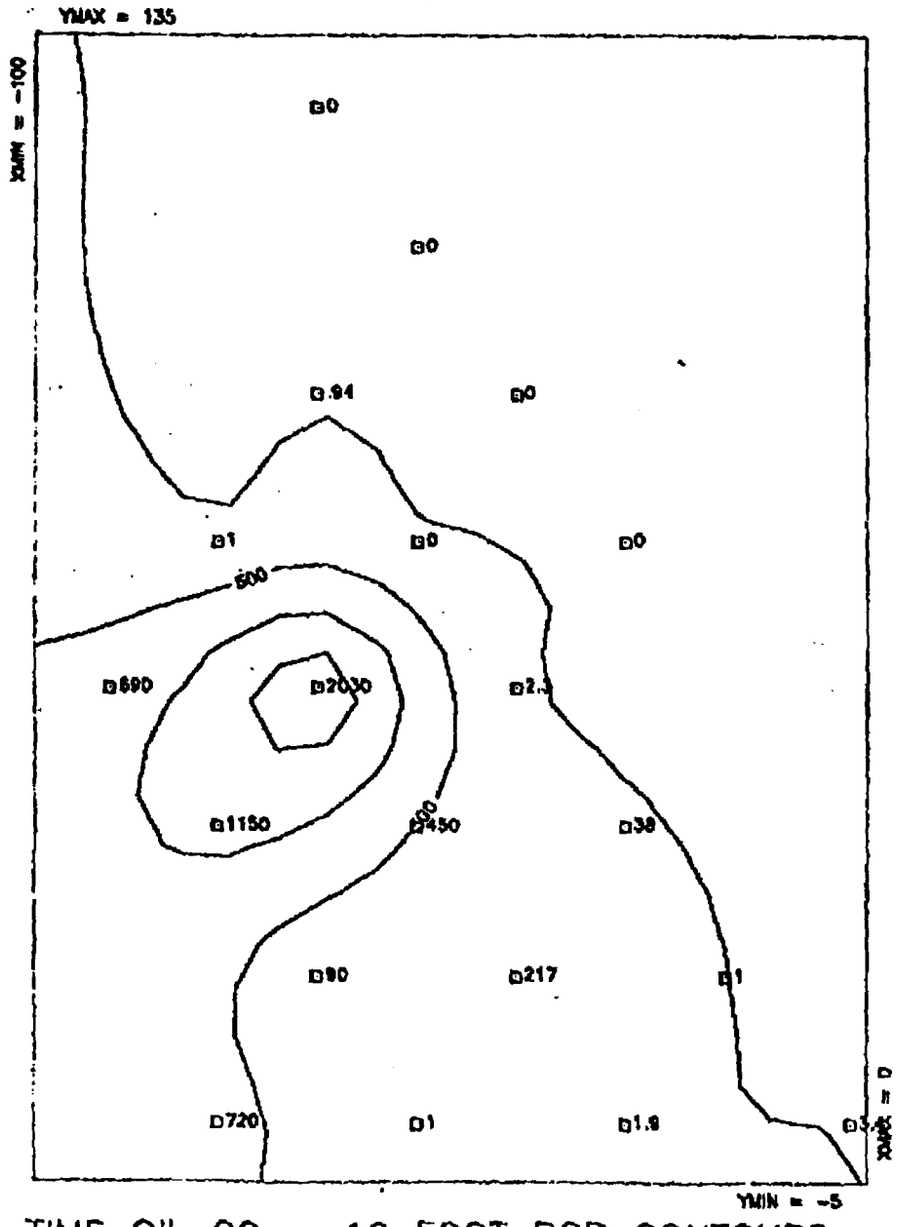
FIGURE III-4



TIME OIL CO - 12 FOOT PCP CONTOURS

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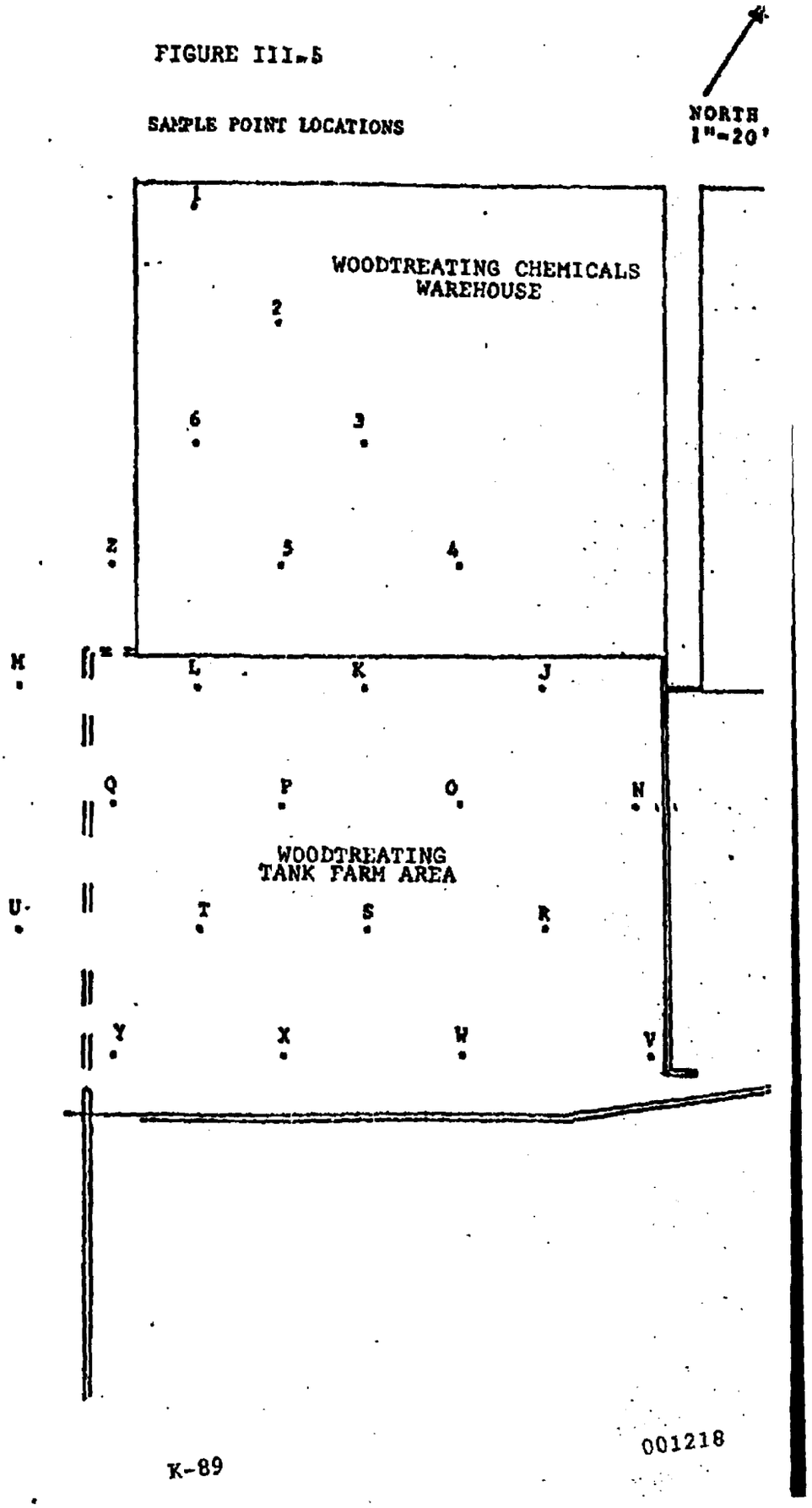
FIGURE III.5

SAMPLE POINT LOCATIONS



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SAMPLE POINT COORDINATES

FIGURE III- 6

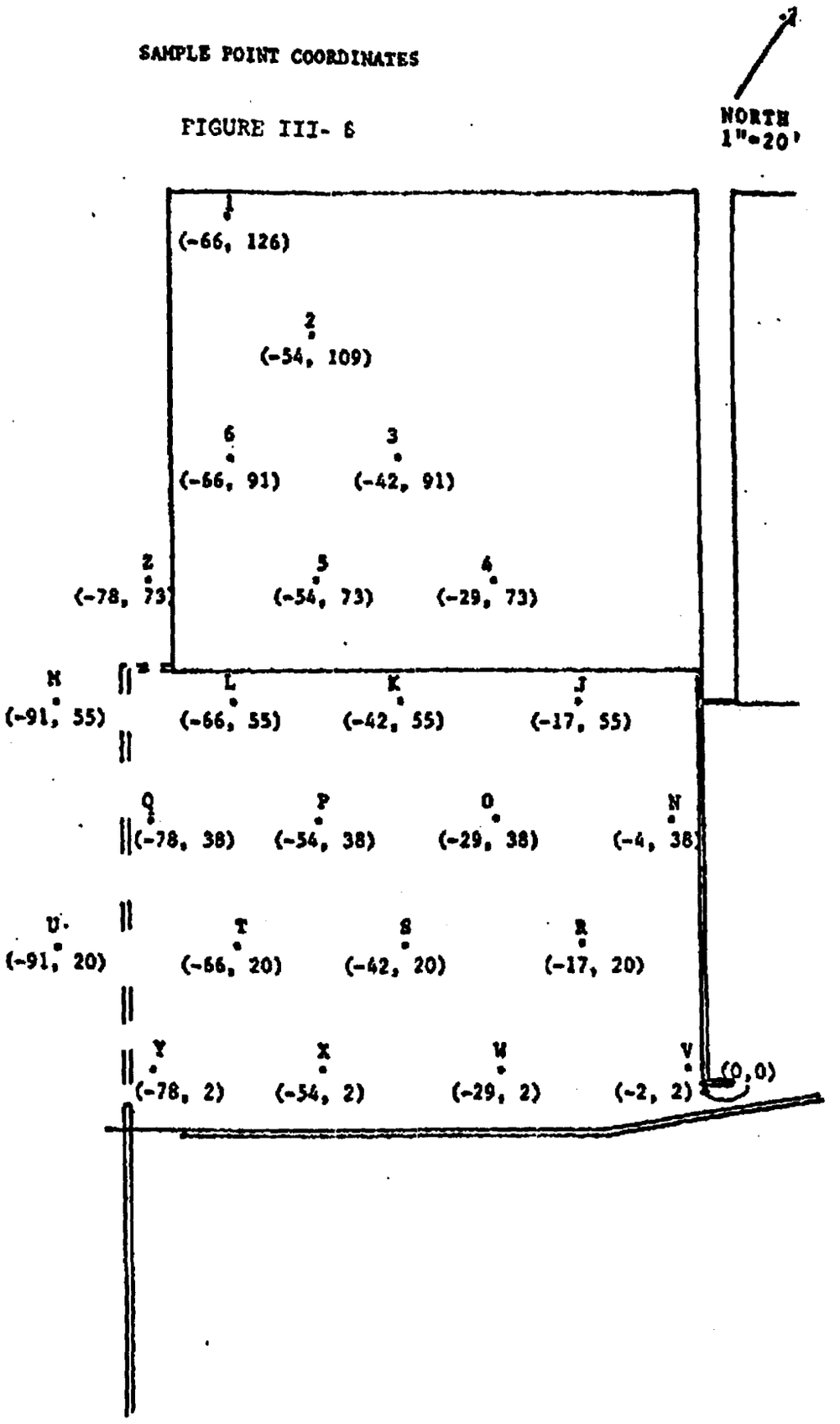

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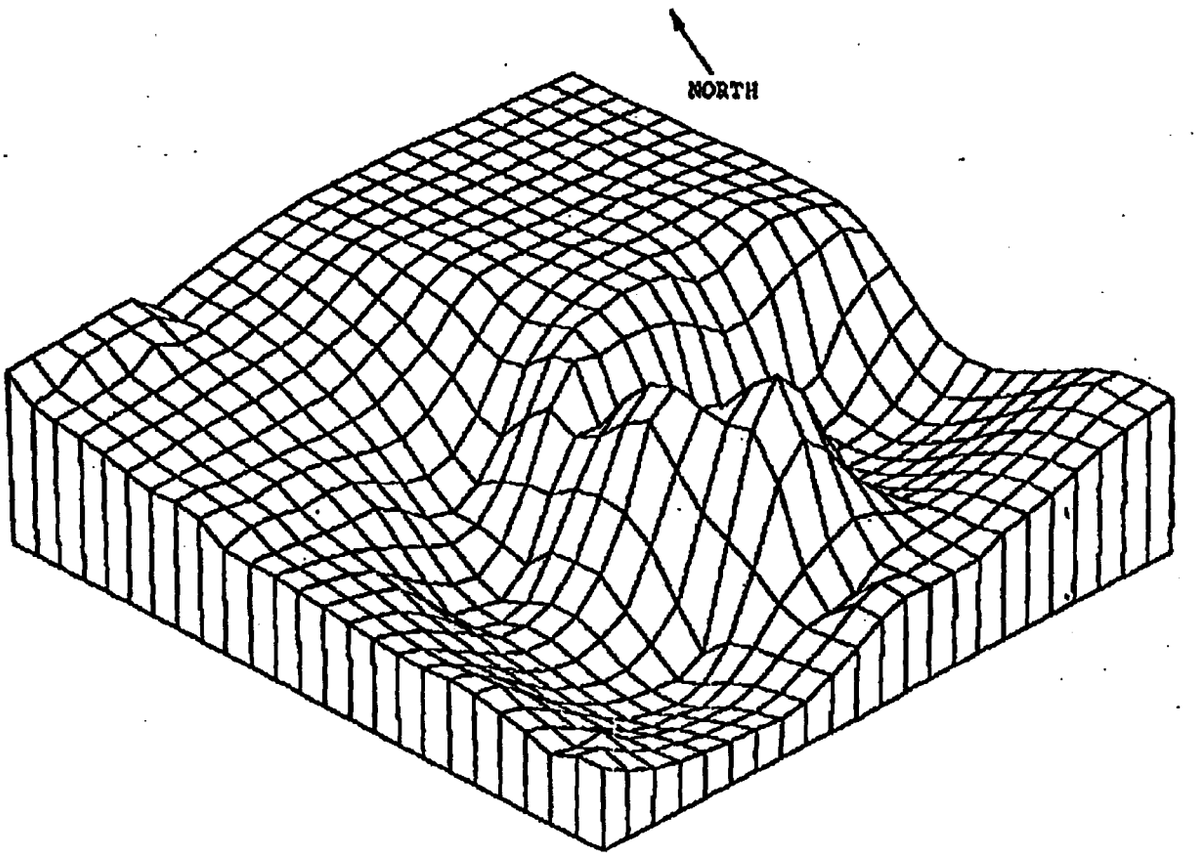
FIGURE III- 7

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)

001221

TOLS002341

BZTO104(e)039162

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
7	-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)

001222

TOLS002342

BZTO104(e)039163

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)

001223

TOLS002343

BZTO104(e)039164

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-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
2	-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)

001225

TOLS002345

BZTO104(e)039166

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

001226

TOLS002346

BZTO104(e)039167

COFFEY LABORATORIES, INC.
4914 N.E. 122nd Ave.
Portland, OR 97230
Phone: (503) 254-1794

September 3, 1986
Log #AB60825-F

SRH Associates, Inc.
P.O. Box 14005
Portland, Oregon 97214
Attention: John Ruddick

Analysis Requested: Pentachlorophenol

Sample Location: Time Oil Co., Portland Terminal

SAMPLE ID	RESULTS
J-O - Surface-N.E. Tank Farm	2.9
K-O - Surface-N. Tank Farm	2954
L-O - Surface-N.W. Tank Farm	0.7
M-O - Surface-N.W. Tank Farm	1.8
N-O - Surface-E. Tank Farm	5.9
O-O - Surface-N.E. Central Tank Farm	176
P-O - Surface-N. Central Tank Farm	75.3
Q-O - Surface-N.W. Central Tank Farm	620
R-O - Surface-E. Central Tank Farm	891
S-O - Surface-S.E. Central Tank Farm	736
T-O - Surface-N. Central Tank Farm	1600
U-O - Surface-W. Central Tank Farm	0.7
V-O - Surface-S.E. Tank Farm	5.0
W-O - Surface-S. Tank Farm	354
X-O - Surface-S. Tank Farm	44.6
Y-O - Surface-S.W. Tank Farm	19
Z-O - Surface-N.W. Roadway	537
1-S - Boring #1, Warehouse Loading Dock, Surface Below Concrete	1.2
1-O - Boring #1, Warehouse Loading Dock, 3.5 ft. Below Concrete	5.7
5-O - 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 letter.

001227

TOLS002347

BZTO104(e)039168

COFFEY LABORATORIES, INC.
4914 N.E. 122nd Ave.
Portland, OR 97230
Phone: (503) 254-1794

September 3, 1985
Log #A860825-F

SRH Associates, Inc.
Page Two

Attention: John Ruddick

Analysis Requested: Pentachlorophenol

Sample Location: Time Oil Co., Portland Terminal

SAMPLE ID	RESULTS
S-2 - Boring #5, S.W. Inside Warehouse 5'4" - 7'4" Below Concrete	5.6
S-4 - Boring #5, S.W. Inside Warehouse 7'4" - 9'4" Below Concrete	< 1
S.7 - Boring #5, S.W. Inside Warehouse 10'4" - 17'4" Below Concrete	< 1
S.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-B, 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.

TOLS002348

BZTO104(e)039169

COFFEY LABORATORIES, INC.
6914 N.E. 122nd Ave.
Portland, OR 97230
Phone: (503) 254-1794

September 3, 1986
Log #A860825-F

SRH Associates, Inc.
Page Three

Attention: John Ruddick

Analysis Requested: Pentachlorophenol

Sample Location: Time Oil Co., Portland Terminal

SAMPLE ID	REBULTS
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 Q-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 3, 1985
Log #A860823-F

SRH Associates, Inc.
Page Four

Attention: John Ruddick

Analysis Requested: Pentachlorophenol

Sample Location: Time Oil Co., Portland Terminal

SAMPLE ID	RESULTS	% Recovery
5-4 - Boring #5, 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	
5-4 - Boring #5, 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)	378	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 #A860826-C

SRH Associates, 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

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 5, 1986
Log # A86-0829-N
P.O. None

SRH 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	6.58 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	6.91 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.

R-89

TOLS002352

BZTO104(e)039173

COFFEY LABORATORIES, INC.
4914 N.E. 122nd Ave.
Portland, OR 97230
Phone: (503) 254-1794

September 9, 1986
Log #A860903-J

ERH Associates, Inc.
P.O. Box 14005
Portland, Oregon 97214

Attention: John Rudoick

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 letter.

TOLS002353

BZTO104(e)039174

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 55	< 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.

001234

TOLS002354

BZTO104(e)039175

COFFEY LABORATORIES, INC.
4914 N.E. 122nd Ave.
Portland, OR 97230
Phone: (503) 254-1794

October 1, 1986
Log #A860926-A

SRH Associates, Inc.
129 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.

TOLS002355

BZTO104(e)039176

CHAIN OF CUSTODY RECORD (8040)

PROJ. NO.	SITE/LOCATION
1003	Time Oil Co

SAMPLERS: (Signature) [signature] / SRH

STA. NO.	DATE	TIME	SAMPLE TYPE	MEDIA	SAMPLE IDENTIFICATION	NO. OF CONTAINERS	AMOUNT/PRESERVATIVE: PENTACHLOROPHENOL	PH					SEAL NO.	SEAL INTACT? (Y or N)	REMARKS (with initials)
MWA	7/3/86	1030	BAILED	WATER	NEAR W TANK FARM	2	[illegible]	[illegible]							
MWA	"	1030	↓	↓	" "	1	[illegible]	[illegible]							
MWB	"	1110	↓	↓	" "	2	[illegible]	[illegible]							
MWB	"	1110	↓	↓	" "	1	[illegible]	[illegible]							

Relinquished by: (Signature/Firm)	Date/Time	Received by: (Signature/Firm)	Relinquished by: (Signature/Firm)	Date/Time	Received by: (Signature/Firm)
[signature]	9/3/86 1045	[signature]			
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)	

K-89

001236

TOLS002356

BZTO104(e)039177

CHAIN OF CUSTODY RECORD

PROJ. NO.	SITE / LOCATION
1003	Time Oil Co PDX

SAMPLERS: (Signature)

STA. NO.	DATE	TIME	SAMPLE TYPE	MEDIA	SAMPLE IDENTIFICATION	NO. OF CONTAINERS	AMOUNT / PRESERVATIVE	REMARKS (with initials)
MW-D	8/29	1600	Grab	GW	SE Tank Farm	3		
MW-E		1430			SW Tank Farm			
MW-F		1615			Roadway (S)			
MW-H		1500			Rear Loading Dock			
MW-I	↓	1630	↓	↓	Roadway (N)	↓		

Relinquished by: (Signature/Firm)	Date / Time	Received by: (Signature/Firm)	Relinquished by: (Signature/Firm)	Date / Time	Received by: (Signature/Firm)
[illegible] BRH	8/29/02 1800	Susie M Coffey Labs			

Remarks (attachments if necessary)

K-89

001237

TOLS002357

BZTO104(e)039178

CHAIN OF CUSTODY RECORD

PROJ. NO.	SITE/LOCATION
1003	Time Oil Co - Portland

SAMPLERS: (Signature) JLH Riddell — SRH Assoc.

STA. NO.	DATE	TIME	SAMPLE TYPE	MEDIA	SAMPLE IDENTIFICATION	NO. OF CONTAINERS	QA AMOUNT/PRESERVATIVE (Laboratory to fill in)	SEAL NO.	SEAL INTACT? (Yes/No)	REMARKS (with Initials)
2-5	8/25	1130	GRAB	SOIL	NW Wineland Hole 2 Screen	1	8/0			HOLD
2-0		1145	SPLIT SPOON		" " 2'5"-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			Stained
1-2		1915	SPLIT SPOON		Hole 1 outside Conductor Pipe 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 Conductor Pipe 15'5"-17'5"	1	8/0			SAT-STAINED Possible Contact with Groundwater

Relinquished by: (Signature/Firm)	Date/Time	Received by: (Signature/Firm)	Relinquished by: (Signature/Firm)	Date/Time	Received by: (Signature/Firm)
JLH Riddell - SRH	8/26/92 1225				
Relinquished by: (Signature/Firm)	Date/Time	Received by: (Signature/Firm)	Relinquished by: (Signature/Firm)	Date/Time	Received by: (Signature/Firm)
				8/26 1226	Steven T. Lucy
Relinquished by: (Signature/Firm)	Date/Time	Received by: (Signature/Firm)	Date/Time	Remarks (attachments if necessary)	

K-89

001238

TOLS002358

BZT0104(e)039179

CHAIN OF CUSTODY RECORD

PROJ. NO.	SITE/LOCATION
1003	Timbron Co – Portland Terminal

SAMPLERS: (Signature) [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)
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			
Ø-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	K-89	1125			" – E CENTRAL "	1	8/0			
S-0		1130			" – SE CENTRAL "	1	8/0			
T-0		1135			" – W 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)
[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)	

001239

TOLS002359

BZTO104(e)039180

CHAIN OF CUSTODY RECORD (Rev 0)

PROJ. NO.: 1003

SITE/LOCATION: Time Oil Co - Portland Terminal

SAMPLERS (Signature): [signature] SRH Assoc

A. NO.	DATE	TIME	SAMPLE TYPE	MEDIA	SAMPLE IDENTIFICATION	NO. OF CONTAINERS	AMOUNT/PRESERVATIVE (as NONE)	PENTACHLOROSTHENOL						SEAL NO.	SEAL INTACT? (Y or N)	REMARKS (with initials)
2-2	8/24	11:40	SPLIT SPOON	SOIL	BORING #6 @ CENTRAL INSIDE WASTE 5.5'-7.5' BELOW CONCRETE	1	8/0									
2-4	↓	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 RECOVERED
D-2	8/24	15:30	GRAB	SOIL	WASTE PILE @ T-S DUPLICATE OF T-S	1	8/0									
T-S	↓	15:30	↓	↓	WASTE PILE FEET BELOW TOP OF PILE	1	8/0									
Q-S	↓	16:15	↓	↓	WASTE PILE FEET BELOW TOP OF PILE	1	8/0									
2-1	8/24	10:50	GRAB	SOIL	BORING #6 DUPLICATE OF 6-S	1	8/0									
4-5	8/24	16:10	GRAB	SOIL	BORING #4 SE WASTE SURFACE BELOW CONCRETE	1	8/0									HOLD
4-0	↓	1650	SPLIT SPOON	↓	BORING #4 SE WASTE 6.5'-5.5' BELOW CONCRETE	1	8/0									
4-2	↓	1715	↓	↓	7.5'-9.5' " "	1	8/0									
4-4	↓	1745	↓	↓	7.5'-9.5' " "	1	8/0									
4-7	↓	1820	↓	↓	10.5'-12.5' " "	1	8/0									

K-89

001240

Relinquished by: (Signature/Firm)	Date/Time	Received by: (Signature/Firm)	Relinquished by: (Signature/Firm)	Date/Time	Received by: (Signature/Firm)
[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)	

TOLS002360

BZTO104(e)039181

CHAIN OF CUSTODY RECORD

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							SEAL NO.	SEAL INTACT P (Y/N)	REMARKS (with initials)
4-12	8/24	1900	Split spoon	Soil	Boring #4 SE Wash 15'5"-17'5" Brine concrete	1	8/0									Saturated Sample
3-5	8/24	1915	Grab	Soil	Boring #3 E-Central Wash Surface Brown 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

K-89

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Relinquished by: (Signature/Firm)	Date/Time	Received by: (Signature/Firm)	Relinquished by: (Signature/Firm)	Date/Time	Received by: (Signature/Firm)
[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)	

TOLS002361

BZTO104(e)039182

CHAIN OF CUSTODY RECORD

PROJ. NO.	SITE/LOCATION
1003	TIME OIL CO – PORTLAND TERM.

SAMPLERS: (Signature) [signature] – SRH Assoc.

STA. NO.	DATE	TIME	SAMPLE TYPE	MEDIA	SAMPLE IDENTIFICATION	NO. OF CONTAINERS	AMOUNT/PRESERVATIVE						SEAL NO.	SEAL INTACT? (Y/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 DOCK BORING #1	1	8/0								HIT CONCRETE OR ASPHALT
5-S	8/23	1655	GRAB	SOIL	BORING #5 SW INTAKE WATER SURFACE BELOW CONCRETE	1	8/0								HOLD
5-0		1720	SPLIT SPOON		BORING #5 3.4-5.4' BELOW CONCRETE	1	8/0								
5-2		1745			BORING #5 SW INTAKE WATER 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 JRH
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								

K-89

Relinquished by: (Signature/Firm)	Date/Time	Received by: (Signature/Firm)	Relinquished by: (Signature/Firm)	Date/Time	Received by: (Signature/Firm)
[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)	

TOLS002362

BZTO104(e)039183

CLIENT ANALYSIS REQUEST

COFFEY LABORATORIES, INC.
4914 N.E. 122nd Ave.
Portland, OR 97230
Phone: (503) 254-1794

COMPANY NAME SHR ASSOCIATES TELEPHONE# 232 0824

ADDRESS 123 NE 3RD SUITE 230 PURCHASE ORDER # VERBAL

ADDRESS PO BOX 14005 LAB PRICE QUOTE # $60/ sample

CITY/STATE/ZIP PORTLAND OR 97205 BILLING ADDRESS: SAME

ATTENTION Jol. Ruddick

SAMPLE COLLECTION DATE 9/3/86 DUE DATE ASAP RUSH

SAMPLE COLLECTED BY [signature] DELEVERED BY J Ruddick

CLIENT COMMENTS-(SPECIAL INSTRUCTIONS, SPECIFIC METHOD ETC):
PENTA BY EPA 8040 (SW846)
(DON'T FILTER — DECANT WATER OFF ANY SEDIMENT)

ID	FieldID	Date	Time	Media	Pres	cntnr	Analysis requested	MDL
	MWA	9/3/86	1030	WATER	1:1 H2O/ TOPH2	2 EA 1L AMBER GLASS	PENTACHLOROPHENOL	
	MWA	"	1030	"	NONE	250 ml PLASTIC	PH	
	MWB	"	1110	"	1:1 H2O/ TOPH2	2 EA 1L AMBER GLASS	PENTACHLOROPHENOL	
	MWB	"	1110	"	NONE	250 ml PLASTIC	PH	

Relinquished by:	Date	Time	Received for Coffey Labs by:
[signature] /SRH	9/3/86	1450	[signature]

SAMPLE INTEGRITY COMMENTS:

LAB LOG # 860903-J | LOGGED IN BY: | DATE: | TIME:

\wp\clom\form\log\login.log

K-89

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TOLS002363

BZTO104(e)039184

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	MDL
	MW-D	8/29	1600	GROUND WATER	1:1 HOLY ACID	2 E 1 LAMBER GLAD	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

SAMPLE INTEGRITY COMMENTS:

LAB LOG # A860829 N 1-10 LOGGED IN BY: S Coffey K-89 DATE: 8-29-86 TIME: 1755

001244

TOLS002364

BZTO104(e)039185

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 NW 3rd Ste 250 PURCHASE ORDER # Verbal
ADDRESS: PO Box 14005 LAB PRICE QUOTE # 60th/24hrs
CITY/STATE/ZIP: 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)

Lab #	Date	Time	Matrix	Preservative	Analysis requested
R-0	8/23	1125	Soil	None	502 Glass	Pentachlorophenol (EPA 8040)
S-0		1130			
T-0		1135			
U-0		1140			
V-0		1145			
W-0		1150			
X-0		1200			

RELINQUISHED BY: Date 8/25/86 Time 1015 Received for Coffey Labs
QUALITY COMMENTS:
K-89
ISSUED IN BY: DATE: T

001245

TOLS002365

BZTO104(e)039186

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)

ID#	Date	Time	Media	Pres	Cnthr	Analysis requested	MDL
4-4	8/24	1745	Soil	None	503 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:	Date	Time	Received for Coffey Labs by:
John H Ruddick / SRH	8/25/86	1045	Steven [illegible]

SPECIAL QUALITY COMMENTS:

LOG	PASSED IN BY:	DATE:	TIME:

K-89 001246

TOLS002366

BZTO104(e)039187

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 NO.	Date	Time	Media	Pres	Cnthr	Analysis requested	MDL
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:	Date	Time	Received for Coffey Labs by:
John H Ruddick / SRH	8/25/86	1045	Steven [illegible]

SAMPLE INTEGRITY COMMENTS:

LAB LOG # LOGGED IN BY: DATE: TIME:

K-89

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BZTO104(e)039188

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: 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)

Date	Time	Media	Pres	Contnr	Analysis requested	MDL
6-5	8/24 1050	Soil	None	80z glass	Penta (EPA 8040)	(HOLD)
6-0	1130					
4-12	1900					
3-5	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 by: [signature]

SAMPLE INTEGRITY COMMENTS:

LAB LOG #: | LOGGED IN BY: | DATE: | TIME:

K-89

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TOLS002368

BZTO104(e)039189

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)

SID	Date	Time	Media	Presentnr	Analysis requested	MDL
2-S	8/25	1130	SOIL	NONE	GLASS 80Z 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: [signature] Date 8/26 Time 1225 Received for Coffey Lab [signature]

SAMPLE INTEGRITY COMMENTS.

LOGGED IN BY: DATE: TIM

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TOLS002369

BZTO104(e)039190

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 8/23/86 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)

Lab #	Date	Time	Media	Preservation	Container	Analysis requested	MD
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 by: [signature]

SAMPLE INTEGRITY COMMENTS:

LAB LOG # LOGGED IN BY: DATE: TIME:

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TOLS002370

BZTO104(e)039191

REPAID_____
ART DEPOSIT_____
FOR RELEASE_____
LL_____

COFFEY LABORATORIES, INC.

4914 N.E. 122nd Ave.
Portland, OR 97230
Phone: (503) 254-1794

LOG#_____

LOGIN TIME_____

OMPANY NAME SRH ASSOC. TELEPHONE# 232-0824

DDRESS 123 NW 3RD PURCHASE ORDER # VERBAL

DDRESS STE 230 LAB PRICE QUOTE #_____

ITY/STATE/ZIP PORTLAND OR 97232 BILLING ADDRESS:

TTENTION JOHN RUDDICK

AMPLE COLLECTION DATE 9/26/86 DUE DATE MONDAY AFTERNOON 9/29/86 RUSH_____

AMPLE COLLECTED BY J RUDDICK DELIVERED BY JHR

_IENT COMMENTS-(SPECIAL INSTRUCTIONS, SPECIFIC METHOD ETC):

DI	Field ID	Date	Time	Media	Pres	btl	Analysis Requested	MDL
	K-O	9/26	0915	SOIL	NONE	3oz GLASS	PENTACHLOROPHENOL (EPA 8040)	

AMPLE INTEGRITY COMMENTS

Relinquished by	Date	Time	Received for Coffey Labs by
	9/26/86	0950	

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TOLS002371

BZTO104(e)039192

KOPPERS

INTEROFFICE CORRESPONDENCE

TO:	Mike Dvorsky	FROM:	William J. Baldwin
LOCATION:	K - 19	LOCATION:	K - 1350
SUBJECT:	Time Oil Project 1221	DATE:	February 3, 1987

I am attaching correspondence dated January 14, 1987 from John Denham to Jay Sebbens which includes an update (October 1, 1986) on the above subject site as well as a proposal and cost estimate dated December 19, 1986 for bench scale evaluation of remedial work. After you have the opportunity to review the attached, let's discuss.

William J. Baldwin

William J. Baldwin

WJB/bml

Attachment

cc: J. Sebbens (Without Attachment)

001253

TOLS002372

BZTO104(e)039193

PHONE 285-2400
CABLE ADDRESS: TIMOIL

SEATTLE
TACOMA
PORTLAND
STOCKTON
RENO
RICHMOND
LOS ANGELES

TIME OIL COMPANY

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

SEATTLE, WASHINGTON 98199-1233
SEATTLE, WASHINGTON 98124-0447

JUL 23 1987

January 14, 1987

Koppers Company Inc.
Attn: J. Sebbens
Koppers Building
Pittsburg, PA 15219

Dear Mr. Sebbens:

Enclosed is copy of the latest (October 1, 1986) update regarding Time/Koppers voluntary efforts to clean up the pentachlorophenol contamination at our Northwest Terminal in Portland, Oregon. The purpose of this paper, in addition to serving as an update for Koppers, is to have data documented by a third party which is suitable to gain approval from necessary regulatory agencies for acceptable remedial actions as next step accomplishment.

Also enclosed is copy of December 19, 1986 proposal and cost estimate by SRH for performance of bench scale evaluations of recommended "soil washing" technique. Request your comments on this matter as soon as possible.

Sincerely,

John P. Denham

John P. Denham
Environmental Manager

Enclosures a/s

JPD/ch

K-89

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BZTO104(e)039194

PROPOSAL AND COST ESTIMATE

BENCH SCALE FEASIBILITY STUDIES FOR THE ELUTION OF PCP FROM CONTAMINATED SOIL

DECEMBER 19, 1986

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

K-89

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BZTO104(e)039195

INTRODUCTION

Time Oil Co. has been investigating the nature and extent of soil and groundwater contamination at its Northwest Terminal facility located in Portland, Or. as a result of pentachlorophenol (PCP) releases which occurred at that site over a period of several years. The results of this investigation indicate that the sandy soils to the south of the wood treating chemicals warehouse are contaminated with PCP at concentrations ranging up to several thousand parts per million.

As a result of these findings, Time has performed a preliminary analysis of potential remedial alternatives for the contaminated soils at the site. Due to existing bans on landfilling of the waste (categorized by EPA as listed hazardous waste number F027) and due to Time's expressed interest in preventing further environmental impairment from this site, few alternatives were concluded to be viable. In October of 1986, SRH Associates conducted a review of all available alternatives for the disposal or treatment of Time's PCP contaminated soil. Since this evaluation, the residual soils from the incineration or thermal treatment of F027 contaminated soils have been upheld as being a separately listed hazardous waste (F028), making such thermal processes unsatisfactory remedial alternatives for Time since the resulting soils could not reasonably be expected to be easily delisted from hazardous status.

On the basis of these cumulative findings, no commercially available, licensed process was identified that was capable of treating or disposing of Time's PCP contaminated soils. Several developmental technologies were identified that appeared to have the capability to achieve Time's objectives but which had not been commercialized or demonstrated under conditions found at the Northwest Terminal facility.

On the basis of Time's evaluation of the available remedial alternatives and the above information, a site specific assessment of soil washing technology was recommended. (See Report "Pentachlorophenol Contamination, Northwest Terminal, Section II, pg. 20) Soil washing involves the extraction of wastes from soils using solvents, surfactants or other solutions. The current status of soil washing technology is generally regarded as developmental, however it represents one of the more advanced technologies available to Time in light of the restrictions placed on landfilling, incineration, and closure of the wastes in place. Assessment of this process is consistent with EPA's Research, Development and Demonstration (RD&D) protocols which ultimately require a demonstration to the agency of the effectiveness and limitations of a waste treatment technology prior to its implementation.

TOLS002375

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The Northwest Terminal contamination is of such a nature that some degree of demonstration to the regulatory agencies of any cleanup process can be expected to be required prior to the implementation of cleanup efforts. This requirement can be expected due to existing regulations, the extent of contamination at Northwest Terminal, and the potential for the presence of dioxin in the wastes.

The following is a proposed scope of work and cost estimate for a bench scale evaluation of soil washing protocols for application to Time's PCP contaminated soil. The proposal defines the work necessary to review existing literature and to perform bench scale studies to generate data which confirm or reject the assumption that soil washing technologies can successfully clean up Time's contaminated soils. The proposed scope of work does not, at this time, include pilot scale studies, which ordinarily follow bench scale determinations, since it is misleading to attempt to define the scope of work or costs associated with the pilot phase of the project until such time as bench scale results define an appropriate process for scale-up considerations.

SCOPE OF WORK

OVERVIEW

The complete investigation of the feasibility of using soil washing procedures to remediate soils at Time's Northwest Terminal includes the following tasks:

- Review of existing literature and regulations.
- Performance of bench scale experiments.
- Evaluation of bench scale results and execution of a decision to continue or terminate the investigation.
- Performance of pilot scale experiments.
- Determination of the economic feasibility of the projected process and execution of a decision to proceed or terminate the investigation.
- Engineering and design of process equipment, if not commercially available.
- Fabrication of unavailable equipment and implementation of the process for EPA demonstration and subsequent cleanup activities.

This proposal addresses only the first phase of the project which includes the first three tasks. Segmenting the project into rational phases with decision points at which to appraise the value of proceeding following completion of each phase, permits stricter control over the project and allows better estimation of the scope of work and costs involved with each phase. The phases may be described as follows:

- o Bench scale studies
- o Pilot scale studies
- o Engineering and Implementation

The detailed scope of work and cost estimate for the bench scale study phase of this project is presented below.

BENCH SCALE STUDIES

The bench scale studies are intended to generate sufficient data to allow Time to make an informed decision to proceed with or abandon the project with a minimal amount of capital expended. The tasks associated with this phase are designed to evaluate three different soil washing procedures, to define the parameters associated with their use, to characterize the soil chemistry and the spectrum of contaminants in the PCP contaminated soil at Time's Northwest Terminal facility, to select the most effective soil washing procedure based on bench study results, to define the nature of the recovered elutriate solution generated during soil washing, and to assess methods for destruction of the contaminants found in that elutriate. The following is a detailed task breakdown to accomplish these objectives.

Task 1 - Review Current Regulations

To reduce the risk of new regulations or new interpretations of existing regulations unfavorably impacting this study, SRH will appraise the status of regulations affecting soil washing technology. These evaluations are necessary to prevent the expenditure of time investigating technologies which are generally regarded as unpermittable and to preclude the potential for regulatory violations and fines. Perhaps the most functional purpose of this task is to provide Time with both regulatory and political data to properly prepare submittals to EPA and DEQ in order to expedite acceptance of plans, permits and other communications.

EPA representatives from Region X, Waste Management Branch, Hazardous Waste Division, Seattle; EPA Headquarters, Office of Solid Waste, Washington, D.C.; and the Office of Research and

Development (ORD), Cincinnati, OH., will be queried regarding the current and pending status of regulations regarding PCP treatment technologies. SRH proposes to solicit and evaluate the information received from these agencies in a confidential manner to allow Time Oil Co. access to unbiased information and to develop strategies which are expeditious due to their regulatory and political acceptability. Emphasis will be placed on extraction procedures. Particular effort will be placed on discussions with representatives from the Alternative Treatment Technologies Section of ORD to not only review the regulations associated with extraction of PCP contaminated soils, but to also determine the status of research being performed by EPA in this area.

This task is expected to require 2 weeks for completion with an estimated cost of $2,336.

Task 2 - Review Current Extraction Literature

SRH will review existing extraction technology by examining literature in the fields of hazardous waste extraction, food processing technology (specifically edible oils) and metal recovery and mining (ore leaching). In addition to the discussions with ORD described under task 1, EPA's list of internal publications will be reviewed to identify, obtain copies of, and subsequently review EPA literature in this field. General extraction theory will be reviewed using current texts. U.S. patent literature will be reviewed to appraise the status of engineering in this field. Manufacturers of extraction equipment will be contacted to determine the commercial availability of extraction equipment and to allow initial estimates of potential costs.

SRH will present the results of tasks 1 through 3 to Time Oil Company representatives at Time's offices in Seattle as a part of task 2. This meeting will be conducted to review findings and to refine the scope of work relative to the development of the bench scale study plan.

This task is expected to require 2 weeks for completion with an estimated cost of $4,316.

Task 3 - Evaluate the Nature of the Wastes to be Treated

SRH will determine the porosity, grain size distribution, organic carbon content and other critical parameters of Time's contaminated soil which affect the extraction of PCP and any other identified contaminants from the soil. Analyses performed to date have indicated the presence of unidentified contaminants

TOLS002378

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in addition to PCP in the soil at Northwest Terminal. SRH will determine the presence and nature of contaminants other than PCP in the soil to allow determination of their impact on the extraction process. Samples of soil from the Northwest Terminal PCP site will be taken and evaluated for priority pollutants by GC/MS, ICP and other appropriate analytical techniques with identification of other major peaks as indicated. Specifically, soil will be evaluated for grain size (particle size distribution), soil type, porosity, specific gravity, moisture content, pH, total organic carbon and oil and grease levels. Two samples are proposed for each test to allow for an estimation of the range of concentration of the contaminants found.

This task is expected to require 3 weeks for completion (including 2 weeks for laboratory analyses) with an estimated cost of $6781.

Task 4 - Develop an Initial Plan for Bench Scale Studies

The information generated in tasks 1 through 3 will be used to refine the experimental approaches needed to complete bench scale studies. The following proposed plan is expected to undergo modification based on those results.

This investigatory plan is based on extraction theory and the existing literature but is heavily weighted towards existing and available technology and equipment. It is intended to quickly produce sufficient results to allow Time to determine if further pursuit of the project is warranted.

Extractability of soil contaminants will be initially evaluated using simple jar tests. Jar tests will be performed by introducing a known amount of contaminated soil into a beaker containing a fixed volume of extracting solution. The material will be agitated for a fixed period of time at a known temperature. Following this protocol, the filtered solution and the extracted soil will be analyzed for PCP and the extraction ratio determined.

Organic solvents, elevated pH solutions and aqueous solutions of surfactants will be evaluated. Up to four solvents, four different pH levels and four different surfactants will be evaluated. Based on the observed results, relative costs, safety and environmental considerations, two different elutriating solutions will be selected for further evaluation, including optimization of extraction conditions. The effect of the extraction procedure on contaminants other than PCP which have been determined to be present in the soil will be assessed by

analysis of the extract and the residual soil for these materials. Conditions indicative of a potentially successful soil cleaning process will be pursued for optimization of the batch process. To optimize the process, the extracting conditions will be varied with respect to surfactant concentration, extraction time, temperature and/or pH, as appropriate, to maximize the removal of PCP and other contaminants from the soil. It should be noted that different contaminants may require different extraction solutions (or combinations of solutions). SRH believes that PCP and oil are the principal contaminants and a single extraction solution may be used to remove both substances from Time's soil.

When the batch process has been optimized in the above fashion, samples of the elutriate will be analyzed for all identified contaminants. A description of the elutriate solution will be prepared to allow for evaluation of elutriate treatment alternatives. At this time, it is expected that oxidation or reduction of the waste material represents a potential treatment option but that final selection of a suitable treatment will require a precise understanding of what contaminating materials, other than PCP, may be present.

The optimized solution will be used to compare three extraction procedures, as appropriate, i.e. sequenced batch, countercurrent, and reflux (Soxhlet) extractions. These processes can be conducted in SRH's bench scale, laboratory apparatus. The objective of this set of tests is to optimize the extraction procedure by improving efficiency and minimizing the quantities of solution required. This study will necessarily be contingent upon the extraction solutions selected. For example, since caustic and surfactant solutions are not generally volatile, Soxhlet procedures would not be applicable to these solutions and therefore would not be evaluated. Conversely, if an organic solvent is indicated as the elutriating solution, it may be necessary to remove the residual solvent from the extracted soil prior to discharge from the extractor. In this case, sequenced batch extraction may be favored while continuous processes such as countercurrent or soxhlet extraction would be contraindicated.

The last evaluation in the bench scale phase of the project is the determination of a treatment method for the extracted material. Although this evaluation will ultimately depend on the nature of the material as produced, it is believed that oxidation/reduction or separatory methods represent likely candidates. For example, if the extraction is performed using caustic solutions, acidification of the extract to a pH < 5.0 may precipitate significant amounts of

PCP due to the reduced solubility of this compound in its acid form. Conversely, if large amounts of oil are present, it may be necessary to utilize a solvent as the extractant, in which case removal of the solvent and treatment of the residual material through peroxide, permanganate, or other chemical oxidation process, chemical reduction, or physical adsorption onto organic or inorganic substrates may be preferred.

The plan will be developed in close association with Time Oil Co. personnel to ensure that the resultant plan meets Time's expectations and requirements.

This task is expected to require 1 week for completion, with an estimated cost of $2290.

Task 5 - Implement Bench Scale Study Plan

SRH will conduct the implementation of the study as planned in task 4, above. The plan, which will have been developed in close coordination with Time Oil Company, will have the following components for the sake of discussion and cost estimation:

- perform 12 initial jar tests
- analyze 24 PCP samples from initial jar tests
- perform 6 secondary jar tests
- analyze 12 PCP samples from secondary jar tests
- perform 4 jar tests for optimization
- analyze 8 PCP samples from optimization jar tests
- perform 3 process emulating extractions (i.e. soxhlet, countercurrent, etc)
- analyze 6 PCP samples from process emulating extractions
- analyze optimized extract from optimized jar test for all identified contaminants
- perform 4 separatory tests on optimized extract
- perform 3 oxidation tests on optimized extract
- perform 2 reduction tests on optimized extract
- analyze effluent from the above extract destruction tests (9 PCP analyses)
- analyze 1 effluent sample for all identified contaminants

The results of the bench scale study will be a summary report to Time Oil Co. indicating the success or failure of the soil washing process at the bench scale level and projecting the probability for success of a pilot level scale-up.

SRH has evaluated the topic of PCP extraction from soil and is aware that extensive work has already been performed in assessing

the extraction efficiency of this material from soils in an EPA directed extraction procedure for preparing samples for quantitative analysis. This work, done to provide a means for analyzing contaminated soil, has direct bearing on this project, and leads SRH to conclude that reflux extractions may pose a viable and well documented process for PCP contaminated soil remediation. To date, SRH is unaware of any commercial effort to decontaminate soils by this process.

This task is expected to require approximately 12 weeks for completion, including laboratory turn around time. The estimate cost for this task is $23,680, including analytical costs.

Task 6 - Prepare Report and Submit Recommendations

SRH will prepare a summary report presenting the data, conclusions and its recommendations to Time Oil Company. The report will include copies of experimental protocols and analytical results and will present a summary of the results and their significance to allow Time Oil Company to determine if further pursuit of this project is warranted. SRH will also attend a one day meeting at Time's offices in Seattle to review the results and conclusions with Time's representatives.

This task is expected to require 1 week for completion with an estimated cost of $2,626.

COST ESTIMATE

Although the precise determination of the costs associated with any developmental process is difficult due to the large potential for project reorientation based on new results and findings, SRH believes that the following cost estimates provide a good foundation for project assessment. SRH proposes to perform the work on a time and materials basis according to its current rate schedule. The estimated costs presented herein would not be exceeded without prior authorization from Time.

A detailed cost estimate breakdown is presented in figure 1. SRH suggests that the estimate be reviewed following the completion of tasks 1 - 3, to reflect information obtained during these activities which could impact the assumptions made in estimated tasks 4 through 6. SRH estimates the total bench scale phase costs to be $37,868 including labor and expenses.

TABLE 1 - COST ESTIMATE DETAIL

TASK	PERSONNEL	HOURS	COST
TASK 1 - REVIEW CURRENT REGULATIONS			
LABOR	REG. SPEC.	24.0	$1,920.00
	CLER	8.0	$216.00
	TOTAL	32.0	$2,136.00
EXPENSES	MISC.		$200.00
	TOTAL		$200.00
TOTAL			$2,336.00
TASK 2 - REVIEW CURRENT EXTRACTION LITERATURE			
TASK 2A - REVIEW LITERATURE			
LABOR	SR. SCI	32.0	$2,560.00
	CLER	8.0	$216.00
	CHEM	10.0	$500.00
	TOTAL	50.0	$3,276.00
EXPENSES	MISC.		$200.00
	TOTAL		$200.00
TOTAL			$3,476.00
TASK 2B - MEETING WITH TIME OIL CO			
LABOR	PRIN	8.0	$640.00
	TOTAL	8.0	$640.00
EXPENSES	MISC.		$200.00
	TOTAL		$200.00
TOTAL			$840.00

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	TOTAL TASK 2			$4,316.00
TASK 3 - EVALUATE NATURE OF WASTES				
	LABOR	SR. SCI	16.0	$1,280.00
		CLER	8.0	$216.00
		CHEM	8.0	$400.00
		GEOL	8.0	$480.00
		TOTAL	40.0	$2,376.00
	EXPENSES	MISC.		$300.00
		ANALYTICAL		$4,105.50
		TOTAL		$4,405.50
	TOTAL			$6,781.50
TASK 4 - DEVELOP STUDY PLAN				
	LABOR	SR. SCI	24.0	$1,920.00
		CLER	10.0	$270.00
		TOTAL	34.0	$2,190.00
	EXPENSES	MISC.		$100.00
		TOTAL		$100.00
	TOTAL			$2,290.00
TASK 5 - IMPLEMENT BENCH SCALE STUDY				
	LABOR	SR. SCI	40.0	$3,200.00
		CLER	16.0	$432.00
		CHEM	72.0	$3,600.00
		GEOL	24.0	$1,440.00
		TECH	40.0	$1,600.00
		TOTAL	192.0	$10,272.00
	EXPENSES	MISC.		$350.00
		ANALYTICAL		$9,487.50
		COMPUTER		$150.00
		OTHER LABORATORY		$3,421.25
		TOTAL		$13,408.75
	TOTAL			$23,680.75

TASK 6 - REPORT AND RECOMMENDATIONS

TASK 6A - PREPARE REPORT

LABOR	SR. SCI	8.0	$640.00
	ADMIN	8.0	$480.00
	CHEM	5.0	$250.00
	CLER	8.0	$216.00
	TOTAL	29.0	$1,586.00
EXPENSES	MISC.		$200.00
	TOTAL		$200.00
TOTAL			$1,786.00

TASK 6B - MEETING WITH TIME OIL CO

LABOR	PRIN	8.0	$640.00
	TOTAL	8.0	$640.00
EXPENSES	MISC.		$200.00
	TOTAL		$200.00
TOTAL			$840.00
TOTAL TASK 6			$2,626.00

PROJECT TOTAL $42,030.25

NOTES:

REG. SPEC	REGULATORY SPECIALIST
CLER	CLERICAL
SR. SCI	SENIOR SCIENTIST
CHEM	CHEMIST
PRIN	PRINCIPAL
ADMIN	ADMINISTRATIVE ASSISTANT
GEOL	GEOLOGIST

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PENTACHLOROPHENOL

CONTAMINATION

NORTHWEST TERMINAL

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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.
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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'.

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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".

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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.

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- Floor of wa house 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 depth 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

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.

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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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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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 additional 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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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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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 directions 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 Willamette 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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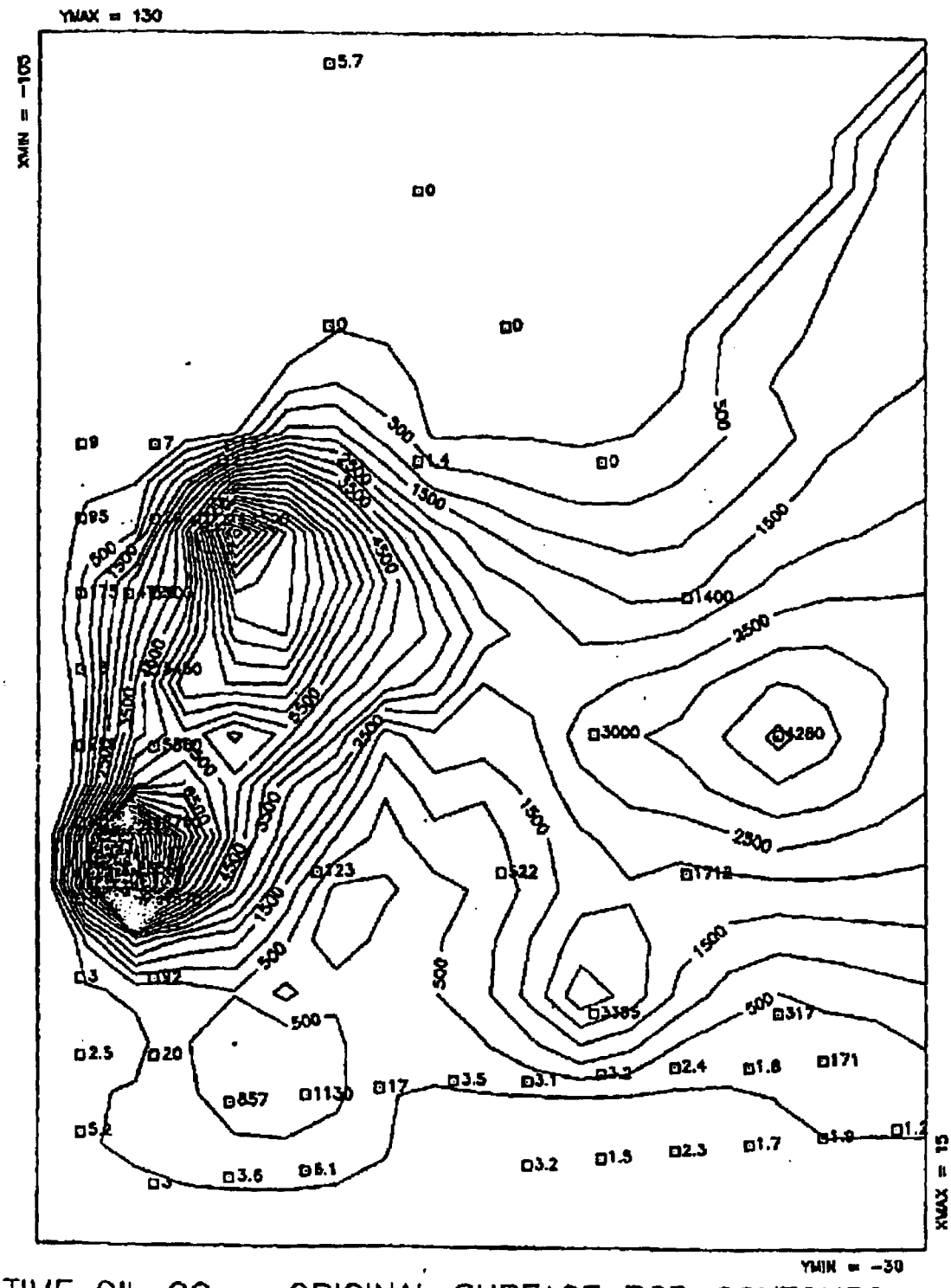
FIGURE I-1



TIME OIL CO - ORIGINAL SURFACE PCP CONTOURS

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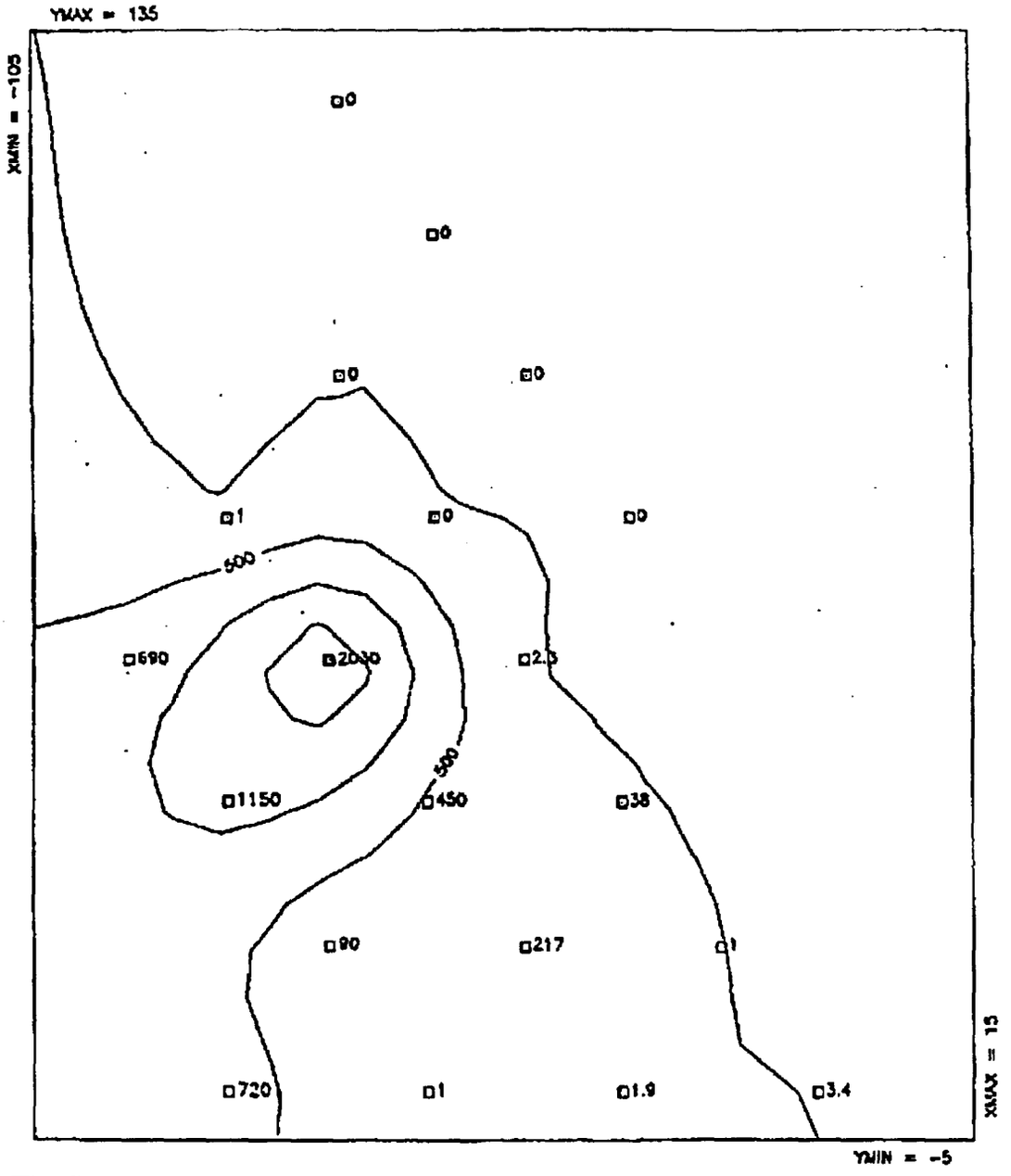
FIGURE I-2



TIME OIL CO – ORIGINAL 12 FOOT PCP CONTOUR

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FIGURE I-3

CONSTRUCTION DIAGRAM FOR

WELL 4

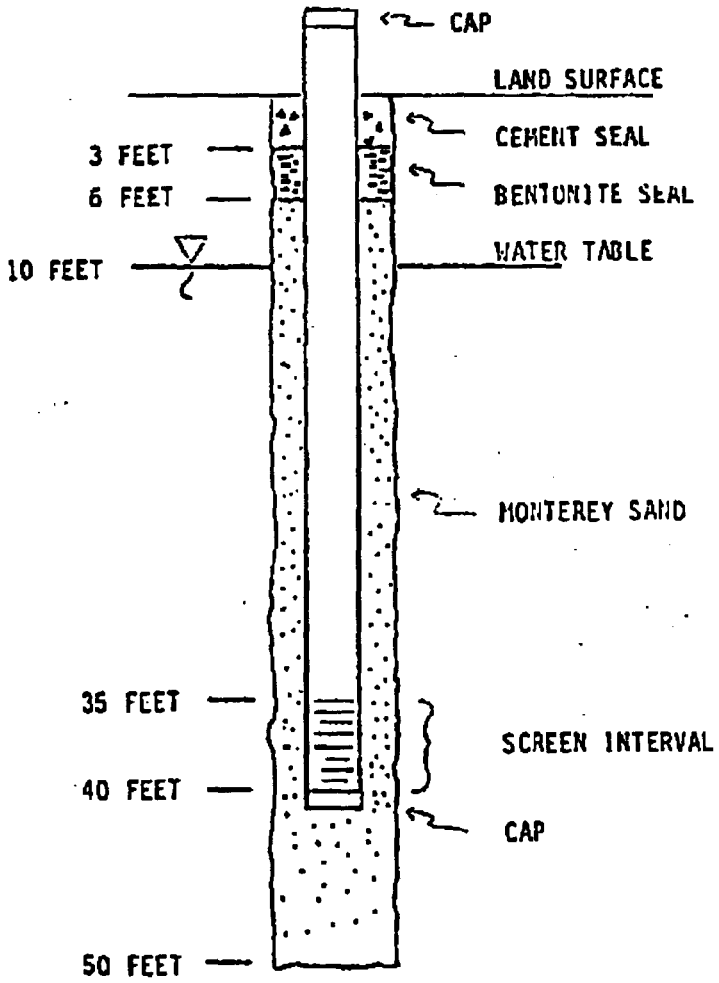

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FIGURE I-4

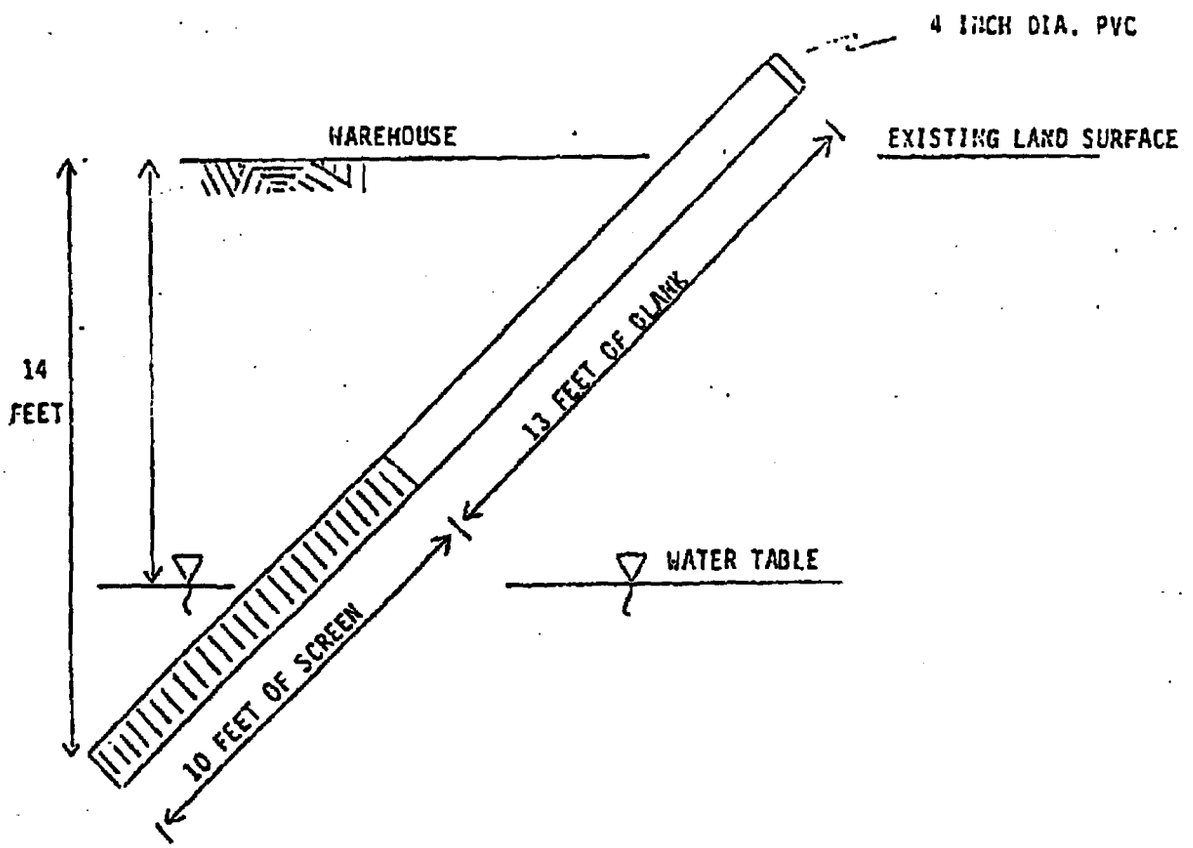
BORING LOG WELL 4

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)

FIGURE I-5

CONSTRUCTION DIAGRAM FOR

WELLS 1, 2 AND 3



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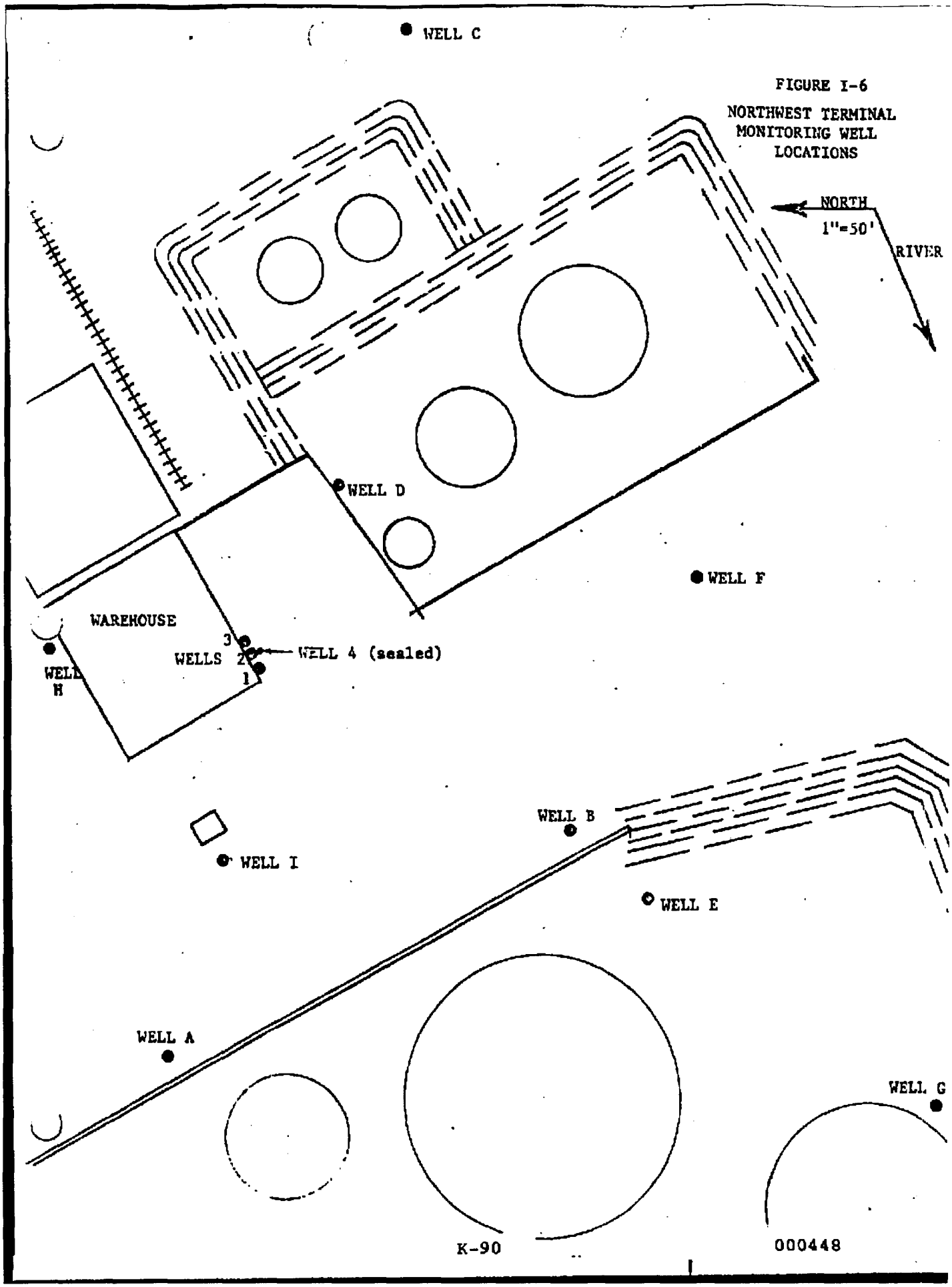

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SECTION II

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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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.

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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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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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 thi process. If technically successful, implementation costs shoul be moderate.

Encapsulation

One method of encapsulation of organic material is through application of sorbents to the contaminated soil. Sorbents include carbon granules, polymeric materials or substance which the waste is soluble. All sorbents must be insolubl water, inert and not readily degradable in order to achieve term stabilization of the wastes in question.

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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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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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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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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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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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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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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 performing 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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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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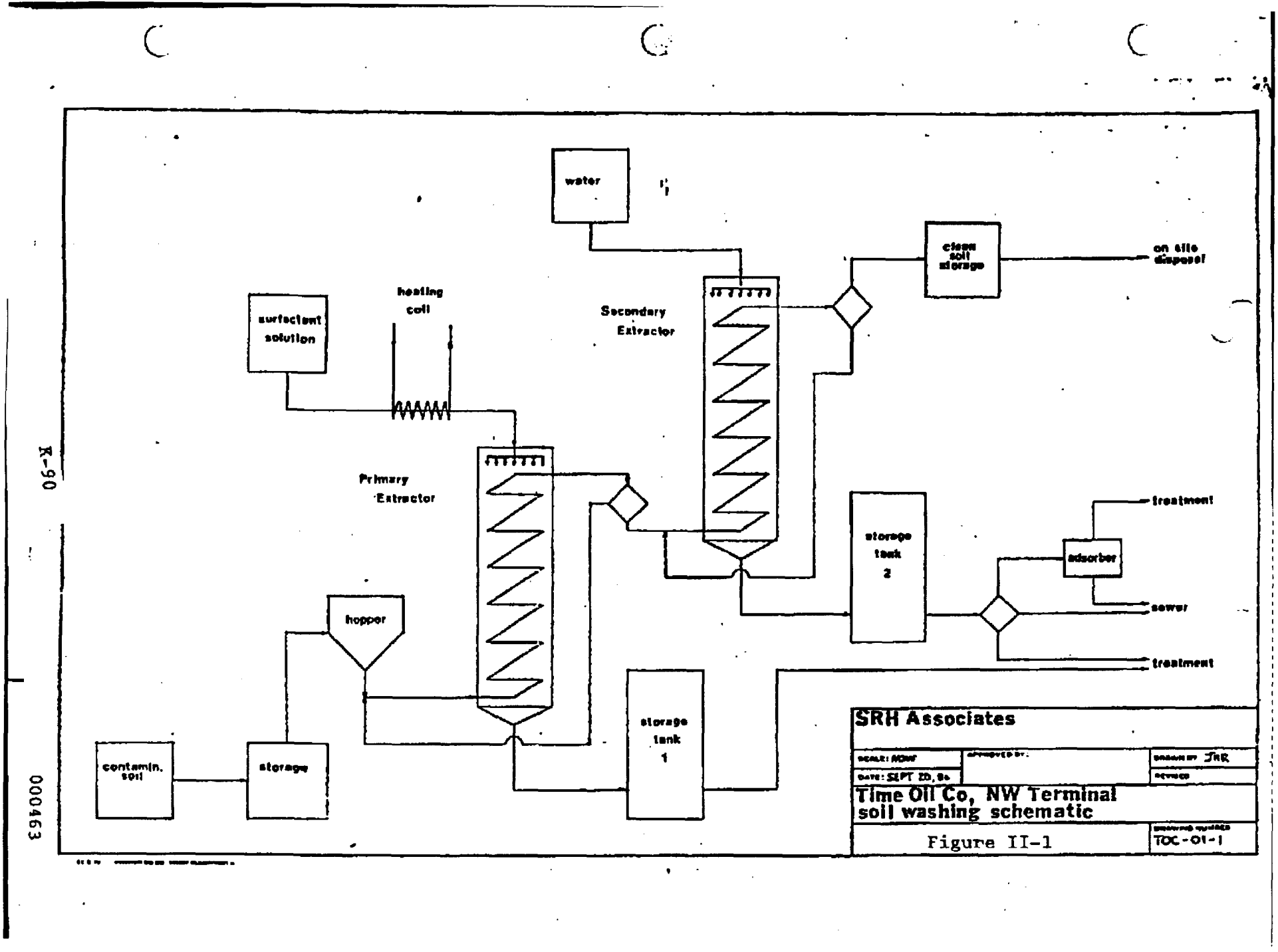

K-90

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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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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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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.

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 procedures 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

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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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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 well 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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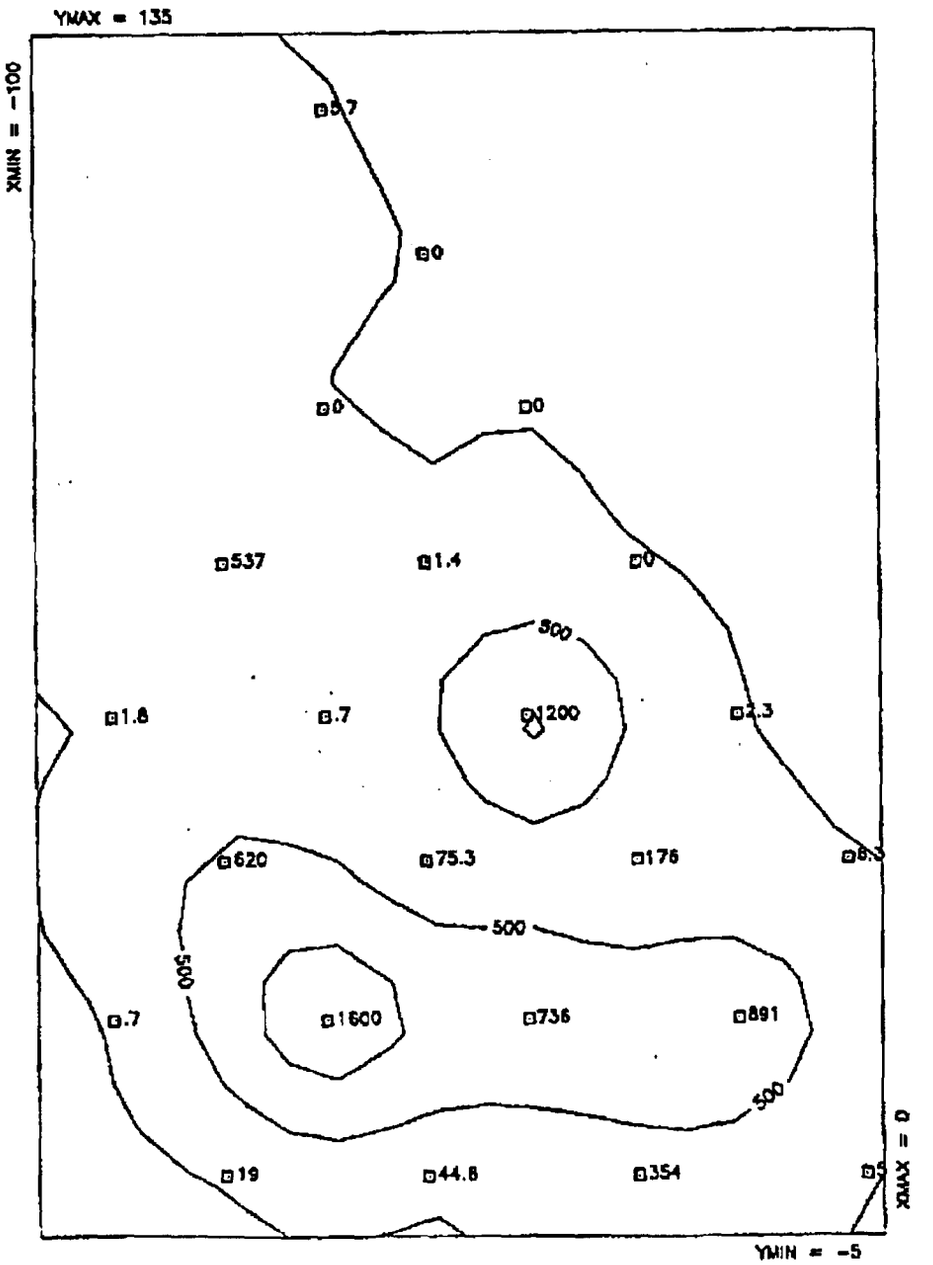
FIGURE III-1



TIME OIL CO – SURFACE PCP CONTOURS

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000471

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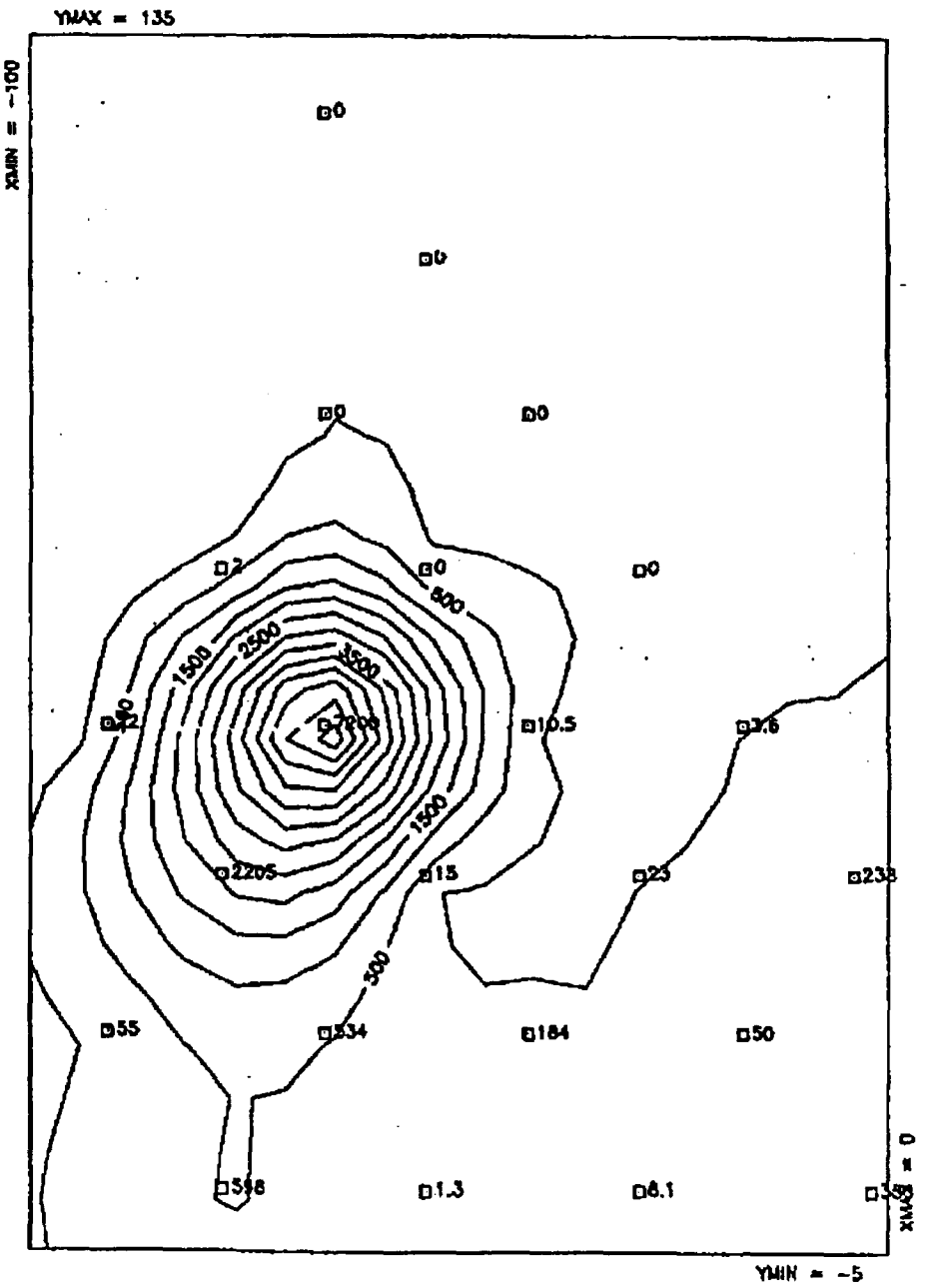
FIGURE III-2



TIME OIL CO - 4' FOOT PCP CONTOURS

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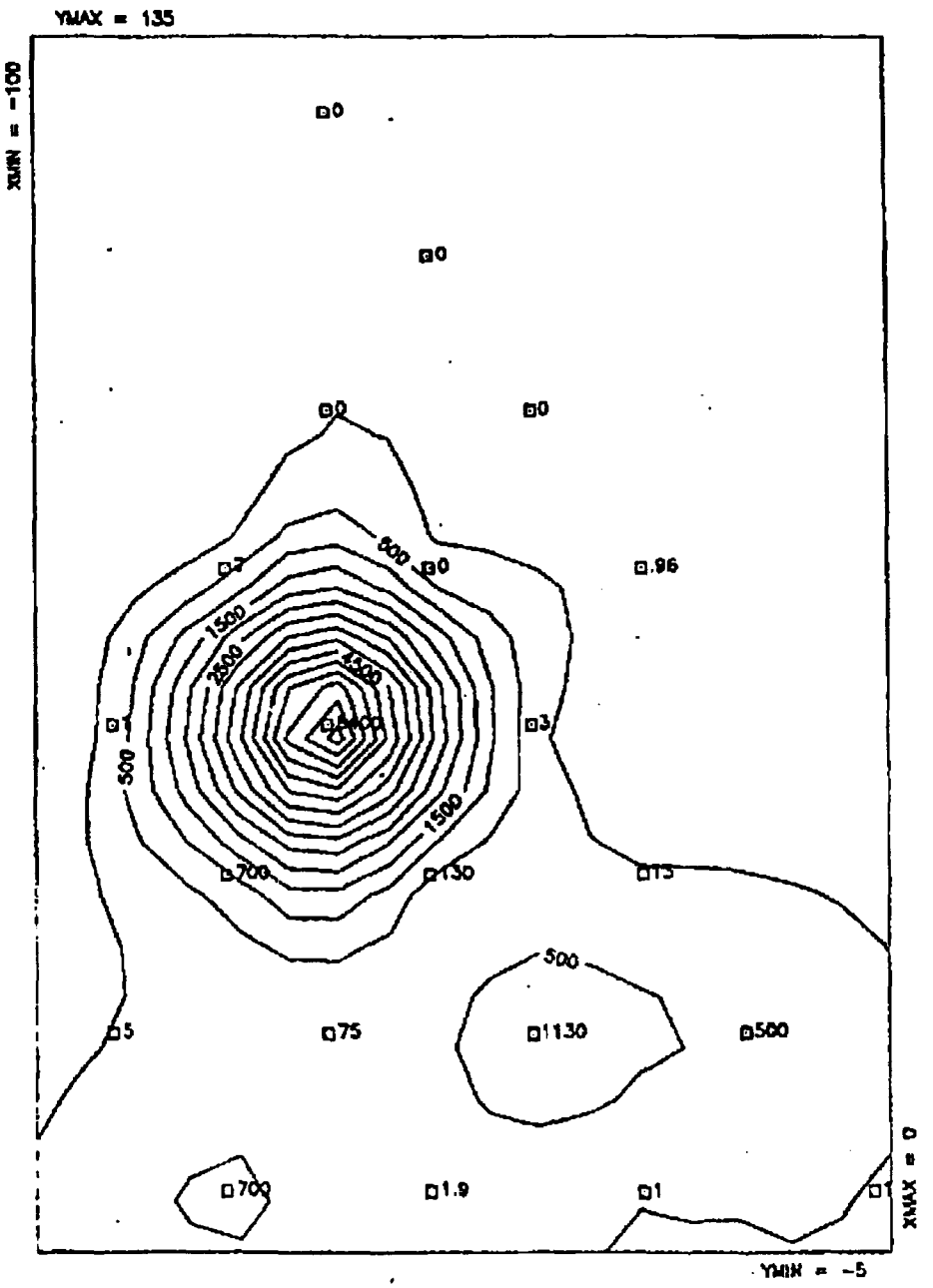
FIGURE III-3



TIME OIL CO - 7 FOOT PCP CONTOURS

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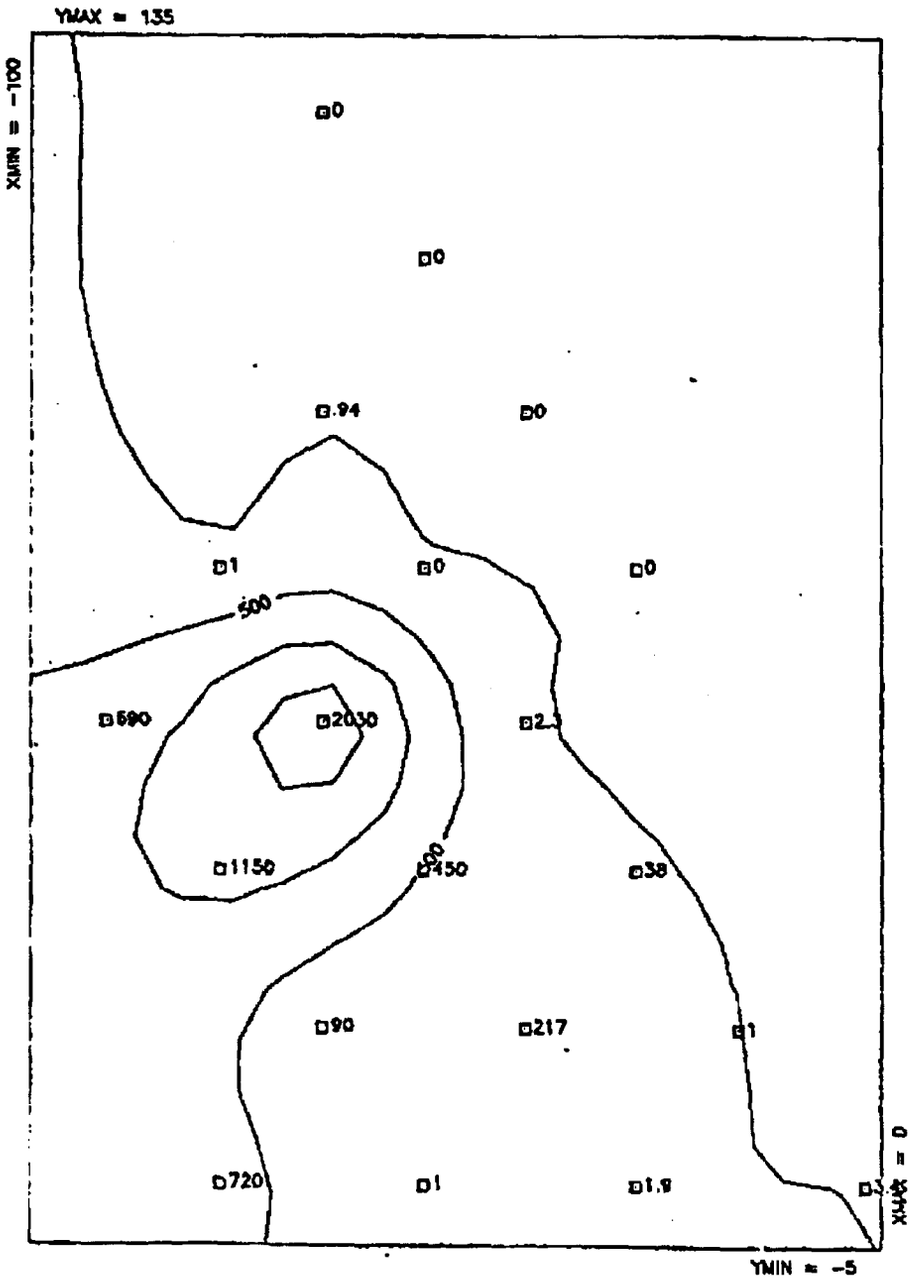
FIGURE III-4



TIME OIL CO - 12 FOOT PCP CONTOURS

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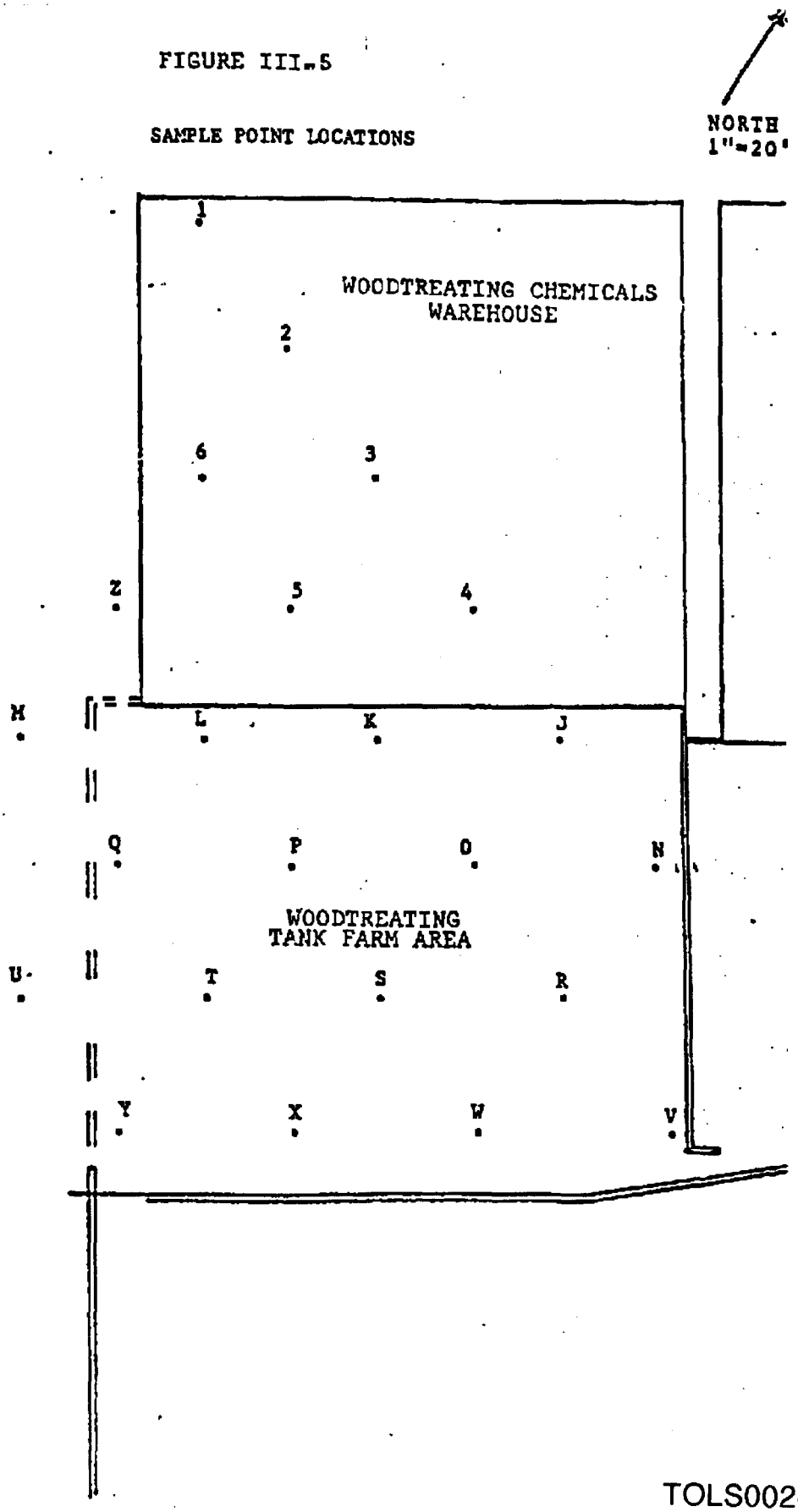
FIGURE III-5

SAMPLE POINT LOCATIONS



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SAMPLE POINT COORDINATE

FIGURE III- 6

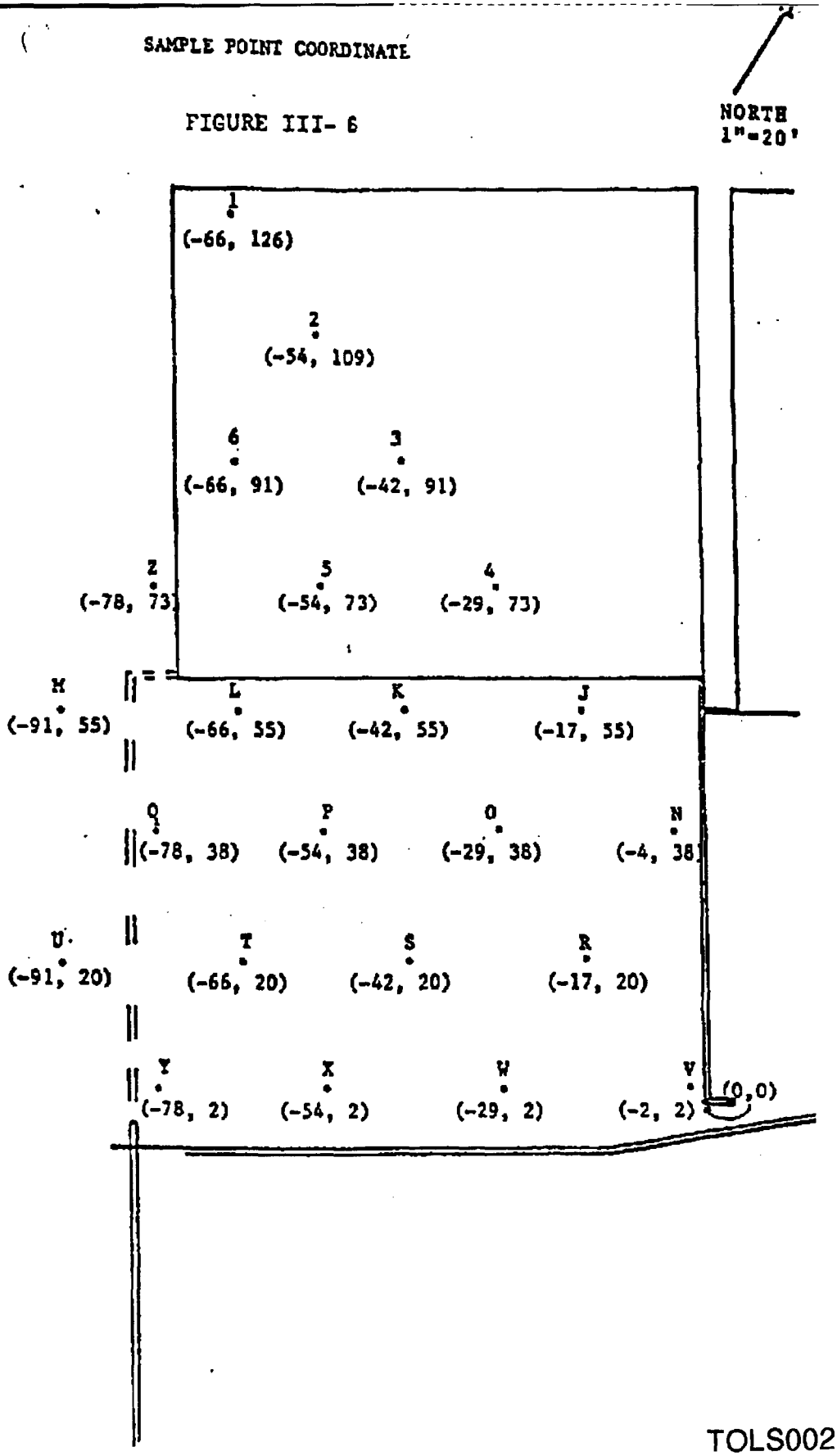

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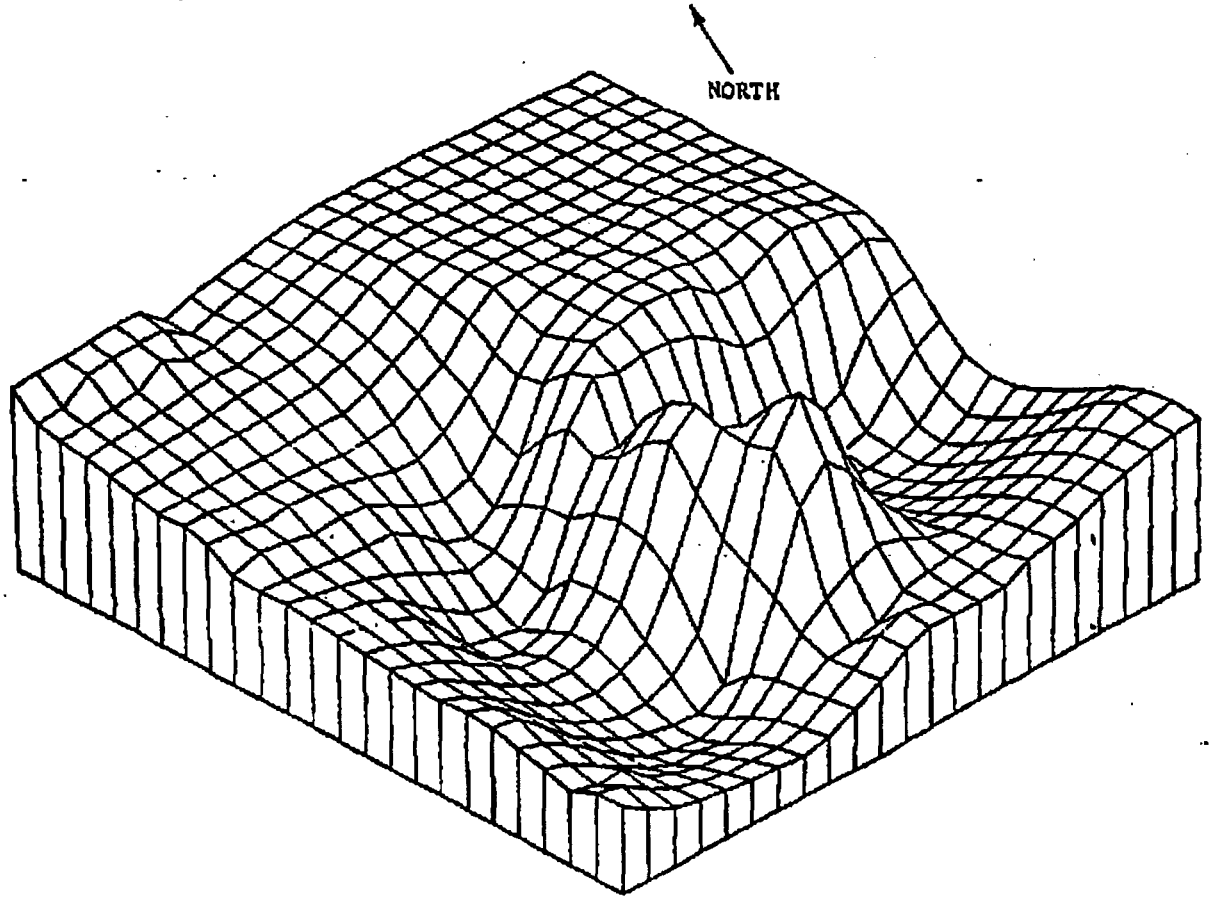
FIGURE III- 7

APPROXIMATE SURFACE TOPOGRAPHY

WOOD TREATING CHEMICALS AREA



TIME OIL CO. - TOPOGRAPHY

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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-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)

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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-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)

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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)

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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

TOLS002440

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KOPPERS

Interoffice Correspondence

RECEIVED
DEC 9 1985
ENVIRONMENTAL RESOURCES

To M. R. Urbassik — From D. R. Kerschner

Location K-1201 — Location K-1940

Subject Monthly Update - November, 1985 — Date December 6, 1985

Galesburg RI/FS

Work is progressing on the RI report. A revised draft version of the first three chapters has been submitted to the State in an attempt to reduce the time period for review of the final product. IEPA has finally commented on the proposed schedule revision submitted in early October; this extends the submittal of the final RI report to the end of January, 1986, and the submittal of the final FS report to the end of June, 1986. Temp Smith will be submitting this proposal for revision of the Consent Agreement.

IEPA is now "strongly recommending" that the lime sludge in the stockpile (approximately 3,000 cu. yards) be disposed of off-site as soon as possible. We have responded that we are unwilling to do this in advance of the FS, since there may be another alternative which is more efficient. Temp Smith has been in touch with Jim Frank (IEPA) concerning this, and is apparently making some headway. As of now, we are planning to go ahead and cover the lime sludge stockpile with an impermeable liner - Mark Franck has located a vinyl-coated tarp which he feels is cost-effective and will last for several years.

A meeting is scheduled for December 3 between Koppers and ESE to work out the final details concerning the revised project cost estimate.

Denver, Colorado

Larry McShea reports that the wastewater treatment plant was up and running on November 23. A permit has not been issued for POTW discharge; the sewer people have indicated that they will issue a temporary permit for batch discharge of the water which is now being held in storage, and that the hold-up on the permit is an office problem, and not a technical problem.

Work is progressing according to the schedule and cost estimate for the Phase I RI. I will be requesting Monroeville to prepare a monthly update concerning this project.

I am in the process of completing the revision to the SPCC plan. I am also assisting when needed in any waste disposal actions. The plant is currently backing approximately 40 drums of drip track, etc. clean-up soil which had been labeled as K001 out of RCRA, and is investigating the disposal possibilities for this material.

K-6 REV. 2 2647

Carbondale RI/FS

We appear to be within one telephone call of having a mutually-agreeable Consent Agreement and Statement of Work with IEPA. Temp Smith and I have reservations about the USEPA Consent Agreement, and plan on approaching EPA with a request to have that document more closely resemble the IEPA document. Temp has reservations about signing with IEPA without an agreement with US EPA in hand.

Woodward-Clyde is progressing with the various work plans; the present strategy is to submit these plans to Koppers for rapid review, then informally submitting the plans to the agencies for preliminary review. The actual submittal will then hopefully require very little review time.

W-C also prepared and submitted a revised Groundwater Quality Assessment Plan to US EPA, reflecting the changes insisted on by that agency. Because of an increase in the number of stainless steel wells required for the GWQAP, it is now cheaper to install all stainless steel wells for the concurrent RI than install, sample, and analyze redundant stainless wells at all PVC well nests.

Woodward-Clyde has promised a revised RI/FS cost estimate shortly; this will allow us to finalize a purchase order. Currently, W-C is working on and billing RI/FS activities under a blanket Order for Carbondale consulting. We also need to get together with W-C concerning Monroeville WQE's involvement as a subcontractor in the RI/FS.

Feather River

Dames and Moore is presently finalizing the RI/FS work plan, and expects to submit it in early December. I expect an updated cost estimate for the RI/FS within the next couple of days; this will probably result in a meeting between Koppers and D&M. I am also in the proccess of better-defining Koppers WQE's role in the RI/FS project.

To date, we have not received a draft of the proposed Consent Agreement from US EPA, nor have we heard what the hold-up is.

The State Attorney General's office has informed us that Koppers is potentially liable for failure to report the three-wheeler fire near the Cellon blowdown sump to the DHS under the Interim Status Document. This fire was apparently caused by an explosion of the ether in the sump.

The plant and I are working on waste disposal alternatives; rumor has it that CWM is accepting penta at Kettleman Hills again. The shipment of waste to Grenada is being examined as a first alternative, however.

2647

Heath, Ohio

Ashland Oil apparently will not indemnify us from groundwater problems under the proposed lease land - they claim it is the former owner's problem, and not in their power to idemnify us. Building Products management and the plant are deciding our next move.

Morgan, PA

There has not been a resolution to the problems of drum disposal. I will be contacting CWM again concerning this. Tom Izaj has informed me that everything needs to be out by December 20.

Newark, NJ

I am working with Legal concerning the claim by SRS of New Jersey. I also gave Legal my files pertaining to former haulers and disposal sites for Newark and Garwood.

Garwood, NJ

The plant has plans to remove 5 unused underground tanks, and has received a local permit to do so. I am working with them on this.

Raleigh, NC

I am preparing a RFP for RI/FS work at Raleigh. This work will most likely be done in-house. I will be visiting the site on December 4, along with Monroeville WQE personnel.

Time Oil

Reviewed the files in preparation of meeting to discuss our future involvement in investigative/remedial activities. This meeting should occur in early December.

Houston/Guthrie

Assisting and reviewing as necessary, due to my past involvement in these projects.

2647

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Parr - Cleveland East

Was informed by a third party that the plant has drums of asbestos and has reportedly been "getting no help from Pittsburgh" for disposal. Contacted the plant; my call has not been returned. I will follow up.

Also want to attempt, at Jordan Dern's suggestion, to merge RCRA storage into one facility between Cleveland East and Cleveland West, or do away with RCRA storage altogether. I will get with Beth on this.

Dave

David R. Kerschner

DRK/mas

cc: J. Dern
E. Kerschner
M. Dvorsky
C. Markle
J. Quagliotti
J. Smith
R. Hepner
M. Morris
R. Ohlis
R. Wagner
W. Baldwin
R. Hamilton
T. Smith
T. Hays
J. Blundon
P. Sawchuck

2647

TOLS002444

BZTO104(e)039265

KOPPERS
Interoffice Memo

To	Mark Urbassik	From	D. R. Kerschner
Location	K-1940	Location	K-1940
Subject	Monthly Update July 1986 Building Products/Coatings	Date	August 21, 1986

Central Asphalt

Working with Legal Services and operating on the potential sale.

Raleigh, NC

Soil removal was completed; everything apparently went very well. Drilling for the RI/FS was started, but is going much slower than anticipated. I assisted in the completion of the draft environmental review report, and will be following up on recommendations.

Time Oil, OR

Reviewing some work done by Time's consultant.

Los Angeles (Vernon), CA

I spoke with the RWQCB regarding the UST proposal. Off the top of his head, Elija Hill, their representative, did not recall having any problems with the proposal. I asked for this in writing. Mike Dvorsky is also looking into the implications of the delay in approval on our permit renewal status. Ron Morosky visited the plant to review drilling locations.

Newark, NJ

Continued work on the PCB issue.

Garwood, NJ

A state inspector visited the plant to review the UST situation, and mentioned that drilling work may be necessary. We will wait for something in writing.

6287

Parr Division

Continuing with the final details of plant clean-up. We are waiting for analytical results for the Ocala soil, and are working on disposal of the final group of drums at Cleveland East.

Asbestos decontamination at Ocala is complete.

General

Transferring the responsibilities for the continuing operations over to Mike Dvorsky. I will continue to follow up on the remaining issues for discontinued operations.

Dave

D. R. Kerschner

DRK/wl
cc: J. Campbell
C. Brush
C. Markle
J. Blundon
W. Baldwin
H. Stoner
R. Hamilton
T. Smith
E. Kerschner
T. Hays
J. Dern
M. Dvorsky
G. Edwards
R. Anderson

6287

K-MULT-0006360

TOLS002446

BZTO104(e)039267

TIME OIL CO.
2737 West Commodore Way
Seattle, Washington 98199

NOTES OF CONVERSATION

Date: 12/18/88

Time:

Between:

of Kopper Co

and

at

Re:

Talked to Jim Campbell

They are willing to pay something on future liability plus the $54,780.28 in one check. Their attorney is preparing a letter & will include a release form

4/1/88 Phone on Monday (412) 227-2689

~~Mgr of environmental section of law dept~~ ~~Jill Blundon (412) 227-2414~~

Legal Dept Bill Giarla (412) 227-2635

112,371 11/87 last work

Tumble to other side.

0127D
TPP-130

K-NWST-0000802

TOLS002447

BZTO104(e)039268

TIME OIL CO.

P.O.BOX 24447 TERM. STATION - SEATTLE WA 98124-0447
2737 WEST COMMODORE WAY - SEATTLE WA 98199-1233
PHONE (206) 285-2400

INVOICE 091868

DATE 03/06/86
REF. 03-03028 JKJ

CUSTOMER #: 03/05505623

ACCOUNT:
KOPPERS COMPANY INC
ATTN: DONALD F. MARION
KOPPERS BUILDING ROOM 750
PITTSBURGH PA 15219

657 60 123 27831.21
120 9 14250.00

TO CHARGE YOU FOR 1/2 OF THE FOLLOWING PER MUTUAL AGREEMENT IN REFERENCE TO CLEAN UP COSTS AT 12005 N. BURGARD RD., PORTLAND, OREGON.

EXPENDITURES

4/26/85 CHEM-SECURITY SYSTEMS (LABORATORY ANALYSIS OF SOIL SAMPLES)	150.00
7/10/85 NORTHWEST VACUUM TRUCK SERVICE (RELOCATING 242.76 TONS OF SOIL TO ARLINGTON)	9,000.00
7/29/85 CHEM-SECURITY SYSTEMS (RECEIVING 243.30 TONS OF SOIL AT ARLINGTON)	27,270.88
8/8/85 ENVIRONMENTAL EMERGENCY SERVICES (OBTAIN AND ANALYZE 3 COMPOSITE SAMPLES)	
12/31/85 ENVIRONMENTAL EMERGENCY SERVICES (PRIMARY SAMPLING AND ANALYSIS PLUS REPORT)	18,741.55
	55,662.43

COMMITMENTS

	3,500.00
DEQ PSK OAK 240-102-065	25,000.00+
*RIEDEL ENVIRONMENTAL SERVICES (ADMENDMENT 2)	
	84,162.43

50% = 42,081.21

*NAME CHANGE FROM ENVIRONMENTAL EMERGENCY SERVICES

INVOICE TOTAL $42,081.21

Encl. 1

ACCOUNTS RECEIV

K-NWST-0000803

TOLS002448

BZTO104(e)039269

As of 04/01/87

TIME OIL CO. EXPENDITURES IN REFERENCE TO PENTACHLOROPHENOL CLEAN UP COSTS AT 12005 NORTH BURGARD, PORTLAND, OR.

04/26/85	Chem-Security Systems (Laboratory analysis of soil sample)	$ 150.00
07/10/85	Northwest Vacuum Truck Service (Relocating 242.76 tons of soil to Arlington)	$ 9,000.00
07/29/85	Chem-Security Systems (Receiving 243.30 tons of soil at Arlington)	$ 27,270.88
08/08/85	Environmental Emergency Services (Sampling and analysis)	$ 500.00
12/05/85	Environmental Emergency Services (Well drilling, sampling & analysis)	$ 18,741.55
03/24/86	Environmental Emergency Services (Sandblast and demolish wall; install wells)	$ 17,252.67
05/16/86	Instrumentation Northwest (Monitoring well materials)	$ 3,702.66
06/11/86	Century West Engineering (Develop and sample wells)	$ 2,739.50
06/11/86	Department of Environmental Quality (Per OAR 240-102-065)	$ 3,500.00
07/08/86	Century Environmental Sciences (sampling wells)	$ 1,800.00
08/08/86	Riedel Environmental Services, Inc. (Sampling and analysis)	$ 4,452.81
08/25/86	Jack Eatch Construction Co. (Relocate soil and dispose of concrete wall)	$ 1,465.00
09/10/86	Concrete Coring Co. (Cut holes through concrete floor of warehouse)	$ 390.00
10/24/86	SRH Associates, Inc. Investigation of pentachlorophenol as per contract dated 08/14/86	$ 18,465.00
01/26/87	Century West Engineering (Well sampling and analysis)	$ 130.50
		$109,560.57
	Koppers Company share of costs = 50% =	$ 54,780.28
	TOTAL DUE FROM KOPPERS =	$ 54,780.28

Encl. 2

K-NWST-0000804

TOLS002449

BZTO104(e)039270

TIME OIL CO.
P.O.BOX 24447 TERM. STATION - SEATTLE WA 98124-0447
2737 WEST COMMODORE WAY - SEATTLE WA 98199-1233
PHONE (206) 285-2400

DEBIT MEMO 020190

DATE 04/17/87
REF. 04-03131 FER

CUSTOMER #: 03/05505625

120 9 12699.07

ACCOUNT:
KOPPERS COMPANY
Koppers Building - Room 750
Pittsburgh, PA 15219

ATTN: JAY STEBBINS

THIS IS AN ADDITION TO INVOICE # 091363 DATED MARCH 6, 1985 FOR $ 42,081.21 TO CHARGE YOU FOR HALF OF EXPENDITURES, PER MUTUTAL AGREEMENT, IN REFERENCE TO CLEAN UP COSTS AT 12005 NORTH BURGARD PORTLAND, OREGON. 12,699.07

COPIES OF THE ORIGINAL INVOICE (#091363, 3/6/86, $42081.21) AND THE UPDATED CHARGES FOR $ 54780.28 ARE ATTACHED.

INVOICE TOTAL $12,699.07

ORIGINAL

K-NWST-0000805

TOLS002450

BZTO104(e)039271

MEMORANDUM

November 9, 1987

TO: Robert Abendroth — Seattle
John Luckovich — Seattle

FROM: John Denham — Seattle

SUBJECT: PENTACHLOROPHENOL CONTAMINATION - NORTHWEST TERMINAL

Today I contacted Jim Campbell of Keystone Environmental Resources Inc. (412-227-2689) regarding above subject. I again asked that Koppers provide two things:

a. The [redacted] accomplished in their laboratory, which was promised not later than June 1, 1987, plus [redacted] to the contamination problem and;

b. A check in the amount of [redacted] as their payment of half the costs incurred to date.

Campbell said they would do so.

Campbell expressed Koppers desire to do two things:

a. Pay us half the costs to date as requested.

b. Come to some agreement where Time Oil will accept all liability for site contamination and relieve Koppers completely. Koppers is willing to pay money for this status.

I plan to discuss [redacted] above with our attorneys as soon as possible. Will advise results for consideration.

JPD/ch

K-NWST-0000807

TOLS002451

BZTO104(e)039272

CONTRACT

The parties to this agreement are Time Oil Co. (hereinafter termed owner) and Northwest Vacuum Truck Service, Inc. (hereinafter termed contractor) whereas:

Owner has a volume of earthen material located in Portland, Oregon and owner is desirous of having that material removed.

Contractor is willing to undertake that task upon the terms and conditions set forth below.

Therefore, in consideration of the agreements contained herein, the parties agree as follows:

1. Contractor agrees to remove the material from its present location, load it into suitable transportation vehicles and transport it to a disposal facility approved by the Oregon Department of Environmental Quality.

2. The material to be removed by contractor is generally set forth on the drawing labeled exhibit 1, attached hereto and incorporated by this reference. Prior to work under this agreement, a representative of owner will meet with contractor at the site and the extent of the material to be removed will be more specifically delineated at that time.

3. The commencement date for work will be February 21, 1985 or such other date as may be agreed upon by the parties following coordination with the Department of Environmental Quality and the authorized disposal facility. Work is intended to be divided into two phases. First phase consists of material removal to an agreed upon depth. Then there will be a several day delay while additional tests are conducted to determine if further removal is required. If so, phase two removal actions are to be effected. Should there be any need to continue removal, above process is to be repeated until ultimate removal is accomplished.

4. For each day worked, owner agrees to pay contractor the sum of 1200 dollars for labor and equipment pertaining to soil removal plus 600 dollars for each truckload of soil transported. A day worked shall be one wherein earth moving equipment, necessary to perform the work, has been utilized to the fullest, reasonably possible, extent for a period of not less than 8 hours. Truck shall be a standard 18 yard rated capacity vehicle. Payment will be made upon completion of the work and receipt by owner of written acknowledgement from the approved disposal facility that all material removed and transported by contractor has been received at that facility.

5. Contractor indemnifies and agrees to defend and hold owner harmless from any and all costs, claims, liabilities and damages arising out of contractors work under this contract.

6. Contractor hereby declares that it is engaged as an independent contractor and agrees to perform the work as independent contractor and not as an employee of owner. Contractor has and hereby retains the right to exercise full control and supervision of the work and full control over the employment, direction, compensation and discharge of all persons assisting in the work.

ENCL. 4

K-NWST-0000879

TOLS002452

BZTO104(e)039273

7. Contractor agrees at its expense to obtain all governmental permits, licenses and approvals and comply with all laws, rules, regulations and requirements now or hereafter existing necessary for the accomplishment of the work to be performed by contractor under this agreement.

8. Contractor especially acknowledges its understanding that portions of the material to be removed, transported and disposed of under this agreement have been found to contain commercial pentachlorophenol in concentrations ranging from 0 ppm to 1820 ppm. Contractor agrees to take all necessary precautions for the protection of persons and property that may be required or prudent in the removal and transportation of that material.

9. Contractor agrees to maintain workmans' compensation insurance in the form and amounts required by the laws of the state of Oregon and broad form comprehensive public liability insurance with minimum limits of $1 million per person and $1 million per accident for bodily injury and $500,000 per accident for property damage. Contractor shall promptly deliver to owner certificates of said insurance, naming owner as an additional insured before commencing work and such certificate shall provide that said insurance shall not be cancelled prior to 30 days by written notice to owner.

10. Contractor agrees that before commencement of any work hereunder, it will promptly furnish owner with a faithful performance bond in an amount to 53,000 dollars guaranteeing completion of all work and performance of all obligations undertaken by contractor under this agreement.

11. The nature, validity and interpretation of this contract shall be governed by the laws of the state of Washington.

Dated this 19th day of February 1985.

OWNER
Time Oil Co.

by _____
John P. Denham
Environmental Manager

CONTRACTOR
Northwest Vacuum Truck Service Inc.

by _____
John H. Somes
General Manager

K-NWST-0000880

TOLS002453

BZTO104(e)039274

PHONE 285-2400
CABLE ADDRESS: TIMOIL

SEATTLE
TACOMA
PORTLAND
STOCKTON
RENO
RICHMOND
SAN PEDRO
LOS ANGELES

TIME

TIME OIL COMPANY

2737 W. COMMODORE WAY, P.O. BOX 24447, TERMINAL ANNEX, SEATTLE, WA 98124

January 16, 1985

Templeton Smith
Law Department
Koppers Co. Inc.
Pittsburg, PA 15129

Dear Mr. Smith:

Per your request, attached is copy of plot plan 1140 showing location at our Northwest terminal where the Department of Environmental Quality sampled the ground within the diked area in which Pentachlorophenol operations were conducted. Sample was a composite of surface, one foot and two foot depths.

It was a pleasure to meet you in St. Louis last week.

Sincerely,

John P. Denham
Environmental Manager

Attachment a/s

JPD/ch

Blind - Robert Abendroth

K-NWST-0000896

TOLS002454

BZTO104(e)039275

TIME OIL CO. - WOOD TREATING CHEMICALS CO.
CONTRACT DATED MARCH 1, 1967

A-1 Time Oil to provide customer with tanks and facilities during contract term.

A-2 Time Oil to retain possession of facilities and keep in clean and serviceable condition and fit for storage and handling of products. Customer has the right to inspect but the provision expressly provides that the right of inspection does not relief Time Oil of its obligations regarding maintenance.

B-1 Time Oil is to provide all labor and services necessary to receive, store, handle, blend and redeliver in a safe, efficient and clean manner.

B-2 Time Oil will move product between tank and trucks etc. at the customer's direction. Time Oil will follow procedures in a booklet.

D-2 Time Oil is not leasing the facilities to the customer.

D-3 Time Oil holds the customer harmless from any costs from non-performance of any Time Oil obligation or from the negligence of Time Oil.

D-8 When the customer is on the premises, the customer is obligated to conform to Time Oil regulations.

D-12 Customer is liable for damages resulting from the storage of non-authorized commodities.

D-15 At the termination of the contract, Customer is to remove the products stored.

D-21 Time Oil is an independent contractor and not an agent of the customer.

Pg. 3 of Schedule - Customer has access to the loading racks but to no other area.

K-NWST-0000923

TOLS002455

BZTO104(e)039276

M E M O R A N D U M

October 5, 1983

TO:	Robert Abendroth	Seattle
	Neil Gallagher (info)	Portland
	Terry Henderson	Seattle
	Jock Streidl	Seattle
	Neil Wallis (info)	Portland
FROM:	John Denham	Seattle

SUBJECT: WOODTREATING AT NORTHWEST TERMINAL

Neil Gallagher, Neil Wallis and I met with the following from Koppers Company at Northwest Terminal on Monday, October 3, 1983.

John D. Palmer
Manager
St. Louis Production Region

KOPPERS

Specialty Wood Chemicals Division
Koppers Company, Inc.
5137 Southwest Ave.
St. Louis, MO 63110. 314-772-2200

William J. Baldwin
Manager, Customer & Technical Services

KOPPERS

Specialty Wood Chemicals Division
Koppers Company, Inc.
Pittsburgh, PA 15219. 412-227-2457

We walked the woodtreating site thoroughly, then met to discuss site condition and planned remedies. The following is my understanding of verbal agreements reached.

Bulk pentachlorophenol operations ceased, effective immediately, until clean-up is completed and a new contract (if there is to be one) is consummated.

The only chemical product input allowable is that necessary to permit "blending off" and/or "shipping out" of remaining inventory. Both Koppers and TOC jointly agreed on inventory quantities. Planned "empty" date is November 15, 1983. Koppers felt date could be met but TOC agreed to slide it if needed to allow Koppers time to locate customers for on-hand inventory.

Koppers is to clean both Koppers owned and TOC owned tanks, dispose of any waste accumulated and pay costs of both actions. Koppers is to use TOC I.D. number on waste manifest since they have no I.D. number in Oregon. Most tanks are ready for cleaning now. Cleaning is to start as soon as Koppers can schedule it - estimated one week.

After cleaning, Koppers will physically remove the following Koppers owned tanks from TOC property.

Quantity	Capacity (gal)
1	3,000
1	6,000
1	7,000
3	8,000
1	10,000

TOC will remove its tanks, except 38009, all piping from area and pay these costs.

TOC will remove and dispose of ground to below test depth showing contamination, then replace ground and correctly grade to sump. Cost of this action is to be shared by Koppers and TOC based on an agreement to be reached between attorneys from both companies. Name of Koppers attorney for contact to be furnished within a week by Bill Baldwin.

TOC is to install impervious liner, spill control sump, pump and tank.

TOC will replace tanks, install complete new manifold system from tank car rack to drumming rack, painting and identifying both tanks and lines correctly.

TOC is to steam clean warehouse as soon as Koppers products are removed. Warehouse and/or tank farm refurbishment is to be in consonance with new contract requirements as negotiated between Koppers and TOC in the future. TOC will continue warehouse handling of pre-drummed penta based materials if desired.

NOTE: Robert Abendroth received telecon briefing of this meeting on October 4, 1983.

JPD/ch

PRC Environmental Management, Inc.
1411 Fourth Avenue
Suite 720
Seattle, WA 98101
206-624-2692
Fax 206-624-3679

RECEIVED
MAR 18 1993
Superfund Response & Investigation Branch

March 18, 1993

Ms. Monica Rolluda
U.S. Environmental Protection Agency, Region 10
1200 Sixth Avenue, HW-114
Seattle, Washington 98101

Subject: Site Inspection Prioritization Level II Report
Time Oil, Portland, Oregon
EPA ID ORD009597543
Work Assignment C1003953
Contract 068-W9-0009

Dear Ms. Rolluda:

PRC Environmental Management, Inc. (PRC) was tasked by the U.S. Environmental Protection Agency (EPA) to conduct a site inspection for the Time Oil Company Northwest Terminal, Portland, Oregon under the site inspection prioritization program. The inspection includes file reviews, a site visit, field sampling (if necessary), and a hazard ranking system (HRS) prescore evaluation incorporating updated and current information. The HRS prescore for Time Oil Company was calculated to be 2.38 based on an observed release of hazardous substances to groundwater and an assumed groundwater and surface water release of pentachlorophenol (PCP) to the Willamette River. Factual information, as well as assumptions based on professional judgement, were used to generate a HRS score, and are discussed below. References used in this report, HRS score sheets for the site, and a Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) eligibility checklist are included as attachments.

Site Description and Background

Time Oil Company owns and operates a petroleum storage terminal on approximately 52 acres on the east bank of the Willamette River (Figure 1). The terminal manager and site address are as follows:

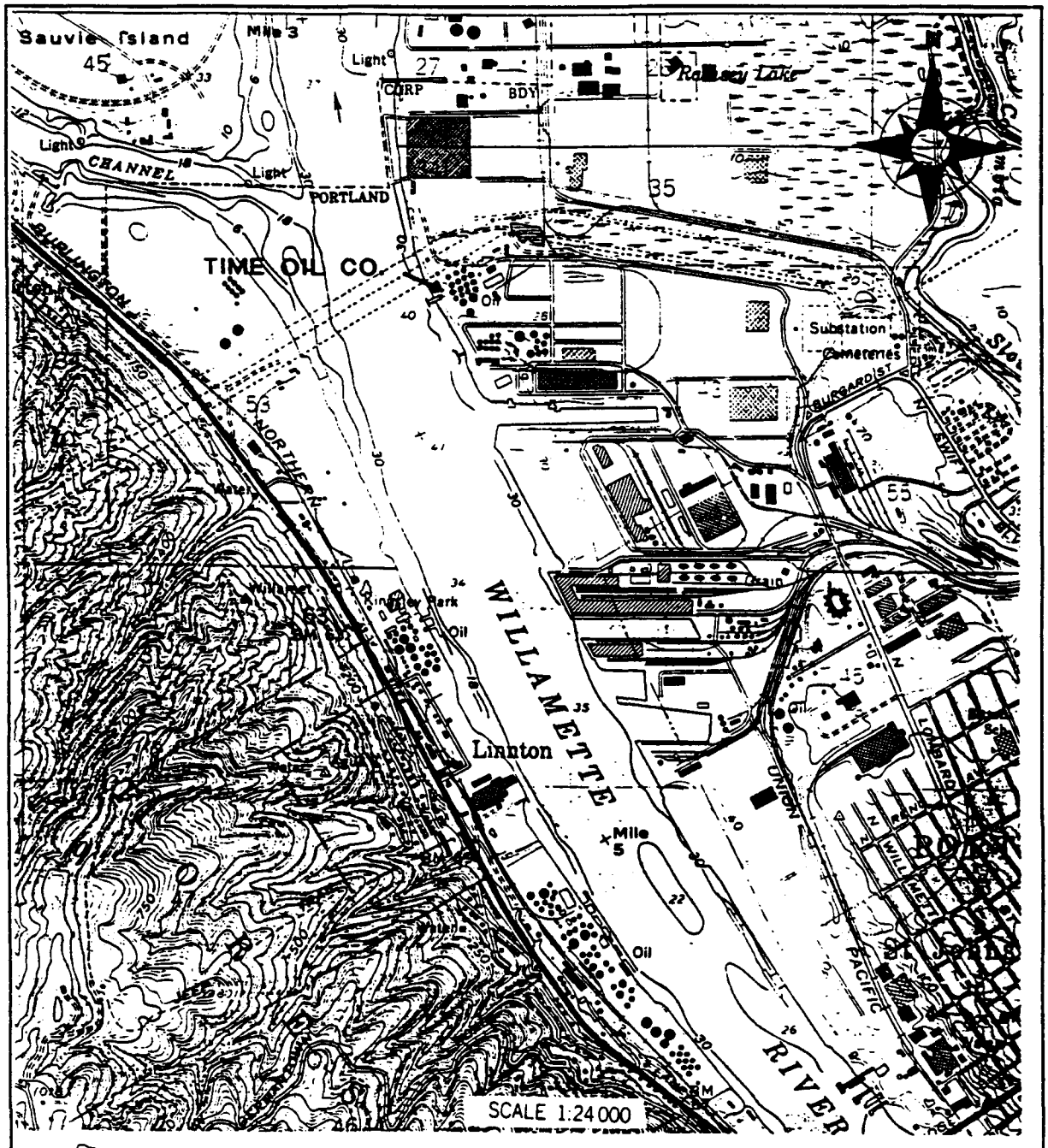
Dick Basney, Terminal Manager
Time Oil Co. Northwest Terminal
12005 North Burgard Road
Portland, Oregon 97203
(503) 286-1611

TOLS002458

32319

contains recycled fiber and is recyclable

BZTO104(e)039279



Source: USGS 1984

FIGURE 1

SITE VACINITY
TIME OIL CO.

PRC Environmental Management, Inc.

32319

TOLS002459

BZTO104(e)039280

The property is owned by Northwest Terminal Company, a wholly owned subsidiary of Time Oil Company, located in Seattle, Washington. The environmental affairs coordinator and the company address are as follows:

Kevin M. Murphy, Sr. Environmental Specialist
Time Oil Company
2737 West Commodore Way
Seattle, Washington 98199-1233
(206) 286-6443

Since the 1940s, Time Oil Company has operated a petroleum products terminal in the Rivergate area of northwest Portland, Oregon, which consists of tank storage facilities for its products. The terminal is located in an area zoned for heavy industry. The approximate geographic coordinates for the facility are 122 degrees, 47 minutes west longitude, and 45 degrees, 37 minutes north latitude. Current storage capacity of approximately 30 aboveground tanks is over 770,000 barrels.

Time Oil Company has, on occasion, leased tanks to outside customers for product storage; in these cases, Time Oil Company has provided product handling and distribution services. In an arrangement of this type, Time Oil Company ran a PCP blending operation for Koppers Company on a portion of the subject property from March 1, 1967 to March 31, 1982. In accordance with Koppers Company specifications, this operation consisted of heating and mixing PCP granules with paraffin wax, mineral spirits, and other similar solvents to yield various woodtreating products. These products were stored in tanks (numbered 20001, 20002, and 20003) and later shipped to Koppers Company customers in 55-gallon drums. Time Oil Company also leased tanks numbered 50067 and 10002 to Crosby and Overton for the storage of waste oil.

At some time during the lease agreement between Time Oil Company and Koppers Company, PCP was released into the soil adjacent to the warehouse in the mixing area. Various solvents used in the process were also released. 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.

In 1983, a worker was allegedly exposed to a substance while cutting an access hole in tank number 10002, leased by Crosby and Overton. The amount of material that spilled from the tank was not specified. In 1984, Oregon Department of Environmental Quality (ODEQ) staff collected soil samples 10 feet from the access hole. A polychlorinated biphenyl (PCB) concentration of 59.7 milligrams per kilogram (mg/kg) was detected. Sludge collected on the ground surface, 4 feet from the tank, showed a total PCB concentration of 1,357 mg/kg. A review of past waste oil disposal records from the tank showed the disposal of 210,000 gallons of petroleum-based sludge by Crosby and Overton at the St. Johns Municipal Landfill located in Portland, Oregon. Subsequent extensive sampling at the landfill did not indicate the presence of PCBs.

The Northwest Region (NWR) of ODEQ completed a preliminary assessment of this facility in conjunction with the federal superfund program on January 15, 1985. The results of that evaluation, including a detailed description of the facility operating history, were summarized in a memo from NWR to the EPA dated February 12, 1985 (ODEQ 1985). Primary concerns identified were the PCP contaminated soil described above, PCB contamination apparently

associated with the waste oil storage, and potential groundwater contamination from historic ground disposal of tank bottom wastewater. No further action under the federal program was recommended; ODEQ planned to follow up remaining issues of concern. This facility is included on the Oregon Environmental Cleanup Division's Confirmed Release List (CRL) based on the presence of PCP, PCB, lead, naphthalene, and chrysene in soil and sludge in the area of the Crosby and Overton tanks. In 1985, Time Oil Company began a program to excavate the contaminated soil for disposal at an appropriate landfill. Early that year, approximately 290 cubic yards of the most contaminated soil were removed from the site and disposed of in Arlington, Oregon. Investigations continued to determine the extent of contamination. However, before the remaining contaminated soil could be removed, PCP was reclassified as an F027 hazardous waste. Because the soil was reclassified, it became ineligible for disposal at hazardous waste facilities in the United States without treatment to meet the land disposal requirements.

Pending resolution of acceptable soil disposal techniques, Time Oil Company switched their focus to determining whether the groundwater had been contaminated. This involved installing a network of groundwater monitoring wells and performing repeated sampling and analysis. Analytical results indicated that the groundwater was contaminated with PCP. In the summer of 1989, approximately 3,000 cubic yards of contaminated soil were excavated from around the former mixing area, stockpiled in a bermed lined area, and covered. PCP-contaminated soil is still present beneath the warehouse and below the vertical limit of excavated soil. Figure 2 shows the former PCP mixing area as well as the vertical and lateral extent of soil removal.

Time Oil Company has proposed aboveground treatment of the contaminated F027 soil followed by on-site disposal. SRH Associates evaluated remedial alternatives and recommended bench testing and aboveground soil washing. Incineration was estimated to cost approximately $2 million. Time Oil Company subsequently hired ECOVA Corporation to test and construct an aboveground phase bioremediation system, combining soil washing and biological treatment.

Volume III of the ECOVA Corporation report is a work plan, prepared in 1988, proposing the conceptual design of the treatment system. Full-scale treatment tests reportedly demonstrated that the lowest residual PCP concentration after treatment that can be practically achieved is 100 mg/kg, although detailed results of those tests were not submitted to ODEQ. PCP degradation is reportedly limited by the presence of mineral spirits and paraffin in the soil. Time Oil Company has asked ODEQ to help them define an appropriate cleanup level for this soil. Time Oil Company has proposed treating to a PCP concentration of 500 mg/kg. They have also proposed quarterly groundwater monitoring for a period of 1 year (ODEQ 1992).

During a January 1992 ODEQ inspection of the site, it was determined that the contaminated soil stockpile constituted an RCRA storage area. Jurisdiction of the site was transferred from CERCLA to RCRA authorities. In May 1992, a letter was sent to Time Oil Company indicating that a RCRA permit would be required if continued storage of the contaminated soil was desired (ODEQ 1992a). Currently ODEQ is working with EPA to issue an administrative order in lieu of a permit to address the soil stockpile and contaminated groundwater at the site. ODEQ is working with EPA because its RCRA program does not currently have corrective action authority. The state applied for authority in the beginning of this year, but it apparently takes a number of months to approve the request.

During the site reconnaissance of the facility conducted by PRC on January 6, 1993, all of the tanks leased by Koppers Company and Crosby and Overton had been removed from the facility.

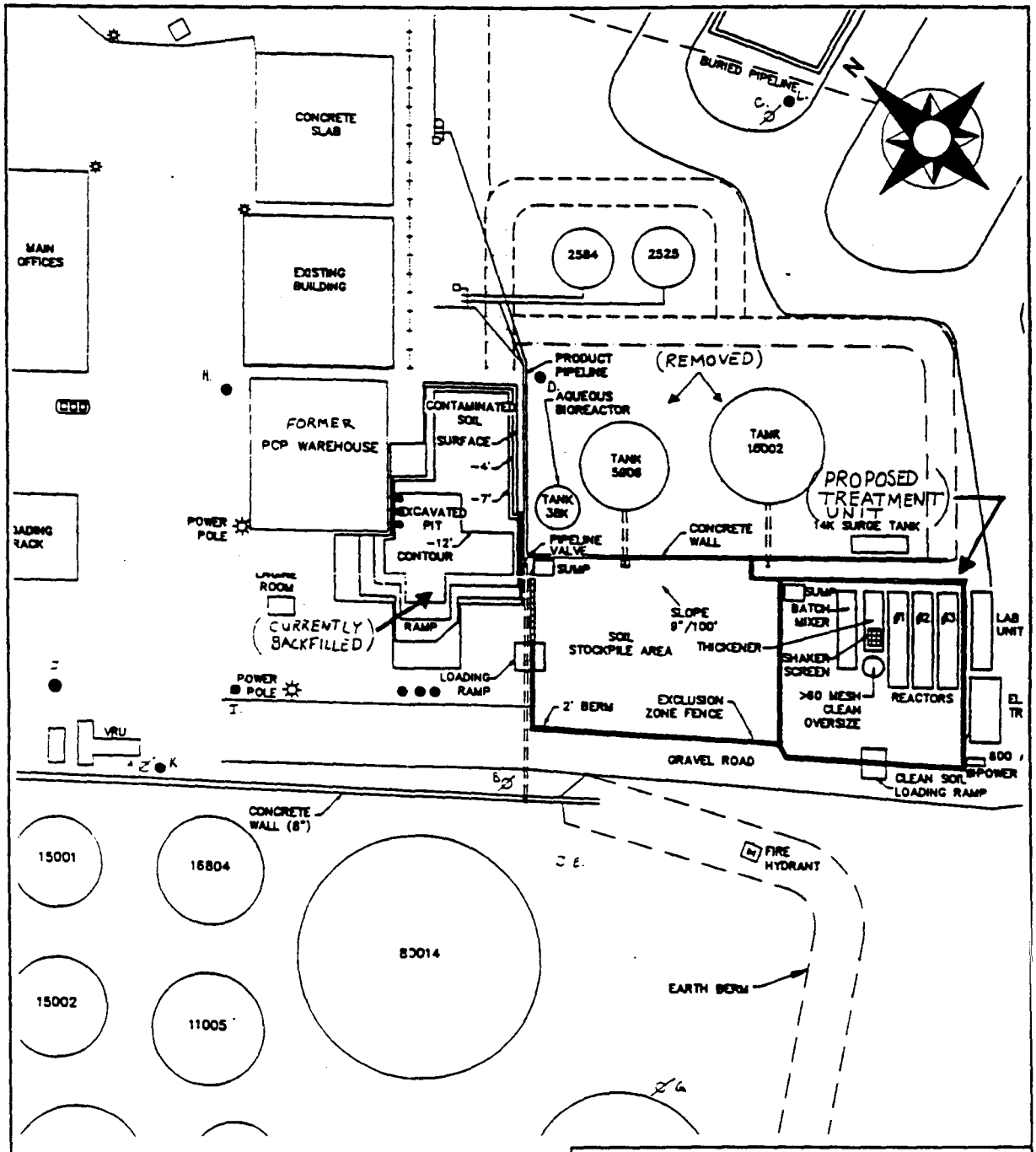


FIGURE 2

SITE MAP
TIME OIL CO.

Source: ECOVA 1991 SCALE: 1"=80'

PRC Environmental Management, Inc.

32319

TOLS002462

BZTO104(e)039283

The PCP-contaminated soil pile was well contained. The pit resulting from the excavation of contaminated soil was observed to have been backfilled with soil. Construction of the proposed bioremediation reactor treatment facility has not been initiated. Time Oil Company officials claimed that the contaminated soil from the Crosby and Overton tank spill was removed in 1989 and that verification samples were collected to document the removal. They further stated a report was sent to ODEQ discussing the removal. In a 1992 memorandum report to the file describing the facility, ODEQ does discuss the removal and further recommends that the area requires further investigation and possibly remedial action.

Sources of Contamination

Three source areas were included in the HRS evaluation and are described below. None of the sources below was assumed accessible to the general public since the facility is completely fenced and has a 24-hour security guard.

Source 1 consists of the 3,000-cubic-yard PCP-contaminated soil stockpile. Nonzero containment was assigned to the groundwater and surface water pathways. The source was assumed to be adequately contained for the air and soil exposure pathways. Constituent quantity was evaluated for the source based on the assumption that average PCP concentrations were 945 parts per million.

Source 2 consists of the PCP-contaminated soil underneath the former mixing building and the contaminated soil not excavated during the 1989 removal. This source was assumed to be contained for the surface water, soil exposure, and air pathways, since soil was used to backfill the excavated soil. No containment was assumed for the groundwater pathway. The volume of contaminated soil remaining in the ground was estimated to be 500 cubic yards.

Source 3 consists of an estimated 100 square feet of contaminated surface soil resulting from the past spill at the Crosby and Overton tank. According to ODEQ, this source has not been fully characterized (ODEQ 1992). During the site reconnaissance, Time Oil Company officials stated that the area has been remediated by removing the contaminated soil. Because it is unclear whether the area has actually been remediated, it was assumed that an area of contamination currently exists. No containment features were assumed for any migration pathway at this source, except the soil contamination pathway.

In addition to PCP- and PCB-contaminated soil, other waste types potentially exist at this site and include spilled petroleum products. Because petroleum wastes are exempted from evaluation by the petroleum exclusion provision of CERCLA, these potential sources were not included in the HRS evaluation of the site.

Pathways of Concern

The groundwater pathway received a score of 0.50 based on an observed release of PCP to the alluvial aquifer beneath the site. The low score was attributed to a lack of groundwater targets. The only known municipal well is located 2.5 miles north of the site and reportedly serves 100 people on Sautie Island. Groundwater was also assumed to be used as a resource.

The surface water pathway received a score of 4.60 based on an assumed release of PCP, via the groundwater to surface migration component, to the Willamette River. The overland flow and flood migration component was not evaluated for several reasons. First, there is no defined

overland migration route from the sources to the river located 0.25 miles away. Second, based on interpretation of topographic map contour lines and statements from facility personnel, surface water drainage flows away from the river towards a low-lying marsh area not connected to the river. Finally, if an overland migration route could be defined, the soil in the area is so permeable that it is unlikely surface flow from the site would reach the river before seeping into the ground.

As mentioned previously, it was assumed that there was a release of PCPs to the Willamette River. PCP has been detected in on-site groundwater wells at 60 ppm. It was assumed a PCP plume extends from the source to the river and could be documented in a groundwater-to-surface water sample. This scoring scenario was designed to represent a worst-case situation. A release to the Willamette River has not been documented.

Targets evaluated on the Willamette River included a productive fishery, an anadromous fish run, and 1 mile of wetlands frontage (DOI 1989, EPA 1992). All surface water targets were evaluated as though they were subject to potential contamination. The food chain individual factor was assigned a value of 20 based on the assumed release of PCP to the Willamette River.

The soil exposure pathway score was calculated at 1.07 based on a resident population of 12 workers who were assumed to work within 200 feet of contaminated soil. Nearby population was very small (66 within 1 mile). It was assumed that on-site contaminated soil was inaccessible to nearby population because the site is completely fenced and served by a security guard.

The air pathway score was calculated to be 0.00 because sources were either covered by an impermeable line, buried, or were too small to be considered during the HRS process.

Conclusions and Recommendations

Time Oil Company and ODEQ are currently negotiating cleanup of the PCP-contaminated soil and groundwater at this site. The PREscore evaluation of the site was calculated to be 2.38 based on observed groundwater contamination and an assumed surface water release of PCP to the Willamette River via the groundwater to surface water migration component. The low HRS score is primarily the result of a lack of targets in the near vicinity of the site.

Based on the low site score, no further work is recommended at Time Oil Company Northwest Terminal site under the CERCLA program.

HRS score sheets, a diskette copy of the PREscore evaluation, a CERCLA/National Priorities List eligibility checklist, and supporting documents used in the evaluation not yet in the CERCLA file are attached to this letter. For additional information regarding the HRS evaluation, please contact me at 206/624-2692.

Sincerely,

David A. Zimmermann

David A. Zimmermann
PRC Site Manager

cc: Mary Bandrowski, PRC Seattle

ATTACHMENT 1

REFERENCES

ECOVA 1991. Preliminary Assessment/Data Evaluation and Proposed Remediation Plan For Pentachlorophenol Contaminated Soils at: Time Oil Co. Northwest Terminal 12005 North Burgard Road Portland, Oregon. Volumes I, II, and III. ECOVA Corporation. Project No. 1067. December 1991.

DOI 1989. National Wetlands Inventory Maps. 7.5 Minute Series, Linnton, Oregon 1989; Sauvie Island, Oregon-Washington 1989; St. Helens, Oregon-Washington 1988. U.S. Department of Interior.

ODEQ 1985. Interoffice Memorandum. John L. Smits, Oregon Department of Environmental Quality, Northwest Regional Office, to Debbie Flood, EPA, Region 10. February 12, 1985.

ODEQ 1992. Memorandum to Time Oil Files summarizing file review and site visit. Oregon Department of Environmental Quality. April 8, 1992.

ODEQ 1992. Letter from ODEQ to Time Oil Co. explaining RCRA regulatory authority to oversee project. Oregon Department of Environmental Quality/Environmental Cleanup Division, May 26, 1992.

EPA 1992. Geographic Information System (GIS) database printout for Time Oil Co. U.S. Environmental Protection Agency, Region 10. December 15, 1992.

USGS 1984. Topographic Map. 7.5 minute series Linnton, Oregon Quadrangle. United States Department of the Interior, Geological Survey. 1961, photorevised 1984.

RECEIVED
MAR 18 1993
Superfund Response & Investigation Branch

EPA REGION 10
CERCLA/NPL ELIGIBILITY CHECKLIST
(CHECK ALL THAT APPLY)

SITE NAME: Time Oil, Northwest Terminal DATE: 3-17-93

- PETROLEUM EXCLUSION
  - [x] exempt wastes present
- NRC
  - [ ] a federally licensed facility
- PESTICIDE SITE
  - [ ] legal application of pesticides in vicinity
- INDOOR AIR POLLUTANTS
  - [ ] present
- METHANE
  - [ ] present
- FEDERALLY PERMITTED RELEASE
  - [ ] present (specify-
- MINING SITE
  - [ ] excluded waste (see 54 FR 15316)
- AGGREGATION ISSUES
  - [ ] ground-water plumes - likely sources identified
  - [ ] sediment contamination - likely sources identified
  - [ ] non-contiguous areas of concern
  - [ ] other (specify-
- RCRA
  - [ ] protective filer
  - [ ] non-notifier
  - [ ] convertor
  - [ ] generator or transportor
  - [ ] late filer
  - [ ] permit issued before HSWA (1984)
  - [ ] owner bankrupt
  - [ ] unwilling (see 53 FR 30005)
  - [ ] inability to pay (see 53 FR 30002)
  - [x] TSD (give status and dates)
    State RCRA is seeking to Issue Order in Lieu of a permit, to force company to clean up Cont. soil pile and groundwater

☐ NONE APPLY

12319

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BZTO104(e)039287

REMEDIAL SITE ASSESSMENT DECISION - EPA REGION 10

Site Name: TIME OIL Co. EPA ID#: ORD009597543

Alias Site Names:

Address: 12005 North Burgard Road

City: Portland County or Borough: State: OR

Report Type: SIP Report Date: 3/18/93 Report Lead: EPA

Report developed by: PRC Environmental Management, Inc

DECISION:

|X| 1. Further Remedial Site Assessment under CERCLA (Superfund) is not required because:

|X| 1a. Site does not qualify for further remedial site assessment under CERCLA (Site Evaluation Accomplished - SEA)

| | 1b. Site may qualify for further action, but is deferred to: | | RCRA | | NRC

| | 2. Further Assessment Needed Under CERCLA: 2a. (optional) Priority: | | Higher | | Lower

2b. Activity Type:
- | | PA
- | | SI
- | | Removal Assessment
- | | Integrated Assessment
- | | Other:
- | | ESI
- | | HRS evaluation

DISCUSSION/RATIONALE:

In view of planned cleanup by Time Oil Company with ODEQ oversight, it appears appropriate to determine that no further action by the federal Superfund Program is warranted. Also, there is a lack of pathway targets (surface water pathway) in the near vicinity of the site. If cleanup does not progress or if new info/data indicate Superfund should be involved, site will be reevaluated at that time.

Report Reviewed and Approved by: Monica Rolluda Signature: Monica Rolluda Date: 3/19/93

Site Decision Made by: Monica Rolluda Signature: Monica Rolluda Date: 3/19/93 PAR

EPA Form # 9100-3

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TOLS002467

BZTO104(e)039288

PRC Environmental Management, Inc.
1411 Fourth Avenue
Suite 720
Seattle, WA 98101
206-624-2692
Fax 206-624-3679

RECEIVED
MAR 18 1993
Superfund Response & Investigation Branch

PRC

March 18, 1993

Ms. Monica Rolluda
U.S. Environmental Protection Agency, Region 10
1200 Sixth Avenue, HW-114
Seattle, Washington 98101

Subject: Site Inspection Prioritization Level II Report
Time Oil, Portland, Oregon
EPA ID ORD009597543
Work Assignment C1003953
Contract 068-W9-0009

Dear Ms. Rolluda:

PRC Environmental Management, Inc. (PRC) is pleased to submit the level II site inspection prioritization report for the Time Oil Co., Northwest Terminal site in Portland, Oregon. A hazard ranking system (HRS) score of 2.38 has been calculated for this site using PREscore software. This score is based on documented pentachlorophenol contamination of groundwater and an assumed release of pentachlorophenol to the Willamette River via groundwater to surface water migration.

Based on a review of EPA and state files, and on our conversation as well as conversations with company officials and state project managers, it is recommended that no further federal preremedial actions take place at this facility. This is also supported by observations made during a January 3, 1993 site reconnaissance.

PRC is submitting HRS score sheets, a letter report, a Comprehensive Environmental Response, Compensation, and Liability Act eligibility checklist, and a diskette containing the PREscore file to EPA for review. Please contact Mary Bandrowski or me at (206) 624-2692 if you have any questions or comments.

Sincerely,

David A. Zimmermann
PRC Site Manager

cc: Mary Bandrowski
Gary Sink, EPA Region 10
Peter Rubenstein, EPA Regional Project Officer

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contains recycled fiber and is recyclable

HRS DOCUMENTATION RECORD

Time Oil Company, Northwest Terminal - 03/11/93

1. Site Name: Time Oil Company, Northwest Terminal
   (as entered in CERCLIS)

2. Site CERCLIS Number: ORD009597543

3. Site Reviewer: David A. Zimmermann, PRC

4. Date: February, 1993

5. Site Location: Portland/Multnomah/Oregon
   (City/County,State)

6. Congressional District: 03

7. Site Coordinates: Single

   Latitude: 45 36'56.4" Longitude: 122 47'00.3"

	Score
Ground Water Migration Pathway Score (Sgw)	0.58
Surface Water Migration Pathway Score (Ssw)	4.60
Soil Exposure Pathway Score (Ss)	1.07
Air Migration Pathway Score (Sa)	0.00

Site Score	2.38

NOTE

EPA uses the terms "facility," "site," and "release" interchangeably. The term "facility" is broadly defined in CERCLA to include any area where hazardous substances have "come to be located" (CERCLA Section 109(9)), and the listing process is not intended to define or reflect boundaries of such facilities or releases. Site names, and references to specific parcels or properties, are provided for general identification purposes only. Knowledge regarding the extent of sites will be refined as more information is developed during the RI/FS and even during implementation of the remedy.

32319

WASTE QUANTITY

Time Oil Company, Northwest Terminal - 03/11/93

1. WASTESTREAM QUANTITY SUMMARY TABLE, SOURCE: Cont. soil pile

a. Wastestream ID	cont. soil
b. Hazardous Constituent Quantity (C) (lbs.)	5700.00
c. Data Complete?	NO
d. Hazardous Wastestream Quantity (W) (lbs.)	6000000.00
e. Data Complete?	NO
f. Wastestream Quantity Value (W/5,000)	1.20E+03

Wastestream Constituent Hazardous Substances	Concent.	Units	Liquid	Qualifier
Pentachlorophenol	9.5E+02	ppm	NO	

2. SOURCE HAZARDOUS WASTE QUANTITY FACTOR TABLE

a. Source ID	Cont. soil pile	
b. Source Type	Waste Pile	
c. Secondary Source Type	N.A.	
d. Source Volume (yd3) | Source Area (ft2)	3000.00	0.00
e. Source Volume/Area Value	1.20E+03	
f. Source Hazardous Constituent Quantity (HCQ) Value (sum of 1b)	5.70E+03	
g. Data Complete?	NO	
h. Source Hazardous Wastestream Quantity (WSQ) Value (sum of 1f)	1.20E+03	
i. Data Complete?	NO	
k. Source Hazardous Waste Quantity (HWQ) Value (2e, 2f, or 2h)	5.70E+03	

Source Hazardous Substances	Depth (feet)	Liquid	Concent.	Units
Pentachlorophenol	< 2	NO	9.4E+02	ppm
Tetrachlorophenol, 2,3,4,6-	< 2	NO	0.0E+00	ppm

1. WASTESTREAM QUANTITY SUMMARY TABLE, SOURCE: Cont Soil

a. Wastestream ID	
b. Hazardous Constituent Quantity (C) (lbs.)	0.00
c. Data Complete?	NO
d. Hazardous Wastestream Quantity (W) (lbs.)	0.00
e. Data Complete?	NO
f. Wastestream Quantity Value (W/5,000)	0.00E+00

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2. SOURCE HAZARDOUS WASTE QUANTITY FACTOR TABLE

a. Source ID	Cont Soil
b. Source Type	Contaminated Soil
c. Secondary Source Type	N.A.
d. Source Volume (yd3) | Source Area (ft2)	500.00 | 0.00
e. Source Volume/Area Value	2.00E-01
f. Source Hazardous Constituent Quantity (HCQ) Value (sum of 1b)	0.00E+00
g. Data Complete?	NO
h. Source Hazardous Wastestream Quantity (WSQ) Value (sum of 1f)	0.00E+00
i. Data Complete?	NO
k. Source Hazardous Waste Quantity (HWQ) Value (2e, 2f, or 2h)	2.00E-01

Source Hazardous Substances	Depth (feet)	Liquid	Concent.	Units
Pentachlorophenol	> 2	NO	0.0E+00	ppm

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WASTE QUANTITY

Time Oil Company, Northwest Terminal - 03/11/93

1. WASTESTREAM QUANTITY SUMMARY TABLE, SOURCE: PCB cont. soil

a. Wastestream ID	
b. Hazardous Constituent Quantity (C) (lbs.)	0.00
c. Data Complete?	NO
d. Hazardous Wastestream Quantity (W) (lbs.)	0.00
e. Data Complete?	NO
f. Wastestream Quantity Value (W/5,000)	0.00E+00

WASTE QUANTITY

Time Oil Company, Northwest Terminal - 03/11/93

2. SOURCE HAZARDOUS WASTE QUANTITY FACTOR TABLE

a. Source ID	PCB cont. soil	
b. Source Type	Contaminated Soil	
c. Secondary Source Type	N.A.	
d. Source Volume (yd3) | Source Area (ft2)	0.00	100.00
e. Source Volume/Area Value	2.94E-03	
f. Source Hazardous Constituent Quantity (HCQ) Value (sum of 1b)	0.00E+00	
g. Data Complete?	NO	
h. Source Hazardous Wastestream Quantity (WSQ) Value (sum of 1f)	0.00E+00	
i. Data Complete?	NO	
k. Source Hazardous Waste Quantity (HWQ) Value (2e, 2f, or 2h)	2.94E-03	

Source Hazardous Substances	Depth (feet)	Liquid	Concent.	Units
PCBs	< 2	YES	1.4E+03	ppm

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TOLS002475

BZTO104(e)039296

3. SITE HAZARDOUS WASTE QUANTITY SUMMARY

No.	Source ID	Migration Pathways	Vol. or Area Value (2e)	Constituent or Wastestream Value (2f,2h)	Hazardous Waste Qty. Value (2k)
1	Cont. soil pile	GW-SW	1.20E+03	5.70E+03	5.70E+03
2	Cont Soil	GW	2.00E-01	0.00E+00	2.00E-01
3	PCB cont. soil	GW-SW-A	2.94E-03	0.00E+00	2.94E-03

WASTE QUANTITY

Time Oil Company, Northwest Terminal - 03/11/93

4. PATHWAY HAZARDOUS WASTE QUANTITY AND WASTE CHARACTERISTICS SUMMARY TABLE

Migration Pathway	Contaminant Values		HWQVs*	WCVs**
Ground Water	Toxicity/Mobility	1.00E+02	100	10
SW: Overland Flow, DW	Tox./Persistence	1.00E+04	100	32
SW: Overland Flow, HFC	Tox./Persis./Bioacc.	5.00E+08	100	320
SW: Overland Flow, Env	Etox./Persis./Bioacc.	5.00E+08	100	320
SW: GW to SW, DW	Tox./Persistence	1.00E+02	100	10
SW: GW to SW, HFC	Tox./Persis./Bioacc.	5.00E+04	100	32
SW: GW to SW, Env	Etox./Persis./Bioacc.	5.00E+05	100	56
Soil Exposure:Resident	Toxicity	1.00E+04	100	32
Soil Exposure: Nearby	Toxicity	0.00E+00	0	0
Air	Toxicity/Mobility	2.00E-01	10	1

* Hazardous Waste Quantity Factor Values
** Waste Characteristics Factor Category Values

Note: SW = Surface Water
GW = Ground Water
DW = Drinking Water Threat
HFC = Human Food Chain Threat
Env = Environmental Threat

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GROUND WATER MIGRATION PATHWAY SCORESHEET

Time Oil Company, Northwest Terminal - 03/11/93

GROUND WATER MIGRATION PATHWAY Factor Categories & Factors	Maximum Value	Value Assigned
Likelihood of Release to an Aquifer Aquifer: alluvial		
1. Observed Release	550	550
2. Potential to Release		
2a. Containment	10	7
2b. Net Precipitation	10	10
2c. Depth to Aquifer	5	5
2d. Travel Time	35	35
2e. Potential to Release [lines 2a(2b+2c+2d)]	500	350
3. Likelihood of Release	550	550
Waste Characteristics		
4. Toxicity/Mobility	*	1.00E+02
5. Hazardous Waste Quantity	*	100
6. Waste Characteristics	100	10
Targets		
7. Nearest Well	50	3.00E+00
8. Population		
8a. Level I Concentrations	**	0.00E+00
8b. Level II Concentrations	**	0.00E+00
8c. Potential Contamination	**	7.00E-01
8d. Population (lines 8a+8b+8c)	**	7.00E-01
9. Resources	5	5.00E+00
10. Wellhead Protection Area	20	0.00E+00
11. Targets (lines 7+8d+9+10)	**	8.70E+00
12. Targets (including overlaying aquifers)	**	8.70E+00
13. Aquifer Score	100	0.58
GROUND WATER MIGRATION PATHWAY SCORE (Sgw)	100	0.58

* Maximum value applies to waste characteristics category.

** Maximum value not applicable.

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BZTO104(e)039299

SURFACE WATER OVERLAND/FLOOD MIGRATION COMPONENT SCORESHEET
Time Oil Company, Northwest Terminal - 03/11/93

SURFACE WATER OVERLAND/FLOOD MIGRATION COMPONENT Factor Categories & Factors DRINKING WATER THREAT	Maximum Value	Value Assigned
Likelihood of Release		
1. Observed Release	550	0
2. Potential to Release by Overland Flow		
2a. Containment	10	7
2b. Runoff	25	1
2c. Distance to Surface Water	25	9
2d. Potential to Release by Overland Flow [lines 2a(2b+2c)]	500	70
3. Potential to Release by Flood		
3a. Containment (Flood)	10	10
3b. Flood Frequency	50	25
3c. Potential to Release by Flood (lines 3a x 3b)	500	250
4. Potential to Release (lines 2d+3c)	500	320
5. Likelihood of Release	550	320
Waste Characteristics		
6. Toxicity/Persistence	*	1.00E+04
7. Hazardous Waste Quantity	*	100
8. Waste Characteristics	100	32
Targets		
9. Nearest Intake	50	0.00E+00
10. Population		
10a. Level I Concentrations	**	0.00E+00
10b. Level II Concentrations	**	0.00E+00
10c. Potential Contamination	**	0.00E+00
10d. Population (lines 10a+10b+10c)	**	0.00E+00
11. Resources	5	5.00E+00
12. Targets (lines 9+10d+11)	**	5.00E+00
13. DRINKING WATER THREAT SCORE	100	0.62

* Maximum value applies to waste characteristics category.
** Maximum value not applicable.

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SURFACE WATER OVERLAND/FLOOD MIGRATION COMPONENT SCORESHEET
Time Oil Company, Northwest Terminal - 03/11/93

SURFACE WATER OVERLAND/FLOOD MIGRATION COMPONENT Factor Categories & Factors HUMAN FOOD CHAIN THREAT	Maximum Value	Value Assigned
Likelihood of Release		
14. Likelihood of Release (same as line 5)	550	320
Waste Characteristics		
15. Toxicity/Persistence/Bioaccumulation	*	5.00E+08
16. Hazardous Waste Quantity	*	100
17. Waste Characteristics	1000	320
Targets		
18. Food Chain Individual	50	0.00E+00
19. Population		
19a. Level I Concentrations	**	0.00E+00
19b. Level II Concentrations	**	0.00E+00
19c. Pot. Human Food Chain Contamination	**	6.20E-03
19d. Population (lines 19a+19b+19c)	**	6.20E-03
20. Targets (lines 18+19d)	**	6.20E-03
21. HUMAN FOOD CHAIN THREAT SCORE	100	0.01

* Maximum value applies to waste characteristics category.
** Maximum value not applicable.

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SURFACE WATER OVERLAND/FLOOD MIGRATION COMPONENT SCORESHEET
Time Oil Company, Northwest Terminal - 03/11/93

SURFACE WATER OVERLAND/FLOOD MIGRATION COMPONENT Factor Categories & Factors ENVIRONMENTAL THREAT	Maximum Value	Value Assigned
Likelihood of Release		
22. Likelihood of Release (same as line 5)	550	320
Waste Characteristics		
23. Ecosystem Toxicity/Persistence/Bioacc.	*	5:00E+08
24. Hazardous Waste Quantity	*	100
25. Waste Characteristics	1000	320
Targets		
26. Sensitive Environments		
26a. Level I Concentrations	**	0.00E+00
26b. Level II Concentrations	**	0.00E+00
26c. Potential Contamination	**	1.33E-03
26d. Sensitive Environments (lines 26a+26b+26c)	**	1.33E-03
27. Targets (line 26d)	**	1.33E-03
28. ENVIRONMENTAL THREAT SCORE	60	0.00
29. WATERSHED SCORE	100	0.63
30. SW: OVERLAND/FLOOD COMPONENT SCORE (Sof)	100	0.63

* Maximum value applies to waste characteristics category.
** Maximum value not applicable.

32319

GROUND WATER TO SURFACE WATER MIGRATION COMPONENT SCORESHEET
Time Oil Company, Northwest Terminal - 03/11/93

GROUND WATER TO SURFACE WATER MIGRATION COMPONENT Factor Categories & Factors DRINKING WATER THREAT	Maximum Value	Value Assigned
Likelihood of Release to Aquifer Aquifer: alluvial		
1. Observed Release	550	550
2. Potential to Release		
2a. Containment	10	7
2b. Net Precipitation	10	10
2c. Depth to Aquifer	5	5
2d. Travel Time	35	35
2e. Potential to Release [lines 2a(2b+2c+2d)]	500	350
3. Likelihood of Release	550	550
Waste Characteristics		
4. Toxicity/Mobility/Persistence	*	1.00E+02
5. Hazardous Waste Quantity	*	100
6. Waste Characteristics	100	10
Targets		
7. Nearest Intake	50	0.00E+00
8. Population		
8a. Level I Concentrations	**	0.00E+00
8b. Level II Concentrations	**	0.00E+00
8c. Potential Contamination	**	0.00E+00
8d. Population (lines 8a+8b+8c)	**	0.00E+00
9. Resources	5	5.00E+00
10. Targets (lines 7+8d+9)	**	5.00E+00
11. DRINKING WATER THREAT SCORE	100	0.33

* Maximum value applies to waste characteristics category.
** Maximum value not applicable.

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GROUND WATER TO SURFACE WATER MIGRATION COMPONENT SCORESHEET
Time Oil Company, Northwest Terminal - 03/11/93

GROUND WATER TO SURFACE WATER MIGRATION COMPONENT Factor Categories & Factors HUMAN FOOD CHAIN THREAT	Maximum Value	Value Assigned
Likelihood of Release		
12. Likelihood of Release (same as line 3)	550	550
Waste Characteristics		
13. Toxicity/Mobility/Persistence/Bioacc.	*	5.00E+04
14. Hazardous Waste Quantity	*	100
15. Waste Characteristics	1000	32
Targets		
16. Food Chain Individual	50	2.00E+01
17. Population		
17a. Level I Concentrations	**	0.00E+00
17b. Level II Concentrations	**	0.00E+00
17c. Pot. Human Food Chain Contamination	**	3.72E-03
17d. Population (lines 17a+17b+17c)	**	3.72E-03
18. Targets (lines 16+17d)	**	2.00E+01
19. HUMAN FOOD CHAIN THREAT SCORE	100	4.27

* Maximum value applies to waste characteristics category.
** Maximum value not applicable.

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GROUND WATER TO SURFACE WATER MIGRATION COMPONENT SCORESHEET
Time Oil Company, Northwest Terminal - 03/11/93

GROUND WATER TO SURFACE WATER MIGRATION COMPONENT Factor Categories & Factors ENVIRONMENTAL THREAT	Maximum Value	Value Assigned
Likelihood of Release		
20. Likelihood of Release (same as line 3)	550	550
Waste Characteristics		
21. Ecosystem Tox./Mobility/Persist./Bioacc.	*	5.00E+05
22. Hazardous Waste Quantity	*	100
23. Waste Characteristics	1000	56
Targets		
24. Sensitive Environments		
24a. Level I Concentrations	**	0.00E+00
24b. Level II Concentrations	**	0.00E+00
24c. Potential Contamination	**	7.95E-04
24d. Sensitive Environments (lines 24a+24b+24c)	**	7.95E-04
25. Targets (line 24d)	**	7.95E-04
26. ENVIRONMENTAL THREAT SCORE	60	0.00
27. WATERSHED SCORE	100	4.60
28. SW: GW to SW COMPONENT SCORE (Sgs)	100	4.60

* Maximum value applies to waste characteristics category.
** Maximum value not applicable.

SOIL EXPOSURE PATHWAY SCORESHEET

Time Oil Company, Northwest Terminal - 03/11/93

SOIL EXPOSURE PATHWAY Factor Categories & Factors RESIDENT POPULATION THREAT	Maximum Value	Value Assigned
Likelihood of Exposure		
1. Likelihood of Exposure	550	550
Waste Characteristics		
2. Toxicity	*	1.00E+04
3. Hazardous Waste Quantity	*	100
4. Waste Characteristics	100	32
Targets		
5. Resident Individual	50	0.00E+00
6. Resident Population		
6a. Level I Concentrations	**	0.00E+00
6b. Level II Concentrations	**	0.00E+00
6c. Resident Population (lines 6a+6b)	**	0.00E+00
7. Workers	15	5.00E+00
8. Resources	5	0.00E+00
9. Terrestrial Sensitive Environments	***	0.00E+00
10. Targets (lines 5+6c+7+8+9)	**	5.00E+00
11. RESIDENT POPULATION THREAT SCORE	**	8.80E+04

* Maximum value applies to waste characteristics category.
** Maximum value not applicable.
*** No specific maximum value applies, see HRS for details.

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SOIL EXPOSURE PATHWAY SCORESHEET

Time Oil Company, Northwest Terminal - 03/11/93

SOIL EXPOSURE PATHWAY Factor Categories & Factors NEARBY POPULATION THREAT	Maximum Value	Value Assigned
Likelihood of Exposure		
12. Attractiveness/Accessibility	100	0.00E+00
13. Area of Contamination	100	0.00E+00
14. Likelihood of Exposure	500	0.00E+00
Waste Characteristics		
15. Toxicity	*	0.00E+00
16. Hazardous Waste Quantity	*	0
17. Waste Characteristics	100	0
Targets		
18. Nearby Individual	1	0.00E+00
19. Population Within 1 Mile	**	3.00E-02
20. Targets (lines 18+19)	**	3.00E-02
21. NEARBY POPULATION THREAT SCORE	**	0.00E+00
SOIL EXPOSURE PATHWAY SCORE (Ss)	100	1.07

* Maximum value applies to waste characteristics category.

** Maximum value not applicable.

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BZTO104(e)039307

AIR PATHWAY SCORESHEET

Time Oil Company, Northwest Terminal - 03/11/93

AIR MIGRATION PATHWAY Factor Categories & Factors	Maximum Value	Value Assigned
Likelihood of Release		
1. Observed Release	550	0
2. Potential to Release		
2a. Gas Potential to Release	500	0
2b. Particulate Potential to Release	500	0
2c. Potential to Release	500	0
3. Likelihood of Release	550	0
Waste Characteristics		
4. Toxicity/Mobility	*	2.00E-01
5. Hazardous Waste Quantity	*	10
6. Waste Characteristics	100	1
Targets		
7. Nearest Individual	50	2.00E+01
8. Population		
8a. Level I Concentrations	**	0.00E+00
8b. Level II Concentrations	**	0.00E+00
8c. Potential Contamination	**	1.20E+01
8d. Population (lines 8a+8b+8c)	**	1.20E+01
9. Resources	5	5.00E+00
10. Sensitive Environments		
10a. Actual Contamination	***	0.00E+00
10b. Potential Contamination	***	2.00E+00
10c. Sens. Environments(lines 10a+10b)	***	2.00E+00
11. Targets (lines 7+8d+9+10c)	**	3.90E+01
AIR MIGRATION PATHWAY SCORE (Sa)	100	0.00E+00

* Maximum value applies to waste characteristics category.
** Maximum value not applicable.
*** No specific maximum value applies, see HRS for details.

SCHWABE WILLIAMSON & WYATT P.C.
ATTORNEYS AT LAW

PACWEST CENTER, SUITES 1600-1800
1211 SOUTHWEST FIFTH AVENUE • PORTLAND, OREGON 97204-3795
TELEPHONE: 503 222-9981 • FAX: 503 796-2900 • TELEX: 650-686-1360

PATRICIA M. DOST

February 5, 1996

Mr. Anthony G. Hopp
Wildman, Harrold, Allen & Dixon
225 West Wacker Drive
Chicago, Illinois 60606-1229

Re: Time Oil Northwest Terminal

Dear Tony:

In late November, I wrote to you suggesting a conference call with our clients. I hope that the fact that we have had no response from you means only that you have been busy. We remain anxious to confer with you and your client at your earliest convenience.

In the meantime, Time Oil would very much appreciate it if Beazer would provide it any available technical information on a number of proprietary chemicals used in the formulation of Koppers' products at the Northwest Terminal. We have virtually no information about the following:

1. Nalco 6SJ743 (polyester)

2. Eastman Kodak Solvent KB3

3. Eastman Kodak Solvent B11

4. Monsanto oxo-alcohol High Boilers

5. Charter International Oil Company Espesol 310-66 (short-range mineral spirits)

6. Koppers WR340 Concentrate

7. Koppers Petroset II (specific gravity 1.03)

8. Stoddard Solvent

TOLS002488

32319

BZTO104(e)039309

Thank you very much for your assistance in this matter. I look forward to talking with you and your client soon.

Very truly yours,

Patricia M. Dost

PMD:rc

cc: Rick Gordon
Kevin Murphy

TOLS002489

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BZTO104(e)039310

SCHWABE WILLIAMSON & WYATT P.C.
ATTORNEYS AT LAW

PACWEST CENTER, SUITES 1600-1800
1211 SOUTHWEST FIFTH AVENUE • PORTLAND, OREGON 97204-3795
TELEPHONE: 503 222-9981 • FAX: 503 796-2900 • TELEX: 650-686-1360

PATRICIA M. DOST

November 29, 1995

Anthony G. Hopp
Wildman, Harrold, Allen & Dixon
225 West Wacker Drive
Chicago, Illinois 60606-1229

Re: Time Oil Co., Northwest Terminal

Dear Tony:

You recently wrote me suggesting that we arrange a conference call to bring you and Jane Patarcity up to date on the status of activities at the Northwest Terminal. I think this is an excellent idea, and I would be happy to schedule such a call within the next week or so. To facilitate the call, I am enclosing some recent Oregon Department of Environmental Quality correspondence.

