SCOPE OF WORK FOR

REMEDIAL DESIGN/REMEDIAL ACTION ACTIVITIES

AT THE GOULD SITE

I. INTRODUCTION

This document constitutes the Remedial Design/Remedial Action (RD/RA) Scope of Work for the Gould Superfund site in Portland, Oregon. The Gould site is located in the Doane Lake industrial area of Portland between N.W. St. Helens Road and N.W. Front Avenue about 1.3 miles southeast of the St. Johns Bridge.

Battery casings and soil contamination from the site operations is the focus of this Scope of Work. The Record of Decision selected a remedy that included excavation of all of the battery casing fragments for processing in a separation unit. In addition, approximately 22,000 yards of contaminated soil and sediment and approximately 6,000 yards of matte will be stabilized to reduce mobility of lead in these materials. Details of site conditions and a description of the selected remedy are contained in the Record of Decision for the site dated March 31, 1988.

II. OBJECTIVES

Goals

The overall goals of the selected remedy are:

* Excavation of battery casings fragments and matte from the Gould property and adjacent properties;

* Separation of battery casing fragments;

* Recycling of recyclable components, off-site disposal of non-recyclable components that exhibit the characteristic of EP toxicity for lead, and on-site disposal of non-recyclable components that do not exhibit the characteristic of EP toxicity for lead;

* Excavation, fixation, and stabilization of remaining subsurface soil, sediment, and matte that exhibit the characteristic of EP toxicity for lead and surface soil that contains a total lead content greater than 1000 ppm;

* Soil capping and revegetation;

* Prevention of surface water runoff to East Doane Lake by site regrading; and

* Development of an air monitoring program and a long term groundwater monitoring program to determine changes in groundwater contamination over time and to ensure that remediation does not adversely impact air quality.

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Predesign Studies

Prior to initiation of remedial actions to accomplish the above objectives, design work and pilot studies will be implemented. The purpose of this work will be to:

* Determine significant features of the site that will affect design;

* Develop recyclability criteria for the subsurface casings to determine the volume of casings that will be processed;

* Determine the process requirements to separate the casing components in a manner that minimizes fugitive emissions;

* Determine the modifications required to adapt existing separation technology to conditions at the Gould site, including modifications to develop a throughput capacity of buried battery casings such that the total remedial action will not take significantly longer than the six years estimated in the Record of Decision; and

* Determine the process and design requirements for treating contaminated soils, sediment, and matte.

III. CONTENTS OF THE WORK PLAN

Pre-Work Plan Tasks

Selection of Contractor. Prior to initiation of work under the work plan, a contractor shall be selected.

Selection of a Test Facility. Prior to the initiation of work under the work plan, a facility(s) for the pilot project shall be selected. This task will also include the execution of formal agreements with the facility(s) in order to define their role in conducting the pilot studies, including handling arrangements, scheduling, and reporting requirements.

Phase A - Predesign Studies

The predesign studies are divided into the tasks described below. The schedule of activities for these studies, with significant milestones, is shown in Table 1.

Task 1. Submission of Work Plan for Predesign Studies. The purpose of this task is to prepare a Work plan that will include a Health and Safety Plan, Sampling Plans and Quality Assurance Plans covering each of the tasks outlined below, and a Permitting Plan. The purpose of the health and safety plan is to ensure that activities identified in the Work Plan are carried out in a safe and efficient manner. The Quality Assurance Plan and Sampling Plan will ensure that sampling and analysis are conducted so as to ensure the generation of data of acceptable quality during the performance of each of the tasks. A plan will also be developed to ensure applicable permitting requirements are satisfied.

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Task 2. Site Investigation. Additional investigative activities will be performed to provide site-specific information needed to prepare the predesign report. Examples include additional geotechnical investigations to refine present estimates of the boundaries of recyclable casings, and studies to determine physical features that might affect fugitive emissions.

Task 3. Site Reference Materials (SRM). SRM samples will be prepared which are representative of the most difficult condition to treat. SRM samples will include battery casings, subsurface and surface soils, sediment, and matte. Field screening will be performed to help select proper locations for the SRMs. Field samples will be transformed into SRM samples in accordance with EPA protocols.

Basic characteristics of SRM materials shall be determined as part of this task. Characteristics include both chemical and physical properties.

Task 4. Recycling Pilot Studies. A series of pilot studies will be developed including evaluation protocols. These protocols will based on the generic protocols for the SITE program, where applicable.

This task includes the removal of representative battery casings and delivery to a facility for pilot testing purposes. The purpose and scope of this task is to investigate the requirements and feasibility of separating the buried battery casings into four output streams: ebonite, plastic, lead oxide, and metallic lead. At a minimum, this task will be divided into the following subtasks, which include:

Subtask I - a developmental project to optimize throughput capacity;.

Subtask II - a developmental project to water-wash ebonite and plastic to lead levels low enough to pass the EP Toxicity test for lead, 5.0 mg/l in extract. Water washing, crushing, and screening techniques will be investigated; and

Subtask III - an evaluation of fugitive emissions during the processing of the casings, and an investigation of the effectiveness of various mitigation measures. The purpose of this task is to investigate the feasibility of reducing airborne lead levels and suspended particulate matter to meet applicable ARARs. Feasibility criteria shall include cost, impacts on separation and recyclability, and environmental impacts. Receptor site selection, monitoring methodology and equipment, system installation, startup, operation and maintenance, and emissions reductions programs will be defined and evaluated.

These tasks may be performed in two phases. Preliminary work will be performed to establish the equipment requirements to perform the above tasks in such a manner as to satisfy the predesign evaluation criteria. Depending on the results of these tasks, additional work on-site work may be required to enable EPA to further evaluate whether the evaluation criteria have been satisfied.

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Task 5. Water Wash Evaluation. In addition to the recycling pilot studies, an evaluation of water washing, in sufficient detail to provide design parameters, will be completed. The water wash evaluation will use SRM materials.

A large-scale leaching study will be used to evaluate various methods of using water to wash casings. The casings will be preprocessed to provide 3 or 4 sample streams, of varying particle size.

Multiple replicates of water washes will evaluate the changes in leaching and process efficiency by varying the key parameters of:

1) contact or residence time,
2) water casing ratios, volume or flow mass,
3) pressure nozzles, and
4) temperature.

The results of the water wash evaluation will provide input for evaluating/proposing modifications during the separation pilot studies. The results may also be used to make additional modifications during design.

Task 6. Stabilization Design Study. Stabilization studies will be performed on selected SRM samples as well as ebonite from the separation process. One of the goals of these studies will be to develop specifications for optimum mixes that could be bid on a materials and placement basis.

The stabilization study will evaluate multiple mixes using commonly available materials such as cements and fly ash (as binders), bentonite, fluidizers and surfactants, blast furnace slag, etc. The procedure includes a sequential program of screening, physical, and chemical tests, with only the most promising mixes being advanced to the next step. Examples of tests included with each step include:

1) screening,
2) physical tests, and
3) chemical tests.

Task 7. Test Marketing. Markets for the separated and processed material will be explored. This task will be performed during both the predesign studies and remedial design phases of the project.

Task 8. Predesign Report. Following completion of predesign studies, a predesign report will be prepared. The purpose of the report will be to describe the engineering parameters and institutional concerns of the selected remedy and to package all pertinent information for effectively transferring to the design contractor.

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Phase B - Predesign Evaluation

After completion of the predesign studies, the results and the selected remedy will be evaluated according to the following criteria:

Achieving a throughput rate such that the processing of the casings will not take significantly longer than four years;

Processing of the ebonite and plastic streams such that they no longer exhibit the characteristics of EP Toxicity for lead; and

Processing of the casings such that ambient lead and particulate levels at the site boundary will not exceed applicable ARARS.

After the above review has been performed, a determination will be made by EPA as to whether the predesign results indicate that the above criteria are satisfied.

Phase C -Remedial Design

Following the completion of predesign studies and EPA approval of the results according to the criteria in Phase B, design work at the site will be initiated. The design work shall address each of the goals mentioned under section II of this scope of work as well as any other objectives defined in the predesign report. This shall include:

* Excavation of battery casings fragments and matte from the Gould property and adjacent properties;

* Separation of battery casing fragments;

* Recycling of recyclable components, off-site disposal of non-recyclable components that exhibit the characteristic of EP toxicity for lead, and on-site disposal of non-recyclable components that do not exhibit the characteristic of EP toxicity for lead;

* Excavation, fixation, and stabilization of remaining subsurface soil, sediment, and matte that exhibit the characteristic of EP toxicity for lead and surface soil that contains a total lead content greater than 1000 ppm;

* Soil capping and revegetation;

* Prevention of surface water runoff to East Doane Lake by site regrading; and

* Development of an air monitoring program and a long term groundwater monitoring program to determine changes in groundwater contamination over time and to ensure that remediation does not adversely impact air quality.

Table 1

List of Deliverables and Significant Milestones

Event	Date
Selection of Contractor	August 15, 1988
Execute Contract	September 1, 1988
Submission of Draft Work Plan	October 1, 1988
EPA Comments on Work Plan Provided	October 15, 1988
Submission of Final Work Plan	November 1, 1988
Progress Report #1	December 15, 1988
Final Site Investigation Report - Task 2	January 15, 1989
Draft Stabilization Report - Task 6	February 1, 1989
Draft Report on Pilot Studies - Tasks 4 and 5	February 1, 1989
Initiation of Demonstration Unit Studies	February 1, 1989
Progress Report #2	March 1, 1989
Draft Test Marketing Report	April 1, 1989
Final Report on Pilot Studies - Tasks 4 and 5	April 15, 1989
Draft Predesign Report - Task 8	April 30, 1989
EPA Comments on Draft Predesign Report	May 10, 1989
Draft RD/RA Work Plan	May 15, 1989
Final Predesign Report - Task 8	May 31, 1989
EPA Evaluation of Results of Predesign Studies	June 1, 1989
Final RD/RA Work Plan	June 15, 1989
Bi-Monthly Progress Reports - Starting	July 1, 1989

A work plan shall be prepared for the remedial design and remedial action. The plans and specifications portion of the work plan shall include the following phases of the remedial design:

Preliminary Design
Intermediate Design
Prefinal/Final Design

The SOW and all design work shall follow as closely as possible and satisfy the requirements of Superfund Remedial Design and Remedial Action Guidance Document (OSWER Directive 9355.04A).

Contractor(s) for RD/RA will be selected based on several factors including, but not limited to, availability, prior work experience, and cost. These factors are further identified in the document entitled "Protocol for Selection of Consultant for RD/RA."

Phase D - Remedial Action

Following completion and EPA approval of the Remedial Design package, remedial action will be implemented at the site. All work pursuant to implementation of remedial action shall follow as closely as possible and satisfy the requirements of Superfund Remedial Design and Remedial Action Guidance Document (OSWER Directive 9355.04A).

********** DRAFT ********** DATE: 05/15/89
TIME: 12:15:11

CORA GROUNDWATER MONITORING COST MODULE (503)

SITE NAME: EAGLE HARBOR
OPERABLE UNIT: CENTRAL HARBOR ESTIMATED START: MID FY 1991
SCENARIO: CAP
RUN BY: david tetta PHONE NUMBER: 206 442-2138

INPUTS	
Parameter	Value
Number of wells to install	20
Average well depth (ft)	30
Protection during setup of drill rig & installation of above-grade piping	D
Protection during drilling	D
Average temp (degrees F)	65
Confidence level	L
Number of wells to monitor	40
Monitoring frequency	4
Monitoring requirements:	
24 Plasma Metals	Y
Pest/PCB	N
GC-BN	Y
GC-Acid	Y
HSLORG	Y
VOA GC/MS	N
Acid GC/MS	N
B/N GC/MS	N

RESULTS	
Component	Total
CAPITAL COST	97,000
O & M COSTS	380,000

IN THE UNITED STATES DISTRICT COURT

FOR THE DISTRICT OF OREGON

UNITED STATES OF AMERICA, Plaintiff, v. NL INDUSTRIES, INC., Defendant.	CIVIL NO. 89-408PA PARTIAL CONSENT DECREE

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I. AGREEMENT OF PARTIES

The parties agree that:

A. The United States of America shall file this Consent Decree. The United States seeks to require the Settling Defendant to abate what the U.S. Environmental Protection Agency ("U.S. EPA") believes to be the release or threat of release of hazardous substances from the Site, as hereafter defined, and to remedy what the U.S. EPA believes to be hazardous conditions presented to the public health, welfare, and the environment by the Site.

B. The relief sought against the Settling Defendant would require remedial actions as provided for in the Record of Decision ("ROD") signed on March 31, 1988, by the Regional Administrator, Region 10, the United States Environmental Protection Agency, or any modifications thereto.

C. The Settling Defendant denies any legal or equitable liability under any statute, regulation, ordinance, or common law for damages caused by the generation, handling, storage, treatment, transportation, release, or disposal of hazardous substances at the Site, or by ownership or operation of the Site.

D. This Consent Decree, the entry hereof, and compliance herewith shall not be an admission of liability for any purpose, and shall not be admissible in any judicial or

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administrative proceeding other than in proceedings to enforce this Consent Decree, where it may be used only to establish the Settling Defendant's responsibility to perform any of the obligations set forth herein.

E. To accomplish the objectives set forth in this Consent Decree the parties have agreed that it is in the public interest and in the interest of the parties for this case to be resolved without litigation, before the taking of any testimony and without the admission of any issue of fact or law.

F. An investigation is underway to identify responsible parties, other than the Settling Defendant, who arranged for the disposal or treatment of hazardous substances at the Site, or who accepted hazardous substances for transportation to the Site, and it is anticipated that the investigation will result in the identification of additional responsible parties for the site.

G. By entering into this Consent Decree, the parties do not intend to discharge non-settling persons from any liability they may have with respect to matters alleged in the complaint. The United States presently intends, subject to its prosecutorial discretion which is not subject to judicial review, to recover from viable PRPs administrative, oversight, remedial, or response costs incurred or to be incurred by the United States in connection with the Site.

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H. U.S. EPA and Settling Defendant do not intend for this Consent Decree to be nor shall it be construed as a totally comprehensive and final response to conditions at the Site, rather the work to be performed by Settling Defendant pursuant to this Consent Decree is intended by the parties to be necessary partial corrective action which is consistent with the objectives of the Record of Decision for this Site.

I. Plaintiff and Settling Defendant, by their representatives, have agreed to this Consent Decree.

NOW THEREFORE, it is ORDERED as follows:

II. JURISDICTION

This Court has jurisdiction pursuant to 42 U.S.C. § 9613 and 28 U.S.C. § 1331 over the subject matter herein, and over the parties consenting hereto. Settling Defendant shall not challenge this Court's jurisdiction to enter and enforce this Consent Decree.

III. PARTIES BOUND

This Consent Decree applies to and is binding upon the undersigned parties, their successors and assigns. The undersigned representative of each party to this Consent Decree certifies that he or she is fully authorized by the party or parties whom she or he represents to enter into the terms and conditions of the Consent Decree and to execute and legally bind

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that party to it. Settling Defendant shall provide a copy of this Consent Decree to the contractor hired to perform the work required by this Consent Decree and shall require the contractor to provide a copy thereof to any subcontractor retained to perform any part of the work required by this Consent Decree.

IV. WAIVER OF CLAIM SPLITTING DEFENSE

In addition to all other agreements of the parties, all parties recognize and acknowledge that the settlement embodied in this Consent Decree is only a partial resolution of issues related to the remediation of conditions at the Site. In the event that U.S. EPA files sequential lawsuits or claims involving the Site in any subsequent litigation regarding Settling Defendant, Settling Defendant hereby waives the defense of claim splitting by the United States.

V. DEFINITIONS

Whenever the following terms are used in this Consent Decree and the Exhibits and Appendix attached hereto, the following definitions specified in this Paragraph shall apply:

A. "Architect" or "Engineer" means the company or companies retained by the Settling Defendant to perform work described in the Scope of Work which is attached to this Consent Decree as Appendix 1.

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B. "Bad faith" means conduct by the Settling Defendant or its pre-design engineer, agents, or employees that constitutes knowing interference with any Pre-Design Study in a manner designed to make it likely to fail, knowing interference in the U.S. EPA's control of the Pre-Design Studies, knowing omission of any material information, or making of any false statement or representation in any report, analytical data, or any document used by the U.S. EPA for the purpose of monitoring compliance with the Pre-Design Study portion of the Scope of Work.

C. "Clear and convincing evidence" means that the evidence that establishes the truth of the facts asserted must be highly probable.

D. "Contractors" or "Subcontractors" means the company or companies retained on behalf of Settling Defendant to undertake and complete the work required by this Consent Decree. Each contractor and subcontractor shall be qualified to do those portions of the work for which it is retained.

E. "Facility" means the "facility" as that term is defined at Section 101(9) of the Comprehensive Environmental Response, Compensation and Liability Act of 1980, as amended by the Superfund Amendments and Reauthorization Act of 1986 (CERCLA), 42 U.S.C. § 9601(9), and shall be used interchangeably with the term "site" as hereinafter described.

F. "Force Majeure" shall have the meaning set forth in Paragraph XIII of this Consent Decree.

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G. "Hazardous substance" shall have the meaning provided in Section 101(14) of CERCLA, 42 U.S.C. § 9601(14).

H. "National Contingency Plan" shall be used as that term is used in Section 105 of CERCLA, 42 U.S.C. § 9605.

I. "Parties" means the United States of America and the Settling Defendant.

J. "Plaintiff" means the United States of America and its agencies and departments.

K. "RD/RA" means remedial design and remedial action. "Remedial Design" means plans, specifications, and bid documents necessary to procure services to implement the remedial action. Remedial action shall have the meaning as set forth in CERCLA, as amended, and shall cover the actions defined in the Record of Decision for this site, or any subsequent modifications.

L. "Response Costs" means any costs incurred by Plaintiff pursuant to 42 U.S.C. §§ 9601 et seq., as defined in CERCLA.

M. "Scope of Work" or "SOW" means the scope of work for implementation of the Pre-Design Studies, remedial design, remedial action, and operation and maintenance of the remedial action at the Facility, as set forth in Appendix 1.

N. "Settling Defendant" means the party other than the United States of America who signs this Consent Decree.

O. "Site" means the Gould site which includes the property presently owned by Gould, Inc., along with any areas

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outside the property boundary where battery casings and other residue from operations on the Gould Site were placed. The Gould Site is located in a heavily industrialized area northwest of downtown Portland, approximately 1000 feet southwest of the Willamette River.

P. "United States" means the United States of America.

Q. "U.S. EPA" means the United States Environmental Protection Agency.

R. "U.S. DOJ" means the United States Department of Justice.

S. "Waste Material" means any hazardous substance as defined in 42 U.S.C. § 9601(14), and any associated contaminated material, pollutant or contaminant as defined in 42 U.S.C. § 9601(33).

T. "Work" means the design, construction and implementation, in accordance with the pertinent Paragraphs of this Consent Decree, of the tasks described in the Scope of Work, and any schedules or plans required to be submitted pursuant thereto.

U. "Work Plan" means the work plan for the Pre-Design Studies studies described in Paragraph VII.

V "RD/RA Work Plan" means the work plan for the Remedial Design and Remedial Action.

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W. All other terms not defined above, but defined in CERCLA, as amended, shall have the meanings set forth in CERCLA, as amended.

VI. GENERAL PROVISIONS

A. Commitment of Plaintiff and Settling Defendant:

1. Settling Defendant agrees subject to the entry of this Consent Decree by the Court, to finance and perform the Work as defined in this Consent Decree and the Scope of Work ("SOW") (Appendix 1). Plaintiff and Settling Defendant acknowledge that pre-design activities described in Paragraph VII are currently in progress.

2. The Work shall be completed in accordance with the standards, specifications and in the time periods set forth in this Consent Decree and in the SOW, provided, however, that if the Consent Decree is entered after November 1, 1988, the schedule shall be automatically extended to afford the Settling Defendant the same amount of time to perform each task as it otherwise would have had. The SOW shall be an enforceable part of this Consent Decree upon entry of this Consent decree by the Court.

B. Permits and Approvals:

1. All activities undertaken by the Settling Defendant pursuant to this Consent Decree shall be undertaken in accordance with the requirements of all applicable local, state and federal laws, regulations and permits. The United States has determined that the obligations and procedures

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authorized under this Consent Decree are consistent with the authority of the United States and the State under applicable law to establish appropriate remedial measures for the Facility.

2. a. The U.S. EPA has determined that no federal, state, or local permits are required for work conducted entirely on-site as described in the Scope of Work. The U.S. EPA has also determined that permits under the Resource Conservation and Recovery Act (RCRA) 42 USC § 6901 et seq. may be required for work conducted off-site at facilities pursuant to Paragraph VII.A. of this Consent Decree. In the event that the time required for obtaining such permits delays or prevents compliance with the schedule for performing the Work required by this Consent Decree and the Scope of Work, the schedule shall be automatically extended by the amount of time required to obtain the permit. In the event that any such permits are not granted, the Settling Defendant shall be excused from complying with the schedule set forth in this Consent Decree and the SOW, and the parties shall renegotiate a schedule.

b. Settling Defendant shall timely apply for any permits or approvals necessary for off-site work under federal, state or local laws. The United States, the State of Oregon, and any other State may assist the Settling Defendant to obtain such permits and approvals, if necessary. Except as provided above in Paragraph V1.B.2, delays in obtaining permits required for the Work, or the denial of any such permits, will constitute a Force Majeure as defined in this Consent Decree.

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3. Settling Defendant shall include in all contracts or subcontracts entered into for work required under this Consent Decree that all contractors and subcontractors, including their agents and employees, shall perform all activities required by such contracts or subcontracts in compliance with all applicable laws and regulations. This Consent Decree is not, nor shall it act as, nor is it intended by the Parties to be, a permit issued pursuant to any federal or state statute or regulation.

C. Conveyance of the Facility

Any deed, title, or other instrument of conveyance entered into by Settling Defendant regarding the Facility shall contain a notice that the Facility is subject to this Consent Decree, setting forth the style of the case, case number, and the Court having jurisdiction herein, and shall require the grantee to continue allowing access to U.S. EPA and its representatives.

VII. PERFORMANCE OF THE PRE-DESIGN STUDIES BY SETTLING DEFENDANTS

A. All Pre-Design Studies to be performed by Settling Defendant pursuant to this Consent Decree shall be under the direction and supervision of a qualified professional engineer approved by Plaintiff and Settling Defendant, and at Facilities agreed to by Plaintiff and Settling Defendant. Such approval and agreement shall be achieved as expeditiously as possible

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and, in any event, prior to the entry of this Decree. The Pre-Design Studies shall be performed in accordance with the schedule in the Scope of Work and the schedule set forth therein, unless the schedule is extended by operation of Paragraph VI.A.2 or VI.B.2 of this Consent Decree. Further, if U.S. EPA does not timely perform under the schedule, the schedule shall be automatically extended by the period of U.S. EPA's delay.

1. Control of Pre-Design Studies.

a. The terms of the contract between Settling Defendant and the engineer (hereafter, the "Contract") shall be jointly agreed upon between U.S. EPA and the Settling Defendant. The terms of the Contract(s) between Settling Defendant and the above-referenced Facilities shall be jointly agreed upon between U.S. EPA and the Settling Defendant. Said Contract(s) shall be entered into within fourteen (14) days of the entry of this Consent Decree, unless an extension is mutually agreed to by the parties.

b. All plans, reports, and data produced shall be provided simultaneously to U.S. EPA and the Settling Defendant. Settling Defendant shall not have any right of approval of work prior to its submission to U.S. EPA.

c. The selected engineer shall address all U.S. EPA comments on draft reports in preparing final reports. Unless the SOW provides a different time period for

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U.S. EPA to comment on drafts, all U.S. EPA comments shall be delivered to the Settling Defendant within thirty (30) days of U.S. EPA's receipt of drafts.

d. Provided it is consistent with the Scope of Work, the work plan for the Pre-Design Studies (the Work Plan) shall be prepared by the Settling Defendant and the selected engineer and submitted to the U.S. EPA in accordance with the schedule for the Pre-Design Studies. The Work Plan shall be subject to approval by the U.S. EPA. Settling Defendant shall have the right of participation in this process but shall not have the right of approval in determining the contents of the Work Plan.

e. If, at any time during the conduct of the Pre-Design Studies, the U.S. EPA makes a determination, based on clear and convincing evidence, that the Settling Defendant is carrying out the provisions of this Paragraph in Bad Faith, then the U.S. EPA shall bar the Settling Defendant from further participation in the Pre-Design Studies. Any such determination by the U.S. EPA shall not be subject to the Dispute Resolution provisions of this Consent Decree. Settling Defendant shall, however, be required to continue to fulfill its financial obligations under the Contract.

2. a. The Work Plan shall be developed in conformance with the SOW, and any additional guidance documents provided by U.S. EPA.

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b. The Work Plan submittal shall include a schedule for submittal of deliverables, reports and plans as set forth in the Scope of Work, including: a sampling and analysis plan; a health and safety/ contingency plan; a plan for satisfaction of any permitting requirements; and a quality assurance project plan.

c. The Work Plan and other required documents and reports (hereinafter referred to as "documents") shall be subject to review, comment and approval by the U.S. EPA. As part of its approval authority U.S. EPA can modify the work plan.

d. Within the schedule set forth in the SOW, the U.S. EPA Remedial Project Manager shall notify Settling Defendant, in writing, of approval or disapproval of the document, or any part thereof. In the event that a longer review period is required, the U.S. EPA Remedial Project Manager shall notify Settling Defendant of that fact within fourteen (14) calendar days of receipt of the document. In the event of a disapproval, the U.S. EPA shall specify, in writing, any deficiencies and required modifications to the document.

e. In accordance with the schedule set forth in the SOW, or as otherwise required by the U.S. EPA, the Settling Defendant shall submit a revised document to the U.S. EPA which addresses the U.S. EPA comments, or the Settling Defendant shall provide a notice of dispute pursuant to the

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Dispute Resolution provisions of this Consent Decree. Unless otherwise provided for in the Scope of Work, the aforesaid submittal or notice shall be furnished to the U.S. EPA within fourteen (14) calendar days of receipt of any U.S. EPA document disapproval.

f. Settling Defendant shall proceed to implement the work, or portions of the work, detailed in the Work Plan if and when all or portions of the Work Plan are fully approved by U.S. EPA. Unless otherwise directed by U.S. EPA, the Settling Defendant shall not commence field activities until approval by U.S. EPA of the Work Plan or portions thereof. The fully approved Work Plan shall be deemed incorporated into and made an enforceable part of this Consent Decree upon entry of this Consent Decree by the Court. All work shall be conducted in accordance with the National Contingency Plan and the requirements of this Consent Decree, including the standards, specifications, and schedule contained in the Work Plan.

3. The Parties acknowledge and agree that neither the SOW nor the Work Plan constitutes a warranty or representation of any kind by Plaintiff and shall not foreclose Plaintiff from seeking performance of all terms and conditions of this Consent Decree.

B. Upon completion of the pre-design report, the U.S. EPA shall determine whether the results of the studies satisfy the criteria described in Phase B of the Scope of Work. The U.S. EPA shall then notify the Settling Defendant of U.S. EPA's

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determination. Settling Defendant shall have no more than thirty (30) days to respond to the U.S. EPA's determination and the response shall be incorporated into the administrative record.

VIII. DETERMINATION OF THE REMEDIAL ACTION

A. In the event that the U.S. EPA determines that the criteria of Phase B of the Scope of Work are satisfied:

1. The U.S. EPA shall notify the Settling Defendant and any known responsible parties identified by the U.S. EPA to proceed with the Remedial Design/Remedial Action ("RD/RA").

2. Thirty (30) days after the Settling Defendant's response pursuant to Paragraph VII.B above, the Settling Defendant, and any other PRPs identified by U.S. EPA, shall notify the U.S. EPA whether or not it will perform the entire RD/RA. Regardless of its participation in the performance of the RD/RA, the Settling Defendant will undertake to perform the tasks identified in Paragraph VIII.A.4. If the Settling Defendant agrees to complete the entire RD/RA, the parties shall negotiate a supplemental agreement to be signed within sixty (60) days and lodged under this Consent Decree.

3. If Settling Defendant declines to perform the selected remedy, the U.S. EPA may, in accordance with applicable law, perform and pay for the selected remedy. U.S. EPA reserves its right to file claims against Settling Defendant in a proceeding to recover response costs, not inconsistent with

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the National Contingency Plan, expended by U.S. EPA in performing the RD/RA. Settling Defendant reserves any rights it may have with respect to liability for U.S. EPA's costs for work performed by the Agency outside of this Consent Decree. The Settling Defendant does not waive any right it may have pursuant to CERCLA, as amended, to contest any U.S. EPA decisions to perform any further remediation, and any and all rights and defenses it may have. This reservation of rights shall not apply to tasks identified in Paragraph VIII.A.4.

4. (i) Notwithstanding the above, the Settling Defendant agrees to pay for the development of an RD/RA Work Plan, engineering, design, and construction of equipment to carry out the fixation of soil and the separation and treatment of battery casings at the Site. Said payment shall not exceed $2.25 million minus the cost of the Pre-Design Studies. Any necessary response costs, not inconsistent with the National Contingency Plan, incurred by U.S. EPA for these items in excess of this amount may be included in amounts sought to be recovered by U.S. EPA in subsequent proceedings.

(ii) All remedial design work to be performed by Settling Defendant pursuant to this Consent Decree shall be under the direction and supervision of a qualified professional engineer. Prior to the initiation of remedial design work for the Facility, the Settling Defendant shall notify U.S. EPA, in writing, of the name, title, and qualifications of any Engineer proposed to be used in carrying

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out the remedial design work, and the selection of engineers shall be subject to approval by U.S. EPA.

(iii) The RD/RA Work Plan submittal shall include a schedule for submittal of the following project plans: (1) a sampling and analysis plan; (2) a health and safety/contingency plan; (3) a plan for satisfaction of permitting requirements; (4) a quality assurance project plan; (5) a groundwater monitoring plan; and (6) an operations and maintenance plan. The RD/RA work plan shall also include a schedule for implementation of the RD/RA tasks and submittal of RD/RA reports.

(iv) All remedial action work to be performed by the Settling Defendant pursuant to this Consent Decree shall be under the direction and supervision of a qualified professional engineer. Prior to the initiation of remedial action work at the Facility, the Settling Defendant shall notify U.S. EPA, in writing, of the name, title, and qualifications of the proposed Engineer, and the names of principal contractors and/or subcontractors, if known, proposed to be used in carrying out the RD/RA work to be performed pursuant to this Consent Decree. Selection of any such Engineer, contractor and/or subcontractor shall be subject to approval by the U.S. EPA.

(v) Settling Defendant shall proceed to implement the work detailed in the RD/RA work plan if and when it is fully approved by the U.S. EPA. Unless otherwise directed

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by U.S. EPA, the Settling Defendant shall not commence field activities until approval by U.S. EPA of the RD/RA work plan. The fully approved RD/RA work plan shall be deemed incorporated into and made an enforceable part of this Consent Decree, provided, however, that the Settling Defendant shall be excused from further performance under this Consent Decree of those activities specified in the RD/RA work plan upon the expenditure of the dollar limitation set forth in Paragraph VIII.A.4(i).

(vi) Periodic reports of expenditures in furtherance of the activities required by Paragraph VIII A.4 shall be furnished to the U.S. EPA. U.S. EPA may use this information to determine the order in which specific portions of the RD/RA shall be performed.

(vii) Performance of the aforesaid tasks may not act as a bar to any additional liability Settling Defendant may have.

B. In the event that the U.S. EPA determines that the criteria of Phase B of the Scope of Work are not satisfied, an additional public comment period will be established and the Record of Decision may be modified. At such time, U.S. EPA would present for comment additional options for treating the on-site materials to the maximum extent practicable. Settling Defendant shall have thirty (30) days after its receipt of any modification of the Record of Decision to negotiate for the performance of the RD/RA selected under this paragraph. In the

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event that these negotiations are successful, then a new Consent Decree shall be entered. In the event that these negotiations are unsuccessful, this Consent Decree shall be terminated in accordance with the provisions of Paragraph XXVIII.

IX. QUALITY ASSURANCE

Settling Defendant shall use quality assurance, quality control, and chain of custody procedures in accordance with U.S. EPA's "Interim Guidelines and Specifications For Preparing Quality Assurance Project Plans," (QAM-005/80), U.S. EPA's Data Quality Objective Guidance (U.S. EPA/540/G87/003 and 004), and subsequent amendments to such guidelines upon notification to Settling Defendant of such amendments by U.S. EPA. Prior to the commencement of any monitoring project under this Consent Decree, Settling Defendant shall submit a Quality Assurance Project Plan ("QAPP") to U.S. EPA that is consistent with the RA and applicable guidelines. U.S. EPA, after review of Settling Defendant's QAPP, will notify Settling Defendant of any required modifications, conditional approval, disapproval, or approval of the QAPP. Except as provided in Paragraph VII.A.2.c, notification of disapproval or any need for modifications in the QAPP shall be subject to the Dispute Resolution provisions of this Consent Decree. In addition, Settling Defendant shall have a designated laboratory analyze samples submitted by U.S. EPA for quality assurance monitoring.

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X. FACILITY ACCESS, SAMPLING, DOCUMENT AVAILABILITY

A. Settling Defendant, if presently owners or record title holder to any part of the Site, shall provide access to U.S. EPA or its representatives for the purpose of effectuating all terms of this Consent Decree.

B. To the extent that the Facility or other areas where Work is to be performed hereunder are presently owned by parties other than those bound by this Consent Decree, Settling Defendant shall use its reasonable efforts to obtain access agreements from the present owners within thirty (30) calendar days of entry of this Consent Decree for purposes of implementing the requirements of this Consent Decree. Settling Defendant may not be required by this Consent Decree to pay compensation or damages or to enter into indemnity agreements to secure such access. Access agreements shall provide access for U.S. EPA, authorized representatives of U.S. EPA, and the contractors of the Settling Defendant. If such access agreements are not obtained within the time specified herein, Settling Defendant shall so notify U.S. EPA, and Plaintiff may use available legal means to secure access to the Facility. Settling Defendant's failure to secure access to any such Facility after reasonable efforts have been made shall not be a violation of this Consent Decree.

C. Settling Defendant shall make available to U.S. EPA and the State the results of all sampling and/or tests or other data generated by Settling Defendant with respect to the

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implementation of this Consent Decree and shall submit these results in progress reports required by the SOW.

D. At the request of U.S. EPA, Settling Defendant shall allow split or duplicate samples to be taken by U.S. EPA and/or its authorized representatives, of any samples collected by Settling Defendant pursuant to the implementation of this Consent Decree. Settling Defendant shall notify U.S. EPA as soon as practicable in advance of any sample collection activity. In addition, U.S. EPA shall have the right to take any additional samples that U.S. EPA deems necessary.

XI. REPORTING REQUIREMENTS

A. Settling Defendant shall be responsible for and require the contractor to prepare and provide to the U.S. EPA periodic written progress reports which: (1) describe the actions which have been taken towards achieving compliance with this Consent Decree during the previous period; (2) include all results of sampling and tests and all other data received by Settling Defendant during previous period; (3) include all plans and procedures completed under the Work Plan during the previous period; (4) describe all actions, data, and plans which are scheduled for the next period and provide other information relating to the progress of construction as is customary in the industry; (5) include information regarding percentage of completion, unresolved delays encountered or anticipated that

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may affect the future schedule for implementation of Scope of Work or Work Plan, and a description of efforts made to mitigate those delays or anticipated delays. Previous period shall be defined as that period of time subsequent to the submittal of the Final Work Plan or subsequent to submittal of the previous progress report, whichever is appropriate. These progress reports are to be submitted to U.S. EPA within the time frames set forth in the SOW. Where required in the SOW, bi-monthly progress reports are to be submitted to U.S. EPA by the tenth day of the month.

B. Upon the occurrence of any event during performance of the Work which, pursuant to Section 103 of CERCLA, requires reporting to the National Response Center, Settling Defendant shall promptly orally notify the U.S. EPA Project Manager ("RPM"), or in the event of the unavailability of the U.S. EPA RPM, the Emergency Response Section, Region 10, United States Environmental Protection Agency, in addition to the reporting required by Section 103. Within twenty (20) days of the onset of such an event, Settling Defendant shall furnish to Plaintiff a written report setting forth the events which occurred and the measures taken, and to be taken, in response thereto. Within sixty (60) days of the conclusion of such an event, Settling Defendant shall submit a report setting forth all actions taken to respond thereto.

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XII. REMEDIAL PROJECT MANAGER(RPM)/PROJECT COORDINATOR

A. U.S. EPA shall designate an RPM for the Facility, and the Plaintiff may designate other representatives, including U.S. EPA and state employees, and federal and state contractors and consultants, to observe and monitor the progress of any activity undertaken pursuant to this Consent Decree. The RPM shall have the authority lawfully vested in an RPM or an On-Scene Coordinator (OSC) by the National Contingency Plan, 40 C.F.R. Part 300. In addition, the RPM shall have authority to halt, conduct, or direct any work required by this Consent Decree and to take any necessary response action when conditions at the Facility present an imminent and substantial endangerment to public health or welfare or the environment. Settling Defendant shall also designate a Project Coordinator who shall have primary responsibility for implementation of the Work at the Facility.

B. To the maximum extent possible, except as specifically provided in the Consent Decree, communications between Settling Defendant and U.S. EPA concerning the terms and conditions of this Consent Decree shall be made between the Project Coordinator and the RPM.

C. Within ten (10) calendar days of the date of entry of this Consent Decree, Settling Defendant and U.S. EPA shall notify each other, in writing, of the name, address, and telephone number of the designated Project Coordinator and an Alternate Project Coordinator or RPM and Alternate RPM.

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XIII. FORCE MAJEURE

A. "Force Majeure" for purposes of this Consent Decree is defined as any event arising from causes beyond the control of Settling Defendant which delays or prevents the performance of any obligation under this Consent Decree, and which its could not avoid or overcome through the exercise of due diligence. "Force Majeure" shall not include changed financial conditions, increased costs, or expenses.

B. When circumstances occur which may delay performance of any obligation under this Consent Decree or delay access to the Facility or to any property on which any part of the Work is to be performed, Settling Defendant shall promptly notify the RPM by telephone, or in the event of his unavailability, the Director of the Waste Management Division of U.S. EPA. Within ten (10) working days after the event which Settling Defendant contends is responsible for the delay, Settling Defendant shall supply to Plaintiff in writing the reason(s) for and anticipated duration of such delay, the measures taken or planned to mitigate the delay, and the timetable for implementation of such measures. Failure to give oral notice to the RPM and to give written explanation to Plaintiff in a timely manner may, in the discretion of the U.S. EPA, constitute a waiver of any claim of force majeure. The U.S. EPA's determination that failure to give oral notice to the RPM constitutes a waiver of a claim of force majeure shall not be subject to the Dispute Resolution provisions of this Consent Decree.

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C. If U.S. EPA agrees that a delay is or was attributable to a "force majeure" event, the Parties shall modify the Work Plan to provide such additional time as may be necessary to allow the completion of the specific phase of Work and/or any succeeding phase of the Work affected by such delay, with such additional time not to exceed the actual duration of the delay.

D. If U.S. EPA and Settling Defendant cannot agree whether the reason for the delay was a "force majeure" event, or whether the duration of the delay is or was warranted under the circumstances, the Parties shall resolve the dispute according to the Dispute Resolution provisions of this Consent Decree. Settling Defendant has the burden of proving "force majeure" as a defense to compliance with this Consent Decree.

XIV. DISPUTE RESOLUTION

A. Except as otherwise specifically provided for in this Consent Decree, these dispute resolution procedures shall apply to all disputes between the Settling Defendant and the Plaintiff arising out of this Consent Decree. Except as otherwise specifically provided for in this Consent Decree, any dispute which arises out of this Consent Decree shall in the first instance be the subject of informal negotiations between the Settling Defendant and Plaintiff.

B. In the event that any dispute arising under this Consent Decree is not resolved within fourteen (14) days through

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informal means, any party desiring Dispute Resolution under this Paragraph shall give written notice to the other parties to the Consent Decree within ten (10) days after the conclusion of the informal negotiation period.

C. Within twenty (20) days of the service of notice of dispute pursuant to Paragraph XIV.B, the party who gave the notice shall serve on the other parties to this Consent Decree a written statement of the issues in dispute, the relevant facts upon which the dispute is based, any factual data, analysis, or opinion supporting its position, and all supporting documentation on which such party relies (hereinafter the "Statements of Position"). Opposing parties shall serve their Statements of Position, including supporting documentation, no later than twenty (20) days after receipt of the complaining Party's Statement of Position. In the event that these 20-day time periods for exchange of Statements of Position may cause a delay in the Work, they shall be shortened upon and in accordance with notice by the U.S. EPA.

D. Any documents regarding a dispute under this Paragraph shall be part of the administrative record maintained by the U.S. EPA in this matter. The record shall be available for review by all parties. Settling Defendant may assert business confidentiality claims covering part or all of the information provided in connection with this Consent Decree in accordance with Section 104(e)(7) of CERCLA, 42 U.S.C. § 9604(e)(7), and pursuant to 40 C.F.R. § 2.203(b) and applicable State law.

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E. Upon review of the administrative record, the Director of Waste Management Division, U.S. EPA, Region 10, shall issue a final decision and order resolving the dispute. Said order shall be followed unless Settling Defendant file a petition for review pursuant to Paragraph XIV.F below. This order shall be enforceable administratively pursuant to Section 121(e)(2) of CERCLA, subject to the rights of judicial review set forth below.

F. Any decision and order of U.S. EPA pursuant to the preceding Paragraph XIV.E shall be reviewable by the Court, provided that a petition for review is filed within ten (10) days of receipt of the U.S. EPA's decision and order, until the date of termination of this Consent Decree. Thereafter, judicial review will be available only by instituting new action(s) to the extent permitted by law.

G. The invocation of the procedures stated in this Paragraph shall not extend or postpone Settling Defendant's obligations under this Consent Decree with respect to the disputed issue unless agreed by the Parties, or until the U.S. EPA finds, or the Court orders, otherwise. Payment of stipulated civil penalties shall not be made during Settling Defendant's participation in Dispute Resolution. Except as specified in Paragraph XVII infra, upon completion of Dispute Resolution, said penalties shall be paid by the Settling Defendant or excused by the U.S. EPA.

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H. The standard of review for dispute resolution shall be determined by the Court in accordance with the provisions of CERCLA. With respect to disputes involving the selection and implementation of the remedy, the Settling Defendant shall bear the burden of proof. In all other disputes, the moving party shall bear the burden of proof.

I. The Court's determination shall bind all signatories to this Consent Decree. Each party shall bear its own attorney's fees or legal costs resulting from utilization of the judicial review provisions of these dispute resolution procedures.

XV. RETENTION AND AVAILABILITY OF INFORMATION

A. Settling Defendant shall make available to U.S. EPA and the State and shall retain, during the pendency of this Consent Decree and for a period of six (6) years after its termination, all records and documents in their possession, custody, or control which relate to the performance of this Consent Decree, including, but not limited to, documents reflecting the results of any sampling, tests, or other data or information generated or acquired by any of them, or on their behalf, with respect to the Facility. After the six (6) year period of document retention, Settling Defendant shall notify U.S. DOJ and the U.S. EPA at least ninety (90) calendar days prior to the destruction of any such documents, and upon request by the U.S. EPA, Settling Defendant shall relinquish custody of the documents to the U.S. EPA.

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B. Settling Defendant may assert business confidentiality claims covering part or all of the information provided in connection with this Consent Decree in accordance with Section 104(e)(7) of CERCLA, 42 U.S.C. § 9604(e)(7), and pursuant to 40 C.F.R. § 2.203(b).

C. Information determined to be confidential by U.S. EPA will be afforded the protection specified in 40 C.F.R. Part 2, Subpart B. If no such claim accompanies the information when it is submitted to the U.S. EPA the public may be given access to such information without further notice to Settling Defendant.

D. Information acquired or generated by Settling Defendant in performance of the Work that is subject to the provisions of Section 104(e)(7)(F) of CERCLA, 42 U.S.C. § 9604(e)(7)(F), shall not be claimed as confidential by Settling Defendant.

XVI. STIPULATED CIVIL PENALTIES

In consideration of the work schedule agreed to in this Consent Decree and Scope of Work, stipulated civil penalties shall be as described below.

A. Settling Defendant shall pay stipulated civil penalties of $100 per day for their submission of a deficient resubmittal progress report unless such failure is excused under the Force Majeure provisions of the Consent Decree.

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B. Except for the stipulated civil penalties specified in paragraph A, the Settling Defendant shall pay the following stipulated civil penalties for each failure to comply with the requirements of this Decree, including but not limited to all implementation schedules and performance and submission dates:

Period of Failure to Comply Penalty Per Violation

1st through 5th day

$100

6th through 20th day

$500

21st day and beyond

$1,000

Settling Defendant shall pay all stipulated penalties upon demand by U.S. EPA unless Settling Defendant invokes the dispute resolution procedures set forth in Paragraph XIV of this Consent Decree.

C. Stipulated civil penalties shall accrue from the date scheduled for performance of a specific task unless excused, and will continue until the completion of the task.

D. Stipulated civil penalties shall accrue but need not be paid during the dispute resolution period. If the District Court becomes involved in the resolution of the dispute the period of dispute shall end upon the rendering of a decision by the District Court regardless of whether any party appeals such decision. If the Settling Defendant does not prevail upon

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resolution, the Plaintiff has the right to collect all penalties which accrue prior to and during the period of dispute. If the Settling Defendant prevail upon resolution, no penalties shall be payable.

E. If Settling Defendant fails to pay stipulated civil penalties, the Plaintiff may institute proceedings to collect the penalties. Notwithstanding the stipulated civil penalties provision of this Paragraph, U.S. EPA may elect to assess civil penalties and/or bring an action in U.S. District Court pursuant to Section 109 of CERCLA, as amended by SARA, to enforce the provisions of this Consent Decree, provided that Settling Defendant's total penalty exposure to U.S. EPA for violations shall be limited to $25,000 per day per violation of this Consent Decree. Payment of stipulated civil penalties shall not preclude the U.S. EPA from electing to pursue any other remedy or sanction to enforce this Consent Decree, and nothing shall preclude U.S. EPA from seeking statutory penalties against Settling Defendant for violations of statutory or regulatory requirements. Any assessed stipulated civil penalties shall be credited toward any statutory penalties awarded by the Court.

XVII. COVENANT NOT TO SUE

A. Except as provided in Paragraph XVIII.C, the Settling Defendant shall receive no release from liability as a result of any action performed pursuant to this Decree. The

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United States reserves the right to institute proceedings in a new action or to issue an Order seeking to compel the Settling Defendant to remediate any release from the Facility.

B. Nothing in this Consent Decree shall constitute or be construed as a release or a covenant not to sue regarding any claim or cause of action against any person, firm, trust, joint venture, partnership, corporation, or other entity not signatory to this Consent Decree for any liability it may have arising out of or relating to the Facility.

C. In consideration of actions which will be performed and payments which will be made by the Settling Defendant under the terms of the Consent Decree, and except as otherwise specifically provided in this Decree, the United States covenants not to sue the Settling Defendant or its officers, directors, employees, or agents for "Covered Matters." "Covered Matters" shall include any and all claims available to Plaintiff for work performed or payments made by the Settling Defendant pursuant to this Consent Decree under Sections 106 and 107 of CERCLA and Section 7003 of RCRA and any and all claims available under common law authority arising out of the facts surrounding the transactions or occurrences as described in the Complaint.

D. "Covered Matters" as defined in Paragraph XVIII.C of this Consent Decree are "matters addressed" in the Consent Decree within the meaning of Section 113 (f)(2) of CERCLA as to which Settling Defendant has resolved its liability to the United States.

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XVIII. OTHER CLAIMS

A. Settling Defendant agrees to indemnify, save, and hold harmless the U.S. EPA and/or its representatives from any and all claims or causes of action arising from negligent acts or omissions of Settling Defendant and/or its representatives in carrying out the activities pursuant to this Consent Decree. The U.S. EPA shall notify Settling Defendant of any such claims or actions within sixty (60) working days of receiving notice that such a claim or action is anticipated or has been filed. The U.S. EPA agrees not to act with respect to any such claim or action without first providing Settling Defendant an opportunity to participate.

B. The U.S. EPA is not to be construed as a party to, and does not assume any liability for, any contract pursuant to this Consent Decree. The proper completion of the Work under this Consent Decree is solely the responsibility of Settling Defendant. Settling Defendant agrees to indemnify, save, and hold harmless U.S. EPA from any and all claims arising from contracts entered in to between Settling Defendant and its contractors pursuant to this Consent Decree.

C. Settling Defendant waives its rights to assert any claims against the Hazardous Substances Trust Fund under CERCLA that are related to any past costs or costs incurred in the Work performed pursuant to this Consent Decree, and nothing in this Consent Decree shall be construed as the U.S. EPA's preauthorization of a claim against the Hazardous Substance

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Trust Fund. Settling Defendant reserves its right to bring an action for contribution and/or indemnification against any person, firm, trust, joint venture, partnership, corporation, or other entity not signatory to this Consent Decree for any liability such person, firm, trust, joint venture, partnership, corporation, or other entity may have arising out of or relating to the Facility.

XIX. FINANCIAL RESPONSIBILITY

Settling Defendant shall provide financial assurance for completion of the Pre-Design Studies in accordance with 40 C.F.R. Part 264, Subpart H.

XX. NOTICES

A. Whenever, under the terms of this Consent Decree, a report or other document is required to be forwarded by one party to another such correspondence shall be directed to the following individuals at the addresses specified below: As to the United States or U.S. EPA:

Director, Waste Management Division
Attn: Gould Site Remedial Project Manager
U.S. Environmental Protection Agency
1200 Sixth Avenue
Seattle, Washington 98101

As to Settling Defendant:

Janet D. Smith
Associate General Counsel
NL Industries, Inc.
445 Park Ave, Suite 1500
New York, New York 10022

and to Jay F. Young
Principal Environmental Engineer
NL Industries, Inc.
P.O. Box 1090
Wyckoff Mills Road
Hightstown, New Jersey 08520

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B. Whenever, under the terms of this Consent Decree, notice is required to be given or service of any papers or process is necessitated by the Dispute Resolution provisions hereof, such correspondence shall be directed to the following individuals at the addresses specified below: As to the United States or U.S. EPA:

Director, Waste Management Division
Attn: Gould Site Remedial Project Manager
U.S. Environmental Protection Agency
1200 Sixth Avenue
Seattle, Washington 98101

Assistant Attorney General
Land & Natural Resources Division
U.S. Department of Justice
10th and Pennsylvania Avenue, N.W.
Washington, D.C. 20530

As to Settling Defendant:

Janet D. Smith
Associate General Counsel
NL Industries, Inc.
445 Park Ave, Suite 1500
New York, New York 10022

and to Jay F. Young
Principal Environmental Engineer
NL Industries, Inc.
P.O. Box 1090
Wyckoff Mills Road
Hightstown, New Jersey 08520

XXI. CONSISTENCY WITH NATIONAL CONTINGENCY PLAN

The Parties agree that the Scope of Work, if properly performed as set forth in Paragraphs VII and VIII herein, is consistent with the provisions of the National Contingency Plan pursuant to 42 U.S.C. § 9605.

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XXII. RESPONSE AUTHORITY

Except as provided for in Paragraph XVIII of this Consent Decree, nothing in this Consent Decree shall be deemed to limit the response authority of the United States under 42 U.S.C. §§ 9604 and 9606.

XXIII. MODIFICATION

Except as provided for herein, there shall be no modification of this Consent Decree without written approval of all Parties to this Consent Decree. If all Parties do not approve, the Party seeking the modification shall petition the Court and shall have the burden of establishing the necessity of the modification.

XXIV. PUBLIC PARTICIPATION

The United States shall publish a notice of this Consent Decree and the availability for review and comment upon its lodging with the United States District Court as a proposed settlement in this matter.

The United States will provide interested persons with the opportunity to file written comments during at least a thirty (30) day period following such notice. In addition, the United States intends to hold an informal public meeting in Portland, Oregon, during this period to receive either written or oral comments. Settling Defendant shall have the right to provide information at such meeting. The United States will file with the Court a copy of any comments received and the responses of the United States to such comments.

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After the closing of the public comment period, the United States will review such comments and determine whether the comments disclose facts or considerations which indicated that the proposed Consent Decree is inappropriate, improper, or inadequate, and that the Consent Decree should therefore be withdrawn. Should the Consent Decree be withdrawn, the United States shall inform the other parties as to the basis for the withdrawal and any modifications necessary for consent to a settlement.

XXV. COMMUNITY RELATIONS

Settling Defendant shall cooperate with U.S. EPA in providing information to the public. As requested by U.S. EPA, Settling Defendant shall participate in the preparation of all appropriate information disseminated to the public and in public meetings which may be held or sponsored by the U.S. EPA to explain activities at or concerning the Facility.

XXVI. NON-ADMISSION

Entry into this Consent Decree shall not constitute an admission, adjudication, or waiver of any right or defense of Settling Defendant with respect to any present or future liability for conditions at or near the Site; or of any fact or conclusion of law arising out of any present or future alleged liability for conditions at or near the Site; or evidence of any wrongdoing or misconduct or liability to any person on the part of Settling Defendant, its officers, directors, agents,

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servants, employees, successors, contractors and assigns, and any persons, firms, subsidiaries, divisions, and corporations acting under or for them. Nothing in this Consent Decree shall constitute an admission of liability by Settling Defendant for any purpose.

XXVII. EFFECTIVE AND TERMINATION DATES

A. This Consent Decree shall be effective upon the date of its entry by the Court.

B. When Settling Defendant determines that it has completed the Work required pursuant to this Decree by Settling Defendant, it shall submit to U.S. EPA a Notice of Completion and a final report as required by the Work Plan. The final report must summarize the Work performed, any modification to the Work Plan, and the performance levels achieved. The summary shall include or reference any supporting documentation.

Upon receipt of the Notice of Completion, the U.S. EPA shall review the accompanying report and any other supporting documentation. The U.S. EPA shall issue a Certification of Completion upon its determination that (1) Settling Defendant has satisfactorily completed the Work, required pursuant to this Decree by Settling Defendant, and (2) all stipulated civil penalties required to be paid under this Consent Decree have been paid in full by Settling Defendant or excused by the U.S. EPA.

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By the signatures below Plaintiff's consents to this Consent Decree is hereby given:

UNITED STATES OF AMERICA
on behalf of the
ENVIRONMENTAL PROTECTION AGENCY

By: _____
FOR ROBIE G. RUSSELL
Regional Administrator

Date: Mar 22 1989

UNITED STATES OF AMERICA

By: _____
DONALD CARR

Date: _____

By: _____

Its: Assistant Attorney General

Date: _____

By: _____

Its: Attorney, Land & Natural Resources Division

Date: April 11, 1989

UNITED STATES ATTORNEY

By: _____

Its: Assistant United States Attorney

Date: April 13, 1989

rm CBD-183
8-76 DOJ

SCOEPA00015411

The undersigned represents that she is authorized to sign this Consent Decree on behalf of NL Industries, Inc., the Settling Defendant. The undersigned Settling Defendant hereby consents to the foregoing Consent Decree in U.S. v. NL Industries, Inc.

NL Industries, Inc.

By: Janet D. Smith
Janet D. Smith
Associate General Counsel

Date: 3/20/89

rm OBD-183
8-76 DOJ

SCOEPA00015412

TO: File

FROM: John Pittman

SUBJECT: Phone call with David Hunt

DATE: November 22, 1988

On Tuesday, November 22, 1988, telephone contact was made with David Hunt, former Director of PDC (Portland Development Commission) during the early negotiations between the City of Portland and Wacker to negotiate the location of Wacker facilities in Portland. It was explained to Mr. Hunt that Wacker was gathering information to satisfy the requirements for an innocent purchaser of this property because of the involvement of the North Doane Lake area through EPA and DEQ. After explaining our situation to Mr. Hunt, he indicated that he was neither aware of the Gould Site problems or any coal tar contaminates from Northwest Natural Gas.

I indicated that our counsel would be in Portland on Monday, November 28 and asked if any further questions came up if he would be willing to discuss this situation. Mr. Hunt indicated that he had bad experiences with lawyers and was not willing to spend any time or get involved in a situation that would not provide income on his behalf. He also indicated that during the time he was Director of PDC, he spent many sessions before the City Council trying to justify the concessions given to Wacker to bring them into Portland and that he left this position in 1980 to get out of the political arena. He also felt that he was not properly thanked by Wacker after they had been located here after all the effort he had given.

As a result, the only way that he will provide information on this subject is if he is subpoenaed. With that, I thanked him for his time and concluded the conversation.

JLP:bw

STOEL RIVES BOLEY
JONES & GREY

ATTORNEYS AT LAW
SUITE 2300
STANDARD INSURANCE CENTER
900 SW FIFTH AVENUE
PORTLAND, OREGON 97204-1268

Telephone (503) 224-3380
Telecopier (503) 220-2480
Cable Lawport
Telex 703455
Writer's Direct Dial Number

294-9213

RECEIVED
ENGINEERING
FEB 16 1988
John L. Pittman
Wacker Siltronic

February 12, 1988

Mr. Edmund L. Bolin
Northwest Natural Gas Company
220 NW Second Avenue
Portland, OR 97209

Mr. John Pittman
Wacker Siltronic
PO Box 03180
Portland, OR 97203

Mr. Roger Sherwood
ESCO
PO Box 10123
Portland, OR 97210

Mr. Robert Ferguson
Rhone-Poulenc
PO Box 10224
Portland, OR 97210

Mr. Jordan Dern
Keystone Environmental Resources
436 Seventh Avenue, Suite 1940
Pittsburgh, PA 15219

Mr. Jim Tracewski
NL Industries, Inc.
Hightstown, NJ 08520

Mr. George Markwood
Pacific Northern Oil Company
7900 NW St. Helens Road
Portland, OR 97210

Mr. Roger Neu
Schnitzer Investment Corp.
3200 NW Yeon Avenue
Portland, OR 97210

Mr. Larry Patterson
Pennwalt Chemical Corp.
6400 NW Front Avenue
Portland, OR 97210

Gentlemen:

This will confirm our scheduled meeting for Tuesday, March 29, 1988, to exchange data and discuss the technical aspects of the proposed expanded DEQ/EPA groundwater study for the northern Doane's Lake area. I have arranged for the use of our 24th floor north conference room and we will begin the meeting at 9:00 a.m. At that time we can decide if we wish to break for lunch or have sandwiches brought in.

SCOEPA00015414

We trust that each party will bring sufficient copies of its response to the CERCLA § 104 letter we were told to expect at our meeting with Fred Hansen on February 11, and copies of at least the executive summary of any groundwater studies that each party may have already undertaken on its own property.

We are looking forward to seeing all of you again next month. If you have any questions or comments, please feel free to call me.

Very truly yours,

Richard D. Bach

RDBS.030:twa

FILE

KEYSTONE
ENVIRONMENTAL RESOURCES, INC.

RECEIVED
ENGINEERING
JUL 1 1988
John L. Pittman
Wacker Siltronic

Phone: 412/227-2694 436 Seventh Avenue, Suite 1940, Pittsburgh, PA 15219 Fax: 412/227-2436

June 14, 1988

CERTIFIED MAIL
Return Receipt
Requested

Mr. Ed Bolin
Northwest Natural Gas
220 N.W. Second Avenue
Portland, OR 97209

Dear Mr. Bolin:

Following the conference call on May 23, 1988, with U.S. EPA and Oregon DEQ and the subsequent conference among the Doan Lake PRP's, I took your proposal for the funding of an outside consultant to review records and prepare a work plan back to Koppers' management. In light of the discussion with U.S. EPA, Koppers' position remains that it should not be asked to participate in funding the preparation of the work plan for the reason stated in my letter of April 7, 1988, a copy of which is attached for your convenience.

Once again, we reiterate that this position neither precludes nor commits Koppers to future participation but that active participation at this time is inappropriate. Koppers remains willing to sit as an observer to the committee.

Sincerely yours,

Jordan M. Dern
Senior Program Manager
Koppers Industrial & Foundry Products

JMD/mrw
Enclosure

cc: William Farran III - Rhone Poulenc, Inc.
Roger Sherwood - ESCO Corp.
Tom McGrath - Schnitzer Investment Corp.
John L. Pittman - Wacker Siltronic Corp.
James Tracewski - NL Industries, Inc.
Richard Bach - Stoel Rives Boley Jones & Grey
Robert Ferguson - Rhone Poulenc, Inc.

KEYSTONE
ENVIRONMENTAL RESOURCES, INC.

Phone: 412/227-2694 436 Seventh Avenue, Suite 1940, Pittsburgh, PA 15219 Fax: 412/227-2436

April 7, 1988

CERTIFIED MAIL
Return Receipt
Requested

Mr. Ed Bolin
Northwest Natural Gas
220 NW Second Avenue
Portland, OR 97209

Dear Ed:

Following our meeting on March 29, 1988, I took the committee proposal of hiring a consultant for the purpose of reviewing existing data to Koppers management to determine their willingness to participate in this early phase of the study. After careful consideration, Koppers feels not only that it should not participate but also that it should not be even asked to participate for a number of reasons; including, but not limited to the following:

1. Koppers area is small - It occupies only about 4 acres of the proposed 400 acre study site.

2. Its history is short - Koppers began operation in 1966. For most of its life it has served as a short term storage terminal.

3. No data is available - Unlike many of the other participants, no studies have been performed on Koppers site, thus there is no benefit to Koppers of the data reduction effort by CDM.

4. The Koppers site is simple. The development of a work plan for the Koppers site alone would be done by assembling existing protocols. There is or no benefit to preparing a work plan prior to meeting with U. S. EPA.

This position does not foreclose Koppers limited participation in the future private investigation at the site nor does it commit Koppers to such participation, but only addresses the issue at hand. Koppers is willing to sit as an observer to the committee and offer its environmental expertise but does not feel that its financial participation is appropriate at this time.

Although they were not available at the meeting, we would appreciate receiving copies of the responses to the 104 letters that were made by each participant. Please let me know if that presents a problem. We look forward to our continued cooperation toward the resolution of this matter.

Sincerely,

Jordan M. Dern
Senior Program Manager
Koppers Industrial & Foundry Products

JMD/mrw

cc: William Farran III - Rhone Poulenc, Inc.
Roger Sherwood - ESCO Corp.
Tom McGrath - Schnitzer Investment Corp.
John L. Pittman - Wacker Siltronic Corp.
James Tracewski - NL Industries, Inc.
Richard Bach - Stoel Rives Boley Jones & Grey
Robert Ferguson - Rhone Poulenc, Inc.

KEYSTONE
ENVIRONMENTAL RESOURCES, INC.

U.S. ENVIRONMENTAL PROTECTION AGENCY
REGION 10
1200 SIXTH AVENUE
SEATTLE, WASHINGTON 98101

May 25, 1988

RECEIVED
JIM DISORBO
JUN 14 1988
WACKER SILTRONIC CORP.

REPLY TO
ATTN OF: HW-113

FILE

Wacker Siltronic Corporation
~~7200 N.W. Front Avenue~~ P.O. Box 03180
Portland, Oregon ~~97229~~ 97230

Gentlemen:

The U.S. Environmental Protection Agency (EPA), through its contractor, Ecology and Environment, Inc. (E&E), has completed the Preliminary Assessment of the Wacker Siltronic facility. A copy of the report is enclosed.

Based on this assessment and other pertinent information, EPA finds that no further action under the Superfund pre-remedial program is appropriate. However, the facility will continue to be assessed as part of the Doane Lake investigation currently ongoing by EPA and the Oregon Department of Environmental Quality.

If you have questions regarding report content or planned actions, I may be reached at (206) 442-2722.

Sincerely,

Deborah Flood

Deborah Flood
Environmental Protection Specialist
Superfund Response & Investigations Section

Enclosure

cc: Al Goodman, EPA-000
Mary Wahl, DEQ (2 copies)
Art Bloom, Multnomah County Health Department

PRELIMINARY ASSESSMENT REPORT
WACKER SILTRONIC CORPORATION
PORTLAND, OREGON

TDD F10-8709-17

Report Prepared by: Ecology and Environment, Inc.
Date: October 1987

Submitted to: J.E. Osborn, Regional Project Officer
Field Operations and Technical Support Branch
U.S. Environmental Protection Agency
Region X
Seattle, Washington

ecology and environment, inc.
101 YESLER WAY, SEATTLE, WASHINGTON, 98104, TEL. 206/624-9537
International Specialists in the Environment

recycled paper

SCOEPA00015420

ecology and environment, inc.
101 YESLER WAY, SEATTLE, WASHINGTON, 98104, TEL. 206/624-9537
International Specialists in the Environment

MEMORANDUM

DATE: November 9, 1987

TO: John Osborn, FIT-RPO, USEPA, Region X

THRU: David Buecker, FIT-OM, E&E, Seattle

FROM: Timothy L. Syverson, FIT-SM, E&E, Seattle

SUBJ: Preliminary Assessment Report for
Wacker Siltronic Corporation
Portland, Oregon

REF: TDD F10-8709-17

CC: Deborah Flood, HWD-SM, USEPA, Region X
Jeffrey Villnow, FIT-PM, E&E, Seattle
Thomas Tobin, E&E, Seattle

1. Introduction and Purpose of the Preliminary Assessment:

Pursuant to U.S. Environmental Protection Agency (EPA) Contract No. 68-01-7347 and Technical Directive Document (TDD) F10-8709-17, Ecology and Environment, Inc. (E&E) conducted a Preliminary Assessment (PA) of the Wacker Siltronic Corporation in Portland, Oregon. The PA represents the second of a three-step assessment process which begins with Site Discovery and concludes, if necessary, with a Site Inspection. The assessment process, in general, is intended to identify, compare, and rank the potential hazards associated with a particular site relative to other sites across the nation for the purpose of identifying priority sites requiring remedial responses. It does not include extensive or complete site characterization, contaminant fate determination, or quantitative risk assessment.

The Wacker Siltronic Corporation Site PA was conducted to identify potential public health and/or environmental hazards related to the site and, if present, evaluate the need for additional investigative action. The PA is based on data derived from available files pertaining to the site, and conversations with state and local officials (1-19). Information developed during the PA is summarized in Appendix A on EPA Form 2070-12.

recycled paper

2. Information Obtained During the Preliminary Assessment:

- Site Location and Description - The Wacker Siltronic Corporation Site is located at 7200 N.W. Front Street, in the northwest portion of the City of Portland, in Multnomah County, Oregon (Figure 1). The 85 acre Wacker Siltronic Site is bordered on the east by the Willamette River, on the west by Highway 30 (St. Helen's Road), on the north by Koppers, Inc. and Northwest Natural Gas, and on the south by the Burlington Northern Railroad Bridge. Wacker has a processing plant and offices in two buildings adjacent to the river, and a wastewater treatment facility along the northwest boundary of the property (Figure 2). A Portland General Electric (PGE) substation is located between the treatment facility and the process building. The southwestern portion of the site is undeveloped, but is the proposed location for Wacker's Polysilicon Plant. Access to the site is limited due to the site's close proximity to the river and the railroad grades that border the site on two sides (Figure 3). The active portions of the site are fenced, and the area is patrolled by private security personnel.

- Site History / Potential Problem(s) at Site - The Wacker Siltronic Site is located in the northwest industrial district of Portland (Figure 3) commonly referred to as "Doane's Lake". The Doane's Lake area previously included two lakes: Doane's Lake to the north, and Guild Lake to the south. Near the turn of the century, the area was filled with dredge sands and mud from the Willamette River, and industrial wastes to provide additional land for developement (1). The land now owned by Wacker is a portion of the old Portland Gas and Coke (PG&C) site. The PG&C plant was in operation from 1913 to 1956. Since 1956, the PG&C property has been owned by Northwest Natural Gas (NNG) (2). In 1976 Wacker purchased the southeast portion of the property, and began construction of their facility (1).

  The Wacker Siltronic Corporation manufactures silicon wafers used in the production of integrated circuits. The plant grows and processes single crystals of silicon from high purity polycrystalline silicon. The Wacker facility is listed under the Resource Conservation and Recovery Act (RCRA) as a generator of industrial wastes (3). The facility has an NPDES permit for the processing and discharge of wastewater to the Willamette River, and an air contaminant discharge permit. Both permits are issued by the Oregon Department of Environmental Quality (DEQ) (4, 5).

  Currently, the Doane Lake area includes a number of industrial plants including Gould Battery, Pennwalt, Rhone-Poulenc, Koppers, Inc., Northwest Natural Gas, and an ESCO landfill. These companies

have produced or handled numerous toxic materials over the past 40 years, including creosote, flammable hydrogen gas, hydrochloric acid, and dioxin-tainted chemicals (6). The Gould Battery site is listed on the EPA's National Priorities List.

The Doane Lake Area has a history of waste disposal problems. Prior to regulatory action by the Oregon Department of Environmental Quality (DEQ) and the EPA, wastes from local industry were discharged to the air, to the ground and surface water, and landfilled in the immediate area (1). Wastes from the old PG&C plant's production of coal gas were landfilled on the lots now occupied by Wacker and Koppers (1) (Figure 3). DEQ has identified abandoned coal tar disposal pits on the Koppers Site, but the history and extent of past waste disposal on the Wacker Site has never been detailed (7).

Wacker Siltronic discovered oil in the ground water and soil of their property twice since 1976. In 1979, oil was found in two excavations in the northwest corner of their property adjacent to the Koppers Site. The oil seepage was contained, and thought to be isolated to the northwest portion of the site (8). Test borings in 1985, for a proposed plant expansion, encountered petroleum products, coal tar, and pesticides at 7 locations in the western portion of the site (9). Generally the contaminants were encountered at depths of 10-20 feet below ground surface, and did not appear to be migrating toward the river approximately 1,400 feet to the east (6, 9). Analyses of ground water samples from monitoring wells completed in the test borings detected low levels of volatile organics and base neutral extractables (10). Wacker proposed that the low levels of contaminants posed no threat to human health or to the environment, but the DEQ did not agree with their assessment and is requesting further work at the site (10, 11).

The Wacker Siltronic Corporation has had at least six incidents since 1976 involving the discharge of hazardous materials from their facility. These discharges have included chromic acid (07/80, 12/80, 05/84), TCE (12/83, 12/84), and wastewater (06/87). Contamination of soil, ground water, and surface water have resulted from these spills or leakages at the Wacker facility (16, 17, 18, 19). The cumulative effect of on-site spills of hazardous materials by Wacker is unknown.

Currently, Wacker Siltronic, Koppers Inc., and Northwest Natural Gas are working under DEQ guidance to develop a plan for a comprehensive study of past practices in the North Doane's Lake area (sites north of the Burlington Northern Railroad bridge) (12).

- Physical Environment - The Wacker Site is located adjacent to the Willamette River at an elevation of 10-25 feet above mean sea level. The immediate area is generally flat, but the bluffs to the east across St. Helen's Road rise to 1,000 feet. The site is underlain by river sediments and mechanically deposited fill. The depth to ground water beneath the site is less than 10 feet below the ground surface (9).

  In the Portland area the Willamette River flows north-west and is extensively used for commercial shipping and recreational purposes. Recreational activities on the river include boating and sport fishing.

  Drinking water for the site area is provided by the City of Portland. The primary source for the Portland public water supply is the Bullrun Watershed located approximately 27 miles east of the city. The city has a secondary source of water from a field of 26 wells located along the Columbia River approximately seven miles northeast of the Wacker Site (13).

  The Portland area has a mild climate with wet winters, and warm dry summers. Total annual precipitation is about 40 inches, and the annual lake evaporation is about 26 inches (14). The one-year 24 hour rainfall for the Portland area is 2.5-3 inches (15).

- Waste Types, Quantities, and Characteristics - Hazardous materials at the Wacker Site include both wastes from past disposal practices in the site area, and wastes generated by current Wacker operations. The petroleum products, coal tar, and pesticides found in the 1985 soil borings represent past disposal at the site or contamination from adjacent sites, because Wacker's operation has never handled these substances.

  As a regulated RCRA generator, Wacker Siltronic generates three waste streams during the normal course of business: waste freon, waste trichloroethylene (TCE), and chromic acid sludge (3).

  TCE is used to clean silicon wafers before a wax coating is applied. Currently about 4,000 gallons per month of waste TCE is recycled through Van Waters and Rogers, a DEQ approved facility. Waste TCE is pumped from the process building to an outside holding tank. This tank and other waste tanks are equipped with level indicators, and are diked to contain spills and leakage (3).

  Waste freon is generated in Wacker's silicon wafer manufacturing process. Currently five to ten, 55 gallon drums per month of waste freon are sent to McClary Columbia (also a DEQ approved facility) for recycling. The waste freon is also stored in an outside storage tank (3).

Chromic acid is used during the etching of silicon wafers. Waste chromic acid is pumped from the processing plant to a treatment building where the acid is neutralized and reduced to trivalent chrome. The liquid portion is pumped to Wacker's wastewater treatment unit (WWTU). The sludge is dried and sent to Chem Security Systems Incorporated for disposal. Wacker generates approximately one, 55 gallon drum of sludge per month (3).

Wastewater from Wacker's processing plant is sent to the WWTU, and then discharged to the city sewer system or to the Willamette River under NPDES permit (4).

- o Pollutants, Mobilization, Pathways, and Risks- Common characteristics of the chemical constituents of petroleum products found at the Wacker Site include high chemical stability, low water solubility, low vapor pressure, and a high affinity to soil (7). As a result, these substances are relatively immobile in the subsurface environment. Subsurface contamination by petroleum products may have a long term affect on soil and ground water due to their high organic content and low solubility (7). The 1985 soil borings and ground water analysis confirm the presence and persistence of materials disposed at the site during past industrial practices. The effect of these contaminants on the public health and the environment is unknown.

  The site has a history of soil, ground and surface water contamination, and there have been reports of skin and eye irritation due to air-borne contaminants (11). The site is composed of fill material of unknown permeability. The contamination of soil and ground water does not pose a direct threat to local drinking water supplies. However, the site's close proximity to the Willamette River makes the potential for contamination of the river by surface runoff or seepage through the soil high. Any releases to the river pose a direct threat to the environment, and an indirect threat to the large population using the river for recreation.

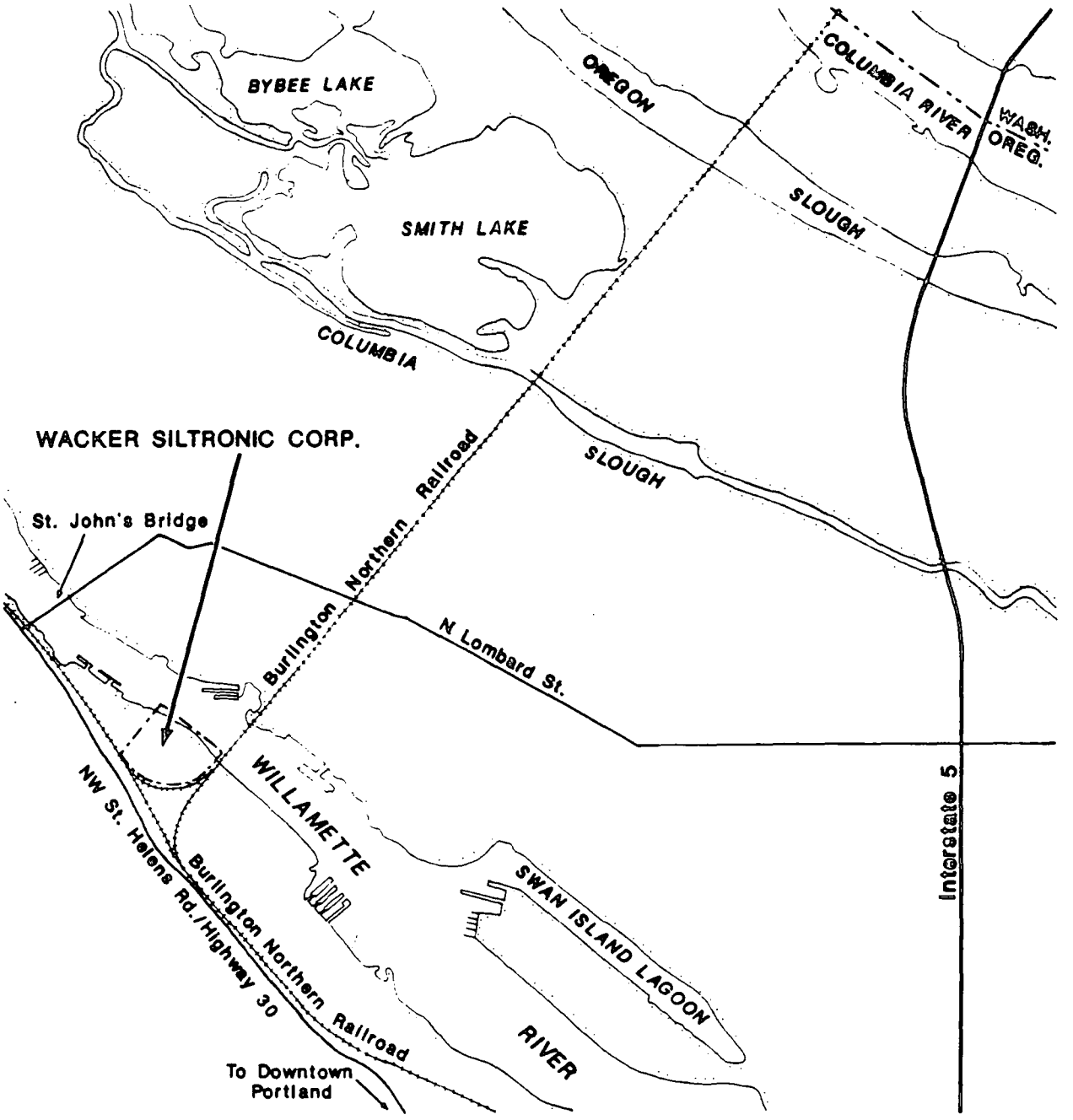
3. Priority Assessment:

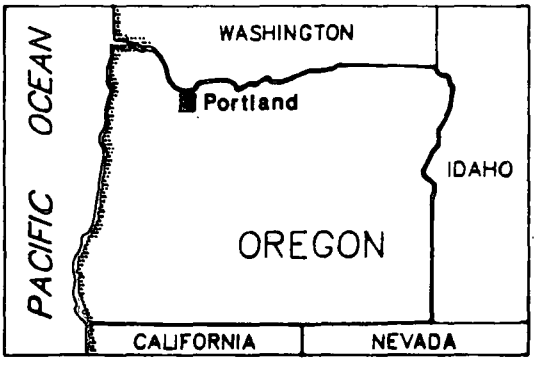
No further action is appropriate by the pre-remedial program. However, the site should continue to be assessed as part of the Doane Lake Investigation.

4. Follow-up Recommendations:

The Wacker Siltronic Site is located in a heavily industrialized area with a long history of waste disposal problems. Based on the fact that there is no target population drinking ground or surface water in the site area, and the on-going monitoring of the site by DEQ under RCRA, no further action under CERCLA is recommended. Results from this PA are in agreement

with DEQ's recommendation that a comprehensive study is needed to characterize the extent of contamination at the Wacker Siltronic Site, and in the North Doane Lake Area. The area-wide study should target both past and present waste handling practices to assess the potential impact of site contamination on the Willamette River, and the threat to human health during any future construction in the area.

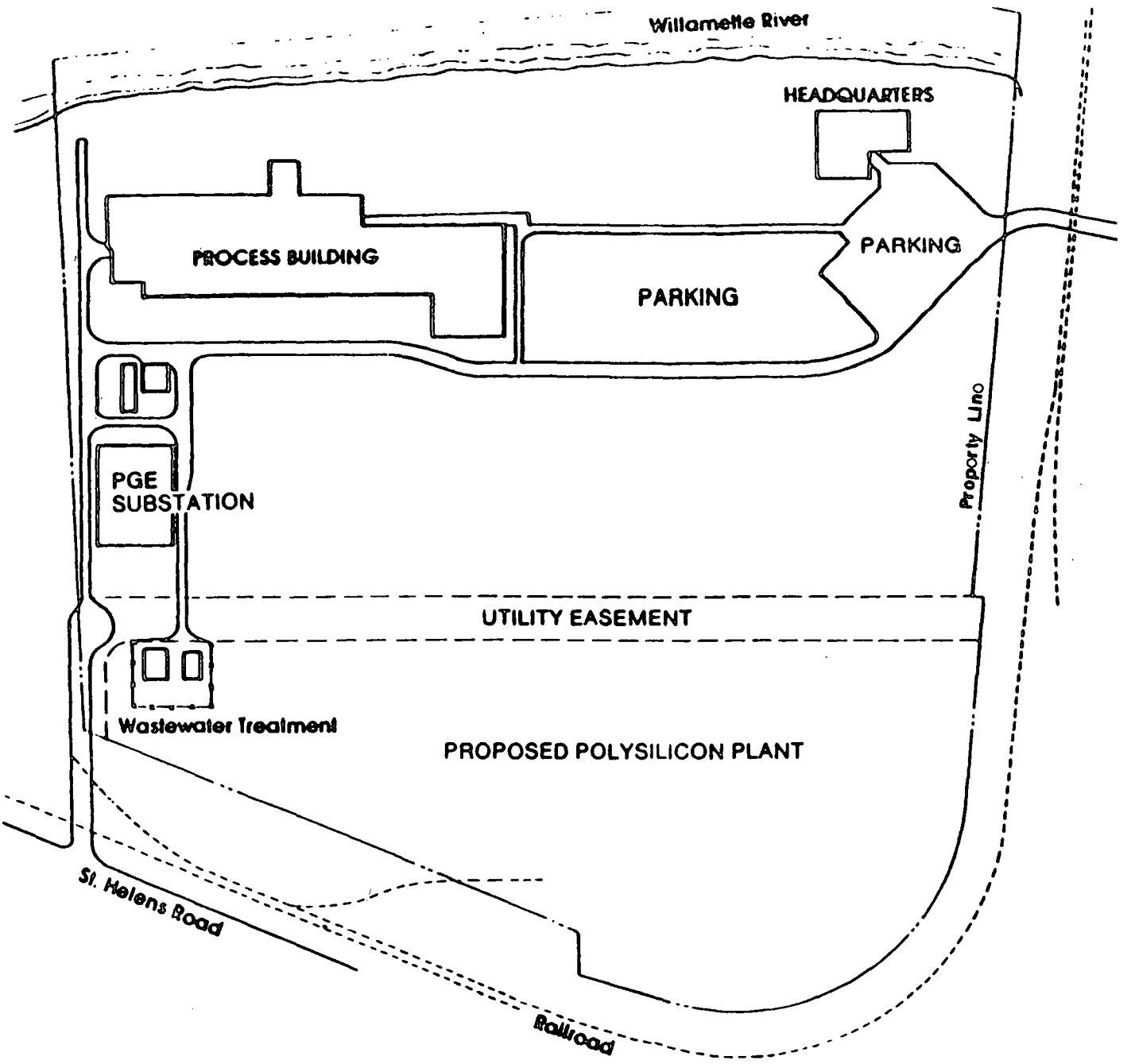




ecology & environment, Inc.	
Job: F10-8709-17	Waste Site: OR 0192
Drawn by: B.T.	Date: 10/26/1987

FIGURE 1
LOCATION MAP
WACKER SILTRONIC CORP.
Portland, OR

SCOEPA00015427

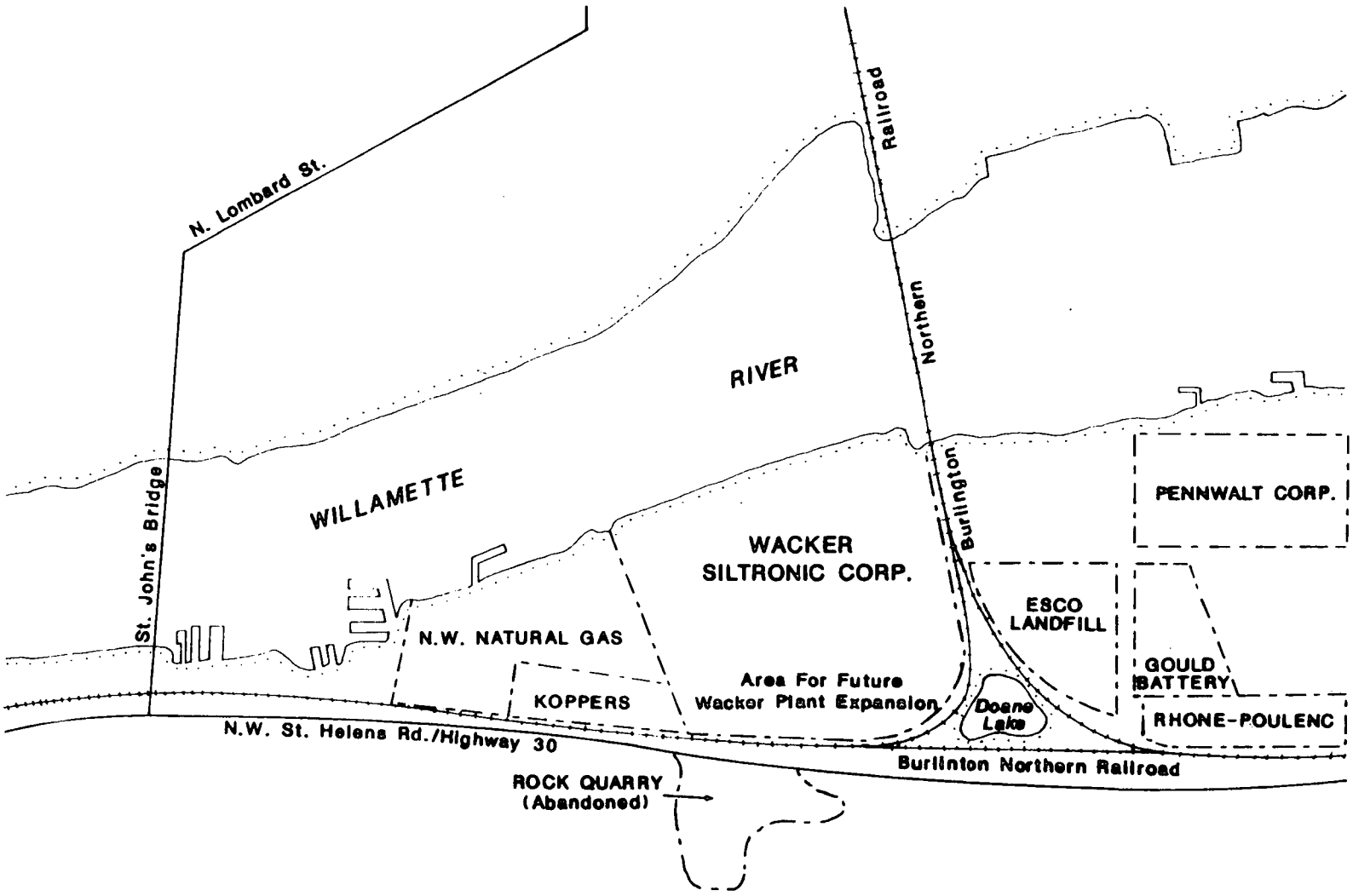


ecology & environment, inc.	
Job: F10-8709-17	Waste Site: OR 0192
Drawn by: B.T.	Date: 10/26/1987

FIGURE 2
SITE MAP
WACKER SILTRONIC CORP.
Portland, OR

Source: CH2M Hill

SCOEPA00015428



LEGEND

Property line

0 500 1000 2000

scale in feet

ecology & environment, inc.	
Job: F10-0700-17	Photo Site: OR 0102
Drawn by: B.T.	Date: 10/27/1987

FIGURE 3
VICINITY MAP (1983)
WACKER SILTRONIC CORP.
Portland, OR

SCOEPA00015429

REFERENCES

1. Memo from F. Hansen to Governor V. Atiyeh, June 19, 1985. ODEQ Site Files.

2. Willamette Week, Vol. 11, No. 4, August 8-14, 1985. Portland's Toxic Armpit. USEPA Region X, Gould, Inc. Superfund Site File.

3. Memo and RCRA inspection checklist from E. Woods to File, September 4, 1987. ODEQ Site Files.

4. Correspondence from F. Hansen to J. Pittman, February 18, 1987. ODEQ Site Files.

5. Correspondence from M. Tilson to G. Davis, February 11, 1987. ODEQ Site Files.

6. The Oregonian, June 24, 1985. Wacker plant deferment points to other problems. USEPA, Region X, Gould, Inc. Superfund Site File.

7. Ecology and Environment, Inc. (E&E), 1987. Preliminary Assessment Report for Koppers Site, Portland, Oregon. TDD F10-8709-09, Draft Copy.

8. Memo from S. Carter to File, February 12, 1979. ODEQ Site Files.

9. CH_2M Hill Northwest, Inc., June 1985. A Preliminary Report Soil Investigation for Proposed Polysilicon Plant, Wacker Siltronic Corporation, Portland, Oregon. ODEQ Site Files.

10. Memo from C. Humphrey to P. Storm, October 23, 1985. USEPA Region X, Gould, Inc. Superfund Site File.

11. Personal Communication, Tom Miller, ODEQ, October 20, 1987.

12. Memo from R. Bach to F. Hansen, July 14, 1985. ODEQ Site Files.

13. Personal Communication, Todd Humphrey, Engineer, City of Portland, October 28, 1987.

14. U.S. Department of Commerce, NOAA, Climatic Atlas of the United States, 1968.

15. U.S. Department of Commerce, Rainfall Frequency Atlas of the United States, Technical Paper No. 40, 1963.

16. Correspondences from J. Ellis to S. Carter, July 14, 1980 and December 22, 1980. ODEQ Site Files.

17. Correspondences from G. Carr to C. Clinton, January 6, 1984 and June 4, 1984. ODEQ Site Files.

SCOEPA00015430

REFERENCES (Cont.)

18. Correspondence from J. Gillaspie to J. Ellis, April 16, 1985. ODEQ Site Files.

19. Correspondence from M. Tilson to G. Davis, July 2, 1987. ODEQ Site Files.

//

APPENDIX A

EPA FORM 2070-12

SCOEPA00015432

POTENTIAL HAZARDOUS WASTE SITE
PRELIMINARY ASSESSMENT
PART 1 - SITE INFORMATION AND ASSESSMENT

I. IDENTIFICATION	
01 State	02 Site Numb
OR	D096253737

II. SITE NAME AND LOCATION

01 Site Name (Legal, common, or descriptive name of site)	02 Street, Route No., or Specific Location Identifier				
Wacker Siltronic Corporation	7200 N. W. Front Avenue				
03 City	04 State	05 Zip Code	06 County	07 County Code	08 C D
Portland	OR	97229	Multnomah	051	0

09 Coordinates Latitude	Longitude
45° 35' 18.0"	122° 45' 39.0"

10 Directions to Site (Starting from nearest public road)
Highway 30 NW from downtown Portlend, approximately 5 miles. Highway 30 becomes St. Helens Road. Wacker is loc in the 7000 block of N.W. Front Street, 2 blocks north of St. Helens Road past the railroad bridge and 1 mile SE St. Johns Bridge in the North Doane Lake industrial area.

III. RESPONSIBLE PARTIES

01 Owner (if known)	02 Street (Business, mailing, residential)		
Wacker Siltronic Corporation	7200 N. W. Front Avenue		
03 City	04 State	05 Zip Code	06 Telephone Number
Portland	OR	97229	(503) 243-2020
07 Operator (if known and different from owner)	08 Street (Business, mailing, residential)		
09 City	10 State	11 Zip Code	12 Telephone Number
			( )

13 Type of Ownership (Check one)
[X] A. Private [ ] B. Federal _____ (agency name) [ ] C. State [ ] C. County [ ] E. Municipal
[ ] F. Other _____ (specify) [ ] G. Unknown

14 Owner/Operator Notification on File (Check all that apply)
[ ] A. RCRA 3001 Date Received: / / (Month Day Year) [X] B. Uncontrolled Waste Site (CERCLA 103c) Date Received: 06 / 14 / 85 (Month Day Year) [ ] C. None

IV. CHARACTERIZATION OF POTENTIAL HAZARD

01 On-Site Inspection
[ ] Yes Date / / (Month Day Year)
[X] No
[ ] A. EPA [ ] B. EPA Contractor [ ] C. State [ ] D. Other Contractor
[ ] E. Local Health Official [ ] F. Other _____ (specify)
Contractor Names(s): _____

02 Site Status (Check one)
[X] A. Active [ ] B. Inactive [ ] C. Unknown

03 Years of Operation
Unknown - may be as early as 1940s (Beginning Year) Present (Ending Year) [ ] Unknown

04 Description of Substances Possibly Present, Known, or Alleged
Wastes and spillage from industrial activities in the Doane Lake area, including petroleum products, coal tar, pesticides. Compounds of concern include: polyaromatic hydrocarbons; 2,4-dichlorophenol; 2,4-D; lead; benzene and toluene.

05 Description of Potential Hazard to Environment and/or Population
Ground water contamination, possible seepage to the Willamette River and potential direct contact to workers du construction at the site.

V. PRIORITY ASSESSMENT

01 Priority for Inspection (Check one. If high or medium is checked, complete Part 2 - Waste Information and Part Description of Hazardous Conditions and Incidents)
[ ] A. High (Inspection required promptly) [ ] B. Medium (Inspection required) [ ] C. Low (Inspect on time available basis) [X] D. None (No further action needed, complete current disposition f

VI. INFORMATION AVAILABLE FROM

01 Contact	02 Of (Agency/Organization)		03 Telephone
Deborah Flood	USEPA Region X, Superfund		(206) 442-27
04 Person Responsible for Assessment	**05 Agency**	**06 Organization**	**07 Telephone No.** / **08 Date**
Timothy L. Syverson	EPA/FIT	E&E, Inc.	(206)624-9537 / 09 /22 / (Month Day)

SCOEPA00015433

POTENTIAL HAZARDOUS WASTE SITE
PRELIMINARY ASSESSMENT
PART 2 - WASTE INFORMATION

I. IDENTIFICATION	
01 State	02 Site Numb
OR	D096253737

II. WASTE STATES, QUANTITIES, AND CHARACTERISTICS

01 Physical States (Check all that apply)

- [ ] A. Solid
- [ ] B. Powder, Fines
- [X] C. Sludge
- [X] D. Other Unknown (Specify)
- [ ] E. Slurry
- [X] F. Liquid
- [ ] G. Gas

02 Waste Quantity at Site (Measure of waste quantities must be independent)

Tons _____
Cubic Yards Unknown
No. of Drums _____

03 Waste Characteristics (Check all that apply)

- [X] A. Toxic
- [ ] B. Corrosive
- [ ] C. Radioactive
- [X] D. Persistent
- [ ] E. Soluble
- [ ] F. Infectious
- [ ] G. Flammable
- [ ] H. Ignitable
- UNKNOWN
- [ ] I. Highly Volati
- [ ] J. Explos
- [ ] K. Reacti
- [ ] L. Incomp ible
- [ ] M. Not Applic

III. WASTE TYPE

Category	Substance Name	01 Gross Amount	02 Unit of Measure	03 Comments
SLU	Sludge	Unknown		Industrial wastes and spillage including petroleum products, coa tar, and pesticides. Materials disposed of on site prior to owne ship by Wacker. *Current waste generated on site includes Trichloroethylene, Freon and Chromic Acid.
OLW	Oily Waste	Unknown		
SOL	Solvents	Unknown		
PSD	Pesticides	Unknown		
OCC	Other Organic Chemicals	Unknown		
IOC	Inorganic Chemicals			
ACD	Acids			
BAS	Bases			
MES	Heavy Metals			

IV. HAZARDOUS SUBSTANCES (See Appendix for most frequently cited CAS Numbers)

01 Category	02 Substance Name	03 CAS Number	04 Storage/Disposal Method	05 Concentration	06 Measure Concentrat
*	Waste Trichloroethylene		Recycled through VanWaters and Rogers.		4,000 gal per month
*	Waste Freon		Recycled through McClary Columbia.		5 - 10 dr per month
*	Chromic Acid		Acid is neutralized and reduced to Cr+3. Liquid fraction is pumped to the wastewater treatment unit. Sludge is dried and sent to Arlington.		2 - 3 dru per year

NOTE: Wacker has a wastewater treatment unit (WWTV) on site. WWTV discharge to the city sewer and the Willamette River are included under NPDS Permit #99527 issued by the Oregon DEQ.

V. FEEDSTOCKS (See Appendix for CAS Numbers)

Category	01 Feedstock Name	02 CAS Number	Category	01 Feedstock Name	02 CAS Numb
FDS			FDS		
FDS			FDS		
FDS			FDS		
FDS			FDS		

VI. SOURCES OF INFORMATION (Cite specific references, e.g., state files, sample analysis, reports)

Oregon Department of Environmental Quality, RCRA Generator Inspection, 09/04/87.
CH_2M Hill Northwest, Inc.; A Preliminary Report Soil Investigation for Proposed Polysilicon Plant, Wacker Siltronic Corporation, Portland, Oregon, 06/85.

SCOEPA00015434

POTENTIAL HAZARDOUS WASTE SITE
PRELIMINARY ASSESSMENT
PART 3 - DESCRIPTION OF HAZARDOUS CONDITIONS AND INCIDENTS

I. IDENTIFICATION	
01 State	02 Site Number
OR	D096253737

II. HAZARDOUS CONDITIONS AND INCIDENTS

01 [X] A. Ground Water Contamination
02 [X] Observed (Date: approx. 1940's to Present) [ ] Potential [ ] Alleg
03 Population Potentially Affected: Unknown
04 Narrative Description

Disposal of petroleum products, coal tar, and pesticides during industrial activity in the North Doane Lake area. Recent spills (post 1980) include Trichloroethylene (TCE) and Chromic Acid. Sampling (1985) of shallow monitorin wells (<40') in the undeveloped southern portion of the site detected low levels of semi-volatile organics. Dept to ground water is < 15 feet.

01 [X] B. Surface Water Contamination
02 [X] Observed (Date: 1980 - Present) [ ] Potential [ ] Alleg
03 Population Potentially Affected: Unknown
04 Narrative Description

The site is adjacent to the Willamette River. Leakage and spills at the Wacker facility enter the river via outf from the plant's wastewater treatment unit. Documented spills of hazardous materials to the river include: Chro Acid (07/80, 12/80, and 05/84); TCE (12/83 anid 12/84); and wastewater (06/87).

01 [X] C. Contamination of Air
02 [X] Observed (Date: Unknown-Present) [ ] Potential [ ] Alleg
03 Population Potentially Affected: Unknown
04 Narrative Description

The Wacker facility has an Air Contaminant Discharge Permit (#26-3002) issued by the Oregon DEQ. However, there reports of odors and skin irritation from fumes originating from wastes landfilled at the site and in the adjacer Doane Lake.

01 [X] D. Fire/Explosive Conditions
02 [ ] Observed (Date:) [X] Potential [ ] Alleg
03 Population Potentially Affected: Unknown
04 Narrative Description

Petroleum products of an unknown type and quantity have been landfilled at the site.

01 [X] E. Direct Contact
02 [X] Observed (Date: Present) [ ] Potential [ ] Alleg
03 Population Potentially Affected: Unknown
04 Narrative Description

Skin and eye irritation have been reported in the site area. The potential exists for exposure to buried pesti- cides, and petroleum products, if excavation is conducted at the site.

01 [X] F. Contamination of Soil
02 [X] Observed (Date: approx. 1940's to Present) [ ] Potential [ ] Alleg
03 Area Potentially Affected (Acres) Unknown
04 Narrative Description

Petroleum products, coal tar, and pesticides were disposed of and/or spilled at the site. Soil borings done in 1 confirm the presence of petroleum products and pesticides in sediments < 20 feet below the surface.

01 [ ] G. Drinking Water Contamination
02 [ ] Observed (Date:) [ ] Potential [ ] Alleg
03 Population Potentially Affected:
04 Narrative Description

The area is served by the City of Portland public water supply. Contamination of ground water at the site is unlikely to affect local drinking water supplies.

01 [X] H. Worker Exposure/Injury
02 [ ] Observed (Date:) [X] Potential [ ] Alleg
03 Workers Potentially Affected: Unknown
04 Narrative Description

Direct contact with buried wastes is possible for workers during any construction or excavation at the site.

01 [X] I. Population Exposure/Injury
02 [X] Observed (Date: Present) [X] Potential [ ] Alleg
03 Population Potentially Affected: Unknown
04 Narrative Description

The Doane Lake area has a history of waste disposal problems. The potential exists for exposure if there are an uncontained or unknown disposal areas.

SCOEPA00015435

POTENTIAL HAZARDOUS WASTE SITE
PRELIMINARY ASSESSMENT
PART 3 - DESCRIPTION OF HAZARDOUS CONDITIONS AND INCIDENTS

I. IDENTIFICATION	
01 State: OR	02 Site Number: D096293737

II. HAZARDOUS CONDITIONS AND INCIDENTS (Continued)

01 ☐ J. Damage to Flora — 02 ☐ Observed (Date: _____) ☐ Potential ☐ Alleg
04 Narrative Description

None reported, observed, or suspected.

01 ☐ K. Damage to Fauna — 02 ☐ Observed (Date: _____) ☐ Potential ☐ Alleg
04 Narrative Description (include name(s) of species)

None reported, observed, or suspected.

01 ☐ L. Contamination of Food Chain — 02 ☐ Observed (Date: _____) ☐ Potential ☐ Alleg
04 Narrative Description

None reported or observed. Contamination of the Willamette River has the potential to affect fishing resources.

01 ☒ M. Unstable Containment of Wastes (Spills/runoff/standing liquids, leaking drums) — 02 ☐ Observed (Date: _____) ☐ Potential ☐ Alleg
03 Population Potentially Affected: _____ 04 Narrative Description

Petroleum products and coal tar were landfilled at, or adjacent to, the site causing soil contamination.

01 ☒ N. Damage to Off-site Property — 02 ☐ Observed (Date: _____) ☒ Potential ☐ Alleg
04 Narrative Description

Adjacent property has the potential to be affected by subsurface migration of wastes.

01 ☒ O. Contamination of Sewers, Storm Drains, WWTPs — 02 ☒ Observed (Date: 12/27/83) ☐ Potential ☐ Alleg
04 Narrative Description

Wastewater spill at the facility was diverted to the municipal sewer system. The water contained 2.02 ppm chrom

01 ☒ P. Illegal/Unauthorized Dumping — 02 ☐ Observed (Date: approx. 1940's to 1980) ☐ Potential ☐ Alleg
04 Narrative Description

The exact quantity and types of materials disposed of or spilled on site during past practices are unknown.

05 Description of Any Other Known, Potential, or Alleged Hazards

Due to the long history of petroleum and chemical manufacturing in the site area, and unknown waste handling practices, the potential exists for the discovery of additional hazardous materials and conditions in the site ar

III. TOTAL POPULATION POTENTIALLY AFFECTED: Unknown

IV. COMMENTS

The Wacker site is located in the heavily industrialized North Doane Lake area of northwest Portland. East of th site is the Gould, Inc. Superfund site. The Doane Lake area has a history of waste disposal and operational problems. The Wacker site will be included in a North Doane Lake study, to be conducted by Wacker, Northwest Natural Gas, and Koppers, Inc., under the guidance of the Oregon DEQ.

V. SOURCES OF INFORMATION (Cite specific references, e.g., state files, sample analysis, reports)

CH2M HILL N.W., Inc., A Preliminary Soil Investigation, Wacker Siltronic Corporation, 06/85; Memos from J. Ellis, Wacker Siltronic, to S. Carter, ODEQ, dated 07/14/80 and 12/22/80; Memo from G. Carr, Wacker Siltronic, to C. Carter, ODEQ, dated 06/04/84; Memo from G. Carr, Wacker Siltronic, to C. Clinton, ODEQ, dated 01/06/84; Memo f J. Gillaspie, ODEQ, to J. Ellis, Wacker Siltronic, dated 04/16/85; Memo from M. Tillson, Wacker Siltronic, to G. Davis, ODEQ, dated 07/02/87; Memo from M. Tillson, Wacker Siltronic, to G. Davis, ODEQ, dated 02/11/87; Tom Mille ODEQ, Personal Communication, 10/20/87.

SCOEPA00015436

U.S. ENVIRONMENTAL PROTECTION AGENCY
REGION 10
1200 SIXTH AVENUE
SEATTLE, WASHINGTON 98101

FEB 18 1988

RECEIVED
ENGINEERING
FEB 23 1988
John L. Pittman
Wacker Siltronic

REPLY TO
ATTN OF: HW-113

CERTIFIED MAIL - RETURN RECEIPT REQUESTED

John Pittman
Wacker Siltronic
P.O. Box 03180
Portland, Oregon 97203

Re: NL/Gould Superfund Site, Portland, Oregon

Dear Mr. Pittman:

The United States Environmental Protection Agency (EPA) has documented the release or threatened release of hazardous substances at the above referenced site. As a result, the site is now listed on the National Priorities List pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, 42 U.S.C. Section 9601 et seq., as amended by the Superfund Amendments and Reauthorization Act of 1986 (to be herein referenced as CERCLA).

A Remedial Investigation (RI) and Feasibility Study (FS) is currently being undertaken at this site by Gould Inc. and NL Industries, Inc., as required by Administrative Order on Consent No. 1085-05-08106, dated August 29, 1985. RI and FS reports are available in the Administrative Record on this site at the Multnomah County Library. The study covers property currently owned by Gould (previously owned by NL Industries) and adjacent properties owned by others. The results of that investigation indicate groundwater contamination in the study area. In order to better evaluate the nature and extent of groundwater contamination underneath the site (the "groundwater unit"), EPA is considering spending public funds to further investigate the contamination at the site and take corrective action for the control of hazardous substances at the site, unless it is determined that such action will be conducted properly by a responsible party.

Responsible parties under CERCLA include the current and past owners and operators of the site, persons who currently lease property at the site or have leased property in the past, and persons who generated the substances or were involved in the transport, treatment, or disposal of them at the site. The EPA has information indicating that you or your company may be a responsible party for the groundwater unit at the NL/Gould site.

Based on EPA's preliminary findings, persons and companies to receive this letter have been identified as potentially responsible parties (PRPs). Inclusion on this list indicates that you or your company may be a responsible party. This list does not constitute a final determination concerning the liability of any party for the hazard or contamination at the site in question.

Under CERCLA, responsible parties may be liable for all monies including interest thereon expended by the government to take necessary corrective action at the site including investigation, planning, and cleanup of the site. Note that use of the word 'site' in this letter refers to the term 'facility' as broadly defined in CERCLA.

EPA and the Oregon Department of Environmental Quality (DEQ) encourage PRPs to perform or participate in the investigation and/or clean-up of the site. The PRPs may participate individually or as a group. In the event that PRPs elect not to participate, each PRP may be liable for site investigation, site clean-up, and for damages to natural resources. These liabilities are joint, strict, and several for all PRPs.

At this time, EPA is seeking to obtain certain information from you. Under the provisions of federal law, specifically Section 104 of CERCLA, 42 U.S.C. 9604, and Section 3007 of the Resource Conservation and Recovery Act (RCRA), 42 U.S.C. 6927, as amended by the Solid Waste Disposal Act Amendments of 1980, the Administrator of the Environmental Protection Agency has the authority to require any person who generates, stores, treats, transports, disposes of, or otherwise handles or has handled hazardous wastes and substances to furnish information related to such wastes and substances.

EPA is also seeking information from you pursuant to Section 9005 of RCRA, 42 U.S.C. 6991(d). This section allows EPA to request information from owners or operators of underground storage tanks as that term is defined in Section 9001(1) of RCRA. Under regulations proposed by EPA on April 17, 1987, an underground storage tank means any one or combination of tanks (including underground pipes connected thereto) that is used to contain an accumulation of regulated substances, and the volume of which (including the volume of underground pipes connected thereto) is 10 percent or more beneath the surface of the ground. "Regulated substances" are defined as either petroleum or substances defined as hazardous under CERCLA (see 52 F.R. 12662).

Pursuant to these statutory provisions, you are hereby requested to respond to the following items:

1. What are the generic names and chemical character of the hazardous substances, as defined under Section 101(14) of CERCLA, that you generate, store, treat, transport, dispose or otherwise handle or have handled at the site? Briefly describe the activities and operations that were carried out by you or your company which involved these hazardous substances.

2. If you do not believe hazardous substances were handled at the site, please briefly describe the activities and operations that were carried out by you or your company.

3. For each hazardous substance identified above, please describe how the substance was handled, when, and the total quantity in weight or volume (estimate if quantity not available).

4. Where was this material stored, and where was it disposed of?

5. What arrangements (if any) were made to transport the hazardous substances away from the site? Who was the transporter of the hazardous substances, and what is his current/previous address?

6. Provide all information you have regarding spills of hazardous substances on or around the site. This should include the generic name and chemical constituents of the material(s) spilled, the quantity of material spilled, clean-up measures taken, the cause for the spill and any other related information.

7. Describe all environmental investigations that have taken place on or around your property/facility. This includes investigations of the physical and chemical characteristics of soil, surface water, sediments, air, and groundwater. This also includes historical evaluations of potential/known contamination. Provide all relevant information including, but not limited to, study design, work plans, quality assurance procedures, sampling procedures, well logs, study results, and data analyses. Raw data need not be provided at this time; data summaries will suffice.

8. Provide all information on all wells on site including the number, locations, associated well logs, date of installation, purpose of installation, and whether the well(s) are being used currently and for what purpose.

9. Provide information regarding all underground storage tanks (see definition above) at the properties owned or leased by you or your company. Specifically, provide a list describing the location, age, construction, contents, and leak detection system or other monitoring system for each tank. Provide a map showing the location of each tank and associated pipelines. Indicate if there are any underground storage tanks no longer in use on the properties.

10. Provide copies of all insurance policies that may provide liability coverage for damages resulting from releases of hazardous substances and/or hazardous wastes. This includes policies that are in effect as well as those effective when hazardous substances were released in the past.

11. For responses under items #4, #6, #7, #8, and #9 above, please provide a map which indicates relevant locations and depths.

Your written answers to these questions must be sent to EPA within thirty (30) calendar days of your receipt of this letter. Your response should include all information you have for the site during the time you or your company owned, operated, or leased the property. Please answer all questions to the best of your knowledge.

Under Section 3008 of RCRA, 42 U.S.C. 6928, failure to comply with this request may result in an order requiring compliance or a civil action for appropriate relief. Section 3008 of RCRA also provides for civil penalties. Pursuant to Section 103 of CERCLA, it is unlawful for any person knowingly to destroy, mutilate, erase, dispose of, conceal, or otherwise render unavailable or unreadable, or falsify any of the above records.

EPA recognizes that this information request is broad in scope. If the information you possess is voluminous, you must respond within the 30 day period as to the availability of all related records, and provide a written description of the type of information available. Specifically, describe the types of records that were maintained by you or your company with regard to the above including the date of the records, the author of the records, the current location of the records, and their current custodian. EPA also requests that arrangements be made to allow designated EPA employees, DEQ employees, and their contractors to review all such documents. Be prepared to present a summary of the information you are submitting at a meeting of all Potentially Responsible Parties to be held in July in Portland. EPA will notify you approximately two weeks prior to the date of this meeting as to the exact location and time.

EPA regulations governing confidentiality of business information are set forth in Part 2, Subpart B of Title 40 of the Code of Federal Regulations Federal Register 36902-36924 (September 1, 1976), as amended by 43 FR 3997 (September 8, 1978), 44 FR 17673 (March 23, 1979), 43 FR 11270 (March 17, 1983), and 50 FR 51663 (December 18, 1985). For any portion of the information submitted which is entitled to confidential treatment, please assert a confidentiality claim in accordance with 40 CFR §2.203(b). If EPA determines that the information so designated meets the criteria set forth in 40 CFR §2.200, the information will be disclosed only to the extent, and by means of, the procedures specified in 40 CFR Part 2, Subpart B. EPA will construe the failure to furnish a confidentiality claim with your response to this letter as a waiver of that claim, and information may be made available to the public by EPA without further notice.

Please respond to EPA within the time frame indicated above. Your written response should be sent to David Tetta, U.S. Environmental Protection Agency, Superfund Branch, 1200 Sixth Avenue, HW-113, Seattle, Washington 98101. Please direct EPA policy and technical questions to David Tetta at (206) 442-2138, and legal questions to Bob Goodstein at (206) 442-8311.

I hope you will give this matter your immediate attention.

Sincerely,

Randall F. Smith

Charles E. Findley, Director
Hazardous Waste Division

SCOEPA00015440

cc: John Pittman Jim Ellis
Harry Schmid
Then file

VICTOR ATIYEH
Governor

Department of Environmental Quality

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

Site
RECEIVED
JIM DiSORBO
JUN 30 1986
WACKER SILTRONIC CORP.

FILE

June 26, 1986

Jim D'Sorbo
Wacker Siltronics
PO Box 03180
Portland, OR 97203

Dear Jim:

I appreciate your taking the time to get together. I've discussed with our staff some of the ideas we talked about.

Given the information we have at this time--information gathered both from you and from our files--we do not feel comfortable giving the entire northern end of Doane's Lake area a "clean bill of health," as you mentioned.

However, our technical staff believes it may be possible to accommodate your current expansion plans while investigating the other issues in the area. You may wish to have John Pittman of your engineering staff contact Neil Mullane of the Hazardous and Solid Waste Division (229-6242), whom I have appointed as lead staff person for this project, to explore this further.

Also, I recently received a letter from an attorney for Northwest Natural Gas indicating that Northwest Natural, Koppers & Wacker have met and will be undertaking a study of the area. We look forward to meeting with you as soon as a consultant has been hired.

Again, I enjoyed our visit and please call me at 229-5300 in the future should you have questions or thoughts about Oregon's environmental programs.

Sincerely,

Mike Downs
for

Fred Hansen
Director

FH:s
AS3232

EQ-1

EPA

Region 10
1200 Sixth Avenue
Seattle WA 98101

Alaska
Idaho
Oregon
Washington

April, 1992

Superfund Update

Gould Battery Superfund Site

Portland, Oregon

Companies Agree To Comply with Unilateral Orders

The seven companies who were ordered by EPA to undertake the cleanup of lead contamination at the Gould Superfund Site in Portland, Oregon have jointly agreed to comply with the orders.

EPA took enforcement action to compel the companies, who did not reach agreement with the agency on a negotiated settlement, to begin cleaning up the site. NL Industries Inc., Gould Inc., Johnson Controls Inc., Exide Inc., AT&T Technologies Inc., Rhone-Poulenc, and Burlington Northern Railroad Co. have agreed to finance and perform the cleanup under the terms of the Unilateral Orders.

Potentially Responsible Parties

Special Notice Letters were sent to 21 potentially responsible parties (PRPs) last summer asking for good faith offers to undertake the cleanup of the site. EPA was not satisfied with the offers, and felt that continued negotiations would only result in further project delays. The agency determined that issuing orders to seven of the companies was necessary to get the cleanup started. The orders were signed on January 22, 1992.

Work Plan Submitted

The PRPs have submitted a Remedial Action Work Plan that presents the proposed plan and schedule for the project. Canonie Environmental Services, the company that developed the battery waste treatment technology to be used, will be the remedial action contractor for the cleanup.

Construction of a waste separation and recycle process is scheduled to be underway this summer. The complete excavation and processing of the contaminated soils, matte, and estimated 90,000 tons of battery casings is expected to take three to four years. EPA and the Oregon Department of Environmental Quality will provide oversight of the cleanup work to ensure that construction activities are conducted in a manner that is protective of human health and the environment. This will include air and groundwater monitoring.

Innovative Treatment Process

The cornerstone of the cleanup process is an innovative treatment process which will separate and treat the battery waste for potential recycling. The process will treat battery casings and other smelter waste on site to recover recyclable materials (including lead and plastic) and to stabilize un-recyclable material. The technology is a unique process developed by Canonie based on treatability studies conducted at the site. This process has the potential for use in cleaning up other battery waste sites around the country.

De Minimis Settlement

EPA is working to finalize a "de minimis" settlement with several other companies who sent smaller quantities of waste materials to the site. Under the terms of the proposed settlement, the companies would contribute funding towards the cleanup project.

For More Information

If you have questions or if you want more information on this site, please contact one of the following:

Chip Humphrey
EPA Oregon Operations Office
Portland, Oregon
(503) 326-2678

Dan Phalen
EPA Community Relations
Seattle, Washington
(206) 553-6709

Ted Yackulic
EPA Office of Regional Counsel
Seattle, Washington
(206) 553-1218

SCOEPA00015442

Background

The Gould Battery Site is the location of a former lead smelter and battery recycling facility. The site was owned and operated by subsidiaries of NL Industries and later sold to Gould, the current owner. The site was listed on the National Priorities List (Superfund) in 1983 because of documented lead contamination. Discarded battery casing materials from the operations were used as fill on the Gould site and an adjacent property.

EPA signed a Record of Decision (ROD) in March, 1988 for the soils portion of the Gould site that required the following:

- Excavating all battery casing fragments for processing in a separation unit
- Recycling of lead and casing materials to the extent practicable
- Stabilizing contaminated soil and sediments
- Air and groundwater monitoring.

Extensive design studies were required to develop the recycling process. Canonie Environmental conducted the predesign studies for NL Industries under the terms of a Partial Consent Decree with EPA. The bench scale, pilot scale, and field demonstration testing was completed last year. It evaluated several aspects of the cleanup remedy, including the ability of a proposed process to clean and recycle the battery casing components. Detailed design plans and specifications were prepared based on the results of the testing.

EPA

United States
Environmental Protection
Agency

Region 10 (HW-117-CR)
1200 Sixth Avenue
Seattle WA 98101

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JOHN PITTMAN
PO BOX 03180
PORTLAND, OR 97203

WACKER

FACSIMILE TRANSMITTAL SHEET

WACKER SILTRONIC CORPORATION
P.O. Box 83180
Portland, Oregon 97283-0180

7200 N.W. Front Avenue
Portland, Oregon 97210

PHONE: (503) 243-2020
FAX: (503) 226-0052
TELEX: 4970339

FAXED
APR 20 1992
12:15 pm.

DATE: April 20, 1992

FAX NO.: (206) 343-0880

NUMBER OF PAGES (INCLUDING THIS PAGE) 3

TO: Marvin B. Durning

FROM: John Pittman

MESSAGE/SPECIAL INSTRUCTIONS: See attached information regarding Gould Battery Superfund Site.

John

TO: FILE

FROM: John Pittman

SUBJECT: DEQ's Meeting on Doane Lake

DATE: February 24, 1988

On Thursday, February 11, 1988, Fred Hansen, Director of DEQ called a meeting of all Doane Lake area property owners for a discussion of the Gould Battery Site study. Fred indicated that the EPA was in preparation of sending out a document (104 order) indicating that the adjacent property owners to the Gould site may be potentially responsible parties for ground water contamination. This is a result of the investigation that has taken place on the Gould Superfund site to determine the level of lead contamination. As a result of the study there was contamination found in both the surface areas and also the ground water areas.

Because of the old Doane Lake regions that have been filled in over the years, the EPA is concerned with ground water contamination from adjacent properties affecting the treatment of ground water at the Gould site. To determine this potential degree of other contaminations, EPA is requesting that all of the adjacent property owners submit in detail the types of operations that have been conducted on the properties over the past years. Therefore, the ground water issue will remain open for some time; whereas the surface conditions at the Gould site will go into remedial action. A record of decision has been issued against the Gould site for four (4) levels of cleanup. DEQ does not expect the EPA to expand the Gould Superfund Site. DEQ also feels that the work Wacker, Koppers, and Northwest Natural Gas are doing on the site investigation study should be satisfactory to the EPA.

P.S. The letter from the EPA was received by certified mail at Siltronics on February 23, 1988.

JP:bw

NEIL GOLDSCHMIDT
GOVERNOR

Department of Environmental Quality

811 SW SIXTH AVENUE, PORTLAND, OREGON 97204-1334 PHONE (503) 229-5696

February 4, 1988

RECEIVED
ENGINEERING
FEB 5 1988
John L. Pittman
Wacker Siltronic

John Pittman
Wacker Siltronic
P.O. Box 03180
Portland, OR 97203

Dear John Mr. Pittman:

As our staff have discussed with you, we have set a meeting for the morning of Thursday, February 11, 1988 to discuss some new developments relating to the study of the Gould Battery site, which is on the federal Superfund list. The meeting will start at 9:00 am in the fourth floor conference room of our offices at 811 SW Sixth Ave., in Portland, and should take an hour to an hour and a half.

Additional work done at the Gould site has indicated the groundwater from around the battery pile (generally south of the SP&S bridge) may be more connected to the northern properties than earlier thought. EPA is anxious to move forward on resolving the necessary cleanup at the Gould site, but if contaminants have moved across the bridge, combining efforts into a larger study will likely be most cost effective.

I would like a chance to discuss these issues with you before EPA takes any final action. I am hopeful that once we have a chance to discuss the problems in the area that we can reach agreement about the best way to approach these new issues in a cooperative manner.

I apologize for the quick scheduling of the meeting, and do appreciate your efforts to rearrange your schedules to attend.

Sincerely,

Fred Hansen
Director

FH:p
RP1307
cc: Northwest Region, DEQ
Remedial Action Section, DEQ

SCOEPA00015446

DOANE LAKE PRPS (POTENTIALLY RESPONSIBLE PARTIES)

John Pittman
Wacker Siltronic
P.O. Box 03180
Portland, Oregon 97203

Roger Sherwood, KEN McCAW
ESCO
P.O. Box 10123
Portland, OR 97210

John Oxford
Kopper's
7540 NW St. Helens Road
Portland, OR 97229

Bob Ferguson
Rhone-Poulenc
P.O. Box 10224
Portland, Or 97210

Dick Bach, ED BOLIN
NW Natural Gas
c/o Stoel, Rives, Boley, Jones & Grey
900 SW Fifth Avenue
Portland, OR 97204

Bob Saling
Pacific Northern Oil Company
7900 NW St. Helens Road
Portland, OR 97210

Jim Tracewski & GOULD
Regulatory Affairs Specialist
NL Industries, Inc.
Hightstown, NJ 08520

Roger Neu, TIM McGRATH
Schnitzer Investment Corp.
3200 NW Yeon Avenue
Portland, OR 97210

Larry Patterson
Pennwalt Chemical Corp.
6400 NW Front Avenue
Portland, OR 97210

FRED HANSEN
MIKE DOWNS
AL GOODMAN
JANET GILLASPIE
BILL RENFROE
TOM BISPHAM
} DEQ

DOANE'S LAKE MEETING

11 FEB 88

NAME	REPRESENTING	~~ADDRESS~~ PHONE
ROGER NEW	SCHNITZER INV. CORP	3200 NW YEON PDX 97210
TIM MCGRATH	"	" 224-9100
AL GOODMAN	DEQ-REMEDIAL ACTION	811 SW SIXTH AVE.
BILL RENFROE	" "	(503) 229-6900
KEN MCCAW	ESCO CORPORATION	778-6605
ROGER SHERWOOD	ESCO CORP	778-6335
JORDAN DERN	KEYSTONE ENG RES. (KOPPERS)	412-227-2207
GEORGE MARKWOOD	PACIFIC N. ELEC	206-282-4421

Name	Company	phone #
J. Dracewski	NL Industries	609-443-2329
LARRY PATTERSON	PENNWALT	228-7655
Bob Ferguson	Rhone-Poulenc	222-3571
Tom Bingham	DEQ	229-5287
Richard D. Bach	Steel Rivers (NW Nat. GASCO)	294-9213
Edmund L. Bolin	NW NAT GAS.	226-4211
JOHN PITTMAN	WACKER SILTRONIC	241-7514

SCOEPA00015449

Gould Inc.,
40 Gould Center, Rolling Meadows, Illinois 60008
Telephone (312) 640-4000

GOULD
Electronics

FEDERAL EXPRESS

May 27, 1988

Dear Sirs:

On February 29, 1988 the United States Environmental Protection Agency, Region 10, issued a special Notice Letter (42 U.S.C. 9622{e}) to the attached list of potentially responsible parties (PRP's). Pursuant to that letter, Gould Inc. and NL Industries, Inc. have presented a "good faith proposal" to EPA for undertaking Remedial Design and Remedial Action (RD/RA) activities at the Site. To date, EPA has not replied to Gould and NL's proposal but we unofficially have been informed that EPA's response should be forthcoming in the next week.

Inasmuch as you have been identified as a PRP at the Site, Gould and NL would like to schedule a meeting among all PRP's to discuss future negotiations with the EPA. Accordingly, we have scheduled a meeting at 10:00 a.m., June 9, 1988 at Gould's headquarters in Rolling Meadows, Illinois. Rolling Meadows is a suburb of Chicago located approximately ten miles northwest of O'Hare Airport.

As you probably know, EPA's selected remedy includes removing battery casings on and beneath the Site, treating them for proper disposal, performing additional studies of groundwater pollution in the Doane Lake area and deciding what, if any, further cleanup is necessary. Gould and NL's basic position is that removal of battery casings beneath the Site requires massive and unnecessary excavation, handling and off-site disposal and presents a grave risk to public health and environment in the area surrounding the Site. In that any risks would affect your companies directly and present and future clean-up activities may involve your companies, NL and Gould think a PRP meeting is in order.

If you would like to participate in the PRP meeting or have any questions about this letter, please contact the undersigned at 312/640-4716 or Janet Smith from NL Industries at 212/421-7204.

Sincerely,

Michael C. Veysey

Michael C. Veysey
Assistant General Counsel

MCV/ddc

MARVIN B. DURNING A PROFESSIONAL SERVICE CORPORATION LAW OFFICES
1411 FOURTH AVENUE BUILDING, SUITE 1522, SEATTLE, WASHINGTON 98101-2212 TELEPHONE (206) 223-9616 TELECOPY (206) 223-9617

GERARDO A. CARLO, OF COUNSEL
ADMITTED IN PUERTO RICO
AND DISTRICT OF COLUMBIA

MARVIN B. DURNING, OF COUNSEL
CARLO & DUBOS
SAN JUAN, PUERTO RICO

FILE

July 28, 1988

Mr. John Bagby
Tetratech
11820 Northup Way, Suite 100 East
Bellevue, WA 98005-1927

Re: NL/Gould Superfund Site -
Wacker Siltronic Corporation -
Reply to Additional Questions

Dear Mr. Bagby:

I am writing to provide to you the reply of Wacker Siltronic Corporation to certain questions you posed to me by telephone several weeks ago.

From our telephone conversation, I understand that Tetratech is a contractor to EPA Region IX, doing a review of the responses of various firms owning property in the vicinity of the NL/Gould Superfund site to an EPA letter of February 18, 1988, which posed a series of questions. From our conversation, I understand that you have reviewed Wacker Siltronic Corporation's response to EPA, dated March 22, 1988, and have certain further questions. My understanding of your further questions (stated as I wrote in a memorandum shortly after our telephone conversation) and the replies of the Wacker Siltronic Corporation are set out below.

Question 1: Mr. Bagby says that in section 6.3 of Wacker Siltronic's reply it is stated that while excavating a foundation for construction of the water treatment facility of the present Wacker facility in 1979, it was discovered that there had been a leak from the Olympic Oil pipeline which passes under the Wacker property. Mr. Bagby asks: How much oil leaked to groundwater, and what, if any, cleanup was done of this oil and of the soil? How was the oil disposed of, and what happened to the oil-contaminated soil?

Replies

How much oil leaked into groundwater?

There is no way for Wacker Siltronic to answer this question. Pipeline leaks were caused by holes formed by electrolysis from pieces of metal rebar buried along with pipe during pipeline construction. It is difficult to determine how long after construction these holes formed and how much oil leaked from these holes into groundwater.

The cleanup was done by Olympic Pipeline Company. Olympic Pipeline Company advised Wacker Siltronic Corporation in May, 1979 that it had thoroughly investigated the extent of the spread of the oil on Wacker Siltronic's property from the pipeline leak and found no evidence that oil had spread beyond the immediate vicinity of the leak site. Olympic Pipeline also said that, as a safety measure, it had built two concrete/sand dams around the 24" storm sewer on the property to assure itself there was no possibility of oil migrating along that route to the river. Finally, Olympic Pipeline reported that no oil or oily substance had been found in the concrete/sand dam areas.

What, if any, cleanup was done of this oil?

Olympic Pipeline brought in tankers and pumped oil from the ground using a number of well points. The oil was pumped into a separation tank to separate oil from groundwater. The oil was then loaded into tankers and hauled offsite by Olympic Pipeline Company.

What was done with contaminated soil?

Unknown to Wacker Siltronic Corporation.

Question 2: Mr. Bagby says that in section 7 of Wacker Siltronic's reply to EPA, there is included a report from CH2M Hill concerning soil sediments and the results of groundwater monitoring at Wacker Siltronic's site. Mr. Bagby states that the sediment analysis reportedly found barium, but that the groundwater monitoring analyses from the same bore holes make no mention of barium. He asks: Did CH2M Hill analyze for barium? What were the results if they did? Why did they or did they not analyze for barium?

Replies

Did CH2M Hill analyze for barium in groundwater?

No.

Why did CH2M Hill not analyze for barium?

As indicated on Page 9 of Section 7.1 (concerning soil samples), a barium analysis was conducted as part of the whole E.P. Toxicity list. The groundwater sampling (reported in Section 7.3), on the other hand, was analyzed only for the priority pollutants.

The soil and water investigations by Wacker Siltronic Corporation were carried out in connection with possible construction of an expansion of its facility; they were not done for any regulatory requirement.

The soil sampling results were given to Oregon DEQ because the company wanted to be sure whether there was any problem, but DEQ knew of no soil or sediment standards. Wacker Siltronic voluntarily did groundwater sampling and analysis for the federal priority pollutants as the most relevant test. See the letter dated July 29, 1985 from CH2M Hill to Jim Ellis of Wacker Siltronic in Section 7.3.

Question 3: Mr. Bagby states that in paragraph 9 of Wacker Siltronic's reply to EPA it is stated that certain underground tanks were removed from the Wacker Siltronic site in the summer of 1985, and that pipelines from the tanks were flushed with water and then capped and left in place. Mr. Bagby asks: What happened to the flushing water, or to material flushed out of the pipes? Was it treated; how was it disposed of?

Replies

What happened to flushing water and material flushed from pipes?

Both the flushing water and the flushed material were collected in 55-gallon drums and pumped back into the plant's solvent recovery system for reuse. See attached "Chronology of Tank Removal Procedure."

Question 4: Mr. Bagby says that the section of Wacker Siltronic's reply to EPA entitled "History" contains an excerpt from a report by the City of Portland Development Commission in March, 1985. Mr. Bagby would like to find a complete copy of that report, and asks us for a reference as to where he can find the report.

Replies

Where can Mr. Bagby get a complete copy?

Copy enclosed.

Question 5: Mr. Bagby asks that in section 3.1 of Wacker Siltronic's reply to EPA, there is a table of "Hazardous Material Handling/Consumption Summary" which lists 29 chemicals which have been used over the reported time period at Wacker Siltronic. Mr. Bagby says that the tables summarizing hazardous waste transportation/disposal in section 5.1 of Wacker Siltronic's reply to the EPA include only eight of the chemicals listed in section 3.1. He asks why the other 21 chemicals are not accounted for in the tables of section 5.1 and suggests that some or all of them may be CERCLA hazardous substances or RCRA hazardous wastes, or both. He asks that we explain the facts concerning the other 21 chemicals.

Replies

1. The list of 29 substances shown in Section 3.1 comprise the total list of chemicals used at the Wacker Portland facility at this time. The substances are taken from both CERCLA and RCRA lists.

2. The list of 10 substances (not 8 as mentioned by John Bagby) is a complete summary of all hazardous waste materials transported off site for disposal at approved landfill, recycling, or incineration depots.

3. The discrepancy in the two lists is because many of the substances shown on the Section 3.1 list were consumed or sent through the wastewater treatment system and therefore did not result in a hazardous waste material to be transported off site for treatment or disposal as listed in Section 5.1.

I trust these replies supply the information you requested.

Very truly yours,

Marvin B. Durning

Marvin B. Durning

MBD:dc

Enclosure

cc: John Pittman, Director of Engineering
Wacker Siltronic Corporation, Portland

ANSWER
No. 3

2. CHRONOLOGY OF TANK REMOVAL PROCEDURE, Continued:

9-2-85	Monday	Holiday - no activity
9-3-85	Tuesday	Hoffman began removal of sidewalk to west of excavation as it had become badly undermined. Siltronic held meeting at 11:00 a.m. to review plan for rinsing of underground drain lines and headers which served as inlets for buried tanks. Weather- no ppt., cloudy, high in low 70's.
9-4-85	Wednesday	Siltronic started flushing SOD-T and SOD-R drain lines from Hega Cleaning machines at Positions 7.13 and 7.18 (see photo in Attachment 6) in the Process Building. Also, the SOD-R and SOD-W header flushing was started in the p.m. All rinse water was captured in the previously mentioned 55 gal. drums and pumped back to the Solvent Recovery System.
9-5-85	Thursday	Finished flushing that was begun on Wednesday and started flushing all other known drains in the Process Building. At the end of the day rinse water samples from each header were taken and submitted to Coffey Labs for analysis, (see Attachment 7). Review of this data indicated that the SOD-W header system required additional flushing.
9-6-85	Friday	Siltronic felt that the SOD-W line had not flushed properly because of debris in the drain lines which had caused "pooling". Accordingly, Roto-Rooter was brought in to ream out this drain line from one side of the building to the other. Siltronic rinsed this line for two (2) hours after Roto-Rooter was finished. After rinsing, an additional sample was taken and submitted to Coffey Labs, (see Attachment 7). Results indicated that the line had been flushed as clean as was possible.

SITE HISTORY

WACKER SILTRONIC CORPORATION

PORTLAND, OREGON

ANSWER
No. 4

MARCH 7, 1985

SCOEPA00015457

SITE HISTORY
WACKER SILTRONIC CORPORATION
PORTLAND, OREGON

INTRODUCTION

The Wacker Siltronic Corporation is located at 7200 N.W. Front Avenue, Portland, Oregon. Recent announcements regarding proposed expansion of Wacker Siltronic has created interest in the history and background of the 85 acre (34 hectares) site purchased by Wacker Siltronic in 1978. The City of Portland Development Commission, which created the urban renewal plan that facilitated the sale of the land to Wacker in 1978, CH2M Hill, the consulting engineering firm involved in the site planning, and Wacker Siltronic Corporation have worked together in researching and supplying information for this history.

Information was obtained from various sources including the Oregon Historical Society, ownership records, interviews with people familiar with the site including former owners, the State Department of Environmental Quality, adjacent businesses, the Corps of Engineers, and the Port of Portland. It is the purpose of this report to present a concise history of the site and immediately surrounding area. The history is intended to provide background information to Wacker Siltronic Corporation as they evaluate the site for their future growth.

WACKER SILTRONIC CORPORATION

Plant Description

In October, 1978, Wacker Siltronic Corporation, a subsidiary of Wacker Chemitronic, a German chemical corporation, began construction in Portland, Oregon, of a $40 million plant to produce silicon wafers. Investment in this plant has reached $70 million by 1985. The start of the wafer production process at the Wacker plant begins with the "growing" of

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cylindrical ingots of silicon. These ingots are sliced into wafers of various diameters. These wafers are then precision-polished. Some of the wafers undergo a further epitaxial growth process in which a thin layer of silicon is grown on the surface. Both the polished and the epitaxial wafers are sold to Wacker's customers who use them as the basic host material on which electronic device chips are produced.

The construction of the Wacker plant was undertaken in conjunction with the City of Portland as part of a 360 acre (145 hectares) urban renewal project. The area was characterized by poor access and lack of major utility services. The City of Portland, through the Portland Development Commission, assembled the site, and sold $15 million in urban redevelopment bonds to finance purchase of land, improvement and realignment of streets in the area, relocation of an existing gas main and installation of two major storm sewers which served the surrounding area. The bonds are being repaid through property taxes generated by the Wacker development.

The Portland Development Commission sold Wacker approximately 85 acres (34 hectares) for the construction of the new plant. The Commission was able to make the necessary arrangements for the land and begin construction in preparation for Wacker in a record 75 days (a process that normally requires nine months) allowing Wacker to keep its tight time schedule. Construction was completed in December, 1979, and the plant began operation in March, 1980. Completion of the plant resulted in the creation of 600 new jobs. Currently, Wacker employs approximately 835 workers. (See Appendix, Photos 18 and 19).

In October, 1983, Wacker announced a $60 million, five year expansion program involving the purchase of new equipment and new construction - in April, 1984, the plan was increased to an $85 million investment.

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This was followed by an announcement in October, 1984, of an additional $80 million in new investment to build facilities at the site to produce polycrystalline material from ferrosilicon feedstock. The polycrystalline material is one of the basic components in the wafer production process. Presently the material must be shipped from Germany.

Wacker officials estimate that employment could grow to 1,700 by 1990 with the combination of the two facilities.

Description of Site

The Wacker site is located in the northwest section of the City of Portland on the west bank of the Willamette River. The property is situated between the St. Johns Bridge and the Burlington Northern Railroad Bridge and is essentially rectangular in shape, consisting of a total of approximately 85 acres (34 hectares). The northeast boundary of the property is the Willamette River; the southeast boundary is the Burlington Northern Railroad berm providing the approach to the railroad bridge; the southwest boundary is the main Burlington Northern Railroad track and adjacent N.W. St. Helens Road; and the northwest boundary is the property line shared with Northwest Natural Gas and the Koppers Company.

The property is accessed by an extension of N.W. Front Avenue which terminates on the property. The property is about six miles (10 kilometers) upstream on the Willamette River from the Columbia River.

The initial impression of the site is one of quietness and serenity despite the closeness of the Northwest Portland industrial area. This feeling is created because of the boundaries created by the Willamette River, the railroad berm which is approximately 30 feet (9 meters) above the level of the site, and the nearness of Forest Park, which forms a natural wooded backdrop to the southwest across N.W. St. Helens Road. A map is attached which locates the property in relationship to other landmarks. (See Appendix, Figures 1 and 2).

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Wacker's site is now essentially flat after previous filling and grading operations which are described later. Two oil pipelines of Olympic Pipeline cross the property.

Geology and Hydrology

The physiography in the vicinity of the plant site is dominated by the flood plain of the Willamette River and a row of hills called the Portland Hills, which are also sometimes referred to as the Tualatin Mountains. The northeastern front of the Portland Hills forms a linear bluff that persists for at least fifty miles (80 kilometers) in the Portland area. The Wacker plant site is situated between the base of the Portland Hills and the Willamette River.

Beneath artificial fill material, the uppermost geologic unit at the site is unconsolidated alluvium deposited by the Willamette River. The alluvium is composed of silt, sand, and combinations of these materials. Columbia River Basalt, a hard dense rock layer, occurs at depths less than 100 feet (30 meters) beneath the site.

The depth of groundwater varies across the site and probably fluctuates widely with the river level. Two borings made in 1982 on the Wacker site indicate a groundwater depth of fifteen to twenty feet (4.5 to 6 meters). The general groundwater flow is expected to be parallel to, and toward, the Willamette River.

EARLY HISTORY OF SITE AND AREA (PRE-1900)

Early Inhabitants and Early Description of General Area

Archaeological research has revealed the earliest inhabitants to the Pacific Northwest migrated during the last ice age from Asia to North America about 10,000 years ago. These people settled along the coast and inland rivers. Over thousands of years these aborigines lived in a stone

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age culture of hunters and gatherers. Due to their isolation, different customs emerged with each village and tribe.

Indians living in the vicinity of the Wacker site spoke their own Chinookan language and dialect, and it was difficult for these people to communicate with other tribes. Coastal and inland Indians of Western Oregon enjoyed an unusually rich environment. The land was covered with dense forest of fir, hemlock, and cedar from which they obtained shelter, utensils and clothing. Hollowed out logs became canoes providing transportation along the waterways, which provided salmon and other fish for food.

In April, 1806, the Lewis and Clark Expedition, upon their return up the Columbia River from wintering at Fort Clatsop, were the first white men to enter the Willamette River. The area was described as covered with trees, with game plentiful, mostly deer and elk. The Indians residing on Sauvie Island, (Wapato Island) about three miles (five kilometers) downstream from the current Wacker site, called the river "Multnomah." Lewis and Clark stated in their journals that "fir is the common growth of the uplands. The river provides fish and abundant flowering plants. The land is very fertile."

The Indians were subject to disease, and the entire Multnomah Village died from a pestilence between 1829 and 1831. There is no evidence that the Wacker site itself is of any archaeological interest.

Early Political Background

Disputed Territory

From 1818 to 1846, the boundaries of the Oregon Country were disputed between Great Britain and the United States. The Hudson Bay Company established Fort Vancouver in 1824 and maintained jurisdiction over British subjects and the fur trade. American missionaries and settlers were outside United States jurisdiction, and, hence outside the law. In January, 1841, Senator Lewis F. Linn from Missouri introduced a joint

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resolution in both the Senate and the House "to occupy, settle, grant lands and extend certain laws of the United States to the Oregon Country." Congress took no action.

Attracted by the fertile land, settlers began arriving from Missouri to the Willamette Valley in 1843. An Oregon Provisional Government was established in 1843, dividing the Oregon Country into counties. The territory north of the 45th parallel and west of the Willamette River was designated Tualatin County. Finally on September 29, 1850, assuming the surrender of Indian title to their land, Congress passed the Donation Land Law. Under this law, a one-half section or 320 acres (130 hectares) was granted to every male settler over the age of 18, who was a U.S. citizen and who had occupied and cultivated his land for four consecutive years before December 1, 1850. The law was designed to settle land disputes in the Oregon Country.

Early Settlers on the Site

Milton Doane and William W. Baker established Donation Land Claims on land between the present St. Johns and Burlington Northern Railroad Bridges. These recorded documents reveal Milton Doane settled parts of Sections 12, 13, 14, and 24 in Township One, North of Range One near the present day St. Johns Bridge. The deed awarded the land to Elizabeth Doane and the heirs at law of Milton Doane, deceased. A certificate dated 8 March, 1866, and signed by President Andrew Johnson, is recorded in the Deed Records, General Land Office. The Oregon Donation Land Act recognized women's part in pioneering by allowing wives the uncommon privilege of holding real property in their own names.

William W. Baker's 640 acre (260 hectares) Donation Land Claim was also deposited in the General Land Office of the United States at Oregon City, and was signed by President Andrew Johnson.

In 1852, a ferry began operation connecting the eastern and western banks of the Willamette River near the present location of the St. Johns Bridge. (See Appendix, Photo 1).

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History of Railroads on the Site

Ben Holladay, Oregon's first great railroad builder, had at his disposal a large land grant for a railroad line from Portland to Astoria (located at the mouth of the Columbia River), but he lost his fortune in the 1873 economic depression before any work could be done. The plan was picked up, however, by Henry Villard, builder of the Northern Pacific Railroad, who was successful in building a route from Portland to Goble (about one-third of the way to Astoria) in 1883. The line was eventually completed to Astoria in 1898 after formation of the Astoria and Columbia River Railroad in 1895. The double track railroad bridge across Doane Lake and the Willamette River was completed in 1908. The road was transferred to the Spokane, Portland and Seattle Railroad, which was sold and consolidated to become the Burlington Northern Railroad in 1970. Title Company public records began in 1906, showing the property as owned by the Spokane, Portland and Seattle Railroad.

DEVELOPMENT OF AREA - (POST 1900)

Wacker Siltronic Site

With the exception of the railroad building activity, the Wacker site remained essentially undisturbed before 1900. The site was, with the exception of few small buildings on the bank of the river, undeveloped until the Wacker Siltronic construction in 1978.

A portion of the property originally contained part of a small shallow lake called Doane Lake. (See Appendix, Figure 2). The lake was only about five feet (1.5 meters) in depth. The lake appears to have varied in size and shows various configurations on early drawings but seems to have been located on the southwest edge of the property. The lake itself was bisected by the railroad leading to the bridge when that was constructed in 1908.

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The property was swampy, and subject to flooding in the winter. A creek ran through the property which was reported to have contained fish in the early part of the century. Other little streams seemed to have coursed through the property depending on the time of year. The creek came from the hills immediately across N.W. St. Helens Road from the site making up what is now Forest Park and the former rock quarry.

The earliest photos of the site (See Appendix, Photo 3) show the property to be wooded, with the lake split by the railroad berm. The property was partially flooded in the 1948 Vanport Flood, a major flood of the Columbia and Willamette Rivers affecting the Portland area. (See Appendix, Photo 5).

It appears from photos that Portland Gas and Coke (P.G.& C.) may have begun using a low strip along the northwest edge of the property in the late 1940's to dispose of some residual products from their operation. (See Appendix, Photo 6). A description of the P.G.& C. activities is contained in a later section.

P.G.& C. apparently contracted with the conveniently located Jack Eatch Construction Company at the rock quarry to provide fill for the site, make drainage ditches, and perform some clearing operations. Early 1960's photos reveal that logging of the standing timber on the site had begun. By 1969, the logging operation appears to have been completed. (See Appendix, Photos 10, 11, 12, and 13).

Disposal activities appear to have been confined to the P.G.& C. operation based on recollections of various people about the use of the site.

Early photos (1936) show several small buildings on the site directly on the river bank near the railroad bridge. Western Transportation had a river dock with two piers leading to the dock. Five buildings and two fuel storage tanks were located on the river bank. Western Transportation used the facility for refueling tugs, and to tie up log rafts and barges. Land access appears to have been a road which lead from the existing Pennwalt

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property (described later) and under the railroad bridge at a location close to the existing Front Avenue. The dock and piers seem to have been removed in the 1950's (See Appendix, Photo 9) and the buildings were removed by 1973. (See Appendix, Photo 15).

A road parallel to the boundary between the P.G.& C. plant and the present Wacker property boundary on the northwest lead to a Shell Oil Company building and dock which appears in a 1936 photo. P.G.& C. sold a by-product from their gasification process to Shell. Shell shipped the product by river barge from this dock. By 1957, the Shell Oil facility appears to have been abandoned, but the old building remained until about 1973.

The property was purchased by Victor Rosenfeld and H.A. Andersen in 1962. In 1964, an interest in the property was also conveyed to Gilbert Schnitzer.

The purchasers of the property from the railroad agreed to fill the site to a minimum elevation of thirty feet (9 meters) by December 31, 1973, and to construct industrial buildings on the site by December 31, 1978. A topographic map of the 85 acre (34 hectares) site prepared in 1969 shows elevations varying from 47 feet (14 meters) to 12 feet (3.7 meters) on the site. It was estimated that 1,529,400 cubic yards (1,167,480 cu. meters) of fill would be required. Mr. Andersen indicated that the site was filled with material from the rock quarry and dredge material from the Port of Portland. Pits of fourteen to sixteen feet (4.3 to 5.0 meters) deep used by the gas company were also filled. The Port of Portland records indicate that 695,522 cu. yards (530,933 cu. meters) of material dredged from the river was placed on the site in 1974.

The site apparently remained idle until 1978 when the property was purchased by the City of Portland Development Commission as part of an urban renewal project and subsequently sold to Wacker Siltronic Corporation the same year. Construction of their new plant began immediately. (See Appendix, Photos 16 and 17).

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DEVELOPMENT OF ADJACENT PROPERTIES

U.S. Government Moorings

The U.S. Government purchased property to the northwest of the Wacker site in 1903 and 1905 for moorings. Additional property was purchased in 1940. The tract contains an area of eleven acres (4.5 hectares) and is located south of the present day St. Johns Bridge. The various buildings exist on the U.S. Government Moorings property for use by the government for storage and operating facilities for dredges and other floating equipment by the Portland Engineering District. (See Appendix, Photo 14).

Portland Gas and Coke Development

In 1913, Portland Gas and Coke (P.G.& C.) built a gas works of the latest design on property which is located to the northwest of the present day Wacker Siltronic property. (See Appendix, Photo 2). The plant produced Gasco Briquettes, which contributed to the area's solid fuel supply. Gas was manufactured from oil at the site as well as benzol and other by-products, such as naphthalene, tar, and lampblack. The products produced were distributed for commercial and residential use in the City of Portland. The synthetic oil gas was produced by the high temperature reaction of steam with naphtha oil.

A flow diagram describing the gas manufacturing and by-products process is shown in the Appendix, Figure 3. The manufacturing process continued until the 1950's when the petroleum gas production furnaces, faced with rebuilding and the advent of natural gas, were shut down and dismantled. The last full year of gas manufacturing was 1955; natural gas arrived in 1956, and Portland Gas and Coke (P.G.& C.) became Northwest Natural Gas Company in 1958.

Most of the old P.G.& C. facilities were razed in the 1960's, when construction of a liquefied natural gas plant was begun. One portion of the small tank farm was leased to Koppers Company, Inc., Organic Materials

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Division, which is still in use. A few large tanks near the riverbank were reconditioned and leased to Pacific Northern Oil. The remaining tanks and metal structures were sold for scrap. In the early 1970's, all the remaining structures except the old Administration Building were demolished. Underground piping was also removed. The Administration Building still remains and has been placed on the National Register of Historic Places.

Tar bottoms and spent oxide from the oil gas production processes were deposited at several locations on and off the P.G.& C. property during the years of P.G.& C.'s operation. Northwest Natural Gas has indicated in correspondence to the Oregon Department of Environmental Quality that two accumulations of process residue were present at the P.G.& C. site when the plant stopped manufacturing gas in 1955. One accumulation of residue was a pile containing 41,000 cubic yards (31,000 cu. meters) of spent oxide from the gas purification process. This pile was located near the north end of the P.G.& C. property.

The second accumulation of residue was a tar pond of about 30,000 cubic yards (23,000 cu. meters) located on the property upstream of the oxide pile. The pond was at the southeast corner of the P.G.& C. site in an area of low elevation that was particularly prone to flooding. This pond was formed as a result of a long accumulation of tar box and lampblack water overflow from the oil gas operations. Records at the Oregon Department of Environmental Quality indicate that oily residue from the open tar ponds may have leached into the Willamette River on a number of occasions.

A portion of the tar pond was located on property currently owned by Wacker Siltronic. This portion of the pond was located at what is now the junction of the Willamette River and the northwest property boundary of the Wacker property. Aerial photos and Northwest Natural Gas records indicate that this pond was eliminated in the late 1960's. The pond was apparently filled with overburden, and some of the tar material was forced onto the ground near the pond. The material was then consolidated by layering with additional overburden. Photographic records indicate that this

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consolidated material was spread over much of the northern corner of the Wacker site.

During razing and cleanup operations at the P.G.& C. site in the early 1970's, most of the spent oxide pile was hauled to the Scappoose, Oregon, landfill. At approximately the same time, the remaining tar pond, which was located on the P.G.& C. property, was filled with remnants of the spent oxide pile and overburden from the adjacent rock quarry, operated by the Jack Eatch Construction Company. The filled pond was then covered with additional overburden.

In addition to the tar bottoms which were deposited in the tar ponds, there is evidence that other material may have been deposited by P.G.& C. on the Wacker site. Refractory brick, evidentally from the P.G.& C. gas production furnaces, was found at the Wacker site during construction excavation activities. In addition, inspection of aerial photographs of the area suggest that a dark material was deposited at one of the higher elevations of the Wacker property in the late 1950's. (See Appendix, Photo 9).

Although the exact composition of the tar bottoms deposited on site is not known, they are generally assumed to be composed of poly-nuclear aromatic hydrocarbons (PAH's) such as naphthalene, phenolic compounds, and various long chain length organics. Some of these materials are of concern to the government regulatory authorities because of potential toxic characteristics.

Presently, the Northwest Natural Gas facility consists of a liquefied natural gas (LNG) storage and distribution facility.

Pennwalt

To the southeast of the Wacker Siltronic Plant and across the railroad berm is located the Pennwalt Corporation. The first record of the company at this location is in 1949 when it was known as the Pennsylvania Salt Manufacturing Company. The Pennwalt plant produces chlorine, caustic soda,

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sodium and potassium chlorate, hydrochloric acid, and ammonia. The basic raw material used by the plant is salt which is obtained from Baja, California, Mexico.

Although the Pennwalt plant is listed as a hazardous waste generator, the Oregon Department of Environmental Quality indicates that the only hazardous waste generated at the plant in the last five years was two drums of methylene chloride. Five surface impoundments exist on the plant site, close to the northwest boundary of the plant property. The impoundments are about 1,000 feet (300 meters) from the Wacker Siltronic plant site. Two impoundments are used for chlor-alkali production and have a pH of less than twelve. The impoundments are known to contain asbestos from old electrolytic cell casings. Two impoundments are used for waste from the sodium orthosilicate process. The pH in these impoundments is 10.9. One impoundment is used for brine sludge. The impoundment may contain heavy metals such as zinc, lead and chrome. The result of Environmental Protection Administration toxicity tests have shown the material to be non-hazardous.

All surface impoundments on the Pennwalt site are unlined and have no surface outlets. No groundwater monitoring is performed at the site.

Rhone-Poulenc/Chipman Chemical

Rhone-Poulenc is located southeast of the Wacker property, at the junction of N.W. St. Helens Road and the Burlington Northern Railroad line. The Rhone-Poulenc and Wacker sites are separated by the railroad tracks. The Rhone-Poulenc production facility is about 1,700 feet (520 meters) from the Wacker property boundary. The plant was known as Chipman Chemical/ Rhodia Agriculture Division until 1978 when it was named after its parent company, Rhone-Poulenc.

The Chipman Chemical plant began operation in 1948 as a liquid formulation plant and insecticide distribution warehouse. In 1956, a technical 2,4-D herbicide production plant began operation at Chipman and operated until 1982. Between 1956 and 1982, various other herbicides and

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insecticides have been produced at the site, including 2,4,5-T 2,4-DB, Silvex, MCPA, and MCPB. Presently, the only chemical manufactured at the plant is bromoxynil octanoate.

Prior to the mid-1960's, effluent from the Chipman Chemical plant was pumped to nearby Doane Lake. In 1964, a plant visitor's guidebook indicates that the plant suffered its first major water pollution incident. Water from the Chipman side of Doane Lake apparently passed through the railroad berm separating the lake. Vegetation in the north portion of the lake died over a short period of time. Water from the north lake passed into the Willamette River via a stream which ran along the edge of the old P.G.& C. property. Fisherman complained that salmon swimming near the plant site were tainted.

Since 1964, the plant has undertaken numerous measures to reduce the level of chemicals leaving the plant, including the shutdown of many of the production processes and addition of several treatment processes. Major cleanup activities at Doane Lake took place in 1966 and 1980.

The plant has conducted numerous investigations of the extent of pesticide contamination around the site. No chlorophenolic contamination was found in sediment and lake samples taken from Doane Lake north of the railroad mainline during 1980 investigations.

Rhone-Poulenc is conducting on-going groundwater investigations for pesticide contamination. Relatively high levels of chlorophenolic compounds have been detected in an area near the old 2,4-D production building. Lower levels of the compounds have been detected in other areas around the plant. Recently, low levels of chlorophenol compounds were detected in groundwater obtained at the Air Products industrial site east of Rhone-Poulenc. Rhone-Poulenc is considering the installation of several groundwater withdrawal wells for treatment of groundwater.

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ESCO Landfill

ESCO Corporation is a steel manufacturer located in Northwest Portland, which apparently used a location just southeast of the railroad berm for disposal of materials from their manufacturing process. The northwest boundary of the disposal landfill is contiguous to the railroad mainline which runs along Wacker's southeast property boundary. Material disposed of in the landfill included refractory, baghouse casting fines, spent mold material, and furnace slag from ESCO's steel casting operation. Most of the landfill has been filled over, except for an area near the Burlington Northern Railroad mainline. ESCO and the railroad are currently in dispute over the filling of this remaining part of the landfill.

Koppers Company, Inc.

In addition to leasing of chemical storage tanks on the Northwest Natural Gas site, Koppers operates a small chemical processing facility on the property. The plant receives coal tar by rail car and makes customized creosote and coal tar blends for wood treaters. Until the mid 1970's, the plant disposed of waste coal tar distillates in a disposal area close to the Wacker property boundary and N.W. Front Avenue. The area, which is approximately 40 feet x 70 feet (12 meters x 21 meters), is now surrounded by five (5) groundwater monitoring wells. Laboratory analysis of groundwater obtained from the wells in 1982 indicated phenol concentrations ranging from 0.12 to 24 mg./l (ppm).

Gould Battery

The Gould Battery site is located on N.W. Front Avenue approximately 1,400 feet (430 meters) from the Wacker property boundary to the southeast. The site was occupied for many years by a battery recycler, a subsidiary of National Lead Company. The site was acquired by Gould in 1979 and has subsequently been renamed GNB Battery. The battery facility is no longer active; refining was terminated in 1980. A large pile of more than 10,000 tons of battery casings was present on the site in the early 1980's. Gould

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Battery is currently undertaking measures to remove the old casings. The battery recycling facility also handled large quantities of lead wastes, disposing of them in ways that have not been determined. In 1973, the facility was cited for discharging wastewater to Doane Lake.

Hazardous substances of concern at the Gould Battery site include lead oxide dust in the air and lead contamination of surface and groundwater. Contamination of a shallow aquifer in the vicinity of Gould with lead has occurred at the level of 0.5 ppm. No contamination has been detected in the deeper aquifer in the vicinity of the Gould site. The lead in the shallow aquifer is thought to be bound to the clay in the aquifer and may be present for a considerable period of time.

RECENT WACKER SITE INVESTIGATIONS AND ACTIVITIES

Soil Borings

Three sets of soil borings have been conducted at the Wacker Siltronic site in preparation for various stages of construction activity. Soil borings made in 1977 and 1978 were primarily concentrated in the area of the present Wacker facilities near the Willamette River. These borings were located in the areas planned for the first phase of site development.

The third set of soil borings was made in 1982. These borings were made in anticipation of the planned construction of the polysilicon production facility. The southwestern part of the Wacker property is being contemplated for location of this facility.

Comments on a majority of the boring logs note the presence of subsurface oil or black organic material at depths ranging from ten to fifty feet (3 meters to 15 meters). A boring roughly corresponding to the location of tar ponds from the old Portland Gas and Coke Company showed oil saturation in a zone from twenty to fifty feet (6 to 15 meters) in depth. Most of the other borings show thinner zones of oil saturation or presence.

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Logs for the 1982 soil borings taken at the southwestern part of the site indicate strong hydrocarbon odors or oil at all but two borings. The northernmost borings indicate oil at depths as high as five feet (1.5 m.).

Clarifier Excavation/Oil Pipeline

Excavation for the construction of the water treatment portion of the present Wacker facility was started in March, 1979. During the excavation, large quantities of oil and water infiltrated the hole which was prepared for the future clarifier.

Investigative activities were initiated to discover and stop the source of the oil, which was interfering with the construction activity. A portion of the Olympic oil pipeline, which passes through an area immediately adjacent to the clarifier, was exposed during investigative digging. The exposed pipeline had numerous perforations and appeared to be the source of the fresh oil which was infiltrating the excavated hole for the clarifier. The holes in the pipe were patched and the treatment plant construction work proceeded as planned. The portion of the pipeline in the immediate vicinity of the clarifier was exposed and repaired.

The foregoing is a summary of the historical information assembled for this report relating to the Wacker Siltronic plant and the immediate surrounding area. An appendix follows containing figures, a chronology and photos showing changes on the property through the years.

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APPENDIX

1. Figure Showing Wacker Siltronic Plant and Surrounding Vicinity (1983).
2. Figure Showing History of Waste Management Areas Surrounding Wacker Siltronic Plant.
3. Portland Gas and Coke Company Gas Manufacturing and By-Products Flow Diagram.
4. Chronology of Activities - 1850 to 1984.
5. Photographic History of Wacker Site and Surrounding Vicinity.

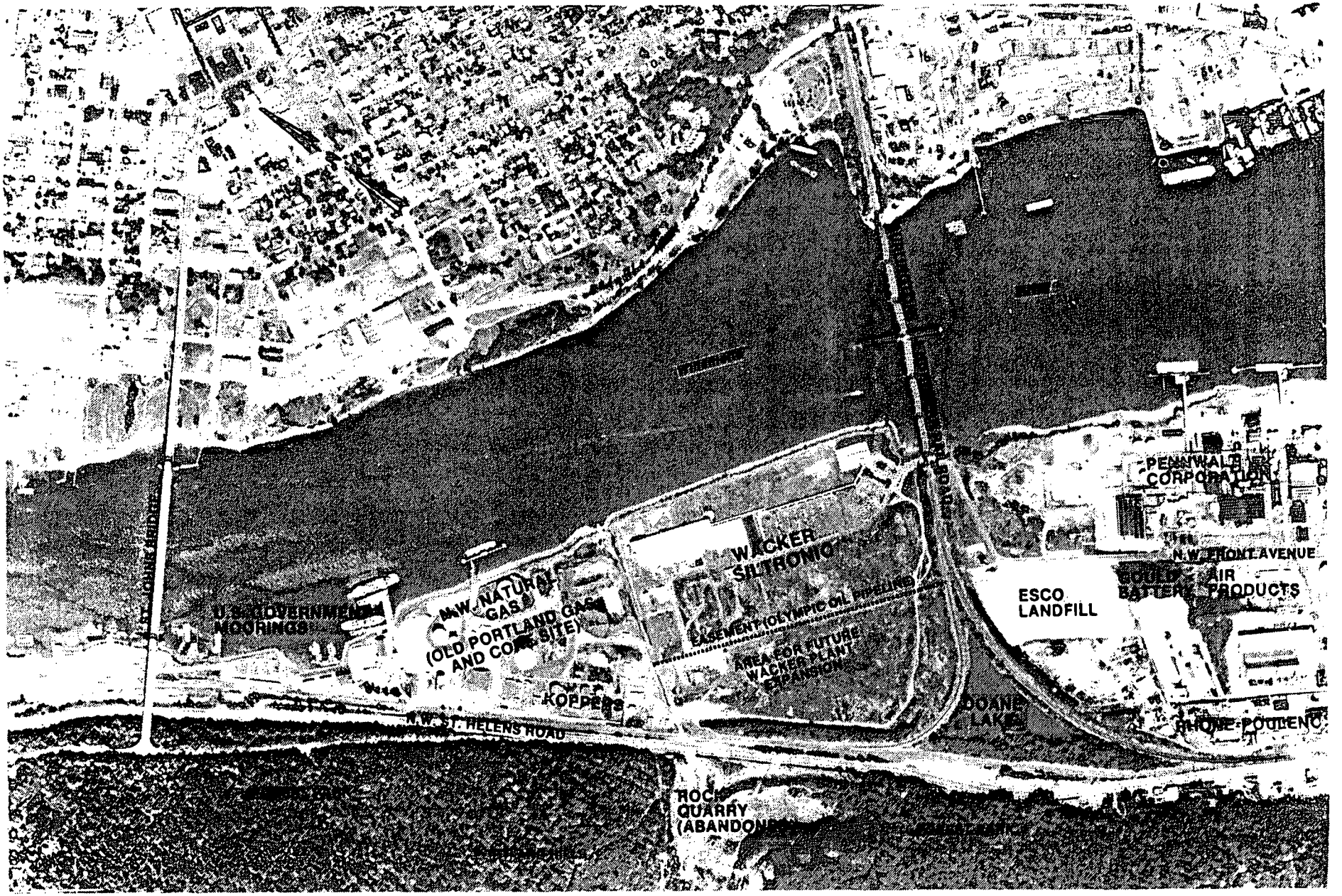


Figure 1 WACKER SILTRONIC PLANT AND SURROUNDING VICINITY (1983)

SCALE: 1" = 940 FEET (1 cm : 110 m)

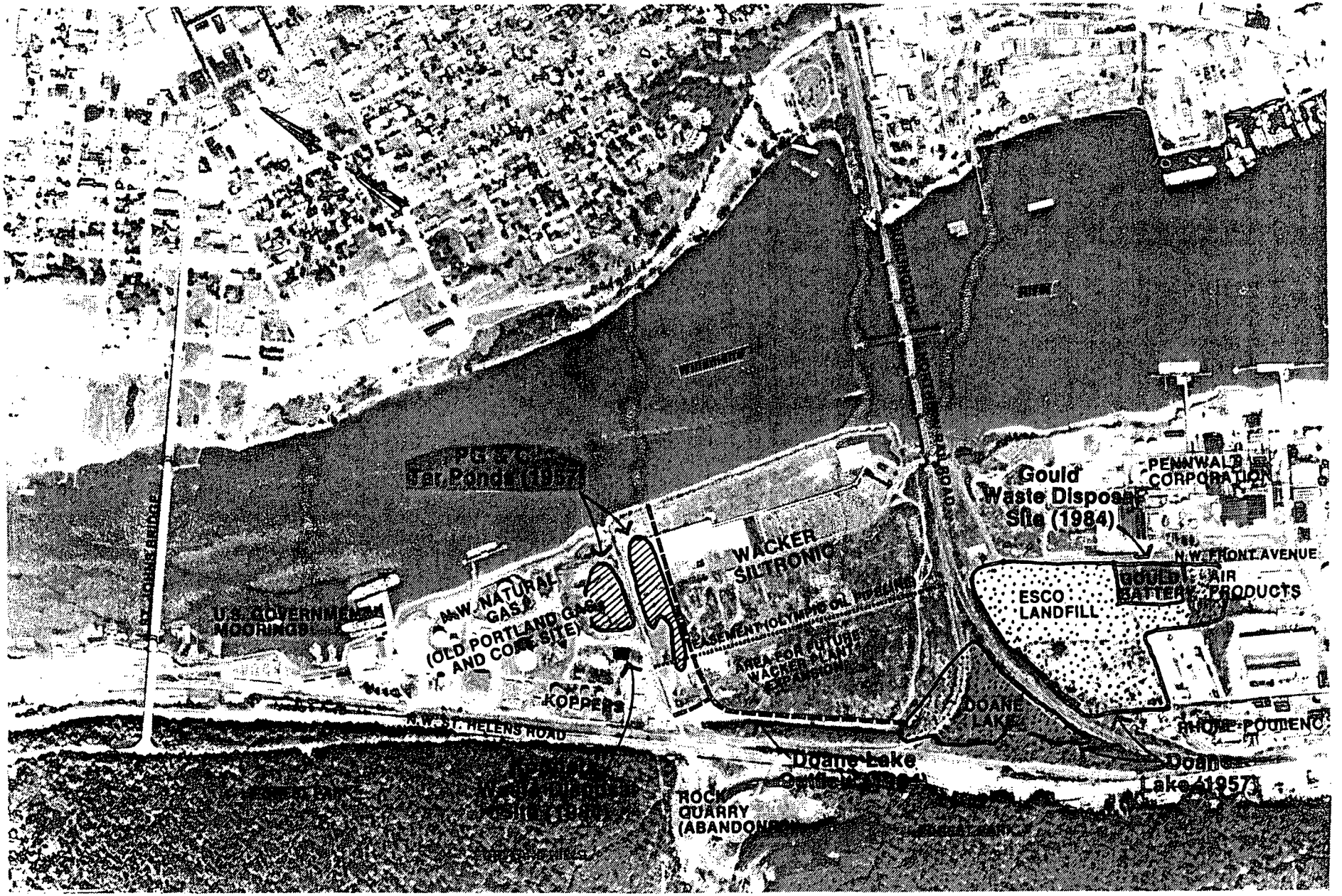
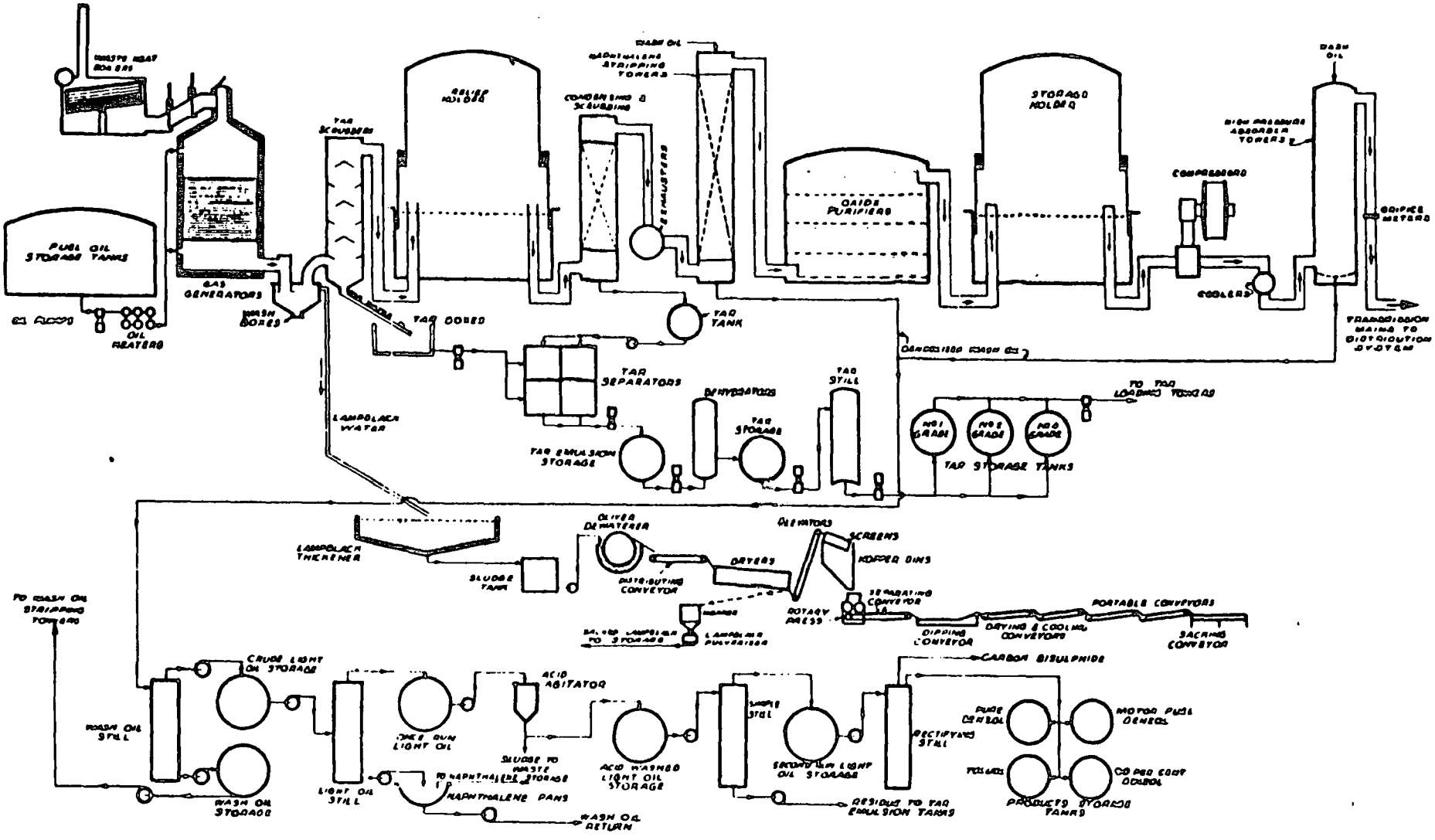


Figure 2 WACKER SILTRONIC PLANT
HISTORIC WASTE MANAGEMENT AREAS

SCALE: 1" = 940 FEET (1 cm : 110 m)



PORTLAND GAS & COKE COMPANY

GAS MANUFACTURING & BY PRODUCTS FLOW DIAGRAM

Figure 3

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CHRONOLOGY OF ACTIVITY INCLUDING DESCRIPTION OF PHOTOS: NORTHWEST ST. HELENS ROAD BETWEEN THE BURLINGTON NORTHERN RAILROAD BRIDGE AND ST. JOHNS BRIDGE

1850	Act to create Office of Surveyor General of Public Lands in Oregon to provide for survey and donation of land to settlers.
1852 (Photo 1)	St. Johns ferry begins operation connecting the eastern and western banks of the Willamette River.
1866	Claim was officially recorded awarding the land to Elizabeth Doane and the heirs at law of Milton Doane, deceased.
1898	Astoria & Columbia River Railroad completed linking Portland and Astoria.
1903-1905	U.S. Government Moorings purchases approximately 6 acres (2.5 hectares) land near present location of St. Johns Bridge.
1908	Double track railroad bridge across Doane Lake and the Willamette River completed.
1913 (Photo 2)	Portland Gas and Coke begins operation. (Notice U.S. Moorings north of P.G.& C. and vacant land to the south).
1915	Area annexed to City of Portland.
1931	St. Johns Bridge completed.
1936 (Photo 3)	First available photograph showing two bridges, U.S. Moorings, Portland Gas & Coke, vacant wooded property, and Doane Lake split by railroad (Note the docks off vacant property in river).
1940 (Photo 4)	Some filling has been done by Portland Gas & Coke adjacent to the south of their facility.
1940	U.S. Government Moorings purchases additional 5 acres (2 hectares).
1948 (Photo 5)	Area is flooded by Vanport Flood; notice flooding of U.S. Moorings, Portland Gas & Coke and the undeveloped property. Pennwalt has begun operation.

1949	(Photo 6)	Photo looking northwest at Portland Gas & Coke with undeveloped site in foreground.
1952	(Photo 7)	Photo looking south at Portland Gas & Coke; standing water on eastern edge of P.G.& C.; Doane Lake visible adjacent to railway tracks; rock quarry in middle of photo on west side of St. Helens Road.
	(Photo 8)	Photo looking north to St. Johns Bridge; notice berm for water flow in foreground forming boundary of pond.
1955		Last full year of gas production at Portland Gas & Coke facility.
1957	(Photo 9)	Holding pond of P.G.& C. is visible in center of photograph with little water in it; dirt roadway visible through undeveloped property.
1961	(Photo 10) (Photo 11)	Logging of portion of undeveloped property has occurred.
1964	(Photo 12)	Rosenfeld and Anderson purchased portion of undeveloped property from railroad and Northwest Natural Gas Company in 1962, and a portion was transferred to Schnitzer in 1964.
1967	(Photo 13)	Aerial; undeveloped site has been completely logged; filling appears to have begun.
1969	(Photo 14)	Portions of Portland Gas & Coke facility have been removed; undeveloped site is logged.
1973	(Photo 15)	Fill and grading done on undeveloped site; portion of Doane Lake on northern side of railroad filled; shore line along undeveloped property straightened; Portland Gas & Coke facility completely removed.
1974		Undeveloped site filled with 695,522 yards (530,933 cu. meters) of dredge material by Port of Portland.
1977	(Photo 16)	Undeveloped site filled and graded.
1978		Undeveloped site purchased by City of Portland.
1978	(Photo 17)	Site development and construction of Wacker plant started.
1980		Wacker plant begins operation.

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1984 (Photo 18) Color photo looking southeast from St. Johns Bridge.

(Photo 19) Color photo of view of Wacker Siltronic Plant.