First, I am sending you an October 24, 1995 letter from Tom Bispham, DEQ's Northwest Region Administrator, formally transferring administrative oversight of the Northwest Terminal from DEQ's hazardous waste enforcement program to the more flexible Voluntary Cleanup Program. DEQ has agreed to refrain from RCRA enforcement activity so long as Time Oil diligently addresses contaminated soil and groundwater at the facility. As Mr. Bispham hints in the letter, DEQ has verbally indicated that it will waive certain technical RCRA requirements. For example, DEQ probably will not require construction of a special building or tank for storage of contaminated soil generated during remedial activities and probably will not require Time Oil to obtain a RCRA permit in order to treat the contaminated soil on site.

Second, I am enclosing the Voluntary Cleanup Program's initial "file summary" memorandum, dated October 1, 1995. We believe that the memorandum contains some inaccuracies and lacks certain information we believed we had provided to DEQ. For example, although the memorandum identifies dioxin data as an information gap to be filled, Time Oil has analyzed contaminated soils for dioxins. (Fortunately, our data indicates that no dioxins are present.) We intend to meet with DEQ shortly to provide additional information and clear up some misunderstandings.

TOLS002490

Finally, I am enclosing an October 20, 1995 Notice To Owners and Operators of Proposal to List Contaminated Property. In the Notice, DEQ proposes to list the Northwest Terminal on its Confirmed Release List and Inventory. As the Notice recites, Oregon law authorizes DEQ to compile a list of facilities at which DEQ "has confirmed a release of a hazardous substance." Time Oil believes that the Notice and its accompanying "Facility Report" contain factual errors and is compiling a response to the Notice. It seems likely, however, that DEQ will find that it has confirmed a release of pentachlorophenol at the facility.

As you can see from the enclosed correspondence, DEQ is moving this project to the front burner. In the "Facility Report" attached to the Notice of DEQ's intent to list the Northwest Terminal, DEQ is indicating to the public that a remedial investigation is "in progress." I expect that DEQ will complete its review of our December 1993 RFI work plan within the next couple of weeks, propose some revisions, and require Time Oil to begin implementation of the plan shortly thereafter.

When my partner, Jay Waldron, first spoke to Robert Shuftan about this matter in 1993, Jay told Mr. Shuftan that Time Oil was looking for two things from Beazer: technical assistance and money. Time Oil is very pleased that we have reached an agreement on the first item, Beazer's technical assistance. Because Time Oil expects to incur substantial costs in the near future to implement the investigation work plan, it is time to begin discussions on the second item. Time Oil proposes that Beazer continue Kopper's historic practice of reimbursing Time Oil one-half of its costs through the remedial investigation and pending final allocation of costs between the parties.[1] I am enclosing Landau's most current estimate of investigation costs; under this interim allocation, Beazer's estimated share of these costs would be $288,000 to $350,000.

TOLS002491

[1]Time Oil considers this letter part of Time Oil and Beazer's ongoing efforts to compromise this matter, and pursuant to Federal Rule of Evidence 408 and Oregon Evidence Code 408, this letter will not be admissible in any future litigation between the parties.

Time Oil and I look forward to discussing all of these issues with you. In particular, we welcome your ideas on the remedial investigation work plan and the revisions DEQ's "file summary" indicates DEQ is considering. Please give me a call so that we can arrange a telephone conference.

Very truly yours,

Patricia M. Dost

PMD:

Enclosures

cc: Richard Gordon, Time Oil Co.
Kevin Murphy, Time Oil Co.

TOLS002492

32319

BZTO104(e)039313

LANDAU
ASSOCIATES.
INC.
Environmental and Geotechnical Services

November 27, 1995

Ms. Patricia Dost
Schwabe Williamson and Wyatt
Pacwest Center Suite 1600
1211 Southwest Fifth Avenue
Portland, Oregon 97204-3795

Dear Ms. Dost:

Per your request, this letter provides an update on current costs and an estimate for potential future costs for Landau Associates Inc.'s environmental consulting services to Time Oil Company related to the former PCP mixing area at Time Oil's Northwest Terminal in Portland, Oregon.

Landau Associates has contracted with Time Oil Co. for $348,471 in services, and of that amount, $99,807 has been expended (through October 1995). The attached table provides the breakdown, per task, for our services.

As you are aware, the contract amount originally was developed on the basis of a project scope that has changed significantly over the last two years. The latest correspondence from the Oregon Department of Environmental Quality (DEQ), dated October 3 and October 24, 1995 indicates that the DEQ may not require Time Oil to enclose the soil currently stockpiled at the site in a containment building, but they will require that Time Oil develop and implement a maintenance and inspection program for the pile, treat the soil in the pile, and expand the scope of the site investigation. The detailed activities associated with these scope changes have not been fully identified, and consequently, estimated associated costs are, at this time, speculative.

Clearly, additional costs will be incurred over the next few months for strategizing an approach, negotiating with the DEQ, preparing a maintenance and inspection program for the stockpile, and revising the work plan for the site investigation of the former PCP mixing area. Over the next year, additional costs will be incurred to implement the maintenance and inspection program and the expanded site investigation, and to make the required progress towards treatment and disposal of the stockpiled soil. A very rough estimate of some of the potential cost changes is as follows:

- A savings of approximately $300,000 - $400,000 (approximately $50,000 of which is in the current authorized budget) due to the withdrawal of the requirement to place the soil in a containment building

32319

TOLS002493

P.O. BOX 1029 • EDMONDS, WA 98020-9129 • (206) 778-0907 • FAX (206) 778-6409
SPOKANE: (509) 327-9737 • FAX (509) 327-9691 TACOMA: (206) 926-2493 • FAX (206) 926-2531

BZTO104(e)039314

- An additional approximately $15,000 in short-term negotiations and strategies
- An additional approximately $200,000 to $260,000 for the remedial investigation (this includes increases over the original investigation scope that are incorporated in the current draft RFI Work Plan, and further changes in the scope recently identified by DEQ for the former PCP Mixing Area and the adjacent Crosby and Overton tank area; this does not include any additional requirements by DEQ based upon the findings of the investigation)
- An additional $25,000 to $50,000 for a baseline risk assessment (the original risk assessment scope was for focussed use of risk assessment methodologies to identify site cleanup levels, not a formal risk assessment)
- An additional $10,000 to $25,000 for consultation regarding the maintenance and inspection ~~of the soil stock~~pile, including preparing a soil stockpile stormwater management plan, but not including implementation of the program (which may include permitting and construction of an NPDES outfall to the Willamette River)
- An additional $25,000 to $50,000 for consultation regarding future treatment of the stockpiled soil, but not including actual treatment and subsequent management of the soil

These estimates suggest that an additional $225,000 to $350,000 above the current authorized consulting budget of approximately $350,000 may be necessary to address the near-term changes in scope for environmental issues related to the former PCP mixing area. Please note that as we discussed, this is only the roughest of estimates; we expect to work with you and Time Oil over the next few months to develop a cost-effective approach to the DEQ issues.

Please call us if you have any questions regarding this information.

LANDAU ASSOCIATES, INC.

By:

Leslee L. Conner
Project Manager

LLC/ljd
11/27/95 J:\231\001\DOST.LET

cc: Kevin Murphy, Time Oil Co.

TOLS002494

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BZTO104(e)039315

TABLE 1

LANDAU ASSOCIATES, INC.
PROJECT COST ANALYSIS
TIME OIL - NORTHWEST TERMINAL
PORTLAND, OREGON

Updated through October 1995

Task Number	Task Description	Total Invoiced	Total Budget	Remaining Budget
.10	Strategy and negotiation meetings	$ 16,050	$ 18,824	$ 2,774
.20	RCRA storage unit	$ 37,998	$ 86,223	$ 48,225
.30	RFI site characterization	$ 45,592	$ 218,205	$ 172,613
.40	Risk assessment/cleanup levels	$ 167	$ 25,219	$ 25,052
	Total	$ 99,807	$ 348,471	$ 248,664

TOLS002495

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LANDAU ASSOCIATES, INC.

BZTO104(e)039316

Oregon

October 24, 1995

DEPARTMENT OF ENVIRONMENTAL QUALITY

NORTHWEST REGION

MR KEVIN MURPHY
2737 WEST COMMODORE WAY
SEATTLE WA 98199-1233

RECEIVED
OCT 3 1 1995

RE: Northwest Terminal
Time Oil Road
ORD 009597543
Multnomah County

Dear Mr. Murphy:

The Department of Environmental Quality has reviewed program options for regulating cleanup of Time Oil's Northwest Terminal facility in Portland. Given the history of this site, the Department wishes to acknowledge and continue Time Oil's current participation in the Voluntary Cleanup Program (VCP).

In summary, the Environmental Cleanup authorities in ORS Chapter 465 provide the needed flexibility to address both the soil and groundwater contamination and the contaminated soil stockpile. If the Department were to apply the Hazardous Waste authorities in ORS Chapter 466 at this time, you may be required to immediately remove and properly dispose of the contaminated soil stockpile. Hazardous Waste Regulations prohibit the storage of land disposal restricted waste longer than one year.

While we are appreciative of your commitment to remediate the environmental contamination at the facility and to eliminate the contaminated soil stockpile, the Department cannot overemphasize the need to develop an aggressive plan to address the stockpile. Although the site will continue in the VCP provided satisfactory progress is demonstrated, the Department is establishing the following expectations that must be met in any proposal for treatment and disposal of the stockpile:

1. An acceptable plan and schedule for treatment and ultimate disposal of the contaminated soil in the stock pile must be developed as part of the Voluntary Cleanup Remedial Investigation/Feasibility Study (RI/FS). The plan may or may not include storing the soil in a containment building or tank as previously proposed. It is expected that the integrity of the cover on the stockpile be adequately maintained, that run-on and run-off be controlled and that inspections for damage will occur on a regular basis throughout the RI/FS process.

John A. Kitzhaber
Governor

2020 SW Fourth Avenue
Suite 400
Portland, OR 97201-4987
(503) 229-5263 Voice
TTY (503) 229-5471
DEQ-1

32319

TOLS002496

BZTO104(e)039317

2. Within five years of entering the VCP agreement, Time Oil must demonstrate that either treatment of the contaminated soil in the stockpile to an approved treatment standard has been successfully achieved and the soil properly disposed of, or that treatment is successfully underway and Time Oil can demonstrate the cleanup goal is achievable within a reasonable time frame. The Department will closely monitor Time Oil's progress in achieving treatment and expects Time Oil to be working towards achieving the treatment goals during this five-year period.

   As the RI/FS is concluded, the Department will evaluate the potential waiver of RCRA hazardous waste requirements, such as the requirement to obtain a hazardous waste treatment permit for any proposed treatment process. Under ORS 465.315, the Director may waive non-substantive hazardous waste and other program requirements.

3. The Northwest Terminal is subject to RCRA corrective action. Therefore, the entire facility must be investigated as part of the RI/FS. In order that investigation of the former pentachlorophenol formulating area may commence immediately, Time Oil will investigate other areas of the Northwest Terminal using a phased approach negotiated with VCP. If additional pentachlorophenol-contaminated soil is found, it must also be addressed or treated according to approved plans within the five year time frame as discussed in (2) above.

4. Time Oil will be expected to provide written documentation to demonstrate adequate financial ability is in place to implement and complete all cleanup activities related the VCP agreement. The financial mechanism used to demonstrate financial capability may be negotiated with the VCP.

Ms. Barbara Puchy will continue her involvement by participating with the VCP to help assure substantive RCRA hazardous waste requirements are met at the site. Provided that Time Oil complies with work plans and schedules approved under the VCP, and meets the above expectations, the Department does not anticipate the need for formal enforcement action to achieve compliance with the hazardous waste requirements. However, should steady progress as measured by performance against approved work plans and schedules and the above expectations not occur, the Department will be required to evaluate enforcement options that may include the assessment of civil penalties and program lead under the VCP would no longer be appropriate.

If you have any questions or would like to meet with staff to more fully discuss Department expectations, please call Mr. Dave St Louis at (503) 229-5532.

Sincerely,

Tom Bispham

Tom Bispham
Administrator
Northwest Region

cc: Mike Rosen/Karla Urbanowicz, VCP
Dave St Louis/Barb Puchy, NWR
Mary Wahl, WMC

32319

TOLS002498

TOTAL P.04

Pittsburgh, PA 15219
Telephone 412-227-2000

KOPPERS

December 21, 1988

Terrill Henderson, Esq.
Time Oil Company
2737 West Commodore Way
P.O. Box 24447
Terminal Station
Seattle, Washington 98124-0047

Re: Northwest Terminal

Dear Mr. Henderson:

This will confirm our conversation of last week in which I informed you that Koppers Company has reviewed your letter of September 19, 1988 and decided how to proceed with respect to the proposal you described.

In our past conversations and your letter of September 19, 1988 you indicated that on January 23, 1986 Koppers agreed to pay one-half of the costs for the cleanup and related work on the above property. After our conversation we reviewed our files, both in the Law Department and in our environmental subsidiary, in an effort to confirm that statement.

We were unable to find anything indicating an agreement as broad as the agreement you describe. We did, however, find a letter dated February 19, 1986 from Robert D. Abendroth of Time Oil which indicated that Koppers and Time had reached a more limited agreement. Mr. Abendroth's letter states:

> "During our January 23, 1986 meeting at your offices in Pittsburgh, you mentioned that Koppers would agree to pay one-half the cleanup costs incurred/committed to date and that further coordination between Koppers and Time would be appropriate for future commitments. Time concurs with this approach."

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TOLS002499

BZTO104(e)039320

Mr. Abendroth's letter convincingly evidences Time's understanding of this more limited agreement between Koppers and Time, and nothing in our file indicates that any Koppers' personnel took exception to Mr. Abendroth's characterization of the agreement.

It seems clear, then, that Koppers did not make a blanket agreement to share all costs of cleanup for the site. The agreement between Koppers and Time was that Koppers would share equally the cost of cleanup and related work which Time incurred or to which Time committed by February 19, 1986. Commitments for additional cost sharing were clearly deferred pending "further coordination" between Koppers and Time.

In light of this agreement to share past costs, Koppers will reimburse Time Oil for one-half of the investigation and cleanup costs referenced in your letter of September 19, 1988. I have requested that a check be issued to Time in the amount of $59,185.55.

With respect to the future costs, the same turnover in personnel which required first hand research into the details of any agreement between our companies now requires an explanation of why Koppers should agree to pay one-half of all the cleanup costs for the Northwest Terminal site. As I told you in our conversation, the current Koppers' management personnel responsible for such costs would like to meet with Time Oil personnel in order to hear Time Oil's views on this subject, and to discuss the issue generally. I will contact you following our next Environmental Claim Review Meeting in order to schedule a meeting between our companies to discuss "future commitments".

Several weeks ago I received a copy of a letter from Mr. Abendroth to Koppers Company's President, Frederick Moore. Mr. Abendroth stated that Koppers Company appeared to be ignoring Time's communications during the last year. Much has happened here at Koppers Company in the last year, including a lengthy takeover battle, a subsequent merger, a divestiture of business units representing almost one-half of the company, and reductions in staff. The level of activity and the turnover in personnel have made communications difficult. My expectation is that future events here at Koppers Company will allow for smoother communications.

(Ironically, Mr. Abendroth's letter also asserted that Koppers had entered into a blanket cost sharing agreement, an assertion contradicted by Mr. Abendroth's February 19, 1988 letter.)

Please feel free to call me if you have any questions or comments concerning the above.

Very truly yours,

William F. Giarla

William F. Giarla
412-227-2635

WFG:km

cc: R. Abendroth

32319

TOLS002501

BZTO104(e)039322

Oregon

DEPARTMENT OF
ENVIRONMENTAL
QUALITY

October 20, 1995

RECEIVED

CERTIFIED MAIL NO.Z 076 234 396
RETURN RECEIPT REQUESTED

Kevin Murphy
Time Oil Company
2737 West Commadore Way
Seattle WA 98199-1233

NOTICE TO OWNERS AND OPERATORS OF PROPOSAL TO LIST CONTAMINATED PROPERTY
Time Oil
12005 N Burgard St Portland
Preliminary Assessment Equivalent - 8/93
ECSI ID NO. # 170

Dear Mr Murphy:

One of the environmental goals of the State of Oregon is to clean up sites throughout the state which are contaminated with hazardous wastes, petroleum products, or other hazardous substances. A key step in this process is to identify the contaminated sites. The Oregon Legislature has directed the Department of Environmental Quality (DEQ) to implement a comprehensive site discovery program to accomplish this.

To date, by reviewing complaints, spill reports, and Department records, DEQ has identified approximately 1485 sites suspected to be contaminated with hazardous substances. Many of these sites have been contaminated through past disposal and management practices considered appropriate when they occurred. For example, gasoline storage tanks were buried to minimize fire and explosion hazards without serious consideration of the resulting threats to groundwater. We are now finding drinking water supplies contaminated by leaking underground storage tanks.

811 SW Sixth Avenue
Portland, OR 97204-1390
(503) 229-5696
TDD (503) 229-6993
DEQ-1

32319

TOLS002502

BZTO104(e)039323

The DEQ is identifying those suspect sites where contamination has been "confirmed". Contamination is "confirmed" when the Department documents a release of a hazardous substance that may pose a significant threat to public health, safety, welfare, or the environment. The Department identifies sites with confirmed releases on two site lists having different listing criteria. The first, the Confirmed Release List, includes all sites where releases of hazardous substances have been confirmed. The second list, the Inventory, includes those sites with confirmed releases which, in addition, based on a site assessment, the Department has found to require further investigation or cleanup.

Both the Legislature and the Department recognize the Department's information regarding these sites may be outdated or incomplete. For example, contamination may have already been cleaned up, owners or operators may have changed, or the report of the release may include inaccuracies. Therefore, before listing sites the Department is notifying the owners and operators of proposed listings and requesting their comments. The fact sheet enclosed explains this listing process.

This letter is to notify you that the DEQ is proposing to include the property identified above on the "Confirmed Release List" and the "Inventory List" and to give you an opportunity to comment on this proposed listing. The enclosed Facility Report identifies the hazardous contamination at this property as well as other information we plan to include on the list. The site assessment report referenced in the caption above provides the basis for the determination that further investigation or cleanup is needed at the site. A copy has been previously provided to you. You may provide any comments you believe will correct or supplement this listing information or demonstrate this property should not be listed.

Listing your property does not necessarily mean that you are responsible for the contamination, investigation or cleanup. Responsibility for these costs is prescribed by various provisions in state and federal laws. If you want more information regarding these laws, you may want to contact your attorney. You may also contact this office, as described below.

As for the proposed listing, you have as an owner or operator of the facility forty-five (45) days from receiving this notice to provide written comments to the Department. You may request an extension of up to another forty-five (45) days (for a total of no more than ninety (90) days) if for special reasons you cannot respond within the initial forty-five (45) day period.

Comments and requests for extensions should be sent to:

Oregon Department of Environmental Quality
Site Assessment Program
Waste Management and Cleanup Division
811 SW 6th Avenue, 9th Floor
Portland, OR 97204

Your comments are critical to us in determining whether to add the property to the Confirmed Release List & Inventory List.

The facility/property can be removed from these lists after all necessary cleanup, including continuing environmental controls such as groundwater monitoring or special land use restrictions, is completed. We are pleased that you have elected to participate in our Voluntary Cleanup Program to investigate and assess necessary remedial actions for this site. We hope that this cooperative relationship will continue until potential threats from hazardous materials at this site have been eliminated.

For your information, the Confirmed Release List and Inventory will be updated quarterly and made available to any member of the public who requests it.

If you have specific questions about the Confirmed Release List or Inventory, the proposed listing or site activities, or want copies of the Oregon Environmental Cleanup Law (beginning at ORS 465.200) or related rules governing the listing process (beginning at OAR 340-122-410), please contact the Site Assessment Program of the Waste Management and Cleanup Division at (503) 229-6170 or at the address shown above.

Sincerely,

Langdon Marsh
Director

Enclosures: Facility Report & Fact Sheet
cc: Northwest Region, DEQ
SAS File #170

32319

TOLS002504

BZTO104(e)039325

ENVIRONMENTAL CLEANUP SITE INFORMATION
FACILITY REPORT

October 09, 1995 05:08 pm

SITE ID: 170 NAME: ** Time Oil Co.

LOCATION: 12005 N Burgard ST Portland 97203

COUNTY: MULTNOMAH

ASSOCIATED PARTIES

AFFILIATION	PARTY NAME **
Current Legal Owner	Bell Oil Terminal Co.
Current Legal Owner	Time Oil

** Not necessarily responsible for contamination.

HAZARDOUS SUBSTANCE INFORMATION

SUBSTANCE	QUANTITY*** RELEASED	MEDIA CONTAMINATED	CONCENTRATION LEVEL	AS VERIFIED BY
BENZO(a) PYRENE	Unknown	Soil	9.4 mg/kg	Laboratory Data
CHRYSENE	Unknown	Soil	16 mg/kg	Laboratory Data
LEAD	Unknown	Soil	200 mg/kg	Laboratory Data
NAPHTHALENE	Unknown	Soil	100 mg/kg	Laboratory Data
PCB 1221	Unknown	Soil	68 mg/kg	Laboratory Data
PENTACHLOROPHENOL	Unknown	Soil Groundwater	116,000 mg/kg 60 mg/L	Laboratory Data Laboratory Data
PETROLEUM HYDROCARBONS	Unknown	Soil	16,430 mg/kg	Laboratory Data

BZTO104(e)039326

32319

SITE ID: 170 Time Oil Co. FACILITY REPORT

COMMENTS: Soil and groundwater.

*** Quantity released may include amounts of substances other than hazardous substances.

MANNER AND TIME OF RELEASE:

Past operating practices in the former PCP mixing area and waste oil tank area;past practices in the tank farm and spills in 1985, 1986, 1990, and 1994.
Time of release: Unknown

STATUS OF REMOVAL OR REMEDIAL ACTION:

PRE-REMEDIAL DEVELOPMENT (Negotiations) completed
SITE EVALUATION completed
PRELIMINARY ASSESSMENT EQUIVALENT completed
VCS Waiting List completed
REMEDIAL INVESTIGATION in progress

ENVIRONMENTAL AND PUBLIC HEALTH THREATS:

Soil and groundwater contamination. Potential for surface water impacts.

REMEDIAL ACTION FUNDED PRIMARILY BY:

Owner, operator or other party under state or federal authority

---

(facility.rpt)

BZTO104(e)039327

32319

TOLS002506

Environmental CLEANUP REPORT

IDENTIFYING CONTAMINATED SITES IN OREGON

Facts about the Confirmed Release List and Inventory of Hazardous Substance Sites

One of the environmental goals of the State of Oregon is to clean up sites throughout the state which are contaminated with hazardous substances. In accordance with Oregon's Environmental Cleanup Law, the Oregon legislature has directed the Department of Environmental Quality (DEQ) to implement a comprehensive site assessment program to identify and evaluate contaminated sites.

As part of this program, DEQ:

1. Identifies and assesses releases or threats of releases of hazardous substances to the environment which may require removal or cleanup action.

2. Publishes two separate lists of facilities, or sites, where releases of hazardous substances have been confirmed.

• **The Confirmed Release List (CRL)**, includes all properties where a hazardous substance release has been documented.

• **The Inventory** of sites with a confirmed release which DEQ has determined require further investigation and/or cleanup, or related long term environmental or institutional controls.

DEQ adds sites that are, or may be, contaminated and may require cleanup to its **Environmental Cleanup Site Information System (ECSI)**, an electronic tracking system.

DEQ adds these sites to the CRL and Inventory when it determines they meet the respective criteria for listing, described above.

ECSI contains more than 1200 sites which are in various stages of investigation and cleanup. This data base includes sites where investigations have not yet occured and sites where no further action is required. Once a site is entered into ESCI, it will not be removed.

Sites may be added to the CRL any time after a confirmed release has been documented. Sites may be added to the Inventory only after a preliminary assessment (PA) or preliminary assessment equivalent (PAE) is completed. Sites may be added to the CRL or Inventory separately or concurrently.

Prior to adding a site to either the CRL or Inventory, DEQ notifies the current owners and operators and allows them to comment on the proposed listing. DEQ removes sites from the CRL and Inventory when all necessary cleanup has been completed and after a public comment period.

Sites requiring continuing environmental or institutional controls to protect public health and the environment must remain on the CRL and Inventory. Listing on the Inventory is not a prerequisite for investigation and/or cleanup action or referral to a cleanup program.

32319

TOLS002507

BZTO104(e)039328

RECEIVED
OCT 06 1995

Oregon

DEPARTMENT OF
ENVIRONMENTAL
QUALITY

NORTHWEST REGION

October 3, 1995

Kevin Murphy
Time Oil Company
2737 W. Commodore Way
Seattle, WA 98199-1233

Re: DEQ File Summary
Time Oil Company Northwest Terminal

Dear Mr. Murphy:

Enclosed for your use is a copy of the file summary prepared by the Department of Environmental Quality (DEQ) Voluntary Cleanup Program (VCP) for the Time Oil Company Northwest Terminal in Portland, Oregon. The file summary identifies data gaps and provides recommendations and a project strategy for continued work.

After you and your consultants have had a chance to review the file summary, we would be happy to meet with you to discuss the next steps in the environmental investigation and cleanup. We will also be preparing a Voluntary Cleanup Agreement in order to continue DEQ VCP oversight through the next phases of the site investigation and cleanup.

If you have any questions or would like to schedule a meeting, please call me at (503) 229-6729. We look forward to working with you to achieve the cleanup of the Time Oil Northwest Terminal site.

Sincerely,

Karla Urbanowicz
Project Manager
Northwest Region
Voluntary Cleanup Section

KLU/klu

Enclosure: File Summary

John A. Kitzhaber
Governor

2020 SW Fourth Avenue
Suite 400
Portland, OR 97201-4987
(503) 229-5263 Voice
TTY (503) 229-5471
DEQ-1

32319

TOLS002508

Cc w/ enclosure: Mike McCann - DEQ WR Eugene
Mike Rosen - DEQ NWR VCSAS
Dave St. Louis - DEQ NWR HW
Mike Kortenhof - DEQ NWR VCSAS
Tom Roick - DEQ NWR VCSAS
Rich Sedman - DEQ NWR VCSAS
Barbara Puchy - DEQ NWR HW

32319

State of Oregon
Department of Environmental Quality **Memorandum**

Date: October 1, 1995

To: File - Time Oil Company
(EPA CERCLIS ID No. ORD009597543
DEQ ECSI No. 170)

From: Karla Urbanowicz, Project Manager
Northwest Region Voluntary Cleanup Site Assessment Section

Subject: File Summary

I. INTRODUCTION

Time Oil Company entered into a Letter Agreement with the Department of Environmental Quality (DEQ) Voluntary Cleanup Program (VCP) on July 10, 1991 to investigate and cleanup contamination at its facility in Portland, Oregon. A DEQ file review memo was completed on April 8, 1992 by Mike Kortenhof of the VCP. The memo identified issues at the site pertaining to federal Resource Conservation and Recovery Act (RCRA) regulations regarding on-site management and storage of listed hazardous waste. Soil contaminated with pentachlorophenol (PCP) had been excavated and stockpiled at the site in 1989. It had been determined by the Environmental Protection Agency (EPA) that the soil was listed hazardous waste (F027) and subject to RCRA regulations for storage, treatment, and disposal. In May, 1992, the VCP referred the site to the DEQ Hazardous Waste section for resolution of the RCRA issues. Time Oil prepared a Site Characteristics Report (1993a, Landau). A work plan for additional work to complete a facility investigation was prepared by Time Oil and submitted to the DEQ Hazardous Waste section for review and approval in December, 1993 (1993b, Landau). The Hazardous Waste section found that the long term storage and treatment of the contaminated soil in the stockpile could not be permitted under RCRA regulations. The site was referred back to the VCP for site investigation and cleanup under state and federal Superfund cleanup rules and authorities. Time Oil re-submitted their Intent to Participate in VCP again in August, 1994. The project was reactivated in VCP on May 22, 1995 under the previously executed Letter Agreement (7/91). The unresolved issues and expectations pertaining to compliance with RCRA regulations are in the process of being summarized in a letter from DEQ to Time Oil.

This file summary was prepared based on a review of documents listed in Attachment 1, and on observations made during a site visit conducted on August 2, 1995.

II. BACKGROUND

Time Oil Company owns and operates a petroleum product storage and handling terminal on approximately 51 acres located at 12005 North Burgard Street, Portland, Oregon, 97203 (see Figure 1). The facility is in north Portland, Multnomah County, at latitude 45 degrees 37 minutes North, longitude 122 degrees 47 minutes west. The property consists of four parcels in Section 35 of Township 2N Range 1W. Three of the parcels comprise the Northwest Terminal; one parcel is known as the Bell Terminal. The focus of this file summary is the Northwest Terminal. The area surrounding the property is the Rivergate Industrial area occupied by Port of Portland facilities and other industries. The facility has operated since 1953.

The Northwest Terminal facility includes a tank farm with approximately 21 tanks ranging from 5,000 to 80,000 gallons in size (see Figure 2). Marine vessels dock in the Willamette River adjacent to the site to load and unload product via pipelines to the tanks. A truck loading area is present northeast of the tank farm. Piping to the truck loading area is currently subsurface, although Time Oil plans to replace the system with above ground piping. Five warehouses and one office building are present. Adjacent to the southern warehouses is an area that was formerly used for pentachlorophenol (PCP) product formulation (Figure 3 - PCP Mixing Area). Adjacent to the PCP mixing area are two former tank locations (5006 and 10002). These tanks were leased by Time Oil to Crosby and Overton, formerly Pac-Mar, in the 1980s for storage of waste oil.

In the PCP mixing area, several former tanks (20001, 20002, 20003 (20,000 gallon tanks) and several smaller horizontal tanks) were leased by Time Oil to Koppers Co. for blending and storage of wood treating products. Blending and storage operations occurred from 1967 to 1982. PCP granules were heated and mixed with paraffin wax, mineral spirits, ketones and other solvents. Dry PCP granules were stored in the southwestern warehouse and product formulation and storage occurred in the large tanks south of the PCP warehouse in the PCP mixing area. At least one of the products had a specific gravity of greater than 1 ("Timbertox 20", specific gravity=1.12). The mixing area was surrounded by a concrete bulkhead about three feet high. Trucks were loaded with product on the west side of the mixing area. The tanks, piping and related equipment were removed in 1984 from the mixing area, and the bulkhead was decontaminated and removed in 1985.

About 290 cubic yards of soil contaminated with pentachlorophenol was excavated in 1985 and disposed at the Chem-Security Systems, Inc. facility in Arlington. RCRA land ban restrictions came into effect in late 1985 and further off-site disposal of PCP-contaminated soil was prohibited. Time Oil contracted with ECOVA to develop a slurry bioreactor treatment system on-site in 1988. The treatment system was installed in late 1988, and additional soil was excavated in 1989. About 3,000 cubic yards of soil was stockpiled adjacent to the excavation area, and treatment process area (see Figure 3). The treatment operation was terminated in 1989 when ECOVA was unable to achieve the target treatment goal of 0.5 ppm PCP. The soil

stock pile is currently maintained on-site in a bermed, lined, and covered area adjacent to the treatment system.

III. ENVIRONMENTAL SETTING

General Environmental Setting

The site is located along the east bank of the Willamette River, about one-half mile upstream from the southern end of Sauvie Island. The site is generally flat up to the embankment along the river. The area around the office and warehouse is paved, but the majority of the site, including the tank farm area, is unpaved. The surface soils are sandy.

The site is within the 100 year flood plane of the Willamette River. Annual precipitation is about 45 inches.

Regional Geology and Hydrogeology

The site is located on a low river terrace adjacent to the Willamette River. The riverbank areas have been filled with sand dredged from the Willamette River. Soils generally consist of fine to medium grained sands with minor amounts of silts and gravel. The depth to bedrock may be greater than 200 feet.

The depth to groundwater in the area is less than 20 feet. Shallow groundwater probably discharges to the Willamette River.

Site Geology and Hydrogeology

Logs from monitoring wells installed at the site indicate the subsurface lithology includes sand to 16 feet below ground surface (bgs), underlain by a zone of silt and fine sand interbeds from about 16 feet to 25 feet bgs, underlain by fine sand to at least 40 feet which is the maximum depth drilled at the site. The zone of interbedded silts and sands contain silt interlayers that vary in thickness, but appear to be less than two feet thick. The silt beds were not encountered in wells installed near the river in the tank farm area (monitoring wells R and P), so the lateral extent of these layers is not known.

The water table at the site is found at about 13 to 18 feet bgs. It has been suggested that the silty layers represent an aquitard separating the water table zone from a lower, confined aquifer that maintains a water level at about 20 feet bgs (1991, ECOVA). The aquitard appears to pinch out towards the river. The groundwater generally flows toward the river, and the wells screened in deeper zones between 20 and 50 feet are reported to exhibit a response to tidal and seasonal fluctuations.

IV. REGULATORY HISTORY/ISSUES

In April and May, 1984, the DEQ and Multnomah County Sheriff's office investigated complaints from a worker that polychlorinated biphenyl (PCB)-contaminated material was being stored in two tanks leased by Crosby and Overton from Time Oil. DEQ collected samples on May 2, 1984 of tank bottom sludge that had been spilled near the tank, and near-surface soil in the vicinity of the leased tank. The sludge contained 1357 mg/kg PCBs, 170 mg/kg pentachlorophenol (PCP), and 630 mg/kg carcinogenic polynuclear aromatic hydrocarbons (PAHs); the soil contained 59.7 mg/kg PCBs (Table 1). An investigation followed to determine if PCB-contaminated wastes had been disposed by Crosby and Overton at St. Johns Landfill. DEQ analyzed samples which were collected from the landfill waste disposal area in October, 1984. PCBs were not found in the landfill areas tested. Additional soil samples were collected in the tank area by Crosby and Overton, under the direction of Time Oil, in 1989 when the lease agreement was terminated. Some PCB-contaminated soil was removed from the area and disposed as hazardous waste (see further discussion in Section V below). The DEQ file also indicates that in June 1986, Crosby and Overton submitted to DEQ results of an analysis of tank residual from their waste oil tanks in order to determine the waste classification for disposal of approximately 70,000 gallons of waste. Solvents present in the waste included 1,1 dichloroethane; trichloroethylene; toluene; tetrachloroethylene; and xylenes at 10 to 88 ppm. DEQ found that the waste was not hazardous waste (Interoffice Memo, 6/6/86).

In November 1984, the DEQ and the EPA conducted an assessment of past waste disposal practices at the Time Oil facility. A site inspection, interview, and soil sampling were conducted. Soil samples were collected on December 12, 1984 from ten locations at the Northwest Terminal, shown approximately on Figure 2, and two locations at the Bell Terminal. Results indicated two locations where PCP concentrations of 515 and 1820 mg/kg were detected. These results are discussed further in Section V below. An EPA Potential Hazardous Waste Site Preliminary Assessment and Site Inspection Report were completed for the site (1/15/85).

In March 1993, EPA indicated in a letter to Time Oil that no further investigation under the Federal Superfund Program was anticipated and referred Time Oil to DEQ for resolution of environmental contamination.

Water Quality Permits

Prior to 1971, Time Oil discharged draw water from tank bottoms onto the ground. In 1972, DEQ approved a plan by Time Oil to manage tank draw water wastes. The system included water draw boxes at each tank, piping to a central sampling sump or holding tank, an oil/water separator, and three dry well stations. A 1974 DEQ site inspection found most of the property to be unpaved. The paved areas drained to collection sumps connected to an on-site system which was pumped to a large oil storage tank. The tank was periodically pumped through the portable oil/water separator, with water subsequently discharged to the City of Portland

sanitary sewer. Waste oil from the separator was periodically removed by a contractor. Waste handling practices are described in a 2/1/85 report from DEQ to EPA Region 10, which describes underground and above-ground oil/water separators, sampling manholes in the sewer system that received discharge, and underground spill prevention control and countermeasure (SPCC) tanks.

Hazardous Waste Permits

Time Oil Co. is a hazardous waste generator (ORD009597543). In 1982, Time Oil reported generating and disposing of wastes including K051 (separator sludge), K052 (leaded tank bottoms), and P090 (pentachlorophenol). More recently, Time Oil has not generated hazardous waste as documented by quarterly reports from 1989 to 1990. In 1985, Time Oil removed and disposed of about 290 cubic yards of PCP-contaminated soil to the Chem-Security Systems, Inc. disposal facility in Arlington, OR. EPA indicated in late 1985 that this soil was F027 waste. In 1989, another 3,000 cubic yards of PCP-contaminated soil was excavated and stockpiled on-site.

Time Oil received a Notice of Violation in 1978 for storing gasoline in tanks without vapor emission control devices.

An inspection of the Time Oil facility as a fully regulated generator occurred by DEQ RCRA on 11/17/92. A Notice of Noncompliance was issued on 12/14/92 regarding the improper storage of 3,000 cubic yards of soil containing F027 waste for longer than 90 days, and for record keeping violations that were subsequently corrected.

Spill Reports

Reported spills include the following:

Date	Location	Product	Amount Spilled	Action Taken
3/8/75	Tank 29508	Diesel	3,663 barrels	
4/21/86	Pipeline	Gasoline	49.6 gallons	Leak stopped
5/16/90		Ethyl Alcohol	1,000 gallons	
5/8/94	Pipeline in tank farm	Gasoline	1297 gallons	Some product recovered; monitoring wells installed

V. PREVIOUS INVESTIGATIONS

Previous investigations and sampling at the site have been conducted by DEQ and Time Oil. Sampling results are summarized in Tables 1 and 2. Time Oil has prepared a work plan for a facility investigation which includes further investigation of soil and groundwater contamination at the site (1993, Landau).

Soil Investigations

General Site - As part of an EPA Preliminary Site Assessment in 1984, DEQ collected soil samples from 10 locations at the Time Oil Northwest Terminal Facility (Figure 2) and two locations at the Bell Terminal. Eight of the samples (Samples 1 through 8) were collected in the tank farm area, and did not contain detectable levels of PCBs, pesticides, or volatile organic compounds (VOCs), but two of these samples did contain levels of non-carcinogenic polycyclic aromatic hydrocarbons (PAHs) of 1 to 105 mg/kg. Sample 9 was collected near Tank 5006 leased to Crosby and Overton, and Sample 10 was collected near the "Koppers Tanks" in the PCP mixing area. Sample 9 contained PCP at 515 mg/kg; Sample 10 contained PCP at 1820 mg/kg. Although a DEQ report (Smits, Interoffice Memo 1985) indicates that "polychlorinated biphenyls were detected at several soil sample sites", the associated laboratory data reports show only one sample (#6) with PCBs detected at 0.09 mg/kg. Based on this initial sampling, subsequent work at the site has focused on the PCP mixing area.

PCP Mixing Area - The configuration of the PCP mixing area included a tank area bounded on the north by the wall of the warehouse, concrete containment walls at the east and west sides of the mixing area, and a pipeline about 70 feet south of the warehouse (Figure 4). Tanks and associated piping were removed in 1984. In June 1985, visibly contaminated material was removed from the mixing area primarily from the northwest corner to a depth of about 4 feet below ground surface. In July 1985, additional soil sampling was conducted to delineate the PCP contamination both within and adjacent to the mixing area, and at depth (Riedel, 1985). Surface contamination inside the mixing area ranged from 21 to 4,280 mg/kg PCP (maximum near the eastern containment wall) and on the outside to the west ranged up to 26,550 mg/kg PCP (maximum near western containment wall where trucks were loaded). Samples collected at 12 feet below ground surface within the mixing area contained up to 2,030 mg/kg PCP (maximum near the southwest corner of the warehouse). Surface sampling on the south side of the containment area near piping and Tank 38009 contained PCP from 2 to 1,130 mg/kg. In November 1985, three angled borings and one vertical boring were installed under the southwest corner of the warehouse to a depth of approximately 50 feet bgs. Concentrations of PCP in these borings ranged from a maximum of 116,000 mg/kg at a depth of 3 feet bgs to 1.59 mg/kg at 49 feet bgs. Samples collected near the water table at about 12 to 19 feet vertical depth ranged from 110 to 1,560 mg/kg (Riedel, 1986).

Additional soil sampling was conducted in August, 1986 in the PCP mixing area and under the concrete foundation of the warehouse (Figure 5). PCP levels of 5.6 mg/kg were detected at about 2 feet bgs in the southwest and northwest corners of the warehouse, but samples at deeper depths did not detect PCP. Samples within the mixing area ranged up to 2,964 mg/kg at the surface (maximum adjacent to the warehouse), and up to 2,205 mg/kg at 4 feet bgs near the west containment area wall. Sample results below 4 feet do not appear to have been reported (SRH, 1986).

Additional soil sampling was conducted in 1989 by ECOVA in preparation for soil removal and treatment. Surface soil samples were collected around Tanks 38009, 5006, and 10002; in the area southwest of the tanks which was later used for the soil stockpile area; and in the area southwest of the tanks which was later used as the process area. PCP was detected at 4.9 to 2,424 mg/kg adjacent to the containment wall for the Crosby and Overton tanks (Samples 1, 2, and 3), but not in other areas. Soil excavation was initiated in January, 1991. Seventy four soil samples were analyzed at various depths as the excavation was extended to its final depth of about 12 feet in the center of the pit. Approximately 3,000 cubic yards of soil were removed from the excavation and stockpiled on-site. Groundwater was encountered at about 12 feet bgs. Samples indicated PCP concentrations of up to 1,006 mg/kg remaining in soil on the south sidewall; 1,882 mg/kg under the southwest corner of the warehouse; and 187 mg/kg at the surface near the southeast corner of the warehouse where excavation could not be conducted without undermining the building foundation. One soil sample near the central part of the pit at 10 feet below grade contained 6,511 mg/kg PCP. It appears that this soil was then removed. Additional samples were collected below the water table in material that could not be excavated, and indicated residual PCP concentrations ranging from non-detectable to 258 mg/kg.

Former Crosby and Overton Tanks - At the termination of the lease between Crosby and Overton and Time Oil in 1989, soil sampling and removal of some contaminated soil were conducted in the areas near tanks 5006 and 10002. Soil samples were collected from four inches below the surface in five zones in the area (Figure 6) and composited into five samples for analysis for EPA Method 8270, 8080, and total metals. Fifty three individual samples were analyzed for PCBs by EPA Method 8080. Sample results are summarized on Table 1, Table 3, and Table 4. The detected levels of PCBs ranged up to 68 ppm in an area along the southern perimeter of the tank area. Other detected contaminants included the carcinogenic PAHs benzo(a)pyrene, benzo(b)fluoranthene, and chrysene at levels up to 7, 14, and 16 mg/kg, respectively. For comparison, the Numerical Soil Cleanup Level (OAR 340-122-045) for PCBs is 0.08 mg/kg and for individual carcinogenic PAHs is 0.1 mg/kg. A removal of about four drums of soil from one area was conducted in May, 1989 (Crosby & Overton, 1989). Composite and individual samples after the excavation showed remaining PCBs to range from 1 to 2 mg/kg. About 300 cubic yards of soil contaminated with up to 6170 mg/kg Total Petroleum Hydrocarbons (TPH) were also removed from another area. A post-excavation sample composite in this area showed remaining TPH concentrations of 15 mg/kg.

Tank Farm - In an investigation implemented after a 5/8/94 release of gasoline from pipelines in the tank farm area, five borings (N, O, P, Q, R) were drilled at locations shown on Figure 2. Soil samples were collected and analyzed for TPH-HCID, and follow-up analyses. Detected concentrations of gasoline ranged from 31 to 210 mg/kg in samples collected above or at the water table in borings N and Q at depths from 10 to 16 feet bgs. Concentrations of diesel were detected in borings N (368 to 637 mg/kg), P (41 mg/kg), and Q (16,430 mg/kg).

Groundwater Investigations

A series of monitoring points have been installed by Time Oil to evaluate contaminant impact to groundwater. Existing monitoring wells and well points are shown on Figures 2 and 3, and groundwater testing results are summarized in Table 2.

The earliest investigation included installation of monitoring wells MW-1 through MW-4 near the PCP warehouse, and drive point wells A through I in the vicinity of the PCP mixing area in 1985 and 1986. Additional monitoring wells (J1, J2, J3, B1, B2, G1A) were installed in this vicinity in 1988 and 1989. Wells K, L, and M were installed in 1990. Wells N, O, P, Q, and R were installed in the tank farm area in 1994 after a gasoline spill.

The existing monitoring network of well points and monitoring wells has a mixture of screen zone depths, with some screen depths unknown (D, H, I, K, L, M). Groundwater sampling in some of the wells in the PCP mixing area occurred most recently in 1991 and sample analyses appear to have been only for PCP. Well points C and G were apparently dry when monitored in 1986 and 1987, and have never been sampled. Monitoring wells MW-1, MW-2, and MW-3 have not been sampled for water quality information. Monitoring well MW-4 was decommissioned in 1986 after one groundwater sampling event. Wells in the tank farm area have not been sampled for analysis, although they have been observed for the occurrence of free product. Several of the wells have been damaged (including MW-1, E, I) and well point F has been lost or covered by the soil stock pile.

Available analytical results indicate that groundwater contamination is present in the water table zone above 20 feet near the PCP mixing area (J1 = 60,000 ug/L PCP). The federal drinking water standard Maximum Contaminant Level (MCL) for pentachlorophenol is 1 ug/L. Contamination has been detected in shallow wells northwest, southwest, and south of the mixing area (M = 4,000 ug/L PCP; B = 2,000 ug/L PCP; F = 1.4 ug/L PCP). Groundwater contamination from PCP is also present in the next lower sand zone at depths to 45 feet in J2, B2, and G1A at 1,000 ug/L. Monitoring well G1A is about 350 feet southwest of the PCP mixing area and is the furthest point downgradient from the PCP mixing area that has been sampled for PCP.

VI. HAZARDOUS SUBSTANCE CHARACTERISTICS

Hazardous substances of concern at the site include pentachlorophenol, tetrachlorophenol, and solvents including mineral spirits, ketones, and other hydrocarbon products. Other contaminants potentially of concern are chlorinated solvents, polychlorinated biphenyls, dioxins, and pesticides. In the tank farm area, petroleum fuel products and their constituent chemicals are of concern.

The primary hazardous substance of concern at the site is pentachlorophenol (PCP). PCP is generally a white or brown crystalline solid with a specific gravity of 1.98. Commercial PCP

contains tetrachlorophenol (TCP) in ratios of about 2.5 to 1 PCP to TCP (Verscheuren, 1983). PCP is slightly soluble in water (14 mg/l at 20° C) and soluble in alcohol, ether, and benzene. Other references list the solubility of PCP to be 80 mg/l (Callahan, 1979). In natural water systems, PCP is primarily present as an anion, and while its solubility will be determined by the cationic composition of the water, the anion will be more soluble than the undissociated compound (Callahan, 1979). PCP is adsorbed on acidic soil systems, but not on neutral soils. Soil pH and organic content are controlling factors. PCP has a log octanol/water partition coefficient of 5.01 and tends to bioaccumulate in aquatic systems. PCP could be present as a solid in surface soil at release points, as a dissolved phase constituent in groundwater, or as a constituent in pure phase carriers which may have been released at the site. At least one product formulated at the facility had a specific gravity of greater than 1, so both dense non-aqueous phase liquids (DNAPL) and light non-aqueous phase liquids (LNAPL) may be present at the site.

VII. EXPOSURE PATHWAYS

Soil, groundwater, surface water, and sediments are potential contaminated media at the site. Surface releases of PCP in the warehouse and mixing areas and other contaminants in the waste oil tank area may have resulted in levels of hazardous substances in the surface and near surface soils. Exposure by direct contact, ingestion, or inhalation of contaminated soil particulates may occur Migration of these contaminants to the groundwater may have occurred. Use of groundwater for industrial and domestic purposes may result in human or environmental exposure. The site is adjacent to the Willamette River. Discharge of groundwater to surface water probably occurs. Surface water and sediment may have been effected by contaminants transported by groundwater from the on-site release points. Human and ecological exposure may occur to surface water and sediments.

VIII. SUMMARY AND DATA GAPS

Based on the information available for review, the potential areas of concern at the site include the PCP warehouse, PCP mixing area and vicinity, former Crosby and Overton tank area, and the tank farm and loading areas. Releases of PCP have been documented by sampling of the soil and groundwater. A excavation of PCP-contaminated soil in the mixing area was conducted in 1989. Soil was stockpiled on-site in preparation for treatment in a bioreactor which had been constructed at the facility. The treatment plan was put on hold when field scale testing indicated that the achievable treatment level would be 100 mg/kg PCP, which did not meet the target treatment goal of 0.5 mg/kg PCP. Soil remaining in-place after the excavation was sampled and contains significant levels of contamination, both in the near-surface and deeper soil. Groundwater contamination by PCP has been documented at the site in testing conducted through 1991. Releases of other contaminants, including PCBs and PAHs, have been documented near the former Crosby and Overton tanks. Releases of petroleum products in the tank farm have been documented in spill reports and soil sampling conducted in the tank farm area.

Additional information is needed to complete a Remedial Investigation/Feasibility Study (RI/FS) for the site, and should address the following data gaps:

1) PCP Handling Area:

- The extent of PCP and degradation product contamination in soil needs to be fully characterized. PCP has been documented in surface and near-surface soil south of the mixing area (Riedel, 1985) and under the northwest corner of the warehouse (SRH, 1986), but the lateral extent has not been defined. PCP contamination is present in deeper soil (12 to 17 feet bgs) remaining after the 1989 soil removal was conducted (ECOVA, 1989), but the vertical extent and the lateral extent to the south has not been defined beyond the limits of the excavation.
- The potential presence of contamination in the warehouse foundation sand fill needs to be investigated. Concentrations of PCP have been detected at the surface level in the northwest and southwest corner under the warehouse foundation. It is reported that the foundation, which is approximately 3 feet above grade, is sand-filled but it does not appear that this fill was sampled for analysis. This information will be needed to determine proper management of the sand fill and foundation.
- The soil on the north side of the warehouse needs to be characterized. Potential spills from handling PCP may have occurred in this vicinity, and shallow contamination has been found in one location under the northwest warehouse foundation.
- Analyses for other constituents (volatile and semivolatile compounds, TPH, dioxins, pesticides) should be conducted. Products formulated at the facility used a variety of solvents, and may have also included gamma-BHC.

2) Former Crosby and Overton Tanks (5006, 10002) and 38K Tank:

- The current levels of contaminants in the soil in this area need to be assessed, and the need for cleanup evaluated. Releases of chemicals from these tanks have been documented. PCP, PCB, and PAH contamination has been found in samples collected in this area (DEQ, 1984; Crosby and Overton, 1989) and along piping from these tanks (ECOVA, 1989). Chlorinated solvents were also apparently present in waste oil stored in these tanks, according to information contained in the DEQ file. Previous sampling indicated contaminant levels above Numerical Soil Cleanup Levels (OAR 340-122-045). The impacts of these contaminants to groundwater also need to be evaluated.

3) Tank Farm and Loading Areas:

- The extent of contamination from historical operating practices and spills in the tank farm and loading areas needs to be characterized. Soil borings in a recent spill area (Landau, 1994) indicate significant gasoline and diesel contamination.

4) Groundwater:

- Additional information is needed to understand the site geology and hydrogeology. In particular, information is needed about the lateral extent of a silt/sand interbed zone, the nature and extent of the sand zone below 40 feet, the interconnection of water table and lower aquifers at the site, the lateral and/or vertical direction and rate of groundwater flow, seasonal variations in the groundwater flow direction, and the connection between the groundwater aquifers and the Willamette River.
- The lateral and vertical extent of groundwater contamination needs to be defined. PCP contamination has been detected in most wells installed in both water table and lower zones. Wells currently installed near the river have not been sampled for PCPs or other constituents. Groundwater contamination in the tank farm area needs to be characterized.
- The potential for contaminant transport by groundwater to the Willamette River exists, and should be evaluated.
- The current quality of groundwater needs to be assessed. Groundwater sampling has not been conducted at the site since 1991. Analyses for constituents of concern other than PCP needs to be conducted.
- The possible presence of separate phase liquids (DNAPLs or LNAPLs) needs to be investigated.
- Information about the current and future uses of groundwater in the area should be obtained.

5) Willamette River:

- The potential for impacts from site contamination on surface water and sediments should be investigated and evaluated.

6) A baseline risk assessment should be conducted for the site to determine if additional remedial actions are necessary. The existing data should be reviewed for quality and quantity to determine if sufficient information is available in some areas to conduct the risk assessment.

7) Data to assess treatment technologies for the existing PCP-contaminated soil stockpile should be obtained.

IX. RECOMMENDATIONS AND PROJECT STRATEGY

1) Further oversight by the DEQ Voluntary Cleanup Program at the Time Oil Company site should proceed under a Voluntary Cleanup Agreement. The agreement should include a scope of work for a Remedial Investigation and Feasibility Study. The Remedial Investigation should include a baseline risk assessment. The Feasibility Study should address the treatment options and long-term management of the existing soil stockpile which contains F027 hazardous waste, as well as any other media effected by significant contamination.

E) Groundwater monitoring at the site should rely on points of known depth and construction for groundwater level monitoring points. Any wells at the site which have been damaged or are not needed for monitoring should be properly abandoned. Wellhead protection should be installed around all monitoring points that are to be maintained at the site (i.e., concrete pad and protective posts). Monitoring wells MW-1, MW-2, and MW-3 have never been sampled for water quality. If these wells no longer serve a purpose for the site investigation, they should be properly abandoned.

F) Because the potential for separate phase liquids exists at the site, all investigation points should be properly constructed to prevent creating conduits for contaminant migration. Exploration points below potential aquitards should use conductor casing.

G) Monthly groundwater level and river level information should be collected.

4) A beneficial well use survey should be prepared.

5) The site should be listed on both the Confirmed Release List and the Inventory (OAR 340-122-427). DEQ will proceed with the listing process.

X. ATTACHMENTS

Documents Reviewed

Figures 1 through 6

Tables 1 through 4

Attachment 1
Documents Reviewed

1994, Landau Associates, Inc., Well Installation Premium Unleaded Gasoline Release Northwest Terminal Portland, Oregon, prepared for Time Oil Company.

1993b, Landau Associates, Inc., Work Plan, RCRA Facility Investigation, Former PCP Mixing Area, Northwest Terminal, Portland, Oregon, prepared for Time Oil Company.

1993a, Landau Associates, Inc., Site Characteristics Report, Former PCP Mixing Area, Northwest Terminal, Portland, Oregon, prepared for Time Oil Company.

1993, Rolluda, M., letter from EPA to Time Oil Company.

1992, Cox, K., Notice of Noncompliance NWR-HW-92-515, from DEQ to Time Oil.

1992, Kortenhof, M., DEQ Memo to Time Oil File regarding Time Oil Project Review, ECSI Site 170.

1991, ECOVA Corporation, Preliminary Assessment/Data Evaluation and Proposed Remediation Plan for Pentachlorophenol Contaminated Soil at: Time Oil Co. Northwest Terminal.

1989, Crosby and Overton, Inc., Remedial Activities Report, Time Oil Project, Portland, Oregon.

1986, Woods, Ed, DEQ Interoffice Memo to File, re: Time Oil c/o Crosby & Overton Tank Residue - HW Determination.

1986, SRH Associates, Inc., Pentachlorophenol Contamination at Time Oil Company Northwest Terminal.

1986, Riedel Environmental Services, Inc., Report on Field Activities Conducted in Late 1985 at Time Oil Company.

1985, Smits, J. L., DEQ Memo to Debbie Flood, EPA Region-X, regarding HW-3012 Superfund Time Oil Company, ORD 009597543.

1985, Riedel Environmental Services, Time Oil Company Pentachlorophenol Sampling and Analyses.

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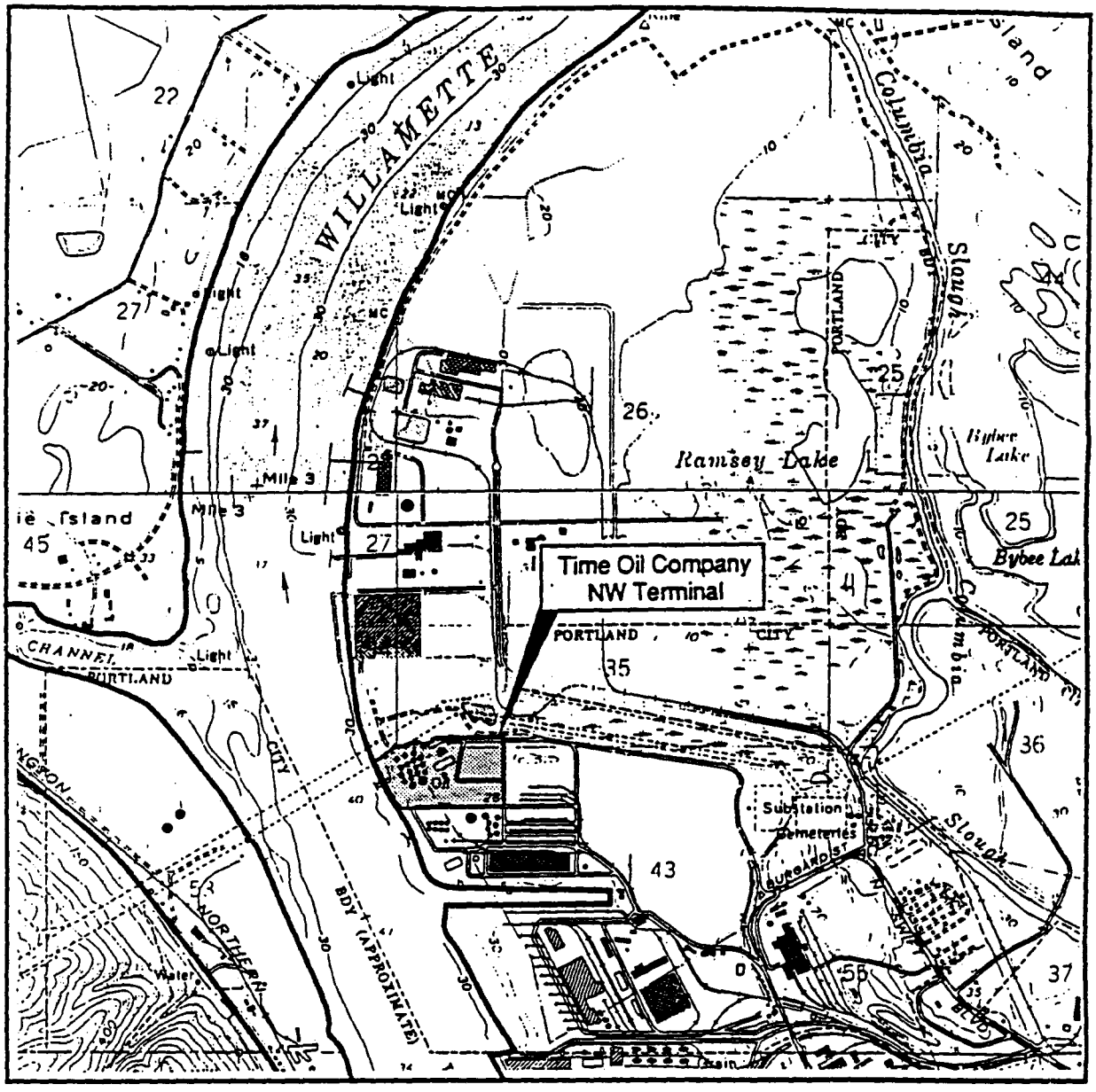
1985, EPA Potential Hazardous Waste Site Preliminary Assessment prepared by J. L. Smits, OR DEQ for Time Oil Company, ORD 0009597543.

1983, Verschueren, K., Handbook of Environmental Data on Organic Chemicals, Van Nostrand Reinhold, New York.

1979, Callahan, M. A., et al, Water-Related Environmental Fate of 129 Priority Pollutants, Volume II, EPA-440/4-79-029b.



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

TOLS002524

231001.01 Time Oil/NW Terminal/RFI Work Plan/Report 12/93

	Vicinity Map	Figure 1

LANDAU ASSOCIATES, INC

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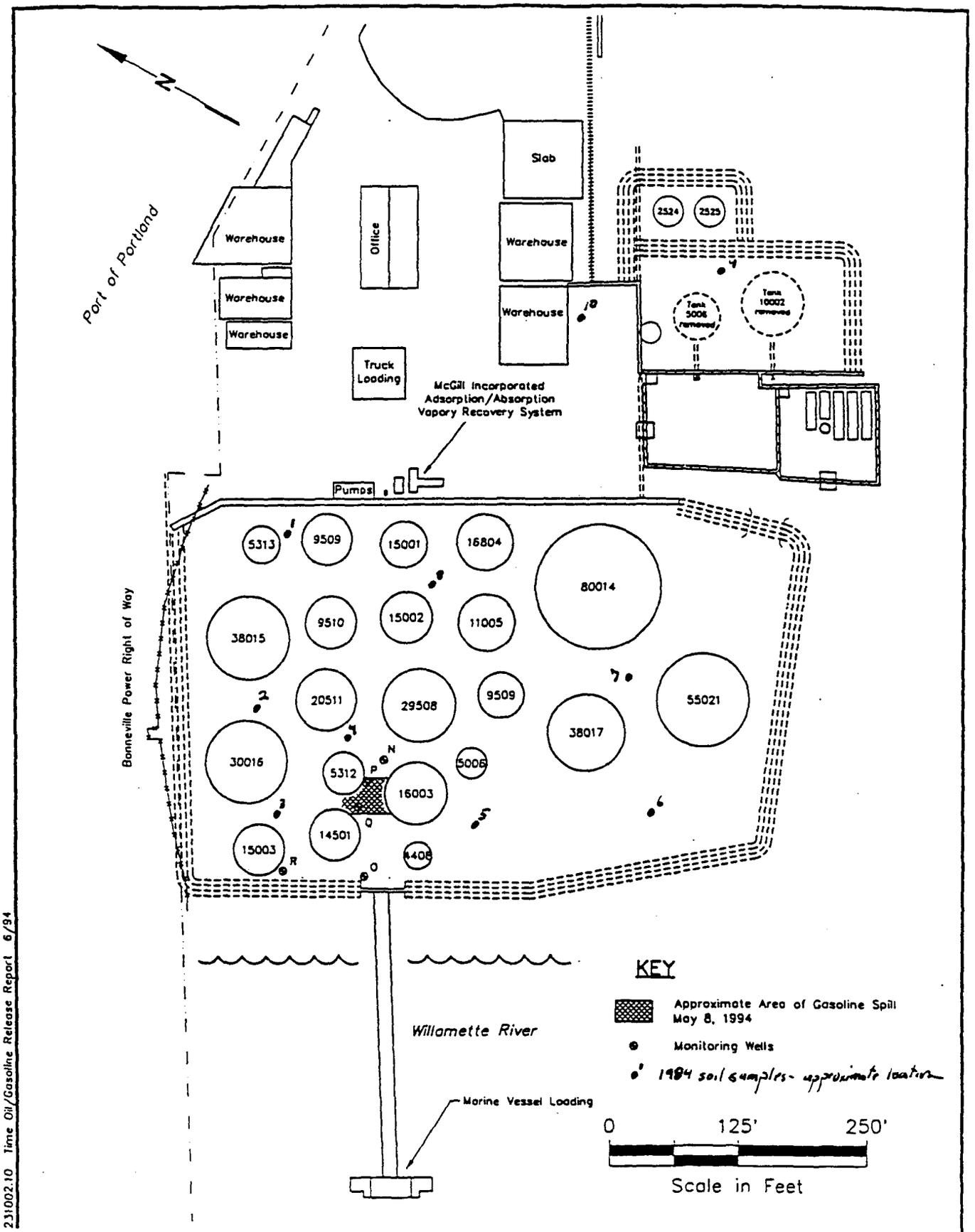

231002.10 Time Oil/Gasoline Release Report 6/94

Site Map | Figure 2

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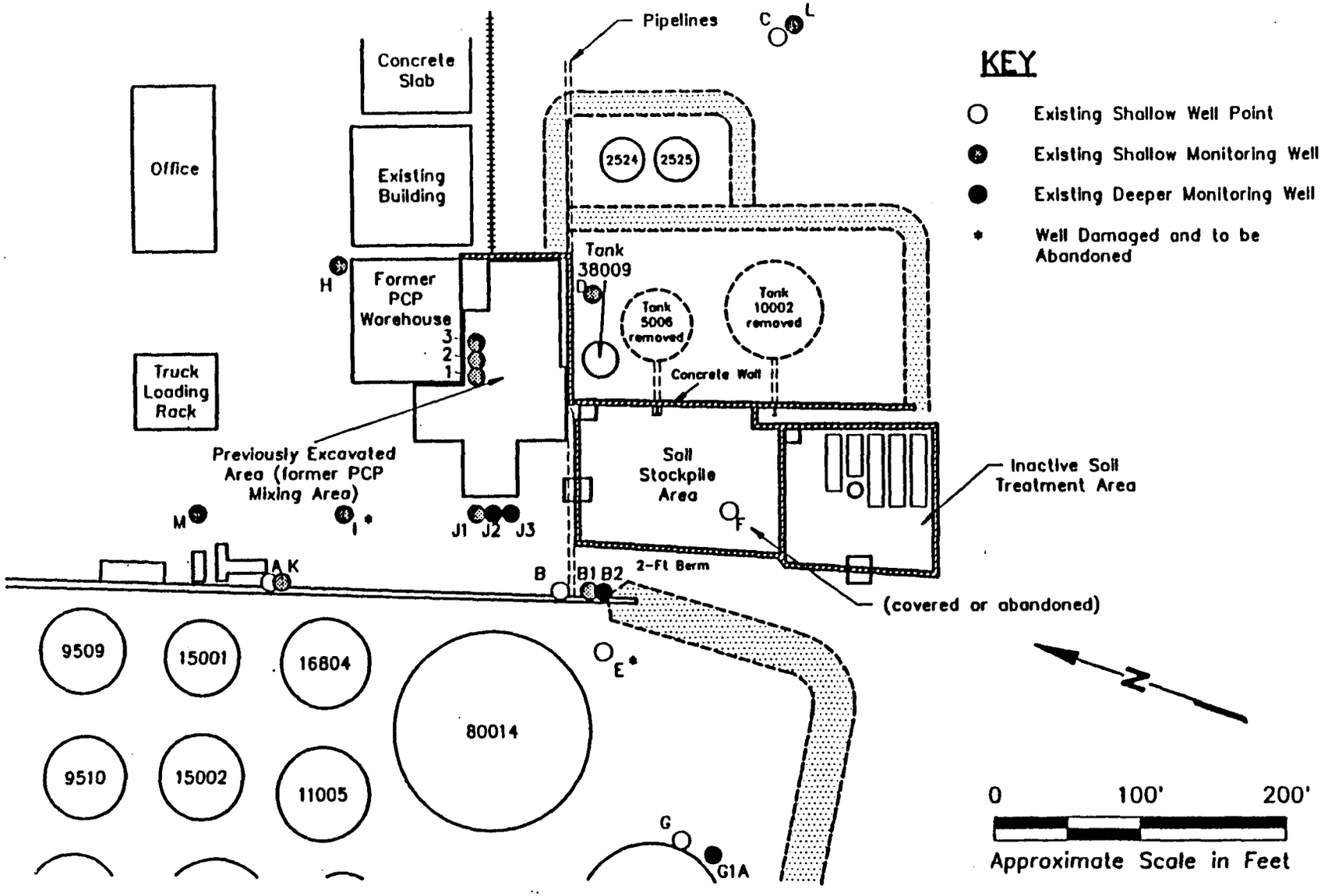


Pre RFI Monitoring Well Locations

Figure 3

LANDAU ASSOCIATES INC

BZTO104(e)039347

TOLS002526

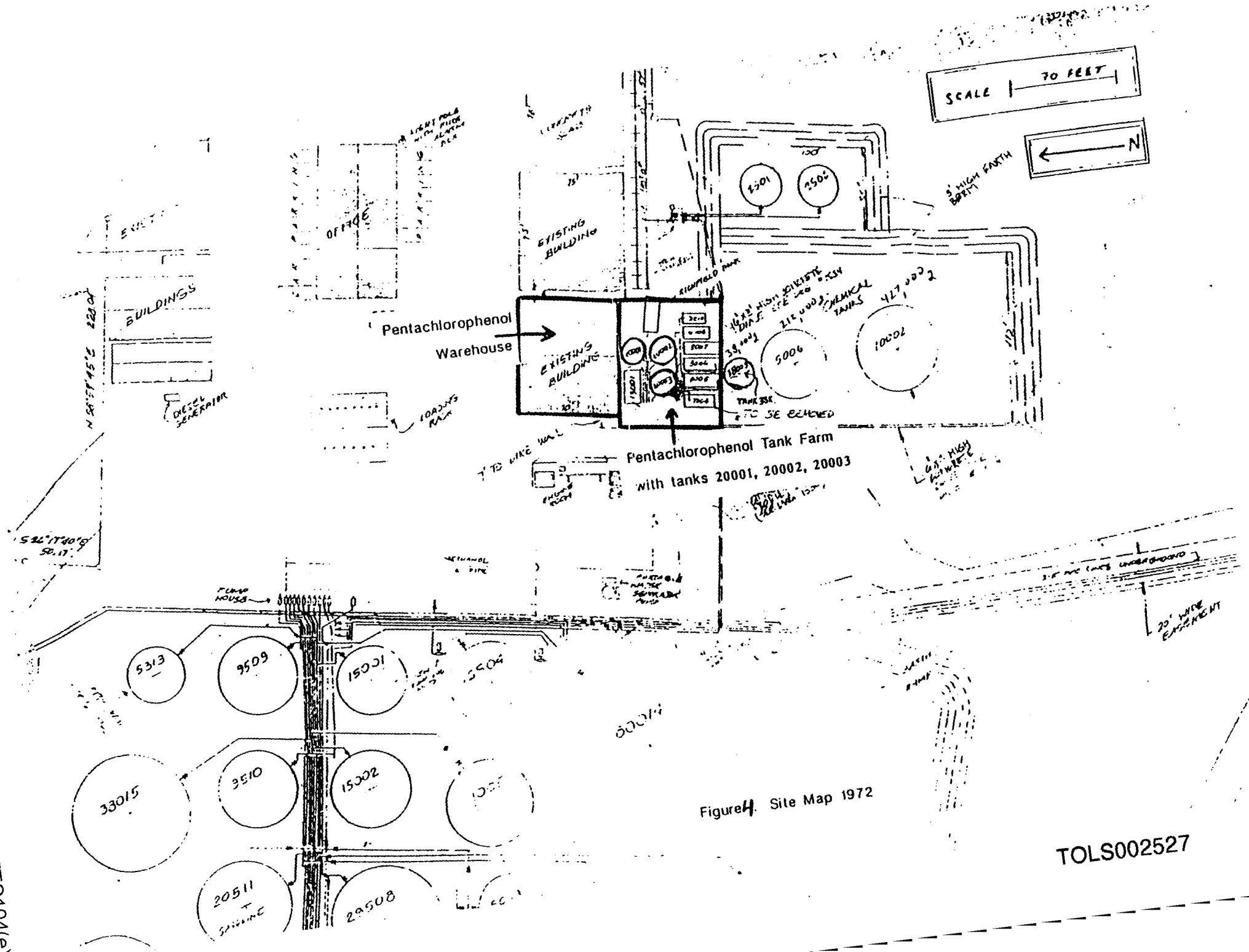
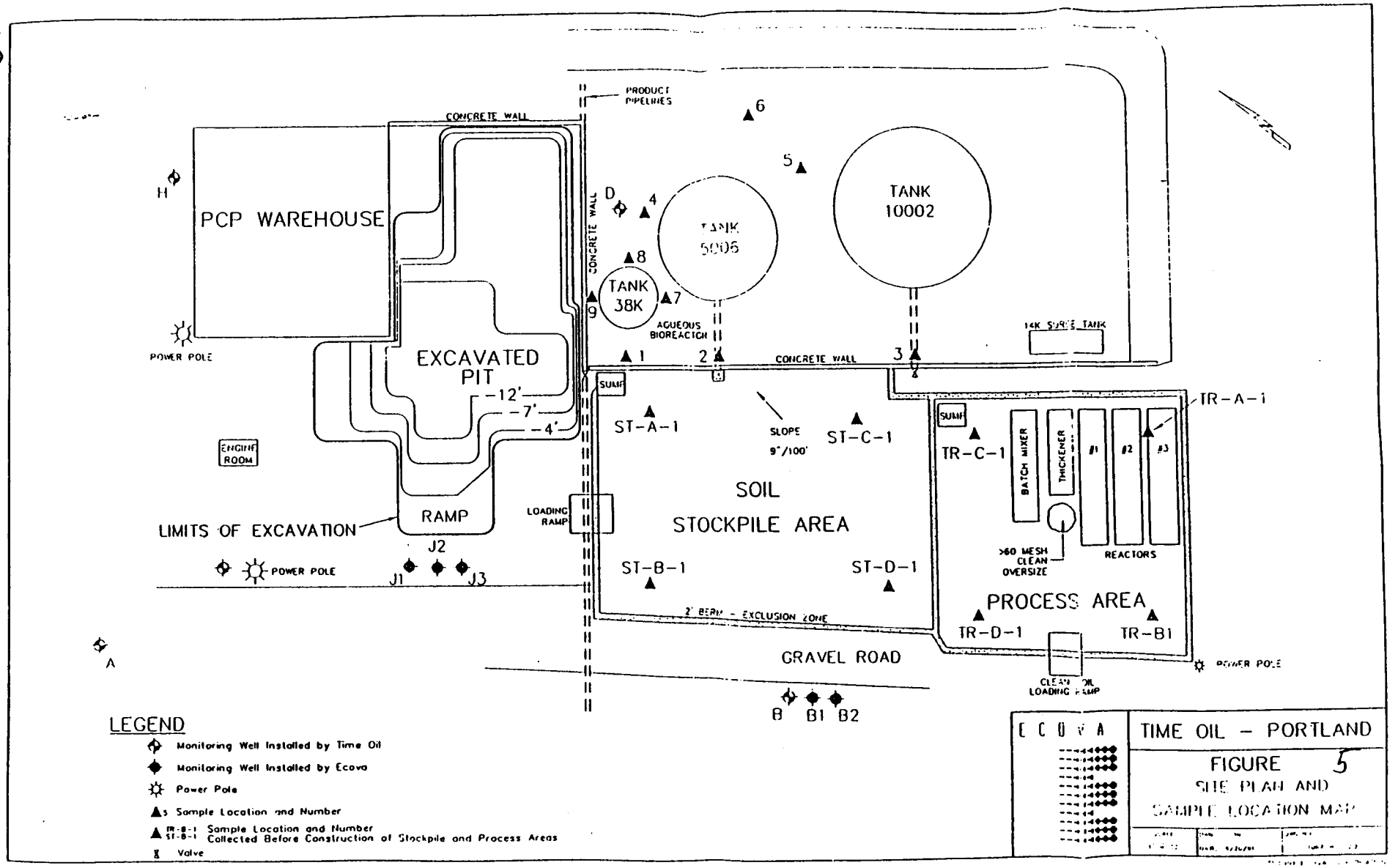


Figure 4. Site Map 1972

TOLS002527

BZT0104(e)03

323319



BZT0104(e)039349

TOLS002528

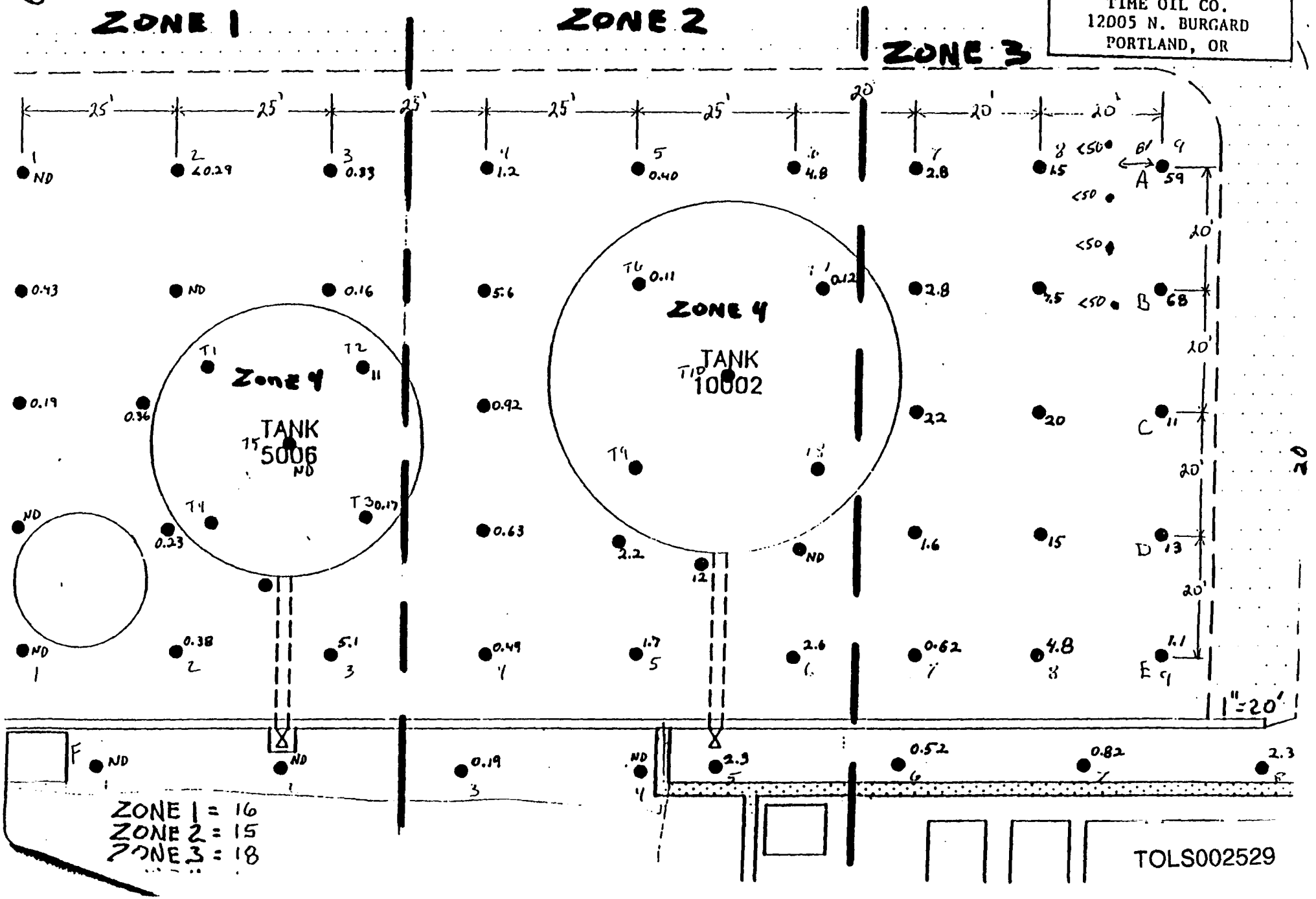
323319

PCB results (ppm)
3/14/89
Detection Limit 0.10ppm

PCB Action Area

TANKS 5006T and 10002
NORTHWEST TERMINAL
scale: 1"=20'

TIME OIL CO.
12005 N. BURGARD
PORTLAND, OR



BZTO104(e)039350

Table 1
TIME OIL COMPANY
Northwest Terminal
Portland, Oregon

Sampling Date	Sample ID	Matrix	Method 608 or 8080-PCBs (mg/kg)	EP Tox - Pb (mg/l)	Method 625-Pesticides (mg/kg)	Total Petroleum Hydrocarbons (mg/kg)	GC-MS Scan (mg/kg)	Method 625-B/N/A (mg/kg)
5/2/84	1 (4 ft from C&O tank)	Sludge	1357		ND			Pentachlorophenol-170 Naphthalene-1300 Acenapthene-910 Fluorene-2300 Phenanthrene-4600 Anthracene-9100 Fluoranthene-910 Pyrene-550 Benz(a)anthracene-160 Chrysene-630 Benz(a)pyrene-90
	2 (10 ft from C&O tank, 0.5 ft bgs)	Soil	59.7		ND			Naphthalene-100 Acenapthene-50 Fluorene-80 Phenanthrene-200 Anthracene-200 Fluoranthene-80 Pyrene-50
12/12/84	1	Soil-composite of surface, 1,2, and 3 ft bgs	ND	< 0.1	<5		<1	<1
	2	as above	ND	< 0.1	<5		<1	<1
	3	as above	ND	< 0.1	<5		<10	<1
	4	as above	ND	< 0.1	<5		TICs	Isophorene-1 2,4-Dinitrotoluene-3 Fluorene-1 N-Nitrosodiphenylamine-2 Phenanthrene-1 Anthracene-1

BZTO104(e)039351

Table 1 page 2
Time Oil Company

Sampling Date	Sample ID	Matrix	Method 608 or 8080-PCBs (mg/kg)	EP Tox - Pb (mg/l)	Method 625-Pesticides (mg/kg)	Total Petroleum Hydrocarbons (mg/kg)	GC-MS Scan (mg/kg)	Method 625-B/N/A (mg/kg)
12/12/84	5	as above	ND	< 0.1	<5		<10	<1
	6	as above	0.09	< 0.1	<5		<10	<1
	7	as above	ND	< 0.1	<5		<1	<1
	8	as above	ND	< 0.1	<5		<1	Fluorene-13 Phenanthrene-14 Anthracene-105
	9 - 19 ft NE of tank 50067	as above	ND	< 0.1	<5		TICs	Pentachlorophenol-515 Tetrachlorophenol-12 Chrysene-1 Bis(2ethylhexyl)phthalate-3
	10-near Koppers tanks	as above	ND	< 0.1	<5		TICs	Pentachlorophenol-1820 Tetrachlorophenol-71
	11	as above	ND	< 0.1	<5		<1	<1
	12	as above	ND	< 0.1	<5		<1	<1
5/8/86	Time Oil-small tank (C&O)	Sludge					1,1 Dichloroethane-88 Trichloroethylene-35 Toluene-32 Tetrachloroethylene-10 Xylene-13	
3/1/89	Zone 1	surface soil composite of 16 samples	individual - <0.1 to 5.1 composite - 0.9					Anthracene-1.2 Benzo(a)pyrene-1.9 Benzo(b)fluoranthene-14 Benzo(ghi)perylene-3 Chrysene-3.8 Fluoranthene-5.1 Phenanthrene-0.36 Pyrene-8.1
	Zone 2	surface soil composite of 15 samples	individual - <0.1 to 12 composite - 7					Anthracene-2.9 Benzo(a)pyrene-2.9 Benzo(b)fluoranthene-4.6 Benzo(ghi)perylene-6.7 Chrysene-1.8 Fluoranthene-2.8

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Sampling Date	Sample ID	Matrix	Method 608 or 8080-PCBs (mg/kg)	EP Tox - Pb (mg/l)	Method 625-Pesticides (mg/kg)	Total Petroleum Hydrocarbons (mg/kg)	GC-MS Scan (mg/kg)	Method 625-B/N/A (mg/kg)
								Phenanthrene-1.7 Pyrene-7.5
	Zone 3	surface soil composite of 18 samples	individual - 0.52 to 68 composite - 10					Anthracene-8.9 Benzo(a)pyrene-9.4 Benzo(b)fluoranthene-13 Benzo(ghi)perylene-20 Chrysene-6.1 Fluoranthene-12 Fluorene-0.74 Phenanthrene-10 Pyrene-30
	Zone 4	surface soil composite of 10 samples	individual - <0.1 to 11 composite - 4					Acenaphthene-21 Acenapthylene-8.8 Anthracene-64 Benzo(a)pyrene-7 Benzo(b)fluoranthene-5 Chrysene-16 2,4-Dichlorophenol-3.6 Fluoranthene-7.2 Fluorene-20 N-Nitorsodiphenylamine-28 Naphthalene-12 Phenanthrene-67 Pyrene-39
	Zone 5	surface soil composite of 4 samples	composite - 0.2			6170 (418.1)		Acenaphthene-2.1 Anthracene-0.72 Fluoranthene-0.33 Fluorene-2.7 N-Nitorsodiphenylamine-3.2 Naphthalene-5.2 Phenanthrene-4.5
5/31/94	MW-N (10-11.5 ft)	Soil				58 (TPH-G) 637 (TPH-D)		
	MW-N (15-16.5 ft)	Soil				31 (TPH-G) 368 (TPH-D)		

BZTO104(e)039353

Table 1 page 4
Time Oil Company

Sampling Date	Sample ID	Matrix	Method 608 or 8080-PCBs (mg/kg)	EP Tox - Pb (mg/l)	Method 625-Pesticides (mg/kg)	Total Petroleum Hydrocarbons (mg/kg)	GC-MS Scan (mg/kg)	Method 625-B/N/A (mg/kg)
	MW-O (19.5-21 ft)	Soil				ND		
	MW-O (25-26.5 ft)	Soil				ND		
	MW-P (15-16 ft)	Soil				41.4 (TPH-D)		
	MW-Q (13-14.5 ft)	Soil				210 (TPH-G) 16,430 (TPH-D)		
	MW-R (14.5-16.5)	Soil				ND		
	MW-R (25-26.5)	Soil				ND		

BZTO104(e)039354

Table 2
TIME OIL COMPANY
Groundwater Sampling

Monitoring Point	Screen Depth (ft)	Date Installed	Date Sampled	Pentachlorophenol (ug/L)	pH
				(Drinking Water MCL = 1 ug/l)	
MW 1	angled - 14 vert	11/85			
MW 2	angled - 14 vert	11/85			
MW 3	angled - 14 vert	11/85			
MW 4	? - 40	11/85	5/9/86	6.1	
		5/14/86-decommissioned			
Well Point A	17.5 - 20	2/86	5/28/86	<2	6.56
			9/3/86	ND	6.8
			8/20/87	<20	6.61
Well Point B	17.5 - 20	2/86	5/?/86	2.6	
			5/28/86	<2	6.29
			9/3/86	ND	6.7
			8/20/87	2300	6.57
			10/16/87	1000	
Well Point C	5.5 - 8	2/86	5/?/86-dry?		
			8/29/86-dry		
			8/20/87-dry		
Well Point D		5/86	5/28/86	<2	6.49
			8/29/86	44	6.53
			8/20/87	<20	6.6
Well Point E	11.5 - 20	3/86	5/?/86	<1.0	
			5/28/86	<2	7.7
			8/29/86	ND	6.54
			8/20/87-dry		
Well Point F	10.5 - 19	3/86	5/?/86	1.4	
			5/28/86	<2	6.73
			8/29/86	ND	6.57
			8/20/87	<20	
Well Point G	4.5 - 13	3/86	5/?/86-dry		
			8/29/86-dry		
			8/20/87-dry		
Well Point H		5/86	5/28/86	<2	6.32
			8/29/86	ND	6.91
			8/20/87	<20	6.64
			3/4/91	<1,000	
Well Point I		5/86	5/28/86	2.2	5.74
			8/29/86	ND	6.77
			8/20/87	<20	6.38
			3/4/91	<1,000	
MW J-1	10 - 20	11/29/88	3/4/91	60,000	
MW J-2	30 - 40	1/3/89	3/4/91	1,000	

32319

TOLS002534

BZTO104(e)039355

Table 2 Page 2
Time Oil Company

Monitoring Point	Screen Depth (ft)	Date Installed	Date Sampled	Pentachlorophenol (ug/L)	pH
MW J-3	28 - 33	1/5/89	3/4/91	<1,000	
MW B-1	10.5 - 20.5	11/30/88	3/4/91	<1,000	
MW B-2	29.5 - 39.5	1/5/89	3/4/91	1,000	
MW G-1A	25 - 35	12/2/88	3/4/91	1,000	
K	?	1990	3/4/91	<1,000	
L	?	1990	3/4/91	<1,000	
M	?	1990	3/4/91	4,000	
N	4 - 16.5	5/31/94			
O	5 - 30	5/31/94			
P	4 - 15.5	5/31/94			
Q	4 –17	5/31/94			
R	5 - 30	5/31/94			

32319

Table 3

PACIFIC ANALYTICAL LABORATORY inc.
9405 S.W. Nimbus Ave. Beaverton, OR 97005 (503) 644-0660

PAL Report #: 89-0120
Client : Crosby & Overton
Date : 3/01/89
Sample ID : Time Oil
Items : Five Soil Composites

ANALYSIS

	Zone 1	Zone 2	Zone 3	Zone 4	Zone 5
Total Petroleum Hydrocarbons (EPA 418.1), mg/kg	--	--	--	--	6170
Cyanide, mg/kg	<1	<1	<1	<1	<1

TOTAL METALS - mg/kg (per EPA SW 846 3050, 7000 series)

	Zone 1	Zone 2	Zone 3	Zone 4	Zone 5
Antimony	50	50	40	40	50
Arsenic	4.1	4.9	9.3	5.5	2.2
Barium	170	200	200	180	160
Cadmium	0.6	0.9	0.8	0.8	0.6
Chromium	15	49	48	24	48
Copper	350	180	94	37	210
Lead	39	200	170	170	34
Mercury	0.1	1.4	2.6	4.9	<0.02
Nickel	18	39	48	28	20
Selenium	<0.005	<0.005	<0.005	<0.005	<0.005
Silver	0.8	0.9	0.7	0.4	0.7
Thallium	10	10	10	<10	10
Zinc	160	170	170	87	82

Respectfully,

Linnet O'Hanlon
Chemist

Reviewed by:

32319

TOLS002536

BZTO104(e)039357

PACIFIC ANALYTICAL LABORATORY inc
9405 S.W. Nimbus Ave. Beaverton, OR 97005 (503) 644-0660

Crosby & Overton
April 20, 1989

PAL REPORT NUMBER: 89-0203
P.O./JOB NUMBER: 23513/06354
REFERENCE: Time Oil
DATE REQUESTED: 3/14/89
ITEMS: 53 Soil Samples

PCB's by EPA 8080

Zone 1	ppm	Zone 2	ppm	Zone 3	ppm
A1	ND	A4	1.2	A7	2.8
A2	<0.29	A5	0.40	A8	1.5
A3	0.33	A6	4.8	A9	59
B1	0.43	B4	5.6	B7	2.8
B2	ND	C4	0.92	B8	7.5
B3	0.16	D4	0.63	B9	68
C1	0.19	D5A	2.2	C7	22
C2	0.36	D5B	12	C8	20
D1	ND	D6	ND	C9	11
D2	0.23	E4	0.49	D7	1.6
E1	ND	E5	1.7	D8	15
E2	0.38	E6	2.6	D9	13
E3	5.1	F3	0.19	E7	0.62
F1	ND	F4	ND	E8	4.8
F2	ND	F5	2.3	E9	1.1
				F6	0.52
				F7	0.82
				F8	2.3

Zone 4	ppm
T2	11
T3	0.17
T5	ND
T6	0.11
T7	0.12

ND = Not Detected
Detection Limit - 0.10 ppm

Respectfully,

Kim Chiusolo
Chemist

Linnet O'Hanlon
Chemist

Time 9 28

SCHWABE WILLIAMSON & WYATT
ATTORNEYS AT LAW

PACWEST CENTER, SUITES 1600-1950
1211 SOUTHWEST FIFTH AVENUE • PORTLAND, OREGON 97204-3795
TELEPHONE: 503 222-9981 • FAX: 503 796-2900 • TELEX: 4937535 SWK UI

PATRICIA M. DOST
DIRECT LINE: 503 796-2449

January 18, 1994

Tony Hopp
Wildman, Harrold, Allen & Dixon
225 West Wacker Drive
Chicago, Illinois 60606-1229

Re: Time Oil Company/Northwest Terminal
Our File No. 89360/82295

Dear Tony:

Congratulations on your favorable settlement in the Arcata Redwood matter. It must be a relief to have that case off your desk.

Enclosed please find the dioxin test results and financial information Jane Patarcity requested during her visit here. I also enclose a copy of the final RFI work plan submitted to the Oregon Department of Environmental Quality and recent correspondence from DEQ. As you can see, both Time Oil and DEQ are anxious to begin work.

Tony, I am sending you a couple of articles passed on to me by our consultant, Landau Associates, concerning Koppers Company's Oroville site. We came away from our meeting with Jane with the impression that Koppers had no prior experience with dioxin waste. Obviously, we were mistaken. Perhaps one of Koppers' employees involved with the Oroville site could share his or her expertise with dioxin and pentachlorophenol with Time Oil and Landau Associates.

Time Oil appreciates Koppers' agreement to provide technical assistance with this project. I look forward to working with you soon to formalize this agreement.

Very truly yours,

Patty M. Dost

PMD:smp
Enclosure
cc: Rick Gordon
Kevin Murphy
Leslee Matthews

TOLS002538

(SWW1/89360/82295/PMD/173464.1)

32319

BZTO104(e)039359

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Andrew John Friedman
James E. Bruya, Ph.D.
(206) 285-8282

3008-B 16th Avenue West
Seattle, WA 98119
FAX: (206) 283-5044

February 26, 1991

Fred Proby, Environmental Specialist
Time Oil Company
2737 West Commodore Way
Seattle, WA 98199

Dear Mr. Proby:

I am writing to clarify our report of January 9, 1991, for your Project 03-123, Northwest Terminal under P.O. #13904. On September 14, 1990 you submitted 8 samples for screening for pentachlorophenol (PCP) to assure that they represented samples sufficiently contaminated for further analyses. The samples ranged from a low of <1,000 ppb to 1,200,000 ppb PCP. The samples were composited in two groups of four each and sent for analysis for chlorinated dibenzodioxins and chlorinated dibenzofurans.

Neither sample showed contamination with 2,3,7,8-Tetrachlorodibenzodioxin or 2,3,7,8-Tetrachlorodibenzofuran (detection levels of 0.0085 and 0.018 ppb, respectively). Levels of tetrachloro- thru octachlorodibenzodioxins ranged from not detected (<0.0085 ppb) to 170 ppb. Levels of tetrachloro- thru octachlorodibenzofurans ranged from 0.21 to 99 ppb. These levels are comparable to those found in estuarine samples from Grays Harbor and the Columbia River.

We appreciate the opportunity to be of service to you on this project. If you have any questions, or would like to discuss this or any other project, please feel free to call on us at your convenience.

Sincerely,

Andrew John Friedman

Andrew John Friedman, Chemist

AJF/fae

Enclosures

TOLS002539

32319

Encl. 3

BZTO104(e)039360

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: February 26, 1991
Date Submitted: September 14, 1990
Project: 03-123, Northwest Terminal under P.O. #13904

**RESULTS OF ANALYSES OF SAMPLES
FOR CONCENTRATIONS OF PENTACHLOROPHENOL (PCP)
FOUND IN TIME OIL COMPANY COMPOSITE SAMPLES
Results Reported as ng/g (ppb)**

Sample #	PCP
1	720,000
2	370,000
3	1,200,000
4	960,000
5	620,000
6	370
7	270,000
8	51,000

32319

TOLS002540

BZTO104(e)039361

32319

Date of Report: February 26, 1991
Date Submitted: September 14, 1990
Project: 03-123, Northwest Terminal under P.O. #13904

**RESULTS OF ANALYSES OF SAMPLES
FOR CONCENTRATIONS OF CHLORINATED DIBENZODIOXINS
FOUND IN TIME OIL COMPANY COMPOSITE SAMPLES
Results Reported as ng/g (ppb)**

Sample #	2,3,7,8-Tetrachloro-Dibenzodioxin	Tetrachloro-Dibenzodioxins	Pentachloro-Dibenzodioxins	Hexachloro-Dibenzodioxins	Heptachloro-Dibenzodioxins	Octachloro-Dibenzodioxins
Composite 1, 2, 3, 4	<0.0085	<0.0085	<0.024	12	170	150
Composite 5, 6 7, 8	<0.0048	<0.0048	<0.020	8.0	110	170

BZTO104(e)039362

TOLS002541

Date of Report: February 26, 1991
Date Submitted: September 14, 1990
Project: 03-123, Northwest Terminal under P.O. #13904

**RESULTS OF ANALYSES OF SAMPLES
FOR CONCENTRATIONS OF CHLORINATED DIBENZOFURANS
FOUND IN TIME OIL COMPANY COMPOSITE SAMPLES
Results Reported as ng/g (ppb)**

Sample #	2,3,7,8-Tetrachloro-Dibenzofuran	Tetrachloro-Dibenzofurans	Pentachloro-Dibenzofurans	Hexachloro-Dibenzofurans	Heptachloro-Dibenzofurans	Octachloro-Dibenzofurans
Composite 1, 2 3, 4	<0.018	0.21	1.4	23	86	99
Composite 5, 6 7, 8	<0.012	0.14	1.9	17	51	68

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Andrew John Friedman
James E. Bruya, Ph.D.
(206) 285-8282

3008-B 16th Avenue West
Seattle, WA 98119
FAX: (206) 283-5044

January 9, 1991

Fred Proby, Environmental Specialist
Time Oil Company
2737 West Commodore Way
Seattle, WA 98199

Dear Mr. Proby:

Enclosed are the results of the analyses of the samples submitted on September 14, 1990 from Project 03-123, Northwest Terminal under P.O. #13904.

We appreciate this opportunity to be of service to you on this project. If you have any questions regarding this material, or if you just want to discuss any aspect of your projects, please do not hesitate to contact me.

Sincerely,

Andrew John Friedman, Chemist

AJF

Enclosures

32319

TOLS002543

BZTO104(e)039364

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: January 9, 1991
Date Submitted: September 14, 1990
Project: 03-123, Northwest Terminal under P.O. #13904

RESULTS OF ANALYSES OF THE SOIL SAMPLES FOR PENTACHLOROPHENOL (PCP) BY GC/ECD
Results Reported as µg/g (ppm)

Sample #	PCP (ppm)
SP-1	720
SP-2	370
SP-3	1,200
SP-4	960
SP-5	620
SP-6	0.37
SP-7	270
SP-8	51

Quality Assurance

Method Blank	<0.01
SP-3 (Duplicate)	510
SP-3 (Matrix Spike) Spiked @ 50 ppm Percent Recovery	a
SP-3 (Matrix Spike Duplicate) Spiked @ 50 ppm Percent Recovery	a

[a] - The amount spiked was insufficient to give meaningful recovery data.

32319

TOLS002544

BZTO104(e)039365

DIOXIN/FURAN REVIEW SHEET

(Higher Molecular Wt. Ion used in Calculations)

Composite Samples 1-4

Analysis: [redacted]
LR/HR: LR
Client Name: Friedman & Bruya, Inc.
CAL Project No.: CALLAB-[redacted]
Client Sample ID: [redacted]
Enseco Sample ID: 173461
Date Sampled:
Date Authorized:
Date Analyzed: 13 DEC 90
Sample Wt./Vol.: [redacted]
RRF's from [redacted]
Units: [redacted]
A = Amount added to the sample

CAL Sample Number: [redacted]
Matrix: SOIL
Date Received: 08 NOV 90
Date Extracted: 05 DEC 90
GC Column: [redacted]
Percent Moisture: NA
Data Prepared by: AALGAZI

FURANS	SCANS	TOTAL AREA	TOTAL AREA	DL HEIGHT	AREA RATIO	RRF	AMOUNT FOUND		DETECTION LIMIT	PERCENT RECOVERY
13C-1234-TCDF							2.	(A)		
13C-2378-TCDF	982	38095	45201	18004	0.84	1.63	1.	(A)		86.73
Tetra (total)		43064.00	55096.00	1888	0.78	1.13	0.21		--	
(2378)				1898		1.13	ND		0.018	
Penta (total)			350183.00		0.00	3.28	1.4		--	
(12378)	1095		54564		0.00	3.28	0.22		--	
(23478)	1117		29166		0.00	3.28	0.12		--	
Hexa (total)		3347638.00	2902145.00		1.15	1.55	23		--	
(123478)	1223	101973	85356		1.19	1.55	0.67		--	
(123678)	1227	56239	49248		1.14	1.55	0.39		--	
(123789)	1288	46231	41548		1.11	1.55	0.33		--	
(234678)	1248	112543	99526		1.13	1.55	0.78		--	
Hepta (total)		8222047.00	7711788.00		1.07	1.72	86		--	
(1234678)	1361	1796230	1686310		1.07	1.72	19		--	
(1234789)	1437	98037	94578		1.04	1.72	1.1		--	
Octa (total)		3303190.00	3561650.00		0.93	1.38	99		--	

JAN 7 '91 15:29 FROM ENSECO CAL LAB

BZTO104(e)039366

TOLS002545

Review, pg 2
CAL Sample ID: CALLAB-[redacted]

DIOXINS	SCANS	TOTAL AREA	TOTAL AREA	DL HEIGHT	AREA RATIO	RRF	AMOUNT FOUND		DETECTION LIMIT	PERCENT RECOVERY
13C-1234-TCDD	995	50997	63947		0.80		2	(A)		
13C-123789-HxCDD								(A)		
13C-2378-TCDD	1000	21085	27290	12074	0.77	0.92	1	(A)		92.77
37Cl-2378-TCDD	1000		49106		0.00	1.95	1	(A)		78.76
Tetra (total)				556		1.06	ND		0.0085	
(2378)				556		1.06	ND		0.0085	
13C-12378	1127	52924	37605	13486	1.41	0.39	2.5	(A)		120.63
Penta (total)				735		1.10	ND		0.024	
(12378)				735		1.10	ND		0.024	
13C-123678	1255	46280	40144	12139	1.15	0.45	2.5	(A)		111.60
Hexa (total)		1340357.00	1051044.00		1.28	1.06	12		--	
(123478)	1256	621926	488093		1.27	1.06	5.6		--	
(123678)	1256	621926	488093		1.27	1.06	5.6		--	
(123789)	1271	55132	41576		1.33	1.06	0.48		--	
13C-1234678	1413	27093	25594	5604	1.06	0.24	2.5	(A)		133.41
Hepta (total)		9815620.00	9913430.00		0.99	1.11	170		--	
(1234678)	1413	6753770	6852470		0.99	1.11	120		--	
13C-~~OCDD~~ HpCDD (amts 12/17)	1413	27093	25594	5604	1.06	+	5	(A)		N.C.
OCDD (total)		12725100.0	13652600.0		0.93	3.38*	150		--	

*RRF calculated using OCDD vs. ^{13}C-HpCDD

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DIOXIN/FURAN REVIEW SHEET

(Higher Molecular Wt. Ion used in Calculations)

Composite Samples 5-8

Analysis: [redacted]
LR/HR: LR
Client Name: Friedman & Bruya, Inc.
CAL Project No.: CALLAB-[redacted]
Client Sample ID: [redacted]
Enseco Sample ID: 173463
Date Sampled:
Date Authorized:
Date Analyzed: 13 DEC 90
Sample Wt./Vol.: [redacted]
RRF's from: S[redacted]
Units: [redacted]

CAL Sample Number.: [redacted]-SA
Matrix: SOIL
Date Received: 08 NOV 90
Date Extracted: 05 DEC 90
GC Column: [redacted]
Percent Moisture: NA

Data Prepared by: AALGAZI

A = Amount added to the sample

FURANS	SCANS	TOTAL AREA	TOTAL AREA	DL HEIGHT	AREA RATIO	RRF	AMOUNT FOUND	DETECTION LIMIT	PERCENT RECOVERY
13C-1234-TCDF							2	(A)	
13C-2378-TCDF	982	42041	53400	23210	0.79	1.63	1	(A)	108.35
Tetra (total)		30505.00	41906.00	1567	0.73	1.13	0.14	--	
(2378)				1567		1.13	ND	0.012	
								12 pg	
Penta (total)			503310.00		0.00	3.28	1.9	--	
(12378)	1095		70731		0.00	3.28	0.27	--	
(23478)	1116		17379		0.00	3.28	0.067	--	
Hexa (total)		2628054.00	2303636.00		1.14	1.55	17	--	
(123478)	1181	220990	191986		1.15	1.55	1.4	--	
(123678)	1226	41240	34670		1.19	1.55	0.26	--	
(123789)	1287	33347	29636		1.13	1.55	0.22	--	
(234678)	1247	83572	72667		1.15	1.55	0.54	--	
Hepta (total)		6277910.00	5880612.00		1.07	1.72	51	--	
(1234678)	1361	1492920	1391050		1.07	1.72	12	--	
(1234789)	1436	70440	69362		1.02	1.72	0.60	--	
Octa (total)		2894970.00	3127180.00		0.93	1.38	68	--	

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Review, pg 2
CAL Sample ID: CALLAB-055710-0002-BA

DIOXINS	SCANS	TOTAL AREA	TOTAL AREA	DL HEIGHT	AREA RATIO	RRF	AMOUNT FOUND	DETECTION LIMIT	PERCENT RECOVERY
13C-1234-TCDD	995	51331	60474		0.85		2	(A)	
13C-123789-HxCDD								(A)	
13C-2378-TCDD	999	29079	36453	16154	0.80	0.92	1	(A)	131.04
37Cl-2378-TCDD	1000		53165		0.00	1.95	1	(A)	90.17
Tetra (total)				412		1.06	ND	0.0048	
(2378)				412		1.06	ND	0.0048	
13C-12378	1126	61396	39572	15450	1.55	0.39	2.5	(A)	134.23
Penta (total)				670		1.10	ND	0.020	
(12378)				670		1.10	ND	0.020	
13C-123678	1254	55765	43800	14527	1.27	0.45	2.5	(A)	128.76
Hexa (total)		941976.00	740865.00		1.27	1.06	8.0	--	
(123478)	1255	429707	339480		1.27	1.06	3.7	--	
(123678)	1255	429707	339480		1.27	1.06	3.7	--	
(123789)	1270	39980	33644		1.19	1.06	0.36	--	
13C-1234678	1411	37086	33396	7260	1.11	0.24	2.5	(A)	184.08
Hepta (total)		7732680.00	7867460.00		0.98	1.11	110	--	
(1234678)	1411	5155450	5254420		0.98	1.11	71	--	
13C-~~OCDD~~ HpCDD (ama 11/17)	1411	37086	33396	7260	1.11	+	5	(A)	N.C.
OCDD (total)		17563500.0	18845000.0		0.93	3.38*	170	--	

*RRF calculated using OCDD vs ^{13}C-HPCDD.

** TOTAL PAGE.005 **

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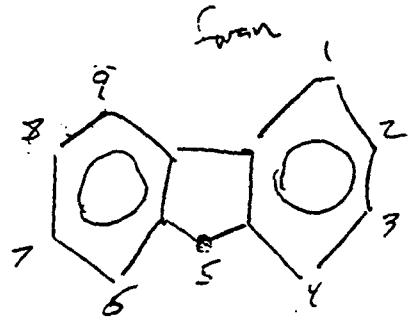
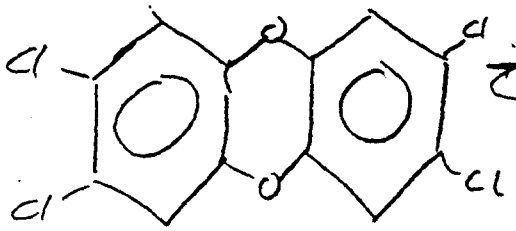


Dibenzo furan



Dibenzodioxin

2,3,7,8 Tetra chloro

40 ppt - aquatic

11/19/93

NORTHWEST TERMINAL - WOODTREATING

COSTS OF INVESTIGATION AND CLEANUP

DATE	EXPLANATION	AMOUNT
04/30/85	Chem-Security Systems - Lab fees	$150.00
07/09/85	NW Vacuum Truck Service - Soil removal	$9,000.00
07/29/85	Chem-Security Systems - Soil disposal	$27,270.88
08/08/85	Riedel - Obtain & analyze 3 soil samples	$500.00
12/05/85	Riedel - Obtain & analyze soil samples	$18,741.55
	1985 Total	$55,662.43
	1/2 Share	$27,831.22
03/24/86	Riedel - Well demo & well installation	$17,252.67
05/16/86	Instrumentation NW - Well point materials	$3,702.66
06/10/86	OR DEQ - Hazardous waste disposal fee	$3,500.00
06/11/86	Century Envir. - Analyze water samples	$2,739.50
07/08/86	Century Envir. - Analyze water samples	$1,800.00
08/08/86	Riedel - Install 3 monitoring wells	$4,452.81
08/15/86	Concrete Coring - Warehouse floor holes	$390.00
08/25/86	Jack Each Construction - Relocate soil	$1,465.00
10/01/86	SRH - Review of cleanup alternatives	$18,465.00
01/26/87	Century West - Analyze 3/86 water samples	$130.50
	1986 Total	$53,898.14
	Cumulative	$109,560.57
	1/2 Share	$54,780.29
11/09/87	SRH - Analyze water samples	$2,810.53
	1987 Total	$2,810.53
	Cumulative	$112,371.10
	1/2 Share	$56,185.55
08/31/88	Ecova - Prepare cleanup work plan	$6,000.00
	1988 Total	$6,000.00
	Cumulative	$118,371.10
	Koppers Paid this amount in 1989 1/2 Share	$59,185.55
03/02/89	PGE - Temporary power lines	$4,763.04
03/14/89	Ecova - Mob, excavation & well installation	$160,000.00
09/13/89	Friedman & Bruya - 8/23/89 Reactor samples	$62.50
10/04/89	Friedman & Bruya - 9/12/89 Reactor samples	$170.00
12/01/89	Friedman & Bruya - 10/6/89 Reactor samples	$510.00
12/01/89	Friedman & Bruya - 10/24/89 Reactor samples	$515.00
12/01/89	Friedman & Bruya - 11/2/89 Reactor samples	$425.00
	1989 Total	$166,445.54
	Cumulative	$284,816.64

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NORTHWEST TERMINAL – WOODTREATING

COSTS OF INVESTIGATION AND CLEANUP

DATE	EXPLANATION	AMOUNT
08/14/90	ECOVA – Soil Treatment & Treatability	$66,017.00
11/30/90	ECOVA – Cover pile & Maint.	$3,760.00
02/15/90	Friedman & Bruya – 1/15/90 Soil pile samples	$442.50
	1990 To Date	$70,219.50
	Cumulative	$355,036.14
02/26/91	Friedman & Bruya–Soil samples for Penta/Dioxin PO #13904	
03/20/91	Friedman & Bruya – Monitoring well samples – PCP	$3,860.00
07/19/91	DEQ Oversight Prepaid 7/91 – 3/92	$5,000.00
12/00/91	ECOVA – Equipment Maint & Rental (Yearly Total)	$25,140.00
12/00/91	ECOVA – DEQ Negotiations and Assessment	$21,643.09
	1991 Total	$55,643.09
	Cumulative	$410,679.23
06/01/92	DEQ Oversight 4/92	$620.07
07/06/92	DEQ Oversight 5/92	$1,164.62
07/23/92	Reef Industries – Soil pile cover	$5,042.50
08/18/92	Friedman & Bruya – Soil sample ID for PCP	$125.00
08/25/92	ECOVA – Soil Treatment, Treatability, Cover & Maint	$6,952.50
10/01/92	SCS Fencing for Penta Site	$1,181.25
	1992 Total	$15,085.94
	Cumulative	$425,765.17
01/31/93	KW Brown – Consulting – RCRA	$1,861.12
03/10/93	KW Brown – Consulting – RCRA	$2,526.48
04/13/93	KW Brown – Consulting – RCRA	$300.00
04/30/93	ATEC – Consulting – RCRA	$1,800.00
06/30/93	ATEC – Consulting – RCRA	$32.30
06/24/93	Landau Associates RFI, Containment design	$14,263.03
07/30/93	Landau Associates RFI, Containment design	$19,629.53
08/31/93	Landau Associates RFI, Containment design	$15,503.10
10/29/93	Landau Associates RFI, Containment design	$24,672.90
	1993 To Date	$80,588.46
	Cumulative	$506,353.63

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Work Plan

RCRA Facility Investigation
Former PCP Mixing Area
Northwest Terminal
Portland, Oregon

December 14, 1993

Prepared for

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C Health and Safety Plan

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1.0 INTRODUCTION

This Work Plan presents the general description and scope of work for a RCRA Facility Investigation (RFI) of the former pentachlorophenol mixing area at the Time Oil Company Northwest Terminal in Portland, Oregon. The RFI will be implemented in accordance with the Oregon Hazardous Waste Management Regulations (OAR 340-100) under the direction of the Oregon Department of Environmental Quality (DEQ).

This RFI Work Plan includes study objectives and tasks; a description of sampling locations; protocols for sampling, analysis, quality assurance/control, and health and safety; and a schedule for conducting the RFI activities.

1.1 PURPOSE/OBJECTIVES OF THE INVESTIGATION

The overall purpose of the RFI for the former pentachlorophenol mixing area (hereafter referred to as the site) is to collect data sufficient to characterize the nature and extent of contamination that remains at the site from releases during former site operations, and after completion of interim remedial actions taken by Time Oil Company (Time) since site operations ceased. The data collected during the RFI will subsequently be used to evaluate whether a Corrective Measures Study is needed and, if so, will be used in the study itself. These objectives will be accomplished by:

- Sampling and analyzing soil in and adjacent to areas previously reported to be contaminated with pentachlorophenol (PCP) and other carrier compounds, or where previous site activities otherwise suggest the potential for contamination
- Identifying and characterizing the carrier compounds
- Installing monitoring wells and sampling and analyzing groundwater in areas downgradient of previously identified soil or groundwater contamination and/or where previous hydrogeologic characterization is insufficient for the purpose of the RFI
- Abandoning two existing wells which are damaged
- Measuring water levels periodically to evaluate flow directions and piezometric head gradients

- Conducting tests in selected monitoring wells to evaluate aquifer properties and potential contaminant migration pathways
- Conducting a topographic survey of all measurement points so that field measurements can be confidently evaluated and compared, and the extent of contamination can be accurately evaluated
- Validating and evaluating the field and laboratory data.

2.0 SITE BACKGROUND AND ENVIRONMENTAL SETTING

The site is a former pentachlorophenol mixing area located within a small portion of Time's Northwest Terminal, in the industrialized Rivergate area of north Portland, Oregon (Figure 2-1). The Northwest Terminal is currently used for petroleum products storage and is bounded to the north, east, and south by heavy industrial complexes and the Port of Portland, and to the west by the Willamette River. The RFI site occupies about 5,000 ft^2 within the interior of the Northwest Terminal, and is located approximately 1/4 mile northeast of the eastern bank of the Willamette River.

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 2-2).

2.1 SITE HISTORY

Former site operations consisted of PCP blending services that were operated by Time under an 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 or containers for offsite transport. No PCP blending activities have occurred at the site since 1982.

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 (Figure 2-2). 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 amount of PCP-containing soil remains unexcavated at the site.

2.2 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* (ECOVA 1991), which was reproduced as Appendix A in the *Site Characteristics Report* (Landau Associates 1993).

2.2.1 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 so that 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. 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 PCP 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 38009 and near the pipelines for the old Tanks (5006 and 10002). These samples were reported to contain PCP concentrations ranging from about 5 to 2,424 ppm (near Tank 38009).

2.2.2 Groundwater

Between 1985 and mid-1990, Time and/or its consultants installed 16 monitoring wells and seven well points at or near the site (Figure 2-3). Of these, one well point and one monitoring well are currently damaged and will be abandoned as part of the RFI.

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.

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2.3 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, and its breakdown products 2,3,4,6-tetrachlorophenol, 2,4,5-trichlorophenol, 2,4,6-trichlorophenol, 2,4-dichlorophenol, and 2-chlorophenol
- Polychlorodibenzo-dioxins and -furans, which are common trace contaminants in technical grade PCP (note that tetrachlorodibenzodioxin, the most toxic isomer, has not been identified in soil samples from the site)
- Benzene, ethylbenzene, toluene, and xylenes 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.

2.4 GEOLOGY AND HYDROGEOLOGY

As noted previously, 16 monitoring wells and well points have been installed to date at 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.

Available site data (Ecova 1991 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 confining layer ranging from about 2-5 ft thick reportedly separates the perched zone from a lower water-bearing zone, and is reported to terminate southwest 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 piezometric head 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 (ECOVA 1991); this direction of flow was confirmed during a comprehensive water level measurement round conducted in August 1993. There is not sufficient information to determine the groundwater flow direction for the lower water-bearing zone at this time.

The geology and hydrogeology have yet to be sufficiently characterized at the site. Information to be collected as part of the RFI, including the installation of additional monitoring wells, periodic measurement of water levels, and aquifer testing, will be used in the evaluation of groundwater flow directions, vertical and horizonal gradients, and aquifer properties in each of the water-bearing zones.

2.5 POTENTIAL MIGRATION PATHWAYS

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

The occurrence of PCP in all of these forms will be evaluated during the RFI.

2.6 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 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.

The RFI field program described in this work plan has been designed to obtain data to evaluate these issues.

3.0 FIELD INVESTIGATION

3.1 INTRODUCTION

The purpose of the RFI field activities will be to collect data to supplement currently available data regarding site hydrogeology and the nature and extent of contamination associated with the former PCP mixing area (the site). To this end, RFI field activities will include collection and analysis of soil and groundwater samples, installation of additional monitoring wells, aquifer testing, measurement of water levels, and land surveying. The planned locations for collecting soil samples and installing monitoring wells are shown on Figures 3-1 and 3-2. The Standard Operating Procedures (SOPs) to be followed during soil and groundwater sampling, drilling, and well installation activities are provided in Appendix A. Quality assurance/quality control (QA/QC) procedures to be followed during this investigation are outlined in the Quality Assurance Project Plan (QAPjP) in Appendix B. Health and safety procedures to be used during field activities are contained in the Health and Safety Plan in Appendix C.

3.2 SOIL INVESTIGATION

Sampling and analysis of surface and subsurface soil will be conducted to evaluate the concentrations and limits of contamination by PCP and related chemicals, and the extent to which carrier chemicals have impacted site soil. Soil samples will be collected for analysis from areas onsite where soil data are limited or unavailable, or from areas previously identified as contaminated, but where additional characterization has been determined to be necessary.

3.2.1 Subsurface Soil Sampling Locations

Subsurface soil samples will be collected from seven "biased" locations where, based upon a review of previous site data, PCP contamination is suspected to exist at depth, and from 5 random locations within or adjacent to the former PCP mixing area. Subsurface soil samples will be collected from depths which extend slightly into the confining layer, which is anticipated to be about 15 to 20 ft BGS. The "biased" subsurface soil sampling locations (LB1-LB7) include:

- Five locations (LB1 through LB5) within the boundaries of the previously excavated area where PCP contamination was reported at depths exceeding the maximum excavation depth or where the lateral extent of contamination was not adequately defined.

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- One location (LB6) south/southeast of the 1989 excavation limits, along the product pipelines, where elevated PCP concentrations were previously reported. LB6 is also adjacent to old storage tank 38009.
- One location (LB7) adjacent to the sump at the northwest corner of the soil stockpile area where contamination was previously reported.

Because the "biased" sampling locations are biased toward locations for which there is some indication of residual contamination, the resultant data may not be appropriate for statistical interpretation. Therefore, the RFI will also include random sampling of subsurface soil within the former PCP mixing area. Each of the 5 random samples (LB8 through LB12) will be collected at a single randomly generated location within each of the 5 rectangular grids, as shown on Figure 3-1. [Note that if any random sample is close (within about 5 ft) to a biased sample location or new monitoring well location, the random sample will be relocated to provide a more evenly distributed representation of constituent concentrations).

3.2.2 Surface Soil Sample Locations

In addition to these subsurface samples, surface soil samples will be collected from three areas [at depths of approximately 0-6 inches below ground surface (BGS)], as shown on Figure 3-1 and listed in Table 3-1. The surface soil sampling areas include the following:

- Two (LS1 and LS2) located near the former PCP loading dock and warehouse, outside the limits of excavation, in areas not previously sampled or where sample results are limited.
- One (LS3) located at the termination of the rail line to the east of the previous excavation limits.

3.2.3 Soil Sample Collection

Methods to be used to collect the soil samples will include drilling shallow soil borings for the subsurface soil samples, and drilling or hand-digging holes for the surface soil samples.

At each subsurface soil location, soil will be collected for lithologic logging purposes at 5-ft intervals or significant changes in lithology (whichever is smaller) and for chemical analyses at the following depth intervals:

- 0-6 inches BGS (except for locations within the excavation area; at these locations, the first sample will be collected near the base of the 1989 excavation or below the base of the backfill. In those locations where the 1989 excavation coincides with the water table, the first depth interval will not be collected.)

- Near the water table surface of the upper water-bearing zone (or, where it is possible to identify, within the zone of seasonal water table fluctuation)
- At the base of the upper water-bearing zone (near the contact with the underlying interbedded confining layer, where present)

Surface soil samples will be collected from 2 to 3 random locations within each surface soil sampling area (LS-1 through LS-3) at a depth interval of 0-6 inches BGS or below any fill layer at the surface. (Note that surface sample area LS1 may have historically been covered with road fill and/or asphalt; if field observations confirm this, no samples will be collected in this area.) The random samples from each area will be composited to yield 1 surface soil sample per area for chemical analysis.

3.2.4 Soil Sample Analysis

Chemical analyses performed on the subsurface and surface soil samples will include semivolatile organics, chlorinated phenols (including PCP and tetrachlorophenol), total petroleum hydrocarbons (TPH), and volatile organics. [Note that if early analytical results indicate that contamination at the site is limited to a smaller group of constituents and, therefore, the full suite of analyses is clearly not necessary to characterize contamination at the site, the extraneous analyses may be dropped for subsequent samples. In making this decision, consideration will be given to the representative nature of the early samples (i.e., vertical and lateral distribution)]. Selected subsurface and/or surface soil samples (approximately 4 samples) may also be analyzed for dioxins/furans. For the semivolatile and volatile organic compounds, the laboratory will also be required to report the first 10 tentatively identified compounds (TICs), to aid in the identification of carrier or additive compounds. Further descriptions of the soil analytical program, including specific analytical method numbers, are provided in Table 3-1 and in Appendix B.

3.3 GROUNDWATER INVESTIGATION

The RFI groundwater investigation will include the following activities:

- Drilling and installing five monitoring wells (3 shallow and 2 deep)
- Measuring water levels in existing wells, well points, new monitoring wells, and at the Willamette River
- Sampling and analysis of soil from the new monitoring well borings

- Sampling and analysis of groundwater from all existing monitoring wells and well points at the site and from the new monitoring wells, on a semiannual basis, for 1 year
- Performing aquifer testing within the upper and lower water-bearing zones after the first groundwater sampling event.

These activities will provide additional information on the extent of groundwater contamination and the potential for contaminant migration.

3.3.1 Monitoring Well Installation

Five new monitoring wells (three shallow and two deep) will be installed at the locations shown on Figure 3-2 and listed on Table 3-1. Two of the new wells will be installed in a cluster (one shallow well and one deep well in separate borings about 10 ft apart). The well cluster (shallow well LW1S and deep well LW1D) will be installed between the former PCP mixing area and Well M, which was previously used for pumping, to identify any influence due to the pumping well, and will provide information on vertical variability in chemical concentrations and vertical groundwater gradients. A shallow well (LW2S) will be installed within the excavation area of the former PCP mixing area (the three existing angled wells do not extend to the top of the confining layer, and, therefore, are not adequate for the purposes of the RFI). A single deep well (LW3D) will be installed adjacent to the former PCP mixing area (and adjacent to existing shallow Well D) to provide information on the direction of flow in the lower water-bearing zone, vertical gradients between the upper and lower water-bearing zones, and water quality in the lower water-bearing zone in this area. Another single shallow well (LW4S) will be installed downgradient from the stockpiled soil area and cross-gradient from the J wells.

Monitoring wells will be drilled and installed in accordance with applicable Oregon Water Resources Department regulations (OAR 690.240). The drilling techniques to be used during the RFI depend on the depth of the monitoring well (shallow or deep) and on soil conditions encountered during drilling. It is currently expected that the drilling methods will include hollow-stem auger or cable tool for the shallow wells and cable tool for the deep wells (as explained further below).

Shallow wells will be completed within the upper water-bearing zone with the screened interval extending from just below or at the base of the water-bearing zone upward across the water table to a level above or approximately equaling the expected seasonal high water level. This will allow detection of both a dense and/or a floating nonaqueous phase, if present. Based

on well logs and historical site water level data, the total depths of the shallow wells are expected to range from 15 to 20 ft BGS, with screen lengths of 10 ft which are anticipated to be sufficient to extend to just above the expected seasonal high water level. Borings for the shallow wells will be drilled using a hollow-stem auger rig.

Deep wells will be completed and screened within the lower water-bearing zone to evaluate whether contamination has migrated vertically downward through the overlying confining layer. Based on previous site well logs, the deep wells are expected to extend about 35-40 ft BGS and will be completed with 5-ft screens to facilitate discrete detection of contamination in the lower water-bearing zone. Boreholes for the deep wells will be properly sealed between aquifers by stepping down casing size across the confining layer. To be certain that the seal is properly achieved and that sloughing that could compromise the seal does not occur, the deep wells will be installed using cable tool drilling (unless auger drilling can be performed without compromising the integrity of the seal between the two water-bearing zones).

Following installation, all new wells will be developed by purging using a development pump. Drilling methods and well installation procedures are described in more detail in Appendix A.

3.3.2 Water Level Measurements

Water levels will be measured in the new monitoring wells following drilling, installation, and development, and prior to each scheduled groundwater sampling event. Water level measurements also will be collected preceding groundwater sampling events in the existing monitoring wells and well points and at the river gauge. The water levels will be used to evaluate the general direction of groundwater flow within each water-bearing zone, horizontal and vertical gradients, and other influences on groundwater flow. The procedures to be used for measuring water levels are provided in Appendix A.

Water level measurements also will be collected over a 24- to 48-hour period in three shallow wells, in three deep wells, and at the river to evaluate tidal responses from the Willamette River in the upper and lower water-bearing zones. The procedures to be used for measuring water levels to evaluate responses to tidal fluctuations are provided in Appendix A.

3.3.3 Monitoring Well Sample Collection

3.3.3.1 Well Boring Soil

At each monitoring well location, soil samples will be collected during drilling as described in Appendix A. Sampling intervals in the shallow and deep well borings will be the same as those indicated for subsurface soil samples (see Section 3.2.3). Two additional samples will be collected from each deep well boring: one from within the confining layer separating the upper and lower water-bearing zones, and one from within the lower water-bearing zone. The soil samples collected from the confining layer at each deep well will be analyzed for chemistry and vertical hydraulic conductivity; the sample from within the lower water-bearing zone will be analyzed for chemistry and the "fate and transport" parameters defined in Table 3-1.

3.3.3.2 Groundwater

Groundwater samples will be collected twice (on a semiannual basis for 1 year) from all newly installed wells, all existing monitoring wells, and one well point (Well Point G, if not dry). The sampling events are expected to be scheduled to obtain dry and wet season groundwater quality data. Groundwater sampling protocols to be followed during the RFI are presented in Appendix A.

3.3.4 Monitoring Well Sample Analyses

3.3.4.1 Well Boring Soil

Chemical analyses performed on the well boring soil samples will be the same as those conducted on the surface and subsurface soil samples as noted in Section 3.2.4 and as shown in Table 3-1; i.e., semivolatile organics, chlorinated phenols (including PCP and tetrachlorophenol), total petroleum hydrocarbons (TPH), and volatile organics. For the semivolatile and volatile organic compounds, the laboratory will also be required to report the first 10 tentatively identified compounds (TICs), to aid in the identification of carrier or additive compounds.

3.3.4.2 Groundwater

Chemical analyses performed on the groundwater samples will be the same as those conducted on the well boring soil samples, listed in the previous section. Also, major ion analyses will be conducted on selected wells (approximately 9) to assist in hydrogeologic characterization. A dioxin/furan analysis will be performed on groundwater collected from Well J1 (the well exhibiting the highest historical PCP concentration). The need to analyze other

groundwater samples for dioxins and furans will be assessed after evaluation of the first sampling round results from Well J1.

Further descriptions of the groundwater analytical program, including specific analytical method numbers, are provided in Table 3-1 and in Appendix B.

3.3.5 Aquifer Testing

Aquifer testing will be conducted to provide estimates of aquifer properties for input to RFI evaluations of contaminant fate and transport. Aquifer testing methods will initially include variable head (slug) tests to estimate aquifer properties. The need for pumping tests to more accurately evaluate aquifer properties will be assessed following evaluation of the results of the slug tests, the first groundwater sampling event, and the boring data results from the confining layer.

The slug tests will be conducted following installation of the new monitoring wells. It is anticipated that at least 4 to 8 slug tests (2 to 4 each in the upper and lower water-bearing zones) will be performed. The information collected will be used to calculate an estimate of the horizontal hydraulic conductivity of the water-bearing strata, using the Hvorslev method for unconfined conditions or the Cooper et al. method if the lower water-bearing zone exhibits confined conditions (Freeze and Cherry 1979).

As noted previously, pumping tests, if conducted, only will be performed after the first semiannual groundwater sampling data are received and evaluated. This will allow identification of optimal location(s) for the tests, and will decrease the chance of unintentional contaminant transport between the upper and lower water-bearing zones.

3.4 ABANDONMENT OF EXISTING DAMAGED WELLS

One shallow monitoring well (Well I) and one well point (Well E), both installed in 1986, have been damaged due to truck traffic at the site. Because of the current damaged condition of these wells, they are unsuitable for use as monitoring points and will be abandoned during RFI activities at the site in accordance with Oregon State regulations (State of Oregon Administrative Rules for Construction and Maintenance of Monitoring Wells and Other Holes in Oregon, OAR 690-240).

Abandonment will be performed using the procedures described in Appendix A.

3.5 HANDLING OF INVESTIGATION-DERIVED WASTES

Investigation-derived wastes, such as water and soil cuttings generated during drilling activities, water purged from the wells during development and sampling, waste decontamination liquids, and solid residuals (i.e. Tyvek, gloves, etc.) will be collected and stored onsite pending laboratory analysis of soil and groundwater. Decontamination fluids containing decontamination solvents will be stored separately. These investigation-derived wastes will be disposed appropriately, in a manner consistent with the analytical results and in accordance with local, state, and federal regulations.

3.6 TOPOGRAPHIC SURVEY

A vertical and horizontal survey will be conducted by a licensed land surveyor to determine and map the locations and elevations of each existing and newly installed monitoring well and well point. The survey information will include northing and easting coordinates, existing surface elevations, and elevations for water level measurement reference points (generally the top of the well casing). The survey will be referenced to a USGS benchmark, and the results of the survey will be translated to spreadsheets and maps utilized in the RFI.

4.0 QUALITY ASSURANCE/QUALITY CONTROL

The RFI data will be used to support decisions regarding the need for further remedial action at the site and, if needed, the appropriate remedial actions to be considered. Because of this, the RFI data must be collected in a manner that both provides for, and documents, an acceptable level of precision and accuracy. A quality assurance/quality control (QA/QC) program designed to provide the necessary level of precision and accuracy, as well as completeness, representativeness, and comparability for the RFI is outlined in detail in Appendix B. The QA/QC program includes, among other things, identification of data quality objectives, specific QA/QC procedures for sample collection and handling, analytical protocols for the analytical laboratories, the use of QC samples, and data validation procedures.

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5.0 DATA EVALUATION AND MANAGEMENT

Following validation, compilation, and evaluation of the field and laboratory data, a report will be prepared to document the findings of the RFI. The report will include tabulations of the RFI data and discussions of the RFI data as compared to previously collected site data, the resulting conclusions regarding the nature and extent of soil and groundwater contamination at the site, any additional constituents of concern, the hydrogeologic properties at the site that may influence contaminant migration, and the anticipated future migration of documented contamination. The RFI data will be presented in tabular and graphical format, as appropriate, and will be available in ASCII format on disk. Maps developed during the RFI will be based on surveys relative to a USGS benchmark.

6.0 INVESTIGATION AND DELIVERABLES SCHEDULE

A schedule for the RFI has been developed and is presented in Figure 6-1. The schedule anticipates completion of the RFI and submittal of the final RFI report within 13 months of submittal of the draft work plan to DEQ. Assumptions incorporated into the schedule include 30-day review periods of the draft work plan and the draft RFI report by DEQ, and 30-day turnaround on analytical results by the laboratories. If these assumptions cannot be realized, the schedule will extend beyond the projected 13 months accordingly.

7.0 REFERENCES

ECOVA. 1991. *Preliminary Assessment/Data Evaluation and Proposed Remediation Plan for Pentachlorophenol Contaminated Soil at Time Oil Co.*

Freeze, R.A. and J.A. Cherry. 1979. *Groundwater.* Prentice-Hall, Inc., Eaglewood Cliffs, NJ.

Landau Associates. 1993. *Site Characteristics Report, Former PCP Mixing Area, Northwest Terminal, Portland, Oregon.* Prepared for Time Oil Company, Seattle, Washington. August 30.

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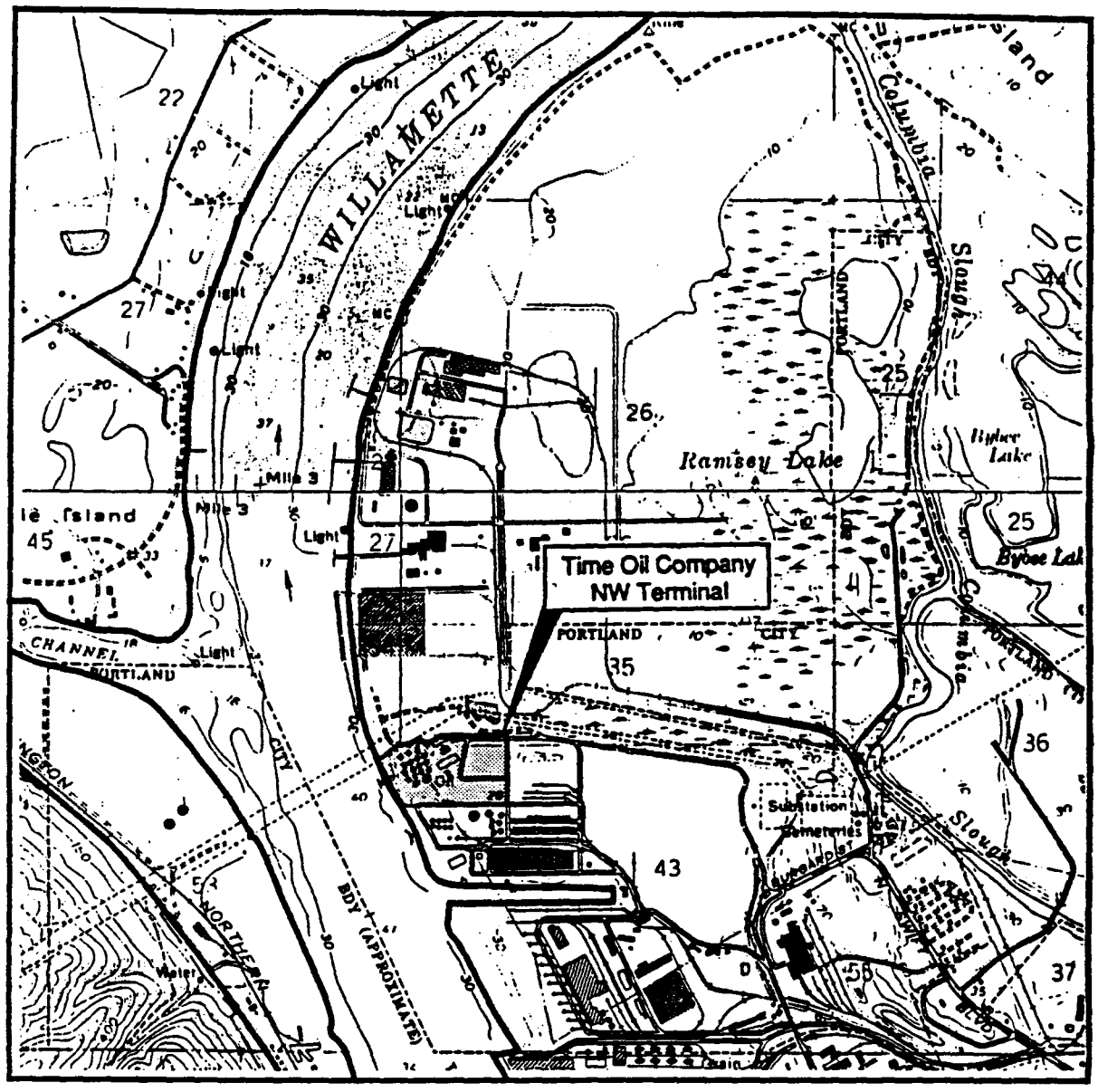

Source: U.S.G.S., 7.5-min. series quadrangle map: Linnton and Sauvie Island, OR (1956; photorevised 1968 and 1973)

0 1/2 1

Scale in Miles

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	Vicinity Map	Figure 2-1

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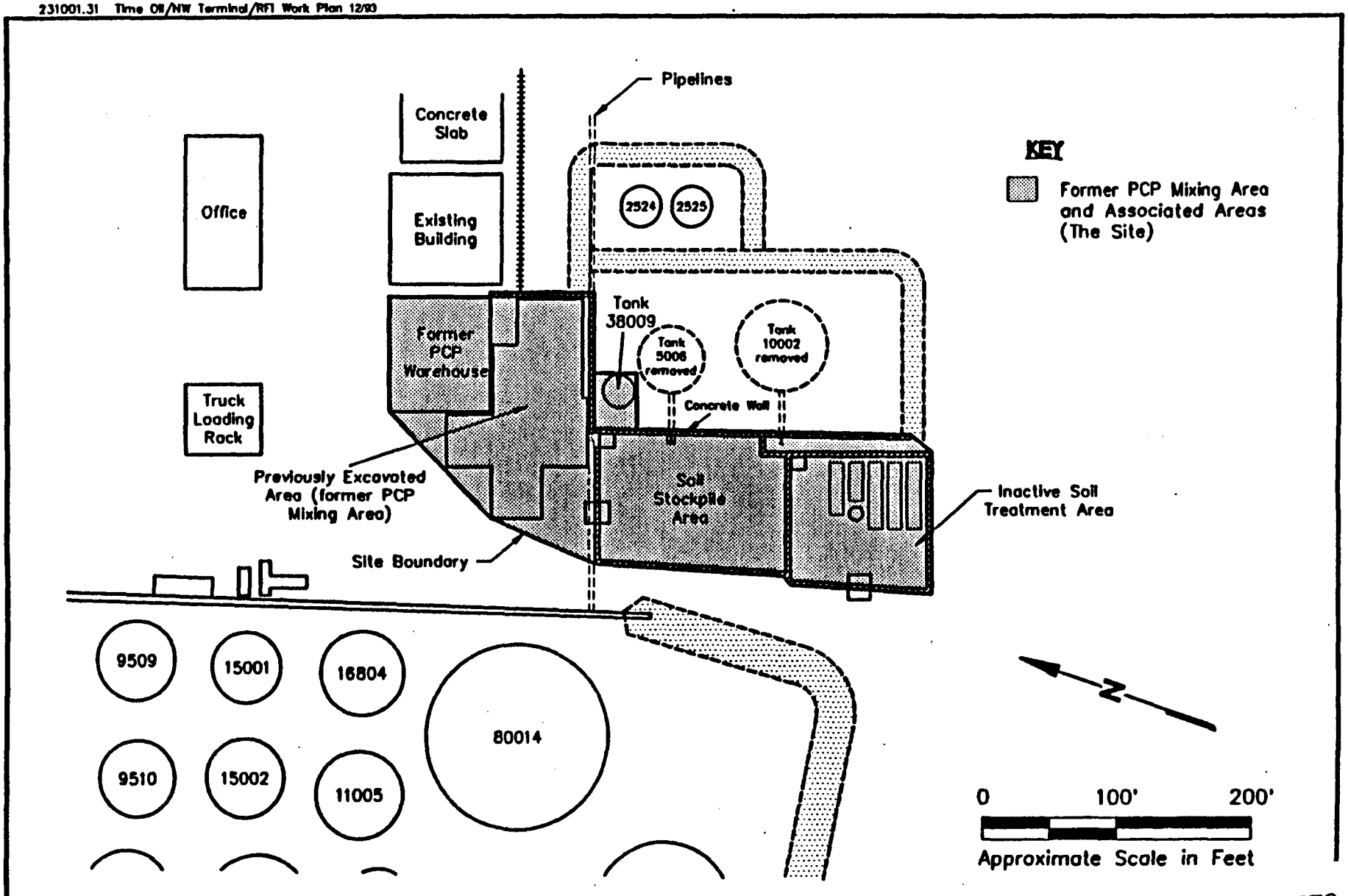

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Site Map

Figure 2-2

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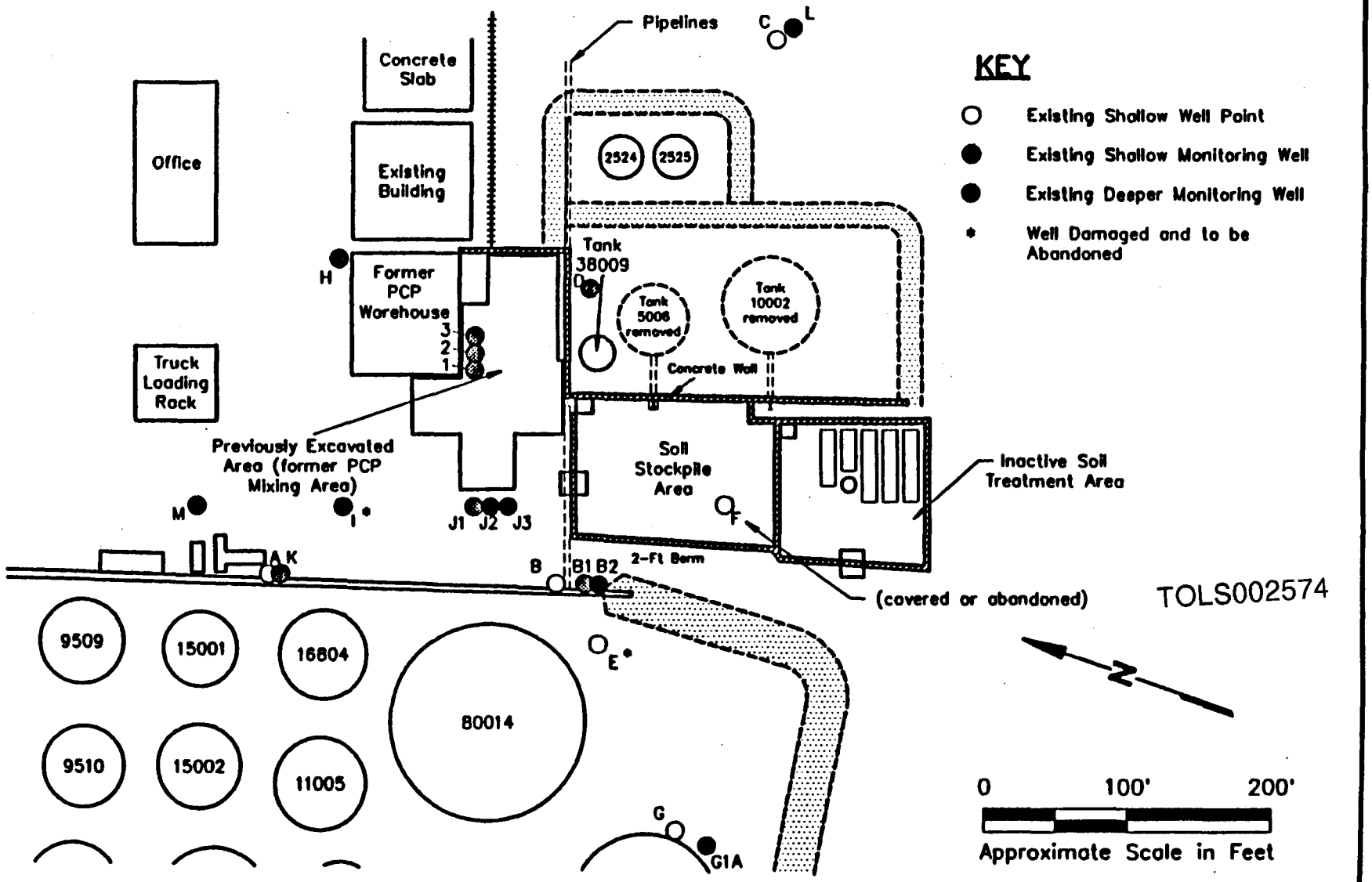

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Pre RFI Monitoring Well Locations

Figure 2-3

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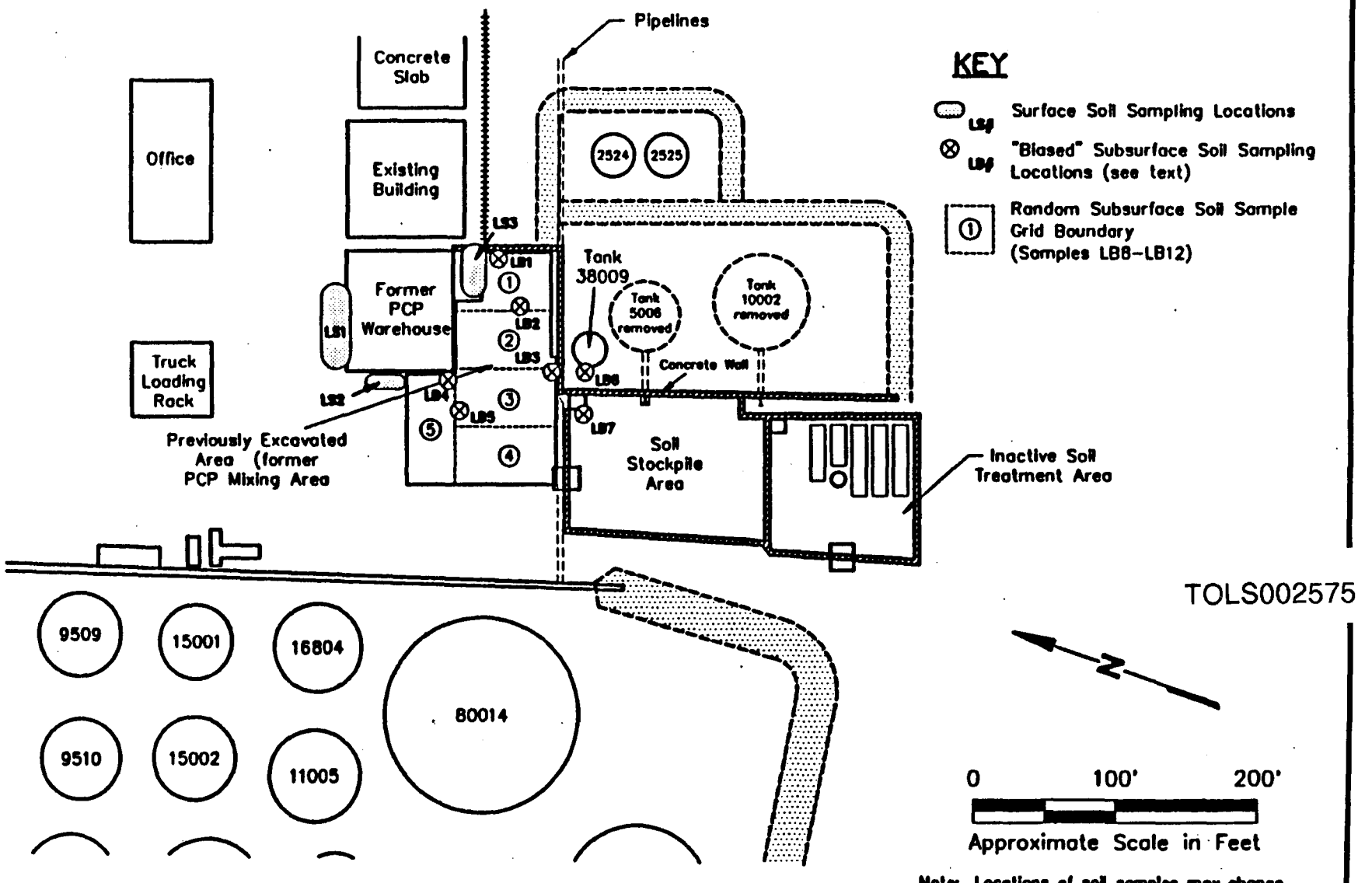

Recommended Locations for Subsurface and Surface Soil Samples

Figure 3-1

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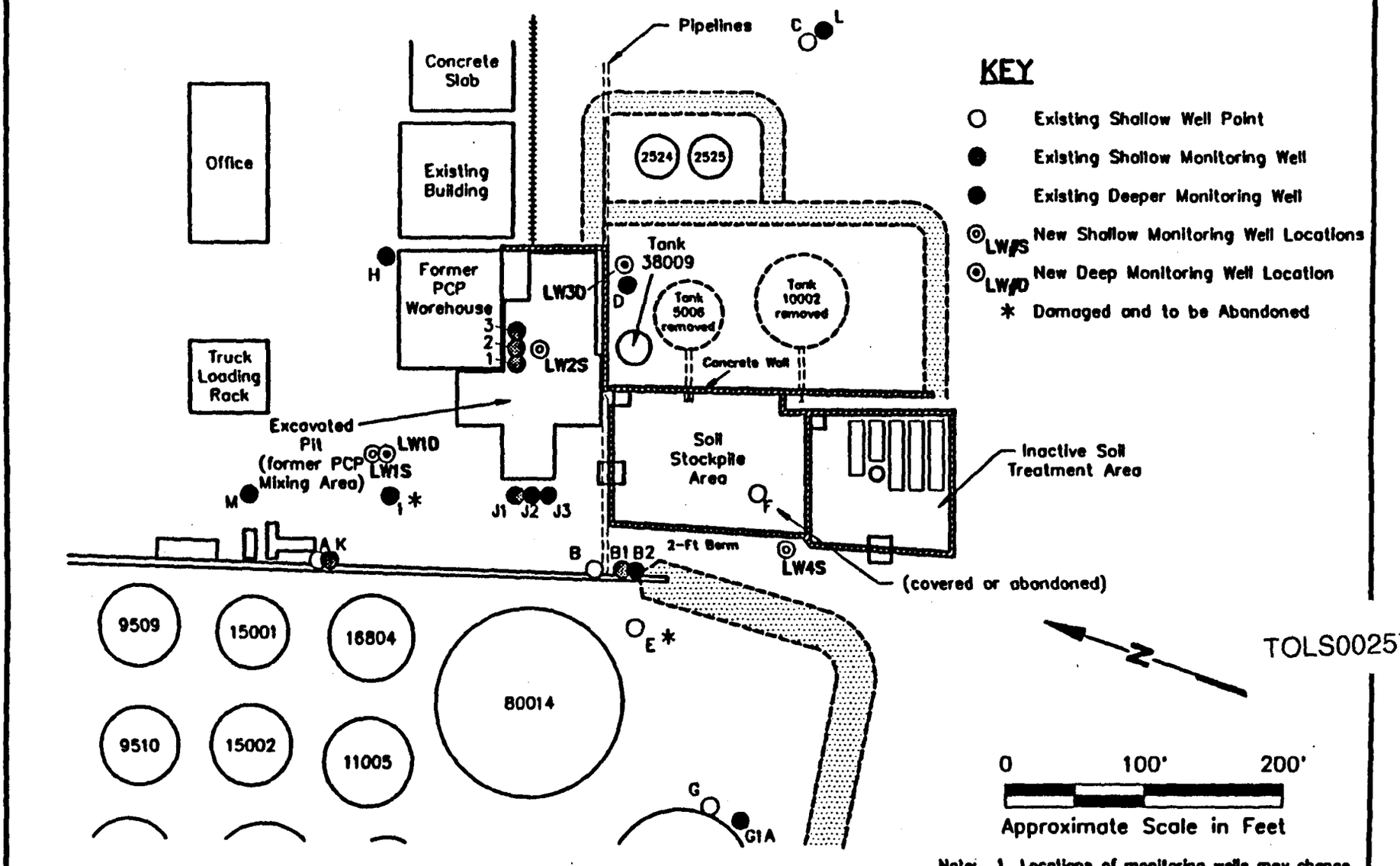

RFI Monitoring Well Locations

Figure 3-2

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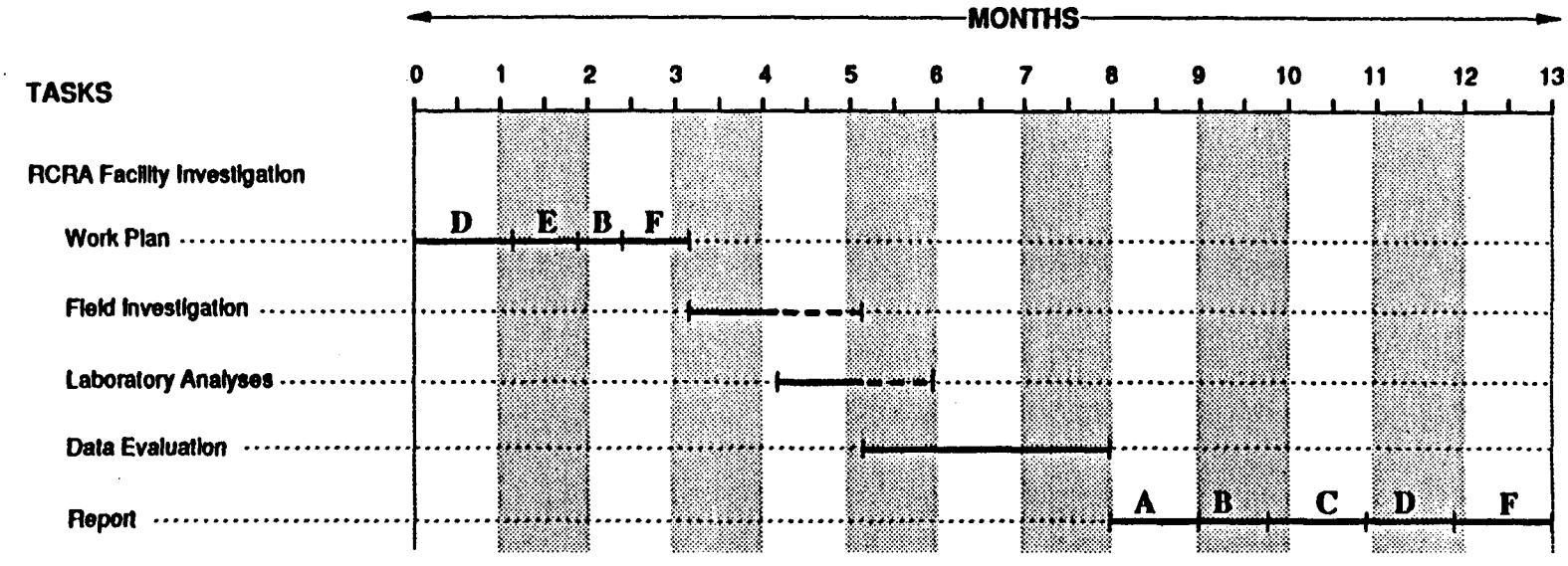

KEY

A Preliminary Draft	D DEQ Review
B Time Review	E Draft Final
C Draft	F Final

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Proposed RFI Schedule
Time Oil Northwest Terminal

Figure 6-1

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TABLE 3-1

RFI SOIL SAMPLE AND MONITORING WELL LOCATIONS AND ANALYSES
TIME OIL COMPANY FORMER PENTACHLOROPHENOL MIXING AREA
PORTLAND, OREGON

		Location[a]/Rationale	No. of Soil Samples[b]	Soil Analyses	Groundwater Analyses
Wells					
LW1S	Shallow	Between source and pumping Well M	3 chem[c] + 1 F&T[d]	PCP and carrier chems[e]	PCP and carrier chems[f]
LW1D	Deep	Between source and pumping Well M; forms a cluster with new Well LW1S	2 chem[c][g] + 1 K_v, F&T[d]	PCP and carrier chems[e]	PCP and carrier chems[f]
LW2S	Shallow	Within the excavation area of the former PCP mixing area	2 chem[h] + 1 F&T[d]	PCP and carrier chems[e]	PCP and carrier chems[f]
LW3D	Deep	Forms cluster with Well D for vertical gradient and lower zone quality data	5 chem[c] + 1 K_v, F&T[d]	PCP and carrier chems[e]	PCP and carrier chems[f]
LW4S	Shallow	Cross gradient from J wells	3 chem[c] + 1 K_v, 1 F&T[d]	PCP and carrier chems[e]	PCP and carrier chems[f]
Subsurface Soil					
"Biased" Locations					
LB1-LB5		Inside excavation area to evaluate carrier chemicals and extent of excavation for PCP	3 chem[c][i] (2-3 borings will also include K_v analyses)	PCP and carrier chems[e]	NA
LB6		South of excavation, along pipelines, near old storage tanks-for lateral definition	3 chem[c]	PCP and carrier chems[e]	NA
LB7		Adjacent to sump at northwest corner of soil stockpile area	3 chem[c]	PCP and carrier chems[e]	NA
Random Locations					
LB8-12		Inside and adjacent to excavation area to provide representative data regarding PCP and associated carrier chemicals	3 chem[c][j]	PCP and carrier chems[e]	NA

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RFI SOIL SAMPLE AND MONITORING WELL LOCATIONS AND ANALYSES
TIME OIL COMPANY FORMER PENTACHLOROPHENOL MIXING AREA
PORTLAND, OREGON

	Location[a]/Rationale	No. of Soil Samples[b]	Soil Analyses	Groundwater Analyses
Surface Soil				
LS1	Near former PCP loading dock	1	PCP and carrier chems[e]	NA
LS2	Along southwest side of former PCP warehouse	1	PCP and carrier chems[e]	NA
LS3	In previously unexcavated area, at rail line spur to east	1	PCP and carrier chems[e]	NA

(a) Sample locations may change based on conditions encountered in the field.

(b) In addition, quality control samples will be run at the frequency of 1 field duplicate and 1 MS/MSD for every 20 samples, by media.

(c) "3 chem" = sampling intervals identified in text: 0-0.5 ft BGS; at water table; and at bottom of upper water-bearing unit; all analyzed for chemistry. "5 chem" = the above 3 chem plus additional intervals to be sampled in deeper borings: in confining zone and in lower water-bearing zone.

(d) F&T refers to the fate and transport parameters grain size and total organic carbon to be analyzed in the water-bearing zone. K_v refers to vertical conductivity tests to be run on the confining layer sample.

(e) Soil analyses will include: semivolatile organics, EPA Method 8270, with lab also required to report first 10 tentatively identified compounds (TICs) (these may help with carrier ID). Chlorinated phenols, modified EPA Method 8040; provides PCP and tetrachlorophenol (both needed for risk assessment) at the lower detection levels needed for potential cleanup standards. TPH-HCID and/or TPH-D, will provide information to help ID carriers. Volatile organics, EPA Method 8260, with lab also required to report first 10 TICs (see semivolatile organics). Dioxin/furan analyses will be conducted (EPA Method 8280 or 8290) for a limited number of samples (~4).

(f) Groundwater analyses will utilize the same analyses identified in (e) above, and will be conducted on samples collected from all wells. Groundwater from selected wells will also be analyzed for major ions. See Table 3-2 for the sampling program for all (new and existing) wells.

(g) The two chemistry samples at this location will be collected from the confining layer and the lower water-bearing zone only (to avoid duplication with the three chemistry samples collected from the boring for Well LW1S).

(h) Surface soil at this location is clean backfill; therefore, the 0-0.5 ft BGS sample will not be collected.

(i) Surface soil at this location is clean backfill; therefore, a sample from near the base of the 1989 excavation will be substituted for the 0-0.5 ft BGS sample. If the base of the excavation coincides with the water table, the 0-0.5 ft BGS sample will not be collected and the planned water table sample also will serve as the base-of-excavation sample.

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TABLE 3-2

RFI SEMIANNUAL GROUNDWATER ANALYSIS PROGRAM
TIME OIL COMPANY FORMER PENTACHLOROPHENOL MIXING AREA
PORTLAND, OREGON

Monitoring Location	Shallow Well	Shallow Well Point	Deep Well	Chemical Analysis					
				Semivolatiles	Volatiles	Chlorinated Phenols	TPH-D	Dioxin/ Furan	Major Ions
1	✓	–	–	✓	✓	✓	✓	–	–
2	✓	–	–	✓	✓	✓	✓	–	–
3	✓	–	–	✓	✓	✓	✓	–	–
A	–	✓	–	–	–	–	–	–	–
B	–	✓	–	–	–	–	–	–	–
B1	✓	–	–	✓	✓	✓	✓	–	✓
B2	–	–	✓	✓	✓	✓	✓	–	✓
C	–	✓	–	–	–	–	–	–	–
D	✓	–	–	✓	✓	✓	✓	–	✓
E[a]	–	✓	–	–	–	–	–	–	–
G	–	✓	–	✓	✓	✓	✓	–	✓
G1A	✓	–	–	✓	✓	✓	✓	–	✓
H	✓	–	–	✓	✓	✓	✓	–	–
I[a]	✓	–	–	–	–	–	–	–	–
J1	✓	–	–	✓	✓	✓	✓	✓	✓
J2	–	–	✓	✓	✓	✓	✓	–	✓
J3	–	–	✓	✓	✓	✓	✓	–	✓
K	✓	–	–	✓	✓	✓	✓	–	–
L	✓	–	–	✓	✓	✓	✓	–	–
M	✓	–	–	✓	✓	✓	✓	–	–
LW1S	✓	–	–	✓	✓	✓	✓	–	–
LW1D	–	–	✓	✓	✓	✓	✓	–	–
LW2S	✓	–	–	✓	✓	✓	✓	–	–
LW3D	–	–	✓	✓	✓	✓	✓	–	✓
LW4S	✓	–	–	✓	✓	✓	✓	–	–

(a) Damaged and scheduled to be abandoned.

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APPENDIX A
STANDARD OPERATING PROCEDURES FOR RFI FIELD INVESTIGATION

I. SURFACE SOIL SAMPLING PROCEDURES

Surface soil samples (at the depth interval discussed in Section 3.2.3) will be collected from shallow hand-dug holes at the locations shown on Figure 3-1 and listed on Table 3-1.

The holes will be hand-dug using new and/or decontaminated implements (shovels, picks, etc.) or drilled using a hollow-stem auger drill rig. Drilling procedures will be the same as those for subsurface samples and are described in the following section. If hand dug, the soil will typically be excavated to about 1-1½ ft in diameter and about 1-½ ft in depth. Material excavated from the surface soil sample locations will be temporarily stored on plastic sheeting until the associated sample collection activities are completed.

Each soil sample will be comprised of equal amounts of three to four soil samples taken at randomly distributed locations around the perimeter of the hand-dug or drilled holes. Prior to sample collection, the exposed soil surfaces in the holes will be scraped with a decontaminated stainless steel spoon to expose a "clean" surface for sample collection. Surface vegetation and other deleterious material will also be removed prior to sampling, where necessary. At the selected depth intervals, soil samples for chemical analyses will be collected with decontaminated stainless steel spoons and homogenized in decontaminated stainless-steel bowls. (Note: subsamples of each individual surface soil sample will be collected for archiving prior to homogenization.) Larger-sized material (gravel greater than approximately ¼- to ½-inch in diameter) will be removed by hand sorting and the soil samples placed in the appropriate containers, as specified in the QAPjP (see Table B-6). Soil samples to be analyzed for volatile organics will not be homogenized but will be collected from the perimeter of the hole using a decontaminated spoon and then placed directly into the appropriate sample container so that little or no headspace remains, prior to processing of soil samples for other analyses. Each sample container will be properly labeled, identifying each sample by number, date and time, analysis type, and sampler's initials (see Figure A-1). Samples will be placed on ice immediately following collection and prior to transport to the laboratory.

Following excavation and sample collection, each hole will be backfilled with soil excavated at that sample location and a description of each surface soil sample will be recorded on a Sample Collection Form (Figure A-2). The soil description will generally include the same parameters described in Section II for boreholes.

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II. SUBSURFACE SOIL AND MONITORING WELL BOREHOLES

A. Drilling

Drilling of subsurface soil borings and monitoring well borings will be conducted using a hollow-stem auger (soil borings and shallow wells) or cable tool rig (deep wells). Drilling of shallow soil and monitoring well borings will terminate at, or extend a maximum of 1 ft into, the confining layer. For the deep monitoring wells, precautions will be taken to minimize the potential for cross contamination between the upper and lower water-bearing zones by using the following procedures:

1. Drilling will commence with large-diameter temporary steel casing (8-10 inches) advanced with the progress of the drilling.
2. Upon encountering the top of the confining layer, drilling will stop and the large-diameter temporary steel casing will be advanced a minimum of 1 ft into the confining layer.
3. The lower portion of the borehole will be sealed with several feet of bentonite chips and allowed to hydrate for at least 12 hours prior to continuing drilling, or until the integrity of the grout is verified and determined to be adequate based on site conditions.
4. A smaller diameter (6- or 8-inch) temporary steel casing will then be lowered inside the 8- or 10-inch casing to the bottom of the hole and drilling will continue through this smaller diameter casing until the total well depth within the lower water-bearing zone is reached.

The drilling of all borings and well installations will be monitored by a field engineer or geologist. A record of the soil and groundwater conditions will be maintained during drilling on a Log of Exploration Form (see Figure A-3). The boring log will show sampling depths, sampling methods, sample recoveries, soil types (in accordance with the Soil Classification System presented on Figure A-4), stratifications, evidence of contamination as indicated through visual observations and the use of appropriate instrumentation (e.g., photoionization meter, UV lamp, etc.), groundwater conditions, and other pertinent information. Each log will also contain the names of the drilling company and drillers, the type of drill rig, starting and finishing dates for drilling, borehole diameter, boring well number, and boring well location.

Prior to and after drilling, all temporary steel casing and downhole equipment will be cleaned using a high-pressure hot water washer. Prior to installation of the wells, all casing centralizers and screens will be similarly cleaned and inspected for damage.

B. Sample Collection

At each subsurface soil sampling location and within each monitoring well borehole, soil samples will be collected for chemical analysis using a properly decontaminated split-barrel sampler at the depth intervals identified in Section 3.2.3 and in Table 3-1. Soil samples to be analyzed for volatile organics will be collected immediately after opening the split-barrel sampler and prior to any other soil processing for chemical analysis. The sample will be collected using a decontaminated stainless steel spoon and placed in the appropriate sample container so that little or no headspace remains.

After collecting the portion of the sample for volatile analysis, the remaining sample will be homogenized in a decontaminated stainless steel bowl. Larger-sized material (gravel greater than approximately ¼ - ½-inch diameter) will be removed and the soil samples placed in appropriate sample jars and preserved as specified in the QAPjP (Table B-6). Sample jars will be labeled, identifying each sample by number, date and time, analysis type, and sampler's initials (see Figure A-1). The samples will be placed on ice immediately following collection and prior to transport to the laboratory.

To obtain relatively undisturbed soil samples for permeability analysis and grain size distribution, the split-barrel sampler will be lined with ten 1-inch high brass rings prior to driving the sampler. Following collection of the soil core, a maximum of six rings will be removed at the desired depth interval or where soil is least disturbed and placed in a plastic tube lined with a plastic bag and capped at both ends. Each sample collected will be properly labeled, identifying each sample by name/location, depth, date and time, and sampler's initials, and will be preserved, as appropriate, for the analysis.

After drilling and sample collection is completed, each borehole will either be backfilled or a monitoring well will be installed in accordance with Section III. For the subsurface soil borings, tremied Volclay grout or a high-solids bentonite grout (e.g., American Colloid Pure Gold grout), will be used to backfill the borehole to within 1 ft of the ground surface as temporary casing or augers are slowly withdrawn. From this point to the ground surface, the borehole will be filled with a cement or bentonite/cement grout.

III. MONITORING WELL INSTALLATION

The monitoring wells will be installed in accordance with the design features shown on Figures A-5 and A-6, and in accordance with State of Oregon Administrative Rules for Well Construction and Maintenance Standards (ODR 690-240).

The shallow and deep monitoring wells generally will be constructed of 2-inch (nominal) threaded Schedule 40 PVC (NSF approved) casing with PVC screen, unless otherwise specified (Well LW2S, located within the former PCP Mixing Area, will be constructed of 4-inch PVC to increase its long-term versatility). The well screen slot size will be 0.020 inch based on currently available site information (the screen slot size may be modified based on initial field observations). Wells installed in the upper water bearing zone (shallow wells) will be screened 10 ft from just below or at the base of the aquifer upward across the water table to a level above or approximately equaling the expected seasonal high water level. Wells installed in the lower water bearing zone (deep wells) will be screened over a 5-ft interval to allow collection of more discrete samples for water quality analysis. The well casing will be installed to the target depth through the auger stem or temporary steel casing. In the deep wells, stainless steel centralizers will be installed above and below the screen. Once the well casing and the screen are installed, the total length of the well will be verified and documented by lowering a weighted tape to the bottom of the inside of the well.

A filter pack will be installed around the screen, extending from the bottom of the end cap to a maximum of 3 ft above the screen. Filter pack material will be commercially prepared, presized, prewashed No. 10-20 Colorado silica sand (or equivalent). A 2-ft layer of fine sand (No. 20-40 or finer) will be placed above the sandpack in the wells overlain by a 3-ft or greater bentonite seal. The filter pack will be installed through a tremie pipe or carefully poured down the annulus between the well casing and the temporary casing, as the temporary casing is slowly withdrawn. During filter pack placement, the distribution and depth of the filter pack will be monitored with a weighted tape.

The annular space above the seal will be grouted with Volclay or a high-solids bentonite grout (e.g. American Colloid Pure Gold grout) through a tremie pipe as augers or temporary casing is slowly withdrawn to about 3 ft below ground surface, and then with a neat cement or bentonite/cement grout (less than 4 percent bentonite) to the surface. The annular seal will be allowed to set for 24 hours prior to completing the surface seal. For all well installations, the tremie pipe will be sealed at the lower end and have side discharges to prevent grout from getting into the sandpack. Grout densities will be checked in the field using a mud balance. Following grouting, well alignment will be determined by lowering a 3-ft long, 1.5-inch outside diameter (OD) or larger bailer into the well. The surface of each well will be finished using bentonite chips (if required to firm the grout) and a concrete surface seal. Locking steel monuments with drain holes will be cemented in place at the surface to a depth of about 3 ft

and a 2x2-ft concrete pad with a minimum thickness of 4 inches will be constructed around each well at the ground surface to divert rainfall away from the well casing. Alternately, in locations where vehicular traffic preclude the use of aboveground monuments, a flush-mounted steel monument will be installed through an impervious surface such as asphalt or concrete. Each wellhead elevation (top of 2-inch well casing and ground surface) and location will be surveyed. Each well installation will be monitored by a field engineer or geologist who will maintain an As-Built Well Completion Form (see Figure A-7) showing well construction details.

IV. WELL DEVELOPMENT

After the final grout has set in the well annulus for a minimum of 24 hrs, the well will be developed to remove soil introduced during installation activities, and to establish hydraulic continuity between the filter pack and the formation. Based on anticipated soil and groundwater conditions, development will be accomplished by purging, using a development pump. Development will continue until at least 5-10 casing volumes are removed, the wells are visibly free of soil, and the turbidity of discharged water is low. Development water will be contained onsite, as discussed in Section 3.5 of the work plan. Following development, no groundwater sampling will be performed for a least 2 days.

V. MONITORING WELL ABANDONMENT

Monitoring Well Point E and Well I, which have been damaged, will be abandoned during RFI activities at the site in accordance with Oregon State regulations (OAR 690-240). Well Point E is constructed of 2-inch PVC casing and was reportedly installed to a depth of 20 ft BGS; however, field observations (August 10, 1993) revealed that the well monument is intact but the well casing was filled with soil to about 0.5 ft BGS. No other well construction information is available. Well I is constructed of 2-inch PVC casing and was installed to a depth of 18.35 ft BGS with a 10-ft, 0.020-inch slotted screen. Based on field observations (August 10, 1993), the well is currently covered (with a bucket) and is inaccessible.

Abandonment will be performed by first removing the well monument (Well E only) and surface seal material from the wells. Then the 2-inch PVC well casing will be removed by overdrilling around the casing and pulling the casing or drilling the casing out completely. All casing, annular seal, and filter pack material will be removed by overdrilling the well to the original total depth and borehole diameter prior to sealing. The overdrilled borehole will be filled with a sealing material (grout or bentonite) by piping the sealing material directly to the

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bottom of the borehole by means of a tremie pipe and filling the annular space upward from that point. The discharge end of the tremie pipe will be kept submerged below the surface of the grout while it is being applied.

The abandonment procedure will be recorded on the appropriate DEQ form and provided to DEQ within 30 days.