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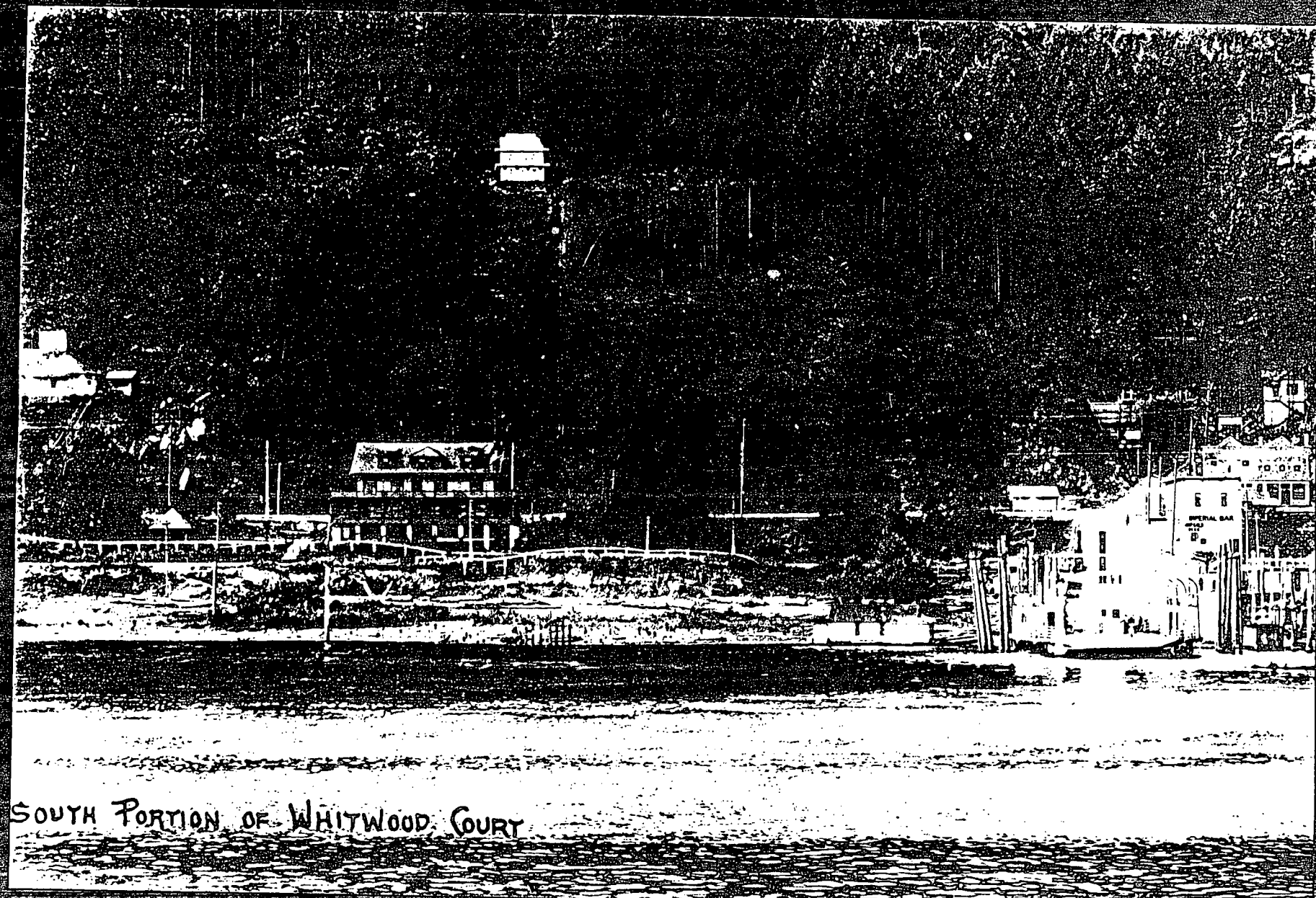

SOUTH PORTION OF WHITWOOD COURT

1. 1920'S

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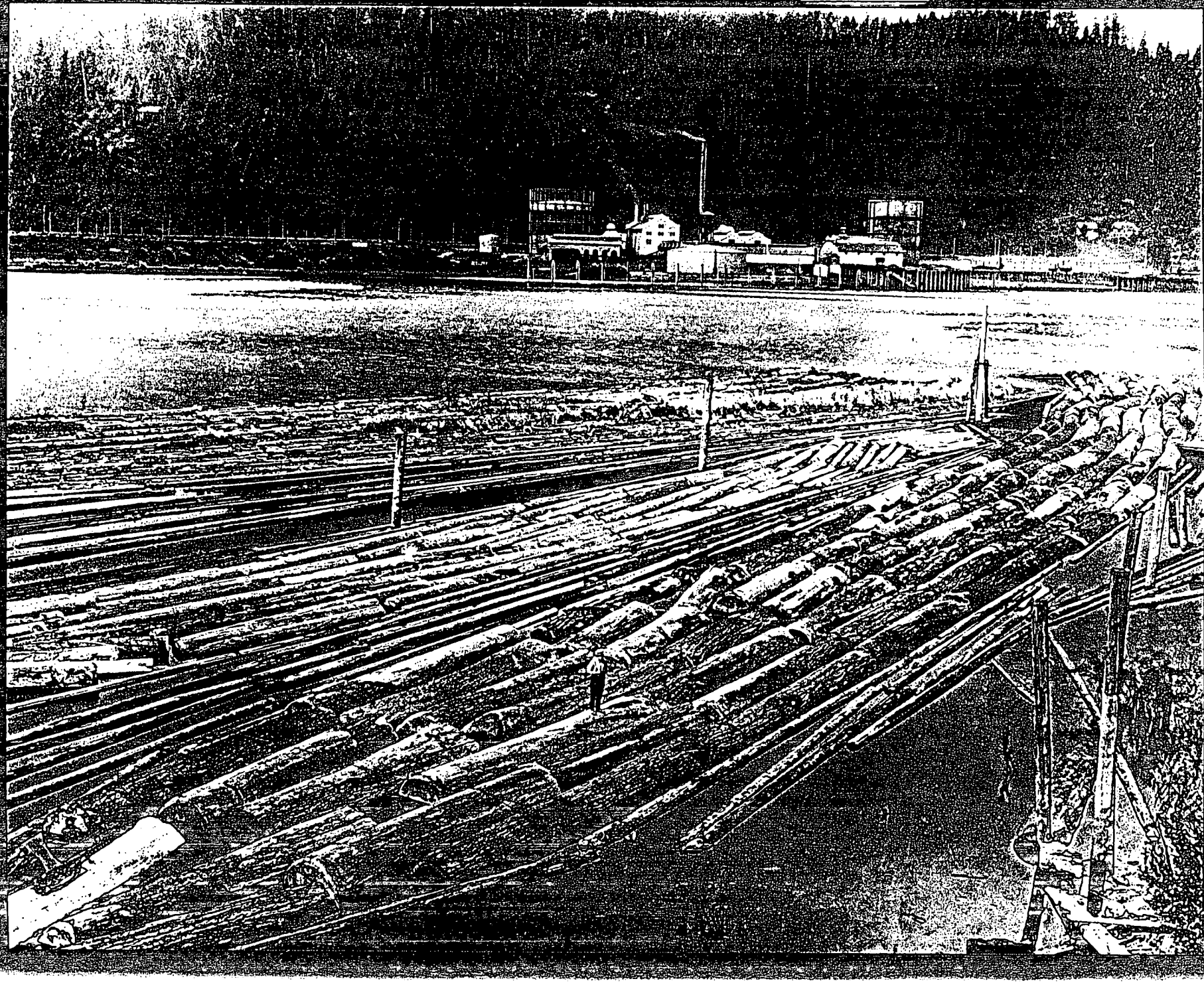
2. 1913



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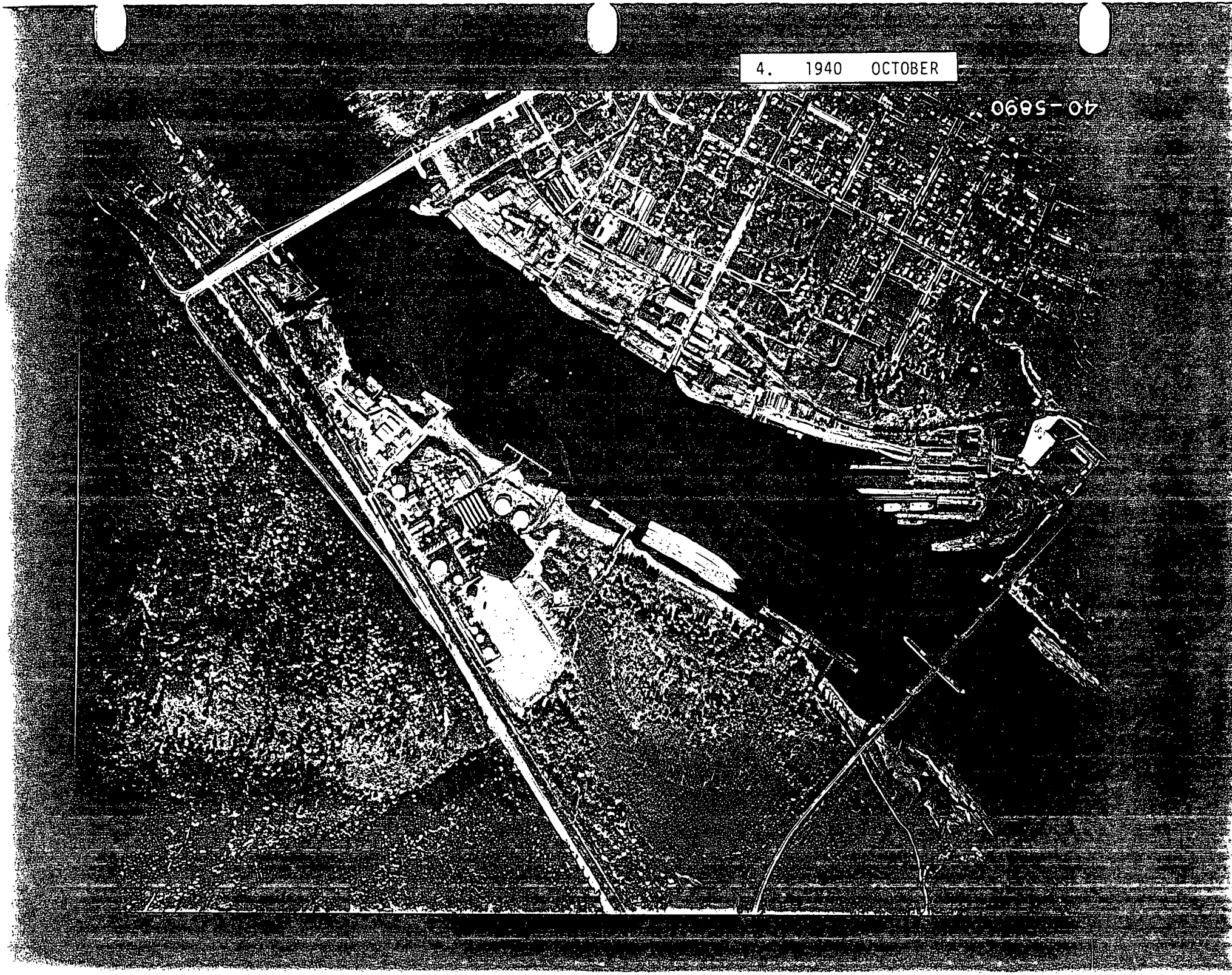

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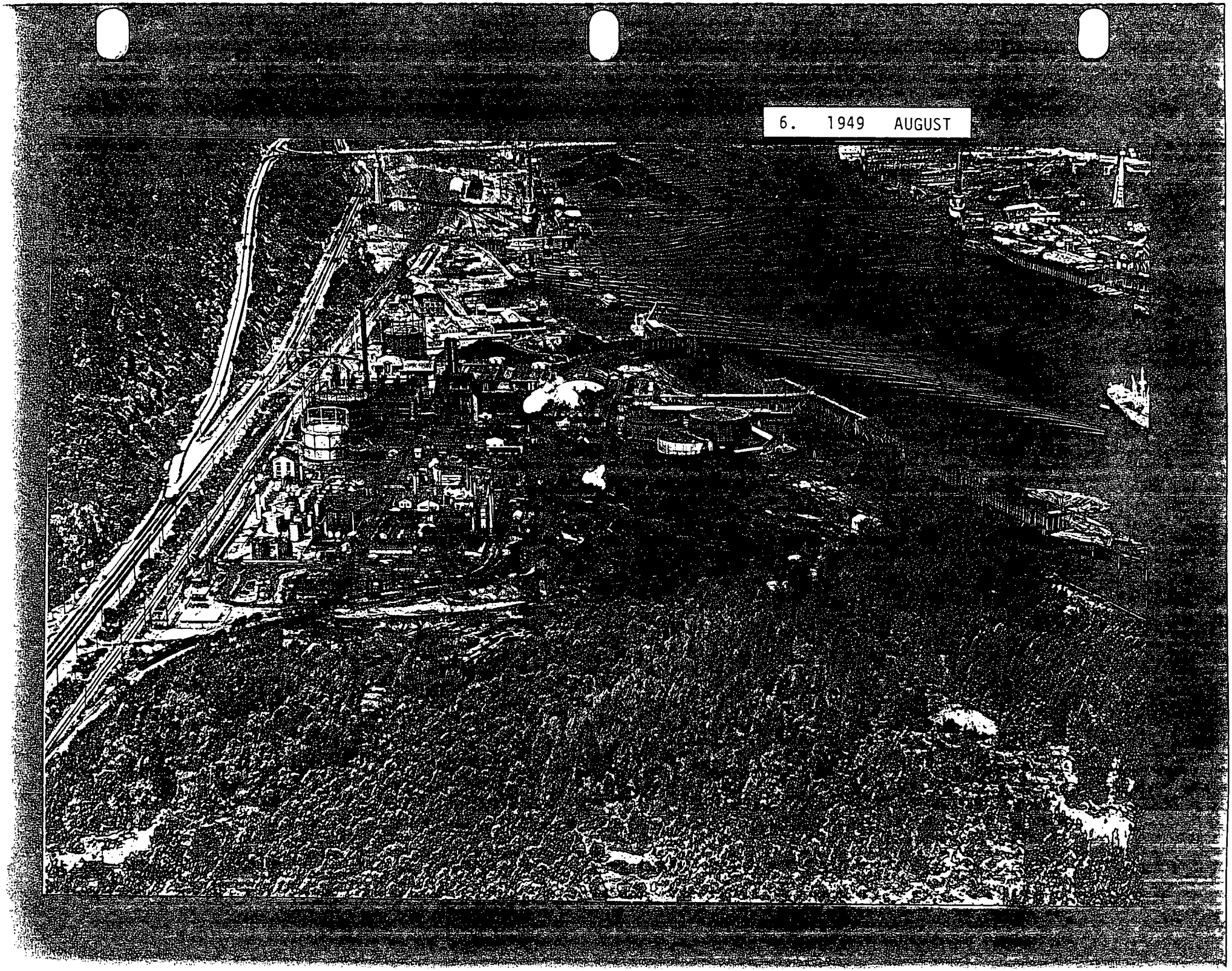

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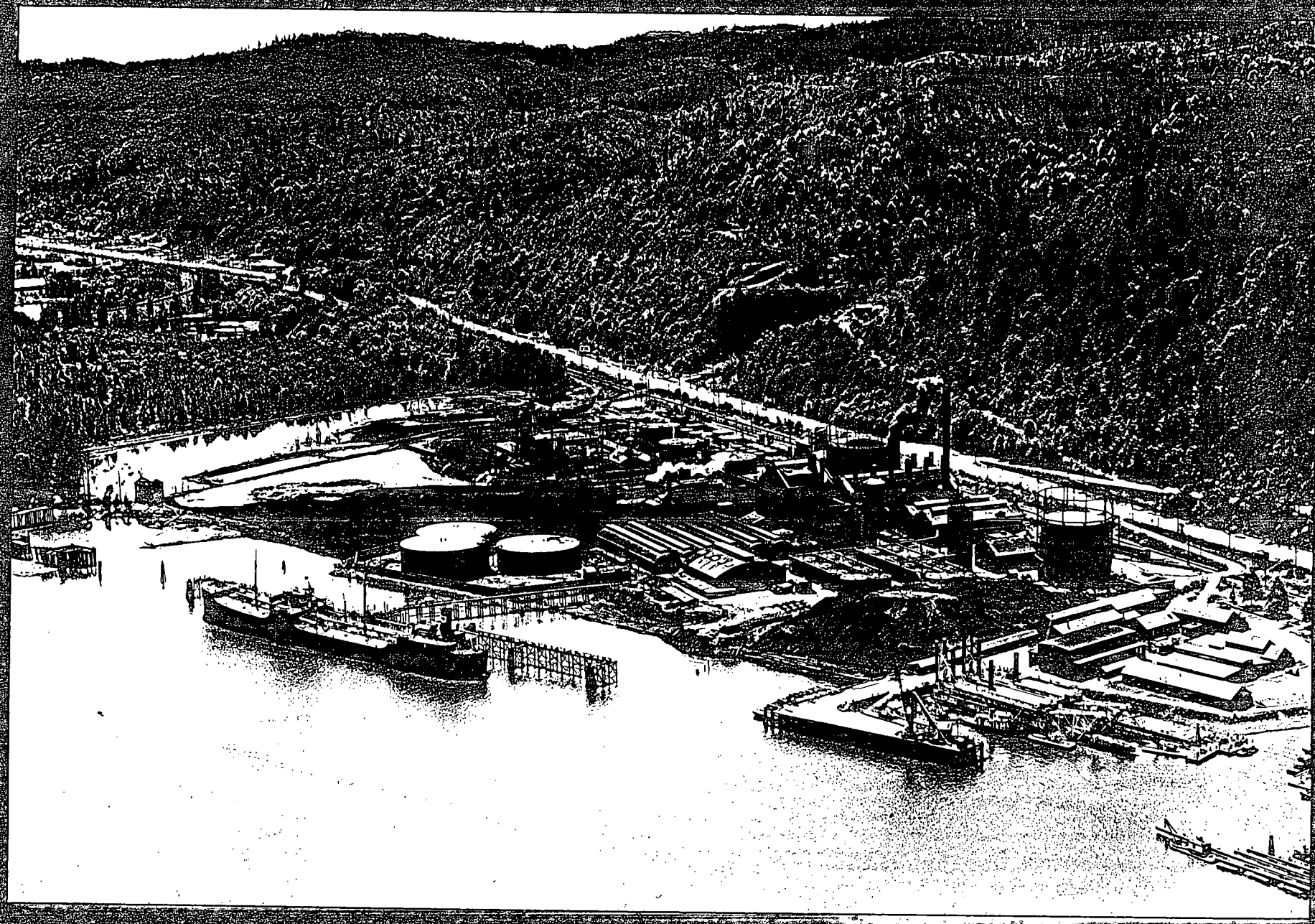
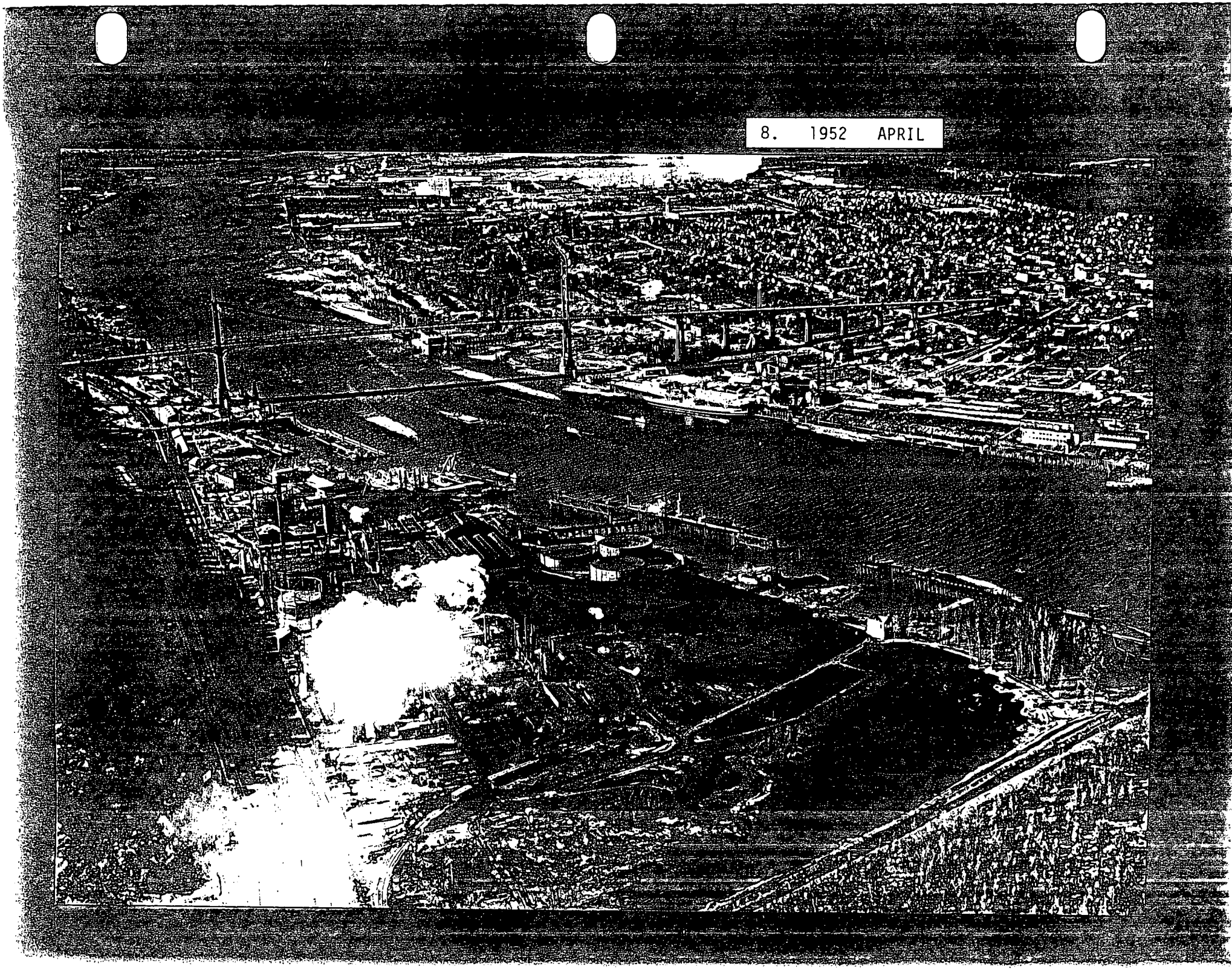


7. 1952 JULY



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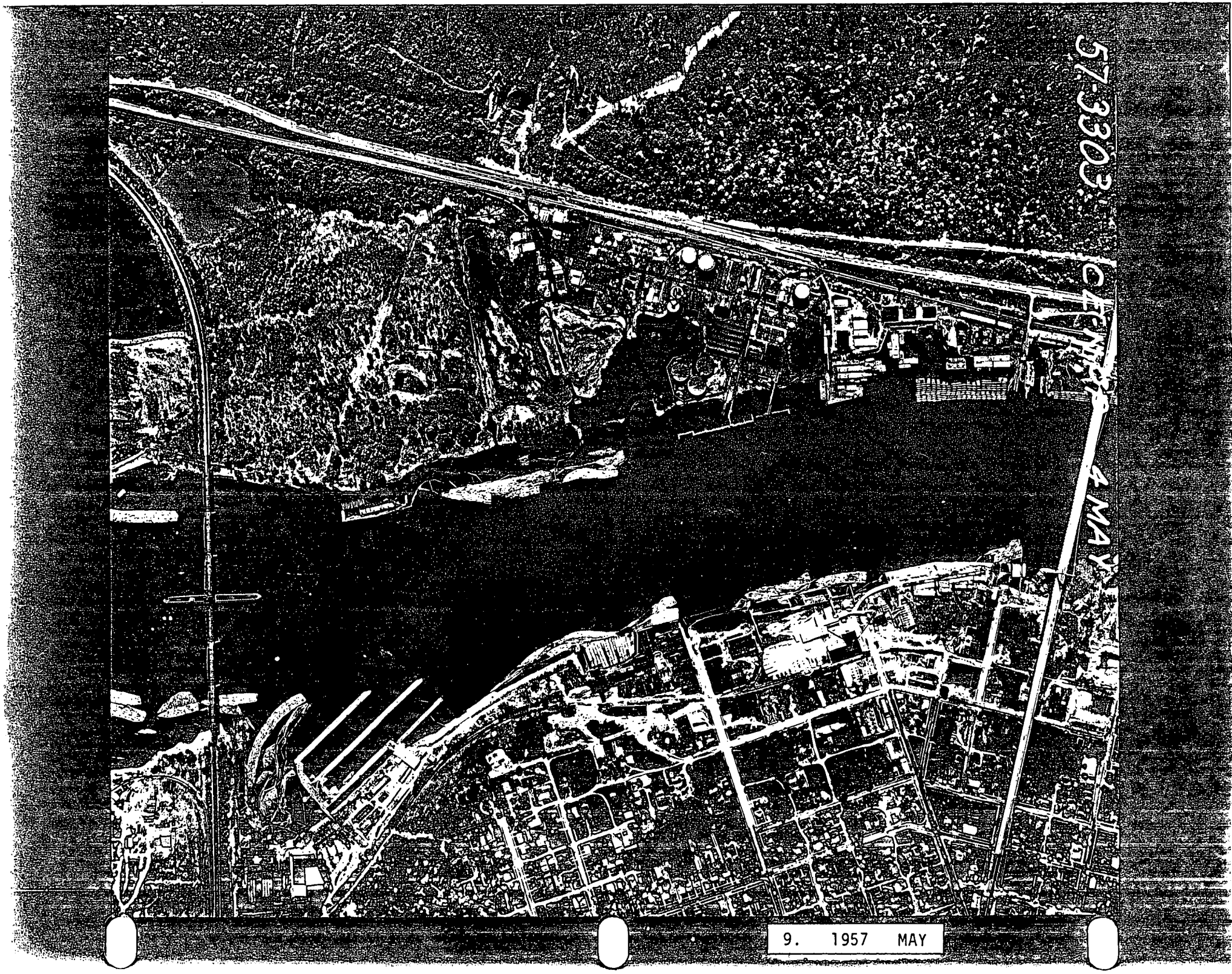

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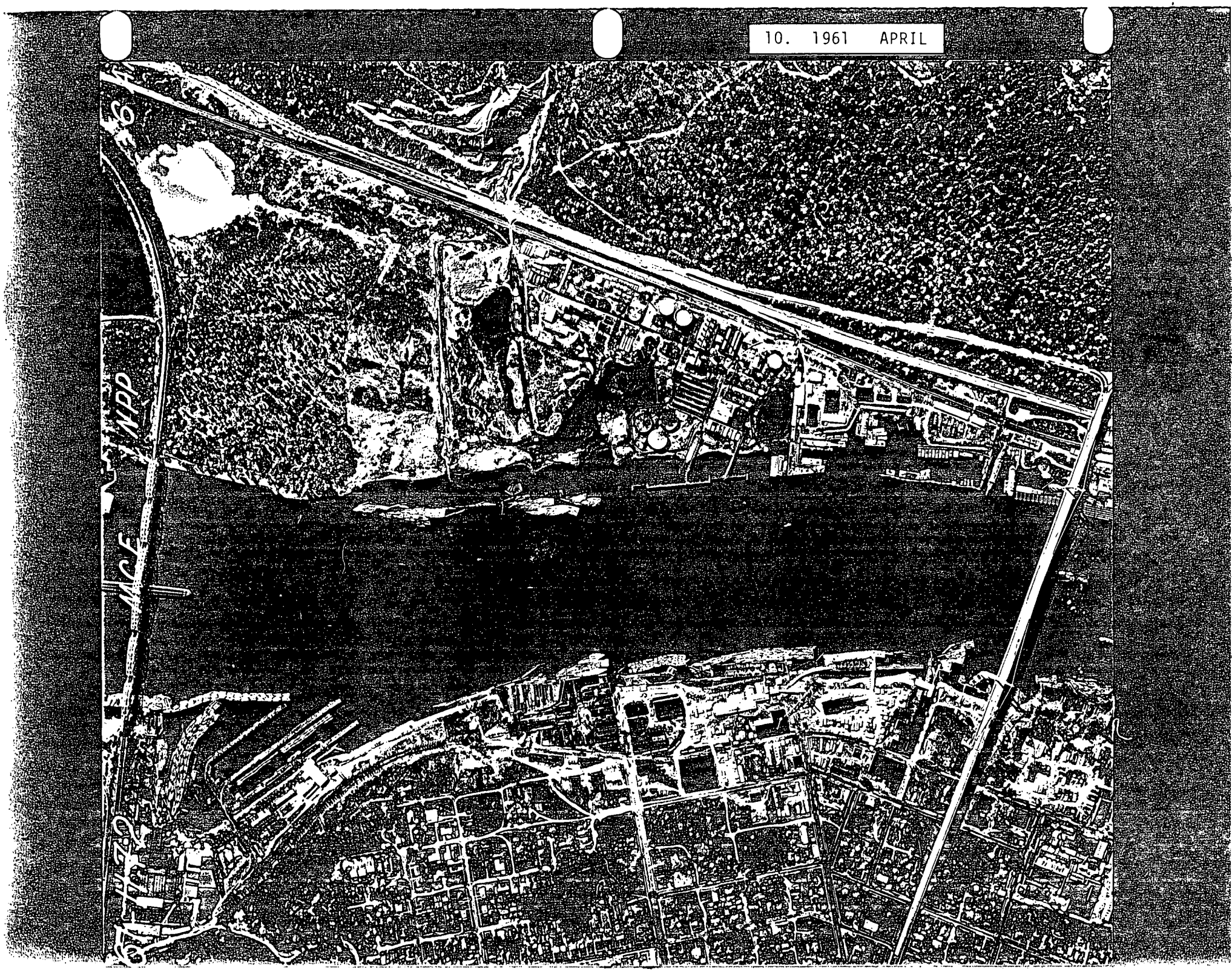

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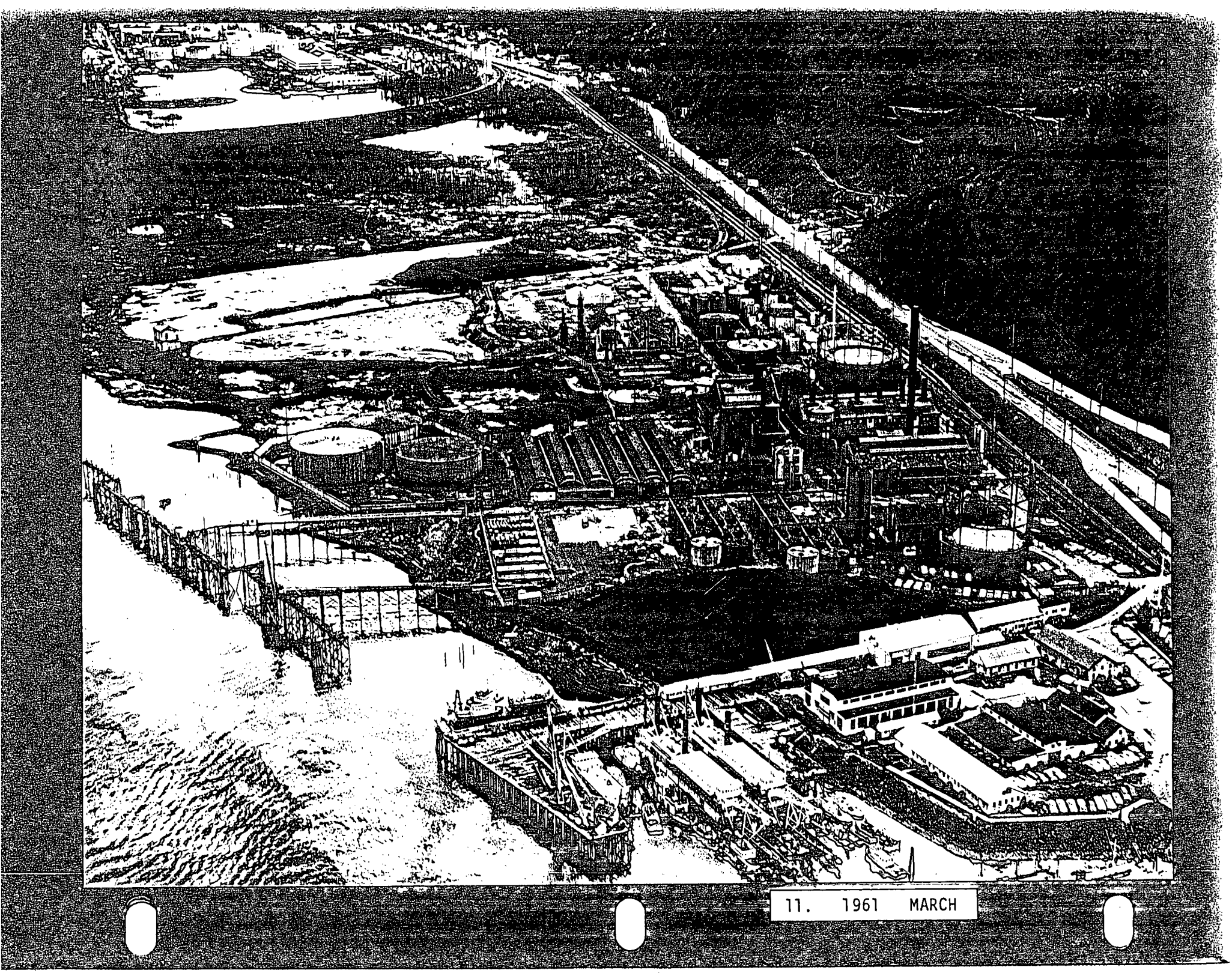

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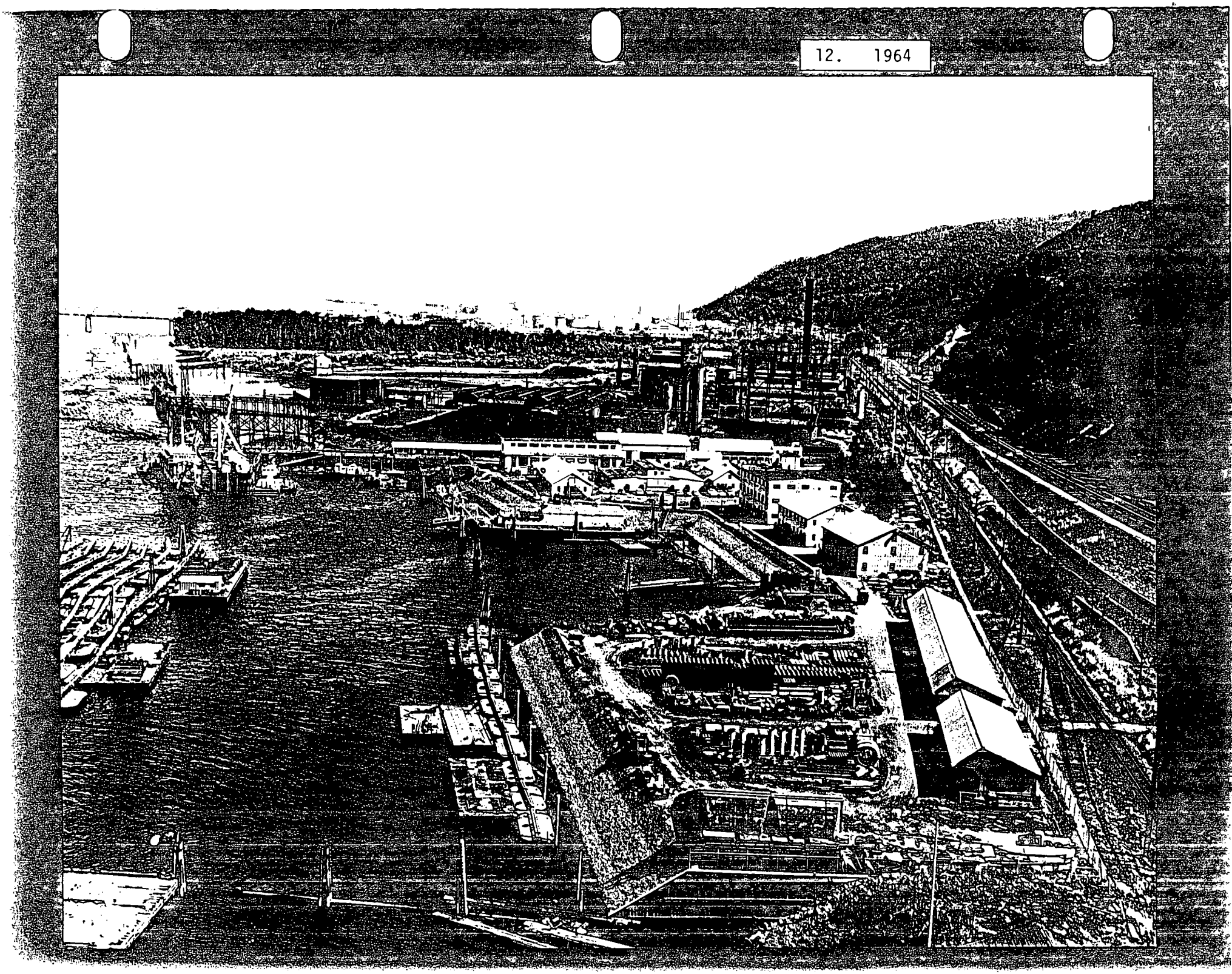
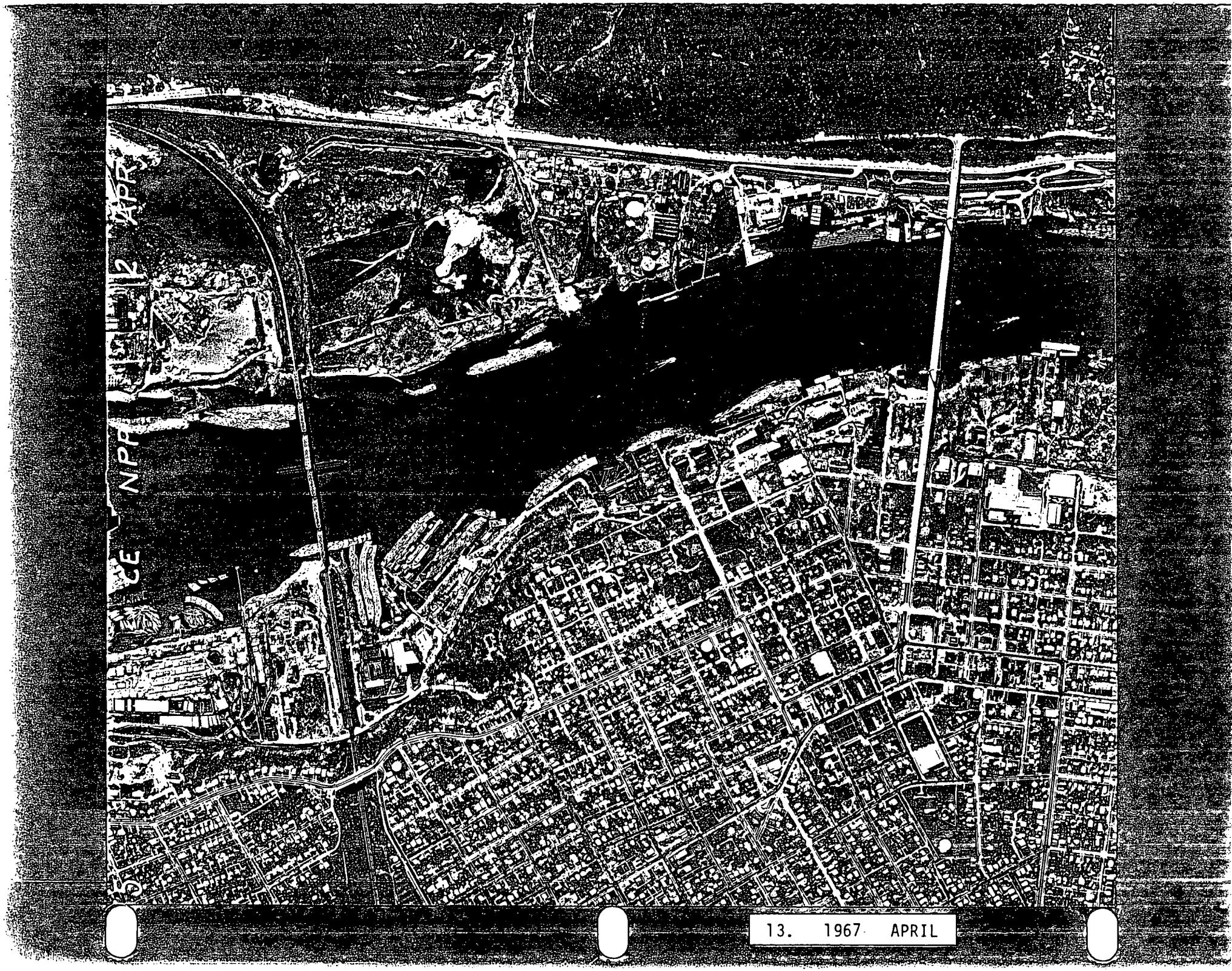

12. 1964



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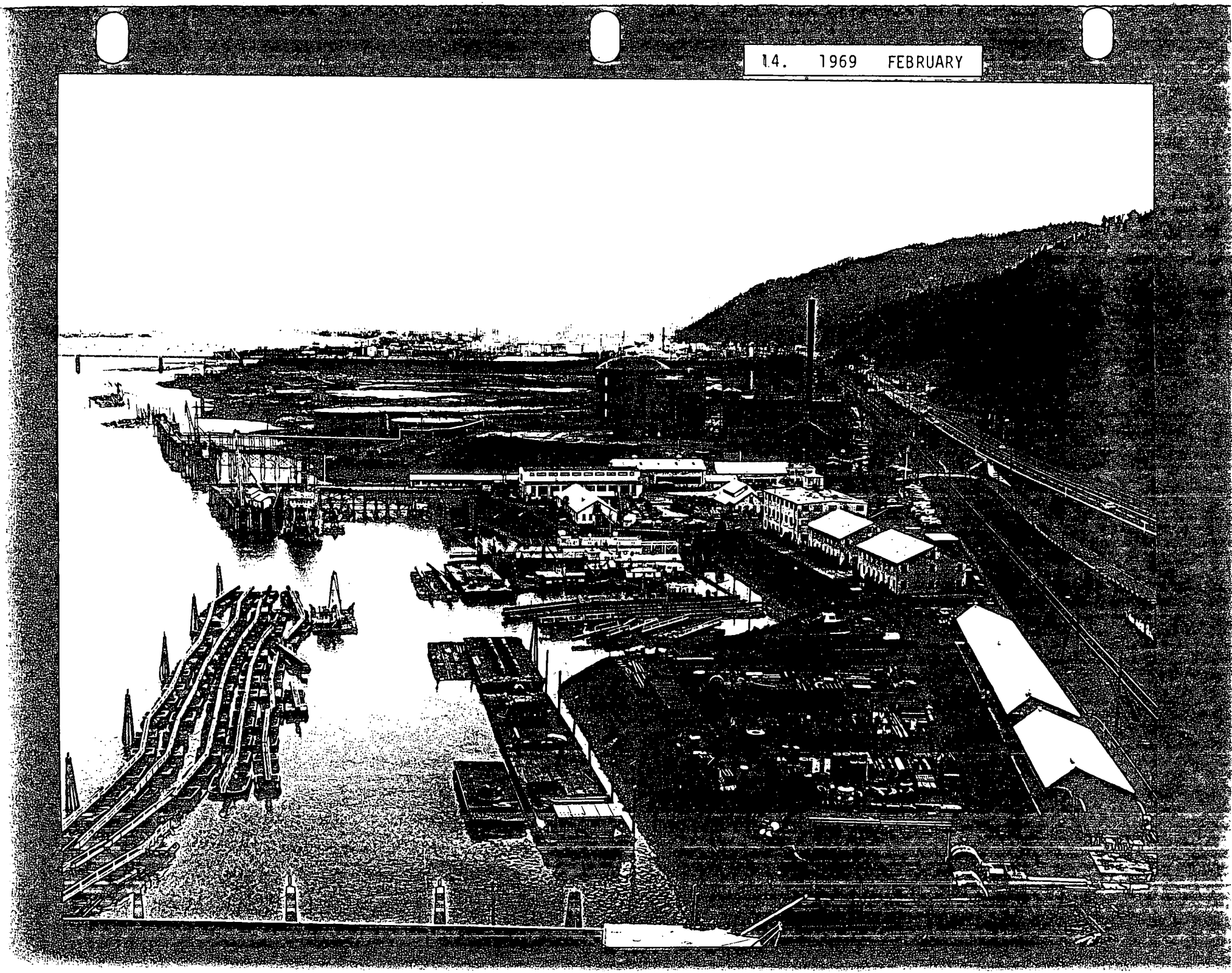
14. 1969 FEBRUARY



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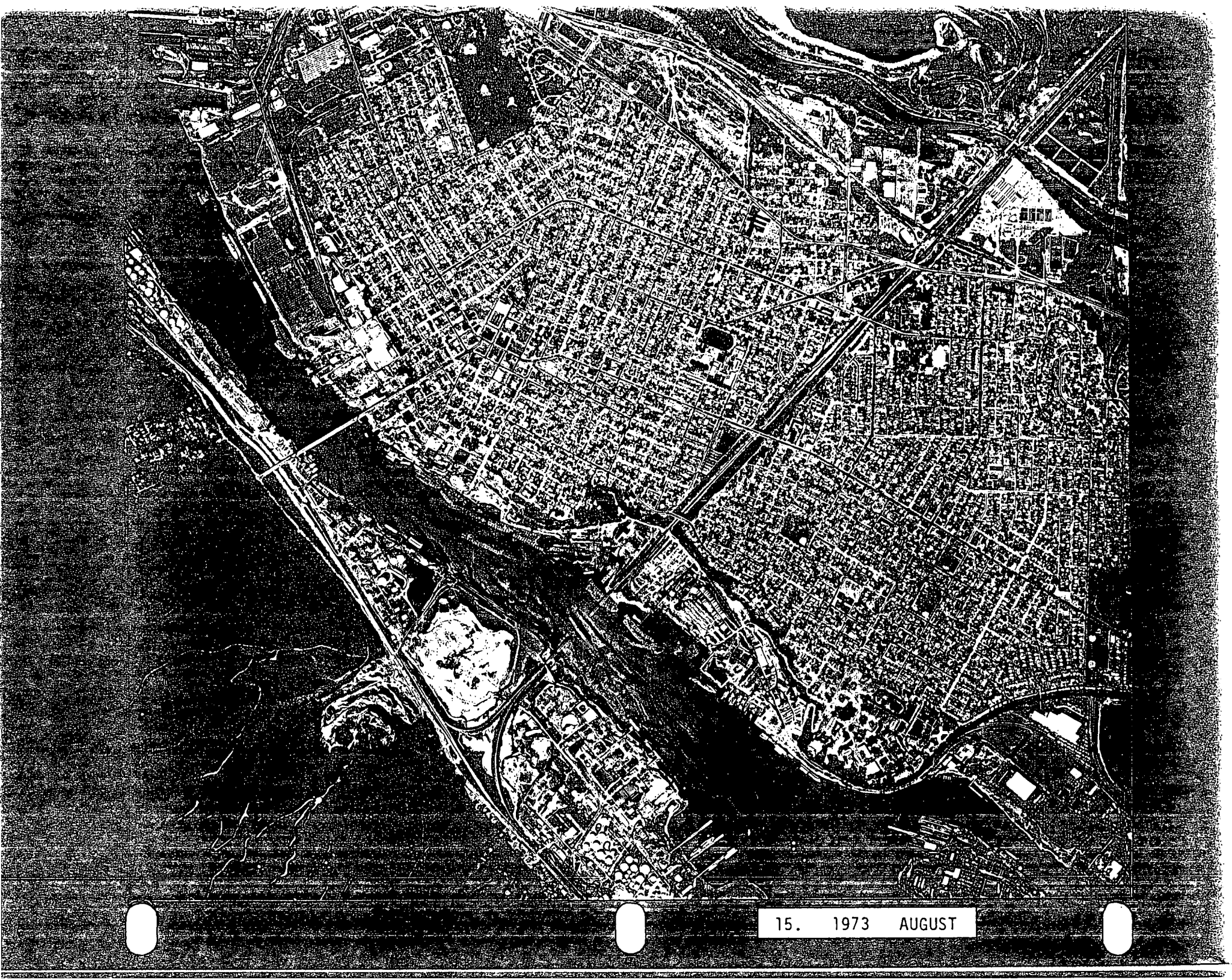

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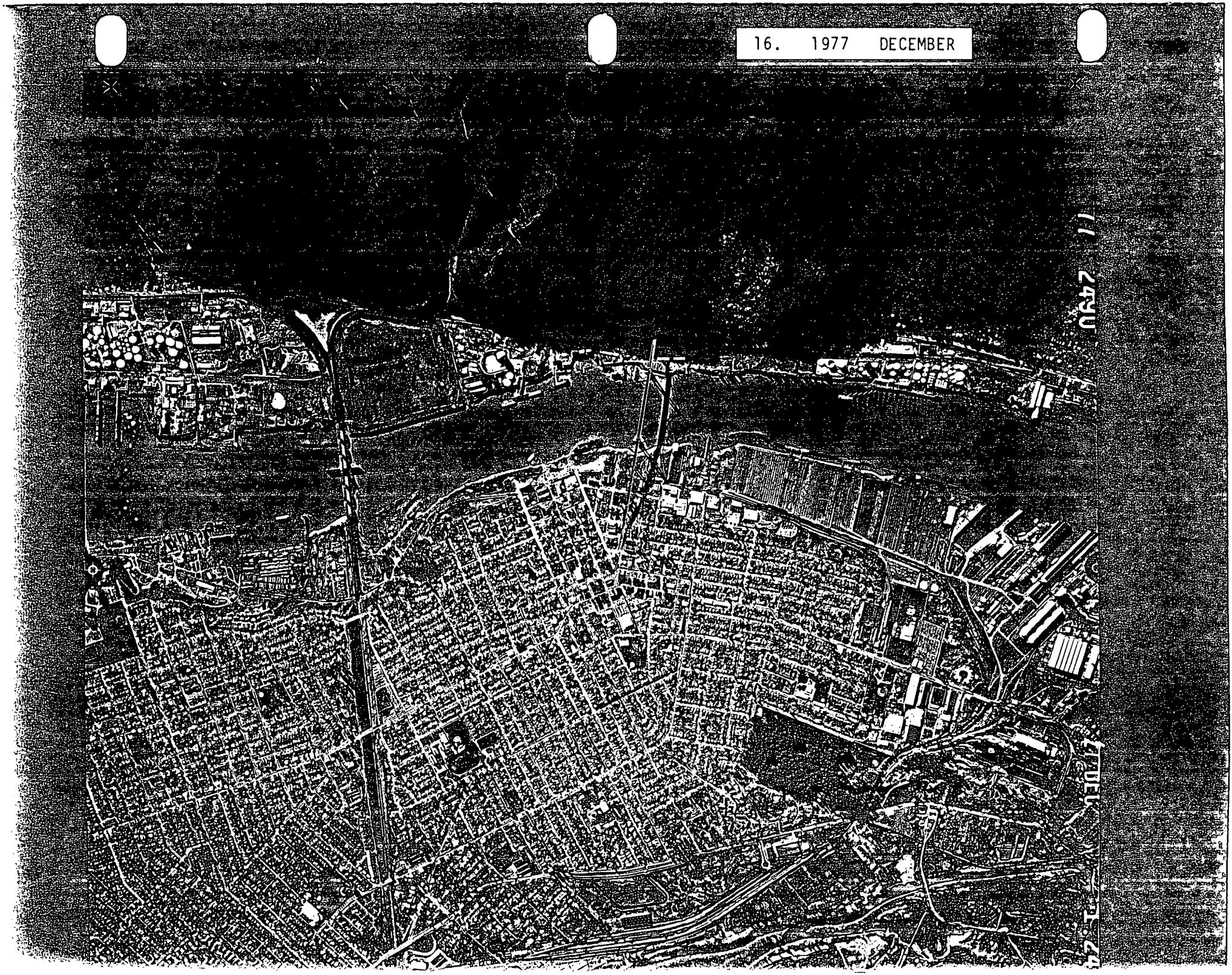

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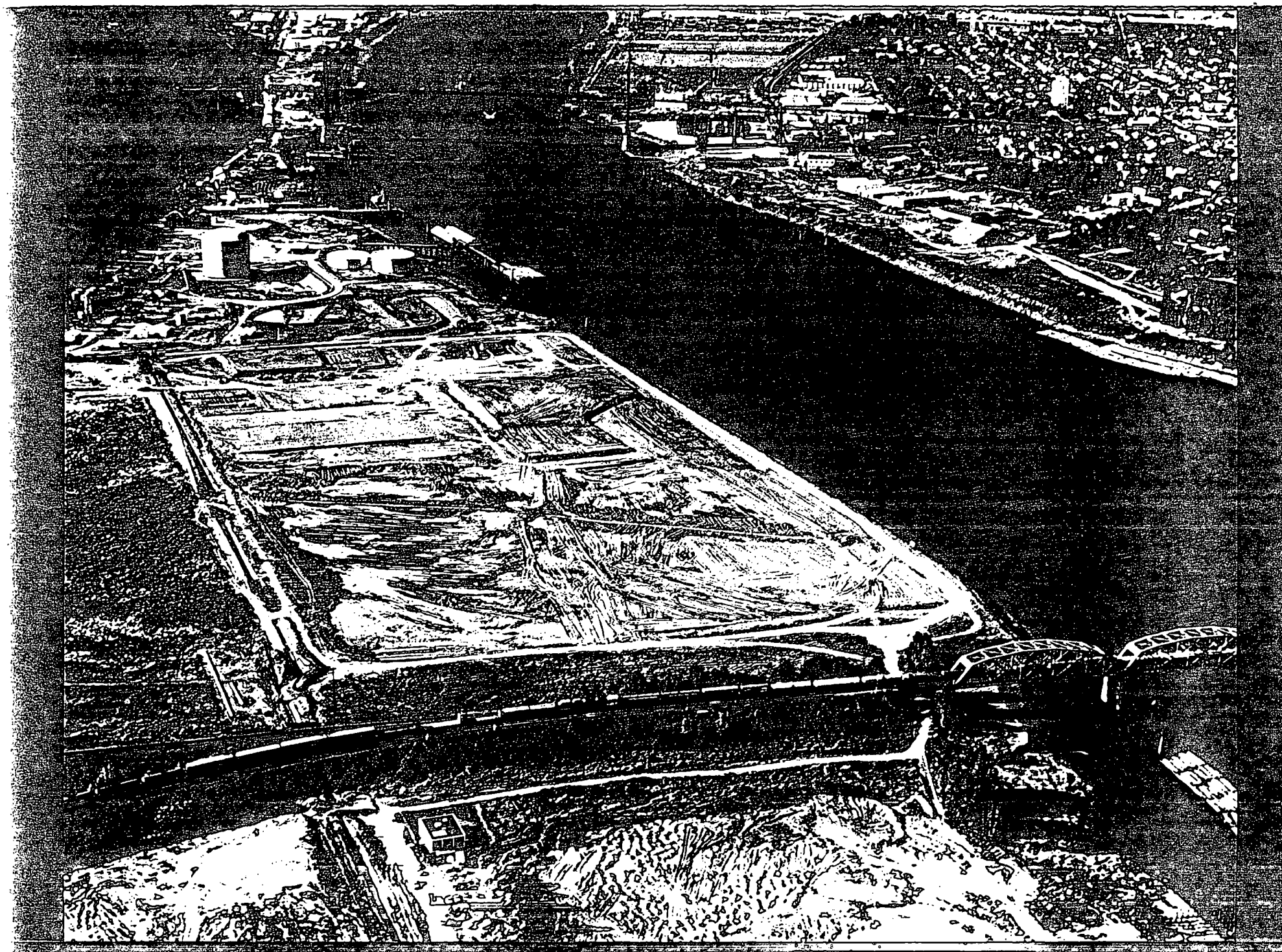

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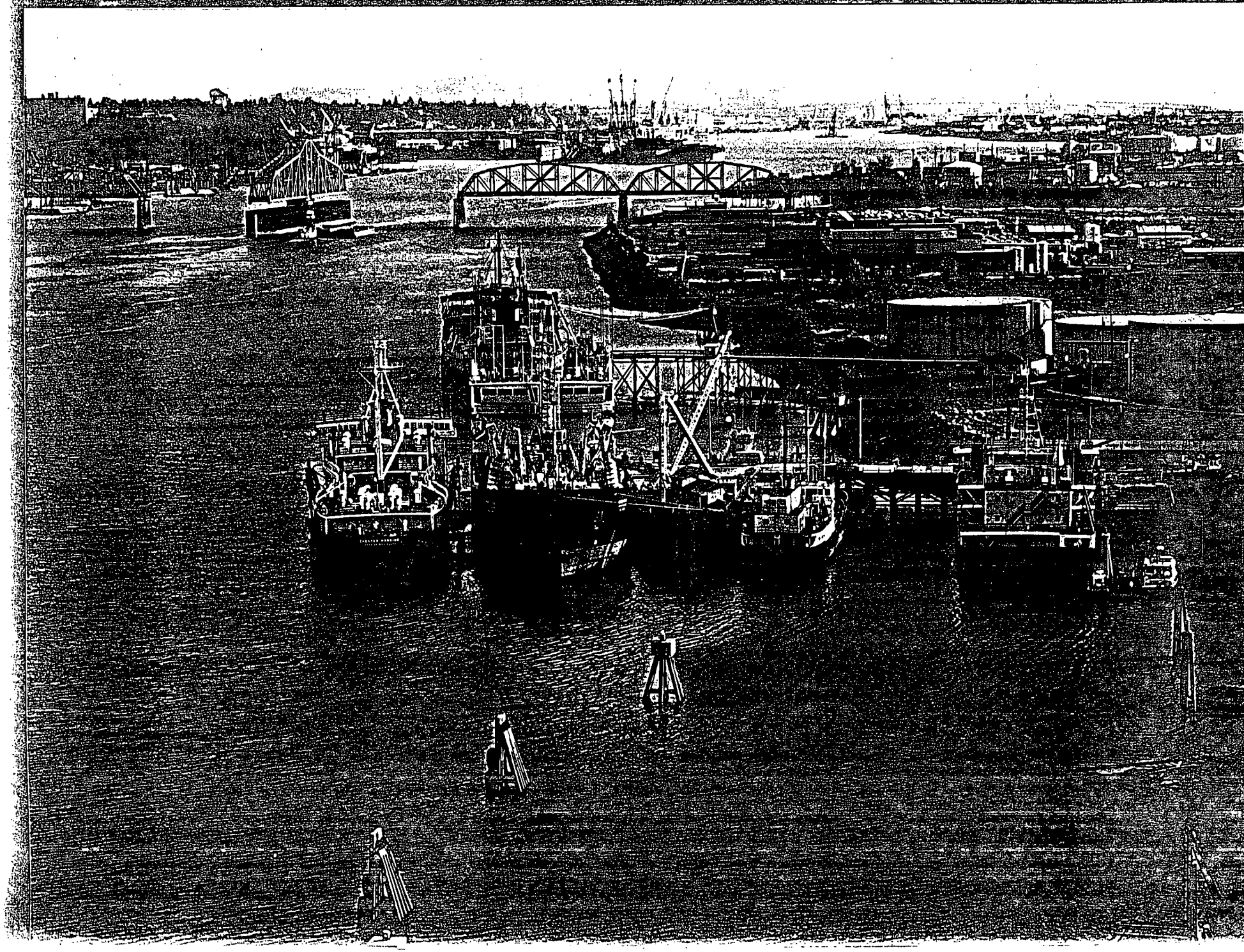
18. 1984



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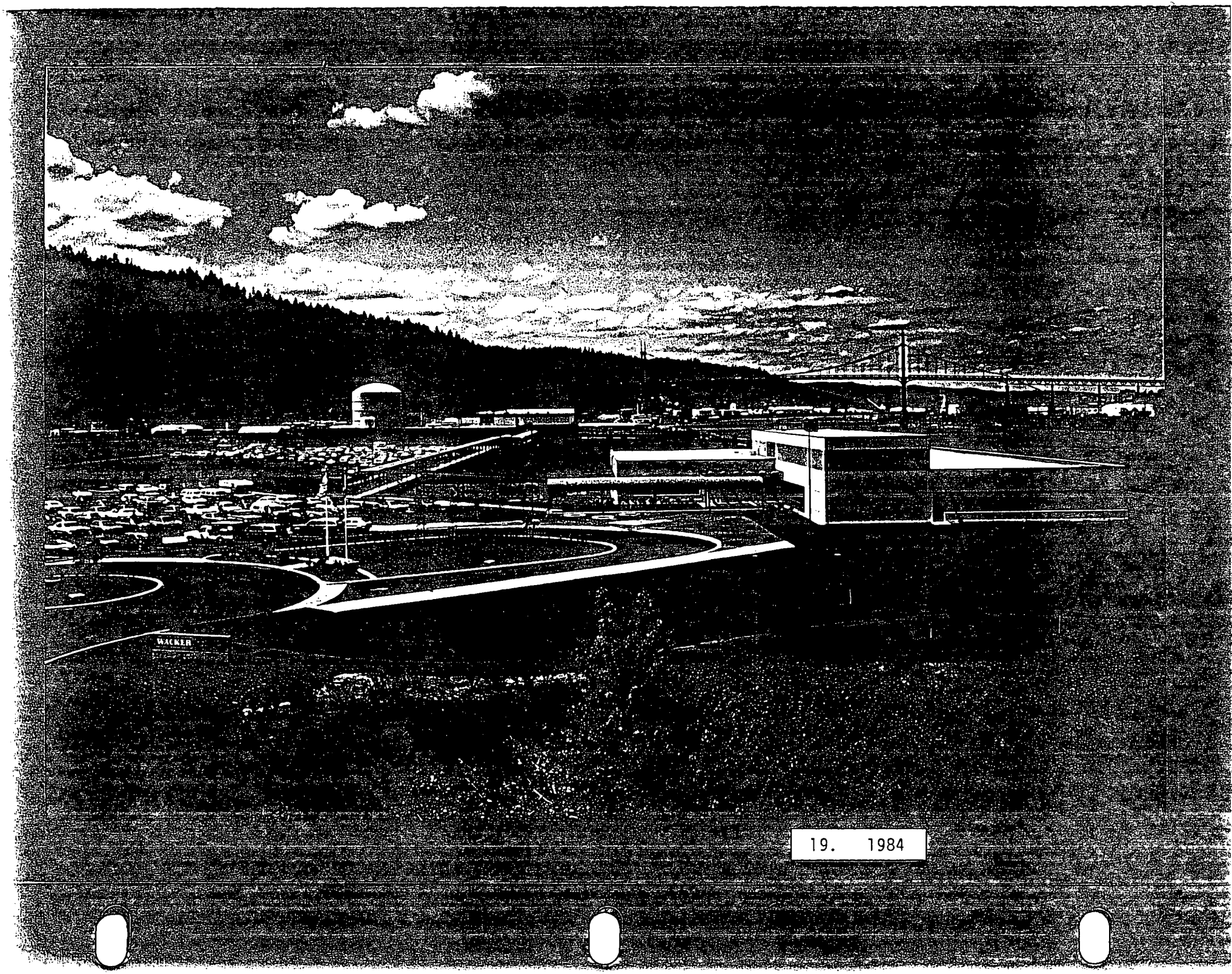
WACKER
19. 1984

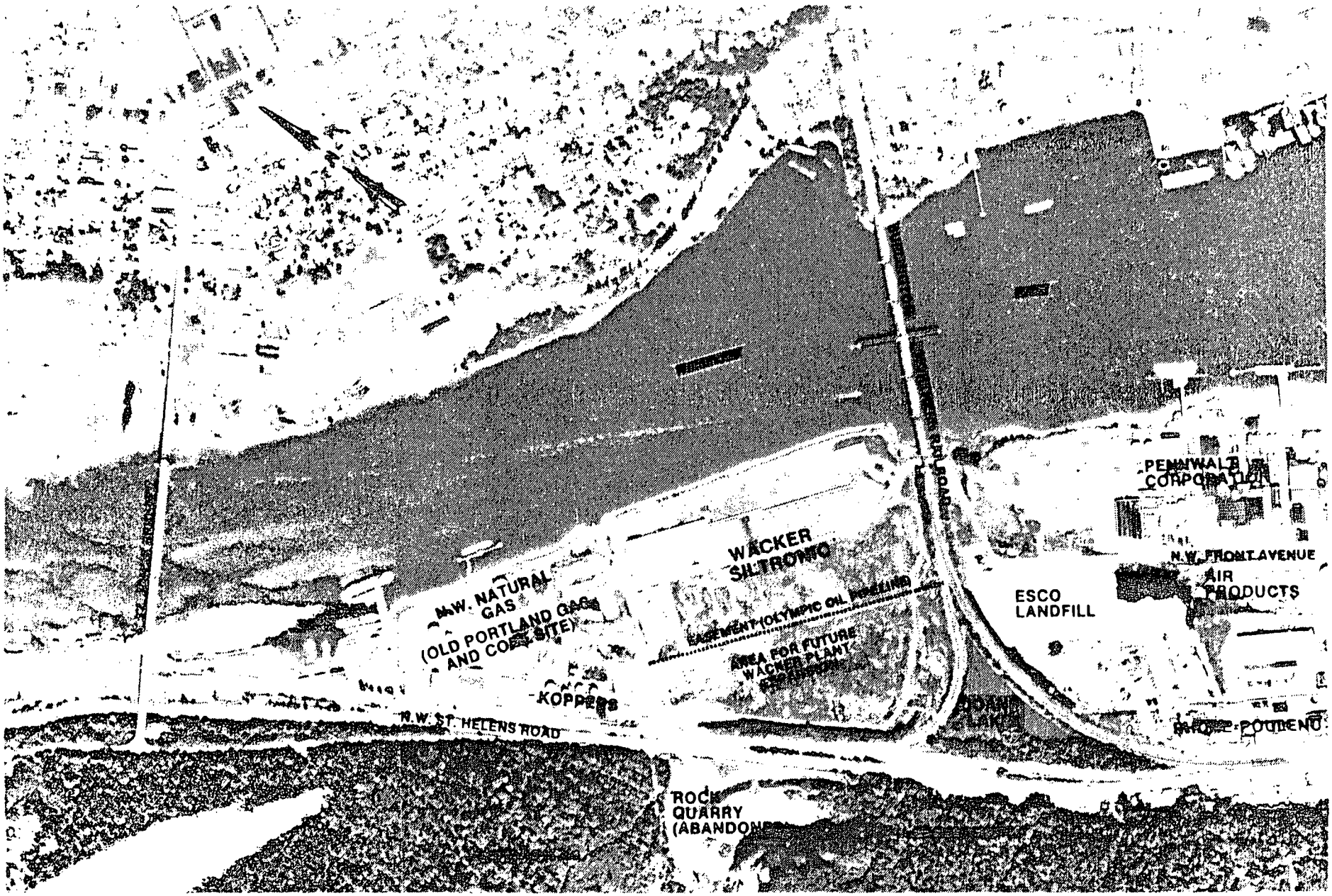

Figure 1 WACKER SILTRONIC PLANT AND SURROUNDING VICINITY (1983)

SCALE: 1" = 940 FEET (1 cm : 110 m)

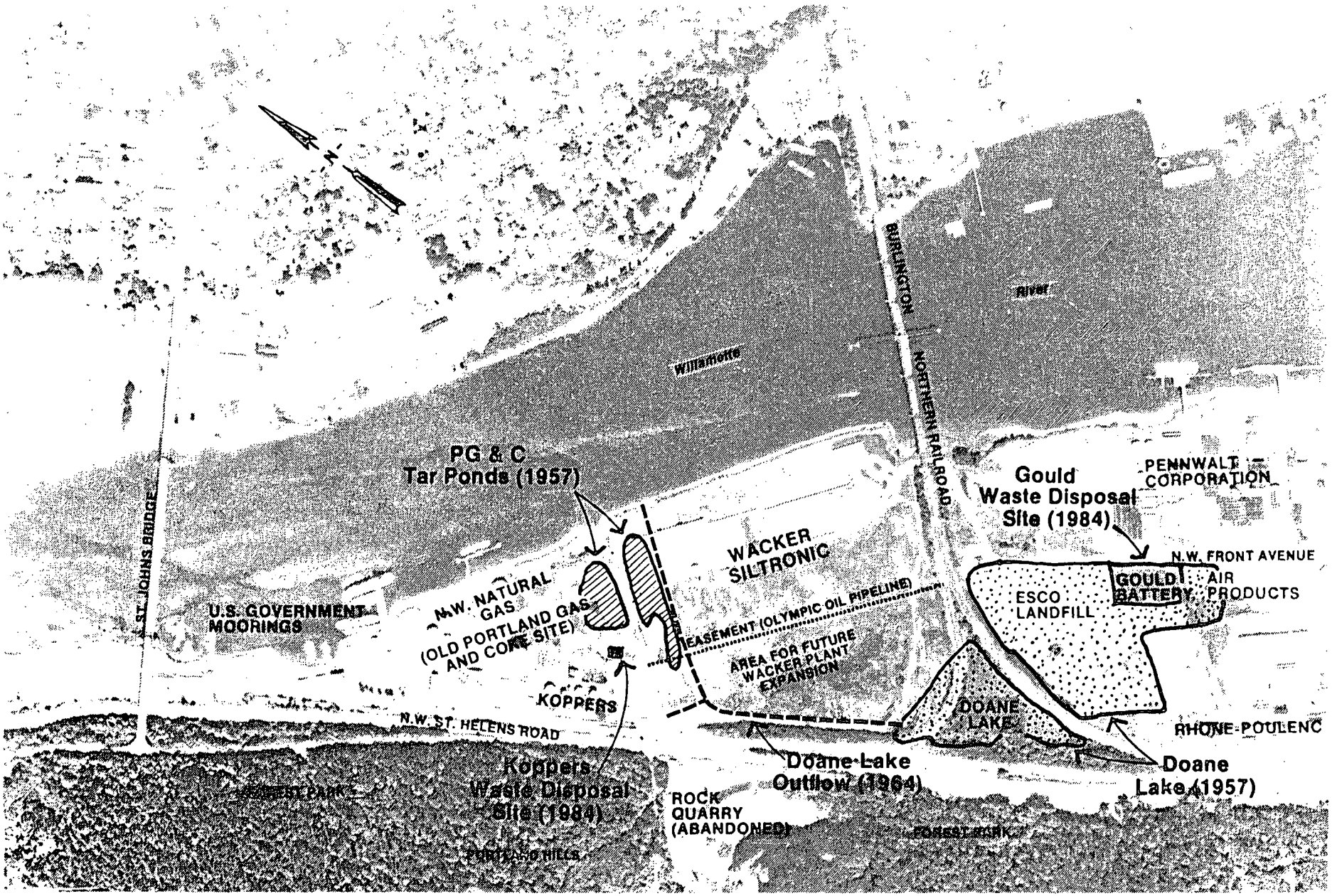

Figure 2 WACKER SILTRONIC PLANT
HISTORIC WASTE MANAGEMENT AREAS

SCALE: 1" = 940 FEET (1 cm : 110 m)

BROWN AND CALDWELL
CONSULTING ENGINEERS

RECEIVED
ENGINEERING
JUN 20 1988
John L. Pittman
Wacker Siltronic

June 16, 1988

Mr. Ed Bolin
Northwest Natural Gas
220 Northwest Second Avenue
Portland, Oregon 97209-3991

13-1904

Subject: Tetra Tech Contract

Dear Mr. Bolin:

As requested, we have enclosed a copy of the Environmental Protection Agency (EPA) contract with Tetra Tech. The contract is for review of 104 (e) responses and preparation of a scope of work for a Doane Lake area groundwater study. Mr. Bill Renfroe of Oregon Department of Environmental Quality (DEQ) and Mr. Tom Robertson of EPA supplied this copy and the modified schedule. Mr. Robertson is the newly appointed project officer in Portland working under Mr. Dave Tetta in Seattle.

Phase 1 is the information collection and review segment and includes these tasks:

- Evaluate the data provided, based on EPA standards for Quality Assurance/Quality Control (QA/QC).
- Clarify past and current activities at each facility.
- Judge whether the industrial operation in question uses and/or produces hazardous substances that may affect the water in the Doane Lake area.
- Categorize the likelihood of each facility's contribution to contamination in the Doane Lake area.

Phase 2 is the development of a scope of work for the groundwater and surface water investigation of the Doane Lake area. The primary objective of the scope of work is to characterize the hydrogeology of the Doane Lake area, with emphasis on:

- Identifying the full extent of lead migration from the Gould site.
- Identifying other contamination that might affect remedial decisions on treating lead contamination.

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Tetra Tech has committed to completing the draft scope of work by July 11, 1988, and completing the final scope of work by July 25, 1988. Consent agreement negotiations between EPA and the involved parties are tentatively scheduled for August.

Our contact with the various involved parties has detected a widespread state of indecision about commitment to a group effort to respond to the EPA plan. As difficult as it may be, the involved parties must act as a group to:

Control the Project - The direction, emphasis and detail of any environmental investigation is controlled by the managing entity. Should that be you or EPA?

Develop an Effective Bargaining Position - After Tetra Tech develops a scope of work to characterize the hydrogeology of the Doane Lake area, EPA will come to your group to begin negotiations on a consent agreement. You may establish a more favorable agreement with EPA by active involvement in the entire process. Would a cohesive group be more effective at the negotiations?

Obtain Favorable Cleanup Standards - The determination of cleanup criteria has a dramatic effect on the total costs incurred. By taking control of the study, you can affect the final cleanup standards in two ways: (1) you can prevent the expansion of the superfund site; and (2) you can be responsible for the selection and interpretation of applicable or relevant and appropriate requirements (ARARs) of federal laws and more stringent promulgated state laws. Do you want the cleanup criteria set without your input?

The time to act is now, before EPA presents you with Tetra Tech's scope of work as the basis of their proposed consent agreement. We propose a scope of services to provide technical support for you as you prepare for negotiations with EPA. The scope includes:

- Review 104 (e) responses.
- Facilitate favorable review of existing data by Tetra Tech with regard to EPA QA/QC.
- Track Tetra Tech's progress and report the implications of their findings to the group.

- Assist the group of involved parties to prepare for consent agreement negotiations.

The costs of these review and coordination services are flexible and will be proportional to the level of detail you require.

Please call Mr. Jonathan Snell or me if you or any of the other involved parties have any questions.

Very truly yours,

BROWN AND CALDWELL

Robert M. Allender
Manager, Hazardous Materials

RMA:has
Enclosure

cc: Mr. Jordan Dern, Keystone Environmental (Koppers)
Mr. Robert Ferguson, Rhone-Poulenc
Mr. Tim McGrath, Schnitzer Brothers
Mr. Larry Patterson, Pennwalt
Mr. John Pittman, Wacker Siltronic
Mr. Roger Sherwood, ESCO
Mr. Dave Simon, Liquid Air

Tom Robertson 000

Please type. Signatures and dates must appear clearly on all copies. Please read Instructions on the reverse.

United States Environmental Protection Agency
OWPE/Contracts Management Section (WH-527)
Washington, DC 20460

Technical Enforcement Support at Hazardous Waste Sites

1. Funding: [X] CERCLA [ ] RCRA [ ] Other	2. TES Number: 4	4. Work Assignment Number: C10004
	3. Contract Number: 68-01-7351	5. [XX] Original [ ] Amendment Number
6. Account Number (for "Other")	7. Prime Contractor Name: Jacobs Engineering	8. Priority: [XX] Normal [ ] Expedite* [ ] Emergency*
9. Site/Facility or Project Name: Gould, Inc.	10. Location (City or County): Portland	11. State: OR / 12. Region/HQ: 10
13. EPA Site/Facility ID Number: ORD095003687	14. NPL Site (Final or Proposed List): [XX] Yes [ ] No	15. RCRA Facility: [ ] Yes [ ] No
16. CERCLA Only: FMS Site/Spill ID Number: OB23	17. CERCLIS OP Unit No.: 02	18. CERCLIS/Event/Enforcement Activity/NSS: 2101 / 1701 FN02 / NSS

19. Purpose

[X] Initiate New Work Assignment [ ] Work Plan Revision* [ ] Notification of a Change in WA Manager [ ] Cancel Work Assignment
[ ] Work Plan Approval [ ] Revised Work Plan Approval [ ] Disapprove Work Plan (Contractor will immediately stop work)
[ ] Work Assignment Revision [ ] Change Period of Performance* [ ] Close Out Work Assignment (All final deliverables received)

20. Statement of Work Summary (SOW) (Attach a Detailed SOW) (See Reporting Requirements)

21. Task Type (Must identify task type and number according to TES User's Guide to show activity is within the overall TES contract SOW): Review of Documents - evaluate and record 104(e) responses

22. Task Number: 15

23. Summary/Contents

Enforcement Support for the Doane Lake operable unit of the Gould, Inc. NPL site. See attached Statement of Work.

RECEIVED
APR 13 1988
OREGON OPERATIONS OFFICE
EPA-REGION 10

24. Base Period	LOE	Cost/Fee	25. Option Period	LOE	Cost/Fee
Previously Approved			Previously Approved	-0-	-0-
This Action			This Action	900	50,000
Total			Total	900	50,000

26. Period of Performance		Period of Performance	
From: Effective date below (#41)	To:	From: Effective date below (#41)	To: September 30, 1988
(closeout date not to exceed base period ending date)		(closeout date not to exceed contract end date)	

27. Number of Pages To Follow (Including SOW): 6

28. Reference Information: [X] Attached [ ] Transmitted Separately [ ] Pick Up From

29. Reporting Requirements: [ ] Briefing(s) [ ] Letter Report [XX] Draft Report [X] Final Report** [X] Other

These deliverables will be treated as Enforcement Confidential unless otherwise specified.

30. Initiator: Work Assignment Manager (WAM)	31. Address	32. Date	
David Tetta/Tom Robertson	EPA Region 10 1200 Sixth Ave. (HW-113) Seattle, WA 98101	33. Phone No. (FTS): 399-2138	34. Phone No. (Off-Net): 206 442-2138
35. Approval: Rgnl Proj Officer or HQPO (RPO/PO) Kathryn M. Davidson	36. Address: same	37. Date: April 8, 1988	
		38. Phone No. (FTS): 399-1088	39. Phone No. (Off-Net): 206 442-1088
40. Contracting Officer (CO)		41. Date (Effective Date)	
42. Contractor Acknowledgement of Receipt (Signature and Title)		43. Date	

EPA Form 9100-1 (2-88)

*Justification required in comment section.
**30 day minimum required between draft and final report.

44. Copy Distribution: White - CO; Green - Contractor; Blue - Regional PO; Goldenrod - WA Manager; Photocopy - HQ PO

SCOEPA00015506

ENVIRONMENTAL PROTECTION AGENCY

TECHNICAL ENFORCEMENT SUPPORT
AT
HAZARDOUS WASTE SITES

TES IV

WORK PLAN FOR
CONTRACT #
WORK ASSIGNMENT #

DOANE LAKE AREA
PORTLAND, OREGON
U.S. EPA REGION 10

TETRA TECH, INC.
PROJECT NUMBER

SCOEPA00015507

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SCOEPA00015508

1.0 INTRODUCTION

The Doane Lake Area covers approximately 120 acres in Northwest Portland on the banks of the Willamette River. The area is heavily industrialized with contributions of waste materials to the groundwater, surface water and soil. The waste materials include: metals, organics, caustics and acids. The Gould NPL site is associated with the Doane Lake area.

The U.S. Environmental Protection Agency (EPA) has identified 10 Potentially Responsible Parties (PRP's) and has issued, on February 18, 1988, notice and information request letters under the provisions of Section 104 of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), 42 U.S.C. 9604.

One purpose of this assignment is for the Contractor to provide technical assistance for review and analyses of documents received in response to these letters. The overall objective of the project is to identify the data gaps in relation to the known information on groundwater and surface water contamination at the NL/Gould superfund site. Another purpose of this assignment is for the Contractor to write the Scope of Work for the Phase I Remedial Investigation (RI) Sampling Plan, Quality Assurance/Quality Control (QA/QC) Project Plan and the Health and Safety Plan for Doane Lake.

2.0 PROJECT APPROACH

The Contractor is needed to provide technical support for the Doane Lake site. This activity involves review and follow up of 104e responses, integration of these responses in the development of a scope of work, and coordinating these efforts with EPA and ODEQ. The work will be performed based on information supplied by the U.S. EPA Region X and discussions with Tom Robertson, the EPA Project Officer.

This assignment is identified as Enforcement Confidential. The information compiled for this project may be used in enforcement proceedings and strict document control is necessary. The Contractor will maintain document control including: a log-in procedure monitored by the Contractor's Work Assignment Manager and storage of documents in a locked room with locked file cabinets.

EPA will provide the Contractor with copies of existing documents as relate to the Doane Lake Area in general and the Gould NPL site specifically.

Phase 1

Based upon responses received by EPA to the notice and information request letters, the Contractor is asked to determine which responses have fully answered the information requests in the notice letter, identify all PRP responses which do not fully answer the questions and follow-up via telephone conversations on those who submitted an incomplete response. The following specific tasks will be performed:

1) Contractor will review responses received by EPA and evaluate the information based on EPA based QA/QC requirements. The data will be broken down as to whether it is Level A (quantitative data) or level B (qualitative data, not meeting EPA's requirements).

2) Contact, if necessary, each PRP by telephone, and inquire as to:

    a) Past and current activities and each type of facility on premises and operations (if response does not provide this information);

    b) Clarification of answers that are unclear. Telephone communications with the PRP's must be fully documented.

3) Review all responses received by EPA and all information obtained above (1 and 2). This will be completed by persons with professional knowledge of industrial processes and chemical characteristics. This person will judge whether the type of industrial operation in question uses and/or produces hazardous substances that might impact groundwater or surface water contamination beneath their site and the general Doane lake area.

4) Contractor will present in writing an indication of high, medium, or low priority for likelihood of the facility's hazardous substance/waste contribution to contamination beneath their site and in the general Doane lake area and an indication as to whether the data provided is Level A or Level B.

5) The contractor will meet bi-weekly via a conference call with the Oregon Department of Environmental Quality (ODEQ) personnel and the EPA Project Officer to discuss potential problems and/or questions that arise. The contractor will provide a computer generated bi-weekly progress report. A standard meeting time will be set by the EPA Project Officer within a week of the start of the contract date.

Phase 2

Based on the work performed under Phase 1, Tetra Tech will develop a scope of work for the groundwater and surface water investigation of the Doane Lake area.

Specific objectives of the scope of work include: characterize the hydrogeology in the Doane Lake Area, especially with regards to identifying data gaps in relation to the NL/Gould RI/FS and 104e responses; identifying the full extent of lead migration from the Gould site; and identifying other contamination that might affect remedial decisions on treating lead contamination.

3.0 PROJECT DELIVERABLES

Five unbound copies of each of the following products are deliverables under this work plan:

Report covering documentation requirements of Phase 1.4.

Draft Scope of Work

Final Scope of Work

4.0 WORK SCHEDULE

The project team will maintain contact with the EPA and ODEQ Project Officers and meet as required in Section 2. EPA will provide a one week turn around on all draft documents to meet the project schedule. The timeline for project activities is listed below:

DELIVERABLE	SCHEDULE	New Schedule Per Bill Rentfro 6/13/88
Phase 1		
EPA provision of information	April 25	June 13
First Bi-Weekly meeting	by April 29, 1988	June 17
Phase 2		
Draft Scope of Work	June 10, 1988	July 11
Comments from EPA on Scope of Work	June 17, 1988	July 18
Final Scope of Work	July 1, 1988	July 25

5.0 COSTS

Estimate costs for this work are as follows:

Estimated total hours:	900	Same
Estimated total cost:	$50,000	

The Contractor shall notify EPA when 600 hours have been expended on this task.

Negotiations with PRPs sometime in August

Koppers Company, Inc., Legal Services
436 Seventh Avenue, Pittsburgh, PA 15219
Telephone 412-227-2000
Telex 0866418, Koppersco

NW-S-21

SENT VIA DHL #339321194

KOPPERS

Donald H. Cuozzo
General Counsel
John F. Ramser
Stephen T. Tomko
Thomas Burgunder
Thomas F. Reid
George Carroll
Edward B. Wood
Kenneth W. Kubrick
Mary Dombrowski Wright
Jill M. Blundon
Billie Schrecker Nolan
William F. Giarla

Hobart Richey
Tax Counsel

RECEIVED
MAR 25 1988
Environmental Resources

March 22, 1988

David Tetta
U.S. Environmental Protection Agency, Superfund Branch
1200 Sixth Avenue, HW-113
Seattle, Washington 98101

Re: NL/Gould Superfund Site
Portland, Oregon

Dear Mr. Tetta:

Koppers Company, Inc. (Koppers) is in receipt of U.S. EPA's request for information letter dated February 18, 1988 in which Koppers is named as a potentially responsible party for the above-referenced site. This request for information letter bases the addition of Koppers as a potentially responsible party on results of investigations conducted as part of a Remedial Investigation (RI) and Feasibility Study (FS) undertaken at this site by Gould Inc. and NL Industries, Inc. which, according to U.S. EPA, indicate that Koppers' Northwest Terminal located at 7540 N.W. St. Helens Road, Portland, Oregon is a source of groundwater contamination detected at the NL/Gould Superfund Site. For the following reasons, Koppers does not believe that it is a potentially responsible party under the federal Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA).

Section 107 (a) of CERCLA defines a potentially responsible party as including current and former owners and operators of facilities and "(a)ny person who by contract, agreement or otherwise has arranged with another party or entity for transport, storage, disposal or treatment of hazardous substances owned, controlled or possessed by such person at a facility owned or operated

Writer's Direct Dial Number 412-227-2515

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by another party." It is without question that Koppers has never had an ownership or operational interest in the NL/Gould Superfund Site. Nor does U.S. EPA contend that Koppers "arranged with another party" for transport, storage, treatment or disposal of hazardous substances from, to or at the NL/Gould Superfund Site. Instead, U.S. EPA relies upon the results of groundwater investigations conducted at the NL/Gould Superfund Site to link Koppers to that site. We are not aware of any precedent under CERCLA for imposing potentially responsible party status upon a company that is not connected with the facility through ownership or operational control or by virtue of having arranged for hazardous substances to be handled at the facility. Indeed, the clear language of the statute requires that a "generator" potentially responsible party must have made arrangements "with another party" for handling of the hazardous substances at the facility. There is no evidence of record that Koppers made any arrangements with anyone to have hazardous substances handled at the NL/Gould Superfund Site.

Accordingly, under both a clear and unambiguous reading of the statute and existing case law, Koppers can not be considered to be a potentially responsible party at the NL/Gould Superfund Site on the grounds that hazardous contituents may have entered the groundwater at the Koppers' Northwest Terminal site and migrated to the NL/Gould Superfund Site. Under these circumstances, we trust that Koppers will not be included as a potentially responsible party for the NL/Gould Site.

Please give me a call if you have any questions or wish to discuss this matter further.

Very truly yours,

Billie S. Nolan

bcc: J. Batchelder
L. Flaherty
J. Dern

SCOEPA00015513

KEYSTONE
ENVIRONMENTAL RESOURCES, INC.

APR 1988
RECEIVED
LAND AND CLAIMS

Phone: 412/227-2694 436 Seventh Avenue, Suite 1940, Pittsburgh, PA 15219 Fax: 412/227-2436

April 7, 1988

CERTIFIED MAIL
Return Receipt
Requested

Mr. Ed Bolin
Northwest Natural Gas
220 NW Second Avenue
Portland, OR 97209

Dear Ed:

Following our meeting on March 29, 1988, I took the committee proposal of hiring a consultant for the purpose of reviewing existing data to Koppers management to determine their willingness to participate in this early phase of the study. After careful consideration, Koppers feels not only that it should not participate but also that it should not be even asked to participate for a number of reasons; including, but not limited to the following:

1. Koppers area is small - It occupies only about 4 acres of the proposed 400 acre study site.

2. Its history is short - Koppers began operation in 1966. For most of its life it has served as a short term storage terminal.

3. No data is available - Unlike many of the other participants, no studies have been performed on Koppers site, thus there is no benefit to Koppers of the data reduction effort by CDM.

4. The Koppers site is simple. The development of a work plan for the Koppers site alone would be done by assembling existing protocols. There is or no benefit to preparing a work plan prior to meeting with U. S. EPA.

This position does not foreclose Koppers limited participation in the future private investigation at the site nor does it commit Koppers to such participation, but only addresses the issue at hand. Koppers is willing to sit as an observer to the committee and offer its environmental expertise but does not feel that its financial participation is appropriate at this time.

Although they were not available at the meeting, we would appreciate receiving copies of the responses to the 104 letters that were made by each participant. Please let me know if that presents a problem. We look forward to our continued cooperation toward the resolution of this matter.

Sincerely,

Jordan M. Dern
Senior Program Manager
Koppers Industrial & Foundry Products

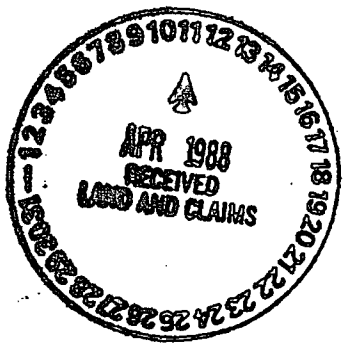
JMD/mrw

cc: William Farran III - Rhone Poulenc, Inc.
Roger Sherwood - ESCO Corp.
Tom McGrath - Schnitzer Investment Corp.
John L. Pittman - Wacker Siltronic Corp.
James Tracewski - NL Industries, Inc.
Richard Bach - Stoel Rives Boley Jones & Grey
Robert Ferguson - Rhone Poulenc, Inc.

KEYSTONE
ENVIRONMENTAL RESOURCES, INC.

U.S. ENVIRONMENTAL PROTECTION AGENCY
REGION 10
1200 SIXTH AVENUE
SEATTLE, WASHINGTON 98101

April 5, 1988



REPLY TO ATTN OF: HW-113

Koppers Company, Incorporated
7540 N.W. St. Helens Road
Portland, Oregon 97229

Dear Sir:

The U.S. Environmental Protection Agency (EPA), through its contractor, Ecology and Environment (E&E), has completed the preliminary assessment of the Koppers facility. A copy of the report is enclosed.

Based on this assessment and other pertinent information, EPA finds it appropriate to defer to state authority for further consideration as part of the Doane Lake study.

If you have questions regarding report content or planned actions, I may be reached at (206) 442-2722.

Sincerely,

Deborah Flood

Deborah Flood
Environmental Protection Specialist
Superfund Response & Investigations Section

Enclosure

cc: ✓Northwest Natural Gas, Portland
Chip Humphrey, EPA-000
Mary Wahl, DEQ, Portland

PRELIMINARY ASSESSMENT REPORT
KOPPERS SITE
PORTLAND, OREGON

TDD F10-8709-09

Report Prepared by: Ecology and Environment, Inc.
Date: October 1987

Submitted to: J.E. Osborn, Regional Project Officer
Field Operations and Technical Support Branch
U.S. Environmental Protection Agency
Region X
Seattle, Washington

ecology and environment, inc.
101 YESLER WAY, SEATTLE, WASHINGTON, 98104, TEL. 206/624-9537
International Specialists in the Environment

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SCOEPA00015517

ecology and environment, inc.
101 YESLER WAY, SEATTLE, WASHINGTON, 98104, TEL. 206/624-9537
International Specialists in the Environment

MEMORANDUM

DATE: October 28, 1987

TO: John Osborn, FIT-RPO, USEPA, Region X

THRU: for David Buecker, FIT-OM, E&E, Seattle PMT

FROM: Lazar Gorelik, FIT-SM, E&E, Seattle LG

SUBJ: Preliminary Assessment Report for
Koppers Site
Portland, Oregon

REF: TDD F10-8709-09

CC: Deborah Flood, HWD-SM, USEPA, Region X
Jeffrey Villnow, FIT-PM, E&E, Seattle
Thomas Tobin, E&E, Seattle

1. Introduction and Purpose of the Preliminary Assessment:

Pursuant to U.S. Environmental Protection Agency (EPA) Contract No. 68-01-7347 and Technical Directive Document (TDD) F10-8709-09, Ecology and Environment, Inc. (E&E) conducted a Preliminary Assessment (PA) of Koppers Site in Portland, Oregon. The PA represents the second of a three-step investigative process which begins with Site Discovery and concludes, if necessary, with a Site Inspection. The investigative process, in general, is intended to identify, compare, and rank the potential hazards associated with a particular site relative to other sites across the nation for the purpose of identifying priority sites requiring remedial responses. It does not include extensive or complete site characterization, contaminant fate determination, or quantitative risk assessment.

The Koppers Site PA was conducted to identify potential public health and/or environmental hazards related to the site and, if present, evaluate the need for additional investigative action. The PA is based on data derived from available files and literature pertaining to the site (1-8). Information developed during the PA is summarized in Appendix A on EPA Form 2070-12.

2. Information Obtained During the Preliminary Assessment:

- Site Location and Description - The Koppers Site is located at 7900 N.W. St. Helens Road in the northwest industrial area of the City of Portland, Oregon (Figures 1 and 2). The facility occupies the southwest corner (8 acres) of a former gasification plant that was

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operated by Portland Gas and Coke Company from 1913 to 1956 when Northwest Natural Gas Company began distributing natural gas. Northwest Natural Gas currently owns the property and leases it to Koppers Company (1).

- Physical Environment - Several large facilities, including the Rhone-Poulenc Chemical Plant which previously generated dioxin containing wastes, are in the vicinity of the Koppers Site (5, 6). The Wacker-Siltronic Company purchased land from Northwest Natural Gas and constructed a facility near the Koppers Site in the late 1970s (3, 4). Sediments containing coal tar residues were found during the construction of the facility. Between the Siltronic and Koppers sites lies the Northern Doane Lake site. Investigation of this area by Northwest Natural Gas and Wacker-Siltronic resulted in the Oregon Department of Environmental Quality (DEQ) identifying the Koppers Site as a source of suspected contamination (4).

  The Willamette River is approximately 1,800 feet from the Koppers Site. The depth to ground water at the site is probably within five to twenty feet. The Portland area has a mild climate, wet winters and warm dry summers. Total annual precipitation is about 40 inches and the average annual evaporation is about 26 inches. Drinking water in this area is supplied by the City of Portland from the Bullrun Reservoir (7).

- Site History / Potential Problem(s) at Site - In 1965, Koppers Company of Pittsburgh signed a long term lease agreement with Northwest Natural Gas Company to construct a new coal tar distillation plant on the property (1, 2). In 1966, the new $1 million plant started processing coke oven tar, which is produced by the carbonization of coal in ovens.

  The plant consisted of tar processing and pitch cooling facilities, a tank farm, a boiler building, an office building, a machine shop, and an extensive piping system for transferring raw materials and finished products from or to transportation facilities or storage tanks (Figure 2) (1). Coal tar was brought by boat to the Willamette River docks at the plant site.

  In the period between 1966 and 1973, the plant produced chemical oil, creosote, and pitch by distillation of coal tar (8, 9). Preheated coal tar was pumped from storage tanks to a large batch still. Heat was supplied by circulating tar from the still through a gas fired heater. Distillation was carried out under relatively high temperatures and vacuum until the still contents reached a

specific softening point. Oil from the tar was separated in a fractionating column and after condensation was pumped to storage. The pitch was pumped to a cooling tank from which it was loaded into tank cars or sent to cooling pans (50 x 80 feet). The solidified pitch was then dug out and loaded into trucks or hopper cars.

Air pollution problems from the following sources were associated with these operations: vents on the heated storage tanks, seals on pumps handling the hot process steam, an oil seal on the condensing system for the fractionating column, spills, and fumes from pitch cooling tanks (10). An air pollution control system used at the plant (9, 11) consisted of a scrubbing tower in which fumes were contacted and condensed by relatively cool circulating oil. Separation of the water condensate (wastewater) from the circulating oil was accomplished in a water tank and a water dehydration tank.

In 1973, the production facilities at the plant were shut down due to a lack of raw materials (8). In 1974, Koppers received permission to operate the plant on a temporary basis for manufacturing experimental batches of electrode pitch, a new product consisting of both coal and petroleum residuals (12). An Air Contaminant Discharge Permit (No. 26-2930) issued by DEQ in 1975 suggests that the electrode pitch production was probably terminated in 1977 (13). Since this time, the facility has been used only for bulk transfer operations of creosote coal tar and coal tar pitch.

In 1987, Koppers proposed to expand the facility (14). The new facility will be used to mix chromic acid, arsenic acid, and dry copper oxide with water. Vapors and particulates from the mixing process will be controlled by a water powered eductor followed by a packed tower scrubber. Wastewater from the tower will be recycled for dilution of the raw materials.

- Waste Types, Quantities, and Characteristics - Available data suggests that solid wastes disposed of at the site in the past probably consist of wastes produced by the former gasification plant and wastes produced by the Koppers plant. Oregon DEQ has identified abandoned coal tar disposal pits at the site (4). The origin, composition, and volume of the wastes are unknown.

  An EPA hazardous waste inventory document from 1979 (15) indicates that wastes from roofing pitch and electrobinding operations were disposed at the site in an area measuring approximately 100 x 20 feet (15). The wastes consisted of phenols and oil and grease, and were probably generated by the Koppers plant. This document also indicates that Koppers Company did not ship wastes from the site and that the company generated over 200 cubic yards of wastes per year.

In the past, the Koppers plant generated approximately 1,500 gallons per day (gpd) of industrial wastewaters from the following sources: the laboratory, pump room, wet oil, wet oil tank and water dehydration tank (11). In 1966, the company proposed that after oil removal the wastewaters be discharged into a drain field, providing over 90% BOD reduction for compounds consumed by soil bacteria. It is unclear, however, whether Koppers applied this treatment method at the site. The company probably started to discharge industrial wastewaters to the City of Portland sewer system in 1975 (16).

The plant effluent consisting of wastewater runoff from the tank farm and boiler blowdown was discharged to the Willamette River in accordance with NPDES permits. In 1975, the company paved the surface in the tank farm area to reduce infiltration of surface water and installed a rainwater collection and treatment system, which included an oil water separator for oil removal (17). The effluent from the separator was discharged into a storm water ditch leading to the river.

The early NPDES permits specify the following daily maximum parameters for the plant effluent: flow (68,000 gpd), oil and grease (20 mg/l), pH (6-9), and temperature (110°F). The NPDES permit of 1975 also includes phenols (0.7 mg/l). In 1985, DEQ required settling and skimming for Kopper's runoff to reduce the content of polynuclear aromatic hydrocarbons (PAHs) and also required monthly monitoring for PAHs in the effluent (18). However, the NPDES discharge monitoring report of 1987 specified the following parameters: flow (3,000 - 10,000 gpd), temperature (72 - 100°F), pH (6 - 9), oil and grease (10 - 15 mg/l), and phenols (0.5 - 0.7 mg/l).

o Pollutants, Mobilization, Pathways, and Risks - In the past, products recovered by distillation of coal tar at the plant included: chemical oil, creosote, and pitch. Coal tar is a complex mixture of many chemicals. It is a viscous liquid heavier than water. A typical composition of coal tar by distillation may be given as: about 5% tar chemicals (tar acids); 30% distillation oils (creosote and other distillates); and 60% to 65% residuals (road tars, crude and refined tars, pitches and pitch coke) (19).

Chemical oil produced by the plant consisted mainly of phenols and naphthalene (9). The product was shipped for further processing for recovery of naphthalene, phenol, xylenol, pyridine, picoline, and various solvent oils. Creosote, a well known wood preservative, is primarily composed of PAHs. It is an oily liquid slightly heavier than water. Pitches have a variety of uses. Hard pitches produced by the plant were used in electrodes as binding materials.

A majority of the chemical constituents of these products are characterized by chemical stability, low water solubility, low vapor pressure, and high affinity to soil (19). As a result, they exhibit low mobility in the environment, distributing preferentially to soil. Subsurface contamination by the liquid products may have a long term adverse affect on both the soil and ground water because of a high content of organic compounds and their low solubility.

A limited set of analytical results of ground water samples from on-site monitoring wells, old wastes from one on-site pond, and river sediment samples near the site suggest that soil and ground water contamination by coal tar constituents have occurred at the site (20). The transport of contaminants from the site is likely to be directed toward the river through surface water runoff and ground water flow.

However, the information gathered suggests that the Koppers Site has a low potential to cause human health problems because residual contaminants are unlikely to influence either the local drinking water source or air quality. In contrast, it appears that potential transport of toxic tar constituents from the site may affect water quality in the river and its aquatic population. This is primarily due to the close proximity of the site to the river. This potential environmental impact cannot be accurately assessed because of incomplete data on the extent and magnitude of the contamination.

3. Priority Assessment:

No further action is appropriate under the pre-remedial program. However, the site should continue to be assessed as part of the Doane Lake investigation.

4. Follow-up Recommendations:

Activities at the Koppers Site have been monitored by DEQ since the construction of the coal tar processing plant, which occupies a portion of the old gasification plant. Tar contamination has been found in the area of the old gas plant in a study conducted by Northwest Gas Company and Wacker-Siltronic Company.

Information gathered during the PA suggests that soil and ground water contamination by tar constituents has occurred at the site as a result of past operational and waste disposal practices. Coal tar was produced at the site in the period 1913-1953. The Koppers plant processed coal tar into chemical oil, creosote, and electrode pitches probably in the period 1966-1973. Experimental batches of an electrode pitch consisting of coal and petroleum residuals were produced probably in the period 1973-1977.

The EPA site file indicates that in the past the plant generated approximately 200 cubic yards per year of wastes which were disposed on the Koppers Site. The process sources of waste generation are unknown. Limited data is available on the waste composition. In the past, the tank farm area probably resulted in subsurface contamination by various coal tar products. It is possible that before 1975 industrial wastewaters from the plant were disposed beneath the site.