VI. GROUNDWATER MONITORING

A. Water Level Measurements

Water levels will be measured in each of the new and existing wells and well points in conjunction with groundwater sampling events, and prior to collecting any water samples. All water levels will be measured using an electronic water level indicator or steel tape and will be recorded to the nearest 0.01 ft. Measurements will be taken from a marked survey point at the top of each well casing, or, if no mark is available, from the northern edge of the casing. To avoid cross contamination between wells, the indicator probe and affected cable will be rinsed with deionized water before the first measurement of the day, between each well, and at the end of the day. Water level information will be recorded in a field notebook.

Following the water level measurement round and prior to initiating the presampling purge, each well will be checked for the presence of nonaqueous phase liquids using oil-finding paste or a water-oil interface probe. If a separate phase is found, it will be collected once as a separate sample with a bailer or peristaltic pump and a groundwater sample will not be collected.

To evaluate tidal influence in the upper and lower water-bearing zones, water levels will be monitored over a 24- to 48-hour period in selected wells (currently expected to be Wells G, G1A, B1, B2, J1, J2, J3, D, and LW3D) and at the river staff gauge. The water levels in the J wells will be monitored using a Microscout datalogger (or equivalent) and pressure transducers; water levels in the other selected wells will be obtained manually or by transducers. Water levels also will be measured manually in all the other monitoring wells at least twice during the monitoring period.

This water level information will be evaluated by transferring the transducer data into a spreadsheet program for manipulation and correction of transducer drift, if necessary. Plots of water level elevation over time will be generated to evaluate tidal responses at each selected monitoring location.

B. Water Quality Sampling

The following procedures will be used to collect RFI groundwater samples:

- Record depth to water and well depth to the nearest 0.01 ft on the Sample Collection Form for Groundwater Sampling (Figure A-8) and calculate the height of water in the well.

- Calibrate specific conductivity and pH meters according to manufacturer's specifications at the beginning of each sample day and every four hours afterward. Record calibration data in a logbook maintained for each instrument. Check meter calibration at least twice during a sample day (middle and end of day) or when meter drift is suspected, and record data in the calibration logbook. Calibrate the meters with solutions buffered closest to known field parameters; usually this is pH = 7 and specific conductivity = 200 µS.

- Prior to sampling, purge the well using a purge pump with dedicated teflon tubing. Continue purging until at least three casing volumes of water have been removed and specific conductance has stabilized (when the replicate sample measurements vary by no more than 10 percent) or until the well is dry. Purge volume will be calculated based on the following formula:

  1 well volume (gallons) = $\pi r^2 h$ x 7.48 gal/ft^3, where π = 3.14, r = radius of well casing in ft, h = height of water column from the bottom of the well, in feet.

  Do not pump well at a rate that allows formation water to vigorously cascade down the sides of the screen.

  Record all purge data on the Sample Collection Form including purge volume, time of commencement and termination of purging, and any observations regarding color, turbidity, or other factors which may be important in evaluation of sample quality.

  Contain all purge and decontamination water onsite in drums or in a storage tank for proper disposal.

- Begin groundwater sampling immediately following well purging or if the well purges dry, as soon as enough water is available in the well for sampling. Record all sample data on the Sample Collection Form, including sample number and time collected, the observed physical characteristics of the sample (e.g., color, turbidity, etc.), and field parameters (pH, specific conductance, and temperature).

  On low-yielding wells, measure pH, temperature, and specific conductance at the beginning and end of sampling.

  Use the following procedures to obtain the four replicate field measurements of pH and specific conductance:

  - Rinse a 250-mL plastic beaker with sample water.
  - Rinse the electrodes and temperature compensation probe with sample water.

- Fill the beaker with sample water; place the probes in the beaker until the reading stabilizes. Record temperature, pH, and specific conductance measurements on the Sample Collection Form.
- Repeat above step to collect remaining replicates.
- Note any problems or significant observations in the "comments" section of the Sample Collection Form.

- Collect groundwater samples for all parameters except volatile organic analysis (VOAs) using a peristaltic pump with dedicated Teflon tubing for each well; collect VOAs first, using a disposable Teflon bailer. To prevent degassing during sampling, use a pumping rate below 100 mL/min (or lower the bailer gently into the water column). Wear clean gloves when collecting each sample.
- Pour water sample slowly and carefully into appropriate sample containers to minimize aeration. Completely fill the VOA containers so that no head space remains. If air bubbles are observed in any of the VOA containers, the container must be emptied and refilled (once only) or a new container used. Preserve samples as specified in Table B-6, including chilling samples on ice immediately following sample collection.

All sampling will be conducted in accordance with the appropriate provisions of the project health and safety plan (Appendix C).

VII. SAMPLE PACKAGING AND SHIPPING

The transportation and handling of samples will be accomplished in a manner that not only protects the integrity of the sample, but also prevents any detrimental effects due to the possible hazardous nature of samples. Regulations for packaging, marking, labeling, and shipping hazardous materials are promulgated by the U.S. Department of Transportation (DOT) in the Code of Federal Regulations (CFR), 49 CFR 171 through 177.

Samples will be placed on sealed, reusable ice packs or double-bagged ice in coolers immediately following collection. At the end of each day, samples sent to the analytical laboratory will be inventoried. A picnic cooler will be used as a shipping container. In preparation for shipping samples, the drain plug will be taped shut, and a large plastic bag will be used as a liner for the cooler. When appropriate, approximately 1 inch of packing material will be placed in the bottom of the liner.

The sample bottles will be placed in the lined cooler containing ice or frozen gel packs. Whenever possible, all volatile analysis samples, and the associated trip blanks, will be placed in the same cooler. Samples will be packaged carefully to avoid breakage or cross contamination

using sufficient packing material and will be shipped to the offsite analytical laboratory at the proper temperature (4°C). The large liner bag will be taped shut and the paperwork accompanying the samples to the laboratory will be placed inside a separate plastic bag and taped inside the cooler lid.

The cooler will be taped shut with strapping tape. Custody seals will be placed on the cooler. The cooler will either be shipped to the laboratory by an overnight carrier or transported by automobile.

VIII. SAMPLE CUSTODY AND DOCUMENTATION

A. Sample Custody

The primary objective of sample custody is to create an accurate, written record that can be used to trace the possession and handling of samples so that their quality and integrity can be maintained from collection until completion of all required analyses. Adequate sample custody will be achieved by means of approved field and analytical documentation. Such documentation includes the chain-of-custody record which is initially completed by the sampler, and is thereafter signed by those individuals who accept custody of the sample. An example chain-of-custody record is shown on Figure A-9. A sample will be considered to be in a particular person's custody if it is:

- In that person's physical possession
- In that person's view
- Locked up or secured by that person in a locked container or otherwise sealed so that tampering will be evident
- Kept in a secured area, restricted to authorized personnel only.

Sample control and chain-of-custody in the field and during transport to the laboratory will be conducted in general conformance with the procedures described below and in Section 4 of *A Compendium of Superfund Field Operations Methods* (EPA 1987, 540/P-87/001).

B. Field Custody Procedures

The following field custody procedures will be followed:

- As few persons as possible will handle samples.

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- Sample bottles will be purchased directly from the manufacturer by Landau Associates or obtained new from the laboratory performing the analyses.
- The sample collector will be personally responsible for the completion of the chain-of-custody record and the care and custody of collected samples until they are transferred to another person, or dispatched properly under chain-of-custody rules.
- The site investigations supervisor will oversee implementation of the field custody procedures during the fieldwork and, in the event of noncompliance, will determine if corrective action is required.

C. Sample Shipment Custody Procedures

The following custody sample shipment procedures will be followed:

- The coolers in which the samples are shipped will be accompanied by the chain-of-custody record identifying their contents. The original record and laboratory copy will accompany the shipment (sealed inside the shipping container). The other copy will be distributed as appropriate to the Landau QAO or QA Task Leader.
- Shipping containers will be sealed with custody seals for shipment to the laboratory. The method of shipment, name of courier, and other pertinent information will be entered in the "Remarks" section of the chain-of-custody record and traffic report.
- If sent by mail, the package will be registered with return receipt requested. If sent by common carrier, a bill of lading will be used. Freight bills, postal services receipts, and bills of lading will be retained as part of the permanent documentation.

D. Transfer of Custody

When samples are transferred, the individuals relinquishing and receiving the samples will sign the chain-of-custody record and document the date and time of transfer. The sample collector will sign the form in the first signature space. The only exception to this is the shipment of samples via commercial carriers. Because sample containers are sealed with the chain-of-custody record inside prior to delivery to the carrier, the custody signature will be that of the individual taking possession of the samples from the carrier at its final destination. Each person taking custody will observe whether the shipping container is correctly sealed and in the same condition as noted by the previous custodian; deviations will be noted on the appropriate section of the chain-of-custody record.

Project documentation of sample custody will be verified by the Landau QAO during regular review of the data validation package.

E. Laboratory Custody Procedures

A designated sample custodian at the laboratory will accept custody of the shipped samples, verify the integrity of the custody seals, and certify that the sample identification numbers match those on the chain-of-custody record. The custodian will then enter sample identification number data into a bound logbook, which is arranged by a project code and station number. If containers arrive with broken custody seals, the laboratory will note this on the chain-of-custody record and will immediately notify the QA Task Leader. The laboratory will maintain sample security and custody as appropriate.

F. Documentation

Documentation necessary to meet the QA objectives for this project includes the following:

- Field notebooks (logbooks), in which general field observations and activities are recorded
- Field sampling forms specific to sampling, chain-of-custody, etc.
- Sample container labels
- Photographs.

General methods for this documentation are as follows: if an error is made on a document, corrections will be made by drawing a single line through the error and entering the correct information; the erroneous information will not be obliterated; corrections will be initialed and dated and, if necessary, a footnote explaining the correction will be included; errors will be corrected by the person who made the entry, whenever possible.

All documentation and other project records will be safeguarded to prevent loss, damage, or alteration.

G. Field Notebook

Daily field documentation is necessary to provide sufficient data and observations to enable participants to reconstruct events that occurred during the project and to refresh the

memory of the field personnel if called upon to give testimony during legal proceedings. Daily field notes pertinent to the individual field tasks will be recorded using non-erasable waterproof ink in a bound waterproof field notebook containing consecutively numbered pages. Corrections will be made according to the procedures given above. Information documented on field sampling forms need not be repeated in the field notebook; however, reference must then be made in the field notebook to the field forms.

H. Field Sampling Forms

Task-specific field sampling forms (e.g., chain-of-custody record, sample collection form, etc.) will be used to document sampling activities. Use of sampling forms aid in achieving complete data for field sampling activities. Example field sampling forms to be used for soil and groundwater sampling are included on Figures A-2 and A-8, respectively. The field sampling forms will be assembled into logbooks, numbered, and bound prior to field use.

I. Sample Container Labels and Identification Format

Each sample container will be labeled, chemically preserved if required, and sealed immediately after collection. Sample container labels will be filled out using waterproof ink and will be firmly affixed to the sample containers. An example sample container label is shown on Figure A-1.

The sample container label will contain the following information:

- Sample number
- Date and time of collection
- Name of sampler(s)
- Analysis required
- Preservation (if applicable).

Sample label information will also be recorded on the appropriate field sampling forms. Samples and their containers will be numbered using the following identification format:

3123-XX-AA##-##

- 3123 - This set of numbers indicates the Time Oil property
- XX - This initial identifies the sample type specific to each sampling activity (i.e., SS = surface soil, SBS = subsurface soil, GW = groundwater).

- AA-##-## - These initials identify sample locations specific to each media (i.e., soil boring or well number, surface soil location, or descriptions) followed by depth (if applicable).

Additional identifiers may be added, as necessary, based on the specific sampling activity. Actual sample locations and other identification information will be recorded in the field notes and on the appropriate sample collection forms. Field QC samples will be coded as individual samples and identified in the field notes and on sample collection forms.

I. Photographs

Photographs may be taken in the field to document sampling locations and conditions. When taken, photographs will be recorded on the photograph documentation form (see Figure A-10) and/or in field notebooks. The final print will be dated, initialed, and appended with a brief description of location and purpose.

IX. EQUIPMENT DECONTAMINATION PROCEDURES

A. Heavy Equipment

All heavy equipment used for drilling and/or excavation (i.e., hollow-stem augers, cable tool) will be decontaminated at an established decontamination area using a high-pressure, hot-water washer prior to and after each use at each exploration location.

Permanent well casings and screens will also be decontaminated using a high-pressure washer prior to installation.

B. Sampling Equipment

Appropriate decontamination procedures for soil and groundwater sampling equipment will be used to minimize the possibility of cross contaminating samples. Sampling equipment that comes in contact with potentially contaminated materials will be decontaminated prior to and after each use. Decontamination of sampling equipment will consist of the following steps:

- Spray or scrub off soiled equipment
- Wash with Alconox soap
- Rinse with tap water
- Rinse with hexane
- Rinse with deionized or distilled water.

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LANDAU ASSOCIATES, INC.
P.O. Box 1029 / Edmonds, WA 98020-9129
Phone: (206)778-0907 / FAX: (206)778-6409

Sample # _____

Project # _____ Site _____

Date _____ Time _____ Sampler _____

Analysis _____

Comments

231001.31 Time OMNW Terminals/RIFI Work Plan/Report 12/93

Sample Container Label | Figure A-1

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LANDAU ASSOCIATES, INC.
Edmonds, WA (206) 778-0907
FAX (206) 778-6409

PROJECT Time Oil RFI Work Plan PROJECT NO. 231001.31
EVENT

SAMPLE NO.
DATE COLLECTED TIME

Soil/Sediment Sample Collection Form

Weather Collector(s)

SAMPLING DATA

Sample Type: ☐ Soil ☐ Sediment ☐ Other

Sample Location: Sample Depth (BGS): (☐ Feet ☐ Inches)

Sample Composited: ☐ Horizontally Locations:
☐ Vertically Depth Range:
☐ Not Composited

GS Elevation (ft, MSL):

SAMPLE COLLECTION

Sample Collected From: ☐ Hand-Dug Hole ☐ Test Pit ☐ Boring ☐ Catch Basin/Manhole ☐ Other

Sample Collected With: ☐ Bowl ☐ Spoon ☐ Split Barrel ☐ Other

Made of: ☐ Stainless Steel ☐ Other

SAMPLE DESCRIPTION

Sample Description (color, grain size, density, moisture, etc.):

SAMPLE CONTAINER

SIZE	QUANTITY	TYPE	LABORATORY ANALYSIS
☐ 8-oz.		☐ Glass ☐ Plastic ☐ Other	☐
☐ 4-oz.		☐ Glass ☐ Plastic ☐ Other	
☐ Other		☐ Glass ☐ Plastic ☐ Other	

ADDITIONAL INFORMATION

Photo No. Roll No.

Duplicate Sample No(s).

Split Sample No(s). Collector

Decon Procedure: *(By Numerical Order)*
☐ Tap Rinse ☐ Alconox Wash ☐ Tap Rinse
☐ Hexane Rinse ☐ DI Water Rinse ☐ Other

Comments:

☐ *Continued on Back*

Signature Date

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231001.31 Time Oil/NW Terminals/RFI Work Plan/Report 12/93

Soil/Sediment Sample Collection Form | Figure A-2

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LANDAU ASSOCIATES, INC.
Edmonds, WA (206) 778-0907
FAX (206) 778-6409

Log of Exploration

Exploration No. _____
Sheet _____ of _____

Client/Owner _____ Project No. _____
Start Date _____ Hour _____
Ground Surface Conditions _____
Weather Conditions _____
Landau Rep. _____ Contractor/ Operator _____
Exploration Method _____
Hammer Weight & Stroke _____

Location Sketch (show dimensions to mapped features) — North Arrow

Surface Elevation _____ Datum _____

Water Level Information				
Date				
Time				
Depth to Water				
Hole Depth				
Casing Depth				

Sample No./ Sampler Type	P.I.D. Reading	Penetration Resistance/6 in.	Length Driven	Sample Length Recovered	Sample Depth (ft.)	Graphic Recovery	Depth Scale (ft.)	USCS Symbol	Soil Description	Comments
							0			
							1			
							2			
							3			
							4			
							5			
							6			
							7			
							8			
							9			
							0			
							1			
							2			
							3			
							4			
							5			
							6			
							7			
							8			
							9			
							0			

☐ No Recovery
☒ Disturbed Sample
■ Undisturbed Sample

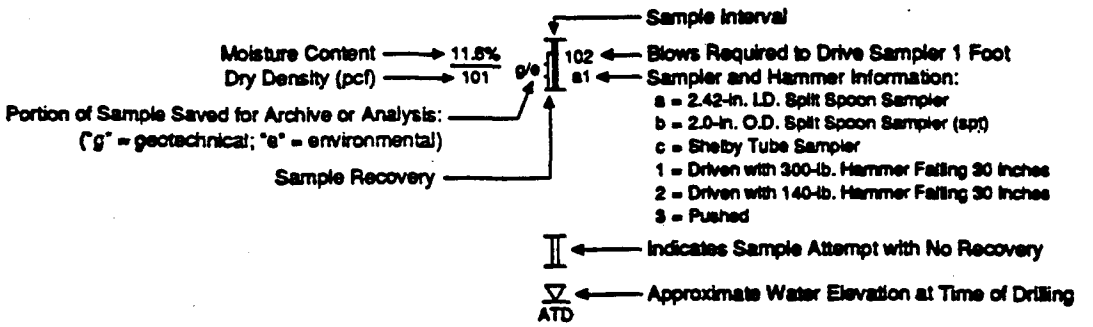
Sampler: SPT, 2.4-in. ID Drive (2.4 D), Thinwall (TW), Shelby Tube (S), Bulk (B), etc. (Add "C" to sampler type if a catcher is used)

Finish Date _____ Hour _____ Continued ☐

231001.31 Time OWNW Terminal/RFI Work Plan/Report 12/00

Log of Exploration | Figure A-3

KEY



SOIL CLASSIFICATION SYSTEM

	MAJOR DIVISIONS		GRAPHIC SYMBOL	USCS LETTER SYMBOL[1]	TYPICAL DESCRIPTIONS[2][3]
COARSE-GRAINED SOIL (More than 50% of material is larger than No.200 sieve size)	GRAVEL AND GRAVELLY SOIL (More than 50% of coarse fraction retained on No.4 sieve)	CLEAN GRAVEL (Little or no fines)		GW	Well-graded gravel; gravel/sand mixture(s); little or no fines
				GP	Poorly graded gravel; gravel/sand mixture(s); little or no fines
		GRAVEL WITH FINES (Appreciable amount of fines)		GM	Silty gravel; gravel/sand/silt mixture(s)
				GC	Clayey gravel; gravel/sand/clay mixture(s)
	SAND AND SANDY SOIL (More than 50% of coarse fraction passed through No.4 sieve)	CLEAN SAND (Little or no fines)		SW	Well-graded sand; gravelly sand; little or no fines
				SP	Poorly graded sand; gravelly sand; little or no fines
		SAND WITH FINES (Appreciable amount of fines)		SM	Silty sand; sand/silt mixture(s)
				SC	Clayey sand; sand/clay mixture(s)
FINE-GRAINED SOIL (More than 50% of material is smaller than No.200 sieve size)	SILT AND CLAY (Liquid Limit less than 50)			ML	Inorganic silt and very fine sand; rock flour; silty or clayey fine sand or clayey silt with slight plasticity
				CL	Inorganic clay of low to medium plasticity; gravelly clay; sandy clay; silty clay; lean clay
				OL	Organic silt; organic, silty clay of low plasticity
	SILT AND CLAY (Liquid Limit greater than 50)			MH	Inorganic silt; micaceous or diatomaceous fine sand or silty soil
				CH	Inorganic clay of high plasticity; fat clay
				OH	Organic clay of medium to high plasticity; organic silt
HIGHLY ORGANIC SOIL				PT	Peat; humus; swamp soil with high organic content

Notes:
1. USCS letter symbols correspond to the Unified Soil Classification System. Dual letter symbols (e.g., SM-SP) for a sand or gravel indicate a soil with an estimated 5-15% fines. Multiple letter symbols (e.g., ML/CL) indicate borderline or multiple soil classifications. Only the first letter symbol's respective pattern is shown on logs.
2. Soil descriptions shown on logs are based on the general approach presented in the *Standard Practice for Description and Identification of Soils (Visual-Manual Procedure)*, as outlined in ASTM D 2488.
3. Soil description terminology (which is based on visual estimates of the percentages of each soil type) is as follows:
   Primary Soil Type(s) - e.g., "GRAVEL," "SAND," "SILT," "CLAY," etc.
   Secondary Soil Type(s) (>15%) - e.g., "gravelly," "sandy," "clayey," etc.
   Modifier(s) (>5% and ≤15%) - e.g., "with gravel," "with sand," "with clay," etc.
   Minor Component(s) (≤5%) - e.g., either "trace gravel," "trace sand," "trace clay," etc., or no mention of minor soil type

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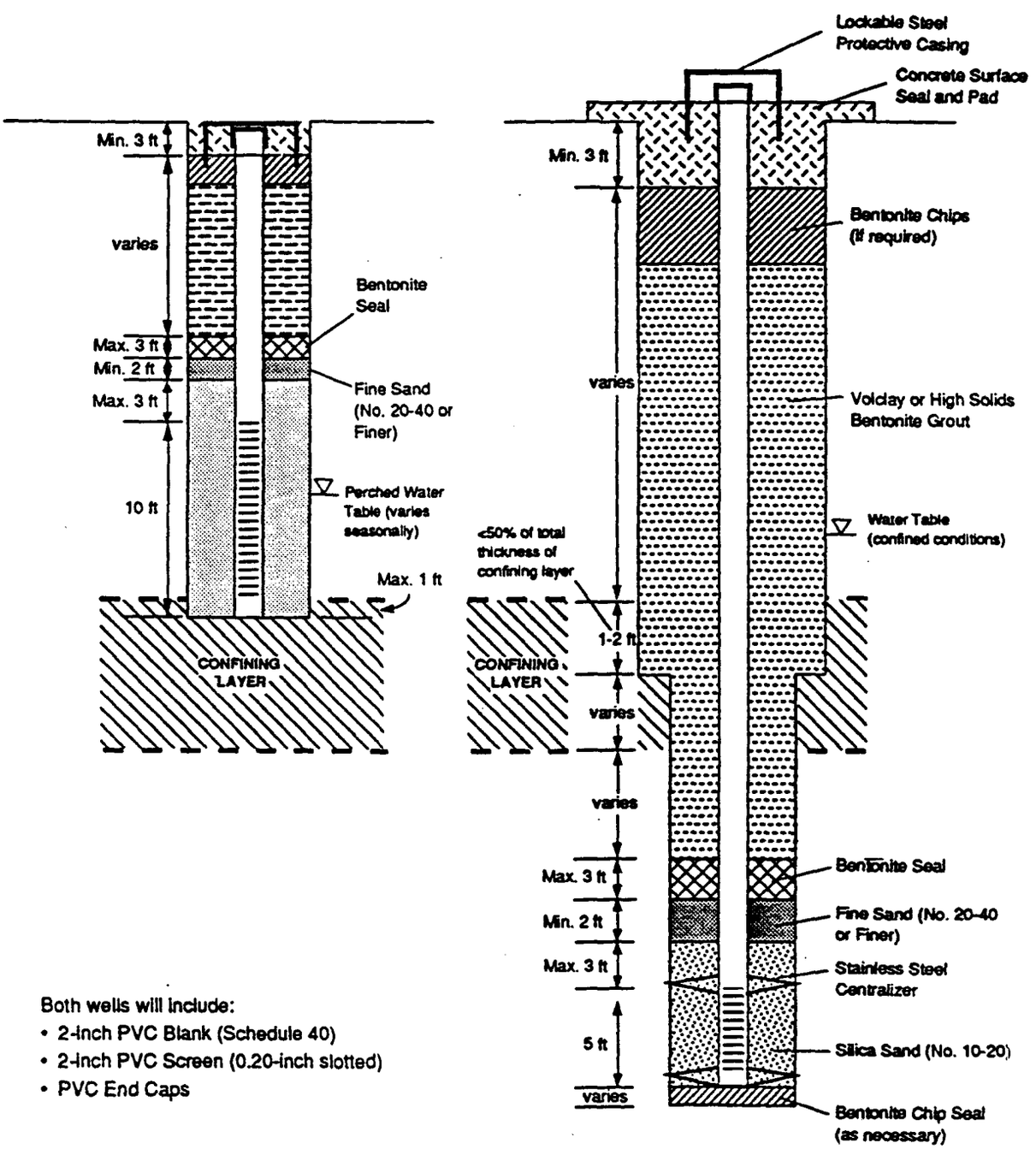
Boring Log Key and Soil Classification System | Figure A-4



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Typical Monitoring Well Design | Figure A-5

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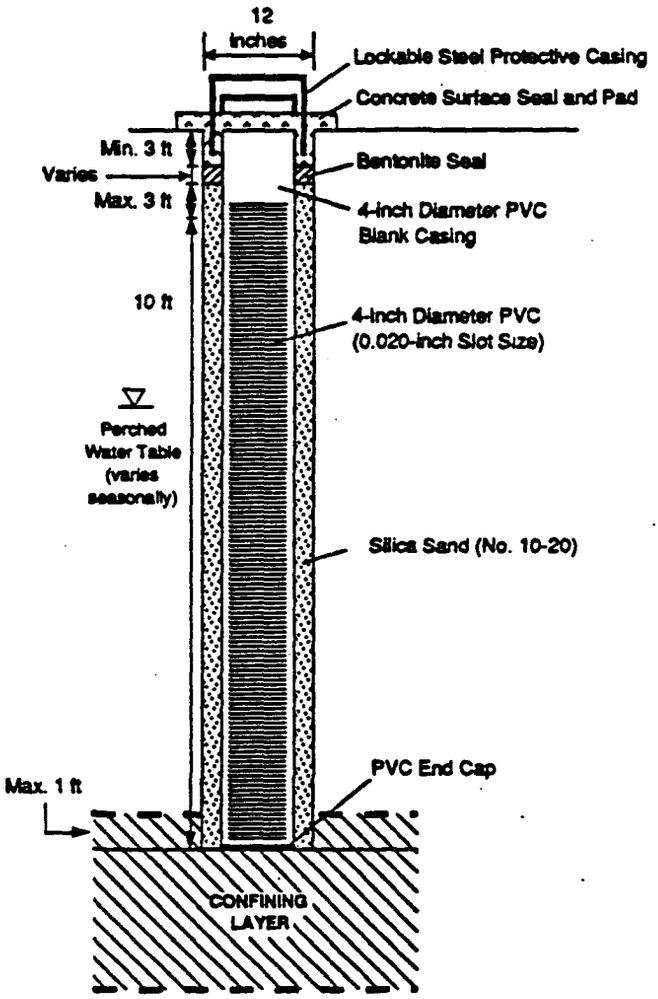
Monitoring Well LW2S

Shallow Monitoring Well
with Aboveground Monument



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	Monitoring Well Design for Well LW2S	Figure A-6

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As-built Well Completion Form

Project: _____
Project No.: _____
Well(s) No.: _____
Drilling Co.: _____
Installation Start Date: _____ Hour: _____
Installation Finish Date: _____ Hour: _____
Well Type: ☐ Single ☐ Nested ☐ Clustered

WATER DISCHARGE MONITORING

Date: _____ Time: _____ PID(ppm) _____
Date: _____ Time: _____ PID(ppm) _____
Date: _____ Time: _____ PID(ppm) _____
Date: _____ Time: _____ PID(ppm) _____
Date: _____ Time: _____ PID(ppm) _____

EQUIPMENT USED

☐ Hollow Stem Auger
☐ Cable Tool
☐ Air Rotary
☐ Other _____

MATERIALS USED

_____ Sacks of _____ Sand
_____ Sacks of _____ Concrete/Cement
_____ Sacks of _____ Grout Mix Used
_____ Sacks of Powdered Bentonite
_____ Pounds of Bentonite Pellets/Chips
_____ Feet of _____ Inch PVC Blank Casing
_____ Feet of _____ Inch PVC Slotted Screen

DEVELOPMENT

Method of Development:

Begin Date: Time:
Finish Date: Time:

Yield: Time From: To: Date:

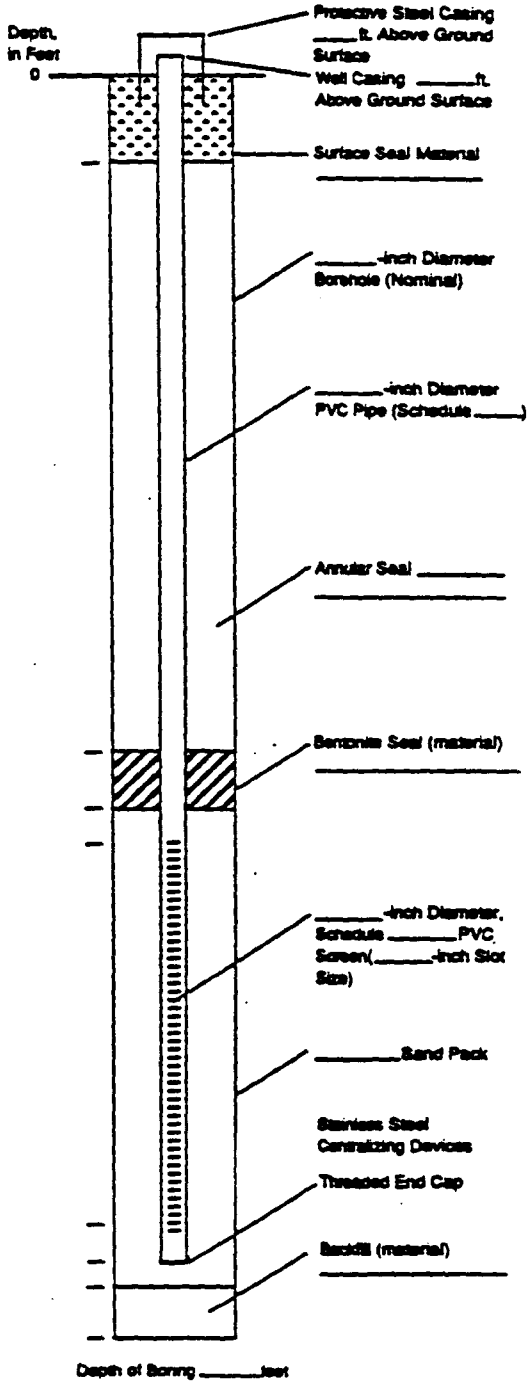
Estimate of Total Water Removed During Development: Gallons

Description of Turbidity at End of Development: ☐ Clear ☐ Slightly Cloudy ☐ Mod. Turbid ☐ Very Cloudy

Odor of Water:

Water Discharged To:

Depth to Water After Development: Feet



231001.31 Time OilNW Terminal/RFI Work Plan/Report 12/03

As-Built Well Completion Form | Figure A-7

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Edmonds, WA (206) 778-0907
FAX (206) 778-6409

PROJECT Time Oil RFI PROJECT NO. 231001.32
EVENT

SAMPLE NO.
DATE COLLECTED TIME

Groundwater/Surface Water Sample Collection Form

Weather Collector(s)

WATER LEVEL/WELL/PURGE DATA

Sample Type: ☐ Groundwater ☐ Surface Water ☐ Other
Sample Location:
Depth to Water (ft): Time: Measured from: ☐ Top of Protective Casing ☐ Top of Well Casing
Well Casing Type: ☐ PVC ☐ Stainless Steel ☐ Fiberglass Well Diameter:
Well Condition: Secure (☐ Yes / ☐ No) Damaged (☐ Yes / ☐ No) Describe
Begin Purge: Date/Time: Casing Volume (gal):
End Purge: Date/Time: Purge Volume (gal):
Total Depth of Well (ft. below top of well casing):
Purge Volume Calculation:
Purge Water Disposal to: ☐ 55-gal Drum ☐ Storage Tank ☐ Ground ☐ Other Gallons Purged:

VOLUME OF SCHEDULE 40 PVC PIPE

Diameter (inch)	O.D. (inch)	I.D. (inch)	Volume (gal/linear ft)	Wt. Water (lbs/linear ft)
1-1/4	1.660	1.380	0.08	0.64
2	2.375	2.067	0.17	1.45
4	4.500	4.026	0.66	5.51

Time	Vol. Purged (gal)	pH	Temperature (°F/°C)	Conductivity	Comments/Observations

SAMPLE COLLECTION DATA

Sample Collected With: ☐ Bailer ☐ Pump/Pump Type Dedicated (☐ Yes / ☐ No)
Made of: ☐ Stainless Steel ☐ PVC ☐ Teflon ☐ Polyethylene ☐ Other
Decon Procedure: (By Numerical Order) ☐ Alconox Wash ☐ Tap Rinse ☐ DI Water ☐ Other ☐ Other ☐ Other
Sample Description (color, turbidity, odor, sheen, etc.):

Replicate	pH	Temperature (°F/°C)	Conductivity (µS)	Other
1				
2				
3				
4				

pH Meter: Cond. Meter: Cond. Range: ATC: ☐ On ☐ Off
Meter Calibration Check: Ph7 Buffer Reads at °C after Sample Collection.

SIZE	QUANTITY	TYPE	FIELD FILTERED	LABORATORY ANALYSIS
		☐ Glass ☐ Plastic	☐ Yes / ☐ No	
		☐ Glass ☐ Plastic	☐ Yes / ☐ No	
		☐ Glass ☐ Plastic	☐ Yes / ☐ No	
		☐ Glass ☐ Plastic	☐ Yes / ☐ No	

Duplicate Sample No(s).
Comments:

☐ Continued on Back

Signature Date

231001.31 Time Oil/NW Terminal/RFI Work Plan/Report 12/93

Groundwater/Surface Water Sample Collection Form — Figure A-8

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Chain-of-Custody Record

Date _____
Page _____ of _____

Project _____ Job No. _____

Client _____

Project Location _____

Sampler's Name _____

Testing Parameters

Sample No.	Date	Time	Location	No. of Containers											Observations/Comments

Special Shipment/Handling or Storage Requirements

Method of Shipment

Relinquished by	Received by	Relinquished by	Received by
Signature	Signature	Signature	Signature
Printed Name	Printed Name	Printed Name	Printed Name
Company	Company	Company	Company
Date _____ Time _____	Date _____ Time _____	Date _____ Time _____	Date _____ Time _____

3/00

WHITE COPY - Project File YELLOW COPY - Laboratory PINK COPY - Client Representative

Chain-of-Custody Record

Figure A-9

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Project: Time Oil
Project No.: 231001

PHOTOGRAPH DOCUMENTATION FORM

ROLL NO.	PHOTO NO.	DATE	TIME	TAKEN BY	ORIENTATION	DESCRIPTION/PURPOSE OF PHOTO

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Photograph Documentation Form — Figure A-10

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APPENDIX B

Quality Assurance Project Plan

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APPENDIX B
QUALITY ASSURANCE PROJECT PLAN

I. INTRODUCTION

This Quality Assurance Project Plan (QAPjP) establishes the Quality Assurance (QA) objectives for RFI site characterization activities at the Time Oil Northwest Terminal former pentachlorophenol mixing area and presents the QA organization and quality control (QC) procedures developed to meet project QA objectives. Execution of the procedures presented in this document will result in satisfaction of data quality objectives (DQOs) developed in accordance with the DEQ QA Policy (DEQ 1990) and EPA guidance documents (EPA 1987a,b) and generation of data that are representative of actual conditions at the site.

The overall goal of the project QA program is to provide a reasonable degree of confidence in project data and results through the establishment of a rigorous system of quality and performance checks on data collection, analysis, and reporting activities, as well as to provide for appropriate and timely corrective action to achieve compliance with established performance and quality criteria.

This QAPjP presents the general procedures and methods for sampling and sample handling, sample custody, instrument/equipment calibration, analytical procedures, internal quality control, auditing, and data assessment that are developed to meet project and QA objectives.

II. PROJECT QA ORGANIZATION AND RESPONSIBILITIES

The project QA organization, including individuals with QA responsibility and lines of QA authority, is shown on Figure B-1. Specific project QA responsibilities are listed in Table B-1. The QA Task Leader will be responsible for QA oversight during RFI site characterization activities including sampling of all media, coordinating with the analytical laboratory as needed, and direct implementation of this QAPjP. The QA officer (QAO) will be responsible for directing/conducting data validation and for confirming that the QA objectives of the project are met. The Project Manager is responsible for overall implementation of this QAPjP. Laboratory analysis will be performed by Analytical Resources, Inc. (ARI) of Seattle, Washington and Twin City Testing Corporation (for dioxin/furan analysis) of St. Paul Minnesota.

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III. DATA QUALITY OBJECTIVES

Results from the RFI sampling activities will be used to determine whether site characterization has been adequately accomplished, and whether remedial action is required. The sample results must be precise, accurate, representative, complete, and comparable (PARCC) to a degree commensurate with these uses.

The QA procedures presented in this QAPjP are based on DQOs (summarized in Table B-2) that were developed in accordance with DEQ (1990) and EPA (1987a,b; 1989b) guidance documents and reflect the intended use of project data. The project DQOs prescribe the sampling program design (e.g., number and location of sample locations), and the level of quality, precision, accuracy, representativeness, completeness, and comparability of data to be collected and analyzed for RFI site characterization activities.

The analytical level DQO for the project data is determined to be Level III [the term "Level III" is used in this document to refer to a level of data quality comparable to that obtained from the use of CLP analytical methods (EPA 1990, 1991a), even though non-CLP analytical methods (EPA 1986, updated 1990) will be utilized. It is expected that data quality obtained using the planned non-CLP methods will be sufficient to achieve the DQOs for the project-specific analyses]. The documentation and validation procedures established herein are considered sufficient to achieve Level III data quality.

The target control limits (the range within which project data of acceptable quality should fall) for the PARCC parameters are presented in Tables B-3 and B-4. The target control limits will be used to evaluate data acceptability as discussed in Section X. The control limits listed in these tables are considered to be QC goals for data acceptance. Field and laboratory precision will be determined through the use of duplicate samples and analyses, respectively. Field precision will be assessed on a case-by-case basis. Laboratory accuracy will be determined through the use of laboratory spiked samples. It should be noted that in the case of field duplicates, both field variability and laboratory variability are potential sources of error, and therefore both will be considered in any investigation of relative percent difference (RPD) values outside the target control limits. Data acceptability will be determined on the basis of the results of this qualitative review of error sources and therefore will be case-specific.

The QA objective for representativeness, completeness, and comparability will be achieved by:

- Collecting samples from areas known or suspected to be contaminated, thereby adequately characterizing analyte concentrations in the subject area of the site

- Implementing standardized, uniform field procedures
- Collecting field equipment blanks and analyzing laboratory method blanks to verify that the analytical results are representative of the sampled item and not influenced by cross contamination
- Reporting data in conventional and standard units.

The RFI quantitation limits are presented in Table B-5. These limits have been established to allow for use of the data in risk assessments [note, however, that it may not be possible to practicably achieve a quantitation limit for dioxins and furans which corresponds to site action levels (established per 55 FR 30798 *et seq*)].

IV. SAMPLING PROCEDURES

A. Sample Collection and Handling

Sampling procedures and sampling locations for the soil and groundwater investigations are identified in Appendix A. Sampling procedures and protocols for each sampling activity were developed to meet the DQOs and are based on proven and acceptable sampling methods as established by Oregon State regulations, EPA guidance documents, other accepted references, and best professional judgment. Where modification of an approved sampling protocol was necessary, the modification was included in this document, as appropriate.

Sample containers, preservatives, and holding times will be appropriate for the type of sample collected and the analytical method to be used. Maximum sample holding times will be strictly adhered to. Sample containers, preservatives, and holding times for each analysis are presented in Table B-6. Each sample will be documented, labeled, and identified as noted in Section VIII of Appendix A.

Sampling equipment will be properly decontaminated prior to collection of each sample to avoid cross contamination between samples. Decontaminated sampling equipment will be handled in a manner that minimizes contact with potentially contaminated surfaces. Specific procedures for sampling equipment decontamination associated with soil and groundwater sampling are presented in Section IX of Appendix A.

V. SAMPLE DOCUMENTATION AND CUSTODY

Soil samples and monitoring well data and other relevant information or field activities will be documented in the field on appropriate forms and in field notebooks at the time of sampling; appropriate custody procedures will be followed, as described in Section VIII of Appendix A.

VI. PREVENTIVE MAINTENANCE/CALIBRATION PROCEDURES

Laboratory and field instruments will be properly operated, calibrated, and maintained by qualified personnel according to the manufacturer's guidelines and recommendations, as well as criteria set forth in the applicable analytical methodology reference. Documentation of routine and special preventive maintenance and calibration information will be maintained in the appropriate field or laboratory logbook or reference file, and will be available upon request. Each maintenance and calibration logbook entry will include the date and initials of the individual performing the activity.

A. Field Instruments

Periodic schedules for preventive maintenance of field instruments, including equipment testing, parts replacement, and general cleaning will be followed according to the manufacturer's instructions.

Field equipment performance will be evaluated against check standards and calibration blanks, as appropriate, for each parameter prior to use on each day that the equipment is used. Field instruments used during RFI site characterization activities will include water level indicators, pH and conductivity meters for groundwater sampling events, and a photoionization detector (i.e., Microtip) that will be used for health and safety air monitoring purposes during soil and groundwater sampling events..

B. Laboratory Instruments

The analytical laboratory project manager has ultimate responsibility for maintaining laboratory instruments in good working order, including responsibilities for routine maintenance and calibration and the training of personnel in maintenance and calibration procedures. Laboratory instruments will be properly calibrated with appropriate check standards and calibration blanks for each parameter prior to commencing actual analysis on each analysis to be performed. Instrument performance check standards, where required, and calibration blank

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results will be recorded in a laboratory logbook dedicated to each instrument. At a minimum, the preventive maintenance schedules contained in the EPA methods and in the equipment manufacturer's instructions will be followed.

Laboratory calibration procedures and schedules will be as described in the laboratory quality assurance program plans (QAPPs) and will be available for review by EPA, upon request.

VII. ANALYTICAL PROCEDURES

Laboratory chemical analyses for all constituents except for dioxins/furans will be conducted by Analytical Resources, Inc. of Seattle, Washington. Laboratory analyses for dioxin/furan analyses will be conducted by Twin City Testing Corporation of St. Paul, Minnesota. Both laboratories are qualified to perform the analyses using standard, documented laboratory analytical procedures (e.g., EPA Method 8270). The laboratory QAPPs and SOPs provide data quality procedures according to the protocols for the analytical method and cleanup steps, and at a level sufficient to meet the sampling program DQOs, and can be provided upon request. Analytical methods and associated extraction procedures are listed in Table B-7.

The analytes and quantitation limits for soil and water for each analytical procedure are listed in Table B-5. Some of the quantitation limits have been lowered, where practical, to meet or approach the expected action levels (as established per 55 FR 30798 *et seq*). Those quantitation limits which still may exceed the action levels are indicated on the table. The quantitation limits listed are goals only, insofar as instances may arise where high sample concentrations, nonhomogeneity of samples, or matrix interferences preclude achieving the desired quantitation limits and associated QC criteria. In such instances, the laboratory will report the reason(s) for deviations from these quantitation limits or noncompliance with QC criteria.

VIII. DATA REDUCTION, VALIDATION, AND REPORTING

Analytical reports from the laboratory for this project will be accompanied by sufficient backup data and QC results to enable reviewers to determine the quality of the data. The Landau QAO or QA Task Leader will be responsible to the Project Manager for conducting checks for internal consistency, transmittal errors, laboratory protocols, and for complete adherence to the QC elements specified in this QAPjP. The Landau QAO (or designee) will also prepare a Laboratory Data Validation Report. If significant nonconformities are found, additional laboratory data will be evaluated by the Landau QAO.

Analytical data for the specific tasks will be reported in the units specified by the quantitation limits as listed in Table B-5. These units have been selected to provide for comparability of the data with previously generated relevant site data and pertinent criteria.

The analytical laboratories will provide deliverables that will include the following:

- Case narrative, including adherence to prescribed protocols, nonconformity events, corrective measures, and/or data deficiencies
- Sample analytical results
- Surrogate recoveries
- Matrix spike/matrix spike duplicate results
- Blank results
- Sample custody (including signed, original chain-of-custody records)
- Analytical responsibility.

If requested, the analytical laboratory will also provide initial and continuing calibration data, chromatograms, and quantitation reports, in addition to those deliverables listed above, as requested by the Landau QAO or QA Task Leader.

A Level III data validation will be performed on all analytical data collected as part of the RFI. Validation will be performed according to the appropriate sections of the EPA Functional Guidelines (EPA 1988a,b; 1991) and will include evaluations of the following:

- Chain-of-custody records
- Holding times
- Field blanks
- Laboratory method blanks
- Surrogate recoveries
- Laboratory matrix spikes and matrix spike duplicates
- Field duplicates
- Corrective action records
- Completeness
- Overall assessment of data quality.

Section X presents statistical tests used to determine data precision, accuracy, and completeness during data evaluation and validation. In the event that a portion of the data is outside the limits specified in Tables B-3 or B-4, or in EPA Functional Guidelines (EPA 1988a,b, 1991), or sample collection and/or documentation practices are deficient, corrective action(s) will be initiated. Corrective action, as described in Section XII, will be determined by the QA Task Leader and Landau QAO in consultation with the Project Manager, and may include any of the following:

- Rejection of the data
- Resampling
- Qualification of the data
- Modified field and/or laboratory procedures.

Data qualification arising from data validation activities will be described in the data validation report, rather than in individual corrective action reports.

IX. INTERNAL QUALITY CONTROL

Internal quality control will consist of samples collected and/or measurements performed in the field and laboratory. The quality control samples are used to evaluate data precision, accuracy, representativeness, completeness, and comparability of the analytical results for this project (see detailed discussion of these parameters in Section X). Analytical methods (referenced in Table B-7) specify routine procedures required to evaluate whether data are within proper QC limits. Additional internal QC includes collection and analysis of a number of field and laboratory QC samples, which are described in the following subsections.

For the purposes of QC sample frequency, a sampling round yields a set of samples of similar matrix, collected within a 14 (calendar) day interval.

A. Field/Laboratory QC Samples

1. Blind Field Duplicate

The blind field duplicate for soil and groundwater will consist of a split sample collected at a single sample location. Soil samples for all analyses, except volatile organics, will be collected, homogenized by mixing in a stainless steel bowl, and split into duplicate sample containers. Soil samples to be analyzed for volatile organics will be collected from co-located areas prior to processing for other analyses and placed into separate sample containers

immediately following collection. Duplicate groundwater samples will be collected by alternately filling sample containers for both the original and the corresponding duplicate sample, to decrease variability between duplicates. Blind field duplicates will be collected at a frequency of 1 per 20 samples, not including QC samples, but not less than 1 duplicate per sampling round per matrix (soil and groundwater).

2. Field Equipment Blanks

Field equipment blanks will consist of clean soil or wipe equipment blanks or rinsate blanks. The field equipment blanks will be used to evaluate the effectiveness of sampling equipment decontamination procedures and the potential for equipment or field cross contamination and will be collected for all analyses associated with soil samples (except for volatile organics; see below). The field equipment blank samples will be prepared by a licensed laboratory and will consist of a contaminant-free ("clean") soil or contaminant-free fabric (such as gauze or cheesecloth) saturated with pesticide-grade hexane placed in separate, marked, pre-cleaned containers. (Wipe blanks will not be collected for TPH samples because of the difficulty of preparing TPH-free wipe materials.) Blank samples will remain sealed in the container until sample collection is performed. Field equipment blanks will either be collected by placing "clean" soil in a decontaminated stainless steel bowl that actually contacted the site samples and following the exact sampling procedure used for environmental soil samples (see Appendix A), or by using the solvent-saturated wipe to wipe the surfaces of the sampling equipment. No equipment blanks will be collected for dedicated or disposable field equipment. Field equipment blanks will be taken at a frequency of at least 1 per 20 soil samples not including QC samples, but not less than 1 soil blank per sampling round.

Field equipment rinsate blanks will be collected for all analyses associated with groundwater samples and for soil samples analyzed for volatile organics. The rinsate blanks will consist of deionized distilled water (supplied by the analytical laboratory) passed over and/or through decontaminated sampling equipment and collected in the appropriate sample containers. Equipment surfaces exposed during actual sampling will be rinsed. No rinsate blanks will be collected from dedicated or disposable field equipment. Field equipment rinsate blanks will be collected at a rate of 1 blank per 20 samples per sample type (i.e., soil and groundwater), not including QC samples, but not less than 1 blank per sampling round.

3. Field Trip Blank

Field trip blanks will be analyzed for volatile organics, and will consist of deionized distilled water (prepared by the analytical laboratory), and sealed in a sample container. The trip blank will be transported to and from the field, then returned to the laboratory unopened for analysis. One trip blank per cooler containing samples for volatile organic analysis will be evaluated to determine possible sample contamination during transport.

4. Laboratory Matrix Spike

For each sample matrix (soil and groundwater), a minimum of 1 laboratory matrix spike per 20 samples, not including QC samples, or 1 matrix spike sample per sampling round, if fewer than 20 samples are obtained, will be analyzed for all constituents. Spiking compounds as well as control limits analysis are listed in Table B-3. Control limits are listed in Table B-3. These analyses will be performed to provide information on accuracy and to verify that extraction and concentration levels are acceptable. The laboratory spikes will follow EPA guidance for matrix spikes.

5. Laboratory Matrix Spike Duplicate

For each sample matrix (soil and groundwater), a minimum of 1 laboratory matrix spike duplicate per 20 samples, not including QC samples, or 1 matrix spike sample per sampling round, if fewer than 20 samples are obtained, will be analyzed for all constituents. Spiking compounds as well as control limits for each analysis are listed in Table B-3. These analyses will be performed to provide information on the precision of chemical analyses. The laboratory spikes will follow EPA guidance for matrix spike duplicates.

6. Laboratory Method Blanks

A minimum of 1 laboratory method blank will be analyzed for all parameters per 20 samples, one every 12 hours, or 1 per batch of samples analyzed (if fewer than 20 samples are analyzed) to assess possible laboratory contamination. Dilution water will be used whenever possible. Method blanks will contain all reagents used for analysis. The generation and analysis of additional method, reagent, and glassware blanks may be necessary to verify that laboratory procedures do not contaminate samples.

X. SPECIFIC ROUTINE PROCEDURES USED TO ASSESS DATA

Analytical laboratory data will be reviewed to confirm that the QA/QC objectives for the PARCC parameters are met. A description of the PARCC parameters and the associated statistical tests used in their evaluation are included in the following sections.

A. Precision

Precision is a measure of mutual agreement among individual measurements of the same property under prescribed conditions. Precision is best expressed in terms of the standard deviation or relative percent difference (RPD). QA/QC sample types that test precision include field and laboratory duplicates and matrix spike duplicates. The estimate of precision of duplicate measurements will be expressed as an RPD, which is calculated:

$$RPD = \left| \frac{D_1 - D_2}{(D_1 + D_2)/2} \right| x\ 100$$

where: D_1 = first sample value
D_2 = second sample value (duplicate)

The RPDs will be routinely calculated and compared with DQO control limits as listed in Table B-3.

B. Accuracy

Accuracy is the degree of agreement of a measurement (or an average of measurements of the same property) X, with an accepted reference or true value T, usually expressed as the difference between the two values (X-T), the difference as a percentage of the reference or true value (100 (X-T)/T), or as a ratio (X/T). Accuracy is a measure of the bias in a system and is expressed as the percent recovery of spiked (matrix or surrogate spike) samples:

$$\frac{Percent}{Recovery} = \frac{(Total\ Analyte\ Found)}{Analyte\ Added}\ x\ 100$$

The percent recovery will be routinely calculated and checked against DQO control limits as listed in Tables B-3 and B-4.

C. Representativeness

Representativeness expresses the degree to which data accurately and precisely represent an actual condition or characteristic of a population. Representativeness can be evaluated using replicate samples, additional sampling locations, and blanks. Representativeness for the project will be monitored as outlined in Section III.

D. Completeness

Completeness is a measure of the proportion of data obtained from a task sampling plan which is determined to be valid. It is calculated as the number of valid data points divided by the total number of data points requested. The QA objective for completeness during this project will be 90 percent. Completeness for the project will be established as outlined in Section III. Completeness will be routinely determined and compared to the DQO acceptable percentage, as listed in Table B-2.

E. Comparability

Comparability is an expression of the confidence with which one data set can be compared to another. QA procedures in this document will provide for measurements that are consistent and representative of the media and conditions measured. All sampling procedures and analytical methods used for RFI site characterization activities will be consistent to provide comparability of results for samples and split samples. Data collected under this QAPjP also will be calculated, qualified, and reported in units consistent with EPA guidelines. Quantitation limits, where appropriate, are listed in Table B-5, and QC samples are described in Section IX.

XI. PERFORMANCE AND SYSTEM AUDITS

Internal performance and/or system audits will not be conducted as part of the RFI activities.

XII. CORRECTIVE ACTIONS

Corrective actions will be needed for two categories of nonconformance:

- Deviations from the methods or QA requirements established in this QAPjP
- Equipment or analytical malfunctions.

Corrective action procedures to be implemented based on detection of unacceptable data are developed on a case-by-case basis. Such actions may include one or more of the following:

- Altering procedures in the field
- Using a different batch of sample containers
- Performing an audit of field or laboratory procedures
- Reanalyzing samples (if holding times allow)
- Resampling and analyzing
- Evaluating sampling and analytical procedures to determine possible causes of the discrepancies
- Accepting the data with no action, acknowledging the level of uncertainty
- Rejecting the data as unusable.

During field operations and sampling procedures, the field personnel will be responsible for conducting and reporting required corrective action. A description of any such action taken will be entered in the daily field notebook. If field conditions are such that conformance with this QAPjP is not possible, the Landau Associates' Project Manager and/or QA Task Leader will be consulted immediately. For any corrective action or field condition resulting in a revision of this QAPjP or RFI work plan, the QA Task Leader will consult with the Landau Associates QAO, who will authorize changes or exceptions to the QAPjP as necessary and appropriate.

During laboratory analysis, the Laboratory QAO will be responsible for taking required corrective actions in response to equipment malfunctions. If an analysis does not meet data quality goals outlined in this QAPjP, corrective action will generally follow the guidelines in the EPA analytical methods noted in this QAPjP and the EPA guidelines for data validation for organics analyses. If analytical conditions are such that nonconformance with this QAPjP is indicated, the Landau QAO and/or QA Task Leader will be notified as soon as possible so that any additional corrective actions can be taken.

Corrective Action Reports will be used to document responses to reported nonconformances. These reports may be generated from internal or external audits or from informal reviews of project activities. Corrective Action Reports will be reviewed initially for appropriateness of recommendations and actions by the Landau QAO (for QA matters) and by the Landau Associates Project Manager (for technical approach). The Landau Associates Project Manager and Landau QAO will jointly define responsibilities for scheduling, performing,

documenting, and assessing the effectiveness of the required action. As appropriate, the Corrective Action Reports will also be submitted to Time and DEQ for review and approval. The Landau QAO is ultimately responsible for implementation of appropriate corrective action and maintenance of a complete record of QC issues and corrective actions.

The Landau QAO will keep the Landau Associates Project Manager informed of significant deviations from the QAPjP due to equipment or analytical malfunctions, and any Corrective Action Reports written for this project.

XIII. REPORTING

A. Laboratory Reports

The laboratory project manager from each laboratory will transmit written reports that summarize the test procedures and provide test results and QC data required for validation, as well as the elements listed in Section VIII. Laboratory reports and analysis results will be signed by the appropriate laboratory project manager and submitted in data packages to the Project Manager or QA Task Leader.

B. Quality Assurance Reports to Management

Reports of significant QA deficiencies will be immediately provided to the Landau QAO by the QA Task Leader upon discovery. Verbal notice will be followed with written documentation such as a memorandum and Corrective Action Report. The Landau QAO will be responsible for reporting QA problems to the Project Manager.

All reported data will include results of the QA data validation review and conclusions containing information regarding data accuracy, precision, completeness, and any corrective action and sampling procedure alteration documentation. Data validation results will be appended to the RFI Report in accordance with Section VIII and, therefore, will not be published in a separate data validation report.

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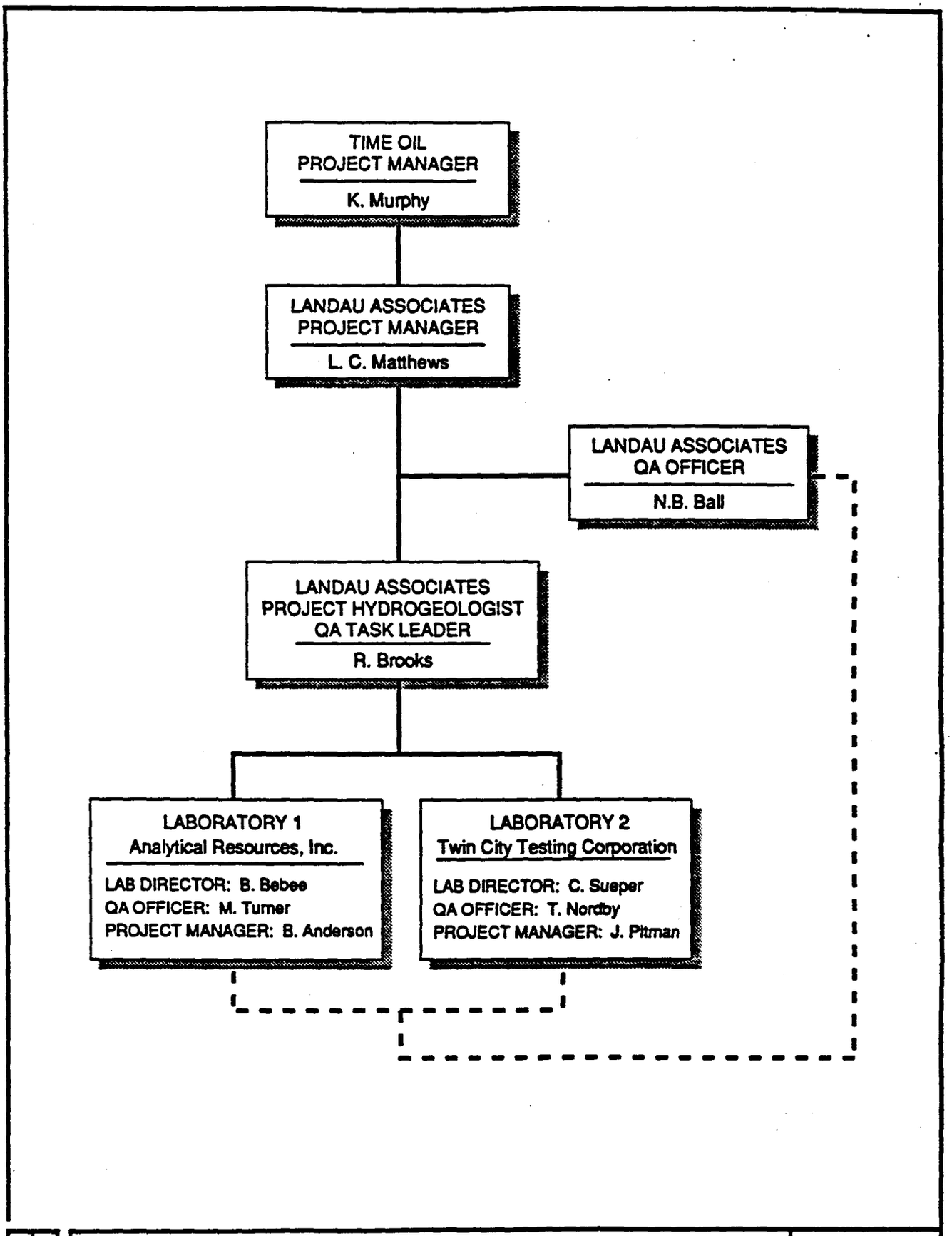

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Project Quality Assurance Organization | Figure B-1

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TABLE B-1

QUALITY ASSURANCE RESPONSIBILITIES
TIME OIL COMPANY FORMER PENTACHLOROPHENOL MIXING AREA
PORTLAND, OREGON

Personnel	Responsibilities
Kevin Murphy Project Manager Time Oil Company	Provides technical project direction and coordinates project-agency interaction; reviews project QA needs and approves appropriate QA corrective actions as required.
Leslee C. Matthews Project Manager Landau Associates, Inc.	Oversees technical project team performance to verify successful accomplishment of technical and QA project objectives. Reviews project QA needs and approve appropriate QA corrective actions as appropriate.
Nancy B. Ball, Ph.D. QA Officer Landau Associates, Inc.	Provides technical review for QA project requirements; review corrective action responses and deviations from the QAPjP; directs or performs data validation and prepare data validation reports; and review QA reports.
Rebekah Brooks QA/QC Task Leader Landau Associates, Inc.	Provides technical QA assistance, direct implementation of QAPjP, prepares QA reports, and provides corrective action response.
Michelle Turner, ARI Tera Nordby, TCT Laboratory QA Officers	Oversees laboratory implementation of QA/QC protocols so that QA objectives are met; provides for properly documented and reported laboratory QA/QC information.
Bryan D. Anderson, ARI Joel A. Pitman, TCT Laboratory Project Managers	Oversees analytical laboratory performance to verify adherence to project specifications and QA objectives and confirm that technical, financial, and scheduling objectives are achieved.

TABLE B-2

DATA QUALITY OBJECTIVES FOR RFI SAMPLING PROGRAMS
TIME OIL COMPANY FORMER PENTACHLOROPHENOL MIXING AREA
PORTLAND, OREGON

DQO Parameter	Soil Investigations	Groundwater Investigations
Data Users	Time Oil, Agencies	Time Oil, Agencies
Data Use/Decision	Monitoring/Characterization/ Necessity of Remedial Action	Monitoring/Characterization/ Necessity of Remedial Action
Data Type	Concentrations of Constituents of Concern[a]	Concentrations of Constituents of Concern[a]
Data Quality Objectives[b]		
Analytical Level	Level III	Level III
QA Goals:		
- Precision	[c]	[c]
- Accuracy	[c]	[c]
- Representativeness	[c]	[c]
- Completeness	90%	90%
Quantitation Limits[d]	See Table B-5	See Table B-5

(a) Potential constituents of concern are identified in Section 2.3 of the work plan.

(b) Developed in accordance with DEQ (1990) and EPA (1987a,b; 1989b) guidance documents.

(c) Control limits for evaluation of precision and accuracy for project analytes are listed in Tables B-3 and B-4. QC samples used for evaluation of precision, accuracy, and representativeness are discussed in Section IX.

(d) Quantitation limits may be affected by matrix interferences. Values are based on current laboratory data.

TABLE B-3
MATRIX SPIKE RECOVERY CONTROL LIMITS
TIME OIL COMPANY FORMER PENTACHLOROPHENOL MIXING AREA
PORTLAND, OREGON

Analysis	Matrix Spike Compound	Recovery (%) Water	Recovery (%) Soil	RPD (%)(a) Water	RPD (%)(a) Soil
Chlorinated Phenols (modified 8040)					
	Pentachlorophenol	45-130	45-130	35	35
Volatiles (8260)					
	1,1-Dichloroethene	61-145	59-172	14	22
	Trichloroethene	71-120	62-137	14	24
	Chlorobenzene	76-127	66-142	11	21
	Toluene	76-125	59-139	13	21
	Benzene	75-130	60-133	13	21
Semivolatiles (8270)					
	1,2,4-Trichlorobenzene	39-98	38-107	28	23
	Acenaphthene	46-118	31-137	31	19
	2,4-Dinitrotoluene	24-96	28-89	38	47
	Pyrene	26-127	35-142	31	36
	N-Nitroso-di-n-propylamine	41-116	41-126	38	38
	1,4-Dichlorobenzene	36-97	28-104	28	27
	Pentachlorophenol	9-103	17-109	50	47
	Phenol	12-110	26-90	42	35
	2-Chlorophenol	27-123	25-102	40	50
	4-Chloro-3-Methylphenol	23-97	26-103	42	33
	4-Nitrophenol	10-80	11-114	50	50
Dioxins and Furans (8290)					
	All reported compounds	--	70-130	--	20

(a) RPD = Relative Percent Difference.
(b) QL = quantitation limit.
(c) If sample value is within 5 times the QL then control limits shall be +/- QL for water or +/- 2QL for soil.

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TABLE B-4
SURROGATE RECOVERY CONTROL LIMITS
TIME OIL COMPANY FORMER PENTACHLOROPHENOL MIXING AREA
PORTLAND, OREGON

Analysis	Surrogate Compound	Recovery (%) Water	Soil
Volatiles (8260)		8240A	
	Toluene-d8	88-110	84-138
	4-Bromofluorobenzene	86-115	59-113
	1,2-Dichloroethane-d4	76-114	70-121
Semivolatiles (8270)			
	Nitrobenzene-d5	35-114	23-120
	2-Fluorobiphenyl	43-116	30-115
	p-Terphenyl-d14	33-141	18-137
	Phenol-d5	10-110	24-113
	2-Fluorophenol	21-110	25-121
	2,4,6-Tribromophenol	10-123	19-122
	d4-2-Chlorophenol	33-110	20-130
	d4-1,2-Dichlorobenzene	16-110	20-130
Chlorinated Phenols (modified 8040)			
	Bromodichlorophenol	40-130	40-130

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TABLE B-5
CONSTITUENTS OF CONCERN
QUANTITATION LIMITS
TIME OIL COMPANY FORMER PENTACHLOROPHENOL MIXING AREA
PORTLAND, OREGON

ANALYTES	Quantitation Limits (a) Water (ug/L)	Quantitation Limits (a) Soil (mg/kg)	Risk-Based Action Levels (b) Water (ug/L)	Risk-Based Action Levels (b) Soil (mg/kg)
VOLATILES				
Benzene	1	0.02	1.2 (C)	24 (C)
Toluene	10	0.02	7000 (NC)	16000 (NC)
Ethylbenzene	10	0.02	3500 (NC)	8000 (NC)
Xylenes (total)	10	0.05	70000 (NC)	160000 (NC)
All others	1-10	0.02	--	--
SEMIVOLATILE ORGANICS				
2-Chlorophenol	10	0.33	180 (NC)	400 (NC)
2,4-Dichlorophenol	10	0.33	100 (NC)	240 (NC)
2,4,6-Trichlorophenol	5 +	0.33	3 (C)	64 (C)
2,4,5-Trichlorophenol	25	0.80	3500 (NC)	8000 (NC)
Pentachlorophenol	5.0 +	0.80	0.3 (C)	6 (C)
Benzo(a)Anthracene	1.0 +	0.33 +	0.005 (C,P)	0.1 (C,P)
Chrysene	1.0 +	0.33 +	0.005 (C,P)	0.1 (C,P)
Benzo(b)Fluoranthene	1.0 +	0.33 +	0.005 (C,P)	0.1 (C,P)
Benzo(k)Fluoranthene	1.0 +	0.33 +	0.005 (C,P)	0.1 (C,P)
Benzo(a)Pyrene	1.0 +	0.33 +	0.005 (C)	0.1 (C)
Indeno(1,2,3-cd)Pyrene	1.0 +	0.33 +	0.005 (C,P)	0.1 (C,P)
Dibenz(a,h)Anthracene	1.0 +	0.33 +	0.005 (C,P)	0.1 (C,P)
All others	1-25	0.33-0.80	--	--
CHLORINATED PHENOLS				
2,4,6-Trichlorophenol	0.2	0.01	3 (c)	64 (c)
2,3,6-Trichlorophenol	0.3	0.01	NA	NA
2,4,5-Trichlorophenol	0.5	0.02	3500 (NC)	8000 (NC)
3,4,5-Trichlorophenol	0.5	0.02	NA	NA
2,3,4-Trichlorophenol	0.4	0.01	NA	NA
2,3,4,6-Tetrachlorophenol	TBD	TBD	1000 (NC)	2400 (NC)
2,3,5,6-Tetrachlorophenol	0.2	0.01	NA	NA
2,3,4,5-Tetrachlorophenol	0.3	0.01	NA	NA
Pentachlorophenol	0.2	0.01	1 (c)	6 (c)
DIOXINS AND FURANS				
All Tetra-congeners	1E-5 (d)	1E-3 (d)	0.00001 (C)(b,c)	0.00005 (C)(b,c)
All Penta-congeners	5E-5 (d)	5E-3 (d)	0.00002 (c)	0.00001 (c)
All Hexa-congeners	5E-5 (d)	5E-3 (d)	0.0001 (c)	0.00005 (c)
All Hepta-congeners	5E-5 (d)	5E-3 (d)	0.001 (c)	0.0005 (c)
All Octa-congeners	1E-4 (d)	1E-2 (d)	0.01 (c)	0.005 (c)
Total Petroleum Hydrocarbons	250	5	N/A	N/A
Total Organic Carbon	--	1	N/A	N/A

NA = Not available.

\+ = Quantitation limits exceed risk-based action levels.

(a) Quantitation limits listed for soil are based on wet weight. The quantitation limits calculated by the laboratory for soil, calculated on dry weight basis required by the contract, will be higher. Laboratory quantitation limits will be based on the lowest standard on the calibration curve. Instances may arise where high sample concentrations, nonhomogeneity of samples, or matrix interferences preclude achieving the desired quantitation limits and associated QC criteria.

(b) Calculated per the methodologies outlined in EPA's proposed Corrective Action Regulations (55 CFR 30798 et seq).

(c) Risk-based action limit is based upon toxicities of each congener relative to 2,3,7,8-tetrachlorodibenzo-p-dioxin, as specified by EPA (1989). Because the potency factor for 2,3,7,8-tetrachlorodibenzo-p-dioxin is currently under review, these numbers are subject to change

(d) Laboratory target detection limit, which is generally achievable, but may be influenced by instrument sensitivity, recovery, and matrix interferences.

(C) = Risk-based action level calculated based on carcinogenic risk of 10E-6.

(NC) = Risk-based action level calculated based on noncarcinogenic hazard index of 1.

(P) = Risk-based action level calculated based on potency factor for benzo(a)pyrene, as directed by EPA (1992).

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TABLE B-6

SAMPLE CONTAINERS, PRESERVATION, AND HOLDING TIMES

TIME OIL COMPANY FORMER PENTACHLOROPHENOL MIXING AREA

PORTLAND, OREGON

Matrix	Analytes	Sample Container	Preservation	Maximum Holding Times(a)
Soil	Chlorinated Phenols	4 oz. widemouth glass with Teflon liner	Cool to 4 Deg.C	10 days until extraction; 40 days after extraction
	Semivolatile Organics	4 oz. widemouth glass with Teflon liner	Cool to 4 Deg.C	14 days until extraction; 40 days after extraction
	Total Petroleum Hydrocarbons	4 oz. widemouth glass with Teflon liner	Cool to 4 Deg.C	14 days until extraction; 21 days after extraction
	Volatile Organics	1.5 oz. widemouth glass with Teflon liner, or widemouth glass sealed with a septum	Cool to 4 Deg.C No headspace	14 days
	Dioxins and Furans	8 oz. widemouth glass with Teflon liner	Cool to 4 Deg.C	30 days until extraction; 45 days after collection
	Total Organic Carbon	4 oz. widemouth glass with Teflon liner		30 days
Ground-water	Chlorinated Phenols	1 L amber glass; Teflon-lined cap	Cool to 4 Deg.C	7 days until extraction; 40 days after extraction
	Semivolatile Organics	3 each - 1L amber glass; Teflon-lined cap	Cool to 4 Deg.C	7 days until extraction; 40 days after extraction
	Total Petroleum Hydrocarbons	1 L glass, Teflon-lined cap	5 mL HCl Cool to 4 Deg.C	7 days until extraction; 14 days after extraction
	Volatile Organics	3 each - 40 mL glass vials; Teflon-lined cap	HCl to pH<2 Cool to 4 Deg.C No headspace	14 days
	Dioxins and Furans	2 each - 1 L amber glass; teflon-lined cap	Cool to 4 Deg.C	30 days until extraction; 45 days after extraction
	Major Ions	1 L high density polyethylene, or glass	HNO3 to pH<2	28 days

(a) Holding times are from date of collection unless otherwise specified.

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TABLE B-7

RFI ANALYTICAL METHODS[a]
TIME OIL COMPANY FORMER PENTACHLOROPHENOL MIXING AREA
PORTLAND, OREGON

Sample Type	Extraction/Cleanup	Analytical Method
Soil		
Chlorinated Phenols	3550 (sonication) 3540 (soxhlet)	8040 (modified)
Volatile Organics[b]	None	8260
Semivolatile Organics[b]	3550 (sonication)	8270
Dioxins/Furans[c]	per 8290 methodology	8290
Total Petroleum Hydrocarbons	None	TPH-HCID and/or TPH-D[d]
Total Organic Carbon	Drying, purging[e]	Combustion/Infrared[f]
Grain Size	None	ASTM D 422
Vertical Conductivity	None	ASTM D 5084-90
Percent Moisture/Solids	None	ASTM D 2216-80
Groundwater		
Chlorinated Phenols	3510 (separatory funnel)	8040 (modified)
Volatile Organics[b]	None	8260
Semivolatile Organics[b]	3510 (separatory funnel)	8270
Dioxins/Furans[c]	per 8290 methodology	8290
Total Petroleum Hydrocarbons	None	TPH-HCID and/or TPH-D[d]
Major Ions[f]	None	Cations by ICP (6010) Anions by standard EPA methods

(a) Methods are from SW-846 (EPA 1986, updated 1990) unless otherwise referenced.

(b) Laboratory will be required to report first 10 tentatively identified compounds (TICs) to aid in the identification of carrier and additive chemicals.

(c) Dioxin/furan results will be converted to an equivalent 2,3,7,8-TCDD toxicity by multiplying concentrations by the toxicity equivalence factors (TEFs; Table B-8).

(d) Source: Oregon Department of Environmental Quality. 1990.

(e) Source: ASA 1982.

(f) Includes calcium, magnesium, sodium, potassium, sulfate, nitrate, chloride, carbonate, and bicarbonate.

TABLE B-8

TOXICITY EQUIVALENCE FACTORS[a]
TIME OIL COMPANY FORMER PENTACHLOROPHENOL MIXING AREA
PORTLAND, OREGON

Compound	I-TEFs/89
Mono-, Di-, and TriCDDS	0
2,3,7,8-TCDD	1
Other TCDDs	0
2,3,7,8-PeCDD	0.5
Other PeCDDs	0
2,3,7,8-HxCDDs	0.1
Other HxCDDs	0
2,3,7,8-HpCDDs	0.01
Other HpCDDs	0
OCDD	0.001
Mono-, Di-, and TriDCFs	0
2,3,7,8-TCDF	0.1
Other TCDFs	0
1,2,3,7,8-PeCDF	0.05
2,3,4,7,8-PeCDF	0.5
Other PeCDFs	0
2,3,7,8-HxCDFs	0.1
Other HxCDFs	0
2,3,7,8-HpCDFs	0.01
Other HpCDFs	0
OCDF	0.001

(a) Source: EPA. 1989a.

APPENDIX C

Health and Safety Plan

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I. INTRODUCTION

This health and safety plan presents the protocols that will be required to provide for worker health and safety during the investigative activities to be conducted at the former pentachlorophenol mixing area (the site) of Time Oil Company's (Time) Northwest Terminal in Portland, Oregon. This plan presents a description of existing site conditions and the project health and safety organization, and also includes safety rules and procedures; criteria for hazard and risk analysis; description of levels of personal protection and required equipment; air monitoring procedures; emergency response information; training requirements; and requirements for routine health care and health monitoring.

The requirements outlined in this plan are considered the minimum health and safety requirements due to potential site contamination. All fieldwork will be performed in accordance with Occupational Safety and Health Administration (OSHA) Standard 29 CFR 1910.120, which regulates hazardous waste site operations; as well as Oregon requirements outlined in the Oregon Administrative Rules (OAR 437). This plan does not address physical worker safety issues that may be associated with excavation, trenching, and shoring (OAR 437-03, Subdivision P) or work in confined spaces (OAR 437-02, Subdivision E).

A. Site Background

The site currently consists of a former pentachlorophenol (PCP) storage warehouse, a former PCP mixing tank area from which soil has been excavated, a stockpile of excavated PCP-containing soil located south-southwest of the excavation area, and an inactive soil treatment area (Figure C-1).

PCP blending services at the site were operated by Time, under an 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; transfer and mixture of the chemicals to formulations specified by Koppers; interim storage of the PCP products; and transfer of the products to drums or containers for offsite transport. No PCP-related activities have occurred at the site since 1982.

Releases of PCP, carriers, 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 1982 resulted in the previously noted excavation of PCP-containing soils and generation of

investigation derived, PCP-containing water. The excavation area was filled and regraded, and 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.

The overall purpose of the RFI is to collect sufficient data to characterize the nature and extent of contamination that remains at the site. Field investigations covered by this health and safety plan may include:

- Sampling and analyzing soil in and adjacent to areas previously reported to be contaminated with PCP and other carrier compounds, or where previous site activities suggest the potential for contamination
- Installing monitoring wells and sampling and analyzing groundwater in areas downgradient of previously identified soil or groundwater contamination and/or where previous hydrogeologic characterization is insufficient for the purpose of the RFI
- Abandoning two existing wells which are damaged
- Measuring water levels periodically to evaluate flow directions and piezometric head gradients
- Conducting tests in selected monitoring wells to evaluate aquifer properties and potential contaminant migration pathways.

This health and safety plan does not cover site activities that are limited to walking across any exclusion zone designated in this plan when the activities noted above are not in progress in that exclusion zone, and if the activities in progress in any other exclusion zone do not represent a reasonable risk of exposure.

PCP, at this time, is the most frequently encountered constituent of concern at the site. Other constituents, including tetrachlorophenol and certain non-carcinogenic polyaromatic hydrocarbons (PAHs; e.g. fluorene, phenanthrene, and anthracene) have been detected at or near the site but at less elevated concentrations. Based on reported site operations and field observations during previous excavation activities, other constituents of concern that may be present, but are unconfirmed, include kerosene and mineral spirits. Other constituents which potentially may occur at the site include tetra-, tri-, di-, and mono-chlorophenols; tetrachlorodibenzo-dioxins, and -furans; and benzene, ethylbenzene, toluene, and xylenes. Table C-1 lists the potential constituents of concern with their maximum previously detected concentrations and health-based exposure information. It should be noted that the symptoms listed as a result of exposure are generally associated with acute (short term) exposures to high

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concentrations of a constituent. Such symptoms may not be associated with the lower level exposure that would be the most likely exposure scenario encountered during site work. Lack of these symptoms does not indicate that exposure is not occurring. Also, symptoms of exposure are not available for some of the constituents. Therefore, use of prescribed protective equipment and monitoring instruments in accordance with this plan is required in order for exposure to these constituents to be kept as low as possible.

B. Health and Safety Plan Applicability and Adherence

All individuals performing fieldwork must read, understand, and comply with this health and safety plan. All field participants must read the plan prior to undertaking field activities. If any information presented in this plan is unclear, the reader should contact the Site Safety Officer for clarification prior to participating in any field activity. Once the information has been read and understood, the individual must sign the Acknowledgement (Table C-2), which will then be placed in the job file.

Similarly, all subcontractors for Landau Associates must prepare their own health and safety plan that is at least as protective as this plan, or they may adopt this plan as their own. Failure to comply with the requirements of this plan are grounds for immediate dismissal. Copies of an acknowledgement form similar to that provided as Table C-2 must be provided to Landau Associates' Site Health and Safety Officer prior to the commencement of field activities.

This plan is flexible, and allows unanticipated site-specific problems to be addressed, while providing adequate and suitable worker protection. The plan may be modified at any time, based on the judgment of the respective Site Safety Officer or the Project Safety Officer, as appropriate. Minor changes to the plan regarding day-to-day activities (e.g., location of decontamination station, etc.) may be made by the Site Safety Officer. Substantive changes to procedures (e.g., monitoring frequency, etc.) must also receive the concurrence of both the Site Safety Officer and the Project Safety Officer. Any modifications to the plan will be documented using Table C-3 (Modification to Health and Safety Plan) and will be presented to the onsite team during a safety briefing.

Activities conducted as part of this investigation shall be conducted without creating health and safety risks for nearby workers or the public. All onsite personnel shall be attentive to the potential for release of contaminated materials associated with field activities and shall immediately bring all such matters to the attention of the appropriate Site Safety Officer. Decontamination procedures and other elements of the field procedures (e.g., access to/from

work areas by heavy equipment) have been developed to be protective of both worker and public health and safety.

C. Responsible Individuals

Safety during the field investigations will be the responsibility of the Landau Associates' project manager and the designated Site Safety Officer. The Site Safety Officer, or designee, will be present at the site at all times during field activities related to the investigation.

II. SITE ORGANIZATION AND OPERATION

The areas of the site to be investigated and the type of activities involved in the investigation are diverse. Additionally, the distribution of contamination at the site is nonuniform in nature. These factors preclude the use of a single work zone boundary.

The designated level of protection for each work area onsite may be downgraded (C to D) if monitoring data obtained prior to or during work activities indicate that such a downgrade is appropriate. Conversely, the level of protection must be upgraded if monitoring conducted during work activities so indicates (see Section VI for site monitoring and action levels). Figure C-1 should be regarded only as an indication of the general work area, actual boundaries may vary slightly with work activity requirements and will be flagged once defined.

A. Work Zones

Each work area will consists of an exclusion zone, a contamination reduction zone, and a support zone:

- **Exclusion Zone:** The outer perimeter of each work area defines the outer perimeter of the exclusion zone for that work area. Only authorized field personnel will be allowed in each exclusion zone. The initial level of protection required in the exclusion zone may be adjusted as conditions change. Levels of protection are discussed in more detail in Section V.
- **Contamination Reduction Zone:** All personnel and equipment will leave the exclusion zone through a contamination reduction zone. Both personnel and equipment decontamination will occur in this zone to prevent the transfer of contaminants to the support zone (decontamination procedures are specified in Section III.B.3). The transition from the exclusion zone to the contamination reduction zone is shown schematically on Figure C-2.

- **Support Zone:** Located adjacent to the contamination reduction zone, the support zone is where all personnel will suit up in specified personal protective equipment before entering the work area defined by the exclusion zone. The support zone includes "clean" equipment storage and personnel resting and eating facilities.

Each zone in each work area will be established on an activity-by-activity basis prior to initiation of work and will be clearly delineated (marked by tape or fencing).

B. Site Security

Most of the area in which field activities will occur is a restricted-access industrial area. For work activities that are conducted in areas with public access, the work area will be blocked off and posted.

III. SAFETY RULES AND PROCEDURES

Safety is the responsibility of every individual involved in project efforts. Whether in the office or in the field, properly followed procedures are essential for personal safety and to minimize injuries or accidents involving equipment. Potential hazards while working at the site include, but are not limited:

- Exposure to toxic and/or hazardous chemicals
- Physical hazards from use of drilling, sampling, and testing equipment
- Physical hazards from heavy equipment
- Physical hazards from working conditions (e.g., heat stress, hypothermia).

A. Safety Rules

All personnel working in the field will follow the rules and procedures listed below:

- All personnel will conduct themselves in a professional manner at all times.
- No personnel will be admitted into an operational exclusion zone without safety equipment in proper working condition and requisite training.
- All personnel must comply with the established safety procedures. Anyone working onsite for or under contract with Landau Associates who does not comply with this health and safety plan may be immediately dismissed from the site.

- Working while under the influence of intoxicants, narcotics, or controlled substances is prohibited. Prescription drugs should not be taken by personnel if the potential for contact with toxic substances exists, unless approved in writing by a physician.
- Firearms, ammunition, fireworks, and explosives are prohibited.
- Climbing or standing on machinery (other than drill rigs or service trucks) or equipment is prohibited unless authorized by the Site Safety Officer.
- Long hair must be contained inside a hard hat. Facial hair that interferes with proper operation and fit of respiratory protection gear is not allowed.
- A team system will be used within an exclusion zone. During site operations, each worker is a safety backup for his/her team partners and should make all personnel aware of dangerous situations that may develop.
- Eating, drinking, chewing gum or tobacco, smoking, or any practice that increases the probability of hand-to-mouth transfer and ingestion of material is prohibited in an exclusion zone.
- Smoking or consumption of food and beverages is allowed only within designated areas in the support zones.
- Disposable clothing will be used whenever necessary and appropriate to minimize the risk of cross contamination.
- The number of personnel and the amount of equipment in contaminated areas will be minimized to allow for efficient site operations.
- Samples will be collected only by trained and authorized personnel.
- Contact with contaminated or potentially contaminated material should be avoided. Efforts will be made to stage site activity upwind of investigative equipment, activities, and materials.
- Proper decontamination procedures must be followed before leaving an exclusion zone and the site, unless medical emergencies dictate otherwise (Section III.B.3). All decontamination residual materials, and any other potentially contaminated materials, will be handled properly and kept onsite or at a designated secure stockpile area.
- Only approved work clothes or equipment will be allowed within the exclusion zones.
- Exchange of personal protective equipment will not be allowed.

B. Safety Procedures

1. Leaving the Support Zone to Enter Site

- Prior to beginning investigation activities, review site information updates. These updates will be provided by the Site Safety Officer and will provide important information concerning:
  - Expected hazards
  - Special conditions
  - Sampling procedures
  - Location of phones
  - Emergency medical information
  - Level of personal protection required
- Finish eating and extinguish smoking materials prior to suiting up.
- Attend safety briefing and worker question and answer period, if applicable.
- Check safety gear and equipment. Suit up as required to begin activities.
- Measure and delineate exclusion zone (unless established previously).

2. Activities in Exclusion Zone

- All activities will be conducted at a minimum of Level D (modified) (Section V).
- For activities capable of creating volatile airborne contamination, levels of personal protection will be adjusted according to results of work zone air monitoring (Section VI).
- Whenever possible, personnel will be stationed upwind of field activities capable of creating airborne contamination.
- If any physical discomfort is experienced (e.g., abnormalities, nausea, lightheadedness), immediately stop work, tell the other team members, and leave the area.
- If any personal protective equipment fails, immediately leave the area.
- One person must never be left alone in an exclusion zone.
- Use maximum care in handling samples. If the sampling site is not accessible using gear available (i.e., water too high, slippery or steeply sloped surface, holes, etc.), confer with the Landau Associates Project Manager and/or Site Safety Officer, as appropriate, to arrange an alternate sampling site or appropriate equipment/procedures to obtain samples safety.
- Immediately wipe off spills and dirt from sampling containers.

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3. Site Exit Decontamination

All personnel and equipment must be properly decontaminated before entering a support zone from an exclusion zone. All contaminated equipment and materials will leave only through the contamination reduction zone or will be contained onsite; any potentially contaminated materials to be stockpiled will be kept in designated, secure locations.

a. Routine Decontamination Procedures

A decontamination area will be set up in the contamination reduction zone at the border of each exclusion zone. Prior to leaving the exclusion zone:

- Portable sampling equipment will be washed or placed in/on plastic for vehicle transport to equipment decontamination area
- Drilling rig auger flights will be placed on a trailer for transport to the decontamination area
- Drill cuttings will be brushed and/or washed off the drill rig before moving to the decontamination area, to minimize transport of potentially contaminated materials from the exclusion zone.

In the contaminant reduction zone, sampling, drilling, and other equipment will be decontaminated as follows:

- Sampling equipment will be decontaminated as outlined in the work plan.
- All heavy equipment must be thoroughly decontaminated prior to leaving the site, with particular care taken in decontaminating those parts of the heavy equipment that have come in direct contact with contaminants, such as tracks, tires, shovels, grapples, and scoops. High-pressure hot water cleaning will be used for these, aided by physical scrubbing with disposable brushes when necessary to loosen caked materials. All portions of the equipment, including the undercarriage, chassis, and cab, will also be inspected and cleaned as necessary.
- Any vehicle used for transportation in an exclusion zone will be equipped with seat covers that can be easily wiped down. All such vehicles must be decontaminated prior to leaving the exclusion zone. Decontamination will include at a minimum high pressure washing of the exterior and, as necessary, wet wiping the interior and scrubbing of the exterior.
- Personal protective equipment will be removed and washed and/or containerized prior to leaving the contaminant reduction zone.

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Certain parts of contaminated respirators, such as the harness assembly or cloth components, are difficult to decontaminate. If grossly contaminated, they will be discarded. Rubber components will be soaked in soap and water and scrubbed with a brush. Respirators will be sanitized by rinsing in a detergent solution followed by a clear rinse, then hung to dry.

b. Emergency Decontamination

In case of an emergency, gross contamination procedures will be speedily implemented if possible. If a life-threatening injury occurs and the injured person cannot undergo decontamination procedures without incurring additional injuries or risk, he or she will be transported wrapped in plastic sheeting if time allows and if consistent with the injury. The medical facility will be: 1) informed that the injured person has not been decontaminated, and 2) given information regarding the most probable contaminants.

4. Disposal of Contaminated Fluids and Materials

All equipment and materials used for decontamination or personal protection will be cleaned or collected for appropriate disposal. All nondisposable equipment will be decontaminated onsite. Disposables will be containerized. Contaminated liquids will be collected in storage tanks or containers and stockpiled in a secure location. Storage and/or disposal will be conducted in accordance with the work plan.

5. Housekeeping

Work areas will be kept as clean and orderly as possible at all times. Ordinary refuse will be placed in suitable rubbish bins or trash containers at the site. The storage or introduction of extraneous materials will be minimized in the exclusion zone to minimize the decontamination load and reduce possibilities for cross contamination.

6. Visitors

Authorized visitors will only be allowed to observe operations from the support zone or beyond, and must obey all instructions of the Site Safety Officer and/or Time Oil representative. Representatives from the Oregon Department of Environmental Quality (DEQ), the Oregon Occupational Safety and Health Division, and EPA must also possess appropriate health and safety equipment at the time of the visit, and have a health and safety plan at least as stringent as this plan, or adopt this plan as their own.

IV. ANALYSIS OF SITE HAZARDS AND RISKS

A. Basis for Analysis

Results of previous investigations of the area have identified the presence of contaminants of concern. Maximum concentrations of constituents detected in area soil and groundwater are summarized in Table C-1 along with occupational exposure criteria, as available, and potential exposure pathways of concern.

B. Suspected Hazardous Substances

There is a potential for field personnel to become exposed to contaminants in the defined work areas. Dermal, inhalation, and incidental ingestion exposures are possible. The general risk of exposure on the site is low to moderate.

Current soil and groundwater contamination could lead to dermal contact during drilling and sampling activities. Dermal protection, as defined in Section V.B, will, therefore, be required for all such activities. Volatization of a few identified contaminants could pose risk of inhalation exposures. Action levels and the associated respiratory protection for potential inhalation exposures will be based initially on constituent concentrations presented in Table C-1 and will be adjusted thereafter based on ambient monitoring data to be collected during field activities (Section VI).

V. PERSONAL SAFETY EQUIPMENT

A. Levels of Protection

Levels of protection have been defined by the EPA in the EPA *Standard Operating Guide*, 1984:

- Level A requires a fully encapsulating suit and full facepiece pressure demand self-contained breathing apparatus (SCBA) with a 5-minute, supplied air escape pack for the highest level of respiratory, skin, and eye protection. Level A is not anticipated at this site and, therefore, is not discussed further.
- Level B requires maximum respiratory protection by the use of supplied air or a positive pressure SCBA. A 5-minute, supplied air escape pack is required while in Level B. Dermal protection is selected on the basis of anticipated hazards. Level B is not anticipated at this site, and therefore, is not discussed further.
- Level C requires an air purifying respirator that is specific to the contaminants of concern. The degree of dermal protection depends on anticipated hazards.

- Level D is the basic work uniform, described in Section V.B, as modified for work at this site.

There are numerous variations and modifications possible with each level of protection. Personal protection action levels for site project activities are discussed in Section VI.

B. Required Equipment

The level of protection designated for site work indicates the level of protection that should be initially used. Air monitoring results may indicate that a downgrading (or upgrading) in the level of protection is appropriate. Level C protection is initially recommended for intrusive work (drilling, digging, or otherwise disturbing soil, accessing monitoring wells for water level measurements or sampling, etc.) only. Level D is considered appropriate for nonintrusive activities unless air monitoring indicates that an upgrade is necessary. The following sections define Level D and Level C protective equipment.

1. Level D (Modified)

- One-piece disposable Tyvek coveralls, which are resistant to PCP, shall be used. Coveralls will be taped at wrists and ankles if wet or excessively dusty conditions are expected.
- PVC inner-disposable gloves.
- Neoprene and/or nitrile outer gloves.
- Neoprene steel-toed and steel-shank, chemically resistant, impermeable outer boots.
- Hard hat (with splash shield if liquid splashes or sprays are likely to be encountered; not required when groundwater monitoring is the only activity occurring at the site).
- Safety glasses with side shields (for intrusive work and groundwater sampling only).

Level D may only be worn in work areas initially designated as Level C after the Site Safety Officer has made a determination that exposure to hazardous materials is unlikely and that exposures will not approach the threshold limit value/permissible exposure level (TLV/PEL).

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2. Level C

- All Level D (modified) equipment described above (including all equipment identified for intrusive work)
- Half-face air purifying respirator equipped with organic vapor/HEPA cartridges. If contaminated liquid splashes or sprays are likely to be encountered, full-face air purifying respirators equipped with organic vapor/HEPA cartridges shall be used.

VI. SITE MONITORING AND ACTION LEVELS

Air monitoring near the breathing zone will be conducted as outlined below for volatile and semivolatile constituents and for particulate matter to determine the appropriate level of respiratory protection (action levels are provided in Table C-4). Background readings will be taken 50 ft upwind of site activities. The personal protective equipment requirements applies to the area within a 30-ft radius of where the contaminants are measured.

A. Volatile Organic Compounds

Substances that are most hazardous from a chronic inhalation standpoint are those that are relatively volatile, highly toxic (i.e., low TLV or PEL) and have an odor threshold much higher than the TLV. If a substance has an odor threshold higher than the TLV, it is considered to have poor warning properties because its odor would not be detected until after the acceptable airborne concentration (TLV or PEL) has been exceeded. The designated Site Safety Officer will have a photoionization detector (e.g., TIP meter) onsite at all times that intrusive activities are conducted and will establish background readings well upwind of any excavation, spoils pile, or borehole. TIP readings will be taken frequently during intrusive work. A table showing the relative response to different chemical constituents at different lamp energies will be kept with each TIP for field reference.

The organic vapor action level for field activities is 10 ppm. Benzene has the lowest PEL (1 ppm) for any of the volatile contaminants previously found at the site (Table C-1). However, this constituent has only been detected in one soil sample, at a low concentration (1 ppm). Because of this, an action level of 1 ppm to protect against benzene exposure is not appropriate. Therefore, the action level for upgrading to respiratory protection will be based on toluene. The PEL for toluene is 50 ppm, and the action level is set below the PEL to account for other constituents which may be present. While monitoring with the TIP, any consistent readings in the breathing zone that are greater than 5 ppm above the upwind background level for more

than 5 minutes, or any readings in the breathing zone greater than 10 ppm other than a momentary peak shall be the action level for donning half-face air purifying respirators equipped with organic vapor/particulate cartridges. Cartridges will be replaced either immediately upon any indication of "break through" or after each day of use.

Any readings consistently greater than 10 ppm above background or greater than 50 ppm other than for a brief peak, or any peak reading greater than 100 ppm in the breathing zone, will be the action level for exiting the area.

VII. EMERGENCY RESPONSE

A. Reporting/Notification Procedures

In the case of any emergency, the Site Safety Officer is to be notified immediately. If the situation is life threatening and notification of the Site Safety Officer would delay emergency response, field personnel may initiate the appropriate emergency contacts prior to notifying the Site Safety Officer. The Site Safety Officer will then initiate contacts as follows:

1) Call appropriate emergency services numbers (ambulance, fire, etc.) if not already done and provide the following information:
   - Name and location of person reporting
   - Location of accident/incident
   - Name and affiliation of injured party
   - Description of injuries
   - Status of medical aid effort
   - Details of any chemicals involved
   - Summary of the accident, including the suspected cause and the time it occurred
   - Temporary control measures taken to minimize further risk.

   Note: This information is not to be released under any circumstances to parties other than the Site Safety Officer, Project Safety Officer, Landau Associates Project Manager, Time Oil, and bona fide emergency response team members.

2) Call the Landau Associates Project Manager (Table C-5) and provide information noted in Item 1 above.

3) The Site Safety Officer will complete a written accident/incident report using Table C-6, within 24 hours, sending copies to each of the project managers.

Resources to be used in cases of emergency include:

- List of Emergency Contacts: Table C-5 includes both the appropriate emergency services (top of table) and the appropriate project contacts (bottom of table).
- Nearest Phone: As of the date of this plan, telephones are located at the Time site office.
- Onsite Emergency Equipment: An industrial first aid kit, a 20-pound type ABC portable fire extinguisher, and an eyewash kit will accompany each field vehicle.
- Offsite Emergency Services: Phone numbers for offsite emergency services are listed in Table C-5. Copies of this table must be located in each vehicle.

  After the required emergency contacts are made, Time and Landau Associates' Project Managers should be promptly notified by the Site Safety Officer.
- Hospital Route: Good Samaritan Hospital is located near the site and should be utilized where care beyond standard first aid is required. Figure C-3 shows the route to the hospital. Onsite field personnel should become familiar with this route prior to field activities. Driving time from the site to Good Samaritan Hospital is estimated to be about 15 to 20 minutes, depending on traffic conditions.

B. Non-Life Threatening Emergencies

1. Injuries

In emergency situations which are not life threatening (e.g., a broken leg), normal decontamination procedures should be followed when possible. However, decontamination procedures may be modified according to the specific circumstances. Outer protective clothing should be removed if doing so would not cause delays or aggravate the injury. Respirators should only be removed: 1) if the victim has stopped breathing, or 2) after the victim has been removed from a breathing hazard area.

Bodily injuries which occur as a result of an accident during operations at the site will be handled in the following manner:

- The victim will be administered to by an individual who holds current first-aid and/or CPR certification, as necessary
- The local first-aid squad/rescue unit and the local hospital (Good Samaritan Hospital, Portland) will be notified as appropriate, depending on the nature of the emergency.

2. Heat-Related Illnesses

It is anticipated that site activities will take place during winter months, when temperatures average 40-45°F. However, heat-related illnesses can occur at any time when protective clothing is worn. Workers wearing semipermeable or impermeable encapsulating clothing should be monitored for heat stress through regular checks of heart rate and by more comprehensive monitoring when the temperature in the work area is above 55-60°F. A pulse rate in excess of 150 beats per minute may indicate heat exhaustion, although this rate will vary among workers. All personnel shall know what their baseline pulse rate is before working in elevated temperatures, so as to monitor themselves. The Site Safety Officer will be trained in monitoring, treating, and recognizing the signs of heat stress. If heat stress occurs, decontamination should be minimized and treatment begun immediately, unless the victim is obviously contaminated.

3. Cold Stress

Fieldwork will likely be conducted during the winter months, when site personnel may be subject to low temperatures, rain, and winds. In these conditions, field teams must be prepared to wear proper protective clothing and to recognize symptoms of cold stress.

Cold stress can be manifested as both hypothermia and frostbite:

- Hypothermia is a cold-induced decrease in the core body temperature that can increase the safety hazards associated with investigation activities that require maximum attentiveness and manual dexterity. Hypothermia produces shivering, numbness, drowsiness, muscular weakness, and, if severe enough, death.
- Frostbite results for the constriction of blood vessels in the extremities, decreasing the supply of warming blood to these areas. This drop in blood supply may result in the formation of ice crystals in the tissues, causing tissue damage. The symptoms of frostbite are white or grayish skin, blisters, or numbness.

Site personnel should review the information provided in their first aid training for response to cold stress problems.

4. Flu-Like Symptoms

Any site personnel experiencing flu-like symptoms should notify the Site Safety Officer. Such symptoms may be sufficient cause for ceasing operations until the work area is evaluated and a "return to operations" order given by the Site Safety Officer.

C. Fire

Fire extinguishers (ABC-type) will be kept in each vehicle and drilling rig. This equipment will be used only to respond to small fires. In the event of major fires, explosions, or fire/explosion hazard conditions, all personnel will immediately evacuate the area. The Site Safety Officer will evaluate the need for further evacuation and/or emergency services.

D. Site Evaluation and Evacuation

The Site Safety Officer will be responsible for determining if circumstances exist which require further evaluation and/or evacuation. The Site Safety Officer should always assume worst-case conditions until proven otherwise. Specific evacuation procedures and warning signs and signals will be covered in the health and safety training session prior to beginning work.

Two levels of evacuation may be considered:

- Withdrawal from the immediate work area onsite
- Evacuation of the surrounding area.

1. Withdraw from Work Area

Withdrawal to a safe upwind location will be required under the following circumstances:

- Detection of volatile organics and/or toxic gases at concentrations above action levels for the level of protection being worn (Section VI)
- Occurrence of a minor accident—field operations will resume after first aid and decontamination procedures have been administered
- Malfunction or failure of protective equipment, clothing, or respirator.

The following hand signals will be used by site personnel to communication within the work zone if respiratory protection is being used:

- Thumbs up - Okay
- Thumbs down - Not okay
- Hands on wrist - Exit exclusion zone
- Hands on throat - cannot breath.

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2. Evacuation of Surrounding Area

There are no foreseeable conditions, based on current knowledge of the site, that would require evacuation of the surrounding area. The site coordinators, in consultation with the Site Safety Officer and, as appropriate, the Landau Associates Project Manager, will be responsible for determining if circumstances exist for area-wide evacuation, and should always assume reasonable worst-case conditions until proven otherwise. Fire and police departments must be contacted in such cases. If evacuation is necessary, it will be implemented with the assistance of the appropriate emergency response personnel (Table C-5).

Procedures for reporting accidents/incidents are provided in Section VII. They will be performed in the order indicated.

VIII. TRAINING

All personnel performing onsite investigation tasks shall have completed formal health and safety training, which complies with 29 CFR 1910.120 and Oregon Administrative Rule (OAR) Chapter 437 (certificates of successful completion of training will be maintained in job files), and shall verify on-the-job training for those tasks they are assigned to perform. At least one member of each field team will be trained in CPR and first aid. All operations will be reviewed and all unfamiliar operations will be rehearsed prior to performing the actual procedures.

IX. ROUTINE HEALTH CARE AND MONITORING

All persons working in an exclusion zone must have a medical evaluation to determine their baseline medical status prior to any site work. Follow-up examinations are appropriate if exposures are known or suspected to have occurred. Documentation of medical evaluations for all site works will be maintained by the Site Safety Officer.

X. REFERENCES

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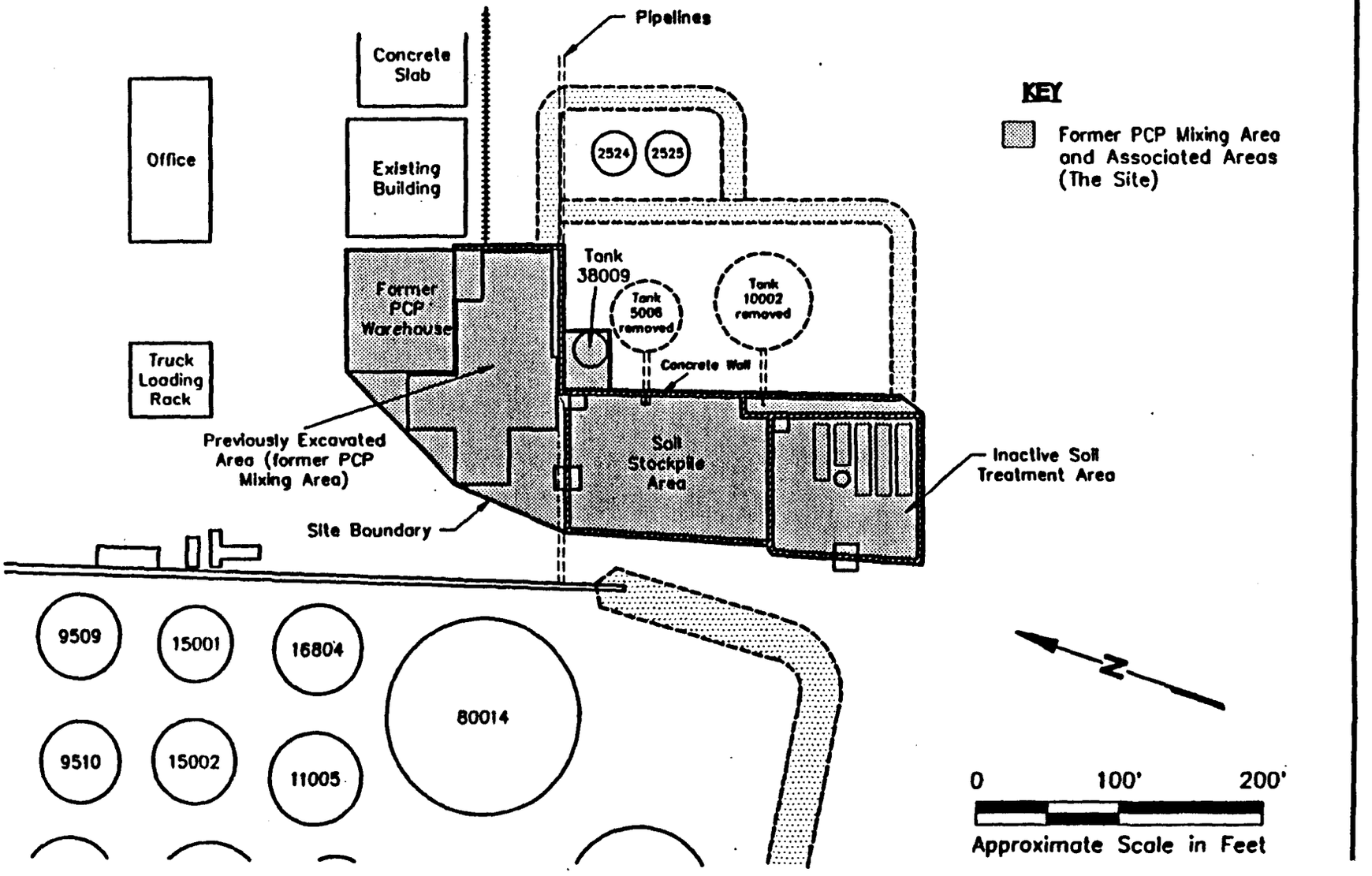

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Site Map

Figure C-1

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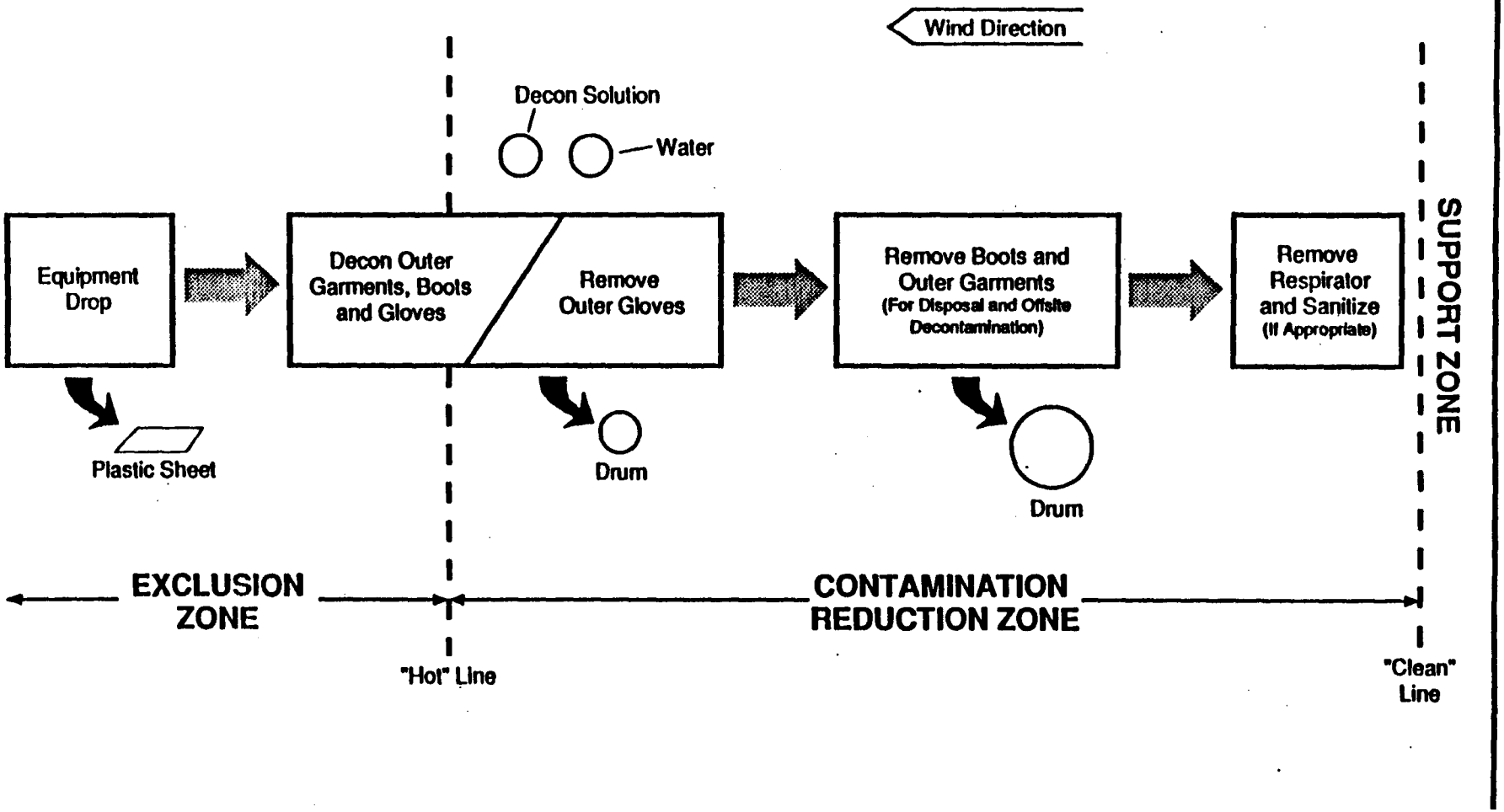

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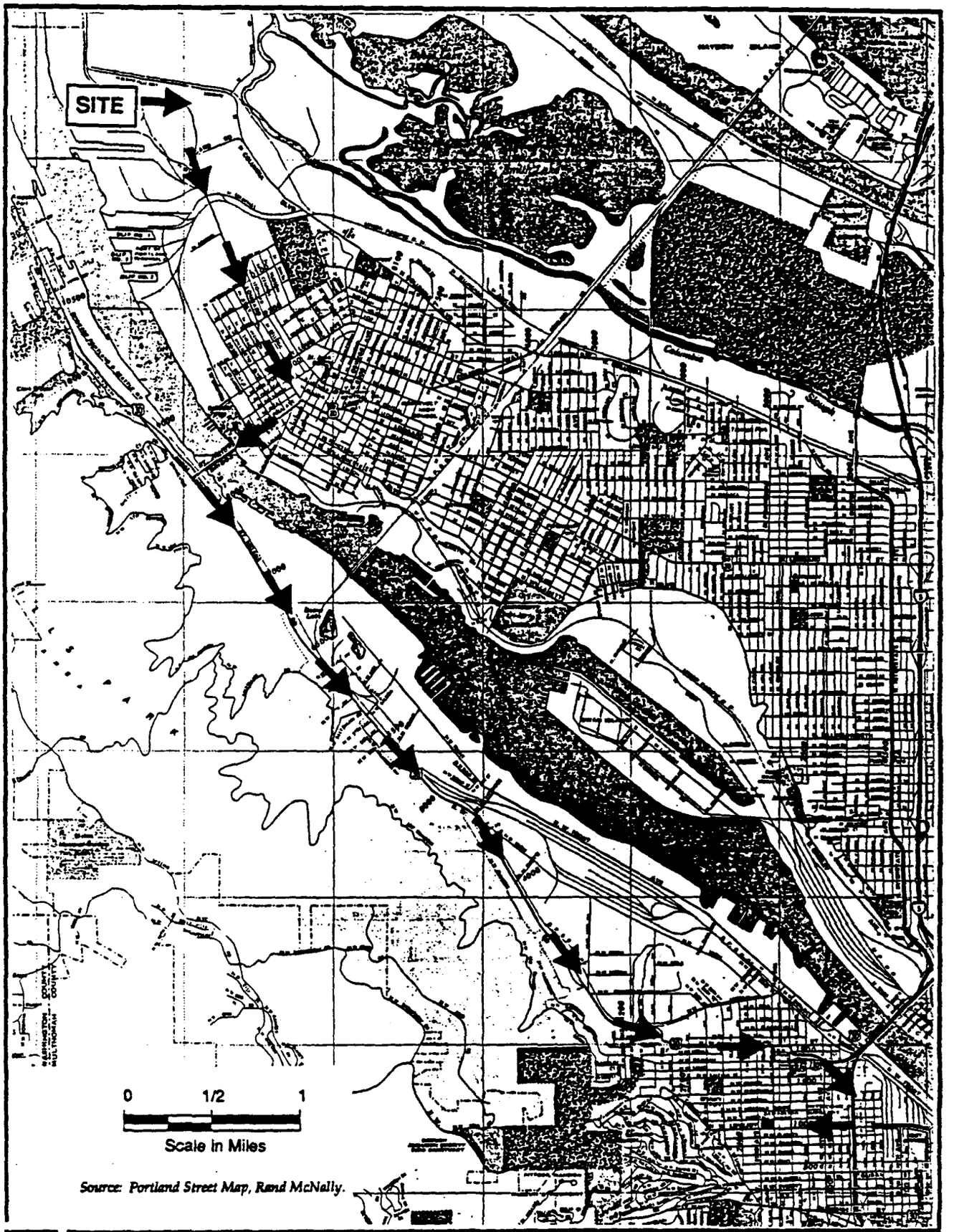
Schematic of Transition from Exclusion Zone to Contamination Reduction Zone to Support Zone

Figure C-2



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Route to Hospital

Figure C-3

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TABLE C-1
SITE EXPOSURE ASSESSMENT
TIME OIL COMPANY FORMER PENTACHLOROPHENOL MIXING AREA
PORTLAND, OREGON

Hazardous Material/ Chemical Constituent	Maximum Concentration Detected Onsite: Soil (mg/kg)	Maximum Concentration Detected Onsite: Groundwater (mg/L)	TLV[a]	PEL[b]	IDLH[c]	Exposure Routes[d]	Symptoms of Exposure
Pentachlorophenol	116000	60	0.5 ppm (skin)	0.5 ppm (skin)	150 mg/m^3	Inh, Ing, Abs, Con	Eye, nose, throat irritation, weakness, nausea
2,3,4,6-Tetrachlorophenol	71	0.17	DNA[e]	DNA	DNA	Inh, Ing, Con	DNA
2-Chlorophenol	5.3	NA[f]	DNA	DNA	DNA	DNA	DNA
Benzene	1	0.64	10 ppm	10 ppm	3000 ppm	Inh, Abs, Ing, Con	Irritated eyes, nose, respiratory tract
Toluene	12	1.6	50 ppm	200 ppm	2000 ppm	Inh, Abs, Ing, Con	Fatigue, dizziness, headache
Ethylbenzene	NA	1.2	100 ppm	100 ppm	2000 ppm	Inh, Ing, Con	Irritated eyes, headache
Xylene	11	3.0	100 ppm	100 ppm	1000 ppm	Inh, Abs, Ing, Con	Dizziness, drowsiness, nausea
Fluorene	2300	NA	DNA	DNA	DNA	Inh, Ing, Abs, Con	DNA
Phenanthrene	4600	NA	0.2 ppm[g]	0.2 ppm[g]	DNA	Inh, Ing, Abs, Con	Skin photosensitization
Anthracene	9100	NA	0.2 ppm[g]	0.2 ppm[g]	DNA	Inh, Ing, Abs, Con	DNA
Dioxins and Furans	0.003	NA	DNA	DNA	DNA	DNA	DNA
Benzo(a)anthracene	160	NA	0.2 mg/m^3[g]	0.2 mg/m^3[g]	700 mg/m^3	Inh, Con	Dermatitis, bronchitis
Chrysene	630	NA	0.2 mg/m^3[g]	0.2 mg/m^3[g]	700 mg/m^3	Inh, Con	Dermatitis, bronchitis
Benzo(b)fluoranthene	14	NA	0.2 mg/m^3[g]	0.2 mg/m^3[g]	700 mg/m^3	Inh, Con	Dermatitis, bronchitis
Benzo(a)pyrene	90	NA	0.2 mg/m^3[g]	0.2 mg/m^3[g]	700 mg/m^3	Inh, Con	Dermatitis, bronchitis
Kerosene	NA	NA	DNA	DNA	DNA	Inh, Ing, Abs, Con	DNA
Mineral Spirits	NA	NA	DNA	DNA	DNA	Inh, Ing, Con	DNA

(a) TLV = Threshold limit value, as defined by the American Council of Governmental Industrial Hygienists (1992).
(b) PEL = Permissible exposure limit, as defined by the Occupational Safety and Health Administration (1991).
(c) IDLH = immediately dangerous to life and health (NIOSH).
(d) Exposure route codes: Inh = inhalation; Ing = ingestion; Con = skin and/or eye contact; Abs = skin absorption.
(e) DNA = Data not available.
(f) NA = Not analyzed.
(g) TLV/PEL for total coal tar pitch volatiles (benzene soluble fraction) includes anthracene, benzo(a)pyrene, phenanthrene, acridine, chrysene, and pyrene.

12/14/95 J:\TIME\[illegible]

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TABLE C-2

ACKNOWLEDGEMENT

I have read the attached Health and Safety Plan for the work at Time Oil Company's Northwest Terminal, Portland, Oregon. I have discussed any questions which I have regarding these materials with my supervisor, and I understand the requirements of the health and safety plan.

Employee _____ Date _____

Employee _____ Date _____

Employee _____ Date _____

Employee _____ Date _____

Employee _____ Date _____

Employee _____ Date _____

Employee _____ Date _____

Employee _____ Date _____

Employee _____ Date _____

Employee _____ Date _____

Employee _____ Date _____

Employee _____ Date _____

Employee _____ Date _____

Employee _____ Date _____

Employee _____ Date _____

Site Safety Officer _____ Date _____

TABLE C-3

MODIFICATION TO HEALTH AND SAFETY PLAN

TIME OIL COMPANY, NORTHWEST TERMINAL

DATE __/__/__

Modification: _____

_____

_____

_____

Reasons for Modification: _____

_____

_____

_____

Site Personnel Briefed:

Name: _____ Date: _____

Name: _____ Date: _____

Name: _____ Date: _____

Name: _____ Date: _____

Name: _____ Date: _____

Name: _____ Date: _____

Name: _____ Date: _____

Approvals:

Site Safety Officer: _____

Manager: _____

Others: _____

TABLE C-4

ACTION LEVELS FOR PERSONAL PROTECTION
TIME OIL COMPANY/NORTHWEST TERMINAL
PORTLAND, OREGON

Monitoring Parameter	Reading[a]	Level of Protection
Organic Vapors[b]	0-5 ppm over background[c] (5 minutes)	Level D (modified)
	5-10 ppm over background	Level C - Half-face air purifying respirator equipped with organic vapor and HEPA cartridges; full-face respirators with organic vapor and HEPA cartridges are required if contaminated liquid splashes or sprays are likely to be encountered
	>50 ppm over background	Leave the work area
	>100 ppm over background (instantaneous)	Leave the work area

(a) Readings are sustained readings over at least a 1-minute duration unless otherwise noted.
(b) Determine using a photoionization or other appropriate organic vapor detector.
(c) Background readings obtained 50 ft upwind of site activity.

TABLE C-5

EMERGENCY SERVICES
TIME OIL COMPANY FORMER PENTACHLOROPHENOL MIXING AREA
PORTLAND, OREGON

Service	Name/Location	Phone Number
Ambulance	—/—	911
Fire	—/—	911
Police	—/—	911
Hospital	Good Samaritan Hospital 1015 N.W. 22nd Avenue Portland, Oregon	229-7260

CONTACT INFORMATION

Time Oil		
Kevin Murphy Senior Environmental Specialist	206/286-6443	Seattle, WA
Landau Associates		
Leslee Matthews Project Manager	206/778-0907[a]	Edmonds, WA
Julie Wilson Health and Safety	206/778-0907	Edmonds, WA

(a) Numbers listed are office telephones; home numbers will also be provided in each field vehicle.

TABLE C-6

EMPLOYEE EXPOSURE/INJURY INCIDENT REPORT

(Use additional page if necessary)

Date: _____ Time: _____

Name: _____ Employer: _____

Site Name and Location: _____

Site Weather (clear, rain, snow, etc.): _____

Nature of Illness/Injury: _____

_____

Symptoms: _____

Action Taken: Rest: _____ First Aid _____ Medical _____

Transported by: _____

Witnessed by: _____

Hospital's Name: _____

Treatment: _____

Comments: _____

_____

What was the person doing at the time of the accident/incident? _____

_____

Personal Protective Equipment Worn: _____

_____

Cause of Accident/Incident: _____

_____

What immediate action was taken to prevent recurrence? _____

_____

Additional comments:

Employee's Signature: Supervisor's Signature:

_____ _____

Date Date

Site Safety Representative's Signature

_____

RECEIVED
JAN 17 1994

Oregon

DEPARTMENT OF ENVIRONMENTAL QUALITY

NORTHWEST REGION

January 10, 1994

Mr. Kevin Murphy
2737 West Commodore Way
Seattle, WA 98199-1233

Re: Soil Building Design Approval

Dear Kevin:

The Department has reviewed the October 18, 1993 design for the soil storage containment building at the Time Oil facility, Northwest Terminal. The design is approved. The Department is currently reviewing the RFI document you submitted on December 17,1993. Note that the RFI work could change based on the RFA which will be conducted by the EPA next year.

In addition, the Department will be preparing a draft Order for your review. The Order will address work necessary for corrective action/closure of the site, and if necessary, a post-closure permit.

Please notify the Department at least 10 days prior to any activity at the facility. If you have any questions, please call me at (503) 229-6682.

Sincerely,

Barbara J. Puchy
Hazardous Waste Specialist
Northwest Region Office

bjp

cc: Jan Palumbo, EPA

2020 SW Fourth Avenue
Suite 400
Portland, OR 97201-4987
(503) 229-5263 Voice/TDD
DEQ-1

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Draft Work Plan

RCRA Facility Investigation
Former PCP Mixing Area
Northwest Terminal
Portland, Oregon

September 30, 1993

Prepared for

Time Oil Company
2737 West Commodore Way
Seattle, WA 98199-1233

Prepared by

Landau Associates, Inc.
P.O. Box 1029
Edmonds, WA 98020-9129
(206) 778-0907

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1.0 INTRODUCTION

This Work Plan presents the general description and scope of work for a RCRA Facility Investigation (RFI) of the former pentachlorophenol mixing area at the Time Oil Company Northwest Terminal in Portland, Oregon. The RFI will be implemented in accordance with the Oregon Hazardous Waste Management Regulations (OAR 340-100) under the direction of the Oregon Department of Environmental Quality (DEQ).

This RFI Work Plan includes study objectives and tasks; a description of sampling locations; protocols for sampling, analysis, quality assurance/control, and health and safety; and a schedule for conducting the RFI activities.

1.1 PURPOSE/OBJECTIVES OF THE INVESTIGATION

The overall purpose of the RFI for the former pentachlorophenol mixing area (hereafter referred to as the site) is to collect data sufficient to characterize the nature and extent of contamination that remains at the site from releases during former site operations, and after completion of interim remedial actions taken by Time Oil Company (Time) since site operations ceased. The data collected during the RFI will subsequently be used to evaluate whether a Corrective Measures Study is needed and, if so, will be used in the study itself. These objectives will be accomplished by:

- Sampling and analyzing soil in and adjacent to areas previously reported to be contaminated with pentachlorophenol (PCP) and other carrier compounds, or where previous site activities otherwise suggest the potential for contamination
- Identifying and characterizing the carrier compounds
- Installing monitoring wells and sampling and analyzing groundwater in areas downgradient of previously identified soil or groundwater contamination and/or where previous hydrogeologic characterization is insufficient for the purpose of the RFI
- Abandoning two existing wells which are damaged
- Measuring water levels periodically to evaluate flow directions and piezometric head gradients

- Conducting tests in selected monitoring wells to evaluate aquifer properties and potential contaminant migration pathways
- Conducting a topographic survey of all measurement points so that field measurements can be confidently evaluated and compared, and the extent of contamination can be accurately evaluated
- Validating and evaluating the field and laboratory data.

2.0 SITE BACKGROUND AND ENVIRONMENTAL SETTING

The site is a former pentachlorophenol mixing area located within a small portion of Time's Northwest Terminal, in the industrialized Rivergate area of north Portland, Oregon (Figure 2-1). The Northwest Terminal is currently used for petroleum products storage and is bounded to the north, east, and south by heavy industrial complexes and the Port of Portland, and to the west by the Willamette River. The RFI site occupies about 5,000 ft^2 within the interior of the Northwest Terminal, and is located approximately 1/4 mile northeast of the eastern bank of the Willamette River.

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 2-2).

2.1 SITE HISTORY

Former site operations consisted of PCP blending services that were operated by Time under an 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 or containers for offsite transport. No PCP blending activities have occurred at the site since 1982.

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 (Figure 2-2). 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 amount of PCP-containing soil remains unexcavated at the site.

2.2 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* (ECOVA 1991), which was reproduced as Appendix A in the *Site Characteristics Report* (Landau Associates 1993).

2.2.1 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 so that 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. 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 PCP 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 38009 and near the pipelines for the old Tanks (5006 and 10002). These samples were reported to contain PCP concentrations ranging from about 5 to 2,424 ppm (near Tank 38009).

2.2.2 Groundwater

Between 1985 and mid-1990, Time and/or its consultants installed 16 monitoring wells and seven well points at or near the site (Figure 2-3). Of these, one well point and one monitoring well are currently damaged and will be abandoned as part of the RFI.

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.

2.3 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, and its breakdown products 2,3,4,6-tetrachlorophenol, 2,4,5-trichlorophenol, 2,4,6-trichlorophenol, 2,4-dichlorophenol, and 2-chlorophenol
- Polychlorodibenzo-dioxins and -furans, which are common trace contaminants in technical grade PCP (note that tetrachlorodibenzodioxin, the most toxic isomer, has not been identified in soil samples from the site)
- Benzene, ethylbenzene, toluene, and xylenes 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.

2.4 GEOLOGY AND HYDROGEOLOGY

As noted previously, 16 monitoring wells and well points have been installed to date at 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.

Available site data (Ecova 1991 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 confining layer 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 (ECOVA 1991); this direction of flow was confirmed during a comprehensive water level measurement round conducted in August 1993. There is not sufficient information to determine the groundwater flow direction for the lower water-bearing zone at this time.

The geology and hydrogeology have yet to be sufficiently characterized at the site. Information to be collected as part of the RFI, including the installation of additional monitoring wells, periodic measurement of water levels, and aquifer testing, will be used in the evaluation of groundwater flow directions, vertical and horizonal gradients, and aquifer properties in each of the water-bearing zones.

2.5 POTENTIAL MIGRATION PATHWAYS

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

The occurrence of PCP in all of these forms will be evaluated during the RFI.

2.6 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 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.

The RFI field program described in this work plan has been designed to obtain data to evaluate these issues.

3.0 FIELD INVESTIGATION

3.1 INTRODUCTION

The purpose of the RFI field activities will be to collect data to supplement currently available data regarding site hydrogeology and the nature and extent of contamination associated with the former PCP mixing area (the site). To this end, RFI field activities will include collection and analysis of soil and groundwater samples, installation of additional monitoring wells, aquifer testing, measurement of water levels, and land surveying. The planned locations for collecting soil samples and installing monitoring wells are shown on Figures 3-1 and 3-2. The Standard Operating Procedures (SOPs) to be followed during soil and groundwater sampling, drilling, and well installation activities are provided in Appendix A. Quality assurance/quality control (QA/QC) procedures to be followed during this investigation are outlined in the Quality Assurance Project Plan (QAPjP) in Appendix B. Health and safety procedures to be used during field activities are contained in the Health and Safety Plan in Appendix C.

3.2 SOIL INVESTIGATION

Sampling and analysis of surface and subsurface soil will be conducted to evaluate the concentrations and limits of contamination by PCP and related chemicals, and the extent to which carrier chemicals have impacted site soil. Soil samples will be collected for analysis from areas onsite where soil data are limited or unavailable, or from areas previously identified as contaminated, but where additional characterization has been determined to be necessary.

3.2.1 Subsurface Soil Sampling Locations

Subsurface soil samples will be collected from seven nine "biased" locations where, based upon a review of previous site data, PCP contamination is suspected to exist at depth, and from 5 random locations within or adjacent to the former PCP mixing area. Subsurface soil samples will be collected from depths which extend slightly into the confining layer anticipated to be about 15 to 20 ft BGS. The "biased" subsurface soil sampling locations (LB1-LB7) include:

- Five locations (LB1 through LB5) within the boundaries of the previously excavated area where PCP contamination was reported at depths exceeding the maximum excavation depth or where the lateral extent of contamination was not adequately defined.

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- One location (LB6) south/southeast of the 1989 excavation limits, along the product pipelines, where elevated PCP concentrations were previously reported. LB6 is also adjacent to old storage tank 38009.
- One location (LB7) adjacent to the sump at the northwest corner of the soil stockpile area where contamination was previously reported.

Because the "biased" sampling locations are biased toward locations for which there is some indication of residual contamination, the resultant data may not be appropriate for statistical interpretation. Therefore, the RFI will also include random sampling of subsurface soil within the former PCP mixing area. The 5 random samples (LB8 through LB12) will be collected at a single randomly generated location within each of the 5 rectangular grids, as shown on Figure 3-1. [Note that if any random sample is close (within about 5 ft) to a biased sample location or new monitoring well location, the random sample will be relocated to provide a more evenly distributed representation of constituent concentrations).

3.2.2 Surface Soil Sample Locations

In addition to these subsurface samples, surface soil samples will be collected from three areas [at depths of approximately 0-6 inches below ground surface (BGS)], as shown on Figure 3-1 and listed in Table 3-1. The surface soil sampling areas include the following:

- Two (LS1 and LS2) located near the former PCP loading dock and warehouse, outside the limits of excavation, in areas not previously sampled or where sample results are limited.
- One (LS3) located at the termination of the rail line to the east of the previous excavation limits.

3.2.3 Soil Sample Collection

Methods to be used to collect the soil samples will include drilling shallow soil borings for the subsurface soil samples, and drilling or hand-digging holes for the surface soil samples.

At each subsurface soil location, soil will be collected for lithologic logging purposes at 5-ft intervals or significant changes in lithology (whichever is smaller) and for chemical analyses at the following depth intervals:

- 0-6 inches BGS (except for locations within the excavation area; at these locations, the first sample will be collected near the base of the 1989 excavation or below the base of the backfill. In those locations where the 1989 excavation coincides with the water table, the first depth interval will not be collected.)

- Near the water table surface of the upper water-bearing zone (or, where it is possible to identify, within the zone of seasonal water table fluctuation)
- At the base of the upper water-bearing zone (near the contact with the underlying interbedded confining layer, where present)

Surface soil samples will be collected from 2 to 3 random locations within each surface soil sampling area (LS-1 through LS-3) at a depth interval of 0-6 inches BGS or below any fill layer at the surface. (Note that surface sample area LS1 may have historically been covered with road fill and/or asphalt; if field observations confirm this, no samples will be collected in this area.) The random samples from each area will be composited to yield 1 surface soil sample per area for chemical analysis.

3.2.4 Soil Sample Analysis

Chemical analyses performed on the subsurface and surface soil samples will include semivolatile organics, chlorinated phenols (including PCP and tetrachlorophenol), total petroleum hydrocarbons (TPH), and volatile organics. [Note that if early analytical results indicate that contamination at the site is limited to a smaller group of constituents and, therefore, the full suite of analyses is clearly not necessary to characterize contamination at the site, the extraneous analyses may be dropped for subsequent samples. In making this decision, consideration will be given to the representative nature of the early samples (i.e., vertical and lateral distribution)]. Selected subsurface and/or surface soil samples (approximately 4 samples) may also be analyzed for dioxins/furans. For the semivolatile and volatile organic compounds, the laboratory will also be required to report the first 10 tentatively identified compounds (TICs), to aid in the identification of carrier or additive compounds. Further descriptions of the soil analytical program, including specific analytical method numbers, are provided in Table 3-1 and in Appendix B.

3.3 GROUNDWATER INVESTIGATION

The RFI groundwater investigation will include the following activities:

- Drilling and installing five monitoring wells (3 shallow and 2 deep)
- Measuring water levels in existing wells, well points, new monitoring wells, and at the Willamette River
- Sampling and analysis of soil from the new monitoring well borings

- Sampling and analysis of groundwater from all existing monitoring wells and well points at the site and from the new monitoring wells, on a semiannual basis, for 1 year
- Performing aquifer testing within the upper and lower water-bearing zones after the first groundwater sampling event.

These activities will provide additional information on the extent of groundwater contamination and the potential for contaminant migration.

3.3.1 Monitoring Well Installation

Five new monitoring wells (two shallow and three deep) will be installed at the locations shown on Figure 3-2 and listed on Table 3-1. Two of the new wells will be installed in a cluster (one shallow well and one deep well in separate borings about 10 ft apart). The well cluster [shallow well (LW1S) and deep well (LW1D)] will be installed between the former PCP mixing area and Well M, which was previously used for pumping, to identify any influence due to the pumping well, and will provide information on vertical variability in chemical concentrations and vertical groundwater gradients. A shallow well (LW2S) will be installed within the excavation area of the former PCP mixing area (the three existing angled wells do not extend to the top of the confining layer, and, therefore, are not adequate for the purposes of the RFI). A single deep well (LW3D) will be installed adjacent to the former PCP mixing area (and adjacent to existing shallow Well D) to provide information on the direction of flow in the lower water-bearing zone, vertical gradients between the upper and lower water-bearing zones, and water quality in the lower water-bearing zone in this area. Another single shallow well (LW4S) will be installed downgradient from the stockpiled soil area and cross-gradient from the J wells.

Monitoring wells will be drilled and installed in accordance with applicable Oregon Water Resources Department regulations (OAR 690.240). The drilling techniques to be used during the RFI depend on the depth of the monitoring well (shallow or deep) and on soil conditions encountered during drilling. It is currently expected that the drilling methods will include hollow-stem auger or cable tool for the shallow wells and cable tool for the deep wells (as explained further below).

Shallow wells will be completed within the upper water-bearing zone with the screened interval extending from just below or at the base of the water-bearing zone upward across the water table to a level above or approximately equaling the expected seasonal high water level. This will allow detection of both a dense and/or a floating nonaqueous phase, if present. Based

on well logs and historical site water level data, the total depths of the shallow wells are expected to range from 15 to 20 ft BGS, with screen lengths of 10 ft which are anticipated to be sufficient to extend to just above the expected seasonal high water level. Borings for the shallow wells will be drilled using a hollow-stem auger rig.

Deep wells will be completed and screened within the lower water-bearing zone to evaluate whether contamination has migrated vertically downward through the overlying confining layer. Based on previous site well logs, the deep wells are expected to extend about 35-40 ft BGS and will be completed with 5-ft screens to facilitate discrete detection of contamination in the lower water-bearing zone. Boreholes for the deep wells will be properly sealed between aquifers by stepping down casing size across the confining layer. To be certain that the seal is properly achieved and that sloughing that could compromise the seal does not occur, the deep wells will be installed using cable tool drilling (unless auger drilling can be performed without compromising the integrity of the seal between the two water-bearing zones).

Following installation, all new wells will be developed by purging using a development pump. Drilling methods and well installation procedures are described in more detail in Appendix A.

3.3.2 Water Level Measurements

Water levels will be measured in the new monitoring wells following drilling, installation, and development, and prior to each scheduled groundwater sampling event. Water level measurements also will be collected preceding groundwater sampling events in the existing monitoring wells and well points and at the river gauge. The water levels will be used to evaluate the general direction of groundwater flow within each water-bearing zone, horizontal and vertical gradients, and other influences on groundwater flow. The procedures to be used for measuring water levels are provided in Appendix A.

Water level measurements will also be collected over a 24- to 48-hour period in three shallow wells, in three deep wells, and at the river to evaluate tidal responses from the Willamette River in the upper and lower water-bearing zones. The procedures to be used for measuring water levels to evaluate responses to tidal fluctuations are provided in Appendix A.

3.3.3 Monitoring Well Sample Collection

3.3.3.1 Well Boring Soil

At each monitoring well location, soil samples will be collected during drilling as described in Appendix A. Sampling intervals in the shallow and deep well borings will be the same as those indicated for subsurface soil samples (see Section 3.2.3). Two additional samples will be collected from each deep well boring: one from within the confining layer separating the upper and lower water-bearing zones, and one from within the lower water-bearing zone. The soil samples collected from the confining layer at each deep well will be analyzed for chemistry and vertical hydraulic conductivity; the sample from within the lower water-bearing zone will be analyzed for chemistry and the "fate and transport" parameters defined in Table 3-1.

3.3.3.2 Groundwater

Groundwater samples will be collected twice (on a semiannual basis for 1 year) from all newly installed wells, all existing monitoring wells, and one well point (Well Point G, if not dry). The sampling events are expected to be scheduled to obtain dry and wet season groundwater quality data. Groundwater sampling protocols to be followed during the RFI are presented in Appendix A.

3.3.4 Monitoring Well Sample Analyses

3.3.4.1 Well Boring Soil

Chemical analyses performed on the well boring soil samples will be the same as those conducted on the surface and subsurface soil samples as noted in Section 3.2.4 and as shown in Table 3-1; i.e., semivolatile organics, chlorinated phenols (including PCP and tetrachlorophenol), total petroleum hydrocarbons (TPH), and volatile organics. For the semivolatile and volatile organic compounds, the laboratory will also be required to report the first 10 tentatively identified compounds (TICs), to aid in the identification of carrier or additive compounds.

3.3.4.2 Groundwater

Chemical analyses performed on the groundwater samples will be the same as those conducted on the well boring soil samples, listed in the previous section. Also, major ion analyses will be conducted on selected wells (approximately 9) to assist in hydrogeologic characterization. A dioxin/furan analysis will also be performed on groundwater collected from Well J1 (the well exhibiting the highest historical PCP concentration). The need to analyze other

groundwater samples for dioxins and furans will be assessed after evaluation of the first sampling round results from Well J1.

Further descriptions of the groundwater analytical program, including specific analytical method numbers, are provided in Table 3-2 and in Appendix B.

3.3.5 Aquifer Testing

Aquifer testing will be conducted to provide estimates of aquifer properties for input to RFI evaluations of contaminant fate and transport. Aquifer testing methods will initially include variable head (slug) tests to estimate aquifer properties. The need for pumping tests to more accurately evaluate aquifer properties will be assessed following evaluation of the results of the slug tests, the first groundwater sampling event, and the boring data results from the confining layer.

The slug tests will be conducted following installation of the new monitoring wells. It is anticipated that at least 4 to 6 slug tests (2 to 4 each in the upper and lower water-bearing zones) will be performed. The information collected will be used to calculate an estimate of the horizontal hydraulic conductivity of the water-bearing strata, using the Hvorslev method for unconfined conditions or the Cooper et al. method if the lower water-bearing zone exhibits confined conditions (Freeze and Cherry 1979).

As noted previously, pumping tests, if conducted, only will be performed after the first semiannual groundwater sampling data are received and evaluated. This will allow identification of optimal location(s) for the tests, and will decrease the chance of unintentional contaminant transport between the upper and lower water-bearing zones.

3.4 ABANDONMENT OF EXISTING DAMAGED WELLS

One shallow monitoring well (Well I) and one well point (Well E), both installed in 1986, have been damaged due to truck traffic at the site. Because of the current damaged condition of these wells, they are unsuitable for use as monitoring points and will be abandoned during RFI activities at the site in accordance with Oregon State regulations (State of Oregon Administrative Rules for Construction and Maintenance of Monitoring Wells and Other Holes in Oregon, OAR 690-240).

Abandonment will be performed using the procedures described in Appendix A.

3.5 HANDLING OF INVESTIGATION-DERIVED WASTES

Investigation-derived wastes, such as water and soil cuttings generated during drilling activities, water purged from the wells during development and sampling, waste decontamination liquids, and solid residuals (i.e. Tyvek, gloves, etc.) will be collected and stored onsite pending laboratory analysis of soil and groundwater. Decontamination fluids containing decontamination solvents will be stored separately. These investigation-derived wastes will be disposed appropriately, in a manner consistent with the analytical results and in accordance with local, state, and federal regulations.

3.6 TOPOGRAPHIC SURVEY

A vertical and horizontal survey will be conducted by a licensed land surveyor to determine and map the locations and elevations of each existing and newly installed monitoring well and well point. The survey information will include northing and easting coordinates, existing surface elevations, and elevations for water level measurement reference points (generally the top of the well casing). The survey will be referenced to a USGS benchmark, and the results of the survey will be translated to spreadsheets and maps utilized in the RFI.

4.0 QUALITY ASSURANCE/QUALITY CONTROL

The RFI data will be used to support decisions regarding the need for further remedial action at the site and, if needed, the appropriate remedial actions to be considered. Because of this, the RFI data must be collected in a manner that both provides for, and documents, an acceptable level of precision and accuracy. A quality assurance/quality control (QA/QC) program designed to provide the necessary level of precision and accuracy, as well as completeness, representativeness, and comparability for the RFI is outlined in detail in Appendix B. The QA/QC program includes, among other things, identification of data quality objectives, specific QA/QC procedures for sample collection and handling, analytical protocols for the analytical laboratories, the use of QC samples, and data validation procedures.

5.0 DATA EVALUATION AND MANAGEMENT

Following validation, compilation, and evaluation of the field and laboratory data, a report will be prepared to document the findings of the RFI. The report will include tabulations of the RFI data and discussions of the RFI data as compared to previously collected site data, the resulting conclusions regarding the nature and extent of soil and groundwater contamination at the site, any additional constituents of concern, the hydrogeologic properties at the site that may influence contaminant migration, and the anticipated future migration of documented contamination. The RFI data will be presented in tabular and graphical format, as appropriate, and will be available in ASCII format on disk. Maps developed during the RFI will be based on state-plane coordinates.

6.0 INVESTIGATION AND DELIVERABLES SCHEDULE

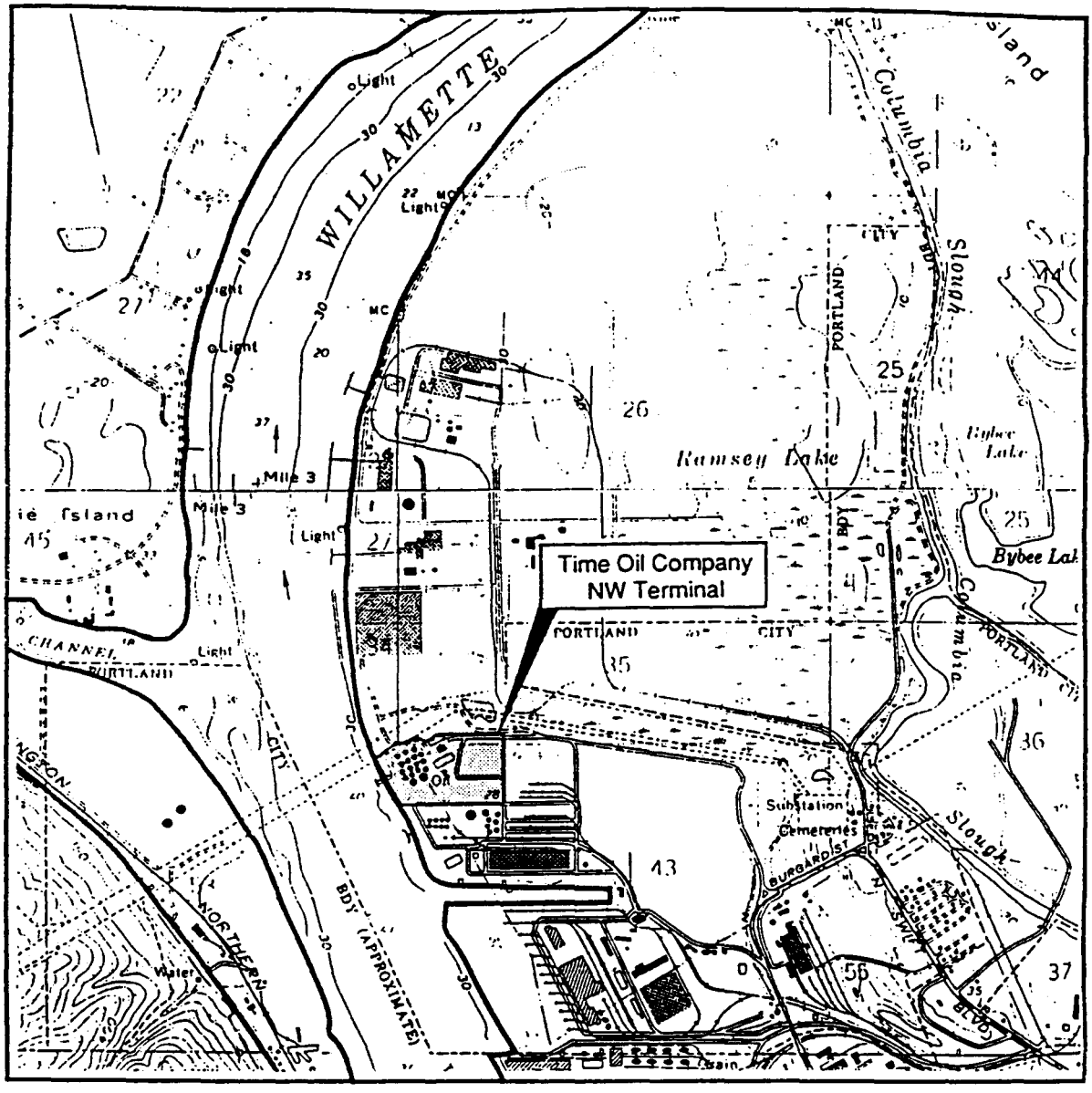
A schedule for the RFI has been developed and is presented in Figure 6-1. The schedule anticipates completion of the RFI and submittal of the final RFI report within 13 months of submittal of the draft work plan to DEQ. Assumptions incorporated into the schedule include 30-day review periods of the draft work plan and the draft RFI report by DEQ, and 30-day turnaround on analytical results by the laboratories. If these assumptions cannot be met, the schedule will extend beyond the projected 13 months accordingly.

7.0 REFERENCES

ECOVA. 1991. *Preliminary Assessment/Data Evaluation and Proposed Remediation Plan for Pentachlorophenol Contaminated Soil at Time Oil Co.*

Freeze, R.A. and J.A. Cherry. 1979. *Groundwater.* Prentice-Hall, Inc., Eaglewood Cliffs, NJ.

Landau Associates. 1993. *Site Characteristics Report, Former PCP Mixing Area, Northwest Terminal, Portland, Oregon.* Prepared for Time Oil Company, Seattle, Washington. August 30.



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 2-1

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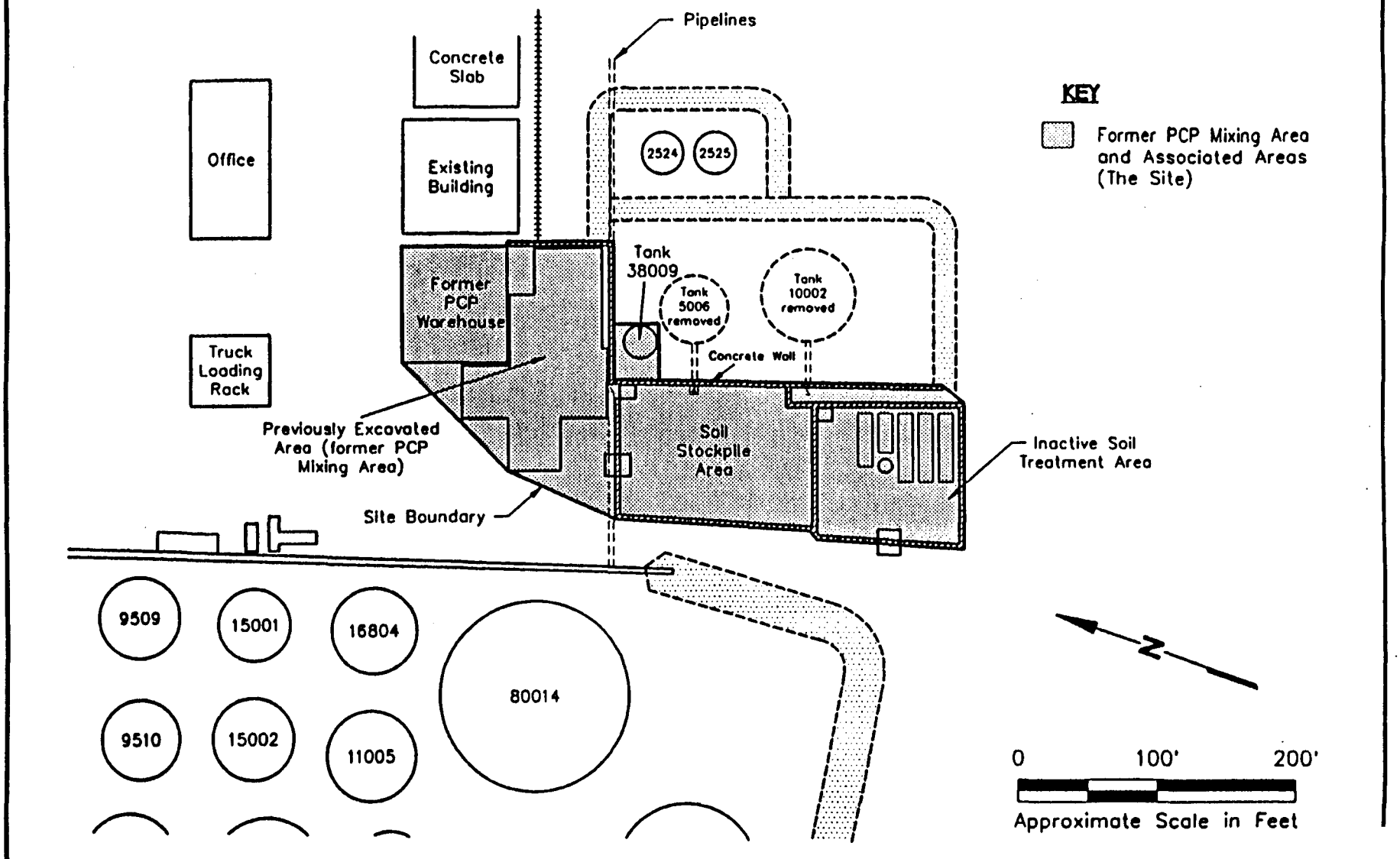

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Site Map

Figure 2-2

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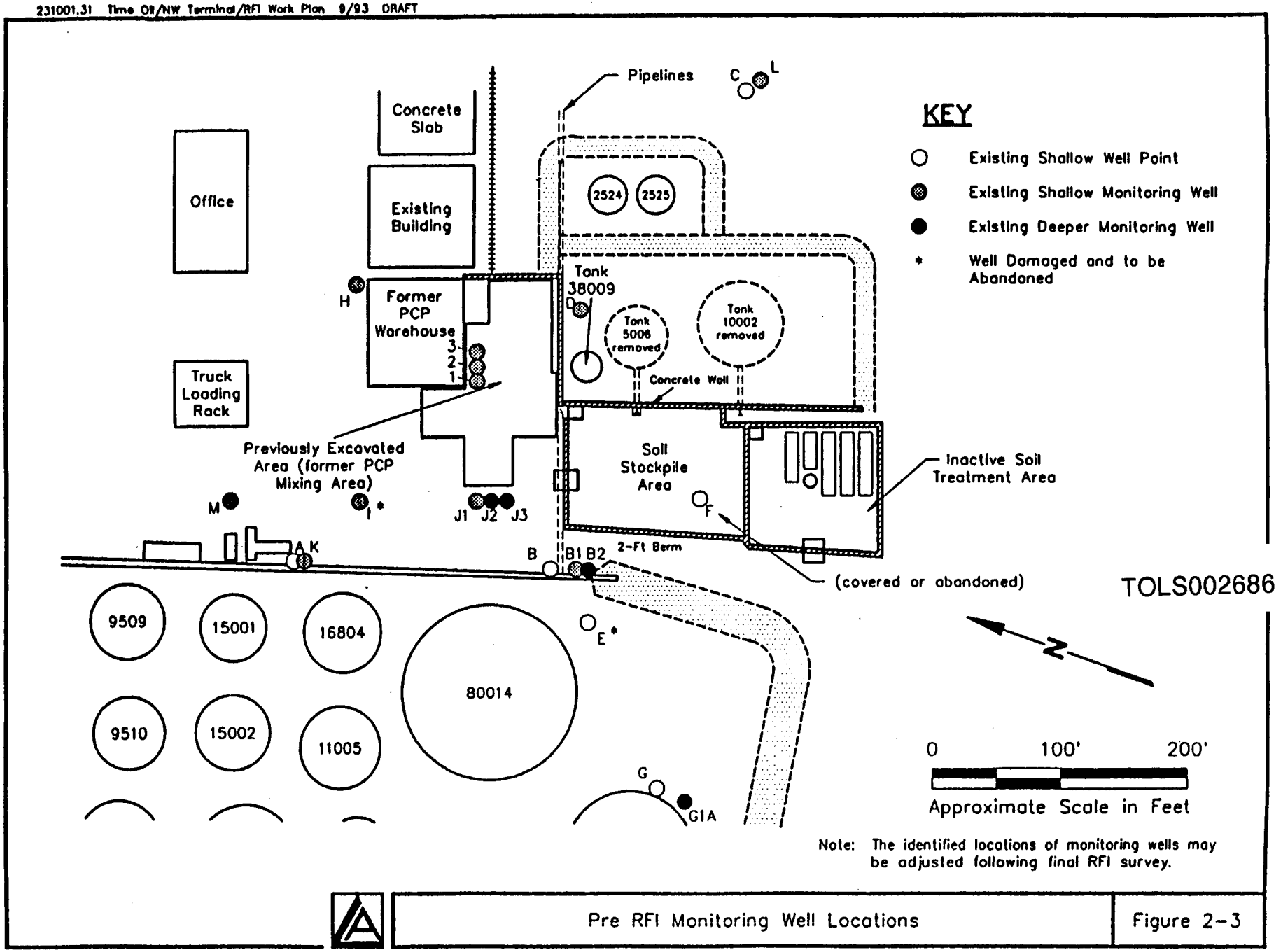

Note: The identified locations of monitoring wells may be adjusted following final RFI survey.

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Pre RFI Monitoring Well Locations | Figure 2-3

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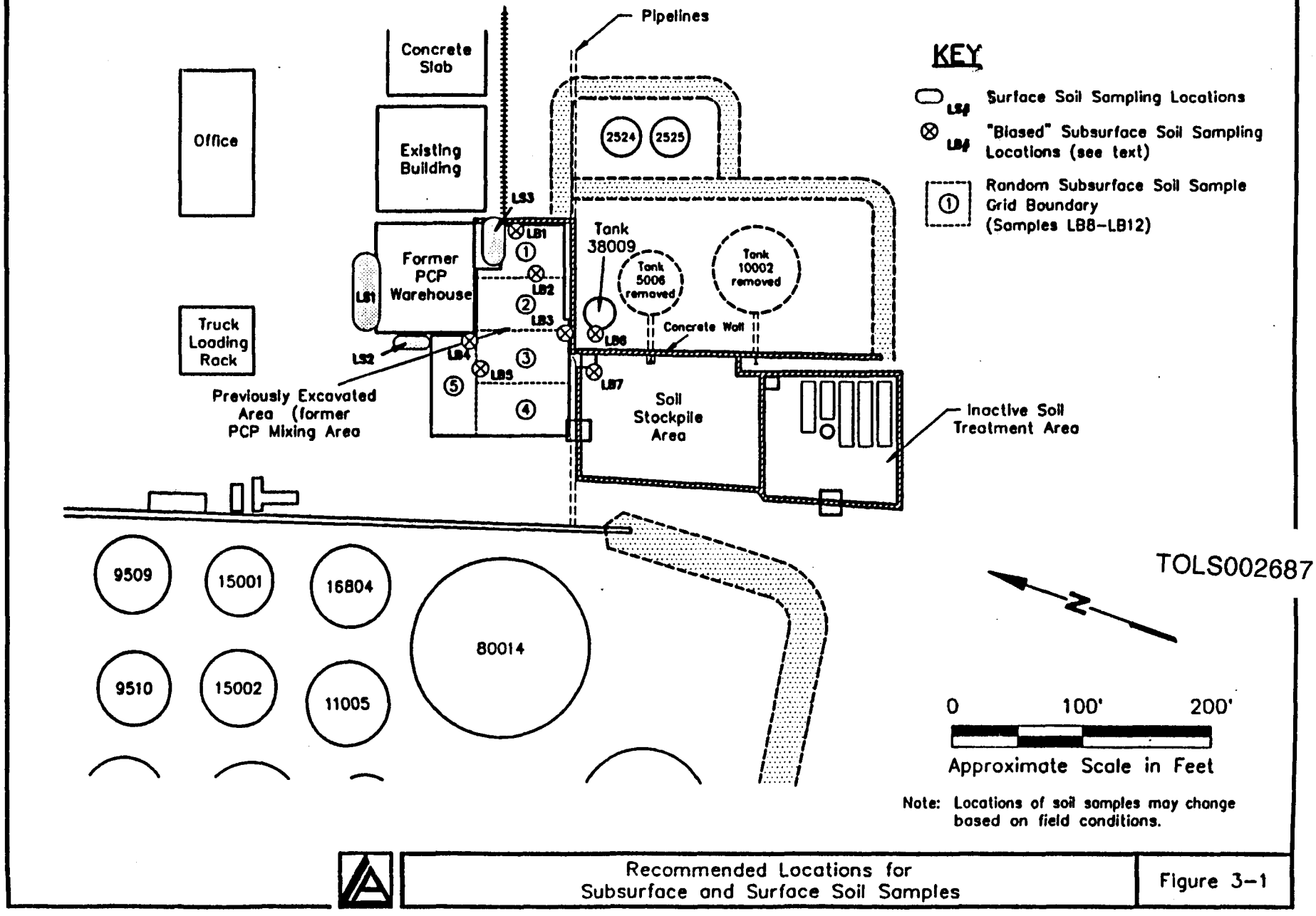

Recommended Locations for Subsurface and Surface Soil Samples

Figure 3-1

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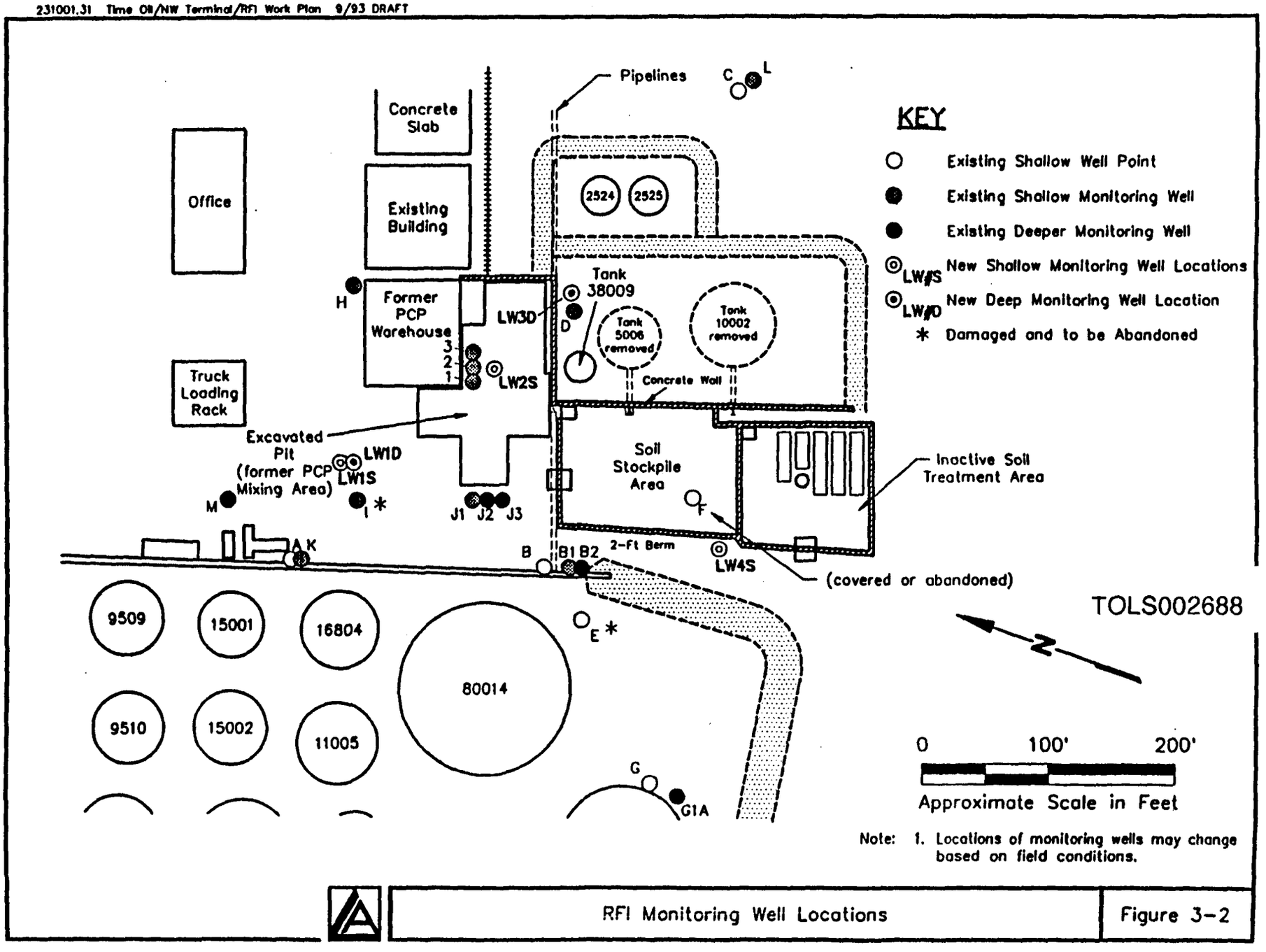

RFI Monitoring Well Locations | Figure 3-2

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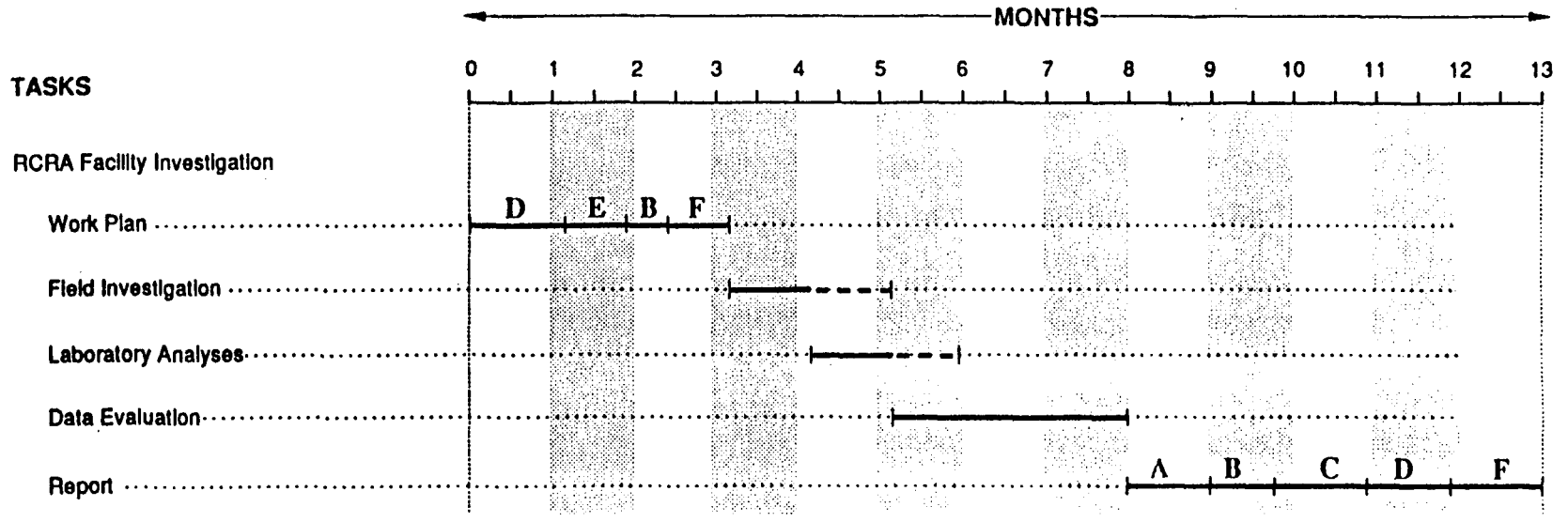

KEY

A	Preliminary Draft	D	DEQ Review
B	Time Review	E	Draft Final
C	Draft	F	Final

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Proposed RFI Schedule
Time Oil Northwest Terminal Facility

Figure 6-1

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RFI SOIL SAMPLE AND MONITORING WELL LOCATIONS AND ANALYSES
TIME OIL COMPANY FORMER PENTACHLOROPHENOL MIXING AREA
PORTLAND, OREGON

		Location[a]/Rationale	No. of Soil Samples[b]	Soil Analyses	Groundwater Analyses
Wells					
LW1S	Shallow	Between source and pumping Well M	3 chem[c] + 1 F&T[d]	PCP and carrier chems[e]	PCP and carrier chems[f]
LW1D	Deep	Between source and pumping Well M; forms a cluster with new Well LW1S	2 chem[c][g] + 1 K_v, F&T[d]	PCP and carrier chems[e]	PCP and carrier chems[f]
LW2S	Shallow	Within the excavation area of the former PCP mixing area	2 chem[h] + 1 F&T[d]	PCP and carrier chems[e]	PCP and carrier chems[f]
LW3D	Deep	Forms cluster with Well D for vertical gradient and lower zone quality data	5 chem[c] + 1 K_v, F&T[d]	PCP and carrier chems[e]	PCP and carrier chems[f]
LW4S	Shallow	Cross gradient from J wells	3 chem[c] + 1 K_v, 1 F&T[d]	PCP and carrier chems[e]	PCP and carrier chems[f]
Subsurface Soil					
"Biased" Locations					
LB1-LB5		Inside excavation area to evaluate carrier chemicals and extent of excavation for PCP	3 chem[c][i] (2-3 borings will also include K_v analyses)	PCP and carrier chems[e]	NA
LB6		South of excavation, along pipelines, near old storage tanks-for lateral definition	3 chem[c]	PCP and carrier chems[e]	NA
LB7		Adjacent to sump at northwest corner of soil stockpile area	3 chem[c]	PCP and carrier chems[e]	NA
Random Locations					
LB8-12		Inside and adjacent to excavation area to provide representative data regarding PCP and associated carrier chemicals	3 chem[c][i]	PCP and carrier chems[e]	NA

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RFI SOIL SAMPLE AND MONITORING WELL LOCATIONS AND ANALYSES
TIME OIL COMPANY FORMER PENTACHLOROPHENOL MIXING AREA
PORTLAND, OREGON

	Location[a]/Rationale	No. of Soil Samples[b]	Soil Analyses	Groundwater Analyses
Surface Soil				
LS1	Near former PCP loading dock	1	PCP and carrier chems[e]	NA
LS2	Along southwest side of former PCP warehouse	1	PCP and carrier chems[e]	NA
LS3	In previously unexcavated area, at rail line spur to east	1	PCP and carrier chems[e]	NA

(a) Sample locations may change based on conditions encountered in the field.

(b) In addition, quality control samples will be run at the frequency of 1 field duplicate and 1 MS/MSD for every 20 samples, by media.

(c) "3 chem" = sampling intervals identified in text: 0-0.5 ft BGS; at water table; and at bottom of upper water-bearing unit; all analyzed for chemistry. "5 chem" = the above 3 chem plus additional intervals to be sampled in deeper borings: in confining zone and in lower water-bearing zone.

(d) F&T refers to the fate and transport parameters grain size and total organic carbon to be analyzed in the water-bearing zone. K_v refers to vertical conductivity tests to be run on the confining layer sample.

(e) Soil analyses will include: semivolatile organics, EPA Method 8270, with lab also required to report first 10 tentatively identified compounds (TICs) (these may help with carrier ID). Chlorinated phenols, modified EPA Method 8040; provides PCP and tetrachlorophenol (both needed for risk assessment) at the lower detection levels needed for potential cleanup standards. TPH-HCID and/or TPH-D, will provide information to help ID carriers. Volatile organics, EPA Method 8260, with lab also required to report first 10 TICs (see semivolatile organics). Dioxin/furan analyses will be conducted (EPA Method 8280 or 8290) for a limited number of samples (~4).

(f) Groundwater analyses will utilize the same analyses identified in (e) above, and will be conducted on samples collected from all wells. Groundwater from selected wells will also be analyzed for major ions. See Table 3-2 for the sampling program for all (new and existing) wells.

(g) The two chemistry samples at this location will be collected from the confining layer and the lower water-bearing zone only (to avoid duplication with the three chemistry samples collected from the boring for Well LW1S).

(h) Surface soil at this location is clean backfill; therefore, the 0-0.5 ft BGS sample will not be collected.

(i) Surface soil at this location is clean backfill; therefore, a sample from near the base of the 1989 excavation will be substituted for the 0-0.5 ft BGS sample. If the base of the excavation coincides with the water table, the 0-0.5 ft BGS sample will not be collected and the planned water table sample also will serve as the base-of-excavation sample.

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TABLE 3-2

RFI SEMIANNUAL GROUNDWATER ANALYSIS PROGRAM
TIME OIL COMPANY FORMER PENTACHLOROPHENOL MIXING AREA
PORTLAND, OREGON

Monitoring Location	Shallow Well	Shallow Well Point	Deep Well	Chemical Analysis					
				Semivolatiles	Volatiles	Chlorinated Phenols	TPH-D	Dioxin/ Furan	Major Ions
1	✓			✓	✓	✓	✓		
2	✓			✓	✓	✓	✓		
3	✓			✓	✓	✓	✓		
A		✓		✓	✓	✓	✓		
B		✓		✓	✓	✓	✓		
B1	✓			✓	✓	✓	✓		✓
B2			✓	✓	✓	✓	✓		✓
C		✓		✓	✓	✓	✓		
D	✓			✓	✓	✓	✓		✓
E[a]		✓		–	–	–	–		
G		✓		✓	✓	✓	✓		✓
G1A	✓			✓	✓	✓	✓		✓
H	✓			✓	✓	✓	✓		
J[a]	✓			–	–	–	–		
J1	✓			✓	✓	✓	✓	✓	✓
J2			✓	✓	✓	✓	✓		✓
J3			✓	✓	✓	✓	✓		✓
K	✓			✓	✓	✓	✓		
L	✓			✓	✓	✓	✓		
M	✓			✓	✓	✓	✓		
LW1S	✓			✓	✓	✓	✓		
LW1D			✓	✓	✓	✓	✓		
LW2S	✓			✓	✓	✓	✓		
LW3D			✓	✓	✓	✓	✓		✓
LW4S	✓			✓	✓	✓	✓		

(a) Damaged and scheduled to be abandoned.

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Appendices

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APPENDIX A

Standard Operating Procedures for RFI Field Investigation

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APPENDIX A
STANDARD OPERATING PROCEDURES FOR RFI FIELD INVESTIGATION

I. SURFACE SOIL SAMPLING PROCEDURES

Surface soil samples (at the depth interval discussed in Section 3.2.3) will be collected from shallow hand-dug holes at the locations shown on Figure 3-1 and listed on Table 3-1.

The holes will be hand-dug using new and/or decontaminated implements (shovels, picks, etc.) or drilled using a hollow-stem auger drill rig. Drilling procedures will be the same as those for subsurface samples and are described in the following section. If hand dug, the soil will typically be excavated to about 1-1½ ft in diameter and about 1-½ ft in depth. Material excavated from the surface soil sample locations will be temporarily stored on plastic sheeting until the associated sample collection activities are completed.