It appears that the site has a low potential to cause human health problems since residual contaminants at the site are unlikely to influence the local drinking water source or air quality. However, the site has potential to cause environmental damage through surface and subsurface migration of various toxic pollutants to the river. Due to the lack of a target population, no further action is recommended under CERCLA. It is, however, recommended that a study at the Koppers Site be conducted by a state or local agency to evaluate the extent and magnitude of contamination in the area leased by Koppers Company.

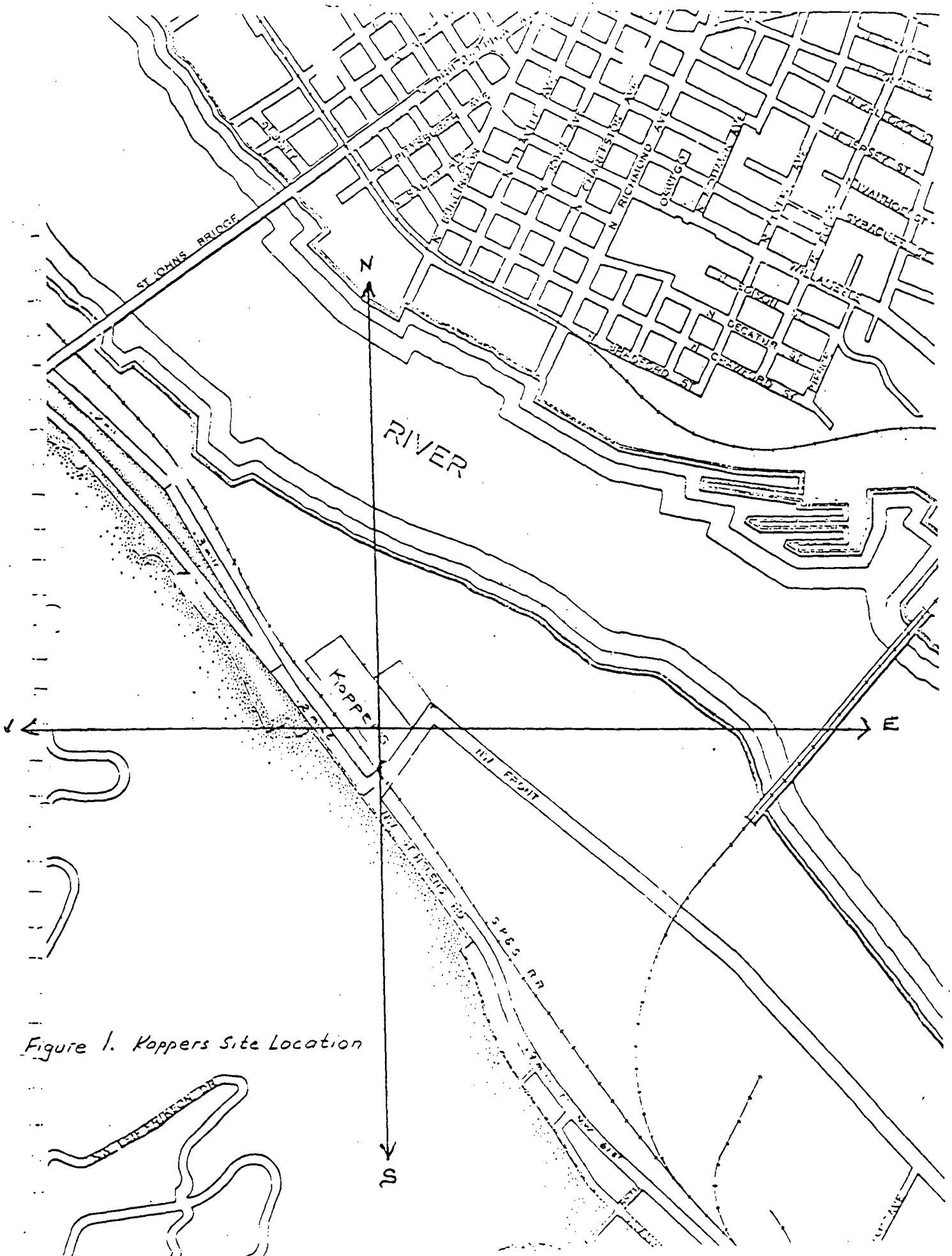

Figure 1. Koppers Site Location

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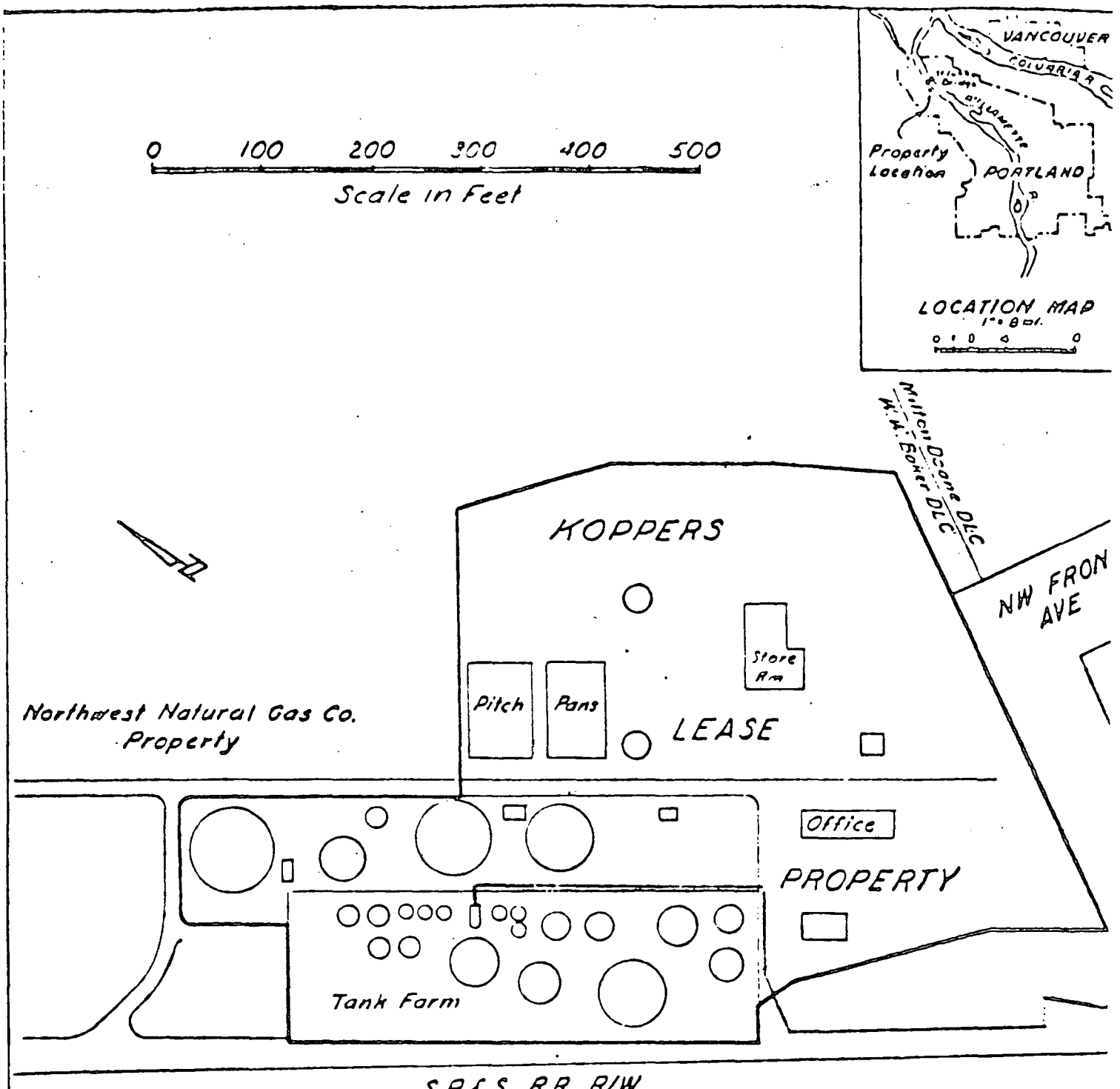

Figure 2. Location of Koppers Lease Property on Northwest Natural Gas Co. property at 7900 NW St Helens Rd., City of Portland, County of Multnomah, State of Oregon.

June 3, 1971

SCOEPA00015525

REFERENCES

1. The Oregon Journal, August 25, 1965. The Casco Plant in New Use. ODEQ Site Files.

2. The Oregonian, August 11, 1966. Koppers' Portland Plant Starts Initial Production. ODEQ Site Files.

3. Memo from Dennis Adamczyk to A. Goodman, December 19, 1986. ODEQ Site Files.

4. Dennis Adamczyk, December 26, 1986. Northern Doane Lake - Koppers Company Hazardous Waste Site. ODEQ Site Files.

5. L. Gorelik, 1985. Tier 2 Dioxin Screening, Phone-Poulene Chemical Plant, Portland, Oregon. Ecology and Environment, TDD R10-8405-09.

6. W. Ritthaler and L. Gorelik, 1986. Alkali Lake Disposal Site, Alkali Lake, Oregon, National Dioxin Study. Ecology and Environment, TDD R10-8410-12.

7. Personal Communication, September 15, 1987. Oregon Water Department.

8. AQ-Koppers-Multnomah County, September 25, 1974. ODEQ Site Files.

9. Memo from D. Roach to R. Hatchard, February 11, 1966. ODEQ Site Files.

10. Memo from T. Bispham to W. Hanson, October 14, 1970. ODEQ Site Files.

11. Effluent Treatment Facilities, January 27, 1966. ODEQ Site Files.

12. Memo from L. Shannon to R. Bispham, December 11, 1974, ODEQ Site files.

13. Memo from L. Patterson to Koppers Company, Inc., January 19, 1977. ODEQ Site Files.

14. ODEQ Memo from A. Broad, August 17, 1987. ODEQ Site Files.

15. Inventory - Possible Source of Hazardous Waste, August 21, 1979. EPA Region X, Site Files.

16. Application No. OR-000077-9, date unknown. ODEQ Site Files.

17. Northwest Tank Farm, Rainwater Collection and Treatment System, January 23, 1975. ODEQ Site Files.

18. Memo from L. Patterson to G. Bausler, March 4, 1985. ODEQ Site Files.

19. Handbook on Manufactured Gas Plant Sites, 1984. Environmental Research and Technology, Inc., Pittsburg PA and Koppers Company, Inc. Prepared for Utility Solid Waste Activity Group Superfund Committee, Washington, D.C., Under EPA Project No. P-D125.

REFERENCES (cont.)

20. Memo from C.H. Gray to G. Calaba, August 27, 1984, ODEQ Site Files.

21. Analytical Results of Samples from the Koppers Site, July 19, 1982. ODEQ Site Files.

APPENDIX A

EPA FORM 2070-12

POTENTIAL HAZARDOUS WASTE SITE
PRELIMINARY ASSESSMENT
PART 1 - SITE INFORMATION AND ASSESSMENT

I. IDENTIFICATION

01 State	02 Site Number
OR	D027734359

II. SITE NAME AND LOCATION

01 Site Name (Legal, common, or descriptive name of site)	02 Street, Route No., or Specific Location Identifier				
Koppers Co., Inc.	7540 N.W. St. Helens Road				
03 City	**04 State**	**05 Zip Code**	**06 County**	**07 County Code**	**08 C D**
Portland	OR	97229	Multnomah	051	0

09 Coordinates

Latitude	Longitude
45° 34' 40.0"	122° 45' 31.0"

10 Directions to Site (Starting from nearest public road)

III. RESPONSIBLE PARTIES

01 Owner (if known)	02 Street (Business, mailing, residential)		
Northwest Natural Gas	220 N.W. Second Avenue		
03 City	**04 State**	**05 Zip Code**	**06 Telephone Number**
Portland	OR	97209	(303) 226-4211
07 Operator (if known and different from owner)	**08 Street (Business, mailing, residential)**		
Koppers Co., Inc.	Environmental Resources		
09 City	**10 State**	**11 Zip Code**	**12 Telephone Number**
Pittsburgh	PA	15219	(412) 227-2000

13 Type of Ownership (Check one)
☒ A. Private ☐ B. Federal _____ (agency name) ☐ C. State ☐ C. County ☐ E. Municipal
☐ F. Other _____ (specify) ☐ G. Unknown

14 Owner/Operator Notification on File (Check all that apply)
☒ A. RCRA 3001 Date Received: 11 /19 /1980 (Month Day Year) ☒ B. Uncontrolled Waste Site (CERCLA 103c) 07 /19 /1982 (Month Day Year) The company was investigated under abandoned HW site inventory. ☐ C. None

IV. CHARACTERIZATION OF POTENTIAL HAZARD

01 On-Site Inspection
☒ Yes Date 07 /19 /1982 (Month Day Year)
☐ No
☐ A. EPA ☐ B. EPA Contractor ☒ C. State ☐ D. Other Contractor
☐ E. Local Health Official ☐ F. Other _____ (specify)
Contractor Names(s): _____

02 Site Status (Check one)	03 Years of Operation		
☒ A. Active ☐ B. Inactive ☐ C. Unknown	1966 (Beginning Year)	Present (Ending Year)	☐ Unknown

04 Description of Substances Possibly Present, Known, or Alleged
Coal gas plant from 1913-1956. Coal tar distillation into oil, creosote, and electrode pitch from 1966 to 1973. Electrode pitches production from coal tar and petroleum residues from 1973 to 1977. Transfer and storage of coal tar products from 1977.

05 Description of Potential Hazard to Environment and/or Population
Solid wastes and industrial wastewater from processing coal tar. Large quantities of solid wastes were disposed the Koppers site. Solid wastes are complex mixtures of phenols and PAHs. Subsurface contamination by coal tar constituents.

V. PRIORITY ASSESSMENT

01 Priority for Inspection (Check one. If high or medium is checked, complete Part 2 - Waste Information and Part Description of Hazardous Conditions and Incidents)
☐ A. High (Inspection required promptly) ☐ B. Medium (Inspection required) ☐ C. Low (Inspect on time available basis) ☒ D. None (No further action needed, complete current disposition fo

VI. INFORMATION AVAILABLE FROM

01 Contact	02 Of (Agency/Organization)		03 Telephone
Deborah Flood	USEPA, Region X, Superfund		(206) 442-27
04 Person Responsible for Assessment	**05 Agency**	**06 Organization**	**07 Telephone No.**	**08 Date**
Lazar Gorelik	EPA/FIT	E&E	(206)624-9537	09 /23 /8 (Month Day)

SCOEPA00015529

POTENTIAL HAZARDOUS WASTE SITE
PRELIMINARY ASSESSMENT
PART 2 - WASTE INFORMATION

I. IDENTIFICATION	
01 State	02 Site Numb
OR	D02773435

II. WASTE STATES, QUANTITIES, AND CHARACTERISTICS

01 Physical States (Check all that apply)

- ☐ A. Solid
- ☐ B. Powder, Fines
- ☒ C. Sludge
- ☐ D. Other _____ (Specify)
- ☐ E. Slurry
- ☐ F. Liquid
- ☐ G. Gas

02 Waste Quantity at Site (Measure of waste quantities must be independent)

Tons _____

Cubic Yards > 200 cy/yr

No. of Drums _____

03 Waste Characteristics (Check all that apply)

- ☐ A. Toxic
- ☐ B. Corrosive
- ☐ C. Radioactive
- ☐ D. Persistent
- ☐ E. Soluble
- ☐ F. Infectious
- ☐ G. Flammable
- ☐ H. Ignitable
- ☐ I. Highly Volati
- ☐ J. Explos
- ☐ K. Reacti
- ☐ L. Incomp ible
- ☐ M. Not Applic

III. WASTE TYPE

Category	Substance Name	01 Gross Amount	02 Unit of Measure	03 Comments
SLU	Sludge			
OLW	Oily Waste	> 200	cubic yards	Oily waste containing coal tar compounds were generated in the past by Koppers Co., Inc. Waste is in fill on the property leased by Koppers Co., Inc.
SOL	Solvents			
PSD	Pesticides			
OCC	Other Organic Chemicals			
IOC	Inorganic Chemicals			
ACD	Acids			
BAS	Bases			
MES	Heavy Metals			

IV. HAZARDOUS SUBSTANCES (See Appendix for most frequently cited CAS Numbers)

01 Category	02 Substance Name	03 CAS Number	04 Storage/Disposal Method	05 Concentration	06 Measure Concentrat
OLW	Complex mixtures; PAHs and other compounds of coal tar	N/A	On-site	Unknown	N/A
		N/A	Disposed	Uknown	N/A

V. FEEDSTOCKS (See Appendix for CAS Numbers)

Category	01 Feedstock Name	02 CAS Number	Category	01 Feedstock Name	02 CAS Numb
FDS	Coal Tar	N/A	FDS		
FDS			FDS		
FDS			FDS		
FDS			FDS		

VI. SOURCES OF INFORMATION (Cite specific references, e.g., state files, sample analysis, reports)

Adamczyk, 01/26/86, ODEQ Files; Adamczyk, 12/05/86, ODEQ Files; Adamczyk, 01/19/86, ODEQ Files; T. Berkmeir, 08/21/79, EPA Region X Files; Memo from C. H. Gray to G. Calala, 08/27/84, ODEQ Files; The Oregonian, 08/11/66, ODEQ Files; Memo from Koppers, 02/22/84, ODEQ Files; Memo from B. Smith to Koppers Co., 02/06/1984, EPA Region X ODEQ Files.

SCOEPA00015530

POTENTIAL HAZARDOUS WASTE SITE
PRELIMINARY ASSESSMENT
PART 3 - DESCRIPTION OF HAZARDOUS CONDITIONS AND INCIDENTS

I. IDENTIFICATION
01 State: OR | 02 Site Numl: D0277343

II. HAZARDOUS CONDITIONS AND INCIDENTS

01 [X] A. Ground Water Contamination
02 [X] Observed (Date: 07/19/82) [ ] Potential [ ] Alle
03 Population Potentially Affected: 0
04 Narrative Description

Elevated levels of phenols were detected in the ground beneath the site. Other coal tar constituents are probat present in the water.

01 [X] B. Surface Water Contamination
02 [ ] Observed (Date:) [X] Potential [ ] Alle
03 Population Potentially Affected:
04 Narrative Description

Potential for migration of contaminants from the site to the Willamette River.

01 [X] C. Contamination of Air
02 [X] Observed (Date: 07/28/1970) [ ] Potential [ ] Alle
03 Population Potentially Affected:
04 Narrative Description

In the past, the chemical plant had a number of problems with air contamination.

01 [ ] D. Fire/Explosive Conditions
02 [ ] Observed (Date:) [ ] Potential [ ] Alle
03 Population Potentially Affected:
04 Narrative Description

None reported, observed, or suspected.

01 [ ] E. Direct Contact
02 [ ] Observed (Date:) [ ] Potential [ ] Alle
03 Population Potentially Affected:
04 Narrative Description

Facility is fenced and access is restricted.

01 [X] F. Contamination of Soil
02 [ ] Observed (Date:) [X] Potential [ ] Alle
03 Area Potentially Affected (Acres): Unknown
04 Narrative Description

Soil contamination is likely to occur at the site as a result of past operational and waste disposal practices. Areas of concern are: waste pit, tank farm, and drain field.

01 [ ] G. Drinking Water Contamination
02 [ ] Observed (Date:) [ ] Potential [ ] Alle
03 Population Potentially Affected:
04 Narrative Description

Ground water in the industrial area is not used for drinking water supplies. The site is unlikely to influence water quality of the local drinking water supply source.

01 [X] H. Worker Exposure/Injury
02 [ ] Observed (Date:) [X] Potential [ ] Alle
03 Workers Potentially Affected: 12
04 Narrative Description

If safety procedures are violated, potential for worker exposure seems likely because of the toxic nature of products.

01 [ ] I. Population Exposure/Injury
02 [ ] Observed (Date:) [ ] Potential [ ] Alle
03 Population Potentially Affected:
04 Narrative Description

Current operations are unlikely to result in population exposure/injury.

SCOEPA00015531

POTENTIAL HAZARDOUS WASTE SITE
PRELIMINARY ASSESSMENT
PART 3 - DESCRIPTION OF HAZARDOUS CONDITIONS AND INCIDENTS

I. IDENTIFICATION
01 State: OR | 02 Site Num: D0277343

II. HAZARDOUS CONDITIONS AND INCIDENTS (Continued)

01 ☐ J. Damage to Flora — 02 ☐ Observed (Date: _____) ☐ Potential ☐ All
04 Narrative Description

None reported, observed, or suspected.

01 ☒ K. Damage to Fauna — 02 ☒ Observed (Date: Unknown) ☐ Potential ☐ All
04 Narrative Description (include name(s) of species)

The Willamette River is about 0.75 miles from the site. The presence of coal tar constituants have been detect in river sediments.

01 ☐ L. Contamination of Food Chain — 02 ☐ Observed (Date: _____) ☐ Potential ☐ All
04 Narrative Description

None reported, observed, or suspected.

01 ☒ M. Unstable Containment of Wastes (Spills/runoff/standing liquids, leaking drums) — 02 ☐ Observed (Date: _____) ☒ Potential ☐ All
03 Population Potentially Affected: _____ 04 Narrative Description

Potential for leaching of contaminants from disposed waste products into subsurface.

01 ☒ N. Damage to Off-site Property — 02 ☐ Observed (Date: _____) ☒ Potential ☐ All
04 Narrative Description

Damage to off-site property may result through subsurface migration of contaminants.

01 ☐ O. Contamination of Sewers, Storm Drains, WWTPs — 02 ☐ Observed (Date: _____) ☐ Potential ☐ All
04 Narrative Description

None reported, observed, or suspected.

01 ☒ P. Illegal/Unauthorized Dumping — 02 ☐ Observed (Date: _____) ☒ Potential ☐ All
04 Narrative Description

Waste products containing phenols and other tar compounds were disposed on site by Koppers Co., Inc. in the pas

05 Description of Any Other Known, Potential, or Alleged Hazards

Potential spills of liquid products as a result of a long operation period of the facility having a large store capacity and extensive piping system.

III. TOTAL POPULATION POTENTIALLY AFFECTED:

IV. COMMENTS

It is recommended that a study be conducted at the Koppers Co., Inc. Site.

V. SOURCES OF INFORMATION (Cite specific references, e.g., state files, sample analysis, reports)

Memo from Gray to Calala, 08/27/84, ODEQ Files; Analytical Results of Samples from Koppers Co., Inc. Site, 07/1 T. Berkmeir, 08/21/79, EPA Region X Files; Memo from C. H. Gray to G. Calala, 08/27/84; Memo, 11/27/87, USGS Me Memo, 07/28/1970, ODEQ Files.

SCOEPA00015532

A WORLD LEADER IN STEEL TECHNOLOGY

ESCO

ESCO CORPORATION 2141 N.W. 25TH AVENUE P.O. BOX 10123 PORTLAND, OREGON 97210 U.S.A. TELEPHONE (503) 228-2141 TELEX 36-059(

April 18, 1988

70586/02404

Mr. David Tetta
U.S. EPA
Superfund Branch
1200 6th Avenue, HW-113
Seattle, Washington 98101

RE: NL/Gould Superfund Site

Dear Mr. Tetta:

ESCO Corporation ("ESCO") has received and reviewed EPA Region X's February 18, 1988 letter to Roger Sherwood, ESCO, requesting information regarding the transportation, treatment or disposal of hazardous substances at the NL Industries/Gould Superfund Site (NL/Gould site).

ESCO understands that the NL/Gould Site is limited to property owned/operated by NL/Gould and which has been previously listed on the National Priorities List. We also understand that NL and Gould have completed a remedial investigation/feasibility study and that EPA has proposed a course of action for cleaning up the contaminated soil and battery casings underneath the site. We further understand that EPA's proposed cleanup plan may include additional studies of groundwater in the Doane Lake area.

ESCO is neither a current nor past owner of any part of the NL/Gould site, as we understand the site to be defined, and as referred to in the February 18, 1988 letter. ESCO does not now, nor has it ever, leased property at the NL/Gould site. ESCO has neither generated hazardous substances nor been involved in the transportation, treatment or disposal of hazardous substances at the NL/Gould site.

EPA's February 18, 1988 letter is ambiguous in stating the scope of property included within the CERCLA § 104 response requirements. The letter addresses three distinct physical entities, namely:

- "The site" - defined as NL/Gould site listed on the NPL list;

- "The study area" - defined as NL/Gould site and adjacent property owned by others; and

- "The groundwater unit" - defined as the groundwater contamination underneath the site.

Therefore, ESCO is not a responsible party at the NL/Gould site because it does not meet even the broad definition of responsible parties under CERCLA, as set forth in the February 18, 1988 letter.

Although ESCO is not a responsible party at the NL/Gould site, it is pleased to assist EPA in its investigation of the broader study area. Therefore, by reading EPA's requests, at pages two and three of the February 18th letter, to refer to the study area, rather than the NL/Gould site, ESCO provides the following response:

In answer to items 1,2,3, and 4:

From approximately 1953 until July, 1983, ESCO operated a non-hazardous landfill, known as the Willbridge landfill, under permit issued by the Oregon Department of Environmental Quality. ESCO initially leased the property from SP & S Railroad from approximately 1953 until 1966, when ESCO purchased the 10.3 acres adjacent to the NL/Gould site. Filling at the landfill ceased in December 1979. Cover of the landfill, in accordance with a plan approved by the Oregon Department of Environmental Quality, occurred in July of 1983. The cover plan included provisions for capping the landfill with soil and planting vegetation; that process was completed and the landfill is now vacant open land with a well-established vegetation cover.

The Willbridge landfill was operated by ESCO since the mid-1950's for the purpose of providing disposal facilities for foundry sand, slag, demolition debris, dust and foundry yard debris from ESCO's main plant located on Northwest 25th Street in Portland, Oregon, as well as its Plant #3 located on Yeon Avenue in Portland. Both plants are secondary steel foundries producing both large and small steel castings from scrap steel.

ESCO maintained no disposal records at the landfill, but its best estimate, based upon the size of the landfill and the

estimated depth of fill, is that the landfill contains approximately 300,000 cubic yards of fill, (e.g. 43,560 sq.ft./acre X 10 acres X 20 ft. deep = 322,666 cubic yds.), not including the soil cap. The majority of the estimated 300,000 cubic yards of fill is clay bonded sands and demolition debris. To the best of ESCO's knowledge, no hazardous wastes or substances, as defined by applicable federal law, have been disposed of at the Willbridge landfill.

Nevertheless, in the interest of assisting the EPA in further understanding the history of the broader study area, ESCO would note the following:

1. Chemically-Bonded Sand In The Landfill:

A small percentage of the fill consists of chemically bonded sand from ESCO's Plant #3. This chemically bonded sand contains a foundry resin to bond the sand together for cores and molds. In 1975, ESCO embarked on a pilot reclamation project which operated periodically, at the Willbridge landfill to reclaim this chemically bonded sand and metal. These chemically bonded sands contained minute amounts of phenolformaldehydes and some of this material may have reached the boundaries of Doane Lake. Upon learning of the potential release of phenolic compounds, ESCO immediately took steps to contain the wastewaters from the pilot reclamation unit and in 1976 discontinued the project. Nevertheless, a careful review of the CERCLA § 101(14) hazardous substances, and the various chemical lists referenced therein, indicates that phenolformaldehydes are not CERCLA hazardous substances.

2. Furnace Arc Dust In the Landfill:

ESCO disposed of a limited quantity of arc furnace dust at the landfill from 1971-1975 from both its main plant and Plant #3. In 1975, ESCO installed a furnace dust pellet reclamation system at the main plant and from then to the present all arc furnace dust from the main plant has been recycled.

Dust samples taken at the main plant in 1983 were subjected to EP toxicity tests and showed a total chromium value of 17.2 mg/L. Subsequent main plant arc furnace dust samples taken in 1986 showed a total chromium value of 0.19 mg/L. ESCO has also deposited arc furnace dust from Plant #3 in the Willbridge

landfill. EP toxicity lab reports done in 1983 on the Plant #3 arc furnace dust showed levels of chromium of 0.45 mg/L, far below the EP toxicity standard for chromium of 5.0 mg/L. The process at the Plant #3 uses raw materials with a lower chromium content than materials used at the main plant, so the low levels of chromium in arc furnace dust tested at Plant #3 plant are consistent with expectations.

The EP toxicity lab reports from 1983 and 1986 have been previously submitted to the DEQ under separate cover letter dated April 8, 1983 and September 12, 1986, from Joe Smith and Roger Sherwood, ESCO's previous and current Managers of Environmental Affairs. However, ESCO questions the usefulness of this data inasmuch as it may not conform with currently required sampling protocol and laboratory analysis QA/QC.

In addition, the Dames & Moore report relative to the NL/Gould site, at page 4-69 states: "EP toxicity test results for lead, arsenic, cadmium and chromium in West remnant [of Doane Lake] sediments were all below hazardous waste limits." Likewise, the Dames & Moore report for these states at pages 4-97:

> "Exposure risks from ground-water contamination on site seems to be confined to lead, arsenic, and chromium. These contaminants exist primarily in the region around East Doane Lake, extending downgradient to well PP-11. The possibility of migration of these contaminants off site is considered to be present primarily in the dissolved state. Current levels of dissolved lead, arsenic, and chromium at the most downgradient wells (W-11, W-10, and PP-11) indicate that no concentration above MCL's exists. The maximum dissolved lead concentration observed at these wells was 0.03 ppm and the average less than 0.02 ppm. The maximum dissolved levels of arsenic and chromium at these wells was less than detection limits (.005 ppm)."

Because the Dames & Moore sampling points of the West remnant of East Doane Lake are downgradient from the Willbridge landfill, the low levels of chromium and other heavy metals found in the West remnant support the conclusion that the lower 1986 test results are more indicative of actual total chromium levels in the furnace arc dust than the 1983 tests, and that total chromium is not an environmental issue in the landfill.

3. Zircon Sand In The Landfill:

Zircon sand, with detectable levels of naturally occurring radioactivity, were deposited at the Willbridge landfill until operation ceased in 1980. On June 4, 1987, in a letter from Martha G. Dibblee, Health Physicist, Radiation Control Section, Health Division, Department of Human Resources, to Roger Sherwood, Manager Environmental Affairs, ESCO Corporation, she states in part:

> "Our records show that your waste does, in fact, meet the 'Pathway Exemption' rules as stated in OAR 345-50-035, and, therefore, is not considered radioactive waste under ORS 469.300. It may be disposed of safely in a Sanitary Landfill."

The State of Oregon is recognized nationally for its stringent radiation regulations and the Oregon State Health Division, charged with administering the radiation program, has found the Zircon sand not to be a radioactive waste. Therefore, ESCO relies on this informed scientific/regulatory opinion in establishing its position that the Zircon sand does not constitute a threat to human health or the environment and should not be an issue for the broader study area.

In answer to items 5 and 6:

ESCO Corporation made no arrangements to transport hazardous substances away from the Willbridge landfill, and to the best of ESCO's knowledge, no hazardous substances were transported away from the Willbridge landfill by any other persons.

ESCO knows of no spills on or around the Willbridge landfill.

In answer to items 7 and 8:

At NL/Gould's request, several groundwater monitoring wells were installed on ESCO's property. The location of these wells is documented in Dames & Moore RVFS reports previously received by the EPA from NL/Gould.

Wells were also installed by the Health Division to test

for radiological monitoring, but ESCO does not know where these wells were located. However, included as Attachment #I are raw data from Health Division's sampling of those wells.

In answer to item 9:

ESCO has never installed any underground storage tanks on the Willbridge Landfill property, and to the best of ESCO's knowledge there are none on the property.

In answer to item 10:

ESCO is in the process of reviewing its insurance policies to determine coverage for damages resulting from releases of hazardous substances and/or hazardous wastes. After ESCO completes that review, and when and if any issue of ESCO's financial responsibility to address any environmental issue of concern to EPA is raised, ESCO will discuss with EPA its need for the requested information.

We will attend the July meeting mentioned in the letter; in the meantime, if ESCO can provide further information, please contact me.

Very truly yours,

ESCO CORPORATION

Roger Sherwood

Roger Sherwood, Manager
Plant Engineering and
Environmental Services

ATTACHMENT I

GROSS ALPHA AND BETA ACTIVITY

COUNTING DATA

ESCO WILLBRIDGE GROUNDWATER

APRIL 14 & 28, 1983

FROM OREGON STATE HEALTH DIVISION

USS ALPHA AND BETA ACTIVITY

COUNTING DATA

PROGRAM RML LOCATION ESCO WILLBRIDGE SAMPLE TYPE GR. WA

Sample Number	RML-108	RML-1089	RML-1090	RML-
Collection Date	4-14-83	4-14-83	4-28-83	4-28
Date Sample Counted	5-04-83	5-06-83	5-04-83	5-05
Elapsed Time (Days)	20	22	7	8
Volume of Sample	50	250	5	50
Programmer Number	3	2	2	6
Gross Beta Counts	712	365	711	63
Counting Time	600	100	600	60
Gross Counts per minute	1.187	3.650	1.185	1.0
Bkg. Counts per minute	0.985	0.985	0.985	0.9
Net Counts per minute	0.202	2.665	0.200	0.0
Final Weight Planchet		6.6871		
Initial Wt. Planchet		6.6660		
Weight of Deposit	30.4 α	21.1		
Self Absorption	[illegible] 0.81 β	[illegible]	[illegible]	0.92 α
BETA (pCi/l) Activity	[illegible] ± 3.4	12.3 ± 1.8	[illegible]	< 28
Program Number	4	2		6
Volume of Sample	10	250	5	5
Date Sample Counted	5-05-83	5-06-83		5-05
Elapsed Time (Days)	21	22		8
Gross Alpha Counts	22	2	18	15
Counting Time	600	100	600	60
Gross Counts per minute	0.037	[illegible]	0.03	0.02
Bkg. Counts per minute	0.037	0.037	0.037	0.03
Net Counts per minute	0.000		(−)	(−)
ALPHA (pCi/l) Activity	< 5.9	[illegible]	< 26	< 15
REMARKS:	[illegible] 6.6808 / 152.2 β	[illegible] 6.6556 / 3.1	6.6779 6.6357 / [illegible]	6.792 6.627

SCOEPA00015540

GROSS ALPHA AND BETA ACTI

COUNTING DATA

G

PROGRAM RML LOCATION ESCO WILLBRIDGE SAMPLE TYPE W

Sample Number	RML-112	RML-113	
Collection Date	4-28-83	4-28-83	
Date Sample Counted	5-05-83	5-06-83	
Elapsed Time (Days)	8	9	
Volume of Sample	50	250	
Programmer Number	5	1	
Gross Beta Counts	591	292	
Counting Time	600	100	
Gross Counts per minute	0.968	2.920	
Bkg. Counts per minute	0.985	0.985	
Net Counts per minute	(—)	1.935	
Final Weight Planchet		6.6944	
Initial Wt. Planchet		6.6607	
Weight of Deposit	37.85.	337	
Self Absorption	0.74α : 0.99β	0.77α : 0.99β	
Beta (pCi/l) Sensitivity	< 29 [illegible]	9.0 ± 1.6	
Program Number	5	1	
Volume of Sample	5	250	
Date Sample Counted	5-05-83	5-06-83	
Elapsed Time (Days)	8	9	
Gross Alpha Counts	10	20	
Counting Time	600	100	
Gross Counts per minute	0.017	0.200	
Bkg. Counts per minute	0.037	0.037	
Net Counts per minute	(—)	0.163	
Alpha (pCi/l) Sensitivity	< 19	2.5 ± 1.4	
REMARKS:	6.9474 6.5664 2785	(illegible) 6.5509	

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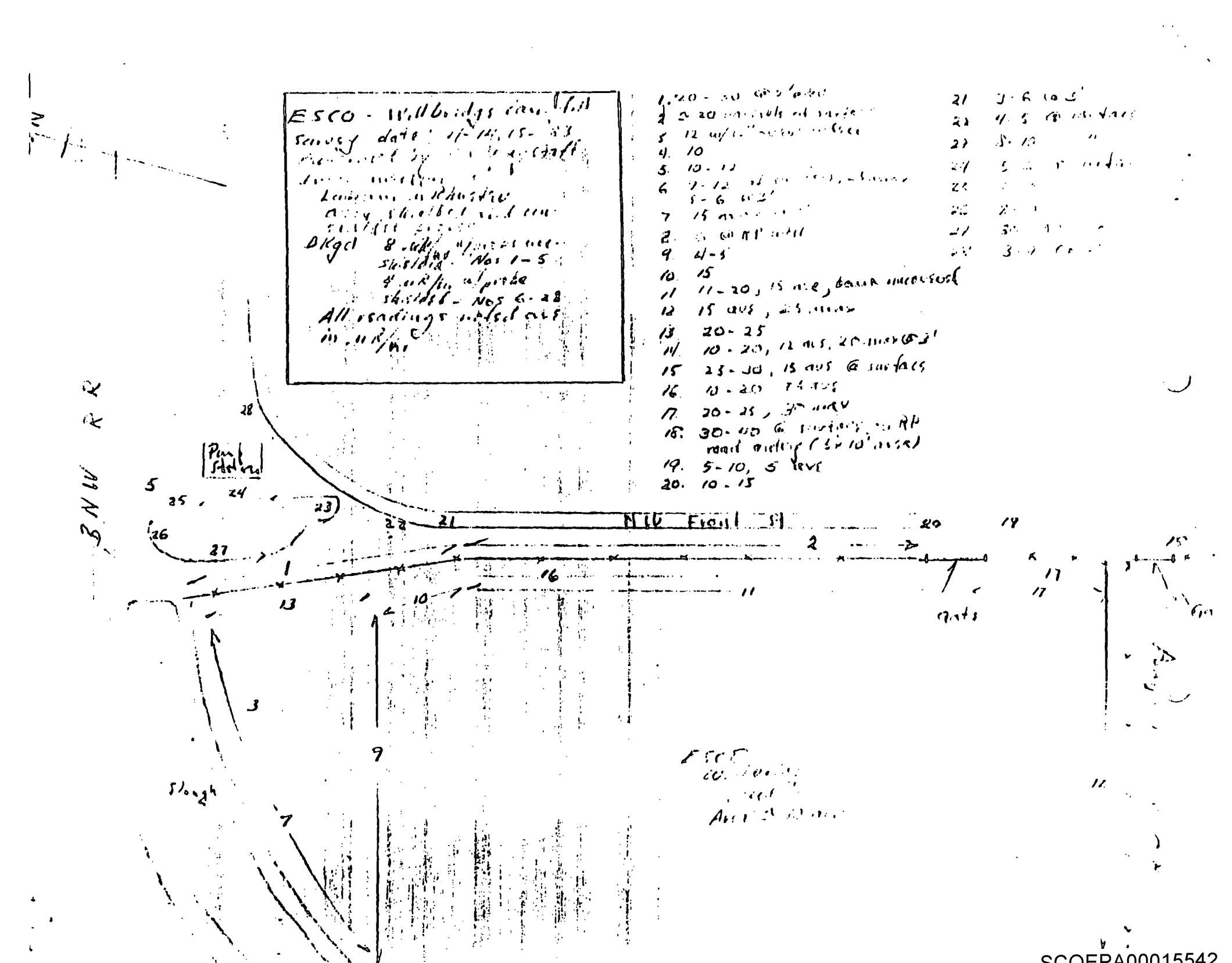


SCOEPA00015542

NORTHWEST NATURAL GAS COMPANY

220 N.W. SECOND AVENUE PORTLAND, OREGON 97209

(503) 226-4211

March 8, 1988

Mr. David Tetta
United States Environmental
Protection Agency
1200 Sixth Avenue (HW-113)
Seattle WA 98101

RE: NL/Gould Superfund Site

Dear Mr. Tetta:

Enclosed is a proposed site characterization work plan which has been developed for our property by Camp Dresser & McKee in connection with a recent study initiated by the Oregon Department of Environmental Quality.

I believe it contains all the information you requested in items one (1) through eight (8) of your February 18 letter. As to item nine (9), we are aware of only one underground storage tank on this property. It is described in the enclosed copy of Oregon DEQ Notification of Underground Storage Tanks report, dated April 7, 1986. We are not aware of any unused tanks on the property.

We have begun research to determine if any of the company's policies of insurance provide coverage for releases of hazardous materials or wastes and will inform you if such coverage is available.

Sincerely,

E.L. Bolin, Manager
Land & Claims Department

ELB/k
Enc.

cc: Richard D. Bach

SCOEPA00015543

2.0 EXISTING SITE CONDITION SUMMARY

2.1 SITE DESCRIPTION

2.1.1 SITE LOCATION

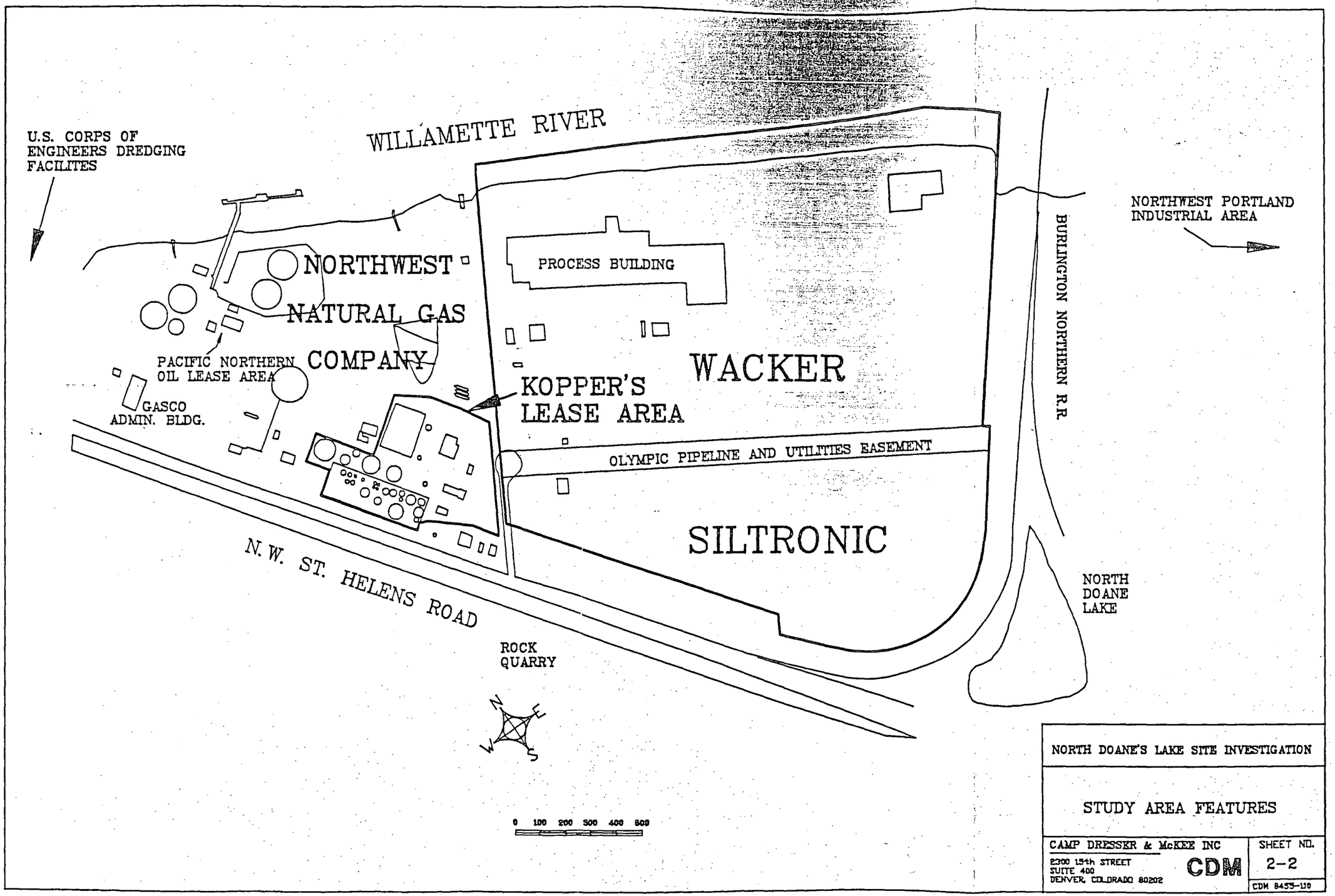
The location of the North Doane's Lake site is in the northwest part of Portland on the west bank of the Willamette River, northwest and downstream of the Northwest Portland industrial area. For the purposes of this study, the site includes land occupied by the former Portland Gas and Coke Company manufactured gas facility, the Northwest Natural Gas (NWNG) LNG facility; Pacific Northern Oil's petroleum terminal; the Koppers Company creosote terminal; and the Wacker Siltronic Corporation semiconductor manufacturing facility. Both Pacific Northern Oil and Koppers lease the property from NWNG. NWNG owns the northwestern part of the site and Wacker owns the southeastern part of the site. Figure 2-1 is a recent aerial photograph of the study area. Figure 2-2 identifies current day features within the study area for reference.

This study area is roughly triangular in shape, consisting of about 120 acres. The northeast boundary of the site is the Willamette River; the southeast boundary is the Burlington Northern (BN) Railroad berm along the approach to the BN Railroad Bridge; the southwest boundary is the main BN Railroad track adjacent to N.W. St. Helens Road; and the northwest boundary is the property line between NWNG property and the U.S. Army Corps of Engineers Moorings facility, which is southeast of the St. John's Bridge. The site is about 6 miles upstream of confluence of the the Willamette River with the Columbia River.

2.1.2 SITE HISTORY

This section discusses history of the site to the present. Much of the information was obtained from a site history prepared for Walker Siltronic

SCOEPA00015544



SCOEPA00015545

Corporation by the Portland Development Commission (1984). Section 2.2 presents a detailed discussion of past waste product disposal practices.

In 1883, a rail line was begun between Portland and Astoria and completed in 1898. This is the line that is now owned by BN and forms the southwest boundary of the site. The railroad bridge across the Willamette River was completed in 1908. The railroad leading to the bridge bisected Doane Lake, a small shallow lake originally located partly on the southwest edge of the site.

The federal government purchased the property immediately northwest of the study area in 1903 and 1905 for moorings. Additional property was purchased in 1940. The area of 11 acres is currently used by the U.S. Army Corps of Engineers for storage and operating facilities for dredges and other floating equipment.

In 1913, the Portland Gas and Coke Company built a residual oil gasification facility, known as the GASCO facility, on the present-day NWNG property. The plant produced 570 Btu town gas and pressed lampblack briquettes, which were sold in the area as solid fuel. Beginning in 1923, the process was modified to optimize aromatic generation and light oil recovery for use as motor fuel. In 1925, tar recovery and refining were initiated to provide tar for use as road binder. During the 1930's, the plant expanded and in 1941 a coking plant began production of electrode grade coke and high Btu gas. With the availability of natural gas in the 1950's, much of the facility was shut down and dismantled. The last full year of operation was 1955. Natural gas arrived in 1956 and Portland Gas and Coke became Northwest Natural Gas Company (NWNG) in 1958. NWNG began construction of a liquefied natural gas (LNG) plant in the late 1960's and most of the old gasification plant facilities were demolished.

A small area of the southeastern part of the former plant site, including a small tank farm, was leased to Koppers Company Inc., Organic Material Division. Koppers built a plant in 1966 to make coal tar pitch for the

SCOEPA00015546

aluminum industry. Koppers land farmed wastewater from the tar stills on the property. The coal tar pitch plant ceased operation in 1973. Koppers still leases the facility which currently serves as a terminal for distribution of creosote oils for wood treating.

During the 1960's, several large tanks at the northwest edge of the property near the river were leased to Pacific Northern Oil. Pacific Northern continues to lease and operate in this location today. Oil is received by ship, stored in the tanks, and distributed to customers.

In the 1970's, all of the remaining gas plant structures outside of the lease areas, except for the GASCO Administration Building, were demolished. Most of the spent oxide pile was taken to the Scappose, Oregon landfill. The remaining tar pond was filled with spent oxide, material from the adjacent rock quarry and overburden after action by the Coast Guard regarding leakage of oil from the tar pond to the river. Underground piping was also removed and sold as scrap. The Administration Building remains [redacted]. In the early 1980's, NWNG added a new dock, three tanks, and a new drainage system.

NWNG continues to operate the LNG plant on the property today. During 1985, NWNG contracted to have the river dredged near the docks to accommodate tankers making deliveries to Pacific Northern Oil. About 500 cubic yards of dredge material was taken to an off-site landfill. The U.S. Army Corps of Engineers (COE) dredges the Willamette periodically to maintain the channel. The river reach near the site between the St. John's Bridge and Burlington Northern bridge was last dredged in 1973.

The southeastern part of the site, which is currently owned by Wacker Siltronic Corporation, was formerly a low-lying swampy area occupying an abandoned river oxbow, that was subject to winter flooding. Several small buildings existed on the site in the 1930's on the river bank near the railroad bridge. Western Transportation had a river dock with two piers,

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five buildings and two fuel tanks. The facility was used for refueling tugs, and to tie up log rafts and barges. The dock and piers were removed in the 1950's, and the buildings by 1973.

In the 1930's, Shell Oil Company built a dock and building on the river bank at the boundary of the present-day Wacker and NWNG properties, with a road following that present boundary. Shell purchased a by-product from Portland Gas and Coke and shipped it by barge from the dock. By 1957 the facility was apparently abandoned and the building destroyed by 1973.

The present-day Wacker property was purchased in 1962 from the railroad and Portland Gas and Coke. The purchasers agreed to fill the site to a minimum elevation of 30 feet by the end of 1973 and construct industrial buildings by the end of 1978. The site was filled with material from the adjacent rock quarry (Figure 2-2) and dredge material from the Port of Portland. Port of Portland records indicate that 695,522 cubic yards of dredge material was placed on the site in 1974. Total fill, including rock, was estimated to be 1,529,400 cubic yards. Settling ponds containing tar along the property line with the gasification facility were filled and the contents spread over the low lying area at this time.

In 1978, the City of Portland Development Commission purchased the site as part of an urban renewal project and sold it to the Wacker Siltronic Corporation in the same year. Construction of the Wacker plant began in October 1978. Construction was completed in December 1979, and operation began in March 1980.

Two pipelines that run parallel to the river, cross the site. The pipelines carry a variety of petroleum products and are operated by Olympic Pipeline.

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2.1.3 ENVIRONMENTAL SETTING

2.1.3.1 Site Physiography and Climate

The study area is located on artificial fill placed on floodplain deposits on the south bank of the Willamette River. The Willamette River flows northwest to its confluence with the Columbia River approximately six miles downstream. The river's floodplain varies in width from several thousand feet southeast of the site to approximately 500 feet wide northwest of the site. The land surface is generally flat across the site due to the extensive artificial fill. Elevations range from about 45 feet above mean sea level (MSL) on the southwest adjacent to the NW St. Helen's Road to less than 10 feet above MSL on the northeast side, near the Willamette River. Immediately southwest of the study area are the Tualatin Mountains, which rise to over 1,100 feet elevation. These mountains form an escarpment 800 feet high near the study site, and parallel the river throughout the Portland area.

The region has a temperate maritime climate, with mild, wet winters and warm, dry summers. Mean annual precipitation in the area is approximately 44 inches. The average annual evaporation is about 26 inches (USDOC, 1968).

2.1.3.2 Geology

The Columbia River basalt is the uppermost bedrock unit underlying the study area. It consists of a series of basaltic lava flows which were emplaced during the middle Tertiary Period, when the Cascade and Coast Ranges were being formed. The Tualatin Mountains southwest of the site were formed by tectonic folding of the basalt during this time. The contacts between individual basalt flows on the northeast flank of the Tualatin Mountains dip approximately 15 degrees to the northeast, toward the Willamette River (Trimble, 1957). Individual lava flows vary in thickness but are typically about 50 feet thick where exposed in the

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Tualatin Mountains (Trimble, 1957). Each flow is characterized by a fractured upper surface which formed due to rapid cooling. This zone of fracturing at the upper surface forms a planar zone of permeable material. A deep bedrock valley roughly parallel to the present day Willamette River was eroded in the surface of the basalt during times of lower sea level. Drilling information within the study area indicates the depth to this erosional bedrock contact ranges from about 40 feet near the road at the southwest boundary of the site, to about 150 feet adjacent to the river.

Unconsolidated deposits of relatively recent age overly the Columbia River basalt in the study area. The unit immediately above the basalt consists of interbeded fine to medium sand and silty sand layers, and is thought to have been deposited in a lake environment approximately 19,000 years ago, near the end of the last major ice age (Trimble, 1957). These deposits range up to approximately 30 feet in thickness immediately southeast of the site (Dames & Moore, 1983). Overlying the lake-deposited sediments are more recent channel, point bar, and overbank deposits of the Willamette River. This unit consists of interbedded layers of fine sand, silt and organic clay. The uppermost layer of unconsolidated material is composed of man-made fill, including debris from former site facilities, process wastes, materials from a nearby rock quarry and sediment from dredging operations on the Willamette River. The unconsolidated deposits vary in thickness across the site from less than five feet along the flank of the Tualatin Mountains to over 150 feet near the Willamette River.

Figure 2-3 shows the approximate location of subsurface borings that have been completed within the study area for various purposes, including foundation exploration and monitoring well installation. The plan view of the lines of cross-section for Figures 2-4 and 2-5 are also shown on Figure 2-3. These simplified geologic cross-sections, which are based on borings from various sources, indicate that the unconsolidated deposits are generally flat lying throughout the site. Copies of boring logs used in the study area cross-sections are provided in Appendix A. It should be noted that the lithologic units are gradational in nature and the

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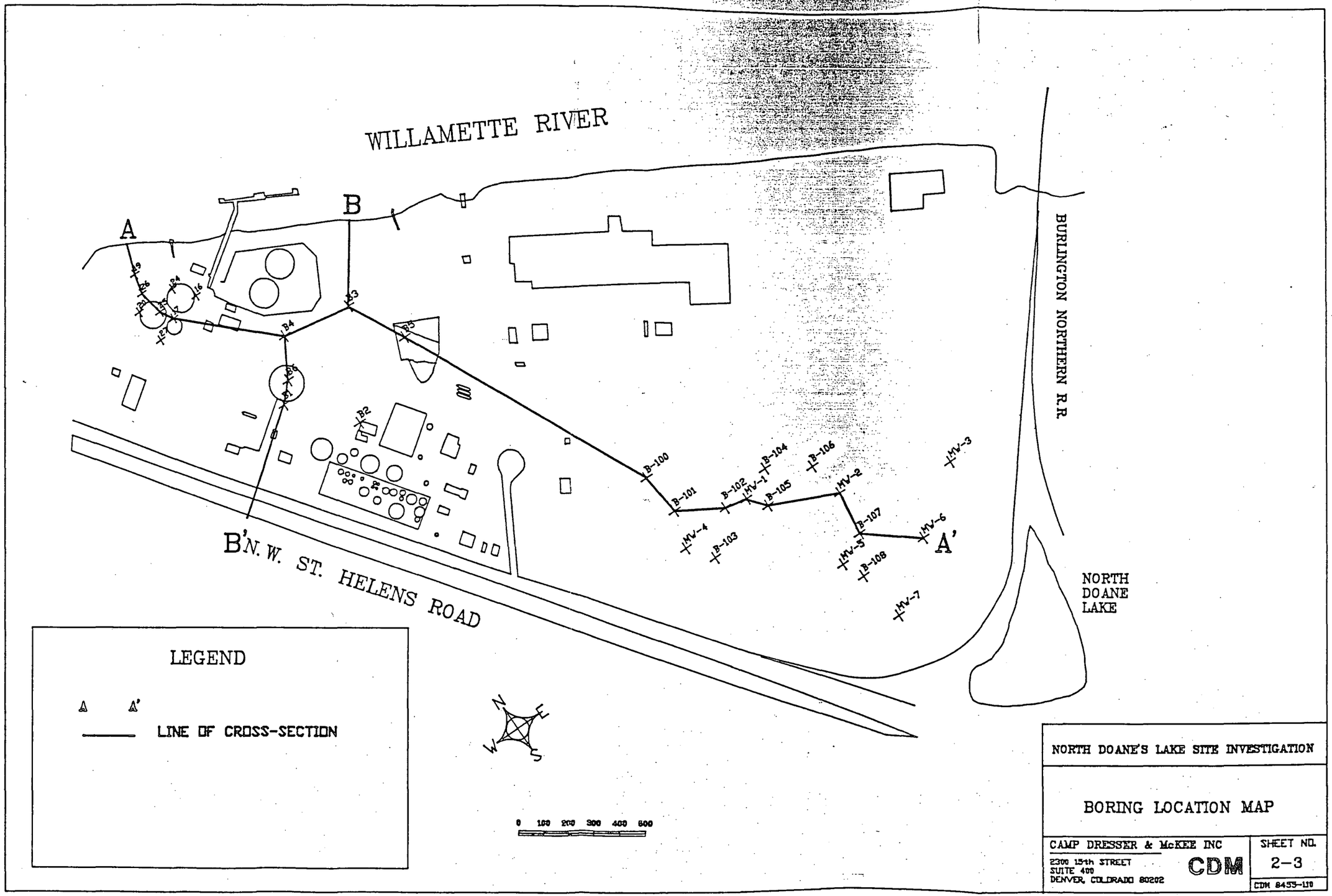


LEGEND

A A' — LINE OF CROSS-SECTION

NORTH DOANE'S LAKE SITE INVESTIGATION

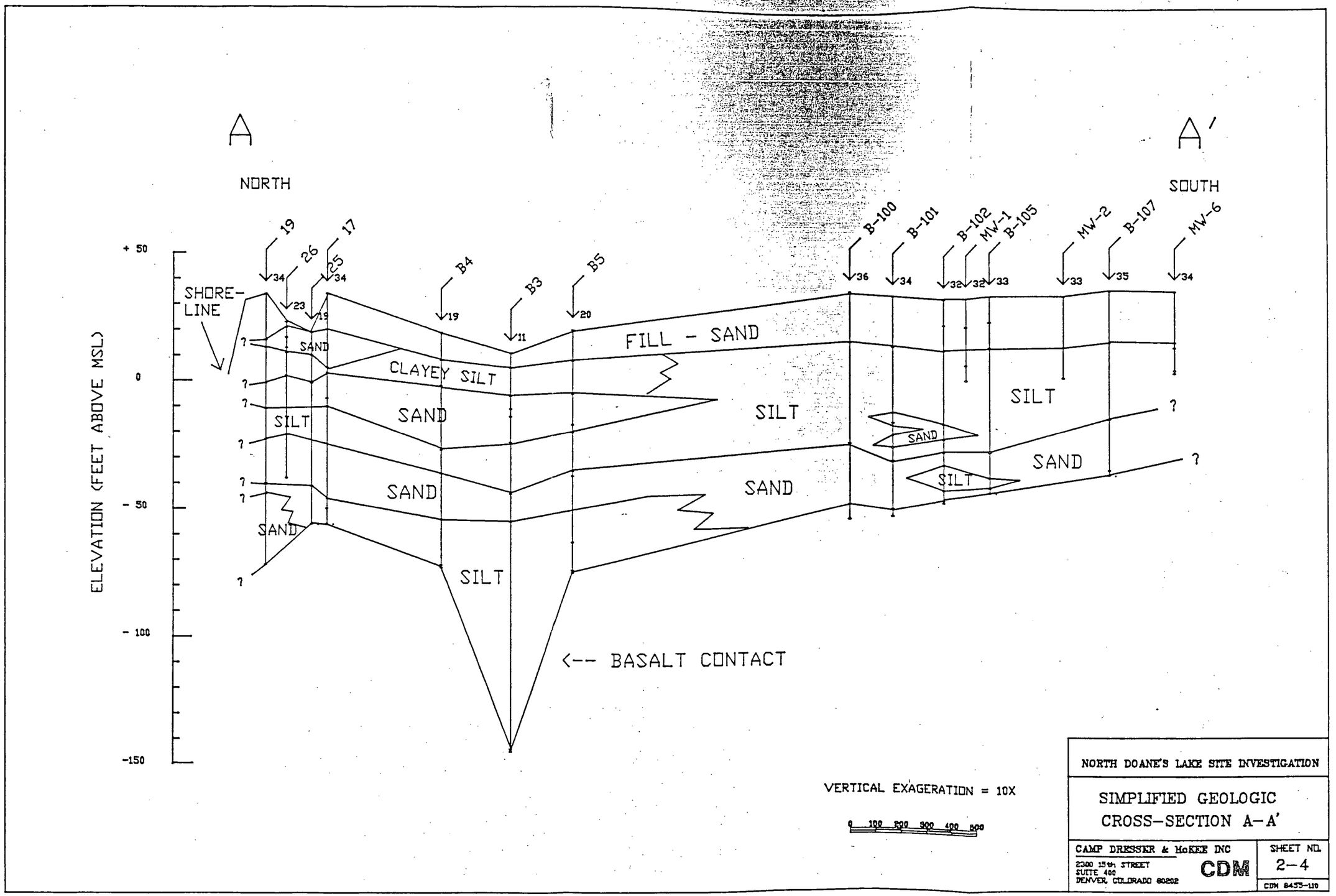
BORING LOCATION MAP

CAMP DRESSER & McKEE INC
2300 15th STREET
SUITE 400
DENVER, COLORADO 80202
CDM

SHEET NO. 2-3

CDM 8453-110

SCOEPA00015551



NORTH DOANE'S LAKE SITE INVESTIGATION

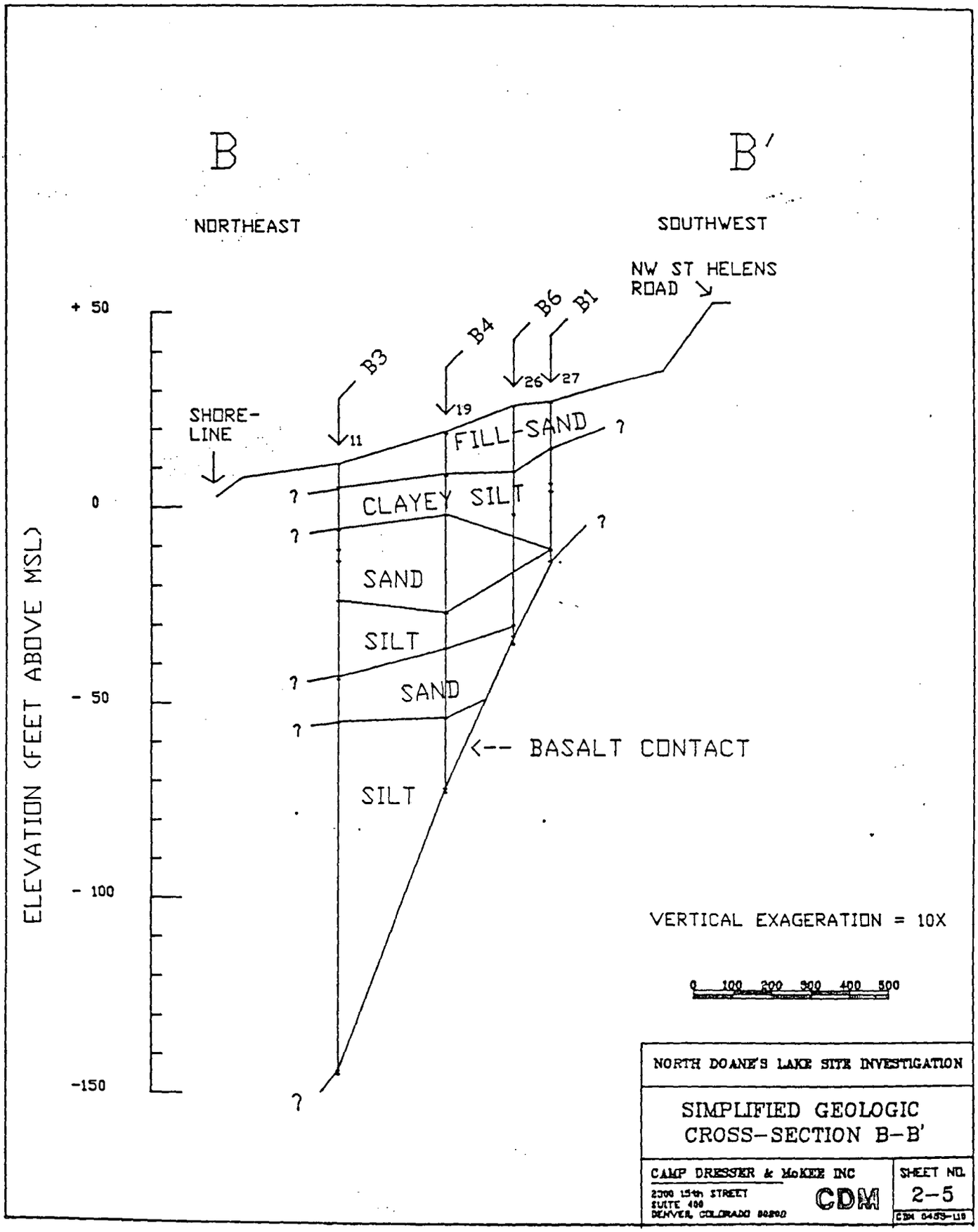
SIMPLIFIED GEOLOGIC CROSS-SECTION A-A'

CAMP DRESSER & McKEE INC
2300 15th STREET
SUITE 400
DENVER, COLORADO 80202
CDM

SHEET NO.
2-4

CDM 8433-110

SCOEPA00015552



NORTH DOANE'S LAKE SITE INVESTIGATION

SIMPLIFIED GEOLOGIC CROSS-SECTION B-B'

CAMP DRESSER & McKEE INC
2300 15th STREET
SUITE 400
DENVER, COLORADO 80202

CDM

SHEET NO.
2-5

CDM 0453-L19

SCOEPA00015553

simplified notation used implies only the dominant lithology within the interval shown at individual borings. A clay-rich zone underlies the surficial fill over most of present NWNG property, but appears to be absent in the Wacker property borings, as indicated on Figure 2-3. Absence of the clay rich zone under the Wacker property may be related to meandering of the river and subsequent scouring and erosion of the clay sediments, but since different companies were responsible for drilling, the apparent difference may be due to differences in logging terminology. A 1936 aerial photograph of the area does, however, show an abandoned river meander on the site of the present Wacker property that corresponds to the area in which the clay-rich zone is absent.

Underlying the clay-rich layer on the NWNG property are interbedded sands and silts. They extend down to an erosional contact with the Columbia River basalt, as shown on Figure 2-4.

2.1.3.3 Hydrology

Surface Water

The Willamette River is the most significant surface water feature in the vicinity of the study area. It is over 1,200 feet wide adjacent to the site with a maintained navigational channel depth of 40 feet. The river flows to the northwest, toward its confluence with the Columbia River six miles downstream. Discharge averages approximately 20,000 cfs (cubic feet per second), but varies with ocean tides and stage in the Columbia River. The Willamette River is the local base level, or drainage point for the area. Its surface elevation averages approximately two feet above MSL in the area, and fluctuates about 5 feet on a daily basis due to tidal influences. The bottom sediments in the river channel consist primarily of silt size particles, based on Corps of Engineers analysis of dredged samples. The river is used for shipping and provides ocean going vessel access to the Port of Portland dock facilities.

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CERTIFIED MAIL - RRR

March 15, 1988

Mr. Robie Russell
U.S. Environmental Protection Agency
Region 10
1200 Sixth Avenue (HW-113)
Seattle, WA 98101

Subject: Gould Inc. CERCLA Site
Comments on RI/FS

Dear Mr. Russell:

This will provide you with NL Industries, Inc.'s comments on the Final Remedial Investigation/Feasibility Study (RI/FS) for the Gould Inc. CERCLA site. The RI/FS was prepared under the requirements of Administrative Consent Order (ACO) No. 1085-05-08-106, signed August 28, 1985. NL Industries, Inc. is providing you with the following comments which we expect EPA and DEQ to address thoroughly in a response. Further, we request this letter and your response to it, be made part of the public record.

Introduction

The Gould Inc. site is located in a heavily industrialized section of Portland, Oregon. Neighbors to the site include Rhone-Poulenc, American Steel Industries, Liquid Air Corporation and others. Although elevated lead levels are present in on-site soils and in the groundwater directly beneath the site, lead is not migrating off site in any media. The groundwater in the area is not a source of drinking water. East Doane Lake, which is on the site, is uninhabited. Elevated lead-in-air emissions from the site are absent unless the site is disturbed. The site, therefore, presents little, if any, threat to public health or the environment at the present time.

NL Industries, Inc.
Environmental Control Department
P.O. Box 1090, Hightstown, N.J. 08520 Tel. (609) 443- 2329

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It has been the unwavering position of the Potentially Responsible Parties (PRP's), that a predicate to the study conducted is the fact that Gould's placement on the National Priorities List (NPL) is in error. This was documented in Gould's letter of February 25, 1983 (included in Appendix F of the FS), to Mr. Russell H. Wyer, EPA Regional Director, which indicates the Hazard Ranking System (HRS) scoring for the site was developed improperly from an observed air release, which should never have been measured for inclusion in the score. The observed air release was part of a response action, and in accordance with regulations, releases must be scored on the basis of conditions that existed prior to response actions. Air releases caused by disturbances during response actions or site investigations must not be taken into account in HRS scoring (47 FR 31187 and 47 FR 31189). These and other defects in the scoring have been noted in the 1983 letter, including improper sampling techniques. Indeed, it is doubtful that the Gould site would qualify for inclusion on the National Priorities List if rescored today.

Since Gould's comments on the HRS were to little avail and the site was added to the NPL, the PRP's entered into an agreement with EPA to conduct the Remedial Investigation/Feasibility Study (RI/FS). The RI has been submitted. The FS has been completed and submitted along with the Endangerment Assessment according to EPA's standard protocol identified in the Public Health Evaluation Manual (OSWER Directive 9285.4-1, 1986), and other EPA guidance.

As required by standard EPA guidelines, many assumptions were utilized in the Endangerment Assessment which are clearly inappropriate for this site. These include the on-site residences assumption, worst-case exposure levels, and others. Because of these overly conservative estimates, the Endangerment Assessment showed that the selection of some alternative more stringent than the No-Action Alternative is appropriate for this site. Even with these conservative and inappropriate assumptions, the Endangerment Assessment cannot support selection of any alternative other than that which is being recommended in the FS.

The Recommended Remedial Alternative identified in the FS report, Alternative 2C, consists of removal and treatment/recycling of battery casing surface piles, treatment of the waters of East Doane Lake, soil treatment, capping of a portion of the site with low-permeability clay, and implementation of institutional controls to prevent potential exposure, however unlikely, to the remaining on-site contaminants. This alternative represents a common-sense approach to a complex problem, and has many similarities to EPA selected alternatives at other related sites undergoing remediation. Further, Alternative 2C meets the requirements of the Comprehensive Environmental Response, Compensation and Liability Act of 1980, as amended by the Superfund Amendments and Reauthorization Act of 1986, which requires EPA to select a remedial action which protects human health and the environment, is cost effective, utilizes permanent solutions and treatment/recovery as practicable, and meets relevant and appropriate standards. As indicated in the FS, only Alternative 2C is rated as "High" across-the-board for those screening criteria required by EPA to be addressed in the analysis of the alternatives.

None of the other alternatives meet all of these mandatory criteria, and therefore are not eligible for selection as the preferred alternative.

In their desire for reassurance that the selected alternative is appropriate, the PRP's retained a second independent organization to review the RI and the Draft FS. Clean Sites, Inc., with the assistance of Environmental Standards, Inc., conducted a thorough evaluation of the draft FS with particular attention to the Endangerment Assessment portion. Their report strongly supports Dames & Moore's selection of Alternative 2C.

In anticipation of questions regarding the use of institutional controls at the site, the PRP's have reviewed recent EPA Records of Decisions (ROD's) and found that institutional controls are integrated in 10 out of 75 available ROD's, including the Sapp Battery site in Jackson County, Florida (Region 4), the Western Processing site in Kent, Washington (Region 10), the

Pepper Steel and Alloys site in Dade County, Florida (Region 4), Marathon Battery, Putnam County, New York (Region 2), Arcanum Metal in Arcanum, Ohio (Region 5), as well as others. Moreover, the Oregon Legislature fully supports the creation of institutional controls to restrict land uses of hazardous waste disposal sites. The support is embodies in paragraph 466.360(2) of the Oregon Notice of Environmental Hazards Act, which states:

> "It is hereby declared to be the public policy of this state to give notice to local governments of potential hazardous disposal sites and to impose use-restrictions on those sites."

This statute, as well as other means of applying institutional controls to the Gould site, are discussed fully in Appendix D of the FS.

A draft FS was submitted to EPA in December, 1987. In a meeting on January 26, 1988 with EPA, the Agency indicated that it is EPA's desire to disregard the remedial alternative recommended in the RI/FS which took over 2 years to complete, and implement a full-scale excavation effort at the Gould site. This remedial alternative consists of excavating the entire 80,000 cubic yards of battery material, separation of components, recycling as much as possible and landfilling the remainder. This alternative, known as Alternative 10C in the FS report, will cost in excess of $20 million (probably significantly in excess of that figure), and, ironically, all this will be spent on an effort which recycles an inconsequentially small amount of material, about 3 percent.

Further, implementation of Alternative 10C involves substantial air emissions during remediation, potential health effects to workers and visitors, unproven technologies for the separation step, and a potential increase in hazardous waste volume.

To justify its position that all battery casings must be "addressed" (indicated to the PRP's during the January 26 meeting), EPA focuses on removal of lead from the site, rather than treatment to produce a non-hazardous waste. Alternative 10C does, in fact, assure the removal of a

very small portion of the total lead compounds present, the metallic lead particulates, which have the least potential for environmental damage. In its desire to implement Alternative 10C, EPA chooses to regard with insignificance that, after the considerable processing of these wastes at an estimated expenditure in excess of $20 million, exposing the surrounding community to lead-bearing dust and violating the National Ambient Air Quality Standard for 5 years, 97 percent of the waste at the site remains hazardous, and then must be transported to a hazardous waste landfill. This landfill ultimately will be required to implement all the institutional controls, including long-term monitoring, which are mentioned under Alternative 2C. Thus, the recycling and treatment potentials of Alternative 10C are extremely insignificant and ineffective in carrying out the intent of SARA.

Investigations conducted during the course of the FS demonstrate the history of failure of such efforts. The PRP's have within very restricted time limits conducted bench scale tests and full scale tests to determine the feasibility of battery casing separation and component stream recycling. The number and scope of these tests is much greater than at any other site with similar contaminants, including a site where the RI/FS was conducted under the direct supervision of EPA.

In summary, NL objects to the remedy selected by EPA because the detailed FS indicates: i) Alternative 10C is potentially harmful to public health and the environment, both short term and long term, due to predicted airborne releases of lead during the 5 year implementation and subsequent off-site dust accumulations, ii) Alternative 10C relies on unproven technology and is thus not practicable, iii) Alternative 10C will not significantly reduce toxicity, mobility or volume of the site contaminants. The FS clearly indicates the opposite is true as Alternative 10C increases mobility and volume of site contaminants, iv) Alternative 10C will results in the off-site landfill disposal of approximately 97 percent of the existing waste, v) Alternative 10C is not a cost-effective action to remediate the Gould site.

In contrast, Alternative 2C is fully protective of human health and the environment as evidence by the RI/FS, the Endangerment Assessment, the "second opinion" provided by Clean Sites, and the clear preponderance of data demonstrating insignificant migration of airborne or water soluble lead off-site. When the surface piles of case material is removed, and the site is capped above a layer of lime, the mobility of the remaining contaminants will be effectively curtailed. Alternative 2C involves no sharply increased risks to human health, as does 1OC. Thus it is the position of NL Industries, as fully set forth in the FS, that Alternative 2C best satisfies the CERCLA requirements for selection of a remedy.

Improper Administrative Action

NL Industries maintains that EPA and DEQ have failed to follow basic administrative and environmental law principles in selecting their preferred alternative without first reviewing and considering the FS. The RI/FS is supposed to precede the selection of the preferred alternative, but this was not done in this case, as evidence by the following chronology:

DEQ stated in a meeting with the PRP's as early as December 19, 1987, that the casings, including the subsurface casings, will have to be addressed (e.g. treated and/or disposed of). This apparent decision was made by senior DEQ management despite the fact that it was acknowledged they had not read the draft FS. EPA/DEQ further described their Preferred Alternative to the PRP's in great detail in a meeting on January 26, 1988. Such detail was not derived from the Feasability Study report, because it was not yet available to the Agencies. Neither EPA nor DEQ were thoroughly aware of the contents of the FS prior to its date of publication, February 12, 1988.

Moreover, not only did EPA and DEQ select a remedy without taking into account the FS, they also disregarded the recommendations of Clean Sites, Inc. and their subcontractor, Environmental Health, Inc. As previously

indicated, Clean Sites conducted an independent review of the FS and concluded that selection of Alternative 2C over 10C is appropriate for the Gould Inc. CERCLA site.

Clean Sites most recent report, included herein as Attachment 1, strongly supports Alternative 2C, and, like their report on the draft FS, emphasizes several undesirable effects of implementing Alternative 10C. Environmental Standards indicates that risks due to ingestion of lead laden soils and dust off-site caused by large scale excavation have not been reflected in the Hazard Rating scores of the Endangerment Assessment, and should have been. Thus, alternatives such as 10C are now shown to be less acceptable than previously indicated in the long term. Dr. Kenneth Symms of Environmental Standards states on page 6 of Attachment 1:

> "Hazards attributable directly to remedial actions in this case are not "short-term." Rather, those alternatives involving excavation may create a significant off-site reservoir of accessible lead contamination that would persist long after remediation of the site was completed. The EA points out that maximal management controls and practices may be inadequate to prevent this contamination. Risk management decision makers should be aware of this situation."

This is another item which EPA/DEQ has ignored, and did not consider in defining the mobility of the lead while implementing Alternative 10C.

Detailed Criticism of Alternative 10C

The following presents an enumeration of the reasons why Alternative 2C is the best remedy for the site, under CERCLA, and why 10C is unsuitable and raises questions that must be addressed by the Agencies.

1. Air Emissions - Endangerment Assessment

Air emission modeling was conducted during the development of the Endangerment Assessment section of the FS. The modeling was done in

accordance with standard scientific procedures, utilizing an accepted dispersion model and incorporating assumptions, including the fact that, for Alternative 10C in particular, the battery casings would be wet during the excavation process. The model used is a Gaussian type model, and as stated in EPA's Guideline on Air Quality Models (EPA 450/2-78-027), "Gaussian models are considered to be state of the art techniques for estimating concentrations of SO_2 and particulate matter. They are the best choice for most point source evaluations". Results of the dispersion model are provided in Appendix A, Attachment C, and indicate off-site airborne emissions of 10.404 ug/M^3 for Alternative 10C. This is almost 7 times in exceedance of the National Ambient Air Quality Standard of 1.5 ug/M^3, which is the federal standard implemented by the Clean Air Act to protect public health. The aforementioned exceedances would occur continuously over a 5 year period.

In order to reassure the efficacy of this input to the Endangerment Assessment and realizing the significance of this modeling effort, NL re-evaluated the emissions potential of Alternative 10C using the Industrial Source Complex-Short Term (ISCST) model. Like the model used in Appendix A of the FS, the ISCST model is a gaussian distribution model, and is the EPA preferred model for Alternative 10C.

In response to DEQ concerns that moisture/precipitation is expected to significantly reduce emissions indicated in the FS, the Compilation of Air Pollutant Emission Factors (EPA 1975) was utilizied to develop appropriate levels of emissions reduction through moisture/ precipitation, largely because this is EPA's own guideline document for developing the same. The maximum reductions recommended in the publication were utilized, including a 50 percent reduction for excavation, utilization of a precipitation-evaporation index of 153 (which is EPA's own recommendation for the Portland area taken from the aforementioned publication) plus a further 40 percent reduction for materials storage. Further, no emissions from the wet separation process are assumed, and crushing and screening emissions were reduced

by 80 and 60 percent respectively, due to gravity settling which may occur in the plant. All these considerations more than adequately address the emissions reductions which would occur through the presence of moisture/precipitation.

The results from the ISCST model indicated significantly higher levels of airborne lead for Alternative 10C than was indicated previously in the FS. The highest off-site concentrations is now indicated to be 37.34 ug/M^3, which is approximately 25 times the level allowable under the Clean Air Act. Of course, airborne lead would be dispersed wherever winds would carry such particulates, but the ISCST model indicates that the air emissions caused by implementing this alternative would violate the NAAQS standard approximately one-half mile from the site in all directions and at all points in-between. Results of the ISCST model are included herein as Attachment 2.

Preliminary calculations give indication of the potential for accumulations of lead-laden dust off site. Under Alternative 10C, implementation would cause some 20,000-30,000 lbs. of lead dust to be dispersed off-site and accumulate in soils and on various surfaces, only to be absorbed by biological organisms later on, causing health and environmental effects. In contrast, only about 100 lbs. of lead would be dispersed through Alternative 2C. This should convince EPA/DEQ that Alternative 10C has significant long-term effects associated with it.

It is recognized that all air dispersion models have some amount of uncertainty associated with them. Indeed, the reason an air dispersion model is utilized at all is because a very high level of uncertainty must be reduced to a much lower level. The ISCST model and that model already in the FS do that. Even if one were to assume an extremely high level of uncertainty in the ISCST model, for example a 50 percent inaccuracy, the results would still indicate exceedances 13 times what the NAAQS allows. How can EPA/DEQ refute such data?

Air sampling during RI activities at the site corroborate the fact that fugitive emissions can be significant. During the study, air monitoring indicated elevated levels of airborne lead, even during the low level activities occurring at those times. It can be seen from a review of Table 5.3-1 of the RI and Table E-2 of the FS that, as on-site activity becomes increasingly intense, airborne emissions increase. Data in Table 5.3-1 was collected over 9 month period, and includes a variety of weather conditions. Clearly, selection of Alternative 10C is not in the public interest, and is likely to be harmful to public health. This endangerment assessment cannot be ignored, nor can the Agency minimize or rationalize it by discounting the work of the FS as being crude. To do so does a disservice to the local community and the entire environmental movement.

2. Other concerns relative to airborne lead emissions are mentioned in Section 7, page 7 of the FS, including off-site exceedances of the OSHA Permissive Exposure Limit of 50 ug/M^3. Protection of off-site workers, visitors, motorists along Front Street and St. Helens Highway, and other passers-by, from the harmful air emissions generated during the excavation and processing of battery casings for 5 years will clearly be impossible to enforce.

   Additionally, the fugitive emissions from the implementation of Alternative 10C will contaminate surrounding properties with lead bearing dust, creating long-term environmental problems, as indicated in the attached report by Clean Sites.

3. Technical Feasibility

   Alternative 10C is based upon separation equipment designed to process whole batteries, not battery cases mixed with dirt, mud, stone and various debris. Pilot tests, using full scale equipment, were conducted during the FS and were accompanied by numerous equipment and process

malfunctions, caused by the inability of the equipment to properly process the buried casing material. Does EPA/DEQ feel that the pilot tests were not valid or do the Agencies hope someone is capable of solving the equipment problems? Certainly, considerable design and development is the minimum effort necessary and should not this be part of the FS instead of a "wish remedy"?

4. NL Industries is aware that EPA/DEQ is not pursuing implementation of Alternative 10A or 10B because of the inclusion of a hazardous waste incinerator therein. An incinerator reduces the quantities of wastes to be disposed of at a landfill, yet the concern of strong public opposition to operating a hazardous waste unit within the Portland city limits, and the potential for dispersing lead emissions throughout the community has caused the Agencies to reject these alternatives. This is understandable, but how then, can EPA/DEQ support implementing Alternative 10C in view of the air emissions data shown in Appendix A, Attachment C, Table 1, which indicates that Alternative 10C will have an airborne impact greater than or equal to Alternatives 10A or 10B? Certainly, this cannot be done on a real health assessment basis with the concern of public health and the environment, but only by imagery, i.e. incineration is inherently dangerous, while recycling is perceived as good.

Appendix A, Attachment C, Fugitive Dust Generated by Site Remediation, p. 22, further defines the air emissions specifically caused by the operation of the incinerator included under Alternatives 10A and 10B. It can be seen from Table VIII.C and Table IX.C of Appendix E that the incinerator contributes relatively little to the total airborne lead emissions of Alternatives 10A and 10B. DEQ feels community opposition to an incinerator is based upon potential objectionable emissions from an incinerator. How then, can EPA/DEQ support an Alternative which has the same problem as the incinerator, namely air emissions, and quantitatively is orders of magnitude greater on environmental impact?

5. Cost Effectiveness

Section 6.2 of the FS, Evaluation of Recycle Potential, indicates that only an inconsequentially small amount of material (about 3 percent) is potentially recyclable. This is clearly not cost effective since Alternative 10C costs approximately $20 million to implement, would result in potentially 2160 tons of material being returned to commerce, and costs in excess of $11,000 per ton of recyclables! This is at least 2 orders of magnitude higher than standard recycling fees. How does EPA/DEQ justify selection of Alternative 10C on a cost basis, since this is one of the mandatory criteria listed under the cleanup standards of Section 121 of SARA?

6. Reduction in Toxicity, Mobility and Volume

Alternative 10C does not meet EPA's criteria that the selected alternative reduce the toxicity, mobility and volume of the site contaminants. Alternative 10C mobilizes lead during the 5 years of implementation by airborne emissions. Further, the volume of material to be sent to a landfill increases because of the inherent inability of any excavation process to neatly separate battery casings from excavated debris. Literally, tons of soil inseparable from buried case material will no doubt be shipped off site for disposal. As concerns the intent to reduce site contaminant's toxicity, Alternative 10C cannot possibly be supported in this regard. The toxicity of lead is unchanged regardless of the processing effort. In fact, at least one waste stream, the lead oxide/mud stream, will demonstrate increased toxicity due to the high lead content (about 25 percent) compared to the site contaminants as excavated, which contain about 3 percent lead.

7. Institutional Controls

EPA has expressed concern as to the effectiveness of institutional controls, basically legal restrictions on use of land, included in the PRP's preferred alternative, 2C. The Agency's contention has been that institutional controls are not an effective means to prevent public exposure to lead at the Gould site. It is NL's position that: 1) institutional controls can be used effectively to prevent exposure to the site contaminants, 2) institutional controls are as much a part of Alternative 10C as Alternative 2C, and 3) institutional controls are widely accepted by EPA at other sites undergoing CERCLA remediation.

EPA commissioned the Environmental Law Institute to conduct a study on the usefulness of institutional controls at various CERCLA sites. The clear conclusion of that project is that, when properly applied, institutional controls can be used effectively in cleanup remedies.

It is NL Industries further position that institutional controls are as much a part of Alternative 10C as Alternative 2C. This may not obvious from a review of the description of Alternative 10C in the RI/FS, but both EPA and DEQ are well aware that hazardous waste landfills such as the one located in Arlington, Oregon, one possible candidate to accept waste materials from the Gould site, are required by federal and state law to incorporate institutional controls, such as deed restrictions and prohibition against well-drilling in present and future land uses. The waste materials then, are subject to much the same institutional controls whether they remain on-site under Alternative 2C, or are sent to the Arlington landfill for disposal under Alternative 10C. Obviously, the latter carries with it significant issues relating to remediation discussed earlier. Further, institutional controls are required for the Gould site under Alternative 10C. How then can DEQ/EPA maintain that Alternative 2C places heavy reliance on institutional controls, and Alternative 10C does not?

Institutional controls under another name would be used in processing the recyclable waste streams from the operation of any battery casing separation equipment. Institutional controls, such as mandatory use of respirators and gloves to prevent exposure to lead at facilities that may be involved in the recycling of the lead particulates and oxide, and the same at the plastics manufacturers locations, would be required. How then can EPA/DEQ maintain that institutional controls identified in Alternative 2C cannot be effectively applied to the site?

Further, our entire society is based on institutional controls, from the necessity to obtain a license to operate a motor vehicle, to the filing of income taxes, to stopping at a traffic light. Can EPA/DEQ deny that all laws and regulations, as well as the Agencies themselves, are in fact "institutional controls" to prevent certain unwanted actions?

8. Use of a Hazardous Waste Landfill

As indicated in Section 6, Alternative 10C proposes to separate the casings into component streams and landfill those streams that cannot be recycled. Has EPA/DEQ considered the impact of utilizing some 80,000 cubic yards (and possibly greater amounts when one considers the dirt, mud and other debris accompanying the excavation process) of landfill space on the regulated industrial community? The displaced landfill volume which otherwise would have been utilized by industries in the area will ultimately have to be sent to some other landfill at a greater distance. Alternative 10C, thus has significant effects on others using the hazardous waste landfill by misuse of valuable landfill space.

9. ROD - Newport Dump Site

NL Industries has reviewed many Records-of-Decision (ROD) for applicability to the Gould site. Inconsistencies with selection of Alternative 10C have already been noted. Another ROD has since been

reviewed involving the Newport Dump Site located in Campbell County, KY. The Newport Dump Site is a former municipal landfill in the city of Wilder, KY. The principal contaminants at the site are metals, solvents, and PCB's. Table 10 of the ROD clearly states that public health and other concerns involving the excavation and off-site disposal alternative (Alternative 4) include "release of particulates and toxic gases during excavation" and the fact that "SARA Section 121 discourages the use of off-site disposal". This alternative was ultimately found to be unsuitable for the remediation at the site. EPA's evaluation of this alternative on pages 14-15 states "The implementation of this alternative would have the potential to significantly impact public health. During the excavation procedures, the opportunity for off-site migration of contaminants would be greatly increased. Pathways for this migration would include airborne particulates, gas emission, and surface runoff. Receptors in the area of the site would be susceptible to inhalation of gas as well as contaminant-laden particulates, the ingestion of particulates, and direct contact with wastes."

An alternative involving monitoring, leachate collection, regrading and revegetation has been chosen for the Newport Dump Site. The RI/FS estimated the cost of the selected alternative at $914,000. In contrast, the rejected alternative involving excavation and off-site disposal is estimated to cost approximately $17 million.

Comments regarding EPA's remedial selection were submitted by the City of Newport and the Northern Kentucky Port Authority. They include, "The additional remedial measures called for in Alternative 4 simply are not necessary for the protection of the public health or welfare or the environment. This quantum leap in expenditures with no corresponding benefits to human health or the environment are not necessary and therefore not mandated by CERCLA. To choose Alternative 4, 5 or 6 would be inconsistent with criteria of cost-effectiveness of the remedial measures. Considerations of cost-effectiveness therefore support the selection of Alternative 3 as the maximum remedial measures for the Newport Dump Site."

Region IV EPA agrees with this in their reply, stating "EPA concurs with your position that Alternative 3 of the Newport Feasibility Study would be a cost-effective remedy that will attain appropriate, relevant and applicable public health and environment standards. The EPA has selected this alternative as the remedy chosen for remedial design and remedial action at the Newport Dump site. Your comments are in accordance with the EPA findings presented in both the Remedial Investigation and Endangerment Assessment reports."

In view of this ROD which was issued in March 27, 1987, how can Region X EPA take a diametrically opposed position and recommend enormous expenditures to achieve a negative result for the Gould site?

10. Summary of Comparisons of 2C and 10C

Table 7.2-1, Performance of Alternatives Against Requirements for a Remedial Action, is a comparison chart of the candidate alternatives and how each of these compares with the requirements of SARA, contained in Section 121, Cleanup Standards. Alternative 10C is deemed to be not protective to health and environment, primarily because of air emissions during 5 years of remediation which exceed the National Ambient Air Quality Standard and the OSHA Permissible Exposure Limit, as well as the accumulation of lead dust in off-site areas such as gardens, lawns, etc. How can EPA/DEQ maintain Alternative 10C meets the requirement that the selected remedy be protective of health and the environment in view of the inescapable conclusion of the Endangerment Assessment that shows Alternative 10C is unsuitable from a health and environmental standpoint? Further, the Endangerment Assessment showed the quarterly average concentration for 10C to be 10.4 ug/M^3, and the Hazard Index for off-site worker exposure to be 1.65, while the same parameters for Alternative 2C are 1.18 mg/M^3 and 0.187 respectively.