Each soil sample will be comprised of equal amounts of three to four soil samples taken at randomly distributed locations around the perimeter of the hand-dug or drilled holes. Prior to sample collection, the exposed soil surfaces in the holes will be scraped with a decontaminated stainless steel spoon to expose a "clean" surface for sample collection. Surface vegetation and other deleterious material will also be removed prior to sampling, where necessary. At the selected depth intervals, soil samples for chemical analyses will be collected with decontaminated stainless steel spoons and homogenized in decontaminated stainless-steel bowls. (Note: subsamples of each individual surface soil sample will be collected for archiving prior to homogenization.) Larger-sized material (gravel greater than approximately ¼- to ½-inch in diameter) will be removed by hand sorting and the soil samples placed in the appropriate containers, as specified in the QAPjP (see Table B-6). Soil samples to be analyzed for volatile organics will not be homogenized but will be collected from the perimeter of the hole using a decontaminated spoon and then placed directly into the appropriate sample container so that little or no headspace remains, prior to processing of soil samples for other analyses. Each sample container will be properly labeled, identifying each sample by number, date and time, analysis type, and sampler's initials (see Figure A-1). Samples will be placed on ice immediately following collection and prior to transport to the laboratory.

Following excavation and sample collection, each hole will be backfilled with soil excavated at that sample location and a description of each surface soil sample will be recorded on a Sample Collection Form (Figure A-2). The soil description will generally include the same parameters described in Section II for boreholes.

II. SUBSURFACE SOIL AND MONITORING WELL BOREHOLES

A. Drilling

Drilling of subsurface soil borings and monitoring well borings will be conducted using a hollow-stem auger (soil borings and shallow wells) or cable tool rig (deep wells). Drilling of shallow soil and monitoring well borings will terminate at, or extend a maximum of 1 ft into, the confining layer. For the deep monitoring wells, precautions will be taken to minimize the potential for cross contamination between the upper and lower water-bearing zones by using the following procedures:

1. Drilling will commence with large-diameter temporary steel casing (8-10 inches) advanced with the progress of the drilling.
2. Upon encountering the top of the confining layer, drilling will stop and the large-diameter temporary steel casing will be advanced a minimum of 1 ft into the confining layer.
3. The lower portion of the borehole will be sealed with several feet of bentonite chips and allowed to hydrate for at least 12 hours prior to continuing drilling, or until the integrity of the grout is verified and determined to be adequate based on site conditions.
4. A smaller diameter (6- or 8-inch) temporary steel casing will then be lowered inside the 8- or 10-inch casing to the bottom of the hole and drilling will continue through this smaller diameter casing until the total well depth within the lower water-bearing zone is reached.

The drilling of all borings and well installations will be monitored by a field engineer or geologist. A record of the soil and groundwater conditions will be maintained during drilling on a Log of Exploration Form (see Figure A-3). The boring log will show sampling depths, sampling methods, sample recoveries, soil types (in accordance with the Soil Classification System presented on Figure A-4), stratifications, evidence of contamination as indicated through visual observations and the use of appropriate instrumentation (e.g., photoionization meter, UV lamp, etc.), groundwater conditions, and other pertinent information. Each log will also contain the names of the drilling company and drillers, the type of drill rig, starting and finishing dates for drilling, borehole diameter, boring well number, and boring well location.

Prior to and after drilling, all temporary steel casing and downhole equipment will be cleaned using a high-pressure hot water washer. Prior to installation of the wells, all casing centralizers and screens will be similarly cleaned and inspected for damage.

B. Sample Collection

At each subsurface soil sampling location and within each monitoring well borehole, soil samples will be collected for chemical analysis using a properly decontaminated split-barrel sampler at the depth intervals identified in Section 3.2.3 and in Table 3-1. Soil samples to be analyzed for volatile organics will be collected immediately after opening the split-barrel sampler and prior to any other soil processing for chemical analysis. The sample will be collected using a decontaminated stainless steel spoon and placed in the appropriate sample container so that little or no headspace remains.

After collecting the portion of the sample for volatile analysis, the remaining sample will be homogenized in a decontaminated stainless steel bowl. Larger-sized material (gravel greater than approximately ¼ - ½-inch diameter) will be removed and the soil samples placed in appropriate sample jars and preserved as specified in the QAPjP (Table B-6). Sample jars will be labeled, identifying each sample by number, date and time, analysis type, and sampler's initials (see Figure A-1). The samples will be placed on ice immediately following collection and prior to transport to the laboratory.

To obtain relatively undisturbed soil samples for permeability analysis and grain size distribution, the split-barrel sampler will be lined with ten 1-inch high brass rings prior to driving the sampler. Following collection of the soil core, a maximum of six rings will be removed at the desired depth interval or where soil is least disturbed and placed in a plastic tube lined with a plastic bag and capped at both ends. Each sample collected will be properly labeled, identifying each sample by name/location, depth, date and time, and sampler's initials, and will be preserved, as appropriate, for the analysis.

After drilling and sample collection is completed, each borehole will either be backfilled or a monitoring well will be installed in accordance with Section III. For the subsurface soil borings, tremied Volclay grout or a high-solids bentonite grout (e.g., American Colloid Pure Gold grout), will be used to backfill the borehole to within 1 ft of the ground surface as temporary casing or augers are slowly withdrawn. From this point to the ground surface, the borehole will be filled with a cement or bentonite/cement grout.

III. MONITORING WELL INSTALLATION

The monitoring wells will be installed in accordance with the design features shown on Figures A-5 and A-6, and in accordance with State of Oregon Administrative Rules for Well Construction and Maintenance Standards (ODR 690-240).

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The shallow and deep monitoring wells generally will be constructed of 2-inch (nominal) threaded Schedule 40 PVC (NSF approved) casing with PVC screen, unless otherwise specified (Well LW2S, located within the former PCP Mixing Area, will be constructed of 4-inch PVC to increase its long-term versatility). The well screen slot size will be 0.020 inch based on currently available site information (the screen slot size may be modified based on initial field observations). Wells installed in the upper water bearing zone (shallow wells) will be screened 10 ft from just below or at the base of the aquifer upward across the water table to a level above or approximately equaling the expected seasonal high water level. Wells installed in the lower water bearing zone (deep wells) will be screened over a 5-ft interval to allow collection of more discrete samples for water quality analysis. The well casing will be installed to the target depth through the auger stem or temporary steel casing. In the deep wells, stainless steel centralizers will be installed above and below the screen. Once the well casing and the screen are installed, the total length of the well will be verified and documented by lowering a weighted tape to the bottom of the inside of the well.

A filter pack will be installed around the screen, extending from the bottom of the end cap to a maximum of 3 ft above the screen. Filter pack material will be commercially prepared, presized, prewashed No. 10-20 Colorado silica sand (or equivalent). A 2-ft layer of fine sand (No. 20-40 or finer) will be placed above the sandpack in the wells overlain by a 3-ft or greater bentonite seal. The filter pack will be installed through a tremie pipe or carefully poured down the annulus between the well casing and the temporary casing, as the temporary casing is slowly withdrawn. During filter pack placement, the distribution and depth of the filter pack will be monitored with a weighted tape.

The annular space above the seal will be grouted with Volclay or a high-solids bentonite grout (e.g. American Colloid Pure Gold grout) through a tremie pipe as augers or temporary casing is slowly withdrawn to about 3 ft below ground surface, and then with a neat cement or bentonite/cement grout (less than 4 percent bentonite) to the surface. The annular seal will be allowed to set for 24 hours prior to completing the surface seal. For all well installations, the tremie pipe will be sealed at the lower end and have side discharges to prevent grout from getting into the sandpack. Grout densities will be checked in the field using a mud balance. Following grouting, well alignment will be determined by lowering a 3-ft long, 1.5-inch outside diameter (OD) or larger bailer into the well. The surface of each well will be finished using bentonite chips (if required to firm the grout) and a concrete surface seal. Locking steel monuments with drain holes will be cemented in place at the surface to a depth of about 3 ft

and a 2x2-ft concrete pad with a minimum thickness of 4 inches will be constructed around each well at the ground surface to divert rainfall away from the well casing. Alternately, in locations where vehicular traffic preclude the use of aboveground monuments, a flush-mounted steel monument will be installed through an impervious surface such as asphalt or concrete. Each wellhead elevation (top of 2-inch well casing and ground surface) and location will be surveyed. Each well installation will be monitored by a field engineer or geologist who will maintain an As-Built Well Completion Form (see Figure A-7) showing well construction details.

IV. WELL DEVELOPMENT

After the final grout has set in the well annulus for a minimum of 24 hrs, the well will be developed to remove soil introduced during installation activities, and to establish hydraulic continuity between the filter pack and the formation. Based on anticipated soil and groundwater conditions, development will be accomplished by purging, using a development pump. Development will continue until at least 5-10 casing volumes are removed, the wells are visibly free of soil, and the turbidity of discharged water is low. Development water will be contained onsite, as discussed in Section 3.5 of the work plan. Following development, no groundwater sampling will be performed for a least 2 days.

V. MONITORING WELL ABANDONMENT

Monitoring Well Point E and Well I, which have been damaged, will be abandoned during RFI activities at the site in accordance with Oregon State regulations (OAR 690-240). Well Point E is constructed of 2-inch PVC casing and was reportedly installed to a depth of 20 ft BGS; however, field observations (August 10, 1993) revealed that the well monument is intact but the well casing was filled with soil to about 0.5 ft BGS. No other well construction information is available. Well I is constructed of 2-inch PVC casing and was installed to a depth of 18.35 ft BGS with a 10-ft, 0.20-inch slotted screen. Based on field observations (August 10, 1993), the well is currently covered (with a bucket) and is inaccessible.

Abandonment will be performed by first removing the well monument (Well E only) and surface seal material from the well. Then the 2-inch PVC well casing will be removed by overdrilling around the casing and pulling the casing or drilling the casing out completely. All casing, annular seal, and filter pack material will be removed by overdrilling the well to the original total depth and borehole diameter prior to sealing. The overdrilled borehole will be filled with a sealing material (grout or bentonite) by piping the sealing material directly to the

bottom of the borehole by means of a tremie pipe and filling the annular space upward from that point. The discharge end of the tremie pipe will be kept submerged below the surface of the grout while it is being applied.

The abandonment procedure will be recorded on the appropriate DEQ form and provided to DEQ within 30 days.

VI. GROUNDWATER MONITORING

A. Water Level Measurements

Water levels will be measured in each of the new and existing wells and well points in conjunction with groundwater sampling events, and prior to collecting any water samples. All water levels will be measured using an electronic water level indicator or steel tape and will be recorded to the nearest 0.01 ft. Measurements will be taken from a marked survey point at the top of each well casing, or, if no mark is available, from the northern edge of the casing. To avoid cross contamination between wells, the indicator probe and affected cable will be rinsed with deionized water before the first measurement of the day, between each well, and at the end of the day. Water level information will be recorded in a field notebook.

Following the water level measurement round and prior to initiating the presampling purge, each well will be checked for the presence of nonaqueous phase liquids using oil-finding paste or a water-oil interface probe. If a separate phase is found, it will be collected once as a separate sample with a bailer or peristaltic pump and a groundwater sample will not be collected.

To evaluate tidal influence in the upper and lower water-bearing zones, water levels will be monitored over a 24- to 48-hour period in selected wells (currently expected to be Wells G, G1A, B1, B2, J1, J2, J3, D, and LW3D) and at the river staff gauge. The water levels in the J wells will be monitored using a Microscout datalogger (or equivalent) and pressure transducers; water levels in the other selected wells will be obtained manually or by transducers. Water levels also will be measured manually in all the other monitoring wells at least twice during the monitoring period.

This water level information will be evaluated by transferring the transducer data into a spreadsheet program for manipulation and correction of transducer drift, if necessary. Plots of water level elevation over time will be generated to evaluate tidal responses at each selected monitoring location.

B. Monitoring Wells

The following procedures will be used to collect RFI groundwater samples:

- Record depth to water and well depth to the nearest 0.01 ft on the Sample Collection Form for Groundwater Sampling (Figure A-8) and calculate the height of water in the well.
- Calibrate specific conductivity and pH meters according to manufacturer's specifications at the beginning of each sample day and every four hours afterward. Record calibration data in a logbook maintained for each instrument. Check meter calibration at least twice during a sample day (middle and end of day) or when meter drift is suspected, and record data in the calibration logbook. Calibrate the meters with solutions buffered closest to known field parameters; usually this is pH = 7 and specific conductivity = 200 µS.
- Prior to sampling, purge the well using a purge pump with dedicated teflon tubing. Continue purging until at least three casing volumes of water have been removed and specific conductance has stabilized (when the replicate sample measurements vary by no more than 10 percent) or until the well is dry. Purge volume will be calculated based on the following formula:

  1 well volume (gallons) = $\pi r^2 h$ x 7.48 gal/ft^3, where π = 3.14, r = radius of well casing in ft, h = height of water column from the bottom of the well, in feet.

  Do not pump well at a rate that allows formation water to vigorously cascade down the sides of the screen.

  Record all purge data on the Sample Collection Form including purge volume, time of commencement and termination of purging, and any observations regarding color, turbidity, or other factors which may be important in evaluation of sample quality.

  Contain all purge and decontamination water onsite in drums or in a storage tank for proper disposal.

- Begin groundwater sampling immediately following well purging or if the well purges dry, as soon as enough water is available in the well for sampling. Record all sample data on the Sample Collection Form, including sample number and time collected, the observed physical characteristics of the sample (e.g., color, turbidity, etc.), and field parameters (pH, specific conductance, and temperature).

  On low-yielding wells, measure pH, temperature, and specific conductance at the beginning and end of sampling.

  Use the following procedures to obtain the four replicate field measurements of pH and specific conductance:

  - Rinse a 250-mL plastic beaker with sample water.
  - Rinse the electrodes and temperature compensation probe with sample water.

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- Fill the beaker with sample water; place the probes in the beaker until the reading stabilizes. Record temperature, pH, and specific conductance measurements on the Sample Collection Form.
- Repeat above step to collect remaining replicates.
- Note any problems or significant observations in the "comments" section of the Sample Collection Form.

- Collect groundwater samples for all parameters except volatile organic analysis (VOAs) using a peristaltic pump with dedicated Teflon tubing for each well; collect VOAs first, using a disposable Teflon bailer. To prevent degassing during sampling, use a pumping rate below 100 mL/min (or lower the bailer gently into the water column). Wear clean gloves when collecting each sample.
- Pour water sample slowly and carefully into appropriate sample containers to minimize aeration. Completely fill the VOA containers so that no head space remains. If air bubbles are observed in any of the VOA containers, the container must be emptied and refilled (once only) or a new container used. Preserve samples as specified in Table B-6, including chilling samples on ice immediately following sample collection.

All sampling will be conducted in accordance with the appropriate provisions of the project health and safety plan (Appendix C).

VII. SAMPLE PACKAGING AND SHIPPING

The transportation and handling of samples will be accomplished in a manner that not only protects the integrity of the sample, but also prevents any detrimental effects due to the possible hazardous nature of samples. Regulations for packaging, marking, labeling, and shipping hazardous materials are promulgated by the U.S. Department of Transportation (DOT) in the Code of Federal Regulations (CFR), 49 CFR 171 through 177.

Samples will be placed on sealed, reusable ice packs or double-bagged ice in coolers immediately following collection. At the end of each day, samples sent to the analytical laboratory will be inventoried. A picnic cooler will be used as a shipping container. In preparation for shipping samples, the drain plug will be taped shut, and a large plastic bag will be used as a liner for the cooler. When appropriate, approximately 1 inch of packing material will be placed in the bottom of the liner.

The sample bottles will be placed in the lined cooler containing ice or frozen gel packs. Whenever possible, all volatile analysis samples, and the associated trip blanks, will be placed in the same cooler. Samples will be packaged carefully to avoid breakage or cross contamination

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using sufficient packing material and will be shipped to the offsite analytical laboratory at the proper temperature (4°C). The large liner bag will be taped shut and the paperwork accompanying the samples to the laboratory will be placed inside a separate plastic bag and taped inside the cooler lid.

The cooler will be taped shut with strapping tape. Custody seals will be placed on the cooler. The cooler will either be shipped to the laboratory by an overnight carrier or transported by automobile.

VIII. SAMPLE CUSTODY AND DOCUMENTATION

A. Sample Custody

The primary objective of sample custody is to create an accurate, written record that can be used to trace the possession and handling of samples so that their quality and integrity can be maintained from collection until completion of all required analyses. Adequate sample custody will be achieved by means of approved field and analytical documentation. Such documentation includes the chain-of-custody record which is initially completed by the sampler, and is thereafter signed by those individuals who accept custody of the sample. An example chain-of-custody record is shown on Figure A-9. A sample will be considered to be in a particular person's custody if it is:

- In that person's physical possession
- In that person's view
- Locked up or secured by that person in a locked container or otherwise sealed so that tampering will be evident
- Kept in a secured area, restricted to authorized personnel only.

Sample control and chain-of-custody in the field and during transport to the laboratory will be conducted in general conformance with the procedures described below and in Section 4 of *A Compendium of Superfund Field Operations Methods* (EPA 1987, 540/P-87/001).

B. Field Custody Procedures

The following field custody procedures will be followed:

- As few persons as possible will handle samples.

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- Sample bottles will be purchased directly from the manufacturer by Landau Associates or obtained new from the laboratory performing the analyses.
- The sample collector will be personally responsible for the completion of the chain-of-custody record and the care and custody of collected samples until they are transferred to another person, or dispatched properly under chain-of-custody rules.
- The site investigations supervisor will oversee implementation of the field custody procedures during the fieldwork and, in the event of noncompliance, will determine if corrective action is required.

C. Sample Shipment Custody Procedures

The following custody sample shipment procedures will be followed:

- The coolers in which the samples are shipped will be accompanied by the chain-of-custody record identifying their contents. The original record and laboratory copy will accompany the shipment (sealed inside the shipping container). The other copy will be distributed as appropriate to the Landau QAO or QA Task Leader.
- Shipping containers will be sealed with custody seals for shipment to the laboratory. The method of shipment, name of courier, and other pertinent information will be entered in the "Remarks" section of the chain-of-custody record and traffic report.
- If sent by mail, the package will be registered with return receipt requested. If sent by common carrier, a bill of lading will be used. Freight bills, postal services receipts, and bills of lading will be retained as part of the permanent documentation.

D. Transfer of Custody

When samples are transferred, the individuals relinquishing and receiving the samples will sign the chain-of-custody record and document the date and time of transfer. The sample collector will sign the form in the first signature space. The only exception to this is the shipment of samples via commercial carriers. Because sample containers are sealed with the chain-of-custody record inside prior to delivery to the carrier, the custody signature will be that of the individual taking possession of the samples from the carrier at its final destination. Each person taking custody will observe whether the shipping container is correctly sealed and in the same condition as noted by the previous custodian; deviations will be noted on the appropriate section of the chain-of-custody record.

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Project documentation of sample custody will be verified by the Landau QAO during regular review of the data validation package.

E. Laboratory Custody Procedures

A designated sample custodian at the laboratory will accept custody of the shipped samples, verify the integrity of the custody seals, and certify that the sample identification numbers match those on the chain-of-custody record. The custodian will then enter sample identification number data into a bound logbook, which is arranged by a project code and station number. If containers arrive with broken custody seals, the laboratory will note this on the chain-of-custody record and will immediately notify the QA Task Leader. The laboratory will maintain sample security and custody as appropriate.

F. Documentation

Documentation necessary to meet the QA objectives for this project includes the following:

- Field notebooks (logbooks), in which general field observations and activities are recorded
- Field sampling forms specific to sampling, chain-of-custody, etc.
- Sample container labels
- Photographs.

General methods for this documentation are as follows: if an error is made on a document, corrections will be made by drawing a single line through the error and entering the correct information; the erroneous information will not be obliterated; corrections will be initialed and dated and, if necessary, a footnote explaining the correction will be included; errors will be corrected by the person who made the entry, whenever possible.

All documentation and other project records will be safeguarded to prevent loss, damage, or alteration.

G. Field Notebook

Daily field documentation is necessary to provide sufficient data and observations to enable participants to reconstruct events that occurred during the project and to refresh the

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memory of the field personnel if called upon to give testimony during legal proceedings. Daily field notes pertinent to the individual field tasks will be recorded using non-erasable waterproof ink in a bound waterproof field notebook containing consecutively numbered pages. Corrections will be made according to the procedures given above. Information documented on field sampling forms need not be repeated in the field notebook; however, reference must then be made in the field notebook to the field forms.

H. Field Sampling Forms

Task-specific field sampling forms (e.g., chain-of-custody record, sample collection form, etc.) will be used to document sampling activities. Use of sampling forms aid in achieving complete data for field sampling activities. Example field sampling forms to be used for soil and groundwater sampling are included on Figures A-2 and A-8, respectively. The field sampling forms will be assembled into logbooks, numbered, and bound prior to field use.

I. Sample Container Labels and Identification Format

Each sample container will be labeled, chemically preserved if required, and sealed immediately after collection. Sample container labels will be filled out using waterproof ink and will be firmly affixed to the sample containers. An example sample container label is shown on Figure A-1.

The sample container label will contain the following information:

- Sample number
- Date and time of collection
- Name of sampler(s)
- Analysis required
- Preservation (if applicable).

Sample label information will also be recorded on the appropriate field sampling forms. Samples and their containers will be numbered using the following identification format:

3123-XX-AA##-##

- 3123 - This set of numbers indicates the Time Oil property
- XX - This initial identifies the sample type specific to each sampling activity (i.e., SS = surface soil, SBS = subsurface soil, GW = groundwater).

- AA-##-## - These initials identify sample locations specific to each media (i.e., soil boring or well number, surface soil location, or descriptions) followed by depth (if applicable).

Additional identifiers may be added, as necessary, based on the specific sampling activity. Actual sample locations and other identification information will be recorded in the field notes and on the appropriate sample collection forms. Field QC samples will be coded as individual samples and identified in the field notes and on sample collection forms.

I. Photographs

Photographs may be taken in the field to document sampling locations and conditions. When taken, photographs will be recorded on the photograph documentation form (see Figure A-10) and/or in field notebooks. The final print will be dated, initialed, and appended with a brief description of location and purpose.

IX. EQUIPMENT DECONTAMINATION PROCEDURES

A. Heavy Equipment

All heavy equipment used for drilling and/or excavation (i.e., hollow-stem augers, cable tool) will be decontaminated at an established decontamination area using a high-pressure, hot-water washer prior to and after each use at each exploration location.

Permanent well casings and screens will also be decontaminated using a high-pressure washer prior to installation.

B. Sampling Equipment

Appropriate decontamination procedures for soil and groundwater sampling equipment will be used to minimize the possibility of cross contaminating samples. Sampling equipment that comes in contact with potentially contaminated materials will be decontaminated prior to and after each use. Decontamination of sampling equipment will consist of the following steps:

- Spray or scrub off soiled equipment
- Wash with Alconox soap
- Rinse with tap water
- Rinse with hexane
- Rinse with deionized or distilled water.

LANDAU ASSOCIATES, INC.
P.O. Box 1029 / Edmonds, WA 98020-9129
Phone: (206)778-0907 / FAX: (206)778-6409

Sample # _____

Project # _____ Site _____

Date _____ Time _____ Sampler _____

Analysis _____

Comments

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Sample Container Label | Figure A-1

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LANDAU ASSOCIATES, INC.
Edmonds, WA (206) 778-0907
FAX (206) 778-6409

PROJECT Time Oil RFI Work Plan PROJECT NO. 231001.31

EVENT

SAMPLE NO.

DATE COLLECTED TIME

Soil/Sediment Sample Collection Form

Weather Collector(s)

SAMPLING DATA

Sample Type: ☐ Soil ☐ Sediment ☐ Other

Sample Location: Sample Depth (BGS): (☐ Feet ☐ Inches)

Sample Composited: ☐ Horizontally Locations:
☐ Vertically Depth Range:
☐ Not Composited

GS Elevation (ft, MSL):

SAMPLE COLLECTION

Sample Collected From: ☐ Hand-Dug Hole ☐ Test Pit ☐ Boring ☐ Catch Basin/Manhole ☐ Other

Sample Collected With: ☐ Bowl ☐ Spoon ☐ Split Barrel ☐ Other

Made of: ☐ Stainless Steel ☐ Other

SAMPLE DESCRIPTION

Sample Description (color, grain size, density, moisture, etc.):

SAMPLE CONTAINER

SIZE	QUANTITY	TYPE	LABORATORY ANALYSIS
☐ 8-oz.		☐ Glass ☐ Plastic ☐ Other	☐
☐ 4-oz.		☐ Glass ☐ Plastic ☐ Other	
☐ Other		☐ Glass ☐ Plastic ☐ Other	

ADDITIONAL INFORMATION

Photo No. Roll No.

Duplicate Sample No(s).

Split Sample No(s). Collector

Decon Procedure: *(By Numerical Order)*
☐ Tap Rinse ☐ Alconox Wash ☐ Tap Rinse
☐ Hexane Rinse ☐ DI Water Rinse ☐ Other

Comments:

☐ *Continued on Back*

Signature Date

10/92

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Soil/Sediment Sample Collection Form | Figure A-2

LANDAU ASSOCIATES, INC.
Edmonds, WA (206) 778-0907
FAX (206) 778-6409

Log of Exploration

Exploration No. _____
Sheet _____ of _____

Client/Owner _____ Project No. _____
Start Date _____ Hour _____
Ground Surface Conditions _____
Weather Conditions _____
Landau Rep. _____ Contractor/ Operator _____
Exploration Method _____
Hammer Weight & Stroke _____

Location Sketch (show dimensions to mapped features) — North Arrow

Surface Elevation _____ Datum _____

Sample No./ Sampler Type	P.I.D. Reading	Penetration Resistance/6 in	Length Driven	Sample Length Recovered	Sample Depth (ft)	Graphic Recovery	Depth Scale (ft)	USCS Symbol	Water Level Information	Soil Description	Comments
							0		Date		
							1		Time		
							2		Depth to Water		
							3		Hole Depth		
							4		Casing Depth		
							5				
							6				
							7				
							8				
							9				
							0				
							1				
							2				
							3				
							4				
							5				
							6				
							7				
							8				
							9				
							0				

☐ No Recovery
☒ Disturbed Sample
■ Undisturbed Sample

Sampler: SPT, 2.4-in. ID Drive (2.4 D), Thinwall (TW), Shelby Tube (S), Bulk (B), etc. (Add "C" to sampler type if a catcher is used)

Finish Date _____ Hour _____ Continued ☐

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Log of Exploration | Figure A-3

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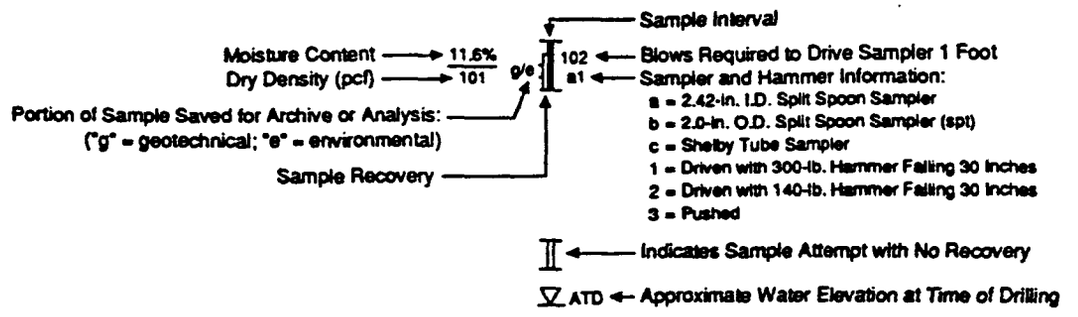
KEY



SOIL CLASSIFICATION SYSTEM

	MAJOR DIVISIONS		GRAPHIC SYMBOL	LETTER SYMBOL[1]	TYPICAL DESCRIPTIONS[2][3]
COARSE-GRAINED SOIL (More than 50% of material is larger than #200 sieve size)	GRAVEL AND GRAVELLY SOIL (More than 50% of coarse fraction retained on #4 sieve)	CLEAN GRAVEL (Little or no fines)		GW	Well-graded gravel; gravel/sand mixture(s); little or no fines
				GP	Poorly-graded gravel; gravel/sand mixture(s); little or no fines
		GRAVEL WITH FINES (Appreciable amount of fines)		GM	Silty gravel; gravel/sand/silt mixture(s)
				GC	Clayey gravel; gravel/sand/silt mixture(s)
	SAND AND SANDY SOIL (More than 50% of coarse fraction passed through #4 sieve)	CLEAN SAND (Little or no fines)		SW	Well-graded sand; gravelly sand; little or no fines
				SP	Poorly-graded sand; gravelly sand; little or no fines
		SAND WITH FINES (Appreciable amount of fines)		SM	Silty sand; sand/silt mixture(s)
				SC	Clayey sand; sand/clay mixture(s)
FINE-GRAINED SOIL (More than 50% of material is smaller than #200 sieve size)	SILT AND CLAY (Liquid Limit less than 50)			ML	Inorganic silt and very fine sand; rock flour; silty- or clayey-fine sand or clayey silt with slight plasticity
				CL	Inorganic clay of low to medium plasticity; gravelly clay; sandy clay; silty clay; lean clay
				OL	Organic silt; organic, silty clay of low plasticity
	SILT AND CLAY (Liquid Limit greater than 50)			MH	Inorganic silt; micaceous or diatomaceous fine sand or silty soil
				CH	Inorganic clay of high plasticity; fat clay
				OH	Organic clay of medium to high plasticity; organic silt
HIGHLY ORGANIC SOIL				PT	Peat; humus; swamp soil with high organic content

Notes:
1. Dual letter symbols (i.e., SM-SP) for a sand or gravel indicate a soil with an estimated 5-15% fines. Multiple letter symbols (i.e., ML/CL) indicates borderline or multiple soil classifications. Only the first letter symbol's respective pattern is shown on logs.
2. Soil descriptions shown on logs use the terminology and general approach for the *Visual-Manual Procedure, Description and Identification of Soils* as outlined in ASTM D 2488.
3. Soil descriptions (which are based on estimated values) are as follows: Primary Soil Type(s) - i.e., "GRAVEL", "SAND", "SILT", "CLAY", etc.
   Secondary Soil Type(s) (>15%) - i.e., "gravelly", "sandy", "clayey", etc.
   Modifier(s) (>5% and ≤15%) - i.e., "with gravel", "with sand", "with clay", etc.
   Minor Component(s) (≤5%) - i.e., "trace gravel", "trace sand", "trace clay", etc.

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Boring Log Key and Soil Classification System | Figure A-4

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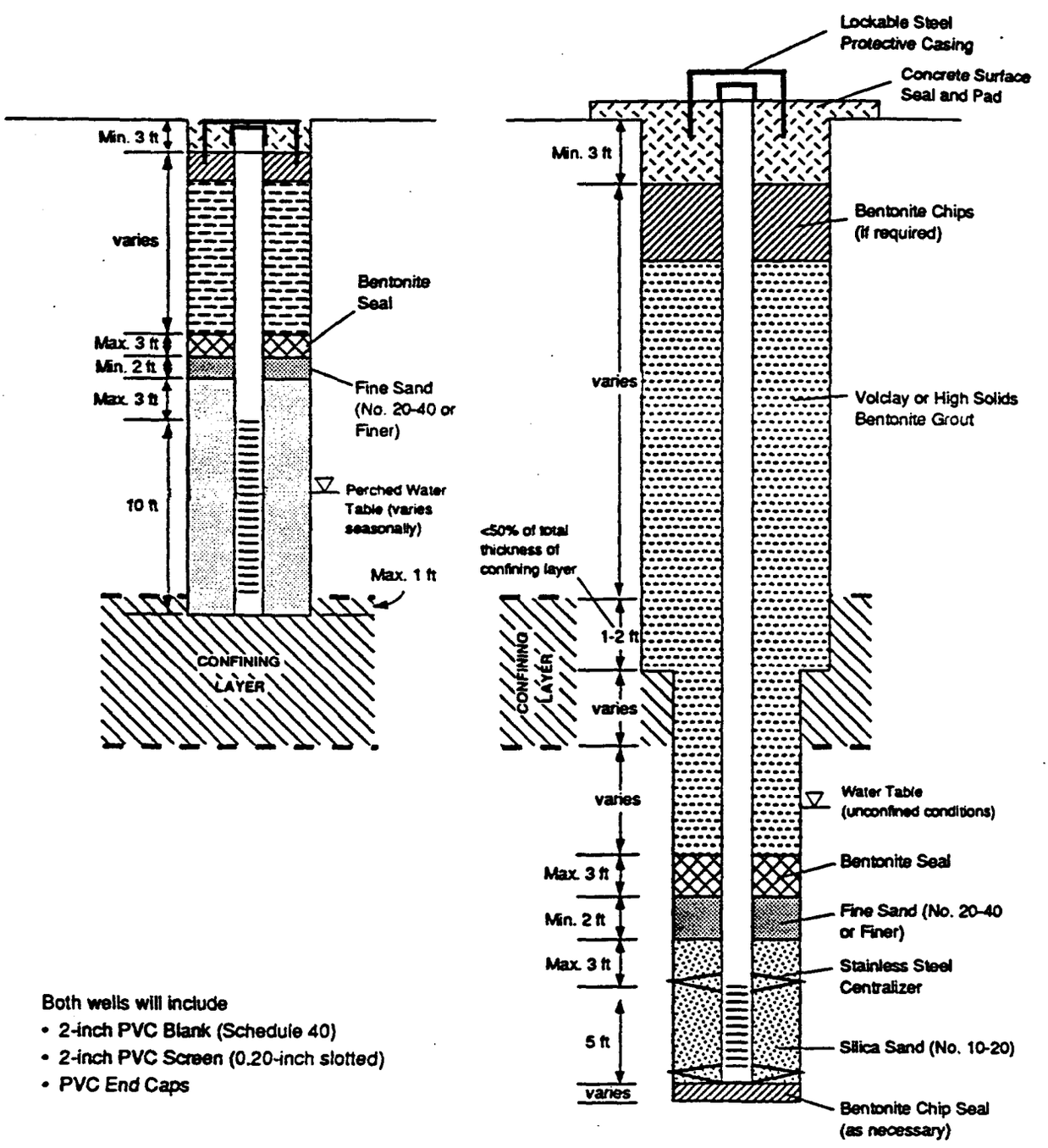

Note: (1) The monument to be used at any well, whether shallow or deep, will depend on site traffic patterns, as noted in Section III.

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Typical Monitoring Well Design | Figure A-5

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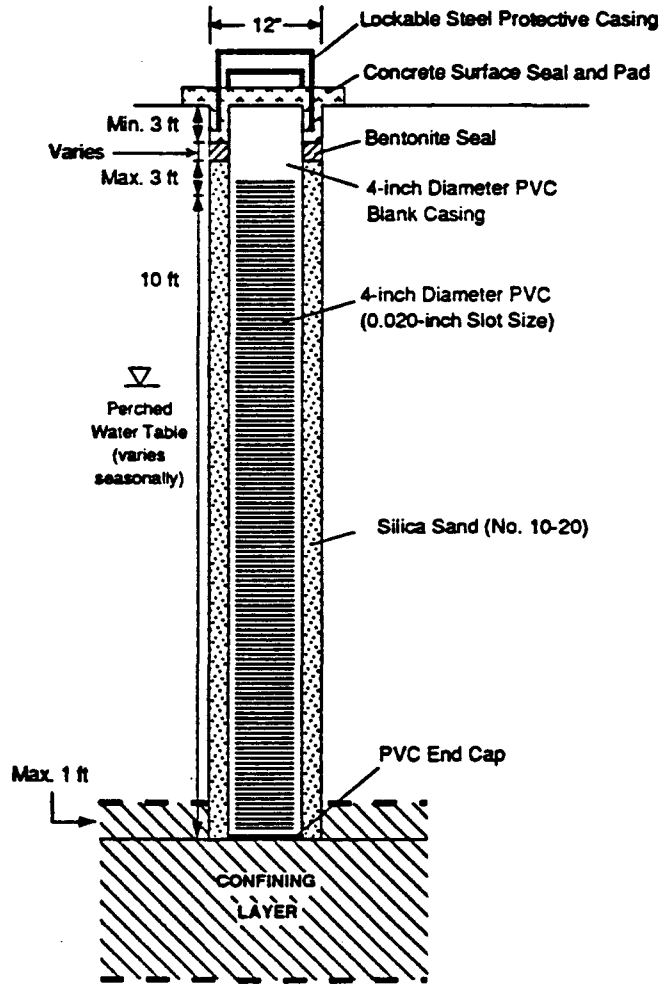
Monitoring Well LW2S

Shallow Monitoring Well with Aboveground Monument



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	Monitoring Well Design for Well LW2S	Figure A-6

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Edmonds, WA (206) 778-0907 FAX (206) 778-5409

As-built Well Completion Form

Project: _____
Project No.: _____
Well(s) No.: _____
Drilling Co.: _____
Installation Start Date: _____ Hour: _____
Installation Finish Date: _____ Hour: _____
Well Type: ☐ Single ☐ Nested ☐ Clustered

WATER DISCHARGE MONITORING

Date: _____ Time: _____ PID(ppm) _____
Date: _____ Time: _____ PID(ppm) _____
Date: _____ Time: _____ PID(ppm) _____
Date: _____ Time: _____ PID(ppm) _____
Date: _____ Time: _____ PID(ppm) _____

EQUIPMENT USED

☐ Hollow Stem Auger
☐ Cable Tool
☐ Air Rotary
☐ Other _____

MATERIALS USED

_____ Sacks of _____ Sand
_____ Sacks of _____ Concrete/Cement
_____ Sacks of _____ Grout Mix Used
_____ Sacks of Powdered Bentonite
_____ Pounds of Bentonite Pellets/Chips
_____ Feet of _____ Inch PVC Blank Casing
_____ Feet of _____ Inch PVC Slotted Screen

DEVELOPMENT

Method of Development:

Begin Date: Time:

Finish Date: Time:

Yield: Time From: To: Date:

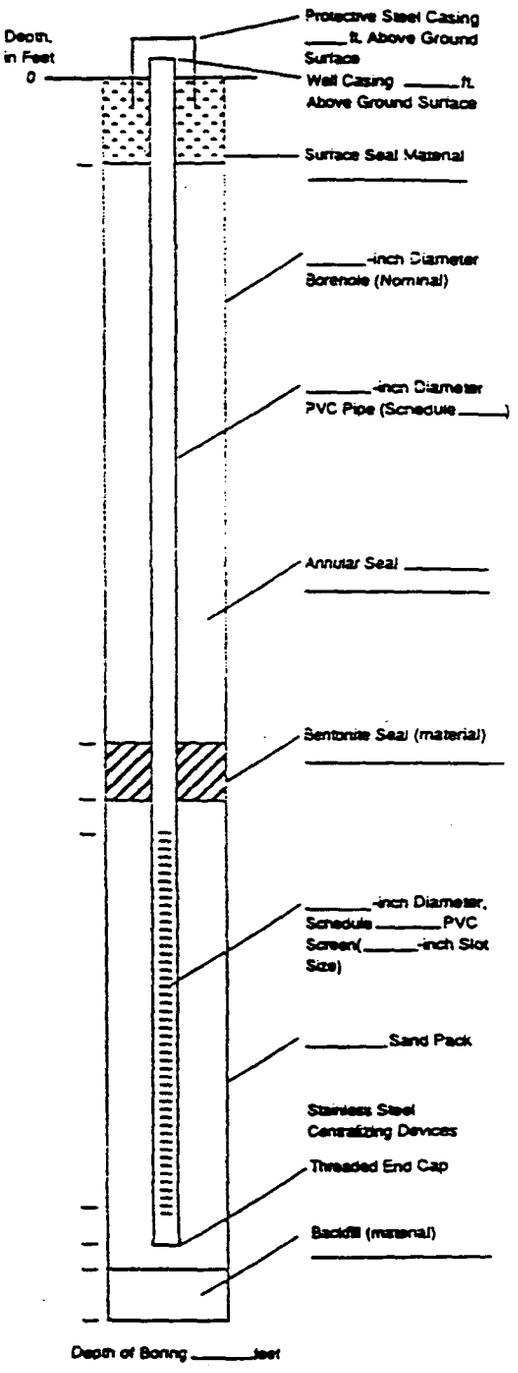
Estimate of Total Water Removed During Development: Gallons

Description of Turbidity at End of Development: ☐ Clear ☐ Slightly Cloudy ☐ Mod. Turbid ☐ Very Cloudy

Odor of Water:

Water Discharged To:

Depth to Water After Development: Feet



231001.31 Time OR/NW Terminal/RFI Work Plan/Report 8/99 DRAFT

As-Built Well Completion Form | Figure A-7

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PROJECT Time Oil RFI PROJECT NO. 231001.32
EVENT

SAMPLE NO.
DATE COLLECTED TIME

Groundwater/Surface Water Sample Collection Form

Weather Collector(s)

WATER LEVEL/WELL/PURGE DATA

Sample Type: ☐ Groundwater ☐ Surface Water ☐ Other

Sample Location:

Depth to Water (ft): Time: Measured from: ☐ Top of Protective Casing ☐ Top of Well Casing

Well Casing Type: ☐ PVC ☐ Stainless Steel ☐ Fiberglass Well Diameter:

Well Condition: Secure (☐ Yes / ☐ No) Damaged (☐ Yes / ☐ No) Describe

Begin Purge: Date/Time: Casing Volume (gal):

End Purge: Date/Time: Purge Volume (gal):

Total Depth of Well (ft. below top of well casing):

VOLUME OF SCHEDULE 40 PVC PIPE

Diameter (inch)	O.D. (inch)	I.D. (inch)	Volume (gal/linear ft)	Wt. Water (lbs/linear ft)
1-1/4	1.660	1.380	0.08	0.64
2	2.375	2.067	0.17	1.45
4	4.500	4.026	0.66	5.51

Purge Volume Calculation:

Purge Water Disposal to: ☐ 55-gal Drum ☐ Storage Tank ☐ Ground ☐ Other Gallons Purged:

Time	Vol. Purged (gal)	pH	Temperature (°F/°C)	Conductivity	Comments/Observations

SAMPLE COLLECTION DATA

Sample Collected With: ☐ Bailer ☐ Pump/Pump Type Dedicated (☐ Yes / ☐ No)

Made of: ☐ Stainless Steel ☐ PVC ☐ Teflon ☐ Polyethylene ☐ Other

Decon Procedure: (By Numerical Order) ☐ Alconox Wash ☐ Tap Rinse ☐ DI Water ☐ Other ☐ Other ☐ Other

Sample Description (color, turbidity, odor, sheen, etc.):

Replicate	pH	Temperature (°F/°C)	Conductivity (µS)	Other
1				
2				
3				
4				

pH Meter: Cond. Meter: Cond. Range: ATC: ☐ On ☐ Off

Meter Calibration Check: Ph7 Buffer Reads at °C after Sample Collection.

SIZE	QUANTITY	TYPE	FIELD FILTERED	LABORATORY ANALYSIS
		☐ Glass ☐ Plastic	☐ Yes / ☐ No	
		☐ Glass ☐ Plastic	☐ Yes / ☐ No	
		☐ Glass ☐ Plastic	☐ Yes / ☐ No	
		☐ Glass ☐ Plastic	☐ Yes / ☐ No	

Duplicate Sample No(s).

Comments:

☐ Continued on Back

Signature Date

sas

231001.31 Time Oil/NW Terminal/RFI Work Plan/Report 8/93 DRAFT

Groundwater/Surface Water Sample Collection Form — Figure A-8

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Chain-of-Custody Record

Date _____
Page _____ of _____

Project _____ Job No. _____

Client _____

Project Location _____

Sampler's Name _____

Sample No.	Date	Time	Location	No. of Containers	Testing Parameters	Observations/Comments

Special Shipment/Handling or Storage Requirements

Method of Shipment

Relinquished by	Received by	Relinquished by	Received by
Signature	Signature	Signature	Signature
Printed Name	Printed Name	Printed Name	Printed Name
Company	Company	Company	Company
Date _____ Time _____	Date _____ Time _____	Date _____ Time _____	Date _____ Time _____

3/90

WHITE COPY - Project File YELLOW COPY - Laboratory PINK COPY - Client Representative

Chain-of-Custody Record

Figure A-9

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Project: Time Oil
Project No.: 231001

PHOTOGRAPH DOCUMENTATION FORM

ROLL NO.	PHOTO NO.	DATE	TIME	TAKEN BY	ORIENTATION	DESCRIPTION/PURPOSE OF PHOTO

TOLS002719

Photograph Documentation Form — Figure A-10

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APPENDIX B

Quality Assurance Project Plan

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APPENDIX B
QUALITY ASSURANCE PROJECT PLAN

I. INTRODUCTION

This Quality Assurance Project Plan (QAPjP) establishes the Quality Assurance (QA) objectives for RFI site characterization activities at the Time Oil Northwest Terminal former pentachlorophenol mixing area and presents the QA organization and quality control (QC) procedures developed to meet project QA objectives. Execution of the procedures presented in this document will result in satisfaction of data quality objectives (DQOs) developed in accordance with the DEQ QA Policy (DEQ 1990) and EPA guidance documents (EPA 1987a,b) and generation of data that are representative of actual conditions at the site.

The overall goal of the project QA program is to provide a reasonable degree of confidence in project data and results through the establishment of a rigorous system of quality and performance checks on data collection, analysis, and reporting activities, as well as to provide for appropriate and timely corrective action to achieve compliance with established performance and quality criteria.

This QAPjP presents the general procedures and methods for sampling and sample handling, sample custody, instrument/equipment calibration, analytical procedures, internal quality control, auditing, and data assessment that are developed to meet project and QA objectives.

II. PROJECT QA ORGANIZATION AND RESPONSIBILITIES

The project QA organization, including individuals with QA responsibility and lines of QA authority, is shown on Figure B-1. Specific project QA responsibilities are listed in Table B-1. The QA Task Leader will be responsible for QA oversight during RFI site characterization activities including sampling of all media, coordinating with the analytical laboratory as needed, and direct implementation of this QAPjP. The QA officer (QAO) will be responsible for directing/conducting data validation and for confirming that the QA objectives of the project are met. The Project Manager is responsible for overall implementation of this QAPjP. Laboratory analysis will be performed by _____ and _____.

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III. DATA QUALITY OBJECTIVES

Results from the RFI sampling activities will be used to determine whether site characterization has been adequately accomplished, and whether remedial action is required. The sample results must be precise, accurate, representative, complete, and comparable (PARCC) to a degree commensurate with these uses.

The QA procedures presented in this QAPjP are based on DQOs (summarized in Table B-2) that were developed in accordance with DEQ (1990) and EPA (1987a,b; 1989b) guidance documents and reflect the intended use of project data. The project DQOs prescribe the sampling program design (e.g., number and location of sample locations), and the level of quality, precision, accuracy, representativeness, completeness, and comparability of data to be collected and analyzed for RFI site characterization activities.

The analytical level DQO for the project data is determined to be Level III [the term "Level III" is used in this document to refer to a level of data quality comparable to that obtained from the use of CLP methods (EPA 1990, 1991a), even though non-CLP methods (EPA 1986, updated 1990) will be utilized. It is expected that data quality obtained using the planned non-CLP methods will be sufficient to achieve the DQOs for the project-specific analyses]. The documentation and validation procedures established herein are considered sufficient to achieve Level III data quality.

The target control limits (the range within which project data of acceptable quality should fall) for the PARCC parameters are presented in Tables B-3 and B-4. The target control limits will be used to evaluate data acceptability as discussed in Section X. The control limits listed in these tables are considered to be QC goals for data acceptance. Field and laboratory precision will be determined through the use of duplicate samples and analyses, respectively. Field precision will be assessed on a case-by-case basis. Laboratory accuracy will be determined through the use of laboratory spiked samples. It should be noted that in the case of field duplicates, both field variability and laboratory variability are potential sources of error, and therefore both will be considered in any investigation of relative percent difference (RPD) values outside the target control limits. Data acceptability will be determined on the basis of the results of this qualitative review of error sources and therefore will be case-specific.

The QA objective for representativeness, completeness, and comparability will be achieved by:

- Collecting samples from areas known or suspected to be contaminated, thereby adequately characterizing analyte concentrations in the subject area of the site

- Implementing standardized, uniform field procedures
- Collecting field equipment blanks and analyzing laboratory method blanks to verify that the analytical results are representative of the sampled item and not influenced by cross contamination
- Reporting data in conventional and standard units.

The RFI quantitation limits are presented in Table B-5. These limits have been established to allow for use of the data in risk assessments [note, however, that it may not be possible to practicably achieve a quantitation limit for dioxins and furans which corresponds to site action levels (established per 55 FR 30798 *et seq*)].

IV. SAMPLING PROCEDURES

A. Sample Collection and Handling

Sampling procedures and sampling locations for the soil and groundwater investigations are identified in Appendix A. Sampling procedures and protocols for each sampling activity were developed to meet the DQOs and are based on proven and acceptable sampling methods as established by Oregon State regulations, EPA guidance documents, other accepted references, and best professional judgment. When modification of an approved sampling protocol is necessary, the modification is included in this document, as appropriate.

Sample containers, preservatives, and holding times will be appropriate for the type of sample collected and the analytical method to be used. Maximum sample holding times will be strictly adhered to. Sample containers, preservatives, and holding times for each analysis are presented in Table B-6. Each sample will be documented, labeled, and identified as noted in Section VIII of Appendix A.

Sampling equipment will be properly decontaminated prior to collection of each sample to avoid cross contamination between samples. Decontaminated sampling equipment will be handled in a manner that minimizes contact with potentially contaminated surfaces. Specific procedures for sampling equipment decontamination associated with soil and groundwater sampling are presented in Section IX of Appendix A.

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V. SAMPLE DOCUMENTATION AND CUSTODY

Soil samples and monitoring well data and other relevant information or field activities will be documented in the field on appropriate forms and in field notebooks at the time of sampling; appropriate custody procedures will be followed, as described in Section VIII of Appendix A.

VI. PREVENTIVE MAINTENANCE/CALIBRATION PROCEDURES

Laboratory and field instruments will be properly operated, calibrated, and maintained by qualified personnel according to the manufacturer's guidelines and recommendations, as well as criteria set forth in the applicable analytical methodology reference. Documentation of routine and special preventive maintenance and calibration information will be maintained in the appropriate field or laboratory logbook or reference file, and will be available upon request. Each maintenance and calibration logbook entry will include the date and initials of the individual performing the activity.

A. Field Instruments

Periodic schedules for preventive maintenance of field instruments, including equipment testing, parts replacement, and general cleaning will be followed according to the manufacturer's instructions.

Field equipment performance will be evaluated against check standards and calibration blanks, as appropriate, for each parameter prior to use on each day that the equipment is used. Field instruments used during RFI site characterization activities will include water level indicators, pH and conductivity meters for groundwater sampling events, and a photoionization detector (i.e., Microtip) that will be used for health and safety air monitoring purposes during soil and groundwater sampling events..

B. Laboratory Instruments

The analytical laboratory project manager has ultimate responsibility for maintaining laboratory instruments in good working order, including responsibilities for routine maintenance and calibration and the training of personnel in maintenance and calibration procedures. Laboratory instruments will be properly calibrated with appropriate check standards and calibration blanks for each parameter prior to commencing actual analysis on each analysis to be performed. Instrument performance check standards, where required, and calibration blank

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results will be recorded in a laboratory logbook dedicated to each instrument. At a minimum, the preventive maintenance schedules contained in the EPA methods and in the equipment manufacturer's instructions will be followed.

Laboratory calibration procedures and schedules will be as described in the laboratory quality assurance program plans (QAPPs) and will be available for review by EPA, upon request.

VII. ANALYTICAL PROCEDURES

Laboratory chemical analyses for all constituents except for dioxins/furans will be conducted by _____. Laboratory analyses for dioxin/furan analyses will be conducted by _____. Both laboratories are qualified to perform the analyses using standard, documented laboratory analytical procedures (e.g., EPA Method 8270). The laboratory QAPPs and SOPs provide data quality procedures according to the protocols for the analytical method and cleanup steps, and at a level sufficient to meet the sampling program DQOs, and can be provided upon request. Analytical methods and associated extraction procedures are listed in Table B-7.

The analytes and quantitation limits for soil and water for each analytical procedure are listed in Table B-5. Some of the quantitation limits have been lowered, where practical, to meet or approach the expected action levels (as established per 55 FR 30798 *et seq*). Those quantitation limits which still may exceed the action levels are indicated on the table. The quantitation limits listed are goals only, insofar as instances may arise where high sample concentrations, nonhomogeneity of samples, or matrix interferences preclude achieving the desired quantitation limits and associated QC criteria. In such instances, the laboratory will report the reason(s) for deviations from these quantitation limits or noncompliance with QC criteria.

VIII. DATA REDUCTION, VALIDATION, AND REPORTING

Analytical reports from the laboratory for this project will be accompanied by sufficient backup data and QC results to enable reviewers to determine the quality of the data. The Landau QAO or QA Task Leader will be responsible to the Project Manager for conducting checks for internal consistency, transmittal errors, laboratory protocols, and for complete adherence to the QC elements specified in this QAPjP. The Landau QAO (or designee) will also prepare a Laboratory Data Validation Report. If significant nonconformities are found, additional laboratory data will be evaluated by the Landau QAO.

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Analytical data for the specific tasks will be reported in the units specified by the quantitation limits as listed in Table B-5. These units have been selected to provide for comparability of the data with previously generated relevant site data and pertinent criteria.

The analytical laboratories will provide deliverables that will include the following:

- Case narrative, including adherence to prescribed protocols, nonconformity events, corrective measures, and/or data deficiencies
- Sample analytical results
- Surrogate recoveries
- Matrix spike/matrix spike duplicate results
- Blank results
- Sample custody (including signed, original chain-of-custody records)
- Analytical responsibility.

If requested, the analytical laboratory will also provide initial and continuing calibration data, chromatograms, and quantitation reports, in addition to those deliverables listed above, as requested by the Landau QAO or QA Task Leader.

A Level III data validation will be performed on all analytical data collected as part of the RFI. Validation will be performed according to the appropriate sections of the EPA Functional Guidelines (EPA 1988a,b; 1991) and will include evaluations of the following:

- Chain-of-custody records
- Holding times
- Field blanks
- Laboratory method blanks
- Surrogate recoveries
- Laboratory matrix spikes and matrix spike duplicates
- Field duplicates
- Corrective action records
- Completeness
- Overall assessment of data quality.

Section X presents statistical tests used to determine data precision, accuracy, and completeness during data evaluation and validation. In the event that a portion of the data is outside the limits specified in Tables B-3 or B-4, or in EPA Functional Guidelines (EPA 1988a,b, 1991), or sample collection and/or documentation practices are deficient, corrective action(s) will be initiated. Corrective action, as described in Section XII, will be determined by the QA Task Leader and Landau QAO in consultation with the Project Manager, and may include any of the following:

- Rejection of the data and resampling
- Qualification of the data
- Modified field and/or laboratory procedures.

Data qualification arising from data validation activities will be described in the data validation report, rather than in individual correction action reports.

IX. INTERNAL QUALITY CONTROL

Internal quality control will consist of samples collected and/or measurements performed in the field and laboratory. The quality control samples are used to evaluate data precision, accuracy, representativeness, completeness, and comparability of the analytical results for this project (see detailed discussion of these parameters in Section X). Analytical methods (referenced in Table B-7) specify routine procedures required to evaluate whether data are within proper QC limits. Additional internal QC includes collection and analysis of a number of field and laboratory QC samples, which are described in the following subsections.

For the purposes of QC sample frequency, a sampling round yields a set of samples of similar matrix, collected within a 14 (calendar) day interval.

A. Field/Laboratory QC Samples

1. Blind Field Duplicate

The blind field duplicate for soil and groundwater will consist of a split sample collected at a single sample location. Soil samples for all analyses, except volatile organics, will be collected, homogenized by mixing in a stainless steel bowl and split into duplicate sample containers. Soil samples to be analyzed for volatile organics will be collected from co-located areas prior to processing for other analyses and placed into separate sample containers immediately following collection. Duplicate groundwater samples will be collected by

alternately filling sample containers for both the original and the corresponding duplicate sample, to decrease variability between duplicates. Blind field duplicates will be collected at a frequency of 1 per 20 samples, not including QC samples, but not less than 1 duplicate per sampling round per matrix (soil and groundwater).

2. Field Equipment Blanks

Field equipment blanks will consist of clean soil or wipe equipment blanks or rinsate blanks. The field equipment blanks will be used to evaluate the effectiveness of sampling equipment decontamination procedures and the potential for equipment or field cross contamination and will be collected for all analyses associated with soil samples (except for volatile organics; see below). The field equipment blank samples will be prepared by a licensed laboratory and will consist of a contaminant-free ("clean") soil or contaminant-free fabric (such as gauze or cheesecloth) saturated with pesticide-grade hexane placed in separate, marked, pre-cleaned containers. (Wipe blanks will not be collected for TPH samples because of the difficulty of preparing TPH-free wipe materials.) Blank samples will remain sealed in the container until sample collection is performed. Field equipment blanks will either be collected by placing "clean" soil in a decontaminated stainless steel bowl that actually contacted the samples collected and following the exact sampling procedure used for environmental soil samples (see Appendix A), or by using the solvent-saturated wipe to wipe the surfaces of the sampling equipment. No equipment blanks will be collected for dedicated or disposable field equipment. Field equipment blanks will be taken at a frequency of at least 1 per 20 samples per soil sample not including QC samples, but not less than 1 soil blank per sampling round.

Field equipment rinsate blanks will be collected for all analyses associated with groundwater samples and for soil samples analyzed for volatile organics. The rinsate blanks will consist of deionized distilled water (supplied by the analytical laboratory) passed over and/or through decontaminated sampling equipment and collected in the appropriate sample containers. Equipment surfaces exposed during actual sampling will be rinsed. No rinsate blanks will be collected from dedicated or disposable field equipment. Field equipment rinsate blanks will be collected at a rate of 1 blank per 20 samples per sample type (i.e., soil and groundwater), not including QC samples, but not less than 1 blank per sampling round.

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3. Field Trip Blank

Field trip blanks will be analyzed for volatile organics, and will consist of deionized distilled water (prepared by the analytical laboratory), and sealed in a sample container. The trip blank will be transported to and from the field, then returned to the laboratory unopened for analysis. One trip blank per cooler containing samples for volatile organic analysis will be evaluated to determine possible sample contamination during transport.

4. Laboratory Matrix Spike

For each sample matrix (soil and groundwater), a minimum of 1 laboratory matrix spike per 20 samples, not including QC samples, or 1 matrix spike sample per sampling round, if fewer than 20 samples are obtained, will be analyzed for all constituents. Spiking compounds as well as control limits analysis are listed in Table B-3. Control limits are listed in Table B-3. These analyses will be performed to provide information on accuracy and to verify that extraction and concentration levels are acceptable. The laboratory spikes will follow EPA guidance for matrix spikes.

5. Laboratory Matrix Spike Duplicate

For each sample matrix (soil and groundwater), a minimum of 1 laboratory matrix spike duplicate per 20 samples, not including QC samples, or 1 matrix spike sample per sampling round, if fewer than 20 samples are obtained, will be analyzed for all constituents. Spiking compounds as well as control limits for each analysis are listed in Table B-3. These analyses will be performed to provide information on the precision of chemical analyses. The laboratory spikes will follow EPA guidance for matrix spike duplicates.

6. Laboratory Method Blanks

A minimum of 1 laboratory method blank will be analyzed for all parameters per 20 samples, one every 12 hours, or 1 per batch of samples analyzed (if fewer than 20 samples are analyzed) to assess possible laboratory contamination. Dilution water will be used whenever possible. Method blanks will contain all reagents used for analysis. The generation and analysis of additional method, reagent, and glassware blanks may be necessary to verify that laboratory procedures do not contaminate samples.

X. SPECIFIC ROUTINE PROCEDURES USED TO ASSESS DATA

Analytical laboratory data will be reviewed to confirm that the QA/QC objectives for the PARCC parameters are met. A description of the PARCC parameters and the associated statistical tests used in their evaluation are included in the following sections.

A. Precision

Precision is a measure of mutual agreement among individual measurements of the same property under prescribed conditions. Precision is best expressed in terms of the standard deviation or relative percent difference (RPD). QA/QC sample types that test precision include field and laboratory duplicates and matrix spike duplicates. The estimate of precision of duplicate measurements will be expressed as an RPD, which is calculated:

$$RPD = \left| \frac{D_1 - D_2}{(D_1 + D_2)/2} \right| x\ 100$$

where: D_1 = first sample value
D_2 = second sample value (duplicate)

The RPDs will be routinely calculated and compared with DQO control limits as listed in Table B-3.

B. Accuracy

Accuracy is the degree of agreement of a measurement (or an average of measurements of the same property) X, with an accepted reference or true value T, usually expressed as the difference between the two values (X-T), the difference as a percentage of the reference or true value (100 (X-T)/T), or as a ratio (X/T). Accuracy is a measure of the bias in a system and is expressed as the percent recovery of spiked (matrix or surrogate spike) samples:

$$\frac{Percent}{Recovery} = \frac{(Total\ Analyte\ Found)}{Analyte\ Added}\ x\ 100$$

The percent recovery will be routinely calculated and checked against DQO control limits as listed in Tables B-3 and B-4.

C. Representativeness

Representativeness expresses the degree to which data accurately and precisely represent an actual condition or characteristic of a population. Representativeness can be evaluated using replicate samples, additional sampling locations, and blanks. Representativeness for the project will be monitored as outlined in Section III.

D. Completeness

Completeness is a measure of the proportion of data obtained from a task sampling plan which is determined to be valid. It is calculated as the number of valid data points divided by the total number of data points requested. The QA objective for completeness during this project will be 90 percent. Completeness for the project will be established as outlined in Section III. Completeness will be routinely determined and compared to the DQO acceptable percentage, as listed in Table B-2.

E. Comparability

Comparability is an expression of the confidence with which one data set can be compared to another. QA procedures in this document will provide for measurements that are consistent and representative of the media and conditions measured. All sampling procedures and analytical methods used for RFI site characterization activities will be consistent to provide comparability of results for samples and split samples. Data collected under this QAPjP also will be calculated, qualified, and reported in units consistent with EPA guidelines. Quantitation limits, where appropriate, are listed in Table B-5, and QC samples are described in Section IX.

XI. PERFORMANCE AND SYSTEM AUDITS

Internal performance and/or system audits will not be conducted as part of the RFI activities.

XII. CORRECTIVE ACTIONS

Corrective actions will be needed for two categories of nonconformance:

- Deviations from the methods or QA requirements established in this QAPjP
- Equipment or analytical malfunctions.

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Corrective action procedures to be implemented based on detection of unacceptable data are developed on a case-by-case basis. Such actions may include one or more of the following:

- Altering procedures in the field
- Using a different batch of sample containers
- Performing an audit of field or laboratory procedures
- Reanalyzing samples (if holding times allow)
- Resampling and analyzing
- Evaluating sampling and analytical procedures to determine possible causes of the discrepancies
- Accepting the data with no action, acknowledging the level of uncertainty
- Rejecting the data as unusable.

During field operations and sampling procedures, the field personnel will be responsible for conducting and reporting required corrective action. A description of any such action taken will be entered in the daily field notebook. If field conditions are such that conformance with this QAPjP is not possible, the Landau Associates' Project Manager and/or QA Task Leader will be consulted immediately. For any corrective action or field condition resulting in a revision of this QAPjP or RFI work plan, the QA Task Leader will consult with the Landau Associates QAO, who will authorize changes or exceptions to the QAPjP as necessary and appropriate.

During laboratory analysis, the Laboratory QAO will be responsible for taking required corrective actions in response to equipment malfunctions. If an analysis does not meet data quality goals outlined in this QAPjP, corrective action will generally follow the guidelines in the EPA analytical methods noted in this QAPjP and the EPA guidelines for data validation for organics analyses. If analytical conditions are such that nonconformance with this QAPjP is indicated, the Landau QAO and/or QA Task Leader will be notified as soon as possible so that any additional corrective actions can be taken.

Corrective Action Reports will be used to document responses to reported nonconformances. These reports may be generated from internal or external audits or from informal reviews of project activities. Corrective Action Reports will be reviewed initially for appropriateness of recommendations and actions by the Landau QAO (for QA matters) and by the Landau Associates Project Manager (for technical approach). The Landau Associates Project Manager and Landau QAO will jointly define responsibilities for scheduling, performing,

documenting, and assessing the effectiveness of the required action. As appropriate, the Corrective Action Reports will also be submitted to Time and DEQ for review and approval. The Landau QAO is ultimately responsible for implementation of appropriate corrective action and maintenance of a complete record of QC issues and corrective actions.

The Landau QAO will keep the Landau Associates Project Manager informed of significant deviations from the QAPjP due to equipment or analytical malfunctions, and any Corrective Action Reports written for this project.

XIII. REPORTING

A. Laboratory Reports

The laboratory project manager from each laboratory will transmit written reports that summarize the test procedures and provide test results and QC data required for validation, as well as the elements listed in Section VIII. Laboratory reports and analysis results will be signed by the appropriate laboratory project manager and submitted in data packages to the Project Manager or QA Task Leader.

B. Quality Assurance Reports to Management

Reports of significant QA deficiencies will be immediately provided to the Landau QAO by the QA Task Leader upon discovery. Verbal notice will be followed with written documentation such as a memorandum and Corrective Action Report. The Landau QAO will be responsible for reporting QA problems to the Project Manager.

All reported data will include results of the QA data validation review and conclusions containing information regarding data accuracy, precision, completeness, and any corrective action and sampling procedure alteration documentation. Data validation results will be appended to the RFI Report in accordance with Section VIII and, therefore, will not be published in a separate data validation report.

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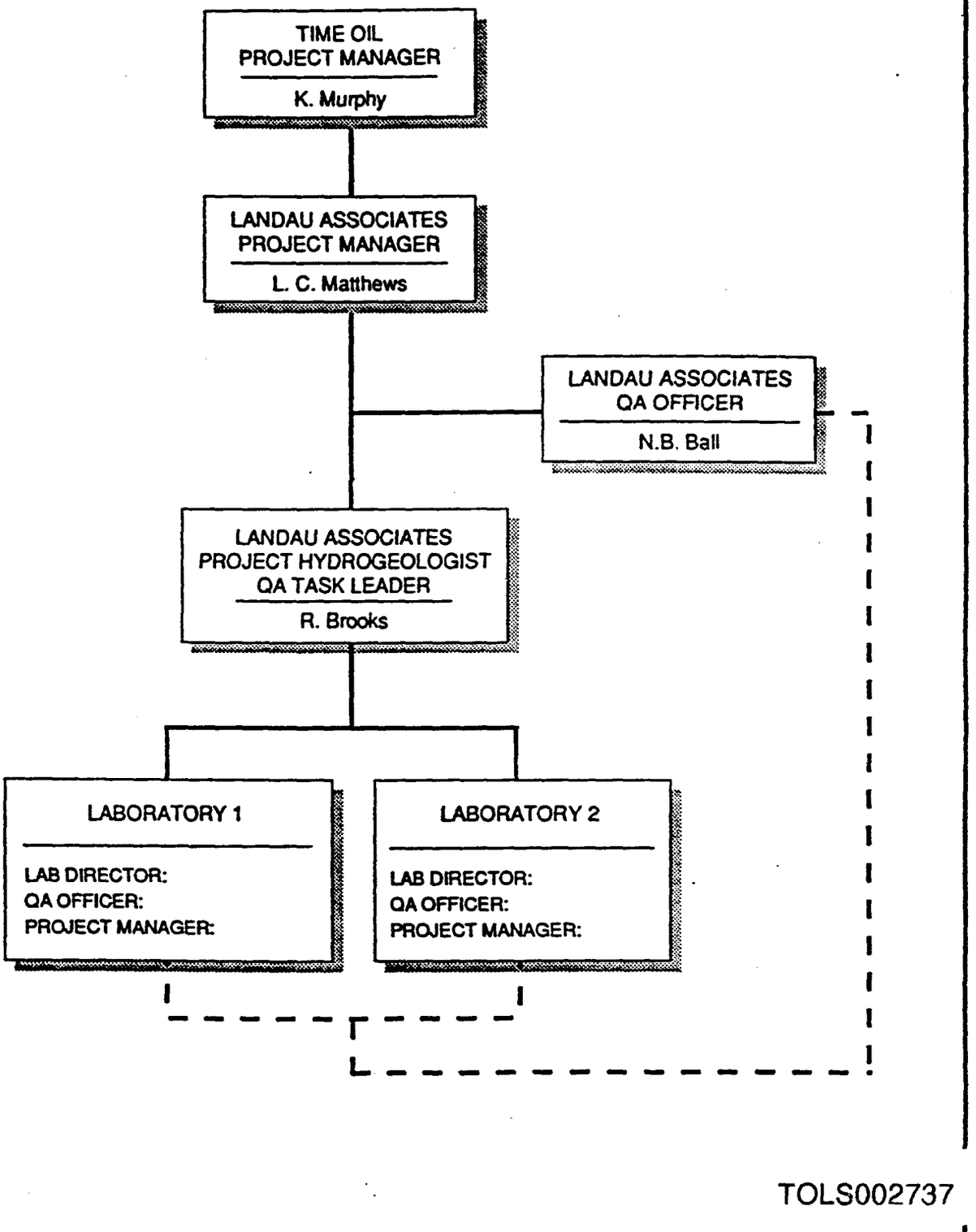

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Project Quality Assurance Organization | Figure B-1

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TABLE B-1

QUALITY ASSURANCE RESPONSIBILITIES
TIME OIL COMPANY FORMER PENTACHLOROPHENOL MIXING AREA
PORTLAND, OREGON

Personnel	Responsibilities
Kevin Murphy Project Manager Time Oil Company	Provides technical project direction and coordinates project-agency interaction; reviews project QA needs and approves appropriate QA corrective actions as required.
Leslee C. Matthews Project Manager Landau Associates, Inc.	Oversees technical project team performance to verify successful accomplishment of technical and QA project objectives. Reviews project QA needs and approve appropriate QA corrective actions as appropriate.
Nancy B. Ball, Ph.D. QA Officer Landau Associates, Inc.	Provides technical review for QA project requirements; review corrective action responses and deviations from the QAPjP; directs or performs data validation and prepare data validation reports; and review QA reports.
Rebekah Brooks QA/QC Task Leader Landau Associates, Inc.	Provides technical QA assistance, direct implementation of QAPjP, prepares QA reports, and provides corrective action response.
_____ _____ Laboratory QA Officers	Oversees laboratory implementation of QA/QC protocols so that QA objectives are met; provides for properly documented and reported laboratory QA/QC information.
_____ _____ Laboratory Project Managers	Oversees analytical laboratory performance to verify adherence to project specifications and QA objectives and confirm that technical, financial, and scheduling objectives are achieved.

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TABLE B-2

DATA QUALITY OBJECTIVES FOR RFI SAMPLING PROGRAMS
TIME OIL COMPANY FORMER PENTACHLOROPHENOL MIXING AREA
PORTLAND, OREGON

DQO Parameter	Soil Investigations	Groundwater Investigations
Data Users	Time Oil, Agencies	Time Oil, Agencies
Data Use/Decision	Monitoring/Characterization/ Necessity of Remedial Action	Monitoring/Characterization Necessity of Remedial Action
Data Type	Concentrations of Constituents of Concern[a]	Concentrations of Constituents of Concern[a]
Data Quality Objectives[b]		
Analytical Level	Level III	Level III
QA Goals:		
- Precision	[c]	[c]
- Accuracy	[c]	[c]
- Representativeness	[c]	[c]
- Completeness	90%	90%
Quantitation Limits[d]	See Table B-5	See Table B-5

(a) Potential constituents of concern are identified in Section 2.3 of the work plan.

(b) Developed in accordance with DEQ (1990) and EPA (1987a,b; 1989b) guidance documents.

(c) Control limits for evaluation of precision and accuracy for project analytes are listed in Tables B-3 and B-4. QC samples used for evaluation of precision, accuracy, and representativeness are discussed in Section IX.

(d) Quantitation limits may be affected by matrix interferences. Values are based on current laboratory data.

TABLE B-3
MATRIX SPIKE RECOVERY CONTROL LIMITS
TIME OIL COMPANY FORMER PENTACHLOROPHENOL MIXING AREA
PORTLAND, OREGON

Analysis	Matrix Spike Compound	Recovery (%) Water	Recovery (%) Soil	RPD (%)(a) Water	RPD (%)(a) Soil
Chlorinated Phenols (modified 8040)					
	Pentachlorophenol	45-130	45-130	35	35
Volatiles (8260)					
	1,1-Dichloroethene	61-145	59-172	14	22
	Trichloroethene	71-120	62-137	14	24
	Chlorobenzene	76-127	66-142	11	21
	Toluene	76-125	59-139	13	21
	Benzene	75-130	60-133	13	21
Semivolatiles (8270)					
	1,2,4-Trichlorobenzene	39-98	38-107	28	23
	Acenaphthene	46-118	31-137	31	19
	2,4-Dinitrotoluene	24-96	28-89	38	47
	Pyrene	26-127	35-142	31	36
	N-Nitroso-di-n-propylamine	41-116	41-126	38	38
	1,4-Dichlorobenzene	36-97	28-104	28	27
	Pentachlorophenol	9-103	17-109	50	47
	Phenol	12-110	26-90	42	35
	2-Chlorophenol	27-123	25-102	40	50
	4-Chloro-3-Methylphenol	23-97	26-103	42	33
	4-Nitrophenol	10-80	11-114	50	50
Dioxins and Furans (8280)					
	All reported compounds	--	70-130	--	20

(a) RPD = Relative Percent Difference.
(b) QL = quantitation limit.
(c) If sample value is within 5 times the QL then control limits shall be +/- QL for water or +/- 2QL for soil.

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TABLE B-4
SURROGATE RECOVERY CONTROL LIMITS
TIME OIL COMPANY FORMER PENTACHLOROPHENOL MIXING AREA
PORTLAND, OREGON

Analysis	Surrogate Compound	Recovery (%) Water	Soil
Volatiles (8260)		8240A	
	Toluene-d8	88-110	84-138
	4-Bromofluorobenzene	86-115	59-113
	1,2-Dichloroethane-d4	76-114	70-121
Semivolatiles (8270)			
	Nitrobenzene-d5	35-114	23-120
	2-Fluorobiphenyl	43-116	30-115
	p-Terphenyl-d14	33-141	18-137
	Phenol-d5	10-110	24-113
	2-Fluorophenol	21-110	25-121
	2,4,6-Tribromophenol	10-123	19-122
	d4-2-Chlorophenol	33-110	20-130
	d4-1,2-Dichlorobenzene	16-110	20-130
Chlorinated Phenols (modified 8040)			
	Bromodichlorophenol	40-130	40-130

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TABLE B-5
CONSTITUENTS OF CONCERN
QUANTITATION LIMITS
TIME OIL COMPANY FORMER PENTACHLOROPHENOL MIXING AREA
PORTLAND, OREGON

ANALYTES	Quantitation Limits (a) Water (ug/L)		Quantitation Limits (a) Soil (mg/kg)		Risk-Based Action Levels (b) Water (ug/L)		Risk-Based Action Levels (b) Soil (mg/kg)	
VOLATILES								
Benzene	1		0.02		1.2	(C)	24	(C)
Toluene	10		0.02		7000	(NC)	16000	(NC)
Ethylbenzene	10		0.02		3500	(NC)	8000	(NC)
Xylenes (total)	10		0.05		70000	(NC)	160000	(NC)
All others	1-10		0.02		--		--	
SEMIVOLATILE ORGANICS								
2-Chlorophenol	10		0.33		180	(NC)	400	(NC)
2,4-Dichlorophenol	10		0.33		100	(NC)	240	(NC)
2,4,6-Trichlorophenol	5	+	0.33		3	(C)	64	(C)
2,4,5-Trichlorophenol	25		0.80		3500	(NC)	8000	(NC)
Pentachlorophenol	5.0	+	0.80		0.3	(C)	6	(C)
Benzo(a)Anthracene	1.0	+	0.33	+	0.005	(C,P)	0.1	(C,P)
Chrysene	1.0	+	0.33	+	0.005	(C,P)	0.1	(C,P)
Benzo(b)Fluoranthene	1.0	+	0.33	+	0.005	(C,P)	0.1	(C,P)
Benzo(k)Fluoranthene	1.0	+	0.33	+	0.005	(C,P)	0.1	(C,P)
Benzo(a)Pyrene	1.0	+	0.33	+	0.005	(C)	0.1	(C)
Indeno(1,2,3-cd)Pyrene	1.0	+	0.33	+	0.005	(C,P)	0.1	(C,P)
Dibenz(a,h)Anthracene	1.0	+	0.33	+	0.005	(C,P)	0.1	(C,P)
All others	1-25		0.33-0.80		--		--	
CHLORINATED PHENOLS								
2,4,6-Trichlorophenol	0.2		0.01		3	(c)	64	(c)
2,3,6-Trichlorophenol	0.3		0.01		NA		NA	
2,4,5-Trichlorophenol	0.5		0.02		3500	(NC)	8000	(NC)
3,4,5-Trichlorophenol	0.5		0.02		NA		NA	
2,3,4-Trichlorophenol	0.4		0.01		NA		NA	
2,3,4,6-Tetrachlorophenol	TBD		TBD		1000	(NC)	2400	(NC)
2,3,5,6-Tetrachlorophenol	0.2		0.01		NA		NA	
2,3,4,5-Tetrachlorophenol	0.3		0.01		NA		NA	
Pentachlorophenol	0.2		0.01		1	(c)	6	(c)
DIOXINS AND FURANS								
All Tetra-congeners	TBD		TBD		0.00001	(C)(b,c)	0.00005	(C)(b,c)
All Penta-congeners	TBD		TBD		0.00002	(c)	0.00001	(c)
All Hexa-congeners	TBD		TBD		0.0001	(c)	0.00005	(c)
All Hepta-congeners	TBD		TBD		0.001	(c)	0.0005	(c)
All Octa-congeners	TBD		TBD		0.01	(c)	0.005	(c)
Total Petroleum Hydrocarbons	250		5			N/A		N/A
Total Organic Carbon	--		1			N/A		N/A

C = Risk-based action level calculated based on carcinogenic risk of 10E-6.
NC = Risk-based action level calculated based on noncarcinogenic hazard index of 1.
P = Risk-based action level calculated based on potency factor for benzo(a)pyrene, as directed by EPA (1992).
N/A = Not available.
TBD = To be determined.
\+ = Quantitation limits exceed risk-based action levels.

(a) Quantitation limits listed for soil are based on wet weight. The quantitation limits calculated by the laboratory for soil, calculated on dry weight basis required by the contract, will be higher. Laboratory quantitation limits will be based on the lowest standard on the calibration curve. Instances may arise where high sample concentrations, nonhomogeneity of samples, or matrix interferences preclude achieving the desired quantitation limits and associated QC criteria.

(b) Calculated per the methodologies outlined in EPA's proposed Corrective Action Regulations (55 CFR 30798 et seq).

(c) Risk-based action limit is based upon toxicities of each congener relative to 2,3,7,8-tetrachlorodibenzo-p-dioxin, as specified by EPA (1989). Because the potency factor for 2,3,7,8-tetrachlorodibenzo-p-dioxin is currently under review, these numbers are subject to change

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TABLE B-6

SAMPLE CONTAINERS, PRESERVATION, AND HOLDING TIMES

TIME OIL COMPANY FORMER PENTACHLOROPHENOL MIXING AREA

PORTLAND, OREGON

Matrix	Analytes	Sample Container	Preservation	Maximum Holding Times(a)
Soil	Chlorinated Phenols	4 oz. widemouth glass with Teflon liner	Cool to 4 Deg.C	10 days until extraction; 40 days after extraction
	Semivolatile Organics	4 oz. widemouth glass with Teflon liner	Cool to 4 Deg.C	14 days until extraction; 40 days after extraction
	Total Petroleum Hydrocarbons	4 oz. widemouth glass with Teflon liner	Cool to 4 Deg.C	14 days until extraction; 21 days after extraction
	Volatile Organics	1.5 oz. widemouth glass with Teflon liner, or widemouth glass sealed with a septum	Cool to 4 Deg.C No headspace	14 days
	Dioxins and Furans	8 oz. widemouth glass with Teflon liner	Cool to 4 Deg.C	30 days until extraction; 45 days after collection
	Total Organic Carbon	4 oz. widemouth glass with Teflon liner		30 days
Ground-water	Chlorinated Phenols	1 L amber glass; Teflon-lined cap	Cool to 4 Deg.C	7 days until extraction; 40 days after extraction
	Semivolatile Organics	3 each - 1L amber glass; Teflon-lined cap	Cool to 4 Deg.C	7 days until extraction; 40 days after extraction
	Total Petroleum Hydrocarbons	1 L glass, Teflon-lined cap	5 mL HCl Cool to 4 Deg.C	7 days until extraction; 14 days after extraction
	Volatile Organics	3 each - 40 mL glass vials; Teflon-lined cap	HCl to pH<2 Cool to 4 Deg.C No headspace	14 days
	Dioxins and Furans	2 each - 1 L amber glass; teflon-lined cap	Cool to 4 Deg.C	30 days until extraction; 45 days after extraction
	Major Ions	1 L high density polyethylene, or glass	HNO3 to pH<2	28 days

(a) Holding times are from date of collection unless otherwise specified.

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TABLE B-7

RFI ANALYTICAL METHODS[a]
TIME OIL COMPANY FORMER PENTACHLOROPHENOL MIXING AREA
PORTLAND, OREGON

Sample Type	Extraction/Cleanup	Analytical Method
Soil		
Chlorinated Phenols	3550 (sonication) 3540 (soxhlet)	8040 (modified)
Volatile Organics[b]	None	8260
Semivolatile Organics[b]	3550 (sonication)	8270
Dioxins/Furans[c]	TBD[d]	TBD
Total Petroleum Hydrocarbons	None	TPH-HCID and/or TPH-D[e]
Total Organic Carbon	Drying, purging[f]	Combustion/Infrared[g]
Grain Size	None	ASTM D 422
Vertical Conductivity	None	ASTM D 5084-90
Percent Moisture/Solids	None	ASTM D 2216-80
Groundwater		
Chlorinated Phenols	3510 (separatory funnel)	8040 (modified)
Volatile Organics[b]	None	8260
Semivolatile Organics[b]	3510 (separatory funnel)	8270
Dioxins/Furans[c]	TBD	TBD
Total Petroleum Hydrocarbons	None	TPH-HCID and/or TPH-D[e]
Major Ions[g]	None	Cations by ICP (6010) Anions by standard EPA methods

(a) Methods are from SW-846 (EPA 1986, updated 1990) unless otherwise referenced.

(b) Laboratory will be required to report first 10 tentatively identified compounds (TICs) to aid in the identification of carrier and additive chemicals.

(c) Dioxin/furan results will be converted to an equivalent 2,3,7,8-TCDD toxicity by multiplying concentrations by the toxicity equivalence factors (TEFs; Table B-8).

(d) TBD = to be determined.

(e) Source: Oregon Department of Environmental Quality. 1990.

(f) Source: ASA 1982.

(g) Includes calcium, magnesium, sodium, potassium, sulfate, nitrate, chloride, carbonate, and bicarbonate.

TABLE B-8

TOXICITY EQUIVALENCE FACTORS[a]
TIME OIL COMPANY FORMER PENTACHLOROPHENOL MIXING AREA
PORTLAND, OREGON

Compound	I-TEFs/89
Mono-, Di-, and TriCDDS	0
2,3,7,8-TCDD	1
Other TCDDs	0
2,3,7,8-PeCDD	0.5
Other PeCDDs	0
2,3,7,8-HxCDDs	0.1
Other HxCDDs	0
2,3,7,8-HpCDDs	0.01
Other HpCDDs	0
OCDD	0.001
Mono-, Di-, and TriDCFs	0
2,3,7,8-TCDF	0.1
Other TCDFs	0
1,2,3,7,8-PeCDF	0.05
2,3,4,7,8-PeCDF	0.5
Other PeCDFs	0
2,3,7,8-HxCDFs	0.1
Other HxCDFs	0
2,3,7,8-HpCDFs	0.01
Other HpCDFs	0
OCDF	0.001

(a) Source: EPA. 1989a.

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APPENDIX C

Health and Safety Plan

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I. INTRODUCTION

This health and safety plan presents the protocols that will be required to provide for worker health and safety during the investigative activities to be conducted at the former pentachlorophenol mixing area (the site) of Time Oil Company's (Time) Northwest Terminal in Portland, Oregon. This plan presents a description of existing site conditions and the project health and safety organization, and also includes safety rules and procedures; criteria for hazard and risk analysis; description of levels of personal protection and required equipment; air monitoring procedures; emergency response information; training requirements; and requirements for routine health care and health monitoring.

The requirements outlined in this plan are considered the minimum health and safety requirements due to potential site contamination. All fieldwork will be performed in accordance with Occupational Safety and Health Administration (OSHA) Standard 29 CFR 1910.120, which regulates hazardous waste site operations; as well as Oregon requirements outlined in the Oregon Administrative Rules (OAR 437). This plan does not address physical worker safety issues that may be associated with excavation, trenching, and shoring (OAR 437-03, Subdivision P) or work in confined spaces (OAR 437-02, Subdivision E).

A. Site Background

The site currently consists of a former pentachlorophenol (PCP) storage warehouse, a former PCP mixing tank area from which soil has been excavated, a stockpile of excavated PCP-containing soil located south-southwest of the excavation area, and an inactive soil treatment area (Figure C-1).

PCP blending services at the site were operated by Time, under an 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; transfer and mixture of the chemicals to formulations specified by Koppers; interim storage of the PCP products; and transfer of the products to drums or containers for offsite transport. No PCP-related activities have occurred at the site since 1982.

Releases of PCP, carriers, 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 1982 resulted in the previously noted excavation of PCP-containing soils and generation of

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investigation derived, PCP-containing water. The excavation area was filled and regraded, and 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.

The overall purpose of the RFI is to collect sufficient data to characterize the nature and extent of contamination that remains at the site. Field investigations covered by this health and safety plan may include:

- Sampling and analyzing soil in and adjacent to areas previously reported to be contaminated with PCP and other carrier compounds, or where previous site activities suggest the potential for contamination
- Installing monitoring wells and sampling and analyzing groundwater in areas downgradient of previously identified soil or groundwater contamination and/or where previous hydrogeologic characterization is insufficient for the purpose of the RFI
- Abandoning two existing wells which are damaged
- Measuring water levels periodically to evaluate flow directions and piezometric head gradients
- Conducting tests in selected monitoring wells to evaluate aquifer properties and potential contaminant migration pathways.

This health and safety plan does not cover site activities that are limited to walking across any exclusion zone designated in this plan when the activities noted above are not in progress in that exclusion zone, and if the activities in progress in any other exclusion zone do not represent a reasonable risk of exposure.

PCP, at this time, is the most frequently encountered constituent of concern at the site. Other constituents, including tetrachlorophenol and certain non-carcinogenic polyaromatic hydrocarbons (PAHs; e.g. fluorene, phenanthrene, and anthracene) have been detected at or near the site but at less elevated concentrations. Based on reported site operations and field observations during previous excavation activities, other constituents of concern that may be present, but are unconfirmed, include kerosene and mineral spirits. Other constituents which potentially may occur at the site include tetra-, tri-, di-, and mono-chlorophenols; tetrachlorodibenzo-dioxins, and -furans; and benzene, ethylbenzene, toluene, and xylenes. Table C-1 lists the potential constituents of concern with their maximum previously detected concentrations and health-based exposure information. It should be noted that the symptoms listed as a result of exposure are generally associated with acute (short term) exposures to high

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concentrations of a constituent. Such symptoms may not be associated with the lower level exposure that would be the most likely exposure scenario encountered during site work. Lack of these systems does not indicate that exposure is not occurring. Also, symptoms of exposure are not available for some of the constituents. Therefore, use of prescribed protective equipment and monitoring instruments in accordance with this plan is required in order for exposure to these constituents to be kept as low as possible.

B. Health and Safety Plan Applicability and Adherence

All individuals performing fieldwork must read, understand, and comply with this health and safety plan. All field participants must read the plan prior to undertaking field activities. If any information presented in this plan is unclear, the reader should contact the Site Safety Officer for clarification prior to participating in any field activity. Once the information has been read and understood, the individual must sign the Acknowledgement (Table C-2), which will then be placed in the job file.

Similarly, all subcontractors for Landau Associates must prepare their own health and safety plan that is at least as protective as this plan, or they may adopt this plan as their own. Failure to comply with the requirements of this plan are grounds for immediate dismissal. Copies of an acknowledgement form similar to that provided as Table C-2 must be provided to Landau Associates' Site Health and Safety Officer prior to the commencement of field activities.

This plan is flexible, and allows unanticipated site-specific problems to be addressed, while providing adequate and suitable worker protection. The plan may be modified at any time, based on the judgment of the respective Site Safety Officer or the Project Safety Officer, as appropriate. Minor changes to the plan regarding day-to-day activities (e.g., location of decontamination station, etc.) may be made by the Site Safety Officer. Substantive changes to procedures (e.g., monitoring frequency, etc.) must also receive the concurrence of both the Site Safety Officer and the Project Safety Officer. Any modifications to the plan will be documented using Table C-3 (Modification to Health and Safety Plan) and will be presented to the onsite team during a safety briefing.

Activities conducted as part of this investigation shall be conducted without creating health and safety risks for nearby workers or the public. All onsite personnel shall be attentive to the potential for release of contaminated materials associated with field activities and shall immediately bring all such matters to the attention of the appropriate Site Safety Officer. Decontamination procedures and other elements of the field procedures (e.g., access to/from

work areas by heavy equipment) have been developed to be protective of both worker and public health and safety.

C. Responsible Individuals

Safety during the field investigations will be the responsibility of the Landau Associates' project manager and the designated Site Safety Officer. The Site Safety Officer, or designee, will be present at the site at all times during field activities related to the investigation.

II. SITE ORGANIZATION AND OPERATION

The areas of the site to be investigated and the type of activities involved in the investigation are diverse. Additionally, the distribution of contamination at the site is nonuniform in nature. These factors preclude the use of a single work zone boundary.

The designated level of protection for each work area onsite may be downgraded (C to D) if monitoring data obtained prior to or during work activities indicate that such a downgrade is appropriate. Conversely, the level of protection must be upgraded if monitoring conducted during work activities so indicates (see Section VI for site monitoring and action levels). Figure C-1 should be regarded only as an indication of the general work area, actual boundaries may vary slightly with work activity requirements and will be flagged once defined.

A. Work Zones

Each work area will consists of an exclusion zone, a contamination reduction zone, and a support zone:

- **Exclusion Zone:** The outer perimeter of each work area defines the outer perimeter of the exclusion zone for that work area. Only authorized field personnel will be allowed in each exclusion zone. The initial level of protection required in the exclusion zone may be adjusted as conditions change. Levels of protection are discussed in more detail in Section V.
- **Contamination Reduction Zone:** All personnel and equipment will leave the exclusion zone through a contamination reduction zone. Both personnel and equipment decontamination will occur in this zone to prevent the transfer of contaminants to the support zone (decontamination procedures are specified in Section III.B.3). The transition from the exclusion zone to the contamination reduction zone is shown schematically on Figure C-2.

- **Support Zone:** Located adjacent to the contamination reduction zone, the support zone is where all personnel will suit up in specified personal protective equipment before entering the work area defined by the exclusion zone. The support zone includes "clean" equipment storage and personnel resting and eating facilities.

Each zone in each work area will be established on an activity-by-activity basis prior to initiation of work and will be clearly delineated (marked by tape or fencing).

B. Site Security

Most of the area in which field activities will occur is a restricted-access industrial area. For work activities that are conducted in areas with public access, the work area will be blocked off and posted.

III. SAFETY RULES AND PROCEDURES

Safety is the responsibility of every individual involved in project efforts. Whether in the office or in the field, properly followed procedures are essential for personal safety and to minimize injuries or accidents involving equipment. Potential hazards while working at the site include, but are not limited:

- Exposure to toxic and/or hazardous chemicals
- Physical hazards from use of drilling, sampling, and testing equipment
- Physical hazards from heavy equipment
- Physical hazards from working conditions (e.g., heat stress, hypothermia).

A. Safety Rules

All personnel working in the field will follow the results and procedures listed below:

- All personnel will conduct themselves in a professional manner at all times.
- No personnel will be admitted into an operational exclusion zone without safety equipment in proper working condition and requisite training.
- All personnel must comply with the established safety procedures. Anyone working onsite for or under contract with Landau Associates who does not comply with this health and safety plan may be immediately dismissed from the site.

- Working while under the influence of intoxicants, narcotics, or controlled substances is prohibited. Prescription drugs should not be taken by personnel if the potential for contact with toxic substances exists, unless approved in writing by a physician.
- Firearms, ammunition, fireworks, and explosives are prohibited.
- Climbing or standing on machinery (other than drill rigs or service trucks) or equipment is prohibited unless authorized by the Site Safety Officer.
- Long hair must be contained inside a hard hat. Facial hair that interferes with proper operation and fit of respiratory protection gear is not allowed.
- A team system will be used within an exclusion zone. During site operations, each worker is a safety backup for his/her team partners and should make all personnel aware of dangerous situations that may develop.
- Eating, drinking, chewing gum or tobacco, smoking, or any practice that increases the probability of hand-to-mouth transfer and ingestion of material is prohibited in an exclusion zone.
- Smoking or consumption of food and beverages is allowed only within designated areas in the support zones.
- Disposable clothing will be used whenever necessary and appropriate to minimize the risk of cross contamination.
- The number of personnel and the amount of equipment in contaminated areas will be minimized to allow for efficient site operations.
- Samples will be collected only by trained and authorized personnel.
- Contact with contaminated or potentially contaminated material should be avoided. Efforts will be made to stage site activity upwind of investigative equipment, activities, and materials.
- Proper decontamination procedures must be followed before leaving an exclusion zone and the site, unless medical emergencies dictate otherwise (Section III.B.3). All decontamination residual materials, and any other potentially contaminated materials, will be handled properly and kept onsite or at a designated secure stockpile area.
- Only approved work clothes or equipment will be allowed within the exclusion zones.
- Exchange of personal protective equipment will not be allowed.

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B. Safety Procedures

1. Leaving the Support Zone to Enter Site

- Prior to beginning investigation activities, review site information updates. These updates will be provided by the Site Safety Officer and will provide important information concerning:
  - Expected hazards
  - Special conditions
  - Sampling procedures
  - Location of phones
  - Emergency medical information
  - Level of personal protection required
- Finish eating and extinguish smoking materials prior to suiting up.
- Attend safety briefing and worker question and answer period, if applicable.
- Check safety gear and equipment. Suit up as required to begin activities.
- Measure and delineate exclusion zone (unless established previously).

2. Activities in Exclusion Zone

- All activities will be conducted at a minimum of Level D (modified) (Section V).
- For activities capable of creating volatile airborne contamination, levels of personal protection will be adjusted according to results of work zone air monitoring (Section VI).
- Whenever possible, personnel will be stationed upwind of field activities capable of creating airborne contamination.
- If any physical discomfort is experienced (e.g., abnormalities, nausea, lightheadedness), immediately stop work, tell the other team members, and leave the area.
- If any personal protective equipment fails, immediately leave the area.
- One person must never be left alone in an exclusion zone.
- Use maximum care in handling samples. If the sampling site is not accessible using gear available (i.e., water too high, slippery or steeply sloped surface, holes, etc.), confer with the Landau Associates Project Manager and/or Site Safety Officer, as appropriate, to arrange an alternate sampling site or appropriate equipment/procedures to obtain samples safety.
- Immediately wipe off spills and dirt from sampling containers.

3. Site Exit Decontamination

All personnel and equipment must be properly decontaminated before entering a support zone from an exclusion zone. All contaminated equipment and materials will leave only through the contamination reduction zone or will be contained onsite; any potentially contaminated materials to be stockpiled will be kept in designated, secure locations.

a. Routine Decontamination Procedures

A decontamination area will be set up in the contamination reduction zone at the border of each exclusion zone. Prior to leaving the exclusion zone:

- Portable sampling equipment will be washed or placed in/on plastic for vehicle transport to equipment decontamination area
- Drilling rig auger flights will be placed on a trailer for transport to the decontamination area
- Drill cuttings will be brushed and/or washed off the drill rig before moving to the decontamination area, to minimize transport of potentially contaminated materials from the exclusion zone.

In the contaminant reduction zone, sampling, drilling, and other equipment will be decontaminated as follows:

- Sampling equipment will be decontaminated as outlined in the work plan.
- All heavy equipment must be thoroughly decontaminated prior to leaving the site, with particular care taken in decontaminating those parts of the heavy equipment that have come in direct contact with contaminants, such as tracks, tires, shovels, grapples, and scoops. High-pressure hot water cleaning will be used for these, aided by physical scrubbing with disposable brushes when necessary to loosen caked materials. All portions of the equipment, including the undercarriage, chassis, and cab, will also be inspected and cleaned as necessary.
- Any vehicle used for transportation in an exclusion zone will be equipped with seat covers that can be easily wiped down. All such vehicles must be decontaminated prior to leaving the exclusion zone. Decontamination will include at a minimum high pressure washing of the exterior and, as necessary, wet wiping the interior and scrubbing of the exterior.
- Personal protective equipment will be removed and washed and/or containerized prior to leaving the contaminant reduction zone.

Certain parts of contaminated respirators, such as the harness assembly or cloth components, are difficult to decontaminate. If grossly contaminated, they will be discarded. Rubber components will be soaked in soap and water and scrubbed with a brush. Respirators will be sanitized by rinsing in a detergent solution followed by a clear rinse, then hung to dry.

b. Emergency Decontamination

In case of an emergency, gross contamination procedures will be speedily implemented if possible. If a life-threatening injury occurs and the injured person cannot undergo decontamination procedures without incurring additional injuries or risk, he or she will be transported wrapped in plastic sheeting if time allows and if consistent with the injury. The medical facility will be: 1) informed that the injured person has not been decontaminated, and 2) given information regarding the most probable contaminants.

4. Disposal of Contaminated Fluids and Materials

All equipment and materials used for decontamination or personal protection will be cleaned or collected for appropriate disposal. All nondisposable equipment will be decontaminated onsite. Disposables will be containerized. Contaminated liquids will be collected in storage tanks or containers and stockpiled in a secure location. Storage and/or disposal will be conducted in accordance with the work plan.

5. Housekeeping

Work areas will be kept as clean and orderly as possible at all times. Ordinary refuse will be placed in suitable rubbish bins or trash containers at the site. The storage or introduction of extraneous materials will be minimized in the exclusion zone to minimize the decontamination load and reduce possibilities for cross contamination.

6. Visitors

Authorized visitors will only be allowed to observe operations from the support zone or beyond, and must obey all instructions of the Site Safety Officer and/or Time Oil representative. Representatives from the Oregon Department of Environmental Quality (DEQ), the Oregon Occupational Safety and Health Division, and EPA must also possess appropriate health and safety equipment at the time of the visit, and have a health and safety plan at least as stringent as this plan, or adopt this plan as their own.

IV. ANALYSIS OF SITE HAZARDS AND RISKS

A. Basis for Analysis

Results of previous investigations of the area have identified the presence of contaminants of concern. Maximum concentrations of constituents detected in area soil and groundwater are summarized in Table C-1 along with occupational exposure criteria, as available, and potential exposure pathways of concern.

B. Suspected Hazardous Substances

There is a potential for field personnel to become exposed to contaminants in the defined work areas. Dermal, inhalation, and incidental ingestion exposures are possible. The general risk of exposure on the site is low to moderate.

Current soil and groundwater contamination could lead to dermal contact during drilling and sampling activities. Dermal protection, as defined in Section V.B, will, therefore, be required for all such activities. Volatization of a few identified contaminants could pose risk of inhalation exposures. Action levels and the associated respiratory protection for potential inhalation exposures will be based initially on constituent concentrations presented in Table C-1 and will be adjusted thereafter based on ambient monitoring data to be collected during field activities (Section VI).

V. PERSONAL SAFETY EQUIPMENT

A. Levels of Protection

Levels of protection have been defined by the EPA in the EPA *Standard Operating Guide*, 1984:

- Level A requires a fully encapsulating suit and full facepiece pressure demand self-contained breathing apparatus (SCBA) with a 5-minute, supplied air escape pack for the highest level of respiratory, skin, and eye protection. Level A is not anticipated at this site and, therefore, is not discussed further.
- Level B requires maximum respiratory protection by the use of supplied air or a positive pressure SCBA. A 5-minute, supplied air escape pack is required while in Level B. Dermal protection is selected on the basis of anticipated hazards. Level B is not anticipated at this site, and therefore, is not discussed further.
- Level C requires an air purifying respirator that is specific to the contaminants of concern. The degree of dermal protection depends on anticipated hazards.

- Level D is the basic work uniform, described in Section V.B, as modified for work at this site.

There are numerous variations and modifications possible with each level of protection. Personal protection action levels for site project activities are discussed in Section VI.

B. Required Equipment

The level of protection designated for site work indicates the level of protection that should be initially used. Air monitoring results may indicate that a downgrading (or upgrading) in the level of protection is appropriate. Level C protection is initially recommended for intrusive work (drilling, digging, or otherwise disturbing soil, accessing monitoring wells for water level measurements or sampling, etc.) only. Level D is considered appropriate for nonintrusive activities unless air monitoring indicates that an upgrade is necessary. The following sections define Level D and Level C protective equipment.

1. **Level D (Modified)**

- One-piece disposal Tyvek coveralls, which are resistant to PCP, shall be used. Coveralls will be taped at wrists and ankles if wet or excessively dusty conditions are expected.
- PVC inner-disposable gloves.
- Neoprene and/or nitrile outer gloves.
- Neoprene steel-toed and steel-shank, chemically resistant, impermeable outer boots.
- Hard hat (with splash shield if liquid splashes or sprays are likely to be encountered; not required when groundwater monitoring is the only activity occurring at the site).
- Safety glasses with side shields (for intrusive work and groundwater sampling only).

Level D may only be worn in work areas initially designated as Level C after the Site Safety Officer has made a determination that exposure to hazardous materials is unlikely and that exposures will not approach the threshold limit value/permissible exposure level (TLV/PEL).

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2. Level C

- All Level D (modified) equipment described above (including all equipment identified for intrusive work)
- Half-face air purifying respirator equipped with organic vapor/HEPA cartridges. If contaminated liquid splashes or sprays are likely to be encountered, full-face air purifying respirators equipped with organic vapor/HEPA cartridges shall be used.

VI. SITE MONITORING AND ACTION LEVELS

Air monitoring near the breathing zone will be conducted as outlined below for volatile and semivolatile constituents and for particulate matter to determine the appropriate level of respiratory protection (action levels are provided in Table C-4). Background readings will be taken 50 ft upwind of site activities. The personal protective equipment requirements applies to the area within a 30-ft radius of where the contaminants are measured.

A. Volatile Organic Compounds

Substances that are most hazardous from a chronic inhalation standpoint are those that are relatively volatile, highly toxic (i.e., low TLV or PEL) and have an odor threshold much higher than the TLV. If a substance has an odor threshold higher than the TLV, it is considered to have poor warning properties because its odor would not be detected until after the acceptable airborne concentration (TLV or PEL) has been exceeded. The designated Site Safety Officer will have a photoionization detector (TIP meter) onsite at all times that intrusive activities are conducted and will establish background readings well upwind of any excavation, spoils pile, or borehole. TIP readings will be taken frequently during intrusive work. A table showing the relative response to different chemical constituents at different lamp energies will be kept with each TIP for field reference.

The organic vapor action level for field activities is 10 ppm. Benzene has the lowest PEL (1 ppm) for any of the volatile contaminants previously found at the site (Table C-1). However, this constituent has only been detected in one soil sample, at a low concentration (1 ppm). Because of this, an action level of 1 ppm to protect against benzene exposure is not appropriate. Therefore, the action level for upgrading to respiratory protection will be based on toluene. The PEL for toluene is 50 ppm, and the action level is set below the PEL to account for other constituents which may be present. While monitoring with the TIP, any consistent readings in the breathing zone that are greater than 5 ppm above the upwind background level for more

than 5 minutes, or any readings in the breathing zone greater than 10 ppm other than a momentary peak shall be the action level for donning half-face air purifying respirators equipped with organic vapor/particulate cartridges. Cartridges will be replaced either immediately upon any indication of "break through" or after each day of use.

Any readings consistently greater than 10 ppm above background or greater than 50 ppm other than for a brief peak, or any peak reading greater than 100 ppm in the breathing zone, will be the action level for exiting the area.

VII. EMERGENCY RESPONSE

A. Reporting/Notification Procedures

In the case of any emergency, the Site Safety Officer is to be notified immediately. If the situation is life threatening and notification of the Site Safety Officer would delay emergency response, field personnel may initiate the appropriate emergency contacts prior to notifying the Site Safety Officer. The Site Safety Officer will then initiate contacts as follows:

1) Call appropriate emergency services numbers (ambulance, fire, etc.) if not already done and provide the following information:
   - Name and location of person reporting
   - Location of accident/incident
   - Name and affiliation of injured party
   - Description of injuries
   - Status of medical aid effort
   - Details of any chemicals involved
   - Summary of the accident, including the suspected cause and the time it occurred
   - Temporary control measures taken to minimize further risk.

   Note: This information is not to be released under any circumstances to parties other than the Site Safety Officer, Project Safety Officer, Landau Associates Project Manager, Time Oil, and bona fide emergency response team members.

2) Call the Landau Associates Project Manager (Table C-5) and provide information noted in Item 1 above.

3) The Site Safety Officer will complete a written accident/incident report using Table C-6, within 24 hours, sending copies to each of the project managers.

Resources to be used in cases of emergency include:

- List of Emergency Contacts: Table C-5 includes both the appropriate emergency services (top of table) and the appropriate project contacts (bottom of table).
- Nearest Phone: As of the date of this plan, telephones are located at the Time site office.
- Onsite Emergency Equipment: An industrial first aid kit, a 20-pound type ABC portable fire extinguisher, and an eyewash kit will accompany each field vehicle.
- Offsite Emergency Services: Phone numbers for offsite emergency services are listed in Table C-5. Copies of this table must be located in each vehicle.

  After the required emergency contacts are made, Time and Landau Associates' Project Managers should be promptly notified by the Site Safety Officer.
- Hospital Route: Good Samaritan Hospital is located near the site and should be utilized where care beyond standard first aid is required. Figure C-3 shows the route to the hospital. Onsite field personnel should become familiar with this route prior to field activities. Driving time from the site to Good Samaritan Hospital is estimated to be about 15 to 20 minutes, depending on traffic conditions.

B. Non-Life Threatening Emergencies

1. Injuries

In emergency situations which are not life threatening (e.g., a broken leg), normal decontamination procedures should be followed when possible. However, decontamination procedures may be modified according to the specific circumstances. Outer protective clothing should be removed if doing so would not cause delays or aggravate the injury. Respirators should only be removed: 1) if the victim has stopped breathing, or 2) after the victim has been removed from a breathing hazard area.

Bodily injuries which occur as a result of an accident during operations at the site will be handled in the following manner:

- The victim will be administered to by an individual who holds current first-aid and/or CPR certification, as necessary
- The local first-aid squad/rescue unit and the local hospital (Good Samaritan Hospital, Portland) will be notified as appropriate, depending on the nature of the emergency.

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2. Heat-Related Illnesses

It is anticipated that site activities will take place during winter months, when temperatures average 40-45°F. However, heat-related illnesses can occur at any time when protective clothing is worn. Workers wearing semipermeable or impermeable encapsulating clothing should be monitored for heat stress through regular checks of heart rate and by more comprehensive monitoring when the temperature in the work area is above 55-60°F. A pulse rate in excess of 150 beats per minute may indicate heat exhaustion, although this rate will vary among workers. All personnel shall know what their baseline pulse rate is before working in elevated temperatures, so as to monitor themselves. The Site Safety Officer will be trained in monitoring, treating, and recognizing the signs of heat stress. If heat stress occurs, decontamination should be minimized and treatment begun immediately, unless the victim is obviously contaminated.

3. Cold Stress

Fieldwork will likely be conducted during the winter months, when site personnel may be subject to low temperatures, rain, and winds. In these conditions, field teams must be prepared to wear proper protective clothing and to recognize symptoms of cold stress.

Cold stress can be manifested as both hypothermia and frostbite:

- Hypothermia is a cold-induced decrease in the core body temperature that can increase the safety hazards associated with investigation activities that require maximum attentiveness and manual dexterity. Hypothermia produces shivering, numbness, drowsiness, muscular weakness, and, if severe enough, death.
- Frostbite results for the constriction of blood vessels in the extremities, decreasing the supply of warming blood to these areas. This drop in blood supply may result in the formation of ice crystals in the tissues, causing tissue damage. The symptoms of frostbite are white or grayish skin, blisters, or numbness.

Site personnel should review the information provided in their first aid training for response to cold stress problems.

4. Flu-Like Symptoms

Any site personnel experiencing flu-like symptoms should notify the Site Safety Officer. Such symptoms may be sufficient cause for ceasing operations until the work area is evaluated and a "return to operations" order given by the Site Safety Officer.

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C. Fire

Fire extinguishers (ABC-type) will be kept in each vehicle and drilling rig. This equipment will be used only to respond to small fires. In the event of major fires, explosions, or fire/explosion hazard conditions, all personnel will immediately evacuate the area. The Site Safety Officer will evaluate the need for further evacuation and/or emergency services.

D. Site Evaluation and Evacuation

The Site Safety Officer will be responsible for determining if circumstances exist which require further evaluation and/or evacuation. The Site Safety Officer should always assume worst-case conditions until proven otherwise. Specific evacuation procedures and warning signs and signals will be covered in the health and safety training session prior to beginning work.

Two levels of evacuation may be considered:

- Withdrawal from the immediate work area onsite
- Evacuation of the surrounding area.

1. Withdraw from Work Area

Withdrawal to a safe upwind location will be required under the following circumstances:

- Detection of volatile organics and/or toxic gases at concentrations above action levels for the level of protection being worn (Section VI)
- Occurrence of a minor accident—field operations will resume after first aid and decontamination procedures have been administered
- Malfunction or failure of protective equipment, clothing, or respirator.

The following hand signals will be used by site personnel to communication within the work zone if respiratory protection is being used:

- Thumbs up - Okay
- Thumbs down - Not okay
- Hands on wrist - Exit exclusion zone
- Hands on throat - cannot breath.

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2. Evacuation of Surrounding Area

There are no foreseeable conditions, based on current knowledge of the site, that would require evacuation of the surrounding area. The site coordinators, in consultation with the Site Safety Officer and, as appropriate, the Landau Associates Project Manager, will be responsible for determining if circumstances exist for area-wide evacuation, and should always assume reasonable worst-case conditions until proven otherwise. Fire and police departments must be contacted in such cases. If evacuation is necessary, it will be implemented with the assistance of the appropriate emergency response personnel (Table C-5).

Procedures for reporting accidents/incidents are provided in Section VII. They will be performed in the order indicated.

VIII. TRAINING

All personnel performing onsite investigation tasks shall have completed formal health and safety training, which complies with 29 CFR 1910.120 and Oregon Administrative Rule (OAR) Chapter 437 (certificates of successful completion of training will be maintained in job files), and shall verify on-the-job training for those tasks they are assigned to perform. At least one member of each field team will be trained in CPR and first aid. All operations will be reviewed and all unfamiliar operations will be rehearsed prior to performing the actual procedures.

IX. ROUTINE HEALTH CARE AND MONITORING

All persons working in an exclusion zone must have a medical evaluation to determine their baseline medical status prior to any site work. Follow-up examinations are appropriate if exposures are known or suspected to have occurred. Documentation of medical evaluations for all site works will be maintained by the Site Safety Officer.

X. REFERENCES

American Conference of Governmental Industrial Hygienists. 1992. *Threshold Limit Values and Biological Exposures Indices for 1992-1993.*

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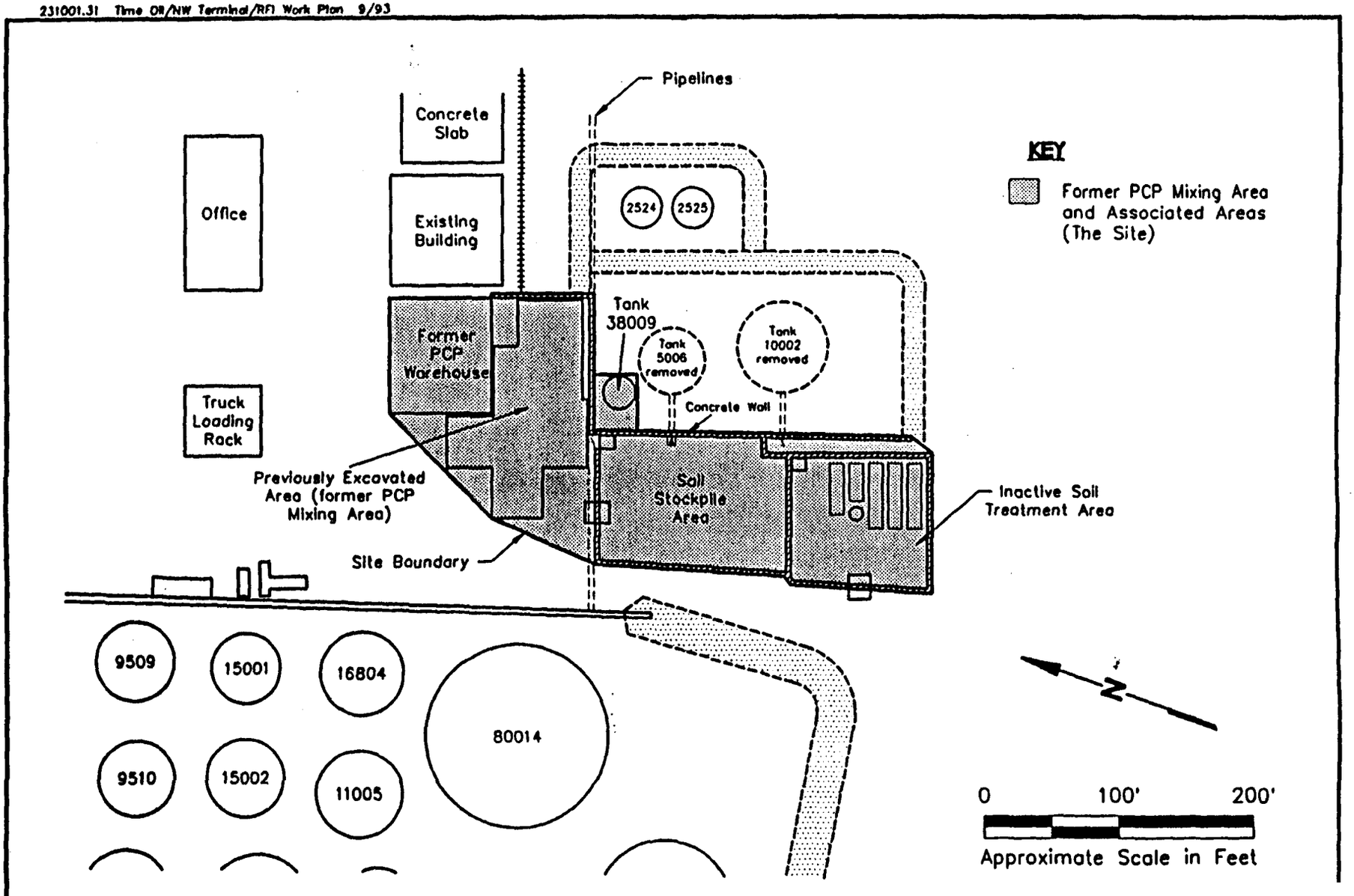
U.S. Department of Labor, Occupational Safety and Health Administration. 1989. *Hazardous Waste Operations and Emergency Response.* Final Rule Federal Register 29 CFR Part 1910.



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Site Map

Figure C-1

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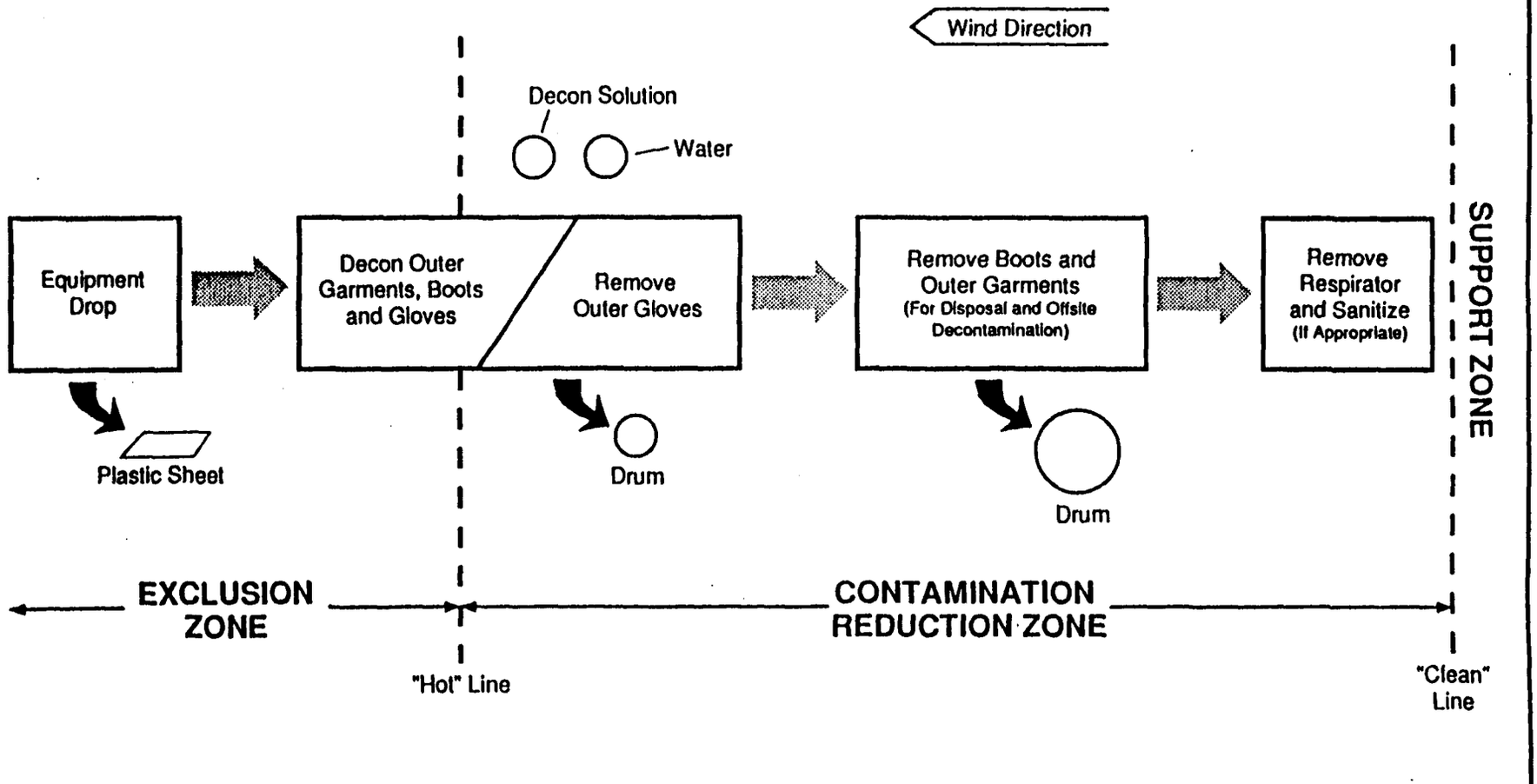

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Schematic of Transition from Exclusion Zone to Contamination Reduction Zone to Support Zone

Figure C-2

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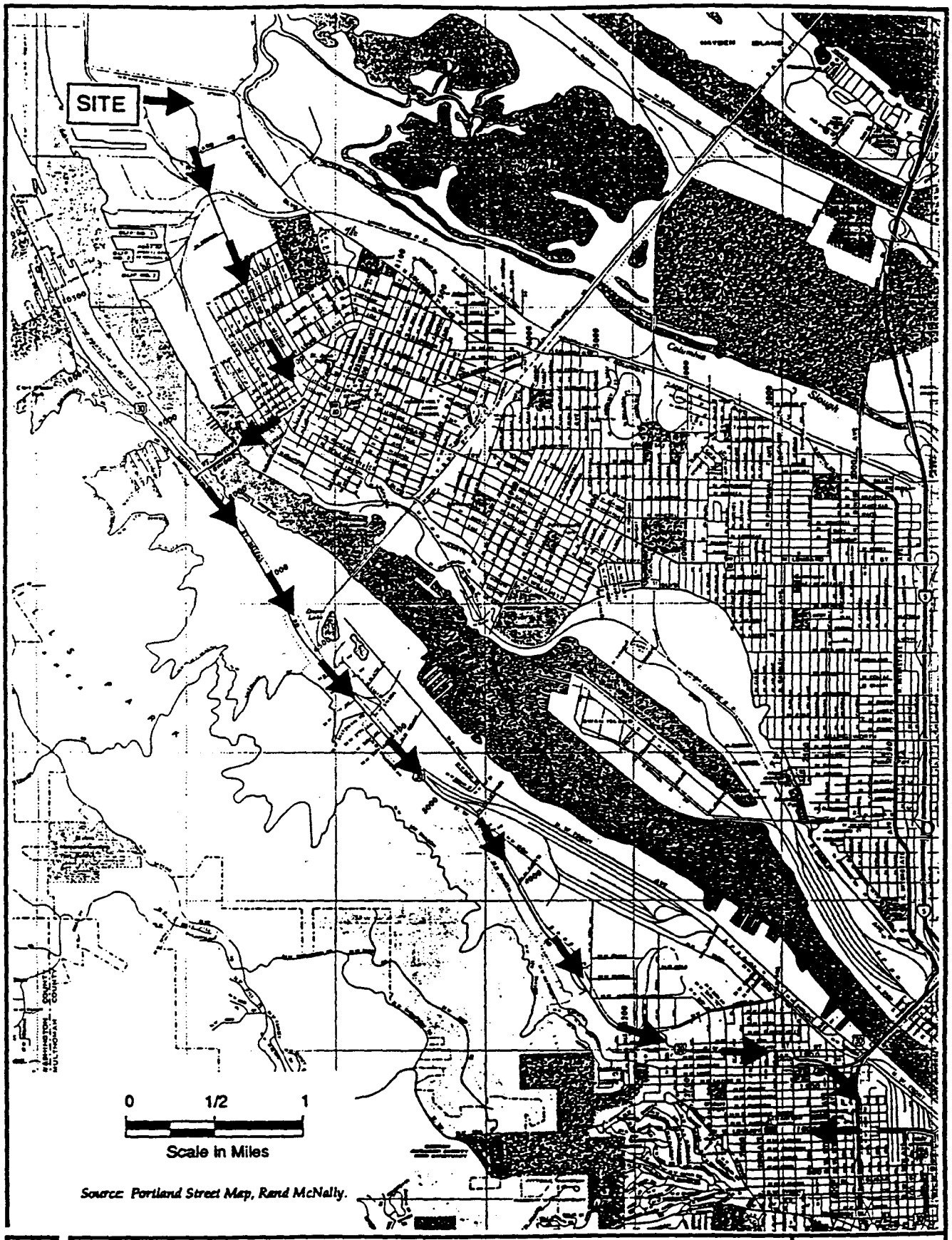

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Route to Hospital

Figure C-3

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TABLE C-1
SITE EXPOSURE ASSESSMENT
TIME OIL COMPANY FORMER PENTACHLOROPHENOL MIXING AREA
PORTLAND, OREGON

Hazardous Material/ Chemical Constituent	Maximum Concentration Detected Onsite: Soil (mg/kg)	Maximum Concentration Detected Onsite: Groundwater (mg/L)	TLV[a]	PEL[b]	IDLH[c]	Exposure Routes[d]	Symptoms of Exposure
Pentachlorophenol	116000	60	0.5 ppm (skin)	0.5 ppm (skin)	150 mg/m³	Inh, Ing, Abs, Con	Eye, nose, throat irritation, weakness, nausea
2,3,4,6-Tetrachlorophenol	71	0.17	DNA[e]	DNA	DNA	Inh, Ing, Con	DNA
2-Chlorophenol	5.3	NA[f]	DNA	DNA	DNA	DNA	DNA
Benzene	1	0.64	10 ppm	10 ppm	3000 ppm	Inh, Abs, Ing, Con	Irritated eyes, nose, respiratory tract
Toluene	12	1.6	50 ppm	200 ppm	2000 ppm	Inh, Abs, Ing. Con	Fatigue, dizziness, headache
Ethylbenzene	NA	1.2	100 ppm	100 ppm	2000 ppm	Inh, Ing, Con	Irritated eyes, headache
Xylene	11	3.0	100 ppm	100 ppm	1000 ppm	Inh, Abs, Ing, Con	Dizziness, drowsiness, nausea
Fluorene	2300	NA	DNA	DNA	DNA	Inh, Ing, Abs, Con	DNA
Phenanthrene	4600	NA	0.2 ppm[g]	0.2 ppm[g]	DNA	Inh, Ing, Abs, Con	Skin photosensitization
Anthracene	9100	NA	0.2 ppm[g]	0.2 ppm[g]	DNA	Inh, Ing, Abs, Con	DNA
Dioxins and Furans	0.003	NA	DNA	DNA	DNA	DNA	DNA
Benzo(a)anthracene	160	NA	0.2 mg/m³[g]	0.2 mg/m³[g]	700 mg/m³	Inh, Con	Dermatitis, bronchitis
Chrysene	630	NA	0.2 mg/m³[g]	0.2 mg/m³[g]	700 mg/m³	Inh, Con	Dermatitis, bronchitis
Benzo(b)fluoranthene	14	NA	0.2 mg/m³[g]	0.2 mg/m³[g]	700 mg/m³	Inh, Con	Dermatitis, bronchitis
Benzo(a)pyrene	90	NA	0.2 mg/m³[g]	0.2 mg/m³[g]	700 mg/m³	Inh, Con	Dermatitis, bronchitis
Kerosene	NA	NA	DNA	DNA	DNA	Inh, Ing, Abs, Con	DNA
Mineral Spirits	NA	NA	DNA	DNA	DNA	Inh, Ing, Con	DNA

(a) TLV = Threshold limit value, as defined by the American Council of Governmental Industrial Hygienists (1992).
(b) PEL = Permissible exposure limit, as defined by the Occupational Safety and Health Administration (1991).
(c) IDLH = Immediately dangerous to life and health (NIOSH).
(d) Exposure route codes: Inh = inhalation; Ing = ingestion; Con = skin and/or eye contact; Abs = skin absorption.
(e) DNA = Data not available.
(f) NA = Not analyzed.
(g) TLV/PEL for total coal tar pitch volatiles (benzene soluble fraction) includes anthracene, benzo(a)pyrene, phenanthrene, acridine, chrysene, and pyrene.

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TABLE C-2

ACKNOWLEDGEMENT

I have read the attached Health and Safety Plan for the work at Time Oil Company's Northwest Terminal, Portland, Oregon. I have discussed any questions which I have regarding these materials with my supervisor, and I understand the requirements of the health and safety plan.

Employee _____ Date _____

Employee _____ Date _____

Employee _____ Date _____

Employee _____ Date _____

Employee _____ Date _____

Employee _____ Date _____

Employee _____ Date _____

Employee _____ Date _____

Employee _____ Date _____

Employee _____ Date _____

Employee _____ Date _____

Employee _____ Date _____

Employee _____ Date _____

Employee _____ Date _____

Employee _____ Date _____

Site Safety Officer _____ Date _____

TABLE C-3

MODIFICATION TO HEALTH AND SAFETY PLAN

TIME OIL COMPANY, NORTHWEST TERMINAL

DATE __/__/__

Modification: _____

_____

_____

_____

Reasons for Modification: _____

_____

_____

_____

Site Personnel Briefed:

Name: _____ Date: _____

Name: _____ Date: _____

Name: _____ Date: _____

Name: _____ Date: _____

Name: _____ Date: _____

Name: _____ Date: _____

Name: _____ Date: _____

Approvals:

Site Safety Officer: _____

Manager: _____

Others: _____

TABLE C-4

ACTION LEVELS FOR PERSONAL PROTECTION
TIME OIL COMPANY/NORTHWEST TERMINAL
PORTLAND, OREGON

Monitoring Parameter	Reading[a]	Level of Protection
Organic Vapors[b]	0-5 ppm over background[c] (5 minutes)	Level D (modified)
	5-10 ppm over background	Level C - Half-face air purifying respirator equipped with organic vapor and HEPA cartridges; full-face respirators with organic vapor and HEPA cartridges are required if contaminated liquid splashes or sprays are likely to be encountered
	>50 ppm over background	Leave the work area
	>100 ppm over background (instantaneous)	Leave the work area

(a) Readings are sustained readings over at least a 1-minute duration unless otherwise noted.
(b) Determine using a photoionization or other appropriate organic vapor detector.
(c) Background readings obtained 50 ft upwind of site activity.

32319

TOLS002774

BZTO104(e)039595

TABLE C-5

EMERGENCY SERVICES
TIME OIL COMPANY FORMER PENTACHLOROPHENOL MIXING AREA
PORTLAND, OREGON

Service	Name/Location	Phone Number
Ambulance	—/—	911
Fire	—/—	911
Police	—/—	911
Hospital	Good Samaritan Hospital 1015 N.W. 22nd Avenue Portland, Oregon	229-7260

CONTACT INFORMATION

Time Oil		
Kevin Murphy Senior Environmental Specialist	206/286-6443	Seattle, WA
Landau Associates		
Leslee Matthews Project Manager	206/778-0907[a]	Edmonds, WA
Julie Wilson Health and Safety	206/778-0907	Edmonds, WA

(a) Numbers listed are office telephones; home numbers will also be provided in each field vehicle.

TABLE C-6

EMPLOYEE EXPOSURE/INJURY INCIDENT REPORT

(Use additional page if necessary)

Date: _____ Time: _____

Name: _____ Employer: _____

Site Name and Location: _____

Site Weather (clear, rain, snow, etc.): _____

Nature of Illness/Injury: _____

_____

Symptoms: _____

Action Taken: Rest: _____ First Aid _____ Medical _____

Transported by: _____

Witnessed by: _____

Hospital's Name: _____

Treatment: _____

Comments: _____

_____

What was the person doing at the time of the accident/incident? _____

_____

Personal Protective Equipment Worn: _____

_____

Cause of Accident/Incident: _____

_____

What immediate action was taken to prevent recurrence? _____

_____

Additional comments:

Employee's Signature: Supervisor's Signature:

_____ _____

Date Date

Site Safety Representative's Signature

_____

32319

TOLS002776

BZTO104(e)039597

bc: W. J. Baldwin
T. A. Marr
M. R. Urbassik
D. F. Marion

Koppers Company, Inc.
Environmental Resources Department
Pittsburgh, PA 15219, Telephone 412-227-2000

check

EXPRESS MAIL

KOPPERS

→ PORTLAND

April 3, 1984

Mr. Neil Wallace
Time Oil Company
12005 North Burgard
Portland, OR 97203

Subject: Samples of Tank #20002
Penta Tank Bottoms

Dear Mr. Wallace:

Per our telephone conversation on April 2, 1984, enclosed is the information required for the Penta Tank Bottom clean out project.

Please package and label two duplicate quart samples of the waste per the prescribed EPA procedures (copy enclosed for your reference) and complete the Certification of Representative Sample Document #NWP D39854 (blank enclosed) required by Chemical Security Systems/Chemical Waste Management, Inc.

The samples and documentation should be shipped together as soon as possible to:

Mr. George Mills, Chemist
Koppers Company, Inc.
Specialty Wood Chemicals Division
5137 Southwest Avenue
St. Louis, MO 63110
Phone: (314) 772-2200

Please note that UPS package #4 is required for shipping penta samples via UPS. Attached are the packaging specifications. A suggested supplier of this packaging is Labelmaster, Inc., Chicago, Illinois (800) 621-5808. The samples must be packaged so that they do not leak, spill, or vaporize from their packages.

In addition, please assure that the following information accompanies each of the samples:

Your Location

Time Oil Company
12005 North Burgard
Portland, OR 97203
Contact: Neil Wallace
Phone: (503) 286-1611

12279

Writer's Direct Dial Number (412) 227-2767

TOLS002777

BZTO104(e)039598

Shipping Destination

Koppers Company, Inc.
Specialty Wood Chemicals Division
5137 Southwest Avenue
St. Louis, MO 63110
ATTN: George Mills, Chemist
Phone: (314) 772-2200

Sample Description

Sample of penta sludge from tank #20002
Quantity of sample: 1 quart

Collection Data

Sample Collector's Name: _____

Collection Date: _____ Time: _____

Date of Shipment: _____

If you have any questions regarding any of the above or attached information, please contact either Mr. John Palmer, Regional Manager at Koppers' St. Louis location, (314) 772-2200 or this office at your earliest convenience. Your cooperation in this matter is appreciated.

Sincerely,

Charles J. Vita
Environmental Specialist

CJV:cg
Enclosures: EPA-600/2-80-018 - Samplers and Sampling Procedures for Hazardous Waste Streams
(NWPD 39854) Chemical Waste Management Form WMI-51 (Rev. 8/83)
(Package #4) UPS Guide for Shipping Hazardous Materials

cc: J. D. Palmer - St. Louis
C. Mills - St. Louis
File Portland (Time Oil)

12279

TOLS002778

BZTO104(e)039599

cc: W. Baldwin
G. Ringeling *
D. Marion
G. Mills *
T. Marr

*attachments

KOPPERS

Interoffice Correspondence

To John Palmer

Location St. Louis, MO

Subject Profile sheet for Time Oil
Penta sludge FPE Req. #3

From Chuck Vita

Location Pittsburgh

Date March 28, 1984

Attached is the completed profile sheet (NWP-D39854) for the tank bottoms clean out at Time Oil in Portland. Please note that Mr. John Denham (Time Oil) has given me Time Oil's Portland, Oregon USEPA I.D. # for use in the clean-up.

Please review all attached information, and if you do not see any problems, follow the Waste Management instruction sheet that is attached to the profile sheet.

In addition to providing the technical information on the profile sheet, Bill Baldwin has informed me that George Mills has in his possession a representative sample of the Time Oil tank bottoms at the St. Louis plant. Please have George (or yourself) review and complete the certification document that accompanies the profile sheet.

The sample and profile sheet should be shipped together along with a short cover letter ASAP to:

Mr. Mike Zabel, Site Chemist
Chem-Security Systems, Inc.
(A Chemical Waste Mg't. Company)
Star Route
Arlington, OR 97812

Please send a photocopy of the profile sheet to:

Mr. Bill Van Dyke, District Sales Mg'r.
Chem-Security Systems, Inc.
(A Chemical Waste Mg't. Company)
P.O. Box 1269
Portland, OR 97207-1269

Also note that in addition to the MSDS for Penta (already attached) MSDS' for the other applicable chemical components should be attached for the landfill's reference.

If you have any questions regarding the above, please contact me at your earliest convenience. Thanks for your help.

Chuck Vita

12279

TOLS002779

PS: UPS pkg. #4 is required for penta shipped via UPS. Attached are specs. Can be obtained from Labelmaster (800) 621-5808.

BZTO104(e)039600

Waste Management, Inc.

GENERATOR'S WASTE MATERIAL PROFILE SHEET

NWP ISOR D39854

A GENERAL INFORMATION

GENERATOR NAME: Koppers Company, Inc., c/o Time Oil Co. TRANSPORTER: Will Advise

FACILITY ADDRESS: 12005 North Burgard, Portland, OR 97203 TRANSPORTER PHONE: Will Advise

GENERATION USEPA ID: OR D0 0 8 6 9 7 5 4 3

GENERATOR STATE ID: Same As Above

TECHNICAL CONTACT: George Mills TITLE: Chemist St. Louis Plt PHONE: (314) 772-2200

NAME OF WASTE: Time Oil Sludge Tank #20002/Penta Tank Bottoms

PROCESS GENERATING WASTE: Manufacturing of Wood Preservative Solution

B PHYSICAL CHARACTERISTICS OF WASTE

COLOR	ODOR	PHYSICAL STATE @ 70°F	LAYERS	FREE LIQUIDS
Amber	[ ] NONE [ ] MILD [X] STRONG, DESCRIBE: Petroleum	[ ] SOLID [ ] SEMI-SOLID [X] LIQUID [ ] POWDER	[ ] MULTILAYERED [X] BILAYERED [ ] SINGLE PHASED	[X] YES [ ] NO VOLUME: 59

pH	SPECIFIC GRAVITY	FLASH POINT
[ ] < 2 [ ] 2-4 [ ] 4.1-6.9 [ ] 7 [ ] 7.1-10 [ ] 10.1-12.5 [ ] > 12.5 [ ] EXACT [X] N/A	[ ] < .8 [X] .8-1.0 [ ] 1.1-1.4 [ ] 1.5-1.7 [ ] 1.8-2.2 [ ] > 2.2 [ ] EXACT	[ ] < 70°F [ ] 70°F-100°F [X] 101°F-139°F [ ] 140°F-200°F [ ] > 200°F [ ] NO FLASH [ ] EXACT [X] CLOSED CUP [ ] OPEN CUP

C CHEMICAL COMPOSITION (TOTALS MUST ADD TO 100%)

Pentachlorophenol	6.03
Paraffin Wax	0.91
Monsanto Heavy Oxo Ends	18.09
Nalco Inhibitor	0.36
Mineral Spirits	33.92
Penta Insolubles	40.69

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

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

E OTHER COMPONENTS TOTAL (PPM)

CYANIDES		PCB'S	
SULFIDES		PHENOLICS	156,000

F SHIPPING INFORMATION

DOT HAZARDOUS MATERIAL? [X] YES [ ] NO

PROPER SHIPPING NAME: RQ Waste Pentachlorophenol (sludge)

HAZARD CLASS: ORM-E ID NO: NA2020 RQ: (A) 10

METHOD OF SHIPMENT: [X] BULK LIQUID or [ ] BULK SOLID

[X] DRUM (TYPE-SIZE): 55 gallons

ANTICIPATED VOLUME: 700 to 1,700 (Not Guaranteed) [ ] GALS [ ] CUBIC YARDS [ ] OTHER

PER	ONE TIME	WEEK	MONTH
QUARTER	[X] YEAR		

G HAZARDOUS CHARACTERISTICS

REACTIVITY: [X] NONE [ ] PYROPHORIC [ ] SHOCK SENSITIVE [ ] EXPLOSIVE [ ] WATER REACTIVE [ ] OTHER

OTHER HAZARDOUS CHARACTERISTICS

[ ] NONE [ ] RADIOACTIVE [ ] ETIOLOGICAL [X] PESTICIDE MANUFACTURING WASTE [ ] OTHER

USEPA HAZARDOUS WASTE? [X] YES [ ] NO

USEPA HAZARDOUS CODE(S): U242 D001

STATE HAZARDOUS WASTE? [X] YES [ ] NO

STATE CODE(S): U242, D001

H SPECIAL HANDLING INFORMATION

As published for pentachlorophenol. See also MSDS for pure materials attached.

[X] ADDITIONAL DATA ATTACHED

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: 12279 William J Baldwin TITLE: Mgr Customer Technical Services DATE: 3-28-84

TOLS002780

BZTO104(e)039601

Waste Management, Inc.

GENERATOR'S WASTE MATERIAL PROFILE SHEET

BILL BARR

TSDR D40760

A GENERAL INFORMATION

GENERATOR NAME: KOPPERS COMPANY, INC C/O TIME OIL CO.
TRANSPORTER: WILL ADVISE
FACILITY ADDRESS: 12005 North Burgard
Portland, OR 97203
TRANSPORTER PHONE: WILL ADVISE
GENERATOR USEPA I.D.: O R D 0 0 9 5 9 7 5 4 3
GENERATOR STATE I.D.: SAME AS ABOVE
TECHNICAL CONTACT: GEORGE MILLS
TITLE: CHEMIST ST. LOUIS PLANT
PHONE: (314)772-2200
NAME OF WASTE: Time Oil Sludge Tank #1 2002 / Penta Tank Bottoms
PROCESS GENERATING WASTE: Manufacturing of Wood Preservative Solution

B PHYSICAL CHARACTERISTICS OF WASTE

COLOR: Amber
ODOR: [ ] NONE [ ] MILD [X] STRONG
DESCRIBE: Petroleum
PHYSICAL STATE @ 70°F: [ ] SOLID [ ] SEMI-SOLID [X] LIQUID [ ] POWDER
LAYERS: [ ] MULTILAYERED [X] BI-LAYERED [ ] SINGLE PHASED
FREE LIQUIDS: [X] YES [ ] NO
VOLUME: 59 %

pH: [ ] < 2 [ ] 2-4 [ ] 4.1-6.9 [ ] 7 [ ] 7.1-10 [ ] 10.1-12.5 [ ] > 12.5 [ ] EXACT [X] N/A

SPECIFIC GRAVITY: [ ] < 8 [X] 8-10 [ ] 11-12 [ ] EXACT [ ] 13-14 [ ] 15-17 [ ] > 17

FLASH POINT: [ ] < 70°F [ ] 70°F-100°F [X] 101°F-139°F [ ] 140°F-200°F [ ] > 200°F [ ] NO FLASH [ ] EXACT [X] CLOSED CUP [ ] OPEN CUP

~~Ignitable~~

C CHEMICAL COMPOSITION (TOTALS MUST ADD TO 100%)

Pentachlorophenol	6.03 %
Paraffin Wax	0.91 %
Monsanto Heavy Oxy Ends	18.09 %
Nalco Inhibitor	0.36 %
Mineral Spirits	33.92 %
Penta Insolubles	40.69 %

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

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

E OTHER COMPONENTS - TOTAL (PPM)

CYANIDES		PCB'S	
SULFIDES		PHENOLICS	156,000

F SHIPPING INFORMATION

D.O.T. HAZARDOUS MATERIAL? [X] YES [ ] NO
PROPER SHIPPING NAME: RQ Waste Pentachlorophenol (sludge)
HAZARD CLASS: ORM-E I.D. NO. NA2020 RQ (N)10#
METHOD OF SHIPMENT: [X] BULK LIQUID OR [ ] BULK SOLID
[X] DRUM (TYPE/SIZE): 55 gallon
ANTICIPATED VOLUME: 700 to 1,700 GALS CUBIC YARDS (NOT GUARANTEED) OTHER
PER: [ ] ONE TIME [ ] WEEK [ ] MONTH [ ] QUARTER [X] YEAR [ ]

G HAZARDOUS CHARACTERISTICS

REACTIVITY: [X] NONE [ ] PYROPHORIC [ ] SHOCK SENSITIVE [ ] EXPLOSIVE [ ] WATER REACTIVE [ ] OTHER
OTHER HAZARDOUS CHARACTERISTICS: [ ] NONE [ ] RADIOACTIVE [ ] ETIOLOGICAL [X] PESTICIDE MANUFACTURING WASTE [ ] OTHER
USEPA HAZARDOUS WASTE? [X] YES [ ] NO
USEPA HAZARDOUS CODE(S): U242 D001
STATE HAZARDOUS WASTE? [X] YES [ ] NO
STATE CODE(S): U242, D001

H SPECIAL HANDLING INFORMATION

AS PUBLISHED FOR PENTACHLOROPHENOL. SEE ALSO MSDS' FOR PURE MATERIALS ATTACHED.

[X] ADDITIONAL PAGE(S) ATTACHED

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
12279	TOLS002781	3/28/89

BZTO104(e)039602

Chuck

KOPPERS

Interoffice Correspondence

To Greg Ringeling — From Chuck Vita

Location K-801 — Location K-1201

Subject Time Oil Penta Tank Clean-Out — Date March 28, 1984

FPE Req. #3

The profile sheet and sample for the penta tank bottoms clean-out at Time Oil in Portland, Oregon should be received shortly by Chem-Security Systems (Chemical Waste Management).

The current rough estimate of the amount of waste is around 700 gallons, however, it could top off at around 1,700 gallons.

Please call the following firms for bid purposes:

1. Chem-Security Systems (Chemical Waste Management)
   Contact: Bill Van Dyke (503) 223-1912
   Note: Please have CSS bid removal, transportation, and disposal, separately.

2. Crosby & Overton
   Phone: (503) 283-1250

3. Wescomp Services, Inc.
   Contact: Paul Hopkins (503) 684-3066

Also, as a suggestion, Mr. Henry Rassi, the Superintendent of Koppers Organic Material Northwest Terminal, located in Portland (503) 286-3681 could be contacted to help develop further leads in this project.

Your help in the expedition of this clean-up project would be appreciated, if you have any questions, please call me at 2767.

Chuck Vita

CJV:cg
cc: W. J. Baldwin
J. D. Palmer - St. Louis
D. F. Marion
T. A. Marr
FILE - Portland (Time Oil) File
M. R. Urbassik

12279

TOLS002782

K-5 REV 2

BZTO104(e)039603

KOPPERS

Interoffice Correspondence

RECEIVED
MAR 14 1984
ENVIRONMENTAL RESOURCES

To Wm. Baldwin

Location K-7

Subject Time Oil Clean-Up

From C. P. Brush

Location K-12

Date March 13, 1984

Enclosed is a first draft of a clean-up procedure for the Time Oil Site in Portland, Oregon. Please comment and advise to your plans and timetable so that a revised clean-up procedure can be prepared in greater detail.

Charles P. Brush

CPB/s
encl.

cc: A. C. Middleton - w/att
J. A. Quagliotti - w/att -- Please comment
T. A. Marr - W/att

12279

TOLS002783

BZTO104(e)039604

KOPPERS

Interoffice Correspondence

To A. C. Middleton
T. A. Marr
C. P. Brush

Location

From C. P. Brush

Location K-12

Subject Time Oil, Inc., Photos

Date February 2, 1984

The enclosed photographs illustrate the current condition at Time Oil, Inc., at Portland, Oregon.

The single pump and piping manifold represents the means used to mix and move penta/oil mixtures for the past 14 years. Note the oil inside the dike. The bottom of the diked area is not sealed (sandy soil).

Charles Brush, /s

Charles Brush

CPB/s
enclosures

RECEIVED
FEB 3 1984
ENVIRONMENTAL RES. LAB.
A. C. MIDDLETON

12279

K-5 REV. 2

Koppers Company, Inc.

MEMO ROUTING SLIP

TO	LOCATION	DATE RECEIVED	INITIAL
C Brush			

RECEIVED
OCT 4 1983
ENVIRONMENTAL RESOURCES

☐ NOTE & FORWARD ☐ PREPARE REPLY FOR MY SIGNATURE

☐ NOTE & RETURN ☐ COMMENT & RETURN

☐ NOTE & FILE ☐ TAKE APPROPRIATE ACTION

REMARKS:

Per Q.C. M's instructions

12279.

FROM M. Dresser PHONE DATE 10/3/83

K-17

TOLS002785

BZTO104(e)039606

ATLANTIC RICHFIELD COMPANY
4900 9TH AVENUE N.W., • SEATTLE, WASHINGTON 98107-3697 • 206/783-4700

ANALYSIS REPORT

CLIENT: Time Oil Company

DATE REPORTED: 4/18/83

REPORT TO: Neil Wallis
P.O. Box 03117
St. Johns Station
Portland, OR 97203

P.O.# 24870

Laboratory Sample No. 57057

Client Identification Soil 2/28/83

SUBJECT: Static acute fish bioassay testing on juvenile rainbow trout Salmo gairdneri.

PROCEDURE: Sample was tested at both the 100 and 1000ppm levels. The procedure followed is outlined in the State of Washington's General Procedure for Static Acute Fish Bioassay Testing.

The test was begun using method two in which the test organisms were placed into the chambers within 30 minutes of adding the toxicant to the water. Daily logs of temperature, dissolved oxygen and mortalities were maintained.

RESULTS: Thirty (30/30) of the fish tested at the 1000 ppm level died within the first five hours of the four day test period.

Thirty (30/30) of the fish tested at the 100ppm level died within 24 hours of the four day period.

None (0/60) of the control fish died during the four day test period.

CONCLUSION: The soil sample submitted by the Time Oil Company was found to be toxic to juvenile rainbow trout at both the 100 and 1000 ppm hazardous waste material (E.H.W.) under Washington State Guidelines.

Respectfully Submitted,

Mark A. Fugiel
Director of Industrial Chemistry

12279

TOLS002786

BZTO104(e)039607

PROPOSAL AND COST ESTIMATE

BENCH SCALE FEASIBILITY STUDIES FOR THE ELUTION OF PCP FROM CONTAMINATED SOIL

DECEMBER 19, 1986

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

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TOLS002787

BZTO104(e)039608

INTRODUCTION

Time Oil Co. has been investigating the nature and extent of soil and groundwater contamination at its Northwest Terminal facility located in Portland, Or. as a result of pentachlorophenol (PCP) releases which occurred at that site over a period of several years. The results of this investigation indicate that the sandy soils to the south of the wood treating chemicals warehouse are contaminated with PCP at concentrations ranging up to several thousand parts per million.

As a result of these findings, Time has performed a preliminary analysis of potential remedial alternatives for the contaminated soils at the site. Due to existing bans on landfilling of the waste (categorized by EPA as listed hazardous waste number F027) and due to Time's expressed interest in preventing further environmental impairment from this site, few alternatives were concluded to be viable. In October of 1986, SRH Associates conducted a review of all available alternatives for the disposal or treatment of Time's PCP contaminated soil. Since this evaluation, the residual soils from the incineration or thermal treatment of F027 contaminated soils have been upheld as being a separately listed hazardous waste (F028), making such thermal processes unsatisfactory remedial alternatives for Time since the resulting soils could not reasonably be expected to be easily delisted from hazardous status.

On the basis of these cumulative findings, no commercially available, licensed process was identified that was capable of treating or disposing of Time's PCP contaminated soils. Several developmental technologies were identified that appeared to have the capability to achieve Time's objectives but which had not been commercialized or demonstrated under conditions found at the Northwest Terminal facility.

On the basis of Time's evaluation of the available remedial alternatives and the above information, a site specific assessment of soil washing technology was recommended. (See Report "Pentachlorophenol Contamination, Northwest Terminal, Section II, pg. 20) Soil washing involves the extraction of wastes from soils using solvents, surfactants or other solutions. The current status of soil washing technology is generally regarded as developmental, however it represents one of the more advanced technologies available to Time in light of the restrictions placed on landfilling, incineration, and closure of the wastes in place. Assessment of this process is consistent with EPA's Research, Development and Demonstration (RD&D) protocols which ultimately require a demonstration to the agency of the effectiveness and limitations of a waste treatment technology prior to its implementation.

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TOLS002788

BZTO104(e)039609

The Northwest Terminal contamination is of such a nature that some degree of demonstration to the regulatory agencies of any cleanup process can be expected to be required prior to the implementation of cleanup efforts. This requirement can be expected due to existing regulations, the extent of contamination at Northwest Terminal, and the potential for the presence of dioxin in the wastes.

The following is a proposed scope of work and cost estimate for a bench scale evaluation of soil washing protocols for application to Time's PCP contaminated soil. The proposal defines the work necessary to review existing literature and to perform bench scale studies to generate data which confirm or reject the assumption that soil washing technologies can successfully clean up Time's contaminated soils. The proposed scope of work does not, at this time, include pilot scale studies, which ordinarily follow bench scale determinations, since it is misleading to attempt to define the scope of work or costs associated with the pilot phase of the project until such time as bench scale results define an appropriate process for scale-up considerations.

SCOPE OF WORK

OVERVIEW

The complete investigation of the feasibility of using soil washing procedures to remediate soils at Time's Northwest Terminal includes the following tasks:

- Review of existing literature and regulations.
- Performance of bench scale experiments.
- Evaluation of bench scale results and execution of a decision to continue or terminate the investigation.
- Performance of pilot scale experiments.
- Determination of the economic feasibility of the projected process and execution of a decision to proceed or terminate the investigation.
- Engineering and design of process equipment, if not commercially available.
- Fabrication of unavailable equipment and implementation of the process for EPA demonstration and subsequent cleanup activities.

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TOLS002789

BZTO104(e)039610

This proposal addresses only the first phase of the project which includes the first three tasks. Segmenting the project into rational phases with decision points at which to appraise the value of proceeding following completion of each phase, permits stricter control over the project and allows better estimation of the scope of work and costs involved with each phase. The phases may be described as follows:

- o Bench scale studies
- o Pilot scale studies
- o Engineering and Implementation

The detailed scope of work and cost estimate for the bench scale study phase of this project is presented below.

BENCH SCALE STUDIES

The bench scale studies are intended to generate sufficient data to allow Time to make an informed decision to proceed with or abandon the project with a minimal amount of capital expended. The tasks associated with this phase are designed to evaluate three different soil washing procedures, to define the parameters associated with their use, to characterize the soil chemistry and the spectrum of contaminants in the PCP contaminated soil at Time's Northwest Terminal facility, to select the most effective soil washing procedure based on bench study results, to define the nature of the recovered elutriate solution generated during soil washing, and to assess methods for destruction of the contaminants found in that elutriate. The following is a detailed task breakdown to accomplish these objectives.

Task 1 - Review Current Regulations

To reduce the risk of new regulations or new interpretations of existing regulations unfavorably impacting this study, SRH will appraise the status of regulations affecting soil washing technology. These evaluations are necessary to prevent the expenditure of time investigating technologies which are generally regarded as unpermittable and to preclude the potential for regulatory violations and fines. Perhaps the most functional purpose of this task is to provide Time with both regulatory and political data to properly prepare submittals to EPA and DEQ in order to expedite acceptance of plans, permits and other communications.

EPA representatives from Region X, Waste Management Branch, Hazardous Waste Division, Seattle; EPA Headquarters, Office of Solid Waste, Washington, D.C.; and the Office of Research and

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TOLS002790

BZTO104(e)039611

Development (ORD), Cincinnati, OH., will be queried regarding the current and pending status of regulations regarding PCP treatment technologies. SRH proposes to solicit and evaluate the information received from these agencies in a confidential manner to allow Time Oil Co. access to unbiased information and to develop strategies which are expeditious due to their regulatory and political acceptability. Emphasis will be placed on extraction procedures. Particular effort will be placed on discussions with representatives from the Alternative Treatment Technologies Section of ORD to not only review the regulations associated with extraction of PCP contaminated soils, but to also determine the status of research being performed by EPA in this area.

This task is expected to require 2 weeks for completion with an estimated cost of $2,336.

Task 2 - Review Current Extraction Literature

SRH will review existing extraction technology by examining literature in the fields of hazardous waste extraction, food processing technology (specifically edible oils) and metal recovery and mining (ore leaching). In addition to the discussions with ORD described under task 1, EPA's list of internal publications will be reviewed to identify, obtain copies of, and subsequently review EPA literature in this field. General extraction theory will be reviewed using current texts. U.S. patent literature will be reviewed to appraise the status of engineering in this field. Manufacturers of extraction equipment will be contacted to determine the commercial availability of extraction equipment and to allow initial estimates of potential costs.

SRH will present the results of tasks 1 through 3 to Time Oil Company representatives at Time's offices in Seattle as a part of task 2. This meeting will be conducted to review findings and to refine the scope of work relative to the development of the bench scale study plan.

This task is expected to require 2 weeks for completion with an estimated cost of $4,316.

Task 3 - Evaluate the Nature of the Wastes to be Treated

SRH will determine the porosity, grain size distribution, organic carbon content and other critical parameters of Time's contaminated soil which affect the extraction of PCP and any other identified contaminants from the soil. Analyses performed to date have indicated the presence of unidentified contaminants

in addition to PCP in the soil at Northwest Terminal. SRH will determine the presence and nature of contaminants other than PCP in the soil to allow determination of their impact on the extraction process. Samples of soil from the Northwest Terminal PCP site will be taken and evaluated for priority pollutants by GC/MS, ICP and other appropriate analytical techniques with identification of other major peaks as indicated. Specifically, soil will be evaluated for grain size (particle size distribution), soil type, porosity, specific gravity, moisture content, pH, total organic carbon and oil and grease levels. Two samples are proposed for each test to allow for an estimation of the range of concentration of the contaminants found.

This task is expected to require 3 weeks for completion (including 2 weeks for laboratory analyses) with an estimated cost of $6781.

Task 4 - Develop an Initial Plan for Bench Scale Studies

The information generated in tasks 1 through 3 will be used to refine the experimental approaches needed to complete bench scale studies. The following proposed plan is expected to undergo modification based on those results.

This investigatory plan is based on extraction theory and the existing literature but is heavily weighted towards existing and available technology and equipment. It is intended to quickly produce sufficient results to allow Time to determine if further pursuit of the project is warranted.

Extractability of soil contaminants will be initially evaluated using simple jar tests. Jar tests will be performed by introducing a known amount of contaminated soil into a beaker containing a fixed volume of extracting solution. The material will be agitated for a fixed period of time at a known temperature. Following this protocol, the filtered solution and the extracted soil will be analyzed for PCP and the extraction ratio determined.

Organic solvents, elevated pH solutions and aqueous solutions of surfactants will be evaluated. Up to four solvents, four different pH levels and four different surfactants will be evaluated. Based on the observed results, relative costs, safety and environmental considerations, two different elutriating solutions will be selected for further evaluation, including optimization of extraction conditions. The effect of the extraction procedure on contaminants other than PCP which have been determined to be present in the soil will be assessed by

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analysis of the extract and the residual soil for these materials. Conditions indicative of a potentially successful soil cleaning process will be pursued for optimization of the batch process. To optimize the process, the extracting conditions will be varied with respect to surfactant concentration, extraction time, temperature and/or pH, as appropriate, to maximize the removal of PCP and other contaminants from the soil. It should be noted that different contaminants may require different extraction solutions (or combinations of solutions). SRH believes that PCP and oil are the principal contaminants and a single extraction solution may be used to remove both substances from Time's soil.

When the batch process has been optimized in the above fashion, samples of the elutriate will be analyzed for all identified contaminants. A description of the elutriate solution will be prepared to allow for evaluation of elutriate treatment alternatives. At this time, it is expected that oxidation or reduction of the waste material represents a potential treatment option but that final selection of a suitable treatment will require a precise understanding of what contaminating materials, other than PCP, may be present.

The optimized solution will be used to compare three extraction procedures, as appropriate, i.e. sequenced batch, countercurrent, and reflux (Soxhlet) extractions. These processes can be conducted in SRH's bench scale, laboratory apparatus. The objective of this set of tests is to optimize the extraction procedure by improving efficiency and minimizing the quantities of solution required. This study will necessarily be contingent upon the extraction solutions selected. For example, since caustic and surfactant solutions are not generally volatile, Soxhlet procedures would not be applicable to these solutions and therefore would not be evaluated. Conversely, if an organic solvent is indicated as the elutriating solution, it may be necessary to remove the residual solvent from the extracted soil prior to discharge from the extractor. In this case, sequenced batch extraction may be favored while continuous processes such as countercurrent or soxhlet extraction would be contraindicated.

The last evaluation in the bench scale phase of the project is the determination of a treatment method for the extracted material. Although this evaluation will ultimately depend on the nature of the material as produced, it is believed that oxidation/reduction or separatory methods represent likely candidates. For example, if the extraction is performed using caustic solutions, acidification of the extract to a pH < 5.0 may precipitate significant amounts of

PCP due to the reduced solubility of this compound in its acid form. Conversely, if large amounts of oil are present, it may be necessary to utilize a solvent as the extractant, in which case removal of the solvent and treatment of the residual material through peroxide, permanganate, or other chemical oxidation process, chemical reduction, or physical adsorption onto organic or inorganic substrates may be preferred.

The plan will be developed in close association with Time Oil Co. personnel to ensure that the resultant plan meets Time's expectations and requirements.

This task is expected to require 1 week for completion, with an estimated cost of $2290.

Task 5 - Implement Bench Scale Study Plan

SRH will conduct the implementation of the study as planned in task 4, above. The plan, which will have been developed in close coordination with Time Oil Company, will have the following components for the sake of discussion and cost estimation:

- perform 12 initial jar tests
- analyze 24 PCP samples from initial jar tests
- perform 6 secondary jar tests
- analyze 12 PCP samples from secondary jar tests
- perform 4 jar tests for optimization
- analyze 8 PCP samples from optimization jar tests
- perform 3 process emulating extractions (i.e. soxhlet, countercurrent, etc)
- analyze 6 PCP samples from process emulating extractions
- analyze optimized extract from optimized jar test for all identified contaminants
- perform 4 separatory tests on optimized extract
- perform 3 oxidation tests on optimized extract
- perform 2 reduction tests on optimized extract
- analyze effluent from the above extract destruction tests (9 PCP analyses)
- analyze 1 effluent sample for all identified contaminants

The results of the bench scale study will be a summary report to Time Oil Co. indicating the success or failure of the soil washing process at the bench scale level and projecting the probability for success of a pilot level scale-up.

SRH has evaluated the topic of PCP extraction from soil and is aware that extensive work has already been performed in assessing

the extraction efficiency of this material from soils in an EPA directed extraction procedure for preparing samples for quantitative analysis. This work, done to provide a means for analyzing contaminated soil, has direct bearing on this project, and leads SRH to conclude that reflux extractions may pose a viable and well documented process for PCP contaminated soil remediation. To date, SRH is unaware of any commercial effort to decontaminate soils by this process.

This task is expected to require approximately 12 weeks for completion, including laboratory turn around time. The estimate cost for this task is $23,680, including analytical costs.

Task 6 - Prepare Report and Submit Recommendations

SRH will prepare a summary report presenting the data, conclusions and its recommendations to Time Oil Company. The report will include copies of experimental protocols and analytical results and will present a summary of the results and their significance to allow Time Oil Company to determine if further pursuit of this project is warranted. SRH will also attend a one day meeting at Time's offices in Seattle to review the results and conclusions with Time's representatives.

This task is expected to require 1 week for completion with an estimated cost of $2,626.

COST ESTIMATE

Although the precise determination of the costs associated with any developmental process is difficult due to the large potential for project reorientation based on new results and findings, SRH believes that the following cost estimates provide a good foundation for project assessment. SRH proposes to perform the work on a time and materials basis according to its current rate schedule. The estimated costs presented herein would not be exceeded without prior authorization from Time.

A detailed cost estimate breakdown is presented in figure 1. SRH suggests that the estimate be reviewed following the completion of tasks 1 - 3, to reflect information obtained during these activities which could impact the assumptions made in estimated tasks 4 through 6. SRH estimates the total bench scale phase costs to be $37,868 including labor and expenses.

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TABLE 1 - COST ESTIMATE DETAIL

TASK	PERSONNEL	HOURS	COST
TASK 1 - REVIEW CURRENT REGULATIONS			
LABOR	REG. SPEC.	24.0	$1,920.00
	CLER	8.0	$216.00
	TOTAL	32.0	$2,136.00
EXPENSES	MISC.		$200.00
	TOTAL		$200.00
TOTAL			$2,336.00
TASK 2 - REVIEW CURRENT EXTRACTION LITERATURE			
TASK 2A - REVIEW LITERATURE			
LABOR	SR. SCI	32.0	$2,560.00
	CLER	8.0	$216.00
	CHEM	10.0	$500.00
	TOTAL	50.0	$3,276.00
EXPENSES	MISC.		$200.00
	TOTAL		$200.00
TOTAL			$3,476.00
TASK 2B - MEETING WITH TIME OIL CO			
LABOR	PRIN	8.0	$640.00
	TOTAL	8.0	$640.00
EXPENSES	MISC.		$200.00
	TOTAL		$200.00
TOTAL			$840.00

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	TOTAL TASK 2			$4,316.00
TASK 3 - EVALUATE NATURE OF WASTES				
	LABOR	SR. SCI	16.0	$1,280.00
		CLER	8.0	$216.00
		CHEM	8.0	$400.00
		GEOL	8.0	$480.00
		TOTAL	40.0	$2,376.00
	EXPENSES	MISC.		$300.00
		ANALYTICAL		$4,105.50
		TOTAL		$4,405.50
	TOTAL			$6,781.50
TASK 4 - DEVELOP STUDY PLAN				
	LABOR	SR. SCI	24.0	$1,920.00
		CLER	10.0	$270.00
		TOTAL	34.0	$2,190.00
	EXPENSES	MISC.		$100.00
		TOTAL		$100.00
	TOTAL			$2,290.00
TASK 5 - IMPLEMENT BENCH SCALE STUDY				
	LABOR	SR. SCI	40.0	$3,200.00
		CLER	16.0	$432.00
		CHEM	72.0	$3,600.00
		GEOL	24.0	$1,440.00
		TECH	40.0	$1,600.00
		TOTAL	192.0	$10,272.00
	EXPENSES	MISC.		$350.00
		ANALYTICAL		$9,487.50
		COMPUTER		$150.00
		OTHER LABORATORY		$3,421.25
		TOTAL		$13,408.75
	TOTAL			$23,680.75

TASK 6 - REPORT AND RECOMMENDATIONS

TASK 6A - PREPARE REPORT

LABOR	SR. SCI	8.0	$640.00
	ADMIN	8.0	$480.00
	CHEM	5.0	$250.00
	CLER	8.0	$216.00
	TOTAL	29.0	$1,586.00
EXPENSES	MISC.		$200.00
	TOTAL		$200.00
TOTAL			$1,786.00

TASK 6B - MEETING WITH TIME OIL CO

LABOR	PRIN	8.0	$640.00
	TOTAL	8.0	$640.00
EXPENSES	MISC.		$200.00
	TOTAL		$200.00
TOTAL			$840.00
TOTAL TASK 6			$2,626.00

PROJECT TOTAL $42,030.25

NOTES:

REG. SPEC	REGULATORY SPECIALIST
CLER	CLERICAL
SR. SCI	SENIOR SCIENTIST
CHEM	CHEMIST
PRIN	PRINCIPAL
ADMIN	ADMINISTRATIVE ASSISTANT
GEOL	GEOLOGIST

PENTACHLOROPHENOL

CONTAMINATION

NORTHWEST TERMINAL

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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:

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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'.

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".

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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.

- o Floor of warehouse work area caked with product. Steam cleaning recommended.
- o No warning signs were posted which call attention to hazards in the area where PCP was stored and mixed.
- o Ground near end of pipelines saturated with product to a depth 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

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.

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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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).

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 additional 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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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.

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.

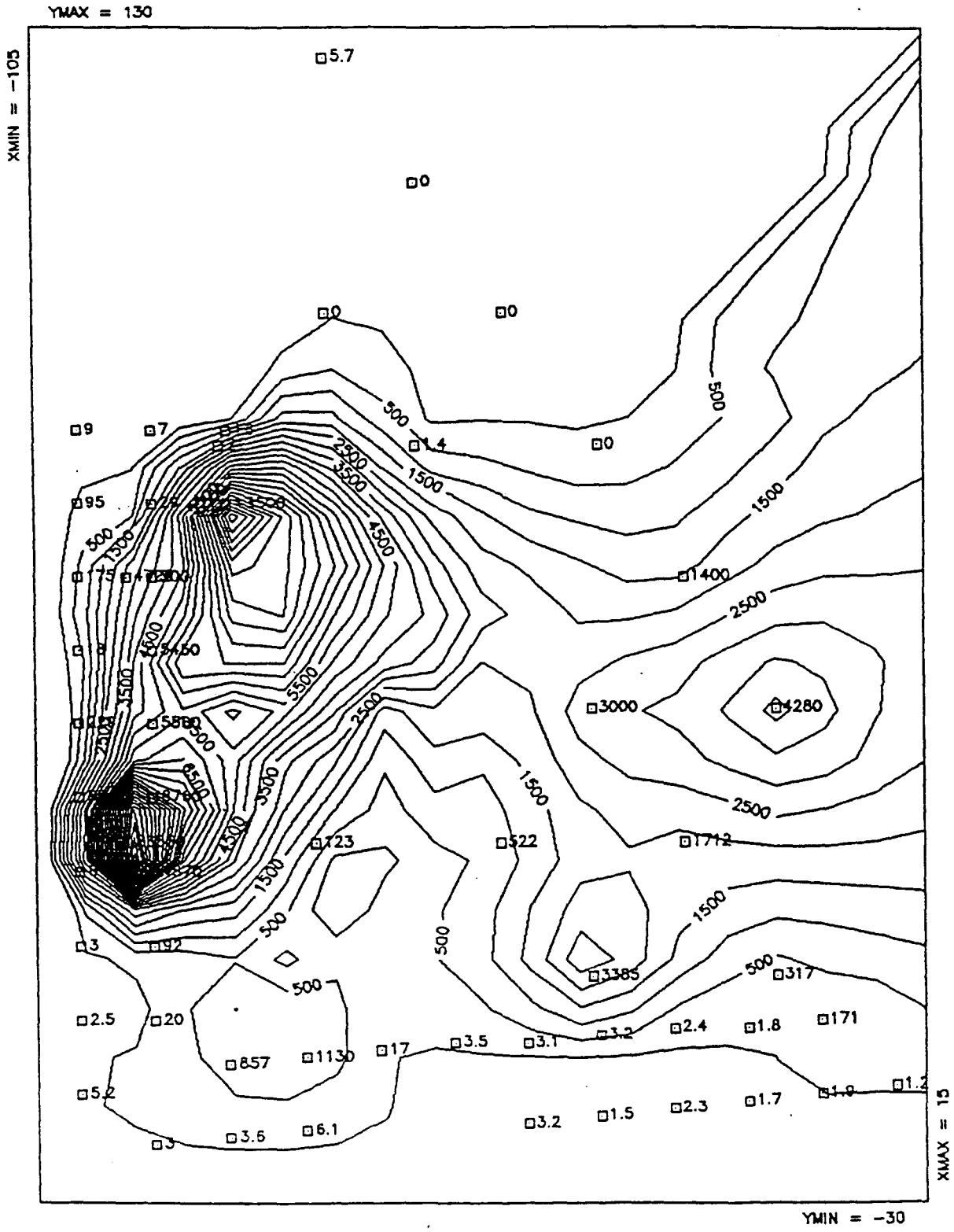
In investigating the extent of soil contamination, Time has obtained assistance from several consulting firms and clean up contractors, and has analyzed sufficient soil samples to determine the vertical and horizontal extent of contamination. The contamination is localized in the northwest corner of 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 directions 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.

FIGURE I-1



TIME OIL CO – ORIGINAL SURFACE PCP CONTOURS

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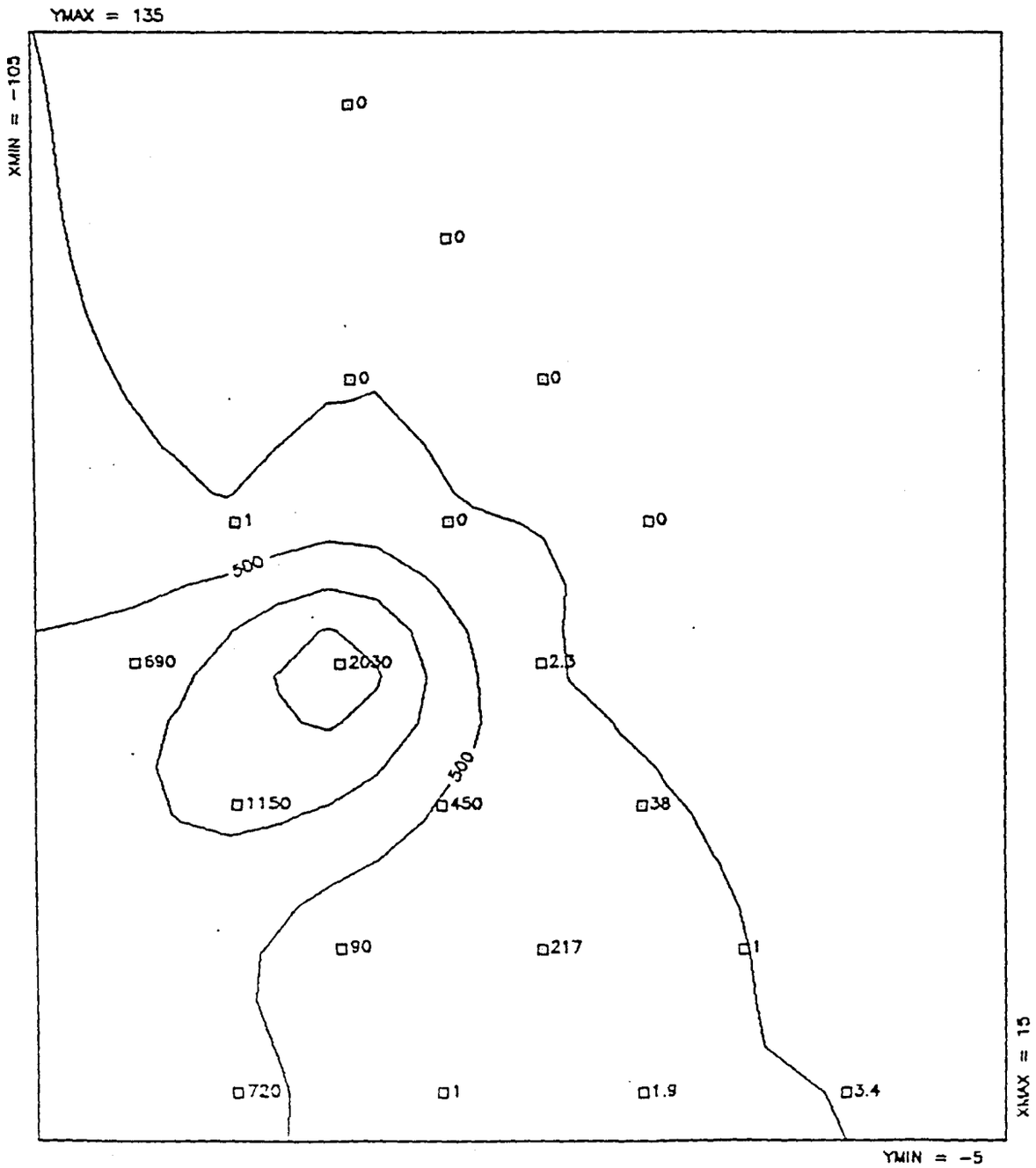
FIGURE I-2



TIME OIL CO – ORIGINAL 12 FOOT PCP CONTOUR

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FIGURE I-3

CONSTRUCTION DIAGRAM FOR

WELL 4

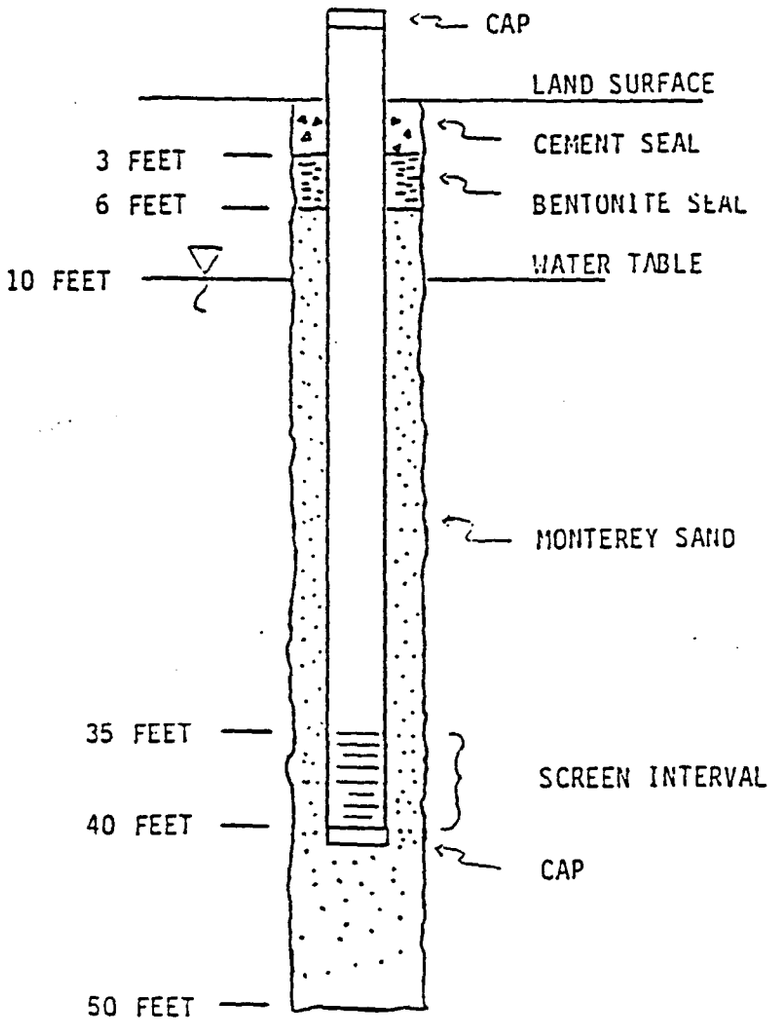

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FIGURE I-4

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)

FIGURE I-5

CONSTRUCTION DIAGRAM FOR

WELLS 1, 2 AND 3

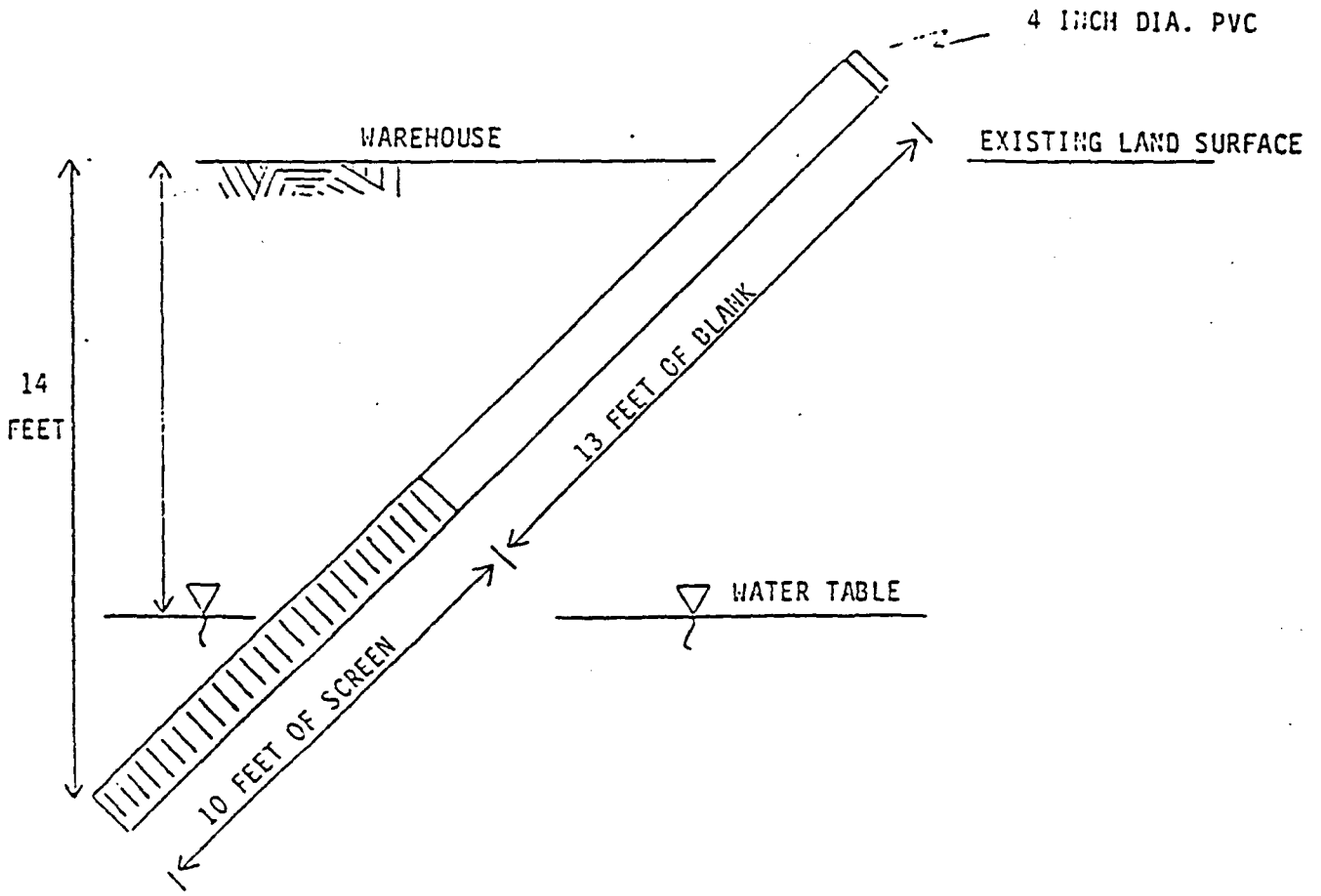

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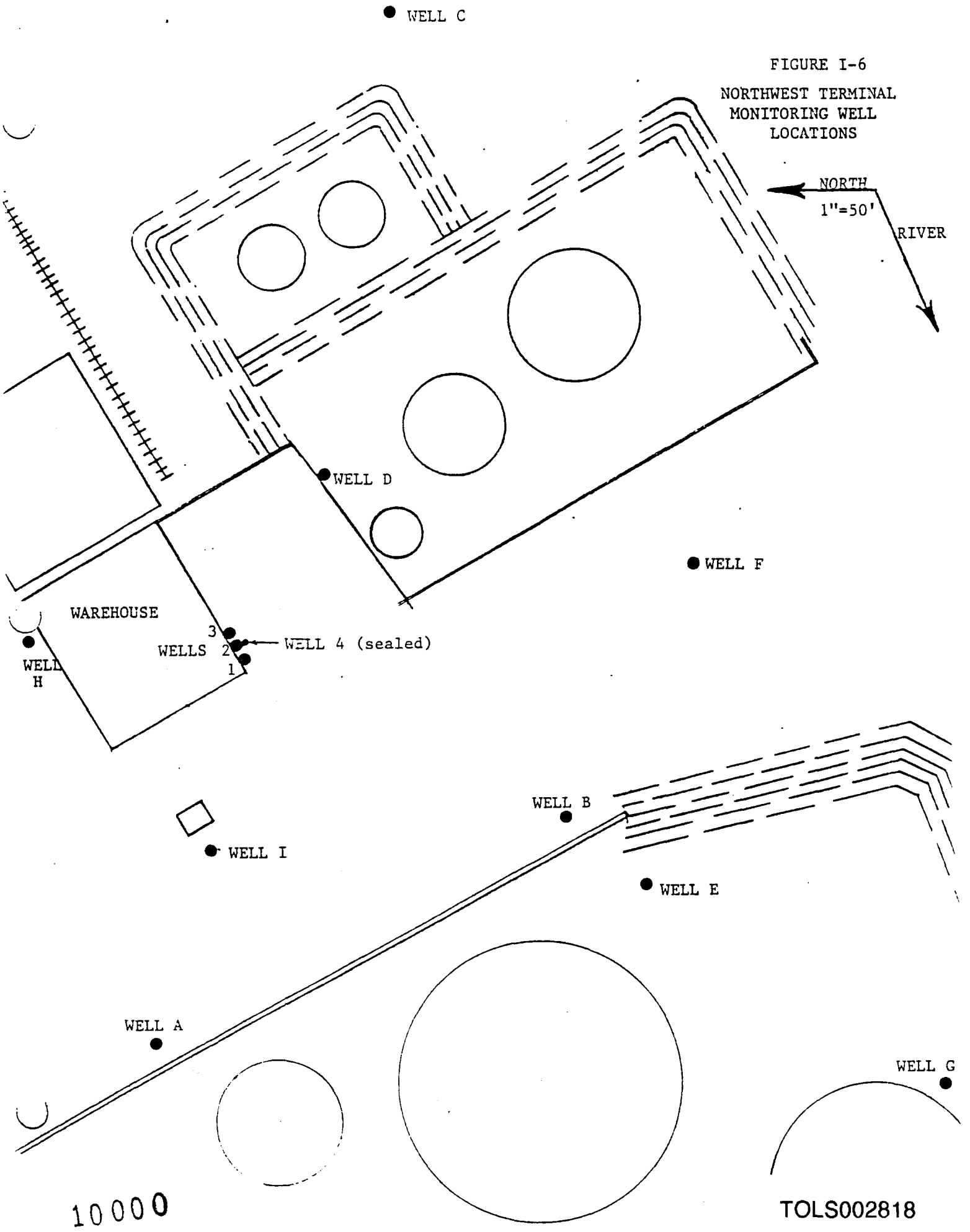
FIGURE I-6

NORTHWEST TERMINAL
MONITORING WELL
LOCATIONS



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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.

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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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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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

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 t application of sorbents to the contaminated soil. Sorbents include carbon granules, polymeric materials or substances which the waste is soluble. All sorbents must be insoluble water, inert and not readily degradable in order to achieve term stabilization of the wastes in question.

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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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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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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

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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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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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

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 performing 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.

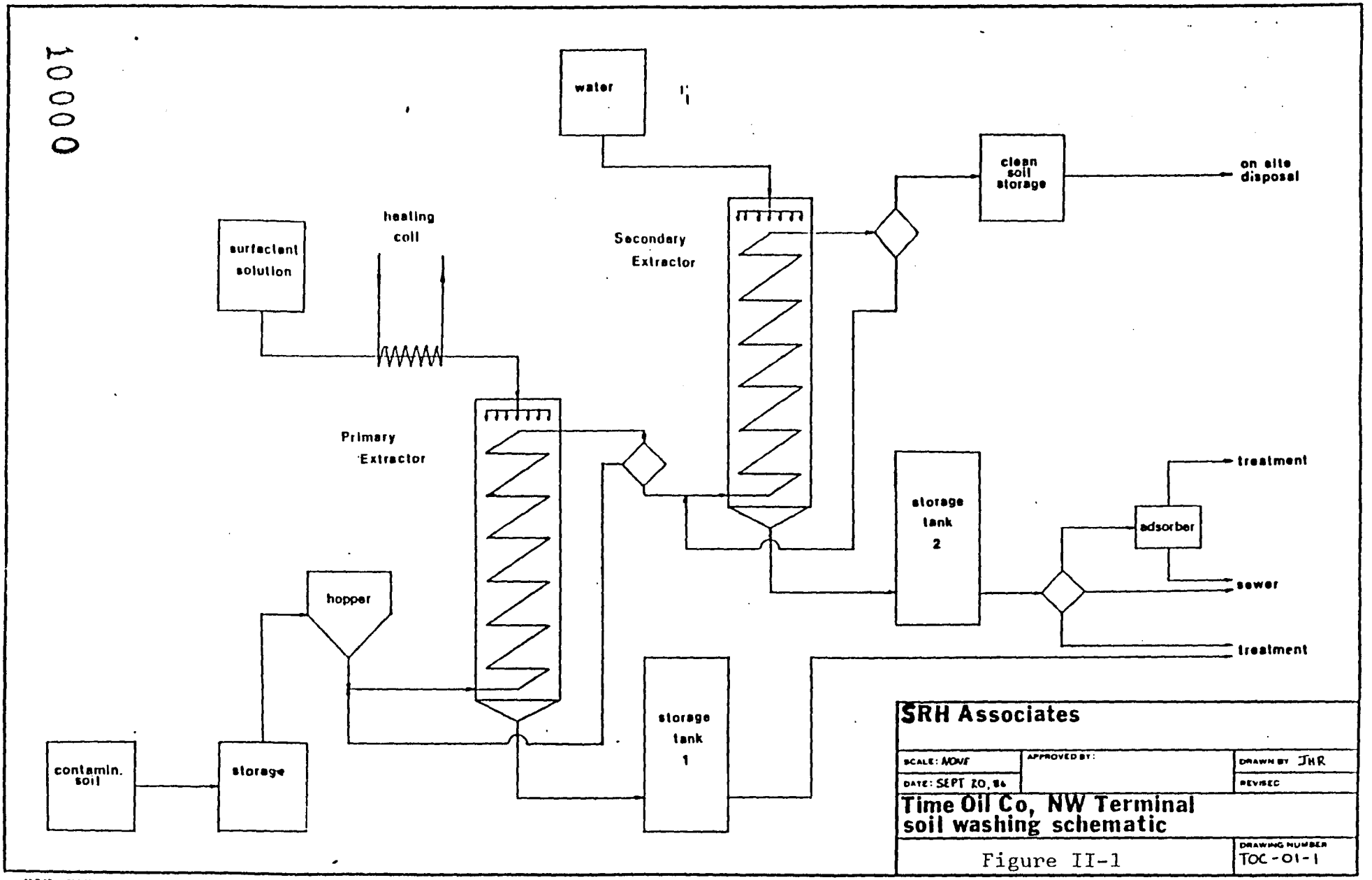
The actual process consists of the physical excavation of contaminated soil using classical techniques and the temporary storage of the excavated soils on an impervious, protected surface. Material from this location would be transferred to an infeed hopper connected to a primary extractor or soil washer. 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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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

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

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.

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 procedures 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

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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.

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 well 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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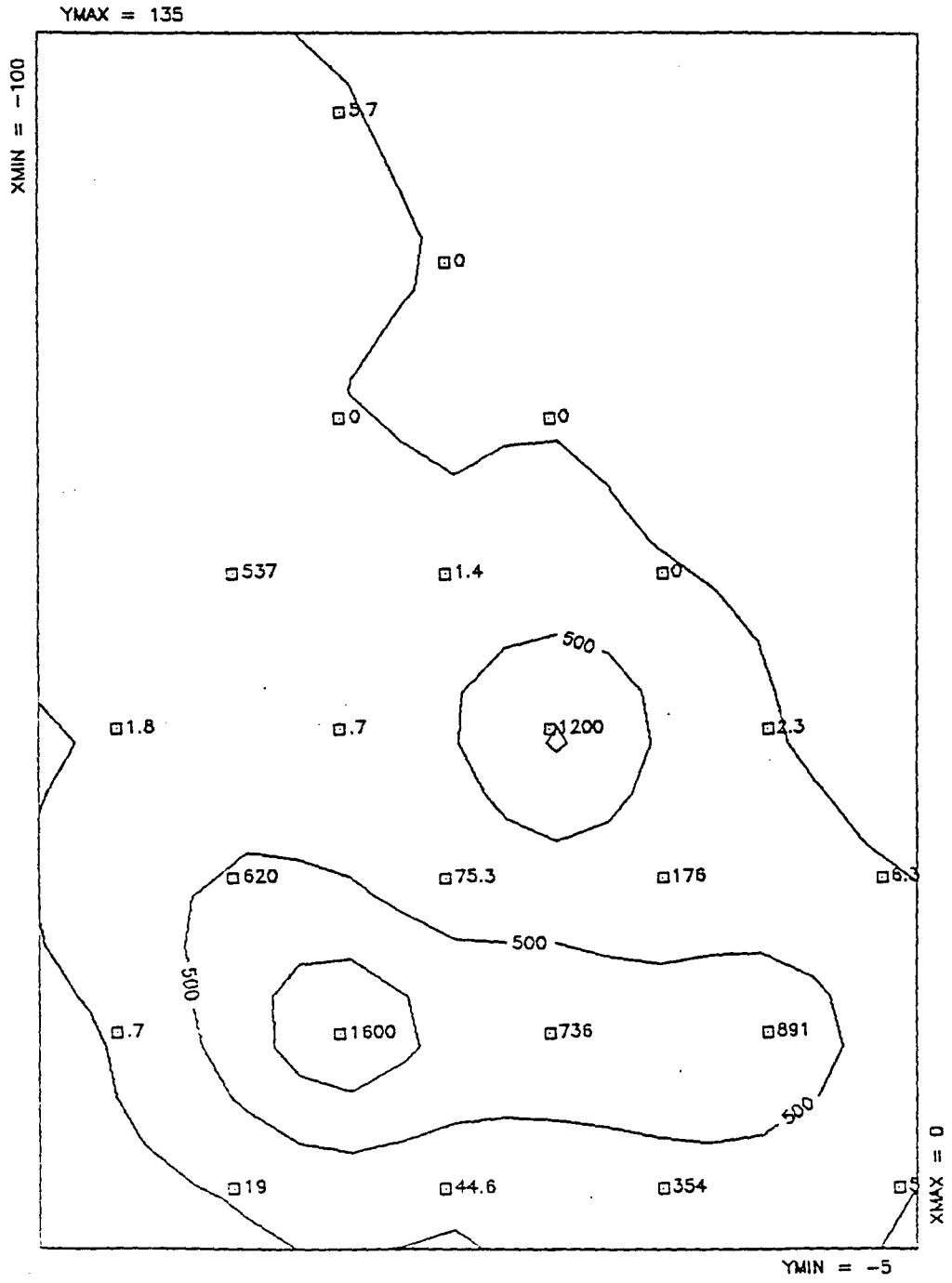
FIGURE III-1



TIME OIL CO - SURFACE PCP CONTOURS

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TOLS002841

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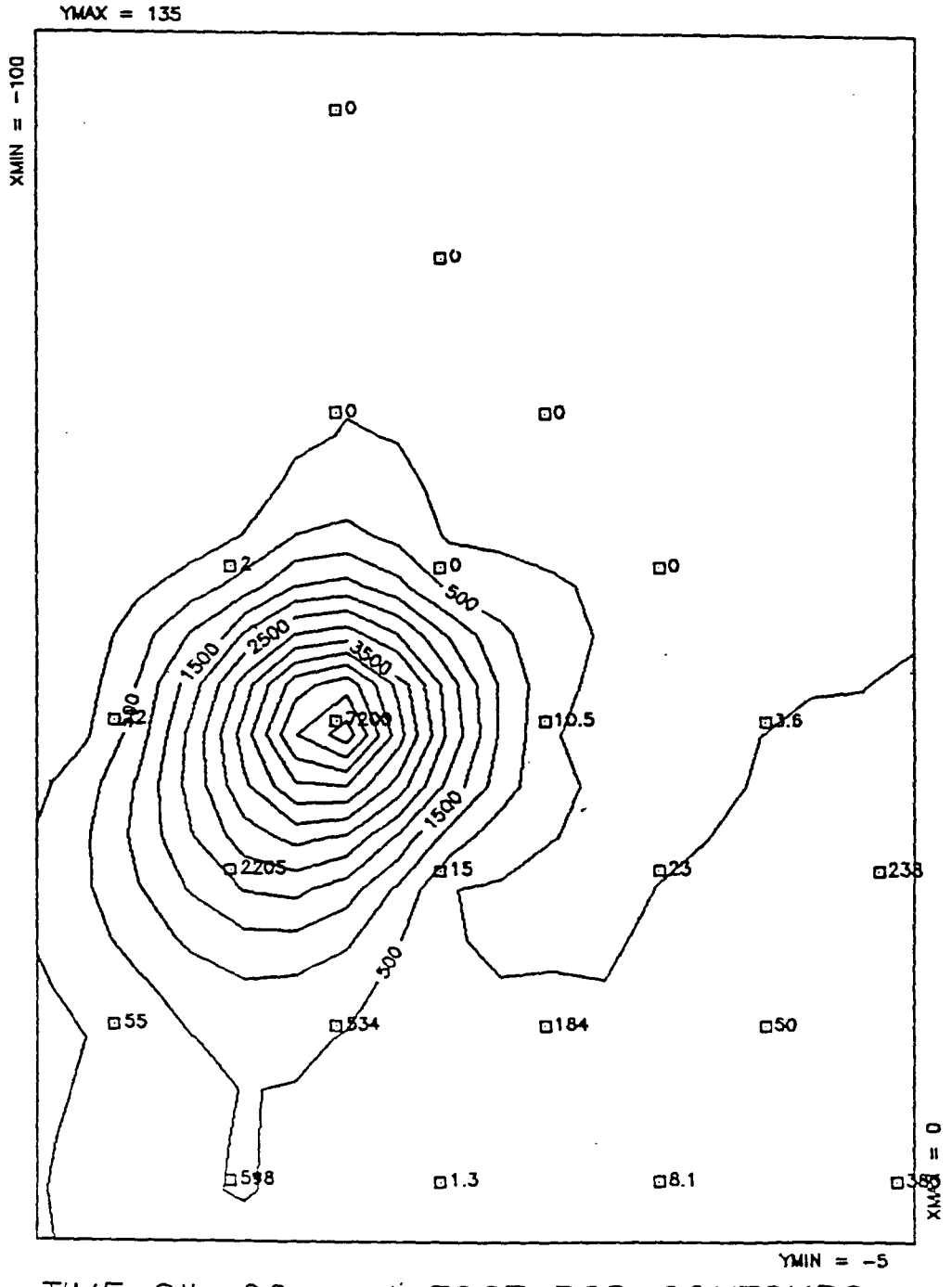
FIGURE III-2



TIME OIL CO – 4 FOOT PCP CONTOURS

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TOLS002842

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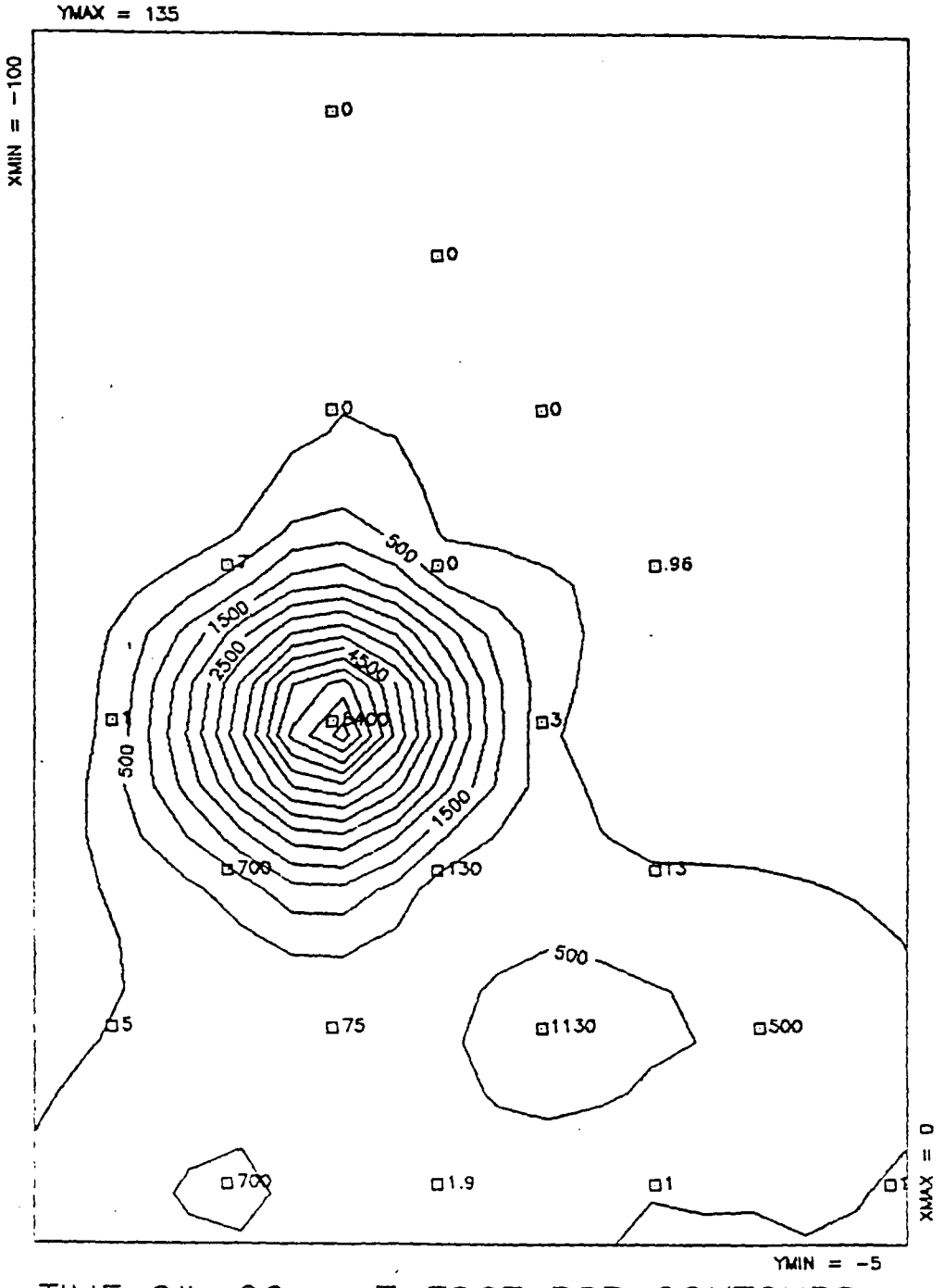
FIGURE III-3



TIME OIL CO - 7 FOOT PCP CONTOURS

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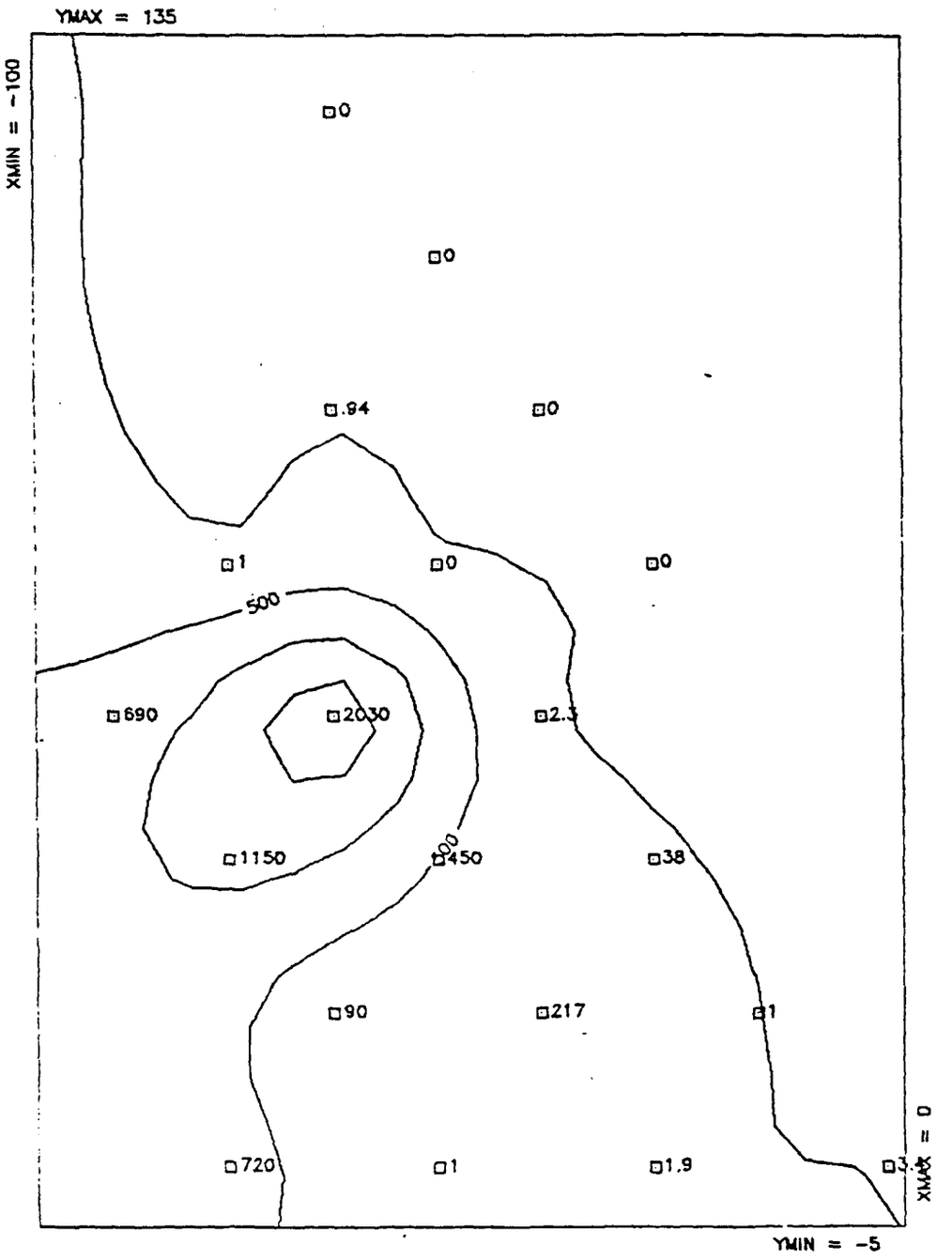
TOLS002843

BZTO104(e)039664

FIGURE III-4



TIME OIL CO - 12 FOOT PCP CONTOURS

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TOLS002844

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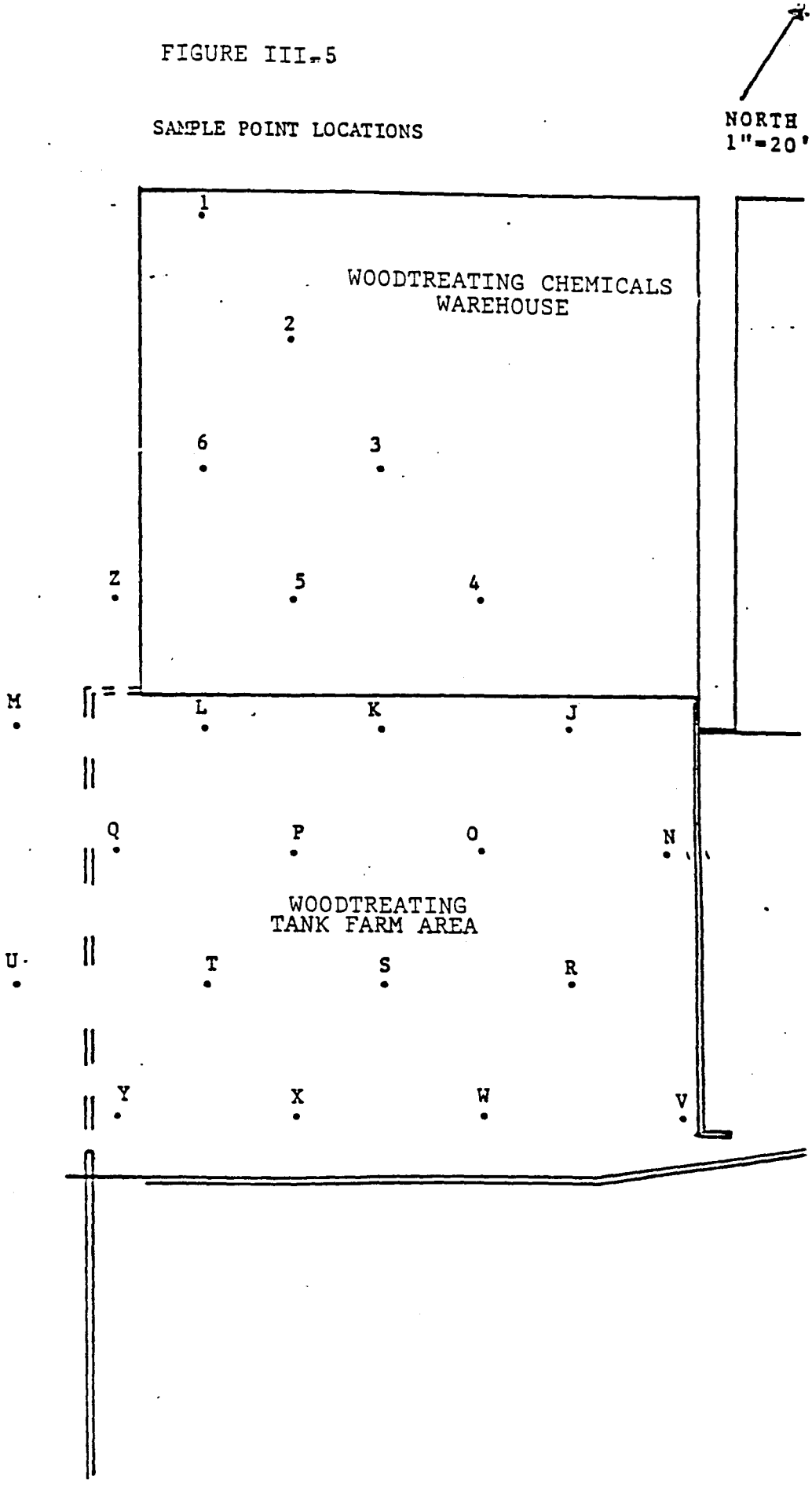
FIGURE III-5

SAMPLE POINT LOCATIONS



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SAMPLE POINT COORDINATE

FIGURE III- 6

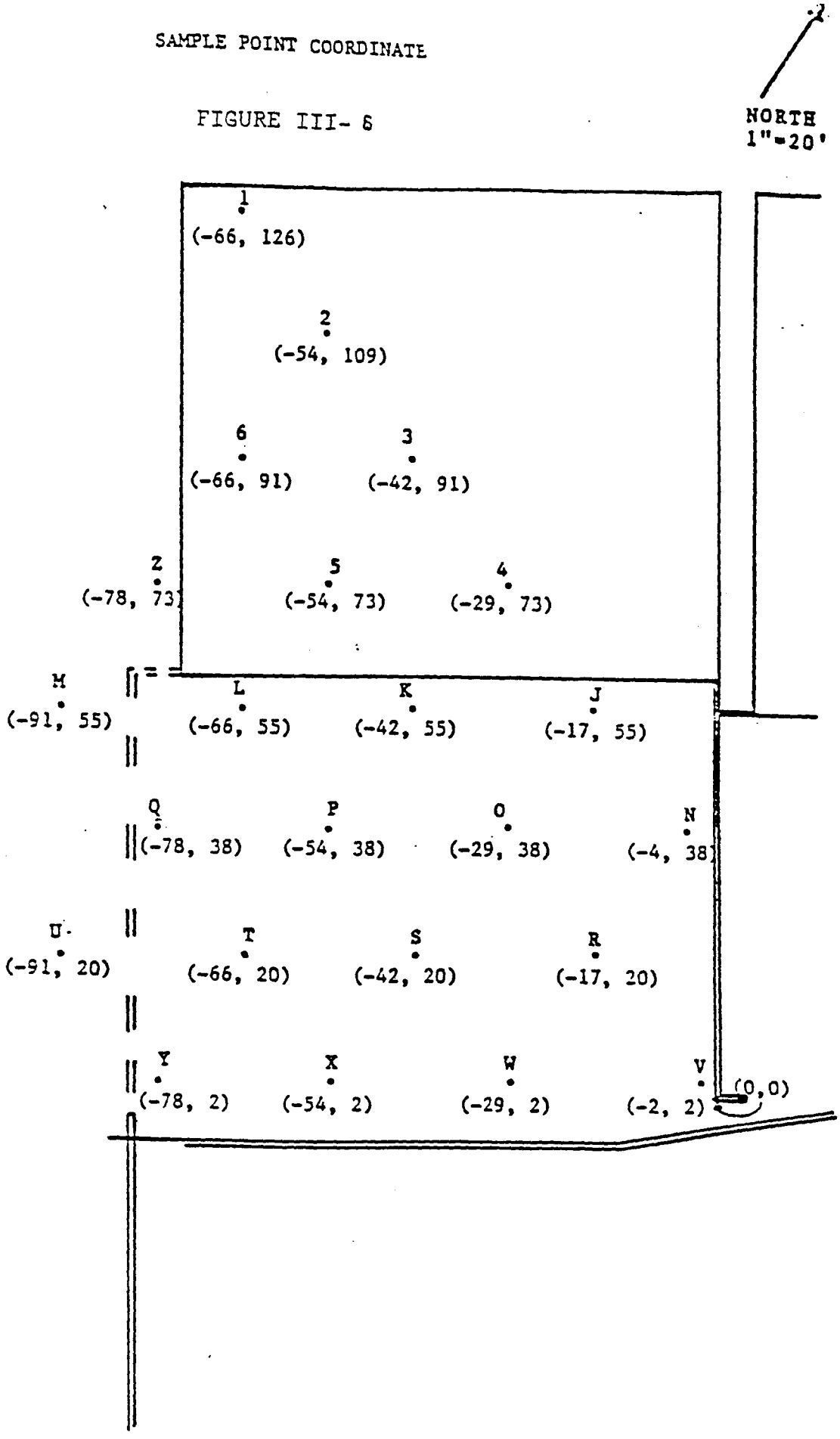

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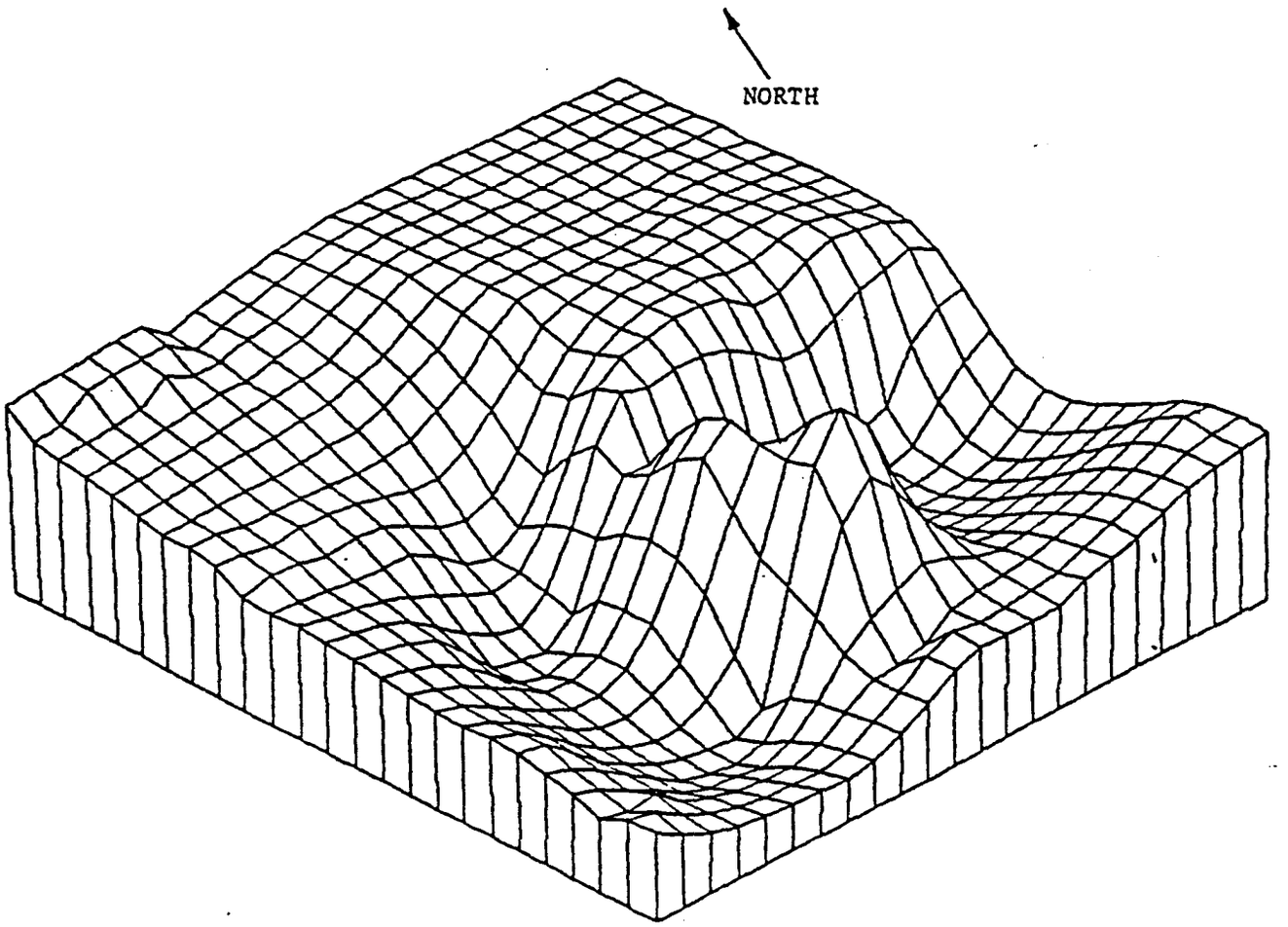
FIGURE III- 7

APPROXIMATE SURFACE TOPOGRAPHY

WOOD TREATING CHEMICALS AREA



TIME OIL CO. - TOPOGRAPHY

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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-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-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-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-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)

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

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TOLS002854

BZTO104(e)039675

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: Pentachlorophenol

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
O-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

TOLS002855

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.

10000

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

TOLS002856

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.

10000

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: John Ruddick

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 Q-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

TOLS002857

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.

10000

BZTO104(e)039678

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

TOLS002858

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.

10000

BZTO104(e)039679

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: Pentachloropnenol

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

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.

10000

TOLS002859

BZTO104(e)039680

COFFEY LABORATORIES, INC.
4914 N.E. 122nd Ave.
Portland, OR 97230
Phone: (503) 254-1794

September 5, 1986
Log # A860829-N
P.O. None

SRH 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	6.91 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.

10000

TOLS002860

BZTO104(e)039681

COFFEY LABORATORIES, INC.
4914 N.E. 122nd Ave.
Portland, OR 97230
Phone: (503) 254-1794

September 9, 1986
Log #A860903-J

SRH 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 letter.

COFFEY LABORATORIES, INC.
4914 N.E. 122nd Ave.
Portland, OR 97230
Phone: (503) 254-1794

September 18, 1986
Log #AS80916-F

SRH Associates, Inc.
P.O. Box 14005
Portland, Oregon 97214

Attention: John Ruddick

Analysis Requested: Pentachlorophenol

SAMPLE ID	RESULTS
#20 55	< 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.

10000

TOLS002862

BZTO104(e)039683

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.

10000

TOLS002863

10000

TOLS002864

BZTO104(e)039685

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CHAIN OF CUSTODY RECORD (8040)

PROJ. NO.	SITE/LOCATION
1003	Time Oil Co

SAMPLERS: (Signature) [signature] / SRH

STA. NO.	DATE	TIME	SAMPLE TYPE	MEDIA	SAMPLE IDENTIFICATION	NO. OF CONTAINERS	AMOUNT/PRESERVATIVE: PENTACHLOROPHENOL	AMOUNT/PRESERVATIVE: pH					SEAL NO.	SEAL INTACT? (Y or N)	REMARKS (with initials)
MW A	7/3/86	1030	BAILED	WATER	NEAR W TANK FARM	2	1L/1H2	[illegible]							
MW A	"	1030	↓	↓	" "	1	[illegible]	[illegible]							
MW B	"	1110	↓	↓	" "	2	1L/1H2	[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)
[signature]	9/3/86 1445	[signature]			
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)	

TOLS002865

BZTO104(e)039686

10000

CHAIN OF CUSTODY RECORD

PROJ. NO.	SITE/LOCATION
1003	TIME OIL CO PDX

SAMPLERS: (Signature) John H Riddell

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	2x1		250						
MW-E	↓	1430	↓	↓	SW TANK FARM	↓	2x1		250						
MW-F	↓	1615	↓	↓	ROADWAY (S)	↓	2x1		250						
MW-H	↓	1500	↓	↓	NEAR LOADING DOCK	↓	2x1		250						
MW-I	↓	1650	↓	↓	ROADWAY (N)	↓	2x1		250						

Relinquished by: (Signature/Firm)	Date/Time	Received by: (Signature/Firm)	Relinquished by: (Signature/Firm)	Date/Time	Received by: (Signature/Firm)
John H Riddell / SRH	8/29/86 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)	

TOLS002866

BZTO104(e)039687

1003

CHAIN OF CUSTODY RECORD

PROJ. NO.	SITE / LOCATION
1003	Time Oil Co - Portland

SAMPLERS: (Signature) Jack H Ruddell — SRH Assoc.

STA. NO.	DATE	TIME	SAMPLE TYPE	MEDIA	SAMPLE IDENTIFICATION	NO. OF CONTAINERS	AMOUNT / PRESERVATIVE	REMARKS (with initials)
2-5	8/25	1130	GRAB	SOIL	NW Wingwall Hole 2 SURFACE	1	8/0	HOLD
2-6		1145	SPLIT SPOON		" " 3'5"-5'5"	1	8/0	
2-8		1450			" " 5'5"-7'5"	1	8/0	
2-9		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 LOADING 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 LOADING DOCK 15'4"-17'4"	1	8/0	SAT-RATED Possible contam. during sampling

SEAL NO. | SEAL INTACT? (Y or N)

Relinquished by: (Signature/Firm)	Date / Time	Received by: (Signature/Firm)	Relinquished by: (Signature/Firm)	Date / Time	Received by: (Signature/Firm)
Jack H Ruddell - SRH	8/26/86 1225				
Relinquished by: (Signature/Firm)	Date / Time	Received by: (Signature/Firm)	Relinquished by: (Signature/Firm)	Date / Time	Received by: (Signature/Firm)
				8/26 1226	
Relinquished by: (Signature/Firm)	Date / Time	Received by: (Signature/Firm)	Date / Time	Remarks (attachments if necessary)	

TOLS002867

BZTO104(e)039688

10000

CHAIN OF CUSTODY RECORD

PROJ. NO.	SITE/LOCATION
1003	Timbroil Co – Portland Terminal

SAMPLERS: (Signature) John H Riddell SRH Assoc.

STA. NO.	DATE	TIME	SAMPLE TYPE	MEDIA	SAMPLE IDENTIFICATION	NO. OF CONTAINERS	AMOUNT/PRESERVATIVE (Ounces) Pentachlorophenol (8040)						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								
Ø-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			" – N 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)
John H Riddell / 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	Steven [illegible]
Relinquished by: (Signature/Firm)	Date/Time	Received by: (Signature/Firm)	Date/Time	Remarks (attachments if necessary)	

TOLS002868

BZTO104(e)039689

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CHAIN OF CUSTODY RECORD (8040)

PROJ. NO.	SITE/LOCATION
1003	Time Oil Co - Portland Terminal

SAMPLERS: (Signature) [signature] SRH Assoc

A. NO.	DATE	TIME	SAMPLE TYPE	MEDIA	SAMPLE IDENTIFICATION	NO. OF CONTAINERS	AMOUNT/PRESERVATIVE (Ø = NONE) PENTACHLOROPHENOL						SEAL NO.	SEAL INTACT? (Y or N)	REMARKS (with initials)
-2	8/24	11:40	SPLIT SPOON	SOIL	BORING #6 W CONTRAC INSIDE WASH 5'5"-7'5" BELOW CONCRETE	1	8/Ø								
-4	↓	12:00	↓	↓	7'5"-9'5" " "	1	8/Ø								
5-7	↓	12:30	↓	↓	10'5"-12'5" " "	1	8/Ø								
6-12	↓	14:20	↓	↓	15'5"-17'5" " "	1	2/Ø								SATURATED SAMPLE ONLY PART RECOVERED
D-2	8/24	15:30	GRAB	SOIL	WASTE PILE @ T-S DUPLICATE OF T-S	1	8/Ø								
T-S	↓	15:30	↓	↓	WASTE PILE FEET BELOW TOP OF PILE	1	8/Ø								
Q-S	↓	16:15	↓	↓	WASTE PILE FEET BELOW TOP OF PILE	1	8/Ø								
2-1	8/24	10:50	GRAB	SOIL	BORING #6 DUPLICATE OF 6-S	1	8/Ø								
4-5	8/24	16:10	grab	SOIL	BORING #4 SE WASH SURFACE BELOW CONCRETE	1	8/Ø								HOLD
4-0	↓	1650	SPLIT SPOON	↓	Boring #4 SE WASH 5'5"-5'5" BELOW CONCRETE	1	8/Ø								
4-2	↓	1715	↓	↓	7'5"-9'5" " "	1	8/Ø								
4-4	↓	1745	↓	↓	7'5"-9'5" " "	1	8/Ø								
4-7	↓	1820	↓	↓	10'5"-12'5" " "	1	8/Ø								

Relinquished by: (Signature/Firm)	Date/Time	Received by: (Signature/Firm)	Relinquished by: (Signature/Firm)	Date/Time	Received by: (Signature/Firm)
[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)	

TOLS002869

BZTO104(e)039690

0001

CHAIN OF CUSTODY RECORD (VOID)

PROJ. NO.	SITE/LOCATION
.1003	Time Oil Co - PDX Terminal

SAMPLERS: (Signature) SRH Assoc.

STA. NO.	DATE	TIME	SAMPLE TYPE	MEDIA	SAMPLE IDENTIFICATION	NO. OF CONTAINERS	AMOUNT/VOLUME	PRESERVATIVE					SEAL NO.	SEAL INTACT? (Y or N)	REMARKS (with initials)
4-12	8/24	1900	SPLIT SPOON	SOIL	BORING #4 SE CORNER 15'5"-17'5" BELOW GRADE	1	4/6								SATURATED SMPLS
3-5	8/24	1915	GRAB	SOIL	BORING #3 E-CENTRAL SURFACE BELOW CONCRETE	1	8/8								HOLD
3-8		1955	SPLIT SPOON		3.5'-5'5" " "	1	7/8								
3-2		2010			5'5"-7'5" " "	1	3/6								
3-4		2015			7'5"-9'5" " "	1	5/8								
3-7		2025			10'5"-12'5" " "	1	8/8								
3-12		2100			15'5"-17'5" " "	1	5/8								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)039691

TOLS002870

10000

CHAIN OF CUSTODY RECORD

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 (Cubic Yards)	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		1435	SPLIT SPOON	"	3.5 FT BELOW WAREHOUSE LOADING DOCK CONCRETE BORING #1	1	8/0			HIT CONCRETE OR ASPHALT
5-S	8/23	~~1055~~ 1655	GRAB	SOIL	BORING #5 SW INSIDE WASH 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 WASH 5.4-7.4' " "	1	8/0			
5-4	↓	1805	↓	↓	BORING #5 7.4-9.4' " "	1	8/0			
5-7	↓	1825	↓	↓	BORING #5 10.4-11.4 " "	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 INSIDE WASH 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)	

TOLS002871

BZTO104(e)039692

10000

TOLS002872

BZTO104(e)039693

* * * * * * *
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 # VER.BAL

ODRESS PO BOX 14005 LAB PRICE QUOTE # $60 / sample

ITY/STATE/ZIP PORTLAND OR 97208 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	MDL
	MWA	9/3/86	1030	WATER	1:1 H_2SO_4 TO PH 2	2 EA 1L AMBER GLASS	PENTACHLOROPHENOL	
	MWA	"	1030	"	NONE	250 ml PLASTIC	PH	
	MWB	"	1110	"	1:1 H_2SO_4 TO PH 2	2 EA 1L AMBER GLASS	PENTACHLOROPHENOL	
	MWB	"	1110	"	NONE	250 ml PLASTIC	PH	

Relinquished by:	Date	Time	Received for Coffey Labs by:
[signature] / SRH	9/3/86	1450	[signature]

PLE INTEGRITY COMMENTS:

AB LOG # 860903-J | LOGGED IN BY: | DATE: | TIME:

:\wp\clom\form\log\login.log 10000

TOLS002873

BZTO104(e)039694

CLIENT
ANALYSIS
REQUEST

COFFEY LABORATORIES, INC.
4914 N.E. 122nd Ave.
Portland, OR 97230
Phone: (503) 254-1794

COMPANY NAME SRI & 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	Date	Time	Media	Preservative	Analysis requested	MD
MW-D	8/29	1600	GROUND WATER	1:1 HNO3 pH<2	2 Amber Glass	PENTACHLOROPHENOL (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				

TOLS002874

Relinquished by: [signature] Date 8/29/86 Time 1800 Received for Coffey Labs by Susan M Coffey

SAMPLE INTEGRITY COMMENTS:

LAB LOG # A860829 N 1-10 LOGGED IN BY: S Coffey DATE: 8-29-86 TIME: 1755

10000

BZTO104(e)039695

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 8-23-86 DUE DATE 9/2/86 RUSH
SAMPLE COLLECTED BY J Ruddick DELIVERED BY JHR
CLIENT COMMENTS-(SPECIAL INSTRUCTIONS, SPECIFIC METHOD ETC):
Pentachloro Phenol by EPA 8040 (SW 846)

Lab #	Date	Time	Matrix	Preservative	Analysis requested
R-0	8/23	1125	Soil	None	502 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 Ruddick Date 8/25/86 Time 1045 Received for Coffey Labs
SPECIAL QUALITY COMMENTS:
10000
TOLS002875
LOGGED IN BY: DATE: T:

BZTO104(e)039696

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 8/24/86 + 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)

ID	Date	Time	Media	Pres	Cntnr	Analysis requested	MDL
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					

TOLS002876

Relinquished by:	Date	Time	Received for Coffey Labs by:
John H Ruddick / SRH	8/25/86	1045	Steven L. [illegible]

SPECIAL QUALITY COMMENTS:

LOG # LOGGED IN BY: DATE: TIME:

10000

BZTO104(e)039697

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	Matrix	Res/cntnr	Analysis requested	MDL
6-4	8/24	1200	Soil	None	8oz Glass	Penta (EPA 8040)
6-7		1230				
6-12		1420				
D-2		1530				
T-5		1530				
Q-5		1615				
D-1		1050				
4-5		1610				(Hold)
4-0		1650				TOLS002877
4-2		1715				

SAMPLED BY: JH Ruddick / SRH — Date: 8/25/86 — Time: 1045 — Received for Coffey Labs by: Steven Hathaway
SPECIAL QUALITY COMMENTS:

LAB LOG # 10000 — LOGGED IN BY: — DATE: — TIME:

BZTO104(e)039698

COFFEY LABORATORIES, INC.
4914 N.E. 122nd Ave.
Portland, OR 97230
Phone: (503) 254-1794

ANALYSIS REQUESTED

COMPANY NAME: SRH Associates TELEPHONE#: 503 232 0824
ADDRESS: 123 SE 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 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)

Date	Time	Matrix	Preservative	Analysis requested	MDL
6-S 8/24	1050	Soil Nmo	802 glass	Penta (EPA 8040)	(HOLD)
6-0	1130				
4-12	1900				
3-5	1915				(HOLD)
3-0	1955				
3-2	2010				
3-4	2015				
3-7	2025				
3-12	2100				
6-2	1140				

TOLS002878

RELINQUISHED BY: JHR / SRH Date: 8/25/86 Time: 1045 Received for Coffey Labs by:

SAMPLE QUALITY COMMENTS:

SAMPLE LOG # LOGGED IN BY: DATE: TIME:

10000

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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 ID #	Date	Time	Media	Preservtn	Container	Analysis requested	MDL
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	

TOLS002879

RELINQUISHED BY: Date 8/26 Time 1225 Received for Coffey Lab:

SAMPLE DISPOSITY COMMENTS:

LAB # 10000 LOGGED IN BY: DATE: TIME

BZTO104(e)039700

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: 8/23/86 DUE DATE: 9/2/86 RUSH:
SAMPLE COLLECTED BY: J Ruddick DELIVERED BY: JHR
CLIENT COMMENTS-(SPECIAL INSTRUCTIONS, SPECIFIC METHOD ETC):
Pentachloro Phenol by EPA 8040 (SW 846)

ID#	Date	Time	Media	Pres	cntnr	Analysis requested	MI
Y-0	8/23	1205	Soil	None	8oz 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		1400					

TOLS002880

RELINQUISHED BY: [signature] Date 8/25 Time 1045 Received for Coffey Labs by [signature]

SAMPLE INTEGRITY COMMENTS:

AS LOG # 10000 LOGGED IN BY: DATE: TIME:

BZTO104(e)039701

REPAID_____
ART DEPOSIT_____
Y FOR RELEASE_____
ILL_____

COFFEY LABORATORIES, INC.

4914 N.E. 122nd Ave.
Portland, OR 97230
Phone: (503) 254-1794

LOG#_____

LOGIN TIME_____

OMPANY NAME SRH ASSOC. TELEPHONE# 232-0824

DDRESS 123 NW 3RD PURCHASE ORDER # VERBAL

DDRESS STE 230 LAB PRICE QUOTE #_____

ITY/STATE/ZIP PORTLAND OR 97232 BILLING ADDRESS:

TTENTION JOHN RUDDICK

AMPLE COLLECTION DATE 9/26/86 DUE DATE MONDAY AFTERNOON ~~AS~~ 9/29/86 RUSH_____

AMPLE COLLECTED BY J RUDDICK DELIVERED BY JHR

_IENT COMMENTS-(SPECIAL INSTRUCTIONS, SPECIFIC METHOD ETC):

ID	Field ID	Date	Time	Media	Pres	btl	Analysis Requested	MD
	K-O	9/26	0915	SOIL	NONE	8oz GLASS	PENTACHLOROPHENOL (EPA 8040)	

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MPLE INTEGRITY COMMENTS

Relinquished by:	Date	Time	Received for Coffey Labs by
	9/26/86	0950	Mary L Stowell

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EXPENDITURES

7/10/85	Northwest Vacuum Truck Service	9000.00 ? 242 tons
7/29/85	Chem-Security Systems	27270.88)
8/8/85	Environmental Emergency Services	500.00
12/5/85	Environmental Emergency Services	18741.55
		55512.43

Due:

DEQ per OAR 340-102-065	3500.00
Riedel Environmental Services (Amendment 2) Consultants	25000.00 includes the 5 new wells
Whatever is necessary to finish job	??
Spent + committed to date.	$ 84,012.43

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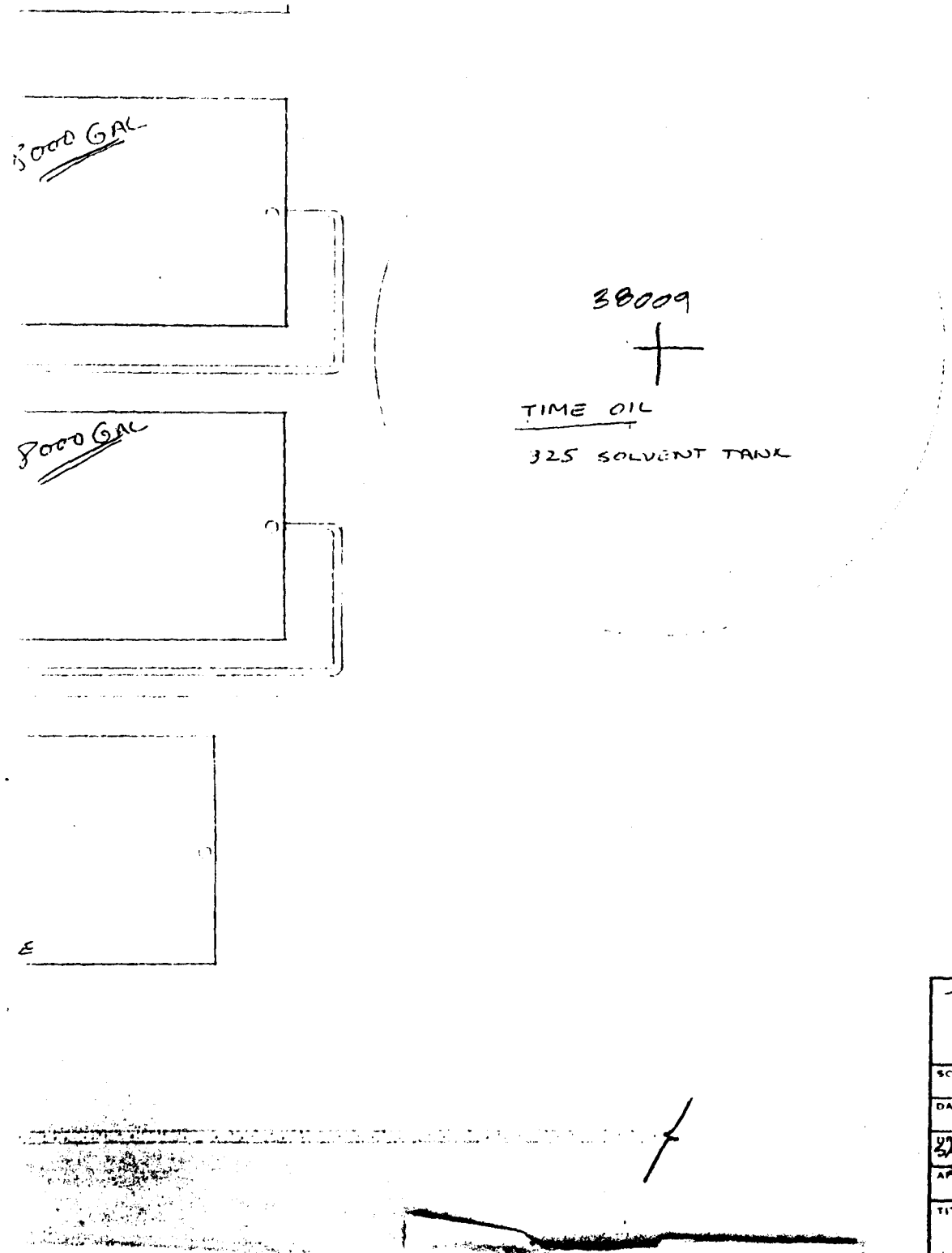

NEW,

THING'S STILL DON'T COME OUT RIGHT, I DON'T KNOW IF IT YOU OR ME

SO COULD YOU LOOK THIS OVER AND LET ME KNOW

SCALE 3/16" = 1'-0"

NOTE

ALL PRODUCT LINES ARE 8'-0

TIME OIL COMPANY
2737 WEST COMMODORE WAY SEATTLE, WA

SCALE 3/16" = 1'-0"	REVISIONS	BY	DATE
DATE 12-1-81			
DR'N SANDHOT / CKD			
APVD			
TITLE CHEMICAL TANKS NORTHWEST & BELL OIL TERMINAL		NO	

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AMENDMENT 2
TIME OIL CO. - RIEDEL ENVIRONMENTAL SERVICES, INC.
SAMPLING AND ANALYSIS AGREEMENT
DATED JUNE 28, 1985

The work scope is amended to include the following:

1. Sandblasting and demolition of the impoundment wall (designated A in Figure 1). The cost of this procedure is estimated to be $5,568.01.

2. Drilling, sampling and installation of 3 monitoring walls angeled 45 degrees beneath the existing warehouse (listed as Wells 1, 2 & 3 in Figure 1). Also, the installation of a 40 foot vertical monitoring well, including sampling at 5 foot intervals, directly in front of the angled wells (listed as Well 4 in Figure 1). Analytical results for 12 PCP samples are included in the estimated cost of $12,667.07.

3. Drilling, sampling and installation of an additional 5, 20-foot monitoring wells (listed in Figure 1 as Wells 5, 6, 7, 8 & 9). Soil samples will be taken at 5 foot intervals and 5 analyses for PCP are included in the estimated cost of $6,595.50.

DATED this 5th day of November, 1985.

TIME OIL CO.

John Denham
Environmental Manager

RIEDEL ENVIRONMENTAL SERVICES, INC.

F.J. Bradach
President

RS:bw

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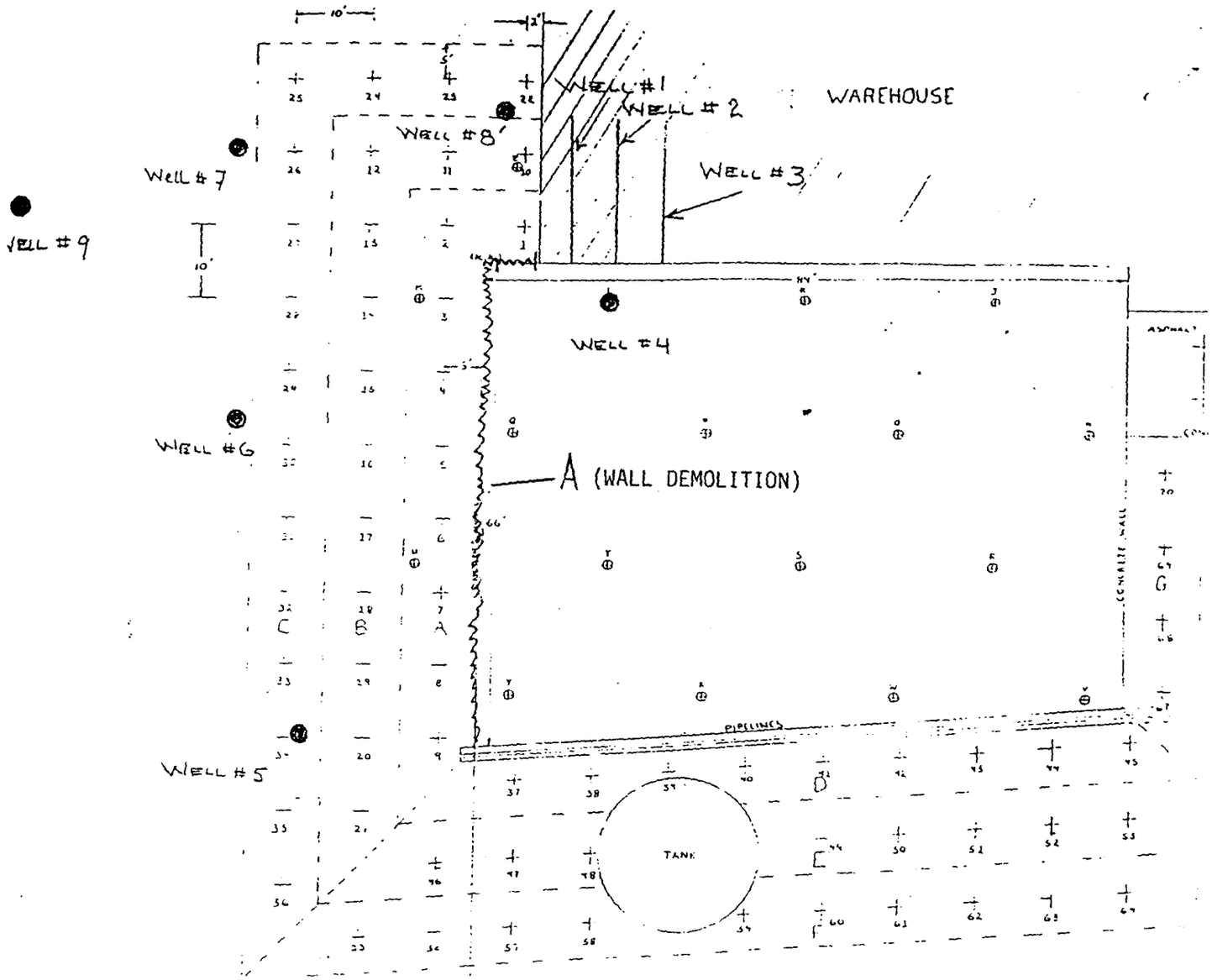

FIGURE 1

Location of Proposed Monitoring Wells

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CHEM-SECURITY SYSTEMS, INC.
P.O. Box 1269 • Portland, Oregon 97207-1269 • (503) 223-1912
CSSI

May 28, 1985

Neil E. Wallis
Time Oil Company
2737 W. Commodore Way
Seattle, Washington 98199

Dear Mr. Wallis:

Enclosed are two copies of our Waste Transportation and Disposal Agreement. Please sign both copies and return both copies to me at the above address. I will then forward your fully-executed copy. We appreciate your business and look forward to serving your hazardous waste needs.

Please feel free to call if you have any questions.

Sincerely,

CHEM-SECURITY SYSTEMS, INC.

Joyce Johnson

Joyce Johnson
Inside Sales Representative

JJ:lh
Enclosures

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Encl. 9

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WASTE TRANSPORTATION AND DISPOSAL AGREEMENT

On this 24th day of May, 19 84, the parties, Time Oil Co., a Washington corporation with its principal offices at 2737 W. Commodore Way, Seattle, WA 98199 (hereinafter called "Generator"), and CHEM-SECURITY SYSTEMS, INC., a Washington corporation with its principal offices at 10602 N. E. 38th Place, Kirkland, Washington 98033 (hereinafter called "Disposer"), have agreed as follows:

1. WASTE PRODUCTS. The term "Waste Products" refers to those solid, liquid, semi-solid, or contained gaseous materials which are generally described in, and which have physical, chemical, biological or radioactive constituents, characteristics and properties within the specifications stated in, the Supplemental Information Document. The term "Waste Products" also includes containers described in the Supplemental Information Document, if they are to be supplied by the Generator. The term "unit of Waste Products" refers to a single whole container of Waste Products (such as a barrel, drum, box, or tanker load).

   Materials and containers shall be considered nonconforming: (i) if they are not in accordance with the warranties, descriptions, specifications or limitations stated in this agreement and the Supplemental Information Document, or (ii) if they have material constituents or components, not specifically identified in the Supplemental Information Document, (a) which materially increase the nature or extent of the hazard and risk undertaken by CSSI in agreeing to handle, load, transport, store, treat or dispose of the Waste Products, or (b) for whose storage, treatment or disposal the Disposal Facility is not designed or permitted.

2. SUPPLEMENTAL INFORMATION DOCUMENT. Where "the Supplemental Information Document" is referred to in this Agreement, the parties understand that such term refers to each single entire document, in that form specified in Exhibit A, (which exhibit is attached hereto and made part hereof), containing the information therein required and executed by the Generator and Disposer. Each Supplemental Information Document shall be numbered in chronological sequence. A Supplemental Information Document, prepared and executed as herein required, shall be considered incorporated into this Agreement and part hereof as of the date and time of Document execution. It is the intention of the parties that each Supplemental Information Document, when incorporated into this Agreement, constitutes a separate undertaking, individually enforceable.

c 1980, WASTE MANAGEMENT, INC.

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A Supplemental Information Document, or any amendment thereto, shall be executed, on behalf of Disposer or Generator, only by such persons appointed as authorized agents of the parties for such purposes, which persons are identified, by name or specific position title, in Exhibit B. attached hereto and made part hereof. Either party may, by notice to the other, amend its list of authorized agents, which shall constitute an amendment to Exhibit B at the time such notice is received.

At any time during the term of a Supplemental Information Document, upon the written request of Disposer, the Generator shall: (a) supply an updated written description of the Waste Products or a written certification that the description previously supplied remains true and accurate; or, (b) supply a written certification that a particular load of Waste Products delivered to Disposer constituted a representative sample of the Waste Products described in the Supplemental Information Document; or, (c) supply a representative sample of the Waste Products together with a written certification of the sample's representativeness; or, (d) allow Disposer access to the Waste Products at Generator's facility for the purpose of obtaining one or more representative samples. Forms to be used in providing written Waste Products descriptions, recertifications of previous descriptions, or certifications of representative Waste Products samples shall be supplied by Disposer.

3. TENDER OF DELIVERY. Generator shall tender delivery of the Waste Products to Disposer at those times and places, in those quantities, and in the manner specified in the Supplemental Information Document. Generator shall, at the same time and place, tender to Disposer those completed documents, shipping papers or manifests as are required, for lawful transfer of the Waste Products to Disposer, by valid and applicable statutes, ordinances, orders, rules or regulations of the federal, state, or local governments, including, but not limited to, the Hazardous Materials Transportation Act, the Toxic Substances Control Act and the Resource Conservation and Recovery Act of 1976.

Tender of delivery shall be considered non-conforming if not in accordance with this Section and the specifications of the Supplemental Information Document, or if not preceded by such notification as required by Section 16 (f).

4. DISPOSER RIGHT TO INSPECTION UPON TENDER. Disposer shall have the right, but not the obligation, to inspect, sample, analyze, or test any tendered Waste Products before accepting such products. Failure or refusal of the Generator to provide Disposer with access to any tendered or delivered Waste Products, prior to Disposer's acceptance, shall be deemed a non-conforming tender or delivery of all of the Waste Products tendered or delivered at that time and place. Disposer's

exercise of, or failure to exercise, its right hereunder shall not operate to relieve Generator of its responsibility or liability under this Agreement.

5. DISPOSER RIGHTS ON IMPROPER DELIVERY. If the Waste Products, any unit thereof, or the tender of delivery fail in any respect to conform to this Agreement, including the requirements of the Supplemental Information Document, Disposer may, at its exclusive option, (i) reject all Waste Products tendered; or, (ii) accept all Waste Products tendered; or, (iii) accept any unit or units of Waste Products and reject the rest. Provided, however, if a particular unit of Waste Products is determined to be non-conforming solely because of a patent non-conformity in the container, its labeling or marking, which non-conformity, if present in any other tendered container, would be visibly apparent, Disposer's option shall be limited to accepting or rejecting the particular non-conforming unit.

Rejection of the Waste Products must be within a reasonable time after their tender or delivery, not to exceed twenty-four (24) hours. In rejecting any Waste Products, Disposer shall orally notify the Generator of the manner in which the Waste Products or the tender of delivery are non-conforming, such notice to be followed by written notice within five (5) business days.

6. ACCEPTANCE OF WASTE PRODUCTS. Disposer shall accept any Waste Products which are in conformance with, and which have been tendered in conformance with, this Agreement, including the Supplemental Information Document, and may accept, as provided in Section 5, non-conforming Waste Products. If transportation is to be provided by Disposer, Disposer shall evidence its acceptance by removing such Waste Products from the place of tender. If transportation to the Storage or Disposal Facility is to be provided by Generator, Disposer shall evidence its acceptance by written notice to the Generator, such as through signing shipping papers or the manifest tendered with the Waste Products.

Failure of Disposer to reject the Waste Products, or any unit thereof, as provided in Section 5 shall be deemed acceptance of all tendered Waste Products not so rejected.

Upon acceptance of the Waste Products Disposer shall be precluded from rejecting those Waste Products accepted and, if acceptance of any unit of Waste Products was made with actual knowledge of a non-conformity, Disposer shall be precluded from revoking its acceptance of such unit because of such non-conformity. Acceptance of the Waste Products, or any unit thereof, does not, however, impair, or operate as a waiver of, any right or remedy available to Disposer, including revocation of acceptance, in the event the Waste Products or

their tender are later discovered to be non-conforming.

7. REVOCATION OF ACCEPTANCE. Disposer may, at any time before the condition of the Waste Products has been materially changed (such as by treatment, processing or disposal), revoke its acceptance of any unit or units of Waste Products discovered to be non-conforming.

Discovery by Disposer that any unit of the Waste Products is non-conforming for any reason shall be considered discovery that all units of such Waste Products, accepted at the same time as the non-conforming unit, are non-conforming for the same reasons. Provided, if a particular unit of Waste Products is determined to be non-conforming solely because of a patent non-conformity in the container, its labeling or marking, which non-conformity, if present in any other accepted container, would be visibly apparent, Disposer's option shall be limited to revoking acceptance of the particular non-conforming unit.

Revocation must occur within a reasonable time after Disposer actually discovers or should have discovered the non-conformity. In revoking its acceptance of any Waste Products, Disposer shall notify the Generator of the manner in which the Waste Products are non-conforming.

7a GENERATOR'S OPTIONS IN EVENT OF REJECTION OF REVOCATION OF ACCEPTANCE.
In the event Disposer rejects or revokes its acceptance of Waste Products, and at such time the Waste Products are in Disposer's possession or control, Generator may, within five (5) business days after receipt of notice, notify Disposer of Generator's intent to test the Waste Products, to verify the alleged non-conformity, or to correct any improper containerization, marking or labeling. Generator may, if lawfully permitted, direct Disposer to arrange for such testing or corrections, pursuant to Generator's instructions and at Generator's cost. All testing or corrections must be completed within twenty-one (21) days of Generator's receipt of the rejection or revocation notice. During the period of any testing or corrections, the duty of Disposer with respect to the Waste Products shall be that of a bailee for hire.

Upon mutual agreement of the parties that the Waste Products or any unit are not conforming for the reasons specified in Disposer's notice, the notice of rejection or revocation as to such Waste Products or unit shall be deemed null and void as of the time of its original issuance.

8. DISPOSER OPTIONS AS TO RIGHTFULLY REJECTED OR REVOKED WASTE PRODUCTS.
If Disposer rejects or revokes its acceptance of all or any units of Waste Products, and at such time the Waste Products

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are in Disposer's possession or control, Disposer and Generator shall, in good faith, attempt to amend the Supplemental Information Document to provide for handling of the non-conforming materials. If the parties cannot, within a reasonable time after rejection or revocation (including any time provided for correction or testing in Section 7a), agree on necessary amendments, Generator shall make prompt arrangements for the removal of the non-conforming materials from the Storage or Disposal Facility to another lawful place of disposition.

Generator agrees to pay Disposer its reasonable expenses and charges for handling, loading, stowing, preparing for transport, transporting, storing and caring for any Waste Products returned to Generator pursuant to this Section.

9. LOADING AND TRANSPORTATION OF WASTE PRODUCTS. If the Supplemental Information Document specifies that Disposer is to provide loading or transportation services, Disposer shall load or stow and transport Waste Products to the Storage or Disposal Facility herein specified. In the aforesaid event, as between the parties, selection of transportation vehicles or vessels, times of travel and routes shall be solely determined by Disposer unless otherwise specified in the Supplemental Information Document. In selecting transportation vehicles or vessels compatible with the Waste Products, Disposer shall rely on Generator's description of the Waste Products.

10. STORAGE AND DISPOSAL. Disposer shall dispose of the Waste Products at the particular facility or facilities, referred to herein as "the Disposal Facility", identified in the Supplemental Information Document. Disposer shall utilize those general storage, treatment, and disposal methods specified in the Supplemental Information Document; however, as between the parties, Disposer shall be solely responsible for determining the specific times and techniques for storage, processing, treatment and disposal of the Waste Products. In determining such techniques, Disposer shall rely on Generator's description of the Waste Products.

If the Supplemental Information Document specifies that Disposer is to provide interim storage of the Waste Products at a "Storage Facility", prior to transportation of the Waste Products to the Disposal Facility, Disposer shall store such Waste Products at such Storage Facility for a period not to exceed ninety (90) days, unless some other period is specified in the Supplemental Information Document.

Disposer may use, distribute or sell any of the Waste Products, or any component or residue thereof, unless otherwise specified in the Supplemental Information Document.

11. TITLE TO WASTE PRODUCTS. At the time Disposer accepts the Waste Products and takes possession and control thereover, title, risk of loss and all other incidents of ownership to the Waste Products shall be transferred from the Generator and vested in Disposer.

A justified revocation of acceptance by Disposer revests title to the Generator, including risk of loss and all other incidents of ownership, at the time such revocation of acceptance is communicated to the Generator.

12. TERM. The term of this Agreement shall be as specified in the Supplemental Informtion Document, to commence on the date of execution of such Document, as provided in Section 2.

13. RIGHT TO TERMINATE. Either party may terminate this Agreement if the other party (i) has been adjudicated a bankrupt, or (ii) has filed a voluntary petition in bankruptcy, or (iii) has made an assignment for the benefit of creditors, or (iv) a receiver has been appointed for such party. Termination pursuant to this paragraph shall be effective for performance remaining under any and all Supplemental Information Documents.

The Generator may terminate this Agreement, with respect to performance remaining under an identified Supplemental Information Document, if, at any time after execution of such document, the specified Storge or Disposal Facility fails to obtain, or maintain as valid, any license, permit or approval required to allow lawful acceptance and storage, treatment, processing and disposal of the Waste Products at such Facility.

Termination as provided above, or as allowed by Section 22, shall be by notice from the terminating party to the other party, specifying the reason therefor and the effective date thereof, which shall be not less than five (5) days after the date of the notice.

Either party may terminate this Agreement without cause, with respect to performance remaining under an identified Supplemental Information Document, by notice from the terminating party to the other party specifying the effective date of termination which shall be not less than thirty (30) days after receipt of the notice by the non-terminating party.

The right of terminating hereunder is in addition to, and not in lieu of, any right of a party to cancel this Agreement for breach of its terms or conditions.

14. COMPENSATION. For all of the Waste Products transported, stored and disposed of by Disposer, the Generator shall pay Disposer a fee, determined in accordance with the Supplemental Information Document. Disposer shall measure the Waste Products, for the purpose of computing fees, at the time and

place, and in the manner, specified in the Supplemental Information Document. Disposer determinations so made shall govern unless proved to be in error by Generator.

Fees specified in the Supplemental Information Document shall not be altered during the term of this Agreement except as follows:

(a) Disposer may, on the first day of any calendar quarter, with thirty (30) days written notice to Generator, increase or decrease fees specified in the Supplemental Information Document. If any Waste Products, to which such fee alterations apply, are delivered to Disposer more than thirty days after Generator's receipt of this notice, Generator shall be deemed to have accepted such fee alterations and the Supplemental Information Document shall be deemed amended in such respect.

(b) If legislation or regulations, first implemented after date of execution of the Supplemental Information Document, impose taxes, tariffs, fees, surcharges or other charges upon the transportation, storage, processing, treatment or disposal of the Waste Products, the Generator shall reimburse the Disposer for such charges upon the Disposer's submission of an invoice stating that such charges have been levied or paid.

The Disposer shall submit statements to the Generator which shall be paid by the Generator not later than thirty (30) days from date of receipt. Disposer shall retain copies of such statements for a period of at least five (5) years as a record of disposal.

15. DISPOSER WARRANTIES. Disposer warrants and represents to the Generator that:

(a) Disposer understands the currently known hazards and risks which are presented to human beings, property and the environment in the handling, transportation, storage, treatment, processing and disposal of the Waste Products as they have been described by the Generator in the Supplemental Information Document; and,

(b) Disposer is engaged in the business of transportation, storage and disposal of industrial and other wastes, and has developed the requisite expertise for the handling, transportation, storage, treatment, processing, and diposal of such; and,

(c) Disposer will handle, load, stow, transport, store, treat, process, and dispose of the Waste Products in a safe and workmanlike manner and in full compliance with all valid and applicable statutes, ordinances, orders,

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rules and regulations of the federal, state and local governments in whose jursidictions such activities are performed under this Agreement; and,

(d) Any and all vehicles or vessels, Waste Products containers and personnel to be provided by Disposer in the performance of this Agreement have obtained or will obtain all permits, licenses, certificates or approvals required to comply with valid and applicable statutes, ordinances, orders, rules and regulations of the federal, state and local governments.

(e) The Storage or Disposal Facility (or Facilities) described in the Supplemental Information Document has been issued, as of the date of execution of such Document, all permits, licenses, certificates or approvals, required by valid and applicable statutes, ordinances, orders, rules and regulations of the federal, state and local governments in which such Facility is located, necessary to allow such Facility to accept and store, treat, process and dispose of the Waste Products as described by the Generator in such Document. Disposer shall provide Generator with reasonable advance notice if any such permit, license, certificate or approval is to expire and not be renewed during the term of a Supplemental Information Document, or becomes the subject of judicial or administrative action seeking revocation or suspension. Such notice shall also be provided if Disposer determines not to seek any necessary permit, license, certificate or approval which becomes required after execution of a Supplemental Information Document.

16. GENERATOR WARRANTIES. The Generator warrants and represents to Disposer that:

(a) The description of the Waste Products in the Supplemental Information Document is true and correct in all material respects, fairly advises Disposer of the hazards and risks known by the Generator to be incident to the handling, transportation, storage, treatment, processing and disposal of the Waste Products, and is otherwise in full compliance with all materials description requirements of valid and applicable statutes, ordinances, orders, rules and regulations of the federal, state and local governments in whose jurisdictions such Waste Products are to be handled, transported, stored, treated, processed or disposed; and,

(b) Waste Products tendered to Disposer will conform to the descriptions and specifications contained in the Supplemental Information Document; and,

(c) If Generator receives information, during the term of any Supplemental Information Document, that Waste Products described in such Document, or some component of such Products, present or may present a hazard or risk to persons or the environment, which was not disclosed in the Supplemental Information Document, Generator shall promptly report such information to Disposer. Such information shall include, but not be limited to, any relevant notification of substantial risk required to be given by Generator pursuant to Section 8 (e) of the Toxic Substances Control Act;

(d) If any load of Waste Products, tendered to Disposer for transportation in a single transportation vehicle, contains a reportable quantity of one or more hazardous substances, as provided in Section 102 of the Federal Comprehensive Environmental Response, Compensation, and Liability Act of 1980, or regulations adopted thereunder, Generator will, prior to tendering such load to Disposer, provide the person in charge of the Disposer transport vehicle with written notice that the load contains a reportable quantity of such hazardous substance(s), identifying the known or estimated quantity of each such hazardous substance present.

(e) Generator will prepare the Waste Products for transportation and tender to Disposer in accordance with all valid and applicable statutes, ordinances, orders, rules and regulations of the federal, state and local governments in whose jurisdiction such Waste Products are to be tendered to Disposer pertaining to: (i) container specifications for any container not supplied by Disposer; and, (ii) marking and labeling of all containers.

(f) If regulations promulgated or revised under Section 3001 of the Resource Conservation and Recovery Act of 1976 (P. L. 94-580) identify the Waste Products as "hazardous waste," either by characteristics or listing, the Generator, prior to tendering any Waste Products to Disposer has filed or will file with the appropriate governmental agency the preliminary notification required by Section 3010(a) of the above Act, and provide Disposer with evidence thereof.

(g) The Generator has sole title to Waste Products which will be tendered to Disposer, and is under no legal restraint, statutory, regulatory, administrative or judicial, which prohibits the transfer of possession or title to such Waste Products to Disposer.

17. INDEMNIFICATION. Disposer agrees to indemnify and save harmless the Generator, its present and future officers or

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directors (or officials), employees and agents, from and against any and all liabilities, penalties, fines, forfeitures, demands, claims, causes of action, suits, and costs and expenses incidental thereto, (including cost of defense, settlement, and reasonable attorney's fees), which any or all of them may hereafter suffer, incur, be responsible for or pay out as a result of bodily injuries (including death) to any person, damage (including loss of use) to any property (public or private), contamination of or adverse effects on the environment, or any violation or alleged violation of statutes, ordinances, orders, rules or regulations of any governmental entity or agency, directly or indirectly caused by, or arising out of breach of any warranties by Disposer, or any negligent or willful act or omission of Disposer, its employees or subcontractors in the performance of this Agreement.

The Generator agrees to indemnify and save harmless Disposer, its present and future officers, directors, employees, agents, subcontractors and assignees, from and against any and all liabilities, penalties, fines, forfeitures, demands, claims, causes of action, suits, and costs and expenses incidental thereto, (including cost of defense, settlement, and reasonable attorney's fees), which any or all of them may hereafter suffer, incur, be responsible for or pay out as a result of bodily injuries (including death) to any person, damage (including loss of use) to any property (public or private), contamination of or adverse effects on the environment, or any violation or alleged violation of statutes, ordinances, orders, rules or regulations of any governmental entity or agency, directly or indirectly caused by, or arising out of breach of any warranties by the Generator, or any negligent or willful act or omission of Generator, its employees or agents in the performance of this Agreement.

18. INSURANCE. Disposer shall procure and maintain, at its expense, during the term of this Agreement, at least the following insurance:

	COVERAGE	LIMITS
(a)	Worker's Compensation	Statutory
(b)	Employer's Liability	$500,000 each occurence
(c)	Public Liability (bodily injury & property damage)	$15,000,000 combined single limit
(d)	Automobile Liability (bodily injury & property damage)	$15,000,000 combined single limit

Public Liability Insurance shall include coverage for completed operations and contractual liability under this Agreement with respect to sudden and accidental occurrences.

Each contract of insurance, and certificate of insurance, shall provide that said insurance shall not be cancelled or materially altered until at least ten (10) days after written notice is received by the Generator. Disposer agrees to furnish insurance with the above requirements, to the Generator before Disposer commences work hereunder.

In the event Disposer is required by law to obtain environmental impairment liability insurance for non-sudden and accidental occurrences at the Disposal Facility, Disposer shall furnish Generator with a copy of the certificate of insurance provided to the regulatory agency imposing the insurance requirement.

19. CONFIDENTIALITY. Disposer and Generator shall treat as confidential property and not disclose to others during or subsequent to the term of this Agreement, except as is necessary to perform this Agreement, (and then only on a confidential basis satisfactory to both parties), any information (including any technical information, experience or data) regarding either party's plans, programs, plants, processes, products, costs, equipment, operations or customers which may come within the knowledge of the parties, their officers or their employees in the performance of this Agreement, without in each instance securing the prior written consent of the other party.

Disposer shall also treat as confidential and shall not disclose to others, except as required by law, information relating to the chemical composition of the Waste Products or the quantity of Waste Products delivered to it by Generator.

Generator shall also treat as confidential and shall not disclose to others, except as required by law, this form of Agreement and the Supplemental Information Document.

Nothing above, however, shall prevent either Disposer or Generator from disclosing to others or using in any manner information which either party can show:

(a) Has been published and has become part of the public domain other than by acts, omissions or fault of Disposer or Generator or their employees; or

(b) Has been furnished or made known to Disposer or Generator by third parties (other than those acting directly or indirectly for or on behalf of Disposer or

Generator) as a matter of legal right without restrictions on its disclosure; or

(c) Was in either party's possession prior to the disclosure thereof by Generator or Disposer to each other.

Provided, however, neither party shall release, or cause or allow the release of, information to the communications media, except as required by law, concerning the existence or terms of this Agreement or any Supplemental Information Document, including identification of the Generator of the Waste Products, identification of the Disposal Facility receiving the Waste Products, or the general description, characteristics or constituents of the Waste Products, without in each instance securing the prior written consent of the other party.

The foregoing obligations shall survive the termination or expiration of the Agreement.

20. WORK ON GENERATOR'S PREMISES. Generator agrees to provide Disposer, its employees and subcontractors a safe working environment for any work, in performance of this Agreement, which must be undertaken on premises owned or controlled by the Generator. While its employees or subcontractors are on Generator's premises, Disposer will maintain strict work discipline and effect its work in compliance with governmental laws or regulations pertaining to occupational safety and health. Disposer, its employees and subcontractors shall also comply with the Generator's safety procedures while on the Generator's premises, provided such procedures have been specified in the Supplemental Information Document or are attached thereto.

21. INSPECTIONS. The Generator shall have the right to inspect and obtain, at its expense, copies of all written licenses, permits or approvals, issued by any governmental entity or agency to Disposer or its subcontractors which are applicable to the performance of this Agreement and for which no claim of business confidentiality or trade secret is asserted; to inspect and test, at its own expense, transportation vehicles or vessels, containers or disposal facilities provided by Disposer; and to inspect the handling, loading, transportation, storage, treatment, processing or disposal operations conducted by Disposer in the performance of this Agreement. Such inspections are encouraged by Disposer, but shall not operate to relieve Disposer of its responsibility or liability under this Agreement.

22. EXCUSE OF PERFORMANCE. The performance of this Agreement, except for the payment of money for services already rendered, may be suspended by either party in the event the delivery or

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transportation of Waste Products by Generator, or transportation, storage, treatment, processing or disposal of Waste Products by Disposer are prevented by a cause or causes beyond the reasonable control of such party. Such causes shall include, but not be limited to, acts of God, acts of war, riot, fire, explosion, accident, flood, or sabotage; lack of adequate fuel, power, raw materials, labor or transportation facilities; governmental laws, regulations, requirements, orders or actions; breakage or failure of machinery or apparatus; national defense requirements; injunctions or restraining orders; labor trouble, strike, lockout or injunction (provided that neither party shall be required to settle a labor dispute against its own best judgement).

The party asserting a right to suspend performance under this Section must, within a reasonable time after he has knowledge of the effective cause, notify the other party of the cause for suspension, the performance suspended, and the anticipated duration of suspension. Upon receipt of such notice advising of a material or indefinite suspension of performance, and if such suspension substantially impairs the value of this Agreement to him, a party may, within a reasonable time (not to exceed thirty days), terminate this Agreement as provided in Section 13. If such notice of termination is not provided, this Agreement will lapse with respect to any performance suspended hereunder.

The party asserting a right to suspend performance hereunder shall advise the other party when the suspending event has ended, and when performance will be resumed.

Provided, if title to Waste Products has been transferred to Disposer, Disposer may not suspend performance of this Agreement with respect to such Waste Products; however, if a performance-suspending event occurs after Disposer has taken title to Waste Products but before completion of performance, Disposer may delegate such performance to any other persons lawfully permitted to transport, store, treat or dispose of the Waste Products pursuant to Section 23. In the circumstances described above, the Generator hereby consents to any necessary delegations for which it receives written notice from Disposer.

23. DELEGATION AND ASSIGNMENT. Disposer may at any time, with the prior written consent of Generator, which consent shall not be unreasonably withheld, delegate, orally or in writing, the performance of the work, or any portion thereof, which is by this Agreement undertaken by Disposer. Any such delegation shall not operate to relieve Disposer of its responsibilities hereunder and, notwithstanding any such delegation, Disposer shall remain obligated to the Generator in these undertakings.

Either party may, at any time, upon written notice to the other party, assign its rights under this Agreement.

24. INDEPENDENT CONTRACTOR. Disposer is and shall perform this Agreement as an independent contractor, and as such, shall have and maintain complete control over all of its employees, agents, and operations. Neither Disposer nor anyone employed by it shall be, represent, act, purport to act or be deemed to be the agent, representative, employee or servant of the Generator.

25. NOTICE. Any notice, communication or statement required or permitted to be given hereunder shall be in writing and deemed to have been sufficiently given when delivered in person or by registered or certified mail, postage prepaid, return receipt requested, to the address of the respective party below:

GENERATOR: Time Oil Company
12005 N. Burgard Road
Portland, Oregon 97203

DISPOSER: CHEM-SECURITY SYSTEMS, INC.
P.O. Box 1269
Portland, Oregon 97207-1269

Either party may, by notice to the other, change the addresses and names above given.

26. ENTIRE AGREEMENT. This Agreement represents the entire understanding and agreement between the parties hereto relating to the transportation, storage, treatment, processing and disposal of Waste Products and supersedes any and all prior agreements, whether written or oral, that may exist between the parties regarding same. No terms, conditions, prior course of dealings, course of performance, usage of trade, understandings, purchase orders, or agreement purporting to modify, vary, supplement or explain any provision of this Agreement shall be effective unless in writing, signed by representatives of both parties authorized to amend this Agreement.

In no event shall the preprinted terms or conditions found on any Disposer or Generator purchase or work order be considered an amendment or modification of this Agreement, even if such documents are signed by representatives of both parties: such preprinted terms or conditions shall be considered null and of no effect.

27. WAIVER. Any waiver by either party of any provision or condition of this Agreement shall not be construed or deemed to be a waiver of any other provision or condition of this Agreement, nor a waiver of a subsequent breach of the same provision or condition, unless such waiver be so expressed in writing and signed by the party to be bound.

28. MISCELLANEOUS. The validity, interpretation and performance of this Agreement shall be governed and construed in accordance with the laws of the State specified in the Supplemental Information Document.

All paragraph headings herein are for convenience only and are in no way to be construed as part of this Agreement or as a limitation of the scope of the particular sections to which they refer.

In the event of a conflict between the terms or conditions of this Agreement and those of the Supplemental Information Document, the terms and conditions of the Supplimental Information Document shall control.

29. SEPARABILITY. If any Section, subsection, sentence or clause of this Agreement shall be adjudged illegal, invalid or unenforceable, such illegality, invalidity or unenforceability shall not affect the legality, validity or enforceability of the Agreement as a whole or of any Section, subsection, sentence or clause hereof not so adjudged.

30. The covenants and agreements contained in this Agreement shall apply to, inure to the benefit of and be binding upon the parties hereto and upon their respective heirs, executors, administrators, assigns and successors in interest.

IN WITNESS WHEREOF, the parties have caused this Agreement to be executed by their duly authorized representatives as of the day and year first above written.

DATE: _____

Time Oil Company

By: _____

Title: _____

CHEM-SECURITY SYSTEMS, INC.

By: _____

Title: Roger E. Nelson
District Manager

TOLS002901

BZTO104(e)039722

EXHIBIT A

SUPPLEMENTAL INFORMATION DOCUMENT: NUMBER 85-001

This Document supplements, and is part of, that certain "Waste Transportation and Disposal Agreement," (hereinafter "the Agreement"), entered into by and between Time Oil Company, (hereinafter "the Generator"), and CHEM SECURITY SYSTEMS, INC., (hereinafter "Disposer"), on May 24, 1985. The provisions of this Document shall be incorporated into the Agreement.

1. DESCRIPTION OF WASTE PRODUCTS. The "Waste Products", to which the Agreement refers, are described in the "Generator's Waste Material Profile Sheet," Code Designation E13588, attached hereto and made part hereof.

   Containers are to be provided by Generator according to the following specifications:
   lined and plastic wrapped dump truck

2. TENDER OF WASTE PRODUCTS. Generator shall tender or deliver the above Waste Products to Disposer as follows:

   (a) Quantity of Waste Products to be Tendered Over Term.

   (1) Estimated.
   Volume listed in Section "F" of referenced Generator's Waste Material Profile Sheet(s) or in addenda for each profile sheet.

   (2) Guaranteed (if applicable).

   Not Applicable.

   (b) Maximum/Minimum Quantity of Waste Products Per Tender (if tendered in installments).

   Maximum: same as quantity listed in Section 2(a) above. or in addendum to waste profile sheet.

   (c) Place of Tender.
   Arlington, Oregon

   (d) Time and Frequency of Tender.

   8:00 a.m. to 4:30 p.m. weekdays, except holidays, weather permitting.

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c 1984, WASTE MANAGEMENT, INC.
(Revised 10/10/84)

(e) Manner of Tender (including notification to Disposer). Uniform hazardous waste manifest. No free liquid may be present in waste.

3. WORK RULES/PROCEDURES AT GENERATOR'S PREMISES. Any specific rules or procedures required by Generator for workers on its premises must be noted here, or attached hereto and initialed by both parties.

4. LOADING AND TRANSPORTATION. The Waste Products are to be loaded (or stowed) on vehicles (or vessels) by Generator _____, and transported to the Storage Facility/Disposal Facility (circle one) by Generator _____. If the Waste Products are first transported to a Storage Facility, they will be reloaded (or stowed) on vehicles (or vessels) by N/A _____, and transported to the Disposal Facility by N/A _____. If Disposer is to provide transportation the following special transportation requirements (if any) shall apply, pursuant to the Generator's direction:

(a) Vehicles or Vessels.

dump truck

(b) Routes.

Not Applicable.

(c) Hours of Transportation.

Not Applicable.

5. STORAGE FACILITY. Disposer shall store the Waste Products at the following storage facility for a period not to exceed ___ days, from which facility the Waste Products will then be removed to the Disposal Facility: Not Applicable

(a) Name/Address of Storage Facility:

(b) Name/Address of Facility Permittee:

(c) Permit Number(s)/Initiation and Termination Date(s):

(d) Permitting Authority(ies):

6. DISPOSAL FACILITY. Disposer shall dispose of the above Waste Products at the following disposal facility (or facilities):

(a) Name/Address of Facility (Facilities):

The Arlington Facility
Star Route
Arlington, Oregon 97812

(b) Name/Address of Facility Permittee:

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

(c) Permit Number(s)/Initiation and Termination Date(s):

State of Oregon - HW-1, initiated Aug. 26, 1980; continues pending issuance of new permit.

(d) Permitting Authority(ies):

Oregon Department of Environmental Quality.

7. DISPOSAL METHODS: Disposer shall utilize one or more of the following methods for the disposal of the Waste Products:
secure burial

8. EMERGENCY SERVICES: Disposer shall provide emergency transportation, storage or disposal services, with respect to the above Waste Products, pursuant to the following:
As required by site license or at Generator's request

9. RECLAMATION AND/OR SALE OF WASTE PRODUCTS. Disposer is authorized to reclaim, recover and sell, distribute or use the Waste Products, their components or residues, except as specified below:

Not Applicable.

10. COMPENSATION. The Generator shall compensate Disposer as follows:

(a) For Transportation, Storage and Disposal of Waste Products.

(b) For Transportation and Disposal of Waste Products. Per ton:

	Before July 1, 1985	Beginning July 1, 1985
250 tons per yr.	$110	$116
250-1500 tons per yr.	$100	$106

Fed. tax is $213 per dry wt. ton. Minimum billing is $200 per tender.

(c) For Disposal of Waste Products Only.

(d) Emergency Services.

Time and mateirals basis

(e) Measurement of Waste Products. Waste Products shall be measured by Disposer for the purpose of computing fees hereunder, at the time and place, and in the manner, as follows: Upon acceptance at the Arlington facility using:

facility scale

(f) Generator's Billing Address. Disposer shall submit its statements to:

Time Oil Company
12005 N. Burgard Road
Portland, Oregon 97203

(g) Disposer Billing Address. Disposer will issue its billings from the following:

CHEM-SECURITY SYSTEMS, INC.
STAR ROUTE
ARLINGTON, OREGON 97812

11. TERM. The term of the Agreement, with respect to the Waste Products covered in this Document, shall be as follows:

This Agreement shall commence on May 24, 1985 and shall remain in effect until terminated by either party with or without cause by thirty (30) days' advance written notice to the other party.

12. LAW TO GOVERN. The Agreement and this Supplemental Information Document shall be governed and construed in accordance with the laws of the State of Oregon.

13. MISCELLANEOUS CONDITIONS.

By their signatures hereto, the parties agree that this Supplemental Information Document shall be considered an attachment to, and part of, that certain "Waste Transportation and Disposal Agreement" identified above.

Date: _____

Time Oil Company

By: _____

Title: _____

CHEM-SECURITY SYSTEMS, INC.

By: _____

Title: Roger E. Nelson
District Manager

TOLS002906

(Revised 10/10/84)

EXHIBIT B

AUTHORIZED SIGNATORIES

This Exhibit, being attached to, and forming part of that certain "Waste Transportation and Disposal Agreement" entered into by the undersigned parties on May 24, 1985, establishes the identities of those persons authorized to execute Supplemental Information Documents on behalf of the parties, to-wit:

FOR GENERATOR:

FOR DISPOSER:

Regional Sales Manager	up to $ 50,000
District Manager or National Accounts Manager	up to $ 300,000
Regional Vice President or Regional Manager	up to $ 500,000
Senior Vice President	up to $1,000,000
President	over $1,000,000

Time Oil Company

By: _____

Title: _____

Chem-Security Systems, Inc.

By: _____

Title: _____

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(Revised 10/10/84)

TOLS002907

BZTO104(e)039728

CHEM-SECURITY SYSTEMS, INC. DISPOSAL REQUEST

RECEIVED MAY 15 1985

REFERENCE 15539 WASTE PROFILE SHEET NO.

SUBJECT WASTE STREAM NAME: PCP contaminated soil

PHYSICAL STATE: LIQUID ☐ SOLID ☒ SEMISOLID ☐

U242 EPA WASTE CODE

GENERATOR NAME: TIM OIL CO. ORD009597543 EPA GENERATOR I.D. NUMBER

FACILITY ADDRESS	MAILING ADDRESS
Tim Oil Co. 12005 N. Burgard Rd. Portland, Or 97203-6493	Same

GENERATOR CONTACT PERSON NAME: John P. Denham Tel. No. 206 285-2400

Review and approval of the subject waste stream is requested for disposal at the Chem-Security Arlington site. The complete waste description is detailed on the attached waste profile sheet and is summarized below.

DESCRIPTION CHEMICAL COMPOSITION	PROCESS/OPERATION GENERATING WASTE
Contaminated soil (pentechlorophenol, tetrachlorophenol other chlorinated chemicals) non-contaminated soil	Clean up

WASTE VOLUME REQUESTED FOR DISPOSAL: 260 cubic yards (NOW) ? (ANNUAL)

Based on the Waste Characteristics, Chem-Security proposes to Dispose of the Waste By (Describe Treatment/Disposal Procedure)

Landfill by Procedure 4.

No free liquids allowed.

C.C. CSSI, Arlington, OR
C.C. CSSI, Bellevue, WA
CSSI, Portland, OR
Generator

SUBMITTED BY: J. Craig McKenzie
NAME (PRINT)

SIGNATURE

4-29-85
DATE

FOR OREGON DEPARTMENT OF ENVIRONMENTAL QUALITY USE ONLY

THE SUBJECT WASTE STREAM HAS BEEN REVIEWED FOR DISPOSAL AT THE ARLINGTON SITE AND IS HEREBY:

State of Oregon
Department of Environmental Quality
APPROVED
On May 14, 1985
By Claudia L. Chung
Solid Waste Division
Hazardous Waste Operations

COMMENTS:

TOLS002908

BZTO104(e)039729

Waste Management, Inc.

GENERATOR'S WASTE MATERIAL PROFILE SHEET

TSDR E13588

PO #[illegible] 2/20/85

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 3

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 ____ %

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

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

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

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)	-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

TOLS002909

☐ ADDITIONAL PAGE(S) ATTACHED

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: 10000 [signature]

TITLE: Environmental Manager

DATE: February 19, 1985

BZTO104(e)039730

"Imagineering a cleaner world"

RIEDEL
ENVIRONMENTAL SERVICES, INC.

☑ 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 Blvd
Chesterfield, MO 63017
(314) 532-7660

☐ San Francisco Division
230 Cutting Blvd
Richmond, CA 94802
(415) 234-7400
or (415) 398-5351

☐ Seattle Division
901 Fairview Ave. No.
P.O. Box 1730
Seattle, WA 98111
(206) 622-2900

May 18, 1985

Mr. Neil Wallis
Time Oil Co.
P. O. Box 03137
12005 N. Burgard
Portland, OR 97203

Dear Neil:

The cost breakdown on our bid for sampling and analysis of PCP contaminated soil at your facility is as follows:

Drilling	$ 7,544
Analytical	4,956
Labor	3,985
Other Direct	2,115
	$18,600

If you have any questions, please don't hesitate to contact me.

Sincerely,

John Ruddick
Microbiologist

JR:kps

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ENCL. 3

CONTRACT

The parties to this agreement are Time Oil Co. (hereinafter termed owner) and Northwest Vacuum Truck Service, Inc. (hereinafter termed contractor) whereas:

Owner has a volume of earthen material located in Portland, Oregon and owner is desirous of having that material removed.

Contractor is willing to undertake that task upon the terms and conditions set forth below.

Therefore, in consideration of the agreements contained herein, the parties agree as follows:

1. Contractor agrees to remove the material from its present location, load it into suitable transportation vehicles and transport it to a disposal facility approved by the Oregon Department of Environmental Quality.

2. The material to be removed by contractor is generally set forth on the drawing labeled exhibit 1, attached hereto and incorporated by this reference. Prior to work under this agreement, a representative of owner will meet with contractor at the site and the extent of the material to be removed will be more specifically delineated at that time.

3. The commencement date for work will be February 21, 1985 or such other date as may be agreed upon by the parties following coordination with the Department of Environmental Quality and the authorized disposal facility. Work is intended to be divided into two phases. First phase consists of material removal to an agreed upon depth. Then there will be a several day delay while additional tests are conducted to determine if further removal is required. If so, phase two removal actions are to be effected. Should there be any need to continue removal, above process is to be repeated until ultimate removal is accomplished.

4. For each day worked, owner agrees to pay contractor the sum of 1200 dollars for labor and equipment pertaining to soil removal plus 600 dollars for each truckload of soil transported. A day worked shall be one wherein earth moving equipment, necessary to perform the work, has been utilized to the fullest, reasonably possible, extent for a period of not less than 8 hours. Truck shall be a standard 18 yard rated capacity vehicle. Payment will be made upon completion of the work and receipt by owner of written acknowledgement from the approved disposal facility that all material removed and transported by contractor has been received at that facility.

5. Contractor indemnifies and agrees to defend and hold owner harmless from any and all costs, claims, liabilities and damages arising out of contractors work under this contract.

6. Contractor hereby declares that it is engaged as an independent contractor and agrees to perform the work as independent contractor and not as an employee of owner. Contractor has and hereby retains the right to exercise full control and supervision of the work and full control over the employment, direction, compensation and discharge of all persons assisting in the work.

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Encl. 4

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7. Contractor agrees at its expense to obtain all governmental permits, licenses and approvals and comply with all laws, rules, regulations and requirements now or hereafter existing necessary for the accomplishment of the work to be performed by contractor under this agreement.

8. Contractor especially acknowledges its understanding that portions of the material to be removed, transported and disposed of under this agreement have been found to contain commercial pentachlorophenol in concentrations ranging from 0 ppm to 1820 ppm. Contractor agrees to take all necessary precautions for the protection of persons and property that may be required or prudent in the removal and transportation of that material.

9. Contractor agrees to maintain workmans' compensation insurance in the form and amounts required by the laws of the state of Oregon and broad form comprehensive public liability insurance with minimum limits of $1 million per person and $1 million per accident for bodily injury and $500,000 per accident for property damage. Contractor shall promptly deliver to owner certificates of said insurance, naming owner as an additional insured before commencing work and such certificate shall provide that said insurance shall not be cancelled prior to 30 days by written notice to owner.

10. Contractor agrees that before commencement of any work hereunder, it will promptly furnish owner with a faithful performance bond in an amount to 53,000 dollars guaranteeing completion of all work and performance of all obligations undertaken by contractor under this agreement.

11. The nature, validity and interpretation of this contract shall be governed by the laws of the state of Washington.

Dated this 19th day of February 1985.

OWNER
Time Oil Co.

by John P. Denham
John P. Denham
Environmental Manager

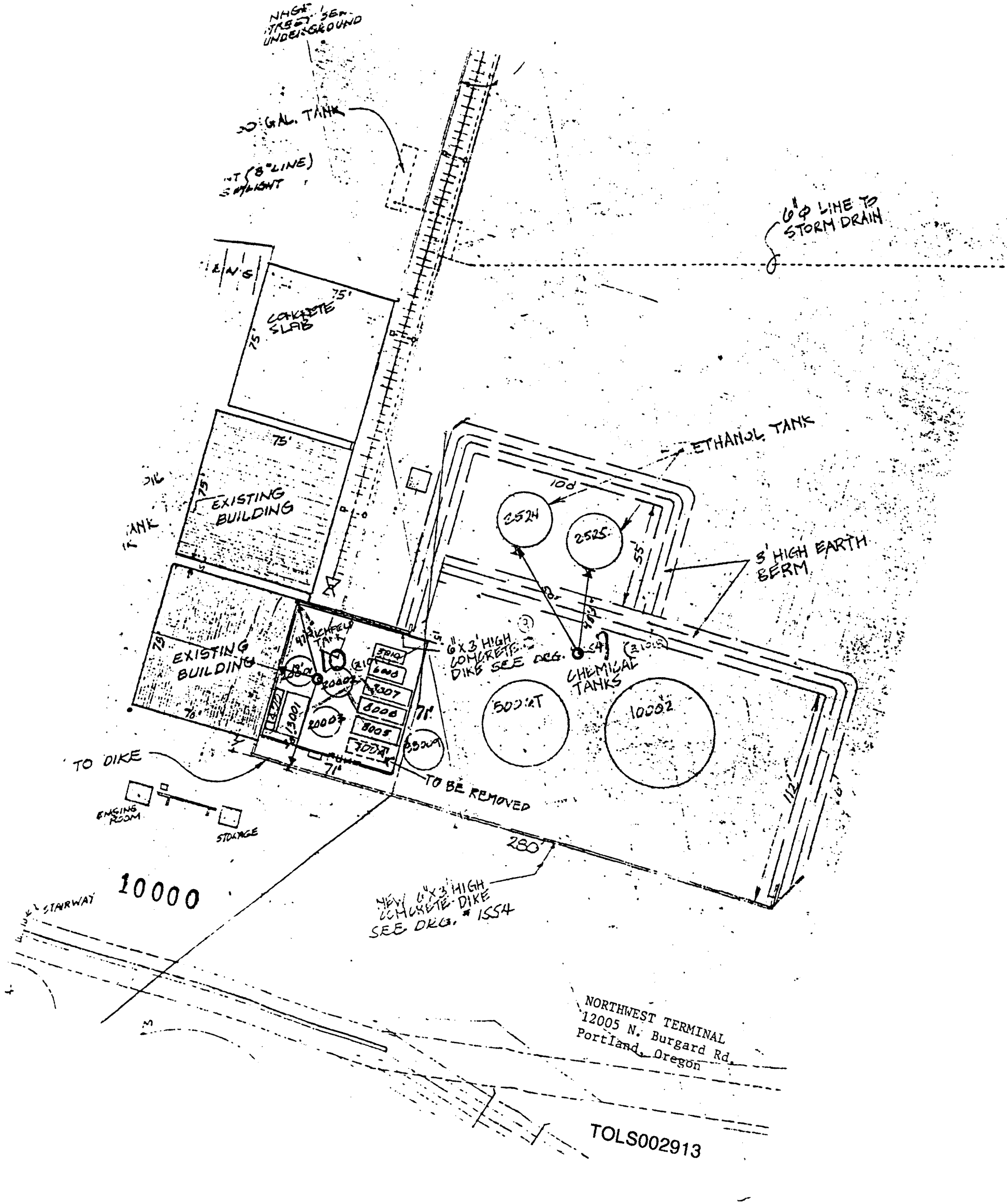
CONTRACTOR
Northwest Vacuum Truck Service Inc.

by John H. Somes
John H. Somes
General Manager

10000

TOLS002912

BZTO104(e)039733



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Encl. 5

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SAIF CORPORATION

INSURING COMPANY:
☐ SAIF CORPORATION
☐ SAIF CORPORATION OF OREGON

Certificate of Coverage

Date of Issue: FEBRUARY 25, 1985

This certifies that NW VACUUM TRUCK SERVICE INC., *Policy No.* 426329, *is insured with SAIF, with a policy period ending date of* JUNE 30, 1985, *and is complying with the Oregon Workers' Compensation Law to provide for payment of compensation to subject Oregon workers.*

TO: TIME OIL CO,
2737 W. COMMODORE WAY
SEATTLE, WASHINGTON 98199

ATTN: JOHN DENHAM

Michael J. Dora

Michael J. Dora
Director
Underwriting Division

F1220 1/84

BZTO104(e)039735

TOLS002914

Marsh & McLennan

Marsh & McLennan, Incorporated
Marsh & McLennan Building
720 Olive Way
Seattle, Washington 98101
Telephone (206) 223-1240

March 5, 1985

Time Oil Company
2737 West Commodore Way
Seattle, Washington 98199

Attention: John Denham

Insured Northwest Vacuum Truck Service, Inc.

Company and Policy No. Safeco

Various - See attached certificate

Coverage

Location Post Office Box 24402
Seattle, Washington 98124

( ) Policy enclosed

(xx) Certificate ~~xxxxxxxxxxxxxxx~~ enclosed

( ) Premium invoice enclosed for

( ) Premium invoice will be mailed to you by the Insuror

( ) Mortgage or Loss Payable clause enclosed

( ) Contract of Sale clause enclosed

( ) Please return for cancellation, Policy No.

( )

Sincerely yours,

MARSH & McLENNAN, INCORPORATED

By Jackie Starr
Account Representative

Enclosures
mf
cc: Northwest Vacuum Truck Service, Inc.
Attn Mr. Steve Skeel

TOLS002915

10000

Certificate of Insurance

acord

THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER. THIS CERTIFICATE DOES NOT AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES LISTED BELOW.

NAME AND ADDRESS OF AGENCY

MARSH & McLENNAN, INCORPORATED
MARSH & McLENNAN BUILDING
720 OLIVE WAY
SEATTLE, WASHINGTON 98101
(206) 223-1240

NAME AND ADDRESS OF INSURED

NORTHWEST VACUUM TRUCK SERVICE, INC.
POST OFFICE BOX 24402
SEATTLE, WASHINGTON 98124

COMPANIES AFFORDING COVERAGES

COMPANY LETTER A: SAFECO
COMPANY LETTER B:
COMPANY LETTER C:
COMPANY LETTER D:
COMPANY LETTER E:

This is to certify that policies of insurance listed below have been issued to the insured named above and are in force at this time. Notwithstanding any requirement, term or condition of any contract or other document with respect to which this certificate may be issued or may pertain, the insurance afforded by the policies described herein is subject to all the terms, exclusions and conditions of such policies.

COMPANY LETTER	TYPE OF INSURANCE	POLICY NUMBER	POLICY EXPIRATION DATE	Limits of Liability in Thousands (000)		
					EACH OCCURRENCE	AGGREGATE
A	**GENERAL LIABILITY** [X] COMPREHENSIVE FORM [X] PREMISES—OPERATIONS [X] EXPLOSION AND COLLAPSE HAZARD [X] UNDERGROUND HAZARD [X] PRODUCTS COMPLETED OPERATIONS HAZARD [X] CONTRACTUAL INSURANCE [X] BROAD FORM PROPERTY DAMAGE [X] INDEPENDENT CONTRACTORS [X] PERSONAL INJURY	CP 842833	05/30/85	BODILY INJURY	$	$
				PROPERTY DAMAGE	$	$
				BODILY INJURY AND PROPERTY DAMAGE COMBINED	$ 500,	$ 500,
				PERSONAL INJURY		$
A	**AUTOMOBILE LIABILITY** [X] COMPREHENSIVE FORM [X] OWNED [X] HIRED [X] NON-OWNED	BA 842833 A	05/30/85	BODILY INJURY (EACH PERSON)	$	
				BODILY INJURY (EACH ACCIDENT)	$	
				PROPERTY DAMAGE	$	
				BODILY INJURY AND PROPERTY DAMAGE COMBINED	$ 500,	
A	**EXCESS LIABILITY** [X] UMBRELLA FORM [ ] OTHER THAN UMBRELLA FORM	UL 842833	05/30/85	BODILY INJURY AND PROPERTY DAMAGE COMBINED	$1,000,	$1,000,
	WORKERS' COMPENSATION and EMPLOYERS' LIABILITY			STATUTORY		
					$	EACH ACCIDENT
	OTHER					

DESCRIPTION OF OPERATIONS/LOCATIONS/VEHICLES

As respects the operations of the Insured.

TOLS002916

Cancellation: Should any of the above described policies be cancelled before the expiration date thereof, the issuing company will endeavor to mail 20 days written notice to the below named certificate holder, but failure to mail such notice shall impose no obligation or liability of any kind upon the company.

ACCOUNT EXECUTIVE: Jo Ann Crook

Time Oil Company
2737 West Commodore Way
Seattle, Washington 98199
Attention: John Denham

10000

DATE ISSUED March 5, 1985 (mf)

MARSH & McLENNAN, INCORPORATED

By: John C. Day
AUTHORIZED REPRESENTATIVE
(John C. Day)

ACORD 25 (1-79)

BZTO104(e)039737

CONTRACT BOND

Bond No. H 34156

KNOW ALL MEN BY THESE PRESENTS, That we, NORTHWEST VACUUM TRUCK SERVICE, INC.

5555 NORTH CHANNEL - BLDG. 43 - PORTLAND, OREGON 97217

called the Principal, and HERITAGE INSURANCE COMPANY OF AMERICA, A ILLINOIS corporation, called the Surety, are held and firmly bound unto TIME OIL CO.

called the owner in the sum of FIFTY THREE THOUSAND AND NO/100THS ---------- Dollars ($ 53,000.00**), for the payment whereof said Principal and Surety bind themselves firmly by these presents.

WHEREAS, the Principal has, by written Agreement, dated MARCH 12, , 19 85, entered into a Contract with the Owner for REMOVAL OF EARTHEN MATERIAL OWNED BY OWNER FROM ITS PRESENT LOCATION, LOAD IT INTO SUITABLE TRANSPORTATION VEHICLES AND TRANSPORT IT TO A DISPOSAL FACILITY APPROVED BY THE OREGON DEPARTMENT OF ENVIRONMENTAL QUALITY.

a copy of which is by reference made a part hereof;

NOW, THEREFORE, THE CONDITION OF THIS OBLIGATION IS SUCH, That if the Principal shall faithfully perform the Contract, and indemnify and save harmless the Owner from all loss, cost or damage which Owner may suffer by reason of any lien arising out of claim for labor or materials utilized in the construction under said Contract, then this obligation shall be void; otherwise to remain in full force and effect.

Signed and sealed this 12TH day of MARCH, 19 85.

NORTHWEST VACUUM TRUCK SERVICE, INC.
Principal

By: S M Skeel

HERITAGE INSURANCE COMPANY OF AMERICA

By: J. C. Baumann
J. C. BAUMANN
Attorney-in-fact

10000

ENCL. 6

TOLS002917

BZTO104(e)039738

HERITAGE INSURANCE COMPANY OF AMERICA

LINCOLNWOOD, ILLINOIS

Power of Attorney

PRINCIPAL NORTHWEST VACUUM TRUCK SERVICE, INC. EFFECTIVE DATE MARCH 12, 1985

DBA _____ AMOUNT OF BOND $ 53,000.00

POWER NO. H 34156

KNOW ALL MEN BY THESE PRESENTS: That the Heritage Insurance Company, a Corporation in the State of Illinois, having its principal office in Lincolnwood, Illinois, pursuant to the following resolution, adopted by the Board of Directors of the said Company on the 9th day of March, 1979, to wit:

"The President, or any Vice-President, or other officer designated by the Board of Executive Committee shall have authority, severally, to make, execute and deliver a power of attorney constituting as Attorney-in-Fact such persons, firms or corporations as such officers may select from time to time."

does hereby make, constitute and appoint J.T. Kohoutek, C.J. Huffman and/or J.C. Baumann of Seattle in the State of Washington, its true and lawful attorney(s)-in-fact, with full power and authority hereby conferred in its name, place and stead, to sign, execute, acknowledge and deliver in its behalf, and its act and deed, as follows:

The obligation of the Company shall not exceed the sum of five hundred thousand ($500,000.00) dollars.

and to bind Heritage Insurance Company thereby as fully and to the same extent as if such bond or undertaking was signed by the duly authorized officers of the Heritage Insurance Company, and all the acts of said Attorney(s) pursuant to the authority herein given, are hereby ratified and confirmed.

IN WITNESS WHEREOF, the Heritage Insurance Company has caused these presents to be signed by its President and/or its Vice-President, and its Corporate Seal to be hereto affixed.

HERITAGE INSURANCE COMPANY OF AMERICA

SEAL

Vincent M. Giacinto, President

State of Illinois)
County of Cook) SS:

On this 9th day of March, 1979, before the subscriber, a Notary Public of the State of Illinois in and for the County of Cook duly commissioned and qualified, came V. M. Giacinto of the Heritage Insurance Company, to me personally known to be the individual and officer described herein, and who executed the preceding instrument, and acknowledged the execution of the same, and being by me duly sworn, deposed and said, that he is the officer of said Company aforesaid, and that the seal affixed to the preceding instrument is the Corporate Seal of said Company, and the said Corporate Seal and signature as an officer were duly affixed and subscribed to the said instrument by the authority and direction of the said Corporation, and that the resolution of said Company, referred to in the preceding instrument, is now in force.

IN TESTIMONY WHEREOF, I have hereunto set my hand, and affixed my official seal at Lincolnwood, Illinois, the day and year above written.

NOTARY PUBLIC COOK COUNTY, ILL.

Joseph D. Udoni
Notary Public

JOSEPH D. UDONI
NOTARY PUBLIC, State of Illinois
Qualified in State of Illinois
Commission Expires March 4, 1984

State of Illinois)
County of Cook) SS:

CERTIFICATE

I, the undersigned, Secretary of *HERITAGE INSURANCE CO.* a stock corporation of the State of Illinois, DO HEREBY CERTIFY that the foregoing and attached Power of Attorney and Certificate of Authority remains in full force and has not been revoked; and furthermore, that the Resolution of the Board of Directors, as set forth in the Certificate of Authority, are now in force.

Signed and Sealed at the Home Office of the Company, at Lincolnwood, Illinois. Dated this 12TH day of MARCH A.D., 19 85

SEAL

Carol A. Faills
Secretary

10000

H-73

TOLS002918

BZTO104(e)039739

REC' T.O.C. PORTLAND 5/16/85

CHEM-SECURITY SYSTEMS, IN(DISPOSAL REQUEST

REFERENCE: E13588
WASTE PROFILE SHEET NO.

SUBJECT:

WASTE STREAM NAME: PCP contaminated soil

PHYSICAL STATE
LIQUID ☐ SOLID ☒ SEMISOLID ☐

U242
EPA WASTE CODE

GENERATOR NAME: TIME OIL CO.

ORD009597543
EPA GENERATOR I.D. NUMBER

FACILITY ADDRESS	MAILING ADDRESS
Time Oil Co.	Same
12005 N. Burgard Rd.	
Portland, Or	

GENERATOR CONTACT PERSON NAME: John P. Denham Tel. No. (206 285-2400

Review and approval of the subject waste stream is requested for disposal at the Chem-Security Arlington site. The complete waste description is detailed on the attached waste profile sheet and is summarized below.

DESCRIPTION CHEMICAL COMPOSITION	PROCESS/OPERATION GENERATING WASTE
Contaminated soil (pentachlorophenol, tetrachlorophenol other chlorinated chemicals) non-contaminated soil	Clean up

WASTE VOLUME REQUESTED FOR DISPOSAL: 260 cubic yards (NOW) (ANNUAL)

Based on the Waste Characteristics, Chem-Security proposes to Dispose of the Waste By (Describe Treatment/Disposal Procedure)

Landfill by Procedure 4.

No free liquid allowed.

C.C. CSSI, Arlington, OR
C.C. CSSI, Bellevue, WA
CSSI, Portland, OR
Generator

SUBMITTED BY: J. Craig McKenzie
NAME (PRINT)
J. Craig McKenzie
SIGNATURE
4-29-85
DATE

FOR OREGON DEPARTMENT OF ENVIRONMENTAL QUALITY USE ONLY

THE SUBJECT WASTE STREAM HAS BEEN REVIEWED FOR DISPOSAL AT THE ARLINGTON SITE AND IS HEREBY:

State of Oregon
Department of Environmental Quality
APPROVED
On May 14 1985
By Edward L. Chiang
Solid Waste Division
Hazardous Waste Operations
10000

RE: HW4.10 I

COMMENTS:

TOLS002919

CSSI-6000 (1/85)

BZTO104(e)039740

CHEM-SECURITY SYSTEMS, INC.

NATIONAL RES' ISE CENTER 1-800-424-8802
OREGON ACCID NT RESPONSE CENTER 1-800-452-0311

Form Approved. OMB No. 2000-0404, Expires 7-31-

UNIFORM HAZARDOUS WASTE MANIFEST

1. Generator's US EPA ID No. | Manifest Document No. 06769

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

3. Generator's Name and Mailing Address

4. Generator's Phone ( )

A. State Manifest Document Number

B. State Generator's ID

5. Transporter 1 Company Name | 6. US EPA ID Number

C. State Transporter's ID

D. Transporter's Phone

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 No.
a.						
b.						
c.						
d.						

J. Additional Descriptions for Materials Listed Above
a.
b.
c.
d.

K. Handling Codes for Wastes Listed Above

15. Special Handling Instructions and Additional Information **Waste Profile Sheet Number(s)**
a.
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 | Signature | Date Month Day Year

17. Transporter 1 Acknowledgement of Receipt of Materials

Printed/Typed Name | Signature | Date Month Day Year

18. Transporter 2 Acknowledgement of Receipt of Materials

Printed/Typed Name | Signature | Date Month Day Year

19. Discrepancy Indication Space

TOLS002920

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

Printed/Typed Name | Signature | Date Month Day Year

GENERATOR

TRANSPORTER

FACILITY

10000

ORIGINAL RETURN TO GENERATOR

BZTO104(e)039741

4.0 MANIFEST REQUIREMENTS

When hazardous waste is transported from the generator's location to the Arlington Facility, the Oregon DEQ, U.S. DOT and EPA require proper manifesting. Beginning September 20, 1984, these agencies required use of a uniform hazardous waste manifest form (Exhibit 7a) and, where necessary, a continuation sheet (Exhibit 7b).

Each load of chemical waste shipped to the Arlington Facility must be accompanied by one or more properly completed uniform manifests. All copies of manifests and continuation sheets must be legible. If manifest forms are needed by the generator, treater or transporter, they can be obtained by contacting the appropriate Chem-Security Systems sales office. When the transporter arrives at the Arlington Facility, the manifest(s) and other shipping paper(s) must be presented to the site receiving clerk for verification.

4.1 WHEN TO USE THE CONTINUATION SHEET

The continuation sheet must be used if:

- o More than two transporters are used to transport the waste, or;
- o More space is required for U.S. DOT description and related information in Section 11 of the manifest.

4.2 GENERATOR SUPPLIED INFORMATION REQUIRED ON MANIFESTS

To meet all the applicable current regulations on manifesting of hazardous waste to the Arlington Facility, and to help us efficiently and speedily handle waste loads, the items described below are needed on a properly completed manifest. A sample completed manifest is shown in Exhibit 7c. States other than Oregon may require other information (see Exhibit 7d).

Continuation Sheet Section #	Manifest Section #	
21	1	Generator's EPA identification number and annually unique manifest document number (preprinted on CSSI supplied manifest forms, must be added on continuation form).
22	2	Number of pages used (manifest) and page number of this sheet (continuation sheet).
23	3-4	Generator's name, mailing address (address where manifest records are kept), and telephone number. The continuation sheet requires name only.
24-27	5-8	Name and EPA identification number of each transporter.
O and Q	D and F	Phone number of each transporter.
None	9, 10, H	Name, address, EPA identification number, and phone number of the designated disposal facility (preprinted on manifests and continuation sheets provided by CSSI).
28	11	DOT proper shipping name, hazard class, identification number (49 CFR Parts 172.101, 172.202, and 172.203); and, a. Designation of whether the waste is hazardous material (check "HM" column), or b. Designation, if the waste is a hazardous substance (write "RQ" instead of a check in the "HM" column) and listing of the

constituent making the waste a hazardous substance after the proper shipping name, if it is not part of the proper shipping name.

29 12 Enter the number of containers for each waste and the appropriate abbreviation from the table below for type of container.

DM = Metal drums, barrels, kegs
DW = Wooden drums, barrels, kegs
DF = Fiberboard or plastic drums, barrels, kegs
TP = Tanks portable
TT = Cargo tanks (tank trucks)
TC = Tank cars
DT = Dump truck
CY = Cylinders
CM = Metal boxes, cartons, cases (including roll-offs)
CW = Wooden boxes, cartons, cases
CF = Fiber or plastic boxes, cartons, cases
BA = Burlap, cloth, paper, or plastic bags

30-31 13-14 Enter the total quantity of waste at 13 and the unit of measure abbreviation from the table below at 14. The quantity should be as precise as possible.

G = Gallons (liquids only)
P = Pounds
T = Tons (2,000 pounds)
Y = Cubic yards
L = Liters (liquids only)
K = Kilograms
M = Metric tons (1,000 kg)
N = Cubic meters

TOLS002923

BZTO104(e)039744

R	I	EPA waste number (if the waste is hazardous under RCRA).
S	J	Oregon Department of Environmental Quality's approved waste description, per Generator's Waste Profile Sheet description - "Waste Name" and physical state.
32	15	Please enter Waste Profile Sheet number(s) here. If an alternate facility is designated, information and identification number must appear here. Generators may use this space to indicate special transportation treatment, storage or disposal information.
None	16	Generator's Certification. Generator must read, sign by hand, and date this section. Please include this person's title along with printed/ typed name in the space provided.

For each lab pack drum, an itemized list of each waste container placed in the drum showing waste description and volume, must be stapled to the manifest. This list should be readily identifiable with a specific drum through a drum numbering or other system.

For certain PCB wastes, the following additional information is required:

- o For any PCB article, the date each item was placed in storage for disposal should be written in Section 15 (this date must also appear on the article container).
- o For each less than 500 ppm PCB liquid container or transformer waste write in PCB concentration on the manifest in Section 15, and staple to the manifest a lab analysis signed by a qualified analyst.
- o For drained and flushed transformers, a statement that each unit was drained and flushed in accordance with 40 CFR 761 must be signed by a responsible representative of the generator and stapled to the manifest.

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TOLS002924

BZTO104(e)039745

- o For full transformers or empty ones requiring flushing at Arlington, if it is not possible for the generator to determine the exact gallonage of PCB transformers, a designation of "estimated" volume should be stated on the manifest.
- o For each container of PCB capacitors a list of manufacturer name, serial number, and KVAR for each capacitor inside must be stapled to the manifest.

4.3 TRANSPORTATION INFORMATION

Continuation Sheet #	Manifest Section #	
33-34	17-18	Enter the name of the person accepting on behalf of the transporter. That person must sign, acknowledging acceptance of the waste. Use 17 for first transporter, 18 for second, and use continuation sheet for additional transporters.

4.4 TSD SUPPLIED INFORMATION

Continuation Sheet Section #	Manifest Section #	
35	19	The authorized representative of the designated facility must note in this space any significant discrepancy between waste described and waste actually received (see Section 9.1).
None	20	The person accepting waste on behalf of the facility must acknowledge acceptance of the waste by signing and entering date of receipt.

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TOLS002925

BZTO104(e)039746

4.5 MANIFEST COPIES

The manifest consists of at least the number of copies which will provide the generator, each transporter, and the Arlington Facility with one copy for their records and an additional copy to be returned to the generator. On CSSI pre-printed manifest forms the use of each copy is designated at the bottom center. After the first transporter signs the manifest, the generator keeps one copy of the manifest and the remaining copies and the original remain with the transporter to accompany the shipment to the disposal facility or to another transporter or treater.

A signed copy of the manifest for loads of waste accepted at the Arlington Facility will be returned to the generator attached to the invoice for the waste shipment.

4.6 UNMANIFESTED WASTES

Wastes that arrive at the facility without manifests or approved Waste Profile Sheets may be returned to the generator as required under 40 CFR Part 262, State of Oregon requirements, and compliance policy.

CHEM-SECURITY SYSTEMS, INC.

EXHIBIT 7a

NATIONAL RESPONSE CENTER 1-800-424-8802
OREGON ACCIDENT RESPONSE CENTER 1-800-452-0311

Please print or type
(Form designed for use on elite (12-pitch) typewriter)

Form Approved. OMB No. 2050-0404 Expires 7-31-86

UNIFORM HAZARDOUS WASTE MANIFEST

1. Generator's US EPA ID No.	Manifest Document No. 01207	2. Page 1 of	Information in the shaded areas is not required by Federal law

GENERATOR

3. Generator's Name and Mailing Address

4. Generator's Phone ( )

A. State Manifest Document Number

B. State Generator's ID

5. Transporter 1 Company Name | 6. US EPA ID Number

C. State Transporter's ID

D. Transporter's Phone

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 | 10. US EPA ID Number

Chem-Security Systems, Inc.
Star Route
Arlington, Oregon 97812 | **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. Container No.	Type	13. Total Quantity	14. Unit Wt/Vol	EPA/I. Waste No.
a. NM					
b.					
c.					
d.					

J. Additional Descriptions for Materials Listed Above
a.
b.
c.
d.

K. Handling Codes for Wastes Listed Above

15. Special Handling Instructions and Additional Information **Waste Profile Sheet Number(s)**
a.
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 | Signature | Date: Month Day Year

TRANSPORTER

17. Transporter 1 Acknowledgement of Receipt of Materials

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

18. Transporter 2 Acknowledgement of Receipt of Materials

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

FACILITY

19. Discrepancy Indication Space

10000

TOLS002927

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

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

EPA Form 8700-22 (3-84)

BZTO104(e)039748

CHEM-SECURITY SYSTEMS, INC.

EXHIBIT 7b

Please print or type
(Form designed for use on elite (12-pitch) typewriter)

Form Approved. OMB No. 2000-0404. Expires 2-31-86

UNIFORM HAZARDOUS WASTE MANIFEST
(Continuation Sheet)

21. Generator's US EPA ID No.	Manifest Document No.	22. Page	Information in the shaded areas is not required by Federal law.

23. Generator's Name	L. State Manifest Document Number
	M. State Generator's ID
24. Transporter _____ Company Name / 25. US EPA ID Number	N. State Transporter's ID
	O. Transporter's Phone
26. Transporter _____ Company Name / 27. US EPA ID Number	P. State Transporter's ID
	Q. Transporter's Phone

28. US DOT Description (Including Proper Shipping Name, Hazard Class, and ID Number)	HM		29. Containers No	Type	30. Total Quantity	31. Unit Wt/Vol	R. Waste No.
a.							
b.							
c.							
d.							
e.							
f.							
g.							
h.							
i.							

GENERATOR

S. Additional Descriptions for Materials Listed Above		T. Handling Codes for Wastes Listed Above
a.	e.	
b.	f.	
c.	g.	
d.	h.	
	i.	

32. Special Handling Instructions and Additional Information — Waste Profile Sheet Number(s)

a.	e.	h.
b.	f.	i.
c.	g.	
d.		

TRANSPORTER

33. Transporter _____ Acknowledgement of Receipt of Materials		Date
Printed/Typed Name	Signature	Month Day Year
34. Transporter _____ Acknowledgement of Receipt of Materials		Date
Printed/Typed Name	Signature	Month Day Year

FACILITY

35. Discrepancy Indication Space

10000

TOLS002928

BZTO104(e)039749

CHEM-SECURITY SYSTEMS, INC. EXHIBIT 7c NATIONAL RES[illegible] CENTER [illegible] 1-800-424-8802
OREGON ACCIDENT RESPONSE CENTER 1-800-452-0311

Please print or type
Form designed for use on elite (12-pitch) typewriter.

Form Approved OMB No. 2050-0039 Expires 7-31-85

UNIFORM HAZARDOUS WASTE MANIFEST

1. Generator's US EPA ID No. O.R.D.0.0.0.0.1.2.3.4.5 — Manifest Document No. 01297
2. Page 1 of 1 — Information in the shaded areas is not required by Federal law

3. Generator's Name and Mailing Address
X Y Z COMPANY
123 Main Street, Process, Oregon
4. Generator's Phone (503) 555-1234

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

5. Transporter 1 Company Name: CHEM-SECURITY SYSTEMS, INC.
6. US EPA ID Number: O.R.D.0.8.9.4.5.2.3.5.3
C. State Transporter's ID
D. Transporter's Phone: 503/454-2643

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/I. Waste No.
a.	RQ Waste Hydrofluoric acid solution corrosive material UN 1790		0 0 1	TT	3 0 0 0	G	D002
b.							
c.							
d.							

J. Additional Descriptions for Materials Listed Above
a. Hydrofluoric Acid Etchant waste, liquid
b.
c.
d.

K. Handling Codes for Wastes Listed Above

15. Special Handling Instructions and Additional Information — Waste Profile Sheet Number(s)
a. D85311
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.

GENERATOR

Printed/Typed Name	Signature	Date (Month Day Year)
John Jones		9 20 84

TRANSPORTER

17. Transporter 1 Acknowledgement of Receipt of Materials

Printed/Typed Name	Signature	Date (Month Day Year)
Robert Smith		9 20 84

18. Transporter 2 Acknowledgement of Receipt of Materials

Printed/Typed Name	Signature	Date (Month Day Year)

FACILITY

19. Discrepancy Indication Space
10000
TOLS002929

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

Printed/Typed Name	Signature	Date (Month Day Year)

EPA Form 8700-22 (3-84)

ORIGINAL - RETURN TO GENERATOR

BZTO104(e)039750

"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 Blvd.
Chesterfield, MO 63017
(314) 532-7660

☐ San Francisco Division
230 Cutting Blvd.
Richmond, CA 94802
(415) 234-7400
or (415) 398-5351

☐ Seattle Division
901 Fairview Ave. No.
P.O. Box 1730
Seattle, WA 98111
(206) 622-2900

RIEDEL
ENVIRONMENTAL SERVICES, INC.

April 25, 1985

Mr. Neil Wallis
Time Oil Company
P. O. Box 03137
12005 N. Burgard Street
Portland, OR 97203

Dear Neil:

Thank you for the opportunity to visit your plant and discuss with you the pentachlorophenol sampling requirements you have at your northwest terminal wood treating site.

We propose that an initial composite sample survey be initiated to accurately define the boundaries of the PCP contamination zone. These surface samples would be collected to establish the actual area to be sampled later by coring at depth, and are warranted since the data indicates contamination at a site outside of your original proposed sampling plan. This task would be performed at a time and materials rate. It would be expected to be quite nominal relative to the core sampling, and will minimize the possibility of having to remobilize the drill rig to modify or extend the core sampling procedure in the future.

We will also review the sampling plan and, with DEQ approval, design a sampling plan that will meet their requirements while minimizing the number of holes needed. This task would also be billed at a time and materials rate and may utilize a triangular sampling matrix to improve coverage.

Riedel Environmental Services is prepared to perform the actual sampling and analysis including grid layout, drilling, sampling at six depths, analysis for PCP, decontamination of personnel and equipment, PCP concentration contour analysis, report and background level determination. The estimate for this task is $18,600, would require five days on site, and is based on an estimated sample area of 80' x 80'. If preliminary composite samples indicate a different area, this bid will be revised accordingly. If tetrachlorophenol analyses are also required, analytical costs will increase this bid by $5,000.

On the basis of the above results, RES can prepare an estimate for removal and disposal of the contaminated soils. We can also include monitoring or observation wells if required.

TOLS002930

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ENCL. 2

Please contact either myself or Rick Gariepy if you have any questions or would like additional information.

Sincerely,

RIEDEL ENVIRONMENTAL SERVICES, INC.

John H. Ruddick
Microbiologist

JHR:kps

10000

TOLS002931

BZTO104(e)039752

CHEM-SECURITY SYSTEMS, INC.
P.O. Box 1269 • Portland, Oregon 97207-1269 • (503) 223-1912
CSSI

June 7, 1985

Mr. John Denham
Time Oil Company
2737 N. Commodore Way
Seattle, Washington 98199

Dear John:

Enclosed are the two copies of replacement pages for our Supplemental Information Document that we discussed by phone today. Please replace them in the original contracts that you have and return both contracts to me.

If I can be of further assistance do not hestitate to call me.

Sincerely,

CHEM-SECURITY SYSTEMS, INC.

Joyce Johnson

Joyce Johnson
Inside Sales Representative

Enclosure

TOLS002932

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BZTO104(e)039753

TIME OIL COMPANY
PORTLAND, OREGON

PENTACHLOROPHENOL SAMPLING & ANALYSIS

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

October, 1985

TOLS002933

BZTO104(e)039754

Introduction

Between 1967 and 197_ 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.

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.

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. These areas did not include areas inside the warehouse or below the asphalt paved railway siding located, respectively, on the north and northeast sides of the containment area. 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 mximum depth of 0, 2, 4, 7 and 12 feet below the surface elevation of the unexcavated portion of the containment area. Sampling at 17 feet, as originally planned, was not undertaken due to the detection of groundwater at approximately 12 feet.

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, 12 or 17 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

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 "B" 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 IIA-E. These contour diagrams have been reduced and printed on mylar sheets in addition to the attached figures.

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

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TABLE II

TIME OIL CO. - PORTLAND, OREGON

Actual Split-Spoon Sample Depths Below Grade

Boring	Nominal Depth 0	2	4	7	12	17
J	0	0-2'	2-4'	5-7'	10-12'	15-17'
K	NA	0-1 1/2	1 1/2-3 1/2	4 1/2-6 1/2	9 1/2-11 1/2	14 1/2-16 1/2
L	NA	NA	Surf (11")	2-4'	7-9'	12-14'
M	0	0-2'	2-4'	5-7'	10-12'	15-17'
N	0	0-2'	2-4'	5-7'	10-12'	15-17'
O	0	0-2'	2-4'	5-7'	10-12'	15-17'
P	NA	Surf (4")	0-2'	3-5'	8-10'	13-15'
Q	NA	NA	0-1 1/2	2 1/2-4 1/2	7 1/2-9 1/2	12 1/2-14 1/2
R	0	0-2'	2-4'	5-7'	10-12'	15-17'
S	0	0-2'	2-4'	5-7'	10-12'	15-17'
T	NA	Surf	0-2'	3-5'	8-10'	13-15'
U	0	0-2'	2-4'	5-7'	10-12'	15-17'
V	0	0-2'	2-4'	5-7'	10-12'	15-17'
W	0	0-2'	2-4'	5-7'	10-12'	15-17'
X	NA	Surf	0-2'	3-5'	8-10'	13-15'
Y	NA	NA	Surf (11")	2-4'	7- 9'	12-14'
Z	0	0-2'	2-4'	5-7'	10-12'	15-17'

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

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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'	17 15-17'
J	X	X	X	X	X	ND
K	-	X	X	X	X	ND
L	-	-	X	X	X	ND
M	X	X	X	X	X	ND
N	X	X	X	X	X	ND
O	X	X	X	X	X	ND
P	-	X	X	X	X	ND
Q	-	-	X	X	X	ND
R	X	X	X	X	X	ND
S	X	X	X	X	X	ND
T	-	X	X	X	X	ND
U	X	X	X	X	X	ND
V	X	X	X	X	X	ND
W	X	X	X	X	X	ND
X	-	X	X	X	X	ND
Y	-	-	X	X	X	ND
Z	X	X	X	X	X	ND

NOTE: X = Sample

\- = Not available due to excavation

ND = Not sampled due to presence of groundwater

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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

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TABLE IVB

TIME OIL CO. - PORTLAND, OREGON
PENTACHLOROPHENOL IN SOIL

Two Foot Contour Data

Core #	Coordinates X	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 IVC

TIME OIL CO. - PORTLAND, OREGON
PENTACHLOROPHENOL IN SOIL

Four Foot Contour Data

Core #	Coordinates X	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 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

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

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TABLE IVF

TIME OIL CO. - PORTLAND, OREGON
PENTACHLOROPHENOL IN SOIL

Preliminary Surface Composites

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

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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, located at coordinates (83,168) in the northwest corner of the containment area, is consistent with reported spillage at this corner of the warehouse. A second focus occurs just outside the containment wall to the west at coordinates (65,125). This site is consistent with reported minor spills during truck loading procedures at this site. 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.

Additional contours at depth indicate penetration of PCP to the saturated zone at the northwest focus. 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 penetration to the groundwater (encountered between 7 and 12 feet) with 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.

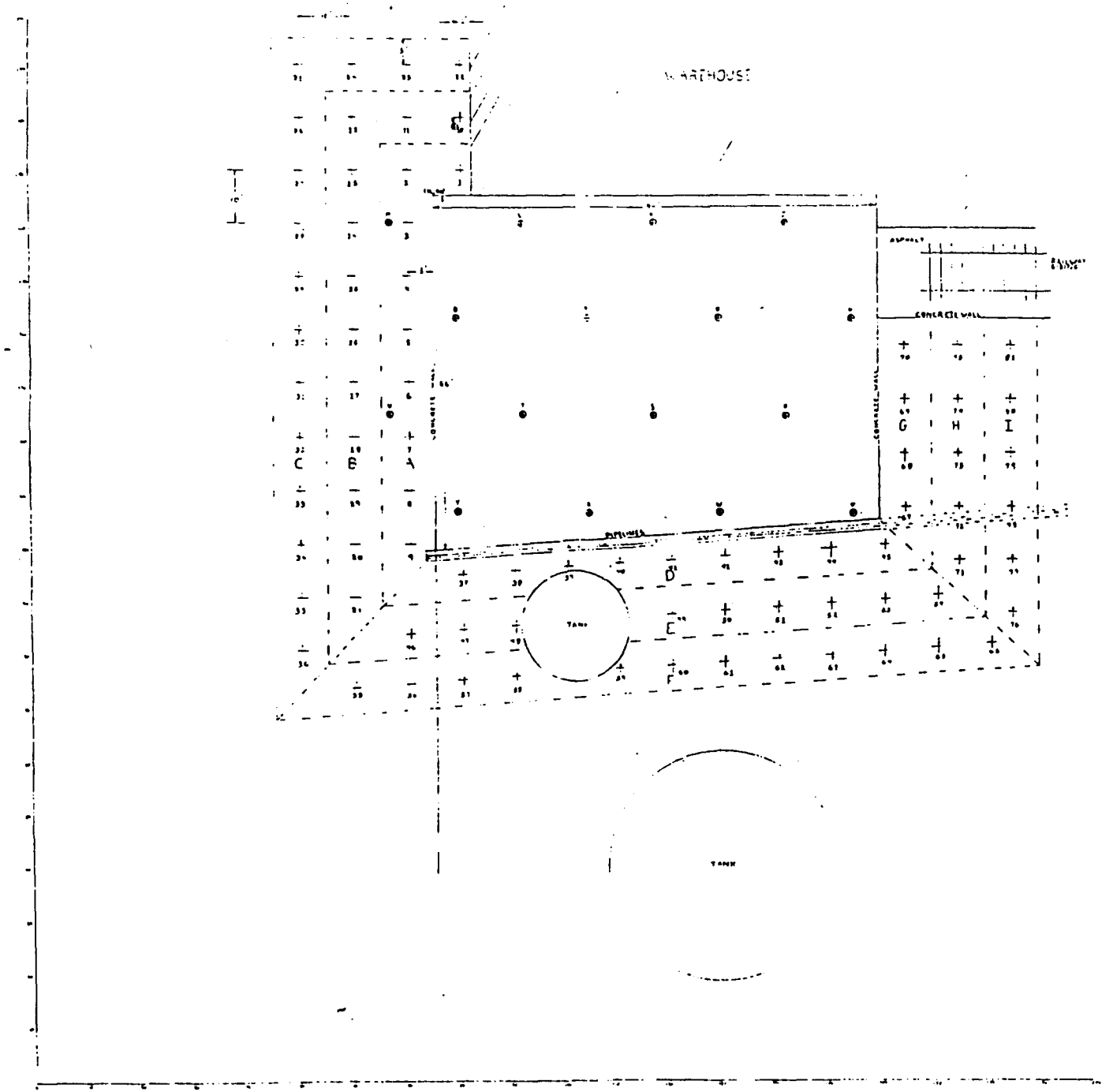
The slight tendency of the PCP plume to tail off to the south implies that groundwater flux may be diffusing the plume in this direction. This conclusion can only be substantiated by hydrogeologic evaluations of the site, however.

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. No sampling was performed underneath the warehouse and this study cannot conclude that migration has occurred beyond the foundation base. 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 1



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RIEDEL INTERNATIONAL, INC.

TIME OIL CO - PORTLAND, OR.

PCP SAMPLING PLAN
SAMPLING GRID - LATERAL SAMPLES

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FIGURE 2A

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FIGURE 2B

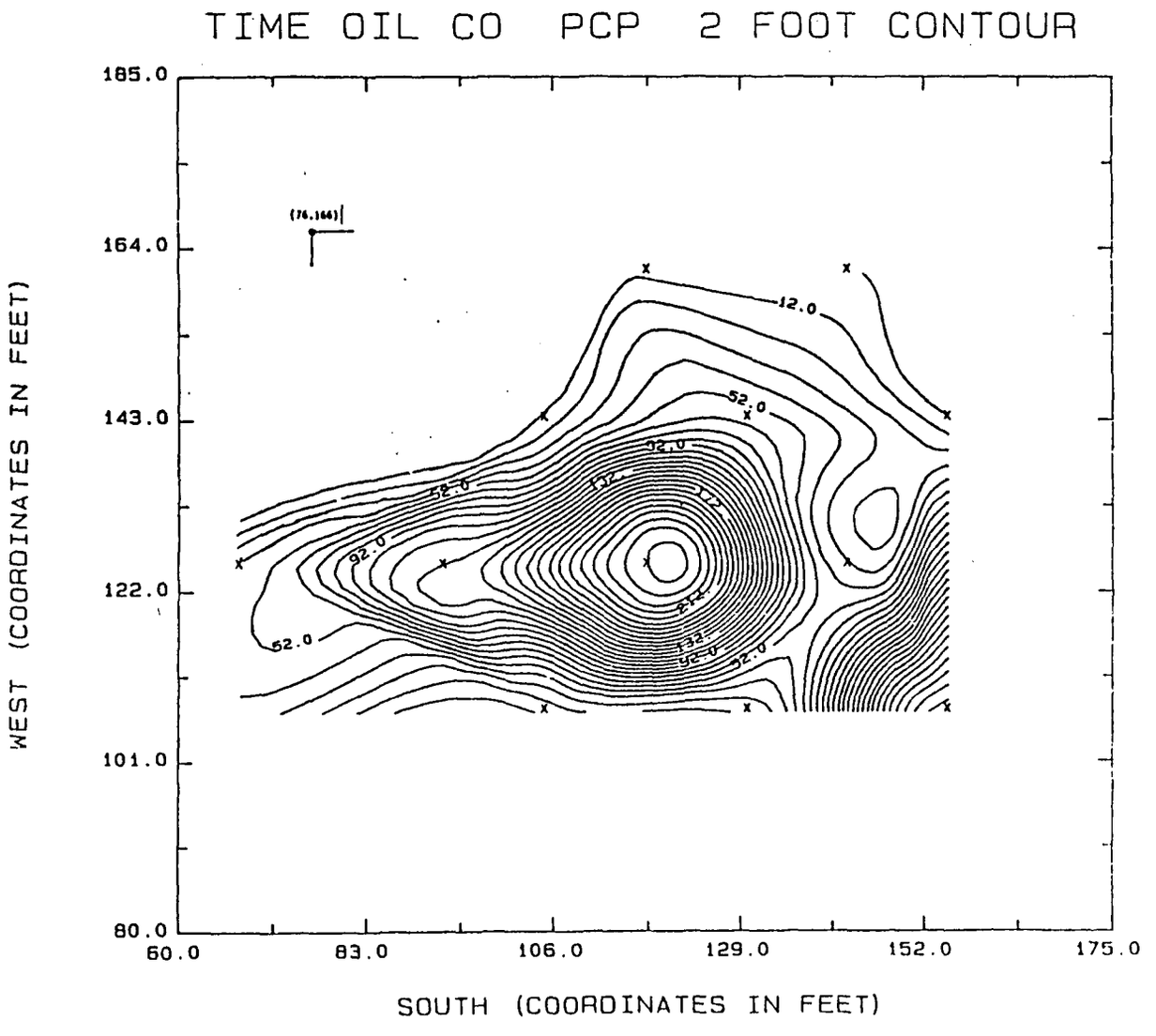

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FIGURE 2C

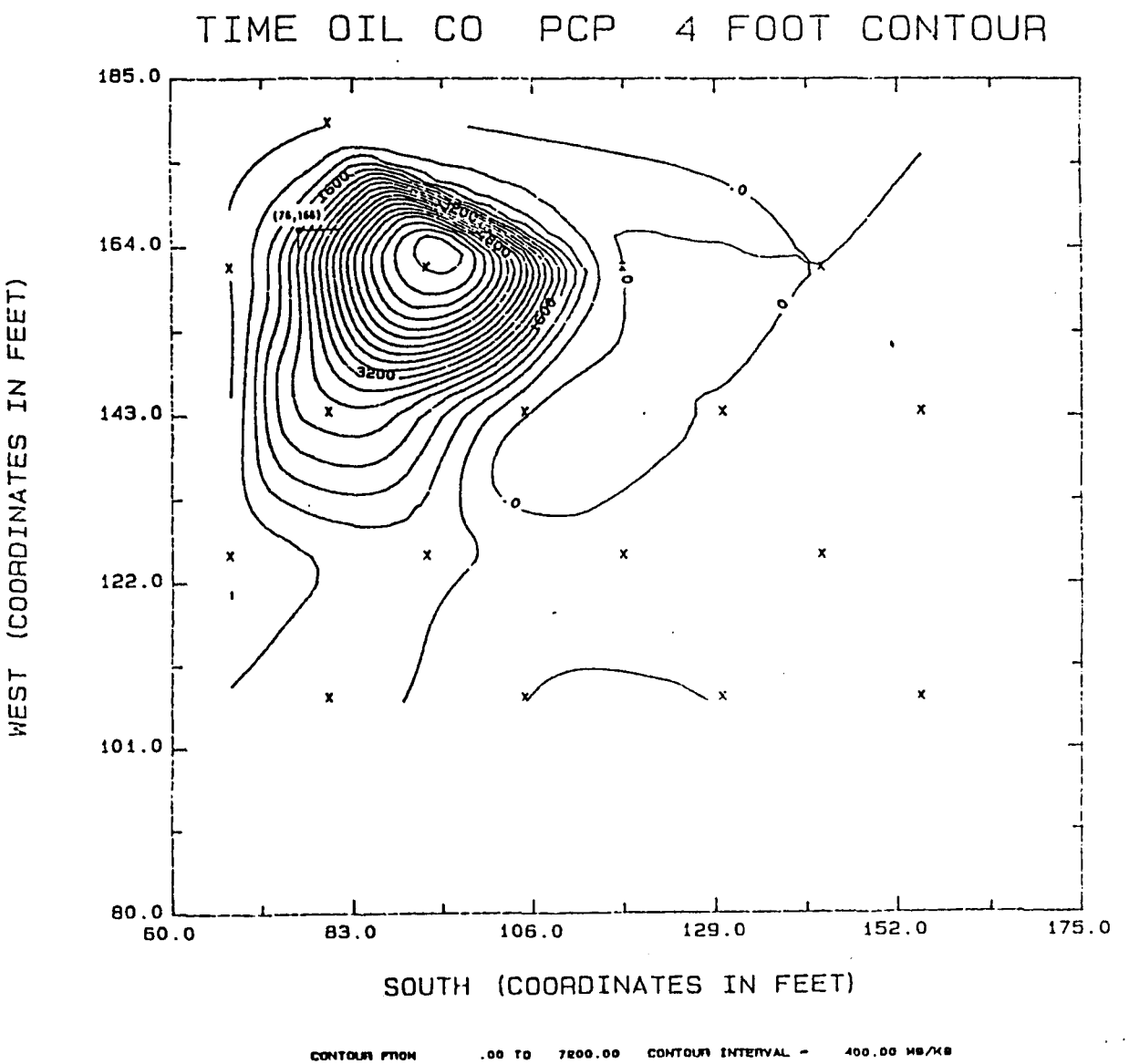

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FIGURE 2 D

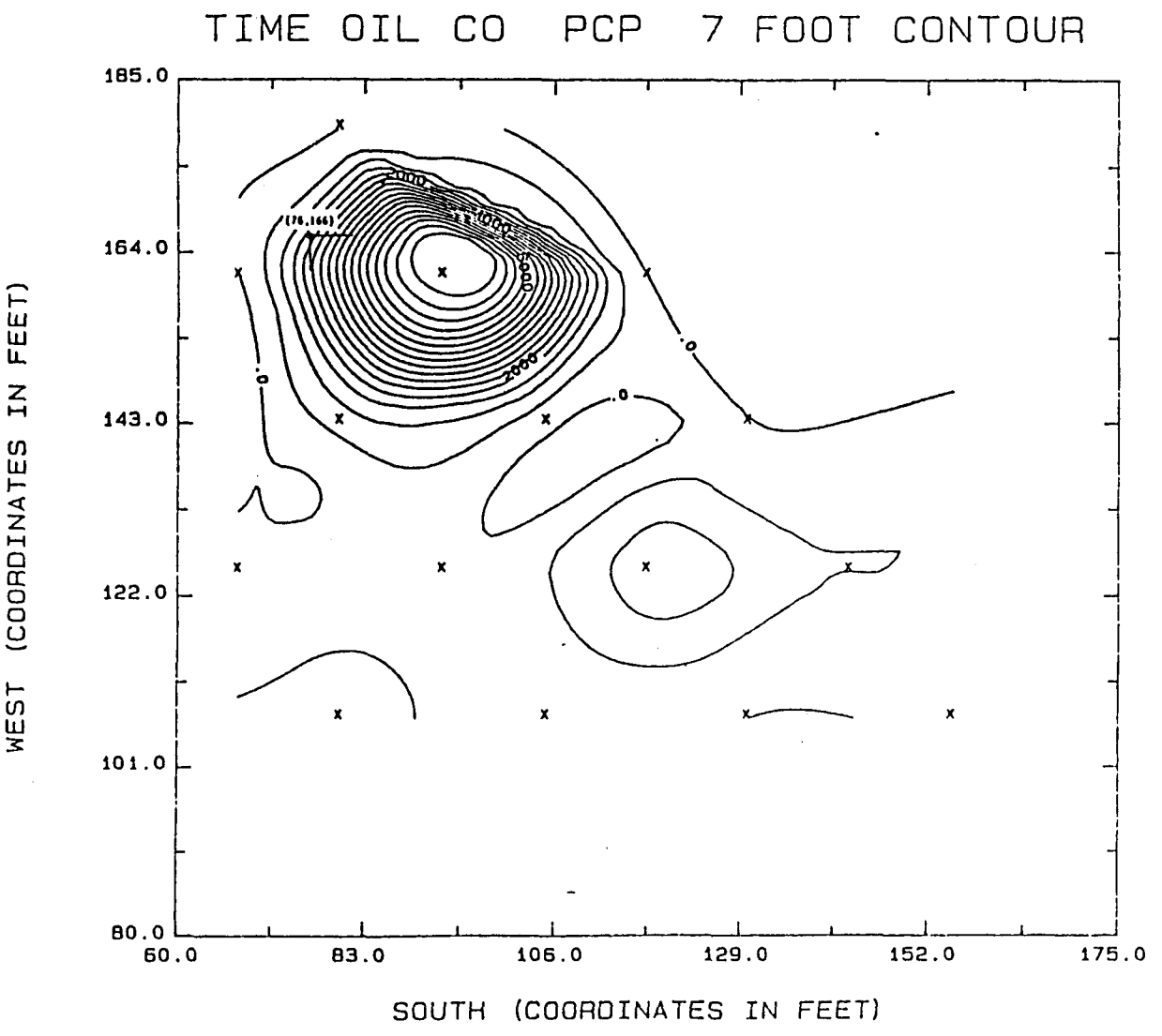

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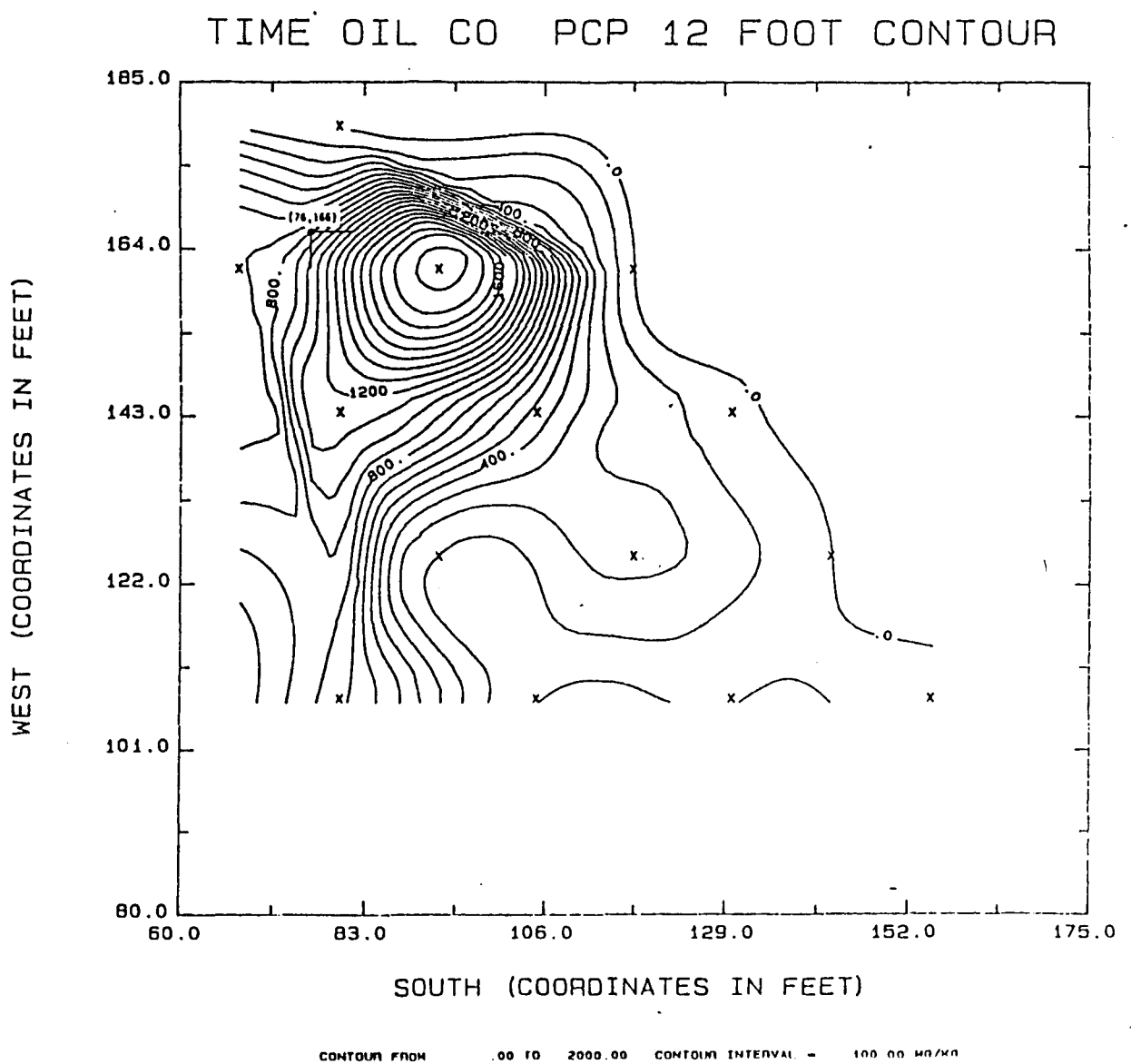
FIGURE 2E



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TOLS002954

AMENDMENT 2
TIME OIL CO. - RIEDEL ENVIRONMENTAL SERVICES, INC.
SAMPLING AND ANALYSIS AGREEMENT
DATED JUNE 28, 1985

The work scope is amended to include the following:

1. Sandblasting and demolition of the impoundment wall (designated A in Figure 1). The cost of this procedure is estimated to be $5,568.01.

2. Drilling, sampling and installation of 3 monitoring walls angeled 45 degrees beneath the existing warehouse (listed as Wells 1, 2 & 3 in Figure 1). Also, the installation of a 40 foot vertical monitoring well, including sampling at 5 foot intervals, directly in front of the angled wells (listed as Well 4 in Figure 1). Analytical results for 12 PCP samples are included in the estimated cost of $12,667.07.

3. Drilling, sampling and installation of an additional 5, 20-foot monitoring wells (listed in Figure 1 as Wells 5, 6, 7, 8 & 9). Soil samples will be taken at 5 foot intervals and 5 analyses for PCP are included in the estimated cost of $6,595.50.

DATED this 5th day of November, 1985.

TIME OIL CO.

John Denham
Environmental Manager

RIEDEL ENVIRONMENTAL SERVICES, INC.