EPA/DEQ's selection of Alternative 10C contradicts all other entries in Table 7.2-1. The alternative has been proven by the Endangerment Assessment to be no more protective of the environment than Alternative 2C, but will cost approximately 4 times as much to undertake. In what sense can selection of Alternative 10C be deemed cost-effective? The uncertain technology on which Alternative 10C is based cannot support any concept of performance. Toxicity reduction is negligible, even if the separation equipment functions as intended, which is extremely doubtful, and volume of site contaminants is increased.

Air emissions greatly increase the mobility of the contaminants into the surrounding environment, and the Applicable, Relevant and Appropriate Standard (ARAR's), the National Ambient Air Quality Standard of 1.5 mg/M^3, is shown to be violated during 5 years of remediation for Alternative 10C. With all this data how can EPA/DEQ possibly maintain Alternative 10C meets the Cleanup Standards of SARA, Section 121?

11. Modification of Alternative 10C

EPA's preferred alternative was described to the PRP's at a meeting on January 26, 1988, and outlined in the Proposed Plan, dated February 5, 1988. NL Industries has noted EPA's description of engineering studies conducted during the FS in the Agency's document entitled Supplement to the Draft Feasibility Study of Cleanup Alternatives for the NL/Gould Superfund Site, published February 1988. Here, EPA describes an additional treatment step for cleaning ebonite after separation, and is apparently considering some as yet undefined treatment after the separation of the battery casing material is complete. Page 6 indicates:

> "Reasonable physical separation of the plastic and ebonite components with some equipment modifications appears to be possible, although the degree of metallic lead contamination of ebonite is high even after separation; therefore, additional work will be required to treat this stream after it leaves the separation

> plant. This is in addition to the rigorous design requirements that will be involved in transferring this technology to the NL/Gould site."

No such additional step is included in the FS. The details of this additional step are unknown. Is it based upon a treatment similar to that described in the laboratory tests conducted by the U.S. Bureau of Mines, in which Ethylene Diamine Tetramine (EDTA) or some other solvent was used to solubilize ebonite-entrapped lead? We remind EPA that this treatment step has not been factored into Dames & Moore's cost calculations for Alternative 10C, nor the environmental evaluation for Alternative 10C.

To present this newly modified Alternative 10C to the public as costing approximately $20 million is grossly incorrect, as an EDTA washing step will add millions (from the Bureau of Mines own estimates) to Alternative 10C. Further, and most importantly, the Bureau of Mines study did not accomplish what it set out to do, namely clean the ebonite material to that level which enabled it to pass the EP Toxicity level of lead, 5 mg/l lead in extract. Their report only indicates further testing is appropriate. How then can EPA include such uncertain results as proof that ebonite can be cleansed of entrained lead? This further adds to NL's position that EPA's preferred alternative, now a modification of Alternative 10C as presented in the FS, has not been adequately evaluated by the Agency.

With this new addition to Alternative 10C, the alternative is open-ended, involves unknown technology and is less cost-effective than the original 10C alternative. Adding to the alternative at this point in time is not only confusing to the PRP's and violates administrative procedures, but it also inhibits any agreement between the PRP's and the Agencies.

12. Review of EPA's FS Supplement

NL Industries has noted several inconsistencies in the Supplement to the Draft Feasibility Study of Cleanup Alternatives for the NL/Gould Superfund Site. These are:

i) On page 3 of the report, under "Cleanup Objectives", it is indicated that one of the objectives of the selected remediation is "To protect human health and the environment from detrimental effects of airborne metals contamination". We agree that this is an important consideration in the selection of a remediation. Based on all the aforementioned data which indicates gross air violations and off-site lead-laden dust accumulations from Alternative 10C, how can EPA/DEQ maintain that the alternative meets this objective? We remind you the ISCST model indicates airborne lead levels will be approximately 25 times acceptable concentrations.

ii) On page 7 of the report, under "EPA's Preferred Alternative", EPA indicates that its preferred Alternative 10C would, among other things, "...cap the exposed fill and contaminants, thereby making them unavailable for human contact by inhalation or ingestion". On the same page, under Differences Between EPA's Proposal and NL and Gould's Preferred Plan, EPA states that Alternative 2C is not adequately protective of human health and the environment" because of the potential for continued inhalation and direct contact exposure to contamination at the site".

Does EPA not realize that the "cap" under 10C is only 4 inches of vegitative cover, while the cap under 2C is 2 and 1/2 foot thick? How does EPA's 4 inch cap prevent inhalation and ingestion from occurring, while the 2 and 1/2 foot thick cap mentioned under 2C is deemed not adequately protective because of the potential for inhalation and direct contact exposure?

iii) On the same page, under the same paragraph, EPA indicates Alternative 2C "does not attain all state and federal regulations". We feel this is incorrect, and request clarification on which regulations are referred to. We remind you that Alternative 10C does not attain the National Ambient Air Quality Standard of 1.5 ug/M^3, so to maintain that 10C meets regulatory requirements and 2C does not, is incorrect.

iv) Page 13, the first paragraph quotes the FS by stating "Future on site activities...could disturb on-site contaminated materials and produce higher air lead concentrations, both on-site and off-site" (here the word "high" means greater than 1.5 ug/M^3, the NAAQS). EPA's response to this and other statements on the No-Action Alternative is "concur with overall rating". Please remember this in your future discussions with the PRP's concerning air emissions which will be caused by large scale recycling efforts such as Alternative 10C.

Conclusion

In summary, NL Industries feels EPA/DEQ's selection of Alternative 10C contradicts logic in that the alternative is less protective of human health and the environment than Alternative 2C. Further, it increases mobility and volume of waste, it is not cost effective and stretches believability when it claims treatment to be practicable. Is there a Contingency plan to the selected alternative if the process fails? It appears the present intent is to construct the processing plant, and conduct research, development and

design modifications as the project continues. This is extremely ill-advised, and is contrary to established engineering principals. NL Industries strongly recommends to EPA/DEQ that Alternative 2C be the basis for the Record of Decision.

Very truly yours,

James E. Tracewski
Regulatory Affairs Specialist

JET/bt

cc: Mr. Lee Thomas
Administrator
U.S. E.P.A.
Washington, DC 20400

Mr. Dave Tetta
Mr. Charles E. Findley
U.S. E.P.A. - Region 10
1200 Sixth Avenue (HW-113)
Seattle, WA 98101

Mr. William Remfroe
Mr. Fred Hansen
Oregon Department of
Environmental Quality
811 SW 6th Avenue
Portland, Oregon 97204

STOEL RIVES BOLEY
JONES & GREY

ATTORNEYS AT LAW
SUITE 2300
STANDARD INSURANCE CENTER
900 SW FIFTH AVENUE
PORTLAND, OREGON 97204-1268

Telephone (503) 224-3380
Telecopier (503) 220-2480
Cable Lawport
Telex 703455

Writer's Direct Dial Number

294-9213

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FEB 23 1988
John L. Pittman
Wacker Siltronic

February 22, 1988

Mr. David Tetta
United States Environmental
Protection Agency
1200 Sixth Avenue (HW-113)
Seattle, WA 98101

Dear Mr. Tetta:

Re: NL/Gould Superfund Site

On behalf of Northwest Natural Gas Company, I wish to reiterate the oral statement that I made at the public meeting on February 18, 1988. Northwest Natural Gas Company is one of the landowners that has been advised to expect an information request under CERCLA Section 104(e) in connection with the expanded groundwater studies in the Doane Lake area.

It is our understanding that EPA does not contemplate expanding the NPL site boundaries to include the properties north of the railroad embankment. It is also our understanding that nothing that has taken place to date with respect to the NL/Gould site or adjacent properties is or will be part of any CERLCA Section 113(k) administrative record that may be made in connection with the area to be investigated under your proposed expanded groundwater study, because neither my client nor any of the other affected parties has had an opportunity to participate in the preparation of such record.

SCOEPA00015576

If the foregoing understanding is incorrect, please advise me as soon as possible.

Very truly yours,

Richard D. Bach

RDBS.021:twa
cc: Mr. William T. Renfroe, Jr.
bc: Mr. Edmund L. Bolin
Mr. Roger Sherwood
Mr. Jordan Dern
Mr. George Markwood
Mr. Larry Patterson
Mr. John Pittman
Mr. Robert Ferguson
Mr. Jim Tracewski
Mr. Roger Neu

EPA
United States
Environmental Protection
Agency

Region 10
1200 Sixth Avenue, HW-113
Seattle WA 98101

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MAR 04 1988
John L. Pittman
Wacker Siltronic

SUPERFUND PROJECT UPDATE--March 1, 1988

NL/GOULD SITE--PORTLAND, OREGON

PROPOSED PLAN

The U. S. Environmental Protection Agency (EPA) has recently accepted a draft feasibility study of cleanup alternatives for the NL/Gould, Inc., Superfund site. EPA has evaluated the study and alternatives and is proposing the following cleanup plan:

- Remove battery casings on and beneath the site and treat them for proper disposal of lead, plastic, and other materials;
- Treat lead-contaminated soil and sediments with a chemical additive to bind the lead to the soil and keep the contamination on-site; and,
- Do additional studies of groundwater pollution in the Doane Lake area and, at a later date, decide if additional cleanup is necessary.

PUBLIC COMMENT PERIOD

February 16 - March 18, 1988

EPA is seeking comments on the NL/Gould site feasibility study and the Agency's proposed plan. The studies and other site records are available for review at locations listed at right.

Send comments to the EPA site manager:

David Tetta
U.S. EPA
1200 Sixth Avenue (HW-113)
Seattle, Washington 98101
(206) 442-2138

In a few weeks, after consideration of your comments, EPA hopes to select a cleanup for the site. Comments should be postmarked by March 18, 1988, to ensure their consideration.

FOLLOW-UP PUBLIC MEETING

March 10, 1988
7:30 PM
Northwest Service Center
1819 NW Everett

EPA held a public meeting on 2/18/88. At that meeting, a number of people requested another opportunity to hear about the studies done at the site and about EPA's proposed plan for cleanup.

Everyone is encouraged to come to the meeting March 10th and/or provide written comments to help EPA decide which cleanup action would be best for the community and the site.

HOW TO OBTAIN FURTHER INFORMATION

Copies of all the documents used to make decisions for the site are available for your review at the following locations:

Multnomah County Library
St John's Branch
7510 N Charleston Avenue
Portland, Oregon

Linnton Community Center
10614 NW St Helens Road
Portland, Oregon

Oregon Dept. of Environmental Quality
Remedial Action Section
811 SW Sixth Avenue
Portland, Oregon

EPA Library
1200 Sixth Avenue, 10th Floor
Seattle, Washington

If you have any questions or would like to receive more information, please call the EPA site manager listed at left. Written comments should also be directed to the same person.

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EPA

United States
Environmental Protection
Agency

Region 10
1200 Sixth Avenue
Seattle WA 98101

SEATTLE WASH MAR-1'88

U.S. OFFICIAL MAIL
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.22
P.B. METER 6230577

John Pittman
PO Box 03180
Portland, OR 97203

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John L. Pittman
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EPA

Region 10
Superfund Project Update
May10, 1988

NL/Gould Site -- Portland, Oregon
Record of Decision

Selected Remedy

The U. S. Environmental Protection Agency (EPA) has decided how to clean up contaminated soils and battery casings at the NL/Gould Inc., Superfund site. After evaluating feasible alternatives and consulting with the Oregon Department of Environmental Quality, EPA has selected a remedy that includes:

- Removing battery casings on and beneath the site and treating them for proper disposal of lead, plastic, and other materials;
- Treating lead-contaminated soil and sediments with a chemical additive to bind the lead to the soil and keep the contamination on-site;
- Monitoring ambient air around the site to ensure that work is done safely; and
- Performing additional studies of groundwater pollution in the Doane Lake area; and at a later date, deciding what, if any, additional cleanup is necessary.

How to Obtain Further Information

EPA has based its decision on documents that you can review at one of several locations. The complete administrative record used to make decisions for the site is at the following locations:

Multnomah County Library
St John's Branch
7510 N Charleston Avenue
Portland, Oregon 97203

EPA Regional Office
Superfund Branch (HW-113)
1200 Sixth Avenue
Seattle, Washington 98101

A smaller set of key documents is also available at:

Linnton Community Center
10614 NW St Helens Road
Portland, Oregon 97231

Oregon Dept. of Environmental Quality
Remedial Action Section
811 SW Sixth Avenue
Portland, Oregon 97204

If you have questions or would like more information, please call the EPA site manager, **Dave Tetta** (206-442-2138) or **Bill Renfroe**, DEQ (503-221-2678).

Differences Between the Selected Remedy and the Proposed Plan

On February 8, 1988 EPA distributed its proposed plan for cleanup of the site. The selected remedy for the site, described briefly above and in detail in the **Record of Decision** (EPA-3/31/88, available for review at the locations listed above), is based on the proposed plan. The Agency will devote extensive effort to the design of the selected remedy. EPA's design program will consist of a series of phased studies, described further below. By doing this, EPA expects to minimize the amount of material requiring landfilling, and consequently achieve a final remedial action that will meet the cleanup goals but cost less than the Feasibility Study cost estimate of $20,000,000.

The original cost estimate was prepared by the consulting firm of Dames & Moore for NL, Industries, and Gould, Inc., and is considered by EPA to represent a worst case cost estimate assuming little of the material is recyclable. In particular, costs for disposal of non-recyclable battery components (such as ebonite) in a hazardous waste landfill are estimated at over $2,500,000 per year for five years. These costs also do not allow for any credit from the sale of recyclable components. EPA believes that the actual cost figures will be less as a result of the increased amount of effort to design a process that minimizes the amount of material that requires disposal in a hazardous waste landfill.

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What Happens Next

Negotiations with the Responsible Parties:

Having decided on the clean up strategy for the site, EPA will negotiate with NL, Inc., and Gould, Inc., to get the work done. The Oregon Department of Environmental Quality will participate in the negotiations. These negotiations will cover any role NL and Gould will play in the engineering design of the cleanup or the cleanup itself, including possibly doing work themselves or paying for EPA or others to do it. Any agreement reached will be documented in a legally binding document known as a consent decree. Public participation in the negotiation and design phases is discussed on the next page.

The Phased Design Program:

The first work to be done to implement the selected remedy will be engineering designs and tests to make sure that the treatment techniques and equipment we select actually work. This is expected to take 9 to 12 months. The design work will consist of a phased series of studies to:

- Determine the volumes of subsurface casings that can be recycled.
- Determine the process requirements to separate the casing components in a manner that minimizes airborne releases of contaminated dust. Depending on the results of the initial evaluations, large quantities of surface casing material may be transported to an off-site facility for recycling studies.
- Determine the modifications required to adapt existing separation equipment to conditions at the Gould site.
- Determine the process requirements for treating contaminated soils, sediment, and matte.

Public Participation and Comment:

The public will be invited to comment on the results of the negotiations with NL, Inc., and Gould, Inc., over what role they will play in the cleanup ***and*** on the work plan developed during the remedial design.

After negotiations are completed between EPA and NL, Industries., and Gould, Inc., EPA will submit to the U. S. Department of Justice (DOJ) a consent decree. Once the consent decree is given to DOJ and DOJ files the consent decree with the court, there will be a 30-day comment period before a final judgment is made by the court. EPA will announce when the comment period will be, where the public meeting will take place, and where to send comments. After all the comments are reviewed, the court will then make a final judgment on whether the decree should be put into force as is or make changes.

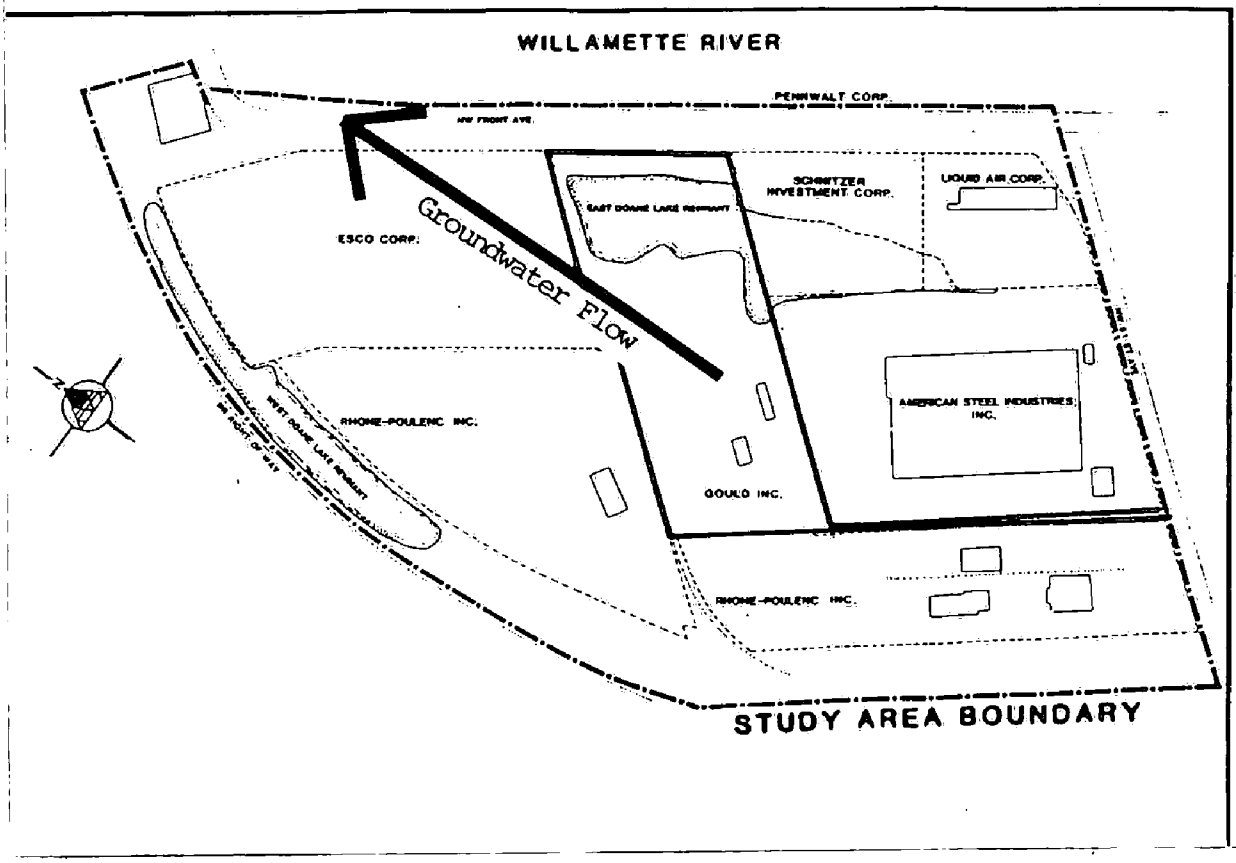
Residents and interested individuals (such as workers employed near the site) are encouraged to continue to work with EPA in the cleanup process. To receive further updates such as this, please detach the form below and send your name and address to EPA.

EPA will be revising the **Community Relations Plan** for the site during May, June, and July. The plan describes community concerns, how the community will be able to participate in the project, and what EPA and DEQ will do to encourage public involvement. If you have concerns, information, or suggestions, please call or write the EPA site manager (address on the last page)

Further Investigations:

While we are doing this design work we will also be doing an additional study of groundwater contamination in the Doane Lake area. This study will help us decide whether action needs to be taken to deal with the contamination underneath the site. Right now we are doing the planning for this study. The study will address organic contamination (such as pesticides) as well as lead contamination. This study should begin later this year. EPA has notified several companies in the Doane Lake area that they may be responsible for groundwater contamination. Based on information EPA receives from these potentially responsible parties, EPA may negotiate with some or all of them to complete this study.

MAP OF STUDY AREA
SHOWING DIRECTION OF GROUNDWATER FLOW



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260.

MILLER, ANDERSON, NASH, YERKE & WIENER
ATTORNEYS AND COUNSELORS AT LAW
900 S.W. FIFTH AVENUE
PORTLAND, OREGON 97204

ANSWER No 1

March 14, 1979

Olympic Pipeline
Post Office Box 236
Renton, Washington 98055

Attention: Mr. George Williams

Gentlemen:

We are attorneys for Wacker Siltronic Corporation. We have been asked to contact you regarding oil which has been encountered beneath the surface of the ground on our client's property adjacent to your pipeline in an area which was formerly N. W. Front Avenue in Portland, Oregon.

As you are no doubt aware, Ordinance No. 146216, adopted by the Council of the City of Portland July 27, 1978, provides that owners of easements within vacated N. W. Front Avenue will be responsible for any damage resulting from the use of the easement. The Department of Environmental Quality has advised Wacker Siltronic Corporation that its chemical analysis indicates the oil on the Wacker property probably has leaked from your pipeline. Our client appreciates your prompt action in seeking to locate the leak and in pumping oil from the property. We interpret your action as indicating that you recognize your responsibility for any damage suffered by Wacker Siltronic Corporation as a result of oil leaking from your pipeline.

Very truly yours,

HARVEY C. BARRAGAR

cc Dr. Hans Herrmann
Mr. Wayne Hanson

SCOEPA00015583

MILLER, ANDERSON, NASH, YERKE & WIENER
ATTORNEYS AND COUNSELORS AT LAW
900 S.W. FIFTH AVENUE
PORTLAND, OREGON 97204

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UICTA-S KS

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March 19, 1979

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MAR 28 1979
WACKER FLD

Olympic Pipeline
Post Office Box 236
Renton, Washington 98055

Attention: Mr. George Williams

Gentlemen:

Reference is made to my letter of March 14, 1979, regarding the oil contamination on the Wacker Siltronic Corporation property in Portland, Oregon.

As soon as you stop pumping oil from the property it will be necessary to determine the extent of the area which has been contaminated by the oil and the amount of oil which is left in the ground. No doubt you will wish to participate in making this determination. As soon as you are done pumping oil, please contact John Ramage at CH2M-Hill in Portland, Oregon, at 503-224-9190. Mr. Ramage is authorized to coordinate this matter on behalf of Wacker Siltronic Corporation.

As soon as Wacker Siltronic Corporation has determined the direct costs incurred by it as a result of the oil spill, we will advise you of the amount of the costs. It will not be possible to determine what action must be taken regarding the contaminated soil until the extent of the contamination is known.

Very truly yours,

HARVEY C. BARRAGAR

cc Dr. Hans Herrmann
Mr. John Ramage

COPY

OLYMPIC PIPE LINE COMPANY
P. O. BOX 230, RENTON, WASHINGTON 98055

MAY 2 5 1979

MILLER, ANDERSON, NASH, YERKE & WIENER

May 22, 1979

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JUN 01 1979
WACKER FLD

Miller, Anderson, Nash, Yerke & Wiener
Attorneys and Counselors at Law
900 S.W. Fifth Avenue
Portland, Oregon 97204

Attention: Mr. Harvey C. Barragar

Dear Mr. Barragar:

In reference to your letter of May 18, 1979, pertaining to Wacker Siltronic Corporation finding additional oil along the Willamette River, Mr. Ed Sloan of CH2M-Hill informed us of this problem on that date. Our representatives visited the site, and after discussing this problem with them and Ed Sloan, we find that Wacker's contractor was actually working in the river itself. The work involved dredging the river for the outfall of the 24" storm sewer and placing the spoil on the river bank. In so doing, an oily-appearing substance was allowed to contaminate the surface of the river.

This material is not of a type handled by Olympic Pipe Line Company, and in fact, it appears from samples taken and further investigation this material is not a petroleum-based product, but results from foreign matter entrapped in the river bottom and as such has no relation with Olympic Pipe Line's recent pipeline problem.

In addition, Olympic Pipe Line Company has thoroughly investigated and established the extent of the spread of oil on Wacker property from our pipeline leak and has found no evidence that oil has spread beyond the immediate vicinity of the leak site. We have however, as a safety measure recently built 2 concrete/sand dams around the 24" storm sewer to assure ourselves that there exists no possibility of oil migrating along this route to the river. During this work no oil or oily substance was found in these areas.

The bulk of the oil released during the leak has been recovered and final clean-up is now underway.

Very truly yours,

Geo. W. Williams

G. W. Williams, Jr.
Manager

GWW:bb

cc: Mr. O. H. Young

SCOEPA00015585

Dames & Moore
Portland, Oregon 97205
(503) 228-7688
TWX: 910-464-4790 Cable address: DAMEMORE

GNB BATTERIES INC.
SEP 13 1982
METALS - P/D & E

RECEIVED
NOV 15 1985
WACKER SILTRONIC
ENGINEERING

September 10, 1982

Gould Inc.
P.O. Box 43484
St. Paul, Minnesota 55164

Attention: Dr. Andrew Larson

Gentlemen:

Summary Report
Airborne Lead Monitoring
Portland Facility
Portland, Oregon

This letter presents the results of recent monitoring for airborne particulate lead at the deactivated Portland battery reclamation facility. This work was performed in accordance with your request during our telephone conversation on August 5, 1982. Air quality samples were obtained at three stations at the locations shown on Attachment 1. The sampling station locations were designated by Mr. Croft Smith, the plant manager, as corresponding to previous sampling locations utilized by the Department of Environmental Quality (DEQ). Samples were obtained over the 4 day period of August 20, 21, 22, 23, and 24, 1982. The samples were collected utilizing high volume (high vol) samplers operating at an average of 1.4 cu m/min. (49 cu ft/min.). The high vol samplers were provided by Amtest, Inc. of Seattle, Washington. Each of the four sampling periods was for a duration of 24 hours, and on the average was started about 2:30 each afternoon.

The sampler filters were subsequently sent to Amtest Inc. for lead analyses. The results of these analyses are summarized on Attachment 2.

During the sampling period, the weather conditions consisted of warm, clear days with light to moderate gusting winds, primarily from the north and northwest. A summary of the weather conditions observed at the site and as recorded at DEQ and National Weather Service monitoring stations is presented on Attachment 3.

At the time of this sampling work, all of the facilities at the site had been demolished and removed from the site with the exception of the office building and the cafeteria-welfare building. The sampling work was performed immediately following cleaning and sweeping of the pavement areas and old building concrete pads. In addition, an asphalt-like oil seal was sprayed over many areas of exposed soil.

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The results of this monitoring work were reported to you by phone on August 26, and were transmitted to Mr. Tom Bispham of DEQ, on August 27, 1982. We appreciate the opportunity to assist you in your efforts to evaluate air quality at the Portland site. Please contact us if you have any questions or if we may be of further assistance.

Yours very truly,

DAMES & MOORE

Dwight J. Hardin

Dwight J. Hardin,
Project Manager

DJH:lld
11831-006-04
Attachments (3)

SCOEPA00015587

AT am test inc.
4900 9TH AVENUE N.W., • SEATTLE, WASHINGTON 98107 • 206/783-4700

ANALYSIS REPORT

CLIENT: Dames & Moore

DATE SAMPLES RECEIVED: 8/25/82

REPORT TO: Mr. Dwight J. Hardin
1220 SW Morrison St.
Portland, Ore. 97205

DATE SAMPLES REPORTED: 8/26/82

P.O. # 5426

AMBIENT AIR ANALYSIS

Laboratory Sample #	Station	Date Started	Filter #	Duration Ran (min)	Volume Sampled (m^3)	Lead ($\mu g/m^3$)
53296	1	8/20/82	5	1439.	2036.	0.26
53299	1	8/21/82	8	1440	2058	0.26
53302	1	8/22/82	11	1440.	2038.	0.38
53305	1	8/23/82	14	1440.	2058.	0.39
53295	2	8/20/82	4	1440.	2058.	0.38
53298	2	8/21/82	7	1440.	2058.	0.39
53301	2	8/22/82	10	1440.	1976.	0.40
53304	2	8/23/82	13	1440.	1936.	0.41
53294	3	8/20/82	3	1440.	1915.	0.28
53297	3	8/21/82	6	1440.	1976.	1.06
53300	3	8/22/82	9	1440.	1976.	1.60
53303	3	8/23/82	12	1440.	1956.	0.47

Reference: US EPA " Reference Method for the Determination of Lead in Suspended Particulate Matter Collected From Ambient Air" 1978.

Reported By Shawn P. Moore
Shawn P. Moore

bc

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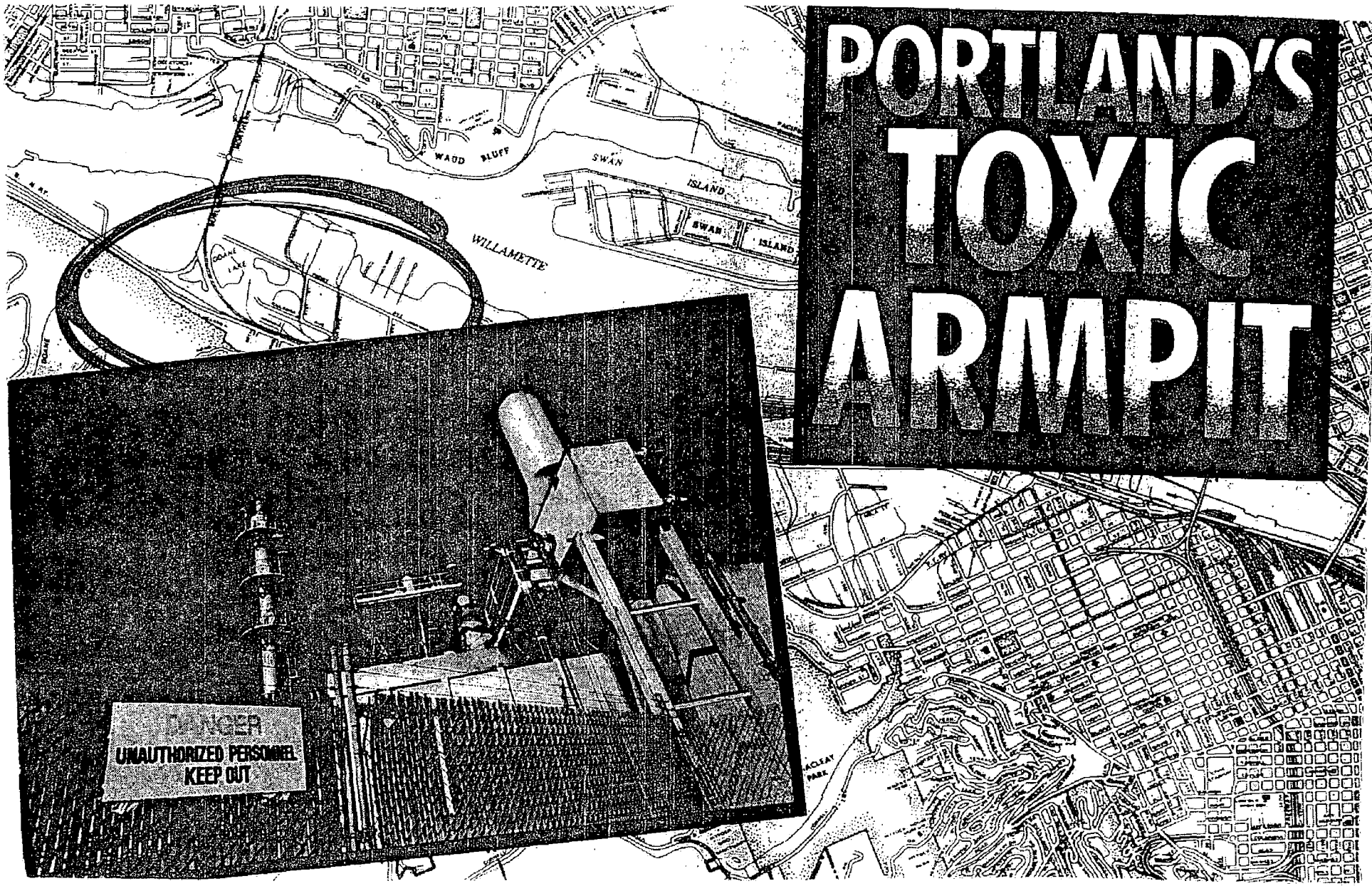
PORTLAND'S TOXIC ARMPIT



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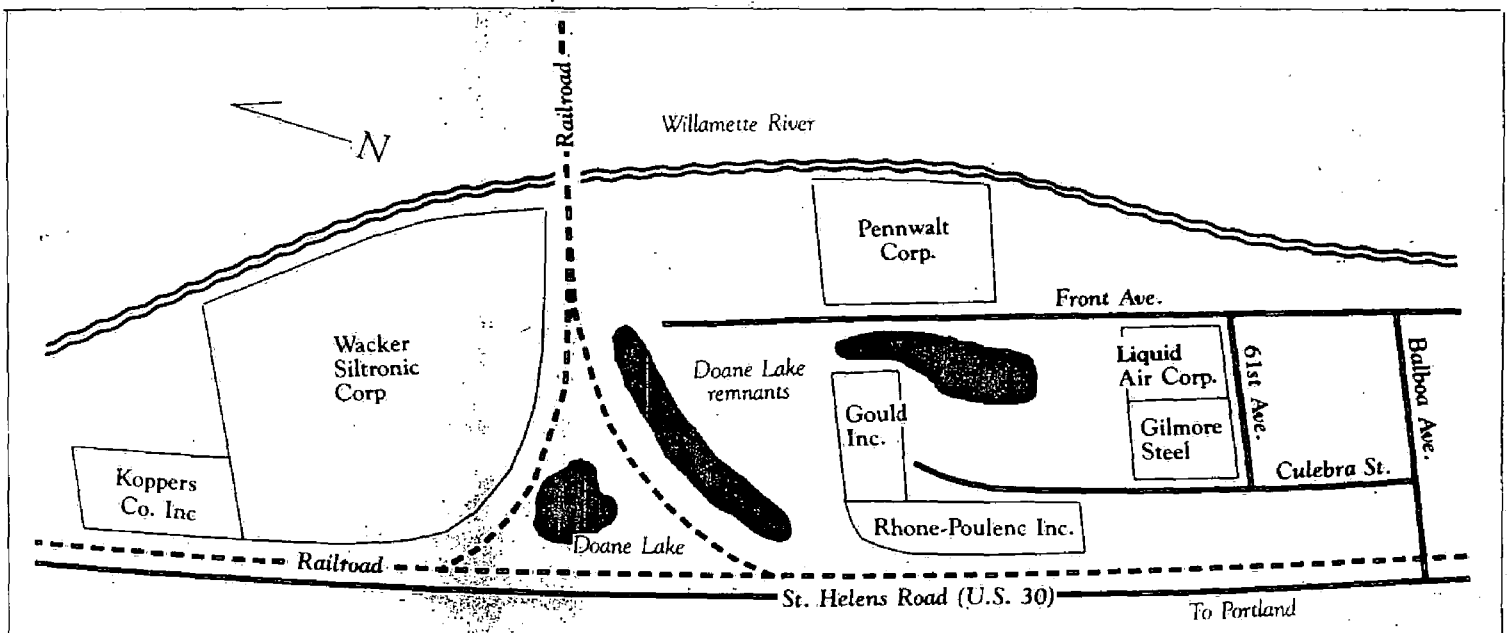
ENVIRONMENT



Will the area remain open to economic development?

According to a recent DEQ progress report, the Doane's Lake area contains seven uncontrolled or abandoned hazardous-waste sites.

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A walk through one of the most environmentally impure areas in all of Oregon

By Garret Romaine

ON A FAIR October day in 1978, surrounded by German sausages, local beer and a polka band under a circus tent, top Oregon officials were on hand in Portland to welcome a new industrial company to town. Wacker Siltronic, a leading maker of hyper-pure silicon crystals, a key component in the growing semiconductor industry, had decided to locate its first U.S. manufacturing plant in Puddletown. Gov. Bob Straub was present, along with Portland Mayor Neil Goldschmidt, who joked to reporters that it was such an important economic-development event that he had even gotten a haircut. The city had reason to be proud: it had beaten out Augusta, Ga., in luring the $100 million, 1,000-job plant after spending $100,000 to make its case. This was the day to celebrate the victory.

Wacker officials pointed to several reasons for their choice of a Northwest Portland site, at the end of Front Avenue, between the Willamette River and Highway 30. The 84-acre parcel cost $10,000 an acre more than the Georgia property, but Portland offered lower electrical rates, pure Bull Run water, a large labor pool, subsidized training for employees and a mayor who refused to let Wacker say no. And, as Don Sorenson at *The Oregonian* put it, "The clean environment also entered into the decision." Dr. Werner Freiesleben, president of Wacker's Portland operations, explained: "The atmosphere has to be absolutely pure: No suspicion of dust, no suspicion of dirt."

Not quite seven years later, it is beginning to look as if Wacker may have chosen the wrong site.

The truth is, the Wacker neighborhood is one of the most environmentally impure areas in all of Oregon. Jon Steubenvoll, an Oregon lobbyist active on environmental issues, calls the area "the toxic armpit of Portland." Interestingly, the state Department of Environmental Quality has known this for some time, as evidenced by the volume of information in the agency's thick files. Wacker itself began to recognize the situation in March of this year when it drilled seven holes on its property to test soil characteristics. Engineers intended the soil test to be the first step in a major expansion. What they found, however, was that the groundwater circulating beneath the surface was laced with high concentrations of herbicides such as 2,4-D and herbicide-manufacturing by-products such as chlorinated phenols. The water also contained high levels of coal tars, oils, grease and lead. Such chemicals could cause severe problems for Wacker's operations by bubbling up along the foundations, supports and pillars, contaminating the air. Wacker's response to this discovery? Last June 8, it announced that instead of proceeding with its anticipated $80 million expansion, which would have raised the number of employees at Wacker to 1,700 by 1990, it was putting its ambitious plans on hold.

Larry Patterson, a water quality specialist with the DEQ for many years, told *Willamette Week* that the news about toxic chemicals at the Northwest Portland site wasn't any great revelation to him. Patterson added that during his initial discussions with the company concerning its first water discharge permit, its representatives asked no questions about any of the plant's prospective neighbors. "None of my discussions with them touched upon potential problems in the area," recalled Patterson.

John Atkins, a press aide to U.S. Rep. Les AuCoin (D-Ore.), whose district includes the Wacker neighborhood, summed it up when he said, "It's a tremendous irony that a company would be given that so-called 'red-carpet treatment,' told of Oregon's great virtues, such as the most livable city in the country two years ago, and then turn around and find this stuff in their own backyard."

Wacker's "discovery" has implications beyond the unexpected expenditures the company will need to make before proceeding with the expansion plans at its Portland site. The chemical cocktail splashing around beneath Wacker's landholdings is also a stark reminder of just how sloppy past environmental practices in the vicinity were, and of the troublesome legacy that such groundwater pollution has left for future generations.

Wacker's troubles stem from the actions and attitudes of its neighbors. The companies that ring Wacker to the north, west and south, all have engaged in heavy industrial activities and have turned the formerly marshy riverfront next to the Willamette River into an environmental black hole. While not every company in the area has had continual pollution problems, three of Wacker's neighbors in particular are responsible for much of its current dilemma. Who or what is to blame for this situation? The causes are rooted in these firms' inattention to what should have been normal environmental considerations as well as in the DEQ's historic inability to get tough with offenders. For a state supposedly known for its clean environment, the result is somewhat sobering.

The epicenter of Northwest Portland's groundwater pollution problems can be found at Doane's Lake, on a five-acre site that has undergone several dramatic changes since the surrounding area was settled by pioneer Milton Doane in 1847. Formerly a large, pristine body of water, the actual lake has been reduced — as a result of development and inattention — to three small, polluted remnants that look and smell more like brackish ponds.

The DEQ continues to refer to the area as Doane's Lake, and the locale figures prominently in the agency's battle with pollution. In its 1984 progress report on Oregon's uncontrolled or abandoned hazardous-waste disposal sites, the agency listed over 40 sites it was studying in Portland; seven were in the Doane's Lake area.

What follows is a description of Wacker's industrial neighbors and the various actions that led to the current dilemma. For some of the companies listed below, the pattern that emerges is one of callous disregard of ordinary environmental safeguards. For others, even legal restrictions on fouling their own nest were disobeyed. Whatever the case, the result is a messy, expensive problem for Wacker.

Gould Inc.

The lead found in the soils at Wacker likely came from Gould, which, until 1981, operated a battery-recycling operation just 200 yards to the south of Wacker that crushed spent batteries and recovered the lead they contained with a smelter.

Not only did Gould and its predecessors fill in portions of Doane's Lake with discarded battery casings (which was then legal), but Gould's routine illegal discharges of corrosive acids periodically ruined what water was available for the area's wild birds.

The Gould production facility was originally owned by Morris P. Kirk and Sons, a subsidiary of National Lead Co. Kirk and Sons started operations in 1960, and from the beginning had problems with air-pollution authorities concerning lead and sulfur emissions from its smelter. Water quality problems were soon to follow. On March 19, 1973, the company was cited for discharging acidic waste water into Doane's Lake. In a July 10, 1973, letter to the DEQ, Kirk and Sons admitted it had used the site as a landfill for crushed battery cases, unusable smelting "slag" and other wastes prior to 1971. Later in 1973, smelting was halted, and in 1974 the Kirk plant was sold to NL Industries. Gould acquired the facility in 1980, and in March 1981, the DEQ warned Gould about both a fugitive lead-dust problem, and the discharge of untreated waste water into Doane's Lake. One month later, Gould halted its battery decasing section, and on May 1, 1981, the smelter was again closed. Both moves were made because Gould was moving out of batteries and into high-technology, and also because the DEQ was getting annoying.

But Gould still had to deal with a 10,000-ton inventory of spent battery casings that remained on the site. For over a year, the lead-rich pile sat untouched. Finally, on September 24, 1982, the DEQ asked Gould for some kind of schedule for cleanup. Gould suggested that it could crush the plastic and rubber battery casings and dispose of them on-site, presumably filling in what remained of Doane's Lake. The DEQ blanched at that idea, stating emphatically that the wastes must be removed.

In late 1983, Gould promised the DEQ that by sending the materials to various smelters and recyclers, it could have the site cleaned up by March 1985. The plan called for grinding up the cases, washing them in a detergent, and floating them to separate the lead from the rubber and plastic cases. Gould had several customers lined up for the by-products, but the operation was inexplicably shut down after Gould, which had sales of $1.4 billion in 1984, stopped paying the recycler.

PHOTOS BY CATHY CHENEY

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While it's unclear when or how Gould will clean up the site, the matter is now in the hands of the federal government. Last year, the Gould site was one of three in Oregon that were made eligible to receive Superfund money from the Environmental Protection Agency to be used for cleanup.

The EPA's Pat Storm, who is the Gould caseworker in Seattle, said recently that the biggest problem at the Gould site was the airborne lead. Testing has shown that the largest concentrations of lead dust are near the property, but researchers have found that lead dust can travel for long distances in strong winds. Inhaled into the lungs, lead can start cancers, cause mental retardation, and stunt the growth of children. The DEQ estimated that two tons of lead particulates were reaching the air annually when Gould was operating its plant; there are no estimates for how much lead is now entering the airshed. In addition, lead has entered the groundwater and has traveled at least as far as the Wacker site.

Rhone-Poulenc Inc.

From all appearances, the Rhone-Poulenc site, abutting Gould to the west, is a dirty mess of rusty pipes, stained tanks and threatening warning signs. Hidden behind barbed wire fences just to the south of Wacker's planned expansion area, this site and the succession of facility owners are more to blame for Wacker's problems than any other neighbor. Not only was Rhone-Poulenc dealing with higher quantities of hazardous wastes, it did a worse job with them. While Gould left its mess in a huge pile in plain sight, Rhone-Poulenc hid many of its wastes underground.

The Rhone-Poulenc facility was built in 1943 for the Chipman Chemical Co., and it has long been used to combine chlorine, hydrochloric acid, sulfuric acid, and other chemicals in order to make herbicides. In 1956 Chipman started producing 2,4-D, and in the late 1950s, handled some 2,4,5-T, which contains a form of dioxin that is one of the deadliest toxic chemicals known to man. When combined in equal proportions, these two herbicides produce Agent Orange, the strong mixture used by the United States to defoliate huge patches of the lush jungles of Southeast Asia during the Vietnam War.

In 1967, Chipman sold its property to the Rhodia Co., a French firm that eventually became the Rhone-Poulenc Agrochemical Division when the French government under President François Mitterrand nationalized Rhodia.

Until three years ago, the former Chipman plant, under Rhone-Poulenc, was one of only three facilities in the U.S. producing 2,4-D. Then, due to slackening demand, it started making the herbicide Buctril (used on wheat and corn fields to control weeds) instead.

For 30 years, liquid wastes were routinely stored on-site by plant operators in remnants of Doane's Lake, and allowed to evaporate off or percolate through the soil. Figures are inexact, but thousands of gallons were handled in this manner. In addition, leaky underground pipes, faulty seals and storm runoff that periodically washed the site contributed to the problem. Finally, in 1975, after years of negotiations with the city and the DEQ, Rhone-Poulenc agreed to send its treated wastewater to the city sewer system, and began to send 200 tons of its more hazardous wastes annually to Arlington, Ore., for safe disposal. But it was too late to reverse the effects of decades of mismanagement, evidence of which was sloshing around underground.

In 1980, after railroad workers complained of strong chemical odors detected while working on a bridge just north of the Rhone-Poulenc plant, DEQ scientists dispatched to the site found concentrations of 2,4-D at 50 parts per million and identified Rhone-Poulenc as the source. The Doane's Lake area that the company used for temporary storage was dammed, and its water was not allowed to reach the nearby Willamette.

Later that year, 10 wells were drilled on the Rhone-Poulenc site to further test the groundwater. Toward the north end of the plant, at a depth of 20 feet, chorinated phenols, toxic by-products of the herbicide production process, were found in concentrations of hundreds of milligrams per liter. Even the deeper wells showed traces of 2,4-D at 50 mg per liter.

According to Dan Hickman at the DEQ's lab, chlorinated phenols (which are usually found as families of related chemicals) can cause minor health problems for humans. Skin irritations, such as reddened tissues and mucous membranes, are the usual result of low-level exposure. Acute poisoning can result in motor weakness and decreased motor activity; it can also lead to convulsive seizures. Inconclusive evidence links phenols to cancer. Phenols are on the EPA's priority pollutant list, however, more for their effect on lower forms of life. The chemical can kill green algae quickly and wipe out protozoan populations. Concentrations as low as eight parts per million can kill goldfish.

Under DEQ orders, Rhone-Poulenc is daily pumping an estimated 15,000 to 30,000 gallons of the polluted groundwater up into surface treatment tanks, where organisms live that eat phenols. The water is treated, sent through charcoal filters, and then, if checking shows it to be clean, pumped to the Willamette River. The operation has continued for almost a year, and according to the DEQ's Chuck Clinton, could be in place for two more years. The DEQ periodically examines the effluent, but much of the responsibility for properly operating the system rests with the company. Rhone-Poulenc officials refused to discuss the operation or its costs with *Willamette Week*.

Meanwhile, the final chapter in the Rhone-Poulenc story waits to unfold. For the past decade, the company's Portland plant has routed its most hazardous wastes to the federal waste facility at Arlington, Ore., but in earlier years, some of the wastes that the company didn't store on-site or allow to soak into the groundwater table were trucked to various landfills. The EPA now wants to know where those wastes ended up, because of fears that lethal dioxins may taint the residues from the days when 2,4,5-T was handled by the plant. At Alkali Lake, near Lakeview in southern Oregon, 23,500 55-gallon drums of Rhone-Poulenc's herbicide manufacturing residues were buried three feet deep or incorporated into topsoil to see if they would naturally decompose. The EPA will check for dioxin in the soils this summer. At Portland's St. Johns Landfill, some 5,000 drums of the company's herbicide wastes were dumped. Records were scanty, and since nobody knows where the wastes were buried, electromagnetic equipment will be used late this summer to try to pinpoint the location of the barrels.

Koppers Co.

Although there is little doubt the 2,4-D in Wacker's groundwater came from Rhone-Poulenc, since only three companies in the United States made the herbicide, the phenols and grease plaguing Wacker could have come from other sources. One of the suspects is Koppers, a small operation on land just north of Wacker, which has a DEQ file full of warnings regarding its waste-disposal practices and its air-quality problems. The complaints began within a month of the plant's construction.

Only seven employees operate the Portland Koppers facility, which is one of 250 in the $1.9-billion-dollar chemical-products giant's empire. Built in 1966 for $1 million, the plant started out primarily making electrical anodes for the aluminum smelters in the area, but eventually the companies that operated those smelters figured out how to make such products themselves. Today, Koppers blends coal tar (a thick, black liquid that looks like asphalt) and other chemicals to produce the wood preservative creosote — using a process that generates no toxic by-products.

But in the old days, when Koppers manufactured a variety of coal-tar-based products as well as anodes, things were not so neat. The company's plant was a constant source of frustration for local residents and for air-pollution authorities. Koppers was using coal tar to produce various road materials and roofing products. Company officials had promised that the plant would operate as efficiently as a similar Koppers facility did in California, but in reality the system ran anything but smoothly. Clogged pipes, broken fans, malfunctioning valves and a faulty boiler caused numerous accidents. Citizens repeatedly com-

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plained of a sinister yellow haze hanging over Koppers. One woman wrote to the DEQ in the early 1970s that the plant was "worse than Chipman's." A man who passed the plant daily on the way to work called the constant odors "nauseating," telling DEQ the odors made him feel like he was plunging his face into the stomach of a freshly killed and disemboweled cow.

The problem was that the Koppers operation released sulfur as a by-product. The root of the infamous "rotten eggs" smell, sulfur can cause more problems than just bad odors. When combined with rainwater, sulfur becomes sulfuric acid, which can cause extreme irritation to the nose, mouth and respiratory tract. Creosote, which produces another odor that citizens complained about, can cause similar eye, ear and throat irritations. With prolonged contact, the vapor and fumes of creosote can lead to skin rashes, dermatitis and lung problems. One truck driver who handled Koppers' raw materials contracted chemical pneumonia in one lung.

Koppers had a problem with its wastewater treatment as well. According to a document in the DEQ's Koppers file, the company proudly informed the pollution agency in 1966 that "Effluent water will be treated using a method devised by Koppers' research and development department. The water will be collected in a surge tank adjacent to a drain field. The field will have three equally spaced furrows running its entire length. Each furrow will have a slide gate at the end closest to the tank. Every day, a different slide gate will be opened, and a different furrow flooded. The effluent water will percolate through the soil and the biochemical oxygen-demanding compounds will be consumed by soil bacteria." What is amazing is that pollution-control authorities would allow such a mindless plan to be put into action. Weather conditions would rarely favor the bacteriological control, and with 1,500 gallons of wastewater flooding the ditches daily for eight years, rapidly soaking through the soil, Koppers may have a lot to do with Wacker's oil, grease and phenol problems.

ıIQUID AIR CORP.

This company is a manufacturer of acetyne, used in hot-burning torches. The gasous product is not hazardous when normal ıfety precautions are followed. The company oes handle a corrosive 10 percent lime slurry olution that it stores in temporary holding onds and re-uses, according to DEQ documents. A few years ago, according to Clinton, the same time Gould was discharging acidic olutions into a Doane's Lake remnant, Liqd Air was pumping in lime slurry, which is alkaline solution, and the effect was to balce out the deleterious impacts. "Environentally, it was very helpful," Clinton noted. They were more or less working pollution ntrol."

Liquid Air also has a 302-foot well drilled its property that punctures an aquifer.

PENNWALT CORP.

This company's presence in Northwest Portland was one of the primary reasons Wacker moved to the neighborhood. A producer of chlorine, which it manufactures by breaking down salt (sodium chloride) into its constituents, Pennwalt saves Wacker a lot of money on transportation by simply piping the chemical straight to Wacker's production facility, where it is used in great quantities in the manufacturing process.

The Portland Pennwalt plant, built in 1941, is part of a $1.05 billion organization, headquartered in Philadelphia, that manufactures chemicals, pharmaceuticals, and specialized equipment. The DEQ says that Pennwalt's Portland facility has a lagoon/landfill on-site for holding brine-purification sludge, and that the more dangerous by-products, such as sodium arsenite (an arsenic compound), are shipped off to Arlington for disposal. "As far as we know, everything is going fine," a Pennwalt executive said last week. "There is no special monitoring or anything like that. Nothing like the battery plant, or Wacker." Because Pennwalt occupies former Doane's Lake sections, and because Pennwalt did some filling of low-lying sections of its land, it, too, is on the DEQ's list.

Wacker's plans are to hire CH_2M Hill, an engineering consulting firm, to further study the site; in June, testing revealed there was no immediate air-quality threat to current employees at Wacker's manufacturing plant from the toxic groundwater. At this point, however, Wacker is not discussing its plans publicly, except to say that it still intends to eventually do further building on the site.

The long-term impact on Portland is harder to gauge. Certainly, any other companies considering a move to the Rose City will be well-advised to study DEQ files on prospective neighbors. New legislation (see sidebar) will further strengthen some of this state's environmental regulations. Still, it is possible there are other areas of this city with groundwater problems that have yet to be revealed. And for companies like Liquid Air Corp., whose 302-foot well just south of Doane's Lake is already tainted by Rhone-Poulenc's past practices, the problems are immediate. Along the nearby Willamette River, fed by two aquifer systems beneath Doane's Lake, a plume of pollution may start causing concern any time now; testing so far has not revealed the presence of phenols in the river, but in 1964, fishermen landing salmon near Rhone-Poulenc couldn't eat their catch because of a strong chemical flavor linked to the herbicide manufacturer. Groundwater pollution problems eventually become river pollution problems; whether or not they will become economic development roadblocks, frightening other companies away, is another concern. •

NORTHWEST NATURAL GAS CO.

In 1913, a forerunner of NNG, Portland Gas and Coke, built a refinery-type operation on land just north of Wacker's present-day site. The plant heated oil and produced synthetic gas, gasoline and other by-products. The operation closed in 1956, and was later replaced with the liquified natural gas tanks that are still present.

Over the last few years, there have been reports from Astoria and Seattle that similar old plant sites have witnessed thick oils and tars oozing from the ground — a result of past activities, when those residues were dumped on-site or even injected into the ground. NNG's Doug Yocum told *Willamette Week* that such oozing was not evident at the Portland plant location. "DEQ has been monitoring the area for years," Yocum said, adding, "We don't think there's any reason to think what Portland Gas and Coke did contributed to the Wacker problem." The DEQ's Clinton said none of the companies surrounding Wacker have been ruled out to date, and it is possible that the former Portland Gas and Coke tar pit could be one source of Wacker's troubling wastes.

AMERICAN STEEL INDUSTRIES

This steel fabricating plant just south of Doane's Lake was formerly owned by Gilmore Steel Corp. Clinton said recently he doesn't believe there is much to fear from the operation. The most dangerous output from the plant is melted furnace slag, which is relatively harmless. The DEQ has searched its files for evidence of on-site disposal, has visited the operation, and has even collected samples. According to Clinton, the primary reason the plant is on the list at all is because of its close proximity to Doane's Lake. "To

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Grappling with toxic-waste management

IN MID-DECEMBER, 2,000 residents of Bhopal, India, lost their lives when a toxic cloud of poson swept over their homes after an industrial accident. Three weeks later, the 1985 Oregon Legislature began, and it turned out to be perhaps the most productive session in state history in terms of its willingness to grapple with toxic-waste management issues.

Seven bills were recently signed into law by Gov. Vic Atiyeh that directly or indirectly concern toxic chemicals and the companies, such as those in the Doane's Lake area, that handle them. Part of the credit for the bills, according to environmental lobbyists such as John Charles, executive director of the Oregon Environmental Council, and Jon Stubenvoll of the Oregon State Public Interest Research Group, belongs to the Bhopal incident, which Stubenvoll says "made people aware of the problems," and part belongs to Rep. Mike McCracken (D-Albany), who as head of the House Environment and Energy Committee, directed traffic on the various bills. The two lobbyists also singled out Rep. Ken Grease (D-Portland), who also served on the Environment and Energy Committee, and Rep. Mike Burton (D-Portland), whose district includes the St. Johns landfill, for being "solid" votes.

Below is a list of the various toxics-related bills that passed the 1985 session and were signed into law. As the OEC's Charles puts it, "Some of these bills two years ago wouldn't have gone anywhere."

• HB 2146 directs the Oregon state treasurer to set aside an account that will enable Oregon to provide matching funds for the federal Environmental Protection Agency's Superfund program. Federal law dictates that before the EPA commits money to clean up a site, the state must provide 10 percent in matching funds if the site is on private land and 50 percent if the site occupies municipal property. Thus, the five Oregon sites already tagged for remedial action (Gould Inc., Teledyne Wah Chang in Albany, the Umatilla Army Depot, United Chrome in Corvallis and the St. Johns landfill in Portland) should eventually be cleaned up if the federal agency ever gets vigorous.

• HB 2142 gives the Oregon Department of Environmental Quality new authority to check records and take immediate action when underground chemical or fuel storage tanks are suspected of leaking. Once the source is located, the DEQ can take the proper actions and later gain reimbursement from the responsible party. In other words, the newly passed bill makes it possible for the DEQ to clean now and ask questions later, rather than waiting for culpability to be settled after exhaustive studies.

• HB 2143 requires that any landowner whose property was once a toxic-waste dump has to stipulate such information on the deed to that property. Presumably, this will prevent land developers from building condominiums on abandoned waste dumps and selling the homes to unsuspecting buyers. The newly passed legislation also could conceivably prevent future situations such as the one Wacker Siltronic finds itself in.

• HB 2255 is known as the community right-to-know bill. It directs the DEQ to survey all current toxic-waste dumpsites in Oregon and to compile the information for public scrutiny. In this manner, neighborhoods that contain industries handling hazardous or toxic wastes will be informed about the possible dangers resulting from their close proximity to the facilities. While supporters of the bill were unable to include provision for conducting a survey of past dumpsites, HB 2255 may enable more residents to rest assured that their homes are safe. And like HB 2143, it will aid people who are considering moving to new locations by providing accurate information on which to base decisions.

• HB 3005 directs the state Department of Transportation to coordinate emergency-response plans in the event of spills or accidents involving the transport of toxic or radioactive wastes and materials. Several of the seven companies being investigated by the DEQ at Doane's Lake, near Wacker, transport their most hazardous wastes to the waste dump at Arlington, Ore., and they will likely be affected by this bill — especially if expensive safety requirements are added to the handling costs in the new plans. An Inter-Agency Hazard Communication Council will be established to oversee the drafting and implementation of emergency-response plans and will also control the dumpsite survey mandated by HB 2255. The goal is to assure that no serious public-health problems occur due to truck accidents, wrecks, or other transport-related incidents. Traffic to the Arlington disposal facility has increased during the last few years, and is expected to continue to do so.

• SB 138 essentially implements a bureaucratic moratorium on construction of a PCB-incinerator at Arlington that is strongly backed by Chem-Security, the Arlington waste facility's owner and operator. Not only would the incinerator attract PCB-laden wastes from all over Oregon and several other western states, Chem-Security is seeking to gain permission to build the facility so that it could easily be re-tooled to handle other kinds of chemical wastes at a later date. (PCBs contain high concentrations of the most toxic form of dioxin, and are to be disposed of by 1989 under EPA regulations.) The transportation bill mentioned above will address some of the Legislature's concerns about attracting high volumes of wastes to Oregon's highways, but SB 138 essentially buys lawmakers time to study the incinerator idea further before final approval is given. High-technology companies like Wacker approve of Chem-Security's plans because the electronics industry generates large volumes of toxic wastes, and uncertainty over disposal can become an economic development issue.

• SB 868 is dubbed workers right-to-know, and is thus the labor corollary of HB 2255. It provides for better labeling of hazardous or toxic chemical containers in the workplace and for more information on the health dangers of chemicals handled routinely by workers. The legislation should be highly beneficial to all workers who handle chemicals they know nothing about. Supporters generally credit the Bhopal incident and related fears for pushing SB 868 through.

The seven newly passed bills add greatly to Oregon's statutory strength in dealing with the problem of air, surface and groundwater contamination. The OEC's John Charles points to the toxics package as evidence that, environmentally at least, the 1985 Legislature was a productive one. OSPIRG's Stubenvoll agrees, adding only that some of the bills will have to be strengthened and fine-tuned later. "We didn't have to hold anybody's feet to the fire or threaten to mount an initiative campaign," Stubenvoll says. "They all seemed to have gotten the message down there that it was time to do something about toxics."

— G.R.

SCOEPA00015594

DAMES & MOORE A PROFESSIONAL LIMITED PARTNERSHIP

November 17, 1987

Oregon Department of Environmental Quality
811 SW 6th Avenue
Portland, Oregon 97204

Attention: Mr. Bill Renfroe

Gould Inc. Site
Portland, Oregon
Final Remedial Investigation Report
Replacement Pages

Gentlemen:

On behalf of our clients, NL Industries, Inc. and Gould Inc., Dames & Moore is pleased to submit this Final Remedial Investigation Report for the Gould Inc. site currently owned by Gould Inc. in Portland, Oregon. This report is submitted pursuant to an Administrative Order on Consent, signed August 28, 1985 (effective August 29, 1985) under EPA Docket No. 1085-05-08-106

The Final Report you are receiving consists of replacement pages for the Draft Remedial Investigation Report, which was submitted on June 1, 1987. A document consisting of two instruction sheets for replacing pages in the draft text is also provided. In addition, a separate document is provided, which summarizes the response to each of the written comments received on the Draft Report.

The report is in four volumes. Volume I contains text and figures; Volume II contains appendices; Laboratory Data Supplemental Volumes I and II contain laboratory and QA/QC data.

If you have any questions, please contact us at (206) 523-0560.

Sincerely,

DAMES & MOORE

Mark Schultheis

Mark D. Schultheis
Project Manager

Attachments

cc: Kevin Dyer, Portland District Corps of Engineers
Chuck Politica, Department of the Interior

SCOEPA00015595

7.0 GOLD

Hazardous & Solid Waste Division
Dept. of Environmental Quality
RECEIVED
NOV 18 1987
Remedial Action Section

REMEDIAL INVESTIGATION
GOULD SITE
PORTLAND, OREGON

FINAL REPORT
VOLUME II
APPENDICES

Prepared by

DAMES & MOORE
A PROFESSIONAL LIMITED PARTNERSHIP
NOVEMBER 1987

Prepared for

NL INDUSTRIES, INC.
GOULD INC.

SCOEPA00015597

APPENDICES

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Appendix B - Quality Assurance/Quality Control Program

Appendix C - Analytical Data

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- Appendix D2 - Geophysical Logs
- Appendix D3 - Water Level Data
  - Appendix D3.1 - Precipitation and River Stage Data
  - Appendix D3.2 - Monitoring Well Data
  - Appendix D3.3 - Monitoring Well Hydrographs
  - Appendix D3.4 - Continuous Stevens Recorder Data
  - Appendix D3.5 - Barometric Pressure Charts
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Appendix A

APPENDIX A

SAMPLING AND ANALYTICAL PROCEDURES

APPENDIX A

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APPENDIX A

SAMPLING AND ANALYTICAL PROCEDURES

Appendix A presents the sampling and analytical procedures utilized during the NL/Gould remedial investigation. The objectives, locations, number and collection period of the surface debris, surface and subsurface soil, sediment, surface-water, and ground-water samples are described in earlier sections of the remedial investigation report. The quality assurance/quality control (QA/QC) procedures associated with the sampling and analytical procedures are presented in Appendix B.

A1.0 SAMPLING PROCEDURES

The following sections present the procedures used for sampling surface debris (battery casings and matte), surface and subsurface soils, sediments, surface water, and ground water at the NL/Gould site and vicinity. These procedures were previously presented in the original and revised work plans. Any additions or modifications to the work plan procedures are described and explained in the discussion which follows.

A1.1 SURFACE DEBRIS SAMPLING

This section describes the procedures used to collect battery casing and matte samples. In addition, the exploratory test pit procedures utilized to evaluate the extent of the battery casing and matte materials are described.

A1.1.1 Battery Casings

Pursuant to Section 2.4.2.2 of the site protocol document, three samples were collected from each of four battery casing sampling locations. Samples were collected from pits excavated by backhoe at three depths: 1) at the pile surface; 2) at a depth of approximately 5 feet within the pile; and 3) at the ground surface elevation. The first sample was collected from the center of the backhoe bucket with a stainless steel scoop and placed in 5-gallon plastic buckets lined with polyethylene plastic bags. Subsequent samples were transferred directly

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from the backhoe bucket to the 5-gallon plastic buckets. Each sample consisted of an estimated 15-20 pounds of battery casing debris. After samples were collected, the sample bags were closed with fasteners and the cover of each bucket was sealed externally for shipping to Laucks Testing Laboratories, Inc. in Seattle, Washington. Two chain-of-custody seals were placed on each bucket, and the chain-of-custody procedures described in Appendix B, Section B2.2.3 were carried out.

A1.1.2 Battery Casing Test Pits

A rubber-tired backhoe with an extendable boom was used to excavate each test pit. One wall face was made as vertical as possible to facilitate geologic logging of the subsurface materials. The depth of the excavation was to 13 feet or to the bottom of the fill, whichever was shallower. Each test pit excavation was approximately 4 feet wide and 15 feet long.

The type of material encountered in each test pit was logged by a qualified geologist/engineer. The thickness of any battery casing fill was noted. A 35-millimeter photograph was taken of the exposed material on the open wall face of the test pits.

The backhoe test pit excavation was backfilled using the material excavated from the test pit. The backfilling sequence followed a "last excavated-first replaced" principle. All backfilled material was compacted with the backhoe bucket. The final ground surface at each test pit was graded to approximately the original grade.

A1.1.3 Matte Sampling

Samples from the matte disposal area were collected at four locations. Two samples from two of the sampling locations and one sample from the other two locations were collected. Samples were collected at the top of the matte material and/or just above the ground-water surface from pits excavated by backhoe. Ground water was encountered within 1 to 3 feet of ground surface in the matte disposal area. Samples were collected from the center of the backhoe bucket with a stainless steel scoop and placed in 1-gallon plastic buckets lined with

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polyethylene plastic bags. Each sample consisted of an estimated 5 pounds of matte material. Chain-of-custody seals were placed on the buckets and the chain-of-custody procedures described in Appendix B, Section B2.2.3 were carried out.

A1.1.4 Matte Test Pits

A total of 14 additional test pits were dug to a depth of approximately 1 to 3 feet. The original proposed depth of 15 feet was not possible due to the depth to ground water (1 to 3 feet) and the hardness of the matte material. Test pit excavation procedures were identical to those described above for battery casings (Section A1.1.2). During this test pit program, no samples of matte material or soil were collected for analysis. Photographic records and geological logs were taken at each test pit.

A1.2 SURFACE SOIL SAMPLING

Samples were obtained from the upper 3 to 9 inches of soil using procedures adapted from EPA procedures (Dallas Lead Investigation, July 7, 1982). Samples were obtained by compositing approximately 100-gram subsamples collected from four equally-spaced locations on the circumference of a 10-meter diameter circle (Figure A1.2-1, Soil Sampling Diagrams). One subsample was collected at the northernmost point on the arc, one at the southernmost point, one at the easternmost point and one at the westernmost point. An additional undisturbed soil core was collected from the center of the circle for samples requiring permeability testing.

Some of the designated soil sampling locations were not large enough in area to collect soils around the required 10-meter diameter circle. At these locations, the diameter of the circle was reduced by 1-meter increments, to a minimum circle diameter of 3 meters, until the sample could be collected. If a sampling circle was not possible, four subsamples were collected from a rectangular configuration (Figure A1.2-1). Soil collected from the four subsampling sites, located in

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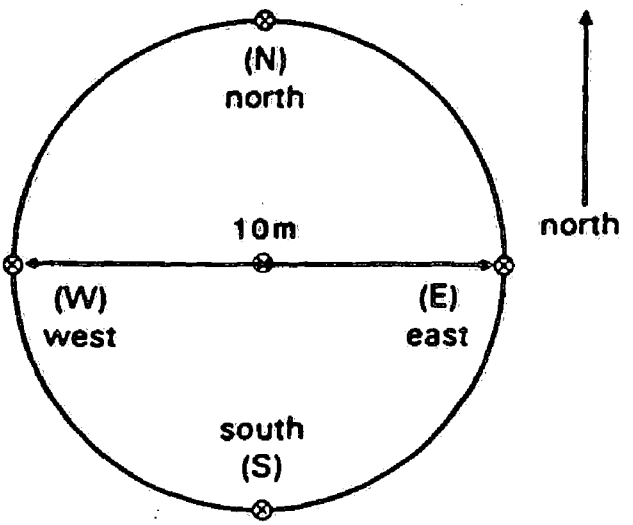
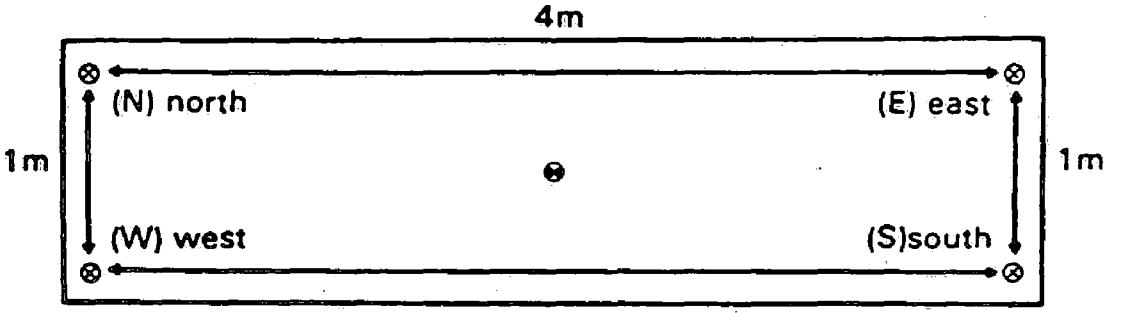


PRIMARY COLLECTION PATTERN



OPTIONAL COLLECTION PATTERN

⊗ Subsample collected for chemical analysis composite

⊖ Sample collected for physical testing

NL IND, INC./GOULD, INC. REMEDIAL INVESTIGATION	
SURFACE SOIL SAMPLING DIAGRAMS	
FIG. A1.2-1	DAMES & MOORE

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each corner of the rectangle, was composited in the same way as those collected from the sampling circle. The midpoint of the rectangle was used for collecting the undisturbed core for permeability testing.

The senior member of the field sampling team was responsible for adhering to the sample collection guidelines. At designated sampling locations, the sampling site configuration (circle or rectangle) was located at the approximate original sampling point location. If this location was unsatisfactory due to the presence of paving, structures, and/or other obstructions, the sampling site was moved within a 30-meter radius of the original sample location (grid intersection). If a sample could not be obtained within the 30-meter radius, the nearest accessible grid cell midpoint or node was sampled.

Collection sites, with the exception of one background site, were located as far as possible from vehicular activity areas such as streets, driveways, parking and vehicle repair locations. Whenever possible, samples were not collected within 20 feet of painted surfaces and under or immediately adjacent to trees, shrubs, and/or structures.

The Dames & Moore Type U sampler was used to collect the surface soil samples (Figure A1.2-2, Soil Sampler Type U). A pump hoist was used to drive and retrieve the sampler at locations where the surface soil was very hard. Some locations were too hard to sample even with the hoist. At these locations, a pick, shovel, and stainless steel spoon were used to collect the samples. The samples consisted of only mineral soil; rocks and gravel were not collected. If sod layers were present at a sample location, the surface vegetative sod material was removed before the sample was collected. The composite sample collected for chemical analysis was prepared by mixing four subsamples together and placing a representative sample of the mixed composite in a sample jar. The sample jar was sealed, labeled, and documented according to chain-of-custody procedures described in Appendix B, Section B2.2.3. The core sample collected for physical testing was placed in a plastic tube for transportation to the testing laboratory. All sampling equipment was decontaminated before collecting each sample, using the procedures described in Appendix B, Section B2.1.

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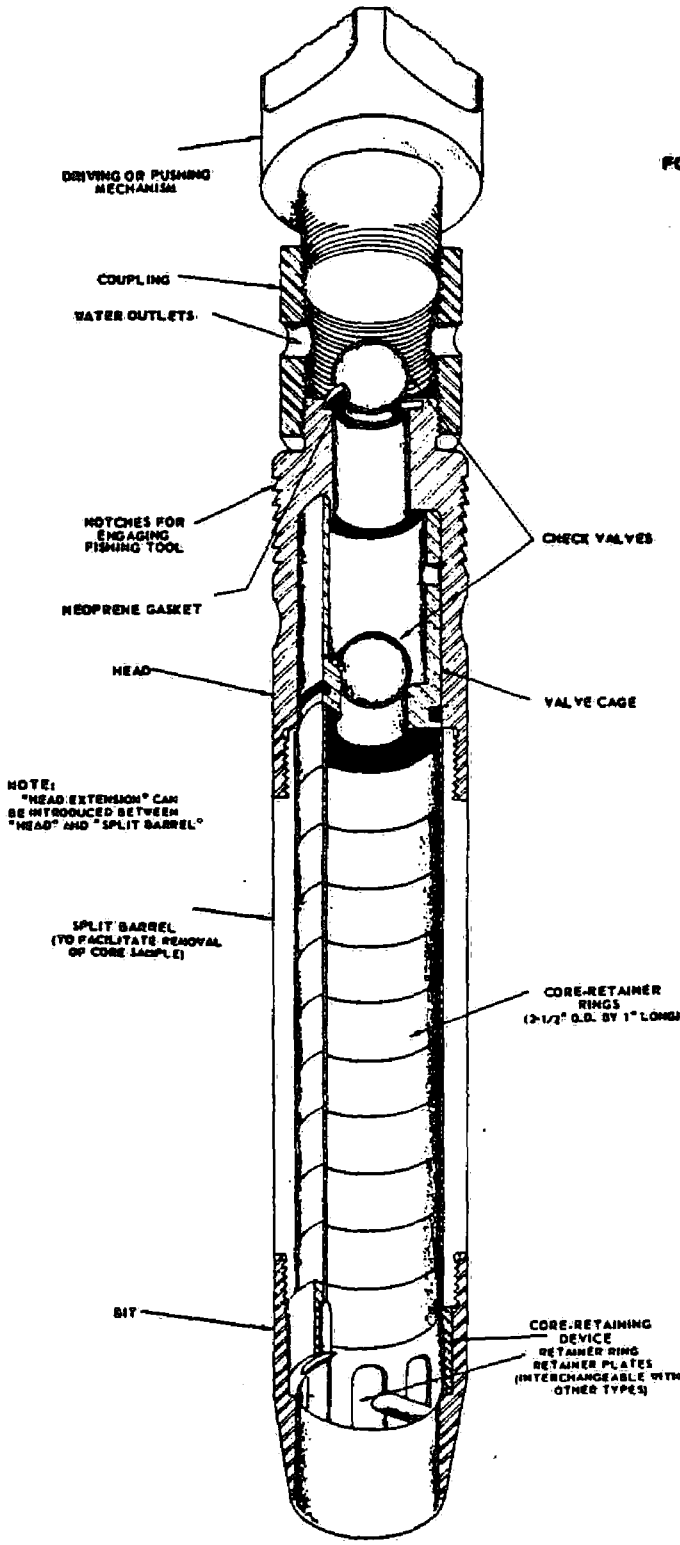
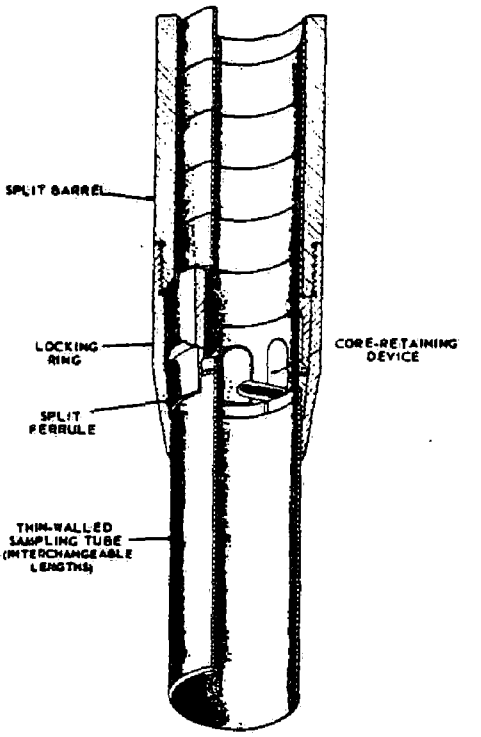
SOIL SAMPLER TYPE U

FOR SOILS DIFFICULT TO RETAIN IN SAMPLER



ALTERNATE ATTACHMENTS



NL IND, INC./GOULD, INC. REMEDIAL INVESTIGATION
SOIL SAMPLER TYPE U
FIG. A1.2-2 DAMES & MOORE

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A1.3 SUBSURFACE SOIL SAMPLING

The main objective of the subsurface soil investigation was to confirm the lateral and vertical extent of soil contamination on the site. A total of four soil borings were drilled for the purpose of collecting subsurface soil samples. These samples were supplemented by samples collected during the installation of six shallow and deep monitoring wells. The locations of subsurface soil borings and monitoring wells were determined based on the location of existing ground-water monitoring wells and onsite areas where fill materials were known to exist. Review of the first quarter hydrogeologic and geochemical results indicated the need for additional borings at W-3, W-12 (B-8), and W-16. (Agreement on these well locations was obtained from EPA Region X personnel.) Subsurface soil samples were collected from each of these new well locations for chemical and physical testing. In summary, samples for chemical and physical analysis were collected from a total of 13 soil borings.

A1.3.1 Drilling Procedures

All subsurface soil borings, except the basalt well boreholes, were advanced using a truck-mounted cable tool drill rig. The four exploratory soil borings were advanced through the fill material and appoximately 5 to 10 feet into the underlying alluvium. Shallow well borings were also drilled into the native material below the fill. Deep and basalt wells were drilled 5 feet into the basalt using the cable tool. Basalt wells were advanced an additional 15 feet into the basalt using a truck-mounted air rotary drill rig. Soil samples for analyses were collected using the Dames & Moore Type U sampler. Grab samples were collected while drilling into the basalt. A Dames & Moore geologist observed the drilling operation, which was performed by a drilling contractor licensed in the State of Oregon. All drill cuttings and fluids were placed in 55-gallon drums and stored on the Gould property.

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A1.3.2 Sample Recovery

Samples were collected using a Dames & Moore Type U sampler (Figure A1.2-2) from depths directly below the fill at 5-foot intervals, and where drill cuttings indicated a change in lithology not noted in the previous sample core. After sample retrieval, the Type U sampler was placed on a plastic-covered table, designated the "dirty" table, and opened. Using a stainless steel spoon, samples for chemical testing were transferred from the sampler into a sample bottle taken from the "clean" table. Sample bottle caps were checked to ensure the presence of the required polytetrafluoroethylene (PTFE) liners. The cap was then secured tightly and the bottle was returned to the "clean" table.

Soil samples for physical testing were collected in six 1-inch brass rings. These rings were placed in a plastic bag and the bag was placed into a sample tube for storage and shipment. Samples collected for moisture content were placed in glass bottles for storage and shipment.

Sample bottles and sample tubes were labeled according to proper documentation procedures (see Appendix B, Section B2.1). The samples for chemical testing were stored in ice chests cooled to 4° Centigrade (C) that were located on the "clean" table. The plastic cover on the "dirty" table was changed after each sample. Sampling equipment was decontaminated before collecting each sample (see Appendix B, Section B2.1).

A1.4 SEDIMENT SAMPLING

A 14-foot long, flat bottom, aluminum hull boat was used as a stable work platform for sediment sample collection. The samples were collected with the Dames & Moore Type U sampler (Figure A1.2-2) modified to connect to a 3/4-inch pipe extension. The original procedure, forcing a clean 2-inch diameter polyvinyl chloride (PVC) pipe into the sediments, was not successful.

The sampler was lowered to the sediment surface and driven 6 to 12 inches, depending upon the sediment consistency. The sampler was driven

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deeper in soft sediments. The pipe was not sealed at the top while the sampler was lowered since this is not necessary with the Type U sampler.

The sample was extruded from the sampler into a clean stainless steel mixing bowl. Excess water was prevented from entering the bowl. The sample was then transferred to sample bottles with a stainless steel spoon. Appropriate sample labeling and documentation procedures described in Appendix B, Section B2.2 were followed. All sampling equipment was decontaminated before collecting each sample (see Appendix B, Section B2.1).

A1.5 SURFACE-WATER SAMPLING

All open lake remnant and river surface-water samples were collected with the aluminum boat used to sample sediments (described above in Section A1.4). If the lake depth exceeded 10 feet, depth-stratified samples of water were collected at the surface and near the bottom (labeled S and B, respectively). For depths less than 10 feet, a single mid-depth location was sampled. All samples were collected with a manual-trip, non-metallic water bottle or a handheld non-metallic scoop bottle. Every effort was made to not disturb the bottom sediments during sampling.

Samples were collected in appropriate sample bottles, with the specified preservatives when required, and sealed tightly. Headspace in the sample bottles was minimized and the bottles were labeled and documented as described in Appendix B, Section B2.2. All samples were stored in ice chests cooled to 4°C and delivered to Laucks Testing Laboratories for preparation within 24 hours after collection. All sampling equipment was decontaminated before collecting each sample (see Appendix B, Section B2.1).

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A1.6 GROUND-WATER SAMPLING

A1.6.1 Well Completion Procedures

The shallow and deep boreholes were advanced with a cable tool rig. The basalt boreholes were advanced by cable tool and air rotary drilling. Verticality and trueness were maintained by use of proper drill string and drill bit stabilization, and suitable drilling rates and pressures. Periodically, verticality and trueness were visually checked by the driller in the presence of the Dames & Moore geologist observing the well installation/construction. Boreholes did not deviate from vertical by more than 1 foot per 100 feet of depth. Boreholes did not deviate from true (straight) by more than 1/3 of their diameter over their depth. Subsurface soil samples for chemical and physical testing were collected according to the procedures previously described in Section A1.3.

Fluids from cable tool drilling were limited to clean water from the onsite city water supply. Fluids from air rotary drilling consisted of clean air supplied by a piston pump and formation water.

The deepest borehole at each of the new drilling sites was logged with a geophysical logging apparatus (including natural gamma, gamma-gamma, and neutron-neutron). These logs were reviewed with the geologist's log of the borehole and the daily field reports, to analyze the stratigraphy of the site. Existing deep monitoring wells were also subjected to geophysical logging wherever feasible.

During deep well installation to the top of the basalt, a bentonite seal was placed below the lower sand pack to hydraulically isolate the borehole from the underlying basalt (see Figure A1.6-1, Typical Well Completion Diagram). Bentonite pellets made from montmorillonite without binders were used for seal material. The bentonite was allowed to hydrate to approximately 90 percent of its final volume after placement, and the borehole depth was sounded to assure proper placement and hydration.

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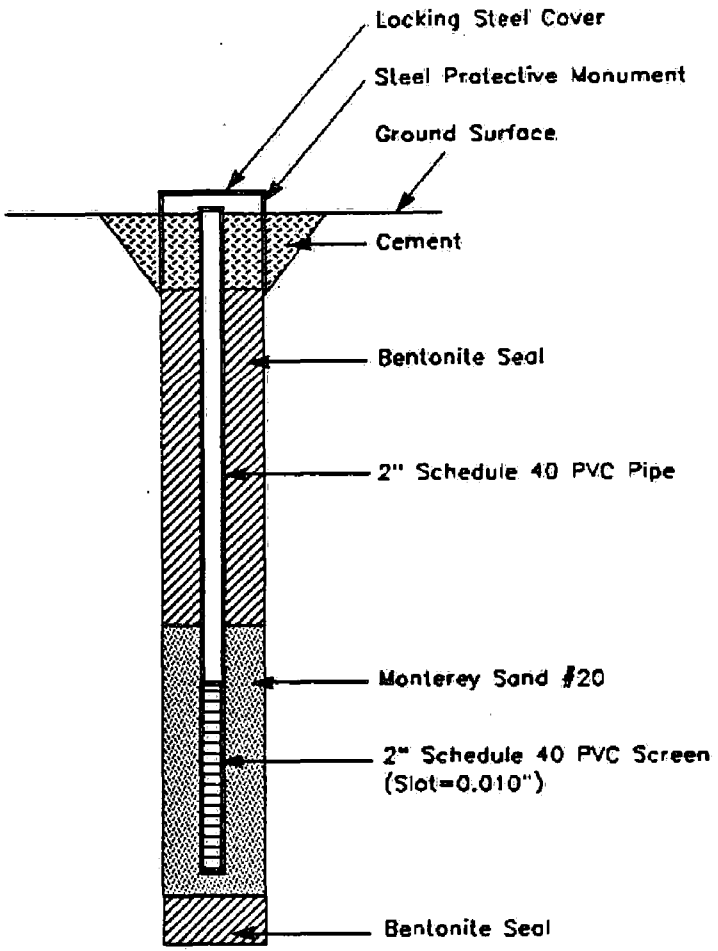

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NL IND, INC./GOULD, INC.
REMEDIAL INVESTIGATION

TYPICAL
WELL COMPLETION DIAGRAM

FIG. A1.6-1 DAMES & MOORE

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A lower sand pack (1 foot of sand below the screen) was placed in the borehole. After the sand was added, the borehole depth was sounded to ensure proper placement of the lower sand pack. The screen and casing of deep and basalt wells consisted of 4-inch diameter, Schedule 40 PVC. The screen and casing of shallow wells consisted of 2-inch diameter, Schedule 40 PVC. Centralizers were used to maintain an equal annular space between the borehole wall and the casing. The length of the total assemblage (screen and casing) was recorded during installation. A threaded cap or a slip fit cap was placed at the bottom of the screen and fixed to the screen with stainless steel screws. All PVC joints were wrapped with PTFE tape.

To prevent cross-contamination from occurring between the alluvium and basalt aquifers, the basalt wells were double cased (Figure A1.6-2, Typical Basalt Well Completion Diagram). An outer casing of 8-inch (nominal) diameter steel was installed from ground surface to approximately 5-feet below the basalt surface. The annular space outside the 8-inch casing was grouted for 5-feet above and below the basalt contact. The annular space above the grout seal was backfilled with a bentonite slurry. Centralizers were used to maintain an equal annular space between the borehole and the casing. After the grout had set, a nominal 8-inch borehole was advanced through the bottom grout seal and approximately 20 feet into the basalt. (Note: Drive samples were not taken within the basalt.) The 4-inch PVC casing was then installed within the cased borehole as previously described.

Where hydrogeologic conditions required the installation of an intermediate water level well, a 2-inch diameter intermediate well was installed in the same borehole as the deep well (Figure A1.6-3, Typical Multi-Level Well Completion Diagram). A bentonite seal at least 10-feet thick was used to isolate the deep and intermediate well screens. Other well installation features were the same as previously described.

The sand pack for the screened interval (consisting of screened interval plus upper and lower sand pack) was placed in a manner so that sand was not deposited on the borehole wall in the interval where the

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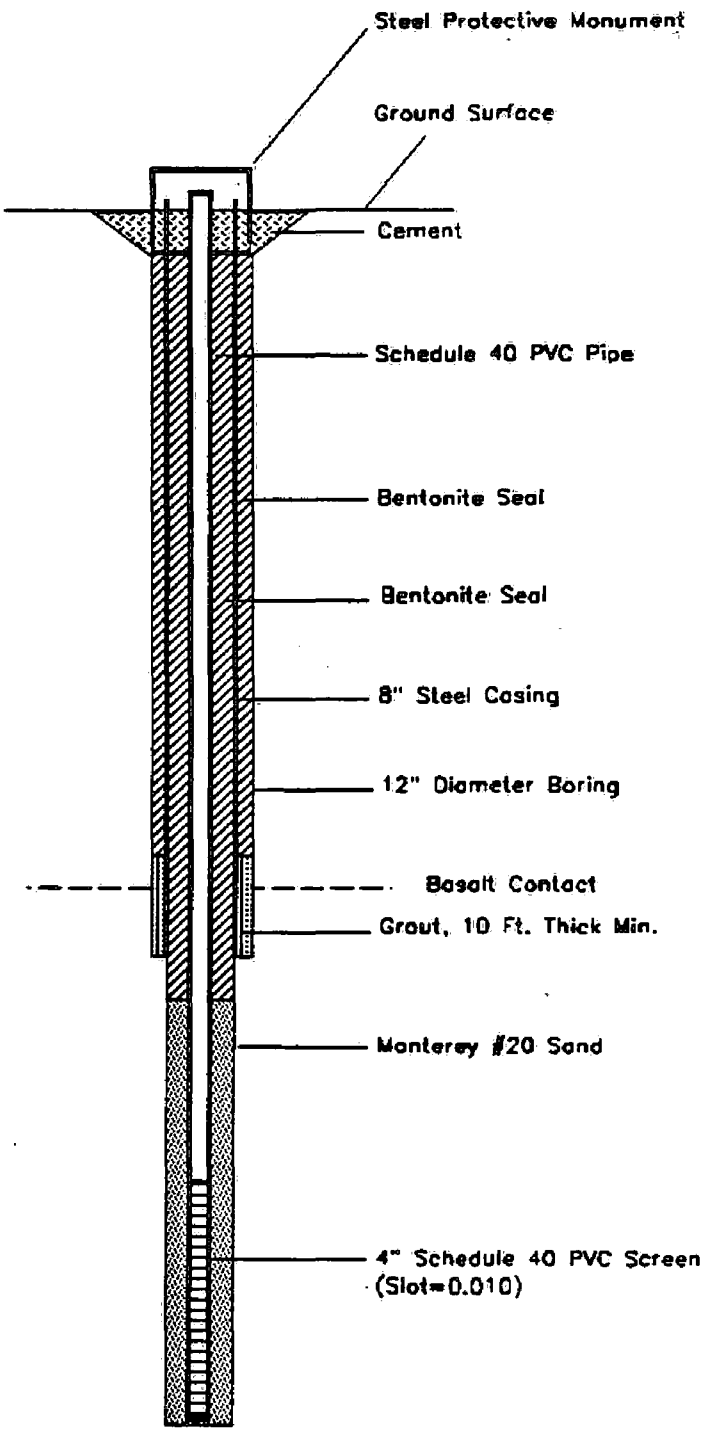

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NL IND, INC./GOULD, INC.
REMEDIAL INVESTIGATION

TYPICAL BASALT WELL
COMPLETION DIAGRAM

FIG. A1.6-2 DAMES & MOORE

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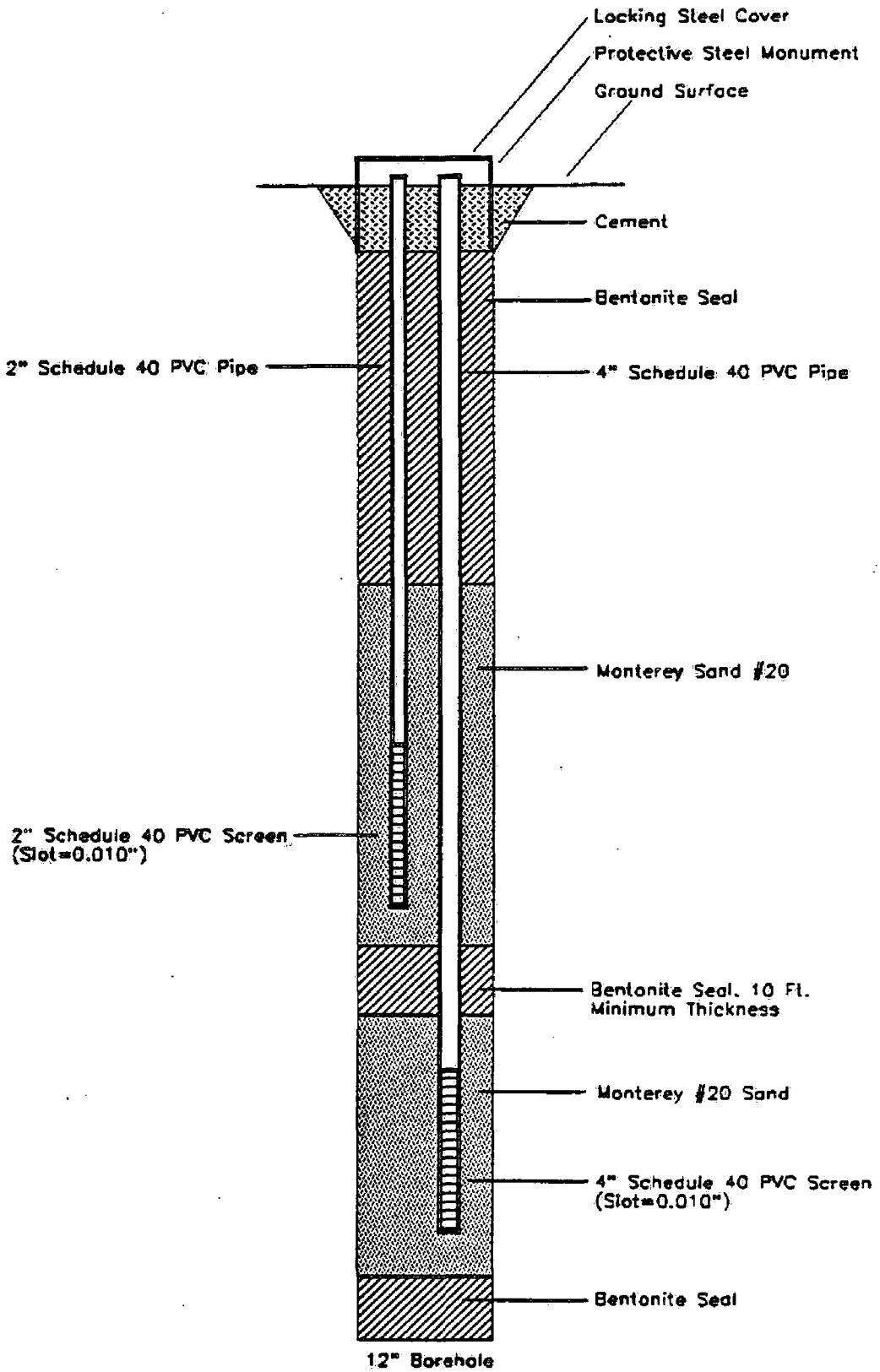

NL IND, INC./GOULD, INC. REMEDIAL INVESTIGATION	
TYPICAL MULTI-LEVEL WELL COMPLETION DIAGRAM	
FIG. A1.6-3	DAMES & MOORE

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well seal was placed. The sand pack was allowed to saturate, and the borehole depth was sounded to assure proper placement of the top of the pack. Number 20 Monterey sand, or the equivalent, was used. A bentonite seal was placed at the top of the sand pack in each well (Figures A1.6-1 through A-1.6-3). A minimum seal thickness of 5 feet was used. Before the wells were backfilled from the top of the seal to the ground surface with bentonite slurry pellets, the lower bentonite seal was allowed to hydrate to 90 percent of its final volume. Before the concrete pad/ surface seal was installed, the bentonite slurry was saturated with water (city water supply), rodded, and allowed to hydrate to 90 percent of its final volume. A cement surface seal was placed around the well casing(s) at each location, and a lockable steel surface casing was installed to a depth of approximately 2 feet below ground surface. A sloped concrete pad was constructed around the surface casing.