F.J. Bradach
President

RS:bw

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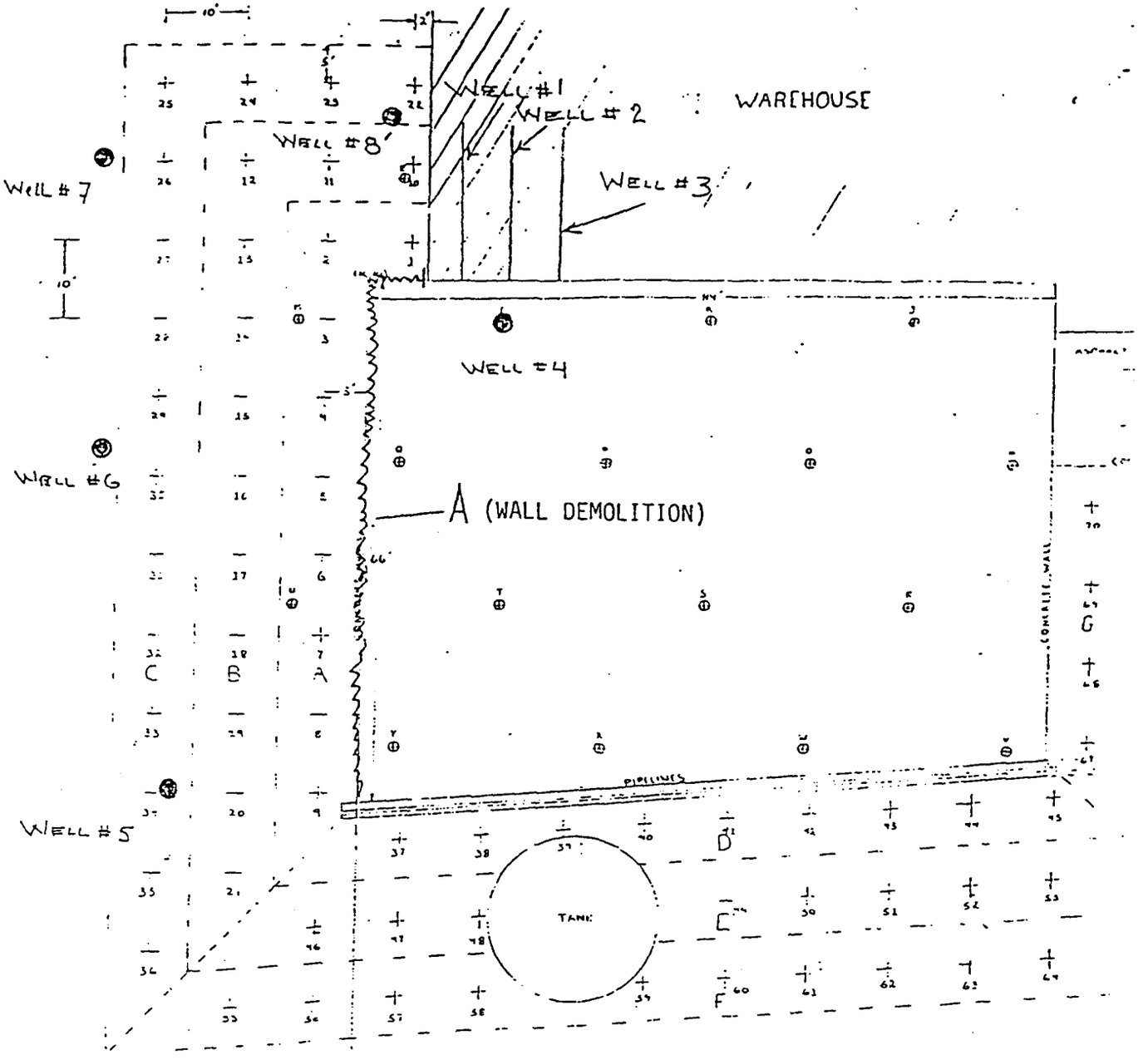
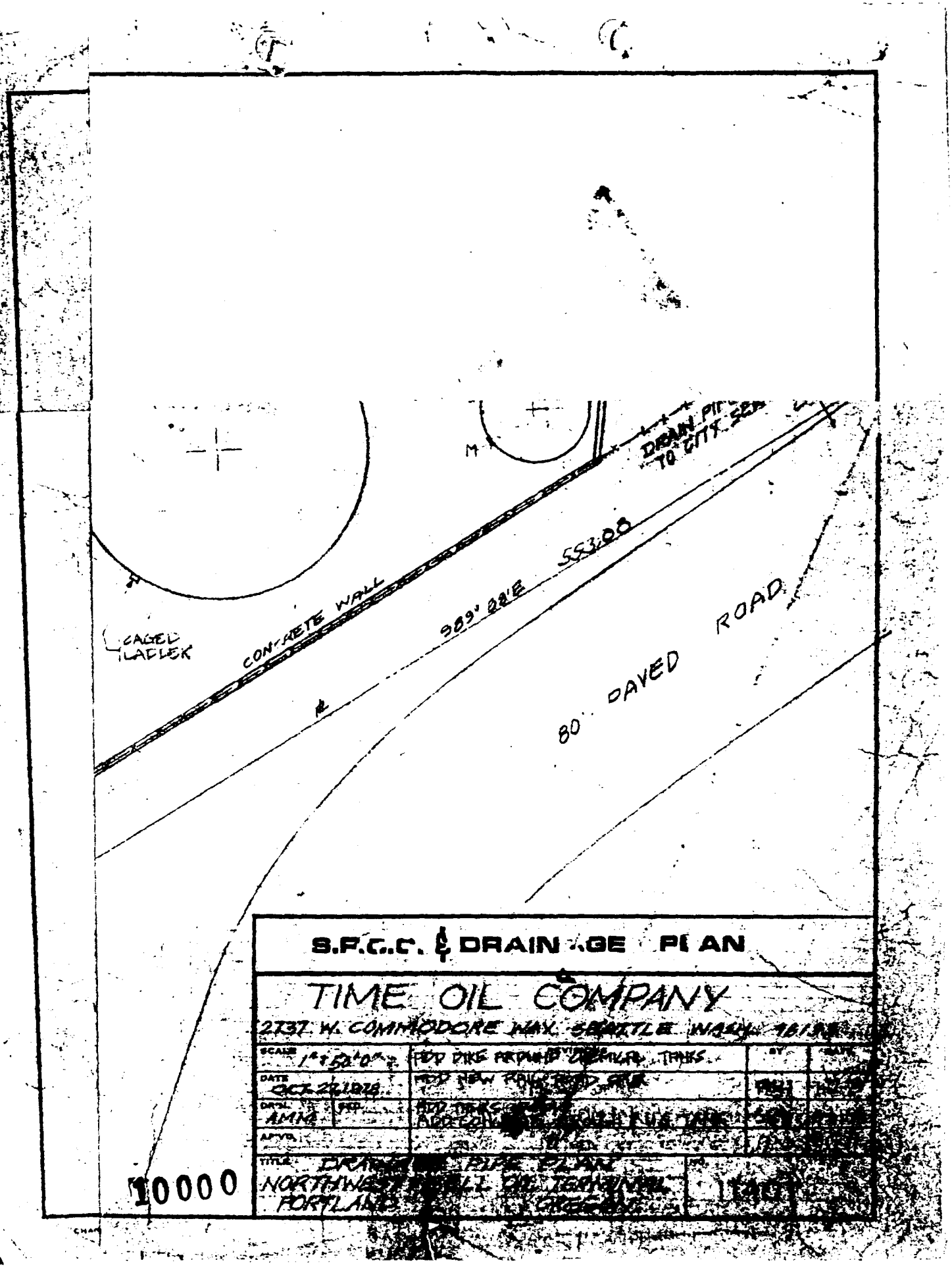


FIGURE 1

Location of Proposed Monitoring Wells



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A S S I G N M E N T

WHEREAS, under date of March 1, 1967 and amended schedule of August 1, 1970 the undersigned WOOD TREATING CHEMICALS CO. entered into an agreement with TIME OIL CO., a Washington corporation, a copy of which is attached hereto marked Exhibit "A" and

WHEREAS, KOPPERS COMPANY, INC. of Pittsburg, Pennsylvania has purchased a majority of the wood preservative business assets of WOOD TREATING CHEMICALS CO.,

NOW, THEREFORE, in consideration of the mutual promises and covenants contained in this assignment, acceptance thereof by KOPPERS COMPANY, INC. and consent thereto by TIME OIL CO., WOOD TREATING CHEMICALS CO. hereby assigns to KOPPERS COMPANY, INC. all right, title and interest in and to the attached contract, accounts payable thereunder, property therein described and rights therefrom ensuing, subject to all the conditions thereof.

IN WITNESS WHEREOF, the undersigned has executed this assignment, this (as of 1st day of December, 1971.

WOOD TREATING CHEMICALS CO.

By _____

ACCEPTANCE OF ASSIGNMENT

Assignee KOPPERS COMPANY, INC. hereby accepts the above assignment and agrees to assume and fulfill all conditions and obligations therein contained and contained in the agreement attached hereto marked Exhibit "A" on the part of the Assignor WOOD TREATING CHEMICALS CO. therein to be fulfilled.

KOPPERS COMPANY, INC.

By _____

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CONSENT TO ASSIGNMENT

TIME OIL CO. hereby consents to the assignment of that certain contract entered into between TIME OIL CO. and WOOD TREATING CHEMICALS CO. dated March 1, 1967 and amended August 1, 1970 by amended schedule, a copy of which TIME OIL CO. acknowledges is hereto attached.

TIME OIL CO.

By Neville P Leach - V Pres

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AGREEMENT

THIS AGREEMENT, made and entered into this 1st day of March, 1967, by and between TIME OIL CO. (hereinafter referred to as "Operator"), a corporation incorporated and existing under the laws of the State of Washington, and WOOD TREATING CHEMICALS CO. (hereinafter referred to as "Customer"), a corporation organized and existing under the laws of the State of Missouri.

WITNESSETH:

For and in consideration of the mutual covenants and conditions contained herein, it is agreed as follows:

A. FACILITIES.

1. Operator shall provide and furnish to Customer during the term of this Agreement facilities, storage tanks, blending tanks, equipment, improvements and warehouse space as set forth in the Schedule attached hereto and as set forth in this Agreement (all hereinafter called "Facilities").

2. Operator shall retain possession of the Facilities and shall keep and maintain the same in good order and repair and clean and fit for the storage and handling of the Products. Customer shall have the right to inspect the Facilities and the Products stored therein at all times during the hereinafter defined Regular Hours, and during other reasonable times, but no such inspection shall relieve Operator of any of its obligations under this Agreement. Operator shall advise Customer in writing in advance of any changes or alterations in or to the Facilities (excluding, however, maintenance and repairs) which are used for the receipt, storage, blending, handling or redelivery of the Products.

B. SERVICES.

1. Operator shall provide and furnish to Customer during the term of this Agreement any and all labor and services necessary or reasonably incidental to receive, store, handle, blend and redeliver the Products at, to and from the Facilities in a safe, efficient, clean and prompt manner (all hereinafter called the "Services").

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2. Operator shall receive the Products from trucks and rail cars, store the same in the storage tanks, transfer such Products to the blending tanks as directed by Customer, and redeliver such Products into trucks and rail cars, as and when directed by Customer. Operator shall follow the procedures outlined in the booklet entitled "Monsanto Warehousing and Terminaling Unified Procedures" and all reasonable amendments thereof and additions thereto, applicable to the Products involved. A copy of such booklet is attached hereto as Exhibit A and made a part hereof. Operator shall keep complete and accurate records of the type and quantity of the Products received into, transferred out of, and remaining in said Facilities at all times and of all shipments of the Products made at Customer's request, and such records shall be open to inspection by Customer at all reasonable times. Operator shall make reports to Customer with respect to such receipts, shipments and inventories, at such times and in such manner as may be reasonably prescribed by Customer.

3. The Services shall be performed from 7:00 a.m. to 4:30 p.m., five days per week, Monday through Friday, except for the holidays hereinafter mentioned, herein called the "Regular Hours." The holidays are New Year's Day, Memorial Day, Independence Day, Labor Day, Veteran's Day, Thanksgiving Day and Christmas. Upon the request of Customer, Operator shall perform such services beyond Regular Hours at an additional charge of $4.25 per man hour.

C. PAYMENTS. So long as Operator shall meet its obligations hereunder, Customer shall make payments to Operator during the term of this Agreement according to the Charges on the attached Schedule.

D. GENERAL.

1. Neither Operator, nor any person or party claiming by, through or under Operator, shall ever have or assert any right, title, claim, lien or interest in or to any of the Products.

2. In no event, anything in this Agreement to the contrary notwithstanding, does Operator intend to lease, sublease or assign to the Customer all or any part of the Facilities referred to herein, and neither this Agreement, nor any provision thereof, shall be so construed.

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3. Operator shall indemnify and hold harmless Customer from and against any and all liabilities, claims, actions, damages, losses, costs or expenses arising out of injury to or death of any person or damage to or loss or destruction of any property, caused by or connected with: (a) any negligence, or wrongful act or omission of Operator, its employees or agents in the receipt, storage, handling or redelivery of the Products, or any of them; (b) the performance or nonperformance of any of its obligations or operations under this Agreement; or (c) any default of Operator hereunder.

4. Operator shall obtain and maintain, at its expense, during the term of this Agreement, the following insurance in insurance companies satisfactory to Customer:

(a) Workmen's compensation insurance in an amount equal to the limit of liability and in the form prescribed by the laws of Oregon, for all Operator's employees engaged in any operations under this Agreement. In the event that any employees are not protected by a workmen's compensation statute, Operator shall provide employer's liability insurance in an amount not less than $100,000 for injury to or for death of any one employee, and subject to the same limitation for each employee, in an amount not less than $300,000 on account of any one accident.

(b) Public liability insurance sufficient to cover the obligations assumed by Operator pursuant to Section D.3 of this Agreement and claims for injury to or death of persons or damage to property arising from any activities or operations of Operator under this Agreement in amounts of:

(i) not less than $150,000 for injury to or death of any one person and not less than $500,000 in respect to any one accident; and

(ii) not less than $100,000 for damage to or destruction of property on account of each accident.

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Operator shall furnish Customer with certificates of insurance which certificates shall provide that the foregoing insurance coverage shall not be terminated or reduced without the insurance carrier first giving Customer ten (10) days' prior written notice thereof.

5. Operator shall be liable and responsible for any loss, destruction, spoilage, spillage, pollution, evaporation, shrinkage, line-loss, clingage, discoloration or contamination of, or damage to, any Products arising out of its receipt, storage, handling, blending, mixing or redelivery thereof, or of any of the Services performed or to be performed hereunder resulting from the negligence or wrongful act or omission of Operator, its employees, agents or representatives, or default of Operator under this Agreement.

6. In the event that the Facilities are partially or totally damaged or destroyed or become unfit by reason of fire, explosion, accident, casualty or any other similar cause, or if any of the Facilities are taken or condemned by eminent domain proceedings (all of the foregoing being hereinafter for convenience collectively called "Casualty") so that the same shall be rendered unsuitable or unavailable for the receipt, storage, handling and redelivery of any of the Products, Operator shall immediately notify Customer thereof. Not later than ten (10) days after the occurrence of such Casualty, Operator shall also notify Customer as to whether the Facilities will be restored to their former condition within a period of time not longer than six (6) months measured from the date of such Casualty. If such notice is not given, or if given and the Facilities are not restored by the end of said six (6) month period, Customer may terminate this Agreement at any time thereafter upon notice to Operator, and thereupon Customer shall be relieved of all duties and obligations hereunder.

7. (a) Losses of any Product for which Operator is responsible hereunder shall be determined monthly at the end of each month, commencing with the date of the first receipt of such Product by Operator hereunder, and also, at the time any abnormal loss occurs or is discovered. The extent of loss shall be computed by deducting the total withdrawals of such Product during the period for which the accounting

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is made, plus the stock of such Product on hand at the end of such period, from the sum of the total receipts of such Product during such period plus the stock of such Product on hand at the beginning of such period.

(b) Operator shall not be liable for actual losses resulting from normal spillage and evaporation not in excess of the loss allowance hereinafter described. The term "loss allowance" shall mean actual losses resulting from normal spillage and evaporation not exceeding 3/4 of 1% per month of the aggregate of the receipts per month or 3/4 of 1% of the maximum amount of Products stored in any one month, whichever is greater, of any such Product as determined under Section D.9(b) of this Agreement.

8. While on Operator's terminal premises, Customer shall comply at all times with any and all rules established as of the date of this Agreement by Operator in connection with the operation of the terminal. A copy of such rules is attached hereto as Exhibit B to this Agreement. Such rules shall not hereafter be amended except by consent of Customer.

9. (a) If the average wage rate in effect at the terminal for all employees of Operator employed full or part time at the terminal as of the first day of any month shall exceed $2.71 per hour, then, with respect to such month, the handling and transfer charges set forth in the schedule(s) shall be increased by a percentage equal to 25 per cent (25%) of that percentage of $2.71 which the excess of the average wage rate of $2.71 constitutes. "Average wage rate" means the amount derived by dividing (a) the total of (i) the rates for the single-rate classifications of wage rates applicable to Operator's personnel and (ii) the mid-points or wage rates for all rate-range classifications applicable to Operator's personnel by (b) the

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number of classifications applicable to Operator's personnel.

(b) The quantity of Product received into or withdrawn from storage tanks shall be determined by Operator's representatives by checking and gauging said tanks at the time of receipt or withdrawal of said Product. Customer may assist, supervise, or participate in all aspects of such checking and gauging, but in the absence of such participation, gauges taken by Operator shall be conclusive, unless such gauges are proven to be in error. However, quantities delivered to rail tank cars or transport trucks may be determined by reference to mutually acceptable calibration charts of the rail car or truck tanks. The cost of such work done by Operator's representatives or licensed inspectors shall be borne by Customer. In the event of any disagreement as to quantities of Products received, it shall, upon written notice of either party to the other, be submitted to one arbitrator to be appointed by the American Arbitration Association for hearing and decision, in Portland, Oregon, which decision shall be rendered within thirty (30) days from the date the case is submitted, and shall be final and binding upon the parties hereto. The cost and expense of the arbitrator shall be borne equally between the parties hereto and the law of Missouri shall govern the arbitration and award.

(c) If requested by Customer, Operator will take samples from rail tank cars, automotive tank trucks and storage tanks and deliver such samples to Customer and the cost of containers for such samples paid by Operator and the freight charges for deliveries thereof to Customer shall be reimbursed to Operator by Customer each month. Samples shall be taken in accordance with the procedure specified by Customer.

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(d) All quantities of Product delivered to or shipped from the terminal shall be calculated in gallons at sixty degrees Fahrenheit (60°F) in accordance with recognized temperature correction tables. The term "barrel" whenever used herein, means 42 U. S. Gallons at sixty degrees Fahrenheit (60°).

(Next paragraph number 10 on following page 7)

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10. Without relieving Operator from any of its duties or obligations under this Agreement, for each day or portion thereof that:

(a) The Facilities are unsuitable for the receipt, storage, blending, handling or redelivery of any of the Products by reason of any Casualty or for any other similar or dissimilar reason, and/or

(b) Operator fails or refuses to provide and furnish the Services,

then, and in either event, the Charges set forth in the Schedule shall be suspended for such period or periods; furthermore, if Operator fails or refuses to redeliver any of the Products within five (5) days after Customer's request therefor, Customer shall have the right to enter upon the Facilities and remove such Products from the storage area.

11. Customer agrees to examine Operator's tanks, pipelines and equipment prior to Customer's acceptance and use of their Facilities hereunder and by such use agrees that said Facilities are acceptable for rendering of the Services referred to herein. Operator may substitute other suitable facilities in lieu of those which are designated hereunder provided Operator pays any costs incurred by Customer in regard to such substitution.

12. Customer shall use the Facilities furnished hereunder for the storage, blending and handling of only the Products and commodities specified in said Schedule; provided, however, that anything in this Agreement to the contrary notwithstanding, Customer shall not store and/or handle or cause to be stored and/or handled in any of these Facilities (a) any commodity other than those listed on such Schedule containing hydrogen sulphide or other corrosive materials, (b) any commodity other than those listed on such Schedule which would in any way be injurious to any of the Facilities, or (c) any commodity other than those listed on such Schedule which would render any of the Facilities unfit, after cleaning, for the proper storage and/or handling of water white oils. Customer shall be responsible for any damages resulting from the storage and/or handling in any of these Facilities of any commodity other than those listed in the Schedule which may not be stored and/or handled therein under the terms hereof.

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13. (a) Subject to the terms of Sections 6 and 10 hereof, neither party shall be liable to the other for, and each shall be excused from, any failure of or delay in performance under this Agreement, caused by any acts of God or the public enemy, war, floods, storms, earthquake, lightning, or other act of the elements, accidental fires, explosion, strikes, labor disturbances, riots, insurrection, civil commotion, governmental acts or regulations, accidents, failure or delay of transportation or delivery facilities or supplies, failure or delay of manufacturers or persons from whom such party is obtaining machinery, equipment, materials or supplies to deliver the same, or any other cause beyond the control and without the fault or neglect of such party, whether similar or not to the foregoing causes. For each day or portion thereof that either party shall fail or be unable to perform by reason of any of the foregoing events, the said charges set forth in the Schedule shall be suspended for such period or periods. Each party shall, in the event it shall fail or be unable to perform by reason of any of the foregoing events, promptly notify the other party thereof. Upon cessation of any such event, performance shall be resumed promptly and the other party shall be notified immediately thereof.

(b) Should the County or City, in which Operator's facilities are located, or any other government agency, local or federal, prohibit operation of any then existing facilities used in performing this Agreement, or shall in any way require Operator of the right to use any such facilities or any property in connection therewith, or shall require the construction of additional facilities to be used in performing this Agreement, this Agreement shall terminate at the option of Operator, unless Customer shall pay for the cost of replacing any such facilities or property of

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which Operator was deprived, or for the cost of construction of such additional facilities, or for any other expenses necessary to meet the requirements of such government agency.

(c) The cost of any Armed Guard Services and/or other protective services or facilities required by Customer or by any government agency shall be for the account of Customer.

14. Operator shall bill Customer monthly in advance and Customer agrees to pay Operator within 10 days after presentation of invoice. All payments hereunder shall be made to Operator at its office at 12005 N. Burgard St., P. O. Box 03117, Portland, Oregon 97203, or at such other place as Operator may notify Customer in writing.

15. Customer agrees promptly upon expiration or termination of this Agreement, to remove all of its Products, either bulk or packaged, from Operator's premises. All such Products not removed within 60 days after the expiration or termination of this Agreement may be sold at auction by Operator and Operator shall return to Customer the proceeds of any such sale, less the amount owed Operator by Customer under the terms of this Agreement and Operator's reasonable expenses in selling said Products.

16. (a) The initial term of this Agreement shall commence as of April 1, 1967 and, if not earlier terminated as herein provided, shall end on March 31, 1972. Upon the expiration of the initial term of this Agreement, this Agreement shall be automatically renewed for a term of five years, and automatically renewed thereafter for successive terms of five years each; provided, however, that either party, at its option, shall have the right to terminate this Agreement at the end of its initial term or at the end of any renewal term by furnishing written notice to the other party at least one year prior to the designated termination date.

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16. (b) Provided that Customer may, at its option, terminate this Agreement at any time during the initial term of this Agreement by making a payment to Operator which is equal to Operator's total expenditures for storage, blending tanks, heating elements, warehouse improvements or improvements to any such Facilities which were expended by Operator for the purpose of furnishing storage or blending tanks and Facilities to Customer, less 20% of the total expenditures for each full year that this Agreement has been in full force and effect. The Operator represents that the amount expended covering the above is $ 6220.00—.

(c) Should Operator fail or refuse to discharge any of its obligations under this Agreement, Customer may, at its option and in addition to any other remedies provided for herein, terminate this Agreement immediately upon giving notice to Operator.

17. Should Customer go into bankruptcy, voluntary or involuntary, or be placed in the hands of a receiver, State or Federal, then, and in any such event, the minimum monthly storage and handling charges for the whole unexpired term hereof together with all accrued charges, shall, at the option of Operator, become immediately due and payable. In any such event, Operator shall also have the right, at its option, to terminate this Agreement and, after giving 15 days' notice to Customer, Operator may sell all or any portion of such Products, at public or private sale, but Operator may not be purchaser at such sale or sales. Customer shall pay for and indemnify Operator against its reasonable expenses of such sale, including reasonable attorney's fees, incurred by Operator for the sale of Customer's Products as above provided, for storage, handling services or other amounts due and owing Operator. Any proceeds of such sale less any amounts due and owing from Customer to Operator under this Agreement and the reasonable expenses of such sale, shall be promptly remitted by Operator to Customer.

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18. In the event Customer decides to reduce the quantity or eliminate the handling, blending or storage of any of the Products so that the Facilities are not used or required, Operator shall, at Customer's request, use all reasonable efforts, and otherwise cooperate with Customer, to find and make arrangements with another party or parties to utilize such unused or unrequired Facilities to the extent and as designated by Customer, Operator shall, however, have the right to establish reasonable fees and charges in connection with such arrangements. Customer shall be entitled to a credit against all fees (but not exceeding any amounts due from Customer) to the extent of payments made by such other party or parties pursuant to said arrangements.

19. Customer shall pay any and all taxes, charges and/or assessments on or with respect to the Products. Operator shall pay any and all taxes, charges and/or assessments on or with respect to the Facilities and/or Services.

20. Operator recognizes that Customer utilizes secret processes in its manufacturing and accordingly Operator agrees that it will not disclose or divulge, without the written consent of Customer the identities or quantities of Products which are received, blended, handled or redelivered by Operator hereunder or the names of customers to whom delivery of such Products or other products is scheduled or made.

21. Operator is not and shall not act or purport to act as an employee, agent or representative of Customer, but is and shall act as an independent contractor.

22. Operator shall obtain and maintain all legally required state and local licenses and permits required for construction, maintenance or operation of the Facilities and/or the Services or Operator's performance of this Agreement.

23. Operator agrees to assume liability for any demurrage on rail equipment or truck equipment, which occurs directly as a result of Operator's operations. Any demurrage accruing on rail equipment or truck equipment, through no fault of Operator shall be paid by Customer; provided, however, Operator shall, in good faith, furnish Customer with all evidence and information known to Operator with respect to the facts, circumstances and causes connected with rail or truck demurrage.

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24. Except for any transfer or assignment, in whole or in part by Customer to the Monsanto Company or to any subsidiary company in which Customer owns or controls at least a 50% interest or to an associated company in which the Monsanto Company owns or controls at least a 50% interest, neither party shall transfer or assign this Agreement, or any of its rights hereunder, in whole or in part, without the prior written consent of the other party, and any attempt to do so without such consent shall be void. Subject to the foregoing, this Agreement shall inure to the benefit of and be binding upon the parties hereto and their respective successors and assigns.

25. Except as otherwise provided in this Agreement, any notice required or permitted to be given under this Agreement shall be in writing and shall be sufficiently given when delivered in person or when deposited in the United States mails (registered or certified), postage prepaid, addressed as follows:

If to Operator, addressed to:	Time Oil Co. 5150 Wilshire Boulevard Los Angeles, California 90036 and a copy to: 12005 N. Burgard Street P. O. Box 03117 Portland, Oregon 97203
If to Customer, addressed to:	Wood Treating Chemicals Co. 5137 Southwest Avenue St. Louis, Mo. 63110 Attn: R. M. Morriss, Jr.

or to such other address as may be specified from time to time in a written notice given by such party. Both parties agree to acknowledge in writing receipt of any notice delivered in person. Routine operating instructions, requests, directions and other similar routine communications shall not require a notice as above provided and may be given in such manner and to such persons as may be customary or practicable.

26. This Agreement constitutes the sole agreement between the parties pertaining to the Facilities and/or Services.

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27. The section and paragraph headings in this Agreement are inserted for convenience only and are in no way to be construed as part of this Agreement or as a limitation of the scope of the particular sections or paragraphs to which they refer.

IN WITNESS WHEREOF, the parties hereto have duly executed this Agreement as of the day and year first hereinabove written.

TIME OIL CO.

ATTEST: [signature] Asst Secy

BY R. D. Almeda Pres

WOOD TREATING CHEMICALS CO.

ATTEST: J. Russell Bley Jr. Secretary

BY H. L. Minckler [signature]

AMENDED SCHEDULE

TERMINAL:	TIME OIL CO., Portland, Oregon.
DATE OF AGREEMENT:	March 1, 1967 August 1, 1970 amended schedule.
INITIAL TERM OF AGREEMENT:	April 1, 1967 to March 31, 1972.
OPERATOR:	TIME OIL CO.
CUSTOMER:	WOOD TREATING CHEMICALS CO.
PRODUCTS TO BE STORED:	Raw materials in bulk, drums and bags for wood preservatives. Finished products in bulk and drums. Also, such other raw materials and finished products specified by the Customer and accepted by the Operator.
FACILITIES:	Operator will furnish Customer the following facilities: Storage tanks - one (1) tank with a shell capacity of approximately 38,000 gallons, three (3) tanks with a shell capacity of approximately 20,570 gallons each, one (1) tank with a shell capacity of approximately 13,000 gallons, one (1) blending tank of approximately 1,500 gallons equipped with six (6) electric heating elements, together with warehouse space for storing approximately 100,000 pounds of raw or finished materials on pallets in drums and bags.
SERVICES: Storage and Handling	Operator shall receive the raw materials from railroad tank cars or freight cars and/or trucks and shall deliver such products into storage tanks and/or warehouse. Operator shall deliver the finished products into storage, trucks and/or railroad cars. Operator shall mix or blend products at a temperature not to exceed 180 deg. F.
HANDLING AND TRANSFER CHARGES:	The only charges for the facilities and services herein are the following: $615.00 per month to be billed in advance on the first day of each month and paid by Customer within 10 days after receipt of invoice. One cent (0.01) per gallon for blending and shipping pentapetroleum or LST type solutions shipped in tank cars, tank trucks or drums that can be bulk or tank blended. These products are Customer's products known as:

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CHARGES: cont.

1. Woodtox Preprime RTU
2. Woodtox 140 RTU
3. Presstreat
4. Woodtox 109 RTU
5. Woodtox 109 w/o Penta

Other products of similar type solutions can be added from time to time by Customer upon written acceptance by the Operator.

Three cents (0.03) per gallon for blending and shipping concentrate type solutions in tank cars, tank trucks or drums. These products are Customer's products known as:

1. Timbertox 40 Concentrate
2. WR 340 Concentrate
3. Woodtox Preprime Concentrate
4. Woodtox 140 Concentrate
5. Inhibitor L
6. Penta Wood Preservative Concentrate

Other concentrate type solutions can be added from time to time by Customer upon written acceptance by the Operator.

Five cents (0.05) per gallon for filling 55 gallon drums.

One cent (0.01) per gallon for blending contaminated products returned to storage and/or blending Woodtox 109 w/o Penta to include Penta.

Seventy-five (0.75) cents for each 55 gallon drum of additives shipped that have been in storage and are shipped without blending with other products.

Blending, shipping and drum filling charges are to be invoiced by Operator to the Customer on the first day of each month for the shipments made during the previous month and Customer agrees to pay charges within 10 days after receipt of invoice.

Overtime and extra labor and cost of armed guards as specified in Sections B.3, D.9 (a) and 13 (c) of the Agreement to which this Schedule is annexed and which it is a part.

It is agreed by the parties hereto that the Schedule attached to the Agreement dated the 1st day of March, 1967, shall be superceded and replaced in its entirety by this Amended Schedule effective August 1, 1970.

It is further agreed that said Agreement dated the 1st day of March, 1967 is further amended as follows:

On Page 1, Section A.FACILITIES, Paragraph 2, line 7 after the word Agreement shall be added "Customer shall, however, inform Operator of any irregularities or deficiencies discovered during any such inspection."

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On page 2, Paragraph 3, line 6. The amount $5.8125 shall be substituted for the amount of $4.25 stated therein.

On page 4, Paragraph 6, line 3. The word "similar" shall be deleted and after the word "cause" shall be added "beyond the control of Operator".

On page 5, Paragraph 8, line 2. The following shall be substituted for Paragraph 8 in its entirety. " Customer's representative shall have access to the truck and rail car loading rack, tanks and warehouse covered by this agreement, as a matter of course, but all other areas of Operator's terminal facilities shall be closed to Customer's representatives except when accompanied by a representative of Operator. While on Operator's terminal premises, Customer's representative shall comply at all times with any rules established from time to time by Operator in connection with the operation of the terminal."

On page 5, Paragraph 9. (a) wherever the amount of $2.71 is stated the amount of $3.875 shall be substituted therefor.

On page 8, Paragraph 13 (a), the following shall be substituted therefor:

"Performance of any obligation under this Agreement may be suspended by either party, in whole or in part, without liability, in the event of act of God, war, riot, fire, explosion, flood, drought, sabotage, inability to obtain fuel or power, accident, national, state, or other governmental laws, regulations, rules or orders, or any other circumstance of like nature beyond the reasonable control of such party, or labor trouble, strike, walkout, or injunction, whether or not any such delays within the reasonable control of such party, which delays, prevents, restricts or limits the performance of this agreement or the consumption, sale, use or end use of the products or any product manufactured or processed therefrom or therewith. The affected party shall invoke this provision by promptly notifying the other party of the nature and estimated duration of the suspension. At Customer's option, the period specified for processing and/or delivery of the products hereunder shall be extended by the period of delay occasioned by any such suspension and processing or deliveries not performed or made during any suspension period shall be performed or made during such extention, or the period specified for processing and/or delivery shall not be extended and the total contract quantity hereunder shall be reduced by the processing or deliveries not performed or made during such suspension and, in either event, the contract shall otherwise remain uneffected."

The following provisions are incorporated therein:

Disposal of waste shall be for the Customer's account but subject to Customer's prior approval of expenditures for that purpose.

Customer shall reimburse Operator for fines or penalties imposed upon Operator by a court of law and paid in full by Operator, which fines are for pollution, expressly prohibited by statute, proved in said court to have been caused solely by the correct, non-negligent performance by Operator of written instructions given by Customer to Operator under and pursuant to this Agreement. Customer shall also re-imburse Operator for all attorneys fees and costs of suit incurred in the defense of any suit brought against Operator for pollution proved to have been caused solely by the correct, non-negligent performance by Operator of written instructions given by Customer to Operator under and pursuant to this Agreement.

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All other of the terms and provisions of said Agreement shall remain the same and in full force and effect.

Witness:

TIME OIL CO., Operator

By R. D. Abendroth
R. D. Abendroth, President

Witness:

Evelyn L. Wright

WOOD TREATING CHEMICALS CO.

By Lowell E. Gutzler
Asst. Secretary

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WILDMAN, HARROLD, ALLEN & DIXON
225 WEST WACKER DRIVE
CHICAGO, ILLINOIS 60606-1229
(312) 201-2000
FAX: (312) 201-2555

ANTHONY G. HOPP
(312) 201-2537

cc: Mike Tisdale
2-5

March 4, 1997

VIA TELECOPY & U.S. MAIL

Patricia M. Dost, Esq.
Schwabe, Williamson & Wyatt
Pacwest Center, Suite 1600-1800
1211 Southwest 5th Avenue
Portland, OR 97204-3795
Telecopy No.: (503) 796-2900

Re: Time Oil, Northwest Terminal

Dear Patty:

I am writing in response to your letter of February 27, 1997, and to follow up on my recent voice mail message to you.

I have discussed your letter of February 27th with the General Counsel of my client, Beazer East, Inc. Beazer would like to discuss with Time Oil a proposal for resolving Time Oil's claims against Beazer with respect to Time Oil's Northwest Terminal. Any proposal Beazer makes must be approved by Beazer's management, in advance. Formulating the proposal and obtaining management approval may take several weeks. Beazer intends to forward the proposal to Time Oil as soon as it is approved.

You have imposed a deadline of March 10, 1997, for the completion of negotiations between Beazer and Time Oil. As I understand your letter of February 27, 1997, if the parties do not reach some type of final agreement by March 10th, you intend to file a lawsuit on that date. While Beazer intends to work diligently toward a resolution of this matter, the deadline you have imposed is unrealistic and counterproductive. I suggest, therefore, that Time Oil agree to postpone filing a lawsuit for at least thirty days, up to and including April 4, 1997, to allow the parties to negotiate.

TOLS002978

10000

MAR 04 '97 05:45PM WILDMAN HARROLD 5 P.2

Finally, the agreement between Time Oil and Beazer dated September 27, 1995, allows either party to terminate its participation on ten days' notice. Should Time Oil sue Beazer, Beazer will elect to exercise its right to terminate the agreement.

Please contact me at your earliest convenience to let me know whether Time Oil will agree to postpone filing its proposed lawsuit.

Very truly yours,

WILDMAN, HARROLD, ALLEN & DIXON

Anthony G. Hopp

AGH:kma

bcc: Jill M. Blundon
Robert L. Shuftan

10000

86-102 A

12-2-96 cc: Jill Tony Hopp

Beazer

BEAZER EAST, INC., 436 SEVENTH AVENUE, PITTSBURGH, PA 15219

DEC 03 1996

November 22, 1996

VIA AIRBORNE EXPRESS

Mr. Kevin Murphy
Time Oil Company
2737 W. Commodore Way
Seattle, WA 98199

Dear Kevin:

As discussed, enclosed are some technical resource documents to help you evaluate remediation strategies for soils and groundwater impacted by pentachlorophenol at Time Oil's Portland facility.

I have included a bio-venting treatability study (primarily groundwater), numerous published papers on soil bioremediation, two site-specific studies done to correlate penta and dioxin, and vendor literature regarding recycling soils into asphaltic material.

I trust this will give you some useful insights. If there are additional materials I can assist in providing you, please feel free to call at (412) 227-2194.

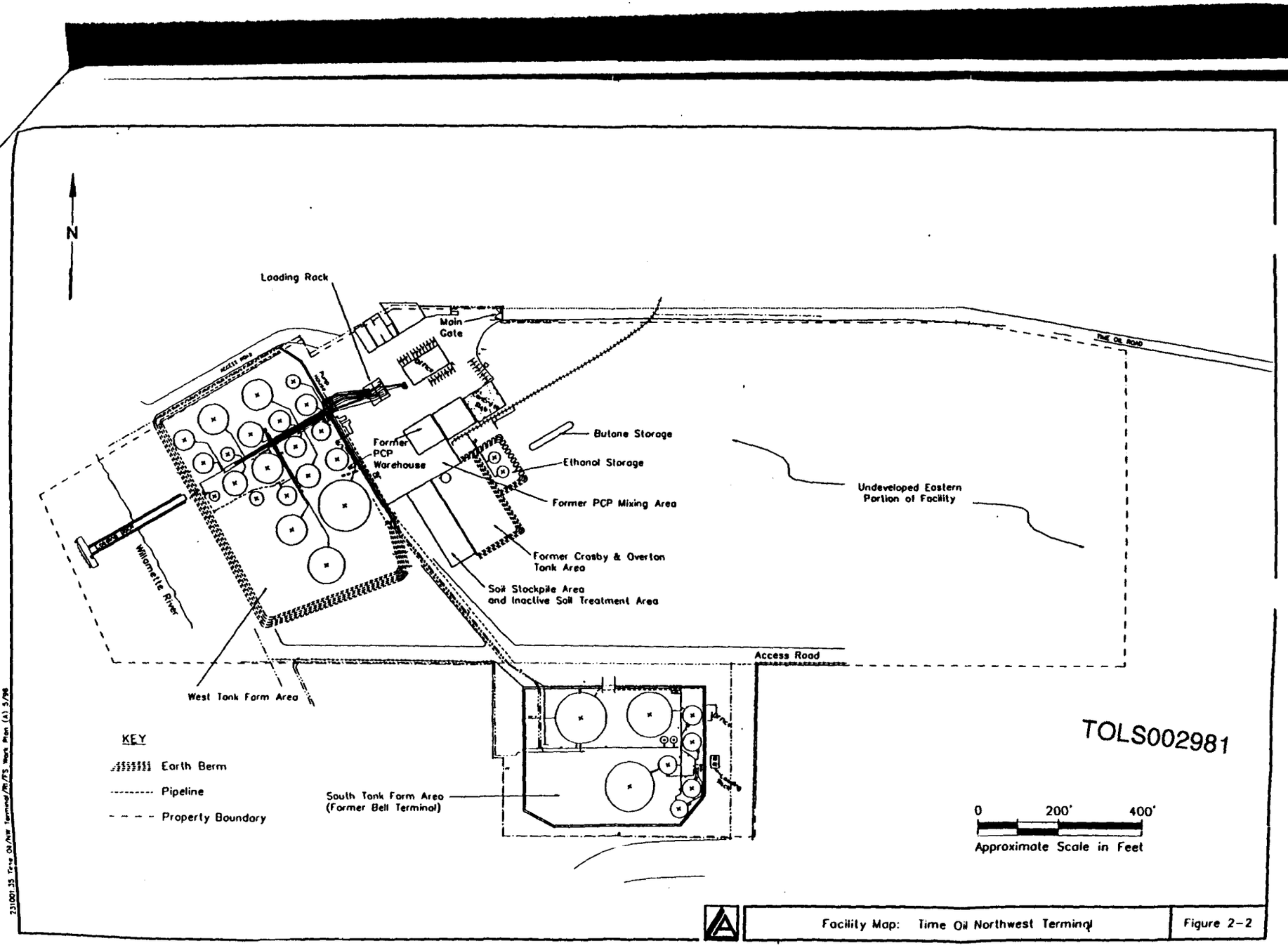
Very truly yours,

Michael D. Tischuk

Michael D. Tischuk
Technical Resources Manager

MDT/dlk

Enclosures



Facility Map: Time Oil Northwest Terminal | Figure 2-2

BZT0104(e)039802

SCHWABE WILLIAMSON & WYATT P.C.
ATTORNEYS AT LAW

PACWEST CENTER, SUITES 1600-1800
1211 SOUTHWEST FIFTH AVENUE • PORTLAND, OREGON 97204-3795
TELEPHONE: 503 222-9981 • FAX: 503 796-2900 • TELEX: 650-686-1360

PATRICIA M. DOST

August 7, 1996

Mr. Anthony G. Hopp
Wildman, Harrold, Allen & Dixon
225 West Wacker Drive
Chicago, Illinois 60606-1229

Re: Time Oil Company Northwest Terminal

Dear Tony:

Enclosed please find Koppers' copies of documents Time Oil has recently submitted to DEQ for approval:

1. RI/FS Work Plan documents;

2. Stockpile Management Plan;

3. Request for Proposal Environmental Construction Services;

4. Drum Removal and Small Stockpile Relocation Plan;

5. Revised Health and Safety Plan.

Please pass these on to Jane Patarcity.

I understand from Kevin Murphy that Jane Patarcity would like to meet at the Time Oil site in September. Jane has suggested to Kevin that Mike Tischuk, the remediation manager at Koppers' Oroville facility, has some good experience dealing with these kinds of problems, and it might be helpful if Mike could attend the site meeting also. Finally, you might consider attending; it would be a good chance for you and I to try to work out our differences on the interim cost allocation issue.

TOLS002982

BZTO104(e)039803

Please give me a call if you have any questions, or feel free to have Jane call Kevin directly. I look forward to talking with you soon.

Very truly yours,

Patricia M. Dost

PMD:rc

Enclosures

cc: Rick Gordon (w/o encs.)
Kevin Murphy (w/o encs.)

TOLS002983

2000

BZTO104(e)039804

SCHWABE WILLIAMSON & WYATT P.C.
ATTORNEYS AT LAW

PACWEST CENTER, SUITES 1600-1800
1211 SOUTHWEST FIFTH AVENUE • PORTLAND, OREGON 97204-3795
TELEPHONE: 503 222-9981 • FAX: 503 796-2900 • TELEX: 650-686-1360

PATRICIA M. DOST

February 5, 1996

Mr. Anthony G. Hopp
Wildman, Harrold, Allen & Dixon
225 West Wacker Drive
Chicago, Illinois 60606-1229

Re: Time Oil Northwest Terminal

Dear Tony:

In late November, I wrote to you suggesting a conference call with our clients. I hope that the fact that we have had no response from you means only that you have been busy. We remain anxious to confer with you and your client at your earliest convenience.

In the meantime, Time Oil would very much appreciate it if Beazer would provide it any available technical information on a number of proprietary chemicals used in the formulation of Koppers' products at the Northwest Terminal. We have virtually no information about the following:

1. Nalco 6SJ743 (polyester)

2. Eastman Kodak Solvent KB3

3. Eastman Kodak Solvent B11

4. Monsanto oxo-alcohol High Boilers

5. Charter International Oil Company Espesol 310-66 (short-range mineral spirits)

6. Koppers WR340 Concentrate

7. Koppers Petroset II (specific gravity 1.03)

8. Stoddard Solvent

TOLS002984

Thank you very much for your assistance in this matter. I look forward to talking with you and your client soon.

Very truly yours,

Patricia M. Dost

PMD:rc

cc: Rick Gordon
Kevin Murphy

10000

TOLS002985

BZTO104(e)039806

PHONE 285-2400
CABLE ADDRESS. TIMOIL

SEATTLE
TACOMA
PORTLAND
STOCKTON
RENO
RICHMOND
LOS ANGELES

TIME OIL COMPANY

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

SEATTLE, WASHINGTON 98199-1233
SEATTLE, WASHINGTON 98124-0447

April 20, 1987

Koppers Company Inc.
Attn: Jay Sebbins
Koppers Building, Room 750
Pittsburgh, PA 15219

Dear Mr. Sebbins:

This refers to our previous telecon regarding clean-up of Koppers pentachlorophenol at 12005 North Burgard, Portland, OR and Time Oil invoice 091868 dated 03/06/86, which you agreed to look into and give me a call back regarding payment.

To my knowledge, there has been no call hence this letter as a reminder. Since invoice 091868 was forwarded, those items shown on invoice as "COMMITMENTS" became a reality and have been paid by Time Oil. In addition, other essentials have been accomplished and fees for those services have been also paid by Time. The net result is an increase to Koppers share of costs by $12,699.07.

Enclosed is copy of original invoice, a listing of expenditures to date and an invoice for one-half the cost of those expenditures incurred since original invoice. This package reflects total costs as of 04/01/87.

Your processing of these invoices for prompt payment is truly appreciated.

Sincerely,

John P. Denham

John P. Denham
Environmental Manager

Encl. a/s

JPD/jam

10000

TIME OIL CO.

P.O.BOX 24447 TERM. STATION - SEATTLE WA 98124-0447
2737 WEST COMMODORE WAY - SEATTLE WA 98199-1233
PHONE (206) 285-2400

INVOICE 091868

DATE 03/06/86
REF. 03-03028 JKJ

CUSTOMER #: 03/05505623

ACCOUNT:
KOPPERS COMPANY INC
ATTN: DONALD F. MARION
KOPPERS BUILDING ROOM 750
PITTSBURGH PA 15219

657 60 123 27831.21
120 9 . 14250.00

TO CHARGE YOU FOR 1/2 OF THE FOLLOWING PER MUTUAL AGREEMENT IN REFERENCE TO CLEAN UP COSTS AT 12005 N. BURGARD RD., PORTLAND, OREGON.

EXPENDITURES

4/26/85 CHEM-SECURITY SYSTEMS (LABORATORY ANALYSIS OF SOIL SAMPLES)	150.00
7/10/85 NORTHWEST VACUUM TRUCK SERVICE (RELOCATING 242.76 TONS OF SOIL TO ARLINGTON)	9,000.00
7/29/85 CHEM-SECURITY SYSTEMS (RECEIVING 243.30 TONS OF SOIL AT ARLINGTON)	27,270.88
8/8/85 ENVIRONMENTAL EMERGENCY SERVICES (OBTAIN AND ANALYZE 3 COMPOSITE SAMPLES)	
12/31/85 ENVIRONMENTAL EMERGENCY SERVICES (PRIMARY SAMPLING AND ANALYSIS PLUS REPORT)	18,741.55
	55,662.43

COMMITTMENTS

DEQ PER OAR 240-102-065	3,500.00
*RIEDEL ENVIRONMENTAL SERVICES (ADMENDMENT 2)	25,000.00+
	84,162.43

50% = 42,081.21

*NAME CHANGE FROM ENVIRONMENTAL EMERGENCY SERVICES

INVOICE TOTAL $42,081.21

TOLS002987

Encl. 1

ACCOUNTS RECEIVABL

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As of 04/01/87

TIME OIL CO. EXPENDITURES IN REFERENCE TO PENTACHLOROPHENOL CLEAN UP COSTS AT 12005 NORTH BURGARD, PORTLAND, OR.

04/26/85	Chem-Security Systems (Laboratory analysis of soil sample)	$ 150.00
07/10/85	Northwest Vacuum Truck Service (Relocating 242.76 tons of soil to Arlington)	$ 9,000.00
07/29/85	Chem-Security Systems (Receiving 243.30 tons of soil at Arlington)	$ 27,270.88
08/08/85	Environmental Emergency Services (Sampling and analysis)	$ 500.00
12/05/85	Environmental Emergency Services (Well drilling, sampling & analysis)	$ 18,741.55
03/24/86	Environmental Emergency Services (Sandblast and demolish wall; install wells)	$ 17,252.67
05/16/86	Instrumentation Northwest (Monitoring well materials)	$ 3,702.66
06/11/86	Century West Engineering (Develop and sample wells)	$ 2,739.50
06/11/86	Department of Environmental Quality (Per OAR 240-102-065)	$ 3,500.00
07/08/86	Century Environmental Sciences (sampling wells)	$ 1,800.00
08/08/86	Riedel Environmental Services, Inc. (Sampling and analysis)	$ 4,452.81
08/25/86	Jack Eatch Construction Co. (Relocate soil and dispose of concrete wall)	$ 1,465.00
09/10/86	Concrete Coring Co. (Cut holes through concrete floor of warehouse)	$ 390.00
10/24/86	SRH Associates, Inc. Investigation of pentachlorophenol as per contract dated 08/14/86	$ 18,465.00
01/26/87	Century West Engineering (Well sampling and analysis)	$ 130.50
		$109,560.57
	Koppers Company share of costs = 50% =	$ 54,780.28
	TOTAL DUE FROM KOPPERS =	$ 54,780.28

Encl. 2

BZTO104(e)039809

TIME OIL CO.
P.O. BOX 24447 TERM. STATION - SEATTLE WA 98124-0447
2737 WEST COMMODORE WAY - SEATTLE WA 98199-1233
PHONE (206) 285-2400

DEBIT MEMO 020190

DATE 04/17/87
REF. 04-03131 FER

CUSTOMER #: 03/05505623

ACCOUNT: 120 9 12699.07
KOPPERS COMPANY
Koppers Building - Room 750
Pittsburgh, PA 15219

ATTN: JAY STEBBINS

THIS IS AN ADDITION TO INVOICE # 091363 DATED MARCH 6, 1986 FOR $ 42,081.21 TO CHARGE YOU FOR HALF OF EXPENDITURES, PER MUTUTAL AGREEMENT, IN REFERENCE TO CLEAN UP COSTS AT 12005 NORTH BURGARD PORTLAND, OREGON. 12,699.07

COPIES OF THE ORIGINAL INVOICE (#091365, 3/6/86, $42081.21) AND THE UPDATED CHARGES FOR $ 54780.28 ARE ATTACHED.

INVOICE TOTAL $12,699.07

TOLS002989

Encl. 3

ORIGINAL

10000

PHONE 285-2400
CABLE ADDRESS: TIMOIL
(FAX)206-283-8038

SEATTLE
TACOMA
PORTLAND
STOCKTON
RENO
RICHMOND
LOS ANGELES

TIME OIL COMPANY

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

SEATTLE, WASHINGTON 98199-1233
SEATTLE, WASHINGTON 98124-0447

September 19, 1988

Mr. Bill Giarla
Koppers Company, Inc.
Koppers Building, Room 750
Pittsburg, Pennsylvania 15219

Dear Mr. Giarla:

On July 27, 1988 you and I discussed the matter of the costs incurred in the cleanup of Koppers' pentachlorophenol at Time Oil's Northwest Terminal in Portland. Since that time, Time Oil has been searching for an economic and effective method of disposing of the problem. In that regard, enclosed is a preliminary work plan prepared by Ecova Corporation for the cleanup of the pentacholorophenol contaminated soils. Although Time Oil is still in the process of evaluating the merits of the work plan, we anticipate following it subject to approval by the Oregon Department of Environmental Quality.

The cost of the proposed cleanup and related work is estimated at $400,000. Pursuant to the January 23, 1986 agreement between Koppers and Time Oil, Kopper's share would be $200,000.

As a reminder, Time Oil has spent $118,371.10 to date on investigation and cleanup of our mutual problem. Of this we have invoiced you $54,780.28 by invoices dated 3/6/86 and 4/17/87 (copies enclosed). We have not yet received payment for those invoices. Also enclosed is our invoice dated 9/21/88 for $4,405.27, which brings Kopper's total share of moneys spent to date to $59,185.55.

Very truly yours,

TIME OIL CO.

Terrill L. Henderson
Corporate Counsel

TLH:pjv

Enclosures

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TIME OIL CO.

P.O.BOX 24447 TERM. STATION - SEATTLE WA 98124-0447
2737 WEST COMMODORE WAY - SEATTLE WA 98199-1233
PHONE (206) 285-2400

INVOICE 091868

DATE 03/06/86
REF. 03-03028 JKJ

CUSTOMER #: 03/05505623

ACCOUNT:
KOPPERS COMPANY INC
ATTN: DONALD F. MARION
KOPPERS BUILDING ROOM 750
PITTSBURGH PA 15219

657 60 123 27831.21
120 9 14250.00

TO CHARGE YOU FOR 1/2 OF THE FOLLOWING PER MUTUAL AGREEMENT IN REFERENCE TO CLEAN UP COSTS AT 12005 N. BURGARD RD., PORTLAND, OREGON.

EXPENDITURES

4/26/85 CHEM-SECURITY SYSTEMS (LABORATORY ANALYSIS OF SOIL SAMPLES)	150.00
7/10/85 NORTHWEST VACUUM TRUCK SERVICE (RELOCATING 242.76 TONS OF SOIL TO ARLINGTON)	9,000.00
7/29/85 CHEM-SECURITY SYSTEMS (RECEIVING 243.30 TONS OF SOIL AT ARLINGTON)	27,270.88
8/8/85 ENVIRONMENTAL EMERGENCY SERVICES (OBTAIN AND ANALYZE 3 COMPOSITE SAMPLES)	
12/31/85 ENVIRONMENTAL EMERGENCY SERVICES (PRIMARY SAMPLING AND ANALYSIS PLUS REPORT)	18,741.55
	55,662.43

COMMITTMENTS

DEQ PER OAR 340-102-065	3,500.00
*RIEDEL ENVIRONMENTAL SERVICES (ADMENDMENT 2)	25,000.00+
	84,162.43
50% =	42,081.21

*NAME CHANGE FROM ENVIRONMENTAL EMERGENCY SERVICES

INVOICE TOTAL $42,081.21

TOLS002991

Encl. 1

10000

ACCOUNTS RECEIVA

TIME [illegible] CO.
[illegible]OX 24447 TERM. STA[illegible]ON - SEATTLE WA 98124-0447
2737 WEST COMMODORE WAY - SEATTLE WA 98199-1233
PHONE (206) 285-2400

DEBIT MEMO 02019
DATE 04/17/8
REF. 04-03131 FE

CUSTOMER #: 03/0550562

ACCOUNT:
KOPPERS COMPANY
Koppers Building - Room 750
Pittsburgh, PA 15219

ATTN: JAY STEBBINS

120 9 12699.07

- -

THIS IS AN ADDITION TO INVOICE # 091363 DATED MARCH 6, 1986 FOR $ 42,081.21 TO CHARGE YOU FOR HALF OF EXPENDITURES, PER MUTUTAL AGREEMENT, IN REFERENCE TO CLEAN UP COSTS AT 12005 NORTH BURGARD PORTLAND, OREGON. 12,699.07

COPIES OF THE ORIGINAL INVOICE (#091363, 3/6/86, $42081.21) AND THE UPDATED CHARGES FOR $ 54730.23 ARE ATTACHED.

INVOICE TOTAL $12,699.07

TOLS002992

ORIGINAL

10000

BZTO104(e)039813

TIME OIL CO.
P.O.BOX 24447 TERM. STATION - SEATTLE WA 98124-0447
2737 WEST COMMODORE WAY - SEATTLE WA 98199-1233
PHONE (206) 285-2400

INVOICE 056677
DATE 09/21/88
REF. 09-03116 CJC

CUSTOMER #: 03/05505623

ACCOUNT: 657 60 123 4405.27
KOPPERS COMPANY INC
KOPPERS BUILDING ROOM 750
ATTN: BILL GIARLA
PITTSBURGH PA 15219

TO CHARGE YOU FOR 1/2 THE FOLLOWING PWR MUTUAL AGREEMENT IN REFERENCE TO CLEAN UP COSTS AT 12005 N BURGARD RD, PORTLAND OREGON

	EXPENDITURES		
11/9/87	SRH-COLLECT AND ANALIZE WATER SAMPLES	2810.53	
3/31/88	ECOVA-PREPARE PENTA CLEANUP WORK PLAN	6000.00	
		8810.53	
	50%=	4405.27	4,405.27
		INVOICE TOTAL	34,405.27

TOLS002993

SEE REVERSE

10000

BZTO104(e)039814

Koppers Company, Inc.
436 Seventh Avenue
Pittsburgh, PA 15219
Telephone 412-227-2000

KOPPERS

January 13, 1989

Mr. Terrill L. Henderson
Corporate Counsel
Time Oil Company
2737 West Commodore Way
Seattle, WA 98199-1233

Re: Northwest Terminal Property

Dear Terry:

Enclosed please find a check from Koppers Company in the amount of $59,185.55. This represents Koppers' share of the costs incurred through September 19, 1988 for the investigation and cleanup of the above site.

I look forward to talking with you soon concerning the scheduling of a meeting to discuss the allocation of responsibility for the remaining work Time Oil plans for the property.

Very truly yours,

Bill Giarla

William F. Giarla
412-227-2635

Enclosure

TOLS002994

10000

BZTO104(e)039815

SCHWABE WILLIAMSON & WYATT P.C.
ATTORNEYS AT LAW

PACWEST CENTER, SUITES 1600-1800
1211 SOUTHWEST FIFTH AVENUE • PORTLAND, OREGON 97204-3795
TELEPHONE: 503 222-9981 • FAX: 503 796-2900 • TELEX: 650-686-1360

PATRICIA M. DOST

November 29, 1995

Anthony G. Hopp
Wildman, Harrold, Allen & Dixon
225 West Wacker Drive
Chicago, Illinois 60606-1229

Re: Time Oil Co., Northwest Terminal

Dear Tony:

You recently wrote me suggesting that we arrange a conference call to bring you and Jane Patarcity up to date on the status of activities at the Northwest Terminal. I think this is an excellent idea, and I would be happy to schedule such a call within the next week or so. To facilitate the call, I am enclosing some recent Oregon Department of Environmental Quality correspondence.

First, I am sending you an October 24, 1995 letter from Tom Bispham, DEQ's Northwest Region Administrator, formally transferring administrative oversight of the Northwest Terminal from DEQ's hazardous waste enforcement program to the more flexible Voluntary Cleanup Program. DEQ has agreed to refrain from RCRA enforcement activity so long as Time Oil diligently addresses contaminated soil and groundwater at the facility. As Mr. Bispham hints in the letter, DEQ has verbally indicated that it will waive certain technical RCRA requirements. For example, DEQ probably will not require construction of a special building or tank for storage of contaminated soil generated during remedial activities and probably will not require Time Oil to obtain a RCRA permit in order to treat the contaminated soil on site.

Second, I am enclosing the Voluntary Cleanup Program's initial "file summary" memorandum, dated October 1, 1995. We believe that the memorandum contains some inaccuracies and lacks certain information we believed we had provided to DEQ. For example, although the memorandum identifies dioxin data as an information gap to be filled, Time Oil has analyzed contaminated soils for dioxins. (Fortunately, our data indicates that no dioxins are present.) We intend to meet with DEQ shortly to provide additional information and clear up some misunderstandings.

TOLS002995

10000

BZTO104(e)039816

Finally, I am enclosing an October 20, 1995 Notice To Owners and Operators of Proposal to List Contaminated Property. In the Notice, DEQ proposes to list the Northwest Terminal on its Confirmed Release List and Inventory. As the Notice recites, Oregon law authorizes DEQ to compile a list of facilities at which DEQ "has confirmed a release of a hazardous substance." Time Oil believes that the Notice and its accompanying "Facility Report" contain factual errors and is compiling a response to the Notice. It seems likely, however, that DEQ will find that it has confirmed a release of pentachlorophenol at the facility.

As you can see from the enclosed correspondence, DEQ is moving this project to the front burner. In the "Facility Report" attached to the Notice of DEQ's intent to list the Northwest Terminal, DEQ is indicating to the public that a remedial investigation is "in progress." I expect that DEQ will complete its review of our December 1993 RFI work plan within the next couple of weeks, propose some revisions, and require Time Oil to begin implementation of the plan shortly thereafter.

When my partner, Jay Waldron, first spoke to Robert Shuftan about this matter in 1993, Jay told Mr. Shuftan that Time Oil was looking for two things from Beazer: technical assistance and money. Time Oil is very pleased that we have reached an agreement on the first item, Beazer's technical assistance. Because Time Oil expects to incur substantial costs in the near future to implement the investigation work plan, it is time to begin discussions on the second item. Time Oil proposes that Beazer continue Kopper's historic practice of reimbursing Time Oil one-half of its costs through the remedial investigation and pending final allocation of costs between the parties.[1] I am enclosing Landau's most current estimate of investigation costs; under this interim allocation, Beazer's estimated share of these costs would be $288,000 to $350,000.

[1]Time Oil considers this letter part of Time Oil and Beazer's ongoing efforts to compromise this matter, and pursuant to Federal Rule of Evidence 408 and Oregon Evidence Code 408, this letter will not be admissible in any future litigation between the parties.

Time Oil and I look forward to discussing all of these issues with you. In particular, we welcome your ideas on the remedial investigation work plan and the revisions DEQ's "file summary" indicates DEQ is considering. Please give me a call so that we can arrange a telephone conference.

Very truly yours,

Patricia M. Dost

PMD:

Enclosures

cc: Richard Gordon, Time Oil Co.
Kevin Murphy, Time Oil Co.

LANDAU
ASSOCIATES,
INC.
Environmental and Geotechnical Services

November 27, 1995

Ms. Patricia Dost
Schwabe Williamson and Wyatt
Pacwest Center Suite 1600
1211 Southwest Fifth Avenue
Portland, Oregon 97204-3795

Dear Ms. Dost:

Per your request, this letter provides an update on current costs and an estimate for potential future costs for Landau Associates Inc.'s environmental consulting services to Time Oil Company related to the former PCP mixing area at Time Oil's Northwest Terminal in Portland, Oregon.

Landau Associates has contracted with Time Oil Co. for $348,471 in services, and of that amount, $99,807 has been expended (through October 1995). The attached table provides the breakdown, per task, for our services.

As you are aware, the contract amount originally was developed on the basis of a project scope that has changed significantly over the last two years. The latest correspondence from the Oregon Department of Environmental Quality (DEQ), dated October 3 and October 24, 1995 indicates that the DEQ may not require Time Oil to enclose the soil currently stockpiled at the site in a containment building, but they will require that Time Oil develop and implement a maintenance and inspection program for the pile, treat the soil in the pile, and expand the scope of the site investigation. The detailed activities associated with these scope changes have not been fully identified, and consequently, estimated associated costs are, at this time, speculative.

Clearly, additional costs will be incurred over the next few months for strategizing an approach, negotiating with the DEQ, preparing a maintenance and inspection program for the stockpile, and revising the work plan for the site investigation of the former PCP mixing area. Over the next year, additional costs will be incurred to implement the maintenance and inspection program and the expanded site investigation, and to make the required progress towards treatment and disposal of the stockpiled soil. A very rough estimate of some of the potential cost changes is as follows:

- A savings of approximately $300,000 - $400,000 (approximately $50,000 of which is in the current authorized budget) due to the withdrawal of the requirement to place the soil in a containment building

P.O. BOX 1029 • EDMONDS, WA 98020-9129 • (206) 778-0907 • FAX (206) 778-6409
SPOKANE: (509) 327-9737 • FAX (509) 327-9691 / TACOMA: (206) 926-2493 • FAX (206) 926-2531

- An additional approximately $15,000 in short-term negotiations and strategies
- An additional approximately $200,000 to $260,000 for the remedial investigation (this includes increases over the original investigation scope that are incorporated in the current draft RFI Work Plan, and further changes in the scope recently identified by DEQ for the former PCP Mixing Area and the adjacent Crosby and Overton tank area; this does not include any additional requirements by DEQ based upon the findings of the investigation)
- An additional $25,000 to $50,000 for a baseline risk assessment (the original risk assessment scope was for focussed use of risk assessment methodologies to identify site cleanup levels, not a formal risk assessment)
- An additional $10,000 to $25,000 for consultation regarding the maintenance and inspection of the soil stockpile, including preparing a soil stockpile stormwater management plan, but not including implementation of the program (which may include permitting and construction of an NPDES outfall to the Willamette River)
- An additional $25,000 to $50,000 for consultation regarding future treatment of the stockpiled soil, but not including actual treatment and subsequent management of the soil

These estimates suggest that an additional $225,000 to $350,000 above the current authorized consulting budget of approximately $350,000 may be necessary to address the near-term changes in scope for environmental issues related to the former PCP mixing area. Please note that as we discussed, this is only the roughest of estimates; we expect to work with you and Time Oil over the next few months to develop a cost-effective approach to the DEQ issues.

Please call us if you have any questions regarding this information.

LANDAU ASSOCIATES, INC.

By:

Leslee L. Conner
Project Manager

LLC/ljd
11/27/95 J:\231\001\DOST.LET

cc: Kevin Murphy, Time Oil Co.

TOLS002999

10000

BZTO104(e)039820

TABLE 1

LANDAU ASSOCIATES, INC.
PROJECT COST ANALYSIS
TIME OIL - NORTHWEST TERMINAL
PORTLAND, OREGON

Updated through October 1995

Task Number	Task Description	Total Invoiced	Total Budget	Remaining Budget
.10	Strategy and negotiation meetings	$ 16,050	$ 18,824	$ 2,774
.20	RCRA storage unit	$ 37,998	$ 86,223	$ 48,225
.30	RFI site characterization	$ 45,592	$ 218,205	$ 172,613
.40	Risk assessment/cleanup levels	$ 167	$ 25,219	$ 25,052
	Total	$ 99,807	$ 348,471	$ 248,664

TOLS003000

10000

LANDAU ASSOCIATES, INC.

BZTO104(e)039821

Oregon

DEPARTMENT OF
ENVIRONMENTAL
QUALITY

October 20, 1995

RECEIVED

CERTIFIED MAIL NO.Z 076 234 396
RETURN RECEIPT REQUESTED

Kevin Murphy
Time Oil Company
2737 West Commadore Way
Seattle WA 98199-1233

NOTICE TO OWNERS AND OPERATORS OF PROPOSAL TO LIST CONTAMINATED PROPERTY
Time Oil
12005 N Burgard St Portland
Preliminary Assessment Equivalent - 8/93
ECSI ID NO. # 170

Dear Mr Murphy:

One of the environmental goals of the State of Oregon is to clean up sites throughout the state which are contaminated with hazardous wastes, petroleum products, or other hazardous substances. A key step in this process is to identify the contaminated sites. The Oregon Legislature has directed the Department of Environmental Quality (DEQ) to implement a comprehensive site discovery program to accomplish this.

To date, by reviewing complaints, spill reports, and Department records, DEQ has identified approximately 1485 sites suspected to be contaminated with hazardous substances. Many of these sites have been contaminated through past disposal and management practices considered appropriate when they occurred. For example, gasoline storage tanks were buried to minimize fire and explosion hazards without serious consideration of the resulting threats to groundwater. We are now finding drinking water supplies contaminated by leaking underground storage tanks.

TOLS003001

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811 SW Sixth Avenue
Portland, OR 97204-1390
(503) 229-5696
TDD (503) 229-6993
DEQ-1

BZTO104(e)039822

The DEQ is identifying those suspect sites where contamination has been "confirmed". Contamination is "confirmed" when the Department documents a release of a hazardous substance that may pose a significant threat to public health, safety, welfare, or the environment. The Department identifies sites with confirmed releases on two site lists having different listing criteria. The first, the Confirmed Release List, includes all sites where releases of hazardous substances have been confirmed. The second list, the Inventory, includes those sites with confirmed releases which, in addition, based on a site assessment, the Department has found to require further investigation or cleanup.

Both the Legislature and the Department recognize the Department's information regarding these sites may be outdated or incomplete. For example, contamination may have already been cleaned up, owners or operators may have changed, or the report of the release may include inaccuracies. Therefore, before listing sites the Department is notifying the owners and operators of proposed listings and requesting their comments. The fact sheet enclosed explains this listing process.

This letter is to notify you that the DEQ is proposing to include the property identified above on the "Confirmed Release List" and the "Inventory List" and to give you an opportunity to comment on this proposed listing. The enclosed Facility Report identifies the hazardous contamination at this property as well as other information we plan to include on the list. The site assessment report referenced in the caption above provides the basis for the determination that further investigation or cleanup is needed at the site. A copy has been previously provided to you. You may provide any comments you believe will correct or supplement this listing information or demonstrate this property should not be listed.

Listing your property does not necessarily mean that you are responsible for the contamination, investigation or cleanup. Responsibility for these costs is prescribed by various provisions in state and federal laws. If you want more information regarding these laws, you may want to contact your attorney. You may also contact this office, as described below.

As for the proposed listing, you have as an owner or operator of the facility forty-five (45) days from receiving this notice to provide written comments to the Department. You may request an extension of up to another forty-five (45) days (for a total of no more than ninety (90) days) if for special reasons you cannot respond within the initial forty-five (45) day period.

Comments and requests for extensions should be sent to:

Oregon Department of Environmental Quality
Site Assessment Program
Waste Management and Cleanup Division
811 SW 6th Avenue, 9th Floor
Portland, OR 97204

Your comments are critical to us in determining whether to add the property to the Confirmed Release List & Inventory List.

The facility/property can be removed from these lists after all necessary cleanup, including continuing environmental controls such as groundwater monitoring or special land use restrictions, is completed. We are pleased that you have elected to participate in our Voluntary Cleanup Program to investigate and assess necessary remedial actions for this site. We hope that this cooperative relationship will continue until potential threats from hazardous materials at this site have been eliminated.

For your information, the Confirmed Release List and Inventory will be updated quarterly and made available to any member of the public who requests it.

If you have specific questions about the Confirmed Release List or Inventory, the proposed listing or site activities, or want copies of the Oregon Environmental Cleanup Law (beginning at ORS 465.200) or related rules governing the listing process (beginning at OAR 340-122-410), please contact the Site Assessment Program of the Waste Management and Cleanup Division at (503) 229-6170 or at the address shown above.

Sincerely,

Langdon Marsh
Director

Enclosures: Facility Report & Fact Sheet
cc: Northwest Region, DEQ
SAS File #170

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TOLS003003

BZTO104(e)039824

ENVIRONMENTAL CLEANUP SITE INFORMATION
FACILITY REPORT

October 09, 1995 05:08 pm

SITE ID: 170 NAME: ** Time Oil Co.

LOCATION: 12005 N Burgard ST Portland 97203

COUNTY: MULTNOMAH

ASSOCIATED PARTIES

AFFILIATION	PARTY NAME **
Current Legal Owner	Bell Oil Terminal Co.
Current Legal Owner	Time Oil

** Not necessarily responsible for contamination.

HAZARDOUS SUBSTANCE INFORMATION

SUBSTANCE	QUANTITY*** RELEASED	MEDIA CONTAMINATED	CONCENTRATION LEVEL	AS VERIFIED BY
BENZO(a)PYRENE	Unknown	Soil	9.4 mg/kg	Laboratory Data
CHRYSENE	Unknown	Soil	16 mg/kg	Laboratory Data
LEAD	Unknown	Soil	200 mg/kg	Laboratory Data
NAPHTHALENE	Unknown	Soil	100 mg/kg	Laboratory Data
PCB 1221	Unknown	Soil	68 mg/kg	Laboratory Data
PENTACHLOROPHENOL	Unknown	Soil Groundwater	116,000 mg/kg 60 mg/L	Laboratory Data Laboratory Data
PETROLEUM HYDROCARBONS	Unknown	Soil	16,430 mg/kg	Laboratory Data

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TOLS003004

SITE ID: 170 Time Oil Co. FACILITY REPORT

COMMENTS: Soil and groundwater.

*** Quantity released may include amounts of substances other than hazardous substances.

MANNER AND TIME OF RELEASE:

Past operating practices in the former PCP mixing area and waste oil tank area;past practices in the tank farm and spills in 1985, 1986, 1990, and 1994.
Time of release: Unknown

STATUS OF REMOVAL OR REMEDIAL ACTION:

PRE-REMEDIAL DEVELOPMENT (Negotiations) completed
SITE EVALUATION completed
PRELIMINARY ASSESSMENT EQUIVALENT completed
VCS Waiting List completed
REMEDIAL INVESTIGATION in progress

ENVIRONMENTAL AND PUBLIC HEALTH THREATS:

Soil and groundwater contamination. Potential for surface water impacts.

REMEDIAL ACTION FUNDED PRIMARILY BY:

Owner, operator or other party under state or federal authority

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(facility.rpt)

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Environmental CLEANUP REPORT

IDENTIFYING CONTAMINATED SITES IN OREGON

Facts about the Confirmed Release List and Inventory of Hazardous Substance Sites

One of the environmental goals of the State of Oregon is to clean up sites throughout the state which are contaminated with hazardous substances. In accordance with Oregon's Environmental Cleanup Law, the Oregon legislature has directed the Department of Environmental Quality (DEQ) to implement a comprehensive site assessment program to identify and evaluate contaminated sites.

As part of this program, DEQ:

1. Identifies and assesses releases or threats of releases of hazardous substances to the environment which may require removal or cleanup action.

2. Publishes two separate lists of facilities, or sites, where releases of hazardous substances have been confirmed.

• **The Confirmed Release List (CRL)**, includes all properties where a hazardous substance release has been documented.

• **The Inventory** of sites with a confirmed release which DEQ has determined require further investigation and/or cleanup, or related long term environmental or institutional controls.

DEQ adds sites that are, or may be, contaminated and may require cleanup to its **Environmental Cleanup Site Information System (ECSI)**, an electronic tracking system.

DEQ adds these sites to the CRL and Inventory when it determines they meet the respective criteria for listing, described above.

ECSI contains more than 1200 sites which are in various stages of investigation and cleanup. This data base includes sites where investigations have not yet occured and sites where no further action is required. Once a site is entered into ESCI, it will not be removed.

Sites may be added to the CRL any time after a confirmed release has been documented. Sites may be added to the Inventory only after a preliminary assessment (PA) or preliminary assessment equivalent (PAE) is completed. Sites may be added to the CRL or Inventory separately or concurrently.

Prior to adding a site to either the CRL or Inventory, DEQ notifies the current owners and operators and allows them to comment on the proposed listing. DEQ removes sites from the CRL and Inventory when all necessary cleanup has been completed and after a public comment period.

Sites requiring continuing environmental or institutional controls to protect public health and the environment must remain on the CRL and Inventory. Listing on the Inventory is not a prerequisite for investigation and/or cleanup action or referral to a cleanup program.

RECEIVED
OCT 06 1995

Oregon

DEPARTMENT OF
ENVIRONMENTAL
QUALITY

NORTHWEST REGION

October 3, 1995

Kevin Murphy
Time Oil Company
2737 W. Commodore Way
Seattle, WA 98199-1233

Re: DEQ File Summary
Time Oil Company Northwest Terminal

Dear Mr. Murphy:

Enclosed for your use is a copy of the file summary prepared by the Department of Environmental Quality (DEQ) Voluntary Cleanup Program (VCP) for the Time Oil Company Northwest Terminal in Portland, Oregon. The file summary identifies data gaps and provides recommendations and a project strategy for continued work.

After you and your consultants have had a chance to review the file summary, we would be happy to meet with you to discuss the next steps in the environmental investigation and cleanup. We will also be preparing a Voluntary Cleanup Agreement in order to continue DEQ VCP oversight through the next phases of the site investigation and cleanup.

If you have any questions or would like to schedule a meeting, please call me at (503) 229-6729. We look forward to working with you to achieve the cleanup of the Time Oil Northwest Terminal site.

Sincerely,

Karla Urbanowicz
Project Manager
Northwest Region
Voluntary Cleanup Section

KLU/klu

Enclosure: File Summary

John A. Kitzhaber
Governor

2020 SW Fourth Avenue
Suite 400
Portland, OR 97201-4987
(503) 229-5263 Voice
TTY (503) 229-5471
DEQ-1

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TOLS003007

BZTO104(e)039828

Cc w/ enclosure: Mike McCann - DEQ WR Eugene
Mike Rosen - DEQ NWR VCSAS
Dave St. Louis - DEQ NWR HW
Mike Kortenhof - DEQ NWR VCSAS
Tom Roick - DEQ NWR VCSAS
Rich Sedman - DEQ NWR VCSAS
Barbara Puchy - DEQ NWR HW

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State of Oregon
Department of Environmental Quality **Memorandum**

Date: October 1, 1995

To: File - Time Oil Company
(EPA CERCLIS ID No. ORD009597543
DEQ ECSI No. 170)

From: Karla Urbanowicz, Project Manager
Northwest Region Voluntary Cleanup Site Assessment Section

Subject: File Summary

I. INTRODUCTION

Time Oil Company entered into a Letter Agreement with the Department of Environmental Quality (DEQ) Voluntary Cleanup Program (VCP) on July 10, 1991 to investigate and cleanup contamination at its facility in Portland, Oregon. A DEQ file review memo was completed on April 8, 1992 by Mike Kortenhof of the VCP. The memo identified issues at the site pertaining to federal Resource Conservation and Recovery Act (RCRA) regulations regarding on-site management and storage of listed hazardous waste. Soil contaminated with pentachlorophenol (PCP) had been excavated and stockpiled at the site in 1989. It had been determined by the Environmental Protection Agency (EPA) that the soil was listed hazardous waste (F027) and subject to RCRA regulations for storage, treatment, and disposal. In May, 1992, the VCP referred the site to the DEQ Hazardous Waste section for resolution of the RCRA issues. Time Oil prepared a Site Characteristics Report (1993a, Landau). A work plan for additional work to complete a facility investigation was prepared by Time Oil and submitted to the DEQ Hazardous Waste section for review and approval in December, 1993 (1993b, Landau). The Hazardous Waste section found that the long term storage and treatment of the contaminated soil in the stockpile could not be permitted under RCRA regulations. The site was referred back to the VCP for site investigation and cleanup under state and federal Superfund cleanup rules and authorities. Time Oil re-submitted their Intent to Participate in VCP again in August, 1994. The project was reactivated in VCP on May 22, 1995 under the previously executed Letter Agreement (7/91). The unresolved issues and expectations pertaining to compliance with RCRA regulations are in the process of being summarized in a letter from DEQ to Time Oil.

This file summary was prepared based on a review of documents listed in Attachment 1, and on observations made during a site visit conducted on August 2, 1995.

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BZTO104(e)039830

II. BACKGROUND

Time Oil Company owns and operates a petroleum product storage and handling terminal on approximately 51 acres located at 12005 North Burgard Street, Portland, Oregon, 97203 (see Figure 1). The facility is in north Portland, Multnomah County, at latitude 45 degrees 37 minutes North, longitude 122 degrees 47 minutes west. The property consists of four parcels in Section 35 of Township 2N Range 1W. Three of the parcels comprise the Northwest Terminal; one parcel is known as the Bell Terminal. The focus of this file summary is the Northwest Terminal. The area surrounding the property is the Rivergate Industrial area occupied by Port of Portland facilities and other industries. The facility has operated since 1953.

The Northwest Terminal facility includes a tank farm with approximately 21 tanks ranging from 5,000 to 80,000 gallons in size (see Figure 2). Marine vessels dock in the Willamette River adjacent to the site to load and unload product via pipelines to the tanks. A truck loading area is present northeast of the tank farm. Piping to the truck loading area is currently subsurface, although Time Oil plans to replace the system with above ground piping. Five warehouses and one office building are present. Adjacent to the southern warehouses is an area that was formerly used for pentachlorophenol (PCP) product formulation (Figure 3 - PCP Mixing Area). Adjacent to the PCP mixing area are two former tank locations (5006 and 10002). These tanks were leased by Time Oil to Crosby and Overton, formerly Pac-Mar, in the 1980s for storage of waste oil.

In the PCP mixing area, several former tanks (20001, 20002, 20003 (20,000 gallon tanks) and several smaller horizontal tanks) were leased by Time Oil to Koppers Co. for blending and storage of wood treating products. Blending and storage operations occurred from 1967 to 1982. PCP granules were heated and mixed with paraffin wax, mineral spirits, ketones and other solvents. Dry PCP granules were stored in the southwestern warehouse and product formulation and storage occurred in the large tanks south of the PCP warehouse in the PCP mixing area. At least one of the products had a specific gravity of greater than 1 ("Timbertox 20", specific gravity=1.12). The mixing area was surrounded by a concrete bulkhead about three feet high. Trucks were loaded with product on the west side of the mixing area. The tanks, piping and related equipment were removed in 1984 from the mixing area, and the bulkhead was decontaminated and removed in 1985.

About 290 cubic yards of soil contaminated with pentachlorophenol was excavated in 1985 and disposed at the Chem-Security Systems, Inc. facility in Arlington. RCRA land ban restrictions came into effect in late 1985 and further off-site disposal of PCP-contaminated soil was prohibited. Time Oil contracted with ECOVA to develop a slurry bioreactor treatment system on-site in 1988. The treatment system was installed in late 1988, and additional soil was excavated in 1989. About 3,000 cubic yards of soil was stockpiled adjacent to the excavation area, and treatment process area (see Figure 3). The treatment operation was terminated in 1989 when ECOVA was unable to achieve the target treatment goal of 0.5 ppm PCP. The soil

stock pile is currently maintained on-site in a bermed, lined, and covered area adjacent to the treatment system.

III. ENVIRONMENTAL SETTING

General Environmental Setting

The site is located along the east bank of the Willamette River, about one-half mile upstream from the southern end of Sauvie Island. The site is generally flat up to the embankment along the river. The area around the office and warehouse is paved, but the majority of the site, including the tank farm area, is unpaved. The surface soils are sandy.

The site is within the 100 year flood plane of the Willamette River. Annual precipitation is about 45 inches.

Regional Geology and Hydrogeology

The site is located on a low river terrace adjacent to the Willamette River. The riverbank areas have been filled with sand dredged from the Willamette River. Soils generally consist of fine to medium grained sands with minor amounts of silts and gravel. The depth to bedrock may be greater than 200 feet.

The depth to groundwater in the area is less than 20 feet. Shallow groundwater probably discharges to the Willamette River.

Site Geology and Hydrogeology

Logs from monitoring wells installed at the site indicate the subsurface lithology includes sand to 16 feet below ground surface (bgs), underlain by a zone of silt and fine sand interbeds from about 16 feet to 25 feet bgs, underlain by fine sand to at least 40 feet which is the maximum depth drilled at the site. The zone of interbedded silts and sands contain silt interlayers that vary in thickness, but appear to be less than two feet thick. The silt beds were not encountered in wells installed near the river in the tank farm area (monitoring wells R and P), so the lateral extent of these layers is not known.

The water table at the site is found at about 13 to 18 feet bgs. It has been suggested that the silty layers represent an aquitard separating the water table zone from a lower, confined aquifer that maintains a water level at about 20 feet bgs (1991, ECOVA). The aquitard appears to pinch out towards the river. The groundwater generally flows toward the river, and the wells screened in deeper zones between 20 and 50 feet are reported to exhibit a response to tidal and seasonal fluctuations.

IV. REGULATORY HISTORY/ISSUES

In April and May, 1984, the DEQ and Multnomah County Sheriff's office investigated complaints from a worker that polychlorinated biphenyl (PCB)-contaminated material was being stored in two tanks leased by Crosby and Overton from Time Oil. DEQ collected samples on May 2, 1984 of tank bottom sludge that had been spilled near the tank, and near-surface soil in the vicinity of the leased tank. The sludge contained 1357 mg/kg PCBs, 170 mg/kg pentachlorophenol (PCP), and 630 mg/kg carcinogenic polynuclear aromatic hydrocarbons (PAHs); the soil contained 59.7 mg/kg PCBs (Table 1). An investigation followed to determine if PCB-contaminated wastes had been disposed by Crosby and Overton at St. Johns Landfill. DEQ analyzed samples which were collected from the landfill waste disposal area in October, 1984. PCBs were not found in the landfill areas tested. Additional soil samples were collected in the tank area by Crosby and Overton, under the direction of Time Oil, in 1989 when the lease agreement was terminated. Some PCB-contaminated soil was removed from the area and disposed as hazardous waste (see further discussion in Section V below). The DEQ file also indicates that in June 1986, Crosby and Overton submitted to DEQ results of an analysis of tank residual from their waste oil tanks in order to determine the waste classification for disposal of approximately 70,000 gallons of waste. Solvents present in the waste included 1,1 dichloroethane; trichloroethylene; toluene; tetrachloroethylene; and xylenes at 10 to 88 ppm. DEQ found that the waste was not hazardous waste (Interoffice Memo, 6/6/86).

In November 1984, the DEQ and the EPA conducted an assessment of past waste disposal practices at the Time Oil facility. A site inspection, interview, and soil sampling were conducted. Soil samples were collected on December 12, 1984 from ten locations at the Northwest Terminal, shown approximately on Figure 2, and two locations at the Bell Terminal. Results indicated two locations where PCP concentrations of 515 and 1820 mg/kg were detected. These results are discussed further in Section V below. An EPA Potential Hazardous Waste Site Preliminary Assessment and Site Inspection Report were completed for the site (1/15/85).

In March 1993, EPA indicated in a letter to Time Oil that no further investigation under the Federal Superfund Program was anticipated and referred Time Oil to DEQ for resolution of environmental contamination.

Water Quality Permits

Prior to 1971, Time Oil discharged draw water from tank bottoms onto the ground. In 1972, DEQ approved a plan by Time Oil to manage tank draw water wastes. The system included water draw boxes at each tank, piping to a central sampling sump or holding tank, an oil/water separator, and three dry well stations. A 1974 DEQ site inspection found most of the property to be unpaved. The paved areas drained to collection sumps connected to an on-site system which was pumped to a large oil storage tank. The tank was periodically pumped through the portable oil/water separator, with water subsequently discharged to the City of Portland

sanitary sewer. Waste oil from the separator was periodically removed by a contractor. Waste handling practices are described in a 2/1/85 report from DEQ to EPA Region 10, which describes underground and above-ground oil/water separators, sampling manholes in the sewer system that received discharge, and underground spill prevention control and countermeasure (SPCC) tanks.

Hazardous Waste Permits

Time Oil Co. is a hazardous waste generator (ORD009597543). In 1982, Time Oil reported generating and disposing of wastes including K051 (separator sludge), K052 (leaded tank bottoms), and P090 (pentachlorophenol). More recently, Time Oil has not generated hazardous waste as documented by quarterly reports from 1989 to 1990. In 1985, Time Oil removed and disposed of about 290 cubic yards of PCP-contaminated soil to the Chem-Security Systems, Inc. disposal facility in Arlington, OR. EPA indicated in late 1985 that this soil was F027 waste. In 1989, another 3,000 cubic yards of PCP-contaminated soil was excavated and stockpiled on-site.

Time Oil received a Notice of Violation in 1978 for storing gasoline in tanks without vapor emission control devices.

An inspection of the Time Oil facility as a fully regulated generator occurred by DEQ RCRA on 11/17/92. A Notice of Noncompliance was issued on 12/14/92 regarding the improper storage of 3,000 cubic yards of soil containing F027 waste for longer than 90 days, and for record keeping violations that were subsequently corrected.

Spill Reports

Reported spills include the following:

Date	Location	Product	Amount Spilled	Action Taken
3/8/75	Tank 29508	Diesel	3,663 barrels	
4/21/86	Pipeline	Gasoline	49.6 gallons	Leak stopped
5/16/90		Ethyl Alcohol	1,000 gallons	
5/8/94	Pipeline in tank farm	Gasoline	1297 gallons	Some product recovered; monitoring wells installed

V. PREVIOUS INVESTIGATIONS

Previous investigations and sampling at the site have been conducted by DEQ and Time Oil. Sampling results are summarized in Tables 1 and 2. Time Oil has prepared a work plan for a facility investigation which includes further investigation of soil and groundwater contamination at the site (1993, Landau).

Soil Investigations

General Site - As part of an EPA Preliminary Site Assessment in 1984, DEQ collected soil samples from 10 locations at the Time Oil Northwest Terminal Facility (Figure 2) and two locations at the Bell Terminal. Eight of the samples (Samples 1 through 8) were collected in the tank farm area, and did not contain detectable levels of PCBs, pesticides, or volatile organic compounds (VOCs), but two of these samples did contain levels of non-carcinogenic polycyclic aromatic hydrocarbons (PAHs) of 1 to 105 mg/kg. Sample 9 was collected near Tank 5006 leased to Crosby and Overton, and Sample 10 was collected near the "Koppers Tanks" in the PCP mixing area. Sample 9 contained PCP at 515 mg/kg; Sample 10 contained PCP at 1820 mg/kg. Although a DEQ report (Smits, Interoffice Memo 1985) indicates that "polychlorinated biphenyls were detected at several soil sample sites", the associated laboratory data reports show only one sample (#6) with PCBs detected at 0.09 mg/kg. Based on this initial sampling, subsequent work at the site has focused on the PCP mixing area.

PCP Mixing Area - The configuration of the PCP mixing area included a tank area bounded on the north by the wall of the warehouse, concrete containment walls at the east and west sides of the mixing area, and a pipeline about 70 feet south of the warehouse (Figure 4). Tanks and associated piping were removed in 1984. In June 1985, visibly contaminated material was removed from the mixing area primarily from the northwest corner to a depth of about 4 feet below ground surface. In July 1985, additional soil sampling was conducted to delineate the PCP contamination both within and adjacent to the mixing area, and at depth (Riedel, 1985). Surface contamination inside the mixing area ranged from 21 to 4,280 mg/kg PCP (maximum near the eastern containment wall) and on the outside to the west ranged up to 26,550 mg/kg PCP (maximum near western containment wall where trucks were loaded). Samples collected at 12 feet below ground surface within the mixing area contained up to 2,030 mg/kg PCP (maximum near the southwest corner of the warehouse). Surface sampling on the south side of the containment area near piping and Tank 38009 contained PCP from 2 to 1,130 mg/kg. In November 1985, three angled borings and one vertical boring were installed under the southwest corner of the warehouse to a depth of approximately 50 feet bgs. Concentrations of PCP in these borings ranged from a maximum of 116,000 mg/kg at a depth of 3 feet bgs to 1.59 mg/kg at 49 feet bgs. Samples collected near the water table at about 12 to 19 feet vertical depth ranged from 110 to 1,560 mg/kg (Riedel, 1986).

Additional soil sampling was conducted in August, 1986 in the PCP mixing area and under the concrete foundation of the warehouse (Figure 5). PCP levels of 5.6 mg/kg were detected at about 2 feet bgs in the southwest and northwest corners of the warehouse, but samples at deeper depths did not detect PCP. Samples within the mixing area ranged up to 2,964 mg/kg at the surface (maximum adjacent to the warehouse), and up to 2,205 mg/kg at 4 feet bgs near the west containment area wall. Sample results below 4 feet do not appear to have been reported (SRH, 1986).

Additional soil sampling was conducted in 1989 by ECOVA in preparation for soil removal and treatment. Surface soil samples were collected around Tanks 38009, 5006, and 10002; in the area southwest of the tanks which was later used for the soil stockpile area; and in the area southwest of the tanks which was later used as the process area. PCP was detected at 4.9 to 2,424 mg/kg adjacent to the containment wall for the Crosby and Overton tanks (Samples 1, 2, and 3), but not in other areas. Soil excavation was initiated in January, 1991. Seventy four soil samples were analyzed at various depths as the excavation was extended to its final depth of about 12 feet in the center of the pit. Approximately 3,000 cubic yards of soil were removed from the excavation and stockpiled on-site. Groundwater was encountered at about 12 feet bgs. Samples indicated PCP concentrations of up to 1,006 mg/kg remaining in soil on the south sidewall; 1,882 mg/kg under the southwest corner of the warehouse; and 187 mg/kg at the surface near the southeast corner of the warehouse where excavation could not be conducted without undermining the building foundation. One soil sample near the central part of the pit at 10 feet below grade contained 6,511 mg/kg PCP. It appears that this soil was then removed. Additional samples were collected below the water table in material that could not be excavated, and indicated residual PCP concentrations ranging from non-detectable to 258 mg/kg.

Former Crosby and Overton Tanks - At the termination of the lease between Crosby and Overton and Time Oil in 1989, soil sampling and removal of some contaminated soil were conducted in the areas near tanks 5006 and 10002. Soil samples were collected from four inches below the surface in five zones in the area (Figure 6) and composited into five samples for analysis for EPA Method 8270, 8080, and total metals. Fifty three individual samples were analyzed for PCBs by EPA Method 8080. Sample results are summarized on Table 1, Table 3, and Table 4. The detected levels of PCBs ranged up to 68 ppm in an area along the southern perimeter of the tank area. Other detected contaminants included the carcinogenic PAHs benzo(a)pyrene, benzo(b)fluoranthene, and chrysene at levels up to 7, 14, and 16 mg/kg, respectively. For comparison, the Numerical Soil Cleanup Level (OAR 340-122-045) for PCBs is 0.08 mg/kg and for individual carcinogenic PAHs is 0.1 mg/kg. A removal of about four drums of soil from one area was conducted in May, 1989 (Crosby & Overton, 1989). Composite and individual samples after the excavation showed remaining PCBs to range from 1 to 2 mg/kg. About 300 cubic yards of soil contaminated with up to 6170 mg/kg Total Petroleum Hydrocarbons (TPH) were also removed from another area. A post-excavation sample composite in this area showed remaining TPH concentrations of 15 mg/kg.

Tank Farm - In an investigation implemented after a 5/8/94 release of gasoline from pipelines in the tank farm area, five borings (N, O, P, Q, R) were drilled at locations shown on Figure 2. Soil samples were collected and analyzed for TPH-HCID, and follow-up analyses. Detected concentrations of gasoline ranged from 31 to 210 mg/kg in samples collected above or at the water table in borings N and Q at depths from 10 to 16 feet bgs. Concentrations of diesel were detected in borings N (368 to 637 mg/kg), P (41 mg/kg), and Q (16,430 mg/kg).

Groundwater Investigations

A series of monitoring points have been installed by Time Oil to evaluate contaminant impact to groundwater. Existing monitoring wells and well points are shown on Figures 2 and 3, and groundwater testing results are summarized in Table 2.

The earliest investigation included installation of monitoring wells MW-1 through MW-4 near the PCP warehouse, and drive point wells A through I in the vicinity of the PCP mixing area in 1985 and 1986. Additional monitoring wells (J1, J2, J3, B1, B2, G1A) were installed in this vicinity in 1988 and 1989. Wells K, L, and M were installed in 1990. Wells N, O, P, Q, and R were installed in the tank farm area in 1994 after a gasoline spill.

The existing monitoring network of well points and monitoring wells has a mixture of screen zone depths, with some screen depths unknown (D, H, I, K, L, M). Groundwater sampling in some of the wells in the PCP mixing area occurred most recently in 1991 and sample analyses appear to have been only for PCP. Well points C and G were apparently dry when monitored in 1986 and 1987, and have never been sampled. Monitoring wells MW-1, MW-2, and MW-3 have not been sampled for water quality information. Monitoring well MW-4 was decommissioned in 1986 after one groundwater sampling event. Wells in the tank farm area have not been sampled for analysis, although they have been observed for the occurrence of free product. Several of the wells have been damaged (including MW-1, E, I) and well point F has been lost or covered by the soil stock pile.

Available analytical results indicate that groundwater contamination is present in the water table zone above 20 feet near the PCP mixing area (J1 = 60,000 ug/L PCP). The federal drinking water standard Maximum Contaminant Level (MCL) for pentachlorophenol is 1 ug/L. Contamination has been detected in shallow wells northwest, southwest, and south of the mixing area (M = 4,000 ug/L PCP; B = 2,000 ug/L PCP; F = 1.4 ug/L PCP). Groundwater contamination from PCP is also present in the next lower sand zone at depths to 45 feet in J2, B2, and G1A at 1,000 ug/L. Monitoring well G1A is about 350 feet southwest of the PCP mixing area and is the furthest point downgradient from the PCP mixing area that has been sampled for PCP.

VI. HAZARDOUS SUBSTANCE CHARACTERISTICS

Hazardous substances of concern at the site include pentachlorophenol, tetrachlorophenol, and solvents including mineral spirits, ketones, and other hydrocarbon products. Other contaminants potentially of concern are chlorinated solvents, polychlorinated biphenyls, dioxins, and pesticides. In the tank farm area, petroleum fuel products and their constituent chemicals are of concern.

The primary hazardous substance of concern at the site is pentachlorophenol (PCP). PCP is generally a white or brown crystalline solid with a specific gravity of 1.98. Commercial PCP

contains tetrachlorophenol (TCP) in ratios of about 2.5 to 1 PCP to TCP (Verscheuren, 1983). PCP is slightly soluble in water (14 mg/l at 20° C) and soluble in alcohol, ether, and benzene. Other references list the solubility of PCP to be 80 mg/l (Callahan, 1979). In natural water systems, PCP is primarily present as an anion, and while its solubility will be determined by the cationic composition of the water, the anion will be more soluble than the undissociated compound (Callahan, 1979). PCP is adsorbed on acidic soil systems, but not on neutral soils. Soil pH and organic content are controlling factors. PCP has a log octanol/water partition coefficient of 5.01 and tends to bioaccumulate in aquatic systems. PCP could be present as a solid in surface soil at release points, as a dissolved phase constituent in groundwater, or as a constituent in pure phase carriers which may have been released at the site. At least one product formulated at the facility had a specific gravity of greater than 1, so both dense non-aqueous phase liquids (DNAPL) and light non-aqueous phase liquids (LNAPL) may be present at the site.

VII. EXPOSURE PATHWAYS

Soil, groundwater, surface water, and sediments are potential contaminated media at the site. Surface releases of PCP in the warehouse and mixing areas and other contaminants in the waste oil tank area may have resulted in levels of hazardous substances in the surface and near surface soils. Exposure by direct contact, ingestion, or inhalation of contaminated soil particulates may occur Migration of these contaminants to the groundwater may have occurred. Use of groundwater for industrial and domestic purposes may result in human or environmental exposure. The site is adjacent to the Willamette River. Discharge of groundwater to surface water probably occurs. Surface water and sediment may have been effected by contaminants transported by groundwater from the on-site release points. Human and ecological exposure may occur to surface water and sediments.

VIII. SUMMARY AND DATA GAPS

Based on the information available for review, the potential areas of concern at the site include the PCP warehouse, PCP mixing area and vicinity, former Crosby and Overton tank area, and the tank farm and loading areas. Releases of PCP have been documented by sampling of the soil and groundwater. A excavation of PCP-contaminated soil in the mixing area was conducted in 1989. Soil was stockpiled on-site in preparation for treatment in a bioreactor which had been constructed at the facility. The treatment plan was put on hold when field scale testing indicated that the achievable treatment level would be 100 mg/kg PCP, which did not meet the target treatment goal of 0.5 mg/kg PCP. Soil remaining in-place after the excavation was sampled and contains significant levels of contamination, both in the near-surface and deeper soil. Groundwater contamination by PCP has been documented at the site in testing conducted through 1991. Releases of other contaminants, including PCBs and PAHs, have been documented near the former Crosby and Overton tanks. Releases of petroleum products in the tank farm have been documented in spill reports and soil sampling conducted in the tank farm area.

Additional information is needed to complete a Remedial Investigation/Feasibility Study (RI/FS) for the site, and should address the following data gaps:

1) PCP Handling Area:

- The extent of PCP and degradation product contamination in soil needs to be fully characterized. PCP has been documented in surface and near-surface soil south of the mixing area (Riedel, 1985) and under the northwest corner of the warehouse (SRH, 1986), but the lateral extent has not been defined. PCP contamination is present in deeper soil (12 to 17 feet bgs) remaining after the 1989 soil removal was conducted (ECOVA, 1989), but the vertical extent and the lateral extent to the south has not been defined beyond the limits of the excavation.
- The potential presence of contamination in the warehouse foundation sand fill needs to be investigated. Concentrations of PCP have been detected at the surface level in the northwest and southwest corner under the warehouse foundation. It is reported that the foundation, which is approximately 3 feet above grade, is sand-filled but it does not appear that this fill was sampled for analysis. This information will be needed to determine proper management of the sand fill and foundation.
- The soil on the north side of the warehouse needs to be characterized. Potential spills from handling PCP may have occurred in this vicinity, and shallow contamination has been found in one location under the northwest warehouse foundation.
- Analyses for other constituents (volatile and semivolatile compounds, TPH, dioxins, pesticides) should be conducted. Products formulated at the facility used a variety of solvents, and may have also included gamma-BHC.

2) Former Crosby and Overton Tanks (5006, 10002) and 38K Tank:

- The current levels of contaminants in the soil in this area need to be assessed, and the need for cleanup evaluated. Releases of chemicals from these tanks have been documented. PCP, PCB, and PAH contamination has been found in samples collected in this area (DEQ, 1984; Crosby and Overton, 1989) and along piping from these tanks (ECOVA, 1989). Chlorinated solvents were also apparently present in waste oil stored in these tanks, according to information contained in the DEQ file. Previous sampling indicated contaminant levels above Numerical Soil Cleanup Levels (OAR 340-122-045). The impacts of these contaminants to groundwater also need to be evaluated.

3) Tank Farm and Loading Areas:

- The extent of contamination from historical operating practices and spills in the tank farm and loading areas needs to be characterized. Soil borings in a recent spill area (Landau, 1994) indicate significant gasoline and diesel contamination.

4) Groundwater:

- Additional information is needed to understand the site geology and hydrogeology. In particular, information is needed about the lateral extent of a silt/sand interbed zone, the nature and extent of the sand zone below 40 feet, the interconnection of water table and lower aquifers at the site, the lateral and/or vertical direction and rate of groundwater flow, seasonal variations in the groundwater flow direction, and the connection between the groundwater aquifers and the Willamette River.
- The lateral and vertical extent of groundwater contamination needs to be defined. PCP contamination has been detected in most wells installed in both water table and lower zones. Wells currently installed near the river have not been sampled for PCPs or other constituents. Groundwater contamination in the tank farm area needs to be characterized.
- The potential for contaminant transport by groundwater to the Willamette River exists, and should be evaluated.
- The current quality of groundwater needs to be assessed. Groundwater sampling has not been conducted at the site since 1991. Analyses for constituents of concern other than PCP needs to be conducted.
- The possible presence of separate phase liquids (DNAPLs or LNAPLs) needs to be investigated.
- Information about the current and future uses of groundwater in the area should be obtained.

5) Willamette River:

- The potential for impacts from site contamination on surface water and sediments should be investigated and evaluated.

6) A baseline risk assessment should be conducted for the site to determine if additional remedial actions are necessary. The existing data should be reviewed for quality and quantity to determine if sufficient information is available in some areas to conduct the risk assessment.

7) Data to assess treatment technologies for the existing PCP-contaminated soil stockpile should be obtained.

IX. RECOMMENDATIONS AND PROJECT STRATEGY

1) Further oversight by the DEQ Voluntary Cleanup Program at the Time Oil Company site should proceed under a Voluntary Cleanup Agreement. The agreement should include a scope of work for a Remedial Investigation and Feasibility Study. The Remedial Investigation should include a baseline risk assessment. The Feasibility Study should address the treatment options and long-term management of the existing soil stockpile which contains F027 hazardous waste, as well as any other media effected by significant contamination.

2) A short-term management and inspection plan for the soil stockpile should be prepared. Inspection reports should be submitted to VCP in regular status reports prepared during the course of the RI/FS.

3) Time Oil Company has previously prepared a Work Plan for additional investigation at the site (1993b, Landau). The objectives, scope, strategy, and schedule should be re-evaluated and refined, if necessary, in order to address the data gaps outlined above. Time Oil should meet with DEQ to discuss the data gaps and objectives. A conceptual work plan to proceed with work at the site should either be submitted for DEQ review or discussed in a meeting. Based on these discussions, the previously prepared Work Plan should be revised as needed. The following areas should be addressed:

A) A significant amount of data has been collected regarding soil conditions in the PCP area of the site. This data should be supplemented with additional data, if needed, in order to complete the characterization and baseline risk assessment for this area. The baseline risk assessment in the PCP area should address potential risks from exposure to contaminated soil, risks from impacts of contaminated soil on groundwater, and risks from exposure to groundwater. A baseline risk assessment should be done for all other areas of interest at the site. The baseline risk assessment should address the significant contaminated media, exposure pathways, and associated risks.

B) The strategy for characterizing groundwater contamination should be re-evaluated so that all data gaps are addressed. It may be useful to conduct an initial phase of groundwater and geological screening using temporary drive point, depth-discrete sampling methods prior to selecting permanent monitoring well locations and screen depths.

C) The existing monitoring well network should be evaluated. Data records should be reviewed, and additional information should be submitted regarding:

- well logs for monitoring wells K, L, M, and H if available (a report on each recently constructed monitoring well should have been submitted to the Oregon Water Resources Department).
- information on pumping conducted in MW-M to recover spilled product, including dates of pumping, how pumped, pumping rates, pumping duration, amount of water and product pumped, any analytical testing or groundwater level data collected during the pumping.

D) An initial round of groundwater sampling of existing monitoring points should be conducted prior to selecting new sampling locations to determine the current groundwater quality. It will be necessary to redevelop the existing monitoring points prior to sampling.

E) Groundwater monitoring at the site should rely on points of known depth and construction for groundwater level monitoring points. Any wells at the site which have been damaged or are not needed for monitoring should be properly abandoned. Wellhead protection should be installed around all monitoring points that are to be maintained at the site (i.e., concrete pad and protective posts). Monitoring wells MW-1, MW-2, and MW-3 have never been sampled for water quality. If these wells no longer serve a purpose for the site investigation, they should be properly abandoned.

F) Because the potential for separate phase liquids exists at the site, all investigation points should be properly constructed to prevent creating conduits for contaminant migration. Exploration points below potential aquitards should use conductor casing.

G) Monthly groundwater level and river level information should be collected.

4) A beneficial well use survey should be prepared.

5) The site should be listed on both the Confirmed Release List and the Inventory (OAR 340-122-427). DEQ will proceed with the listing process.

X. ATTACHMENTS

Documents Reviewed

Figures 1 through 6

Tables 1 through 4

Attachment 1
Documents Reviewed

1994, Landau Associates, Inc., Well Installation Premium Unleaded Gasoline Release Northwest Terminal Portland, Oregon, prepared for Time Oil Company.

1993b, Landau Associates, Inc., Work Plan, RCRA Facility Investigation, Former PCP Mixing Area, Northwest Terminal, Portland, Oregon, prepared for Time Oil Company.

1993a, Landau Associates, Inc., Site Characteristics Report, Former PCP Mixing Area, Northwest Terminal, Portland, Oregon, prepared for Time Oil Company.

1993, Rolluda, M., letter from EPA to Time Oil Company.

1992, Cox, K., Notice of Noncompliance NWR-HW-92-515, from DEQ to Time Oil.

1992, Kortenhof, M., DEQ Memo to Time Oil File regarding Time Oil Project Review, ECSI Site 170.

1991, ECOVA Corporation, Preliminary Assessment/Data Evaluation and Proposed Remediation Plan for Pentachlorophenol Contaminated Soil at: Time Oil Co. Northwest Terminal.

1989, Crosby and Overton, Inc., Remedial Activities Report, Time Oil Project, Portland, Oregon.

1986, Woods, Ed, DEQ Interoffice Memo to File, re: Time Oil c/o Crosby & Overton Tank Residue - HW Determination.

1986, SRH Associates, Inc., Pentachlorophenol Contamination at Time Oil Company Northwest Terminal.

1986, Riedel Environmental Services, Inc., Report on Field Activities Conducted in Late 1985 at Time Oil Company.

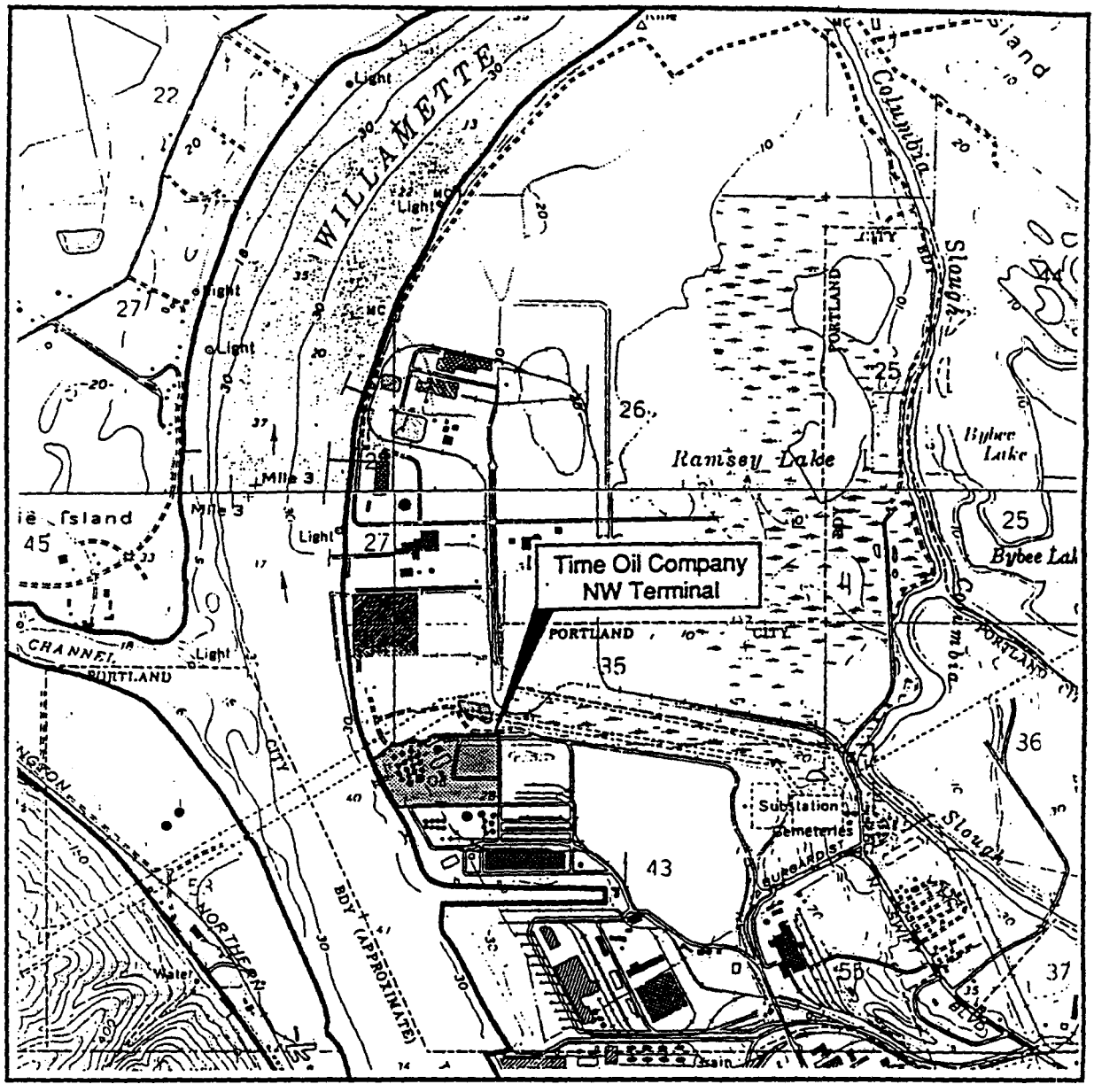
1985, Smits, J. L., DEQ Memo to Debbie Flood, EPA Region-X, regarding HW-3012 Superfund Time Oil Company, ORD 009597543.

1985, Riedel Environmental Services, Time Oil Company Pentachlorophenol Sampling and Analyses.

1985, EPA Potential Hazardous Waste Site Preliminary Assessment prepared by J. L. Smits, OR DEQ for Time Oil Company, ORD 0009597543.

1983, Verschueren, K., Handbook of Environmental Data on Organic Chemicals, Van Nostrand Reinhold, New York.

1979, Callahan, M. A., et al, Water-Related Environmental Fate of 129 Priority Pollutants, Volume II, EPA-440/4-79-029b.



Source: U.S.G.S., 75-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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231001.31 Time Oil/NW Terminal/RFI Work Plan/Report 12/03

	Vicinity Map	Figure 1

LANDAU ASSOCIATES, INC

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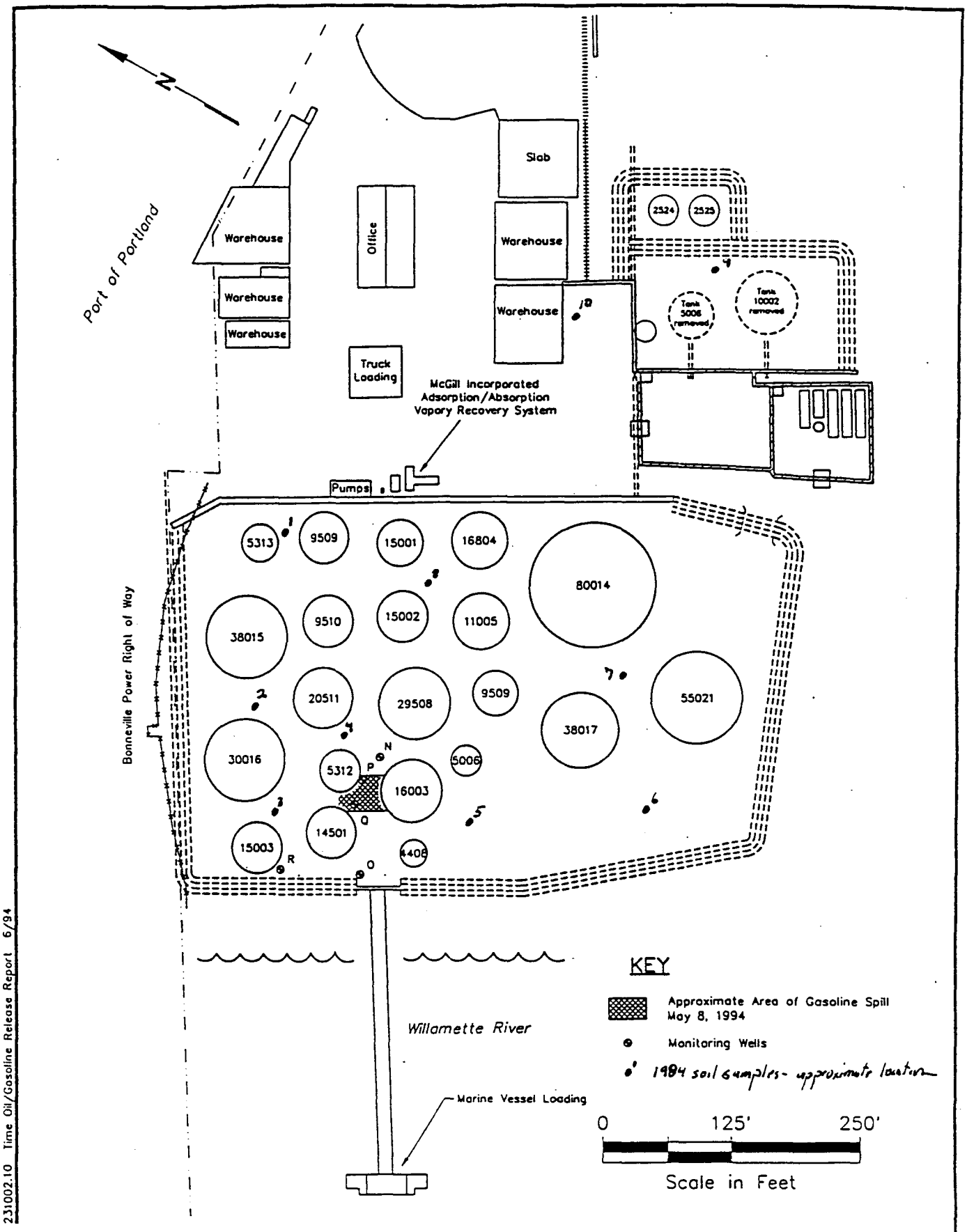

231002.10 Time Oil/Gasoline Release Report 6/94

Site Map

Figure 2

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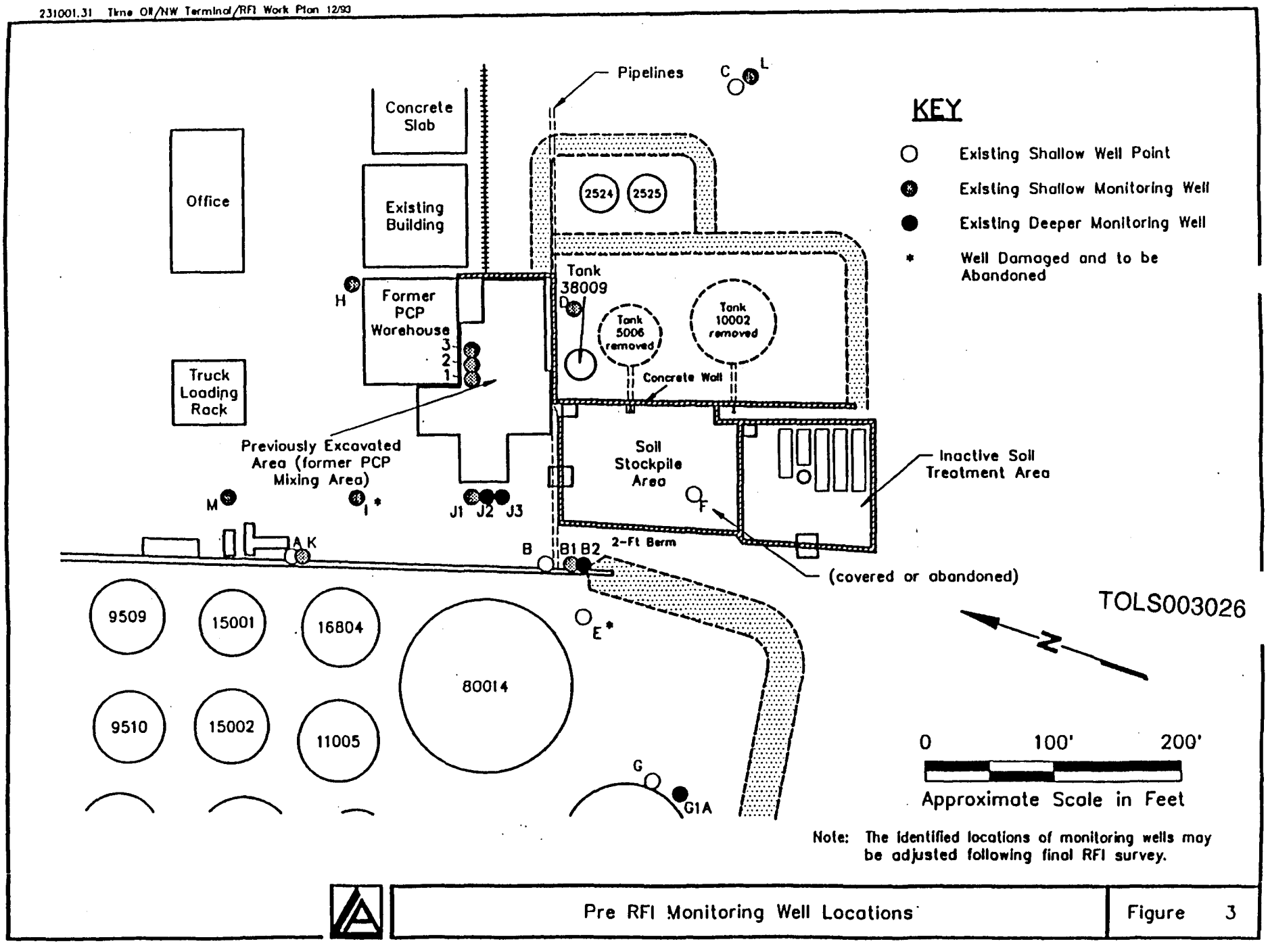

Pre RFI Monitoring Well Locations

Figure 3

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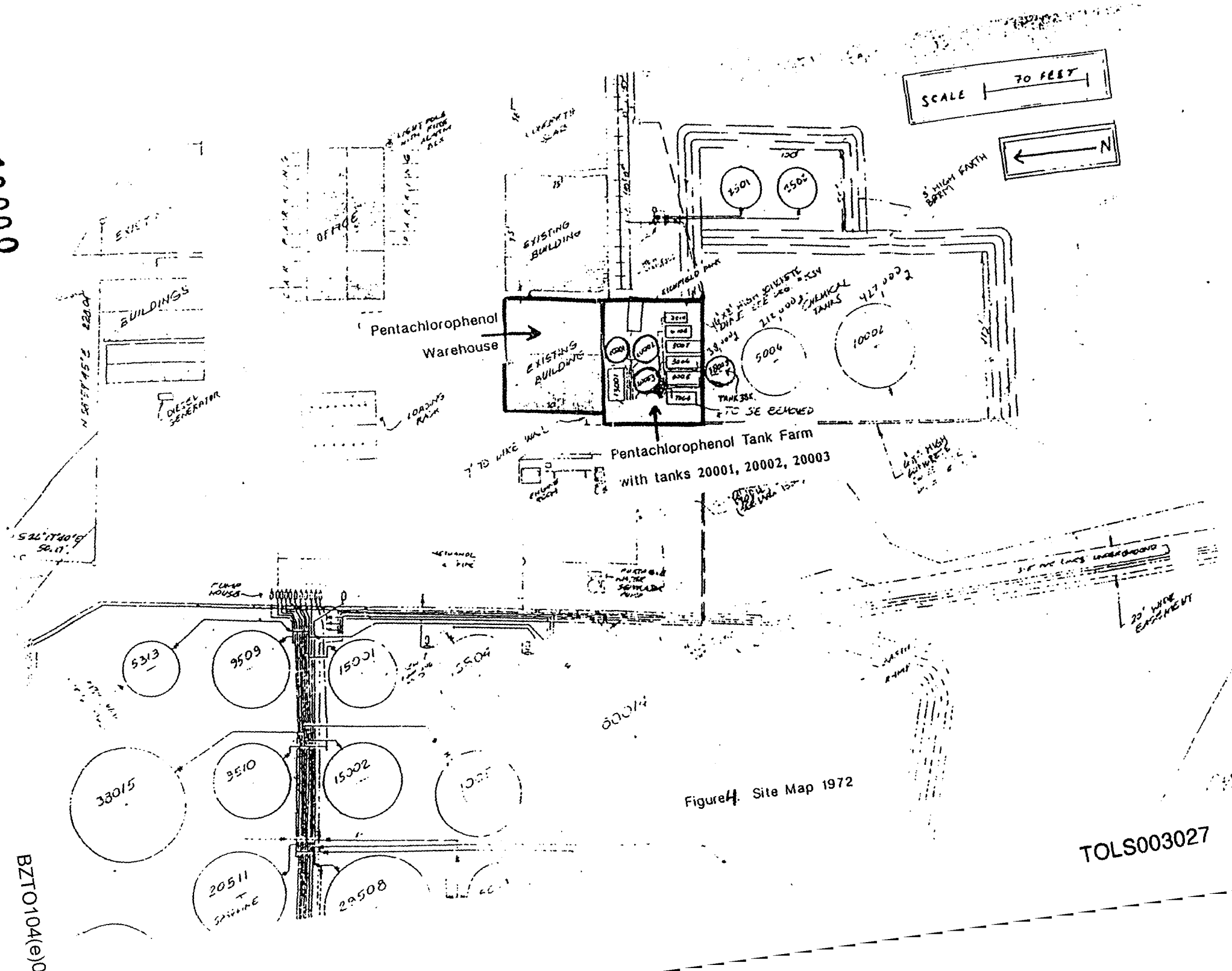

Figure 4. Site Map 1972

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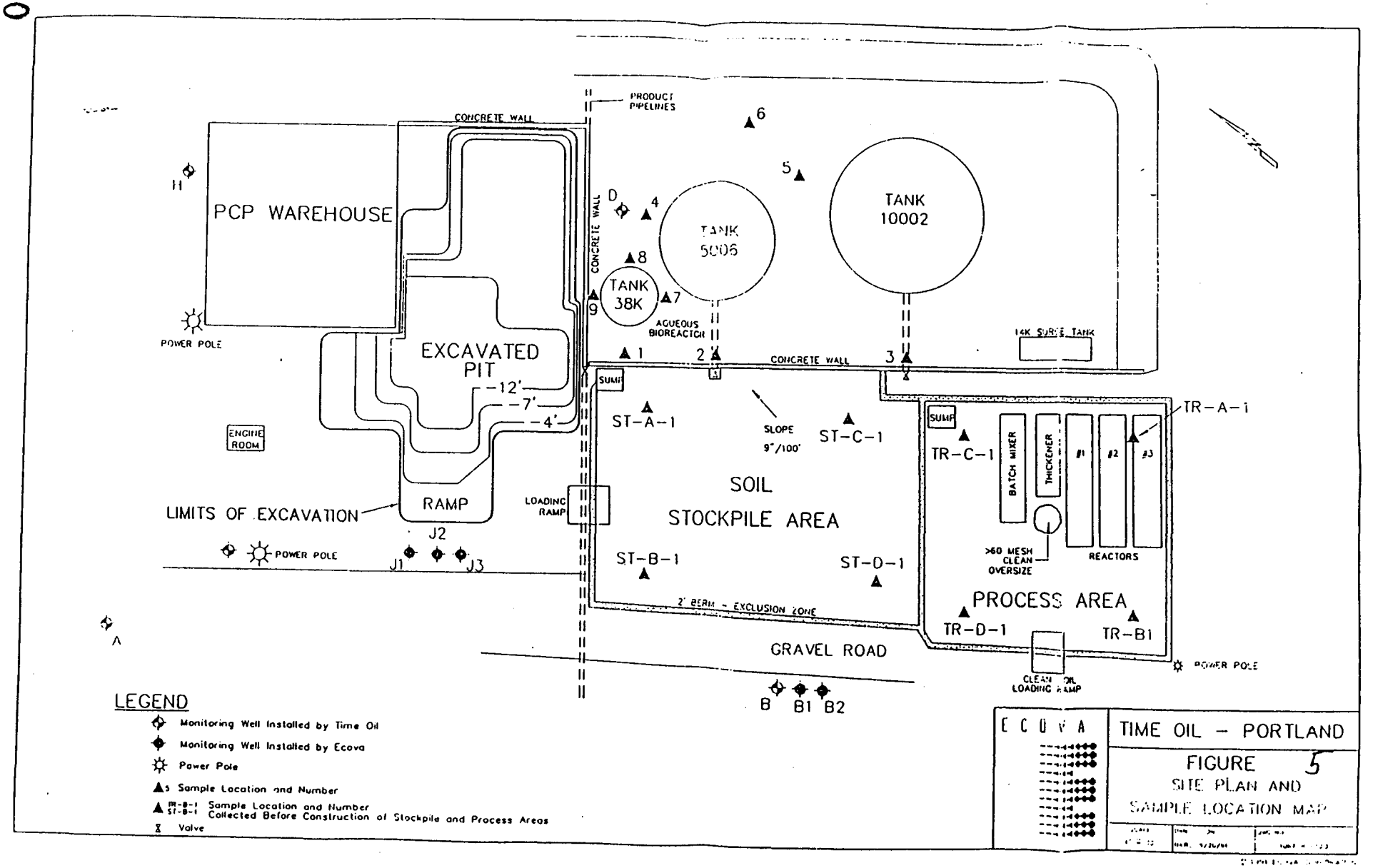

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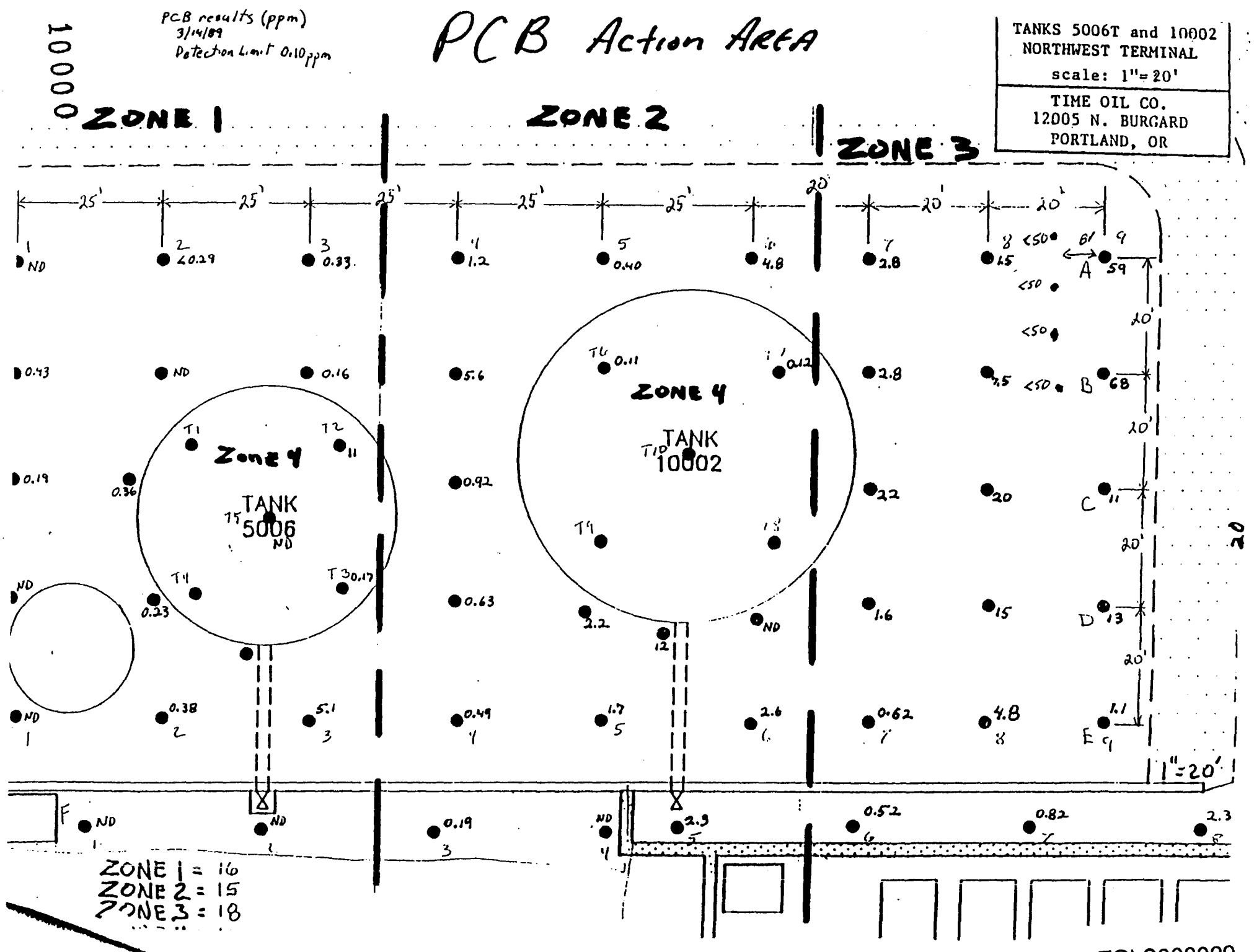

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Table 1
TIME OIL COMPANY
Northwest Terminal
Portland, Oregon

Sampling Date	Sample ID	Matrix	Method 608 or 8080-PCBs (mg/kg)	EP Tox - Pb (mg/l)	Method 625-Pesticides (mg/kg)	Total Petroleum Hydrocarbons (mg/kg)	GC-MS Scan (mg/kg)	Method 625-B/N/A (mg/kg)
5/2/84	1 (4 ft from C&O tank)	Sludge	1357		ND			Pentachlorophenol-170 Naphthalene-1300 Acenapthene-910 Fluorene-2300 Phenanthrene-4600 Anthracene-9100 Fluoranthene-910 Pyrene-550 Benz(a)anthracene-160 Chrysene-630 Benz(a)pyrene-90
	2 (10 ft from C&O tank, 0.5 ft bgs)	Soil	59.7		ND			Naphthalene-100 Acenapthene-50 Fluorene-80 Phenanthrene-200 Anthracene-200 Fluoranthene-80 Pyrene-50
12/12/84	1	Soil-composite of surface, 1,2, and 3 ft bgs	ND	< 0.1	<5		<1	<1
	2	as above	ND	< 0.1	<5		<1	<1
	3	as above	ND	< 0.1	<5		<10	<1
	4	as above	ND	< 0.1	<5		TICs	Isophorene-1 2,4-Dinitrotoluene-3 Fluorene-1 N-Nitrosodiphenylamine-2 Phenanthrene-1 Anthracene-1

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Table 1 page 2
Time Oil Company

Sampling Date	Sample ID	Matrix	Method 608 or 8080-PCBs (mg/kg)	EP Tox - Pb (mg/l)	Method 625-Pesticides (mg/kg)	Total Petroleum Hydrocarbons (mg/kg)	GC-MS Scan (mg/kg)	Method 625-B/N/A (mg/kg)
12/12/84	5	as above	ND	< 0.1	<5		<10	<1
	6	as above	0.09	< 0.1	<5		<10	<1
	7	as above	ND	< 0.1	<5		<1	<1
	8	as above	ND	< 0.1	<5		<1	Fluorene-13 Phenanthrene-14 Anthracene-105
	9 - 19 ft NE of tank 50067	as above	ND	< 0.1	<5		TICs	Pentachlorophenol-515 Tetrachlorophenol-12 Chrysene-1 Bis(2ethylhexyl)phthalate-3
	10-near Koppers tanks	as above	ND	< 0.1	<5		TICs	Pentachlorophenol-1820 Tetrachlorophenol-71
	11	as above	ND	< 0.1	<5		<1	<1
	12	as above	ND	< 0.1	<5		<1	<1
5/8/86	Time Oil-small tank (C&O)	Sludge					1,1 Dichloroethane-88 Trichloroethylene-35 Toluene-32 Tetrachloroethylene-10 Xylene-13	
3/1/89	Zone 1	surface soil composite of 16 samples	individual - <0.1 to 5.1 composite - 0.9					Anthracene-1.2 Benzo(a)pyrene-1.9 Benzo(b)fluoranthene-14 Benzo(ghi)perylene-3 Chrysene-3.8 Fluoranthene-5.1 Phenanthrene-0.36 Pyrene-8.1
	Zone 2	surface soil composite of 15 samples	individual - <0.1 to 12 composite - 7					Anthracene-2.9 Benzo(a)pyrene-2.9 Benzo(b)fluoranthene-4.6 Benzo(ghi)perylene-6.7 Chrysene-1.8 Fluoranthene-2.8

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Sampling Date	Sample ID	Matrix	Method 608 or 8080-PCBs (mg/kg)	EP Tox - Pb (mg/l)	Method 625-Pesticides (mg/kg)	Total Petroleum Hydrocarbons (mg/kg)	GC-MS Scan (mg/kg)	Method 625-B/N/A (mg/kg)
								Phenanthrene-1.7 Pyrene-7.5
	Zone 3	surface soil composite of 18 samples	individual - 0.52 to 68 composite - 10					Anthracene-8.9 Benzo(a)pyrene-9.4 Benzo(b)fluoranthene-13 Benzo(ghi)perylene-20 Chrysene-6.1 Fluoranthene-12 Fluorene-0.74 Phenanthrene-10 Pyrene-30
	Zone 4	surface soil composite of 10 samples	individual - <0.1 to 11 composite - 4					Acenaphthene-21 Acenapthylene-8.8 Anthracene-64 Benzo(a)pyrene-7 Benzo(b)fluoranthene-5 Chrysene-16 2,4-Dichlorophenol-3.6 Fluoranthene-7.2 Fluorene-20 N-Nitorsodiphenylamine-28 Naphthalene-12 Phenanthrene-67 Pyrene-39
	Zone 5	surface soil composite of 4 samples	composite - 0.2			6170 (418.1)		Acenaphthene-2.1 Anthracene-0.72 Fluoranthene-0.33 Fluorene-2.7 N-Nitorsodiphenylamine-3.2 Naphthalene-5.2 Phenanthrene-4.5
5/31/94	MW-N (10-11.5 ft)	Soil				58 (TPH-G) 637 (TPH-D)		
	MW-N (15-16.5 ft)	Soil				31 (TPH-G) 368 (TPH-D)		

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Table 1 page 4
Time Oil Company

Sampling Date	Sample ID	Matrix	Method 608 or 8080-PCBs (mg/kg)	EP Tox - Pb (mg/l)	Method 625-Pesticides (mg/kg)	Total Petroleum Hydrocarbons (mg/kg)	GC-MS Scan (mg/kg)	Method 625-B/N/A (mg/kg)
	MW-O (19.5-21 ft)	Soil				ND		
	MW-O (25-26.5 ft)	Soil				ND		
	MW-P (15-16 ft)	Soil				41.4 (TPH-D)		
	MW-Q (13-14.5 ft)	Soil				210 (TPH-G) 16,430 (TPH-D)		
	MW-R (14.5-16.5)	Soil				ND		
	MW-R (25-26.5)	Soil				ND		

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Table 2
TIME OIL COMPANY
Groundwater Sampling

Monitoring Point	Screen Depth (ft)	Date Installed	Date Sampled	Pentachlorophenol (ug/L)	pH
				(Drinking Water MCL = 1 ug/l)	
MW 1	angled - 14 vert	11/85			
MW 2	angled - 14 vert	11/85			
MW 3	angled - 14 vert	11/85			
MW 4	? - 40	11/85	5/9/86	6.1	
		5/14/86- decommissioned			
Well Point A	17.5 - 20	2/86	5/28/86	<2	6.56
			9/3/86	ND	6.8
			8/20/87	<20	6.61
Well Point B	17.5 - 20	2/86	5/?/86	2.6	
			5/28/86	<2	6.29
			9/3/86	ND	6.7
			8/20/87	2300	6.57
			10/16/87	1000	
Well Point C	5.5 - 8	2/86	5/?/86-dry?		
			8/29/86-dry		
			8/20/87-dry		
Well Point D		5/86	5/28/86	<2	6.49
			8/29/86	44	6.53
			8/20/87	<20	6.6
Well Point E	11.5 - 20	3/86	5/?/86	<1.0	
			5/28/86	<2	7.7
			8/29/86	ND	6.54
			8/20/87-dry		
Well Point F	10.5 - 19	3/86	5/?/86	1.4	
			5/28/86	<2	6.73
			8/29/86	ND	6.57
			8/20/87	<20	
Well Point G	4.5 - 13	3/86	5/?/86-dry		
			8/29/86-dry		
			8/20/87-dry		
Well Point H		5/86	5/28/86	<2	6.32
			8/29/86	ND	6.91
			8/20/87	<20	6.64
			3/4/91	<1,000	
Well Point I		5/86	5/28/86	2.2	5.74
			8/29/86	ND	6.77
			8/20/87	<20	6.38
			3/4/91	<1,000	
MW J-1	10 - 20	11/29/88	3/4/91	60,000	
MW J-2	30 - 40	1/3/89	3/4/91	1,000	

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Table 2 Page 2
Time Oil Company

Monitoring Point	Screen Depth (ft)	Date Installed	Date Sampled	Pentachlorophenol (ug/L)	pH
MW J-3	28 - 33	1/5/89	3/4/91	<1,000	
MW B-1	10.5 - 20.5	11/30/88	3/4/91	<1,000	
MW B-2	29.5 - 39.5	1/5/89	3/4/91	1,000	
MW G-1A	25 - 35	12/2/88	3/4/91	1,000	
K	?	1990	3/4/91	<1,000	
L	?	1990	3/4/91	<1,000	
M	?	1990	3/4/91	4,000	
N	4 - 16.5	5/31/94			
O	5 - 30	5/31/94			
P	4 - 15.5	5/31/94			
Q	4 –17	5/31/94			
R	5 - 30	5/31/94			

Table 3

PACIFIC ANALYTICAL LABORATORY inc.
9405 S.W. Nimbus Ave. Beaverton, OR 97005 (503) 644-0660

PAL Report #: 89-0120
Client : Crosby & Overton
Date : 3/01/89
Sample ID : Time Oil
Items : Five Soil Composites

ANALYSIS

	Zone 1	Zone 2	Zone 3	Zone 4	Zone 5
Total Petroleum Hydrocarbons (EPA 418.1), mg/kg	--	--	--	--	6170
Cyanide, mg/kg	<1	<1	<1	<1	<1

TOTAL METALS - mg/kg (per EPA SW 846 3050, 7000 series)

	Zone 1	Zone 2	Zone 3	Zone 4	Zone 5
Antimony	50	50	40	40	50
Arsenic	4.1	4.9	9.3	5.5	2.2
Barium	170	200	200	180	160
Cadmium	0.6	0.9	0.8	0.8	0.6
Chromium	15	49	48	24	48
Copper	350	180	94	37	210
Lead	39	200	170	170	34
Mercury	0.1	1.4	2.6	4.9	<0.02
Nickel	18	39	48	28	20
Selenium	<0.005	<0.005	<0.005	<0.005	<0.005
Silver	0.8	0.9	0.7	0.4	0.7
Thallium	10	10	10	<10	10
Zinc	160	170	170	87	82

Respectfully,

Linnet O'Hanlon
Chemist

Reviewed by:

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TOLS003036

BZTO104(e)039857

Page 4

PACIFIC ANALYTICAL LABORATORY inc.
9405 S.W. Nimbus Ave. Beaverton, OR 97005 (503) 644-0660

Page 2
Crosby & Overton
April 20, 1989

PAL REPORT NUMBER: 89-0203
P.O./JOB NUMBER: 23513/06354
REFERENCE: Time Oil
DATE REQUESTED: 3/14/89
ITEMS: 53 Soil Samples

PCB's by EPA 8080

Zone 1	ppm	Zone 2	ppm	Zone 3	ppm
A1	ND	A4	1.2	A7	2.8
A2	<0.29	A5	0.40	A8	1.5
A3	0.33	A6	4.8	A9	59
B1	0.43	B4	5.6	B7	2.8
B2	ND	C4	0.92	B8	7.5
B3	0.16	D4	0.63	B9	68
C1	0.19	D5A	2.2	C7	22
C2	0.36	D5B	12	C8	20
D1	ND	D6	ND	C9	11
D2	0.23	E4	0.49	D7	1.6
E1	ND	E5	1.7	D8	15
E2	0.38	E6	2.6	D9	13
E3	5.1	F3	0.19	E7	0.62
F1	ND	F4	ND	E8	4.8
F2	ND	F5	2.3	E9	1.1
				F6	0.52
				F7	0.82
				F8	2.3

Zone 4	ppm
T2	11
T3	0.17
T5	ND
T6	0.11
T7	0.12

ND = Not Detected
Detection Limit - 0.10 ppm

Respectfully,

Kim Chiusolo
Kim Chiusolo
Chemist

Linnet O'Hanlon
Linnet O'Hanlon
Chemist

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October 24, 1995

Oregon

DEPARTMENT OF ENVIRONMENTAL QUALITY

NORTHWEST REGION

MR KEVIN MURPHY
2737 WEST COMMODORE WAY
SEATTLE WA 98199-1233

RE: Northwest Terminal
Time Oil Road
ORD 009597543
Multnomah County

Dear Mr. Murphy:

The Department of Environmental Quality has reviewed program options for regulating cleanup of Time Oil's Northwest Terminal facility in Portland. Given the history of this site, the Department wishes to acknowledge and continue Time Oil's current participation in the Voluntary Cleanup Program (VCP).

In summary, the Environmental Cleanup authorities in ORS Chapter 465 provide the needed flexibility to address both the soil and groundwater contamination and the contaminated soil stockpile. If the Department were to apply the Hazardous Waste authorities in ORS Chapter 466 at this time, you may be required to immediately remove and properly dispose of the contaminated soil stockpile. Hazardous Waste Regulations prohibit the storage of land disposal restricted waste longer than one year.

While we are appreciative of your commitment to remediate the environmental contamination at the facility and to eliminate the contaminated soil stockpile, the Department cannot overemphasize the need to develop an aggressive plan to address the stockpile. Although the site will continue in the VCP provided satisfactory progress is demonstrated, the Department is establishing the following expectations that must be met in any proposal for treatment and disposal of the stockpile:

1. An acceptable plan and schedule for treatment and ultimate disposal of the contaminated soil in the stock pile must be developed as part of the Voluntary Cleanup Remedial Investigation/Feasibility Study (RI/FS). The plan may or may not include storing the soil in a containment building or tank as previously proposed. It is expected that the integrity of the cover on the stockpile be adequately maintained, that run-on and run-off be controlled and that inspections for damage will occur on a regular basis throughout the RI/FS process.

John A. Kitzhaber
Governor

2020 SW Fourth Avenue
Suite 400
Portland, OR 97201-4987
(503) 229-5263 Voice
TTY (503) 229-5471
DEQ-1

TOLS003038

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2. Within five years of entering the VCP agreement, Time Oil must demonstrate that either treatment of the contaminated soil in the stockpile to an approved treatment standard has been successfully achieved and the soil properly disposed of, or that treatment is successfully underway and Time Oil can demonstrate the cleanup goal is achievable within a reasonable time frame. The Department will closely monitor Time Oil's progress in achieving treatment and expects Time Oil to be working towards achieving the treatment goals during this five-year period.

   As the RI/FS is concluded, the Department will evaluate the potential waiver of RCRA hazardous waste requirements, such as the requirement to obtain a hazardous waste treatment permit for any proposed treatment process. Under ORS 465.315, the Director may waive non-substantive hazardous waste and other program requirements.

3. The Northwest Terminal is subject to RCRA corrective action. Therefore, the entire facility must be investigated as part of the RI/FS. In order that investigation of the former pentachlorophenol formulating area may commence immediately, Time Oil will investigate other areas of the Northwest Terminal using a phased approach negotiated with VCP. If additional pentachlorophenol-contaminated soil is found, it must also be addressed or treated according to approved plans within the five year time frame as discussed in (2) above.

4. Time Oil will be expected to provide written documentation to demonstrate adequate financial ability is in place to implement and complete all cleanup activities related the VCP agreement. The financial mechanism used to demonstrate financial capability may be negotiated with the VCP.

Ms. Barbara Puchy will continue her involvement by participating with the VCP to help assure substantive RCRA hazardous waste requirements are met at the site. Provided that Time Oil complies with work plans and schedules approved under the VCP, and meets the above expectations, the Department does not anticipate the need for formal enforcement action to achieve compliance with the hazardous waste requirements. However, should steady progress as measured by performance against approved work plans and schedules and the above expectations not occur, the Department will be required to evaluate enforcement options that may include the assessment of civil penalties and program lead under the VCP would no longer be appropriate.

If you have any questions or would like to meet with staff to more fully discuss Department expectations, please call Mr. Dave St Louis at (503) 229-5532.

Sincerely,

Tom Bispham

Tom Bispham
Administrator
Northwest Region

cc: Mike Rosen/Karla Urbanowicz, VCP
Dave St Louis/Barb Puchy, NWR
Mary Wahl, WMC

10000

TOLS003040

TOTAL P.04

BZTO104(e)039861

Pittsburgh, PA 15219
Telephone 412-227-2000

KOPPERS

December 21, 1988

Terrill Henderson, Esq.
Time Oil Company
2737 West Commodore Way
P.O. Box 24447
Terminal Station
Seattle, Washington 98124-0047

Re: Northwest Terminal

Dear Mr. Henderson:

This will confirm our conversation of last week in which I informed you that Koppers Company has reviewed your letter of September 19, 1988 and decided how to proceed with respect to the proposal you described.

In our past conversations and your letter of September 19, 1988 you indicated that on January 23, 1986 Koppers agreed to pay one-half of the costs for the cleanup and related work on the above property. After our conversation we reviewed our files, both in the Law Department and in our environmental subsidiary, in an effort to confirm that statement.

We were unable to find anything indicating an agreement as broad as the agreement you describe. We did, however, find a letter dated February 19, 1986 from Robert D. Abendroth of Time Oil which indicated that Koppers and Time had reached a more limited agreement. Mr. Abendroth's letter states:

> "During our January 23, 1986 meeting at your offices in Pittsburgh, you mentioned that Koppers would agree to pay one-half the cleanup costs incurred/committed to date and that further coordination between Koppers and Time would be appropriate for future commitments. Time concurs with this approach."

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BZTO104(e)039862

Mr. Abendroth's letter convincingly evidences Time's understanding of this more limited agreement between Koppers and Time, and nothing in our file indicates that any Koppers' personnel took exception to Mr. Abendroth's characterization of the agreement.

It seems clear, then, that Koppers did not make a blanket agreement to share all costs of cleanup for the site. The agreement between Koppers and Time was that Koppers would share equally the cost of cleanup and related work which Time incurred or to which Time committed by February 19, 1986. Commitments for additional cost sharing were clearly deferred pending "further coordination" between Koppers and Time.

In light of this agreement to share past costs, Koppers will reimburse Time Oil for one-half of the investigation and cleanup costs referenced in your letter of September 19, 1988. I have requested that a check be issued to Time in the amount of $59,185.55.

With respect to the future costs, the same turnover in personnel which required first hand research into the details of any agreement between our companies now requires an explanation of why Koppers should agree to pay one-half of all the cleanup costs for the Northwest Terminal site. As I told you in our conversation, the current Koppers' management personnel responsible for such costs would like to meet with Time Oil personnel in order to hear Time Oil's views on this subject, and to discuss the issue generally. I will contact you following our next Environmental Claim Review Meeting in order to schedule a meeting between our companies to discuss "future commitments".

Several weeks ago I received a copy of a letter from Mr. Abendroth to Koppers Company's President, Frederick Moore. Mr. Abendroth stated that Koppers Company appeared to be ignoring Time's communications during the last year. Much has happened here at Koppers Company in the last year, including a lengthy takeover battle, a subsequent merger, a divestiture of business units representing almost one-half of the company, and reductions in staff. The level of activity and the turnover in personnel have made communications difficult. My expectation is that future events here at Koppers Company will allow for smoother communications.

(Ironically, Mr. Abendroth's letter also asserted that Koppers had entered into a blanket cost sharing agreement, an assertion contradicted by Mr. Abendroth's February 19, 1988 letter.)

Please feel free to call me if you have any questions or comments concerning the above.

Very truly yours,

William F. Giarla

William F. Giarla
412-227-2635

WFG:km

cc: R. Abendroth
F. Moore

10000

TOLS003043

BZTO104(e)039864

file — 86-102A
SEP 21 1995

WILDMAN, HARROLD, ALLEN & DIXON
225 WEST WACKER DRIVE
CHICAGO, ILLINOIS 60606-1229
(312) 201-2000
FAX: (312) 201-2555

ANTHONY G. HOPP
(312) 201-2537

September 18, 1995

VIA FEDERAL EXPRESS

Mr. Richard Gordon
Time Oil Company
2737 West Commodore Way
Seattle, WA 98199

Re: Time Oil/Northwest Terminal

Dear Mr. Gordon:

At the request of Patricia Dost, of Schwabe, Williamson & Wyatt, I am enclosing two executed original Agreements between Time Oil Company and Beazer East, Inc. related to the investigation of Time Oil's Northwest Terminal. Please execute at least one of these Agreements, and return it to me at your earliest convenience.

Thank you for your prompt attention to this matter.

Very truly yours,

WILDMAN, HARROLD, ALLEN & DIXON

Tony Hopp

Anthony G. Hopp

AGH:kma
Enclosures
cc: Patricia M. Dost

bcc: Jill M. Blundon
Jane Patarcity

10000

TOLS003044

BZTO104(e)039865

86-102-A

WILDMAN, HARROLD, ALLEN & DIXON
225 WEST WACKER DRIVE
CHICAGO, ILLINOIS 60606-1229
(312) 201-2000
FAX: (312) 201-2555

ANTHONY G. HOPP
(312) 201-2537

October 2, 1995

Ms. Patricia M. Dost
Schwabe, Williamson & Wyatt
Pacwest Center, Suite 1600-1800
1211 Southwest 5th Avenue
Portland, OR 97204-3795

Re: Time Oil Company, Northwest Terminal
Portland, Oregon

Dear Patty:

I have recently received a fully executed copy of the Agreement between Time Oil and Beazer. While Jane Patarcity stands ready to assist Time Oil, her schedule is often quite full. Please provide me with as much advance notice as possible, therefore, before you require Ms. Patarcity's assistance.

Last time we spoke, we discussed scheduling an initial telephone conference call so that Jane could be brought up to speed regarding the status of the site. Please let me know when you would like to schedule such a call. In addition, it would be helpful if Jane and I could review any recent documents relating to the site. I would particularly appreciate receiving copies of any correspondence between the DEQ and your office or Time Oil within the last year.

Very truly yours,

WILDMAN, HARROLD, ALLEN & DIXON

Tony Hopp

Anthony G. Hopp

AGH:kma
cc: Jill M. Blundon
Jane Patarcity
Robert L. Shuftan

cc: Tony - Pls. include me on this call. Thanks. Jill 10-9-95

TOLS003045

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BZTO104(e)039866

This Agreement ("Agreement") is entered into by Time Oil Company ("Time Oil") and Beazer East, Inc., formerly known as Beazer Materials and Services, Inc. and Koppers Company, Inc. (collectively "Beazer") as of May ____, 1995.

RECITALS

1. Time Oil owns and operates a facility located at 10350 N. Time Oil Road, Portland, Oregon (the "Northwest Terminal").

2. Pentachlorophenol-formulating operations were formerly conducted at a portion (the "Mixing Area") of the Northwest Terminal under a contract between Time Oil and Beazer.

3. The Oregon Department of Environmental Quality ("DEQ") has requested that Time Oil investigate whether and to what extent the pentachlorophenol-formulating operations may have impacted soil or ground water at the Northwest Terminal.

4. Time Oil and Beazer anticipate that the DEQ may require that Time Oil or Beazer take action to remedy or otherwise mitigate any impact on the ~~Mixing Area~~ Northwest Terminal caused by the pentachlorophenol-formulating operations.

5. Time Oil and Beazer desire to cooperate in completing the investigation of the Northwest Terminal and, if necessary, in negotiating with DEQ the scope, extent and description of any necessary remedial action. Time Oil and Beazer do not intend by this Agreement to assign, apportion or allocate any liability for investigation costs, negotiation costs or costs to perform any necessary remedial action. This Agreement is not an accord and satisfaction.

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BZTO104(e)039867

AGREEMENT

Time Oil and Beazer agree as follows:

1. Definitions. Terms used in this Agreement have the following meanings:

a. "The Mixing Area" means that area of the Northwest Terminal where pentachlorophenol-formulating and associated operations were formerly conducted and where mixed formulations were stored or loaded for shipment.

b. "Investigation" means investigation or investigations required by DEQ or undertaken pursuant to DEQ's voluntary clean-up program into the nature and extent of impact on the Mixing Area. "Investigation" includes studies to assess site conditions and evaluate alternatives to the extent necessary to select a remedy.

c. "Remedial Action" means those actions required by DEQ or undertaken pursuant to DEQ's voluntary clean-up program to clean up, remove or remediate the release or threatened release of a hazardous substance, including actions to monitor, assess or evaluate the release or threat of release of a hazardous substance and actions taken to prevent, minimize or mitigate damage or risk, if any, to health, welfare or the environment.

d. "Hazardous Substance" means any substance defined as "hazardous" or "toxic" under any applicable federal, state or local law, regulation, rule, ordinance or order pertaining to the protection of human health, welfare or the environment, including, but not limited to, the federal

Comprehensive Environmental Response, Compensation and Liability Act, 42 U.S.C. § 9601 et ~~seq.~~ seq. ("CERCLA"), and the Oregon Hazardous Substance Removal and Remedial Action Statute, ORS 465.200 et seq. (the "Oregon Statute").

2. Beazer Technical Assistance. Beazer agrees to provide technical assistance, as further defined in Subparagraphs 2a, 2b and 2d of this Agreement, to Time Oil in investigating the nature and extent of any impact on the Mixing Area and, if necessary, in negotiating the scope, extent and description of any Remedial Action.

a. Beazer shall provide to Time Oil the services of Jane Patarcity, a Beazer employee, or another Beazer employee similarly situated ("Patarcity") as well as the services of any assistants or consultants selected by Patarcity ("Others"), for the purpose of providing to Time Oil information and advice related to the Investigation and, if necessary, information and advice relating to negotiations with the DEQ concerning the scope, extent and description of any Remedial Action.

b. Time Oil agrees and represents that it has retained a consultant to assist Time Oil in completing the Investigation. Time Oil agrees that, at its option, it will continue to retain and employ a consulting firm to assist Time Oil in completing the Investigation and performing any necessary Remedial Action, but that in no event shall this Agreement entitle Time Oil to professional consulting or engineering services from Beazer. This Agreement does not obligate Beazer to pay any portion of any consulting fees incurred by Time Oil;

however, nothing in this subparagraph or this Agreement shall be construed as a waiver or release by Time Oil of any claim against Beazer for such fees.

c. Beazer agrees that it shall provide the services of Patarcity and Others to Time Oil on an as-needed basis, and it will endeavor to make Patarcity or Others available to Time Oil, on reasonable notice, for consultation; provided, however, that should Time Oil request that Patarcity travel outside of Pittsburgh, Pennsylvania, Time Oil will provide Beazer and Patarcity or Others with at least seven (7) business days' advance notice.

d. Beazer agrees that it will pay all expenses incurred by Patarcity and Others in connection with any services to be performed by Patarcity and Others pursuant to this Agreement.

e. As further set forth in paragraph ~~6~~ 7 of this Agreement, in entering into this Agreement, Beazer does not waive its right to seek to recover from Time Oil all costs, fees and expenses incurred by Beazer in connection with this Agreement. Time Oil does not waive its right to seek to recover from Beazer all costs, fees and expenses incurred by Time Oil in connection with Remedial Action at the Northwest Terminal.

3. Time Oil Information. Time Oil agrees to provide Beazer with Confidential Information necessary for Beazer to provide technical assistance in the Investigation or Remedial Action.

TOLS003049

a. Time Oil will not furnish Beazer with any information Time Oil knows to be inaccurate. Time Oil does not vouch for the accuracy or completeness of any information generated, collected or assembled by any entity including Time Oil and its employees, agents and representatives.

b. The term "Confidential Information" shall mean and include any and all data, field notes, investigative notes, drawings, tests, photographs, records, analyses, calculations, summaries, reports, recommendations and conclusions, as well as any work product developed, generated, produced, received and collected by Time Oil or its agents, contractors, subcontractors or attorneys. All Confidential Information is and shall remain the property of Time Oil, whether in its possession or otherwise, unless Time Oil agrees in writing to waive such right. All Confidential Information shall be delivered to Time Oil upon request.

c. The term "Confidential Information" does not include information that (1) Time Oil makes or has made generally available to the public; (2) Beazer receives other than from Time Oil, its agents, employees, contractors, subcontractors or attorneys and otherwise than in breach of a duty or confidence; or (3) Beazer has received from Time Oil prior to the date of execution of this Agreement.

d. Except as expressly provided herein, Beazer shall not, without the previous written consent of Time Oil, use, publish, or disclose to any other person any Confidential Information. Beazer may disclose Confidential Information when

required to comply with a valid order of a governmental entity or a court of competent jurisdiction. Beazer and Time Oil agree that all information developed by Time Oil and/or Beazer in connection with Investigation or Remedial Action at the Mixing Area is generated in preparation of a joint defense and in anticipation of litigation against the State of Oregon or other third parties. However, nothing in this Agreement shall be construed as protecting from discovery or admission into evidence otherwise unprotected material in any future litigation between Time Oil and Beazer.

e. Beazer agrees that breach of this paragraph 3 may cause irreparable harm which may not be adequately remedied by money damages. Accordingly, Beazer and Time Oil stipulate that in the event of any breach or a threatened breach, Time Oil may have equitable relief, without bond, including a temporary restraining order and preliminary injunction, barring further prohibited conduct. Such equitable relief shall be in addition to any other remedies which Time Oil may have under this contract, at law or in equity.

4. Beazer Liability. Beazer denies any obligation to pay any losses, damages, attorneys fees, costs or expenses incurred or to be incurred by Time Oil. This Agreement shall not be treated as an admission of liability or responsibility by Beazer at any time for any purpose, such liability having been and continuing to be expressly denied by Beazer. Nothing in this Agreement shall be construed as giving rise to liability for

Beazer under CERCLA, the Oregon Statute, or any other state or federal statute or regulation.

5. Time Oil agrees to defend, hold harmless and indemnify Beazer and its parents, subsidiaries, affiliated companies, successors and assigns, their employees, agents, consultants, attorneys, officers and directors from all fines, penalties or damages arising out of or in any way related to the following: Time Oil's failure to timely comply with any DEQ order, except to the extent that violation of any DEQ order results from Beazer's negligence or willful misconduct~~; and the transportation or disposal of any material removed from the Northwest Terminal in connection with~~.

6. Removal of Material. Time Oil agrees that it will not remove soil, ground water or any other pentachlorophenol-contaminated material generated in the Investigation or any Remedial Action at the Northwest Terminal except pursuant to an order from the DEQ or with the DEQ's express consent or approval.

~~6~~ 7. No Waiver, Exceptions. This Agreement does not constitute an accord and satisfaction either in whole or in part. In entering into this Agreement, neither Beazer nor Time Oil waives or releases any claims, counterclaims, cross claims, affirmative defenses, actions, or causes of actions it has or may have in any future litigation or administrative proceeding, other than the following:

a. Beazer and Time Oil agree that the period of time beginning with the date of execution of this Agreement and ending with the date of termination of the Agreement as provided

in Paragraph ~~7~~ 8 will not be included in the application of any statute of limitations to any future litigation between Beazer and Time Oil.

b. Beazer waives any affirmative defense, claim, counterclaim, crossclaim, action or cause of action based upon Time Oil's failure to comply or substantially comply with any provision of the National Oil and Hazardous Substances Pollution Contingency Plan, 40 C.F.R. part 300 et seq., ("NCP") in performing any future Investigation or Remedial Action at the Mixing Area, unless Beazer makes specific written objection within ten (10) business days after receipt of written notice from Time Oil that it intends to commence the objectionable item of Investigation or Remedial Action. This Subparagraph does not apply to, and Beazer does not waive, any affirmative defense related to or based on any failure by Time Oil to comply or substantially comply with the NCP in performing any Investigation or Remedial Action commenced or completed prior to the date of execution of this Agreement, or after the termination of this Agreement, except to the extent that Beazer expressly agreed with the Investigation or Remedial Action.

~~7~~ 8. Termination. Either party may terminate this Agreement at any time upon ten (10) days' prior written notice to the other party. Termination under this provision shall in no way affect Beazer's obligation to maintain the confidentiality of Time Oil's Confidential Information or Time Oil's indemnity obligations under this Agreement as set forth in paragraph 5. In the event of termination, Beazer shall be entitled to claim any

defense, claim, counterclaim, crossclaim, cause of action or action based upon Time Oil's failure to comply or substantially comply with the NCP with respect to any Investigation or Remedial Action occurring after the date of termination and as provided in Paragraph 6(b).

~~8~~ 9. Duplicate Originals. This Agreement is executed in duplicate originals.

~~9~~ 10. No Third Party Beneficiaries. This Agreement is entered into for the express benefit of Time Oil and Beazer and is not intended and shall not be deemed to create any rights or interests whatsoever in any other person, including without limitation, any right to enforce the terms hereof.

~~10~~ 11. Severability. Each provision of this Agreement shall be interpreted in such a manner as to be valid and enforceable under applicable law, but if any provision hereof shall be or become prohibited or invalid under any applicable law, that provision shall be ineffective only to the extent of such prohibition or invalidity, without thereby invalidating the remainder of that provision or any other provision hereof.

~~11~~ 12. Governing Law. This Agreement shall be governed by and considered in accordance with the laws of the State of Oregon.

~~12~~ 13. Integration. This Agreement constitutes the entire agreement by and among all of the parties hereto and integrates and supersedes all prior understandings or agreements with respect to the subject matter.

TOLS003054

~~13~~ 14. Modification. This Agreement may not be altered, amended, modified or otherwise changed except by writing, duly executed by authorized representatives of Beazer and Time Oil. The parties agree to confer about the provisions of this Agreement, and specifically about Paragraphs 1b, 1c and 6 of this Agreement, should the opportunity arise for Time Oil to perform any necessary Investigation or Remedial Action at the Northwest Terminal independent of DEQ oversight.

~~14~~ 15. Notices. Notices required or permitted to be given under the Agreement shall be sent via first class mail to the following addresses:

For Time Oil:	Richard Gordon Time Oil Company 2737 W. Commodore Way Seattle, Washington 98199
With copy to:	Patricia Dost Schwabe, Williamson & Wyatt 1211 S.W. Fifth Avenue - Suite 1700 Portland, Oregon 97204-3795
For Beazer:	Jill Blundon Beazer East Inc. 436 Seventh Avenue Pittsburgh, Pennsylvania 15219
With copy to:	Anthony Hopp Wildman, Harrold, Allen & Dixon 225 West Wacker Drive Chicago, Illinois 60606-1229

~~15~~ 16. Warranty of Representation. Each party executing this Agreement represents that it has been represented by counsel of its own choosing regarding the preparation and negotiation of this Agreement and all the matters set forth herein and that each of them has read this Agreement and is fully aware of the contents thereof and its legal effect.

TOLS003055

~~16~~ 17. Arbitration.

a. All disputes arising under this Agreement shall be submitted to arbitration. If a dispute arises, the party desiring arbitration shall give written notice to the other party and in such notice shall appoint a disinterested person of recognized competence in the field involved as the arbitrator on its behalf. Within five (5) business days thereafter, the other party by written notice may appoint a second disinterested person of recognized competence in such field as the arbitrator on its behalf. The arbitrators thus appointed shall appoint a third disinterested person of recognized competence in such field, and such three arbitrators shall as promptly as possible, but not later than ten (10) business days later, determine such matter; provided, however, if the second arbitrator shall not have been appointed as described above, the first arbitrator shall proceed to determine the matter as the sole arbitrator.

b. The determination of the majority of the arbitrators, or the sole arbitrator, as the case may be, shall be conclusive upon the parties and judgment upon the same may be entered in any court having jurisdiction thereof. The

arbitrators or the sole arbitrator, as the case may be, shall give written notice to the parties stating the determination, and shall furnish to each party a signed copy of such determination.

TIME OIL COMPANY	BEAZER EAST INC., fka BEAZER MATERIALS AND SERVICES, INC. and KOPPERS COMPANY INC.
By: _____	By: _____
Title: _____	Title: _____
Date: _____	Date: _____

TOLS003057

WILDMAN, HARROLD, ALLEN & DIXON
225 WEST WACKER DRIVE
CHICAGO, ILLINOIS 60606-1229
(312) 201-2000
FAX: (312) 201-2555

ANTHONY G. HOPP
(312) 201-2537

JUN 12 1995

file - 96-102A

June 9, 1995

Ms. Patricia M. Dost
Schwabe, Williamson & Wyatt
Pacwest Center, Suite 1600-1950
1211 Southwest 5th Avenue
Portland, OR 97204-3795

Re: Time Oil

Dear Patty:

Attached please find yet another revised, proposed agreement between Time Oil and Beazer. The purpose of this letter is to explain the most recent revisions.

When you and I last spoke, Time Oil's major concern was the indemnity language contained in the last clause of paragraph 5 of the last version of the proposed agreement. This language would have required Time Oil to indemnify Beazer for any liabilities arising out of the transportation or disposal of material removed from Time Oil's northwest terminal. You told me that any material removed from the northwest terminal would be removed pursuant to an order from, or with the consent of, the Oregon Department of Environmental Quality ("DEQ"). You stated that it would not be equitable to require Time Oil to indemnify Beazer for potential liabilities arising out of Time Oil's compliance with the DEQ's orders, requests or recommendations.

Beazer understands Time Oil's concerns. For that reason, the attached draft deletes the final clause of paragraph 5. At the same time, the agreement states that nothing contained in the agreement shall be construed as giving rise to liability for Beazer under CERCLA or any other federal or state statute or regulation. In addition, the revised agreement states that Time Oil will not remove any soil, groundwater or other material from the northwest terminal other than pursuant to an order from the DEQ, or with the DEQ's consent.

I believe that this latest revised, proposed agreement adequately addresses both Time Oil's concerns and Beazer's concerns. I look forward to hearing from you regarding this latest draft.

Very truly yours,

WILDMAN, HARROLD, ALLEN & DIXON

Anthony G. Hopp

AGH:kma
Enclosure

bcc: Jill M. Blundon, w/enc.
Robert L. Shuftan, w/enc.

10000

TOLS003059

BZTO104(e)039880

This Agreement ("Agreement") is entered into by Time Oil Company ("Time Oil") and Beazer East, Inc., formerly known as Beazer Materials and Services, Inc. and Koppers Company, Inc. (collectively "Beazer") as of May ____, 1995.

RECITALS

1. Time Oil owns and operates a facility located at 10350 N. Time Oil Road, Portland, Oregon (the "Northwest Terminal").

2. Pentachlorophenol-formulating operations were formerly conducted at a portion (the "Mixing Area") of the Northwest Terminal under a contract between Time Oil and Beazer.

3. The Oregon Department of Environmental Quality ("DEQ") has requested that Time Oil investigate whether and to what extent the pentachlorophenol-formulating operations may have impacted soil or ground water at the Northwest Terminal.

4. Time Oil and Beazer anticipate that the DEQ may require that Time Oil or Beazer take action to remedy or otherwise mitigate any impact on the Mixing Area caused by the pentachlorophenol-formulating operations.

5. Time Oil and Beazer desire to cooperate in completing the investigation of the Northwest Terminal and, if necessary, in negotiating with DEQ the scope, extent and description of any necessary remedial action. Time Oil and Beazer do not intend by this Agreement to assign, apportion or allocate any liability for investigation costs, negotiation costs or costs to perform any necessary remedial action. This Agreement is not an accord and satisfaction.

AGREEMENT

Time Oil and Beazer agree as follows:

1. Definitions. Terms used in this Agreement have the following meanings:

a. "The Mixing Area" means that area of the Northwest Terminal where pentachlorophenol-formulating and associated operations were formerly conducted and where mixed formulations were stored or loaded for shipment.

b. "Investigation" means investigation or investigations required by DEQ or undertaken pursuant to DEQ's voluntary clean-up program into the nature and extent of impact on the Mixing Area. "Investigation" includes studies to assess site conditions and evaluate alternatives to the extent necessary to select a remedy.

c. "Remedial Action" means those actions required by DEQ or undertaken pursuant to DEQ's voluntary clean-up program to clean up, remove or remediate the release or threatened release of a hazardous substance, including actions to monitor, assess or evaluate the release or threat of release of a hazardous substance and actions taken to prevent, minimize or mitigate damage or risk, if any, to health, welfare or the environment.

d. "Hazardous Substance" means any substance defined as "hazardous" or "toxic" under any applicable federal, state or local law, regulation, rule, ordinance or order pertaining to the protection of human health, welfare or the environment, including, but not limited to, the federal Comprehensive Environmental Response, Compensation and Liability Act, 42 U.S.C. § 9601 et seq. ("CERCLA"), and the Oregon Hazardous Substance Removal and Remedial Action Statute, ORS 465.200 et seq. (the "Oregon Statute").

2. **Beazer Technical Assistance.** Beazer agrees to provide technical assistance, as further defined in Subparagraphs 2a, 2b and 2d of this Agreement, to Time Oil in investigating the nature and extent of any impact on the Mixing Area and, if necessary, in negotiating the scope, extent and description of any Remedial Action.

a. Beazer shall provide to Time Oil the services of Jane Patarcity, a Beazer employee, or another Beazer employee similarly situated ("Patarcity") as well as the services of any assistants or consultants selected by Patarcity ("Others"), for the purpose of providing to Time Oil information and advice related to the Investigation and, if necessary, information and advice relating to negotiations with the DEQ concerning the scope, extent and description of any Remedial Action.

b. Time Oil agrees and represents that it has retained a consultant to assist Time Oil in completing the Investigation. Time Oil agrees that, at its option, it will continue to retain and employ a consulting firm to assist Time Oil in completing the Investigation and performing any necessary Remedial Action, but that in no event shall this Agreement entitle Time Oil to professional consulting or engineering services from Beazer. This Agreement does not obligate Beazer to pay any portion of any consulting fees incurred by Time Oil; however, nothing in this subparagraph or this Agreement shall be construed as a waiver or release by Time Oil of any claim against Beazer for such fees.

c. Beazer agrees that it shall provide the services of Patarcity and Others to Time Oil on an as-needed basis, and it will endeavor to make Patarcity or Others available to Time Oil, on reasonable notice, for consultation; provided, however, that should Time Oil request that Patarcity travel outside of Pittsburgh, Pennsylvania, Time Oil will provide Beazer and Patarcity or Others with at least seven (7) business days' advance notice.

d. Beazer agrees that it will pay all expenses incurred by Patarcity and Others in connection with any services to be performed by Patarcity and Others pursuant to this Agreement.

e. As further set forth in paragraph 6 of this Agreement, in entering into this Agreement, Beazer does not waive its right to seek to recover from Time Oil all costs, fees and expenses incurred by Beazer in connection with this Agreement.

3. **Time Oil Information.** Time Oil agrees to provide Beazer with Confidential Information necessary for Beazer to provide technical assistance in the Investigation or Remedial Action.

a. Time Oil will not furnish Beazer with any information Time Oil knows to be inaccurate. Time Oil does not vouch for the accuracy or completeness of any information generated, collected or assembled by any entity including Time Oil and its employees, agents and representatives.

b. The term "Confidential Information" shall mean and include any and all data, field notes, investigative notes, drawings, tests, photographs, records, analyses, calculations, summaries, reports, recommendations and conclusions, as well as any work product developed, generated, produced, received and collected by Time Oil or its agents, contractors, subcontractors or attorneys. All Confidential Information is and shall remain the property of Time Oil, whether in its possession or otherwise, unless Time Oil agrees in writing to waive such right. All Confidential Information shall be delivered to Time Oil upon request.

c. The term "Confidential Information" does not include information that (1) Time Oil makes or has made generally available to the public; (2) Beazer receives other than from Time Oil, its agents, employees, contractors, subcontractors or attorneys and otherwise than in breach of a duty or confidence; or (3) Beazer has received from Time Oil prior to the date of execution of this Agreement.

d. Except as expressly provided herein, Beazer shall not, without the previous written consent of Time Oil, use, publish, or disclose to any other person any Confidential Information. Beazer may disclose Confidential Information when required to comply with a valid order of a governmental entity or a court of competent jurisdiction. Beazer and Time Oil agree that all information developed by Time Oil and/or Beazer in connection with Investigation or Remedial Action at the Mixing Area is generated in preparation of a joint defense and in anticipation of litigation against the State of Oregon or other third parties. However, nothing in this Agreement shall be construed as protecting from discovery or admission into evidence otherwise unprotected material in any future litigation between Time Oil and Beazer.

e. Beazer agrees that breach of this paragraph 3 may cause irreparable harm which may not be adequately remedied by money damages. Accordingly, Beazer and Time Oil stipulate that in the event of any breach or a threatened breach, Time Oil may have equitable relief, without bond, including a temporary restraining order and preliminary injunction, barring further prohibited conduct. Such equitable relief shall be in addition to any other remedies which Time Oil may have under this contract, at law or in equity.

4. Beazer Liability. Beazer denies any obligation to pay any losses, damages, attorneys fees, costs or expenses incurred or to be incurred by Time Oil. This Agreement shall not be treated as an admission of liability or responsibility by Beazer at any time for any purpose, such liability having been and continuing to be expressly denied by Beazer. Nothing in this Agreement shall be construed as giving rise to liability for Beazer under CERCLA, the Oregon Statute, or any other state or federal statute or regulation.

5. Time Oil agrees to defend, hold harmless and indemnify Beazer and its parents, subsidiaries, affiliated companies, successors and assigns, their employees, agents, consultants,

attorneys, officers and directors from all fines, penalties or damages arising out of or in any way related to the following: Time Oil's failure to timely comply with any DEQ order, except to the extent that violation of any DEQ order results from Beazer's negligence or willful misconduct~~; and the transportation or disposal of any~~.

6. **Removal of Material.** Time Oil agrees that it will not remove soil, ground water or any other material ~~removed~~ from the Northwest Terminal ~~in connection with the Investigation or Remedial Action.~~ except pursuant to an order from the DEQ or with the DEQ's express consent or approval.

6 7. **No Waiver, Exceptions.** This Agreement does not constitute an accord and satisfaction either in whole or in part. In entering into this Agreement, neither Beazer nor Time Oil waives or releases any claims, counterclaims, cross claims, affirmative defenses, actions, or causes of actions it has or may have in any future litigation or administrative proceeding, other than the following:

a. Beazer and Time Oil agree that the period of time beginning with the date of execution of this Agreement and ending with the date of termination of the Agreement as provided in Paragraph 7 will not be included in the application of any statute of limitations to any future litigation between Beazer and Time Oil.

b. Beazer waives any affirmative defense, claim, counterclaim, crossclaim, action or cause of action based upon Time Oil's failure to comply or substantially comply with any provision of the National Oil and Hazardous Substances Pollution Contingency Plan, 40 C.F.R. part 300 et seq., ("NCP") in performing any future Investigation or Remedial Action at the Mixing Area, unless Beazer makes specific written objection within ten (10) business days after receipt of written notice from Time Oil that it intends to commence the objectionable item

of Investigation or Remedial Action. This Subparagraph does not apply to, and Beazer does not waive, any affirmative defense related to or based on any failure by Time Oil to comply or substantially comply with the NCP in performing any Investigation or Remedial Action commenced or completed prior to the date of execution of this Agreement, or after the termination of this Agreement, except to the extent that Beazer expressly agreed with the Investigation or Remedial Action.

~~7~~ 8. **Termination**. Either party may terminate this Agreement at any time upon ten (10) days' prior written notice to the other party. Termination under this provision shall in no way affect Beazer's obligation to maintain the confidentiality of Time Oil's Confidential Information or Time Oil's indemnity obligations as set forth in Paragraph 5. In the event of termination, Beazer shall be entitled to claim any defense, claim, counterclaim, crossclaim, cause of action or action based upon Time Oil's failure to comply or substantially comply with the NCP with respect to any Investigation or Remedial Action occurring after the date of termination, and as provided in Paragraph 6(b).

~~8~~ 9. **Duplicate Originals**. This Agreement is executed in duplicate originals.

~~9~~ 10. **No Third Party Beneficiaries**. This Agreement is entered into for the express benefit of Time Oil and Beazer and is not intended and shall not be deemed to create any rights or interests whatsoever in any other person, including without limitation, any right to enforce the terms hereof.

~~10~~ 11. **Severability**. Each provision of this Agreement shall be interpreted in such a manner as to be valid and enforceable under applicable law, but if any provision hereof shall be or become prohibited or invalid under any applicable law, that provision shall be

ineffective only to the extent of such prohibition or invalidity, without thereby invalidating the remainder of that provision or any other provision hereof.

~~11~~ 12. **Governing Law.** This Agreement shall be governed by and considered in accordance with the laws of the State of Oregon.

~~12~~ 13. **Integration.** This Agreement constitutes the entire agreement by and among all of the parties hereto and integrates and supersedes all prior understandings or agreements with respect to the subject matter.

~~13~~ 14. **Modification.** This Agreement may not be altered, amended, modified or otherwise changed except by writing, duly executed by authorized representatives of Beazer and Time Oil.

~~14~~ 15. **Notices.** Notices required or permitted to be given under the Agreement shall be sent via first class mail to the following addresses:

For Time Oil:
Richard Gordon
Time Oil Company
2737 W. Commodore Way
Seattle, Washington 98199

With copy to:
Patricia Dost
Schwabe, Williamson & Wyatt
1211 S.W. Fifth Avenue - Suite 1700
Portland, Oregon 97204-3795

For Beazer:
Jill Blundon
Beazer East Inc.
436 Seventh Avenue
Pittsburgh, Pennsylvania 15219

With copy to:
Anthony Hopp
Wildman, Harrold, Allen & Dixon
225 West Wacker Drive
Chicago, Illinois 60606-1229

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TOLS003067

BZTO104(e)039888

~~15~~ 16. **Warranty of Representation.** Each party executing this Agreement represents that it has been represented by counsel of its own choosing regarding the preparation and negotiation of this Agreement and all the matters set forth herein and that each of them has read this Agreement and is fully aware of the contents thereof and its legal effect.

~~16~~ 17. **Arbitration.**

a. All disputes arising under this Agreement shall be submitted to arbitration. If a dispute arises, the party desiring arbitration shall give written notice to the other party and in such notice shall appoint a disinterested person of recognized competence in the field involved as the arbitrator on its behalf. Within five (5) business days thereafter, the other party by written notice may appoint a second disinterested person of recognized competence in such field as the arbitrator on its behalf. The arbitrators thus appointed shall appoint a third disinterested person of recognized competence in such field, and such three arbitrators shall as promptly as possible, but not later than ten (10) business days later, determine such matter; provided, however, if the second arbitrator shall not have been appointed as described above, the first arbitrator shall proceed to determine the matter as the sole arbitrator.

b. The determination of the majority of the arbitrators, or the sole arbitrator, as the case may be, shall be conclusive upon the parties and judgment upon the same may be entered in any court having jurisdiction thereof. The arbitrators or the sole arbitrator, as the case may be, shall give written notice to the parties stating the determination, and shall furnish to each party a signed copy of such determination.

TIME OIL COMPANY

BEAZER EAST INC., f/k/a
BEAZER MATERIALS AND SERVICES,
INC. and KOPPERS COMPANY INC.

By: _____	By: _____
Title: _____	Title: _____
Date: _____	Date: _____

TOLS003069

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BZTO104(e)039890

WILDMAN, HARROLD, ALLEN & DIXON
225 WEST WACKER DRIVE
CHICAGO, ILLINOIS 60606-1229
(312) 201-2000
FAX: (312) 201-2555

ANTHONY G. HOPP
(312) 201-2537

May 24, 1995

VIA FEDERAL EXPRESS

Ms. Patricia M. Dost
Schwabe, Williamson & Wyatt
Pacwest Center, Suite 1600-1950
1211 Southwest 5th Avenue
Portland, OR 97204-3795

- file 86-102

Re: Time Oil Northwest Terminal
Your File No.: 89360/82295
Our File No.: K7528-097

Dear Patty:

Enclosed please find what I hope are the final revisions to the Time Oil/Beazer agreement. Beazer has approved these changes, and is prepared to execute the agreement in its present form.

Please call me when you receive this so that I can explain the concerns which led to the most recent revisions.

Very truly yours,

WILDMAN, HARROLD, ALLEN & DIXON

Tony Hopp

Anthony G. Hopp

AGH:kma
Enclosures
cc: Jill M. Blundon, Esq.
Robert L. Shuftan, Esq., w/enc.

10000

TOLS003070

BZTO104(e)039891

WILDMAN, HARROLD, ALLEN & DIXON
225 WEST WACKER DRIVE
CHICAGO, ILLINOIS 60606-1229
(312) 201-2000
FAX: (312) 201-2555

ANTHONY G. HOPP
(312) 201-2537

February 6, 1995

Ms. Patricia M. Dost
Schwabe, Williamson & Wyatt
Pacwest Center, Suite 1600-1950
1211 Southwest 5th Avenue
Portland, Oregon 97204-3795

Re: Time Oil Northwest Terminal
Your File No.: 89360/82295
Our File No.: K7528-097

Dear Patty:

Attached please find two versions of the proposed revised agreement between Time Oil Company and Beazer East, Inc. The first version is a "redlined" version. It should help you to easily identify the changes that I have made. The second version is a non-"redlined" version. Please call me after you have had an opportunity to discuss this proposed revised draft with your client.

Very truly yours,

Tony Hopp

Anthony G. Hopp

AGH:kma
Enclosures
cc: Robert L. Shuftan, w/enc.
Jill M. Blundon, w/enc.

cc Jane P.
2.10 file 86-102 A

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TOLS003071

BZTO104(e)039892

DRAFT
2-6-95

This Agreement ("Agreement") is entered into by Time Oil Company ~~(Time Oil)~~("Time Oil") and Beazer East, Inc., formerly known as Beazer Materials and Services, Inc. and Koppers Company, Inc. (collectively "Beazer") as of December __, 1994.

RECITALS

1. Time Oil owns and operates a facility located at 1205 North Burgard Road, Portland, Oregon ~~and known as the Northwest Terminal.~~(the "Northwest Terminal".)

2. Pentachlorophenol-formulating operations were formerly conducted at a portion (the ~~Mixing Area)~~"Mixing Area") of the Northwest Terminal under a contract between Time Oil and Beazer.

3. The Oregon Department of Environmental Quality ("DEQ") has requested that Time Oil investigate whether and to what extent the pentachlorophenol-formulating operations may have impacted soil or ground water at the Northwest Terminal.

4. Time Oil and Beazer anticipate that the DEQ may require that Time Oil ~~and Beazer~~ take action to remedy or otherwise mitigate ~~contamination of~~ any impact on the Northwest Terminal caused by the pentachlorophenol-formulating operations.

5. Time Oil has requested that Beazer assist Time Oil in completing the investigation of the Northwest Terminal and, if necessary, assist Time Oil in negotiating the scope, extent, and description of any remedial action requested by the DEQ.

AGREEMENT

Time Oil and Beazer agree as follows:

1. Definitions. Terms used in this Agreement have the following meanings:

a. "The Mixing Area" means that area of the Northwest Terminal where pentachlorophenol-formulating operations were formerly conducted and where mixed formulations were stored or loaded for shipment.

b. "Investigation" means investigation or investigations into the nature and extent of ~~contamination of~~ impact on the Mixing Area. "Investigation" includes studies to assess site conditions and evaluate alternatives to the extent necessary to select a remedy.

c. "Remedial Action" means those actions taken to clean up, remove or remediate the release or threatened release of a hazardous substance, including actions to monitor, assess or evaluate the release or threat of release of a hazardous substance and actions taken to prevent, minimize or mitigate damage or risk, if any, to health, welfare or the environment.

d. "Hazardous Substance" means any substance defined as "hazardous" or "toxic" under any applicable federal, state or local law, regulation, rule, ordinance or order pertaining to the protection of human health, welfare or the environment, including, but not limited to, the federal Comprehensive Environmental Response, Compensation and Liability Act, 42 USC § 9601 et seq., and the Oregon Hazardous Substance Removal and Remedial Action Statute, ORS 465.200 et seq.

2. Beazer Technical Assistance. Beazer agrees to provide technical assistance, as further defined in Subparagraphs 2a, 2b and 2d of this Agreement, to Time Oil in investigating the nature and extent of contamination at the Mixing Area and, if necessary, in negotiating the scope, extent and description of any ~~remedial action~~ Remedial Action.

a. Beazer shall provide to Time Oil the services of Jane Patarcity, a Beazer employee, or another Beazer employee similarly situated ("Patarcity") as well as the services of any assistants or consultants selected by Patarcity ~~(Others)~~ ("Others"), for the purpose of providing to Time Oil information and advice related to the ~~investigation~~ Investigation and, if necessary, information and advice relating to negotiations with the DEQ concerning the scope, extent and description of any Remedial Action.

b. Time Oil agrees and represents that it has retained a consultant to assist Time Oil in completing the ~~investigation~~ Investigation and performing the Remedial Action. Time Oil agrees that it will continue to retain and employ a consulting firm to assist Time Oil in completing the ~~investigation~~ Investigation and performing the Remedial Action, and in no event shall this Agreement entitle Time Oil to professional consulting or engineering services from Beazer. Time Oil further agrees that Time Oil has paid and will continue to pay all reasonable invoices received from any consulting firm retained by Time Oil in connection with the Investigation and Remedial Action. Nothing in this Agreement shall be construed as obligating Beazer to pay any portion of any invoice received by Time Oil by any consulting firm retained by Time Oil.

c. Beazer agrees that it shall provide the services of Patarcity and Others to Time Oil on an as-needed basis, and it will endeavor to make Patarcity available to Time oil, on reasonable notice, for consultation; provided, however, that should Time Oil request that Patarcity travel outside of Pittsburgh, Pennsylvania, Time Oil will provide Beazer and Patarcity with at least seven (7) business days' advance notice.

d. Beazer agrees that it will pay all expenses incurred by Patarcity and Others in connection with any services to be performed by Patarcity and Others pursuant to this Agreement.

3. Time Oil Information. Time Oil agrees to provide Beazer with Confidential Information necessary for Beazer to provide technical assistance in the Investigation or Remedial Action.

a. Time Oil will not furnish Beazer with any information Time Oil knows to be inaccurate. Time Oil does not vouch for the accuracy or completeness of any information generated, collected or assembled by any entity including Time Oil and its employees, agents and representatives.

b. The term "confidential information" shall mean and include any and all data, field notes, investigative notes, drawings, tests, photographs, records, analyses, calculations, summaries, reports, recommendations and conclusions, as well as any work product developed, generated, produced, received and collected by Time Oil or its agents, contractors, subcontractors or attorneys. All confidential information is and shall remain the property of Time Oil, whether in its possession or otherwise, unless Time Oil agrees in writing to waive such right. All confidential information shall be delivered to Time Oil upon request.

c. The term "confidential information" does not include information that (1) Time Oil makes or has made generally available to the public; ~~or~~(2) Beazer receives other than from Time Oil, its agents, employees, contractors, subcontractors or attorneys and otherwise than in breach of a duty or confidence; or (3) Beazer has received from Time Oil prior to the date of execution of this Agreement.

d. Except as expressly provided herein, Beazer shall not, without the previous written consent of Time Oil, use, publish, or disclose to any other person any confidential information. Beazer may disclose confidential information when required to comply with a valid order of a governmental entity or a court of competent jurisdiction. ~~Beazer and Time Oil agree that all information developed by Time Oil and/or Beazer in connection with Investigation or Remedial Action at the Mixing Area is generated in anticipation of litigation or for trial.~~

e. Beazer agrees that breach of this paragraph 3 may cause irreparable harm which may not be adequately remedied by money damages. Accordingly, Beazer and Time Oil stipulate that in the event of any breach or a threatened breach, Time Oil may have equitable relief, without bond, including a temporary restraining order and preliminary injunction, barring further prohibited conduct. Such equitable relief shall be in addition to any other remedies which Time Oil may have under this contract at law or in equity.

4. Beazer Liability. Except as otherwise provided in this Agreement, Beazer denies any obligation to pay any losses, damages, attorneys fees, costs or expenses incurred or to be incurred by Time Oil. This Agreement shall not be treated as an admission of liability or responsibility by Beazer at any time for any purpose, such liability having been and continuing to be expressly denied by Beazer.

5. Time Oil agrees to defend, hold harmless and indemnify Beazer and its parents, subsidiaries, affiliated companies, successors and assigns, their employees, agents, consultants, attorneys, officers and directors from all claims, demands, damages, expenses, costs, attorneys' fees, actions, and liabilities of any kind and nature that have been or may be brought, known and unknown, against Beazer by any person or entity seeking compensation or damages from

Beazer related to or in any way arising out of the following: the Investigation; any Remedial Action; the transportation or disposal of any material removed from the Northwest Terminal in connection with the Investigation and the Remedial Action; Time Oil's failure to timely comply with any order or request by the DEQ, or any other state or federal agency, related to the Investigation, any Remedial Action or the Northwest Terminal.

~~5.~~ 6. No ~~waiver~~ Waiver, Exceptions. This Agreement does not constitute an accord and satisfaction. In entering into this Agreement, neither Beazer nor Time Oil waives any claims, counterclaims, cross claims, affirmative defenses, actions, or causes of actions it has or may have in any future litigation or administrative proceeding, other than the following:

a. Beazer and Time Oil agree that the period of time beginning with the date of execution of this Agreement and ending with the date of termination of the Agreement as provided in Paragraph ~~6~~ 7 will not be included in the application of any statute of limitations to any future litigation between Beazer and Time Oil.

b. Beazer waives any affirmative defense, claim, counterclaim, crossclaim, action or cause of action based upon Time Oil's failure to comply or substantially comply with any provision the National Oil and Hazardous Substances Pollution Contingency Plan, 40 CFR part 300 et seq., ("NCP") in performing any future Remedial Action at the Mixing Area, unless Beazer makes specific written objection at least ten (10) ~~days prior to Time Oil's commencement of~~ business days after receipt of written notice from Time Oil that it intends to commence the objectionable item of Remedial Action. This Subparagraph does not apply to, and Beazer does not waive, any affirmative defense related to or based on any failure by Time Oil to comply or substantially comply with the NCP in performing any Investigation or Remedial Action

commenced or completed prior to the date of execution of this Agreement, or after the termination of this Agreement.

~~6~~ 7. Termination. Either party may terminate this Agreement at any time upon ten (10) days' prior written notice to the other party. Termination under this provision shall in no way affect Beazer's obligation to maintain the confidentiality of Time Oil's ~~Confidential Information.~~ confidential information. In the event of termination, Beazer shall be entitled to claim any defense, claim, counterclaim, crossclaim, cause of action or action based upon Time Oil's failure to comply or substantially comply with the NCP with respect to any Investigation or Remedial Action occurring after the date of termination.

~~7~~ 8. Duplicate Originals. This Agreement is executed in duplicate originals.

~~8~~ 9. No Third Party Beneficiaries. This Agreement is entered into for the express benefit of Time Oil and Beazer and is not intended and with the exception of the defense and indemnity obligations set forth in paragraph 5 hereof, shall not be deemed to create any rights or interests whatsoever in any other person, including without limitation, any right to enforce the terms hereof.

~~9~~ 10. Severability. Each provision of this Agreement shall be interpreted in such a manner as to be valid and enforceable under applicable law, but if any provision hereof shall be or become prohibited or invalid under any applicable law, that provision shall be ineffective only to the extent of such prohibition or invalidity, without thereby invalidating the remainder of that provision or any other provision hereof.

~~10~~ 11. Governing Law. This Agreement shall be governed by and considered in accordance with the laws of the State of Oregon.

DRAFT
2-6-95

~~11~~ 12. Integration. This Agreement constitutes the entire agreement by and among all of the parties hereto and integrates and supersedes all prior understandings or agreements with respect to the subject matter.

~~12~~ 13. Modification. This Agreement may not be altered, amended, modified or otherwise changed except by writing, duly executed by authorized representatives of Beazer and Time Oil.

~~13~~ 14. Notices. Notices required or permitted to be given under the Agreement shall be sent via first class mail to the following addresses:

For Time Oil: Richard Gordon
Time Oil Company
2737 W. Commodore Way
Seattle, Washington 98199

With copy to: Patricia Dost
Schwabe, Williamson & Wyatt
1211 S.W. Fifth Avenue - Suite 1700
Portland, Oregon 97204-3795

For Beazer: Jane Patarcity
Beazer East Inc.
436 Seventh Avenue
Pittsburgh, Pennsylvania 15219

With copy to: Anthony Hopp
Wildman, Harrold, Allen & Dixon
225 West Wacker Drive
Chicago, Illinois 60606-1229

~~14~~ 15. Warranty of Representation. Each party executing this Agreement represents that it has been represented by counsel of its own choosing regarding the preparation and negotiation of this Agreement and all the matters set forth herein and that each of them has read this Agreement and is fully aware of the contents thereof and its legal effect.

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BZTO104(e)039900

DRAFT
2-6-95

~~15. Attorney Fees. If any dispute should arise with respect to this Agreement, the prevailing party in any ensuing litigation or controversy shall be entitled to reasonable attorney fees.~~

16. Arbitration.

a. All disputes arising under this Agreement shall be submitted to arbitration. If a dispute arises, the party desiring arbitration shall give written notice to the other party and in such notice shall appoint a disinterested person of recognized competence in the field involved as the arbitrator on its behalf. Within five (5) business days thereafter, the other party by written notice may appoint a second disinterested person of recognized competence in such field as the arbitrator on its behalf. The arbitrators thus appointed shall appoint a third disinterested person of recognized competence in such field, and such three arbitrators shall as promptly as possible, but not later than ten (10) business days later, determine such matter; provided, however, if the second arbitrator shall not have been appointed as described above, the first arbitrator shall proceed to determine the matter as the sole arbitrator.

b. The determination of the majority of the arbitrators, or the sole arbitrator, as the case may be, shall be conclusive upon the parties and judgment upon the same may be entered in any court having jurisdiction thereof. The arbitrators or the sole arbitrator, as the case may be, shall give written notice to the parties stating the determination, and shall furnish to each party a signed copy of such determination.

TIME OIL COMPANY

~~Beazer~~ BEAZER EAST INC.,
~~fka Beazer~~ f/k/a BEAZER
MATERIALS AND SERVICES, INC.
and KOPPERS COMPANY INC.

DRAFT
2-6-95

By:	_____	By:	_____
Title:	_____	Title:	_____
Date:	_____	Date:	_____

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TOLS003081

BZTO104(e)039902

DRAFT
2-6-95

This Agreement ("Agreement") is entered into by Time Oil Company ("Time Oil") and Beazer East, Inc., formerly known as Beazer Materials and Services, Inc. and Koppers Company, Inc. (collectively "Beazer") as of December __, 1994.

RECITALS

1. Time Oil owns and operates a facility located at 1205 North Burgard Road, Portland, Oregon (the "Northwest Terminal".)

2. Pentachlorophenol-formulating operations were formerly conducted at a portion (the "Mixing Area") of the Northwest Terminal under a contract between Time Oil and Beazer.

3. The Oregon Department of Environmental Quality ("DEQ") has requested that Time Oil investigate whether and to what extent the pentachlorophenol-formulating operations may have impacted soil or ground water at the Northwest Terminal.

4. Time Oil and Beazer anticipate that the DEQ may require that Time Oil take action to remedy or otherwise mitigate any impact on the Northwest Terminal caused by the pentachlorophenol-formulating operations.

5. Time Oil has requested that Beazer assist Time Oil in completing the investigation of the Northwest Terminal and, if necessary, assist Time Oil in negotiating the scope, extent, and description of any remedial action requested by the DEQ.

AGREEMENT

Time Oil and Beazer agree as follows:

1. Definitions. Terms used in this Agreement have the following meanings:

a. "The Mixing Area" means that area of the Northwest Terminal where pentachlorophenol-formulating operations were formerly conducted and where mixed formulations were stored or loaded for shipment.

b. "Investigation" means investigation or investigations into the nature and extent of impact on the Mixing Area. "Investigation" includes studies to assess site conditions and evaluate alternatives to the extent necessary to select a remedy.

c. "Remedial Action" means those actions taken to clean up, remove or remediate the release or threatened release of a hazardous substance, including actions to monitor, assess or evaluate the release or threat of release of a hazardous substance and actions taken to prevent, minimize or mitigate damage or risk, if any, to health, welfare or the environment.

d. "Hazardous Substance" means any substance defined as "hazardous" or "toxic" under any applicable federal, state or local law, regulation, rule, ordinance or order pertaining to the protection of human health, welfare or the environment, including, but not limited to, the federal Comprehensive Environmental Response, Compensation and Liability Act, 42 USC § 9601 et seq., and the Oregon Hazardous Substance Removal and Remedial Action Statute, ORS 465.200 et seq.

2. Beazer Technical Assistance. Beazer agrees to provide technical assistance, as further defined in Subparagraphs 2a, 2b and 2d of this Agreement, to Time Oil in investigating the nature and extent of contamination at the Mixing Area and, if necessary, in negotiating the scope, extent and description of any Remedial Action.

a. Beazer shall provide to Time Oil the services of Jane Patarcity, a Beazer employee, or another Beazer employee similarly situated ("Patarcity") as well as the services of any assistants or consultants selected by Patarcity ("Others"), for the purpose of providing to Time Oil information and advice related to the Investigation and, if necessary, information and advice relating to negotiations with the DEQ concerning the scope, extent and description of any Remedial Action.

b. Time Oil agrees and represents that it has retained a consultant to assist Time Oil in completing the Investigation and performing the Remedial Action. Time Oil agrees that it will continue to retain and employ a consulting firm to assist Time Oil in completing the Investigation and performing the Remedial Action, and in no event shall this Agreement entitle Time Oil to professional consulting or engineering services from Beazer. Time Oil further agrees that Time Oil has paid and will continue to pay all reasonable invoices received from any consulting firm retained by Time Oil in connection with the Investigation and Remedial Action. Nothing in this Agreement shall be construed as obligating Beazer to pay any portion of any invoice received by Time Oil by any consulting firm retained by Time Oil.

c. Beazer agrees that it shall provide the services of Patarcity and Others to Time Oil on an as-needed basis, and it will endeavor to make Patarcity available to Time oil, on reasonable notice, for consultation; provided, however, that should Time Oil request that Patarcity travel outside of Pittsburgh, Pennsylvania, Time Oil will provide Beazer and Patarcity with at least seven (7) business days' advance notice.

d. Beazer agrees that it will pay all expenses incurred by Patarcity and Others in connection with any services to be performed by Patarcity and Others pursuant to this Agreement.

3. Time Oil Information. Time Oil agrees to provide Beazer with Confidential Information necessary for Beazer to provide technical assistance in the Investigation or Remedial Action.

a. Time Oil will not furnish Beazer with any information Time Oil knows to be inaccurate. Time Oil does not vouch for the accuracy or completeness of any information generated, collected or assembled by any entity including Time Oil and its employees, agents and representatives.

b. The term "confidential information" shall mean and include any and all data, field notes, investigative notes, drawings, tests, photographs, records, analyses, calculations, summaries, reports, recommendations and conclusions, as well as any work product developed, generated, produced, received and collected by Time Oil or its agents, contractors, subcontractors or attorneys. All confidential information is and shall remain the property of Time Oil, whether in its possession or otherwise, unless Time Oil agrees in writing to waive such right. All confidential information shall be delivered to Time Oil upon request.

c. The term "confidential information" does not include information that (1) Time Oil makes or has made generally available to the public; (2) Beazer receives other than from Time Oil, its agents, employees, contractors, subcontractors or attorneys and otherwise than in breach of a duty or confidence; or (3) Beazer has received from Time Oil prior to the date of execution of this Agreement.

d. Except as expressly provided herein, Beazer shall not, without the previous written consent of Time Oil, use, publish, or disclose to any other person any confidential information. Beazer may disclose confidential information when required to comply with a valid order of a governmental entity or a court of competent jurisdiction.

e. Beazer agrees that breach of this paragraph 3 may cause irreparable harm which may not be adequately remedied by money damages. Accordingly, Beazer and Time Oil stipulate that in the event of any breach or a threatened breach, Time Oil may have equitable relief, without bond, including a temporary restraining order and preliminary injunction, barring further prohibited conduct. Such equitable relief shall be in addition to any other remedies which Time Oil may have under this contract at law or in equity.

4. Beazer Liability. Except as otherwise provided in this Agreement, Beazer denies any obligation to pay any losses, damages, attorneys fees, costs or expenses incurred or to be incurred by Time Oil. This Agreement shall not be treated as an admission of liability or responsibility by Beazer at any time for any purpose, such liability having been and continuing to be expressly denied by Beazer.

5. Time Oil agrees to defend, hold harmless and indemnify Beazer and its parents, subsidiaries, affiliated companies, successors and assigns, their employees, agents, consultants, attorneys, officers and directors from all claims, demands, damages, expenses, costs, attorneys' fees, actions, and liabilities of any kind and nature that have been or may be brought, known and unknown, against Beazer by any person or entity seeking compensation or damages from Beazer related to or in any way arising out of the following: the Investigation; any Remedial Action; the transportation or disposal of any material removed from the Northwest Terminal in

connection with the Investigation and the Remedial Action; Time Oil's failure to timely comply with any order or request by the DEQ, or any other state or federal agency, related to the Investigation, any Remedial Action or the Northwest Terminal.

6. No Waiver, Exceptions. This Agreement does not constitute an accord and satisfaction. In entering into this Agreement, neither Beazer nor Time Oil waives any claims, counterclaims, cross claims, affirmative defenses, actions, or causes of actions it has or may have in any future litigation or administrative proceeding, other than the following:

a. Beazer and Time Oil agree that the period of time beginning with the date of execution of this Agreement and ending with the date of termination of the Agreement as provided in Paragraph 7 will not be included in the application of any statute of limitations to any future litigation between Beazer and Time Oil.

b. Beazer waives any affirmative defense, claim, counterclaim, crossclaim, action or cause of action based upon Time Oil's failure to comply or substantially comply with any provision the National Oil and Hazardous Substances Pollution Contingency Plan, 40 CFR part 300 et seq., ("NCP") in performing any future Remedial Action at the Mixing Area, unless Beazer makes specific written objection at least ten (10) business days after receipt of written notice from Time Oil that it intends to commence the objectionable item of Remedial Action. This Subparagraph does not apply to, and Beazer does not waive, any affirmative defense related to or based on any failure by Time Oil to comply or substantially comply with the NCP in performing any Investigation or Remedial Action commenced or completed prior to the date of execution of this Agreement, or after the termination of this Agreement.

DRAFT
2-6-95

7. Termination. Either party may terminate this Agreement at any time upon ten (10) days' prior written notice to the other party. Termination under this provision shall in no way affect Beazer's obligation to maintain the confidentiality of Time Oil's confidential information. In the event of termination, Beazer shall be entitled to claim any defense, claim, counterclaim, crossclaim, cause of action or action based upon Time Oil's failure to comply or substantially comply with the NCP with respect to any Investigation or Remedial Action occurring after the date of termination.

8. Duplicate Originals. This Agreement is executed in duplicate originals.

9. No Third Party Beneficiaries. This Agreement is entered into for the express benefit of Time Oil and Beazer and is not intended and with the exception of the defense and indemnity obligations set forth in paragraph 5 hereof, shall not be deemed to create any rights or interests whatsoever in any other person, including without limitation, any right to enforce the terms hereof.

10. Severability. Each provision of this Agreement shall be interpreted in such a manner as to be valid and enforceable under applicable law, but if any provision hereof shall be or become prohibited or invalid under any applicable law, that provision shall be ineffective only to the extent of such prohibition or invalidity, without thereby invalidating the remainder of that provision or any other provision hereof.

11. Governing Law. This Agreement shall be governed by and considered in accordance with the laws of the State of Oregon.

TOLS003088

10000

BZTO104(e)039909

DRAFT
2-6-95

12. Integration. This Agreement constitutes the entire agreement by and among all of the parties hereto and integrates and supersedes all prior understandings or agreements with respect to the subject matter.

13. Modification. This Agreement may not be altered, amended, modified or otherwise changed except by writing, duly executed by authorized representatives of Beazer and Time Oil.

14. Notices. Notices required or permitted to be given under the Agreement shall be sent via first class mail to the following addresses:

For Time Oil:
Richard Gordon
Time Oil Company
2737 W. Commodore Way
Seattle, Washington 98199

With copy to:
Patricia Dost
Schwabe, Williamson & Wyatt
1211 S.W. Fifth Avenue - Suite 1700
Portland, Oregon 97204-3795

For Beazer:
Jane Patarcity
Beazer East Inc.
436 Seventh Avenue
Pittsburgh, Pennsylvania 15219

With copy to:
Anthony Hopp
Wildman, Harrold, Allen & Dixon
225 West Wacker Drive
Chicago, Illinois 60606-1229

15. Warranty of Representation. Each party executing this Agreement represents that it has been represented by counsel of its own choosing regarding the preparation and negotiation of this Agreement and all the matters set forth herein and that each of them has read this Agreement and is fully aware of the contents thereof and its legal effect.

DRAFT
2-6-95

16. Arbitration.

a. All disputes arising under this Agreement shall be submitted to arbitration. If a dispute arises, the party desiring arbitration shall give written notice to the other party and in such notice shall appoint a disinterested person of recognized competence in the field involved as the arbitrator on its behalf. Within five (5) business days thereafter, the other party by written notice may appoint a second disinterested person of recognized competence in such field as the arbitrator on its behalf. The arbitrators thus appointed shall appoint a third disinterested person of recognized competence in such field, and such three arbitrators shall as promptly as possible, but not later than ten (10) business days later, determine such matter; provided, however, if the second arbitrator shall not have been appointed as described above, the first arbitrator shall proceed to determine the matter as the sole arbitrator.

b. The determination of the majority of the arbitrators, or the sole arbitrator, as the case may be, shall be conclusive upon the parties and judgment upon the same may be entered in any court having jurisdiction thereof. The arbitrators or the sole arbitrator, as the case may be, shall give written notice to the parties stating the determination, and shall furnish to each party a signed copy of such determination.

TIME OIL COMPANY	BEAZER EAST INC., f/k/a BEAZER MATERIALS AND SERVICES, INC. and KOPPERS COMPANY INC.
By: _____	By: _____
Title: _____	Title: _____
Date: _____	Date: _____

SCHWABE WILLIAMSON & WYATT
ATTORNEYS AT LAW

PACWEST CENTER, SUITES 1600-1950
1211 SOUTHWEST FIFTH AVENUE • PORTLAND, OREGON 97204-3795
TELEPHONE: 503 222-9981 • FAX: 503 796-2900 • TELEX: 4937535 SWK UI

PATRICIA M. DOST
DIRECT LINE: 503 796-2449

December 16, 1994

Anthony G. Hopp
Wildman, Harrold, Allen & Dixon
225 West Wacker Drive
Chicago, Illinois 60606-1229

Re: Time Oil Northwest Terminal
Our File No.: 89360/82295

Dear Tony:

Since we last spoke, our efforts to convince the Oregon Department of Environmental Quality that its RCRA program is not the most appropriate or expeditious manner of managing investigation and remediation of the Northwest Terminal have borne fruit. Recently, DEQ agreed to allow us to leave the RCRA program and enter its Voluntary Cleanup Program, which we hope will allow us much more flexibility in investigating the nature and extent of the pentachlorophenol contamination and in selecting and implementing a remedy. DEQ has not yet assigned us a project manager, and so the project remains on hold. DEQ has, however, promised to assign someone to us before the end of the year.

At the risk of being overly optimistic that this project will finally get off the ground, I am forwarding to you some draft terms and conditions to formalize Beazer's earlier agreement to provide Time Oil technical assistance at the Northwest Terminal. Please let me know what you think.

Very truly yours,

Patty M. Dost

PMD:smp
Enclosure
cc: Richard Gordon
Kevin Murphy

TOLS003091

(SWW1/89360/82295/PMD/584795.1)

BZTO104(e)039912

SCHWABE WILLIAMSON & WYATT
ATTORNEYS AT LAW

PACWEST CENTER, SUITES 1600-1950
1211 SOUTHWEST FIFTH AVENUE • PORTLAND, OREGON 97204-3795
TELEPHONE: 503 222-9981 • FAX: 503 796-2900 • TELEX: 4937535 SWK UI

PATRICIA M. DOST
DIRECT LINE: 503 796-2449

December 16, 1994

Anthony G. Hopp
Wildman, Harrold, Allen & Dixon
225 West Wacker Drive
Chicago, Illinois 60606-1229

Re: Time Oil Northwest Terminal
Our File No.: 89360/82295

Dear Tony:

Since we last spoke, our efforts to convince the Oregon Department of Environmental Quality that its RCRA program is not the most appropriate or expeditious manner of managing investigation and remediation of the Northwest Terminal have borne fruit. Recently, DEQ agreed to allow us to leave the RCRA program and enter its Voluntary Cleanup Program, which we hope will allow us much more flexibility in investigating the nature and extent of the pentachlorophenol contamination and in selecting and implementing a remedy. DEQ has not yet assigned us a project manager, and so the project remains on hold. DEQ has, however, promised to assign someone to us before the end of the year.

At the risk of being overly optimistic that this project will finally get off the ground, I am forwarding to you some draft terms and conditions to formalize Beazer's earlier agreement to provide Time Oil technical assistance at the Northwest Terminal. Please let me know what you think.

Very truly yours,

PMD

Patty M. Dost

PMD:smp
Enclosure
cc: Richard Gordon
Kevin Murphy

TOLS003092

10000

Pittsburgh, PA 15219
Telephone 412-227-2000

KOPPERS

December 21, 1988

Terrill Henderson, Esq.
Time Oil Company
2737 West Commodore Way
P.O. Box 24447
Terminal Station
Seattle, Washington 98124-0047

Re: Northwest Terminal

Dear Mr. Henderson:

This will confirm our conversation of last week in which I informed you that Koppers Company has reviewed your letter of September 19, 1988 and decided how to proceed with respect to the proposal you described.

In our past conversations and your letter of September 19, 1988 you indicated that on January 23, 1986 Koppers agreed to pay one-half of the costs for the cleanup and related work on the above property. After our conversation we reviewed our files, both in the Law Department and in our environmental subsidiary, in an effort to confirm that statement.

We were unable to find anything indicating an agreement as broad as the agreement you describe. We did, however, find a letter dated February 19, 1986 from Robert D. Abendroth of Time Oil which indicated that Koppers and Time had reached a more limited agreement. Mr. Abendroth's letter states:

> "During our January 23, 1986 meeting at your offices in Pittsburgh, you mentioned that Koppers would agree to pay one-half the cleanup costs incurred/committed to date and that further coordination between Koppers and Time would be appropriate for future commitments. Time concurs with this approach."

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TOLS003093

BZTO104(e)039914

Mr. Abendroth's letter convincingly evidences Time's understanding of this more limited agreement between Koppers and Time, and nothing in our file indicates that any Koppers' personnel took exception to Mr. Abendroth's characterization of the agreement.

It seems clear, then, that Koppers did not make a blanket agreement to share all costs of cleanup for the site. The agreement between Koppers and Time was that Koppers would share equally the cost of cleanup and related work which Time incurred or to which Time committed by February 19, 1986. Commitments for additional cost sharing were clearly deferred pending "further coordination" between Koppers and Time.

In light of this agreement to share past costs, Koppers will reimburse Time Oil for one-half of the investigation and cleanup costs referenced in your letter of September 19, 1988. I have requested that a check be issued to Time in the amount of $59,185.55.

With respect to the future costs, the same turnover in personnel which required first hand research into the details of any agreement between our companies now requires an explanation of why Koppers should agree to pay one-half of all the cleanup costs for the Northwest Terminal site. As I told you in our conversation, the current Koppers' management personnel responsible for such costs would like to meet with Time Oil personnel in order to hear Time Oil's views on this subject, and to discuss the issue generally. I will contact you following our next Environmental Claim Review Meeting in order to schedule a meeting between our companies to discuss "future commitments".

Several weeks ago I received a copy of a letter from Mr. Abendroth to Koppers Company's President, Frederick Moore. Mr. Abendroth stated that Koppers Company appeared to be ignoring Time's communications during the last year. Much has happened here at Koppers Company in the last year, including a lengthy takeover battle, a subsequent merger, a divestiture of business units representing almost one-half of the company, and reductions in staff. The level of activity and the turnover in personnel have made communications difficult. My expectation is that future events here at Koppers Company will allow for smoother communications.

10000

December 21, 1988
Terrill Henderson, Esq.
3.

(Ironically, Mr. Abendroth's letter also asserted that Koppers had entered into a blanket cost sharing agreement, an assertion contradicted by Mr. Abendroth's February 19, 1988 letter.)

Please feel free to call me if you have any questions or comments concerning the above.

Very truly yours,

William F. Giarla

William F. Giarla
412-227-2635

WFG:km

cc: R. Abendroth

10000

TOLS003095

BZTO104(e)039916

PHONE 285-2400
CABLE ADDRESS: TIMOIL

SEATTLE
TACOMA
PORTLAND
STOCKTON
RENO
RICHMOND
LOS ANGELES

TIME OIL COMPANY

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

SEATTLE, WASHINGTON 98199-1233
SEATTLE, WASHINGTON 98124-0447

January 13, 1989

William F. Giarla
Koppers Company, Inc.
436 Seventh Avenue
Pittsburgh, PA 15219

Re: Northwest Terminal

Dear Mr. Giarla:

Thank you for your letter of December 21, 1988. I look forward to hearing from you on the matter of setting up a meeting between Koppers and Time Oil management personnel to resolve the question of payment for the cleanup costs associated with storage and blending of Koppers Company's penta at our Portland facility. In fact, our facility in Portland may be an appropriate place for such a meeting.

As of this Friday we have not yet received Koppers check for $5[illegible].33 you referred to in your letter.

Thank you for your assistance and I look forward to hearing from you soon.

Very truly yours,

TIME OIL CO.

Terrill L. Henderson
Corporate Counsel

TLH:m

10000

0047C

TOLS003096

BZTO104(e)039917

PHONE 285-2400
CABLE ADDRESS. TIMOIL

SEATTLE
TACOMA
PORTLAND
STOCKTON
RENO
RICHMOND
LOS ANGELES

TIME OIL COMPANY

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

SEATTLE, WASHINGTON 98199-1233
SEATTLE, WASHINGTON 98124-0447

Emily Madden
Jill,
As per your request
see below.
Karen

January 13, 1989

William F. Giarla
Koppers Company, Inc.
436 Seventh Avenue
Pittsburgh, PA 15219

Re: Northwest Terminal

Dear Mr. Giarla:

Thank you for your letter of December 21, 1988. I look forward to hearing from you on the matter of setting up a meeting between Koppers and Time Oil management personnel to resolve the question of payment for the cleanup costs associated with storage and blending of Koppers Company's penta at our Portland facility. In fact, our facility in Portland may be an appropriate place for such a meeting.

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Thank you for your assistance and I look forward to hearing from you soon.

Very truly yours,

TIME OIL CO.

Terrill L. Henderson
Corporate Counsel

5/18/93
Document was paid
Beazer check #0607809
dated 1-11-89
Amt $ 59,185.55
*Attached copies of cancelled check
TLH:m
AR - A/P Dept

10000

0047C

TOLS003097

BZTO104(e)039918

BEAZER MATERIALS AND SERVICES, INC./KOPPERS
PITTSBURGH, Pa. 15219

80-289
815

NO. 0607809

PAY
FIFTY NINE THOUSAND ONE HUNDRED EIGHTY FIVE AND 55/100 ONLY

To the order of

Date JANUARY 11 1989

Pay this amount $59185.55

TIME OIL CO
BOX 24447 TERM ANNEX
SEATTLE WA 98124-0447

CENTERRE BANK
ROLLA, MD

408501916 01-[redacted]1204

AD-396 9/88 ⑈0607809⑈ ⑆081502899⑆ 09 9789 1⑈ Dean McAllister 918555⑈

JA '89
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SPBW 08-10-00 TLE WASH. SECPAC BK WA
408501916 01-19-89

JA '89 24

0792 1729

OIL CO
TAIL
1770101204

[redacted]

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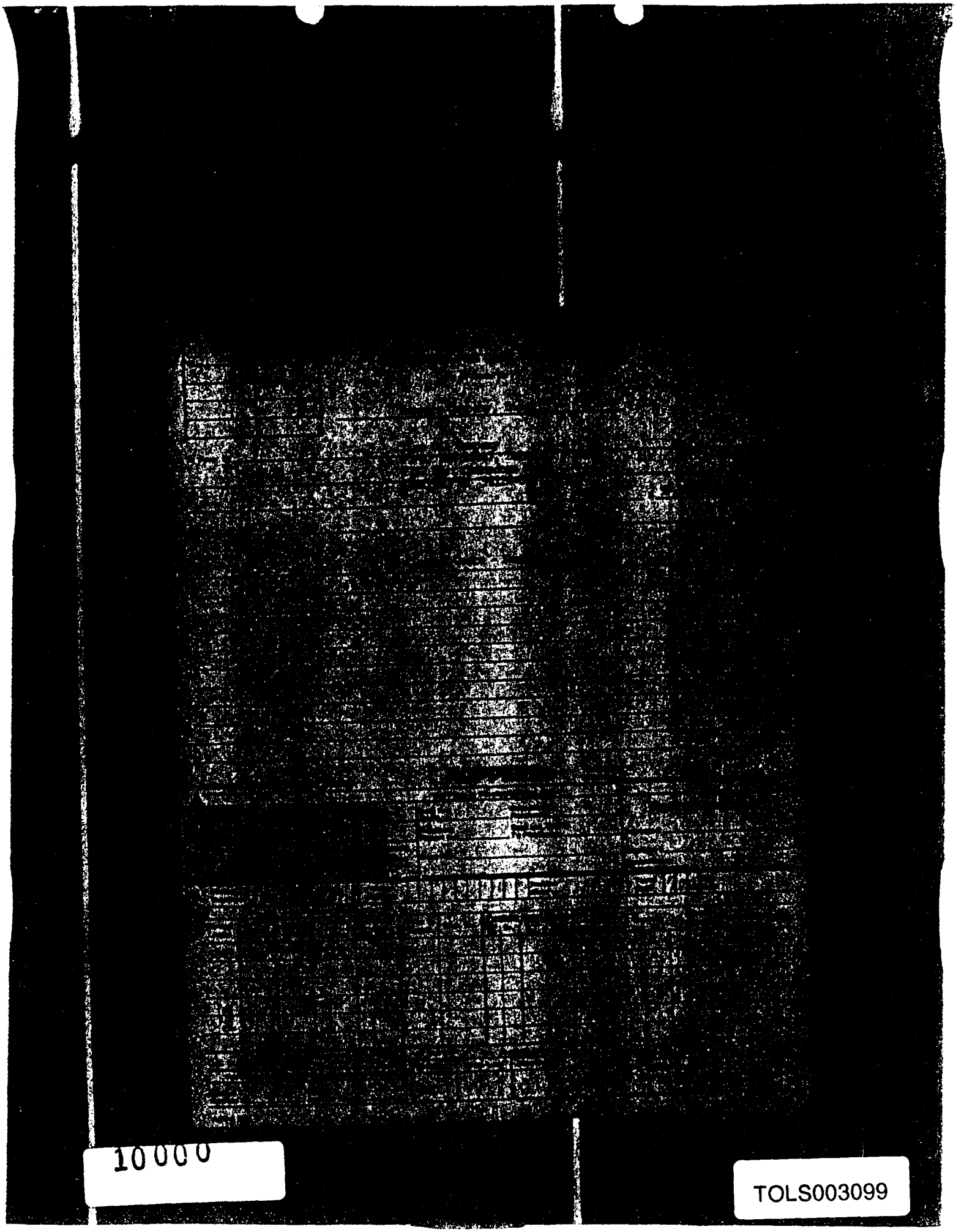
TOLS003098

BZTO104(e)039919


10000
TOLS003099

WILDMAN, HARROLD, ALLEN & DIXON
225 WEST WACKER DRIVE
CHICAGO, ILLINOIS 60606-1229
(312) 201-2000
FAX: (312) 201-2555

ROBERT L. SHUFTAN
(312) 201-2505

COPY

April 12, 1993

VIA FACSIMILE

Jay T. Waldron, Esq.
SCHWABE, WILLIAMSON & WYATT
Pacwest Center
1211 S.W. Fifth Avenue
Portland, Oregon 97204-3795

Re: Time Oil Company

Dear Mr. Waldron:

This letter will follow my telephone conversation with your office of earlier today. Your April 5, 1993 letter was received by certified mail at Koppers Industries, Inc. ("KII") in Pittsburgh. Since KII is a company which was not even in existence at the time of Time Oil's relationship with Koppers Company, your letter was forwarded for response by Beazer East, Inc., formerly known as Koppers Company, Inc. Bill Giarla is, in fact, in-house counsel at Beazer.

This firm serves as counsel for Beazer East, Inc. I have been asked to respond to your inquiry. I understand that you are out of the office today. Rather than contacting either Mr. Wagner or Mr. Sweeney, please call me so that we can discuss this matter further.

Thank you very much.

Very truly yours,

WILDMAN, HARROLD, ALLEN & DIXON

Robert L. Shuftan

Robert L. Shuftan

RLS:rrn

bcc: Jill M. Blundon, Esq. ✓

10000

SCHWABE WILLIAMSON & WYATT
ATTORNEYS AT LAW

PACWEST CENTER, SUITES 1600-1950
1211 SOUTHWEST FIFTH AVENUE • PORTLAND, OREGON 97204-3795
TELEPHONE: 503 222-9981 • FAX: 503 796-2900 • TELEX: 4937535 SWK UI

PATRICIA M. DOST
DIRECT LINE: 503 796-2449

APR 0 8 1993

April 5, 1993

CERTIFIED - RETURN RECEIPT REQUESTED

Mr. Robert K. Wagner
Mr. Clayton Sweeney
Koppers Company
436 - 7th Avenue - Koppers Building
Pittsburgh, Pennsylvania 15219

Re: Time Oil Company, Northwest Terminal
12005 N. Burgard Road, Portland, Oregon
Our File No. 89360/82295

Dear Messrs. Wagner and Sweeney:

On February 25, 1993 I wrote to Mr. William F. Giarla requesting Koppers' participation in remediation of Time Oil Company's Northwest Terminal facility. I have since tried to contact Mr. Giarla, but it appears that he is no longer employed by Koppers.

For your convenience, I enclose a copy of my February 25, 1993 letter. Please review the letter, and I will call you Monday, April 12, 1993 to discuss the amicable resolution of this matter.

Very truly yours,

Jay T. Waldron

JTW:smp
Enclosure
cc: Mr. Kevin Murphy
Mr. Richard Gordon
Ms. Patty Dost

TOLS003101

10000

(89360/82295/PMD/144812.1)

BZTO104(e)039922

SCHWABE WILLIAMSON & WYATT
ATTORNEYS AT LAW
PACWEST CENTER, SUITES 1900-1950
1211 SOUTHWEST FIFTH AVENUE • PORTLAND, OREGON 97204-3795
TELEPHONE: 503 222-9981 • FAX: 503 796-2900 • TELEX: 4937535 SWK UT
A CENTURY IN THE NORTHWEST 1892 1992
JAY T. WALDRON
DIRECT LINE: 503 796-2945

February 25, 1993

Mr. William F. Giarla
The Koppers Company
c/o Beazer Materials & Services, Inc.
436 Seventh Avenue
Pittsburgh, Pennsylvania 15219

Re: Time Oil Co., Northwest Terminal
12005 North Burgard Road, Portland, Oregon

Dear Mr. Giarla:

On July 26, 1990, Richard Gordon, Time Oil Co.'s corporate counsel, wrote to you requesting Koppers' participation in Time Oil's remediation of the Northwest Terminal in compliance with federal and state environmental laws. Koppers declined to respond to this request.

Recently, the Oregon Department of Environmental Quality (DEQ) notified Time Oil that it intends to regulate the Northwest Terminal as a hazardous waste management facility subject to the federal Resource Conservation and Recovery Act (RCRA), 42 U.S.C. § 6901 et seq., and Oregon's hazardous waste treatment, storage and disposal laws, ORS 466.005 et seq. Time Oil is beginning negotiations with the DEQ to determine specific regulatory requirements. Time Oil again invites Koppers to participate in these negotiations and in remediation of the Northwest Terminal.

As you will recall, Koppers contracted with Time Oil from 1967 through 1982 for use of Time Oil's facility and employees to formulate pentachlorophenol-containing wood preservatives for sale to Koppers' customers in the Northwest. Koppers' contract with Time Oil provided that Koppers would retain ownership of all materials it supplied to Time Oil and expressly contemplated that a percentage of these materials would be lost through "normal spillage." Koppers ultimately ceased operations at the Northwest Terminal and removed its equipment and chemicals from the terminal in late 1983.

TOLS003102

(89360/82295/PMD/132750.1)

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BZTO104(e)039923

By the time Koppers and Time Oil terminated their contract, it was apparent that soil at the Northwest Terminal had become contaminated through the pentachlorophenol formulating operations. Accordingly, on October 5, 1983, representatives of Koppers and Time Oil met at the Northwest Terminal and agreed to share the cost to clean up the contamination. Koppers has honored this agreement in the past, reimbursing Time Oil $59,185.55 of its cleanup costs in 1989.

Koppers, as a former operator of the Northwest Terminal, is responsible for these cleanup costs under the federal Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), 42 U.S.C.A. § 9601 et seq., and Oregon's Hazardous Substance Removal and Remedial Action statute, ORS 465.200 et seq. As you are aware, a court would also find that Koppers, under the terms of its contract with Time Oil, arranged for the disposal of pentachlorophenol and associated hazardous substances at the Northwest Terminal. See, Jones-Hamilton v. Beazer Materials & Services, 973 F.2d 688 (9th Cir. 1992). Koppers' obligation to contribute to remediation of the pentachlorophenol contamination at the Northwest Terminal is thus statutory as well as contractual.

Thank you for giving this matter your immediate attention. Time Oil must act promptly at the Northwest Terminal to comply with applicable environmental laws. Time Oil is now in the process of selecting an environmental consultant for this project and welcomes Koppers' assistance in making its selection.

I will call you on March 4, 1993 to discuss Koppers' participation in remediation of the Northwest Terminal and the amicable resolution of this matter.

Very truly yours,

Jay T. Waldron

JTW:bc

cc: Kevin Murphy, Time Oil Co.
Richard Gordon, Time Oil Co.
Patricia Dost, Schwabe, Williamson & Wyatt

Billee for Initiatagram

SCHWABE WILLIAMSON & WYATT
ATTORNEYS AT LAW

PACWEST CENTER, SUITES 1600-1950
1211 SOUTHWEST FIFTH AVENUE • PORTLAND, OREGON 97204-3795
TELEPHONE: 503 222-9981 • FAX: 503 796-2900 • TELEX: 4937535 SWK UI

JAY T. WALDRON
DIRECT LINE: 503 796-2945

MAR 5 1993

February 25, 1993

Mr. William F. Giarla
The Koppers Company
c/o Beazer Materials & Services, Inc.
436 Seventh Avenue
Pittsburgh, Pennsylvania 15219

Re: Time Oil Co., Northwest Terminal
12005 North Burgard Road, Portland, Oregon

Dear Mr. Giarla:

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TOLS003104

(89360/82295/PMD/132750.1)

10000

BZTO104(e)039925

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I will call you on March 4, 1993 to discuss Koppers' participation in remediation of the Northwest Terminal and the amicable resolution of this matter.

Very truly yours,

Jay T. Waldron

JTW:bc

cc: Kevin Murphy, Time Oil Co.
Richard Gordon, Time Oil Co.
Patricia Dost, Schwabe, Williamson & Wyatt

TOLS003105

10000

(89360/82295/PMD/132750.1)

BZTO104(e)039926

M E M O R A N D U M

August 27,1981

TO: R.D. Abendroth Seattle

FROM: John Denham Time Safety Man Seattle

SUBJECT: WOOD TREATING (KOPPERS COMPANY)

Reference last sentence of my August 17,1981 memo, copy attached.

My August 21,1981 inspection of this operation revealed the following deficiencies:

A. TANK FARM OUTSIDE WAREHOUSE

1. Tanks 20001 and 13001 are too close to warehouse. (relocation needed to distance at least five feet from building)

2. Tanks are rusted in many places. (cleaning and painting white needed)

3. No stairways, railings or walkways exist on horizontal tanks 3010, 6008, 8005, 8006 and 8007. (installation needed)

4. No ladder cages exist on tanks 20002, 20003, and 38009. Walkways and railings are damaged, missing or improper. (installation needed)

5. Several heating coils in 1400 gallon heating tank under platform do not work. (replacement needed)

6. Deck atop 1400 gallon heating tank is damaged, unsafe to walk on and permits vapors from this volatile mixture to readily escape into working area. (new metal deck needed)

7. No suction pipelines or manifold exist at rail car siding for unloading purposes. (installation needed)

8. No manifold system exists on incoming product lines for receipt, blending or storage purposes. (manifold needed)

9. Valves on tanks and lines are not maintained at all. (repair and testing or replacement needed)

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TOLS003106

BZTO104(e)039927

10. Valves, lines, pumps, hoses and tanks (in some places) are thickly covered with product. (steam cleaning badly needed)

11. Several valves in system are not chained and locked. (installation needed)

12. Valve at end of isolated line to tank 38009 is leaking product onto ground. (replacement valve needed)

13. Pipeline supports are improper and inadequate. (replacement needed)

14. Pipelines are not painted or identified as to product content. (maintenance needed)

15. Product identification is not on all tanks. (signs needed)

16. Ground area at end of pipelines is saturated with product about four inches deep. (dirt removal and replacement needed)

17. Pump journal cover is not secured to pump. (four sheetmetal screws needed)

18. Cargo hoses are not marked or recorded to show condition, manufacturer, dates inspected or pressure tested. Some are damaged. (repair and recording needed)

19. Weeds are prevalent in quantity within diked compound. Good fire hazard. (weed removal needed)

20. Rail car siding wheel bumpers are not fastened to track. (repair needed)

21. Fire extinguisher on platform by 1400 gallon heating tank is not tagged, has not been inspected for operational capability and is fixed so it can not work, even if needed. (replacement system needed)

22. No spill control system exists at rail car rack or within diked area. One was recommended in 1975, copy attached, but apparently not approved by management. (installation needed)

B. INSIDE WAREHOUSE

1. Operation is not isolated. Fumes generated during process can readily enter lube oil warehousing area and overcome any individual not wearing appropriate respiratory equipment. (wall needed in warehouse to isolate operation)

BZTO104(e)039928

2. Ventilation inadequate even with doors open. (installation of three - four foot sucker fans needed - one in south wall, one in east wall and one over 1400 gallon heating tank)

3. No spill control system exists in building. Now liquid can run all over area and out of doors at will. (floor sloping and drain installation needed)

4. Four ceiling joists are damaged severely from fork lift operation. (repair and/or replacement beams needed)

5. No clearance signs exist on beams to alert fork lift operators. (signs needed)

6. Lighting is inadequate for the work. Several bulbs are out but even with all lights on, only one candle power was recorded during middle of the day bright daylight. (additional lighting to a minimum of five foot candles needed. An assist to this would be to paint ceiling white)

7. Work area is caked with product and very very dirty. (steam cleaning needed badly)

8. Small floor fan thickly covered with product. Fire hazard. (cleaning needed)

9. No emergency deluge shower exists. Material handled can be injurious. (shower would help. Eyewash should be included on such a permanent hookup)

Nearly all of these deficiencies have been reported previously.

JPD/mm

Attachments

BZTO104(e)039929

SCHWABE WILLIAMSON & WYATT
ATTORNEYS AT LAW

PACWEST CENTER, SUITES 1800-1950
1211 SOUTHWEST FIFTH AVENUE • PORTLAND, OREGON 97204-3795
TELEPHONE: 503 222-9981 • FAX: 503 796-2900 • TELEX: 4937535 SWK UI

JAY T. WALDRON
DIRECT LINE: 503 796-2845

September 21, 1993

Robert L. Shuftan
Wildman, Harrold, Allen & Dixon
225 West Wacker Drive
Chicago, Illinois 60606-1229

Re: Time Oil Company
Northwest Terminal
Our File No. 89360/82295

Dear Mr. Shuftan:

Enclosed please find a copy of a Site Characteristics Report we recently submitted to the Oregon Department of Environmental Quality at the agency's request. We are in the process of preparing a draft RCRA facility investigation work plan for submission to DEQ later this month.

I will contact you next week after you have had the opportunity to review this document to discuss Koppers Company's participation in the investigation and remediation of the Northwest Terminal.

Very truly yours,

Jay T. Waldron

JTW:smp
Enclosure
cc: Richard Gordon
Kevin Murphy
Patty Dost

TOLS003109

10000

(SWW1/89360/82295/PMD/168634.1)

BZTO104(e)039930

c: RC Hamilton ✓
(1/30/89)

SC-102

PHONE 285-2400
CABLE ADDRESS: TIMOIL
(FAX) 206-283-8036

SEATTLE
TACOMA
PORTLAND
STOCKTON
RENO
RICHMOND
LOS ANGELES

TIME
PRODUCTS TIME TESTED
TIME TO ONE IT'S TIME

TIME OIL COMPANY

2737 WEST COMMODORE WAY
P.O. BOX 24447, TERMINAL STATION
SEATTLE, WASHINGTON 98199-1233
SEATTLE, WASHINGTON 98124-0447

JAN 31 1989
KOPPERS COMPANY, INC.
Legal Dept.

January 27, 1989

William F. Giarla
Koppers Company, Inc.
436 Seventh Avenue
Pittsburgh, PA 15219

Re: Meeting - Portland, Oregon
March 1, 1989

Dear Bill:

This is to confirm our discussion yesterday in which we agreed that March 1, 1989 would be an agreeable date to meet at Time Oil Co.'s facility at 12005 North Burgard, Portland, Oregon. The purpose of the meeting to be for us to review the remedial measures that have been and will be taken at the facility in order to remove the pentachlorophenol in the soil surrounding the tanks that had been used to store Koppers' products and to resolve the division of responsibility for the costs being incurred in this cleanup.

Please let me know what time would be most convenient for you to meet. We look forward to meeting you and working with Koppers to resolve this matter in a manner that will be fair to both companies.

Very truly yours,

TIME OIL CO.

Terrill L. Henderson

Terrill L. Henderson
Corporate Counsel

TLH:mw

cc: Robert D. Abendroth
Fred Proby

10000

0063C

TOLS003110

BZTO104(e)039931

#86-102

PHONE 285-2400
CABLE ADDRESS: TIMOIL

SEATTLE
TACOMA
PORTLAND
STOCKTON
RENO
RICHMOND
LOS ANGELES

TIME
PRODUCTS TIME TESTED
TEN TO ONE IT'S TIME

TIME OIL COMPANY

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

SEATTLE, WASHINGTON 98199-1233
SEATTLE, WASHINGTON 98124-0447

Emily Marsh

January 13, 1989

William F. Giarla
Koppers Company, Inc.
436 Seventh Avenue
Pittsburgh, PA 15219

Re: Northwest Terminal

Dear Mr. Giarla:

Thank you for your letter of December 21, 1988. I look forward to hearing from you on the matter of setting up a meeting between Koppers and Time Oil management personnel to resolve the question of payment for the cleanup costs associated with storage and blending of Koppers Company's penta at our Portland facility. In fact, our facility in Portland may be an appropriate place for such a meeting.

As of this Friday we have not yet received Koppers check for $59,185.55 you referred to in your letter.

Thank you for your assistance and I look forward to hearing from you soon.

Very truly yours,

TIME OIL CO.

Terrill L. Henderson
Corporate Counsel

TLH:m

10000

0047C

TOLS003111

BZTO104(e)039932

86-119 A

Koppers Company, Inc.
436 Seventh Avenue
Pittsburgh, PA 15219
Telephone 412-227-2000

KOPPERS

December 21, 1988

Terrill Henderson, Esq.
Time Oil Company
2737 West Commodore Way
P.O. Box 24447
Terminal Station
Seattle, Washington 98124-0047

Re: ~~Northwest~~ Terminal Time Oil

Dear Mr. Henderson:

This will confirm our conversation of last week in which I informed you that Koppers Company has reviewed your letter of September 19, 1988 and decided how to proceed with respect to the proposal you described.

In our past conversations and your letter of September 19, 1988 you indicated that on January 23, 1986 Koppers agreed to pay one-half of the costs for the cleanup and related work on the above property. After our conversation we reviewed our files, both in the Law Department and in our environmental subsidiary, in an effort to confirm that statement.

We were unable to find anything indicating an agreement as broad as the agreement you describe. We did, however, find a letter dated February 19, 1986 from Robert D. Abendroth of Time Oil which indicated that Koppers and Time had reached a more limited agreement. Mr. Abendroth's letter states:

> "During our January 23, 1986 meeting at your offices in Pittsburgh, you mentioned that Koppers would agree to pay one-half the cleanup costs incurred/committed to date and that further coordination between Koppers and Time would be appropriate for future commitments. Time concurs with this approach."

TOLS003112

cc: 7-28
Bob Shifton -
include
Bill's note

10000

BZTO104(e)039933

Mr. Abendroth's letter convincingly evidences Time's understanding of this more limited agreement between Koppers and Time, and nothing in our file indicates that any Koppers' personnel took exception to Mr. Abendroth's characterization of the agreement.

It seems clear, then, that Koppers did not make a blanket agreement to share all costs of cleanup for the site. The agreement between Koppers and Time was that Koppers would share equally the cost of cleanup and related work which Time incurred or to which Time committed by February 19, 1986. Commitments for additional cost sharing were clearly deferred pending "further coordination" between Koppers and Time.

In light of this agreement to share past costs, Koppers will reimburse Time Oil for one-half of the investigation and cleanup costs referenced in your letter of September 19, 1988. I have requested that a check be issued to Time in the amount of $59,185.55.

With respect to the future costs, the same turnover in personnel which required first hand research into the details of any agreement between our companies now requires an explanation of why Koppers should agree to pay one-half of all the cleanup costs for the Northwest Terminal site. As I told you in our conversation, the current Koppers' management personnel responsible for such costs would like to meet with Time Oil personnel in order to hear Time Oil's views on this subject, and to discuss the issue generally. I will contact you following our next Environmental Claim Review Meeting in order to schedule a meeting between our companies to discuss "future commitments".

Several weeks ago I received a copy of a letter from Mr. Abendroth to Koppers Company's President, Frederick Moore. Mr. Abendroth stated that Koppers Company appeared to be ignoring Time's communications during the last year. Much has happened here at Koppers Company in the last year, including a lengthy takeover battle, a subsequent merger, a divestiture of business units representing almost one-half of the company, and reductions in staff. The level of activity and the turnover in personnel have made communications difficult. My expectation is that future events here at Koppers Company will allow for smoother communications.

(Ironically, Mr. Abendroth's letter also asserted that Koppers had entered into a blanket cost sharing agreement, an assertion contradicted by Mr. Abendroth's February 19, 1988 letter.)

Please feel free to call me if you have any questions or comments concerning the above.

Very truly yours,

William F. Giarla

William F. Giarla
412-227-2635

WFG:km

cc: R. Abendroth

10000

Koppers Company, Inc.
436 Seventh Avenue
Pittsburgh, PA 15219
Telephone 412-227-2000

86-119

KOPPERS

January 13, 1989

Mr. Terrill L. Henderson
Corporate Counsel
Time Oil Company
2737 West Commodore Way
Seattle, WA 98199-1233

Re: Northwest Terminal Property Time Oil

Dear Terry:

Enclosed please find a check from Koppers Company in the amount of $59,185.55. This represents Koppers' share of the costs incurred through September 19, 1988 for the investigation and cleanup of the above site.

I look forward to talking with you soon concerning the scheduling of a meeting to discuss the allocation of responsibility for the remaining work Time Oil plans for the property.

Very truly yours,

Bill Giarla

William F. Giarla
412-227-2635

Enclosure

10000

TOLS003115

BZTO104(e)039936

Beazer Materials and Services, Inc./Koppers-Pittsburgh, PA 15219

Vendor No.	Div.	Our Audit No.	Your Invoice No.	Inv. Date Mo.	Inv. Date Day	Invoice Amt.	Discount	Net Amt. Payable
125619011	100	10090100280		01	09	59185.55	0.00	59185.55

Detach Before Depositing

BEAZER MATERIALS AND SERVICES, INC./KOPPERS
PITTSBURGH, Pa. 15219

80-289
815

No. 0607809

PAY
FIFTY NINE THOUSAND ONE HUNDRED EIGHTY FIVE AND 55/100 ONLY

To the order of

Date JANUARY 11 1989

Pay this amount $59185.55

TIME OIL CO
BOX 24447 TERM: ANNEX
SEATTLE WA 98124-0447

CENTERRE BANK
ROLLA, MD

AD-396 9/88

⑈0607809⑈ ⑆081502899⑆ 09 9789 ⑈ Dean McAllister

10000

TOLS003116

PHONE 285-2400
CABLE ADDRESS: TIMOIL
(FAX) 206-283-8036

SEATTLE
TACOMA
PORTLAND
STOCKTON
RENO
RICHMOND
LOS ANGELES

TIME
PRODUCTS TIME TESTED

TEN TO ONE IT'S TIME

TIME OIL COMPANY

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

SEATTLE, WASHINGTON 98199-1233
SEATTLE, WASHINGTON 98124-0447

September 19, 1988

Mr. Bill Giarla
Koppers Company, Inc.
Koppers Building, Room 750
Pittsburg, Pennsylvania 15219

Dear Mr. Giarla:

On July 27, 1988 you and I discussed the matter of the costs incurred in the cleanup of Koppers' pentachlorophenol at Time Oil's Northwest Terminal in Portland. Since that time, Time Oil has been searching for an economic and effective method of disposing of the problem. In that regard, enclosed is a preliminary work plan prepared by Ecova Corporation for the cleanup of the pentacholorophenol contaminated soils. Although Time Oil is still in the process of evaluating the merits of the work plan, we anticipate following it subject to approval by the Oregon Department of Environmental Quality.

The cost of the proposed cleanup and related work is estimated at $400,000. Pursuant to the January 23, 1986 agreement between Koppers and Time Oil, Kopper's share would be $200,000.

As a reminder, Time Oil has spent $118,371.10 to date on investigation and cleanup of our mutual problem. Of this we have invoiced you $54,780.28 by invoices dated 3/6/86 and 4/17/87 (copies enclosed). We have not yet received payment for those invoices. Also enclosed is our invoice dated 9/21/88 for $4,405.27, which brings Kopper's total share of moneys spent to date to $59,185.55.

Very truly yours,

TIME OIL CO.

Terrill L. Henderson

Terrill L. Henderson
Corporate Counsel

Just
Please find me a copy of this thanks

TLH:pjv

Enclosures

0297C

10000

TOLS003117

BZTO104(e)039938

TI E OIL CO.

INVOICE 091868

P.O.BOX 24447 TERM. STATION - SEATTLE WA 98124-04[illegible]
2737 WEST COMMODORE WAY - SEATTLE WA 98199-1233
PHONE (206) 285-2400

DATE 03/06/86
REF. 03-03028 JKJ

CUSTOMER #: 03/05505623

ACCOUNT:
KOPPERS COMPANY INC
ATTN: DONALD F. MARION
KOPPERS BUILDING ROOM 750
PITTSBURGH PA 15219

657 60 123 27831.21
120 9 . 14250.00

TO CHARGE YOU FOR 1/2 OF THE FOLLOWING PER MUTUAL AGREEMENT IN REFERENCE TO CLEAN UP COSTS AT 12005 N. BURGARD RD., PORTLAND, OREGON.

EXPENDITURES

4/26/85 CHEM-SECURITY SYSTEMS (LABORATORY ANALYSIS OF SOIL SAMPLES)	150.00
7/10/85 NORTHWEST VACUUM TRUCK SERVICE (RELOCATING 242.76 TONS OF SOIL TO ARLINGTON)	9,000.00
7/29/85 CHEM-SECURITY SYSTEMS (RECEIVING 243.30 TONS OF SOIL AT ARLINGTON)	27,270.88
8/8/85 ENVIRONMENTAL EMERGENCY SERVICES (OBTAIN AND ANALYZE 3 COMPOSITE SAMPLES)	
12/31/85 ENVIRONMENTAL EMERGENCY SERVICES (PRIMARY SAMPLING AND ANALYSIS PLUS REPORT)	18,741.55
	55,662.43

COMMITTMENTS

DEQ PER OAR 240-102-065	3,500.00
*RIEDEL ENVIRONMENTAL SERVICES (ADMENDMENT 2)	25,000.00+
	84,162.43

50% = 42,081.21

*NAME CHANGE FROM ENVIRONMENTAL EMERGENCY SERVICES

INVOICE TOTAL $42,081.21

10000

Encl. 1

TOLS003118

ACCOUNTS RECEIVA

TIME OIL CO.
BOX 24447 TERM. STATION SEATTLE WA 98124-0447
2737 WEST COMMODORE WAY SEATTLE WA 98199-1233
PHONE (206) 285-2400

DEBIT MEMO 020190

DATE 04/17/87
REF. 04-03131 FER

CUSTOMER #: 03/05505623

ACCOUNT: 120 9 12699.07

KOPPERS COMPANY
Koppers Building - Room 750
Pittsburgh, PA 15219

ATTN: JAY STEBBINS

- -

THIS IS AN ADDITION TO INVOICE # 091363 DATED MARCH 6, 1986 FOR $ 42,081.21 TO CHARGE YOU FOR HALF OF EXPENDITURES, PER MUTUTAL AGREEMENT, IN REFERENCE TO CLEAN UP COSTS AT 12005 NORTH BURGARD PORTLAND, OREGON. 12,699.07

COPIES OF THE ORIGINAL INVOICE (#091363, 3/6/86, $42081.21) AND THE UPDATED CHARGES FOR $ 54730.23 ARE ATTACHED.

INVOICE TOTAL $12,699.07

10000

TOLS003119

ORIGINAL

BZTO104(e)039940

TIME OIL C

O. BOX 24447 TERM. STATION SEATTLE WA 98124-0447
2737 WEST COMMODORE WAY - SEATTLE WA 98199-1233
PHONE (206) 285-2400

INVOICE 056677

DATE 09/21/88
REF. 09-03116 CJC

CUSTOMER #: 03/05505623

ACCOUNT:
KOPPERS COMPANY INC
KOPPERS BUILDING ROOM 750
ATTN: BILL GIARLA
PITTSBURGH PA 15219

657 60 123 4405.27

TO CHARGE YOU FOR 1/2 THE FOLLOWING PWR MUTUAL AGREEMENT IN REFERENCE TO CLEAN UP COSTS AT 12005 N BURGARD RD, PORTLAND OREGON

EXPENDITURES

11/9/87	SRH-COLLECT AND ANALIZE WATER SAMPLES	2810.53	
8/31/88	ECOVA-PREPARE PENTA CLEANUP WORK PLAN	6000.00	
		8810.53	
	50%=	4405.27	4,405.27

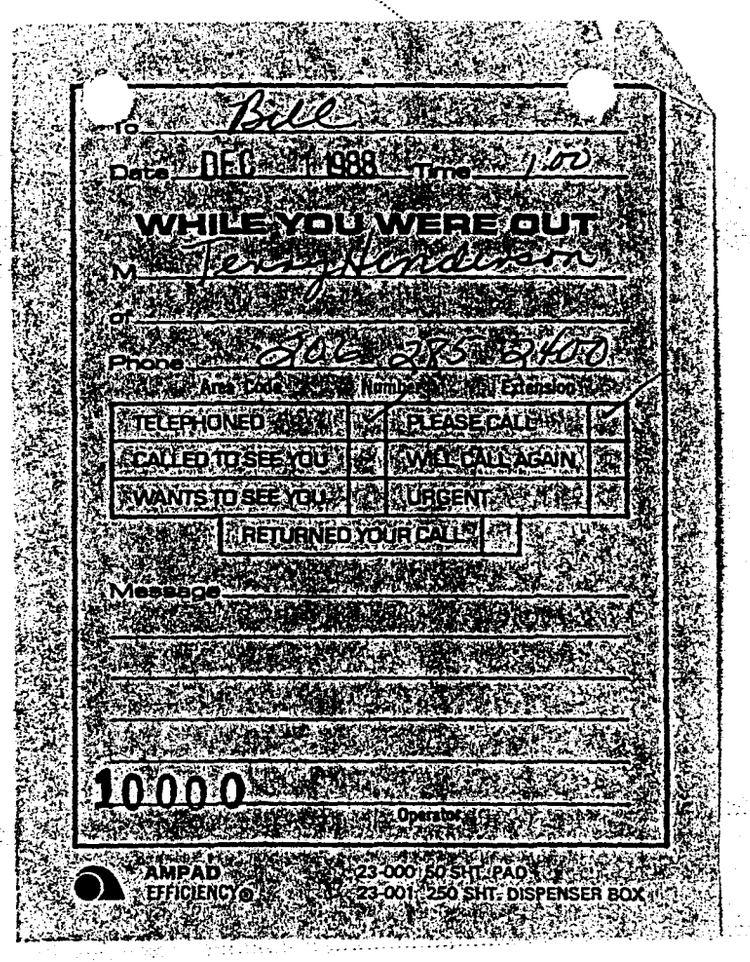
INVOICE TOTAL $4,405.27

10000

TOLS003120

ORIGINAL

EE REVERSE SIDE FOR GENERAL TERMS AND CONDITIONS
P 190 REV. 8/82



To Bill

Date DEC 1988 Time 1:00

WHILE YOU WERE OUT

M Terry Henderson

of

Phone 202 285 3400

Area Code Number Extension

TELEPHONED		PLEASE CALL	
CALLED TO SEE YOU		WILL CALL AGAIN	
WANTS TO SEE YOU		URGENT	
RETURNED YOUR CALL			

Message

10000

Operator

AMPAD EFFICIENCY® 23-000 50 SHT. PAD
23-001 250 SHT. DISPENSER BOX

TOLS003121

SEATTLE
TACOMA
PORTLAND
STOCKTON
RENO
RICHMOND
LOS ANGELES

PHONE 285-2400
CABLE ADDRESS: TIMOIL
(FAX)206-283-8036

TIME OIL COMPANY

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

SEATTLE, WASHINGTON 98199-1233
SEATTLE, WASHINGTON 98124-0447

November 17, 1988

Mr. Frederick C. Moore
President
Koppers Company, Inc.
436 Seventh Avenue
Pittsburgh, Pennsylvania 15219

Dear Mr. Moore:

I am writing to you in hopes of resolving a situation that exists between Time Oil Co. and Koppers before it develops into a needless and costly dispute.

Briefly, the situation arises out of an agreement dated March 1, 1967 under which Time Oil agreed to provide certain labor and services to store and blend wood preservatives containing pentachloraphenol belonging to Koppers Company at our Portland, Oregon terminal. After the agreement was terminated in 1982 it was discovered that the ground at the terminal contains substantial quantities of the product belonging to Koppers. As you know pentachloraphenol is a hazardous substance under federal and state law and gives rise to authority by the federal and state governments to compel cleanup of the product by responsible parties including the owner of the product.

Since the problem first materialized Time Oil has been in contact with Koppers Company and initially there appeared to be willingness on the part of Koppers to work with Time to resolve this problem as inexpensively as possible and without exciting the interest of the federal and state authorities. To that end we met with Koppers personnel on January 23, 1986 in Pittsburgh where an agreement in principle was reached under which the cost of resolving this problem would be shared on a fifty fifty basis.

It is not my purpose here to detail the efforts that Time Oil has undertaken to resolve this environmental problem nor the efforts it has taken to obtain the continued cooperation of Koppers. Suffice it to say here that within the last year and half Koppers Company appears to be simply ignoring the problem and our communications.

0297C

10000

TOLS003122

BZTO104(e)039943

I would appreciate anything you might be able to do to advise us as to how this matter may be resolved. My telephone number is (206) 285-2400.

Very truly yours,

TIME OIL CO.

Robert D. Abendroth
Vice President

RDA:TLH:pjv

cc Mr. Bill Giarla
Koppers Company, Inc.
Koppers Building, Room 750
Pittsburgh, Pennsylvania 15219

10000

0297C

SEATTLE
TACOMA
PORTLAND
STOCKTON
RENO
RICHMOND
LOS ANGELES

PHONE 285-2400
CABLE ADDRESS: TIMOIL
(FAX) 206-283-8036

TIME OIL COMPANY

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

SEATTLE, WASHINGTON 98199-1233
SEATTLE, WASHINGTON 98124-0447

11/30 called T. Henderson wcb
12/1 Called T. Henderson wcb
12/2 called T. Henderson wcb
12/8 called T. Henderson wcb

November 17, 1988

Mr. Frederick C. Moore
President
Koppers Company, Inc.
436 Seventh Avenue
Pittsburgh, Pennsylvania 15219

Dear Mr. Moore:

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It is not my purpose here to detail the efforts that Time Oil has undertaken to resolve this environmental problem nor the efforts it has taken to obtain the continued cooperation of Koppers. Suffice it to say here that within the last year and half Koppers Company appears to be simply ignoring the problem and our communications.

0297C

10000

TOLS003124

BZTO104(e)039945

I would appreciate anything you might be able to do to advise us as to how this matter may be resolved. My telephone number is (206) 285-2400.

Very truly yours,

TIME OIL CO.

Robert D. Abendroth
Vice President

RDA:TLH:pjv

cc Mr. Bill Giarla
Koppers Company, Inc.
Koppers Building, Room 750
Pittsburgh, Pennsylvania 15219

10000

0297C

TOLS003125

BZTO104(e)039946

TIME OIL CO.

INVOICE 091868

P.O.BOX 24447 TERM. STATION - SEATTLE WA 98124-0447
2737 WEST COMMODORE WAY - SEATTLE WA 98199-1233
PHONE (206) 285-2400

DATE 03/06/86
REF. 03-03028 JKJ

CUSTOMER #: 03/05505623

ACCOUNT:
KOPPERS COMPANY INC
ATTN: DONALD F. MARION
KOPPERS BUILDING ROOM 750
PITTSBURGH PA 15219

657 60 123 27831.21
120 9 14250.00

TO CHARGE YOU FOR 1/2 OF THE FOLLOWING PER MUTUAL AGREEMENT IN REFERENCE TO CLEAN UP COSTS AT 12005 N. BURGARD RD., PORTLAND, OREGON.

EXPENDITURES

4/26/85 CHEM-SECURITY SYSTEMS (LABORATORY ANALYSIS OF SOIL SAMPLES)	150.00
7/10/85 NORTHWEST VACUUM TRUCK SERVICE (RELOCATING 242.76 TONS OF SOIL TO ARLINGTON)	9,000.00
7/29/85 CHEM-SECURITY SYSTEMS (RECEIVING 243.30 TONS OF SOIL AT ARLINGTON)	27,270.88
8/8/85 ENVIRONMENTAL EMERGENCY SERVICES (OBTAIN AND ANALYZE 3 COMPOSITE SAMPLES)	
12/31/85 ENVIRONMENTAL EMERGENCY SERVICES (PRIMARY SAMPLING AND ANALYSIS PLUS REPORT)	18,741.55
	55,662.43

COMMITTMENTS

DEQ PSK OAR 240-102-065	3,500.00
*RIEDEL ENVIRONMENTAL SERVICES (ADMENDMENT 2)	25,000.00+
	84,162.43

50% = 42,081.21

*NAME CHANGE FROM ENVIRONMENTAL EMERGENCY SERVICES

INVOICE TOTAL $42,081.21

10000

Encl. 1

TOLS003126

ACCOUNTS RECEIV

BZTO104(e)039947

TIME OI CO.
OX 24447 TERM. STATION - SEATTLE WA 98124-0447
2737 WEST COMMODORE WAY - SEATTLE WA 98199-1233
PHONE (206) 235-2400

DEBIT MEMO 020190

DATE 04/17/87
REF. 04-03131 FER

CUSTOMER #: 03/05505623

ACCOUNT: 120 9 12699.07

KOPPERS COMPANY
Koppers Building - Room 750
Pittsburgh, PA 15219

ATTN: JAY STEBBINS

- -

THIS IS AN ADDITION TO INVOICE # 091363 DATED MARCH 6, 1986 FOR $ 42,081.21 TO CHARGE YOU FOR HALF OF EXPENDITURES, PER MUTUTAL AGREEMENT, IN REFERENCE TO CLEAN UP COSTS AT 12005 NORTH BURGARD. PORTLAND, OREGON. 12,699.07

COPIES OF THE ORIGINAL INVOICE (#091363, 3/6/86, $42081.21) AND THE UPDATED CHARGES FOR $ 54730.28 ARE ATTACHED.

INVOICE TOTAL $12,699.07

10000

TOLS003127

ORIGINAL

BZTO104(e)039948

TIME OIL CO.
P.O.BOX 24447 TERM. STATION - SEATTLE WA 98124-0447
2737 WEST COMMODORE WAY - SEATTLE WA 98199-1233
PHONE (206) 285-2400

INVOICE 056677

DATE 09/21/88
REF. 09-03116 CJC

CUSTOMER #: 03/05505623

ACCOUNT:
KOPPERS COMPANY INC
KOPPERS BUILDING ROOM 750
ATTN: BILL GIARLA
PITTSBURGH PA 15219

557 60 123 4405.27

- -

TO CHARGE YOU FOR 1/2 THE FOLLOWING PWR MUTUAL AGREEMENT IN REFERENCE TO CLEAN UP COSTS AT 12005 N BURGARD RD, PORTLAND OREGON

EXPENDITURES

11/9/87	SRH-COLLECT AND ANALIZE WATER SAMPLES		2810.53	
3/31/88	ECOVA-PREPARE PENTA CLEANUP WORK PLAN		6000.00	
			8810.53	
		50%=	4405.27	4,405.27

INVOICE TOTAL $4,405.27

10000

TOLS003128

SEE REVERSE SIDE FOR GENERAL TERMS AND CONDITIONS
TOP 190 REV. 8/82

ORIGINAL

BZTO104(e)039949

cc: B. Nolan - K-1

PHONE 285-2400
CABLE ADDRESS TIMOIL

SEATTLE
TACOMA
PORTLAND
STOCKTON
RENO
RICHMOND
LOS ANGELES

PRODUCTS TIME TESTED

TELEPHONE IT'S TIME

TIME OIL COMPANY

OCT 07 1987

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

SEATTLE, WASHINGTON 98199-1233
SEATTLE, WASHINGTON 98124-0447

RECEIVED

OCT 5 1987

Environmental Resources

October 2, 1987

Keystone Environmental Resources Inc.
Jim Campbell
436 7th Ave.
Pittsburg, PA 15219

Dear Mr. Campbell:

This is in reference to our discussion regarding clean up costs at 12005 North Burgard in Portland, Oregon.

Enclosed are copies of the documents you wish to review.

A. The Original invoice #091868 dated March 6, 1986 for $42,081.21.

B. A complete list of expenditures as of April 1, 1987.

C. Billing for the additional charges of $12,699.07 for expenses after the date of the original invoice.

Your cost for half the expenditure, per mutual agreement is $54,780.28.

We appreciate your working with us and look forward to hearing from you at your earliest convenience.

Yours Truly,

TIME OIL CO.

John Luckovich

John E. Luckovich
Credit Manager

JEL:ltd

Enclosures

0002B

10000

TOLS003129

BZTO104(e)039950

TIME OIL CO. INVOICE 091868
P.O.BOX 24447 TERM. STATION - SEATTLE WA 98124-0447
2737 WEST COMMODORE WAY - SEATTLE WA 98199-1233
PHONE (206) 285-2400

DATE 03/06/86
REF. 03-03028 JKJ

CUSTOMER #: 03/05505623

ACCOUNT:
KOPPERS COMPANY INC
ATTN: DONALD F. MARION
KOPPERS BUILDING ROOM 750
PITTSBURGH PA 15219

657 60 123 27831.21
120 9 . 14250.00

TO CHARGE YOU FOR 1/2 OF THE FOLLOWING PER MUTUAL AGREEMENT IN REFERENCE TO CLEAN UP COSTS AT 12005 N. BURGARD RD., PORTLAND, OREGON.

EXPENDITURES

4/26/85 CHEM-SECURITY SYSTEMS	
(LABORATORY ANALYSIS OF SOIL SAMPLES)	150.00
7/10/85 NORTHWEST VACUUM TRUCK SERVICE	
(RELOCATING 242.76 TONS OF SOIL TO ARLINGTON)	9,000.00
7/29/85 CHEM-SECURITY SYSTEMS	
(RECEIVING 243.30 TONS OF SOIL AT ARLINGTON)	27,270.88
8/8/85 ENVIRONMENTAL EMERGENCY SERVICES	
(OBTAIN AND ANALYZE 3 COMPOSITE SAMPLES)	
12/31/85 ENVIRONMENTAL EMERGENCY SERVICES	
(PRIMARY SAMPLING AND ANALYSIS PLUS REPORT)	18,741.55
	55,662.43

COMMITTMENTS

DEQ PER OAR 240-102-065	3,500.00
*RIEDEL ENVIRONMENTAL SERVICES (ADMENDMENT 2)	25,000.00+
	84,162.43

50% = 42,081.21

*NAME CHANGE FROM ENVIRONMENTAL EMERGENCY SERVICES

INVOICE TOTAL $42,081.21

10000

TOLS003130

Encl. 1

ACCOUNTS RECEIVA

BZTO104(e)039951

As of 04/01/87

TIME OIL CO. EXPENDITURES IN REFERENCE TO PENTACHLOROPHENOL CLEAN UP COSTS AT 12005 NORTH BURGARD, PORTLAND, OR.

04/26/85	Chem-Security Systems (Laboratory analysis of soil sample)	$ 150.00
07/10/85	Northwest Vacuum Truck Service (Relocating 242.76 tons of soil to Arlington)	$ 9,000.00
07/29/85	Chem-Security Systems (Receiving 243.30 tons of soil at Arlington)	$ 27,270.88
08/08/85	Environmental Emergency Services (Sampling and analysis)	$ 500.00
12/05/85	Environmental Emergency Services (Well drilling, sampling & analysis)	$ 18,741.55
03/24/86	Environmental Emergency Services (Sandblast and demolish wall; install wells)	$ 17,252.67
05/16/86	Instrumentation Northwest (Monitoring well materials)	$ 3,702.66
06/11/86	Century West Engineering (Develop and sample wells)	$ 2,739.50
06/11/86	Department of Environmental Quality (Per OAR 240-102-065)	$ 3,500.00
07/08/86	Century Environmental Sciences (sampling wells)	$ 1,800.00
08/03/86	Riedel Environmental Services, Inc. (Sampling and analysis)	$ 4,452.81
08/25/86	Jack Eatch Construction Co. (Relocate soil and dispose of concrete wall)	$ 1,465.00
09/10/86	Concrete Coring Co. (Cut holes through concrete floor of warehouse)	$ 390.00
10/24/86	SRH Associates, Inc. Investigation of pentachlorophenol as per contract dated 08/14/86	$ 18,465.00
01/26/87	Century West Engineering (Well sampling and analysis)	$ 130.50
		$109,560.57
	Koppers Company share of costs = 50% =	$ 54,780.28
	TOTAL DUE FROM KOPPERS =	$ 54,780.28

Encl. 2

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TOLS003131

BZTO104(e)039952

TIME OIL CO.
P.O.BOX 24447 TERM. STATION - SEATTLE WA 98124-0447
2737 WEST COMMODORE WAY - SEATTLE WA 98199-1233
PHONE (206) 285-2400

DEBIT MEMO 020190

DATE 04/17/87
REF. 04-03131 FER

CUSTOMER #: 03/05505623

ACCOUNT: 120 9 12699.07

KOPPERS COMPANY
Koppers Building - Room 750
Pittsburgh, PA 15219

ATTN: JAY STEBBINS

- -

THIS IS AN ADDITION TO INVOICE # 091363 DATED MARCH 6, 1986 FOR $ 42,081.21 TO CHARGE YOU FOR HALF OF EXPENDITURES, PER MUTUTAL AGREEMENT, IN REFERENCE TO CLEAN UP COSTS AT 12005 NORTH BURGARD PORTLAND, OREGON. 12,699.07

COPIES OF THE ORIGINAL INVOICE (#091363, 3/6/86, $42081.21) AND THE UPDATED CHARGES FOR $ 54730.28 ARE ATTACHED.

INVOICE TOTAL $12,699.07

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TOLS003132

Encl. 3
SEE REVERSE SIDE FOR GENERAL TERMS AND CONDITIONS

ORIGINAL

BZTO104(e)039953

KEYSTONE
ENVIRONMENTAL RESOURCES, INC.

FEB 09 1987

Interoffice Correspondence

To	W.J. Baldwin	From	M.J. Dvorsky
Location	K-1350	Location	K-1940
Subject	Time Oil - 460100	Date	February 6, 1987

The correspondence dated January 14, 1987, on the Time Oil Company has been forwarded for review to the Environmental Engineering Group of Keystone as per your request of February 3, 1987. We have set up project number 460100 under the Protection Products section of the Building Products Sector to track costs of this review.

In a quick review of the information, nothing is said of how the effluent streams from the various process streams would be rendered non-toxic. Dilution below toxic levels and discharge to a POTW may not be acceptable to the regulatory authorities. Should the liquid stream be passed through activated charcoal, what is to be done with the spent charcoal? It cannot be classified K001.

These are a few preliminary comments. Once all the reviews, both technical and regulatorial, have been accomplished, a meeting will be scheduled to discuss our comments with you.

Mike

MD/smg

cc: J. Sebbens
J. Smith
J. Fu

Jack Adams 55gal dirt
soil wash
HRC do - outanalytical only

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TOLS003133

BZTO104(e)039954

KOPPERS

INTEROFFICE CORRESPONDENCE

TO:	Mike Dvorsky	**FROM:**	William J. Baldwin
LOCATION:	K - 19	**LOCATION:**	K - 1350
SUBJECT:	Time Oil Project 1221	**DATE:**	February 3, 1987

I am attaching correspondence dated January 14, 1987 from John Denham to Jay Sebbens which includes an update (October 1, 1986) on the above subject site as well as a proposal and cost estimate dated December 19, 1986 for bench scale evaluation of remedial work. After you have the opportunity to review the attached, let's discuss.

William J. Baldwin

William J. Baldwin

WJB/bml

Attachment

cc: J. Sebbens (Without Attachment)

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TOLS003134

BZTO104(e)039955

PHONE 285-2400
CABLE ADDRESS: TIMOIL

SEATTLE
TACOMA
PORTLAND
STOCKTON
RENO
RICHMOND
LOS ANGELES

TIME OIL COMPANY

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

SEATTLE, WASHINGTON 98199-1233
SEATTLE, WASHINGTON 98124-0447

JAN 2[illegible]7

January 14, 1987

Koppers Company Inc.
Attn: J. Sebbens
Koppers Building
Pittsburg, PA 15219

Dear Mr. Sebbens:

Enclosed is copy of the latest (October 1, 1986) update regarding Time/Koppers voluntary efforts to clean up the pentachlorophenol contamination at our Northwest Terminal in Portland, Oregon. The purpose of this paper, in addition to serving as an update for Koppers, is to have data documented by a third party which is suitable to gain approval from necessary regulatory agencies for acceptable remedial actions as next step accomplishment.

Also enclosed is copy of December 19, 1986 proposal and cost estimate by SRH for performance of bench scale evaluations of recommended "soil washing" technique. Request your comments on this matter as soon as possible.

Sincerely,

John P. Denham

John P. Denham
Environmental Manager

Enclosures a/s.

JPD/ch

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TOLS003135

BZTO104(e)039956

PHONE 285-2400
CABLE ADDRESS: TIMOIL

SEATTLE
TACOMA
PORTLAND
STOCKTON
RENO
RICHMOND
SAN PEDRO
LOS ANGELES

PRODUCTS TIME TESTED

TIME OIL COMPANY

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

SEATTLE, WASHINGTON 98199-1233
SEATTLE, WASHINGTON 98124-0447

August 8, 1986

Koppers Company, Inc.
Attn: Donald F. Marion
Koppers Building Room 750
Pittsburgh, PA 15219

Dear Don:

Per our telecon today, copy of amendment 2 to agreement with Riedel is attached.

Since EPA advised, in December 1985, that we could no longer remove contaminated dirt from the premises, we set aside the soil investigation and concentrated on learning if there was any ground water contamination and, if so, plume extent. We installed wells, developed them, had them sampled and analyzed. Results are favorable in that only .0022 ppm was found in one spot by corner of building. Map showing well locations is attached. We also determined water flow direction and checked water elevations several times.

Now we are attempting to somehow effect clean up of soil on site. Several areas are being investigated but we do not yet, in my opinion, have any really good solution. About the middle of next month, we should be in a more knowledgeable position regarding remedial actions. Still have more sampling to do under building if possible, more water measurements to be taken and more data to develop regarding available clean up processes. Will try to gather up everything by October 1 and send it along to you for your use.

Sincerely,

John P. Denham

John P. Denham
Environmental Manager

Enclosures a/s

JPD/ch

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TOLS003136

BZTO104(e)039957

AMENDMENT 2
TIME OIL CO. - RIEDEL ENVIRONMENTAL SERVICES, INC.
SAMPLING AND ANALYSIS AGREEMENT
DATED JUNE 28, 1985

The work scope is amended to include the following:

1. Sandblasting and demolition of the impoundment wall (designated A in Figure 1). The cost of this procedure is estimated to be $5,568.01.

2. Drilling, sampling and installation of 3 monitoring walls angeled 45 degrees beneath the existing warehouse (listed as Wells 1, 2 & 3 in Figure 1). Also, the installation of a 40 foot vertical monitoring well, including sampling at 5 foot intervals, directly in front of the angled wells (listed as Well 4 in Figure 1). Analytical results for 12 PCP samples are included in the estimated cost of $12,667.07.

3. Drilling, sampling and installation of an additional 5, 20-foot monitoring wells (listed in Figure 1 as Wells 5, 6, 7, 8 & 9). Soil samples will be taken at 5 foot intervals and 5 analyses for PCP are included in the estimated cost of $6,595.50.

DATED this 5th day of November, 1985.

TIME OIL CO.

John Denham
Environmental Manager

RIEDEL ENVIRONMENTAL SERVICES, INC.

F.J. Bradach
President

RS:bw

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TOLS003137

BZTO104(e)039958

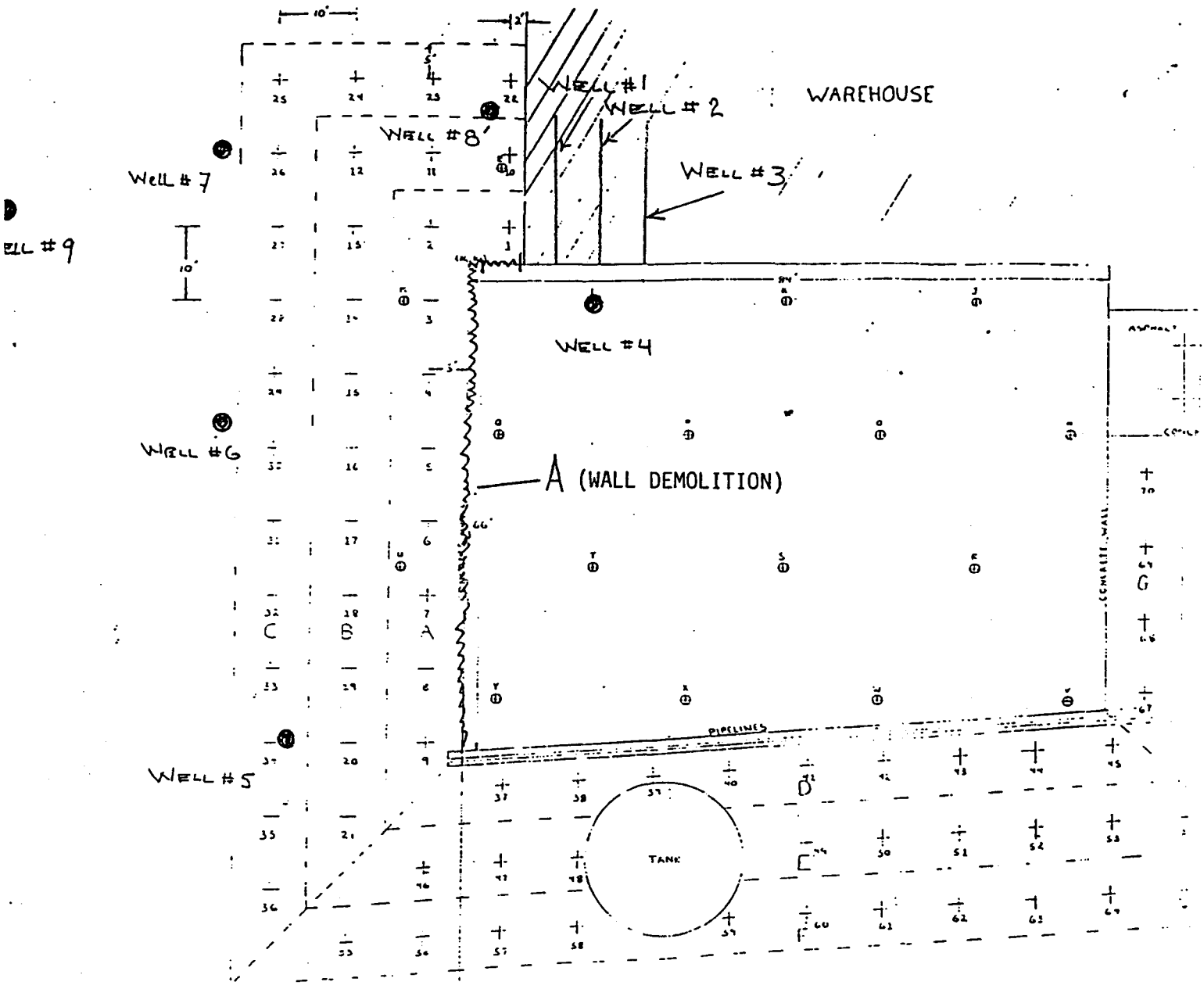

FIGURE 1

Location of Proposed Monitoring Wells

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TOLS003138

BZTO104(e)039959

TIME OIL COMPANY
PORTLAND, OREGON

PENTACHLOROPHENOL SAMPLING & ANALYSIS

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

October, 1985

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TOLS003139

BZTO104(e)039960

Introduction

Between 1967 and 197_ 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.

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.

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. These areas did not include areas inside the warehouse or below the asphalt paved railway siding located, respectively, on the north and northeast sides of the containment area. 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 mximum depth of 0, 2, 4, 7 and 12 feet below the surface elevation of the unexcavated portion of the containment area. Sampling at 17 feet, as originally planned, was not undertaken due to the detection of groundwater at approximately 12 feet.

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, 12 or 17 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

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 IIA-E. These contour diagrams have been reduced and printed on mylar sheets in addition to the attached figures.

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

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TABLE II

TIME OIL CO. - PORTLAND, OREGON

Actual Split-Spoon Sample Depths Below Grade

Boring	Nominal Depth 0	2	4	7	12	17
J	0	0-2'	2-4'	5-7'	10-12'	15-17'
K	NA	0-1 1/2	1 1/2-3 1/2	4 1/2-6 1/2	9 1/2-11 1/2	14 1/2-16 1/2
L	NA	NA	Surf (11")	2-4'	7-9'	12-14'
M	0	0-2'	2-4'	5-7'	10-12'	15-17'
N	0	0-2'	2-4'	5-7'	10-12'	15-17'
O	0	0-2'	2-4'	5-7'	10-12'	15-17'
P	NA	Surf (4")	0-2'	3-5'	8-10'	13-15'
Q	NA	NA	0-1 1/2	2 1/2-4 1/2	7 1/2-9 1/2	12 1/2-14 1/2
R	0	0-2'	2-4'	5-7'	10-12'	15-17'
S	0	0-2'	2-4'	5-7'	10-12'	15-17'
T	NA	Surf	0-2'	3-5'	8-10'	13-15'
U	0	0-2'	2-4'	5-7'	10-12'	15-17'
V	0	0-2'	2-4'	5-7'	10-12'	15-17'
W	0	0-2'	2-4'	5-7'	10-12'	15-17'
X	NA	Surf	0-2'	3-5'	8-10'	13-15'
Y	NA	NA	Surf (11")	2-4'	7- 9'	12-14'
Z	0	0-2'	2-4'	5-7'	10-12'	15-17'

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 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'	17 15-17'
J	X	X	X	X	X	ND
K	-	X	X	X	X	ND
L	-	-	X	X	X	ND
M	X	X	X	X	X	ND
N	X	X	X	X	X	ND
O	X	X	X	X	X	ND
P	-	X	X	X	X	ND
Q	-	-	X	X	X	ND
R	X	X	X	X	X	ND
S	X	X	X	X	X	ND
T	-	X	X	X	X	ND
U	X	X	X	X	X	ND
V	X	X	X	X	X	ND
W	X	X	X	X	X	ND
X	-	X	X	X	X	ND
Y	-	-	X	X	X	ND
Z	X	X	X	X	X	ND

NOTE: X = Sample

\- = Not available due to excavation

ND = Not sampled due to presence of groundwater

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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

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BZTO104(e)039968

TABLE IVB

TIME OIL CO. - PORTLAND, OREGON
PENTACHLOROPHENOL IN SOIL

Two Foot Contour Data

Core #	Coordinates X	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

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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 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

TABLE IVE

TIME OIL CO. - PORTLAND, OREGON

Pentachlorophenol in Soil

12 Foot Contour Data

CORE #	COORDINATES		CONCENTRATION
	X	Y	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 IVF

TIME OIL CO. - PORTLAND, OREGON
PENTACHLOROPHENOL IN SOIL

Preliminary Surface Composites

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

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, located at coordinates (83,168) in the northwest corner of the containment area, is consistent with reported spillage at this corner of the warehouse. A second focus occurs just outside the containment wall to the west at coordinates (65,125). This site is consistent with reported minor spills during truck loading procedures at this site. 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.

Additional contours at depth indicate penetration of PCP to the saturated zone at the northwest focus. 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 penetration to the groundwater (encountered between 7 and 12 feet) with 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.

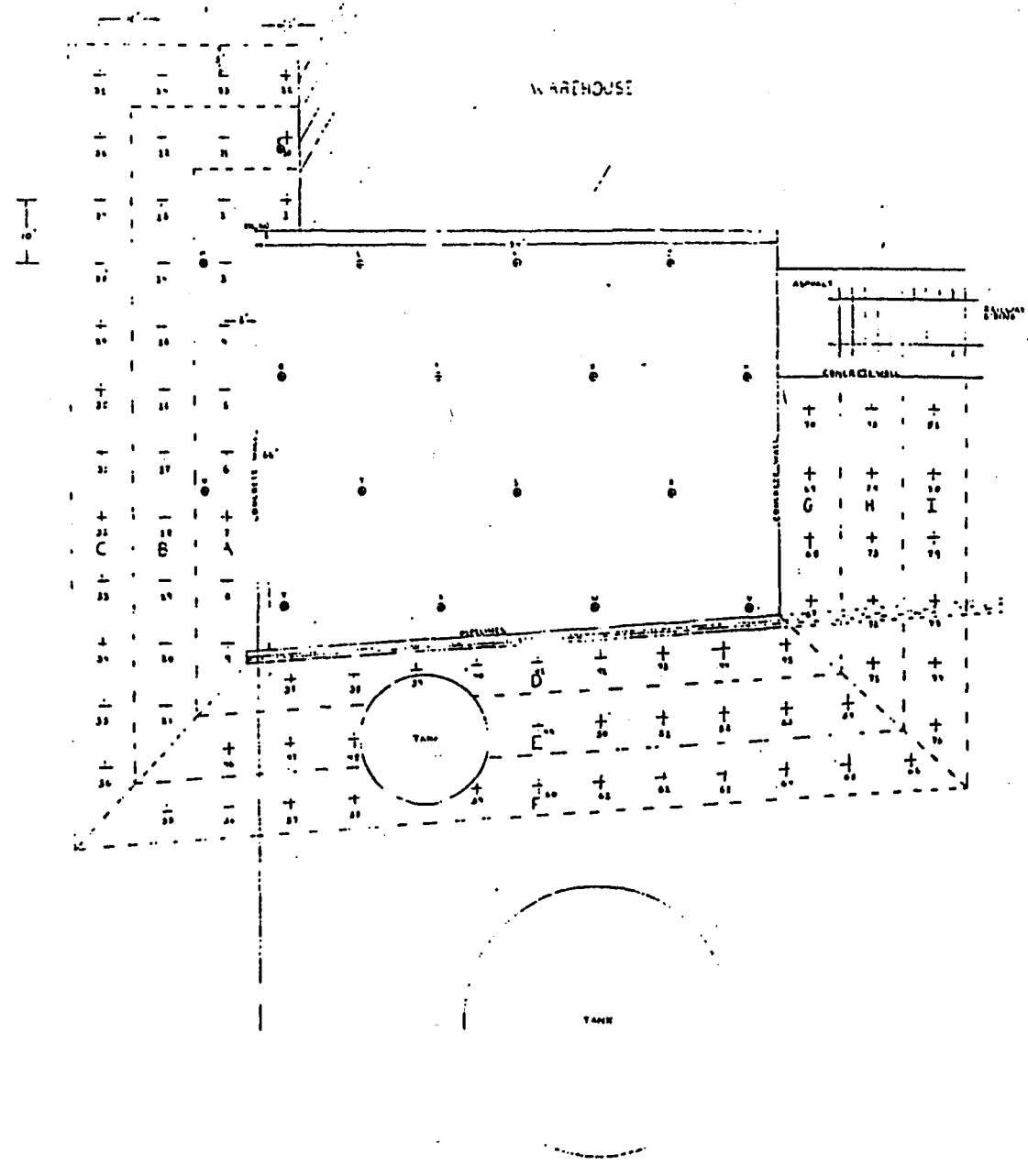
The slight tendency of the PCP plume to tail off to the south implies that groundwater flux may be diffusing the plume in this direction. This conclusion can only be substantiated by hydrogeologic evaluations of the site, however.

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. No sampling was performed underneath the warehouse and this study cannot conclude that migration has occurred beyond the foundation base. 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 1



TOLS003155

RIEDEL INTERNATIONAL, INC.

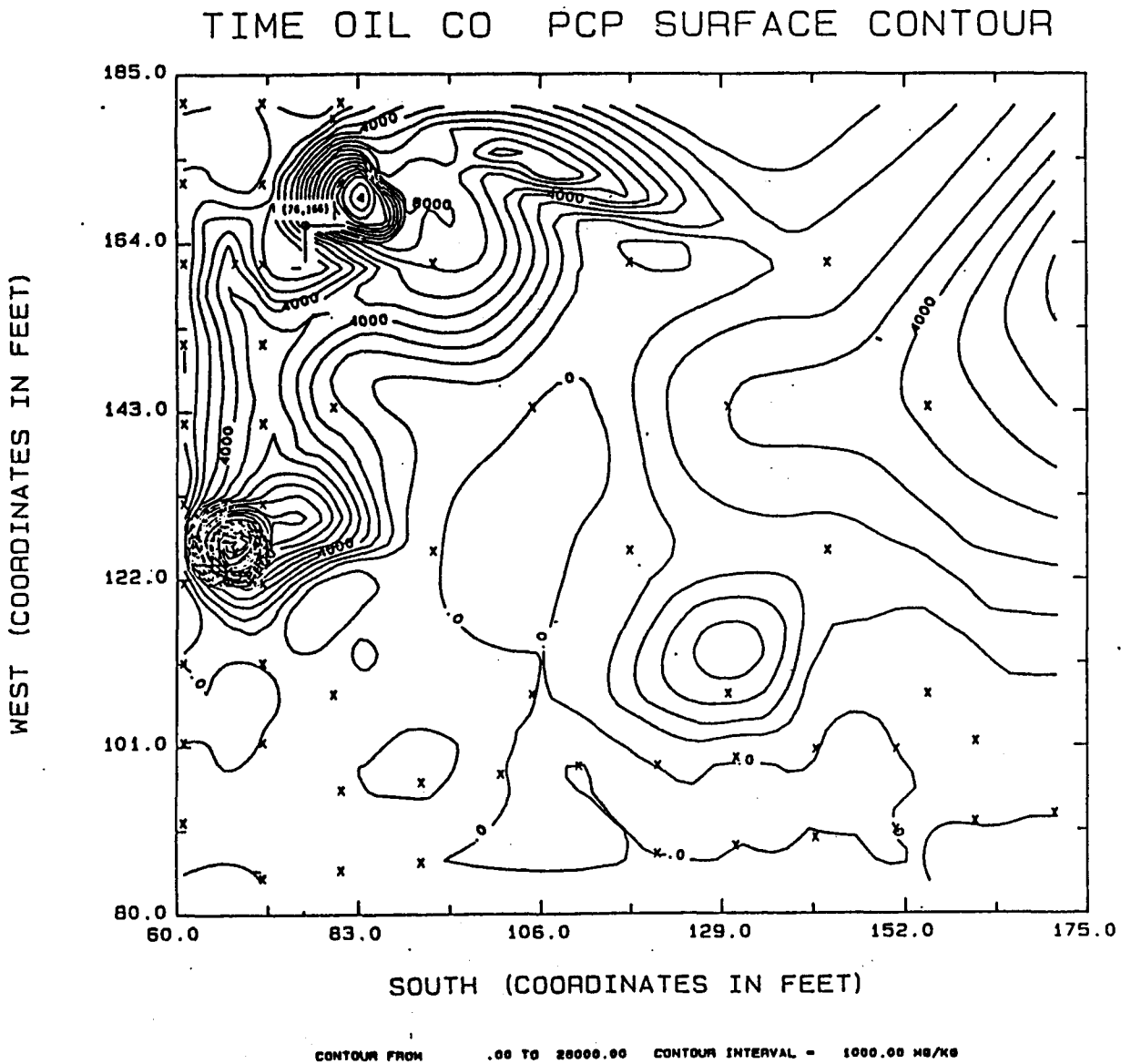
TIME OIL CO. - PORTLAND, OR.

P.C.P. SAMPLING PLAN

10000

BZT0104(e)039976

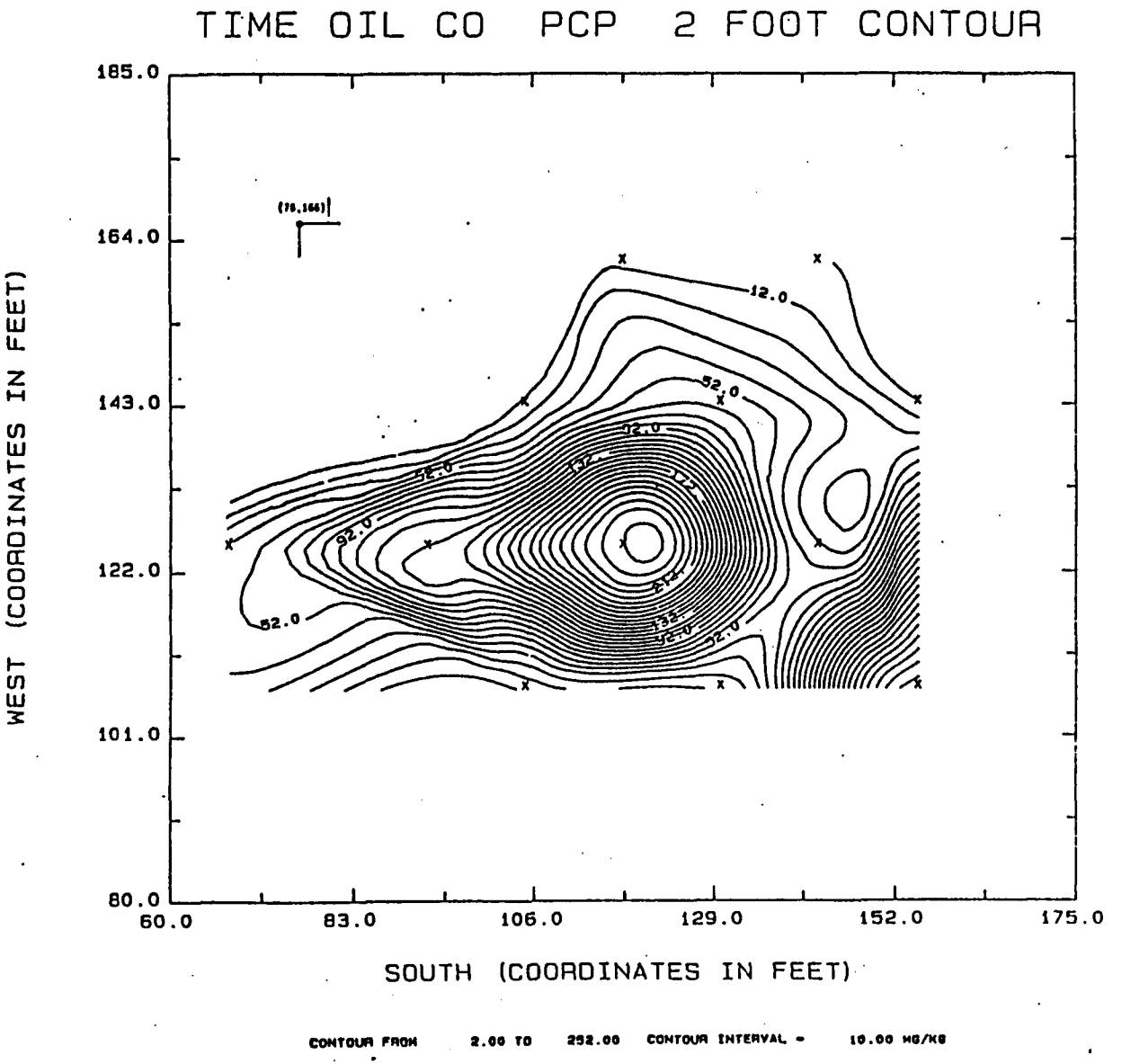
FIGURE 2A



BZTO104(e)039977

TOLS003156

FIGURE 2B



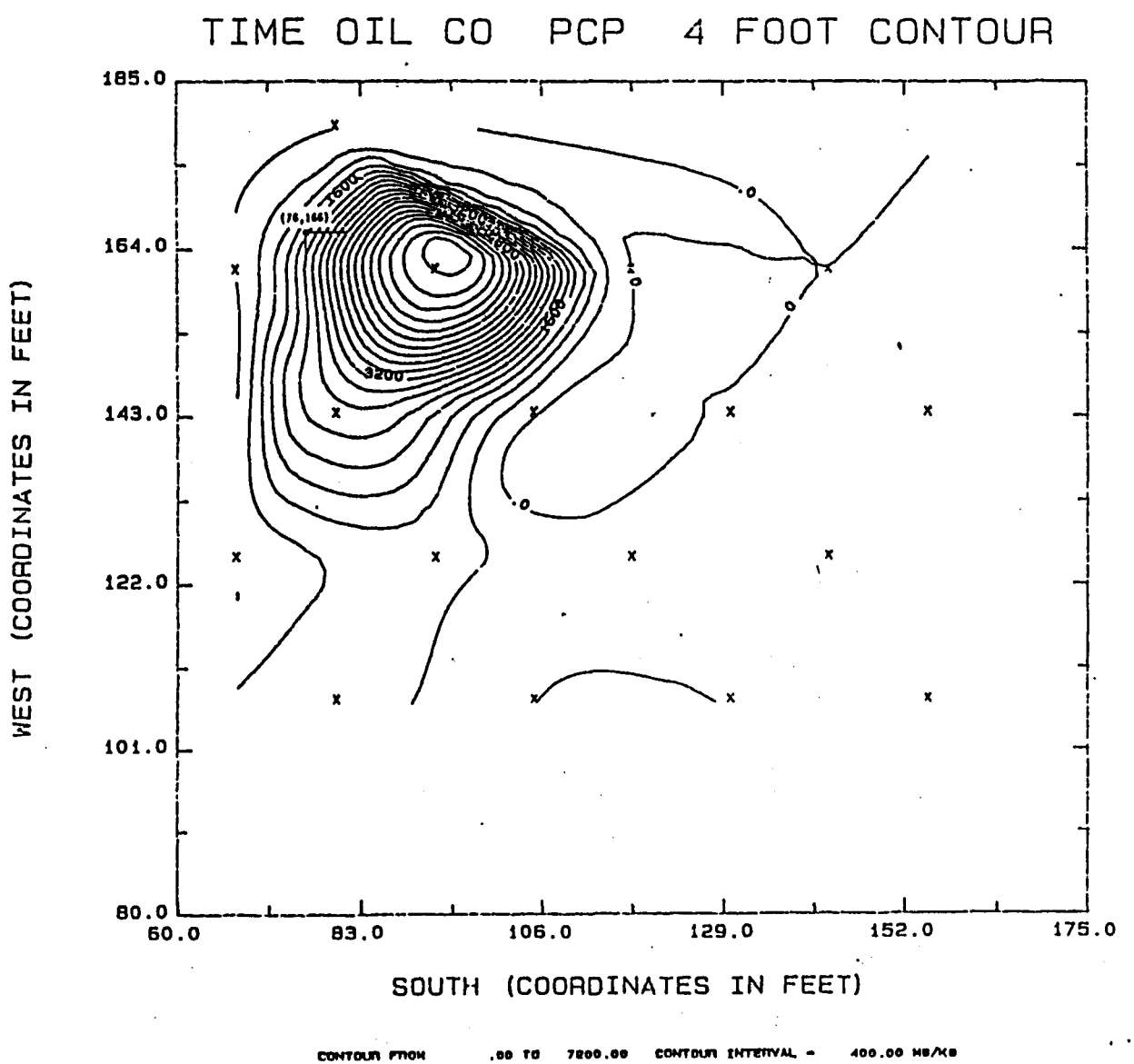
BZTO104(e)039978

10000

TOLS003157

BZTO104(e)039979

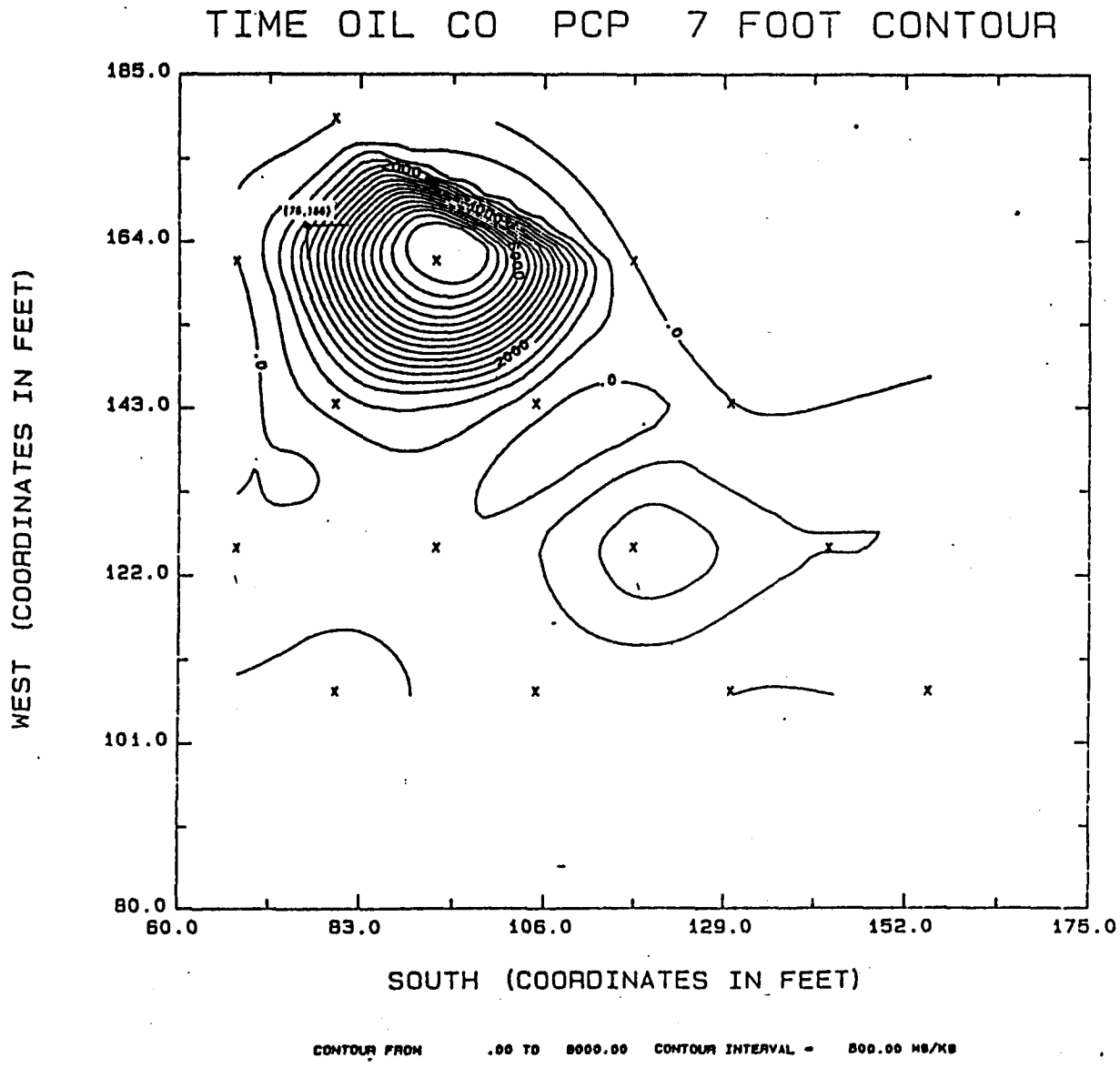
FIGURE 2C



10000

TOLS003158

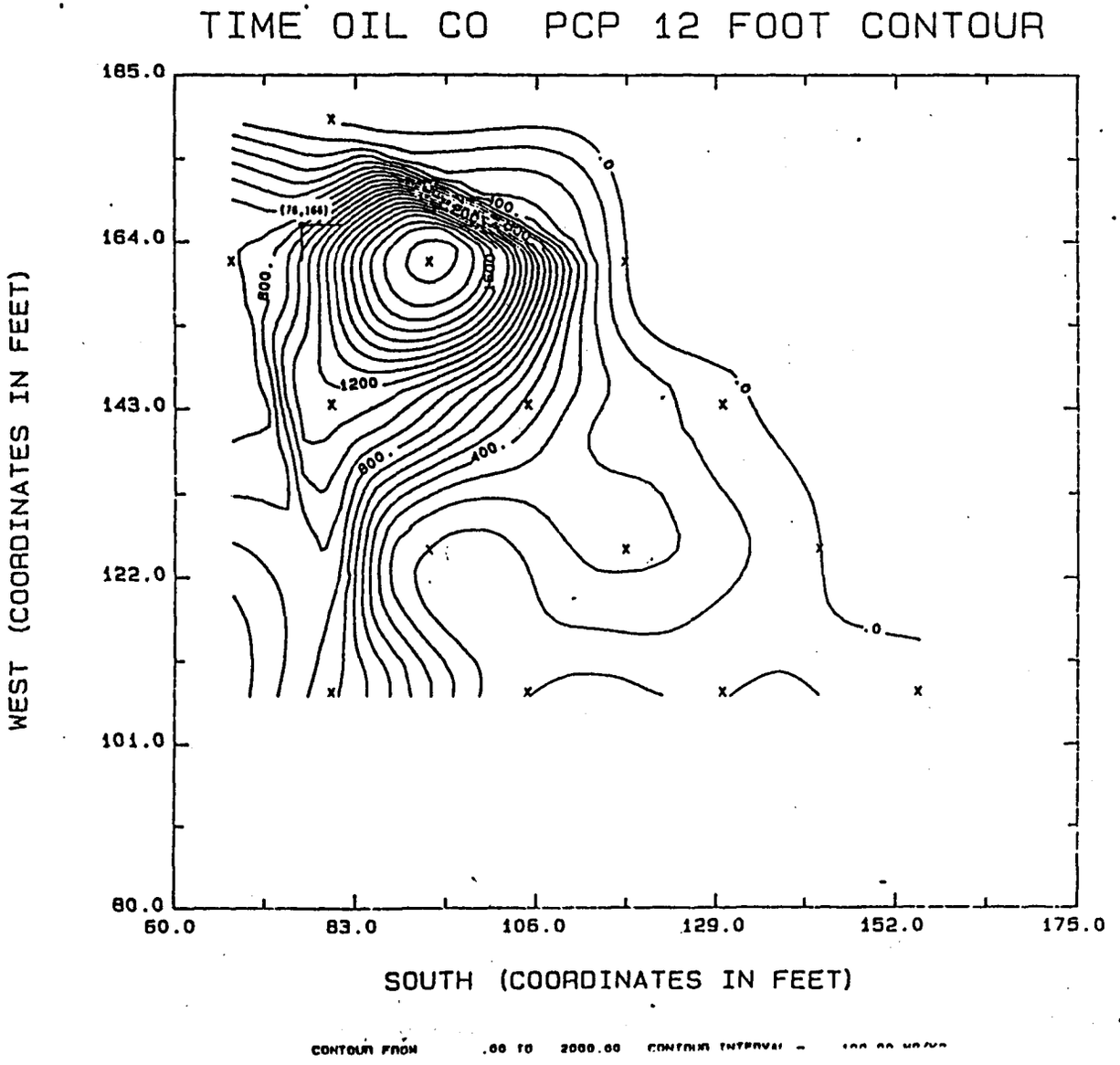
FIGURE 2 D



BZTO104(e)039980

TOLS003159

FIGURE 2E



BZTO104(e)039981

TOLS003160

PPERS
Interoffice Memo

Time file

To Don Marion

From D. R. Kerschner

Location K-750

Location K-1940

Subject Time Oil

Date September 15, 1986

With regard to your August 11, 1986 memo -- we are not being given too much information to base our opinion on. If we are going to have to continue to provide funding for this project, I would recommend that we insist that Keystone Environmental Resources get involved -- either in doing all the technical work, or at least a thorough technical review. I am having difficulty determining whether Reidel is providing the necessary services or not. I'm sorry for the delay.

David

David R. Kerschner

DRK/wl
cc: W. Baldwin
T. Smith

10000

TOLS003161

BZTO104(e)039982

PHONE 285-2400
CABLE ADDRESS: TIMOIL

SEATTLE
TACOMA
PORTLAND
STOCKTON
RENO
RICHMOND
SAN PEDRO
LOS ANGELES

PRODUCTS TIME TESTED

TIME OIL COMPANY

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

SEATTLE, WASHINGTON 98199-1233
SEATTLE, WASHINGTON 98124-0447

August 8, 1986

Koppers Company, Inc.
Attn: Donald F. Marion
Koppers Building Room 750
Pittsburgh, PA 15219

Dear Don:

Per our telecon today, copy of amendment 2 to agreement with Riedel is attached.

Since EPA advised, in December 1985, that we could no longer remove contaminated dirt from the premises, we set aside the soil investigation and concentrated on learning if there was any ground water contamination and, if so, plume extent. We installed wells, developed them, had them sampled and analyzed. Results are favorable in that only .0022 ppm was found in one spot by corner of building. Map showing well locations is attached. We also determined water flow direction and checked water elevations several times.

Now we are attempting to somehow effect clean up of soil on site. Several areas are being investigated but we do not yet, in my opinion, have any really good solution. About the middle of next month, we should be in a more knowledgeable position regarding remedial actions. Still have more sampling to do under building if possible, more water measurements to be taken and more data to develop regarding available clean up processes. Will try to gather up everything by October 1 and send it along to you for your use.

Sincerely,

John P. Denham

John P. Denham
Environmental Manager

Enclosures a/s

JPD/ch

10000

TOLS003162

BZTO104(e)039983

KOPPERS

INTEROFFICE CORRESPONDENCE

Time Oil file

TO:	Don Marion	**FROM:**	W. J. Baldwin
LOCATION:	K - 750	**LOCATION:**	K - 1350
SUBJECT:	Time Oil Company	**DATE:**	March 19, 1986

I am attaching a copy of J. K. Fu's March 10 correspondence to Dave Kerschner on the above subject. Overall, Mr. Fu reports that the information provided by Time Oil did not provide enough evidence regarding treatment of organically contaminated material. Furthermore, prior to paying the invoice, I would again suggest that we receive a copy of "Amendment 2" from the Riedel Environmental Services as well as a detailed work plan for Dave Kerschner's review.

William J. Baldwin

William J. Baldwin

WJB/bml

Attachment

cc: With Attachments

J. D. Hite
Templeton Smith
Dave Kerschner
Jim Garrity
R. G. Hamilton
A. S. Wells

10000

TOLS003163

BZTO104(e)039984

KERR-MCGEE

Interoffice Correspondence

RECEIVED

MAR 12 1986

ENVIRONMENTAL RESOURCES

To D. R. Kerschner

Location K-1940

Subject Response on Remedial Measures - Time Oil

From J. K. Fu

Location Monroeville

Date March 10, 1986

This is in response to the information you provided on evaluating the feasibility of a physical-chemical technology (ATW process) on removing PCP contamination at the Time Oil site. Overall, the information did not provide enough evidence regarding treatment of organically contaminated material. My specific comments are as follows:

1. The information provided described a process which can effectively reduce heavy metal migration in the subsurface environment. As you understand, PCP is an organic compound which behaves in a different manner than metal species. Under typical subsurface environmental conditions, PCP remains in the nonionic form. Several of the chemical processes utilized in the ATW technology (neutralization, precipitation) generally do not affect nonionic species.

2. The articles state that the chemical oxidation process can break down benzene ring structure but does not react with phenol. Phenol is a benzene derivative and as such the meaning of the statement is unclear. Additionally, phenol is present at the majority of the sites where PCP is present, and we would need a system which would deal with both constituents.

3. In ATW process, lime cycle ($CaO \longrightarrow Ca(OH)_2 \longrightarrow CaCO_3 \longrightarrow CaO$) is used to transform waste residue, clay and calcium oxide into limestone. The limestone is pH sensitive and can dissolve in low pH conditions. The waste can then be released to the environment. Additionally, the calcination temperature (1900~2400°F) utilized to convert limestone to calcium oxide would make the process energy intensive, and could make direct incineration of the waste a cost-competitive alternative.

4. The information indicates that in-situ biodegradation is cost-effective, but they did not provide examples and details on what they can do. The information we have from our past studies can provide much better information for this area.

10000

K-5 REV. 2

TOLS003164

BZTO104(e)039985

5. The "chemical barrier" and "biodegradation barrier" combination may be useful if there is metal and organic contamination together. If there is only PCP contamination, the chemical barrier will not be needed and the process will become what we call "land treatment."

J. K. Fu

JKF:ss

TIME OIL CO. INVOICE 091868

P.O.BOX 24447 TERM. STATION - SEATTLE WA 98124-0447
2737 WEST COMMODORE WAY - SEATTLE WA 98199-1233
PHONE (206) 285-2400

DATE 03/06/86
REF. 03-03028 JKJ

CUSTOMER #: 03/05505623

ACCOUNT:
KOPPERS COMPANY INC
ATTN: DONALD F. MARION
KOPPERS BUILDING ROOM 750
PITTSBURGH PA 15219

657	60	123	27831.21
120	9		14250.00

- -

TO CHARGE YOU FOR 1/2 OF THE FOLLOWING PER MUTUAL AGREEMENT IN REFERENCE TO CLEAN UP COSTS AT 12005 N. BURGARD RD., PORTLAND, OREGON.

EXPENDITURES

4/26/85 CHEM-SECURITY SYSTEMS (LABORATORY ANALYSIS OF SOIL SAMPLES)	150.00
7/10/85 NORTHWEST VACUUM TRUCK SERVICE (RELOCATING 242.76 TONS OF SOIL TO ARLINGTON)	9,000.00
7/29/85 CHEM-SECURITY SYSTEMS (RECEIVING 243.30 TONS OF SOIL AT ARLINGTON)	27,270.88
8/8/85 ENVIRONMENTAL EMERGENCY SERVICES (OBTAIN AND ANALYZE 3 COMPOSITE SAMPLES)	
12/31/85 ENVIRONMENTAL EMERGENCY SERVICES (PRIMARY SAMPLING AND ANALYSIS PLUS REPORT)	18,741.55
	55,662.43

COMMITTMENTS

DEQ PER OAR 240-102-065	3,500.00
*RIEDEL ENVIRONMENTAL SERVICES (ADMENDMENT 2)	25,000.00+
	84,162.43

50% = 42,081.21

*NAME CHANGE FROM ENVIRONMENTAL EMERGENCY SERVICES

INVOICE TOTAL $42,081.21

10000

TOLS003166

SEE REVERSE SIDE FOR GENERAL TERMS AND CONDITIONS
TDP 190 REV. 8/82

ORIGINAL

BZTO104(e)039987

KOPPERS

INTEROFFICE CORRESPONDENCE

TO:	Don Marion	**FROM:**	W. J. Baldwin
LOCATION:	K - 750	**LOCATION:**	K - 1350
SUBJECT:	Time Oil Company	**DATE:**	February 28, 1986

I have reviewed your letter of February 24, 1986 and my notes from our meeting of January 23. As such, the only comment I would like to make is that I believe we should have a copy of "Amendment 2" from the Riedel Environmental Services Contract as well as a detailed work plan for Dave Kerschner's review since this work has been quoted at $25,000 plus.

W. J. Baldwin

WJB/bml

cc: Templeton Smith
Dave Kerschner
Jim Garrity
R. G. Hamilton
J. D. Hite
A. S. Wells

0000

TOLS003167

BZTO104(e)039988

PHONE 285-2400
CABLE ADDRESS: TIMOIL

SEATTLE
TACOMA
PORTLAND
STOCKTON
RENO
RICHMOND
SAN PEDRO
LOS ANGELES

PRODUCTS TIME TESTED

TIME OIL COMPANY

2737 W. COMMODORE WAY, P.O. BOX 24447, TERMINAL ANNEX, SEATTLE, WA 98124

February 19, 1986

Koppers Company, Inc.
Attn: Donald F. Marion
Forest Products Group
Koppers Building, Room 750
Pittsburgh, PA 15219

Dear Don:

This refers to our mutual problem of pentachlorophenol contamination at 12005 North Burgard Road in Portland Oregon.

During our January 23, 1986 meeting at your offices in Pittsburgh, you mentioned that Koppers would agree to paying half the clean-up costs incurred/committed to date and that further coordination between Koppers and Time would be appropriate for future committments. Time concurs with this approach.

In this light, the below accounting to date will be followed by an invoice two weeks from today unless we hear some objections from you before then.

EXPENDITURES

4/26/85	Chem-Security Systems (Laboratory Analysis of soil sample)	150.00
7/10/85	Northwest Vacuum Truck Service (Relocating 242.76 tons of soil to Arlington)	9,000.00
7/29/85	Chem-Security Systems (Receiving 243.30 tons of soil at Arlington)	27,270.88
8/8/85	Environmental Emergency Services (Obtain and analyze 3 composite samples)	500.00
12/5/85	Environmental Emergency Services (Primary sampling and analysis plus report)	18,741.55
		$55,662.43

10000

TOLS003168

BZTO104(e)039989

COMMITTMENTS

	DEQ per OAR 240-102-065	3,500.00
*	Riedel Environmental Services (Amendment 2)	25,000.00 +
		$84,162.43
		50% = $42,081.21

* Name change from Environmental Emergency Services

Should you have any questions regarding the above, please give me a call.

Sincerely,

Robert D. Abendroth
Operations Manager

RDA/ch

10000

TOLS003169

BZTO104(e)039990

PHONE 285 2800
CABLE ADDRESS: TIMOIL

SEATTLE
TACOMA
PORTLAND
STOCKTON
RENO
RICHMOND
SAN PEDRO
LOS ANGELES

TIME OIL COMPANY

2737 W. COMMODORE WAY, P.O. BOX 24447, TERMINAL ANNEX, SEATTLE, WA 98124

Time Oil - File

January 27, 1986

William J. Baldwin
Koppers Company, Inc.
436 Seventh Avenue
Pittsburgh, PA 15219

Dear Bill,

Enclosed is copy of the ATW Calweld data I promised on January 23, 1986 during our meeting at your Pittsburgh, PA offices. Calweld designed, developed and operates the equipment. ATW developed the waste treatment technology. Cary Jackson is the chemist who determines what is needed to treat whatever the problem, consistent with client desires. The proper person to contact is Franch Manchak. I have spoken with him. He has agreed to speak with you about our mutual problem.

Regarding the water treatment biodegradation process, the three basic chemicals are amonium nitrate, potassium sulfate and sodium phosphate. These fertilizer materials provide the chemical nutriants enabling bacteria to grow. Bacteria are added. The whole mixture is arable. Water is pumped from below ground to a surge tank to a 10' x 10' x 30' tank where the mixture exists. Discharge is either returned to the ground or to sewer as permitted.

Today I received the enclosed DEQ Hazardous Waste Enforcement Guidelines dated January 9, 1986. A copy is enclosed for your information. The thought I intend to convey here is related to our meeting discussion about the unknown amount of money (shown as a ?) on the "cost to date" paper presented. This is an unknown that I had no idea was in existance at the time of our meeting.

Hope this helps. It was a pleasure to see you again, to meet Dave and to provide a project status update.

Sincerely,

John P. Denham

John P. Denham
Environmental Manager

Enclosure a/s

cc: Robert Abendroth
Jim Garrity
Dave Kerschner
Don Marion
Templeton Smith

10000

TOLS003170

BZTO104(e)039991

U.S. ENVIRONMENTAL PROTECTION AGENCY
REGION 10
1200 SIXTH AVENUE
SEATTLE, WASHINGTON 98101

Rec'd Dec. 13, '85

DEC 10 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

10000

TOLS003171

BZTO104(e)039992

KOPPERS

Interoffice Correspondence

To W. J. Baldwin — From D. F. Marion

Location K-1350 — Location K-750

Subject Time Oil Visit - October 9, 1985 — Date October 14, 1985

On October 9, 1985, Jim Garrity, Denise Burrell and I visited with Neil Wallis at Time Oil Company's terminal in Portland, Oregon. We discussed the clean-up efforts at the Portland terminal to date and reviewed where we would go in the future. At this time, Time Oil has disposed of nine truckloads of soil and incurred costs of $55,000 - $60,000. While visiting Neil Wallis, he made copies of the pentachlorophenol sampling and analysis report prepared by Riedel Environmental Services which is attached for everyone's review and comments. Neil indicated that a meeting with John Denham and John Ruddick of Riedel Environmental Services was to be held on Thursday, October 10, in Portland. After this meeting, Neil Wallis, John Denham and Bob Abbendroth would like to get together to determine the next steps in meeting allowable limits of PCP at the Portland Terminal. In addition, Bob Abbendroth would like to set up a meeting to finalize Koppers portion of the payment for services to clean up the Portland Terminal.

After you have had an opportunity to review the attached report, please give me a call to determine our options at this point in time. If you have any questions regarding the above information or attached report, please call me immediately.

Donald F. Marion

DFM/jls

Attachment

cc: J. F. Garrity
R. G. Hamilton
J. D. Hite
J. Kusar
R. J. Parry
T. Smith
M. R. Urbassik
A. S. Wells

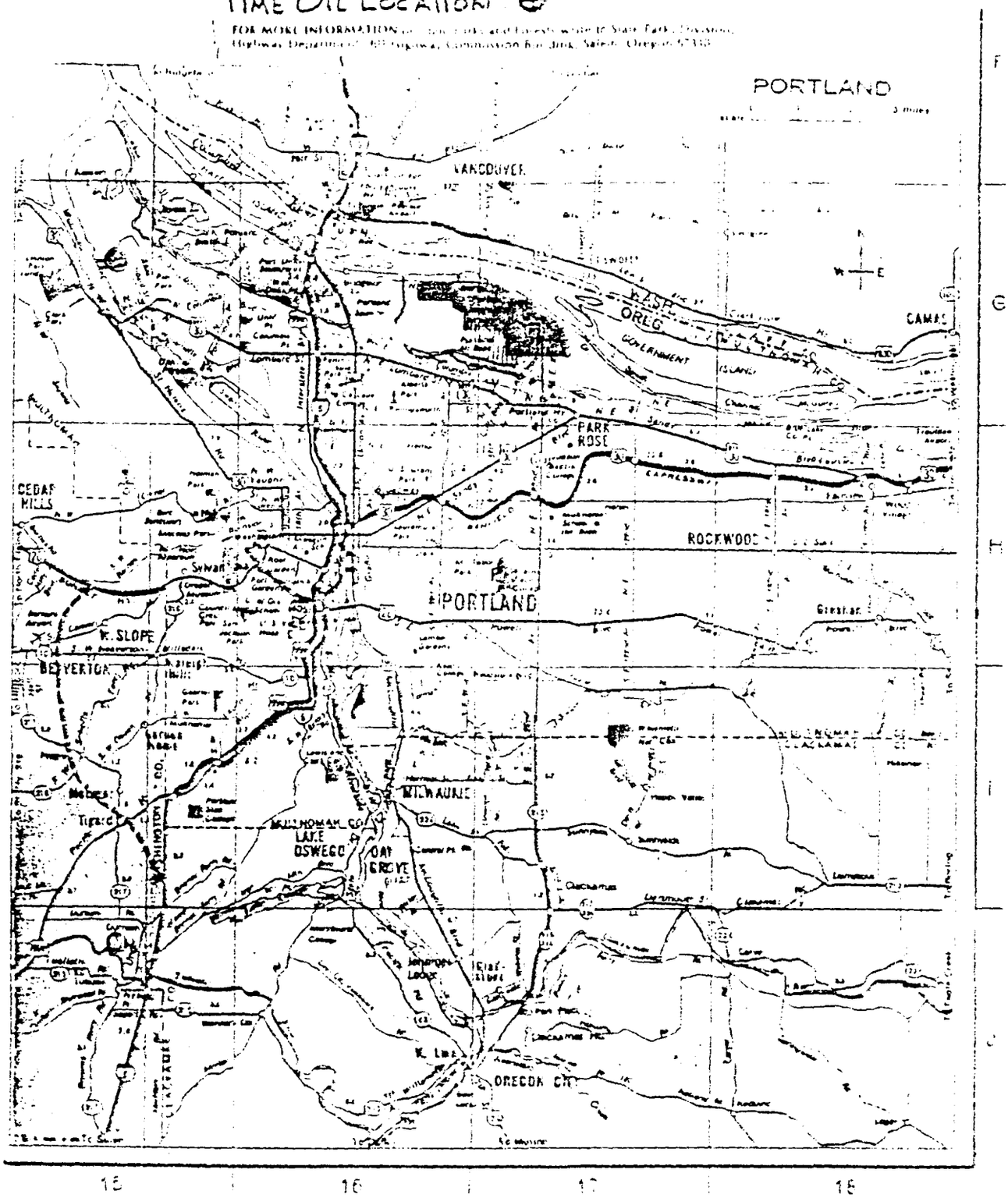
K-5 REV. 2

10000

TOLS003172

BZTO104(e)039993

TIME OIL LOCATION ⊖



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TOLS003173

BZTO104(e)039994

M E M O R A N D U M

June 11, 1985

TO:	Robert Abendroth	Seattle
	Bill Baldwin	Pittsburgh
	Don Marion	Pittsburgh
	Neil Wallis	Portland
FROM:	John Denham	Seattle

SUBJECT: NORTHWEST TERMINAL WOODTREATING SITE

This is a status update regarding cleanup of soil at our Portland Oregon terminal where the Pentachlorophenol operation existed.

Following Don Marion and Bill Baldwin's March 13, 1985 visit, the following occurred:

a. On April 2, Bill B called to coordinate results of his contact with Koppers geologists. Bill requested sampling per enclosure 1. On April 4, Robert A agreed with this action. On April 5, Neil W was tasked to locate a firm to accomplish soil sampling and a laboratory which could handle this sizable soil analysis within a reasonable time frame at the lowest possible costs.

b. After a diligent search, it was learned there was only one firm in the area that had the capability to do this job - Riedel Environmental Services, Inc. On April 25, Riedel submitted their cost of $18,600 (enclosure 2). I asked for a cost breakdown. Riedel submitted it on May 18 (enclosure 3). Drilling cost of $7,544 is actual fee of drilling contractor Sweet and Edwards out of Kelso (I verified this). Analytical cost of $4,956 is strictly the laboratory charge for processing 96 samples from 16 holes at 6 six samples per hole. (Note this is 7 less holes than Bill B requested but covers a larger 80' x 80' area). Method of analysis is GC/MS, which is the only one allowed by EPA/DEQ. Cost to analyze each sample is $51.63. Labor cost of $3,985 includes taking nine additional composite surface samples (3 on northeast, 3 on east and 3 on south) outside bermed area to determine soil contamination boundaries, taking the 96 samples mentioned above, drawing the drilling plan, preparing the contour map which shows location of contamination at the various depths, supervision of entire job on site by a qualified hydrologist and writing the report. Other direct costs of $2,115 cover decontamination of equipment between the taking of each sample, sample jars, safety gear used, drums for and disposal of decontamination solvent used for all equipment decontamination and the bentonite used to plug all holes drilled.

c. Contract with Northwest Vacuum Truck Service was negotiated (enclosure 4). Certificate of insurance coverage (enclosure 5) and contract bond (enclosure 6) were obtained from contractor. An "approved" transporter was obtained (Gresham Transfer Service).

d. Disposal request for contaminated soil was approved by DEQ (Enclosure 7).

e. Hazardous Waste Manifests with appropriate instructions were obtained (enclosure 8).

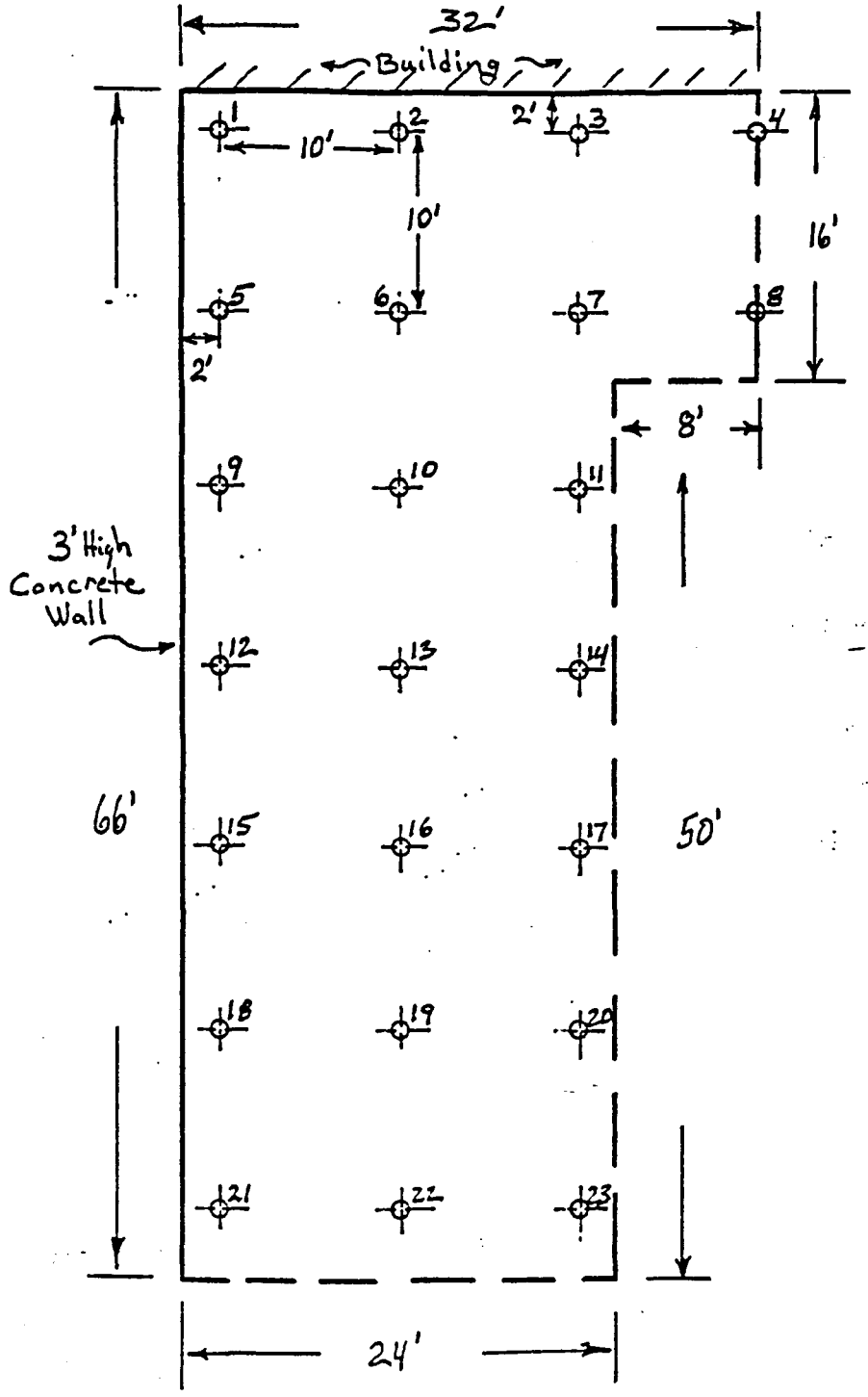
f. The required "Waste Transportation and Disposal Agreement" was obtained from Chem-Security Systems, operators of the Arlington disposal facility (enclosure 9). I disagreed with item 2(b) on page 17 (in that it limited disposal on this tender to only one movement) and item 10(c) on page 20 (in that there was no price break after 250 tons as was originally quoted). Telecon contact with their offices resulted in satisfactorily worded replacement pages for agreement, which arrived today and are included in enclosure 9.

At this point in time, everything seems to be "go". All arrangements have been made to start the first phase of digging, hauling and disposing on June 24, 1985. I will be on site. Plan is to remove and dispose of several truck loads of soil, stop, have sampling and analyses done, then repeat as needed. This approach takes advantage of lower disposal costs (prior to July 1) and the conduct of the expensive sampling and analysis only one time. Current known costs for first phase are $53,000 plus $18,600 = $71,600.

JPD/ch

NORTHWEST TERMINAL WOODTREATING SOIL SAMPLING PLAN

Scale: 1" = 10'



1. Drill 23 holes and obtain samples from each.

2. On holes 2, 3, 4, 6 & 7:
   a. Sample at 6", 1', 2', 3', 5', 10' and 15' levels.
   b. Analyze samples at 1', 2', 3', 5' & 10' levels (25 analyses). Also analyze holes 2,3 & 6 at 15' level.
   c. Hold remaining samples at 40 degrees F.

3. On all other holes:
   a. Sample at 6", 1', 2', 3', 5' and 10' levels.
   b. Analyze samples at 6", 1', 2' & 3' levels (72 analyses).
   c. Hold remaining samples at 40 degrees F.

10000

TOLS003176

Encl. 1

CHEM-SECURITY SYSTEMS, INC.
P.O. Box 1269 • Portland, Oregon 97207-1269 • (503) 223-1912
CSSI

May 28, 1985

Neil E. Wallis
Time Oil Company
2737 W. Commodore Way
Seattle, Washington 98199

Dear Mr. Wallis:

Enclosed are two copies of our Waste Transportation and Disposal Agreement. Please sign both copies and return both copies to me at the above address. I will then forward your fully-executed copy. We appreciate your business and look forward to serving your hazardous waste needs.

Please feel free to call if you have any questions.

Sincerely,

CHEM-SECURITY SYSTEMS, INC.

Joyce Johnson

Joyce Johnson
Inside Sales Representative

JJ:lh
Enclosures

10000

TOLS003177

Exhibit 9

BZTO104(e)039998

WASTE TRANSPORTATION AND DISPOSAL AGREEMENT

On this 24th day of May, 19 84, the parties, Time Oil Co., a Washington corporation with its principal offices at 2737 W. Commodore Way, Seattle, WA 98199 (hereinafter called "Generator"), and CHEM-SECURITY SYSTEMS, INC., a Washington corporation with its principal offices at 10602 N. E. 38th Place, Kirkland, Washington 98033 (hereinafter called "Disposer"), have agreed as follows:

1. WASTE PRODUCTS. The term "Waste Products" refers to those solid, liquid, semi-solid, or contained gaseous materials which are generally described in, and which have physical, chemical, biological or radioactive constituents, characteristics and properties within the specifications stated in, the Supplemental Information Document. The term "Waste Products" also includes containers described in the Supplemental Information Document, if they are to be supplied by the Generator. The term "unit of Waste Products" refers to a single whole container of Waste Products (such as a barrel, drum, box, or tanker load).

   Materials and containers shall be considered nonconforming: (i) if they are not in accordance with the warranties, descriptions, specifications or limitations stated in this agreement and the Supplemental Information Document, or (ii) if they have material constituents or components, not specifically identified in the Supplemental Information Document, (a) which materially increase the nature or extent of the hazard and risk undertaken by CSSI in agreeing to handle, load, transport, store, treat or dispose of the Waste Products, or (b) for whose storage, treatment or disposal the Disposal Facility is not designed or permitted.

2. SUPPLEMENTAL INFORMATION DOCUMENT. Where "the Supplemental Information Document" is referred to in this Agreement, the parties understand that such term refers to each single entire document, in that form specified in Exhibit A, (which exhibit is attached hereto and made part hereof), containing the information therein required and executed by the Generator and Disposer. Each Supplemental Information Document shall be numbered in chronological sequence. A Supplemental Information Document, prepared and executed as herein required, shall be considered incorporated into this Agreement and part hereof as of the date and time of Document execution. It is the intention of the parties that each Supplemental Information Document, when incorporated into this Agreement, constitutes a separate undertaking, individually enforceable.

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A Supplemental Information Document, or any amendment thereto, shall be executed, on behalf of Disposer or Generator, only by such persons appointed as authorized agents of the parties for such purposes, which persons are identified, by name or specific position title, in Exhibit B. attached hereto and made part hereof. Either party may, by notice to the other, amend its list of authorized agents, which shall constitute an amendment to Exhibit B at the time such notice is received.

At any time during the term of a Supplemental Information Document, upon the written request of Disposer, the Generator shall: (a) supply an updated written description of the Waste Products or a written certification that the description previously supplied remains true and accurate; or, (b) supply a written certification that a particular load of Waste Products delivered to Disposer constituted a representative sample of the Waste Products described in the Supplemental Information Document; or, (c) supply a representative sample of the Waste Products together with a written certification of the sample's representativeness; or, (d) allow Disposer access to the Waste Products at Generator's facility for the purpose of obtaining one or more representative samples. Forms to be used in providing written Waste Products descriptions, recertifications of previous descriptions, or certifications of representative Waste Products samples shall be supplied by Disposer.

3. TENDER OF DELIVERY. Generator shall tender delivery of the Waste Products to Disposer at those times and places, in those quantities, and in the manner specified in the Supplemental Information Document. Generator shall, at the same time and place, tender to Disposer those completed documents, shipping papers or manifests as are required, for lawful transfer of the Waste Products to Disposer, by valid and applicable statutes, ordinances, orders, rules or regulations of the federal, state, or local governments, including, but not limited to, the Hazardous Materials Transportation Act, the Toxic Substances Control Act and the Resource Conservation and Recovery Act of 1976.

Tender of delivery shall be considered non-conforming if not in accordance with this Section and the specifications of the Supplemental Information Document, or if not preceded by such notification as required by Section 16 (f).

4. DISPOSER RIGHT TO INSPECTION UPON TENDER. Disposer shall have the right, but not the obligation, to inspect, sample, analyze, or test any tendered Waste Products before accepting such products. Failure or refusal of the Generator to provide Disposer with access to any tendered or delivered Waste Products, prior to Disposer's acceptance, shall be deemed a non-conforming tender or delivery of all of the Waste Products tendered or delivered at that time and place. Disposer's

exercise of, or failure to exercise, its right hereunder shall not operate to relieve Generator of its responsibility or liability under this Agreement.

5. DISPOSER RIGHTS ON IMPROPER DELIVERY. If the Waste Products, any unit thereof, or the tender of delivery fail in any respect to conform to this Agreement, including the requirements of the Supplemental Information Document, Disposer may, at its exclusive option, (i) reject all Waste Products tendered; or, (ii) accept all Waste Products tendered; or, (iii) accept any unit or units of Waste Products and reject the rest. Provided, however, if a particular unit of Waste Products is determined to be non-conforming solely because of a patent non-conformity in the container, its labeling or marking, which non-conformity, if present in any other tendered container, would be visibly apparent, Disposer's option shall be limited to accepting or rejecting the particular non-conforming unit.

Rejection of the Waste Products must be within a reasonable time after their tender or delivery, not to exceed twenty-four (24) hours. In rejecting any Waste Products, Disposer shall orally notify the Generator of the manner in which the Waste Products or the tender of delivery are non-conforming, such notice to be followed by written notice within five (5) business days.

6. ACCEPTANCE OF WASTE PRODUCTS. Disposer shall accept any Waste Products which are in conformance with, and which have been tendered in conformance with, this Agreement, including the Supplemental Information Document, and may accept, as provided in Section 5, non-conforming Waste Products. If transportation is to be provided by Disposer, Disposer shall evidence its acceptance by removing such Waste Products from the place of tender. If transportation to the Storage or Disposal Facility is to be provided by Generator, Disposer shall evidence its acceptance by written notice to the Generator, such as through signing shipping papers or the manifest tendered with the Waste Products.

Failure of Disposer to reject the Waste Products, or any unit thereof, as provided in Section 5 shall be deemed acceptance of all tendered Waste Products not so rejected.

Upon acceptance of the Waste Products Disposer shall be precluded from rejecting those Waste Products accepted and, if acceptance of any unit of Waste Products was made with actual knowledge of a non-conformity, Disposer shall be precluded from revoking its acceptance of such unit because of such non-conformity. Acceptance of the Waste Products, or any unit thereof, does not, however, impair, or operate as a waiver of, any right or remedy available to Disposer, including revocation of acceptance, in the event the Waste Products or

their tender are later discovered to be non-conforming.

7. REVOCATION OF ACCEPTANCE. Disposer may, at any time before the condition of the Waste Products has been materially changed (such as by treatment, processing or disposal), revoke its acceptance of any unit or units of Waste Products discovered to be non-conforming.

Discovery by Disposer that any unit of the Waste Products is non-conforming for any reason shall be considered discovery that all units of such Waste Products, accepted at the same time as the non-conforming unit, are non-conforming for the same reasons. Provided, if a particular unit of Waste Products is determined to be non-conforming solely because of a patent non-conformity in the container, its labeling or marking, which non-conformity, if present in any other accepted container, would be visibly apparent, Disposer's option shall be limited to revoking acceptance of the particular non-conforming unit.

Revocation must occur within a reasonable time after Disposer actually discovers or should have discovered the non-conformity. In revoking its acceptance of any Waste Products, Disposer shall notify the Generator of the manner in which the Waste Products are non-conforming.

7a GENERATOR'S OPTIONS IN EVENT OF REJECTION OF REVOCATION OF ACCEPTANCE.
In the event Disposer rejects or revokes its acceptance of Waste Products, and at such time the Waste Products are in Disposer's possession or control, Generator may, within five (5) business days after receipt of notice, notify Disposer of Generator's intent to test the Waste Products, to verify the alleged non-conformity, or to correct any improper containerization, marking or labeling. Generator may, if lawfully permitted, direct Disposer to arrange for such testing or corrections, pursuant to Generator's instructions and at Generator's cost. All testing or corrections must be completed within twenty-one (21) days of Generator's receipt of the rejection or revocation notice. During the period of any testing or corrections, the duty of Disposer with respect to the Waste Products shall be that of a bailee for hire.

Upon mutual agreement of the parties that the Waste Products or any unit are not conforming for the reasons specified in Disposer's notice, the notice of rejection or revocation as to such Waste Products or unit shall be deemed null and void as of the time of its original issuance.

8. DISPOSER OPTIONS AS TO RIGHTFULLY REJECTED OR REVOKED WASTE PRODUCTS.
If Disposer rejects or revokes its acceptance of all or any units of Waste Products, and at such time the Waste Products

are in Disposer's possession or control, Disposer and Generator shall, in good faith, attempt to amend the Supplemental Information Document to provide for handling of the non-conforming materials. If the parties cannot, within a reasonable time after rejection or revocation (including any time provided for correction or testing in Section 7a), agree on necessary amendments, Generator shall make prompt arrangements for the removal of the non-conforming materials from the Storage or Disposal Facility to another lawful place of disposition.

Generator agrees to pay Disposer its reasonable expenses and charges for handling, loading, stowing, preparing for transport, transporting, storing and caring for any Waste Products returned to Generator pursuant to this Section.

9. LOADING AND TRANSPORTATION OF WASTE PRODUCTS. If the Supplemental Information Document specifies that Disposer is to provide loading or transportation services, Disposer shall load or stow and transport Waste Products to the Storage or Disposal Facility herein specified. In the aforesaid event, as between the parties, selection of transportation vehicles or vessels, times of travel and routes shall be solely determined by Disposer unless otherwise specified in the Supplemental Information Document. In selecting transportation vehicles or vessels compatible with the Waste Products, Disposer shall rely on Generator's description of the Waste Products.

10. STORAGE AND DISPOSAL. Disposer shall dispose of the Waste Products at the particular facility or facilities, referred to herein as "the Disposal Facility", identified in the Supplemental Information Document. Disposer shall utilize those general storage, treatment, and disposal methods specified in the Supplemental Information Document; however, as between the parties, Disposer shall be solely responsible for determining the specific times and techniques for storage, processing, treatment and disposal of the Waste Products. In determining such techniques, Disposer shall rely on Generator's description of the Waste Products.

If the Supplemental Information Document specifies that Disposer is to provide interim storage of the Waste Products at a "Storage Facility", prior to transportation of the Waste Products to the Disposal Facility, Disposer shall store such Waste Products at such Storage Facility for a period not to exceed ninety (90) days, unless some other period is specified in the Supplemental Information Document.

Disposer may use, distribute or sell any of the Waste Products, or any component or residue thereof, unless otherwise specified in the Supplemental Information Document.

11. TITLE TO WASTE PRODUCTS. At the time Disposer accepts the Waste Products and takes possession and control thereover, title, risk of loss and all other incidents of ownership to the Waste Products shall be transferred from the Generator and vested in Disposer.

A justified revocation of acceptance by Disposer revests title to the Generator, including risk of loss and all other incidents of ownership, at the time such revocation of acceptance is communicated to the Generator.

12. TERM. The term of this Agreement shall be as specified in the Supplemental Informtion Document, to commence on the date of execution of such Document, as provided in Section 2.

13. RIGHT TO TERMINATE. Either party may terminate this Agreement if the other party (i) has been adjudicated a bankrupt, or (ii) has filed a voluntary petition in bankruptcy, or (iii) has made an assignment for the benefit of creditors, or (iv) a receiver has been appointed for such party. Termination pursuant to this paragraph shall be effective for performance remaining under any and all Supplemental Information Documents.

The Generator may terminate this Agreement, with respect to performance remaining under an identified Supplemental Information Document, if, at any time after execution of such document, the specified Storge or Disposal Facility fails to obtain, or maintain as valid, any license, permit or approval required to allow lawful acceptance and storage, treatment, processing and disposal of the Waste Products at such Facility.

Termination as provided above, or as allowed by Section 22, shall be by notice from the terminating party to the other party, specifying the reason therefor and the effective date thereof, which shall be not less than five (5) days after the date of the notice.

Either party may terminate this Agreement without cause, with respect to performance remaining under an identified Supplemental Information Document, by notice from the terminating party to the other party specifying the effective date of termination which shall be not less than thirty (30) days after receipt of the notice by the non-terminating party.

The right of terminating hereunder is in addition to, and not in lieu of, any right of a party to cancel this Agreement for breach of its terms or conditions.

14. COMPENSATION. For all of the Waste Products transported, stored and disposed of by Disposer, the Generator shall pay Disposer a fee, determined in accordance with the Supplemental Information Document. Disposer shall measure the Waste Products, for the purpose of computing fees, at the time and

place, and in the manner, specified in the Supplemental Information Document. Disposer determinations so made shall govern unless proved to be in error by Generator.

Fees specified in the Supplemental Information Document shall not be altered during the term of this Agreement except as follows:

(a) Disposer may, on the first day of any calendar quarter, with thirty (30) days written notice to Generator, increase or decrease fees specified in the Supplemental Information Document. If any Waste Products, to which such fee alterations apply, are delivered to Disposer more than thirty days after Generator's receipt of this notice, Generator shall be deemed to have accepted such fee alterations and the Supplemental Information Document shall be deemed amended in such respect.

(b) If legislation or regulations, first implemented after date of execution of the Supplemental Information Document, impose taxes, tariffs, fees, surcharges or other charges upon the transportation, storage, processing, treatment or disposal of the Waste Products, the Generator shall reimburse the Disposer for such charges upon the Disposer's submission of an invoice stating that such charges have been levied or paid.

The Disposer shall submit statements to the Generator which shall be paid by the Generator not later than thirty (30) days from date of receipt. Disposer shall retain copies of such statements for a period of at least five (5) years as a record of disposal.

15. DISPOSER WARRANTIES. Disposer warrants and represents to the Generator that:

(a) Disposer understands the currently known hazards and risks which are presented to human beings, property and the environment in the handling, transportation, storage, treatment, processing and disposal of the Waste Products as they have been described by the Generator in the Supplemental Information Document; and,

(b) Disposer is engaged in the business of transportation, storage and disposal of industrial and other wastes, and has developed the requisite expertise for the handling, transportation, storage, treatment, processing, and diposal of such; and,

(c) Disposer will handle, load, stow, transport, store, treat, process, and dispose of the Waste Products in a safe and workmanlike manner and in full compliance with all valid and applicable statutes, ordinances, orders,

rules and regulations of the federal, state and local governments in whose jursidictions such activities are performed under this Agreement; and,

(d) Any and all vehicles or vessels, Waste Products containers and personnel to be provided by Disposer in the performance of this Agreement have obtained or will obtain all permits, licenses, certificates or approvals required to comply with valid and applicable statutes, ordinances, orders, rules and regulations of the federal, state and local governments.

(e) The Storage or Disposal Facility (or Facilities) described in the Supplemental Information Document has been issued, as of the date of execution of such Document, all permits, licenses, certificates or approvals, required by valid and applicable statutes, ordinances, orders, rules and regulations of the federal, state and local governments in which such Facility is located, necessary to allow such Facility to accept and store, treat, process and dispose of the Waste Products as described by the Generator in such Document. Disposer shall provide Generator with reasonable advance notice if any such permit, license, certificate or approval is to expire and not be renewed during the term of a Supplemental Information Document, or becomes the subject of judicial or administrative action seeking revocation or suspension. Such notice shall also be provided if Disposer determines not to seek any necessary permit, license, certificate or approval which becomes required after execution of a Supplemental Information Document.

16. GENERATOR WARRANTIES. The Generator warrants and represents to Disposer that:

(a) The description of the Waste Products in the Supplemental Information Document is true and correct in all material respects, fairly advises Disposer of the hazards and risks known by the Generator to be incident to the handling, transportation, storage, treatment, processing and disposal of the Waste Products, and is otherwise in full compliance with all materials description requirements of valid and applicable statutes, ordinances, orders, rules and regulations of the federal, state and local governments in whose jurisdictions such Waste Products are to be handled, transported, stored, treated, processed or disposed; and,

(b) Waste Products tendered to Disposer will conform to the descriptions and specifications contained in the Supplemental Information Document; and,

(c) If Generator receives information, during the term of any Supplemental Information Document, that Waste Products described in such Document, or some component of such Products, present or may present a hazard or risk to persons or the environment, which was not disclosed in the Supplemental Information Document, Generator shall promptly report such information to Disposer. Such information shall include, but not be limited to, any relevant notification of substantial risk required to be given by Generator pursuant to Section 8 (e) of the Toxic Substances Control Act;

(d) If any load of Waste Products, tendered to Disposer for transportation in a single transportation vehicle, contains a reportable quantity of one or more hazardous substances, as provided in Section 102 of the Federal Comprehensive Environmental Response, Compensation, and Liability Act of 1980, or regulations adopted thereunder, Generator will, prior to tendering such load to Disposer, provide the person in charge of the Disposer transport vehicle with written notice that the load contains a reportable quantity of such hazardous substance(s), identifying the known or estimated quantity of each such hazardous substance present.

(e) Generator will prepare the Waste Products for transportation and tender to Disposer in accordance with all valid and applicable statutes, ordinances, orders, rules and regulations of the federal, state and local governments in whose jurisdiction such Waste Products are to be tendered to Disposer pertaining to: (i) container specifications for any container not supplied by Disposer; and, (ii) marking and labeling of all containers.