Each monitoring well was developed by air lifting or bailing. In some wells, a surge block tool was used in conjunction with the above techniques. Wells were developed until the apparent turbidity stabilized. Development water from each well was collected in an individual 55-gallon drum.

During the first sampling round, sand was observed in Well W-11D. It was determined that the well casing had separated above the screened interval. A 3-inch diameter PVC casing, with 10-feet of screen, was placed within the well after the sand was removed. A viton 0-ring seal was used to prevent the sand from entering the new inner casing. The well was repaired and redeveloped prior to the second sampling round. In addition, it was observed that full depth was not achievable in well W-2D. The obstruction appeared to be hard, but an air-lift pipe could be lowered below the obstruction to facilitate removal of any sand and silt in the well. A video camera was sent down the well in an unsuccessful attempt to identify the obstruction.

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A1.6.2 Sampling Procedures

Ground-water samples were collected from the monitoring wells on a quarterly basis over a 9-month period. Prior to sampling, accurate water-level measurements were obtained from each well using a calibrated conventional electric water-level meter. Before sampling, a minimum of three standing well casing water volumes were evacuated from each well. The wells were purged using a stainless steel or PTFE bailer, an air-activated positive displacement pump, a centrifugal pump, or a stainless steel PTFE bladder pump. Samples were collected using the bladder pump, the positive displacement pump, or the bailers. After purging and before sample collection, specific conductance, pH and temperature were measured to ensure stability. Three to four replicate pH and conductivity readings were obtained from each monitoring well before sampling. All field measurements were recorded immediately on the field documentation forms (Appendix B, Section B2.2).

During the first quarterly sampling round, all ground-water samples collected for metals analysis were either field-filtered and then preserved with acid or sent to the laboratory where they were filtered and then preserved. Other samples not requiring filtration or preservation were collected and shipped to the laboratory unfiltered and unpreserved. During the second and third quarterly sampling rounds, the following procedures were conducted:

- Two 1-liter unfiltered and unpreserved samples were collected from each well and piezometer. The samples were collected so that headspace was minimized in the sample bottles. One 250-milliliter (ml) unfiltered sample was collected from each well and piezometer and preserved with sulfuric acid. This preserved sample was collected so that no headspace remained in the sample bottle.

- Collected samples were stored in ice chests cooled to 4°C and delivered within 24 hours to Laucks Testing Laboratories for analysis. Appropriate labeling and documentation procedures described in Appendix B, Section B2.2 were followed. All

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sampling equipment was decontaminated before collecting each sample (see Appendix B, Section B2.1).

A1.6.3 In-Situ Permeability Tests

In-situ field permeability tests were conducted on all wells at the site. On all wells except Wells W-11I, W-11D, W-11B, and W-12D, tests were conducted by artificially lowering the water level through rapid evacuation of the wells with a centrifugal pump. The water level was monitored as the aquifer recovered. Due to the depth of water in the other four wells, the centrifugal pump could not effectively be used. In these four wells, a sealed 20-foot section of weighted PVC casing was rapidly lowered into the water. The water level was monitored until the aquifer reached 90 percent recovery. After 90 percent recovery was achieved, the PVC casing was removed and the water level was monitored during recovery. Recorded data were analyzed in accordance with Hvorslev time-lag principles (Hvorslev 1951) using a semi-log plot of piezometric head versus recovery time. The relation for a rising head test is:

$$k_h = \frac{d^2 \ln\left[\frac{mL}{D} + \sqrt{1 + \left(\frac{mL}{D}\right)^2}\right]}{8LT}$$

where

k_h = horizontal hydraulic conductivity (centimeters per second)
k_v = vertical hydraulic conductivity (centimeters per second)
d = diameter of standpipe (centimeters)
L = length of sand interval (centimeters)
D = diameter of the well bore (centimeters)
T = basic time lag (seconds)
m = transformation ratio

$$m = \sqrt{\frac{k_h}{k_v}}$$

Calculated in-situ permeabilities are presented and discussed in Section 4.0 of the remedial investigation report.

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A1.7 AIR MONITORING AND SAMPLING

The ambient air monitoring program described in this section consists of sampling equipment and operating procedures which reflect a proven record of high quality, accuracy and reliability. All airborne particulate and lead data were collected using instruments having an EPA designation as a Reference Method according to Title 40, Code of Federal Regulations, Part 50, Appendices B and G. The samplers were operated and calibrated in accordance with EPA's Ambient Monitoring Guidelines for Prevention of Significant Deterioration (PSD), dated November 1980. Quality assurance functions were performed using as guidelines procedures contained in Title 40 of the Code of Federal Regulations, Part 58, Appendix B, Quality Assurance Requirements for PSD Air Monitoring.

A1.7.1 Sampling Equipment

A1.7.1.1 High Volume Air Samplers

Instrumentation used for the project consisted of standard high-volume (HIVOL) samplers manufactured by General Metal Works (Model No. GMWL2000H). Manufacturing conformed with the Reference Method for lead and total suspended particulate contained in Title 40 of the Code of Federal Regulations, Part 50, Appendix B and Appendix G. The samplers had the following specifications:

- Measurement Technique - High volume (EPA Reference Method, 40 CFR 50, Appendices B & G)
- Airflow Range - 40 to 60 standard cubic feet per minute
- Calibration System - EPA certified flow orifice

The HIVOL sampler operates by drawing air into a covered housing at a flowrate of 40 to 60 standard cubic feet per minute (SCFM). Air flows through the system and an 8" x 10" glass fiber filter at a calibrated flow rate. Flow controllers were not used to adjust flow rates. The flow was measured by a Dixon continuous flow recorder during sampling. The instruments were also equipped with resettable elapsed time indicators to allow for reliable sample start/stop time recording. Figure A1.7-1 shows an illustration of the monitor used.

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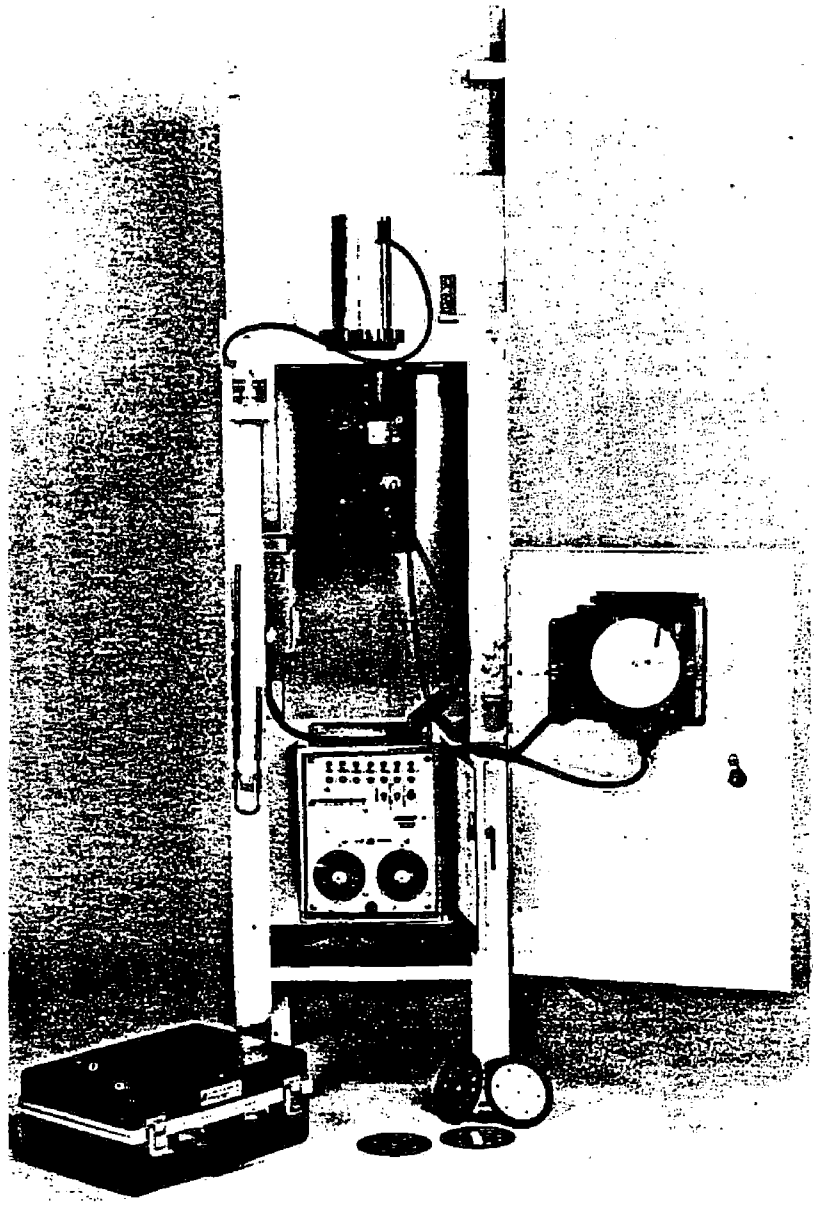

Specifications:

Motor HP — 0.6
Speed — 13,500 R.P.M.
Amperage — 4.8
Wattage — 440
Max. Flow Rate — 52 C.F.M.
Min. Flow Rate — 20 C.F.M.
Power Source — 115 V, 1 phase, 60 Hertz (other electrical characteristics available on request)
Net Weight — 65 lbs.
Shipping Weight—80 lbs.
Complies with newly proposed Federal Reference Method for T.S.P.

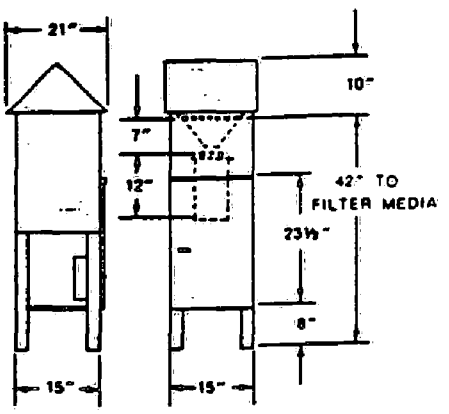

Figure 2.10. High volume sampler and orifice unit assembled for calibration with flow recorder.

Designed for continuous operation in an all weather environment, the Model GMWL-2000 H is a complete monitoring station for the collection of suspended particulate matter with precise measurement capability. All instruments and components are mounted within the anodized aluminum shelter for protection. The hinged roof facilitates filter media exchange.

The Model GMWL-2000 H is complete with high volume sampler, seamless stainless steel filter holder, pressure transducer recorder, 100 charts, cartridge pen point and 90-volt protective transformer all housed in the aluminum shelter ready to operate. A seven day regular timer Model GMW-70 is included as standard equipment. The timer/programmer Model GMW-800 is optional.

The sampler is a heavy duty turbine type blower with high speed motor arranged with a fixed orifice on the discharge end. Although factory calibrated against a water manometer, recalibration is suggested to suit barometric conditions at the site. Air flow is accurately measured by the pressure transducer which provides a permanent record of every sample.

Four bolts, easily accessible, permit motor removal for periodic brush replacement. The 90-volt transformer reduces the operating voltage to extend brush and motor life.

NL IND, INC./GOULD, INC. REMEDIAL INVESTIGATION	
HIGH VOLUME AIR SAMPLING SYSTEM	
FIG. A1.7-1	DAMES & MOORE

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A1.7.1.2 Meteorological Sensors

A Mechanical Weather Station (MWS) manufactured by MRI Inc. was installed to provide representative wind data for the study area. The MRI Model 1071 MWS was instrumented with sensors for wind speed and wind direction. Sensor elevation was approximately 15 meters (46 feet) above ground level. The MRI unit was capable of 60-day unattended operation.

Wind direction, from 0 through 360 degrees, was sensed by a ball bearing-mounted balanced single blade aluminum vane with nose damping. Sensor output was mechanical, recorded on plastic coated, pressure sensitive paper. Specifications for the sensor were as follows:

- Starting Threshold: Less than 0.75 miles per hour (mph)
- Overall Accuracy: ± 1 percent full scale
- Delay Distance: 8 feet (50 percent recovery)
- Damping Ratio: 0.5 to 0.6

Wind speed was measured by a wind run cup anemometer employing three 4-1/2-inch diameter conical aluminum cups. These cups were placed directly above the directional vane on the center shaft, allowing the system to record truly representative data from one point in space. Sensor output was mechanical, recording on plastic coated, pressure sensitive paper. Average wind speeds were read from the chart graduations by means of a plastic overlay guide. Specifications for the sensor were as follows:

- Starting Threshold: Less than 0.5 mph
- Overall Accuracy: ± 2 percent
- Response Distance: 8 feet (63 percent recovery)
- Flow Per Recording Traverse on Wind Run: 10 miles

Data for both wind direction and wind speed were simultaneously recorded directly on the same pressure-sensitive strip chart contained within the watertight weather station unit. The battery-wound spring recorder drive used precision escapement timing with a chart speed of 1 centimeter per hour (cm/hr).

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A1.7.2 System Operating Methods

A1.7.2.1 Sampling Schedule

HIVOL samplers were operated for 24 hours every sixth day following EPA's standard monitoring schedule for high volume samplers. The samplers ran from 7 a.m. to 7 a.m. (Note: Since tending each site could take 10 to 15 minutes, the 7 a.m. start time was nominal. Start times for the analyzers in the system were grouped around 7 a.m.) In addition, sampling was conducted on a daily basis when remedial activities were occurring on the plant site, when required by the EPA On-Scene Coordinator (OSC), or when wind/weather conditions warranted. Sample filters were collected as soon as possible after the end of a sample run, generally the day following the run.

Pursuant to Section 2.4.5.2 of the site protocol document, monitoring was conducted between April 1986 and January 1987. At the end of monitoring, the air quality data obtained was reviewed with EPA during February 1987. Additional monitoring was determined to be unnecessary.

A1.7.2.2 Filter Handling Procedures

Filter handling procedures were as follows:

- Before the filters were placed in the HIVOL on site, they were conditioned, weighed, numbered, and placed in 8" X 10" glassine envelopes by Laucks Testing Laboratories. The glassine envelopes in turn were placed in "Ziplock" polyethylene bags to prevent contamination during shipping and handling. A data form was completed by the onsite system operator and attached to the polyethylene bag along with the relevant data for that filter (Figure A1.7-2).

- Used filters were returned periodically to the laboratory for analysis with chain-of-custody forms accompanying them.

- The laboratory again conditioned and weighed the filters before slicing a strip from each of the filters for analysis (see Section A2.1.4).

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PARTICULATE SAMPLE DATA SHEET

Gould
11831-034-001

SAMPLE NUMBER _____

INITIAL WEIGHING

Hi-Vol ID: _____

Filter paper weighed: Date _____ By _____

Filter paper weight checked: Date _____ By _____

INSTALLATION

Filter paper installed: Date _____ By _____

Dickson Reading _____

Timer Reading _____

Sample was taken: Date _____

REMOVAL

Filter paper was removed: Date _____ By _____

Timer Reading _____

Dickson Reading _____

FINAL WEIGHING

Filter paper weighed: Date _____ By _____

Filter paper weight checked: Date _____ By _____

CALCULATIONS

	Routine	Audit	
Final Weight	_____	_____	Final Time _____
Initial Weight	_____	_____	Initial Time _____
Weight Difference	_____	_____	Lapsed Time _____

Sampler Calibration Date _____

Actual altitude adjusted flow rate _____

Average Dickson reading _____

NL IND, INC./GOULD, INC. REMEDIAL INVESTIGATION	
PARTICULATE SAMPLE DATA SHEET	
FIG. A1.7-2	DAMES & MOORE

11831-034

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A1.7.2.3 Routine Operations

A routine instrument check was performed daily during HIVOL operations by the onsite system operator. At each station, visual inspections were made to detect developing or existing equipment problems, filters were changed, and timers and flows set. The order of visiting each station stayed the same from visit to visit.

Complete documentation of each station visit, including inspections or any other activity, was recorded in a project logbook. The logbook was maintained by the onsite system operator and serves as a legal record of all activities involving the monitoring network. This document forms part of the total record package used to substantiate the integrity of the data collected.

A1.7.2.4 Preventive Maintenance

The preventive maintenance procedures and schedules used by the onsite system operator followed the manufacturer's instructions and Dames & Moore's experience.

During each 6-day HIVOL sampler operating cycle, the timer date and time were checked and reset if necessary. Motor brushes were normally replaced every 12 weeks, however, brush failure did occur on several occasions. The motor was examined when the brushes were replaced. Since the monitors were purchased new and the program was relatively short in duration, the motors remained in good condition and did not need replacement.

A1.7.3 Data Processing

Used HIVOL filters, site logs, and quality assurance documentation were forwarded to the Dames & Moore Project Manager in Seattle. Documentation was reviewed and discussed by telephone with the onsite system operator to correct any apparent instrument problems.

Filters were delivered periodically to Laucks Testing Laboratories for total suspended particulate (TSP) and lead analysis. Upon receipt

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of analysis results from the laboratory, TSP and airborne lead concentrations were calculated, with results expressed in micrograms per standard cubic meter (ug/m^3) of air sampled. Calculation sheets (Figure A1.7-3) were reviewed by the Dames & Moore QA/QC Manager.

The monitoring network was operated when onsite activities were occurring. Therefore, the sampling frequency was greater than the once every 6-day cycle used by EPA for routine air monitoring. For calculating quarterly lead concentrations, a cellular averaging approach was used to prevent biasing of the quarterly average. The 6-day time period (or cell) was centered on the EPA-scheduled monitoring day (from the EPA National Schedule, see Figure A1.7-4). All monitored data for the 6-day period (or cell) were averaged. This average value then replaced, for calculation purposes only, the actual monitored value for the EPA-scheduled day.

To aid in interpretation of airborne lead data, TSP results for each filter were calculated as well. All data were reported in summary form to the EPA in the first monthly progress report following receipt and quality assurance check of the laboratory data. All data reduction and reporting procedures complied with guidelines specified in Title 40 of the Code of Federal Regulations, Part 58, Appendices A and B, and EPA's Quality Assurance Handbook, Volumes I and II.

Data validation procedures included review and analysis of the routine equipment checks. TSP and lead concentrations were only calculated if the sampler operated at least 12 hours. (Note: EPA procedures normally require that data be voided if the high-volume air sampler operates less than 23 hours. Given the short duration of air monitoring system operation, it was requested by Mr. Jon Schweiss of EPA Region X that data for operating times greater than 12 hours be included.) Data were reviewed for "reasonableness" with outliers identified. For example, lead and TSP data were checked to make sure that lead concentrations were always less than the corresponding values for TSP. Invalidated data were voided and flagged with codes identifying the reason for data loss.

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TOTAL SUSPENDED PARTICULATE/LEAD CONCENTRATION WORKSHEET

Sample Number _____

HIVOL Sampler _____

COC Received _____

Total Suspended Particulate (TSP) _____(ug/m3)

Total Lead _____(ug/m3)

	Particulate Sample Data Sheet	Lab Report	Dixon Chart
Start Date	_____		
Sampler Calibration Date	_____		
Total Filter Residue (Wp)	_____(g)	_____(g)	
Total Lead/Filter (Wl)		_____(ug)	
Average Flow Rate (Q)			_____(ft3/min)
Sampler Run Time (T)	_____(min)		

Notes: _____

****

Formula for TSP:

$$\frac{Wp}{[(Q-b)/m][T]} * 35.314 * 10^6 = TSP\ (ug/m3)$$

Formula for Total Lead:

$$\frac{Wl}{[(Q-b)/m][T]} * 35.314 = Total\ Lead\ (ug/m3)$$

where: m = slope from calibration curve (see calibration worksheet)
b = intercept from calibration curve (see calibration worksheet)

Signature _____

Date _____

Audited by _____

Date _____

NL IND, INC./GOULD, INC. REMEDIAL INVESTIGATION
TOTAL SUSPENDED PARTICULATE/ LEAD CONCENTRATION WORKSHEET
FIG. A1.7-3 DAMES & MOORE

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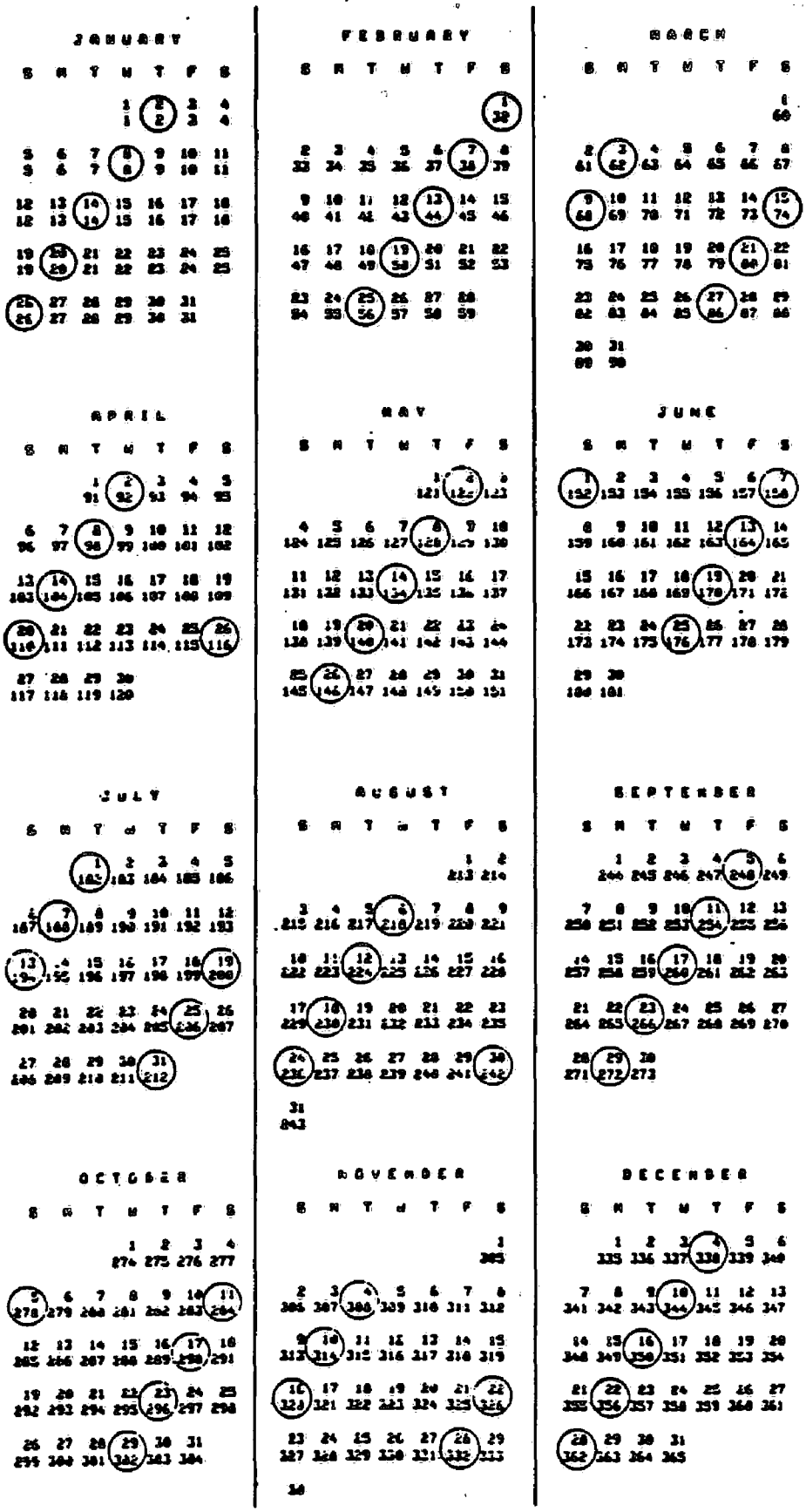
1986



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NL IND, INC./GOULD, INC.
REMEDIAL INVESTIGATION

EPA NATIONAL SCHEDULE FOR 1986

FIG. A1.7-4 DAMES & MOORE

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A2.0 ANALYTICAL PROCEDURES

The following sections describe the preparation and analytical methods used to analyze the surface debris (battery casings and matte), surface soil, subsurface soil, sediment, surface-water, ground-water, and air filter samples collected during the NL/Gould remedial investigation. Analytical quality assurance/quality control (QA/QC) procedures associated with the analyses are described in Appendix B of this report.

A2.1 SAMPLE PREPARATION

This section describes the preliminary preparation procedures used for the samples collected during the NL/Gould remedial investigation. Only those procedures that were non-standard or not normally required are discussed. Normal preparation methods (i.e., digestion, extraction, etc.) associated with the individual specific analyses are not described. These standard preparation and analytical method numbers are listed in Section A2.2.

A2.1.1 Surface Debris

Battery casing (BC) samples consisted of nonhomogeneous mixtures of plastic, metallic lead, non-lead metals, rock and slag. The mixtures varied from sample to sample. All samples were initially screened and pieces of plastic (greater than 2 inches in size) and metallic lead and non-lead metals (greater than 1/4-inch in size) were handpicked from the samples. The remaining samples were homogenized before analysis.

Matte (MT) samples consisted of very hard metallic chunks. These chunks were ground and broken into finer pieces and homogenized before analysis.

A2.1.2 Surface Soils, Subsurface Soils, and Sediments

There were no preparation procedures used on the surface soil (SS), subsurface soil (SB), and sediment (SD) samples other than the normal preparations required by the analysis methods.

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A2.1.3 Surface Water and Ground Water

During the first sampling round, surface-water (SW) and ground-water (GW) samples were either field-filtered and preserved with acid or sent to Laucks Testing Laboratories where they were filtered and preserved with acid. This resulted in dissolved concentrations reported for the analyses of the samples. Other samples not requiring filtration or preservation were collected and shipped to the laboratory unfiltered and unpreserved.

During the second and third sampling rounds, two unfiltered and unpreserved 1-liter samples were collected from each well. A 250-millileter total organic carbon (TOC) sample preserved with sulfuric acid was also collected. Within 24 hours of collection, the samples were delivered to Laucks where they were prepared for analysis. The TOC sample was stored as received by Laucks until analysis. The unfiltered, unpreserved samples were prepared as described below.

For samples analyzed for total lead, 250 ml of the unfiltered and unpreserved samples was preserved with nitric acid to a pH below 2. The preserved sample was then digested following the total metals vigorous digestion procedure outlined in Section 4.1.3 of the EPA Methods for Chemical Analysis of Water and Wastes (EPA-600-4-79-20, revised 1983).

For the samples analyzed for total recoverable lead, 250 ml of the unfiltered and unpreserved samples was preserved by adding 1.25 ml of concentrated nitric acid (5.0 ml per liter) to the samples. The preserved sample was then digested following the milder total recoverable metals digestion procedure outlined in Section 4.1.4 of EPA-600-4-79-20.

For the samples analyzed for dissolved lead and other dissolved metals, 250 ml of the unfiltered and unpreserved samples was filtered with a 0.45 micron (um) filter and preserved with nitric acid to a pH below 2. The preserved sample was then digested according to procedures outlined in Section 4.1.1 of EPA-600-4-79-20.

A sufficient volume of the unfiltered and unpreserved samples was filtered with a 0.45 um filter and preserved as required for additional

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surface-water and ground-water analyses. Any remaining unfiltered and unpreserved samples were stored at 4°C for future possible use.

A2.1.4 Air Filters

The air filters were equilibrated at constant temperature and humidity before analysis. After the filters were weighed for total suspended particulate (TSP) measurements, a strip of the filter was taken for total lead analysis and digested. Filter handling procedures are described in Section A1.7.2.2.

A2.2 ANALYTICAL AND PHYSICAL TESTING METHODS

The analytical and physical testing methods used to analyze the samples collected during the NL/Gould remedial investigation are presented in Table A2.2-1. In addition, the air filters were analyzed for total suspended particulate (Title 40 CFR Part 50, Appendix B), and total lead (Title 40 CFR Part 50, Appendix G). Additional analytical methods (Bench Scale Studies) are described in Section 7.0 of this report.

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TABLE A2.2-1

ANALYTICAL GROUPS AND PHYSICAL TESTING METHODS

ANALYTICAL GROUP	SAMPLE TYPE[1]	TEST PARAMETER	TEST METHOD[2] (PREP/ANALYSIS)
A	BC,MT, SS,SB,SD	EP Lead	1310/7420,7421
		EP Arsenic	1310/7060,7061
		EP Cadmium	1310/7130,7131
		EP Chromium	1310/7190,7191
B1	BC,MT, SS,SB,SD	Lead	3050/7420,7421
		pH	1:1 DIW Slurry/9040
B2	SW,GW,DW	Total Lead	Sec. 4.1.3[3]/7420,7421
		Total Recoverable Lead	Sec. 4.1.4[3]/7420
		Dissolved Lead	Sec. 4.1.1[3]/7420
		pH	NA/150.1
		TOC	NA/415.2
C1	BC,SS SB,SD	Lead	3050/7420,7421
		Arsenic	3050/7060,7061
		Cadmium	3050/7130,7131
		Chromium	3050/7190,7191
		Hexavalent Chromium	3050/7195,7196,7197
		Iron	3050/236.1
		Zinc	3050/7950,7951
		Sulfate	3050/Ion Chromatography
		Cation Exchange Capacity	NA/9080,9081
C2	SW,GW	Dissolved Lead	3010,3020/7420,7421
		Dissolved Arsenic	3010,3020/206.3
		Dissolved Cadmium	3010,3020/213.1
		Dissolved Chromium	3010,3020/218.1
		Dissolved Iron	3010,3020/236.1
		Dissolved Zinc	3010,3020/289.1
		Dissolved Calcium	3010,3020/215.1
		Dissolved Magnesium	3010,3020/242.1
		Dissolved Sodium	3010,3020/273.1
		Dissolved Potassium	3010,3020/258.1
		Dissolved Chloride	NA/325.3, SM/429 (IC)
		Dissolved Sulfate	NA/375.4, SM/429 (IC)
		Dissolved Nitrate	NA/353.2, SM/429 (IC)
		Dissolved Total Phosphorus	NA/365.2
		Alkalinity	NA/310.1
		Hardness	NA/130.2
		Specific Conductance	NA/120.1

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TABLE A2.2-1 (Concluded)

ANALYTICAL GROUP	SAMPLE TYPE[1]	TEST PARAMETER	TEST METHOD[2] (PREP/ANALYSIS)
D	SS,SB,SD	Grain Size	ASTM-422-63
		Moisture Content	ASTM-D1557-78
		Bulk Density	ASTM D1557-78
		Atterberg Limits	ASTM-D423-66, -D424-59
		Permeability Constant Head	ASTM-D2434-68

(1) BC - Battery Casing
GW - Ground Water
MT - Matte
SB - Subsurface Soil
SD - Sediment
SS - Surface Soil
SW - Surface Water

(2) Method numbers from:

(A) Test Methods for Evaluating Solid Waste, Physical/Chemical Methods; U.S. EPA; SW-846; 1982.

(B) Method for Chemical Analysis of Water and Wastes; Environmental Monitoring and Support Laboratory, Office of Research and Development, U.S. EPA; March 1983.

(C) American Society for Testing and Materials (ASTM) Part 19:Soils and Rock, Building Stones, 1984.

(3) Sections on pages Metals-5,6 and 7 of EPA's Method for Chemical Analysis of Water and Wastes (1983), cited above as Footnote 2(B).

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Appendix B

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APPENDIX B

QUALITY ASSURANCE/QUALITY CONTROL PROGRAM

APPENDIX B

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APPENDIX B

QUALITY ASSURANCE/QUALITY CONTROL PROGRAM

B1.0 INTRODUCTION

B1.1 PURPOSE

The purpose of the Quality Assurance/Quality Control (QA/QC) Program was: (1) to provide the mechanisms for on-going control of data quality; (2) to evaluate data quality in terms of precision, accuracy and data capture (recovery); and, (3) to provide usable, qualitative and quantitative data for analysis and decision-making.

B1.2 SCOPE

The following sections describe the methods and results of the QA/QC procedures utilized to enhance data quality during the NL/Gould remedial investigation. The QA/QC procedures used during field investigations, laboratory analysis, and data management are presented in Sections B2.0, B4.0, and B5.0, respectively. Field QA/QC methods include sampling equipment decontamination, sample custody and field audit procedures. Laboratory QA/QC methods include sample logging and handling, instrument calibration, QA/QC sample analyses (method blank, matrix spike, duplicate and reference material analyses) and data reporting procedures. Data management methods included data entry, database management and error checking procedures.

The QA/QC methods and results for the air monitoring program are presented separately in Section B3.0. Included in this section are the calibration, flow audit and analytical audit procedures. The analytical audit sample (blank, duplicate and spike) analysis results are presented along with EPA audit sample analysis results.

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B2.0 FIELD QUALITY ASSURANCE/QUALITY CONTROL METHODS

The following subsections describe the field QA/QC methods used during the NL/Gould remedial investigation. Sampling equipment decontamination, sample custody and field audit procedures are presented. In addition, the field audit (decontamination blank and duplicate) sample analysis results are presented.

B2.1 DECONTAMINATION PROCEDURES

This section describes the decontamination procedures used during field investigations at the site. The decontamination procedures for surface debris, surface and subsurface soil, sediment, surface-water and ground-water sampling are presented. These procedures were designed and implemented to minimize the potential for cross-contamination between samples collected at the same sample location and between different sampling locations. The sampling procedures are presented in Appendix A.

B2.1.1 Surface Debris Sampling

The decontamination procedures used during surface debris sampling involved washing the backhoe bucket and any sampling equipment between sample collections at different locations. The backhoe bucket and sampling equipment were not decontaminated between sample collections at the same location. During the test pit program, the backhoe bucket was only washed at the end of the sampling program.

The backhoe bucket was steam cleaned/pressure washed with tap water and partially dried before sample collection at a new location. When other sampling equipment (such as stainless steel sample scoops) was used to transfer surface debris from the backhoe bucket to the sample containers, the equipment was washed with an Alconox detergent solution followed by a distilled water rinse, a dilute hydrochloric (HCl) acid wash, a dilute methanol wash, and finally, two deionized water rinses. The dilute acid and methanol decontamination wash liquids were stored in 55-gallon drums on the Gould property. Acidic decontamination wash liquids were neutralized with base and stored separately from the methanol wash liquids.

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B2.1.2 Surface and Subsurface Soil Sampling

The decontamination procedures used during surface and subsurface soil sampling involved washing the sampling equipment before collecting each sample. The surface soil sampling equipment was only washed between sample locations since the sample collected at each location was a composite sample and washing between samples at each location was not necessary. The subsurface sampling equipment was washed before collecting each sample.

The Dames & Moore Type U sampler (Figure A1.2-2), stainless steel rings, spoons, scoops, knives and mixing bowls were all washed with the Alconox, dilute acid, dilute methanol and deionized water decontamination sequence described above. The pick and shovel used in the surface soil sampling were steam cleaned/pressure washed with tap water between sampling locations. All down-hole drilling and sampling equipment used for collecting subsurface soil samples was steam cleaned/pressure washed between sampling locations. Decontamination wash liquids were collected and stored as described in Section B2.1.1.

B2.1.3 Sediment Sampling

The sediment sampling equipment was decontaminated with the wash sequence described above. The Type U sampler and the stainless steel spoons and bowls were washed between sample locations. Decontamination wash liquids were collected and stored as described above.

B2.1.4 Surface-Water Sampling

The surface-water sampling equipment was decontaminated with a wash sequence similar to the one described above, except that the Alconox wash was not used. The manual-trip, non-metallic water bottle and the handheld non-metallic scoop bottle were washed between sample locations. Decontamination wash liquids were collected and stored as described above.

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B2.1.5 Ground-Water Sampling

The ground-water sampling equipment was decontaminated with a wash sequence similar to the one described for surface-water sampling, except that tap water was used instead of deionized water for the first of the final rinses. The internal surfaces of the bladder pumps, the positive displacement pump and the centrifugal pump were all decontaminated in plastic tubes or buckets containing the decontamination wash liquids. The exterior surfaces of the pumps were steam cleaned/pressure washed and/or rinsed with deionized water. The tubing used for the bladder and centrifugal pumps were similarly decontaminated. The tubing (pipe) used with the positive displacement pump was steam cleaned/pressure washed with tap water. Sampling equipment was decontaminated between use at each well. Decontamination wash liquids were collected and stored as described above.

B2.2 SAMPLE CUSTODY

Sample custody procedures used during the field investigations were based on EPA guidelines. The procedures include general recordkeeping, sample documentation, chain-of-custody documentation, documentation of requested analyses, documentation of sample shipment, and sample storage and shipment procedures. These procedures were designed and implemented to verify that samples were labeled, documented, handled and tracked correctly, thereby maintaining sample integrity.

B2.2.1 Recordkeeping

All project documents generated during the remedial investigation were accounted for through accurate and complete recordkeeping. These documents included logbooks, field data records, correspondence, photographic prints and graphs.

All documents, such as field logbooks, field data records, and chain-of-custody records, were the responsiblity of the Field Supervisor. The Field Supervisor was responsible for maintaining and distributing the documents to the appropriate personnel. Project logbooks were assigned to key individuals who had specific task responsibilities. All pertinent information was recorded during the project.

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Logbook entries were dated, legible and contained accurate documentation of an individual's project activities. Entries made by individuals other than the person to whom the logbook was assigned were dated and signed by the individual making the entry.

Field data records (in the form of individual sheets or bound logbooks) were maintained for each task and the project job number was recorded on each page. All in-situ measurements and field observations were recorded with pertinent information necessary to reconstruct sampling operations. Each day's field data records were dated and signed by all individuals making entries. The Field Supervisor and the field team were responsible for making sure that field data records were completed during monitoring activities and were stored safely to avoid possible tampering. Any lost, damaged or voided records were reported to the Field Supervisor.

After the field team completed its work for a particular task, all documents generated during the task were assembled in the field file. The Field Supervisor was responsible for assuring that collection, assembly, and inventory of all documents relative to a particular task occurred at the time the project objectives were completed. Any records leaving the file after this time were signed out.

When slides or photographs were taken, they were numbered to correspond to logbook entries. The name of the photographer, date, time, site location, and site description were entered sequentially in the logbook as photos were taken. Data packs were used on cameras to cross-reference logbook entries. Chain-of-custody procedures depended upon the type of film and film processing required. Once developed, the slides or photographic prints were numbered to correspond to the logbook descriptions.

B2.2.2 Sample Documentation

The Field Supervisor was responsible for adhering to proper custody and documentation practices during all field operations. The primary mechanism for making sure that all the necessary information was

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recorded for each sample or measurement was the extensive use of field data and sample custody forms. The following forms were used to identify and record sampling methods, field conditions, and other pertinent information:

- Sample labels for both water and soil samples (Figure B2.2-1);
- Field Record of Water Samples (Figure B2.2-2);
- Field Record of Soil Samples (Figure B2.2-3); and
- Field Memoranda (Figure B2.2-4).

All sample containers were labeled with the following information: 1) sample number; 2) sample type; 3) depth; 4) name of collector; 5) date and time of collection; 6) sample location; and 7) general remarks. All sampling procedures, measurements, and observations were recorded on field sample records and field memoranda which were kept in a field notebook. The following information was documented:

- Facility site name, sample point identification number, and other pertinent identifiers;
- Depth to ground water or soil depth;
- Date and elapsed time from sample start to sample finish;
- Sampling method--bailer, positive placement, or submersible pump;
- Field test results, including pH, temperature, and specific conductance;
- Type of sample and necessary treatment (e.g., no headspace);
- Field observations (e.g., weather and well condition);
- Appearance of sample (i.e., color, turbidity, sediment, or oil on surface); and
- Sampler's identity and signature, and other personnel present.

All field record entries were done in ink with no erasures. If mistakes were made, a strike throughout the incorrect entry was made and a new entry was noted.

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SOIL SAMPLE

Client _____

Sample _____ Depth _____

Date _____ Time _____ By _____

Remarks _____

_____

_____

WATER SAMPLE

Client _____

Sample _____

Date _____ Time _____ Collected by _____

Remarks _____

_____

_____

NL IND, INC./GOULD, INC. REMEDIAL INVESTIGATION	
EXAMPLES OF SAMPLE LABELS	
FIG. B2.2-1	DAMES & MOORE

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FIELD RECORD OF WATER SAMPLE

WELL OR SAMPLE NO./ID _____ JOB NUMBER: _____

DEPTH OF WELL _____ CLIENT: _____

_____DIAMETER CASING LOCATION: _____

WELL ELEVATION: _____ SAMPLED BY: _____

PERFORATED INTERVAL _____TO_____

METHOD OF EVACUATION _____

DATE	TIME	WATER LEVEL BEFORE EVACUATION	GALLONS REMOVED DURING EVACUATION OR PRIOR TO SAMPLING

METHOD OF SAMPLING _____

DATE OF SAMPLE _____ TIME _____

DEPTH OF SAMPLE _____ DOMESTIC WELL TANK ____YES ____NO

CONTAINER TYPES (VOLUME) ANALYSIS

TEMP. _____

CONDUCTIVITY _____

pH _____

APPEARANCE OF SAMPLE

_____

COMMENTS: _____

NL IND, INC./GOULD, INC. REMEDIAL INVESTIGATION	
FIELD RECORD OF WATER SAMPLES	
FIG. B2.2-2	DAMES & MOORE

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FIELD RECORD

SOIL SAMPLES

SAMPLING METHOD: _____

JOB NUMBER: _____
CLIENT: _____
LOCATION: _____
SAMPLED BY: _____
DATE: _____ Page ____ of ____

BORING NO.	SAMPLE NO./ID	DATE/ TIME	LOCATION	DEPTH	DESCRIPTION/ CLASSIFICATION	CONTAINER TYPE AND STORAGE	pH	COMMENTS (i.e. WEATHER)

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REMEDIAL INVESTIGATION

FIELD RECORD OF SOIL SAMPLES

FIG. B2.2-3 DAMES & MOORE

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FIELD MEMORANDUM

ACTION	INFO	
To:		File:
		X-Ref:
		Date:

From: Reply Required By:

Subject:

Reference(s):

ROUTING

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NL IND, INC./GOULD, INC.
REMEDIAL INVESTIGATION

FIELD MEMORANDUM FORM

FIG. B2.2-4 DAMES & MOORE

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B2.2.3 Chain-of-Custody

After each sample was collected, a chain-of-custody record was completed (Figure B2.2-5). Separate chain-of-custody records were completed for each sample destination (e.g., laboratory or onsite storage). After transfer of sample possession to subsequent custodians, the chain-of-custody record was signed by the person taking custody of the sample container. After receipt of samples at the laboratory, the shipping container seal was broken. The condition of the samples was recorded by the receiver. The chain-of-custody procedures documented all sample transactions from collection through analysis. Chain-of-custody records were included in the analytical report prepared by the laboratory, and are presented with the data in the NL/Gould RI Report Laboratory Data Supplement.

The first two pages of the chain-of-custody form (white and canary or blue colors) traveled with the samples through transportation and analysis. A completed form was returned to Dames & Moore with the results from the analytical laboratory. One page was sent from the field to the central job files in Dames & Moore's Seattle office as notification of sample shipment, and one copy was retained by the sampler and subsequently filed at Dames & Moore's Portland office.

B2.2.4 Documentation of Requested Analyses

An analytical request form (Figure B2.2-6) was completed and accompanied the chain-of-custody record with each sample shipment to the testing laboratories. A duplicate copy was sent to Dames & Moore's Seattle office with the chain-of-custody record copy. The analytical groups listed on this form are described in Appendix A, Section A2.0.

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JOB NO. _____

CHAIN OF CUSTODY RECORD

GENERATOR INFORMATION

Facility _____

Address _____

_____

Telephone ( ) _____

COLLECTOR INFORMATION

Collected by _____

Address _____

_____

Telephone ( ) _____

SAMPLE INFORMATION

No.	DEPTH	TYPE	DATE	TIME

Suspected Waste Constituents _____

_____

Field Conditions/Remarks _____

_____

SAMPLE ALLOCATION

Name _____

Address _____

_____

Telephone ( ) _____

_____ sample received intact

_____ sample received damaged or missing (describe on back)

_____
(Signature) (Date)

CHAIN OF POSSESSION

Relinquished by: (Signature)	Date	Time	Received by: (Signature)	Date	Time
1.					
2.					
3.					
4.					

Distribution

White-w/shipment-for consignee files
Blue-w/shipment-forward to Dames & Moore
Attn: _____

Pink-with report
Goldenrod-Dames & Moore - Job File

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CHAIN OF CUSTODY RECORD

FIG. B2.2-5 DAMES & MOORE

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Analytical Request Form

Job No. _____

Date _____

By _____

Sample Number	Sample Type (1)	Sample Depth	Collection Date	Collection Time	Analytical Group (2)										Special Instructions
					A	B1	B2	C1	C2	C3	D	E	F	Hold	

(1) BC - Battery Casing
MT - Matte
SS - Surface Soil
SB - Subsurface Soil
SD - Sediment
GW - Ground Water
SW - Surface Water
DW - Decon Water

(2) See Attached Table

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ANALYTICAL REQUEST FORM

FIG. B2.2-6

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B2.2.5 Documentation of Sample Shipment

A sample shipment log (Figure B2.2-7) was completed at the end of each day. This form tracked the sample through collection, storage and shipment to the testing laboratories. It also provided a check system to verify that chain-of-custody and analytical request forms were completed and sent with the samples. One copy of the sample shipment log was sent to Dames & Moore's Seattle office as notification of the shipment. One copy remained with the field records.

B2.2.6 Sample Storage and Shipment

Samples were stored on site in ice-filled coolers or in onsite refrigerators. Chain-of-custody records accompanied all samples through shipment.

Soil and water samples collected for chemical testing were delivered to Laucks Testing Laboratories, Inc. in Seattle, Washington. Samples for physical testing were delivered to Pacific Testing Laboratories in Seattle, Washington. Ground-water and surface-water samples were delivered to Laucks within 24 hours. They were shipped as environmental samples were shipped in accordance with the Department of Transportation (DOT) standard requirements for packages, as specified in 49 CFR 173.24, or in accordance with 49 CFR 173.6 if samples were shipped by air.

Individual sample containers were packed to prevent breakage and transported in a sealed ice chest or other suitable container. Care was taken to secure the drainage hole at the bottom of the cooler in case of sample container leakage.

A label containing Dames & Moore's name and address was placed on the container. Glass bottles were separated in the shipping container by cushioning (i.e., Styrofoam or absorbent material) to prevent breakage and plastic containers were protected from punctures. Ice was placed in the coolers in separate plastic bags and sealed, or in large-mouthed cubic containers with lids.

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SAMPLE SHIPMENT LOG FOR _____
(Date)

Field Sample No.	Sample Type	Sample Date/Time	Sampler	Container	Preserved	Destination	Date Shipped	COC	Analytical Request Form	Comments

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SAMPLE SHIPMENT LOG

FIG. B2.2-7 DAMES & MOORE

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A sealed envelope containing the chain-of-custody record (Figure B2.2-5) and analytical request form (Figure B2.2-6) was enclosed in a plastic bag and placed in the cooler. Signed and dated EPA chain-of-custody seals were placed on all coolers prior to shipment.

B2.3 FIELD QUALITY ASSURANCE/QUALITY CONTROL AUDIT PROCEDURES

QA/QC audit procedures used during the field investigations included review audits of field operations, and collection of decontamination blank and duplicate QA/QC samples for laboratory analysis. The results of the review audits and the QA/QC sample analyses are presented below, along with a discussion of the effect these results have on data quality.

B2.3.1 Field Operations Review Audit Procedures and Results

The field operations review audit was conducted to verify that the field methods and sampling procedures detailed in the original and revised Work Plan documents (Work Plan and Quality Assurance Project Plan) were followed. To maximize the objectiveness of the audit, the audit was performed by Dames & Moore personnel independent of the sampling team. The person who performed the audit was fully knowledgeable of the Work Plan procedures and had previous experience with the types of procedures subjected to the audit. The field procedures audited included soil boring, subsurface soil sampling, ground-water well installation, ground-water sampling, surface-water sampling and sediment sampling procedures.

The audits were conducted using Field Surveillance Checklist forms compiled from the procedures detailed in the Work Plan documents. The checklist questions covered all aspects of the procedures under consideration. An example of the checklists, showing ground-water sampling audit questions, is presented in Figure B2.3-1.

Field audits were conducted during the first and second sampling rounds. The first-round audits were conducted in August 1986 and the second-round audits were conducted in December 1986.

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DAMES & MOORE

FIELD SURVEILLANCE CHECKLIST

for

NL-Gould Site
Portland, OR
Remedial Investigation

Surveillance conducted for: Ground Water Sampling

Surveillance conducted by: _____

Date of surveillance: _____

D&M sampling team members: _____

_____

_____

Reviews:

PM _____ Date_____

PI _____ Date_____

QAM _____ Date_____

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REMEDIAL INVESTIGATION

FIELD SURVEILLANCE CHECKLIST
SHEET 1 OF 4

FIG. B2.3-1 DAMES & MOORE

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QUESTION	Yes	No
SAMPLING LOCATION AND METHODS		
1. Which well was selected for surveillance?	_____	_____
2. Was an accurate water level measurement made before purging the well?	_____	_____
3. Were a minimum of 3 standing wells casing water volumes evacuated from the wells using a PTFE bailer or positive displacement PTFE and stainless steel pump before sampling?	_____	_____
4. Were specific conductance, pH, and temperature measured to ensure that they have stabilized?	_____	_____
5. After stabilization, were 4 replicate samples of specific conductance, pH, and temperature obtained before sampling?	_____	_____
6. Were all purged waters collected in barrels and stored onsite?	_____	_____
7. Were the two, 1-liter unfiltered and unpreserved samples collected so that no head space remained?	_____	_____
8. Were the 250 ml unfiltered samples preserved with sulfuric acid and collected so that no head space remained?	_____	_____
9. Were the collected samples sealed?	_____	_____
10. Was a sample label affixed to each sample jar and did it contain the following information: boring/well number, sample number, depth, date, collector name, owner, sample location, sampling time?	_____	_____
11. Were clean polyethylene gloves worn during sample handling to avoid cross contamination?	_____	_____

Reviews:

PM _____ Date_____

PI _____ Date_____

QAM _____ Date_____

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REMEDIAL INVESTIGATION

FIELD SURVEILLANCE CHECKLIST
SHEET 2 OF 4

FIG. B2.3-1 DAMES & MOORE

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QUESTION	Yes	No
SAMPLING LOCATION AND METHODS		
12. Was the type of lab analysis indicated clearly:		
(a) On Field Record sheet?	____	____
(b) On Analytical Request Form?	____	____
(c) Other?_____	____	____
13. Was the sealed sample stored on ice in a portable ice chest?	____	____
14. If the above sampling methods were not feasible, what were the problems encountered and how were they solved? Problem:_____ _____ Remedy:_____ _____		
15. Were samples shipped to the lab on the day of collection?	____	____
16. Was a Field Record completed for the sample?	____	____
17. Were samples transferred to freezer or refrigerator?	____	____
18. Were samples shipped to lab?	____	____
19. Was the Chain-of-Custody Record completed for the sample before releasing for storage/transport?	____	____
20. Did the Chain-of-Custody Record remain with the sample?	____	____
21. Was the Sample Shipping Form completed after sample was released?	____	____
22. Were all entries on all forms made in ink?	____	____
DECONTAMINATION		
23. After each sample was collected, were the pump housing and screens rinsed in Alconox and water solution?	____	____

Reviews:

PM _____ Date_____

PI _____ Date_____

QAM _____ Date_____

NL IND, INC./GOULD, INC.
REMEDIAL INVESTIGATION

FIELD SURVEILLANCE CHECKLIST
SHEET 3 OF 4

FIG. B2.3-1 DAMES & MOORE

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QUESTION	Yes	No
SAMPLING LOCATION AND METHODS		
24. Were the pump housing and screens rinsed with 6N HCL?	____	____
25. Were the pump housing and screens then rinsed with 10 percent methyl alcohol?	____	____
26. Were the pump housing and screens then rinsed twice with City water?	____	____
27. Was the final decontamination rinse made with distilled water collected for laboratory analysis?	____	____
28. Was all additional pump piping steamcleaned between wells?	____	____

Reviews:

PM _____ Date_____

PI _____ Date_____

QAM _____ Date_____

NL IND, INC./GOULD, INC.
REMEDIAL INVESTIGATION

FIELD SURVEILLANCE CHECKLIST
SHEET 4 OF 4

FIG. B2.3-1 DAMES & MOORE

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The field audits did not find major procedural errors in any of the field operations audited. Corrections to minor deviations from the procedures detailed in the Work Plan are summarized below:

- Stainless steel spoons and knives were used instead of non-stainless steel equipment;
- Clean plastic sheeting was used to cover well casing and screen after steam cleaning/pressure washing;
- Per the revised Work Plan, ground-water and surface-water samples collected during the second and third sampling rounds were collected unfiltered and unpreserved (except for TOC samples requiring preservation); and
- General site condition, in terms of organization and cleanliness, was improved.

B2.3.2 Field QA/QC Sample Procedures and Results

This section describes the field QA/QC sample collection procedures and discusses the analytical results for these samples. In addition, a discussion on the effect the results have on the quality of the data is presented. The types of field QA/QC samples collected were decontamination blank and field duplicate samples.

In general, the field QA sample results indicate that good quality data were obtained from the collection and analysis of samples during the remedial investigation. The decontamination blank sample results indicate that sampling equipment decontamination procedures were sufficient to prevent significant cross-contamination between samples. The field duplicate sample results indicate that sampling and analytical precision was acceptable for all sample matrix types.

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B2.3.2.1 Decontamination Blank Samples

Decontamination blank samples were collected to verify that the decontamination procedures used to clean the sampling equipment were efficient and correct. Decontamination samples were collected during the surface soil, subsurface soil, sediment, surface-water and ground-water sampling. Samples were collected from the final rinse or by passing deionized water through or over the decontaminated sampling equipment after the final rinse or collecting a portion of the final rinse. The samples were analyzed for total lead and pH. Total organic carbon (TOC) analysis was added during the second and third sampling rounds.

The decontamination blank sample results are presented in Table B2.3-1 and summarized in Table B2.3-2. In general, the results indicate that decontamination procedures were efficient, correct and consistent between the three sampling rounds. The results for ground-water decontamination blank samples indicate that there was total lead in many of the blank samples. However, the levels detected in these samples are relatively low and, since the equipment was rinsed with water purged from the next sampling location before the next sample was collected, the decontamination blank levels probably had little effect on reported sample concentrations.

B2.3.2.2 Field Duplicate Samples

Field duplicate samples were collected to evaluate sample collection and analytical laboratory reproducibility. Duplicate samples were collected during surface soil, subsurface soil, sediment, surface-water and ground-water sampling. Samples were collected by splitting the recovered sample, then placing one part in the regular sample container and the other part in the duplicate sample container. Where sample volumes did not allow this splitting procedure, multiple samples were collected from the same location, mixed together and split as described. In addition, some duplicate samples were obtained by collecting a sample near the original in terms of depth, distance, or time.

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TABLE B2.3-1

DECONTAMINATION BLANK ANALYSIS RESULTS

SAMPLE NUMBER	SAMPLE DATE	LAB REPORT NUMBER	SAMPLE TYPE*	pH	Total Lead (mg/l)	Total Organic Carbon (TOC) (mg/l)
Surface Soil Decontamination Blanks						
DS-7-15-F	7/15/86	97915	SS	--	U0.01	--
DS-7-16-F	7/16/86	97915	SS	--	U0.01	--
DS-7-18-F	7/18/86	97915	SS	--	U0.01	--
DS-7-14-F	7/14/86	97915	SS	--	U0.01	--
DS-7-17-F	7/17/86	97915	SS	--	U0.01	--
DS-7-7-F	7/07/86	99378	SS	--	0.4	--
S-15-DW	1/06/87	2227	SS	--	U0.01	--
S-17-DW	1/05/87	2227	SS	--	U0.01	--
S-22-DW	1/09/87	2227	SS	--	0.02	--
Subsurface Soil Decontamination Blanks						
DB-B-8-7-30(3)	7/30/86	99378	SB	--	U0.01	--
DB-B-8-7-29(2)	7/29/86	99378	SB	--	U0.01	--
DB-B-8-7-28(1)	7/28/86	99378	SB	--	U0.01	--
DB-B-6-7-25(1)	7/25/86	99378	SB	--	0.01	--
DB-B-6-7-28(2)	7/28/86	99378	SB	--	U0.01	--
DB-B-5-7-25	7/25/86	99378	SB	--	0.01	--
DB-B-10-8-5(2)	8/05/86	99378	SB	--	U0.01	--
DB-W15D-8-8(2)	8/08/86	99378	SB	--	0.02	--
DB-W15D-8-7(1)	8/07/86	99378	SB	--	U0.01	--
DB-B-10-8-4(1)	8/04/86	99378	SB	--	U0.01	--
DB-W11D-7-25	7/25/86	99378	SB	--	0.04	--
DB-7-24-F	7/24/86	2227	SB	--	J0.06	--
DB-7-22-F	7/22/86	2227	SB	--	J0.01	--
DB-W11D-7-28	7/28/86	2227	SB	--	JU0.01	--
DB-W15D-8-11-F(3)	8/11/86	2227	SB	--	U0.01	--
DW-3D-1-36.5	11/25/86	2227	SB	--	U0.01	--
DW-3D-2-61.5	11/26/86	2227	SB	--	U0.01	--
DW-3D-3-96.0	12/01/86	2227	SB	--	U0.01	--
W-11-S-10.5(1)	7/22/86	2227	SB	--	J0.10	--
W-11-S-35(2)	7/23/86	2227	SB	--	J0.03	--
W-11-S-45(3)	7/23/86	2227	SB	--	J0.01	--
W-12D-DW1	12/08/86	2227	SB	--	0.01	--
W-12D-DW2	12/09/86	2227	SB	--	U0.01	--
W-12D-DW3	12/11/86	2227	SB	--	U0.01	--
W-12D-DW4	12/12/86	2227	SB	--	U0.01	--
W-12D-DW5	12/15/86	2227	SB	--	U0.01	--
W-12D-DW6	12/16/86	2227	SB	--	U0.01	--
W-15-S	7/24/86	2227	SB	--	J0.02	--
W-16D-DW1	12/11/86	2227	SB	--	0.03	--

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TABLE B2.3-1 (Continued)

SAMPLE NUMBER	SAMPLE DATE	LAB REPORT NUMBER	SAMPLE TYPE*	pH	Total Lead (mg/l)	Total Organic Carbon (TOC) (mg/l)
Subsurface Soil Decontamination Blanks (Continued)						
W-16D-DW2	12/12/86	2227	SB	--	U0.01	--
W-16D-DW3	12/15/86	2227	SB	--	0.02	--
W-16D-DW4	12/16/86	2227	SB	--	U0.01	--
W-16D-DW5	12/17/86	2227	SB	--	U0.01	--
W-16S-DW1	12/29/86	2227	SB	--	0.01	--
Sediment Decontamination Blanks						
DD-8-20-F	8/20/86	2227	SD	--	0.04	--
DW-SD	12/17/86	1298	SD	--	U0.01	--
Surface-Water Decontamination Blanks						
DW-SW-1,2	12/17/86	1298	SW	9.0	U0.01	1.6
Ground-Water Decontamination Blanks						
DW-GW-1,2,3	12/11/86	1298	GW	7.6	0.01	1.4
DW-GW-4,5	12/14/86	1298	GW	6.3	U0.01	4.9
DW-GW-6,7	12/15/86	1298	GW	6.7	0.02	13.0
DW-GW-9,10	12/16/86	1298	GW	6.9	0.02	7.5
DW-GW-10,11	12/17/86	1298	GW	10.2	0.04	4.7
DW-GW-12,13	12/18/86	1298	GW	7.1	0.03	27.0
DW-GW-14,15	12/19/86	1298	GW	4.5	0.01	4.9
DW-GW-16,17	12/21/86	1298	GW	5.4	0.01	13.0
DW-GW-18,19	12/22/86	1298	GW	7.1	U0.01	5.9
DW-GW-20,21	12/29/86	1298	GW	---	0.03	3.7
DW-GW-22,23	12/30/86	1298	GW	---	0.01	4.5
DW-GW-10	1/21/87	1914	GW	8.1	U0.01	---
DW-GW-1	2/17/87	2411	GW	---	---	---
DW-GW-2	2/17/87	2411	GW	---	---	---
DW-GW-3,4	2/18/87	2411	GW	---	0.01	3.9
DW-GW-5,6	2/19/87	2411	GW	---	U0.01	2.3
DW-GW-7,8	2/21/87	2411	GW	---	U0.01	0.9
DW-GW-9,10	2/22/87	2411	GW	---	U0.01	3.1

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TABLE B2.3-1 (Concluded)

SAMPLE NUMBER	SAMPLE DATE	LAB REPORT NUMBER	SAMPLE TYPE*	pH	Total Lead (mg/l)	Total Organic Carbon (TOC) (mg/l)
Miscellaneous Blanks						
Decon Blank	9/05/86	2227	--	---	0.02	---
Distilled Water	8/20/86	98424	--	7.5	U0.01	---
	Other detectable analytes (mg/l): Zn (0.006), Ca (0.1), sulfate (1.0).					
Distilled Water	12/12/86	1298	--	7.0	U0.01	1.1
	Other detectable analytes (mg/l): Zn (0.007), alkalinity (2.0), spec. conductance (1.1).					
Distilled Water	2/18/87	2411	--	7.6	U0.01	2.1
	Other detectable analytes (mg/l): Fe (0.12), hardness (6.0).					
Tap Water	12/12/86	1298	--	7.1	U0.01	2.9
	Other detectable analytes (mg/l): Zn (0.36), Ca (1.0), Mg (0.4), Cl (14), nitrate (0.14), alkalinity (5.0), hardness (8.0), spec. conductance (21).					
Tap Water	2/18/87	2411	--	7.0	U0.01	2.4
	Other detectable analytes (mg/l): Zn (0.087), Fe (0.31), Ca (1.0), Mg (0.5), Na (1.0), Cl (3.0), K (0.2), nitrate (0.09), hardness, (8.0), spec. conductance (36).					

* Sample Types:

SS - surface soil SB - subsurface soil SD - sediment
SW - surface water GW - ground water

U Quality control flag - indicates not detected above value shown

J Quality control flag - indicates estimate value (all samples flagged J in the above table were flagged because sample holding times were exceeded)

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TABLE B2.3-2

DECONTAMINATION BLANK RESULTS SUMMARY

SAMPLE TYPE*	NUMBER OF BLANKS	AVERAGE CONCENTRATION pH	Total Lead (mg/l)	Total Organic Carbon (TOC) (mg/l)	CONCENTRATION RANGE pH	Total Lead (mg/l)	Total Organic Carbon (TOC) (mg/l)
SS	9	--	0.05	--	--	U0.01-0.4	--
SB	34	--	0.017	--	--	U0.01-0.1	--
SD	2	--	0.02	--	--	U0.01-0.0	--
SW	1	9.0	U0.01	1.6	--	--	--
GW	16	7.0	0.015	6.7 4	.5-12	U0.01-0.0	0.9-27

* Sample Types:

SS - surface soil SB - subsurface soil SD - sediment
SW - surface water GW - ground water

U Quality control flag - indicates not detected above value shown

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The duplicate samples collected during ground-water sampling were collected by alternately filling the regular sample bottle and the duplicate sample bottle with ground water until both containers were full. The duplicate samples were labeled as other field samples to eliminate any possible bias on the part of the analytical laboratory. In general, the duplicate samples were analyzed for the regular sample analysis parameters. In some cases, the duplicate sample was only analyzed for a subset of the regular sample analysis parameters.

The duplicate sample results are presented with the regular sample results (Appendix C). In general, a comparison of the duplicate and regular sample results indicates that sample collection and analytical laboratory performance were reproducible. The average difference between the samples was generally within the $\pm$ 20 percent range for water samples and the $\pm$ 35 percent range for soil and sediment samples. Percent differences outside the ranges are probably due to: (1) the non-homogeneous nature of many of the samples collected; (2) variable analytical precision; or (3) a combination of these two factors. In addition, the percent differences were biased at low concentrations. That is, small differences between low concentration samples resulted in large percent differences.

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B3.0 AIR MONITORING PROGRAM

The quality assurance procedures used during the NL/Gould air monitoring program were based on EPA's three-volume Quality Assurance Handbook for Air Pollution Measurement Systems (EPA 1976 and 1977). Another EPA document, Ambient Monitoring Guidelines for Prevention of Significant Deterioration (EPA 1980) and the quality assurance requirements contained in 40 CFR 58 Appendices A and B also provide guidance on quality assurance.

B3.1 PROCUREMENT CONTROL

Standard high volume (HIVOL) samplers were selected from a reputable manufacturer (see Section A1.7.1.1). All components were inspected and tested prior to installation. The instruction manual received with each instrument was reviewed and operation instructions checked to verify conformance with this monitoring plan.

B3.2 DOCUMENTATION

Preformatted forms were used for recording all measurements made during field calibrations, audits, and site activities. The forms were designed to prevent omission of important information, such as identification of standards. The documentation of each activity was an integral part of the method, and specific instructions for completing the documentation were provided to the system operator. Examples of the forms pertinent to this project include:

- Particulate Sample Data Sheet (see Appendix A, Figure A1.7-2).
- High-Volume Air Sampler Calibration Worksheet (Figure B3.2-1); and
- Total Suspended Particulate/Lead Concentration Worksheet (see Appendix A, A1.7-3).

The project logbook was an additional source of documentation. The logbook contained the history of equipment operation, repairs, maintenance, and calibrations. It also contained information on other factors

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Site Location _____ Client _____ Job No. _____

Date _____ Baro. Pres. P_2 (mm Hg) _____

Calibrated By _____ Temp. T_2 (°K) _____

Sampler No. _____ Serial No. _____

Transfer Std. Type _____ Serial No. _____

No.	(X) ΔH Pressure Drop Across Orifice □(in) □(cm) Of Water	(X) ΔH Corrected To std. Temp. & Pres. $\Delta H \left(\frac{P_2}{760}\right) \left(\frac{298}{T_2}\right)$	(X) Q_{std} [From Orifice Certification] std.m^3/min	(X) Q_{act} $\left[Q_{std} \left(\frac{760}{P_2}\right)\left(\frac{T_2}{298}\right)\right]$ act.. m^3/min	I Sampler Flow Rate Indication	(Y) I_{std} [Corrected to std Temp. & Pres.] □I (Mass Flowmeter) □ $\sqrt{I\left(\frac{P_2}{760}\right)\left(\frac{298}{T_2}\right)}$ (Manometer) □ $I\sqrt{\left(\frac{P_2}{760}\right)\left(\frac{298}{T_2}\right)}$ (Rotameter or Dickson Recorder)
1						
2						
3						
4						
5						
6						

LEAST SQUARES CALCULATION

Linear Regression of Y on X : Y = mX + b, where Y = I_{std} and X = Q_{std}

Slope (m) = _____ Intercept (b) = _____ Correlation coefficient (r) = _____

To determine flow rate for concentration calculations: $X = \frac{1}{m}(Y-b)$

Set sampler to operate between 1.1 and 1.7 actual m^3/min

Signature _____

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REMEDIAL INVESTIGATION

HIGH VOLUME AIR SAMPLER
CALIBRATION WORKSHEET

FIG. B3.2-1 DAMES & MOORE

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that may have occured on site that affected the sampling program, such as power failures. The logbook was kept on site at all times by the onsite system operator, Mr. Gene Moore.

Chain-of-custody forms were used to track the filters during shipment (see Figure B2.2-5). Tracking of the filters and cross-checking of filter numbers to prevent loss was accomplished by reviewing laboratory data reports and comparing reported filter numbers with the actual filter numbers on the chain-of-custody forms. After the sample filters were returned by the laboratory, they were stored in a labeled file drawer in Dames & Moore's Seattle office.

B3.3 CALIBRATIONS

Methods for multipoint calibrations of the HIVOL samplers were based on EPA documents (EPA 1977, 1979). The initial system calibration was performed at the beginning of the monitoring program on April 15, 1986. The calibration data was recorded on the calibration record form (Figure B3.2-1). Although the instruments were to be recalibrated by the onsite system operator any time repairs affecting instrument response were performed (i.e., changing motor brushes), these recalibrations were not performed.

Motor brushes were replaced on all four samplers during the end of July 1986 (brushes were changed on the following dates: Sampler No. 3 on July 24, Nos. 1 and 2 on July 26th, and No. 1A on July 28, 1986). Since calibrations were not performed at the time of the brush changes, the audit performed on August 25, 1986 had to be conducted as a five-point calibration. Brushes were changed on Sampler Nos. 1 and 3 on October 3, 1986. Calibrations were performed on these samplers at the time of brush change. The brushes on Sampler No. 2 were changed and a calibration was performed on November 19, 1986. All four samplers were calibrated at the end of the monitoring program on February 9, 1987.

The calibrations were used to calculate the air volumes sampled. The April 15, 1986 calibrations were used for all samples collected before the brush changes in July 1986. The August 26, 1986 calibration

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was used for all samples collected between the July 1986 brush change and the October 3, 1986 brush change for Sampler Nos. 1 and 3. For Sampler No. 2, the August 25, 1986 calibration was used between the July 1986 brush change and the November 19, 1986 brush change. These last brush change calibrations were used for all samples collected through the end of the monitoring program. Sampler No. 1A did not have a second brush change (co-located sampler) so the August 25, 1986 calibration was used for samples collected from that date on. The final calibration conducted on February 9, 1987 was used to verify system performance at the conclusion of the monitoring period.

Calibration results are presented in Table 3.3-1 and the data is graphically shown on Figures B3.3-1 through B3.3-4. These figures indicate that the calibrations, although somewhat varied, were relatively comparable.

The HIVOL sampler flow rates were calibrated using an orifice calibrator that had been certified by the manufacturer. The orifice calibrator was installed on each instrument and the flow rate was checked by observing the pressure drop across the orifice calibrator.

As stated in the Work Plan for the remedial investigation, the meteorological system instrument is no longer manufactured and no calibration equipment could be obtained. Therefore, the meteorological system was not operated in full accordance with EPA procedures set forth in EPA's Ambient Monitoring Guidelines for Prevention of Significant Deterioration (EPA 1980).

The wind direction sensor was aligned with true north using a transit and compass at instrument start-up, and was checked again during the system audit. Normal calibration of wind speed consisted of 1) removing the anemometer cups, 2) attaching a synchronous motor to the hub of the sensor, and 3) recording the simulated wind speed as determined by the revolutions per minute (RPM) of the synchronous motor. This method was attempted during the August audit, however, the method was not compatible with the wind speed totalizer cups used on the mechanical station. Therefore, it was necessary to rely upon the calibration performed during the pre-installation reconditioning by Belfort Instrument Company.

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Table B3.3-1

HIVOL Sampler Audit/Calibration Data

Sampler #1

4/15/86 Calib. Orifice	Dixon Chart	8/25/86 Calib. Orifice	Dixon Chart	10/03/86 Calib. Orifice	Dixon Chart	2/09/87 Calib. Orifice	Dixon Chart
63.10	59.05	40.00	37.96	31.30	25.96	67.31	58.75
57.70	52.38	55.00	49.45	39.80	30.54	57.99	54.70
50.50	46.73	58.70	53.95	49.80	40.21	48.83	50.65
40.90	39.03			56.00	46.32	36.87	42.55
32.00	30.81			61.40	51.92	35.56	42.44

Sampler #1A

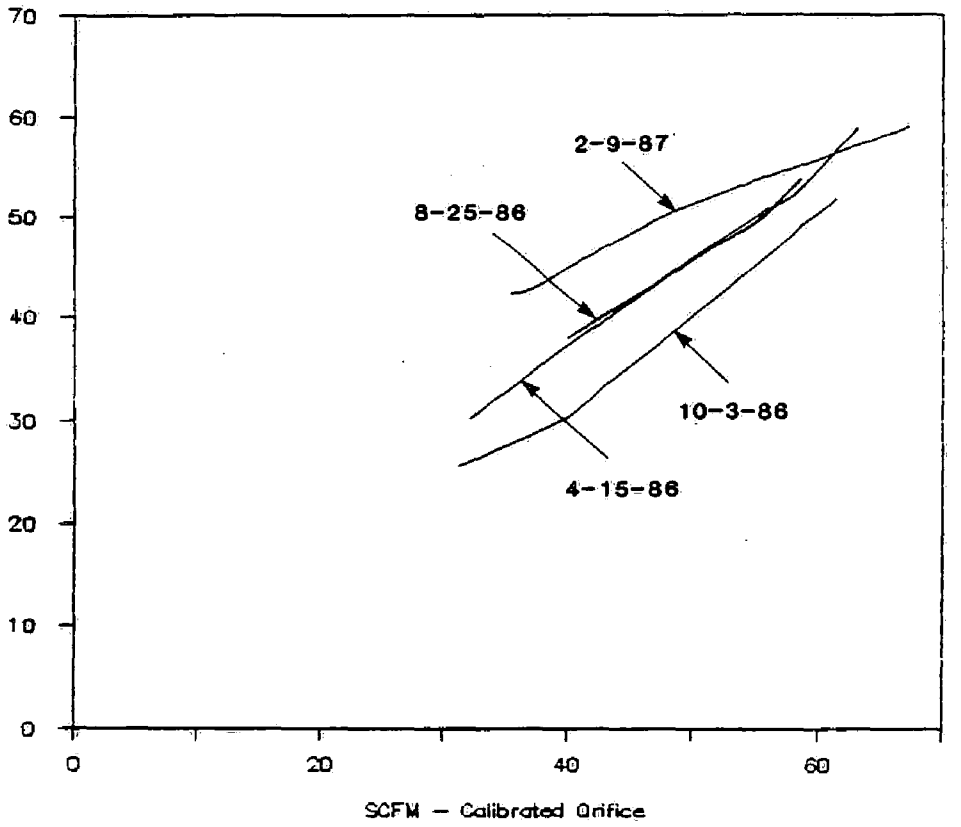
4/15/86 Calib. Orifice	Dixon Chart	8/25/86 Calib. Orifice	Dixon Chart	2/09/87 Calib. Orifice	Dixon Chart
63.00	49.81	41.00	27.97	65.12	48.62
57.00	44.98	48.00	34.37	61.62	47.61
51.00	39.54	53.20	39.96	54.95	42.55
41.00	32.35	55.00	41.96	46.26	38.49
32.00	24.65			34.11	30.39

Sampler #2

4/15/86 Calib. Orifice	Dixon Chart	8/25/86 Calib. Orifice	Dixon Chart	11/19/86 Calib. Orifice	Dixon Chart	2/09/87 Calib. Orifice	Dixon Chart
32.00	31.32	39.50	34.96	28.50	24.56	67.31	61.79
41.00	40.05	47.80	42.96	37.90	32.74	65.12	60.78
51.20	47.76	53.20	48.45	47.00	40.93	59.65	54.70
56.30	54.43	56.00	51.95	53.50	47.07	52.23	48.62
63.10	60.08			58.90	52.69	35.56	33.43

Sampler #3

4/15/86 Calib. Orifice	Dixon Chart	8/25/86 Calib. Orifice	Dixon Chart	10/03/86 Calib. Orifice	Dixon Chart	2/09/87 Calib. Orifice	Dixon Chart
29.00	33.89	40.50	30.27	31.30	21.89	68.44	60.78
40.30	41.59	45.60	37.96	39.80	26.47	63.39	56.73
50.70	50.32	54.00	47.45	50.00	38.18	56.26	50.65
57.10	54.94	58.00	51.95	56.80	45.30	48.34	41.53
62.30	61.62			63.00	51.41	36.87	31.40



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NL IND, INC./GOULD, INC.
REMEDIAL INVESTIGATION

AUDIT/CALIBRATION OF
HIVOL SAMPLER S-1

FIG. B3.3-1 DAMES & MOORE

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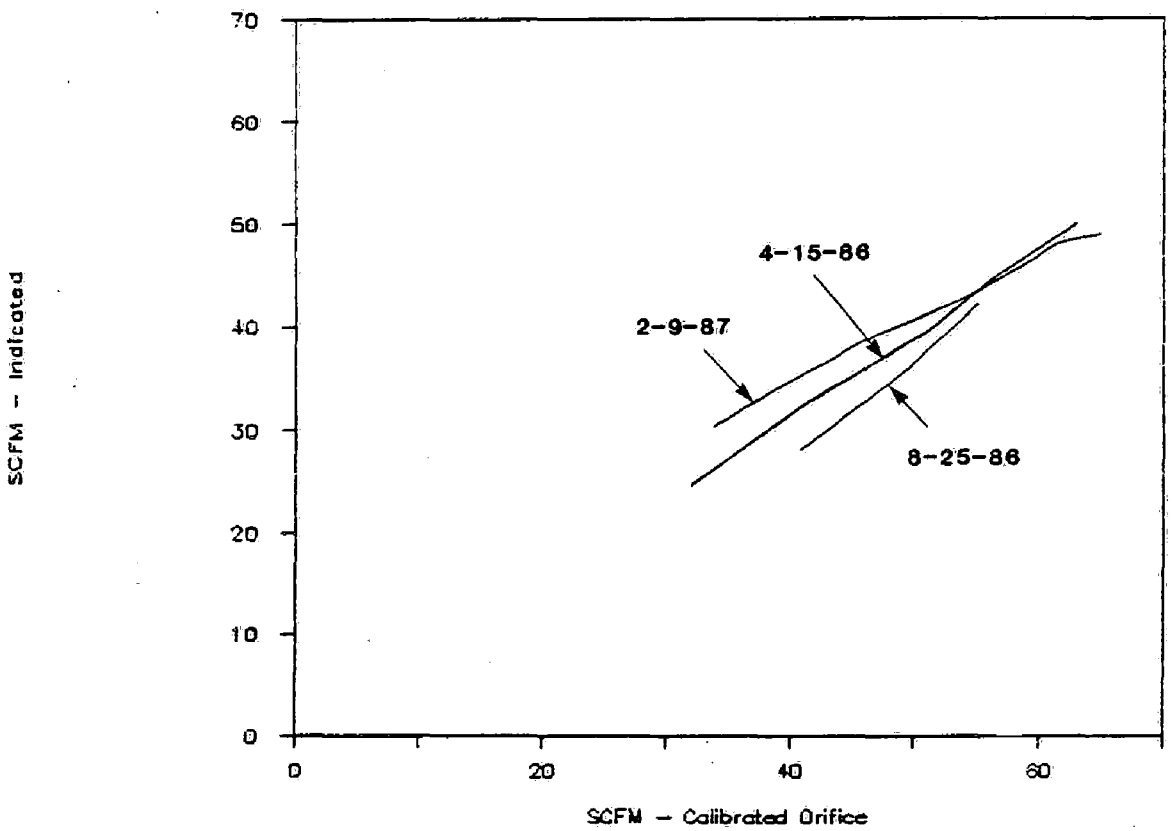

NL IND, INC./GOULD, INC.
REMEDIAL INVESTIGATION

AUDIT/CALIBRATION OF
HIVOL SAMPLER S-1A

FIG. B3.3-2 DAMES & MOORE

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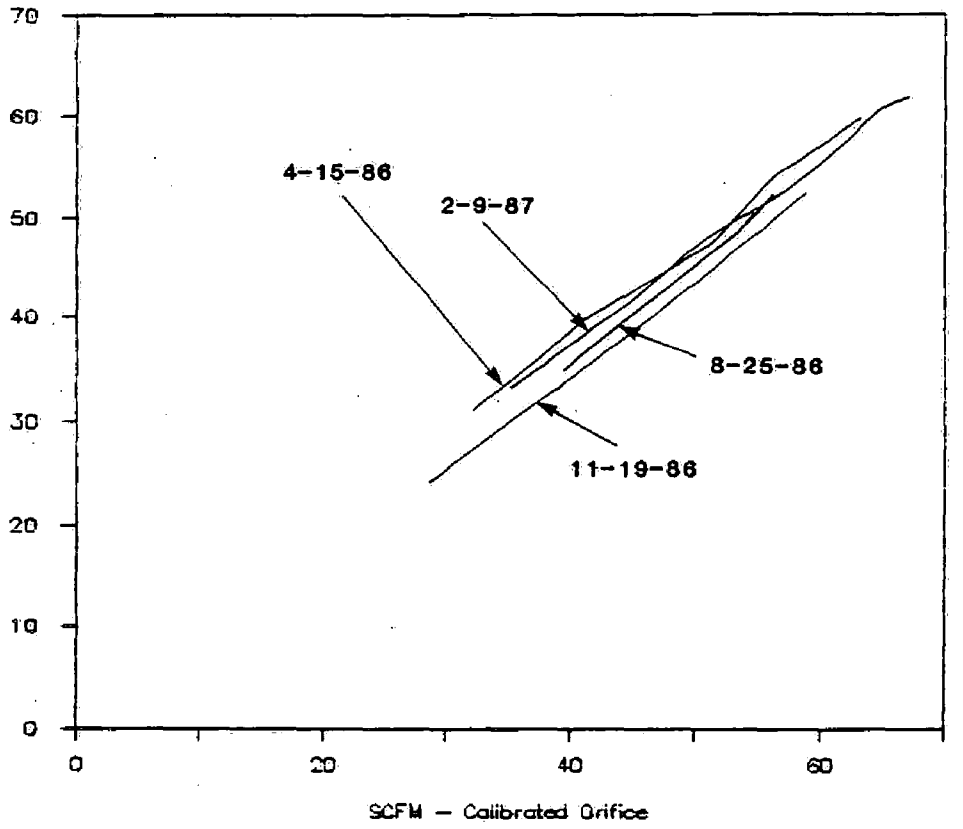

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NL IND, INC./GOULD, INC.
REMEDIAL INVESTIGATION

AUDIT/CALIBRATION OF
HIVOL SAMPLER S-2

FIG. B3.3-3 DAMES & MOORE

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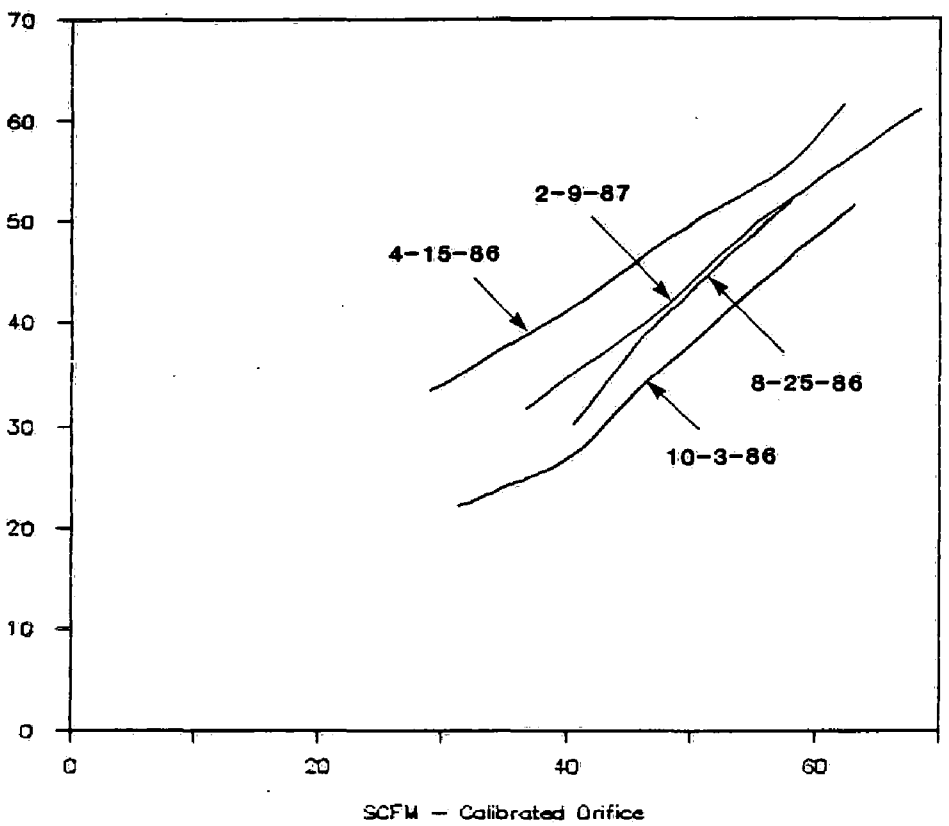

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NL IND, INC./GOULD, INC.
REMEDIAL INVESTIGATION

AUDIT/CALIBRATION OF
HIVOL SAMPLER S-3

FIG. B3.3-4 DAMES & MOORE

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B3.4 PRECISION CHECKS

Precision checks for HIVOL samplers were performed by running co-located samplers. Sampler S-1 was designated as the primary sampler for reporting air quality data. Sampler S-1A was designated as the colocated sampler and was run on at least the routine 6-day sampling cycle. The difference in the calculated TSP concentrations between these two samplers was used to calculate the system precision. Precision control limits, contained in Section 2.2.9 of EPA600/4-77-027a, call for the resulting average quarterly percent difference in TSP to be within $\pm$ 15 percent. Table B3.4-1 presents the TSP precision control statistics obtained for the system in this manner. The quarterly average precision data for TSP indicate that the system operated within the EPA recommended limit of $\pm$ 15 percent and that precision improved as the monitoring program progressed (average quarterly percent differences decreased from -8.3 percent for the first quarter to -5.4 percent for the final, third quarter).

In addition, precision checks for airborne lead were requested by Mr. Jon Schweiss (EPA Region X); the results are presented in Table B3.4-2. No precision control limits have been established for airborne lead. However, average quarterly precision data for airborne lead indicate that the system operation was near or within control limits established for TSP. This demonstrates that system precision was acceptable for lead, taking into consideration that additional sample filter analysis steps would inherently add greater variability to the analytical results.

B3.5 AUDITS

Audits were conducted during the air monitoring program to assess both sampling equipment and analytical accuracy.

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TABLE B3.4-1

PRECISION CONTROL STATISTICS
TOTAL SUSPENDED PARTICULATE

Date	Daily Values TSP (ug/m^3) Sampler S-1	Sampler S-1A	Percent Difference	Quarterly Average Percent Difference	STD Percent Difference
04-16-86	10.5	12.0[a]	14.3		
04-20-86	44.5	42.4[a]	-4.7		
04-26-86	13.6	12.7	-6.6		
05-02-86	19.2	15.2	-20.8		
05-08-86	33.9	33.8	-0.3		
05-14-86	37.2	36.6	-1.6		
05-20-86	54.4	57.0	4.8		
05-26-86	20.1	22.2	10.4		
05-29-86	69.1	59.5	-13.9		
06-01-86	52.0	45.8	-11.9		
06-02-86	60.6	139[a]	129		
06-03-86	70.5	59.4	-15.7		
06-04-86	57.6	48.1	-16.5		
06-05-86	67.1	53.1	-20.9		
06-07-86	27.4	24.4	-10.9		
06-10-86	130	--			
06-11-86	110	--			
06-13-86	81.5	71.5	-12.3		
06-19-86	43.2	33.4	-22.7		
06-25-86	58.9	52.4	-11.0		
				-8.3	10.8
07-01-86	48.3	42.7	-11.6		
07-07-86	36.1	32.5	-10.0		
07-13-86	23.2	20.4	-12.1		
07-15-86	21.6	--			
07-16-86	16.2	--			
07-17-86	23.0	--			
07-18-86	33.6	--			
07-19-86	30.8	34.9	13.3		
07-22-86	31.8	--			
07-23-86	58.5	--			
07-24-86	47.0	--			
07-25-86	54.1	50.9	-5.9		
07-28-86	38.2	--			
07-29-86	54.4	--			
07-30-86	67.9	--			
07-31-86	73.4	68.6	-6.5		

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TABLE B3.4-1 (Continued)

Date	Daily Values TSP (ug/m^3) Sampler S-1	Sampler S-1A	Percent Difference	Quarterly Average Percent Difference	STD Percent Difference
08-01-86	157[c]	--			
08-04-86	57.4	--			
08-05-86	68.8	--			
08-06-86	89.6	82.6	-7.8		
08-07-86	90.4	--			
08-08-86	72.5	--			
08-11-86	47.0	--			
08-12-86	38.8	35.6	-8.2		
08-13-86	70.8	--			
08-14-86	72.4	--			
08-15-86	74.8	--			
08-18-86	72.4	70.6	-2.5		
08-22-86	77.0	--			
08-24-86	41.1	40.0	-2.7		
08-25-86	117	--			
08-26-86	98.4	--			
08-27-86	91.8	--			
08-30-86	13.0	12.6	-3.1		
09-02-86	61.1	--			
09-03-86	88.0	--			
09-05-86	147	117	-20.4		
09-11-86	50.9	43.1	-15.3		
09-12-86	60.1	--			
09-17-86	18.2	17.1	-6.0		
09-23-86	13.4	12.5	-6.7		
09-24-86	void[d]	--			
09-29-86	24.8	22.1	-10.9		
				-7.3	7.3
10-05-86	49.3	47.1	-4.5		
10-11-86	88.8	82.5	-7.1		
10-17-86	71.4	70.5	-1.3		
10-23-86	109	103	-5.5		
10-29-86	30.8	28.5	-7.5		
11-04-86	55.0	51.8	-5.8		
11-10-86	48.7	44.7	-8.2		
11-16-86	12.1	11.7	-3.3		
11-22-86	8.4	7.8	-7.1		
11-25-86	26.5	--			
11-28-86	18.7	19.1	2.1		

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TABLE B3.4-1 (Concluded)

Date	Daily Values TSP (ug/m^3) Sampler 1	Sampler 1A	Percent Difference	Quarterly Average Percent Difference	STD Percent Difference
12-01-86	33.3	--			
12-02-86	33.8	--			
12-03-86	43.7	--			
12-04-86	39.7	37.3	-6.0		
12-05-86	36.9	--			
12-08-86	33.4	--			
12-09-86	4.7	--			
12-10-86	54.5	46.7	-14.3		
12-11-86	33.2	--			
12-12-86	38.7	--			
12-15-86	59.3	--			
12-16-86	46.1	41.3	-10.4		
12-17-86	54.8	--			
12-18-86	27.6	--			
12-19-86	31.0	--			
12-22-86	17.5	18.0	2.9		
12-23-86	25.2	--			
12-28-86	11.2	10.7	-4.5		
1-5-87	35.3	--			
1-6-87	39.2	--			
1-7-87	36.3[a]	--			
				-5.4	4.4

[a] Void by EPA standards--Sampler run time is less than 23 hours, but at least 12 hours. Not included in statistical calculations.