(f) If regulations promulgated or revised under Section 3001 of the Resource Conservation and Recovery Act of 1976 (P. L. 94-580) identify the Waste Products as "hazardous waste," either by characteristics or listing, the Generator, prior to tendering any Waste Products to Disposer has filed or will file with the appropriate governmental agency the preliminary notification required by Section 3010(a) of the above Act, and provide Disposer with evidence thereof.

(g) The Generator has sole title to Waste Products which will be tendered to Disposer, and is under no legal restraint, statutory, regulatory, administrative or judicial, which prohibits the transfer of possession or title to such Waste Products to Disposer.

17. INDEMNIFICATION. Disposer agrees to indemnify and save harmless the Generator, its present and future officers or

directors (or officials), employees and agents, from and against any and all liabilities, penalties, fines, forfeitures, demands, claims, causes of action, suits, and costs and expenses incidental thereto, (including cost of defense, settlement, and reasonable attorney's fees), which any or all of them may hereafter suffer, incur, be responsible for or pay out as a result of bodily injuries (including death) to any person, damage (including loss of use) to any property (public or private), contamination of or adverse effects on the environment, or any violation or alleged violation of statutes, ordinances, orders, rules or regulations of any governmental entity or agency, directly or indirectly caused by, or arising out of breach of any warranties by Disposer, or any negligent or willful act or omission of Disposer, its employees or subcontractors in the performance of this Agreement.

The Generator agrees to indemnify and save harmless Disposer, its present and future officers, directors, employees, agents, subcontractors and assignees, from and against any and all liabilities, penalties, fines, forfeitures, demands, claims, causes of action, suits, and costs and expenses incidental thereto, (including cost of defense, settlement, and reasonable attorney's fees), which any or all of them may hereafter suffer, incur, be responsible for or pay out as a result of bodily injuries (including death) to any person, damage (including loss of use) to any property (public or private), contamination of or adverse effects on the environment, or any violation or alleged violation of statutes, ordinances, orders, rules or regulations of any governmental entity or agency, directly or indirectly caused by, or arising out of breach of any warranties by the Generator, or any negligent or willful act or omission of Generator, its employees or agents in the performance of this Agreement.

18. INSURANCE. Disposer shall procure and maintain, at its expense, during the term of this Agreement, at least the following insurance:

	COVERAGE	LIMITS
(a)	Worker's Compensation	Statutory
(b)	Employer's Liability	$500,000 each occurence
(c)	Public Liability (bodily injury & property damage)	$15,000,000 combined single limit
(d)	Automobile Liability (bodily injury & property damage)	$15,000,000 combined single limit

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Public Liability Insurance shall include coverage for completed operations and contractual liability under this Agreement with respect to sudden and accidental occurrences.

Each contract of insurance, and certificate of insurance, shall provide that said insurance shall not be cancelled or materially altered until at least ten (10) days after written notice is received by the Generator. Disposer agrees to furnish insurance with the above requirements, to the Generator before Disposer commences work hereunder.

In the event Disposer is required by law to obtain environmental impairment liability insurance for non-sudden and accidental occurrences at the Disposal Facility, Disposer shall furnish Generator with a copy of the certificate of insurance provided to the regulatory agency imposing the insurance requirement.

19. CONFIDENTIALITY. Disposer and Generator shall treat as confidential property and not disclose to others during or subsequent to the term of this Agreement, except as is necessary to perform this Agreement, (and then only on a confidential basis satisfactory to both parties), any information (including any technical information, experience or data) regarding either party's plans, programs, plants, processes, products, costs, equipment, operations or customers which may come within the knowledge of the parties, their officers or their employees in the performance of this Agreement, without in each instance securing the prior written consent of the other party.

Disposer shall also treat as confidential and shall not disclose to others, except as required by law, information relating to the chemical composition of the Waste Products or the quantity of Waste Products delivered to it by Generator.

Generator shall also treat as confidential and shall not disclose to others, except as required by law, this form of Agreement and the Supplemental Information Document.

Nothing above, however, shall prevent either Disposer or Generator from disclosing to others or using in any manner information which either party can show:

(a) Has been published and has become part of the public domain other than by acts, omissions or fault of Disposer or Generator or their employees; or

(b) Has been furnished or made known to Disposer or Generator by third parties (other than those acting directly or indirectly for or on behalf of Disposer or

Generator) as a matter of legal right without restrictions on its disclosure; or

(c) Was in either party's possession prior to the disclosure thereof by Generator or Disposer to each other.

Provided, however, neither party shall release, or cause or allow the release of, information to the communications media, except as required by law, concerning the existence or terms of this Agreement or any Supplemental Information Document, including identification of the Generator of the Waste Products, identification of the Disposal Facility receiving the Waste Products, or the general description, characteristics or constituents of the Waste Products, without in each instance securing the prior written consent of the other party.

The foregoing obligations shall survive the termination or expiration of the Agreement.

20. WORK ON GENERATOR'S PREMISES. Generator agrees to provide Disposer, its employees and subcontractors a safe working environment for any work, in performance of this Agreement, which must be undertaken on premises owned or controlled by the Generator. While its employees or subcontractors are on Generator's premises, Disposer will maintain strict work discipline and effect its work in compliance with governmental laws or regulations pertaining to occupational safety and health. Disposer, its employees and subcontractors shall also comply with the Generator's safety procedures while on the Generator's premises, provided such procedures have been specified in the Supplemental Information Document or are attached thereto.

21. INSPECTIONS. The Generator shall have the right to inspect and obtain, at its expense, copies of all written licenses, permits or approvals, issued by any governmental entity or agency to Disposer or its subcontractors which are applicable to the performance of this Agreement and for which no claim of business confidentiality or trade secret is asserted; to inspect and test, at its own expense, transportation vehicles or vessels, containers or disposal facilities provided by Disposer; and to inspect the handling, loading, transportation, storage, treatment, processing or disposal operations conducted by Disposer in the performance of this Agreement. Such inspections are encouraged by Disposer, but shall not operate to relieve Disposer of its responsibility or liability under this Agreement.

22. EXCUSE OF PERFORMANCE. The performance of this Agreement, except for the payment of money for services already rendered, may be suspended by either party in the event the delivery or

transportation of Waste Products by Generator, or transportation, storage, treatment, processing or disposal of Waste Products by Disposer are prevented by a cause or causes beyond the reasonable control of such party. Such causes shall include, but not be limited to, acts of God, acts of war, riot, fire, explosion, accident, flood, or sabotage; lack of adequate fuel, power, raw materials, labor or transportation facilities; governmental laws, regulations, requirements, orders or actions; breakage or failure of machinery or apparatus; national defense requirements; injunctions or restraining orders; labor trouble, strike, lockout or injunction (provided that neither party shall be required to settle a labor dispute against its own best judgement).

The party asserting a right to suspend performance under this Section must, within a reasonable time after he has knowledge of the effective cause, notify the other party of the cause for suspension, the performance suspended, and the anticipated duration of suspension. Upon receipt of such notice advising of a material or indefinite suspension of performance, and if such suspension substantially impairs the value of this Agreement to him, a party may, within a reasonable time (not to exceed thirty days), terminate this Agreement as provided in Section 13. If such notice of termination is not provided, this Agreement will lapse with respect to any performance suspended hereunder.

The party asserting a right to suspend performance hereunder shall advise the other party when the suspending event has ended, and when performance will be resumed.

Provided, if title to Waste Products has been transferred to Disposer, Disposer may not suspend performance of this Agreement with respect to such Waste Products; however, if a performance-suspending event occurs after Disposer has taken title to Waste Products but before completion of performance, Disposer may delegate such performance to any other persons lawfully permitted to transport, store, treat or dispose of the Waste Products pursuant to Section 23. In the circumstances described above, the Generator hereby consents to any necessary delegations for which it receives written notice from Disposer.

23. DELEGATION AND ASSIGNMENT. Disposer may at any time, with the prior written consent of Generator, which consent shall not be unreasonably withheld, delegate, orally or in writing, the performance of the work, or any portion thereof, which is by this Agreement undertaken by Disposer. Any such delegation shall not operate to relieve Disposer of its responsibilities hereunder and, notwithstanding any such delegation, Disposer shall remain obligated to the Generator in these undertakings.

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Either party may, at any time, upon written notice to the other party, assign its rights under this Agreement.

24. INDEPENDENT CONTRACTOR. Disposer is and shall perform this Agreement as an independent contractor, and as such, shall have and maintain complete control over all of its employees, agents, and operations. Neither Disposer nor anyone employed by it shall be, represent, act, purport to act or be deemed to be the agent, representative, employee or servant of the Generator.

25. NOTICE. Any notice, communication or statement required or permitted to be given hereunder shall be in writing and deemed to have been sufficiently given when delivered in person or by registered or certified mail, postage prepaid, return receipt requested, to the address of the respective party below:

GENERATOR: Time Oil Company
12005 N. Burgard Road
Portland, Oregon 97203

DISPOSER: CHEM-SECURITY SYSTEMS, INC.
P.O. Box 1269
Portland, Oregon 97207-1269

Either party may, by notice to the other, change the addresses and names above given.

26. ENTIRE AGREEMENT. This Agreement represents the entire understanding and agreement between the parties hereto relating to the transportation, storage, treatment, processing and disposal of Waste Products and supersedes any and all prior agreements, whether written or oral, that may exist between the parties regarding same. No terms, conditions, prior course of dealings, course of performance, usage of trade, understandings, purchase orders, or agreement purporting to modify, vary, supplement or explain any provision of this Agreement shall be effective unless in writing, signed by representatives of both parties authorized to amend this Agreement.

In no event shall the preprinted terms or conditions found on any Disposer or Generator purchase or work order be considered an amendment or modification of this Agreement, even if such documents are signed by representatives of both parties: such preprinted terms or conditions shall be considered null and of no effect.

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27. WAIVER. Any waiver by either party of any provision or condition of this Agreement shall not be construed or deemed to be a waiver of any other provision or condition of this Agreement, nor a waiver of a subsequent breach of the same provision or condition, unless such waiver be so expressed in writing and signed by the party to be bound.

28. MISCELLANEOUS. The validity, interpretation and performance of this Agreement shall be governed and construed in accordance with the laws of the State specified in the Supplemental Information Document.

All paragraph headings herein are for convenience only and are in no way to be construed as part of this Agreement or as a limitation of the scope of the particular sections to which they refer.

In the event of a conflict between the terms or conditions of this Agreement and those of the Supplemental Information Document, the terms and conditions of the Supplimental Information Document shall control.

29. SEPARABILITY. If any Section, subsection, sentence or clause of this Agreement shall be adjudged illegal, invalid or unenforceable, such illegality, invalidity or unenforceability shall not affect the legality, validity or enforceability of the Agreement as a whole or of any Section, subsection, sentence or clause hereof not so adjudged.

30. The covenants and agreements contained in this Agreement shall apply to, inure to the benefit of and be binding upon the parties hereto and upon their respective heirs, executors, administrators, assigns and successors in interest.

IN WITNESS WHEREOF, the parties have caused this Agreement to be executed by their duly authorized representatives as of the day and year first above written.

DATE: _____

Time Oil Company

By: _____

Title: _____

CHEM-SECURITY SYSTEMS, INC.

By: _____

Title: Roger E. Nelson
District Manager

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EXHIBIT A

SUPPLEMENTAL INFORMATION DOCUMENT: NUMBER 85-001

This Document supplements, and is part of, that certain "Waste Transportation and Disposal Agreement," (hereinafter "the Agreement"), entered into by and between Time Oil Company, (hereinafter "the Generator"), and CHEM SECURITY SYSTEMS, INC., (hereinafter "Disposer"), on May 24, 1985. The provisions of this Document shall be incorporated into the Agreement.

1. DESCRIPTION OF WASTE PRODUCTS. The "Waste Products", to which the Agreement refers, are described in the "Generator's Waste Material Profile Sheet," Code Designation E13588, attached hereto and made part hereof.

   Containers are to be provided by Generator according to the following specifications:
   lined and plastic wrapped dump truck

2. TENDER OF WASTE PRODUCTS. Generator shall tender or deliver the above Waste Products to Disposer as follows:

   (a) Quantity of Waste Products to be Tendered Over Term.

   (1) Estimated.
   Volume listed in Section "F" of referenced Generator's Waste Material Profile Sheet(s) or in addenda for each profile sheet.

   (2) Guaranteed (if applicable).

   Not Applicable.

   (b) Maximum/Minimum Quantity of Waste Products Per Tender (if tendered in installments).

   Maximum: same as quantity listed in Section 2(a) above.
   or in addendum to waste profile sheet.

   (c) Place of Tender.
   Arlington, Oregon

   (d) Time and Frequency of Tender.
   8:00 a.m. to 4:30 p.m. weekdays, except holidays, weather permitting.

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(Revised 10/10/84)

(e) Manner of Tender (including notification to Disposer). Uniform hazardous waste manifest. No free liquid may be present in waste.

3. WORK RULES/PROCEDURES AT GENERATOR'S PREMISES. Any specific rules or procedures required by Generator for workers on its premises must be noted here, or attached hereto and initialed by both parties.

4. LOADING AND TRANSPORTATION. The Waste Products are to be loaded (or stowed) on vehicles (or vessels) by Generator _____, and transported to the Storage Facility/Disposal Facility (circle one) by Generator. If the Waste Products are first transported to a Storage Facility, they will be reloaded (or stowed) on vehicles (or vessels) by N/A, and transported to the Disposal Facility by N/A. If Disposer is to provide transportation the following special transportation requirements (if any) shall apply, pursuant to the Generator's direction:

(a) Vehicles or Vessels.

dump truck

(b) Routes.

Not Applicable.

(c) Hours of Transportation.

Not Applicable.

5. STORAGE FACILITY. Disposer shall store the Waste Products at the following storage facility for a period not to exceed ____ days, from which facility the Waste Products will then be removed to the Disposal Facility: Not Applicable

10000

TOLS003194

(Revised 10/10/84)

BZTO104(e)040015

(a) Name/Address of Storage Facility:

(b) Name/Address of Facility Permittee:

(c) Permit Number(s)/Initiation and Termination Date(s):

(d) Permitting Authority(ies):

6. DISPOSAL FACILITY. Disposer shall dispose of the above Waste Products at the following disposal facility (or facilities):

(a) Name/Address of Facility (Facilities):

The Arlington Facility
Star Route
Arlington, Oregon 97812

(b) Name/Address of Facility Permittee:

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

(c) Permit Number(s)/Initiation and Termination Date(s):

State of Oregon - HW-1, initiated Aug. 26, 1980; continues pending issuance of new permit.

(d) Permitting Authority(ies):

Oregon Department of Environmental Quality.

10000

7. DISPOSAL METHODS: Disposer shall utilize one or more of the following methods for the disposal of the Waste Products:

secure burial

8. EMERGENCY SERVICES: Disposer shall provide emergency transportation, storage or disposal services, with respect to the above Waste Products, pursuant to the following:

As required by site license or at Generator's request

9. RECLAMATION AND/OR SALE OF WASTE PRODUCTS. Disposer is authorized to reclaim, recover and sell, distribute or use the Waste Products, their components or residues, except as specified below:

Not Applicable.

10. COMPENSATION. The Generator shall compensate Disposer as follows:

(a) For Transportation, Storage and Disposal of Waste Products.

(b) For Transportation and Disposal of Waste Products. Per ton:

	Before July 1, 1985	Beginning July 1, 1985
250 tons per yr.	$110	$116
250-1500 tons per yr.	$100	$106

Fed. tax is $213 per dry wt. ton. Minimum billing is $200 per tender.

(c) For Disposal of Waste Products Only.

(d) Emergency Services.

Time and mateirals basis

(e) Measurement of Waste Products. Waste Products shall be measured by Disposer for the purpose of computing fees hereunder, at the time and place, and in the manner, as follows: Upon acceptance at the Arlington facility using:

facility scale

10000

TOLS003196

(f) Generator's Billing Address. Disposer shall submit its statements to:

Time Oil Company
12005 N. Burgard Road
Portland, Oregon 97203

(g) Disposer Billing Address. Disposer will issue its billings from the following:

CHEM-SECURITY SYSTEMS, INC.
STAR ROUTE
ARLINGTON, OREGON 97812

11. TERM. The term of the Agreement, with respect to the Waste Products covered in this Document, shall be as follows:

This Agreement shall commence on May 24, 1985 and shall remain in effect until terminated by either party with or without cause by thirty (30) days' advance written notice to the other party.

12. LAW TO GOVERN. The Agreement and this Supplemental Information Document shall be governed and construed in accordance with the laws of the State of Oregon.

13. MISCELLANEOUS CONDITIONS.

By their signatures hereto, the parties agree that this Supplemental Information Document shall be considered an attachment to, and part of, that certain "Waste Transportation and Disposal Agreement" identified above.

Date: _____

Time Oil Company

By: _____

Title: _____

CHEM-SECURITY SYSTEMS, INC.

By: _____

Title: Roger E. Nelson
District Manager

10000

TOLS003197

(Revised 10/10/84)

EXHIBIT B

AUTHORIZED SIGNATORIES

This Exhibit, being attached to, and forming part of that certain "Waste Transportation and Disposal Agreement" entered into by the undersigned parties on May 24, 1985, establishes the identities of those persons authorized to execute Supplemental Information Documents on behalf of the parties, to-wit:

FOR GENERATOR:

FOR DISPOSER:

Regional Sales Manager	up to $ 50,000
District Manager or National Accounts Manager	up to $ 300,000
Regional Vice President or Regional Manager	up to $ 500,000
Senior Vice President	up to $1,000,000
President	over $1,000,000

Time Oil Company

By: _____

Title: _____

Chem-Security Systems, Inc.

By: _____

Title: _____

10000

(Revised 10/10/84)

TOLS003198

BZTO104(e)040019

"Imagineering a cleaner world"

RIEDEL
ENVIRONMENTAL SERVICES, INC.

☑ 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 Blvd
Chesterfield, MO 63017
(314) 532-7660

☐ San Francisco Division
230 Cutting Blvd
Richmond, CA 94802
(415) 234-7430
or (415) 398 5351

☐ Seattle Division
901 Fairview Ave. No.
P.O. Box 1730
Seattle, WA 98111
(206) 622-2900

May 18, 1985

Mr. Neil Wallis
Time Oil Co.
P. O. Box 03137
12005 N. Burgard
Portland, OR 97203

Dear Neil:

The cost breakdown on our bid for sampling and analysis of PCP contaminated soil at your facility is as follows:

Drilling	$ 7,544
Analytical	4,956
Labor	3,985
Other Direct	2,115
	$18,600

If you have any questions, please don't hesitate to contact me.

Sincerely,

John Ruddick
Microbiologist

JR:kps

10000

TOLS003199

ENCL. 3

BZTO104(e)040020

CONTRACT

The parties to this agreement are Time Oil Co. (hereinafter termed owner) and Northwest Vacuum Truck Service, Inc. (hereinafter termed contractor) whereas:

Owner has a volume of earthen material located in Portland, Oregon and owner is desirous of having that material removed.

Contractor is willing to undertake that task upon the terms and conditions set forth below.

Therefore, in consideration of the agreements contained herein, the parties agree as follows:

1. Contractor agrees to remove the material from its present location, load it into suitable transportation vehicles and transport it to a disposal facility approved by the Oregon Department of Environmental Quality.

2. The material to be removed by contractor is generally set forth on the drawing labeled exhibit 1, attached hereto and incorporated by this reference. Prior to work under this agreement, a representative of owner will meet with contractor at the site and the extent of the material to be removed will be more specifically delineated at that time.

3. The commencement date for work will be February 21, 1985 or such other date as may be agreed upon by the parties following coordination with the Department of Environmental Quality and the authorized disposal facility. Work is intended to be divided into two phases. First phase consists of material removal to an agreed upon depth. Then there will be a several day delay while additional tests are conducted to determine if further removal is required. If so, phase two removal actions are to be effected. Should there be any need to continue removal, above process is to be repeated until ultimate removal is accomplished.

4. For each day worked, owner agrees to pay contractor the sum of 1200 dollars for labor and equipment pertaining to soil removal plus 600 dollars for each truckload of soil transported. A day worked shall be one wherein earth moving equipment, necessary to perform the work, has been utilized to the fullest, reasonably possible, extent for a period of not less than 8 hours. Truck shall be a standard 18 yard rated capacity vehicle. Payment will be made upon completion of the work and receipt by owner of written acknowledgement from the approved disposal facility that all material removed and transported by contractor has been received at that facility.

5. Contractor indemnifies and agrees to defend and hold owner harmless from any and all costs, claims, liabilities and damages arising out of contractors work under this contract.

6. Contractor hereby declares that it is engaged as an independent contractor and agrees to perform the work as independent contractor and not as an employee of owner. Contractor has and hereby retains the right to exercise full control and supervision of the work and full control over the employment, direction, compensation and discharge of all persons assisting in the work.

10000

ENCL. 4

7. Contractor agrees at its expense to obtain all governmental permits, licenses and approvals and comply with all laws, rules, regulations and requirements now or hereafter existing necessary for the accomplishment of the work to be performed by contractor under this agreement.

8. Contractor especially acknowledges its understanding that portions of the material to be removed, transported and disposed of under this agreement have been found to contain commercial pentachlorophenol in concentrations ranging from 0 ppm to 1820 ppm. Contractor agrees to take all necessary precautions for the protection of persons and property that may be required or prudent in the removal and transportation of that material.

9. Contractor agrees to maintain workmans' compensation insurance in the form and amounts required by the laws of the state of Oregon and broad form comprehensive public liability insurance with minimum limits of $1 million per person and $1 million per accident for bodily injury and $500,000 per accident for property damage. Contractor shall promptly deliver to owner certificates of said insurance, naming owner as an additional insured before commencing work and such certificate shall provide that said insurance shall not be cancelled prior to 30 days by written notice to owner.

10. Contractor agrees that before commencement of any work hereunder, it will promptly furnish owner with a faithful performance bond in an amount to 53,000 dollars guaranteeing completion of all work and performance of all obligations undertaken by contractor under this agreement.

11. The nature, validity and interpretation of this contract shall be governed by the laws of the state of Washington.

Dated this 19th day of February 1985.

OWNER
Time Oil Co.

by John P. Denham
John P. Denham
Environmental Manager

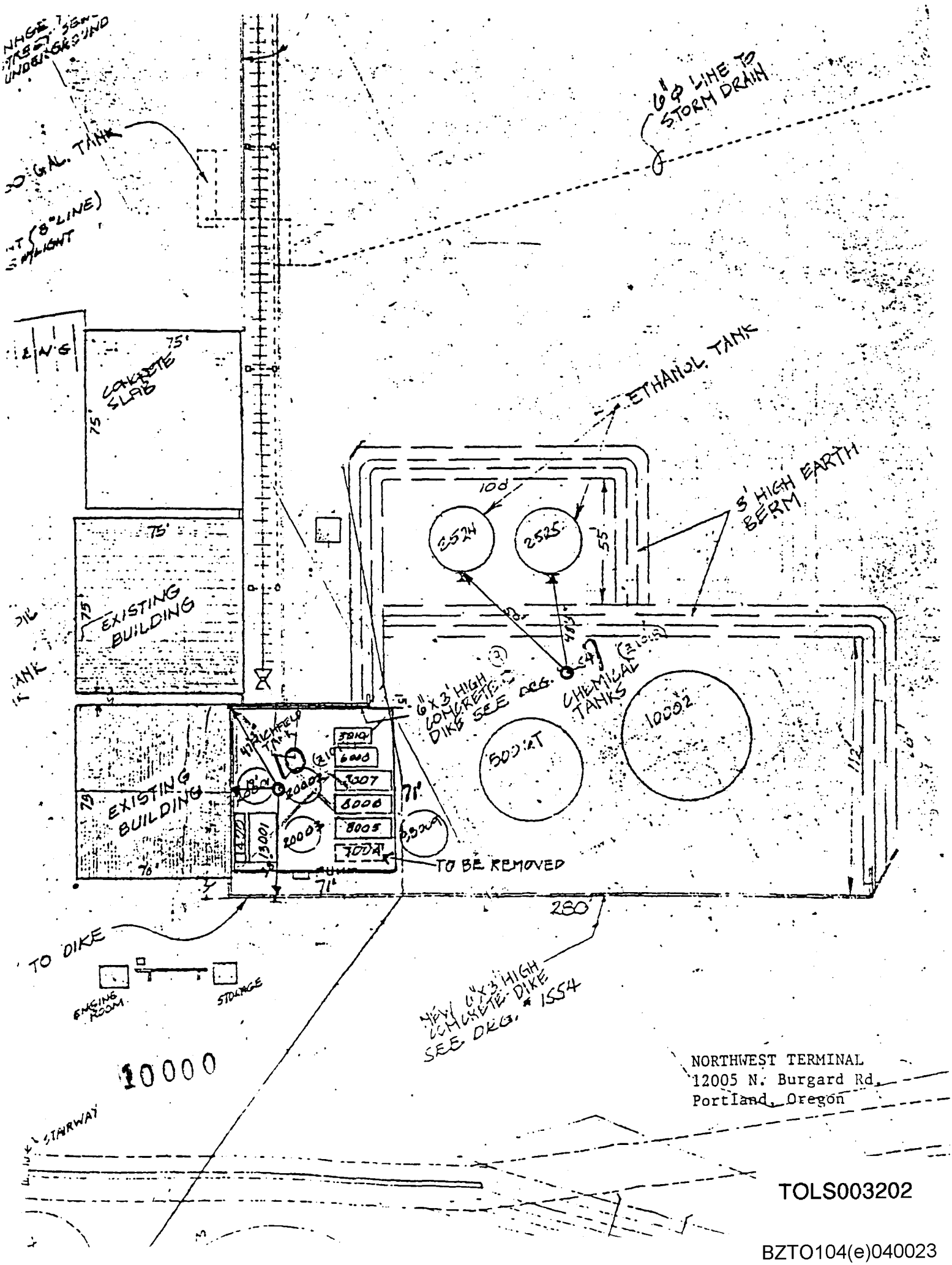
CONTRACTOR
Northwest Vacuum Truck Service Inc.

by John H. Somes
John H. Somes
General Manager

10000

TOLS003201

BZTO104(e)040022


6" LINE TO STORM DRAIN
ETHANOL TANK
5' HIGH EARTH BERM
CONCRETE SLAB
EXISTING BUILDING
EXISTING BUILDING
6"x3' HIGH CONCRETE DIKE SEE DRG.
CHEMICAL TANKS
TO BE REMOVED
TO DIKE
ENGINE ROOM
STORAGE
NEW 6"x3' HIGH CONCRETE DIKE SEE DRG. # 1554
10000
NORTHWEST TERMINAL
12005 N. Burgard Rd.
Portland, Oregon
TOLS003202
BZTO104(e)040023

CHEM-SECURITY SYSTEMS, INC. DISPOSAL REQUEST

RECEIVED MAY 15 1985

REFERENCE # 15589

WASTE PROFILE SHEET NO.

SUBJECT:

WASTE STREAM NAME: PCP contaminated soil

PHYSICAL STATE: LIQUID ☐ SOLID ☒ SEMISOLID ☐

U242
EPA WASTE CODE

GENERATOR NAME: TIME OIL CO.

OSD000597543
EPA GENERATOR I.D. NUMBER

FACILITY ADDRESS

Time Oil Co.
12005 N. Burgard Rd.
Portland, Or 97203 - 6493

MAILING ADDRESS

Same

GENERATOR CONTACT PERSON NAME: John P. Denham Tel. No. 206 285-2400

Review and approval of the subject waste stream is requested for disposal at the Chem-Security Arlington site. The complete waste description is detailed on the attached waste profile sheet and is summarized below.

DESCRIPTION CHEMICAL COMPOSITION	PROCESS/OPERATION GENERATING WASTE
Contaminated soil (pentachlorophenol, tetrachlorophenol other chlorinated chemicals) non-contaminated soil	Clean up

WASTE VOLUME REQUESTED FOR DISPOSAL: 260 cubic yards (NOW) ? (ANNUAL)

Based on the Waste Characteristics, Chem-Security proposes to Dispose of the Waste By (Describe Treatment/Disposal Procedure)

Landfill by Procedure 4.

No free liquids allowed.

C.C. CSSI, Arlington, OR
C.C. CSSI, Bellevue, WA
CSSI, Portland, OR
Generator

SUBMITTED BY: J. Craig McKenzie
NAME (PRINT)

SIGNATURE

4-29-85
DATE

FOR OREGON DEPARTMENT OF ENVIRONMENTAL QUALITY USE ONLY

THE SUBJECT WASTE STREAM HAS BEEN REVIEWED FOR DISPOSAL AT THE ARLINGTON SITE AND IS HEREBY:

State of Oregon
Department of Environmental Quality
APPROVED
On May 14, 1985
By Elizabeth L. Chang
Solid Waste Division
Hazardous Waste Operations

10000

COMMENTS:

TOLS003203

BZTO104(e)040024

Waste Management, Inc.

GENERATOR'S WASTE MATERIAL PROFILE SHEET

TSDR E13588

PO #[illegible] 2/20/85

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 3

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 ____ %

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

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

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

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)	-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

TOLS003204

H SPECIAL HANDLING INFORMATION

☐ ADDITIONAL PAGE(S) ATTACHED

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: John P. Denham

10000

TITLE: Environmental Manager

DATE: February 19, 1985

BZTO104(e)040025

REC' T.O.C. PORTLAND 5/16/85

CHEM-SECURITY SYSTEMS, IN DISPOSAL REQUEST

REFERENCE: E13588
WASTE PROFILE SHEET NO.

SUBJECT:

WASTE STREAM NAME: PCP contaminated soil

PHYSICAL STATE
LIQUID ☐ SOLID ☒ SEMISOLID ☐

1242
EPA WASTE CODE

GENERATOR NAME: TIME OIL CO. ORD009597543
EPA GENERATOR I.D. NUMBER

FACILITY ADDRESS	MAILING ADDRESS
Time Oil Co.	Same
12005 N. Burgard Rd.	
Portland, Or	

GENERATOR CONTACT PERSON NAME: John P. Denham Tel. No. (206 285-2400

Review and approval of the subject waste stream is requested for disposal at the Chem-Security Arlington site. The complete waste description is detailed on the attached waste profile sheet and is summarized below.

DESCRIPTION CHEMICAL COMPOSITION	PROCESS/OPERATION GENERATING WASTE
Contaminated soil (pentachlorophenol, tetrachlorophenol other chlorinated chemicals) non-contaminated soil	Clean up

WASTE VOLUME REQUESTED FOR DISPOSAL: 260 cubic yards (NOW) 0 (ANNUAL)

Based on the Waste Characteristics, Chem-Security proposes to Dispose of the Waste By (Describe Treatment/Disposal Procedure)

Landfill by Procedure 4.

No free liquid allowed.

C.C. CSSI, Arlington, OR
C.C. CSSI, Bellevue, WA
CSSI, Portland, OR
Generator

10000

SUBMITTED BY: J. Craig McKenzie
NAME (PRINT)
J Craig McKenzie
SIGNATURE
4-29-85
DATE

FOR OREGON DEPARTMENT OF ENVIRONMENTAL QUALITY USE ONLY

THE SUBJECT WASTE STREAM HAS BEEN REVIEWED FOR DISPOSAL AT THE ARLINGTON SITE AND IS HEREBY:

State of Oregon
Department of Environmental Quality
APPROVED
On May 14, 1985
By Edward S. Chiang
Solid Waste Division
Hazardous Waste Operations

RE: HW4.10 T

COMMENTS:

TOLS003205

CSSI-6000 (1-85)

BZTO104(e)040026

"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 Blvd.
Chesterfield, MO 63017
(314) 532-7660

☐ San Francisco Division
230 Cutting Blvd.
Richmond, CA 94802
(415) 234-7400
or (415) 398-5351

☐ Seattle Division
901 Fairview Ave. No.
P.O. Box 1730
Seattle, WA 98111
(206) 622-2900

RIEDEL
ENVIRONMENTAL SERVICES, INC.

April 25, 1985

Mr. Neil Wallis
Time Oil Company
P. O. Box 03137
12005 N. Burgard Street
Portland, OR 97203

Dear Neil:

Thank you for the opportunity to visit your plant and discuss with you the penta-chlorophenol sampling requirements you have at your northwest terminal wood treating site.

We propose that an initial composite sample survey be initiated to accurately define the boundaries of the PCP contamination zone. These surface samples would be collected to establish the actual area to be sampled later by coring at depth, and are warranted since the data indicates contamination at a site outside of your original proposed sampling plan. This task would be performed at a time and materials rate. It would be expected to be quite nominal relative to the core sampling, and will minimize the possibility of having to remobilize the drill rig to modify or extend the core sampling procedure in the future.

We will also review the sampling plan and, with DEQ approval, design a sampling plan that will meet their requirements while minimizing the number of holes needed. This task would also be billed at a time and materials rate and may utilize a triangular sampling matrix to improve coverage.

Riedel Environmental Services is prepared to perform the actual sampling and analysis including grid layout, drilling, sampling at six depths, analysis for PCP, decontamination of personnel and equipment, PCP concentration contour analysis, report and background level determination. The estimate for this task is $18,600, would require five days on site, and is based on an estimated sample area of 80' x 80'. If preliminary composite samples indicate a different area, this bid will be revised accordingly. If tetrachlorophenol analyses are also required, analytical costs will increase this bid by $5,000.

On the basis of the above results, RES can prepare an estimate for removal and disposal of the contaminated soils. We can also include monitoring or observation wells if required.

10000

TOLS003206

Encl. 2

Please contact either myself or Rick Gariepy if you have any questions or would like additional information.

Sincerely,

RIEDEL ENVIRONMENTAL SERVICES, INC.

John H. Ruddick
Microbiologist

JHR:kps

10000

TOLS003207

BZTO104(e)040028

SAIF CORPORATION

INSURING COMPANY:
☐ SAIF CORPORATION
☐ SAIF CORPORATION OF OREGON

Certificate of Coverage

Date of Issue: FEBRUARY 25, 1985

This certifies that NW VACUUM TRUCK SERVICE INC., *Policy No.* 426329, *is insured with SAIF, with a policy period ending date of* JUNE 30, 1985, *and is complying with the Oregon Workers' Compensation Law to provide for payment of compensation to subject Oregon workers.*

TO: TIME OIL CO,
2737 W. COMMODORE WAY
SEATTLE, WASHINGTON 98199

ATTN: JOHN DENHAM

Michael J. Dora

Michael J. Dora
Director
Underwriting Division

TOLS003208

F1220 1/84

BZTO104(e)040029

Marsh & McLennan

Marsh & McLennan, Incorporated
Marsh & McLennan Building
720 Olive Way
Seattle, Washington 98101
Telephone (206) 223-1240

March 5, 1985

Time Oil Company
2737 West Commodore Way
Seattle, Washington 98199

Attention: John Denham

Insured Northwest Vacuum Truck Service, Inc.

Company and Policy No. Safeco

Various - See attached certificate

Coverage

Location Post Office Box 24402
Seattle, Washington 98124

( ) Policy enclosed

(xx) Certificate ~~xxxpoxDxcyxcopyx~~ enclosed

( ) Premium invoice enclosed for

( ) Premium invoice will be mailed to you by the Insuror

( ) Mortgage or Loss Payable clause enclosed

( ) Contract of Sale clause enclosed

( ) Please return for cancellation, Policy No.

( )

Sincerely yours,

MARSH & McLENNAN, INCORPORATED

By Jackie Starr
Jackie Starr
Account Representative

Enclosures
mf
cc: Northwest Vacuum Truck Service, Inc.
Attn Mr. Steve Skeel

10000

TOLS003209

BZTO104(e)040030

Certificate of Insurance

ACORD

THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER. THIS CERTIFICATE DOES NOT AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES LISTED BELOW.

NAME AND ADDRESS OF AGENCY

MARSH & McLENNAN, INCORPORATED
MARSH & McLENNAN BUILDING
720 OLIVE WAY
SEATTLE, WASHINGTON 98101
(206) 223-1240

COMPANIES AFFORDING COVERAGES

COMPANY LETTER A: SAFECO
COMPANY LETTER B:
COMPANY LETTER C:
COMPANY LETTER D:
COMPANY LETTER E:

NAME AND ADDRESS OF INSURED

NORTHWEST VACUUM TRUCK SERVICE, INC.
POST OFFICE BOX 24402
SEATTLE, WASHINGTON 98124

This is to certify that policies of insurance listed below have been issued to the insured named above and are in force at this time. Notwithstanding any requirement, term or condition of any contract or other document with respect to which this certificate may be issued or may pertain, the insurance afforded by the policies described herein is subject to all the terms, exclusions and conditions of such policies.

COMPANY LETTER	TYPE OF INSURANCE	POLICY NUMBER	POLICY EXPIRATION DATE	Limits of Liability in Thousands (000)	EACH OCCURRENCE	AGGREGATE
A	GENERAL LIABILITY [X] COMPREHENSIVE FORM [X] PREMISES—OPERATIONS [X] EXPLOSION AND COLLAPSE HAZARD [X] UNDERGROUND HAZARD [X] PRODUCTS-COMPLETED OPERATIONS HAZARD [X] CONTRACTUAL INSURANCE [X] BROAD FORM PROPERTY DAMAGE [X] INDEPENDENT CONTRACTORS [X] PERSONAL INJURY	CP 842833	05/30/85	BODILY INJURY	$	$
				PROPERTY DAMAGE	$	$
				BODILY INJURY AND PROPERTY DAMAGE COMBINED	$ 500,000	$ 500,000
				PERSONAL INJURY		$
A	AUTOMOBILE LIABILITY [X] COMPREHENSIVE FORM [X] OWNED [X] HIRED [X] NON-OWNED	BA 842833 A	05/30/85	BODILY INJURY (EACH PERSON)	$	
				BODILY INJURY (EACH ACCIDENT)	$	
				PROPERTY DAMAGE	$	
				BODILY INJURY AND PROPERTY DAMAGE COMBINED	$ 500,000	
A	EXCESS LIABILITY [X] UMBRELLA FORM [ ] OTHER THAN UMBRELLA FORM	UL 842833	05/30/85	BODILY INJURY AND PROPERTY DAMAGE COMBINED	$1,000,000	$1,000,000
	WORKERS' COMPENSATION and EMPLOYERS' LIABILITY			STATUTORY		
					$	(EACH ACCIDENT)
	OTHER					

DESCRIPTION OF OPERATIONS/LOCATIONS/VEHICLES

As respects the operations of the Insured.

TOLS003210

Cancellation: Should any of the above described policies be cancelled before the expiration date thereof, the issuing company will endeavor to mail 20 days written notice to the below named certificate holder, but failure to mail such notice shall impose no obligation or liability of any kind upon the company.

ACCOUNT EXECUTIVE: Jo Ann Crook

NAME AND ADDRESS OF CERTIFICATE HOLDER

Time Oil Company
2737 West Commodore Way
Seattle, Washington 98199
Attention: John Denham

10000

DATE ISSUED: March 5, 1985 (mf)

MARSH & McLENNAN, INCORPORATED

By: John C. Day

AUTHORIZED REPRESENTATIVE

(John C. Day)

ACORD 25 (1/79)

BZTO104(e)040031

CONTRACT BOND

Bond No. H 34156

KNOW ALL MEN BY THESE PRESENTS, That we, NORTHWEST VACUUM TRUCK SERVICE, INC.

5555 NORTH CHANNEL - BLDG. 43 - PORTLAND, OREGON 97217

called the Principal, and HERITAGE INSURANCE COMPANY OF AMERICA, A ILLINOIS corporation, called the Surety, are held and firmly bound unto TIME OIL CO.

called the owner in the sum of FIFTY THREE THOUSAND AND NO/100THS ---------- Dollars ($ 53,000.00**), for the payment whereof said Principal and Surety bind themselves firmly by these presents.

WHEREAS, the Principal has, by written Agreement, dated MARCH 12, 19 85, entered into a Contract with the Owner for REMOVAL OF EARTHEN MATERIAL OWNED BY OWNER FROM ITS PRESENT LOCATION, LOAD IT INTO SUITABLE TRANSPORTATION VEHICLES AND TRANSPORT IT TO A DISPOSAL FACILITY APPROVED BY THE OREGON DEPARTMENT OF ENVIRONMENTAL QUALITY.

a copy of which is by reference made a part hereof;

NOW, THEREFORE, THE CONDITION OF THIS OBLIGATION IS SUCH, That if the Principal shall faithfully perform the Contract, and indemnify and save harmless the Owner from all loss, cost or damage which Owner may suffer by reason of any lien arising out of claim for labor or materials utilized in the construction under said Contract, then this obligation shall be void; otherwise to remain in full force and effect.

Signed and sealed this 12TH day of MARCH, 19 85.

NORTHWEST VACUUM TRUCK SERVICE, INC.
Principal

By: S M Steel

HERITAGE INSURANCE COMPANY OF AMERICA

By: J. C. Baumann
J. C. BAUMANN
Attorney-in-fact

10000

ENCL. 6

TOLS003211

BZTO104(e)040032

HERITAGE INSURANCE COMPANY OF AMERICA

LINCOLNWOOD, ILLINOIS

Power of Attorney

PRINCIPAL NORTHWEST VACUUM TRUCK SERVICE, INC. EFFECTIVE DATE MARCH 12, 1985

DBA _____ AMOUNT OF BOND $ 53,000.00

POWER NO. H 34156

KNOW ALL MEN BY THESE PRESENTS: That the Heritage Insurance Company, a Corporation in the State of Illinois, having its principal office in Lincolnwood, Illinois, pursuant to the following resolution, adopted by the Board of Directors of the said Company on the 9th day of March, 1979, to wit:

"The President, or any Vice-President, or other officer designated by the Board of Executive Committee shall have authority, severally, to make, execute and deliver a power of attorney constituting as Attorney-in-Fact such persons, firms or corporations as such officers may select from time to time."

does hereby make, constitute and appoint J.T. Kohoutek, C.J. Huffman and/or J.C. Baumann of Seattle in the State of Washington, its true and lawful attorney(s)-in-fact, with full power and authority hereby conferred in its name, place and stead, to sign, execute, acknowledge and deliver in its behalf, and its act and deed, as follows:

The obligation of the Company shall not exceed the sum of five hundred thousand ($500,000.00) dollars.

and to bind Heritage Insurance Company thereby as fully and to the same extent as if such bond or undertaking was signed by the duly authorized officers of the Heritage Insurance Company, and all the acts of said Attorney(s) pursuant to the authority herein given, are hereby ratified and confirmed.

IN WITNESS WHEREOF, the Heritage Insurance Company has caused these presents to be signed by its President and/or its Vice-President, and its Corporate Seal to be hereto affixed.

HERITAGE INSURANCE COMPANY OF AMERICA

SEAL

Vincent M. Giacinto, President

State of Illinois)
County of Cook) SS:

On this 9th day of March, 1979, before the subscriber, a Notary Public of the State of Illinois in and for the County of Cook duly commissioned and qualified, came V. M. Giacinto of the Heritage Insurance Company, to me personally known to be the individual and officer described herein, and who executed the preceding instrument, and acknowledged the execution of the same, and being by me duly sworn, deposed and said, that he is the officer of said Company aforesaid, and that the seal affixed to the preceding instrument is the Corporate Seal of said Company, and the said Corporate Seal and signature as an officer were duly affixed and subscribed to the said instrument by the authority and direction of the said Corporation, and that the resolution of said Company, referred to in the preceding instrument, is now in force.

IN TESTIMONY WHEREOF, I have hereunto set my hand, and affixed my official seal at Lincolnwood, Illinois, the day and year above written.

NOTARY PUBLIC COOK COUNTY, ILL.

Notary Public

JOSEPH D. UDONI
NOTARY PUBLIC, State of Illinois
Qualified in State of Illinois
Commission Expires March 4, 1984

State of Illinois)
County of Cook) SS:

CERTIFICATE

I, the undersigned, Secretary of *HERITAGE INSURANCE CO.* a stock corporation of the State of Illinois, DO HEREBY CERTIFY that the foregoing and attached Power of Attorney and Certificate of Authority remains in full force and has not been revoked; and furthermore, that the Resolution of the Board of Directors, as set forth in the Certificate of Authority, are now in force.

Signed and Sealed at the Home Office of the Company, at Lincolnwood, Illinois. Dated this 12TH day of MARCH A.D., 19 85

SEAL

Secretary

10000

H-73

TOLS003212

BZTO104(e)040033

SEATTLE
TACOMA
PORTLAND
STOCKTON
RENO
RICHMOND
SAN PEDRO
LOS ANGELES

TIME OIL COMPANY

2737 W. COMMODORE WAY, P.O. BOX 24447, TERMINAL ANNEX, SEATTLE, WA 98124

February 4, 1985

Department of Environmental Quality
Attn: Janet Gillaspie, Northwest Region Manager
522 S.W. 5th Avenue, P.O. Box 1760
Portland, Oregon 97207

Dear Ms. Gillaspie:

This pertains to our Northwest Terminal location at 12005 North Burgard in Portland, Oregon and the bulk pentachlorophenol operation at that site. The purpose of this letter is to acquaint you with concurrent actions being taken by two companies to voluntarily correct what both felt may become a problem.

BACKGROUND

In March of 1982, a potential problem with the ground surrounding the pentachlorophenol operation was determined. Contract between Koppers Co. (product owner) and Time Oil Co. (land owner) was cancelled. Product phaseout and clean-up actions were jointly agreed upon by both companies. Accomplishments to date have been:

a. Bulk pentachlorophenol operations ceased.

b. On hand product inventory blended off and shipped out.

c. All tanks and piping cleaned.

d. Waste from cleaning shipped to Arlington.

e. Piping removed and scrapped.

f. Time Oil Co. tanks removed and scrapped.

Remaining to be accomplished are:

a. Removal of Koppers owned tanks (scheduled for week of February 4, 1985).

b. Contaminated soil removal and replacement.

10000

TOLS003213

On December 12, 1984, Messrs. John Smits and Rick Gates of your office conducted soil sampling activities at the site. Twelve samples were taken inside diked areas. Split samples were provided Time Oil Co. DEQ laboratory test results (49 pages) were received here on February 1, 1985. Telecon with Messrs. Smits and Gates on that date revealed the following:

a. All samples were tested for lead content. None were found to be above normal limits (page 1).

b. All samples were tested for fourteen different pesticides. None were found to be above normal limits (pages 3, 6, 9, 12, 15, 18, 21, 24, 27, 30, 33, 36).

c. All samples were scanned for organic chemicals other than priority pollutants (pages 4, 7, 10, 13, 16, 19, 22, 25, 28, 31, 34, 37). No unknowns were identified above detection limits on nine of these samples. On three sample, (pages 13, 28, 31), the compounds tentatively identified were those petroleum residues normally expected to be found in a tank farm. Estimated concentrations were so low that none were at all significant, simply present.

d. All samples were tested for priority pollutant chemicals (pages 2, 5, 8, 11, 14, 17, 20, 23, 26, 29, 32, 35). No unknowns were identified above detection limits on eight of these samples. On one sample (page 11), only two trace elements were found. Both were in the 1 ppm quantity, which is not considered significant and certainly cannot be classed as a problem. On one sample (page 23), three residues of polynuclear aeromatics were found, again insignificant in quantity. On one sample (page 26), one more polynuclear aeromatic of insignificant quantity was found along with a small quantity (515 ppm) of pentachlorophenol and 12 ppm of tetrachlorophenol. It is my understanding that since this quantity (515 ppm) of pentachlorophenol is below 1000 ppm, it falls in the gray area of consideration regarding significance. The tetrachlorophenol is a part of commercial pentachlorophenol so its presense would naturally be expected. On one sample (page 29), pentachlorophenol (1820 ppm) and tetrachlorophenol (71 ppm) were found. This latter finding confirms our unitedly expressed (Koppers and Time Oil) concern and substantiates the need for corrective action as we had previously planned.

CURRENT

As of today, it appears that our (Koppers and Time Oil) initial plan of action remains valid. Progress has been made. Time and more favorable weather conditions should result in the contaminated soil being removed, necessary second soil tests being conducted and new soil being put in place without difficulty.

Sincerely,

John P. Denham
Environmental Manager

JPD/ch

TOLS003214

10000

BZTO104(e)040035

Portland operation

January 24, 1985

Mr. Gary Calaba
Environmental Analyst
Hazardous Waste Operations
Solid Waste Division
Department of Environmental Quality
522 Southwest Fifth Avenue
Box 1760
Portland, Oregon 97207

Subject: HW7.20
Koppers Storage Tanks
Located at 1200
North Burgard
Portland, Oregon

Dear Mr. Calaba:

Per our discussion of your December 18, 1984 correspondence to Mr. Jim Garrity of Koppers' St. Louis Office, we wish to advise that the material manifested under the provisional EPA Identification Number ORP 000008000 was generated from the cleanout of storage tanks no longer in use at the above referenced location. Since this cleanout is complete, I do not anticipate further use of this number.

Sincerely,

William J. Baldwin

WJB/bml

cc: Jim Garrity
bcc: ✔Templeton Smith- w/copy of Mr. Calaba's letter.
D. Marion

10000

TOLS003215

BZTO104(e)040036

VICTOR ATIYEH
Governor

Department of Environmental Quality

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

December 18, 1984

CERTIFIED MAIL NO. P 497 014 602

Jim Garrity
Koppers Company, Inc.
5137 Southwest Avenue
St. Louis, MO 63110

Re: HW 7.20
Koppers Storage Tanks
Located at 1200 N. Burgard
Portland, Oregon

Dear Mr. Garrity:

On December 6, 1984, the Department assigned your company the provisional EPA Identification No. ORP 000008000 to allow you to move hazardous waste from your site at 12005 N. Burgard Street, Portland, OR 97203. This provisional number is only for this particular shipment and will be cancelled once the waste is accepted by the designated disposal facility, in this instance Chem-Security Systems at Arlington, Oregon.

For your permanent EPA I.D. No., please complete the blank form 8700-12 (enclosed) and return it to us within 10 calendar days of receipt of this letter. Please call me at area code (503) 229-6534 if you have questions.

Sincerely,

Gary Calaba
Environmental Analyst
Hazardous Waste Operations
Solid Waste Division

GJC:b
ZB4060
Enclosure(s)
cc: Northwest Region, DEQ
Al Goodman, EPA
Joyce Nunley, CSSI

Temp

10000

EQ 1

TOLS003216

BZTO104(e)040037

JAN 25 1985

✓cc Templeton
Smith

KOPPERS

Interoffice Correspondence

Time Oil File K-1400

To Bill Baldwin

From James F. Garrity

As info.

Location K-750

Location St. Louis

Subject Penta Exposure - Time Oil

Date January 23, 1985

Bill B.

Attached are copies of letters sent to us by St. Johns Clinic. It seems that workers that were exposed to penta are getting physical exams.

Please review and advise if needed.

Jim

James F. Garrity

JFG/mp
Encl.
P.S. Temp Smith may be interested.

10000

K-5 REV. 2

TOLS003217

BZTO104(e)040038

ST. JOHNS CLINIC, P.C.
PHYSICIANS AND SURGEONS
GORDON F. WOLFE, M.D.
J. VICTOR VORE, M.D.
GORDON A. CARON, M.D.

9250 N. LOMBARD
PORTLAND, OREGON 97203
(503) 286-8808

January 17, 1985

Time Oil Co.,
Wood Treating Chemical Department,
Koppers' Company, Inc.,
5137 S. W. Avenue,
St. Louis, Missouri 63110.

Re: Donald Grosmick

Employer: Time's Oil Plant,
12005 No. Burgard,
Portland, Oregon

Dear Gentlemen:

On January 9, 1985 I examined Mr. Donald Grosmick. These are the results as oriented to your ten points that you recommended regarding his general physical examination for exposure to occupational chemicals.

The patient states he is not sure he has had any recent exposure to Pentachlorophenol. Examination of the skin revealed that he has some acne-like lesions of the back. However, these are of long-standing and he has had these since he was a teenager. They have not recently increased in size and are more scarring in nature than active acne. Examination of the nose and throat revealed no irritation. Examination of the eyes, particularly the cornea and the iris showed no abnormality. Blood pressure, sitting, was 122/90 and standing is 120/84. Examination of the abdomen revealed tenderness or enlargement of the liver. This was borne out on the SMAC-20 laboratory examination. Neurologic functions of the arms and legs were normal. The chest x-ray revealed no abnormalities of the bony thorax; the lungs were normal and the heart was normal in size and configuration. Urinalysis, microscopically, was negative for cells except for an occasional epithelial cell. The examination was negative for sugar and albumin. The SMAC-20 analysis, including blood sugars were all normal.

I hope this information will be of benefit to you.

Sincerely yours,

Gordon F. Wolfe

Gordon F. Wolfe, M.D.

GFW/transdata

10000

ST. JOHNS CLINIC, P.C.
PHYSICIANS AND SURGEONS
GORDON F. WOLFE, M.D.
J. VICTOR VORE, M.D.
GORDON A. CARON, M.D.

8280 N. LOMBARD
PORTLAND, OREGON 97203
(503) 286-8808

January 17, 1985

Time Oil Co.,
12005 No. Burgard Road,
Portland, Oregon 97218.

Re: Physical Examination
Mike DeLaschmit
Date: January 7, 1985

Dear Gentlemen:

Mr. Mike DeLaschmit was examined by me at your request on January 7, 1985.

The interim history was that the patient had increasing fatigue in the fall of 1984 and saw his family physician who advised him that his physical examination by him was normal but that he required more rest.

The patient has not been exposed to Pentochlorophenol or any other chemicals recently and is presently feeling in good condition. The patient smokes one pack of cigarets a day.

General physical examination was performed by me and the ten items listed that you want particular emphasis to be expressed were done, and in summary his skin examination was normal. There was no irritation of the nose or throat. Examination of the eyes and cornea was normal. The blood pressure, while standing, was 112/76 and while sitting, 122/74. Examination of the abdomen revealed no masses and no abnormalities. The liver was not enlarged to palpation and there was no spleen palpable. Neurologic examination of the arms and legs, and the rest of the body was normal. The chest x-ray revealed no abnormality of the bony skeleton nor of the heart size which was normal. The lungs showed no abnormality. Urinalysis: microscopic examination showed just an occasional epithelial cell. There was no blood or pus, or white blood cells present. Examination for sugar and albumin was negative.

The blood chemistry analysis in the form of an SMA-20 was performed and all 20 items checked were normal.

In summary, this patient is presently, when examined by me, with special emphasis on the items mentioned by your company, found to be generally in good health. Despite his smoking one package of cigarets for many years, his time vital capacity was above normal. However, we still suggested to the patient that he avoid smoking, if possible.

I hope this information will be of help to you.

Sincerely,

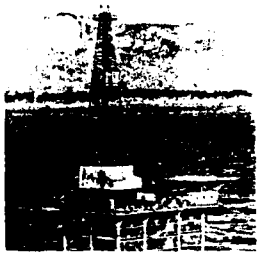
Gordon F. Wolfe, M.D.

GFW/transdata

10000

TOLS003220

BZTO104(e)040041

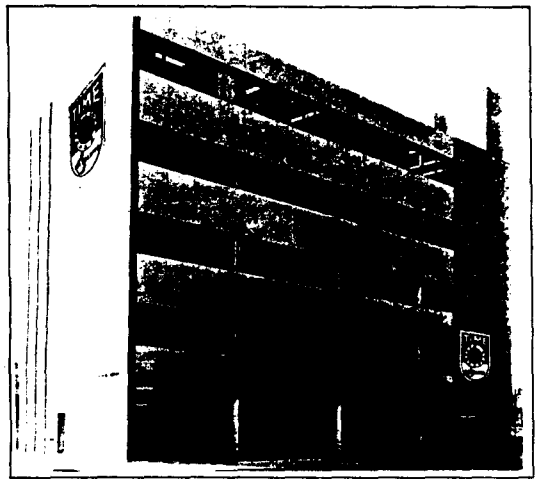


PRODUCING

REFINING

TIME OIL CO. / U.S. OIL & REFINING CO.

SUBSIDIARIES AND AFFILIATES



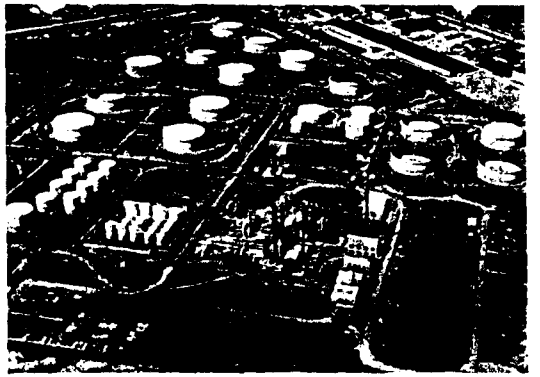
TIME OIL BUILDING – LOS ANGELES

Policy making headquarters. From this location, executive staff maintain close contact with the widespread operations.

TERMINALING

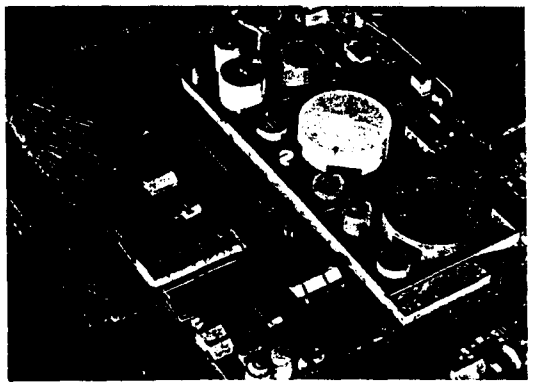
MARKETING

TACOMA – WASHINGTON



U.S. OIL & REFINING – TACOMA PLANT

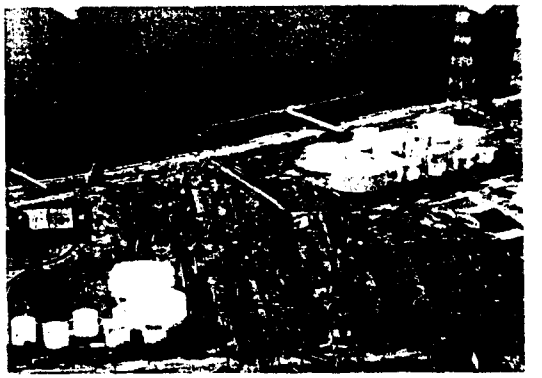
Located with deep water access near Tacoma harbor. This modern plant is the largest independent refinery in the northwest United States with a designed crude input capacity of approximately 33,000 barrels per day, and modern downstream facilities including catalytic, reforming, and hydrotreating, and manufacturing a full range of petroleum products. Total storage capacity is approximately 2,000,000 barrels.



TACOMA TERMINAL

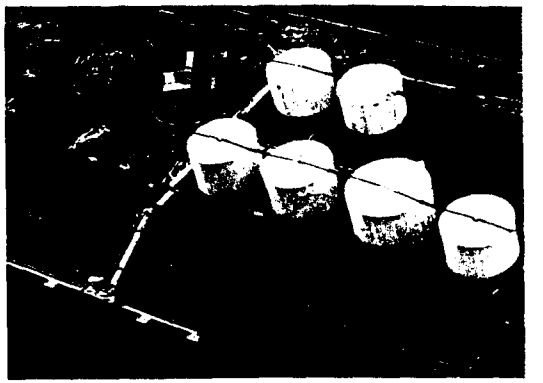
Accessible to ocean-going vessels, connected to Olympic pipelines. Total storage capacity approximately 200,000 barrels.

PORTLAND – OREGON



TIME OIL'S NORTHWEST TERMINAL – PORTLAND

Located on the Willamette River at Portland. Its tank car facilities are connected with four major railroads and its docks are accessible to ocean going tankers, thus making this terminal the ideal point of distribution for Oregon, southwest Washington and Idaho. Total storage capacity approximately 800,000 barrels.



TIME OIL'S PORTLAND TERMINAL CO.

The Portland Terminal Co. is the second of two terminals owned and operated by Time Oil Co. on the Willamette River at Portland. With docks accessible to ocean-going tankers, pipeline connections with Southern Pacific Pipelines and Olympic Pipelines – this terminal handles all grades of gasoline and diesel oil – modern truck loading facilities – storage capacity approximately 200,000 barrels.

BZTO104(e)040042

10000

TOLS003221

Time Oil file

George McGinley
Pittsburgh, PA

Real Estate Section
Pittsburgh, PA

Operating Agreement
Portland, Oregon

January 16, 1985

Time Oil Co. and Wood Treating Chemical Co. (now Koppers) entered into an operating agreement and lease of tanks dated March 1, 1967 for a five-year term to March 1, 1972. The agreement was renewed to March 1, 1982 and Koppers continued to operate thereafter on a verbal month-to-month basis.

The agreement was recently canceled and all outstanding problems resolved. Accordingly, it is in order for you to sell, to the highest bidder, the five Koppers tanks shown on copy of letter dated May 5, 1972, which you have.

T. F. McGuire

TFM/sjd

cc: J. Palmer
D. Marion
T. Smith

10000

TOLS003222

BZTO104(e)040043

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FOR THE EXCLUSIVE USE OF SUBSCRIBER 016 05933L.

ATTN: TEMPLETON SMITH

IN DATE

DUNS: 00-959-1207
TIME OIL CO (INC)
JACKPOT
SAV-MOR
GAS MART
QUICKY MART
TIME SAV-OR

BOX 24447
SEATTLE WA 98111
2737 W COMMODORE WAY
AND BRANCH(ES) OR DIVISION(S)
SEATTLE WA 98199
TEL: 206 285-2400

DATE PRINTED
JAN 09 1985

RET GASOLINE WHOL
PETROLEUM PRODUCTS

SIC NOS.
55 41 51 72

SUMMARY

RATING	4A1
STARTED	1941
PAYMENTS	SEE BELOW
SALES	$170,000,000 (PROJ)
WORTH F	$47,387,352
EMPLOYS	337(75 HERE)
HISTORY	CLEAR
CONDITION	STRONG

CHIEF EXECUTIVE: RAYMOND D ABENDROTH, CHB/PRES

PAYMENTS (AMOUNTS MAY BE ROUNDED TO NEAREST FIGURE IN PRESCRIBED RANGES)

REPORTED	PAYING RECORD	HIGH CREDIT	NOW OWES	PAST DUE	SELLING TERMS	LAST SALE WITHIN
11/84	PPT	500	-0-	-0-		2-3 MOS
	PPT	100	-0-	-0-		2-3 MOS
	PPT	50	-0-	-0-		6-12 MOS
	PPT	50	-0-	-0-	1 10 N30	6-12 MOS
	(005)	50	-0-	-0-		2-3 MOS
10/84	ANTIC	100	-0-	-0-		2-3 MOS
	DISC-PPT	2500	-0-	-0-		4-5 MOS
	PPT	1000000	80000	70000		1 MO
	PPT	500000				
	PPT	400000	400000	-0-		1 MO
	PPT	300000	200000	-0-		1 MO
	PPT	70000	-0-	-0-		6-12 MOS
	PPT	2500	2500	-0-	1 10 N30	1 MO
	PPT	1000	-0-	-0-		6-12 MOS
	PPT	500	500	-0-		1 MO
	PPT	250	-0-	-0-	2 10 PROX	
	PPT	250	250	-0-		1 MO
	PPT	250	-0-	-0-		6-12 MOS
	PPT	100	-0-	-0-	2 10 PROX	
	PPT	100	-0-	-0-	N7	6-12 MOS
	PPT	100	50	-0-		1 MO
	PPT	50	50	-0-	N7	1 MO
	PPT-SLOW 30	250	250	50	N7	1 MO
	PPT-SLOW 45	15000	15000	2500		1 MO
	PPT-SLOW 90	2500	500	500		4-5 MOS
09/84	DISC	15000	15000	-0-		2-3 MOS
08/84	DISC	100	-0-	-0-	2 10 PROX	6-12 MOS

10000

TOLS003223

	PPT-SLOW 30	250	-0-	-0-	2 10 N30	2-3 MOS
	SLOW 15	1000	-0-	-0-		
07/84	DISC	15000	-0-	-0-		
	DISC	10000	-0-	-0-	1 10 N30	6-12 MOS
	SLOW 5	100				
	SLOW 10	250				
	SLOW 10	100				
	SLOW 20	50				
06/84	DISC	100	-0-	-0-		6-12 MOS
05/84	PPT	50000	-0-			4-5 MOS
	PPT	2500	2500	-0-		1 MO
	PPT	50			N30	
	PPT-SLOW 45	10000			N30	
03/84	(041)	40000	20000	-0-		2-3 MOS
01/84	PPT	500	250	-0-	N30	1 MO
	PPT	500	-0-	-0-		6-12 MOS
	SLOW 5	100	-0-	-0-		
	(045)	7500	-0-	-0-		6-12 MOS
12/83	(046)	50				2-3 MOS

PAYMENT EXPERIENCES REFLECT HOW BILLS ARE MET IN RELATION TO THE TERMS GRANTED. IN SOME INSTANCES PAYMENT BEYOND TERMS CAN BE THE RESULT OF DISPUTES OVER MERCHANDISE, SKIPPED INVOICES ETC.

FINANCE

* A FINANCIAL SPREAD SHEET OF COMPARATIVES, RATIOS, AND INDUSTRY AVERAGES *
* MAY BE AVAILABLE. ORDER A DUNS FINANCIAL PROFILE VIA YOUR DUNSPRINT *
* TERMINAL OR LOCAL D&B OFFICE *

10/26/84

	FISCAL DEC 31 1980	FISCAL DEC 31 1982	FISCAL DEC 31 1983
CURR ASSETS	34,166,195	38,860,356	45,342,750
CURR LIABS	24,862,574	23,410,752	29,680,686
CURRENT RATIO	1.37	1.66	1.52
WORKING CAPITAL	9,303,621	15,449,604	15,662,064
TOTAL ASSETS	61,132,068	71,090,120	81,144,100
WORTH	34,237,490	44,962,884	47,387,352

SUBMITTED APR 16 1984 BY JAMES D MASON, EXEC VICE PRESIDENT. PREPARED FROM STATEMENT(S) BY ACCOUNTANT: ERNST & WHINNEY.

ACCOUNTANTS OPINION: "A REVIEW OF THE ACCOUNTANTS OPINION INDICATES THAT THE AUDIT MEETS GENERALLY ACCEPTED ACCOUNTING PRINCIPLES AND CONTAINS NO QUALIFICATIONS.".

--0--

THE DECEMBER 31 1983 FINANCIAL STATEMENT WAS REVIEWED BY REPORTER. CURRENT ASSETS CONSIST PRIMARILY OF CASH. OTHER ASSETS CONSIST OF FIXED ASSETS AND INVESTMENT IN SUBSIDIARIES. CURRENT LIABILITIES CONSIST LARGELY OF ACCOUNTS PAYABLE AND NOTES PAYABLE TO BANKS. LONG TERM DEBT CONSISTS OF MORTGAGES ON PROPERTY. THERE ARE NO INTANGIBLES OR CONTINGENT DEBT INDICATED. LIQUID ASSETS APPROXIMATE TOTAL DEBT.

ON OCT 25 1984 JAMES D MASON, EXEC VICE PRESIDENT, REFERRED TO THE ABOVE FIGURES.

HE SUBMITTED THE FOLLOWING PARTIAL ESTIMATES DATED OCT 25 1984:
PROJECTED ANNUAL SALES ARE $ 170,000,000.
FINANCIAL CONDITION IS STRONG. EQUITY HAS INCREASED THROUGH

RETENTION OF EARNINGS.

PUBLIC FILINGS
UCC FILING
10/26/84 FINANCING STATEMENT #833460097 FILED 12-12-83 WITH SECRETARY, STATE OF WA. DEBTOR: JACKPOT, SEATTLE, WA. SECURED PARTY: SEVEN-UP BOTTLING CO, SPOKANE, WA. COLLATERAL: SPECIFIED EQUIPMENT.

BANKING
10/84 ACCOUNT OPEN OVER THREE YEARS. LOAN(S) UNSECURED. PAYMENTS AS AGREED. RELATIONS SATISFACTORY. SHORT TERM CREDIT LINES ARE AVAILABLE IN EIGHT FIGURE AMOUNTS.

HISTORY
10/26/84

+RAYMOND D ABENDROTH, CHB PRES
JAMES D MASON, EX V PRES-FIN TREAS
H ROGER HOLLIDAY, V PRES-SUPPLY
BEN TSUCHIDA, V PRES SEC
ALBERT SCHNEIDER, V PRES-PPTY RE
C EDWARD MILLER JR, DIR CORP POL/PLAN

DIRECTOR(S): THE OFFICERS IDENTIFIED BY (+)

INCORPORATED WASHINGTON NOV 29 1941. AUTHORIZED CAPITAL CONSISTS OF 2,000,000 SHARES COMMON STOCK, $.25 PAR VALUE.

BUSINESS STARTED 1941 BY PRESENT CONTROL. 95% OF CAPITAL STOCK IS OWNED BY MILLER AND ABENDROTH FAMILIES. 5% OF CAPITAL STOCK IS OWNED BY KEY EMPLOYEES.

ABENDROTH BORN 1910 MARRIED. 1931-41 WITH CASCADE PETROLEUM COMPANY (INC), SEATTLE, WA. 1941 TO PRESENT ACTIVE HERE.

TSUCHIDA BORN 1931. 1952-57 A STUDENT. 1957 TO PRESENT EMPLOYED BY TIME OIL CO (INC) AND ELECTED TO PRESENT POSITION IN 1966.

SCHNEIDER BORN 1925 MARRIED. 1950 TO PRESENT ACTIVE HERE.

MASON BORN 1925. 1949 TO PRESENT ACTIVE HERE AND IS CHIEF FINANCIAL OFFICER.

HOLLIDAY BORN 1939. 1969 TO PRESENT ACTIVE WITH TIME OIL CO (INC) AND BECAME VICE PRESIDENT IN 1977.

MILLER BORN 1943. COMPANY FOUNDER'S SON AND ACTIVE IN SUBJECT COMPANY ALL OF HIS WORKING CAREER.

OPERATION
10/26/84 RETAILS GASOLINE AND LUBRICATION OIL (72%). WHOLESALES PETROLEUM PRODUCTS INCLUDING GASOLINE, FUEL OIL, DIESEL OIL, AND LUBRICATION OILS (26%). THE COMPANY HAS 225 COMPANY OPERATED GAS STATIONS. SUBJECT IS ALSO A TERMINAL OPERATOR ON THE WEST COAST STORING PETROLEUM PRODUCTS FOR OTHERS (2%). 3.4 millions of total sales SELLS FOR CASH 70% BALANCE ON ~~NET~~ 30 DAYS. HAS 500 ACCOUNTS. SELLS TO GENERAL PUBLIC, DISTRIBUTORS AND OIL COMPANIES. TERRITORY :WASHINGTON, OREGON, CALIFORNIA, NEVADA, AND IDAHO. NONSEASONAL.

EMPLOYEES: 337 INCLUDING OFFICERS. 75 EMPLOYED HERE.

FACILITIES: OWNS 40,000 SQ. FT. IN TWO STORY FRAME BUILDING IN GOOD CONDITION.

LOCATION: INDUSTRIAL SECTION ON SIDE STREET. THE FACILITY IS LOCATED ON THE LAKE WASHINGTON SHIP CANAL AND HAS DOCK AND STORAGE CAPACITY OF 185,000 BARRELS AT THIS LOCATION WITH A TOTAL OF 2,571,000 BARRELS FOR ALL TERMINAL LOCATIONS COMBINED.

BRANCHES: A DIVISION OFFICE IS LOCATED AT 5150 WILSHIRE BLVD, LOS ANGELES, CA. OTHER TERMINAL/STORAGE LOCATIONS ARE AT RICHMOND, CA; STOCKTON, CA; RENO, NV; 12005 N BURGARD AND 9400 ST HELENS ROAD IN PORTLAND, OR; BELLINGHAM, WA; AND 250 E "D" ST, TACOMA, WA.

SUBSIDIARIES: U S OIL & REFINING CO (INC), TACOMA, WA. 55% OWNED. A DELAWARE CORPORATION CHARTERED IN 1952. OPERATES A REFINERY. RELATED THROUGH STOCK OWNERSHIP OF OFFICERS AND CORPORATION. INTERCOMPANY RELATIONS GENERALLY CONFINED TO SERVICES PERFORMED BY ONE COMPANY FOR THE OTHER AND MERCHANDISE TRANSACTIONS ON REGULAR NET 30 DAY TERMS.

NORTHWEST TERMINAL CO (INC), SEATTLE, WA. STARTED 1943. OPERATES AS A REAL ESTATE HOLDING COMPANY AND AUTOMOTIVE EQUIPMENT RENTALS. PARENT OWNS 100% OF STOCK. INTERCOMPANY RELATIONS CONSIST OF SUBSIDIARIES LEASING PROPERTY TO PARENT ON REGULAR NET 30 DAY TERMS.

TIME OIL DRILLING CO (INC), SEATTLE, WA. STARTED 1975. INACTIVE. INTERCOMPANY RELATIONS: MANAGEMENT SERVICES.

01-09(190 /78) 21101 050 H

RAINIER NATIONAL BANK, SEATTLE, WA

****
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FULL DISPLAY COMPLETE

MEMORANDUM

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.

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

Attachment 3
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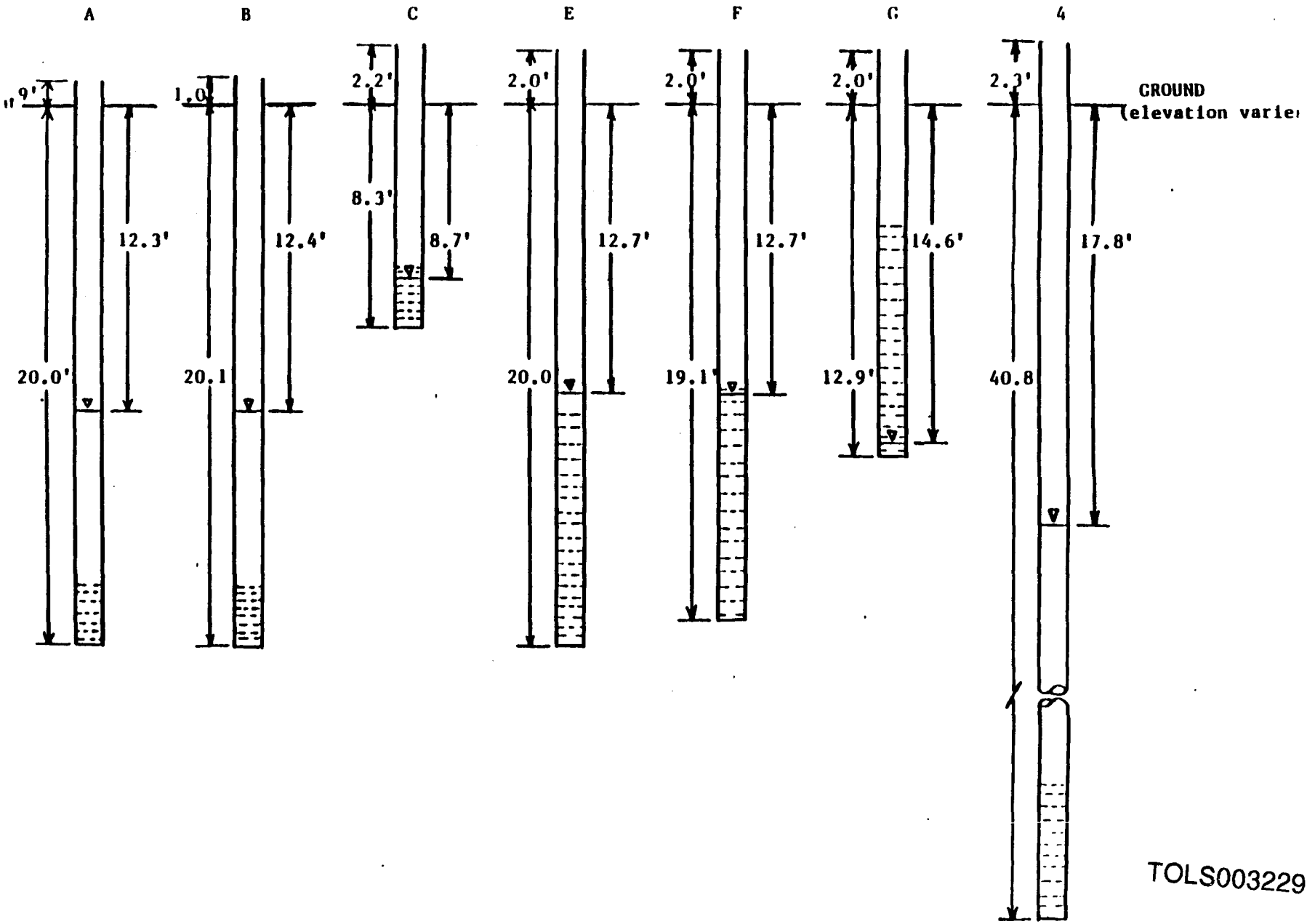
WELL CONSTRUCTION DETAILS



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Proposal

Environmental Consulting Services
Northwest Terminal Project
Portland, Oregon

April 8, 1993

Prepared for

Time Oil Co.
2737 West Commodore Way
Seattle, WA 98199-1233

Prepared by

Landau Associates, Inc.
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(206) 778-0907

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LANDAU ASSOCIATES, INC.
Environmental and Geotechnical Services

April 8, 1993

Mr. Kevin Murphy
Time Oil Company
2737 West Commodore Way
Seattle, WA 98199-1233

RE: PROPOSAL FOR ENVIRONMENTAL AND ENGINEERING CONSULTING SERVICES NORTHWEST TERMINAL FACILITY PROJECT PORTLAND, OREGON

Dear Mr. Murphy:

Landau Associates is pleased to have the opportunity to present this proposal for regulatory and technical services at Time Oil Company's (Time) Northwest Terminal Facility.

Landau Associates is confident that our proposed project team has the technical expertise, practical experience, and understanding of Time's project goals to accomplish a successful project within the schedule and budget guidelines desired by Time.

Specifically, Landau Associates offers:

- The experience to effectively work with the Oregon Department of Environmental Quality and the U.S. Environmental Protection Agency to meet regulatory requirements.
- Field staff with experience in, and knowledge of, the hydrologic and geologic conditions in the Portland area.
- The experience and technological background to produce innovative and cost-effective remediations of the site while minimizing Time's long-term liability.

We understand the importance to Time of achieving a successful site cleanup for this project. Landau Associates will give this project the highest priority to meet Time's expectations and attain a cost-effective solution.

Landau Associates looks forward to further discus Time's goals and objective at an interview.

LANDAU ASSOCIATES, INC.

By: Leslee C. Matthews

Leslee C. Matthews

and

John T. Baker

LCM/JTB/fas
No. 15.012

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INTRODUCTION

Landau Associates is pleased to present this proposal to Time Oil Company (Time) for environmental and engineering consulting services for the former pentachlorophenol mixing area and adjacent tank area at Time's Northwest Terminal facility in Portland, Oregon. The proposal is based on information contained in Time's March 17, 1993 Request for Proposal and on information obtained by Landau Associates during a site visit on April 1, 1993, and in several telephone discussions with Mr. Kevin Murphy.

We understand that Time seeks regulatory strategy development and technical services to support Time's environmental management of the former pentachlorophenol mixing area (the site) at Time's Northwest Terminal facility. The selected consultant will assist Time in establishing an integrated environmental regulatory strategy and facility investigation/ remediation program that minimizes Time's potential environmental liability, satisfies environmental regulatory requirements, and attains agency approval in a timely and cost-effective manner.

In response to the Request for Proposal, Landau Associates offers a proposed approach to pending environmental activities at the site and a demonstration of our project team's experience and expertise directly relevant to the site and its current regulatory status. Our proven technical expertise and record of success in evaluating regulations and negotiating cost-effective and protective remedial solutions for previous clients will benefit Time on this project.

SECTION A: SCOPE OF WORK

A.1 PROJECT BACKGROUND

A.1.1 Site History and Conditions

The site is a former pentachlorophenol mixing area on a small portion of Time's Northwest Terminal facility, approximately ¼ mile from the eastern bank of the Willamette River. The site currently consists of a pentachlorophenol (PCP) storage warehouse, a former PCP mixing tank area from which soil has been excavated, a stockpile of excavated PCP-containing soil located south-southwest of the excavation area, and an inactive soil treatment area.

Operations at the site were conducted by Time, under a lease agreement with Koppers Company, from 1967 through 1982. Operations included import of solid PCP and the various

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liquids (carriers) into which the PCP would be mixed; interim storage of the PCP and carriers; transfer and mixture of the PCP and carriers to formulations specified by Koppers; interim storage of the PCP formulations; and transfer of the formulations to 55-gallon barrels for offsite transport. No PCP-related activities have occurred at the site since 1982.

Releases of PCP, carriers, and PCP formulations to soil in the mixing area reportedly occurred through intermittent spillage from hoses, mixing vessels, and daily operations. Environmental investigations and remedial actions conducted by and for Time since 1982 resulted in the previously noted excavation of PCP-containing soils and generation of PCP-containing water. The excavation area was filled and regraded, and 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 (beneath the former PCP warehouse). The Oregon Department of Environmental Quality (DEQ) has determined that the PCP formulations spilled intermittently during daily site operations are Resource Conservation and Recovery Act (RCRA) hazardous wastes (waste code F027). In 1992, DEQ informed Time that the onsite soil stockpile, impacted by RCRA hazardous waste, does not meet RCRA hazardous waste storage requirements.

We understand that Time wants to satisfy regulatory requirements for the stored soil and water and is concerned with the potential risks posed to site workers who may contact contaminants in the unexcavated soil, as well as the potential for any remaining PCP (or carrier constituents) to leach to groundwater at levels that represent an unacceptable risk to the surface water of the Willamette River (the local groundwater discharge point). We understand that PCP has been documented in groundwater samples from the site and that Time is also concerned that current groundwater contamination has potential to impact the Willamette River.

A small former tank area where PCB-containing oil was stored is next to the PCP mixing area. An unknown volume of oil was spilled to soil in the area during tank cleaning operations. Time has requested that the evaluation of soil in this area also be included in the scope of services to determine whether any residual risk regarding the past release exists.

A.1.2 Current Regulatory Status

As described above, previous site operations impacted site soil and groundwater by releases of PCP and related chemicals through intermittent spillage from daily operations. DEQ has designated the released material as discarded, unused chemical formulations containing

PCP, and therefore RCRA listed hazardous waste F027. DEQ identified impacted environmental media at the site as F027 wastes through the RCRA "contained-in" doctrine. Environmental media "containing" listed hazardous wastes must themselves be managed as hazardous waste. Such management must continue until the material is properly disposed at a permitted hazardous waste disposal facility, following any treatment required by RCRA land disposal restrictions, or until the material no longer contains the impacting hazardous waste. For environmental media the "no longer contains" standard is satisfied when concentrations of the constituents of concern are below human health and/or other appropriate risk-based standards.

At present, management of soil previously excavated from the site (and associated runoff water and investigation-derived waste water) is not in compliance with RCRA storage requirements. In addition, the condition of in-place soil and groundwater associated with the former mixing area requires further definition.

We understand that DEQ has determined that site issues will be regulated under the Oregon Hazardous Waste Management Regulations (OAR 340-100) with assistance and oversite from the EPA RCRA program. (For brevity, RCRA will be used hereafter in our proposal to reference either program, with state or federal specifications called out where needed; similarly, we will use DEQ to refer to either DEQ or EPA, unless a distinction is required). Time has continued its ongoing discussions with DEQ concerning appropriate management of the F027 impacted media (both stored and in-place). Through these discussions, Time and the agencies have tentatively agreed to pursue a management plan which, we understand, includes the following key elements:

- Conducting Corrective Action of both stored and in-place media under agency enforcement (rather than permitting) authority, as specified in Corrective Action Consent Orders.
- Establishing Time site performance obligations in Consent Orders, which we assume would be generally as described in the March 17, 1993 RFP. These obligations would include evaluating, designing, and constructing a RCRA storage facility or containment building for managing currently stockpiled soil. Building design would be provided to DEQ by August 31, 1993. Additional elements of Consent Orders would address completing the characterization of in-place soil and groundwater at the site and conducting any additional corrective action deemed necessary.
- Designating the site as a RCRA corrective action site. requiring no RCRA permit.

We understand that this plan is not yet final and may not be given final approval by the agencies. Consequently, actual obligations and requirements, schedules, and the level of flexibility with respect to RCRA regulations are unknown. If the agencies do not proceed as currently planned, site corrective actions will most likely be conducted under a RCRA Corrective Action Permit (a result which could provide less flexibility and entail significantly greater cost than that now proposed). This proposal and cost estimate is based on the current plan.

A.2 PROJECT APPROACH

Landau Associates has developed an approach that integrates the regulatory status of the site and the flexibility/opportunities afforded by that status with our experience in the technical aspects of the project. In particular, we have tried to take advantage of DEQ's apparent willingness to proceed with management of existing stored material, site characterization, and development of cleanup levels and remedial resolutions within the administrative context of a RCRA Consent Order. The general approach described below is not specifically tied to the current agency plan and can be adapted to other, less flexible regulatory authorities (e.g., a RCRA permit). However, for this proposal, we have assumed that given DEQ's current position, attainable goals and objectives can be established for the various site issues, and that practical methods (e.g., use of a RCRA containment building) and a reasonable degree of flexibility (e.g., waiver of hazardous waste storage time limits) will be made available for achieving them.

The following paragraphs describe Landau Associates' approach, generally in the context of the three primary issues identified in the RFP: management of existing stored materials; site characterization; and risk assessment/development of cleanup levels. Our approach provides significant opportunities for savings in level of effort and cost by maximizing the advantages offered by the current agency plan, and recent and pending changes in RCRA regulations.

A.2.1 Stored Materials

Soil

The current agency plan would authorize, under a Consent Order, continued onsite storage of the F027 containing soil, but would require that the soil be stored in a RCRA storage facility or containment building. Time has agreed to design and construct such a facility.

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Landau Associates' proposes that the most appropriate storage facility is a RCRA containment building as recently authorized by EPA. A containment building, properly designed, offers the benefits of being relatively easy (and therefore cost-effective) to construct, operate, and decontaminate for closure. Storage of hazardous material in a containment building does not constitute land disposal and therefore, for the duration of the storage period, avoids imposition of RCRA land disposal restrictions.

Landau Associates proposes that the soil be held in the containment building at least until site characterization activities are completed and determinations can be made regarding the need to excavate, treat, or dispose of any additional similarly impacted in-place soil. Holding existing stored soil would allow consolidation of any newly excavated soil and uniform management for ultimate treatment or disposal. Furthermore, by holding existing stored soil, Time may gain potential benefits of several RCRA rule changes recently finalized or now being considered by EPA, as noted below:

- Recent changes would allow onsite management of hazardous waste without incurring RCRA land disposal restrictions. In February 1993, EPA published a final rule establishing Corrective Action Management Units (CAMUs). The new provision (40 CFR 264.552) allows EPA to establish areas within RCRA facilities (or, by extension, non-RCRA facilities conducting corrective action under a RCRA Consent Order) within which hazardous remediation wastes can be aggregated, stored, treated, and/or disposed without triggering RCRA land disposal restrictions. The direct benefit of this rule for the site is that it would allow management of currently stored (and any additional) impacted soil in a designated area within which moderate treatment methods could be employed, and disposal (or beneficial reuse as, for example, fill, paving subgrade, or asphalt aggregate) could occur. Treated soil could be disposed or reused onsite when PCP concentrations satisfied levels determined appropriate under applicable standards less stringent than land disposal restrictions.

- Potential new opportunities may include redefinition of RCRA hazardous waste identification criteria for both as-generated and remediation wastes, which could significantly reduce the scope of Time's effort.

Landau Associates is closely following the ongoing implementation of recent RCRA changes and the formulation of pending amendments and will use that knowledge to take advantage of the opportunities they provide to Time in defining or negotiating cleanup levels, treatment and disposal requirements, and investigation and remediation activities.

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Water

Based on our discussions with Time, we understand that potentially impacted water derived from past investigation activities, site runoff, and bioreactor decommissioning is being stored onsite. We understand that Time prefers to treat this water and dispose of it to the local publicly owned treatment works (POTW) as soon as possible to enable other business use of the current storage unit. Treatment and disposal of this material is consistent with the approach described for soil and represents a long-term savings over storage (as standards affecting disposal of this material are unlikely to change with changes in RCRA definitions). Additional cost savings may become available by negotiations of POTW acceptance criteria and unit costs.

A.2.2 Site Characterization

To date, Time discussions with the agencies apparently have not defined the site characterization activities to be conducted. We propose that the regulatory approach to site characterization utilize existing RCRA Corrective Action Guidance, which establishes a characterization process more streamlined and more narrowly focused than typically available under CERCLA. This approach would allow a narrow definition of the scope of the RCRA Facility Investigation (RFI) and any Corrective Measures Study (CMS) required.

The streamlined focus of an RFI would result in a cost-effective technical program to obtain data to characterize site conditions, be used in risk assessment and development of cleanup levels, and to evaluate remediation options. Landau Associates proposes to develop an investigation scope that utilizes previous site data to the maximum extent possible and that remains focused on resolving the questions of whether further remedial action is warranted and if so, what the optimal action would be.

Landau Associates approaches site investigations in the context of the current conceptual model of the site, and the expected use of the data derived from the investigations. In this way, we hope to optimize our efforts and our client's resources by focusing on those data most relevant to future regulatory-driven or technically-based site decisions. The conceptual site model on which this proposal is based (Appendix A), is derived from information provided by Time in the Request for Proposal and during the site visit. We expect that the conceptual model will be reevaluated and refined throughout the project, as new information is obtained and evaluated. The first of these iterations is expected to occur during the data review effort of Task 1; the next major iteration is not expected to occur until field investigations conclude.

We recognize that Time has taken a proactive approach to site environmental issues, an approach which we have found to be most beneficial to our clients. We expect to conduct our work on the project in a similar manner. We expect that the initiative and credibility gained by Time through this approach will be important in negotiating difficult decisions that inevitably arise with site investigation and remediation.

A.2.3 Risk Assessment/Development of Cleanup Levels

We propose, as part of our project approach, to develop site-specific cleanup levels based in part on a streamlined site-specific risk assessment and in part by reference to various existing and potentially applicable or relevant regulatory and risk-based standards that will support the findings of the risk assessment. At this time there is no specific applicable numerical value or single standard that establishes contaminant concentration values for which the site would be declared "clean." The factors we would incorporate in developing cost-effective, achievable cleanup levels for the site include:

- *Site-specific risk assessment*: Landau Associates will identify contaminant concentration levels determined to pose an unacceptable risk to current and future site workers, and to the environment.
- *Oregon Hazardous Waste Cleanup Management Regulations*: This regulation requires RCRA site cleanup to "lowest practicable" levels, based on human health risk analysis and related factors, including background concentrations (OAR 340-108-030).
- *Oregon Hazardous Substance Remedial Action Rules*: These rules are not directly applicable to this project, but they provide a point of comparison with other established standards because they establish generic human health risk-based standards for contaminated site cleanup.
- *RCRA Corrective Action Cleanup Levels*: These levels are established by EPA as guidance, using human health risk equations and hypothetical exposure assumptions. Presumably they can be used to determine when environmental media no longer contain hazardous waste.
- *Oregon Surface Water Quality Regulations*: These regulations set limits for toxic chemicals in the Willamette River and may be applicable if the RFI results indicate potential migration of site chemicals to the river through groundwater.

These different factors provide the foundation for risk assessment discussion and provide for flexibility in determining the risk levels to be achieved and the technical methods available to achieve them.

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The key factor in Landau Associates' approach to establishing site cleanup levels is our focus on the total risk reduction achieved by multiple integrated elements of the remediation. For example, risk reduction based on a combination of treatment (reduction of contaminant concentrations) and onsite engineering controls (limitation of exposure potential) removes the limitations on flexibility imposed by the notion of "cleanup level" as an absolute maximum concentration to be achieved. Significant cost saving opportunities are available with remedial responses that include onsite engineering controls. Landau Associates has significant experience in gaining agency acceptance of this type of remedial approach, and in completing associated design and construction. Consequently, a major element of Landau Associates' strategy is the evaluation of remedial options in the context of risk assessment and development of cleanup levels that reflect actual risk reduction.

A.3 PROPOSED SCOPE OF SERVICES

A.3.1 TASK 1: Strategy and Negotiation Meetings

Task 1 activities are critical first steps of this project. During the first weeks of the project Landau Associates will develop an in-depth knowledge of the site, site history, and existing site technical data. In this same period, Landau Associates will begin to establish a close working relationship with Time. The success of the project will, to a large extent, depend upon frequent substantive communications between Landau Associates and Time and the resulting interactive development and refinement of regulatory and technical strategies.

Subtask 1.1, Data Review: Landau Associates agrees with Time that the first step in Task 1 should be a thorough review of the existing site data contained in Time's files. Our overall objective in this subtask will be to maximize the use of previous data, identify remaining data gaps, and verify the benefit to Time of currently proposed additional data collection efforts.

Subtask 1.2, Strategic Planning and Agency Meetings: Developing and implementing Time's regulatory strategy will begin at the start of the project and continue through project completion. The process is continuous, accommodating new data and information, rule modifications, agency decisions, and other issues as they may arise. Regulatory options will be continually evaluated in the context of cost-effectiveness and achievement of Time project goals, and with close, frequent communication with Time.

Currently, three meetings between Time and Landau Associates are scheduled, including the project kickoff meeting. These meetings will enable refinement of Landau Associates' understanding of site background information and of specific Time regulatory and technical

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objectives and business-related requirements. The meetings will allow iterative development of a detailed project regulatory approach and of specific strategies for agency interactions and negotiations.

Two additional meetings currently are scheduled with DEQ. In these meetings Landau Associates will support Time in introducing its regulatory and technical approach and negotiating the terms and conditions of project performance that will enable cost-effective and environmentally protective site management. Landau Associates will assist Time and Time's legal counsel in evaluating the regulatory and technical terms of the proposed Consent Order and any associated technical scope of work, and in negotiating with the agencies for a Consent Order that provides reasonable, attainable goals and sufficient flexibility to achieve them.

For each meeting, Landau Associates will prepare an agenda and presentation materials as determined appropriate in consultation with Time. Landau Associates will take detailed meeting notes and prepare minutes of DEQ meetings for Time.

A.3.2 TASK 2: RCRA Storage Unit

Under Task 2, we will assist Time in developing practical and cost-effective storage and treatment alternatives for stockpiled soil and stored PCP-containing water. For the purpose of this proposal, we have identified what we currently consider to be the most practicable and cost-effective storage and treatment alternatives given the current regulatory status and our understanding of site conditions and the project goals and objectives.

The remedial alternatives that we have already identified for Time were selected based on the services we have provided on over 75 projects involving remedial alternatives evaluation and design. Our project team has extensive experience in the evaluation and design of the remedial alternatives that we have identified for Time, including the design of containment facilities and biological treatment systems. Our conceptual design of the soil storage and treatment alternative for Tank No. 55021 employs simple and effective methods to meet the storage requirements of the RCRA regulations, including a primary and secondary barrier system that can be easily constructed with limited alteration to the tank. Limiting the evaluation process to the most practical and cost-effective alternatives and utilizing personnel experienced in evaluating and designing these alternatives results in a streamlined and efficient evaluation and design process.

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The identified alternatives include both storage and treatment alternatives for the estimated 3,000 yd^3 of soil and the estimated 500,000 gallons of water. At a minimum, we will evaluate the following remedial alternatives:

- Two soil storage alternatives: storage within the existing 55,000 barrel above ground storage tank (Tank No. 55021) and storage within either an existing onsite building or within a pre-engineered steel shell building to be constructed especially for storage of the contaminated soil.
- Two soil treatment alternatives: bioremediation of soil within Tank No. 55021 and bioremediation within the building described above.
- At least five alternatives for treatment of the 500,000 gallons of water, including the following treatment technologies: activated carbon, biological treatment, chemical oxidation (e.g., hydrogen peroxide, ozone, UV-ozone).
- One water storage alternative: long-term storage within an existing above-ground storage tank.

The alternatives currently identified for further evaluation are discussed in more detail below:

- **Soil Storage in Existing Tank No. 55021.** This alternative provides a low-cost and environmentally sound solution to achieve the storage requirements of 40 CFR 264 Subpart DD. The alternative is conceptually shown on Figure 1 and assumes that the stockpiled soil does not contain free liquid that would result in failure of the paint filter test. (In accordance with the above cited regulation, a liquid collection system is not required for storage of material that does not contain free liquid and, therefore, little alteration to the tank would be required. If only portions of the pile contain free liquid, this material could be mixed with drier material or tilled to promote drying.) This alternative also assumes that the results of the structural inspection of the tank described in Subtask 2.1 indicates that the tank can be used for this purpose. As illustrated on Figure 1, Tank No. 55021 has sufficient capacity to store at least 3,000 yd^3 of soil. Assuming a 30 degree angle of repose, a soil depth of about 5 ft would rest against the tank wall.

  Our approach to this alternative includes a cost-effective design to provide easy access to the stored soil, allowing future treatment of the soil in small batches, if beneficial. The alternative consists of installing a large, reinforced entranceway in the tank wall to provide personnel and small, conventional earthwork equipment access to the inside of the tank and the soil. The bottom of the entranceway would be placed just above the anticipated maximum height of the soil against the tank wall. A small ramp would be constructed on the outside of the tank. The entranceway would be secured during normal storage and removed only when accessing the tank. An asphalt concrete containment pad would be constructed outside of the entranceway to provide a firm, easily cleanable surface for collection and removal of soil spilled or tracked during emptying of the tank. A separate smaller opening would be installed through a different area of the tank wall

or the tank roof to provide access for a conveyor system which would be used to fill the tank. As illustrated on Figure 1, design measures would also be included to protect the tank floor and wall from the corrosive effects of the moist soil and to provide adequate ventilation in the tank.

- **Soil Storage in Existing or Newly Constructed Building.** This alternative consists of storing the soil in an existing, onsite building (or buildings) or within a newly constructed building that meets RCRA requirements. It is expected that the cost to implement this alternative would be significantly greater than the cost to implement the Tank No. 55021 alternative, unless an existing building(s) with sufficient capacity is available. Constructing a new building would be recommended only if an existing building was not available and storage in the tank could not be implemented because of structural or other considerations. Design of the new building would consider utilization of economical structures (e.g., pre-engineered steel building), maximum utilization of interior space (e.g., soil cribs to allow near-vertical sidewalls), and easy access to the stored soil.

- **Soil Storage and Biological Treatment in Tank No. 55021.** This alternative combines the alternative described above for storage of soil in Tank No. 55021, with additional, relatively low cost measures designed to enhance biological treatment of the soil during the storage period. The alternative is conceptually illustrated on Figure 2 and consists of injecting oxygen (air) into the soil and sprinkling the soil with nutrient-enriched water to promote biological uptake of PCP and other contaminants. Based on the results of previous efforts to biologically treat the soil at the site and on treatability data from other sites with similar wastes, it is unlikely that the 0.5 ppm PCP soil cleanup level described in the Preliminary Assessment/Data Evaluation Report could be achieved using this alternative. However, given possible changes in hazardous waste identification rules and new regulations enabling onsite disposal not controlled by RCRA land disposal restrictions, appropriate cleanup levels may be achievable with biotreatment and controlled onsite disposal.

  This alternative includes constructing a liquid collection system in the bottom of the tank in accordance with 40 CFR 264 Subpart DD. A liquid collection system is required because the soil will contain free liquids as a result of the application of nutrient-enriched water. Our design includes the construction of a primary and secondary containment system. Both containment systems would drain to sumps installed through the tank bottom. Collected water would be recirculated over the soil. The primary and secondary barriers are shown on Figure 2 and would be installed before filling the tank.

  The air injection system would consist of perforated pipe placed throughout the soil pile as the pile is filled, as illustrated on Figure 2. The piping would be connected to blowers located outside of the tank. Separate air injection and air extraction piping would be placed in the pile to enhance circulation of the air through the pile. Measures would be taken to allow reversing the air flow direction in the injection and extraction piping to further enhance uniform distribution of air throughout the pile. Water would be applied to the soil

through overhead sprinklers consisting of misting-type nozzles. An optional nutrient feeding system would be installed for addition of growth limiting nutrients to the feed water.

- **Soil Storage and Treatment in Existing or Newly Constructed Building.** This alternative is similar to the alternative for storage and treatment in Tank No. 55021 with the exception that storage and treatment would be conducted in the storage building described above. It is expected that the cost to implement this alternative would be significantly greater than the cost to implement the alternative described above involving storage and treatment of the soil in Tank No. 55021, unless an existing building was available. Design consideration for retrofitting an existing building or constructing a new building would include providing a primary and secondary containment system, maximum utilization of space, and the air piping, sprinklers, and ventilation equipment previously described for the Tank No. 55021 alternative.

- **Water Storage in Existing Above-Ground Tank.** It is our understanding that Time intends to treat the water currently stored in Tank No. 11005 to allow the tank to be used for product storage. However, it may be advantageous to delay treatment of the water until further generation of water is not anticipated; treatment could therefore be conducted at one time. This alternative will evaluate the regulatory requirements associated with short- and long-term storage of the water to determine if retrofitting of Tank No. 11005 will be required to allow further storage of the water.

- **Water Treatment.** Each of the three treatment technologies noted previously (activated carbon, biological treatment, and chemical oxidation) are relatively proven technologies for the treatment of PCP and related chemicals that may be contained in the 500,000 gallons of stored water. All of these technologies will be assembled into various treatment alternatives including alternatives consisting of a combination of these technologies (e.g. biological treatment followed by an activated carbon polishing step). Because all of these technologies are available as vendor-supplied "package" treatment systems, both "package" and custom-designed systems will be evaluated. At least one of the alternatives involving biological treatment will include utilization of the existing onsite bioreactor. Various options for ultimate disposal of the water also will be identified, including discharge to the local POTW and discharge to surface waters. We will review the existing POTW discharge levels for the constituents of concern in the water to evaluate whether less stringent levels could potentially be applied.

Our scope of services for the RCRA storage unit task is divided into five subtasks that generally correspond to the subtasks outlined in the Request for Proposal. These subtasks are described below.

Subtask 2.1, Review Existing Conditions: Our review of existing conditions will focus on reviewing existing chemical data on the stockpiled soil and stored water and collecting

additional data necessary to evaluate the storage and treatment remedial alternatives. Anticipated field data collection activities are listed in Table 1 and are expected to include, but may not be limited to, sampling and analysis of the stored water for chemical characterization and treatment parameters (e.g., total organic carbon, alkalinity), assessment of the stockpiled soil's moisture content, and investigation of the structural characteristics of Tank No. 55021 to demonstrate its capability to be used for soil storage.

Subtask 2.2, Evaluation and Recommendation of Remedial Alternatives: Because we have already tentatively identified those alternatives that we expect to be evaluated for the site for treatment and/or storage of the PCP-contaminated soil and water, we will proceed directly to the task of evaluating these alternatives (or others requested by Time) and to identifying the optimal remedial alternatives for Time's consideration.

The primary criteria that will be used to evaluate the alternatives are technical effectiveness, implementability, and cost. Additional criteria include permitting requirements, compatibility with Time's long-term plans for the site, potential use of the alternatives, and potential changes to applicable regulations. It is assumed that bench scale testing of at least one water treatment technology will be conducted as part of this subtask, but that bench scale testing will not be conducted for biological treatment of the soil (because it is presently proposed as an enhancement of storage, not a final remedy).

At the conclusion of this evaluation, a meeting will be held with Time during which our recommended alternatives for both the soil and water will be presented. The presented material will include preliminary cost estimates and permitting requirements. Summary handouts will be provided. The meeting will be held within 2 months of project authorization, as requested by Time in the Request for Proposal.

Subtask 2.3, Design Report: Upon Time's selection of a preferred remedial alternative, we will proceed with design. Subtask 2.3 will include the preparation of a draft, draft final, and final design report that will provide a detailed description (and design drawings, as appropriate) of the selected alternatives. The draft final report will be submitted to DEQ and revised in accordance with DEQ's comments. For purposes of defining the scope of Subtasks 2.3 and 2.4, it is assumed that the selected alternative for the soil will be storage and treatment in Tank No. 55021 and, for the water, a treatment alternative consisting of a vendor-supplied "package" treatment unit. The design report will, therefore, include design drawings of the soil alternative, a general description of the water treatment alternative, including operating parameters and cleanup levels, a sampling and analysis plan for both the soil and water

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alternatives, and general operations and maintenance requirements for the soil alternative. Detailed operating procedures for the soil alternative will not be provided because operating parameters (e.g. nutrient feed rate, water application rate, air flow rates) will not have been established at this point in the project. An engineer's cost estimate will be prepared for the alternatives contained in the approved design report.

Subtask 2.4, Construction Bid Document: A construction bid document will be prepared based on the alternatives contained in the approved design report. The document will include Time's general conditions and all necessary specifications and drawings to construct the selected alternatives and treat the water. Three complete sets of the bid document will be submitted to Time, including mylars of all drawings (for document reproduction). This subtask does not include bid advertisement, bid evaluation, contractor selection, or construction management. However, Landau Associates has experience providing these services and can assist Time in these efforts.

Subtask 2.5, Permitting: Landau Associates will coordinate with regulatory agencies to obtain the permits necessary to implement the chosen remedial alternatives. These permits are expected to include a discharge permit to the POTW and possibly an air quality permit. It is assumed that Time will obtain any locally required building permits. For the purpose of this proposal, it is assumed that the treated water will not be discharged to a surface water and, therefore, an NPDES permit will not be required. (As stated previously in this proposal, the assumed regulatory approach does not include obtaining a RCRA Part B permit.)

A.3.3 TASK 3: RFI Site Characterization

The scope of the RFI can only be identified after the data review of Task 1 (proposed Subtask 3.1) is completed. For the purpose of this proposal, we have identified those components that we expect to be needed to complete the RFI, and a rough estimate of a likely quantity for each component (i.e., soil samples, wells, etc). Our cost estimate is based upon this tentative program, but is structured to allow Time an opportunity to independently evaluate component unit costs.

The subtasks of the RFI are discussed below.

Subtask 3.1 Work Plan: The first activities under Task 3 will be a review and compilation of the site data that exist in Time's files. Following the review, we will draft a work plan for the RFI, which will address site background, goals and objectives of the investigation, planned field activities (including locations), field protocols, the analytical

program, quality assurance protocols, a project health and safety plan, and a schedule. The work plan will be prepared according to the following schedule:

- Preliminary draft for Time review/comment
- Draft for submittal to DEQ for review/comment
- Draft Final for Time review/comment
- Final for submittal to DEQ.

Following finalization of the work plan, we will prepare a detailed cost proposal for Time, in the format requested in the Request for Proposal.

Subtask 3.2 Field Investigations: Upon authorization from Time to proceed, Landau Associates will implement the RFI Work Plan. Subtask 3.2 will accomplishing the field activities, including:

- Sampling surface and subsurface soil
- Installing monitoring wells where needed to supplement the existing monitoring well network
- Surveying all measurement points to USGS datum
- Sampling groundwater and measuring water levels twice over a 12-month period
- Validating and evaluating the field and laboratory data, and refining the conceptual model.

For the purpose of this proposal, we estimate the following component quantities:

- Conducting soil sampling at an estimated 5 locations (Figure 3) to evaluate the limits of PCP and related chemicals and also to characterize the extent to which carrier chemicals have impacted site soil. We anticipate collecting these samples from three depth intervals in the upper water-bearing zone (at the surface; within the interval across which the upper water-bearing zone fluctuates seasonally; and at the bottom). We also estimate collecting surface soil samples in an additional 4 locations. The surface samples will be collected from 2 or 3 locations within each area, from the 0-1 ft depth interval. The samples from each location will be composited to yield 1 sample per area.

- Installing 4 to 6 monitoring wells at the approximate locations shown on Figure 3. These wells, along with those currently installed will provide information on flow direction and rate in each water-bearing unit, vertical gradients across the site, and groundwater quality. During drilling, we propose to take soil samples at the intervals identified previously for subsurface soil sampling, and additionally within the aquitard and the lower

water-bearing zone in those borings that extend to the lower water-bearing zone. Also during drilling, site geology will be logged, and the samples will be inspected for evidence of contamination (using UV light, TIP meter, or equivalent observations).

- Sampling all monitoring wells at least twice over a full year. Before each sampling event the wells and well points will be checked for the presence of free phase contaminants, and we will measure water levels in all wells and well points, as well as at the river. We also will monitor water levels in selected nearby wells during the purging required prior to groundwater sampling. Such data can often provide inexpensive order-of-magnitude information regarding the site hydrology (e.g., vertical interconnections)

The proposed soil and groundwater analysis program is shown in Table 2. It was developed to supplement existing site PCP data, and to collect data regarding other probable constituents of concern. These include other chemicals associated with PCP (such as tetrachlorophenol and dioxins/furans), chemicals from the PCP carriers, and, in the case of Crosby and Overton tanks, PCBs.

We currently estimate that aquifer testing of at least the upper water-bearing zone will be needed to provide estimates of aquifer characteristics for input to the fate and transport modeling. However, because the contaminant distribution is not fully known at present for either the upper or lower water-bearing zone and the relative interconnection of the two water-bearing zones is uncertain, we recommend delaying the aquifer tests after the first semiannual groundwater sampling data are received and evaluated. This will allow informed identification of optimal locations for the tests, and will minimize the chance of unknowing and unintentional contaminant transport.

We do recommend conducting slug tests in selected wells during the first phase of the RFI, to provide inexpensive, rough estimates of aquifer characteristics. For the purpose of the proposal, a 1-day field effort that should provide 4 to 6 slug tests (2 to 4 each in the upper and lower water-bearing zones) has been planned.

Subtask 3.3 Data Evaluation and Report: The field and laboratory data collected under Subtask 3.2 will be validated, compiled, and evaluated in conjunction with previously collected site data to characterize the nature and extent of soil and groundwater contamination at the site, the hydrogeologic properties of the site that influence contaminant migration, and the expected future migration of documented contamination. The results of the data evaluation and results of the subsequent risk assessment will enable Time to determine whether further remedial action is required at the site, and if so, what the optimal actions would be.

After completing the data evaluation, a site characterization report will be written to document the findings of the RFI. As requested in the Request for Proposal, the report will be developed as a draft for Time review and comment, and subsequently as a draft for submittal to DEQ. Following DEQ review, the report will be finalized.

A.3.4 TASK 4: Risk Assessment

Risk assessments are traditionally used to assess the magnitude and probability of actual or potential harm to public health and the environment from site contamination in the absence of remediation (i.e., a "baseline" condition). Risk assessment concepts and methodologies can be used outside the traditional framework to evaluate whether remedial action is necessary at a given site, and if so, to help identify, by comparing cost to risk reduction, the most cost-effective remedial action. Landau Associates has successfully utilized risk assessment concepts and tools to achieve successful, cost-effective remedies for many clients. Our success is based in part on our recognition that the most cost-effective remedial action may include treating impacted media to a degree that is less than that required to reach the site cleanup standard, and then applying institutional controls or otherwise managing exposure potential.

For this project, Landau Associates proposes a streamlined approach to the risk assessment process. Instead of using the risk assessment process to establish a baseline risk in the absence of any remedial action, we propose to use the tools of the traditional risk assessment process to develop risk-based cleanup levels to identify whether further remedial actions are necessary at the site, and if so, to identify cost-effective remedial actions. The risk-based cleanup levels that will be developed will represent the environmental concentrations of constituents of concern that can exist in site media that will not result in exceedance of a specified target risk level. This streamlined approach does not include an ecological assessment due to our preliminary determination that such an assessment is not necessary for the site. If site conditions or the results of the fate and transport evaluation of the RFI suggest that an ecological assessment is warranted, we will advise Time.

The steps of the Time risk assessment will be the following:

- Determining constituents of concern
- Identifying the intrinsic toxicological properties, human health standards, and current criteria for the identified constituents of concern
- Identifying populations potentially at risk and defining reasonable exposure pathways and the extent of the potential exposure

- Quantifying the concentrations of the constituents of concern that result in risks by these pathways and exposures that exceed a specified level of acceptable risk
- Comparing site concentrations to the calculated risk levels, to determine whether remedial action is warranted.

The risk assessment for the Time site began with preparation of this proposal, through an evaluation of the potential constituents of concern at the site. The list of potential constituents of concern was then used to plan the analytical program of the RFI. The risk assessment process will continue in Task 1, at which time the available site data will be reviewed to identify the additional site data required to complete the planned risk assessment. Such data may include soil and groundwater analyses for constituents not previously tested for, data from areas of the site not sufficiently characterized at this time for the risk assessment, and physical parameters to assist in predicting constituent transport and fate.

After the constituents of concern for each medium have been identified, the literature and regulatory guidance will be reviewed to characterize each constituents' toxicity. Toxicity criteria, such as reference dose factors and cancer potency factors will be identified, if available. The subsequent evaluation of exposure media, pathways, and receptors for the site will result in the identification of an exposure scenario that results in the highest potential degree of exposure via all potential pathways; this scenario will serve as the basis for estimating cleanup levels.

Once this exposure scenario is identified, the associated risk assessment exposure model will be generated and run, using pre-established risk levels, to estimate cleanup levels in environmental media. The resulting cleanup levels will be evaluated to determine if cleanup levels for single substances in a single medium are sufficiently protective when overall site risk and hazard are evaluated. Additionally, if risks due to individual constituents and pathways exceed a preset target risk when totaled, an analysis will be conducted to determine the most cost effectively re-allocation of the total risk allowance in establishing modified cleanup levels that account for multiple constituents/multiple pathways. Finally, if a comparison to the site concentrations of the constituents of concern indicates that further remedial action at the site is necessary, we will be prepared to run a cost-benefit analysis for those remedial alternatives identified in a Corrective Measures Study.

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The results of the risk assessment will be summarized in a report that presents the methodology, the risk assessment assumptions and uncertainties, and the risk assessment results. In order to save Time the costs associated with multiple document preparation and production, we have, for the purpose of this proposal, assumed that the risk assessment report can be included as an appendix in the RFI Site Characterization report.

SECTION B: LANDAU ASSOCIATES' PROJECT STAFF

B.1 RELEVANT FIRM EXPERIENCE

Landau Associates and, specifically, the individuals identified to assist Time in the Northwest Terminal facility project, have the requisite knowledge and experience to successfully accomplish the project goals. As previously presented in our SOQ, the following paragraphs summarize the special Landau Associates qualifications that we consider relevant to this project.

- Strong technical expertise and experience. Landau Associates has completed numerous projects that required a thorough understanding of the same physical, environmental, and chemical issues that must be addressed at the Time Northwest Terminal facility. We have worked with industrial operations and waste management practices similar to those found at the Northwest Terminal facility and have developed effective remedial technologies similar to those that will be needed to successfully meet Time's goals for this project. We have evaluated industrial sites, including wood-treating facilities and wood and paper products facilities. These investigations have enhanced our expertise regarding organic and inorganic chemicals such as pentachlorophenol, degreasers, solvents, paint residuals, hydraulic and lubricating oils, PCBs, creosote, coolants, metals, smelter slag, and diesel, gasoline, and other fuels. We have evaluated fate and transport of and remedies for chemicals that are sorbed to soil, that exist as free-phase liquids (both lighter and denser than water), and that are dissolved in groundwater. We have identified optimal remedial technologies and associated costs for these contaminants, and have participated in remedial design and oversight of remedial action for sites involving pentachlorophenol, PAHs, PCBs, solvents, creosote, arsenic and other metals, and petroleum hydrocarbons.

- Exceptional strength regarding environmental regulations. Landau Associates has found that a thorough understanding of the applicable environmental regulations results in our ability to customize cost-effective project strategies and solutions for our clients. Consequently, Landau Associates' staff has a strong understanding of federal and state environmental regulations. This understanding, in conjunction with a continued firmwide attention to the ongoing revisions and interpretations of the regulations, agency guidance and technical memoranda, and agency policies, allows Landau Associates to

provide to its clients efficient and successful regulatory strategies that range from site reporting to identifying and designing the optimal site remedies.

- Strengths in RI/FS-type work, developing cleanup action plans, and in innovative approaches to site remediation. Landau Associates has conducted site investigations and/or assessed remedial action options at over 200 sites in the Pacific Northwest. We have completed or are currently preparing, as prime consultant, six formal RI/FS investigations. Our RI/FS project experience has been gained on several of the most complex and well known sites in the Northwest, including Queen City Farms, Colbert Landfill, McCarty's Pacific Hide and Fur Site, and the Port of Olympia Cascade Pole site.

  Landau Associates' knowledge of CERCLA and RCRA, NPDES, and other environmental regulations governing site remediation allows us to expedite the development of innovative, responsible, and cost-effective approaches to site investigation and remediation. For example, Landau Associates developed a highly innovative and cost-effective remedial alternative for the Western Processing site, which resulted in national recognition by the American Consulting Engineers Council.

- Ability to work closely with DEQ Landau Associates has a proven record of performance with DEQ, as a representative of our client's interests on the Boeing Portland project. Over the past 6.5 years, this has included frequent meetings and negotiations with both the Hazardous and Solid Waste and Environmental Cleanup Division (ECD) of DEQ. We have completed both onsite and offsite remedial investigations which have resulted in the design and successful implementation of a groundwater containment and remediation extraction and treatment system. Particularly over the past 3 years we have become recognized for our knowledge and understanding of regional hydrology. We have provided leadership and technical expertise in the East Multnomah County Technical Advisory Committee established and directed by ECD to coordinate investigation and remediation of regional groundwater quality problems potentially threatening supplementary water supply sources for the City of Portland.

B.2 PROJECT TEAM QUALIFICATIONS

Landau Associates has selected personnel for the Time's Northwest Terminal facility project based on their experience in the specific areas of expertise necessary for the successful, timely completion of this project.

The Project Manager will be **Ms. Leslee Matthews.** Ms. Matthews is a Senior Project Hydrogeologist with Landau Associates and has 7 years experience in site evaluation and an additional 3 years experience in broader environmental regulatory affairs. She is project manager and senior hydrogeologist for the Remedial Investigation/Feasibility Study (RI/FS) for

the Port of Olympia's Cascade Pole site, a former wood-treatment facility with soil, groundwater, and sediment contamination (the primary contaminants of concern are creosote, PCP, and dioxins and furans). Her efforts for this project have included negotiating the Consent Decree with the Washington State Department of Ecology, preparing work plans and quality assurance/quality control documents, overseeing sampling and analysis of groundwater, soil, and marine sediments, overseeing a risk assessment, developing site cleanup standards, and preparing RI/FS and Cleanup Action Plan documents. She also has managed or provided technical assistance to numerous other site investigations. Before joining Landau Associates, Ms. Matthews managed a groundwater investigation at a RCRA landfill, and conducted and wrote RCRA Facility Assessments under subcontract to EPA.

As Project Manager, Ms. Matthews will provide day-to-day management and coordination of the project and will be responsible for the developing and maintaining task budgets and schedules. Ms. Matthews will be intimately involved in the regulatory and technical aspects of the project, including negotiations with the DEQ, will provide technical oversight and supervision of project tasks, and will review project reports and other deliverables.

A discussion of the background of other Landau Associates' individual team members and their proposed project roles follow. The project organization chart is shown on Table 4.

- **Mr. Paul Agid, Regulatory Strategist.** Mr. Agid is a Senior Geologist with over 8 years of experience in environmental consulting, and prior to that 12 years experience as a practicing attorney specializing in regulatory law. As an environmental consultant, Mr. Agid has concentrated on developing, negotiating, and implementing regulatory strategies for site investigations and remediation conducted under RCRA, CERCLA, and state cleanup laws. Mr. Agid will support Ms. Matthews and provide consultation and support to Time for identifying regulatory options, developing negotiation strategy, and attaining agency approval of regulatory approaches most beneficial to Time.

- **Dr. Julie Wilson, Risk Assessment.** Dr. Wilson is a Senior Environmental Scientist with 12 years of experience in risk assessment, toxicology, and health and safety issues. Dr. Wilson will conduct the risk assessment and assist in developing site-specific cleanup levels.

- **Mr. Jim Bet Site, Investigations Supervisor.** Mr. Bet is a Staff Geologist with more than 7 years of experience in planning, organizing, and conducting site investigations. His participation in the Boeing Portland project includes installation of groundwater monitoring wells, extraction wells, and multiport piezometers; groundwater, surface water and soil sampling; abandonment of monitoring wells and municipal production wells; evaluation of data to form a geologic model of regional geology; and aquifer pump testing. Mr. Bet has

supervised field activities for groundwater monitoring well installation and groundwater and soil sampling to characterize site environmental conditions at various sites in the Northwest. He will be responsible for conducting soil sampling, installing monitoring wells, and other site field investigations of the RFI.

- **Mr. Jerry Ninteman, P.E., Remedial Design.** Mr. Ninteman is a Senior Project Engineer with 9 years of experience in site investigation and remedial design. Mr. Ninteman will be responsible for evaluating and designing remedial alternatives and implementing the alternative that best meets the requirements of both Time and DEQ.

- **Mr. John Markus, P.E., Remedial Design.** Mr. Markus is a Senior Engineer with 17 years of experience designing water, wastewater, sludge, soil, and groundwater systems. Mr. Markus will be responsible for providing technical assistance on the evaluation and design of remedial alternatives.

In our Statement of Qualifications we identified Mr. John LaManna as the field supervisor. The substitution of Mr. Jim Bet has been made to enhance the project. Mr. Bet's extensive knowledge of the Portland area geology, gained through his project experience and thorough research and investigation, will provide a valuable benefit to the field activities. We have also added Mr. John Markus to enhance the design aspects of the project.

Table 3 provides a general indication of the project member's involvement; we can provide a more detailed estimate if so required by Time.

The following Landau Associates staff have not been specifically committed to the Time Northwest Terminal facility project because the scope of the project is, in some respects, uncertain. Each staff member is, however, available to perform project tasks, major or minor, on an as-needed basis.

- **Mr. John Leder, Regulatory Strategist.** Mr. Leder is a Senior Planner with over 7 years experience managing a very complex RCRA project in the Portland area (Boeing Portland). This directly relevant experience makes Mr. Leder particularly well qualified to assist with regulatory strategy development on the Northwest Terminal Facility project. Mr. Leder will be available to Ms. Matthews and Mr. Agid to advise regarding regulatory strategy and negotiations.

- **Dr. Nancy Ball, Environmental Chemistry and Contaminant Fate and Transport,** is a Senior Project Chemist with 7 years of experience in the areas of groundwater chemistry, sediment and soil chemistry, analytical chemistry, and organic and inorganic contaminant mobility and transport in groundwater.

- **Mr. William Harrar, Groundwater Modeling.** Mr. Harrar is a Project Hydrogeologist with 7 years of experience conducting modeling of groundwater flow and solute transport to evaluate site characteristics and to

assist in the assessment of remedial actions. He recently was Project Groundwater Hydrologist for Boeing Portland, conducting numerical modeling of groundwater flow for site characterization and delineation of extraction system capture zone.

SECTION C: SCHEDULE

Landau Associates is prepared to begin work immediately for Time. We recognize that timely completion of Tasks 1 and 2 are important to Time, and, as shown on Figure 5, we anticipate meeting the schedule identified in the RFP for these tasks. The durations for Tasks 3 and 4 that are shown on Figure 5 are recommended durations. If Time's business considerations, or DEQ's expectations, indicate that a more compressed schedule is required, we will work with Time to shorten the schedule.

Landau Associates is prepared to provide monthly status reports and budget tracking summaries to Time in the format requested in the Request for Proposal.

SECTION D: CONTRACTUAL ISSUES

D.1 ESTIMATED PROJECT BUDGET

The tasks described in our proposal represent Landau Associates' estimate of the project scope required to meet Time's goals regarding this project. Table 3 presents a detailed project budget by task. As indicated in Table 3, we estimate the project budget to be approximately $322,250. Assumptions used to develop the estimated project costs are presented in Table 4.

D.2 CONTRACT

Based on our review of the standard contract provided in the RFP, Landau Associates can provide our services in general accordance with the terms of the contract. Several provisions of the terms regarding insurance and indemnification are not acceptable to us as written, but we are confident that these issues will not prevent Time and Landau Associates from reaching mutually satisfactory alternative language.

There are, in addition, several minor terms for which, should Landau Associates be selected to provide services to Time, we will seek clarification or limited modifications. These are all, however, provisions of lesser significance, best suited for discussion during a contracting period.

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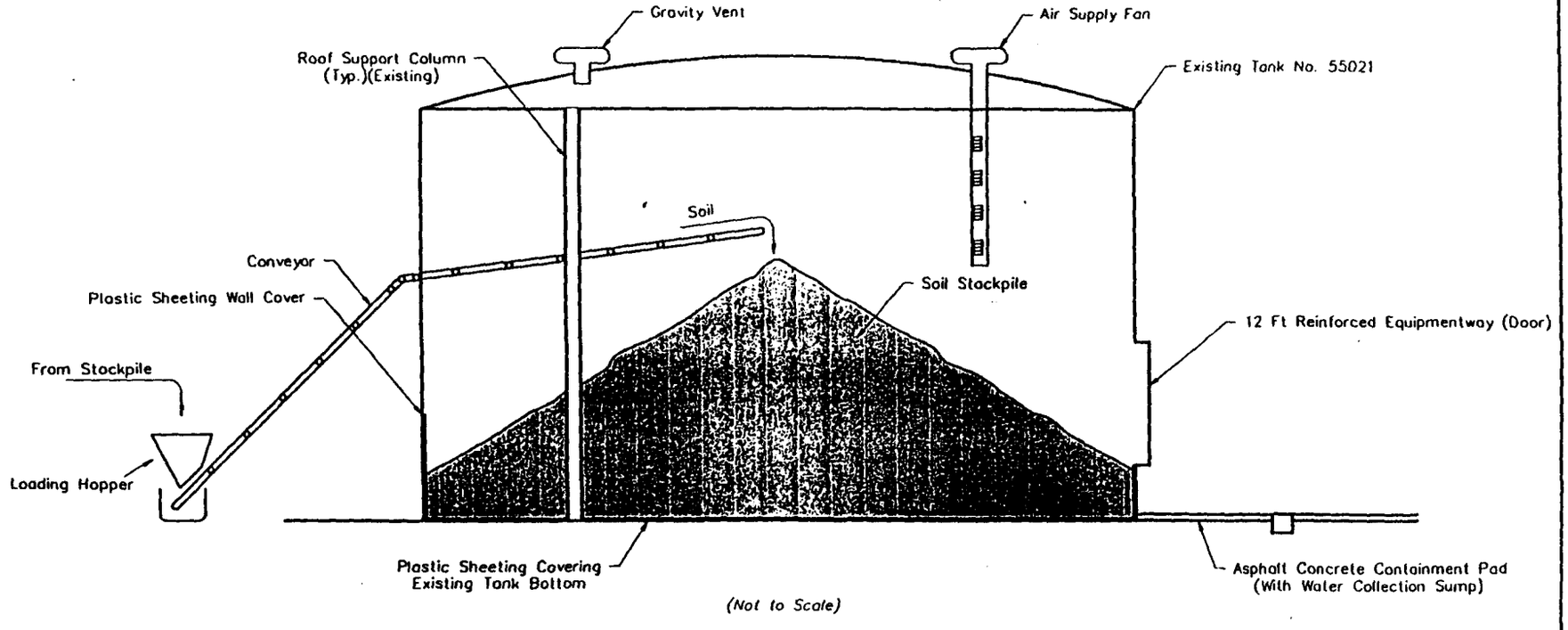

Time Oil Northwest Terminal Facility – Tank No. 55021
Soil Storage Alternative – Conceptual Design

Figure 1

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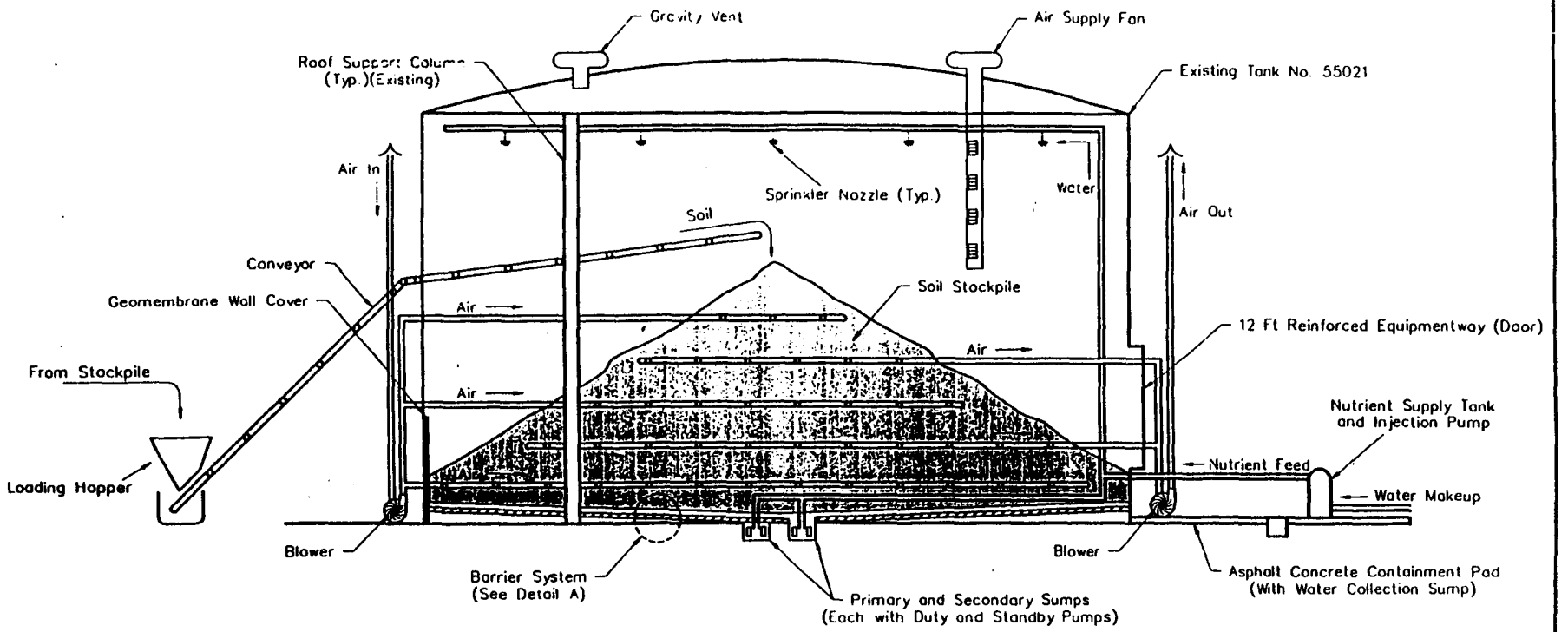

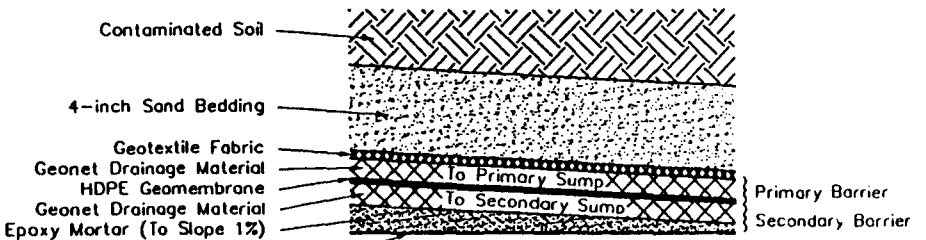

Detail A
Barrier System
(Not to Scale)

Note: Lateral air injection and extraction piping not shown

Time Oil Northwest Terminal Facility – Tank No. 55021
Soil Storage and Treatment Alternative – Conceptual Design

Figure 2

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15.012 Time Oil/Northwest Terminals/Proposal 4/93

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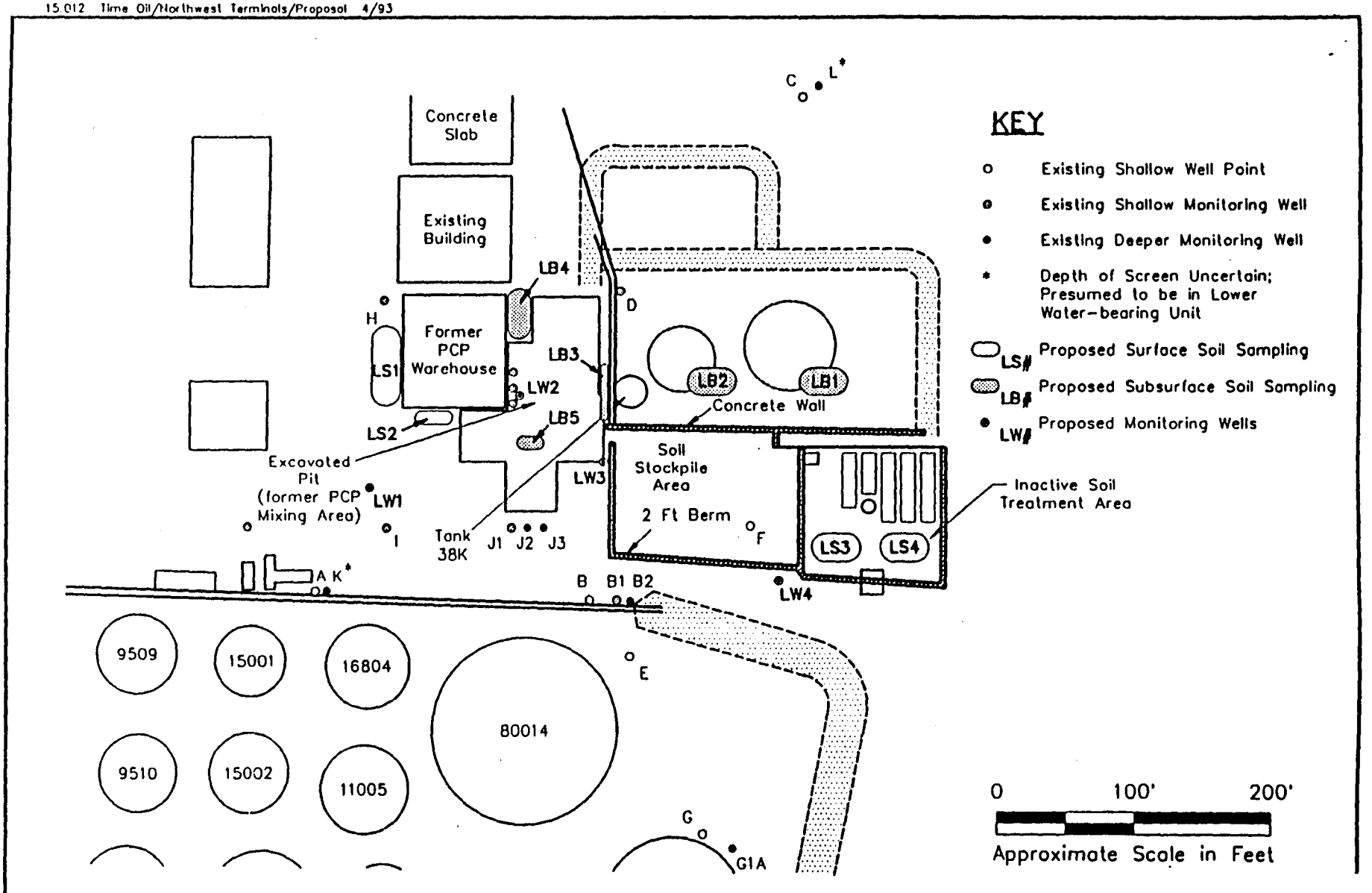

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Time Oil Company Northwest Terminal Project
Locations of Proposed RFI Sampling

Figure 3

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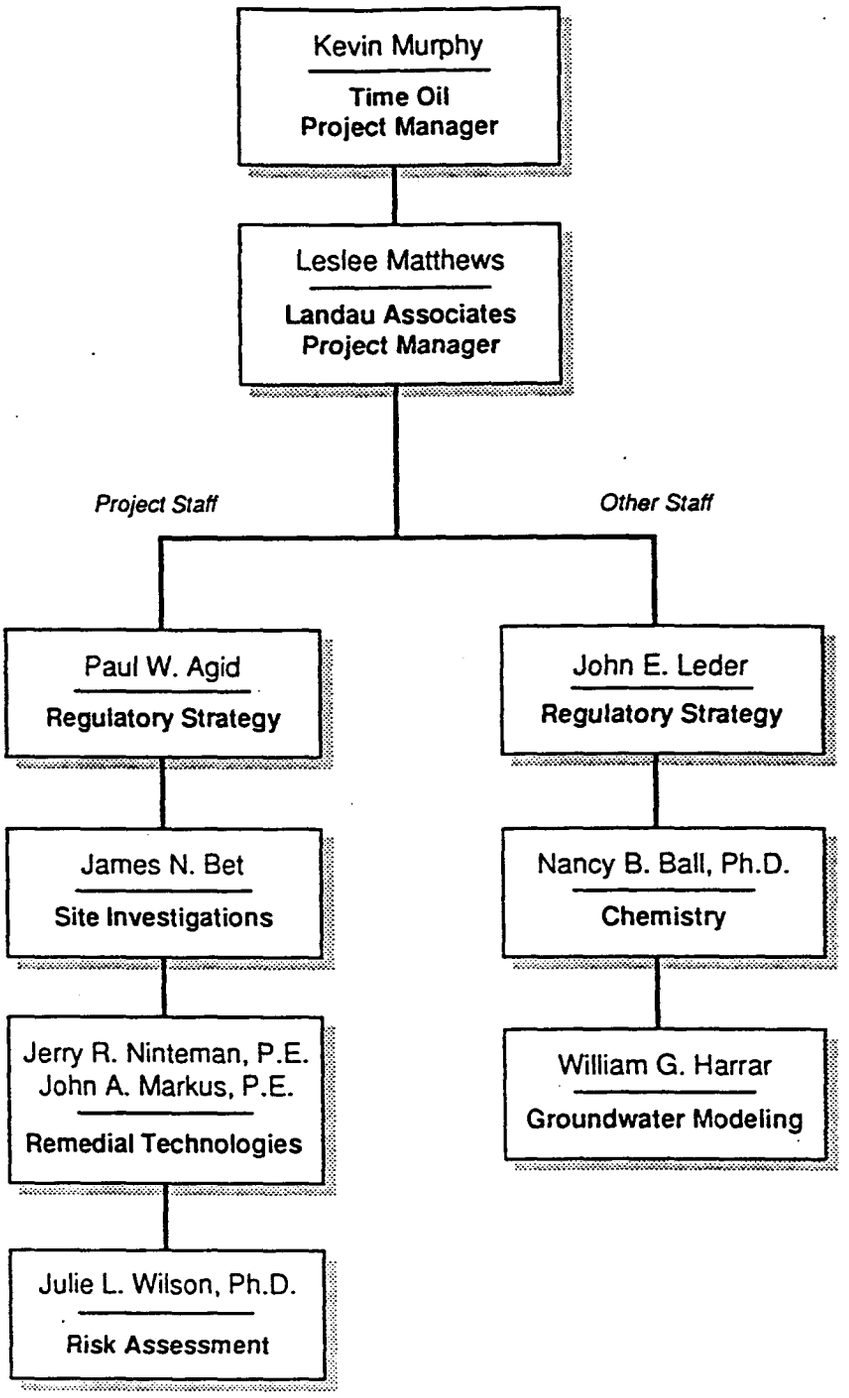

15.012 Time Oil/Northwest Terminals/Proposal 4/93

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Project Organization | Figure 4

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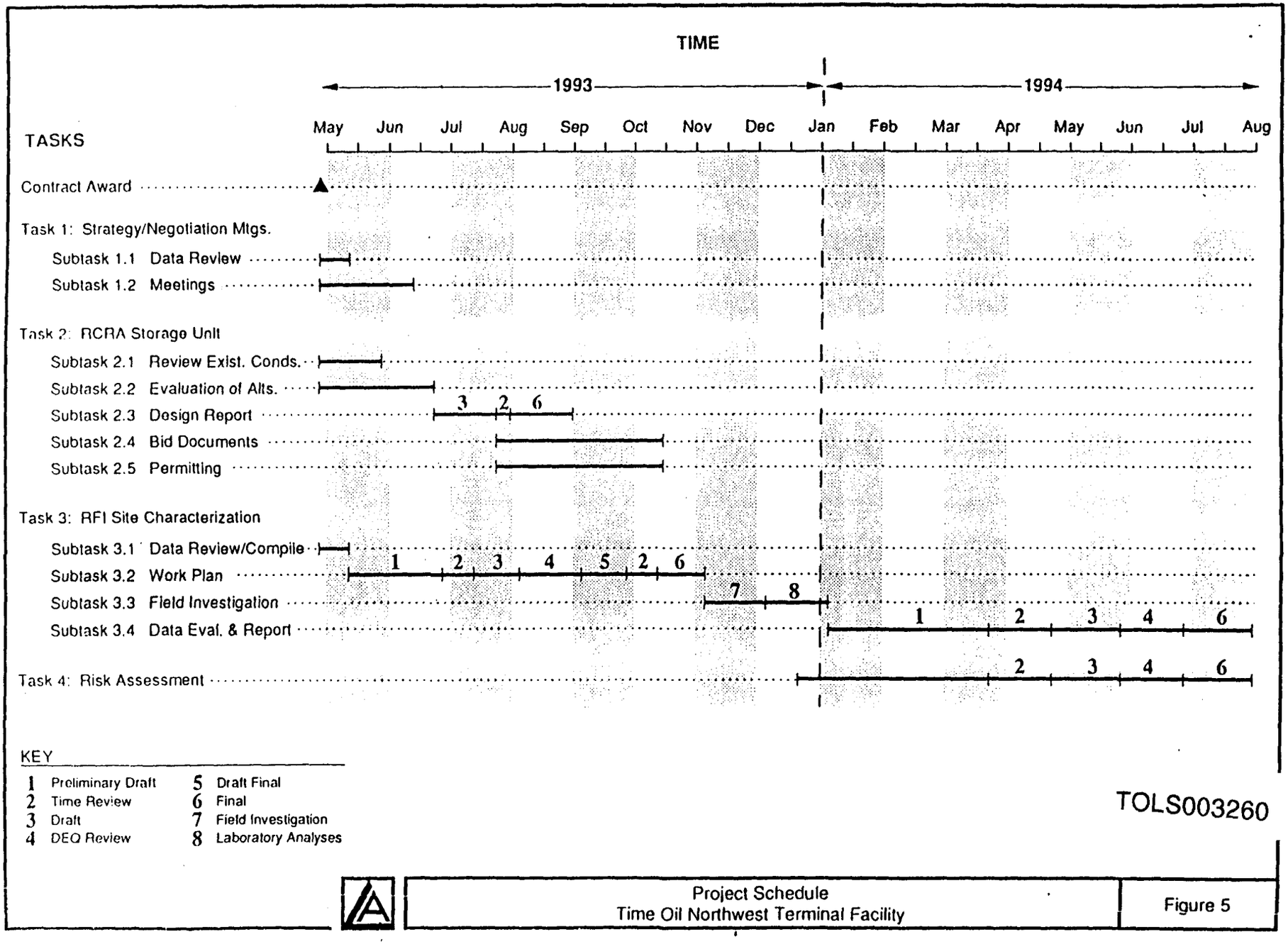

KEY

1	Preliminary Draft	5	Draft Final
2	Time Review	6	Final
3	Draft	7	Field Investigation
4	DEQ Review	8	Laboratory Analyses

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Project Schedule
Time Oil Northwest Terminal Facility

Figure 5

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TABLE 1

TASK NO. 2 FIELD DATA COLLECTION ACTIVITIES

Activity	Purpose
Sample the waste water for volatile and semivolatile organics, dioxins and furans, total organic carbon, chemical oxygen demand, alkalinity, hardness, and dissolved inorganics.	Provide data to evaluate treatment technologies, including discharge of treated water and regeneration/disposal of used carbon.
Evaluate structural capacity of the tank and tank foundation.	Evaluate whether the tank can support the weight of the soil.
Measure the dimensions of the stockpiled soil.	Verify existing estimate of the quantity of stockpiled soil.
Conduct paint filter tests or other visual examination of the soil.	Determine if a liquid collection system is required to store the soil.
Field determination of soil's angle or repose.	Estimate the slope that the soil stockpile will attain if placed in Tank No. 55021.

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TABLE 2

PROPOSED SOIL AND GROUNDWATER ANALYSES
TASK 3: RFI SITE CHARACTERIZATION

		Location[a]/Rationale	No. of Soil Samples[b]	Soil Analyses	Groundwater Analyses
Wells					
LW1	Shallow	Between source and pumping Well M	3 chem[c] + 1 F&T[d]	PCP and carrier chems (Soil Set 1)[e]	PCP and carrier chems[f]
	Deep	Between source and pumping Well M and expected to be downgradient from source	5 chem[c] + 1 K_v, F&T[d]	PCP and carrier chems (Soil Set 1)[e]	PCP and carrier chems[f]
LW2	Deep	Forms cluster with Wells 1-3 for vertical gradient and quality data	5 chem[c] + 1 K_v, F&T[d]	PCP and carrier chems (Soil Set 1)[e]	PCP and carrier chems[f]
LW3	Shallow	Downgradient in more southerly direction for bounding	3 chem[c] + 1 F&T[d]	PCP and carrier chems (Soil Set 1)[e]	PCP and carrier chems[f]
	Deep	Potentially upgradient, provides bounding	5 chem[c] + 1 K_v, F&T[d]	PCP and carrier chems (Soil Set 1)[e]	PCP and carrier chems[f]
LW4	Shallow	Downgradient of stockpiled soil and cross gradient from J wells to bound quality data	3 chem[c] + 1 F&T[d]	PCP and carrier chems (Soil Set 1)[e]	PCP and carrier chems[f]
Subsurface Soil					
LB1		Evaluate Crosby & Overton tank area	3 chem[c] but archive lowest[g]	PCBs and carrier oils (Soil Set 2)[h]	NA
LB2		Evaluate Crosby & Overton tank area	3 chem[c]	PCBs and carrier oils (Soil Set 2)[h]	NA
LB3		South of excavation, along pipelines, near old storage tanks-for lateral definition	3 chem[c]	PCP and carrier chems (Soil Set 1)[e]	NA
LB4		At rail line spur to east	3 chem[c]	PCP and carrier chems (Soil Set 1)[e]	NA
LB5		Inside excavation area to evaluate carrier chemicals and extent of excavation for PCP	3 chem[c] (less the surface sample)	PCP and carrier chems (Soil Set 1)[e]	NA

TABLE 2

PROPOSED SOIL AND GROUNDWATER ANALYSES
TASK 3: RFI SITE CHARACTERIZATION

	Location[a]/Rationale	No. of Soil Samples[b]	Soil Analyses	Groundwater Analyses
Surface Soil				
LS1	Loading dock-to verify lack of contamination	1	PCP and carrier chems (Soil Set 1)[e]	NA
LS2	Along southwest side of building	1	PCP and carrier chems (Soil Set 1)[e]	NA
LS3	Inside biotreatment area	1	PCP and carrier chems (Soil Set 1)[e]	NA
LS4	Inside biotreatment area	1	PCP and carrier chems (Soil Set 1)[e]	NA

(a) All locations are very tentative, and subject to change following Task 1 (Data Review).

(b) In addition, quality control samples will be run at the frequency of 1 field duplicate and 1 MS/MSD for every 20 samples, by media.

(c) "3 chem" = sampling intervals identified in text: 0-1 ft; at water table; and at bottom of upper water-bearing unit; all analyzed for chemistry.
"5 chem" = 3 chem plus additional intervals to be sampled in deeper borings: in confining zone and in lower water-bearing zone.

(d) F&T refers to fate and transport parameters: grain size and total organic carbon. K_v refers to vertical conductivity tests.

(e) Soil Set 1 = semivolatile organics, EPA Method 8270, with lab also required to report first 10 tentatively identified compounds (TICs) (these may help with carrier ID). Chlorinated phenols, modified EPA Method 8040; provides PCP and tetrachlorophenol (both needed for risk assessment) at the lower detection levels needed for potential cleanup standards. TPH by HCID, will provide a chromatographic printout to help ID carriers. Aliphatic hydrocarbons, Method 418.1. Volatile organics, EPA Method 8240, with lab also required to report first 10 TICs (see semivolatile organics). We also propose dioxin/furan analyses (EPA Method 8290) for a limited number of samples (~4).

(f) Groundwater analyses will utilize the same analyses identified in Soil Set 1, except for the aliphatic hydrocarbon analysis (these chemicals are quite insoluble and not expected to be present in water at concentrations that would contribute significant to site risk). These analyses will be conducted on samples collected from all wells. In addition, we propose limiting dioxin/furan analyses to Well J1 (the cost for this expensive analysis is included in the proposal estimate), and recommend major ion analyses in selected wells (~7) to assist the hydrogeologic evaluation (this would increase lab costs by ~$1,600 over two sampling rounds).

(g) To save analytical costs, we plan to hold the last sample (bottom of aquitard) pending evaluation of soil chemistry for shallower samples unless field observations identify obvious contamination in the sample.

(h) Soil Set 2 = PCBs, by EPA Method 8080. Semivolatile organics, EPA Method 8270, with lab also required to report first 10 tentatively identified compounds (TICs) (may help with carrier ID). Chlorinated phenols, modified EPA Method 8040; provides PCP and tetrachlorophenol (both needed for risk assessment) at the lower detection levels needed for potential cleanup standards. TPH by HCID, will provide a chromatographic printout to help ID carriers. Aliphatic hydrocarbons, Method 418.1. Volatile organics, EPA Method 8240, with lab also required to report first 10 TICs (see semivolatile organics).

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TABLE 3
LANDAU ASSOCIATES BUDGET ESTIMATE
TIME OIL, NW TERMINALS, PCP MIXING AREA PROPOSAL

TASK	Assoc.	Senior	Sr. Proj	Project	Senior Staff	Staff	Assist	T.I.	Prj. Crd.	W.P.	Support Staff	Total Lbr Hrs	Total Lbr $	Analyt Rebill	Equip	Lab	Drilling	Subs	TOTAL NonLabor	TOTAL
1. STRATEGY AND NEGOTIATION MTGS																				
Subtask 1.1 File Review		covered in tasks 2 through 4																		
Subtask 1.2 Meetings		24	28					5		3		60	$5,078						$0	$5,078
2. RCRA STORAGE UNIT																				
Subtask 2.1 Review Ex. Conditions		16	64		8	16						104	$8,464		335	3170		3500	$7,005	$15,469
Subtask 2.2 Evaluation of Alts		40	120	32				8	10	4		214	$17,614		250				$250	$17,864
Subtask 2.3 Design Report		40	100	60				40	24			264	$20,048		1200				$1,200	$21,248
Subtask 2.4 Bid Documents		56	140	60				32	40	24		352	$26,400		800			3000	$3,800	$30,200
Subtask 2.5 Permitting		8	40									48	$4,208		50				$50	$4,258
3. REI SITE CHARACTERIZATION																				
Subtask 3.1 Data Review /Compile			8	32	8		6		2		2	58	$4,146		200				$200	$4,346
Subtask 3.2 Work Plan	14	14	72	80	34	12	36	36	56	36	18	408	$26,540	1705					$1,705	$28,245
Subtask 3.3 Field Investig																				
- Soil sampling			4	12		12	12	10	4			54	$3,172	165		42400	1320		$43,885	$47,057
- Install/develop/survey wells			4	12		60	48	18	6			148	$8,054	1353	610		15235	1100	$18,298	$26,352
- semiannual gw sampling			8	24		92	84		12			220	$12,252	1100	448	38700			$40,248	$52,500
Subtask 3.4 Data Eval and Report	22	16	64	148	78	28	64	48	88	58	22	636	$40,488		2650				$2,650	$43,138
4. RISK ASSESSMENT/CLEANUP LEVELS	8	90	12			108	104	12	32	24	16	406	$25,388	1100					$1,100	$26,488
Unit Rate	105	96	86	76	68	55	49	48	47	42	47									
Total Units (hours)	44	304	664	460	128	328	354	209	274	149	58									
Total Cost	$4,620	$29,184	$57,104	$34,960	$8,704	$18,040	$17,346	$10,032	$12,878	$6,258	$2,726		$201,852	$5,423	$6,543	$84,270	$16,555	$7,600	$120,391	$322,243

(1) See budget estimate assumptions and notes following this table.

(2) Associate = document QC reviewer, unspecified
Senior = Agid; Wilson; Markus; (Leder)
Sr. Project = Matthews; Ninteman; (Ball)
Project = engineers and hydrogeologists, unspecified; (Harrar)
Sr. Staff = engineers and hydrogeologists, unspecified
Staff = Bet, risk assessment chemist, unspecified
Assistant = field assistant and database personnel, unspecified
Support Staff = technical illustration, word processing, project coordinators and production personnel, unspecified

LANDAU ASSOCIATES, INC.

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TABLE 4

BUDGET ESTIMATE ASSUMPTIONS AND NOTES

Task 1 Strategy and Negotiation Meetings

- The existing site data in Time's files has been validated or otherwise deemed acceptable for future use in engineering or hydrogeologic calculations. The data consists primarily of reports and correspondence, with raw field notes the exception rather than the rule.
- Meetings with Time will average 2 hours apiece; those with DEQ will average 2 hours.
- Travel by all project personnel will be billed for the first hour only (please note that this is an exception to Landau Associates' normal billing procedures, and is made to offset the cost to Time of our distance from the site).

Task 2 RCRA Storage Unit

- Time will be responsible for coordinating the cleaning of Tank No. 55021.
- The selected alternative for the soil will be storage and treatment in Tank No. 55021 and a vendor-supplied package treatment system for the water.
- Time will be responsible for production and advertisement of the bid packages.
- Time will obtain all locally-required building permits.
- The schedule assumes that Time will select a remedial alternative at least one month prior to the scheduled submittal date of the draft design.

Task 3 RFI Site Characterization

- Time will identify buried utilities in the areas of proposed explorations. Level C health and safety precautions may be required for some investigation activities.
- New shallow monitoring wells and shallow soil borings will be 20 ft in depth. Deep wells will be 40 ft in depth. Drilling of shallow borings will be conducted using a hollow-stem auger rig. Due to the need to provide a competent well seal at the aquitard prior to drilling into the lower water-bearing zone (to prevent carry down of contaminants), the deep wells will be drilled using a cable tool rig. All wells will be constructed with 2-inch Schedule 40 PVC.
- The existing wellpoints will be acceptable for use for water levels and all existing wells and 3 existing wellpoints will be included in the groundwater sampling

- The survey of newly installed wells will also include the existing 21 monitoring wells and wellpoints, and the river staff gauge. The survey will include x,y coordinates and elevation of tops of casing.
- The 30-day standard laboratory turnaround for analyses is acceptable.
- Subcontractor costs include 8.2 percent tax and Landau Associates' 10 percent handling charge. (This represents a decrease in our normal 15 percent handling charge, in response to Time's request).
- Data validation will evaluate holding times, surrogate and matrix spike recoveries, duplicate RPDs, and detection limits.
- The reports that document Task 3 (RFI Site Characterization) and Task 4 (Risk Assessment) will be combined.
- There is a large degree of uncertainty in the level of effort that will be necessary to respond to Time and DEQ comments. We have estimated costs on a level of effort that corresponds to a low-to-moderate number of comments.
- Subtask 3.2 includes preparing four drafts of the work plan, and a detailed cost estimate in Time's standard format. The cost estimate will include the results of competitive bids from up to four laboratories.
- Subtask 3.5 includes preparing three drafts of the RFI Site Characterization Report.

Task 4 Risk Assessment

- The risk assessment will be limited to no more than six constituents of concern.
- No ecological risk assessment is necessary.
- Environmental contamination is limited to soil and groundwater.

APPENDIX A
CONCEPTUAL MODEL

Groundwater occurs at the site in what has been described as fill and alluvial sediments of the Willamette River. Groundwater occurs as perched groundwater in a gravelly sand unit (the upper water-bearing zone) above a zone of interbedded clays, silts, and sands. Groundwater in the upper water-bearing zone reportedly flows to the southwest. Below the interbedded unit is a fine sand, in which groundwater exists under confined conditions beneath the site (the interbedded unit that confines the water in the lower water-bearing zone is reported to be absent between the site and the Willamette River). The vertical extent of the lower water-bearing zone has not been defined at the site. No flow direction has been identified for the lower water-bearing zone, but it most likely flows west-northwest. Groundwater in the lower water-bearing zone discharges directly to the Willamette River and groundwater in the perched aquifer reportedly discharges indirectly to the river via the lower water-bearing zone. Recharge to the upper water-bearing zone is expected to be primarily from infiltrating precipitation; recharge to the lower water-bearing zone may occur along contacts with older sediments to the east, from the upper water-bearing zone, from direct infiltration of precipitation in those areas where the confining unit is absent, and seasonally, perhaps from the river itself.

Chemicals released during past operations at the site would be expected to leach into the subsurface soils and the water of the upper water-bearing zone in the dissolved phase or as a pure phase (while some of the leaks and spills were probably so limited in volume that the retention capacity of the soils depleted the spills before they reached groundwater, others may have been large enough in volume for some portion of those spills to reach the water as a pure phase). Based on a review of the MSDS sheets provided for components of the Koppers formulations and the formulations themselves, and of the American Wood Preservers Association (AWPA) specifications for PCP wood treatment solutions, the most likely forms of contamination in the subsurface at the site are the following:

- Pure (solid) PCP in near surface soils (or deeper if surface disturbance or filling has occurred)
- Dissolved phase PCP and carrier components

- Pure phase carriers or PCP-containing formulations. The pure phase would be expected to exist in the unsaturated zone as residual and at the top of the capillary zone of the upper water-bearing zone (due to the fact that most of the carriers and formulations 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 "smeared" over an interval that corresponds to the seasonal fluctuation of the groundwater.

There is also the potential at the site for a dense pure phase which would, given sufficient volume to overcome depletion through soil retention, migrate downward under gravity through the saturated soils of the upper water-bearing zone, and accumulate on lenses or units of low permeability. This potential is due to the fact that a Koppers MSDS sheet exists for a formulation that had a specific gravity greater than 1 (PCP itself is also denser than water, but at its solubility limit, would not form a solution denser than water; it does not appear that dissolved PCP could form a solution denser than water even if carriers were also dissolved in the water, thereby inducing a cosolvency effect; however, this potential will be evaluated during the RFI).

PCP exhibits a relatively high tendency to sorb to organic carbon in soil, thereby retarding its movement in the environment relative to water and some of the constituents in the solvents 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 soils. Boring logs provided to us during the site visit suggest that, with the exception of the upper silty clay of the confining unit, the soil that comprises the upper water-bearing zone may be fairly low in organic carbon.

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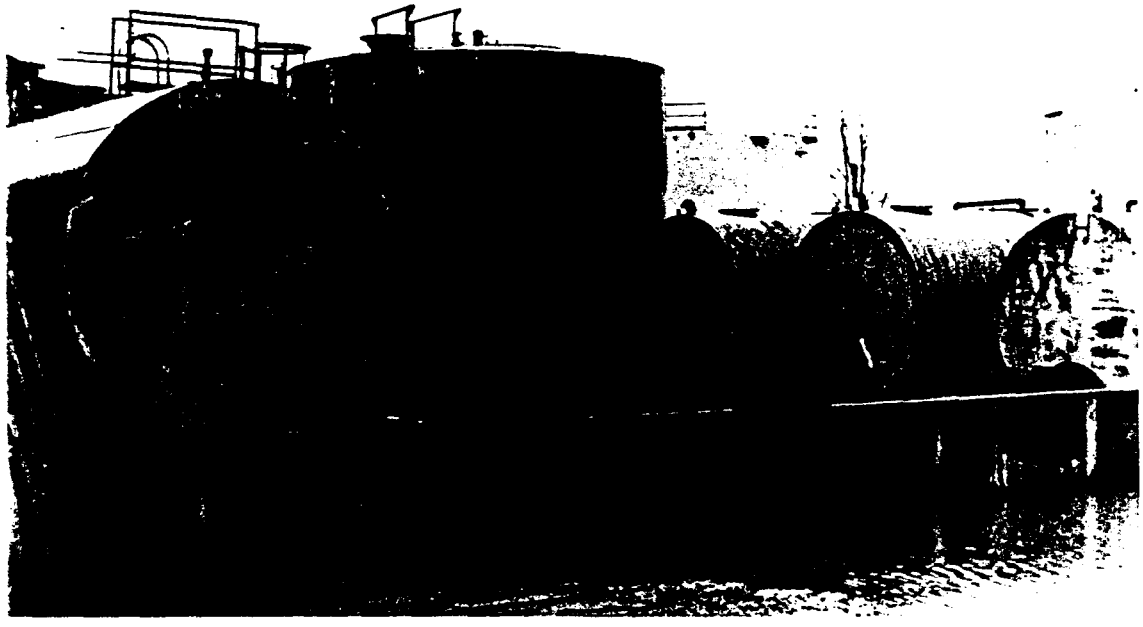

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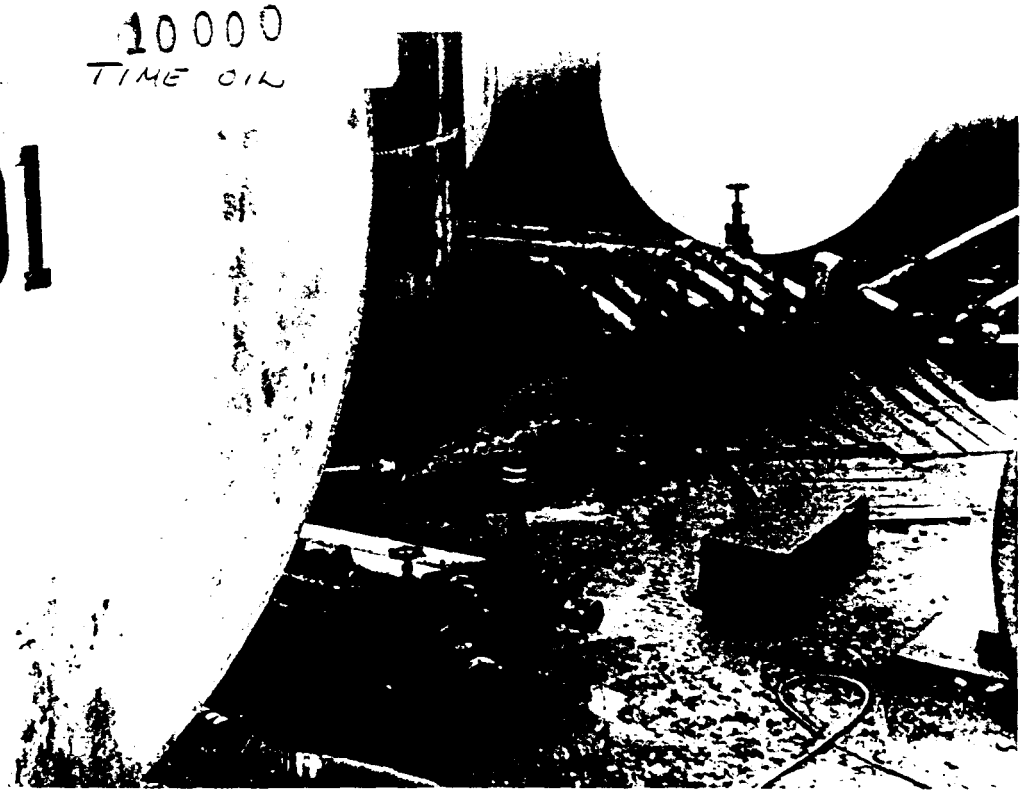

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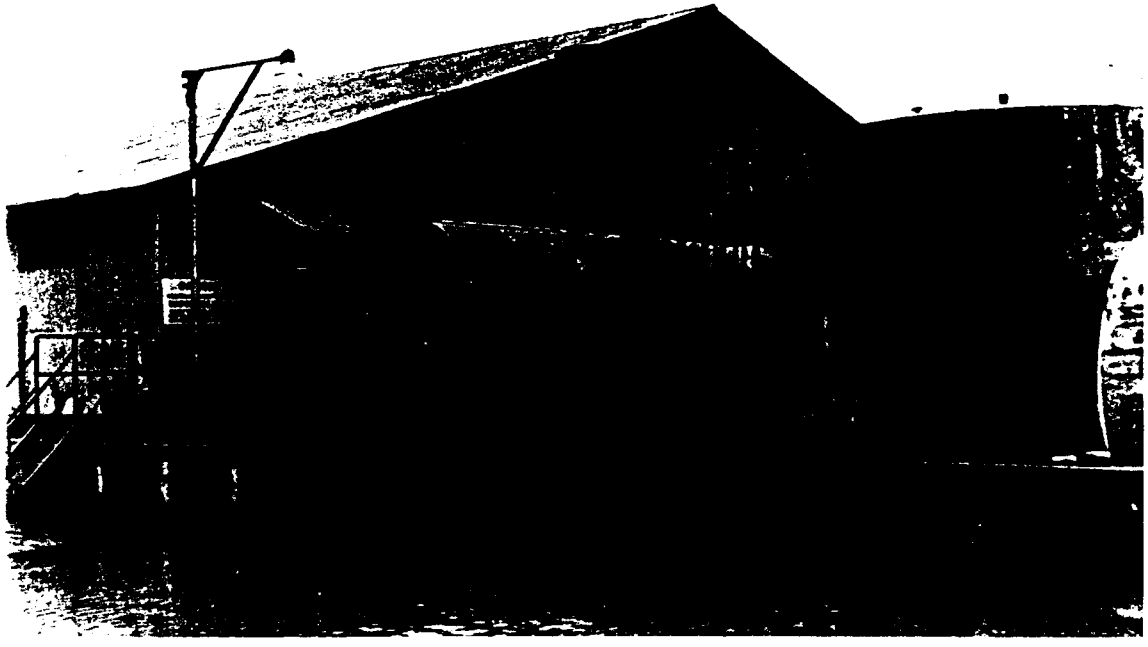

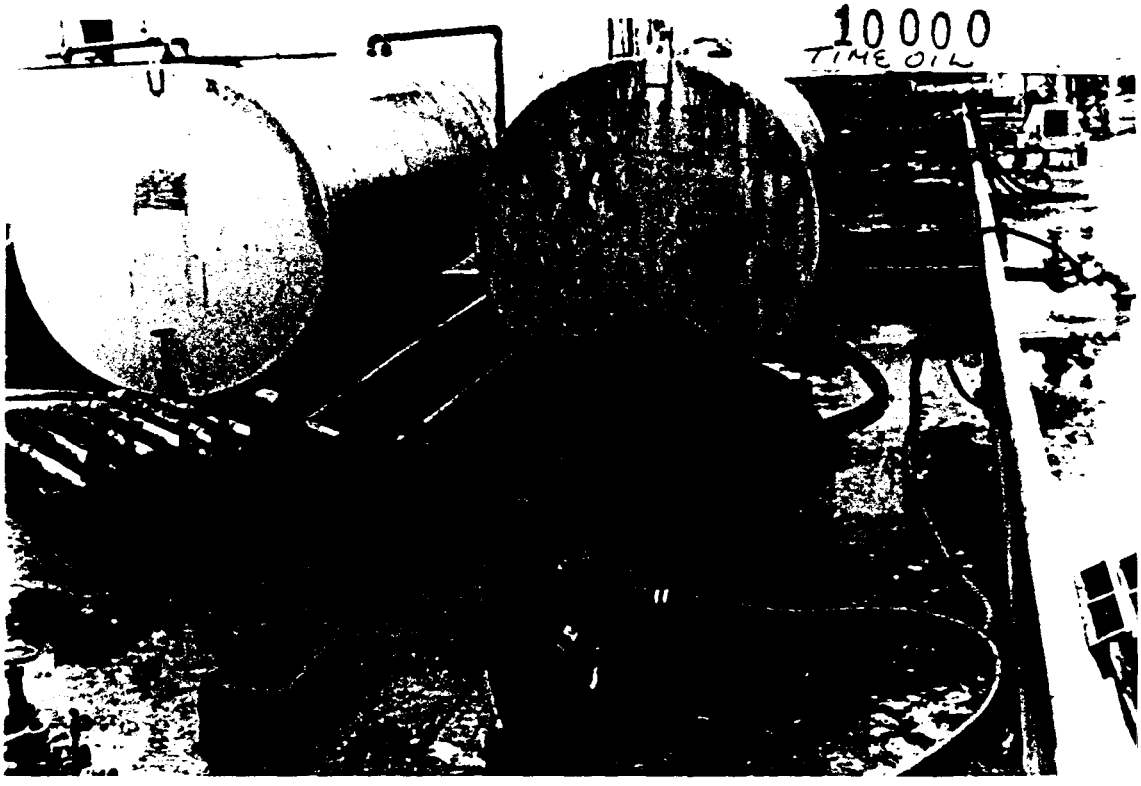
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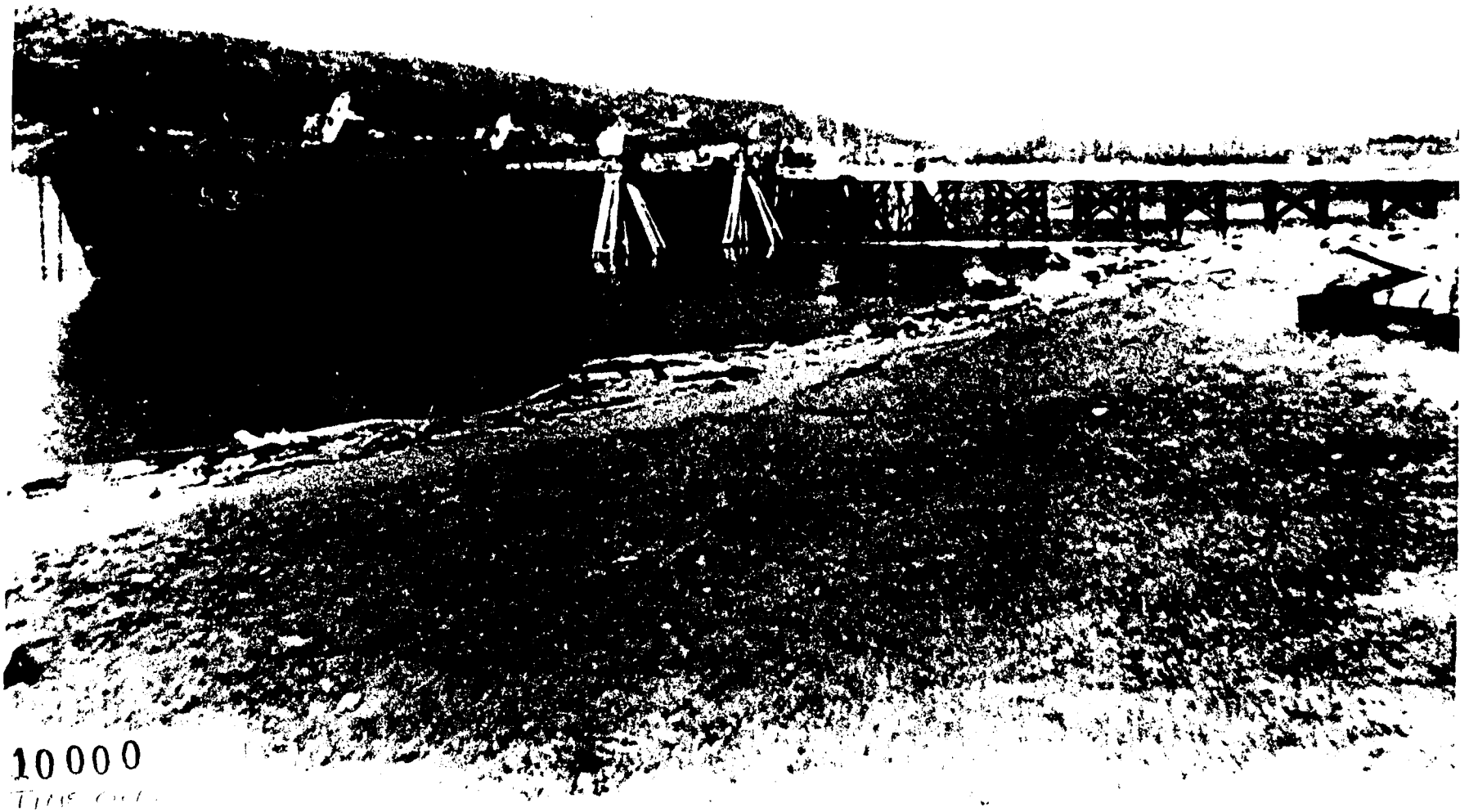

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