[b] Dixon chart is questionable.

[c] Conditions included drilling on Rhone Poulenc and ESCO and strong winds.

[d] Sampler run time is less than 12 hours.

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TABLE B3.4-2

PRECISION CONTROL STATISTICS
TOTAL AIRBORNE LEAD

Date	Daily Values Lead (ug/m^3) Sampler S-1	Sampler S-1A	Percent Difference	Quarterly Average Percent Difference	STD Percent Difference
04-16-86	0.09	0.06a			
04-20-86	0.10	0.13	30.0		
04-26-86	0.10	0.04	-60.0		
05-02-86	0.05	0.04	-20.0		
05-08-86	0.10	0.09	-10.0		
05-14-86	0.05	0.05	0.0		
05-20-86	0.10	0.09	-10.0		
05-26-86	0.10	0.09	-10.0		
05-29-86	0.34	0.33	-2.9		
06-01-86	0.19	0.17	-10.5		
06-02-86	0.05	0.13[a]	160.0		
06-03-86	0.10	0.08	-20.0		
06-04-86	0.05	0.04	-20.0		
06-05-86	0.10	0.04	-60.0		
06-07-86	0.14	0.12	-14.3		
06-10-86	0.44	--			
06-11-86	0.20	--			
06-13-86	0.09	0.08	-11.1		
06-19-86	0.05	0.04	-20.0		
06-25-86	0.19	0.16	-15.8		
				-16.9	20.8
07-01-86	0.10	0.12	20.0		
07-07-86	0.05	0.08	60.0		
07-13-86	0.05	0.08	60.0		
07-15-86	0.05	--			
07-16-86	0.04	--			
07-17-86	0.09	--			
07-18-86	0.09	--			
07-19-86	0.09	0.14	55.6		
07-22-86	0.27	--			
07-23-86	0.39	--			
07-24-86	0.45	--			
07-25-86	0.81	0.67	-17.3		
07-28-86	0.33	--			
07-29-86	0.61	--			
07-30-86	0.61	--			
07-31-86	0.53	0.51	-3.8		

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TABLE B3.4-2 (Continued)

Date	Daily Values Lead (ug/m^3) Sampler S-1	Sampler S-1A	Percent Difference	Quarterly Average Percent Difference	STD Percent Difference
08-01-86	1.48[c]	--			
08-04-86	0.63	--			
08-05-86	1.04	--			
08-06-86	0.84	0.94	11.9		
08-07-86	0.80	--			
08-08-86	0.71	--			
08-11-86	0.27	--			
08-12-86	0.26	0.24	-7.7		
08-13-86	0.32	--			
08-14-86	0.65	--			
08-15-86	0.55	--			
08-18-86	0.48	0.57	18.8		
08-22-86	0.46	--			
08-24-86	0.15	0.14	-6.7		
08-25-86	0.94	--			
08-26-86	0.53	--			
08-27-86	0.60	--			
08-30-86	0.04	0.08	100.0		
09-02-86	0.42	--			
09-03-86	0.41	--			
09-05-86	0.33	0.27	-18.2		
09-11-86	0.27	0.27	0.0		
09-12-86	0.23	--			
09-17-86	0.05	0.04	-20.0		
09-23-86	0.09	0.08	-11.1		
09-24-86	void[d]	--			
09-29-86	0.21	0.20	-4.8		
				14.8	35.6
10-05-86	0.08	0.08	0.0		
10-11-86	0.20	0.15	-25.0		
10-17-86	0.17	0.15	-11.8		
10-23-86	0.24	0.23	-4.2		
10-29-86	0.08	0.08	0.0		

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TABLE B3.4-2 (Concluded)

Date	Daily Values Lead (ug/m^3) Sampler S-1	Sampler S-1A	Percent Difference	Quarterly Average Percent Difference	STD Percent Difference
11-04-86	0.20	0.19	-5.0		
11-10-86	0.16	0.15	-6.3		
11-16-86	0.04	0.04	0.0		
11-22-86	0.04	0.04	0.0		
11-25-86	0.12	--			
11-28-86	0.08	0.04	-50.0		
12-01-86	0.12	--			
12-02-86	0.12	--			
12-03-86	0.12	--			
12-04-86	0.12	0.11	-8.3		
12-05-86	0.15	--			
12-08-86	0.08	--			
12-09-86	0.11	--			
12-10-86	0.15	0.14	-6.7		
12-11-86	0.19	--			
12-12-86	0.12	--			
12-15-86	0.20	--			
12-16-86	0.25	0.23	-8.0		
12-17-86	0.35	--			
12-18-86	0.11	--			
12-19-86	0.08	--			
12-22-86	0.08	0.08	0.0		
12-23-86	0.04	--			
12-28-86	0.04	0.04	0.0		
01-05-87	0.16	--			
01-06-87	0.12	--			
01-07-87	0.39[a]	--		-8.4	13.3

[a] Void by EPA standards--Sampler run time is less than 23 hours, but at least 12 hours. Not included in statistical calculations.

[b] Dixon chart is questionable.

[c] Conditions included drilling on Rhone Poulenc and Esco and strong winds.

[d] Sampler run time is less than 12 hours.

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B3.5.1 Flow Audits

Flow audits were not performed on the HIVOL samplers because the onsite system operator did not perform routine calibrations following motor brush replacement (see Section B3.3). Without such routine calibrations, five-point calibration was required to assess sampling equipment accuracy.

B3.5.2 Analytical Audits

The analytical audit was conducted at the end of the monitoring program. The audit consisted of analyzing blank, spike and EPA audit samples for lead. These samples were analyzed to assess the analytical accuracy. In order to assess the analytical precision, 10 percent of the samples analyzed for lead during the program were reanalyzed during the audit sample analyses. In addition, laboratory quality control samples analyzed during the monitoring plan were used to assess precision and potential matrix interferences.

The results of the audit sample analyses are presented below. The results indicate that the precision and accuracy of the monitoring program were acceptable.

The blank sample analysis results indicate that the filters analyzed had lead concentrations below the detection limit (90 ug/filter) (Table B3.5-2). These filters, analyzed during the post-monitoring program audit, were representative of the filters used throughout the program. These results indicate that interferences due to blank contamination were minimal, if present at all.

The spike sample analysis results indicate that the analyses conducted by the analytical laboratory were accurate (Table B3.5-3). The average relative percent difference (RPD) for the five analyses was 9.6 percent. The RPD for the analysis of sample B (45 percent) is outside the $\pm$ 20 percent control limits for duplicate analyses. However, given the excellent precision obtained in the analysis of the other four samples, and in the EPA audit strips, this result is considered to be due to filter spike variability. This filter spike variability would not affect the accuracy of regular sample analyses.

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TABLE B3.5-2

BLANK SAMPLE RESULTS

Sample Number	Result (ug lead/filter)	Actual Concentration (ug lead/filter)	Relative Percent Difference
0276	U 90	0	0
0277	U 90	0	0
0278	U 90	0	0
0279	U 90	0	0

TABLE B3.5-3

SPIKE SAMPLE RESULTS

Sample Number	Result (ug lead/filter)	Actual Concentration (ug lead/filter)	Relative Percent Difference
A	100	100	0
B	380	600	45
C	U 10	0	0
D	1000	1000	0
E	290	300	3

The results of the EPA audit samples indicate that the analyses conducted by the analytical laboratory were accurate (Table B3.5-4). The average RPD for the six analyses was 5.5 percent.

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TABLE B3.5-4

EPA AUDIT SAMPLE RESULTS

Sample Number	Result (ug lead/filter)	Actual Concentration (ug lead/filter)	Relative Percent Difference
EPA 1093	290	281.6	4.2
EPA 2153	100	91.6	8.4
EPA 3008	180	195	7.6
EPA 4101	580	600	3.3
EPA 5110	1380	1453	5.1
EPA 6121	1100	1150	4.3

The results of the sample reanalysis indicate, as did the spike sample results, that the analytical precision during the monitoring program was acceptable (Table B3.5-5). The average RPD for these 31 analyses, covering the lead concentration range detected at the site (from below detection limit of 90 ug/filter to 11,500 ug/filter), was 9.7 percent. This average RPD is nearly identical to that obtained for the spike sample analyses. As with the spike sample analyses, a small number of sample RPDs are outside the $\pm$ 20 percent control limits for duplicate analyses. However, due to the good precision obtained for other analyses over the range of sample concentrations, these results are considered acceptable.

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TABLE B3.5-5

SAMPLE REANALYSIS RESULTS

Sample Number	Original Result (ug lead/filter)	Reanalysis Result (ug lead/filter)	Relative Percent Difference
7458	270	270	0
G-01	180	180	0
G-10	90	90	0
A-5	90	U 90	0
A-58	190	180	5
A-74	180	270	40
0001	180	180	0
0015	450	450	0
0025	450	360	22
0029	1260	1080	15
0039	3020	2610	15
0043	1440	1260	13
0046	2880	2340	21
0049	2160	1710	23
0071	1080	900	18
0076	810	810	0
0080	3420	3420	0
0085	1980	1710	15
0087	11300	11500	2
0102	720	630	13
0107	900	900	0
0112	450	450	0
0113	4230	4500	6
0131	180	180	0
0136	2250	2250	0
0151	450	360	22
0171	90	90	0
0188	360	360	0
0196	360	360	0
0214	810	810	0
0231	90	90	0
0239	270	540	67

$$\text{Relative Percent Difference} = \frac{(\text{original result} - \text{reanalysis result})}{(\text{original result} + \text{reanalysis result})/2} \times 100$$

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The results of the replicate analyses conducted by the analytical laboratory during the monitoring program also indicate that the analytical precision during the monitoring program was acceptable (Table B3.5-6). The average RPD for these 35 analyses was 11.6 percent. As with the spike and reanalysis sample results, a small number of sample RPDs are outside the ± 20 percent. The RPD for these six samples appear to be due primarily to the low concentrations. A difference of 90 ug/filter, the detection limit, causes 28 to 66 percent differences in five of the samples. This same difference in higher concentration samples causes percent differences within the control limits. The only significant result outside the control limits is the result for sample A60 (72.7 percent). However, since this is the only significant indication of unacceptable precision, the overall analytical precision remains acceptable.

The matrix spike/matrix spike duplicate results conducted by the analytical laboratory during the monitoring program indicate that matrix interferences were insignificant (Table B3.5-7). The percent recoveries for the 28 samples were all within the ± 20 percent control limits for matrix spike analyses.

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TABLE B3.5-6

MATRIX SPIKE/MATRIX SPIKE DUPLICATE RESULTS
(Total ug Pb/filter)

Laucks Rept. No.	Filter No.	Date Analyzed	Spike Added	Sample Result	MS Result	Percent Rec.	MSD Result	Percent Rec.	RPD
97236	A-47	6/23/86	4500	270	5310	112			
97236	A-55	6/23/86	4500	<90	5220	116			
97236	A-65	6/23/86	4500	90	5220	114			
97706	7462	7/17/86	4500	90	4140	90			
98066	0031	8/12/86	4500	810	5400	102			
98066	0042	8/12/86	4500	1350	5760	98			
97883	0010	8/14/86	4500	270	4950	104	4770	100	2.0
97883	0020	8/14/86	4500	900	5670	106	5580	104	1.9
97883	7475	8/14/86	4500	90	4770	104			
98401	0077	8/29/86	4500	1170	5580	98			
98254	0056	8/22/86	4500	810	5400	102			
98254	0066	8/22/86	4500	540	5130	102			
98656	0079	9/10/86	4500	1080	5400	96			
98656	0092	9/10/86	4500	1890	6300	98			
98875	0100	9/20/86	4500	540	4950	98			
98875	0110	9/20/86	4500	720	5130	98			
98934	0118	9/23/86	4500	450	4950	100			
99123	0124	10/10/86	4500	540	5130	102			
99435	0130	10/24/86	4500	180	4500	96			
99524	0144	11/06/86	4500	540	4680	98			
99842	0157	11/19/86	4500	360	5040	104			
99956	0161	12/12/86	4500	90	4680	102			
99956	0185	12/12/86	4500	270	4680	96			
1695	0237	1/12/87	4500	270	4320	90			
1604	0215	1/07/87	4500	270	4770	100			
1472	0205	12/31/86	4500	450	4950	100			
1472	0214	12/31/86	4500	810	5220	98			
1343	0191	12/19/86	4500	180	4680	100			

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TABLE B3.5-7

REPLICATE ANALYSIS RESULTS
(Total ug Pb/filter)

Laucks Rept. No.	Filter No.	Date Analyzed	Rep 1	Rep 2	Relative Error
96266	G-12	5/22/86	180	180	0
96266	G-17	5/22/86	180	180	0
97032	0003	6/13/86	90	90	0
97032	0010	6/13/86	90	90	0
97032	0022	6/13/86	540	450	18.2
97032	0034	6/13/86	90	90	0
97236	A-45	6/23/86	90	180	66.7
97236	A-50	6/23/86	90	180	66.7
97236	A-60	6/23/86	1350	630	72.7
97706	7460	7/17/86	180	180	0
98066	0028	8/12/86	720	720	0
98066	0038	8/12/86	990	900	9.5
98066	0039	8/12/86	3150	2880	9.0
97883	00 5	8/04/86	270	270	0
97883	7465	8/04/86	270	180	40
98401	0073	8/29/86	270	360	28.6
98254	0061	8/22/86	540	540	0
98254	0069	8/22/86	2070	1890	9.1
98656	0083	9/10/86	450	450	0
98656	0085	9/10/86	1980	1890	4.7
98875	0095	9/20/86	180	180	0
98875	0105	9/20/86	630	630	0
98934	0112	9/23/86	450	450	0
99123	0119	10/10/86	180	180	0
99123	0129	10/10/86	360	360	0
99435	0137	10/24/86	180	180	0
99524	0139	11/06/86	360	360	0
99524	0144	11/06/86	540	540	0
99842	0153	11/19/86	900	720	14.8
99956	0175	12/12/86	270	270	0
99956	0179	12/12/86	270	180	66.6
1695	0225	1/12/87	90	90	0
1604	0215	1/07/87	270	270	0
1472	0192	12/31/86	270	270	0
1472	0202	12/31/86	270	270	0

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B4.0 LABORATORY QUALITY CONTROL/QUALITY ASSURANCE METHODS

This section presents the QA/QC methods used by the analytical and physical testing laboratories to verify the quality and accuracy of the data reported during the NL/Gould remedial investigation. Sample logging and handling methods, data reporting methods and QA/QC sample analyses are discussed. The results of QA/QC sample analyses, including method blank, matrix spike/matrix spike duplicate, replicate and standard reference material analyses, are also presented.

B4.1 SAMPLE LOGGING AND HANDLING

The steps followed by the person(s) responsible for the receipt, log-in, entry, storage, and control of samples received from the field are:

1. Verification that all chain-of-custody forms received with the samples corresponded to the labels on the sample containers, and verification that all analytical request forms received with the samples agreed with designated analyses predetermined with the laboratory. If discrepancies or omissions occurred, the Field Supervisor or QA Manager were contacted to determine the correct information. Any problems and their resolution were entered on the log-in sheet.

2. Examination of chain-of-custody seals and verification of the integrity of all sample containers. Samples that should have contained no headspace were checked for the absence of headspace.

3. Assignment of a single lab report number for large batches of samples received at one time, or when it was known ahead of time that samples were to arrive over several days.

4. Assignment of sample laboratory numbers for each sample received within each batch. Samples consisted of a number of discrete bottles where various fractions/preservatives were required to make all the determinations. The lab report number

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was a 5-digit number assigned to each batch during the project. Within a batch, each samples was assigned another number which was suffixed to the lab number. For instance, if 10 samples were received under lab report number 88901, they were assigned numbers 88901-1 to 88901-10. These numbers were written directly on each sample container using a waterproof marker and on the chain-of-custody form.

5. After completing steps 1 through 4, the storage location of the sample bottles was indicated on the lab entry form.

B4.2 DATA REPORTING

All laboratory data were reported in complete, reviewed and signed data reports. Calculations performed by the laboratory were checked with the following methods:

- All transfers of manually calculated numbers were checked to see if they were done correctly. The laboratory documented all calculations. Spot checks were done to verify the accuracy of the remaining calculations.

- All other calculations were inspected to verify approximate correctness of results. Reasonableness of calculations was assessed; this included comparison with previous results, where possible.

- Instrument output (strip chart recordings, absorbances, integrated outputs, etc.) were verified for proper performance of instrumentation. Plotted calibration curves verified linearity.

- Values calculated by computers were checked to verify that manually entered numbers had been transferred correctly and that the computer computations were correct. Analog data were compared to digital data by comparing strip chart recordings, etc. to values reported.

- Final calculated concentrations were checked for correct units and correct transfer to the draft laboratory report sheet. The

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draft report was typed in final form and checked for errors before submittal.

B4.3 ANALYTICAL LABORATORY QA/QC ANALYSES

The analytical laboratory conducted method blank, matrix spike/ matrix spike duplicate, replicate and standard reference material analyses to document and verify sample result quality in terms of precision and accuracy. The results of these QA/QC analyses and the results of a review of instrument calibration and sample holding times are presented and discussed below. The QA/QC data were used to evaluate the overall data quality. The criteria used during the data review followed EPA guidelines (U.S. EPA Laboratory Data Validation: Functional Guidelines For Evaluating Inorganics Analyses, Office of Emergency and Remedial Response, no date).

In general, good quality data were generated during the NL/Gould remedial investigation. Any questionable data identified during the QA/QC data review were flagged with appropriate indicators on the data tables (Appendix C), as discussed below.

B4.3.1 Method Blank Analyses

Method blank analyses were conducted to evaluate possible laboratory contamination. The analytical laboratory analyzed method blanks at a frequency of at least one per batch, or every 20 samples, whichever was more frequent. The method blank analysis results were reviewed for each lab report. Concentrations of any detected analyte(s) in the blank samples were compared to the sample results for the analyte(s). If the analyte concentration in the blank sample was below the Contract Required Detection Limit (CRDL) for that analyte, then all samples with concentrations within ten times (10x) the blank concentration were flagged "B" to indicate that the analyte was detected in the blank. If the analyte concentration in the blank sample was above the CRDL, then all samples with concentrations within ten times (10x) the blank concentration were flagged "J" to indicate that the analyte was detected in the blank and that these results are estimated concentrations.

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The data that were flagged as a result of the method blank data review are presented in Table B4.3-1.

B4.3.2 Matrix Spike/Matrix Spike Duplicate Analyses

The matrix spike/matrix spike duplicate (MS/MSD) results give an indication of the possible interferences caused by sample matrices and the recovery efficiency of spike samples. The analytical laboratory analyzed MS/MSD samples at a frequency of at least one per batch, or every 20 samples, whichever was more frequent. The MS/MSD results were reviewed for each lab report. If the percent recovery for an analyte was outside of the acceptable 75 to 125 percent range, all samples in the report with detectable sample concentration(s) reported for that analyte were flagged "J" to indicate the results were estimated due to sample matrix interference or poor spike recovery. Exceptions to this criteria included MS/MSD samples where the spike concentration was less than the required 4:1 spike-to-sample ratio and MS/MSD samples were additional MS/MSD samples or the total percent recovery indicated that the result was acceptable. The samples were not flagged.

The MS/MSD results for the hexavalent chromium samples were generally outside the required limits. The analytical laboratory stated that acceptable spike recoveries for this analyte are typically impossible to obtain due to the probable conversion of the hexavalent chromium to the trivalent state. Generally, the laboratory was able to show acceptable MS/MSD results for total chromium spikes. For this reason, the hexavalent chromium MS/MSD data were not considered during the review. The data that were flagged as a result of the MS/MSD data review are presented in Table B4.3-2.

TABLE B4.3-2

DATA FLAGGED DUE TO MATRIX SPIKE/MATRIX SPIKE DUPLICATE RESULTS

Lab Report Number	Lab Sample Number	D&M Sample Number	Analyte	QA Flag	MS/MSD Recovery/ Reason
2103	ALL	ALL	Sulfate	J	67/70 percent recovery

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TABLE B4.3-1

DATA FLAGGED DUE TO METHOD BLANK RESULTS

Lab Report Number	Lab Sample Number	D&M Sample Number	Analyte	QA Flag	Blank Concentration/ Reason
98374	1	D-4-B,C	Cadmium	B	0.6 mg/kg (DL=0.5 mg/kg) within 10x sample result
	2	D-9-A,B,C	Cadmium	B	Same as above
	3	D-5-A,B,C	Cadmium	B	Same as above
98420	1	SW-1	Iron	B	0.05 mg/l (DL=0.01 mg/l) within 10x sample result
	2	SW-3	Iron	B	Same as above
98424	5	SW-5	Iron	B	Same as above
	6	SW-6	Iron	B	Same as above
98664	1	W-6-B	Iron	B	Same as above
	2	W-6-Bl	Iron	B	Same as above
	3	W-6-D	Zinc	B	0.003 mg/l (DL=0.002 mg/l) within 10x sample result
98825	10	RPW-4D	Iron	B	0.04 mg/l (DL=0.01 mg/l) within 10x sample result
99378	ALL soil samples EXCEPT lab sample number 22 - D&M sample number W-15D-16.0		Cadmium	J	1.2 mg/kg (DL=0.5 mg/kg) within 10x sample results

TABLE B4.3-1 (Continued)

Lab Report Number	Lab Sample Number	D&M Sample Number	Analyte	QA Flag	Blank Concentration/ Reason
1298	1	P-01	Iron	B	0.04 mg/l (DL=0.01 mg/l) within 10x sample result
	15	W-06D	Iron	B	Same as above
	17	W-11B	Iron	B	Same as above
	49	W-3D(2)	Iron	B	Same as above
1914	3	W-12I	Iron	B	Same as above
2103	1	W-15d-19.0	Cadmium	J	1.0 mg/kg (DL=0.5 mg/kg) within 10x sample result
	2	W-15D-30.8	Cadmium	J	Same as above
	8	W-16D-3	Cadmium	J	Same as above
	9	W-16D-6	Cadmium	J	Same as above
	13	S-15BC	Cadmium	J	Same as above
	14	S-16BC	Cadmium	J	Same as above
	17	S-19BC	Cadmium	J	Same as above
2411	4	W-1D	Iron	B	0.06 mg/l (DL=0.01 mg/l) within 10x sample result
	8	W-16D	Iron	B	Same as above
	9	W-16I	Iron	B	Same as above
	10	W-16S	Iron	B	Same as above

TABLE B4.3-1 (Concluded)

Lab Report Number	Lab Sample Number	D&M Sample Number	Analyte	QA Flag	Blank Concentration/ Reason
	13	W-15S	Iron	B	Same as above
	15	W-18S	Iron	B	Same as above
	19	W-3D(2)	Iron	B	Same as above
	20	PP-6	Iron	B	Same as above
	27	W-6B	Iron	B	Same as above
2538	3	W-12D	Iron	B	0.04 mg/l (DL=0.01 mg/l) within 10x sample result
	4	W-12I	Iron	B	Same as above
	5	W-21D	Iron	B	Same as above
	7	SW-6	Iron	B	Same as above
	8	SW-5	Iron	B	Same as above
	9	SW-4	Iron	B	Same as above
	12	SW-2	Iron	B	Same as above
	13	SW-8	Iron	B	Same as above
	25	SW-1S	Iron	B	Same as above
	26	SW-1B	Iron	B	Same as above
	27	SW-3	Iron	B	Same as above
	47	W-7D	Iron	B	Same as above

DL = Detection limit

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B4.3.3 Replicate Analyses

Replicate analyses were conducted to evaluate the laboratory precision. The analytical laboratory analyzed replicate samples at a frequency of one per batch, or every 20 samples, whichever was more frequent. Replicate samples were not analyzed with every batch since MS/MSD results were also indicative of precision. If a replicate analysis result for an analyte was outside the acceptable ± 20 percent range, then any sample in that lab report with a detectable concentration of the analyte that was outside the acceptable range was flagged "J" to indicate that it was an estimated result. The data that were flagged as a result of the replicate analysis review are presented in Table B4.3-3.

TABLE B4.3-3

DATA FLAGGED DUE TO REPLICATE ANALYSIS RESULTS

Lab Report Number	Lab Sample Number	D&M Sample Number	Analyte	QA Flag	Relative Percent Difference/Reason (RPD)
97202	7	S-6	EP Lead	J	67 percent RPD on EP TOX Lead
	9	S-9-DUP	EP Lead	J	
	11	S-13	EP Lead	J	
	14	S-49	EP Lead	J	
98016	ALL	ALL	Chromium	J	67 percent RPD on total chromium
	ALL	ALL	Iron	J	39 percent RPD on total iron
	ALL	ALL	Sulfate	J	23 percent RPD on total sulfates

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B4.3.4 Standard Reference Material Analyses

Standard reference material (SRM) analyses were conducted to verify the accuracy of the analyses by comparing the sample analysis result with the known, standardized concentration. The SRM analyses were conducted for each batch of samples. If the SRM result was outside the 95 percent confidence interval for the analyte, the samples with detectable concentrations of the analyte were flagged "J" to indicate an estimated concentration. The data flagged as a result of the SRM analysis review are presented in Table B4.3-4.

TABLE B4.3-4

DATA FLAGGED DUE TO STANDARD REFERENCE MATERIAL ANALYSIS RESULTS

Lab Report Number	Lab Sample Number	D&M Sample Number	Analyte	QA Flag	Result/95 Percent Confidence Interval
98374	5	SW-2	Iron	J	0.68/0.70-0.88 mg/l
98587	ALL	ALL	Chloride	J	13.5/9.8-13.2
	ALL	ALL	Alkalinity	J	38/31.1-37.7
98634	ALL	ALL	Alkalinity	J	38/31.1-37.7
98664	ALL	ALL	Alkalinity	J	38/31.1-37.7
98825	ALL	ALL	Chloride	J	13.4/9.8-13.2

B4.3.5 Calibration Results

Calibration samples were analyzed to verify that analytical equipment were initially accurate and that they remained accurate throughout the analyses for a given batch of samples. The analytical laboratory performed two types of calibration during the analyses. The first was the initial calibration involving a multipoint calibration and the second was the continuing calibration involving single-point calibration checks. Initial calibration results were presented as calibration graphs

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and then checked to verify the data and to assure that the calibrated linear range encompassed the sample result range (taking any necessary dilutions into account). The continuing calibration analyses were conducted after every 10 samples were analyzed. If continuing calibration results were not within the acceptable ± 10 percent range, the full multipoint calibration was conducted or else the data associated with the calibration (in the same report) were to be flagged "J" indicating an estimated concentration. The calibration analysis results indicated that initial and continuing calibration were acceptable.

B4.3.6 Sample Holding Times

The sample holding times were reviewed to verify that sample were extracted and that extracts were analyzed within acceptable periods of time. The samples listed in Table B4.3-5 were flagged "J" to indicate an estimated concentration because the acceptable holding times were exceeded.

B4.4 PHYSICAL TESTING LABORATORY QA/QC METHODS

The physical testing laboratory conducted duplicate sample testing. The results of the duplicate sample testing indicate that the data reported by Pacific Testing Laboratories were accurate and precise.

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TABLE B4.3-5

DATA FLAGGED DUE TO EXCEEDED HOLDING TIMES

Lab Report Number	Lab Sample Number	D&M Sample Number	Analyte	QA Flag	Reason
2103	11	B-5-25.5	ALL	J	6-month sample holding time exceeded
	18	W-11D-35	ALL	J	Same as above
2222	3	W-15S-5.5	ALL	J	Same as above
	4	W-15S-15.8	ALL	J	Same as above
	28	W-11D-50	ALL	J	Same as above
	29	W-11D-60	ALL	J	Same as above
	30	W-11D-70	ALL	J	Same as above
	31	W-11D-80	ALL	J	Same as above
	32	W-11D-90	ALL	J	Same as above
	33	W-11D-100	ALL	J	Same as above
	34	B-6-30.5	ALL	J	Same as above
	35	B-10-36.5	ALL	J	Same as above
	36	W-6S-25	ALL	J	Same as above
	37	W-6S-61	ALL	J	Same as above
	42	W-6S-FILL	ALL	J	Same as above
	43	W-6S-15	ALL	J	Same as above
	44	W-6S-20	ALL	J	Same as above
	45	W-7S-5	ALL	J	Same as above
	46	W-7S-10	ALL	J	Same as above
	47	W-7S-20	ALL	J	Same as above
	48	W-7S-FILL	ALL	J	Same as above

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B5.0 DATA MANAGEMENT PROCEDURES

All onsite real-time measurement and laboratory generated analytical data were transcribed onto preformatted data collection forms. The data were entered from the forms, verified, and input into a computer file to provide ready access for data analysis. A computer based data management system (DBASE III Plus) was used for validation and processing of the data to a form which allowed flexible validation and output routines. Data summaries were output from the data base and checked manually.

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Appendix C

APPENDIX C

ANALYTICAL DATA
SUMMARY TABLES

TABLE C- 1

NL GOULD: SEDIMENT SAMPLES, ROUND 1 (Aug - Sept, 1986), ROUND 2(Dec, 1986 - Jan, 1987) AND ROUND 3 (Feb, 1987) ANALYSIS RESULTS

D & M SAMPLE #	ROUND	LAB#-SAMPLE#	DATE	pH	Pb mg/kg	As mg/kg	Cd mg/kg	Cr Hex mg/kg	Cr mg/kg	Zn mg/kg	Fe mg/kg	SO4 mg/kg	CE Cap (#)	TOT SLDS %	EP Pb mg/kg	EP As mg/kg	EP Cd mg/kg	EP Cr mg/kg
WEST DOANE LAKE REMNANT																		
SD-04	1	98374 - 1	08/19/86	9.3	1500	41.0	2.5 B	9.3	360	630	18000	45000	7.4	25.9	--	--	--	--
SD-04	3	2538 - 20	02/24/87	9.2	1500	40.0	1.7	--	210	550	7400	6100	16.4	34.5	--	--	--	--
SD-05	1	98374 - 3	08/19/86	9.1	1000	45.0	4.4 B	4.2	860	920	41000	5000	3.5	23.7	0.4	0.01	0.02	0.1U
SD-05	3	2538 - 15	02/24/87	9.0	890	50.0	4.8	--	540	1000	26000	8400	23.2	24.2	0.4	0.10U	0.02	0.2
SD-05-dup	1	98374 - 2	08/19/86	9.0	1000	37.0	3.9 B	4.2	920	860	41000	4200	7.4	23.8	0.4	0.01U	0.02	0.1U
SD-05-dup	3	2538 - 17	02/24/87	9.0	870	55.0	4.7	--	740	1000	31000	8200	22.3	24.3	0.4	0.10U	0.02	0.2
SD-06	1	98374 - 4	08/19/86	10.2	240	--	--	--	--	--	--	--	--	44.6	--	--	--	--
SD-06	3	2538 - 16	02/24/87	8.1	390	--	--	--	--	--	--	--	--	45.6	--	--	--	--
SD-12	3	2538 - 19	02/24/87	9.0	460	76.0	2.2	--	110	410	21000	5600	34.9	38.1	--	--	--	--
SD-13	3	2538 - 18	02/24/87	10.5	780	20.0	6.5	--	2200	2000	88000	1400	7.0	53.3	--	--	--	--
EAST DOANE LAKE REMNANT																		
SD-01	1	98420 - 4	08/20/86	8.1	1400	--	--	--	--	--	--	--	--	63.9	--	--	--	--
SD-01	3	2538 - 35	02/24/87	11.8	4100	--	--	--	--	--	--	--	--	40.5	--	--	--	--
SD-02	1	98420 - 3	08/20/86	8.0	7200	--	--	--	--	--	--	--	--	33.8	--	--	--	--
SD-02	3	2538 - 31	02/24/87	7.1	12000	99.0	36.0	--	48	1500	49000	21000	6.4	43.9	28.0	0.10U	0.33	0.1U
SD-02-2	2	1298 - 25	12/17/86	7.0	3900	--	--	--	--	--	--	--	--	34.8	--	--	--	--
SD-03	1	98420 - 5	08/20/86	8.5	160	--	--	--	--	--	--	--	--	77.2	--	--	--	--
SD-03	3	2538 - 36	02/24/87	9.2	2600	--	--	--	--	--	--	--	--	47.3	--	--	--	--
SD-10	2	1298 - 32	12/17/86	12.4	1700	--	--	--	--	--	--	--	--	20.9	--	--	--	--
SD-10	3	2538 - 32	02/24/87	11.6	1500	13.0	3.3	--	13	390	4800	250	12.6	20.7	0.2	0.10U	0.01U	0.1U
SD-10-dup	3	2538 - 33	02/24/87	11.8	1500	13.0	2.8	--	16	370	6500	66	14.1	24.3	0.2	0.10U	0.01U	0.1U
SD-11	2	1298 - 30	12/17/86	12.4	530	160.0	3.1	--	23	210	3300	1900	6.9	29.2	0.2	0.10U	0.01	0.1U
SD-11	3	2538 - 34	02/24/87	11.7	4900	--	--	--	--	--	--	--	--	23.9	--	--	--	--
SD-11-dup	2	1298 - 31	12/17/86	12.4	430	98.0	2.5	--	12	69	1800	3300	4.7	24.7	0.5	0.10U	0.01U	0.1U
WILLAMETTE RIVER																		
SD-07	1	98424 - 2	08/21/86	9.2	56	5.7	0.5U	0.5U	9	72	38000	51	8.8	71.9	--	--	--	--
SD-07	3	2538 - 10	02/23/87	6.4	26	6.2	0.7	--	26	82	30000	190	14.2	71.9	--	--	--	--
SD-08	1	98424 - 3	08/21/86	8.8	30	--	--	--	--	--	--	--	--	70.7	--	--	--	--
SD-08	3	2538 - 11	02/23/87	5.8	34	--	--	--	--	--	--	--	--	69.5	--	--	--	--

U: following a number indicates concentration below detection limit. Value shown is detection limit.
dup: following a sample number indicates sample is a duplicate.
B: following a number indicates blank concentration with 10x sample result. See Appendix B Section 4.0 for explanation.

SCOEPA00015703

NL GOULD: SUBSURFACE SOIL SAMPLES

D & M SAMPLE #	DEPTH (ft)	LAB#-SAMPLE#	DATE	pH	Pb mg/kg	As mg/kg	Cd mg/kg	Cr Hex mg/kg	Cr mg/kg	Zn mg/kg	Fe mg/kg	SO4 mg/kg	CE Cap (%)	TOT SLDS %	EP Pb mg/kg	EP As mg/kg	EP Cd mg/kg	EP Cr mg/kg
B-05-01	6.5	98016 - 10	07/25/86	11.0	110	14.0	0.7	1.0U	290 J	130	31000 J	160 J	7.6	82.3	0.2U	0.01	0.02U	0.1U
B-05-01-dup	60	98016 - 15	07/25/86	11.0	120	--	--	--	--	--	--	--	--	82.7	--	--	--	--
B-05-02	10.5	98016 - 11	07/25/86	11.0	90	14.0	0.6	1.0U	200 J	89	28000 J	100 J	8.2	83.1	--	--	--	--
B-05-03	15.5	98016 - 12	07/25/86	11.0	210	--	--	--	--	--	--	--	--	79.3	--	--	--	--
B-05-04	20.5	98016 - 13	07/25/86	10.0	190	--	--	--	--	--	--	--	--	74.2	--	--	--	--
B-05-05	23	98016 - 14	07/25/86	9.6	62	--	--	--	--	--	--	--	--	77.6	--	--	--	--
B-05-06	25.5	2103 - 11	07/25/86	5.8	16 J	--	--	--	--	--	--	--	--	62.0	0.1UJ	0.01UJ	0.01 J	0.1UJ
B-06-01	5.5	98016 - 16	07/25/86	10.0	42	8.3	0.5	1.0U	23 J	75	25000 J	220 J	10.8	80.9	0.2U	0.01U	0.02U	0.1U
B-06-02	10.5	98016 - 17	07/25/86	9.2	75	13.0	0.6	1.0U	57 J	93	26000 J	140 J	10.5	82.4	--	--	--	--
B-06-02-dup	61	98016 - 20	07/25/86	--	56	13.0	0.6	1.0U	27 J	98	26000 J	160 J	11.5	81.8	--	--	--	--
B-06-03	15.5	98016 - 18	07/25/86	7.7	16	--	--	--	--	--	--	--	--	75.6	--	--	--	--
B-06-04	20.5	98016 - 19	07/25/86	7.7	74	--	--	--	--	--	--	--	--	81.6	--	--	--	--
B-06-05	23.5	99378 - 24	07/28/86	5.7	29	--	--	--	--	--	--	--	--	64.8	--	--	--	--
B-06-06	30.5	2222 - 34	07/28/86	5.2	17 J	--	--	--	--	--	--	--	--	67.5	--	--	--	--
B-08-01	5.5	98016 - 1	07/28/86	8.4	46	2.3	0.5U	1.0U	41 J	38	21000 J	77 J	9.7	86.7	0.2	0.01U	0.02U	0.1U
B-08-02	10.5	98016 - 2	07/28/86	10.0	96	3.1	0.7	1.0U	280 J	130	34000 J	48 J	8.9	90.1	--	--	--	--
B-08-02-dup	60	98016 - 9	07/28/86	11.0	140	--	--	--	--	--	--	--	--	88.7	--	--	--	--
B-08-03	15.5	98016 - 3	07/28/86	10.0	21	3.1	0.5U	1.0U	240 J	16	85000 J	28 J	1.4	86.4	--	--	--	--
B-08-04	20.5	98016 - 4	07/28/86	11.0	98	4.8	0.7	1.0U	250 J	78	26000 J	46 J	4.0	87.0	--	--	--	--
B-08-05	25.5	98016 - 5	07/28/86	11.0	87	1.4	0.5U	1.0U	740 J	81	61000 J	190 J	6.7	87.3	--	--	--	--
B-08-06	30.5	98016 - 6	07/28/86	11.0	30	3.8	0.5U	1.0U	420 J	36	27000 J	150 J	3.0	86.6	--	--	--	--
B-08-07	32.5	98016 - 7	07/30/86	6.2	41	5.3	0.7	1.0U	16 J	130	26000 J	180 J	19.3	65.4	--	--	--	--
B-08-08	34.5	98016 - 8	07/30/86	5.7	16	3.3	0.5U	1.0U	15 J	64	29000 J	50 J	26.9	60.2	--	--	--	--
B-10-01	5	99378 - 13	08/04/86	8.0	10U	0.9	0.7 J	0.5U	7	6	10000	40	2.2	91.2	0.1U	0.01U	0.01U	0.1U
B-10-02	10.5	99378 - 14	08/04/86	9.8	240	5.8	2.4 J	0.5U	770	210	44000	78	4.8	91.2	--	--	--	--
B-10-03	15.5	99378 - 15	08/04/86	10.1	60	--	--	--	--	--	--	--	--	78.2	--	--	--	--
B-10-04	19	99378 - 16	08/05/86	9.4	33	3.5	0.5 J	0.5U	1000	71	64000	25	5.8	91.5	--	--	--	--
B-10-05	20.8	99378 - 17	08/05/86	10.4	17	2.5	0.7 J	0.5U	1200	10	17000	150	3.6	89.6	--	--	--	--
B-10-06	25.5	99378 - 18	08/05/86	10.3	140	15.0	1.1 J	0.5U	190	170	23000	130	7.1	81.5	--	--	--	--
B-10-07	29.2	99378 - 19	08/05/86	8.9	43	--	--	--	--	--	--	--	--	80.9	--	--	--	--
B-10-08	30.7	2103 - 12	08/05/86	4.5	13	--	--	--	--	--	--	--	--	76.3	0.1U	0.01U	0.01	0.1U
B-10-09	36.5	2222 - 35	08/05/86	4.0	15 J	--	--	--	--	--	--	--	--	73.5	--	--	--	--
W-03D-01	5.5	2222 - 11	11/25/86	8.0	56	--	--	--	--	--	--	--	--	83.8	--	--	--	--
W-03D-02	10.5	2222 - 12	11/25/86	9.2	27	3.4	0.5U	--	36	64	25000	310	9.2	73.5	--	--	--	--
W-03D-02	10.5	2222 - 12	11/25/86	9.2	27	3.4	0.5U	--	36	64	25000	310	9.2	73.5	--	--	--	--
W-03D-02-dup	10.5	2222 - 13	11/25/86	9.4	26	--	--	--	--	--	--	--	--	81.0	--	--	--	--
W-03D-03	15.5	2222 - 14	11/25/86	7.0	330	72.0	1.9	--	74	220	31000	6100	26.1	58.2	--	--	--	--
W-03D-04	20.5	2222 - 15	11/25/86	5.7	22	--	--	--	--	--	--	--	--	62.7	--	--	--	--
W-03D-05	25.7	2222 - 16	11/25/86	6.2	16	--	--	--	--	--	--	--	--	68.8	--	--	--	--
W-03D-06	30.5	2222 - 17	11/25/86	5.5	16	--	--	--	--	--	--	--	--	60.5	--	--	--	--
W-03D-08	40.5	2222 - 8	11/26/86	6.9	10	2.0	0.5U	--	28	50	19000	54	18.6	6.7	--	--	--	--
W-03D-10	52.0	2222 - 9	11/26/86	7.3	11	--	--	--	--	--	--	--	--	66.5	--	--	--	--
W-03D-12	60.5	2222 - 10	11/26/86	6.8	85	--	--	--	--	--	--	--	--	70.0	--	--	--	--
W-03D-14	70.5	2222 - 18	12/01/86	6.8	16	--	--	--	--	--	--	--	--	52.4	--	--	--	--
W-03D-16	80.3	2222 - 19	12/01/86	7.9	15	--	--	--	--	--	--	--	--	67.4	--	--	--	--
W-03D-18	87.7	2222 - 20	12/01/86	7.9	28	3.2	0.6	--	23	78	31000	72	10.7	74.2	--	--	--	--
W-06S-01	5.0	2222 - 42	07/22/86	5.5	29 J	--	--	--	--	--	--	--	--	77.7	--	--	--	--
W-06S-02	15.0	2222 - 43	07/22/86	7.1	20 J	--	--	--	--	--	--	--	--	74.8	--	--	--	--
W-06S-03	20.0	2222 - 44	07/22/86	7.4	28 J	--	--	--	--	--	--	--	--	74.1	--	--	--	--
W-06S-04	25.0	2222 - 36	07/22/86	6.6	16 J	4.5 J	0.7 J	--	22 J	69 J	34000 J	150J	14.4 J	74.4	--	--	--	--
W-06S-04-dup	25.0	2222 - 37	07/22/86	6.9	18 J	--	--	--	--	--	--	--	--	76.9	--	--	--	--
W-07S-01	5.0	2222 - 45	07/13/86	5.9	67000 J	--	--	--	--	--	--	--	--	89.2	--	--	--	--
W-07S-02	10.0	2222 - 46	07/13/86	6.0	26000 J	--	--	--	--	--	--	--	--	87.3	--	--	--	--

SCOEPA00015704

NL GOULD: SUBSURFACE SOIL SAMPLES

D & M SAMPLE #	DEPTH (ft)	LAB#-SAMPLE#	DATE	pH	Pb mg/kg	As mg/kg	Cd mg/kg	Cr Hex mg/kg	Cr mg/kg	Zn mg/kg	Fe mg/kg	SO4 mg/kg	CE Cap (%)	TOT SLDS %	EP Pb mg/kg	EP As mg/kg	EP Cd mg/kg	EP Cr mg/kg
M-07S-03	19.0	2222 - 46	07/24/86	5.0	620 J	--	--	--	--	--	--	--	--	78.7	--	--	--	--
M-07S-04	20.0	2222 - 47	07/24/86	4.5	820 J	--	--	--	--	--	--	--	--	81.7	--	--	--	--
M-11D-01	5	98016 - 21	07/24/86	11.0	17	0.7	0.5U	1.0U	450 J	18	29000 J	27 J	2.2	89.4	0.2U	0.01U	0.02U	0.1U
M-11D-02	10	98016 - 22	07/24/86	11.0	48	2.4	0.5U	1.0U	440 J	59	92000 J	37 J	7.3	86.8	--	--	--	--
M-11D-03	15	98016 - 23	07/24/86	12.0	28	3.9	0.5U	1.0U	100 J	47	130000 J	31 J	11.7	86.0	--	--	--	--
M-11D-03-dup	60	99378 - 11	07/24/86	--	21	2.7	0.5 J	0.5U	260	54	35000	110	12.0	80.6	--	--	--	--
M-11D-04	20	98016 - 24	07/25/86	9.5	120	73.0	0.6	1.0U	200 J	92	34000 J	260J	11.4	77.4	--	--	--	--
M-11D-05	25	98016 - 25	07/25/86	7.9	32	--	--	--	--	--	--	--	--	70.8	--	--	--	--
M-11D-06	30	99378 - 12	07/25/86	7.0	28	--	--	--	--	--	--	--	--	57.8	--	--	--	--
M-11D-07	35.0	2103 - 18	07/25/86	5.8	24 J	--	--	--	--	--	--	--	--	56.4	0.10J	0.01UJ	0.01 J	0.10J
M-11D-07	50	2222 - 28	07/25/86	6.5	13 J	--	--	--	--	--	--	--	--	72.1	--	--	--	--
M-11D-08	60	2222 - 29	07/28/86	7.9	22 J	--	--	--	--	--	--	--	--	70.4	--	--	--	--
M-11D-09	70	2222 - 30	07/28/86	7.4	17 J	--	--	--	--	--	--	--	--	75.6	--	--	--	--
M-11D-10	80	2222 - 31	07/28/86	7.2	15 J	--	--	--	--	--	--	--	--	71.4	--	--	--	--
M-11D-11	90	2222 - 32	07/28/86	7.2	17 J	--	--	--	--	--	--	--	--	73.5	--	--	--	--
M-11D-12	100	2222 - 33	07/28/86	7.8	17 J	--	--	--	--	--	--	--	--	71.4	--	--	--	--
M-12D-12	40.0	2222 - 38	12/11/86	6.6	15	--	--	--	--	--	--	--	--	62.7	--	--	--	--
M-12D-16	50.0	2222 - 39	12/12/86	6.0	14	--	--	--	--	--	--	--	--	66.9	--	--	--	--
M-12D-20	60.0	2222 - 40	12/12/86	5.8	15	--	--	--	--	--	--	--	--	67.3	--	--	--	--
M-12D-25	70.0	2222 - 41	12/15/86	6.3	15	--	--	--	--	--	--	--	--	63.6	--	--	--	--
M-12D-28	80	2222 - 2	12/15/86	6.6	10U	--	--	--	--	--	--	--	--	71.8	--	--	--	--
M-15D-01	11.5	99378 - 20	08/07/86	11.4	290	3.7	1.5 J	0.5U	1100	1000	140000	200	--	71.8	--	--	--	--
M-15D-01-dup	60	99378 - 21	08/07/86	--	--	--	--	--	--	--	--	--	--	--	0.1	0.01U	0.01U	0.1
M-15D-02	16	99378 - 22	08/07/86	12.7	2300	87.0	13.0	0.5U	24	210	6600	50	3.5	55.7	--	--	--	--
M-15D-03	17.6	99378 - 23	08/08/86	10.9	17	6.0	0.6 J	0.5U	15	47	23000	92	4.4	77.2	--	--	--	--
M-15D-04	13.5	2222 - 5	07/24/86	11.9	120	3.1	0.5U	--	410	110	44000	120	9.2	82.4	--	--	--	--
M-15D-04-dup	13.5	2222 - 2	08/07/86	6.6	10U	--	--	--	--	--	--	--	--	71.8	--	--	--	--
M-15B-05	19.0	2103 - 1	08/08/86	7.8	23	3.9	1.6 J	--	28	47	18000	64 J	7.5	78.1	0.1U	0.01U	0.02	0.1U
M-15D-06	26.0	2222 - 6	08/08/86	9.7	16	--	--	--	--	--	--	--	--	75.6	--	--	--	--
M-15D-07	30.8	2103 - 2	08/08/86	9.4	26	4.8	0.7 J	--	39	53	22000	70 J	7.7	80.0	0.1	0.01U	0.02	0.1U
M-15D-08	35.5	2103 - 4	08/08/86	3.6	10	--	--	--	--	--	--	--	--	79.8	0.1U	0.01U	0.02	0.1U
M-15B-09	41.0	2103 - 3	08/08/86	4.3	18	--	--	--	--	--	--	--	--	82.3	0.1U	0.01U	0.01	0.1U
M-15D-10	45.0	2103 - 5	08/11/86	3.6	36	--	--	--	--	--	--	--	--	79.6	0.1U	0.01U	0.02	0.1U
M-15D-11	55.0	2103 - 6	08/11/86	5.6	31	--	--	--	--	--	--	--	--	74.8	0.1U	0.01U	0.01	0.1U
M-15D-12	65.5	2222 - 7	08/11/86	8.0	12	--	--	--	--	--	--	--	--	73.7	--	--	--	--
M-15S-01	5.5	2222 - 3	07/24/86	8.0	120 J	--	--	--	--	--	--	--	--	83.0	--	--	--	--
M-15S-02	15.8	2222 - 4	07/24/86	10.6	340 J	--	--	--	--	--	--	--	--	78.2	--	--	--	--
M-16B-03	10.0	2103 - 8	12/11/86	11.1	23	4.3	1.3 J	--	19	55	19000	350 J	10.8	83.8	0.1U	0.01U	0.04	0.1U
M-16D-04	15.0	2103 - 7	12/11/86	11.4	110	--	--	--	--	--	--	--	--	75.4	0.3	0.01U	0.05	0.1U
M-16D-06	15.5	2103 - 9	12/11/86	9.5	24	5.5	1.6 J	--	20	61	22000	160 J	12.4	78.7	0.1U	0.01U	0.01	0.1U
M-16D-08	20.0	2103 - 10	12/11/86	9.8	16	--	--	--	--	--	--	--	--	78.0	0.1	0.01U	0.01	0.1U
M-16B-09	25.0	2222 - 21	12/12/86	8.2	15	--	--	--	--	--	--	--	--	76.5	--	--	--	--
M-16B-10	30	2222 - 22	12/12/86	5.7	12	--	--	--	--	--	--	--	--	61.9	--	--	--	--
M-16B-13	40	2222 - 23	12/15/86	6.3	11	--	--	--	--	--	--	--	--	56.4	--	--	--	--
M-16B-15	50	2222 - 24	12/15/86	7.4	23	--	--	--	--	--	--	--	--	72.5	--	--	--	--
M-16D-18	60	2222 - 25	12/16/86	6.9	20	--	--	--	--	--	--	--	--	70.5	--	--	--	--
M-16D-21	70	2222 - 26	12/16/86	7.7	18	--	--	--	--	--	--	--	--	71.9	--	--	--	--
M-16D-24	80	2222 - 27	12/17/86	8.0	17	--	--	--	--	--	--	--	--	74.5	--	--	--	--

U: following a number indicates concentration below detection limit. Value shown is detection limit.
dup: following a sample number indicates sample is a duplicate.
J: following a number indicates estimated concentration. See Appendix B Section 4.0 for explanation.

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ML GOULD: SURFACE SOIL SAMPLES, ANALYSIS RESULTS

D & M SAMPLE #	LABO-SAMPLE#	DATE	pH	Pb mg/kg	As mg/kg	Cd mg/kg	Cr Hex mg/kg	Cr mg/kg	Zn mg/kg	Fe mg/kg	SO4 mg/kg	CE Cap (%)	TOT SLDS %	EP Pb mg/kg	EP As mg/kg	EP Cd mg/kg	EP Cr mg/kg
SS-01	97202 - 1	06/05/86	5.0	530	--	--	--	--	--	--	--	--	93.6	--	--	--	--
SS-01-dup	97202 - 2	06/05/86	5.2	480	--	--	--	--	--	--	--	--	93.6	--	--	--	--
SS-02	97202 - 3	06/02/86	5.2	1700	--	--	--	--	--	--	--	--	93.1	--	--	--	--
SS-03	97202 - 4	06/03/86	8.0	3300	19.0	3.4	0.5U	15	10000	27000	43	6.8	94.0	--	--	--	--
SS-04	97202 - 5	06/03/86	8.0	7900	--	--	--	--	--	--	--	--	94.1	--	--	--	--
SS-05	97202 - 6	06/03/86	7.3	10000	--	--	--	--	--	--	--	--	88.0	--	--	--	--
SS-06	97202 - 7	06/03/86	6.6	1500	--	--	--	--	--	--	--	--	93.5	0.2 J	0.01U	0.01	0.1U
SS-07	97202 - 8	06/03/86	6.6	1100	--	--	--	--	--	--	--	--	93.1	--	--	--	--
SS-09	97202 - 9	06/05/86	7.2	20000	63.0	12.0	0.5U	16	320	34000	500	6.5	93.0	30.0 J	0.01U	0.10	0.1U
SS-09-dup1	97202 - 14	06/05/86	--	--	--	--	--	--	--	--	--	--	--	23.0 J	0.01U	0.08	0.1U
SS-09-dup2	97202 - 15	06/05/86	--	19000	52.0	11.0	0.5U	16	320	34000	550	6.1	93.0	--	--	--	--
SS-10R	97915 - 18	07/18/86	8.2	130	--	--	--	--	--	--	--	--	77.1	--	--	--	--
SS-11R	97915 - 19	07/18/86	8.5	27	--	--	--	--	--	--	--	--	92.9	--	--	--	--
SS-12	97202 - 10	06/04/86	4.7	1500	15.0	0.6	0.5U	15	89	24000	110	4.3	92.4	--	--	--	--
SS-13	97202 - 11	06/05/86	5.7	1400	--	--	--	--	--	--	--	--	92.4	0.3 J	0.01U	0.01U	0.1U
SS-13-dup	97202 - 12	06/05/86	--	--	--	--	--	--	--	--	--	--	--	0.2U	0.01U	0.01U	0.1U
SS-14	97202 - 13	06/04/86	5.9	120	--	--	--	--	--	--	--	--	91.2	--	--	--	--
SS-15	2103 - 13	01/06/87	8.4	230	7.8	2.5 J	--	390	780	34000	34 J	7.7	85.6	--	--	--	--
SS-16	2103 - 14	01/06/87	8.4	120	16.0	1.8 J	--	170	160	37000	21 J	14.0	86.7	--	--	--	--
SS-17	2103 - 15	01/05/87	8.6	95	--	--	--	--	--	--	--	--	88.2	--	--	--	--
SS-17-dup	2103 - 20	01/05/87	8.6	100	--	--	--	--	--	--	--	--	87.6	--	--	--	--
SS-18	2103 - 16	01/05/87	8.4	110	--	--	--	--	--	--	--	--	85.3	--	--	--	--
SS-19	2103 - 17	01/05/87	7.9	140	6.5	1.5 J	--	120	140	39000	20 J	16.3	87.5	--	--	--	--
SS-20	99378 - 1	06/10/86	7.4	260	--	--	--	--	--	--	--	--	92.5	--	--	--	--
SS-21	99378 - 2	06/10/86	7.5	160	47.0	0.8 J	0.5U	18	130	33000	14	13.0	91.6	--	--	--	--
SS-22	2103 - 19	01/09/87	6.8	66	--	--	--	--	--	--	--	--	80.8	--	--	--	--
SS-23	99378 - 3	06/11/86	7.6	640	7.4	1.0 J	0.5U	16	170	29000	250	10.6	92.0	--	--	--	--
SS-24	97915 - 29	07/17/86	8.2	750	--	--	--	--	--	--	--	--	92.1	--	--	--	--
SS-25	97915 - 17	07/18/86	7.6	520	--	--	--	--	--	--	--	--	87.5	--	--	--	--
SS-26	97915 - 28	07/17/86	8.7	1200	7.1	0.5	0.5U	15	180	32000	410	9.2	92.4	--	--	--	--
SS-27	99378 - 4	06/11/86	7.4	590	5.5	1.2 J	0.5U	10	300	12000	9600	7.2	90.0	--	--	--	--
SS-27-dup	99378 - 9	06/11/86	--	990	2.6	1.7 J	0.5U	11	430	14000	9700	7.2	90.4	--	--	--	--
SS-28	97915 - 27	07/17/86	9.2	17000	--	--	--	--	--	--	--	--	91.7	47.0	0.01U	0.02U	0.1U
SS-29	99378 - 5	06/11/86	7.9	7800	--	--	--	--	--	--	--	--	93.3	--	--	--	--
SS-30	99378 - 6	06/11/86	8.0	220	--	--	--	--	--	--	--	--	91.2	--	--	--	--
SS-30-dup	99378 - 10	06/11/86	8.1	250	--	--	--	--	--	--	--	--	91.4	--	--	--	--
SS-31	97915 - 1	07/15/86	8.4	68	--	--	--	--	--	--	--	--	92.1	--	--	--	--
SS-32	97915 - 2	07/15/86	8.2	23	3.8	0.5U	0.5U	170	55	31000	36	11.2	92.0	--	--	--	--
SS-33	97915 - 3	07/15/86	8.3	22	--	--	--	--	--	--	--	--	92.2	--	--	--	--
SS-34	97915 - 4	07/15/86	8.2	17	--	--	--	--	--	--	--	--	91.0	--	--	--	--
SS-35	97915 - 5	07/15/86	7.4	15	4.8	0.5U	0.5U	18	51	24000	120	13.8	82.6	--	--	--	--
SS-36	99378 - 7	07/07/86	7.8	18	--	--	--	--	--	--	--	--	89.4	--	--	--	--
SS-37	97915 - 10	07/16/86	8.0	16	--	--	--	--	--	--	--	--	89.7	--	--	--	--
SS-38	97915 - 9	07/16/86	8.6	19	--	--	--	--	--	--	--	--	89.3	--	--	--	--
SS-39	97915 - 8	07/16/86	7.6	19	--	--	--	--	--	--	--	--	87.8	--	--	--	--
SS-40	97915 - 6	07/15/86	6.9	18	--	--	--	--	--	--	--	--	90.4	--	--	--	--
SS-41	99378 - 8	07/07/86	7.9	19	--	--	--	--	--	--	--	--	91.5	0.1U	0.01U	0.01U	0.1U
SS-42	97915 - 12	07/16/86	9.2	21	--	--	--	--	--	--	--	--	86.4	--	--	--	--
SS-42-dup	97915 - 13	07/16/86	9.3	16	--	--	--	--	--	--	--	--	91.2	--	--	--	--

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NL GOULD: SURFACE SOIL SAMPLES, ANALYSIS RESULTS

B & N SAMPLE #	LAB#-SAMPLE#	DATE	pH	Pb mg/kg	As mg/kg	Cd mg/kg	Cr Hex mg/kg	Cr mg/kg	Zn mg/kg	Fe mg/kg	SO4 mg/kg	CE Cap (%)	TOT SLDS %	EP Pb mg/kg	EP As mg/kg	EP Cd mg/kg	EP Cr mg/kg
SS-43	97915 - 14	07/16/86	8.3	14	--	--	--	--	--	--	--	--	89.9	--	--	--	--
SS-44	97915 - 15	07/16/86	8.6	18	--	--	--	--	--	--	--	--	83.3	--	--	--	--
SS-45	97915 - 16	07/16/86	8.4	20	--	--	--	--	--	--	--	--	91.6	--	--	--	--
BACKGROUND SAMPLES																	
SS-56	97915 - 21	07/14/86	7.1	85	--	--	--	--	--	--	--	--	77.4	--	--	--	--
SS-57	97915 - 23	07/14/86	6.3	45	--	--	--	--	--	--	--	--	81.6	--	--	--	--
SS-58	97915 - 24	07/14/86	7.0	44	--	--	--	--	--	--	--	--	79.1	--	--	--	--
SS-59	97915 - 25	07/14/86	5.9	34	--	--	--	--	--	--	--	--	78.3	--	--	--	--
SS-60	97915 - 26	07/14/86	5.6	15	--	--	--	--	--	--	--	--	85.0	--	--	--	--

U: following a number indicates concentration below detection limit. Value shown is detection limit.
dup: following a sample number indicates sample is a duplicate.
J: following a number indicates estimated concentration. See Appendix B Section 4.0 for explanation.

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Appendix D

APPENDIX D

HYDROGEOLOGIC INVESTIGATION DATA

Appendix D1

APPENDIX D1

BORING LOGS AND WELL COMPLETION DIAGRAMS

INTRODUCTION

APPENDIX D1, BORING LOGS AND WELL COMPLETION DIAGRAMS

Table D1-1 presents a tabulation of well construction data, such as well numbers, locations, elevations of various features, diameters, total depths, and horizontal permeabilities as determined by field testing. This appendix also includes logs of all borings utilized in the present study (Figures D1-2 through D1-41). Borings that were developed as wells by installing piezometers or well casing and screen show the well-construction details along with the log of borings. Soil types shown on the logs of borings are classified in accordance with the Unified Soil Classification System, which is included as Figure D1-1.

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TABLE D1-1

LOCATION AND CONSTRUCTION OF WELLS, BORINGS AND TEST PITS

WELL AND AQUIFER DESIGNATION (1)		EAST COORD	NORTH COORD	ELEV GROUND SURFACE	ELEV TOP STEEL	ELEV TOP PVC	Screen Top (ft)	Screen Bottom (ft)	Sand Pack Top (ft)	Sand Pack Bottom (ft)	PVC Dia. (in.)	Total Depth (ft)		HORIZONTAL PERMEABILITY (cm/sec) (2)
clusters														
P-1	S	10265.18	8677.83	36.1	36.11	37.17	9.00	21.00	7.00	21.50	4.00	21.50		1.5E-03
W-1D	D	10271.18	8687.22	36.0	38.17	38.06	40.00	50.00	35.00	51.50	4.00	31.50		1.2E-04
P-2	S	10340.72	9100.16	33.6	35.85	35.82	13.00	18.00	7.00	19.00	4.00	19.00	>	7.0E-02
W-2D	D	10347.44	9108.79	34.4	35.79	35.34	50.00	60.00	45.00	60.50	4.00	60.50		7.3E-06
P-3	S	10438.84	9480.69	32.2	34.50	34.47	9.00	17.00	6.00	18.00	4.00	18.00		6.9E-04
W-3D	I	10432.20	9471.16	31.5	33.79	33.19	30.50	40.50	25.00	41.50	4.00	41.50		5.3E-05
W-3D2	D	10441.90	9472.39	31.5		32.58	79.00	89.00	75.00	89.50	4.00	94.40		7.1E-04
P-4	S	10674.00	9200.87	30.8	32.76	32.71	8.00	16.00	6.00	17.00	4.00	17.00		1.2E-04
W-4D	I	10662.49	9200.45	30.7	32.77	32.68	39.00	49.00	35.00	50.00	4.00	50.00		4.0E-06
W-6S	I	9779.08	8731.85	37.7	39.70	39.55	12.25	27.25	8.00	28.00	2.00	28.00		3.7E-04
W-6D	D	9774.10	8723.30	39.1	39.39	39.19	39.00	49.00	34.00	51.50	3.81	51.50		5.0E-04
W-6B	B	9768.95	8732.10	37.8	40.44	39.96	57.90	67.90	55.80	67.90	4.00	67.90		3.2E-03
W-7S	S	10086.90	9141.58	36.0	38.20	38.11	10.00	15.00	5.90	16.00	2.00	22.00	>	2.0E-02
W-7D	I	10098.16	9143.51	36.4	38.41	37.71	44.00	54.00	40.00	55.00	4.00	65.50		1.8E-04
W-11S	S	9968.24	9957.56	39.0	41.40	41.00	11.50	21.50	8.00	23.50	2.00	46.50		2.3E-04
W-11I	I	9967.48	9967.51	38.7	40.48	40.32	50.00	60.00	43.00	60.00	2.00	60.00		4.2E-04
W-11D	D	9967.48	9967.51	38.7	40.48	40.40	81.30	91.30	71.00	97.00	3.00	104.00		3.5E-04
W-11B	B	9964.60	9977.10	38.9	41.59	41.35	111.90	121.90	104.00	121.90	4.00	121.90		3.7E-04
W-12S	S	10083.5	9544.3	39.4	41.81	41.44	15.00	20.00	12.00	20.00	2.00	21.50		3.5E-04
W-12I	I	10089.8	9552.6	39.4	42.11	41.67	49.00	58.50	46.50	61.00	2.00	61.00		2.1E-06
W-12D	D	10089.8	9552.6	39.4	42.11	41.66	90.00	100.00	88.00	101.00	4.00	104.50		1.3E-04
W-15S	S	10675.26	8664.52	41.2	43.45	43.01	9.80	14.80	8.50	15.00	2.00	26.50		7.0E-03
W-15I	I	10683.33	8656.59	40.8	43.77	43.48	28.80	38.80	27.00	40.00	2.00	40.00		4.9E-04
W-15D	D	10683.33	8656.59	40.8	43.77	43.48	52.00	62.00	50.00	64.00	4.00	70.00		1.5E-04
W-16S	S	10995.7	8868.7	33.1	35.72	35.56	8.00	13.00	7.00	16.50	2.00	16.50		1.5E-03
W-16I	I	11001.7	8863.3	33.1	36.17	35.91	40.00	50.00	38.00	53.50	2.00	53.50		1.4E-05
W-16D	D	11001.7	8863.3	33.1	36.17	35.96	75.50	85.50	73.00	88.00	4.00	90.30		2.1E-04
singles														
RPW-1D	D	10383.21	7699.49	46.8	48.77	48.65	38.00	48.00	33.50	50.00	4.00	50.00		3.2E-03
RPW-2D	D	10494.85	7787.18	45.4	47.96	46.94	28.00	38.00	24.00	40.00	4.00	40.00		3.3E-04
RPW-3D	D	10623.16	7923.11	42.4	44.50	43.85	43.00	53.00	38.00	54.00	4.00	54.00		3.9E-03
RPW-4D	D	10108.33	8435.04	46.4	48.20	46.35	28.50	38.50	23.00	40.00	4.00	40.00		8.9E-04
RPW-5D	D	9790.39	8383.47	47.8	49.80	45.98	30.75	40.75	24.50	42.00	4.00	42.00		1.4E-03
PP-6	S	9935.55	9004.87	36.6	38.58	37.99	15.00	20.00	8.00	22.00	2.00	22.00	>	2.0E-02
PP-8	I	9603.24	9017.91	36.2	38.15	37.45	20.00	25.00	15.00	26.00	1.88	26.00		2.8E-05
W-8D	D	9583.03	9314.94	35.2	37.20	35.96	44.00	54.00	38.00	55.50	4.00	55.50		1.9E-03
W-9D	I	9625.28	9658.29	33.8	35.91	35.03	28.00	38.00	22.50	39.00	3.81	39.00		5.9E-06
W-10D	I	9918.90	10368.15	30.1	32.06	30.25	60.50	70.50	55.00	71.50	4.00	79.00		1.6E-03
PP-11	I	10187.65	9931.21	34.2	36.46	36.28	33.00	38.00	28.00	40.00	2.00	40.00		5.4E-05
STAFF GAUGE EAST		10395.00	9450			26.68								
STAFF GAUGE WEST		9525.00	9730			23.93								
B-5		10652.66	9196.82	30.70								26.50		
B-6		10538.03	9353.72	30.80								31.50		

SEE NOTES AT END OF TABLE

SCOEPA00015713

TABLE D1-1

LOCATION AND CONSTRUCTION
OF WELLS, BORINGS AND TEST PITS

WELL AND AQUIFER DESIGNATION (1)	EAST COORD	NORTH COORD	ELEV GROUND SURFACE	ELEV TOP STEEL	ELEV TOP PVC	Screen Top [ft]	Screen Bottom [ft]	Sand Pack Top [ft]	Sand Pack Bottom [ft]	PVC Dia. [in.]	Total Depth [ft]	HORIZONTAL PERMEABILITY (cm/sec) (2)
B-8	10116.57	9552.45	39.20								36.50	
B-10	10109.82	9256.21	38.30								36.50	
TP-1	10145.00	9162.00	36.50								11.25	
TP-2	9925.00	9384.00	35.70								12.00	
TP-3	9840.00	9005.00	36.60								13.00	
TP-4	9975.00	8934.00	36.60								13.00	
TP-5	9833.00	9255.00	35.40								12.00	
TP-6	9823.00	8865.00	36.60								8.50	
TP-7	9780.00	9360.00	35.20								12.50	
TP-8	9942.00	9230.00	36.00								11.00	
TP-9	9887.00	9100.00	36.00								11.00	
TP-10	8586.00	8954.00	36.60								10.00	

NOTES: 1) AQUIFER DESIGNATIONS - S = FILL; I = SHALLOW ALLUVIUM;
D = DEEP ALLUVIUM, AND B = BASALT
2) PERMEABILITY EXPRESSED IN EXPONENTIAL FORMAT
IE, 1E-03 IS 1 X 10 -3 CM/SEC
3) ELEVATIONS REFERENCED TO CITY OF PORTLAND DATUM

SCOEPA00015714

MAJOR DIVISIONS			GRAPHIC SYMBOL	LETTER SYMBOL	TYPICAL DESCRIPTIONS
COARSE GRAINED SOILS — MORE THAN 50% OF MATERIAL IS LARGER THAN NO. 200 SIEVE SIZE	GRAVEL AND GRAVELLY SOILS — MORE THAN 50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE	CLEAN GRAVELS (LITTLE OR NO FINES)		GW	WELL-GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES
				GP	POORLY-GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES
		GRAVELS WITH FINES (APPRECIABLE AMOUNT OF FINES)		GM	SILTY GRAVELS, GRAVEL-SAND-SILT MIXTURES
				GC	CLAYEY GRAVELS, GRAVEL-SAND-CLAY MIXTURES
	SAND AND SANDY SOILS — MORE THAN 50% OF COARSE FRACTION PASSING NO. 4 SIEVE	CLEAN SAND (LITTLE OR NO FINES)		SW	WELL-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
				SP	POORLY-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
		SANDS WITH FINES (APPRECIABLE AMOUNT OF FINES)		SM	SILTY SANDS, SAND-SILT MIXTURES
				SC	CLAYEY SANDS, SAND-CLAY MIXTURES
FINE GRAINED SOILS — MORE THAN 50% OF MATERIAL IS SMALLER THAN NO. 200 SIEVE SIZE	SILTS AND CLAYS	LIQUID LIMIT LESS THAN 50		ML	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY
				CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
				OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
	SILTS AND CLAYS	LIQUID LIMIT GREATER THAN 50		MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SAND OR SILTY SOILS
				CH	INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS
				OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
HIGHLY ORGANIC SOILS				PT	PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS

NOTE: DUAL SYMBOLS ARE USED TO INDICATE BORDERLINE SOIL CLASSIFICATIONS

NL IND, INC./GOULD, INC.
REMEDIAL INVESTIGATION

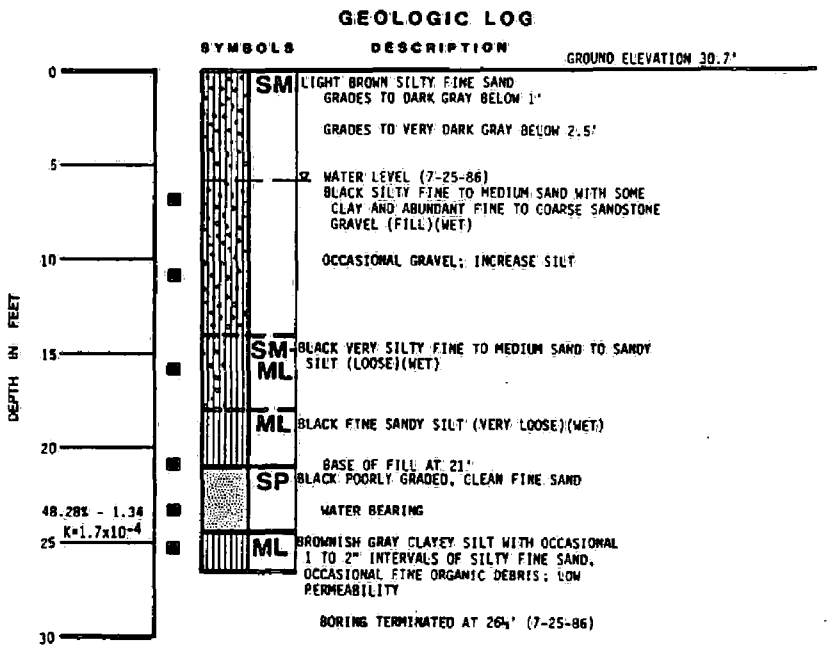
UNIFIED SOIL CLASSIFICATION SYSTEM

FIG. D1-1 DAMES & MOORE

11831-034

SCOEPA00015715

BORING B-5



NOTE: DISCUSSION IN THE TEXT OF THIS REPORT IS NECESSARY FOR A PROPER UNDERSTANDING OF SUB-SURFACE CONDITIONS REVEALED BY THE BORINGS.

LOG OF BORING B-5

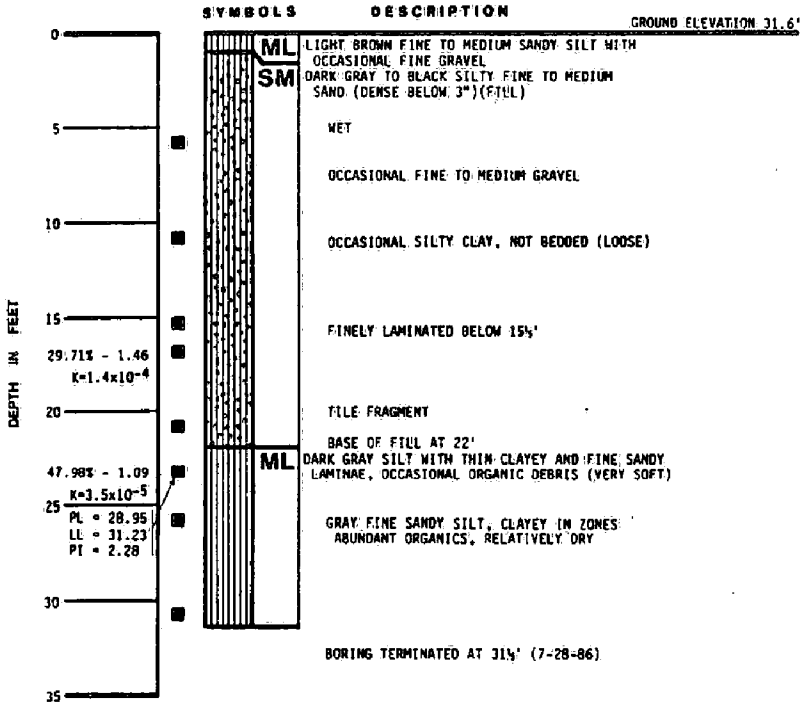
Dames & Moore

FIGURE D1-2

SCOEPA00015716

BORING B-6

GEOLOGIC LOG



NOTE: DISCUSSION IN THE TEXT OF THIS REPORT IS NECESSARY FOR A PROPER UNDERSTANDING OF SUB-SURFACE CONDITIONS REVEALED BY THE BORINGS.

LOG OF BORING B-6

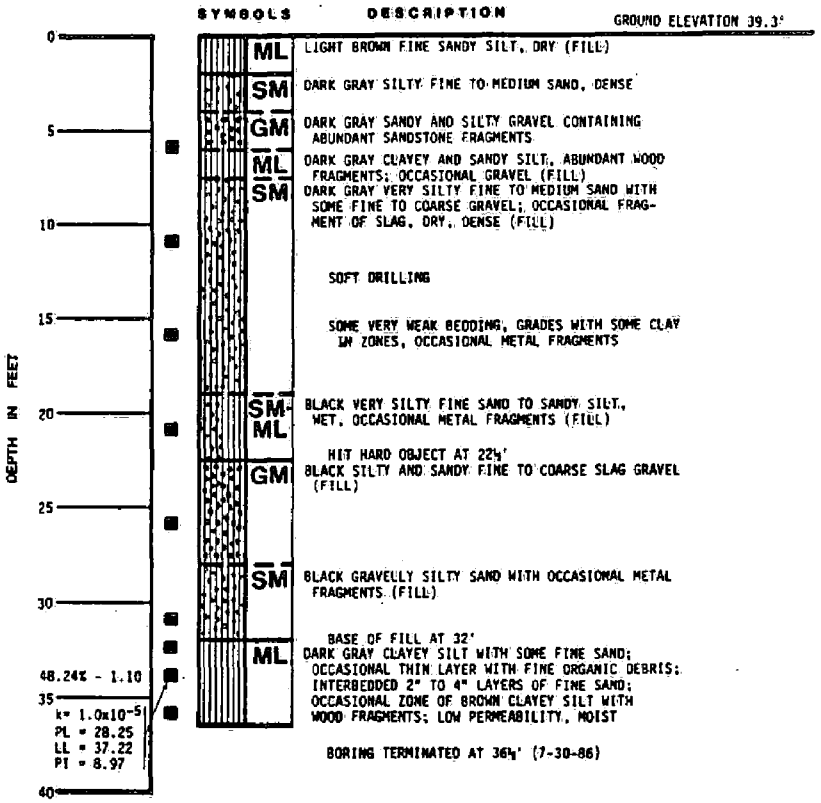
Dames & Moore

FIGURE D1-3

SCOEPA00015717

BORING B-8

GEOLOGIC LOG



NOTE: DISCUSSION IN THE TEXT OF THIS REPORT IS NECESSARY FOR A PROPER UNDERSTANDING OF SUBSURFACE CONDITIONS REVEALED BY THE BORINGS.

LOG OF BORING B-8

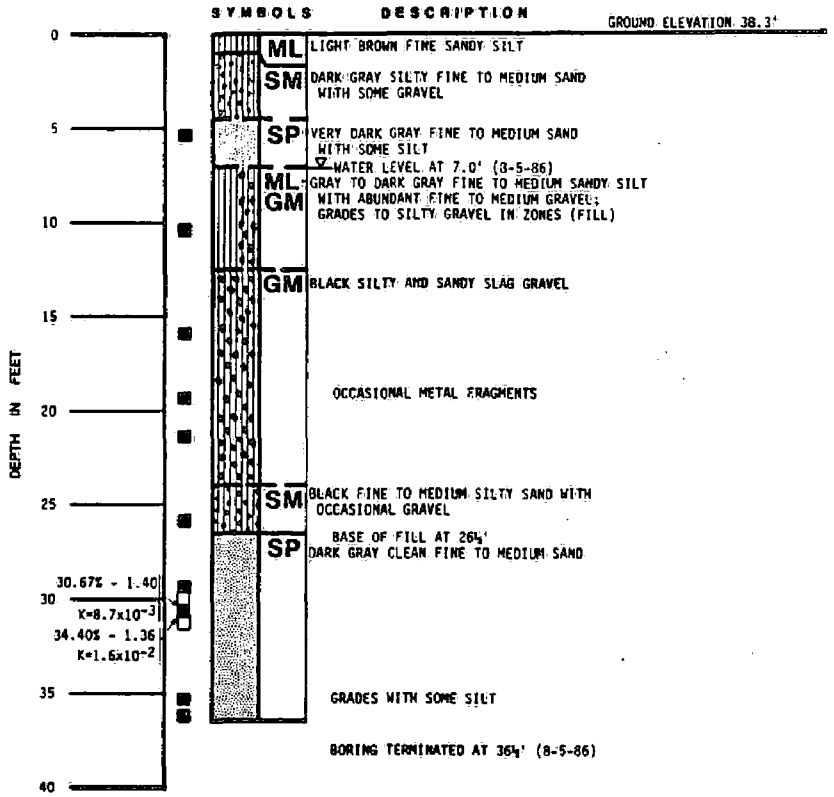
Dames & Moore

FIGURE D1-4

SCOEPA00015718

BORING B-10

GEOLOGIC LOG



NOTE: DISCUSSION IN THE TEXT OF THIS REPORT IS NECESSARY FOR A PROPER UNDERSTANDING OF SUB-SURFACE CONDITIONS REVEALED BY THE BORINGS.

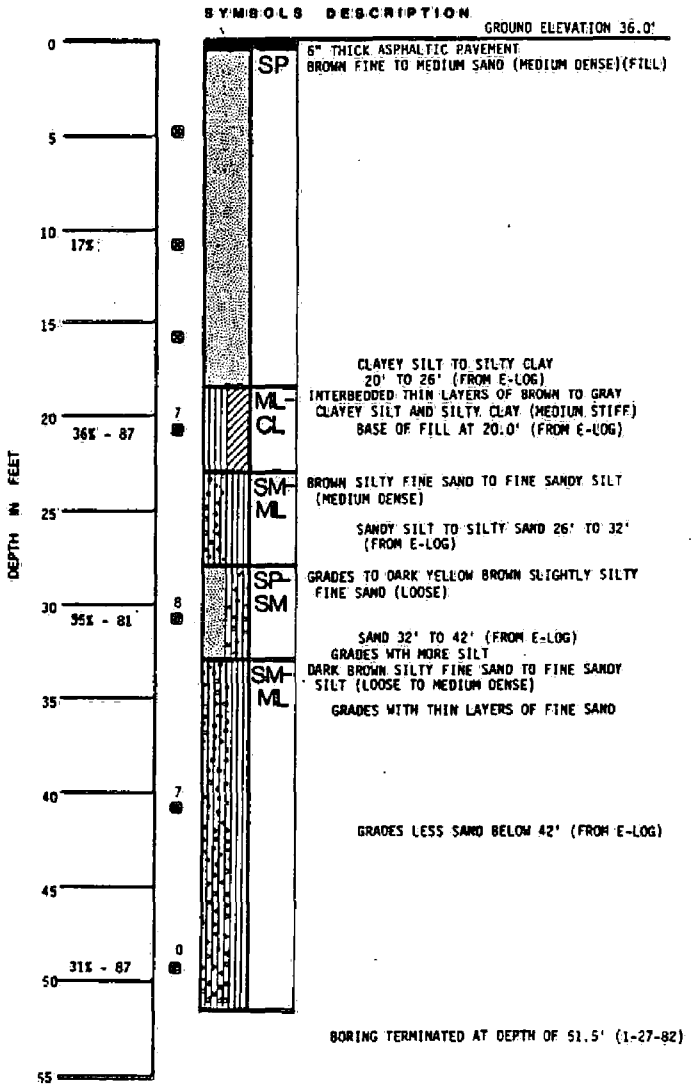
LOG OF BORING B-10

Dames & Moore

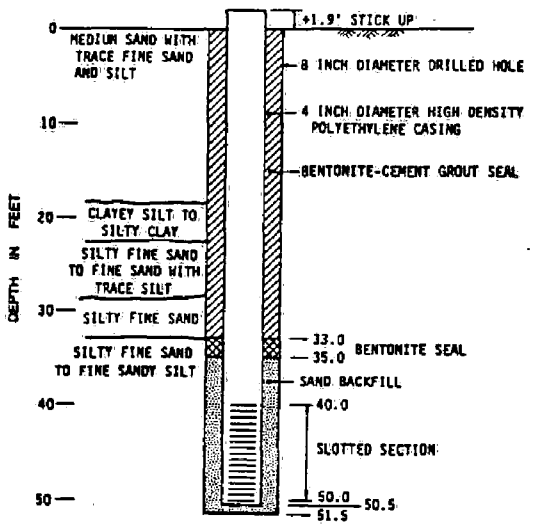
FIGURE D1-5

SCOEPA00015719

BORING W-1-D



WELL W-1-D



LOG OF BORING
AND
WELL COMPLETION DIAGRAM
W-1-D

NOTE:

DISCUSSION IN THE TEXT OF THIS REPORT IS NECESSARY FOR A PROPER UNDERSTANDING OF SUBSURFACE CONDITIONS REVEALED BY THE BORINGS.

DAMES & MOORE

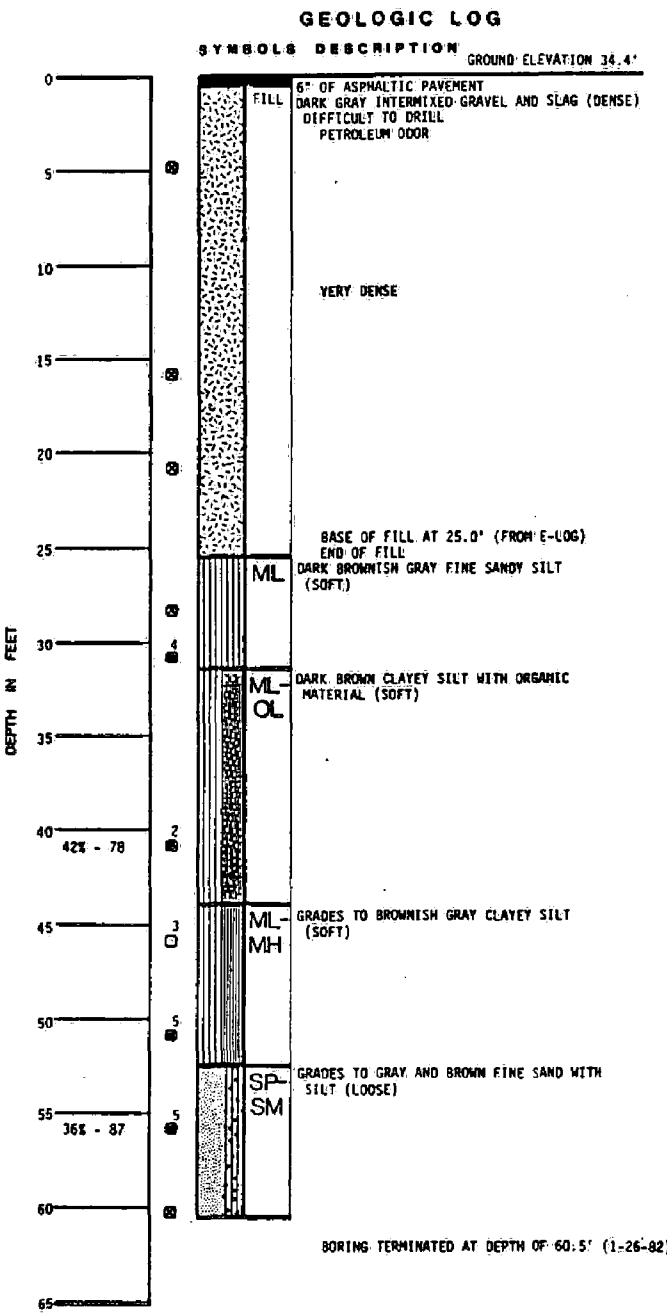
FIGURE D1-6

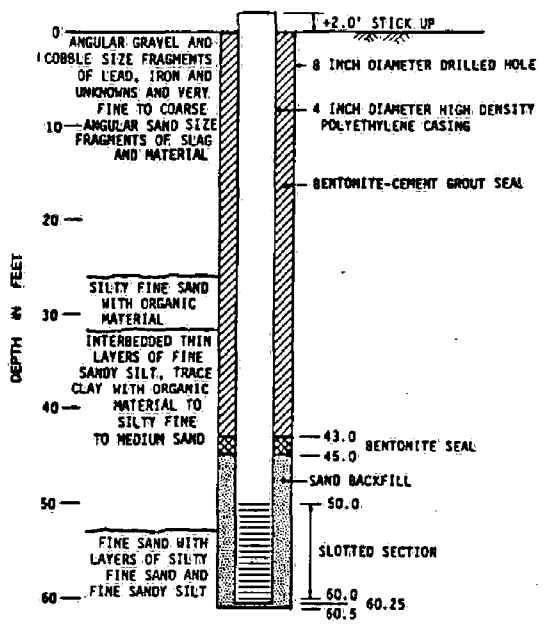
11831-006-04
BY AM DATE 02-18-82
CHECKED BY OTK DATE 3-22-82

SCOEPA00015720

BORING W-2-D

WELL W-2-D





LOG OF BORING
AND
WELL COMPLETION DIAGRAM
W-2-D

NOTE:

DISCUSSION IN THE TEXT OF THIS REPORT IS NECESSARY FOR A PROPER UNDERSTANDING OF SUBSURFACE CONDITIONS REVEALED BY THE BORINGS.

DAMES & MOORE

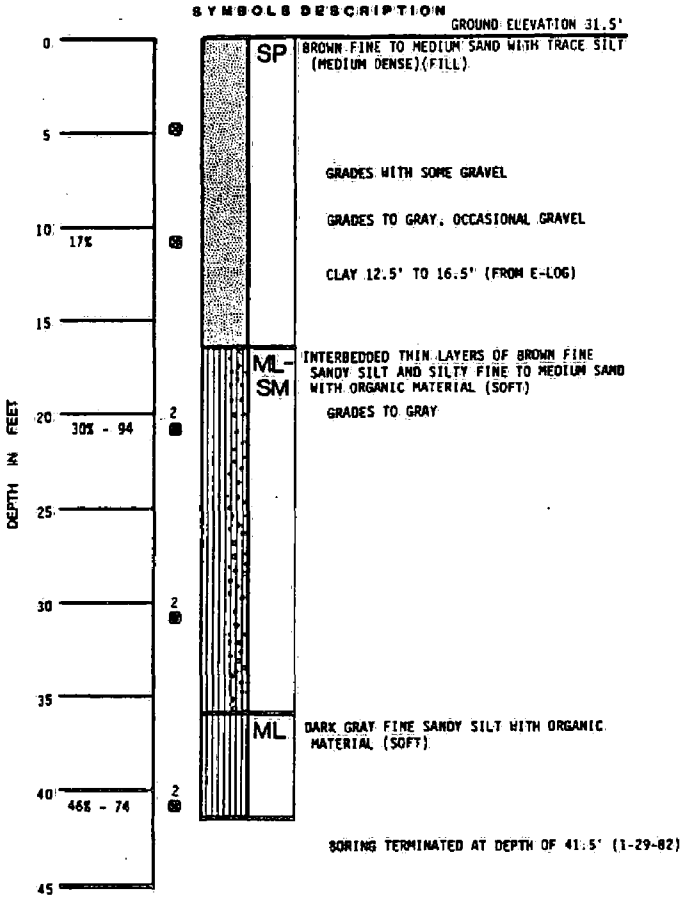
FIGURE D1-7

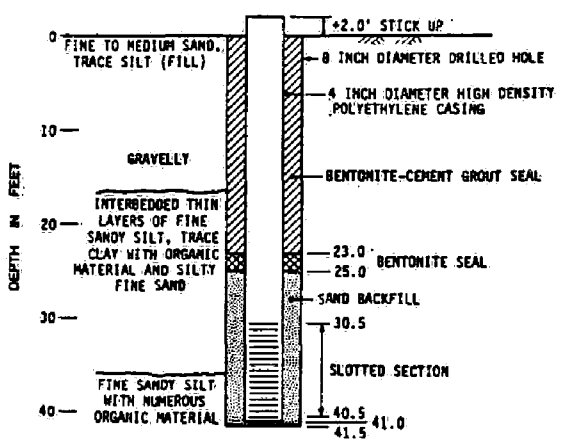
SCOEPA00015721

BORING W-3-D

WELL W-3-D

GEOLOGIC LOG





LOG OF BORING
AND
WELL COMPLETION DIAGRAM
W-3-D

NOTE:

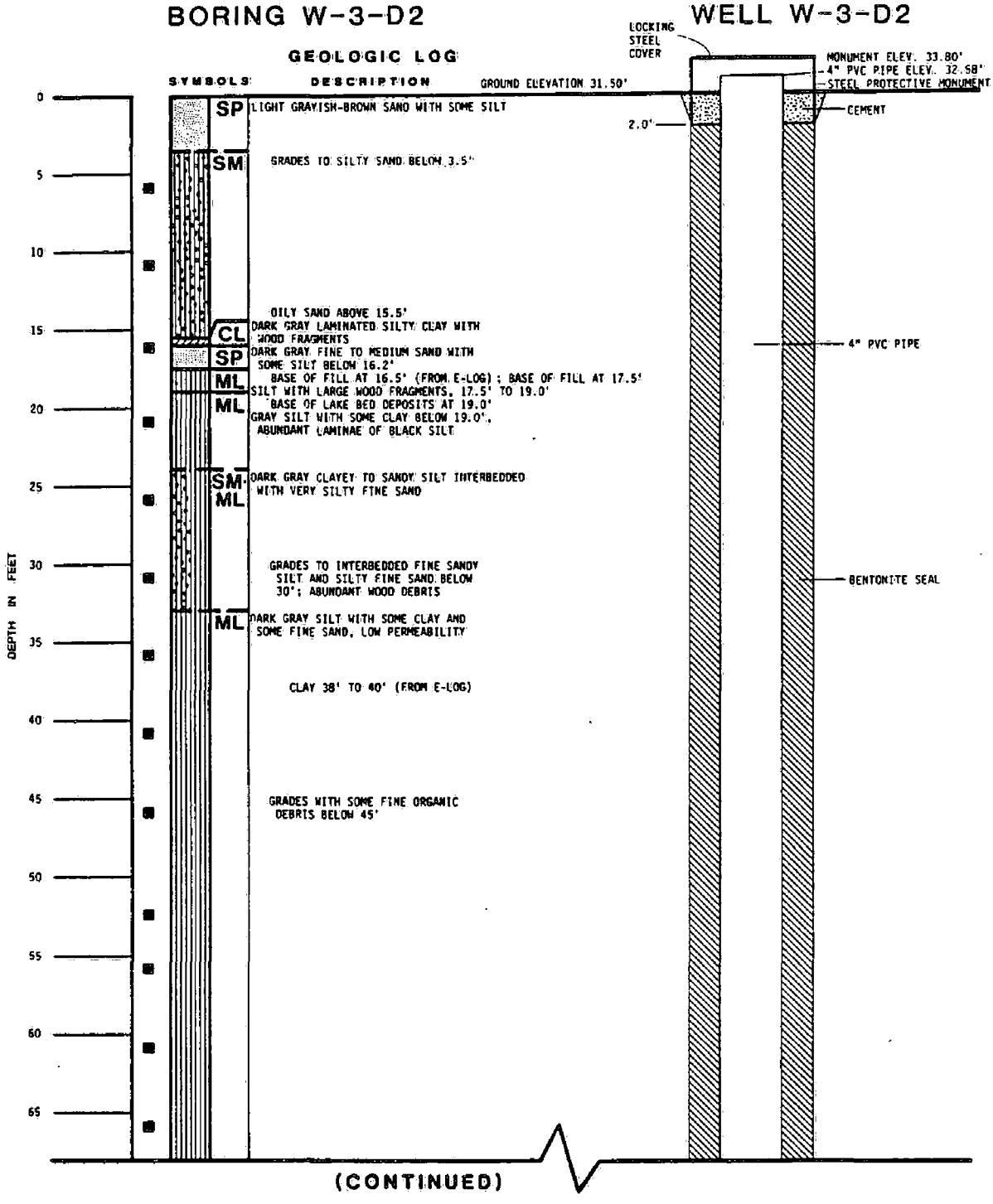
DISCUSSION IN THE TEXT OF THIS REPORT IS NECESSARY FOR A PROPER UNDERSTANDING OF SUBSURFACE CONDITIONS REVEALED BY THE BORINGS.

DAMES & MOORE

FIGURE D1-8

11431-006-04
BY ADV DATE 02-16-82
CHECKED BY DSM DATE 3-11-82

SCOEPA00015722



LOG OF BORING
AND
WELL COMPLETION DIAGRAM
W-3-D2

NOTE:

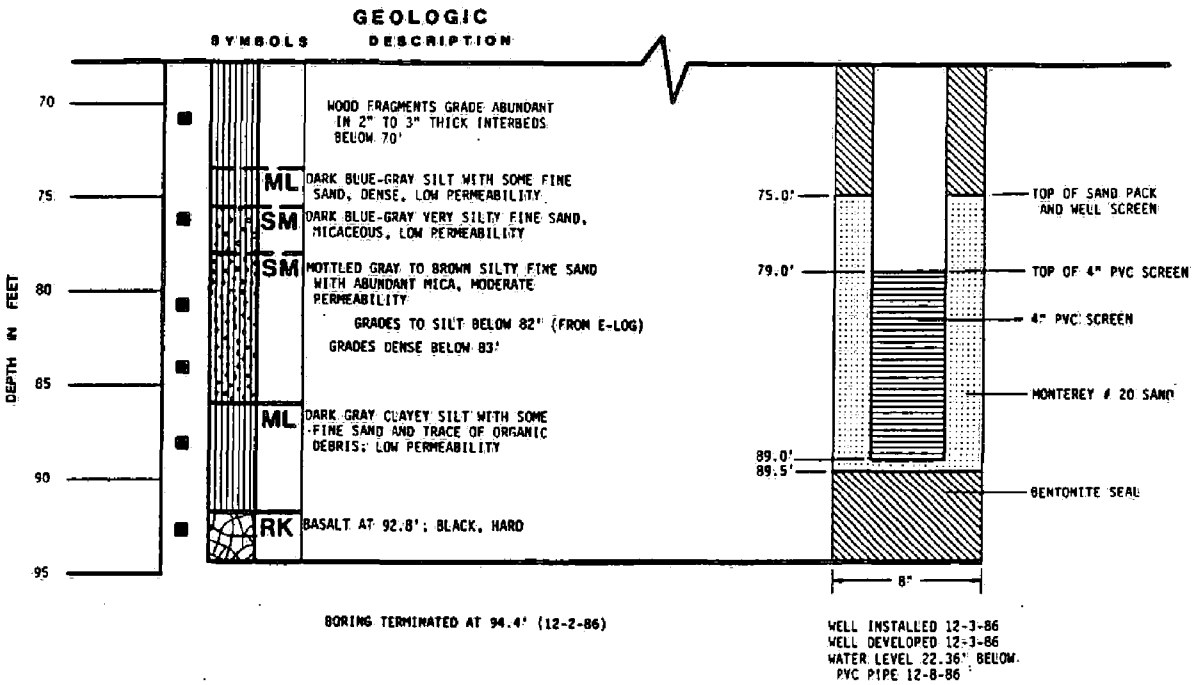
DISCUSSION IN THE TEXT OF THIS REPORT IS NECESSARY FOR A PROPER UNDERSTANDING OF SUBSURFACE CONDITIONS REVEALED BY THE BORINGS.

Dames & Moore

FIGURE D1-9

SCOEPA00015723

BORING W-3-D2(CONTINUED) WELL W-3-D2



LOG OF BORING
AND
WELL COMPLETION DIAGRAM
W-3-D2

Dames & Moore

NOTE:

DISCUSSION IN THE TEXT OF THIS REPORT IS NECESSARY FOR A PROPER UNDERSTANDING OF SUBSURFACE CONDITIONS REVEALED BY THE BORINGS.

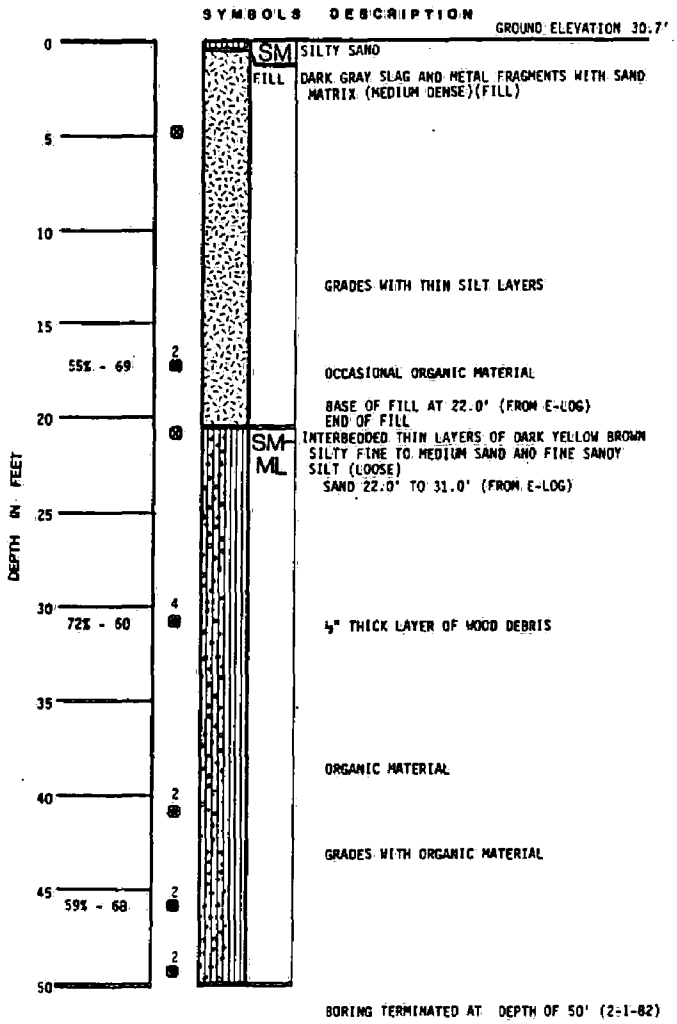
FIGURE D1-10

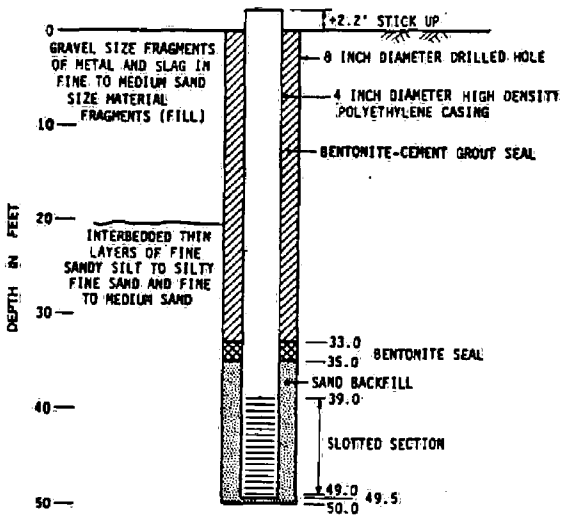
SCOEPA00015724

BORING W-4-D

WELL W-4-D

GEOLOGIC LOG





LOG OF BORING
AND
WELL COMPLETION DIAGRAM
W-4-D

NOTE:

DISCUSSION IN THE TEXT OF THIS REPORT IS NECESSARY FOR A PROPER UNDERSTANDING OF SUBSURFACE CONDITIONS REVEALED BY THE BORINGS.

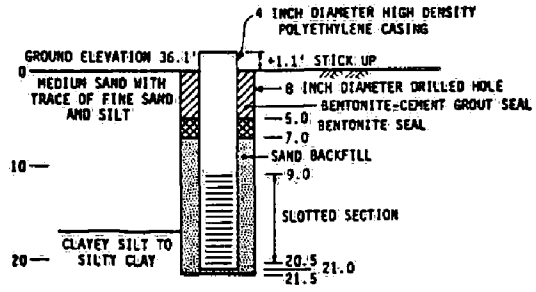
DAMES & MOORE

FIGURE D1-11

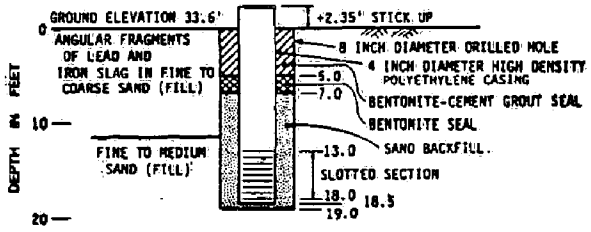
FILE 11831-006-04 BY AA DATE 05-18-82 CHECKED BY DTK DATE 5-21-82

SCOEPA00015725

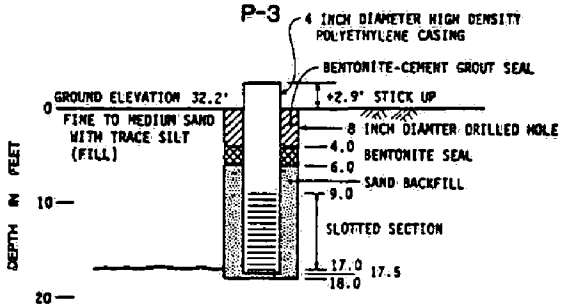
P-1



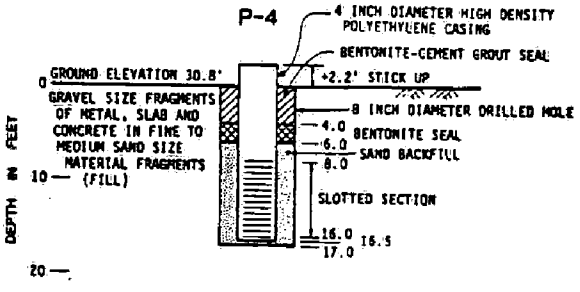
P-2



P-3



P-4



WELL COMPLETION DIAGRAM

P-1, P-2, P-3 , AND P-4

DAMES & MOORE

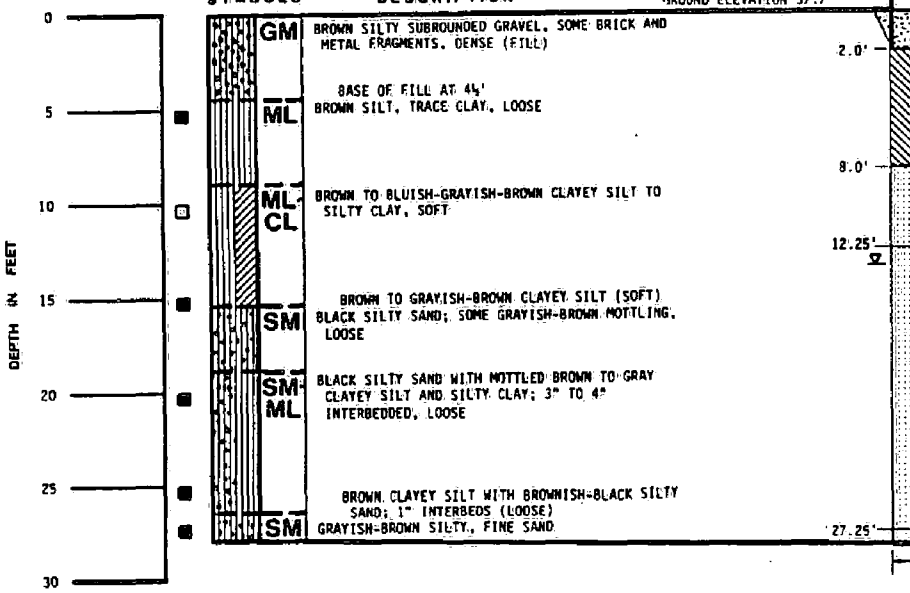
FIGURE D1-12

11831-006-04
BY AH DATE 03-16-84
CHECKED BY DTH DATE 3-21-84

SCOEPA00015726

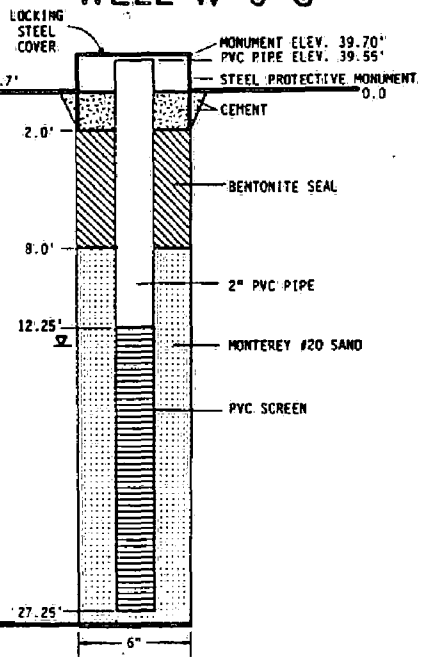
BORING W-6-S

GEOLOGIC LOG



BORING TERMINATED AT 28' (7-23-86)

WELL W-6-S



WELL INSTALLED 7-23-86
WELL DEVELOPED 9-27,28 & 29-86
WATER LEVEL 15.12' BELOW PVC PIPE 9-23-86

LOG OF BORING
AND
WELL COMPLETION DIAGRAM
W-6-S

NOTE:

DISCUSSION IN THE TEXT OF THIS REPORT IS NECESSARY FOR A PROPER UNDERSTANDING OF SUBSURFACE CONDITIONS REVEALED BY THE BORINGS.

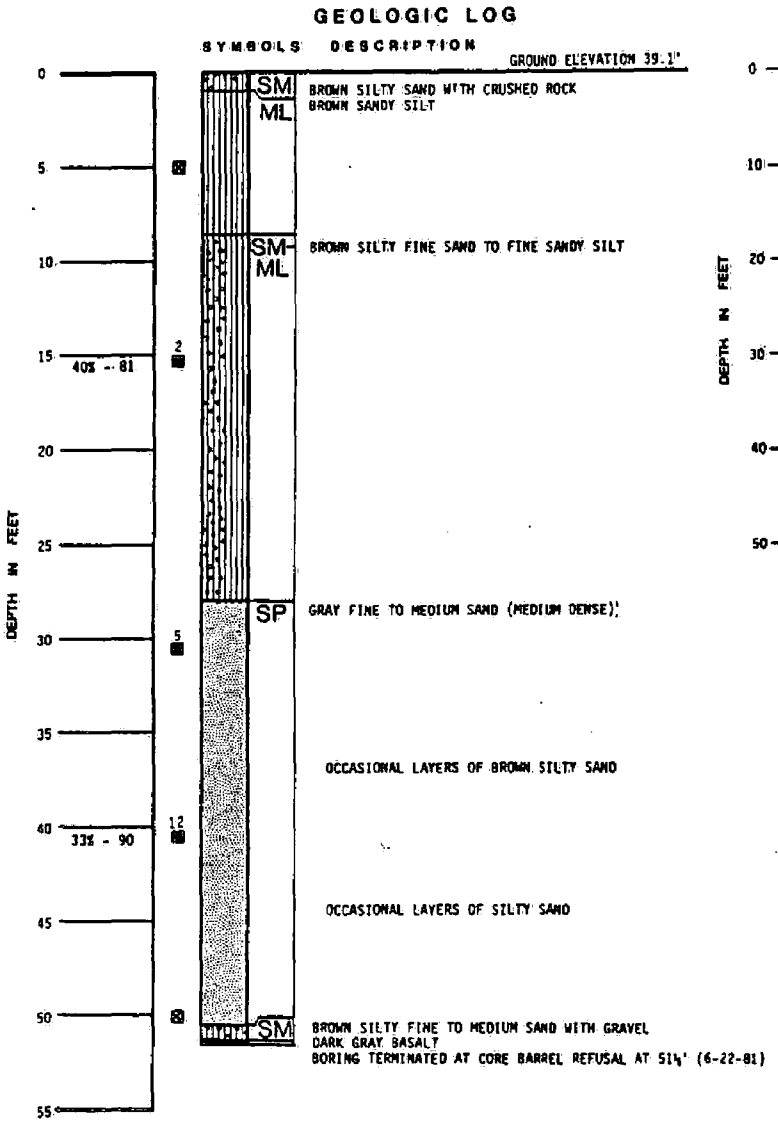
Dames & Moore

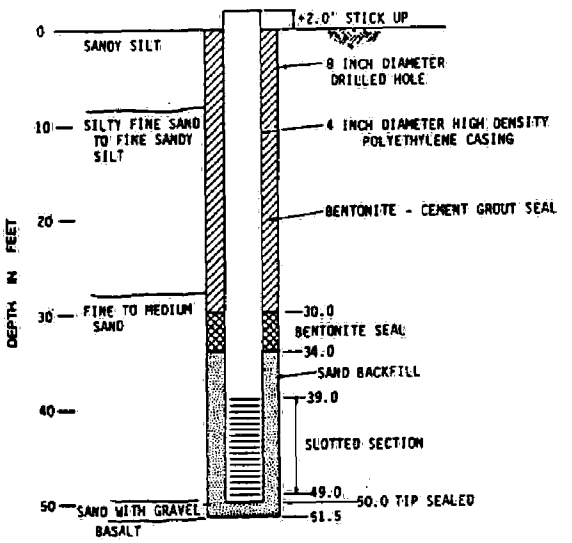
FIGURE D1-13

SCOEPA00015727

BORING W-6-D

WELL W-6-D





LOG OF BORING
AND
WELL COMPLETION DIAGRAM
W-6-D

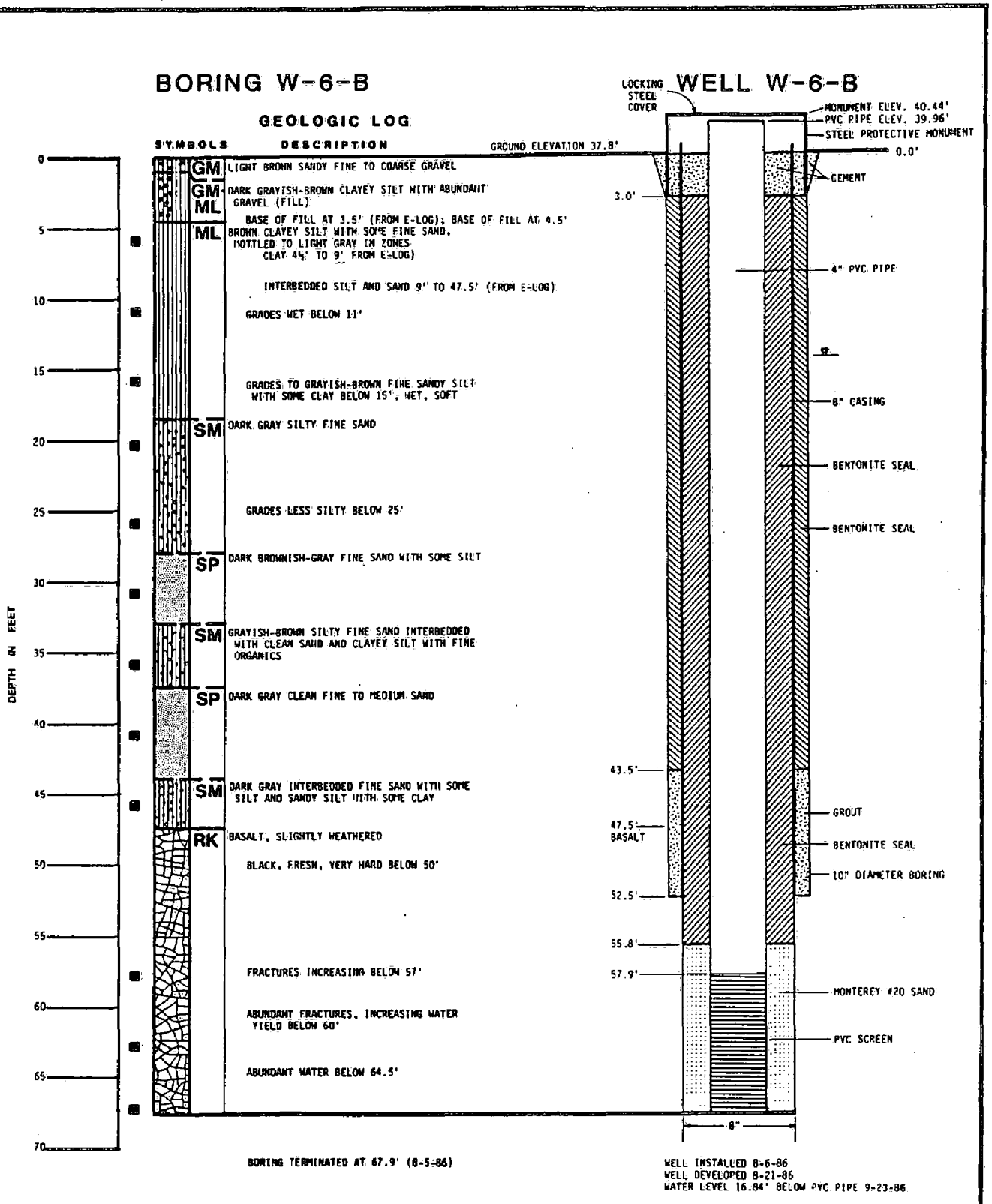
NOTE:

DISCUSSION IN THE TEXT OF THIS REPORT IS NECESSARY FOR A PROPER UNDERSTANDING OF SUBSURFACE CONDITIONS REVEALED BY THE BORINGS.

DAMES & MOORE

FIGURE D1-14

SCOEPA00015728



LOG OF BORING
AND
WELL COMPLETION DIAGRAM
W-6-B

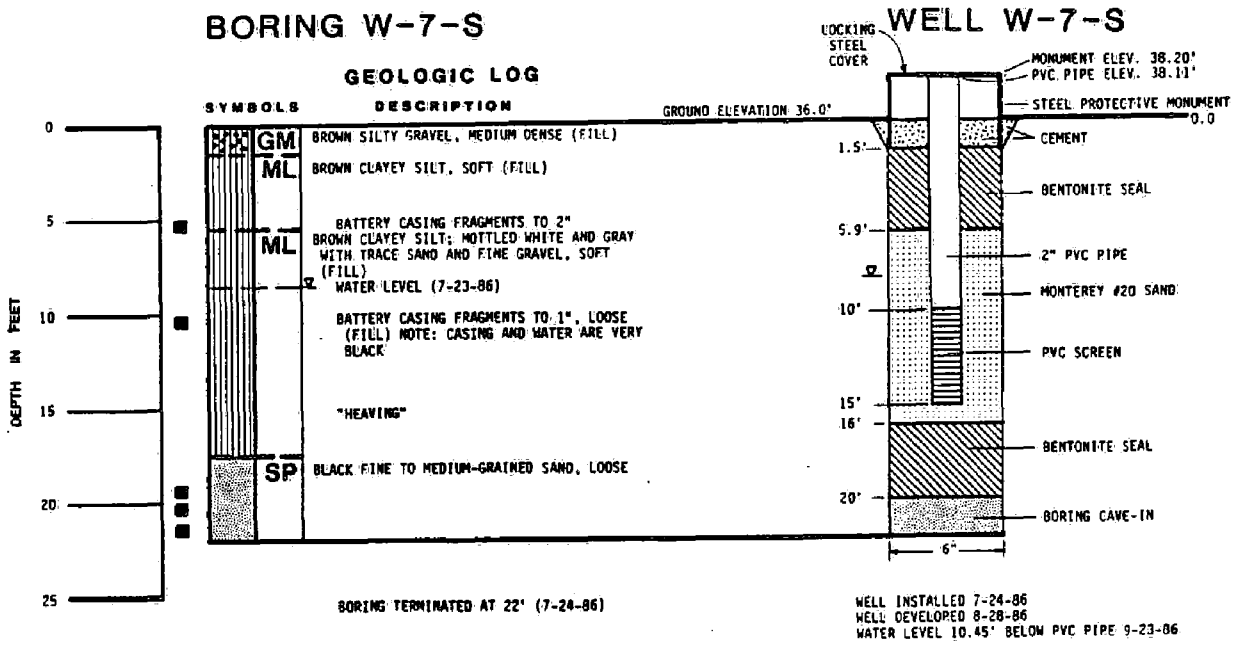
NOTE:

DISCUSSION IN THE TEXT OF THIS REPORT IS NECESSARY FOR A PROPER UNDERSTANDING OF SUBSURFACE CONDITIONS REVEALED BY THE BORINGS.

Dames & Moore

FIGURE D1-15

SCOEPA00015729



LOG OF BORING
AND
WELL COMPLETION DIAGRAM
W-7-S

NOTE:

DISCUSSION IN THE TEXT OF THIS REPORT IS NECESSARY FOR A PROPER UNDERSTANDING OF SUBSURFACE CONDITIONS REVEALED BY THE BORINGS.

Dames & Moore

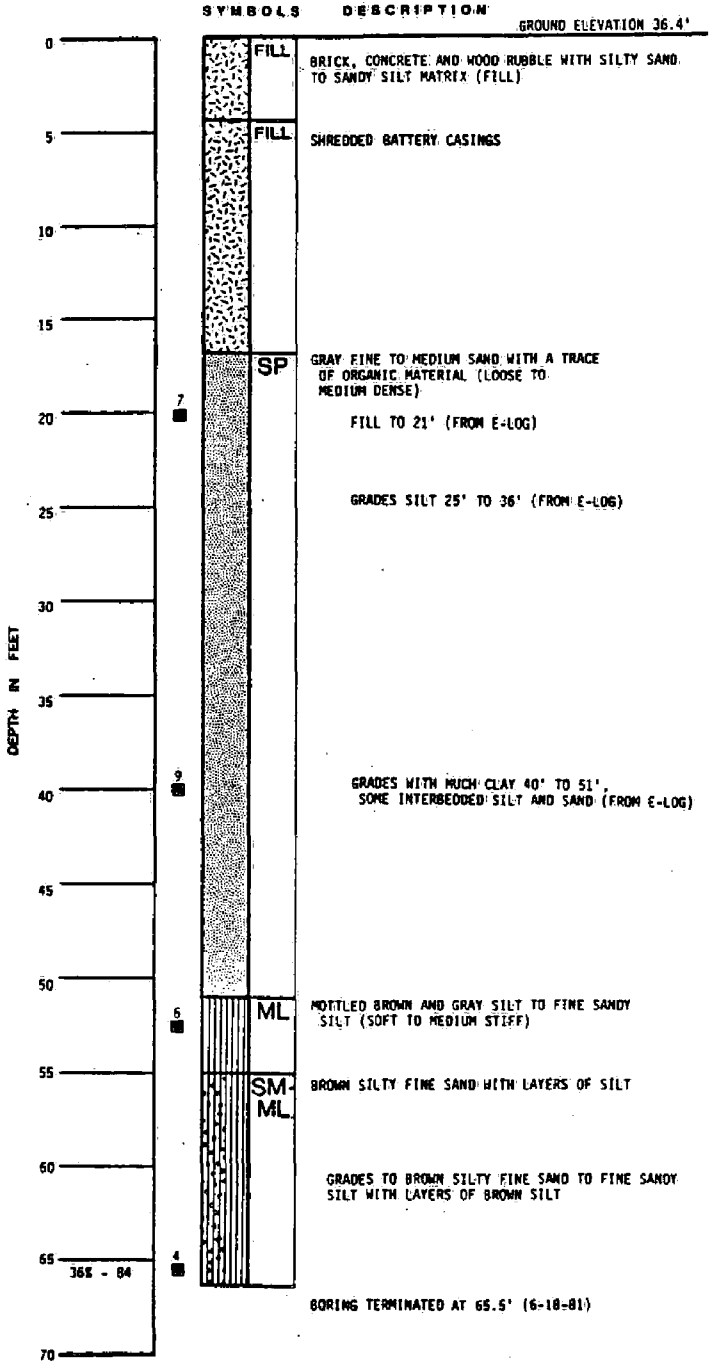
FIGURE D1-16

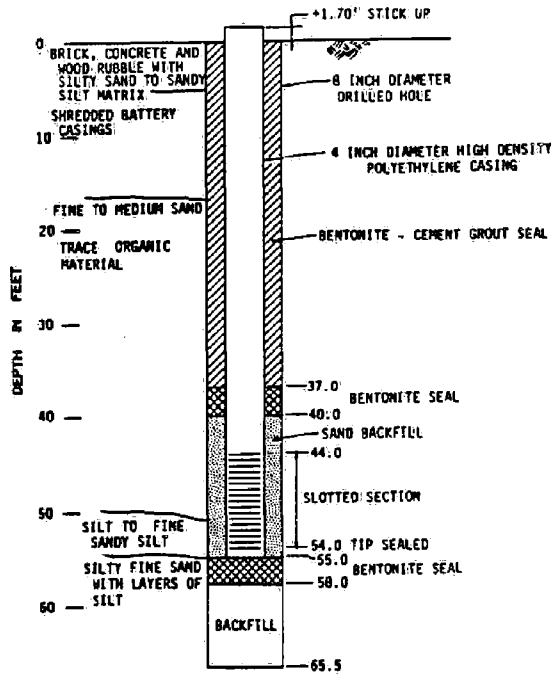
SCOEPA00015730

BORING W-7-D

WELL W-7-D

GEOLOGIC LOG





PRELIMINARY
BY MBI DATE 7-11-81
CHECKED BY DSK DATE

LOG OF BORING
AND
WELL COMPLETION DIAGRAM
W-7-D

NOTE:

DISCUSSION IN THE TEXT OF THIS REPORT IS NECESSARY FOR A PROPER UNDERSTANDING OF SUBSURFACE CONDITIONS REVEALED BY THE BORINGS.

DAMES & MOORE

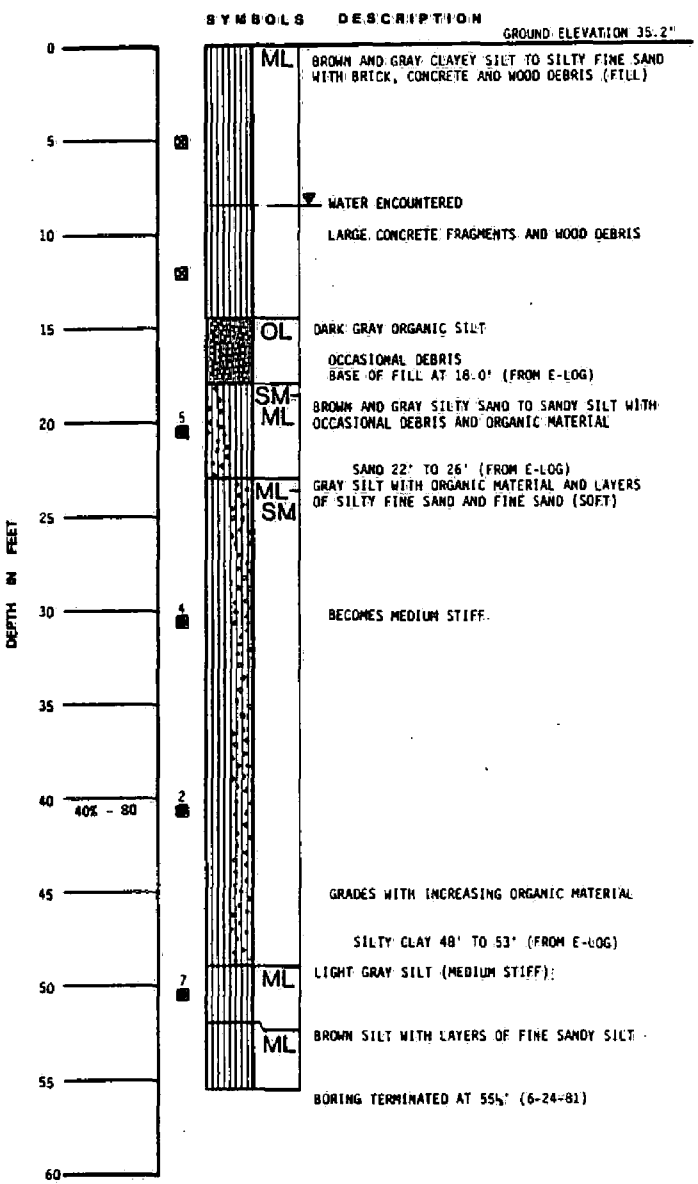
FIGURE D1-17

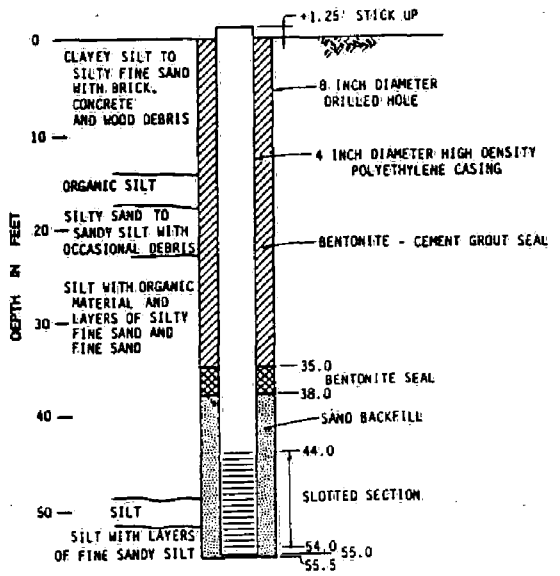
SCOEPA00015731

BORING W-8-D

WELL W-8-D

GEOLOGIC LOG





LOG OF BORING
AND
WELL COMPLETION DIAGRAM
W-8-D

NOTE:

DISCUSSION IN THE TEXT OF THIS REPORT IS NECESSARY FOR A PROPER UNDERSTANDING OF SUBSURFACE CONDITIONS REVEALED BY THE BORINGS.

DAMES & MOORE

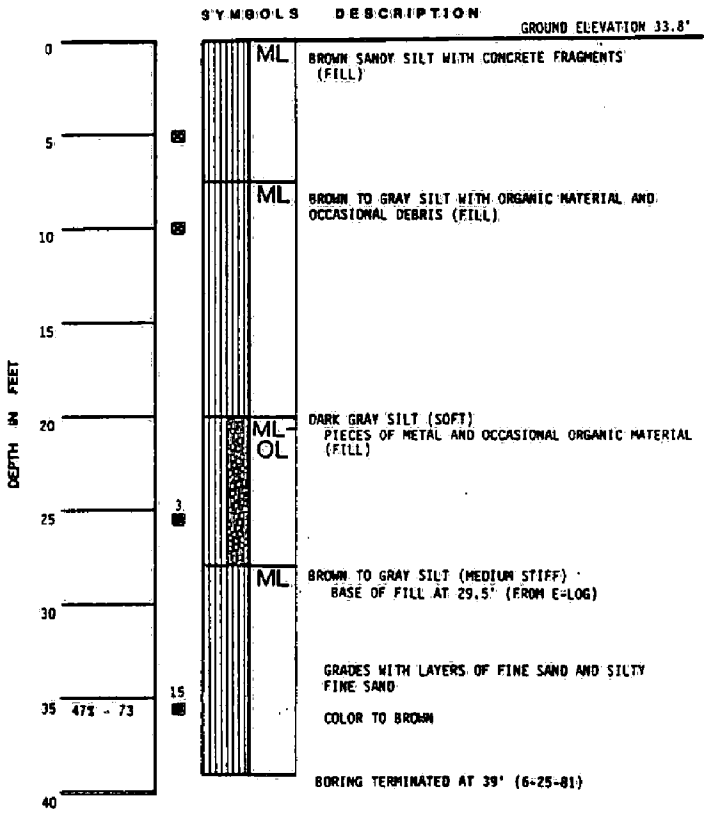
FIGURE D1-18

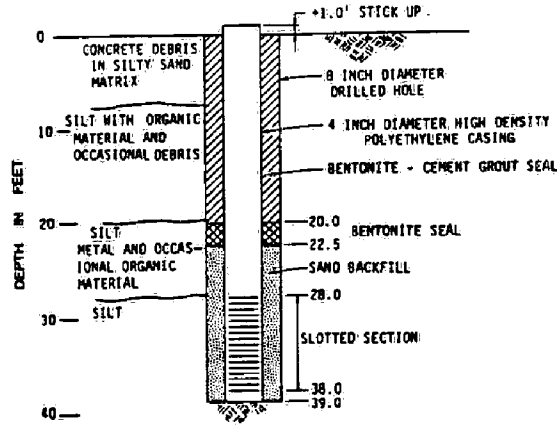
SCOEPA00015732

BORING W-9-D

WELL W-9-D

GEOLOGIC LOG





LOG OF BORING
AND
WELL COMPLETION DIAGRAM
W-9-D

NOTE:

DISCUSSION IN THE TEXT OF THIS REPORT IS NECESSARY FOR A PROPER UNDERSTANDING OF SUBSURFACE CONDITIONS REVEALED BY THE BORINGS.

DAMES & MOORE

FIGURE D1-19

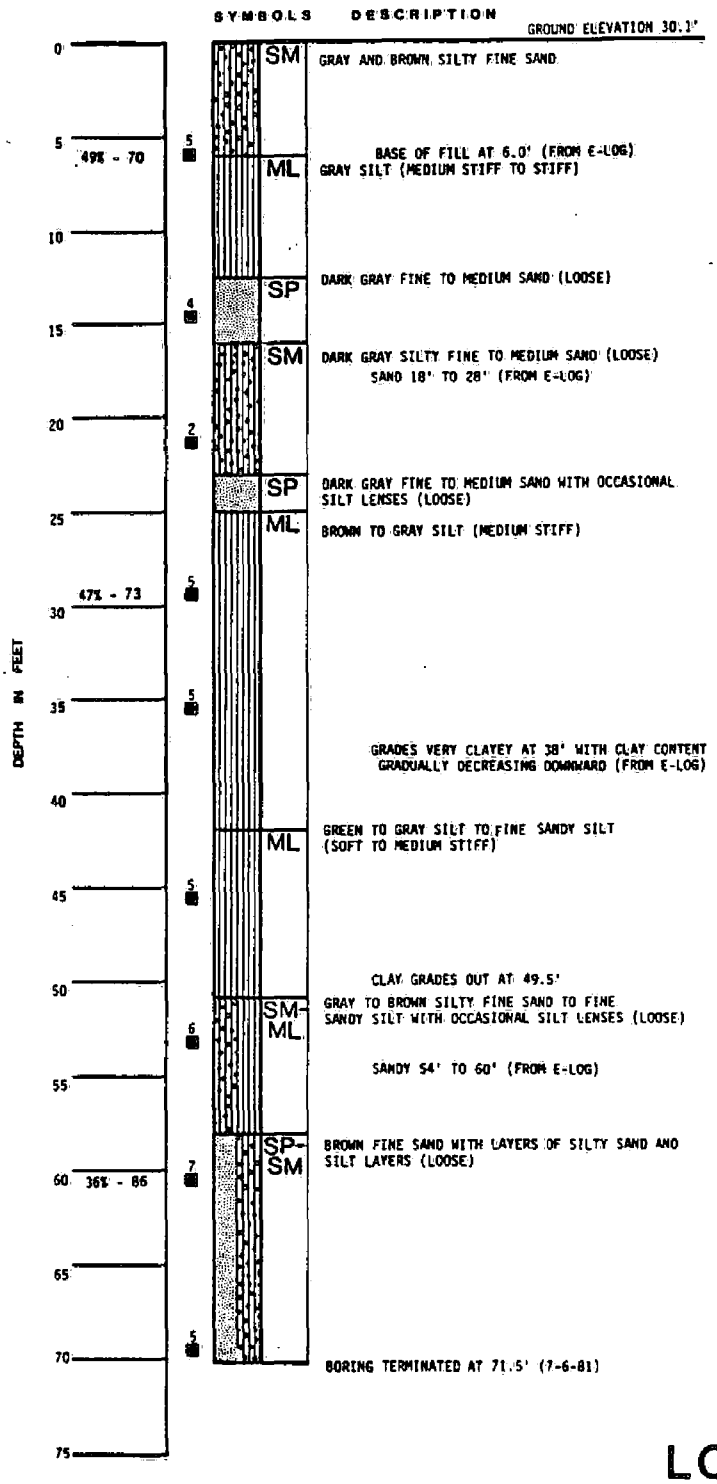
BY MDS DATE 2-18-81
CHECKED BY DEF DATE

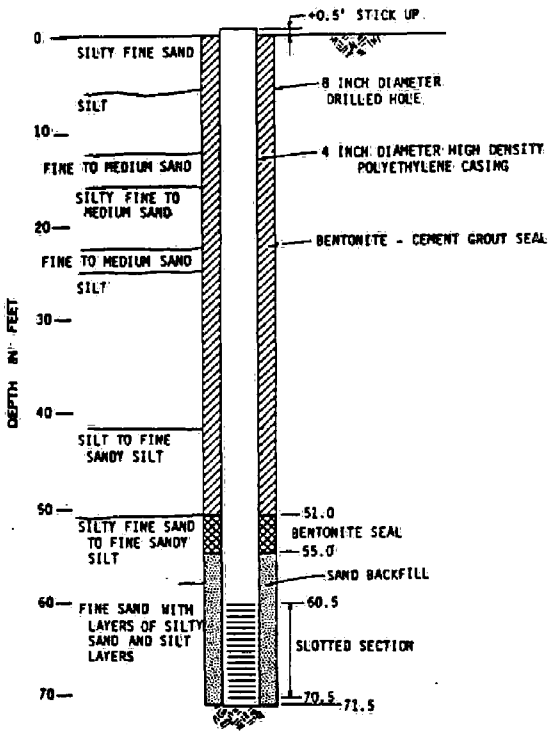
SCOEPA00015733

BORING W-10-D

WELL W-10 D

GEOLOGIC LOG





BY MDS DATE 5-18-81
CHECKED BY DSH DATE

LOG OF BORING
AND
WELL COMPLETION DIAGRAM
W-10-D

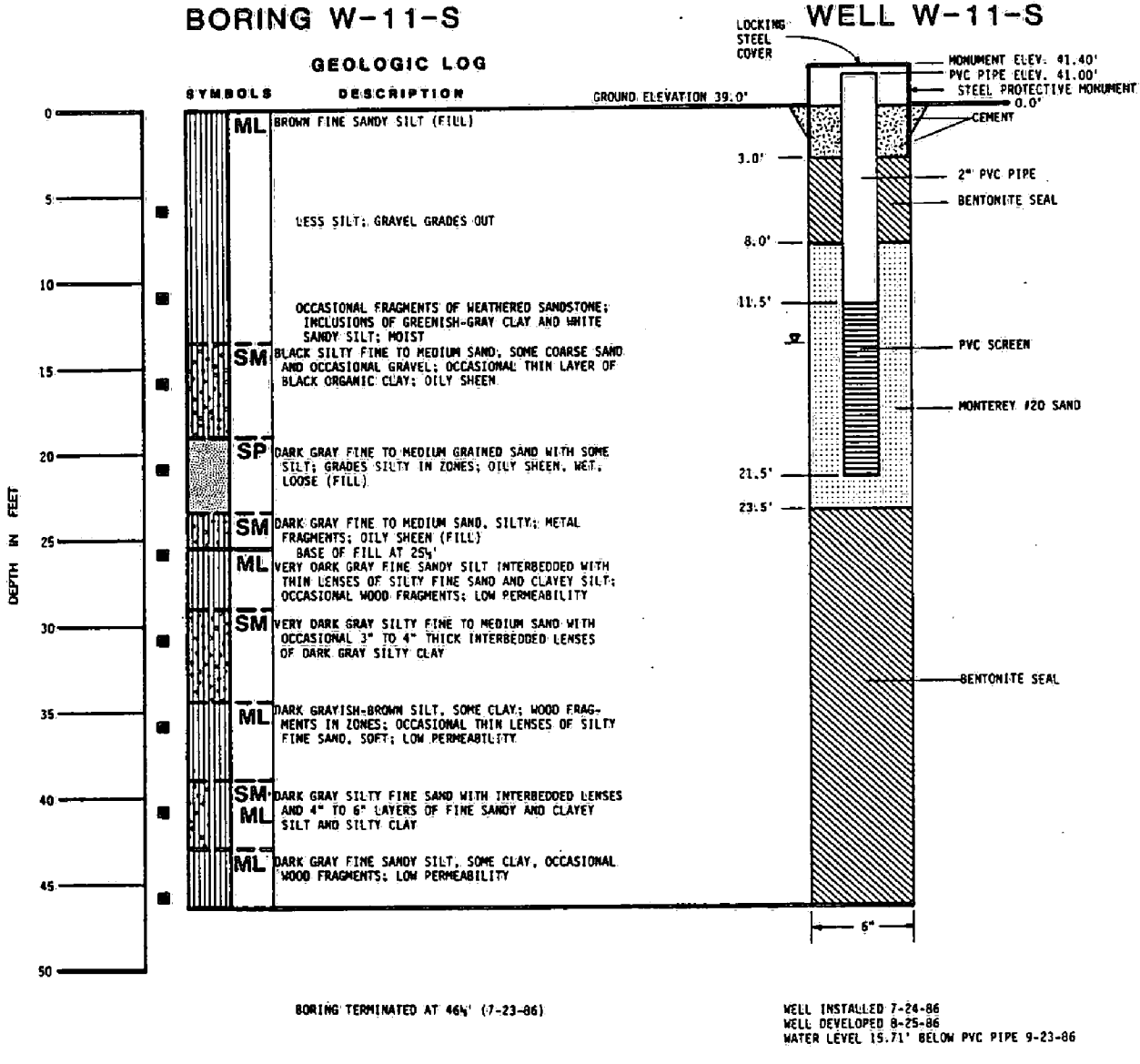
NOTE:

DISCUSSION IN THE TEXT OF THIS REPORT IS NECESSARY FOR A PROPER UNDERSTANDING OF SUBSURFACE CONDITIONS REVEALED BY THE BORINGS.

DAMES & MOORE

FIGURE D1-20

SCOEPA00015734



LOG OF BORING
AND
WELL COMPLETION DIAGRAM
W-11-S

NOTE:

DISCUSSION IN THE TEXT OF THIS REPORT IS NECESSARY FOR A PROPER UNDERSTANDING OF SUBSURFACE CONDITIONS REVEALED BY THE BORINGS.

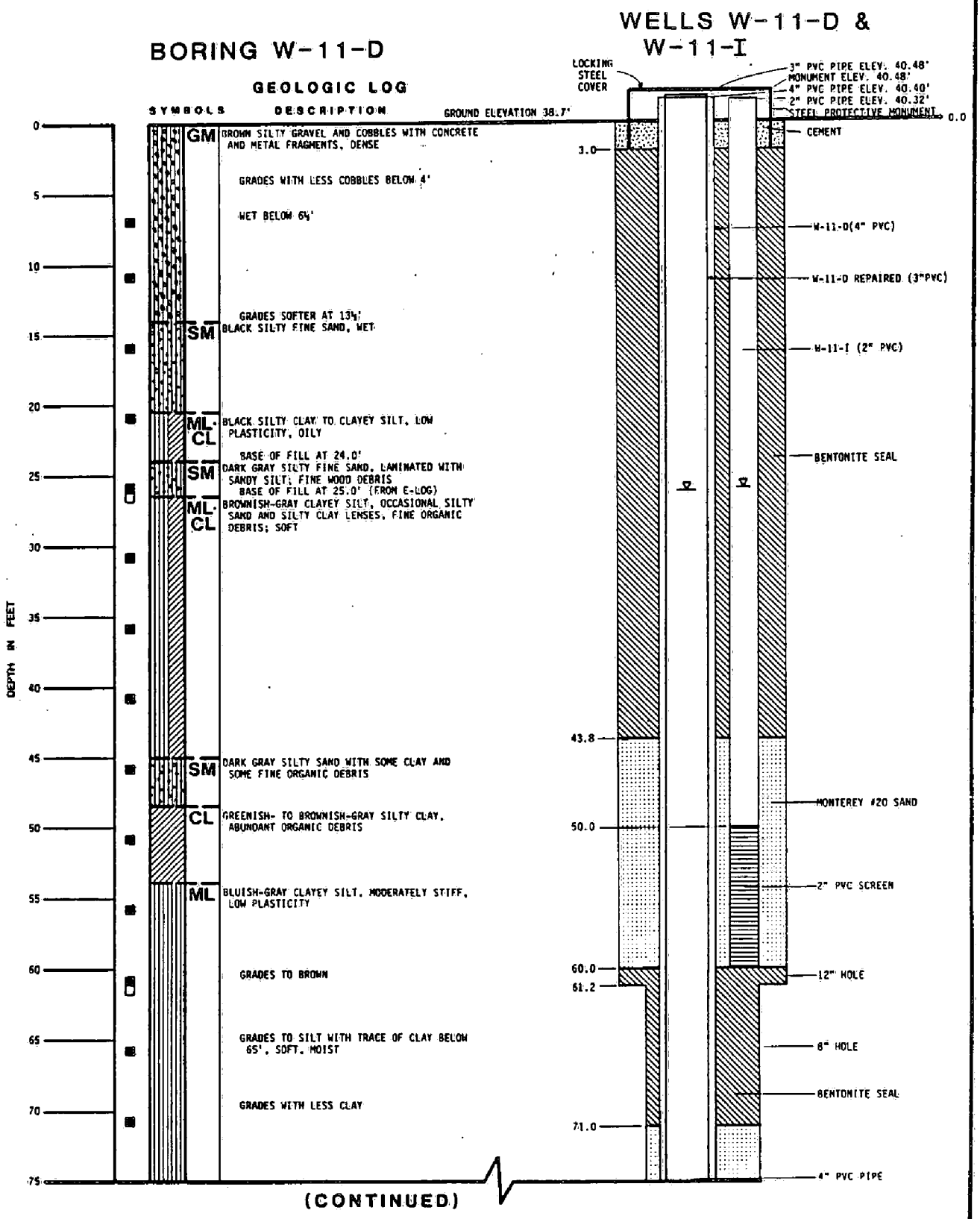
Dames & Moore

FIGURE D1-21

FILE 11831-034-041
BY AM DATE 10-01-86
CHECKED BY DATE

REVISIONS
BY DATE
BY DATE
PLATE OF

SCOEPA00015735



LOG OF BORING
AND
WELL COMPLETION DIAGRAM
W-11-D & W-11-I

NOTE:

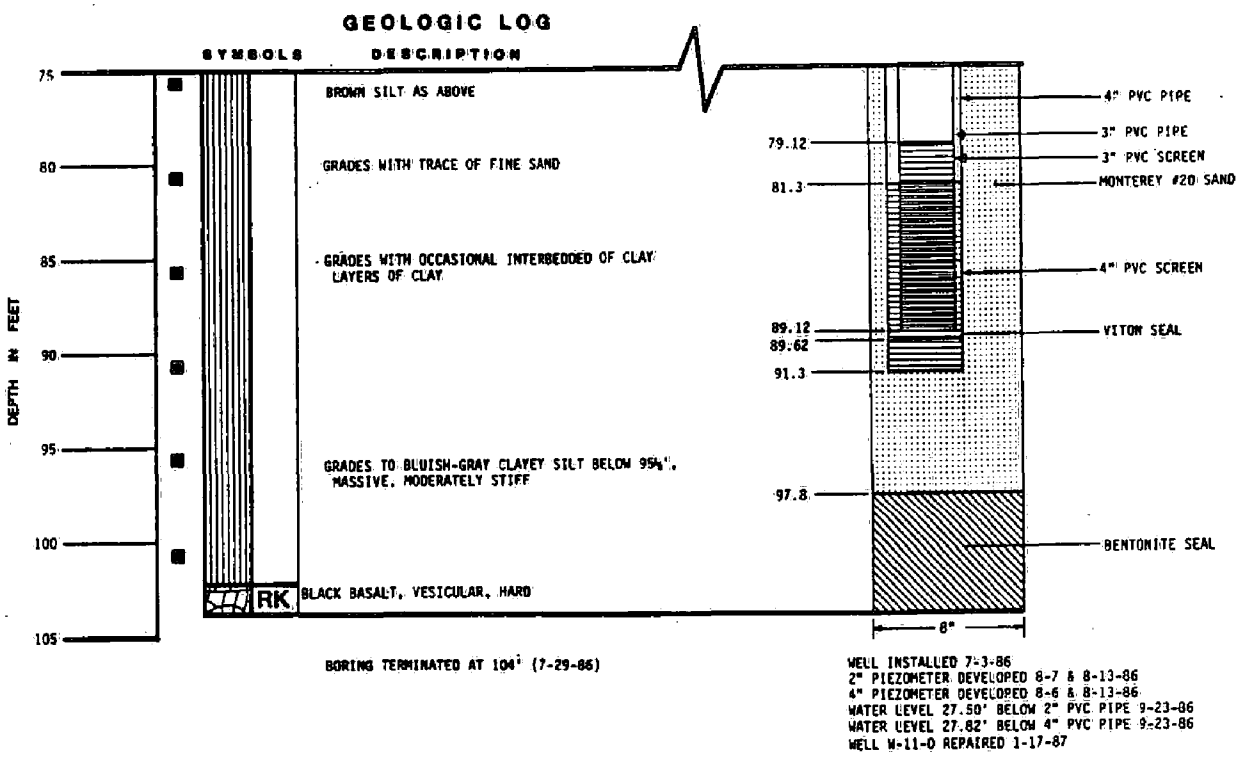
DISCUSSION IN THE TEXT OF THIS REPORT IS NECESSARY FOR A PROPER UNDERSTANDING OF SUBSURFACE CONDITIONS REVEALED BY THE BORINGS.

Dames & Moore

FIGURE D1-22

SCOEPA00015736

BORING W-11-D(CONTINUED) WELLS W-11-D & W-11-I



LOG OF BORING
AND
WELL COMPLETION DIAGRAM
W-11-D & W-11-I

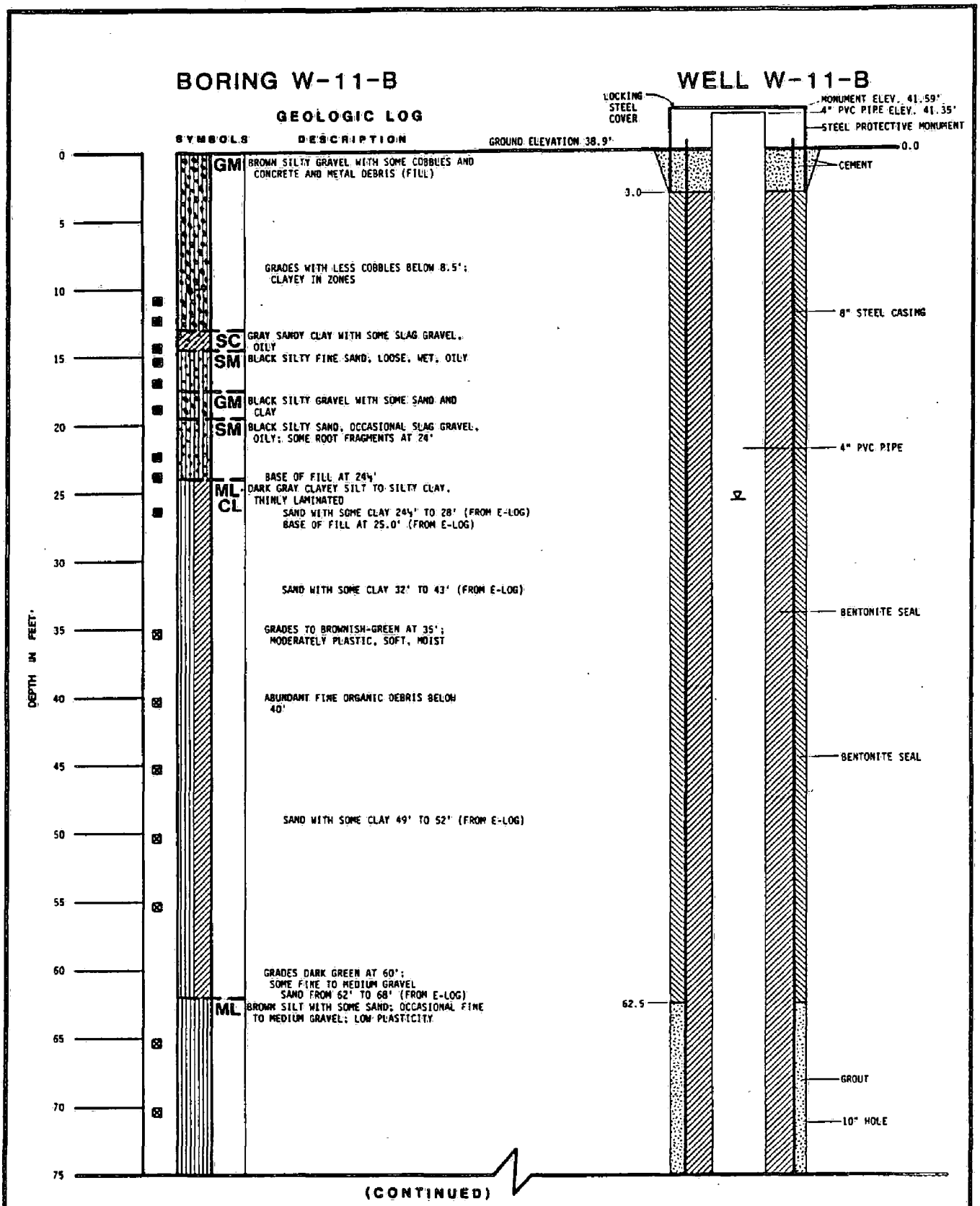
NOTE:

DISCUSSION IN THE TEXT OF THIS REPORT IS NECESSARY FOR A PROPER UNDERSTANDING OF SUBSURFACE CONDITIONS REVEALED BY THE BORINGS.

Dames & Moore

FIGURE D1-23

SCOEPA00015737



LOG OF BORING
AND
WELL COMPLETION DIAGRAM
W-11-B

NOTE:

DISCUSSION IN THE TEXT OF THIS REPORT IS NECESSARY FOR A PROPER UNDERSTANDING OF SUBSURFACE CONDITIONS REVEALED BY THE BORINGS.

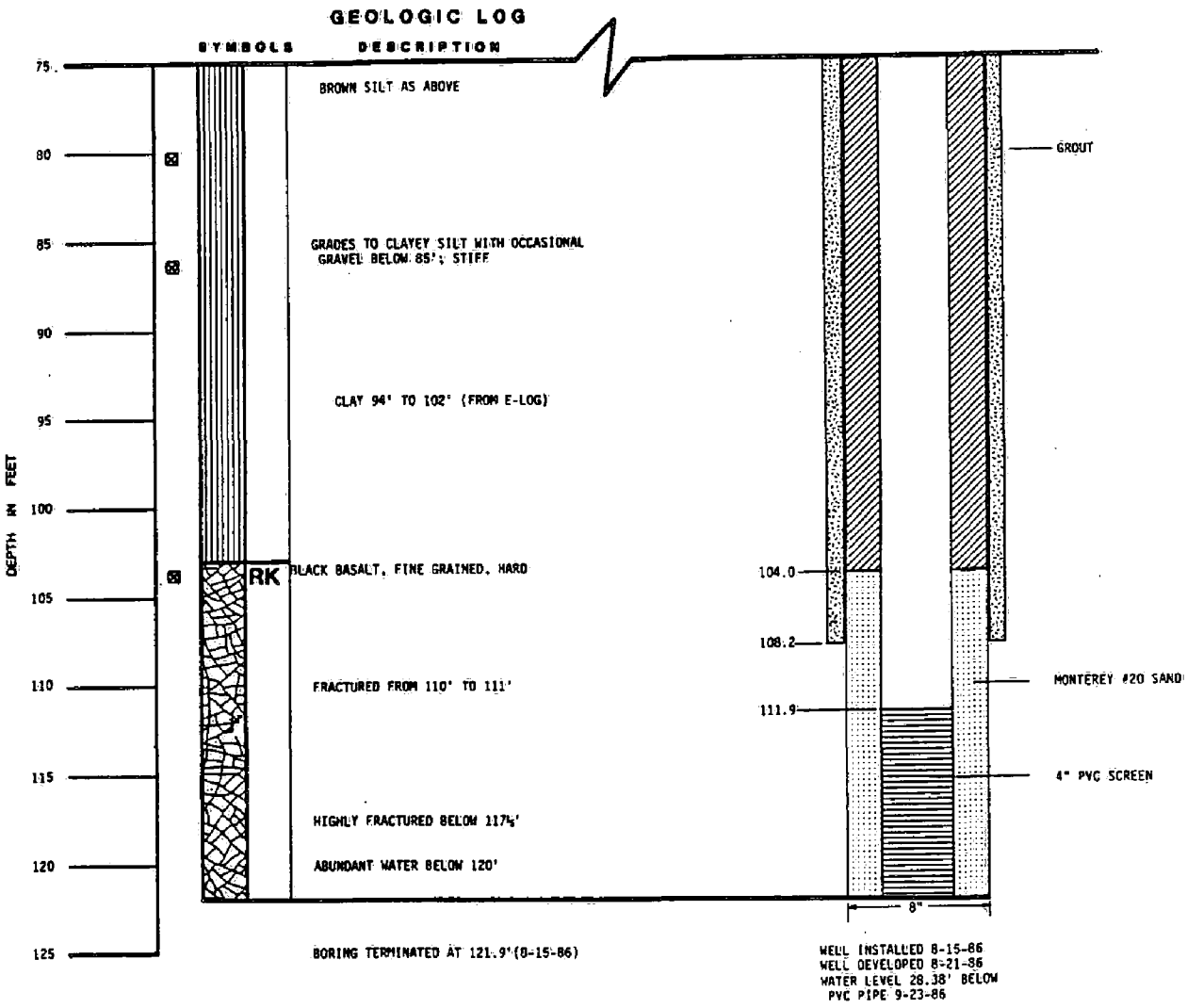
Dames & Moore

FIGURE D1-24

SCOEPA00015738

BORING W-11-B (CONTINUED)

WELL W-11-B



LOG OF BORING
AND
WELL COMPLETION DIAGRAM
W-11-B

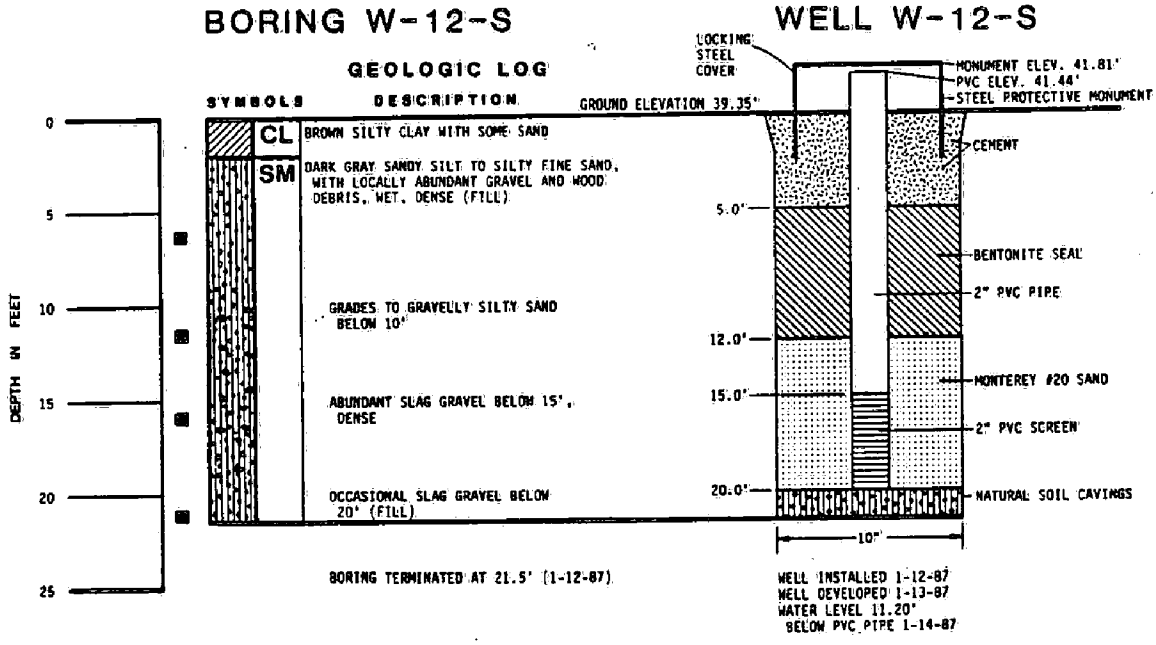
NOTE:

DISCUSSION IN THE TEXT OF THIS REPORT IS NECESSARY FOR A PROPER UNDERSTANDING OF SUBSURFACE CONDITIONS REVEALED BY THE BORINGS.

Dames & Moore

FIGURE D1-25

SCOEPA00015739



LOG OF BORING
AND
WELL COMPLETION DIAGRAM
W-12-S

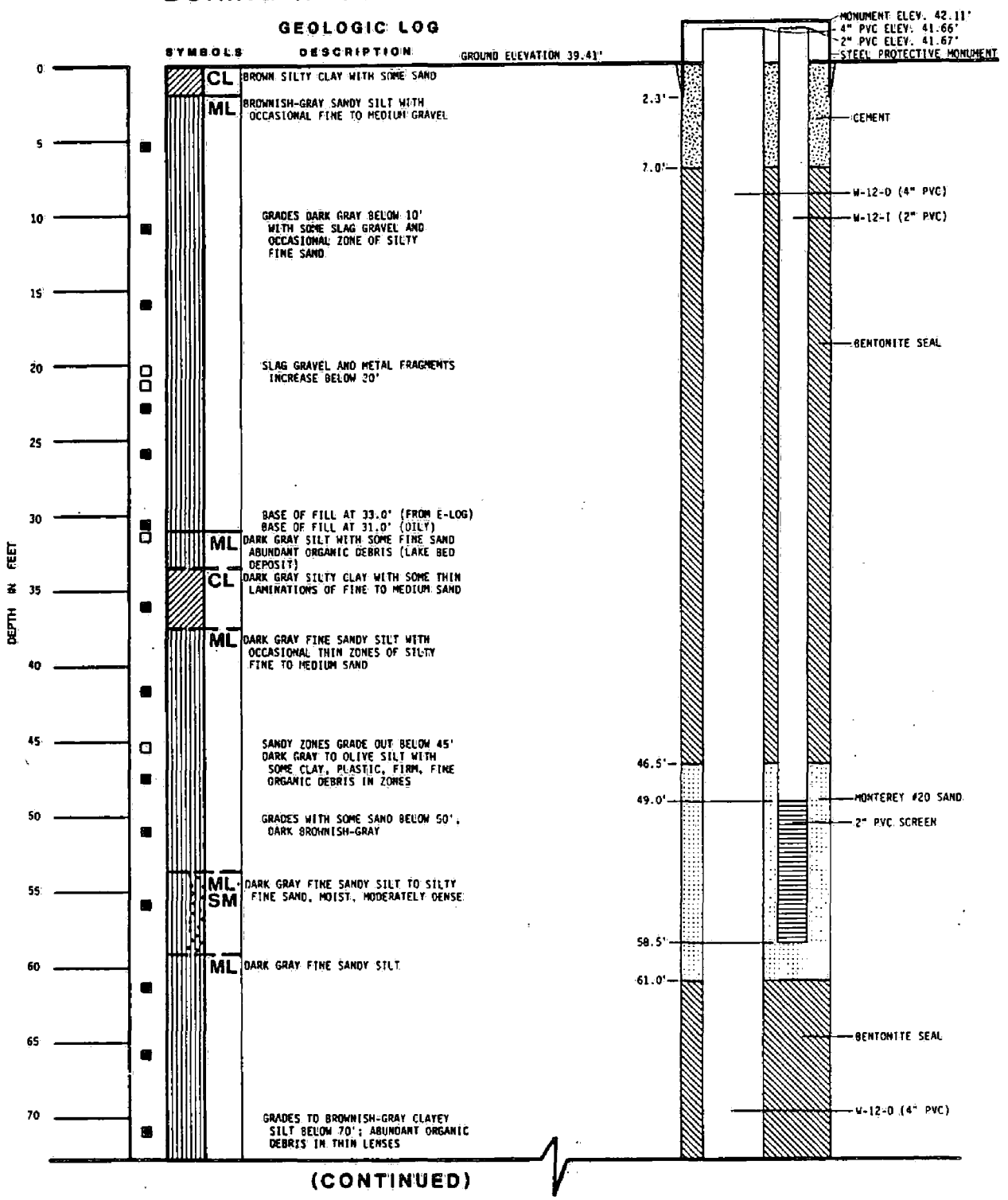
NOTE:

DISCUSSION IN THE TEXT OF THIS REPORT IS NECESSARY FOR A PROPER UNDERSTANDING OF SUBSURFACE CONDITIONS REVEALED BY THE BORINGS.

Dames & Moore

FIGURE D1-26

SCOEPA00015740



LOG OF BORING
AND
WELL COMPLETION DIAGRAM
W-12-D & W-12-I

Dames & Moore

NOTE:

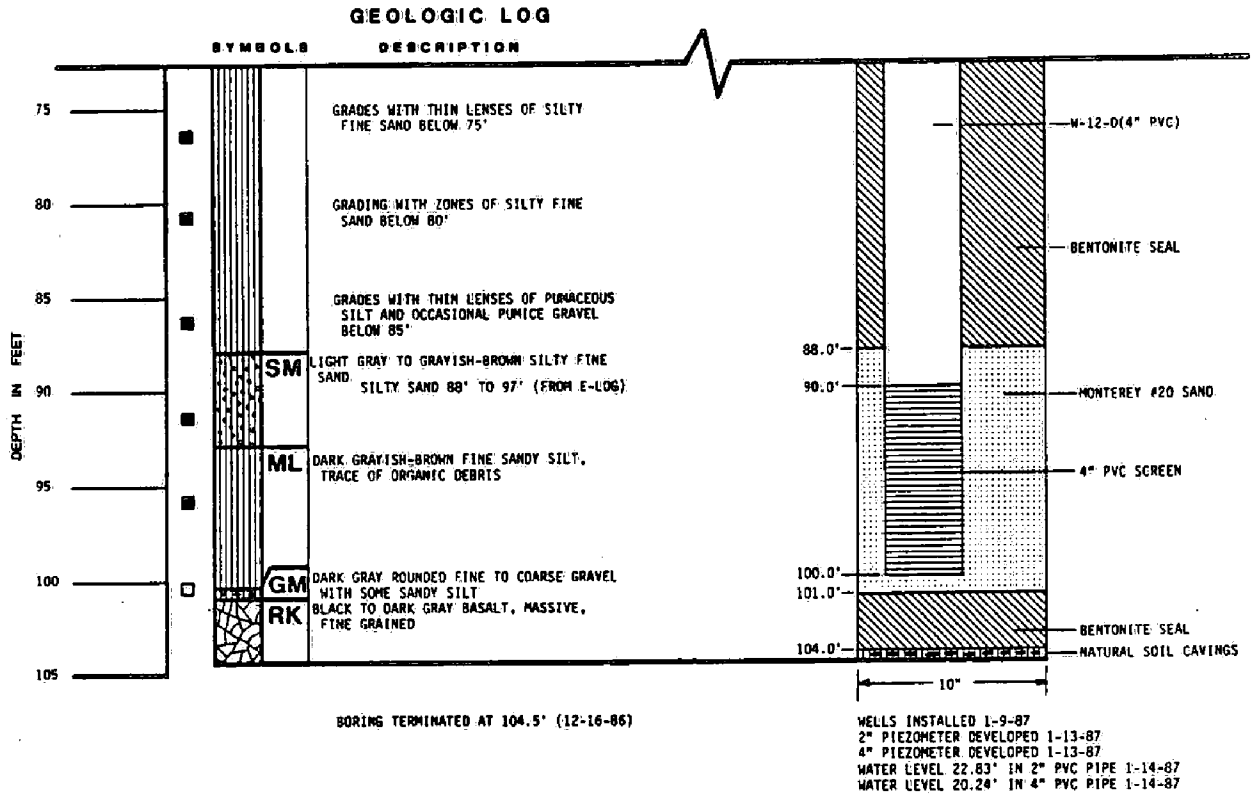
DISCUSSION IN THE TEXT OF THIS REPORT IS NECESSARY FOR A PROPER UNDERSTANDING OF SUBSURFACE CONDITIONS REVEALED BY THE BORINGS.

FIGURE D1-27

SCOEPA00015741

WELLS W-12-D & W-12-I

BORING W-12-D(CONTINUED)



BORING TERMINATED AT 104.5' (12-16-86)

WELLS INSTALLED 1-9-87
2" PIEZOMETER DEVELOPED 1-13-87
4" PIEZOMETER DEVELOPED 1-13-87
WATER LEVEL 22.83' IN 2" PVC PIPE 1-14-87
WATER LEVEL 20.24' IN 4" PVC PIPE 1-14-87

LOG OF BORING AND WELL COMPLETION DIAGRAM

W-12-D & W-12-I

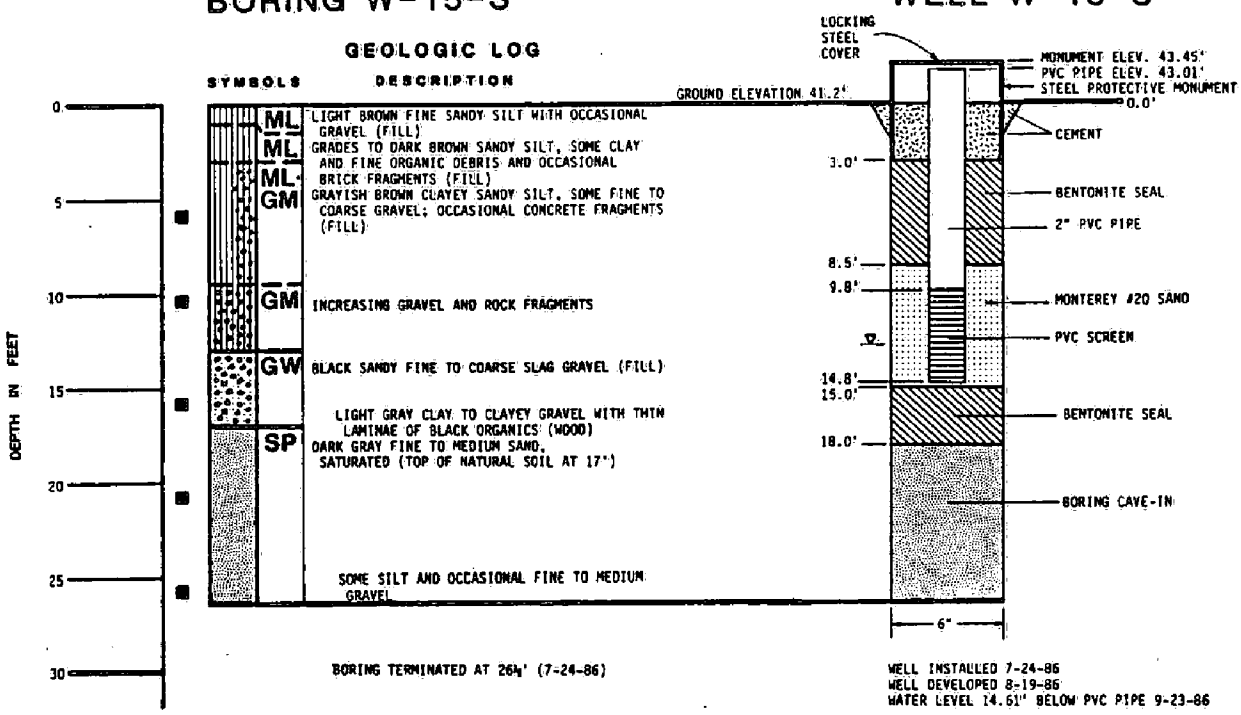
Dames & Moore

NOTE:

DISCUSSION IN THE TEXT OF THIS REPORT IS NECESSARY FOR A PROPER UNDERSTANDING OF SUBSURFACE CONDITIONS REVEALED BY THE BORINGS.

FIGURE D1-28

SCOEPA00015742



LOG OF BORING
AND
WELL COMPLETION DIAGRAM
W-15-S

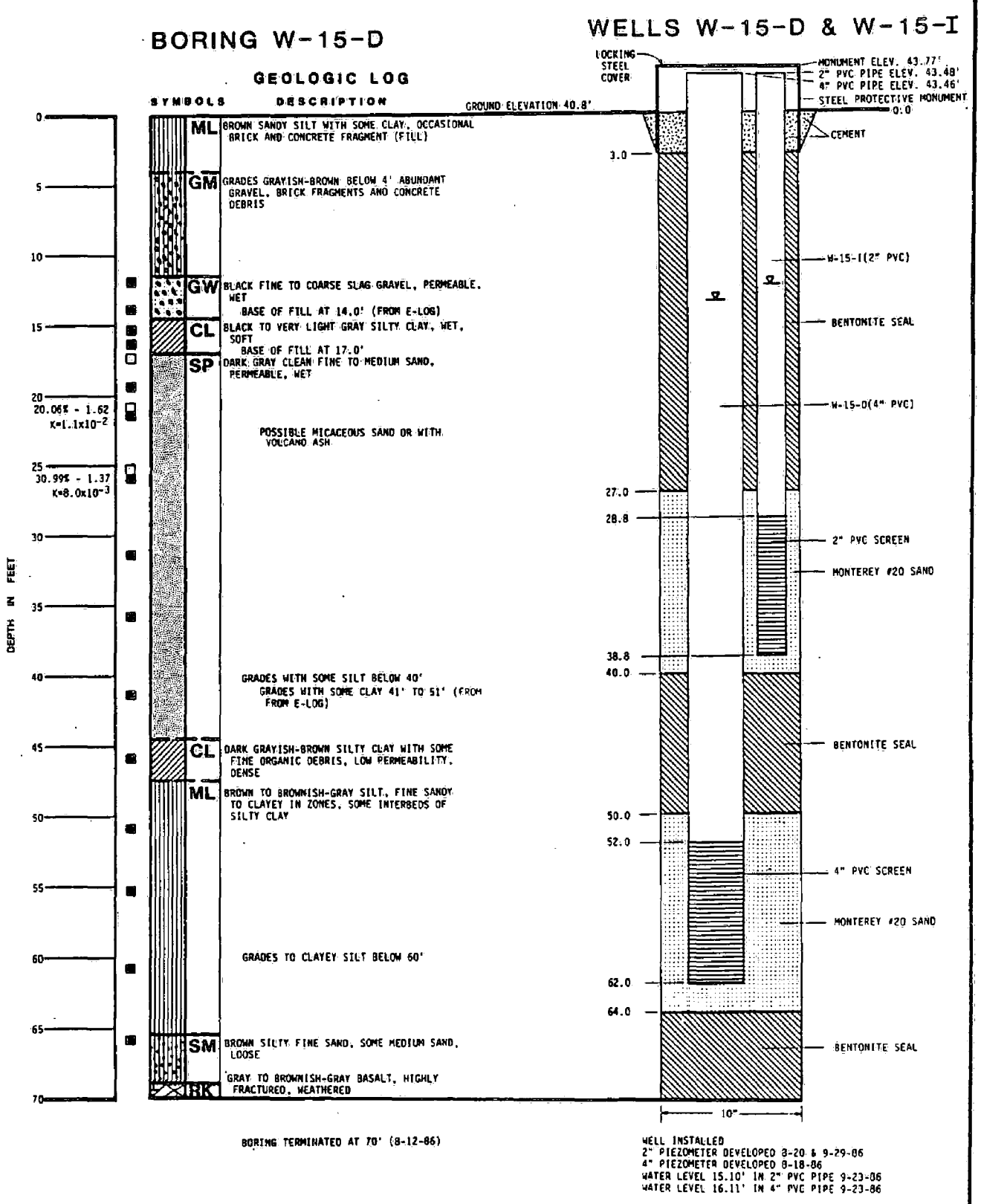
NOTE:

DISCUSSION IN THE TEXT OF THIS REPORT IS NECESSARY FOR A PROPER UNDERSTANDING OF SUBSURFACE CONDITIONS REVEALED BY THE BORINGS.

Dames & Moore

FIGURE D1-29

SCOEPA00015743



LOG OF BORING
AND
WELL COMPLETION DIAGRAM
W-15-D & W-15-I

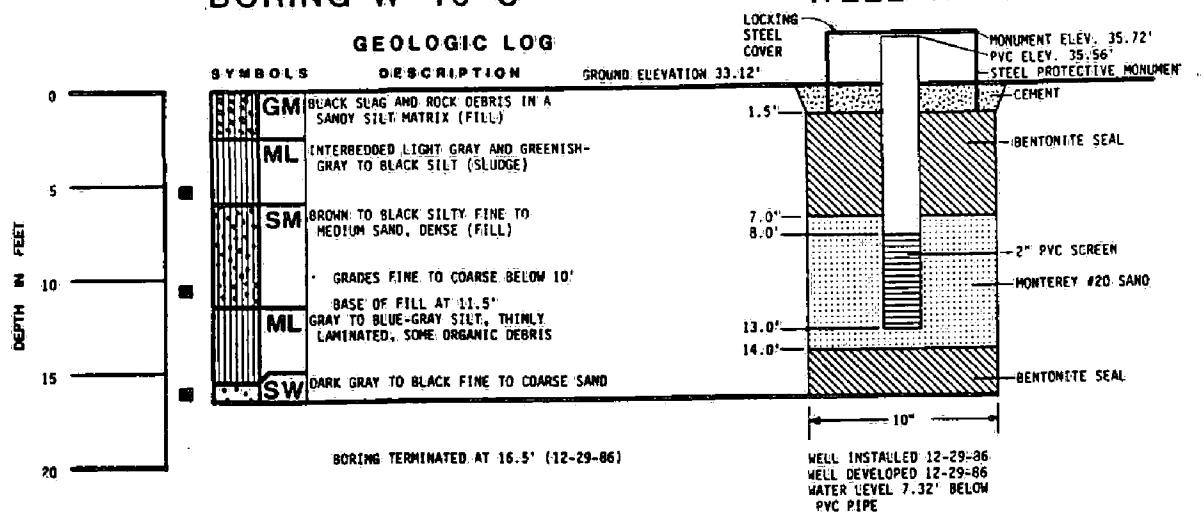
NOTE:

DISCUSSION IN THE TEXT OF THIS REPORT IS NECESSARY FOR A PROPER UNDERSTANDING OF SUBSURFACE CONDITIONS REVEALED BY THE BORINGS.

Dames & Moore

FIGURE D1-30

SCOEPA00015744



LOG OF BORING
AND
WELL COMPLETION DIAGRAM
W-16-S

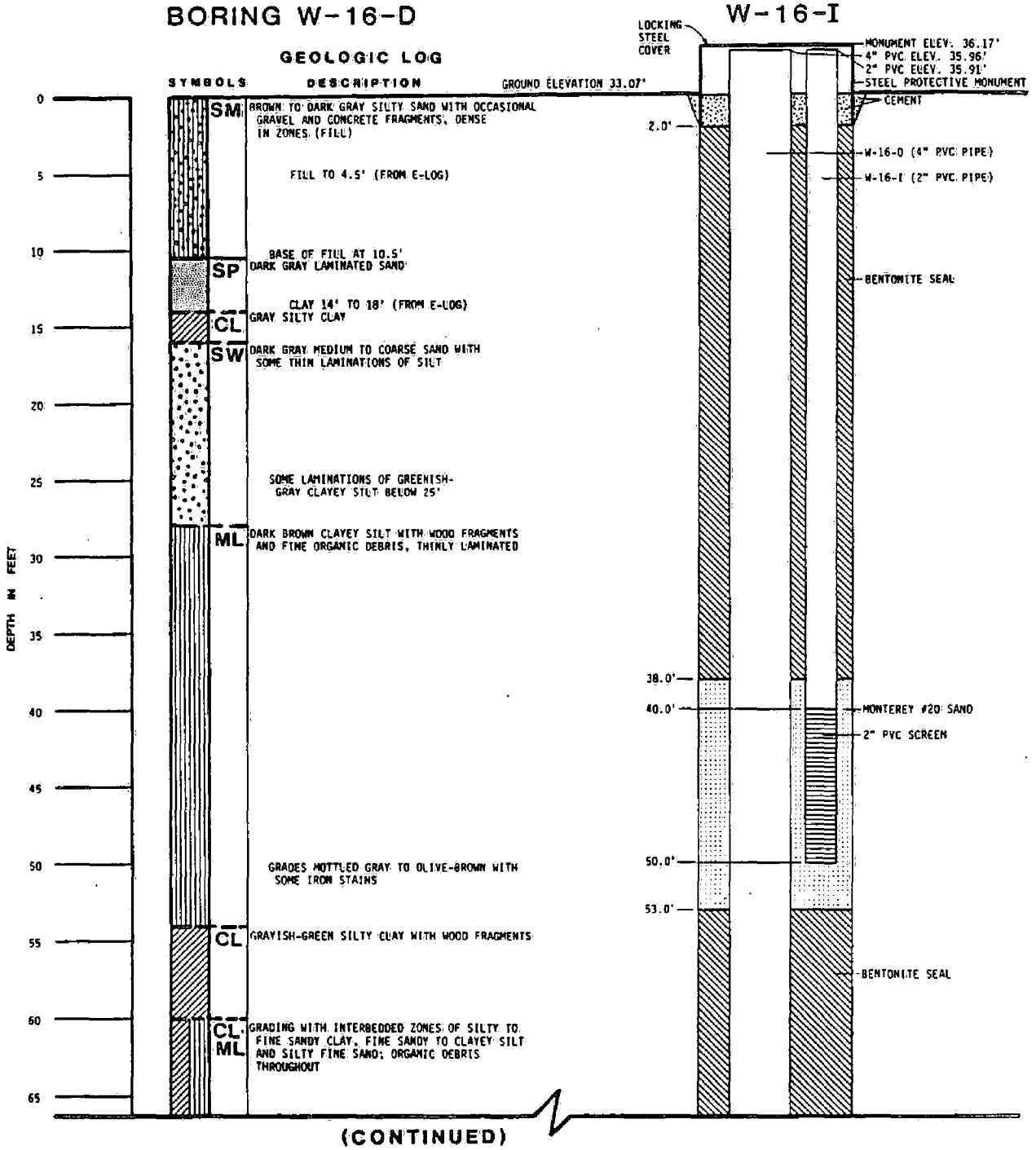
NOTE:

DISCUSSION IN THE TEXT OF THIS REPORT IS NECESSARY FOR A PROPER UNDERSTANDING OF SUBSURFACE CONDITIONS REVEALED BY THE BORINGS.

Dames & Moore

FIGURE D1-31

SCOEPA00015745



LOG OF BORING
AND
WELL COMPLETION DIAGRAM
W-16-D & W-16-I

NOTE:

DISCUSSION IN THE TEXT OF THIS REPORT IS NECESSARY FOR A PROPER UNDERSTANDING OF SUBSURFACE CONDITIONS REVEALED BY THE BORINGS.

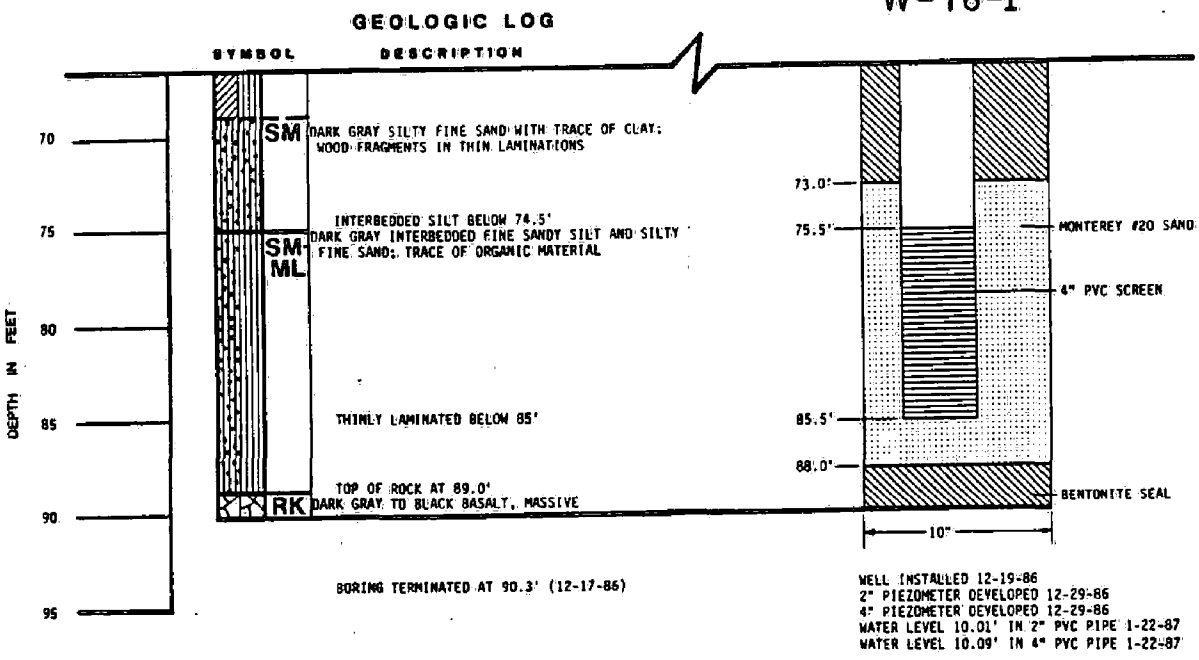
Dames & Moore

FIGURE D1-32

SCOEPA00015746

BORING W-16-D(CONTINUED)

WELLS W-16-D & W-16-I



NOTE:

DISCUSSION IN THE TEXT OF THIS REPORT IS NECESSARY FOR A PROPER UNDERSTANDING OF SUBSURFACE CONDITIONS REVEALED BY THE BORINGS.

LOG OF BORING
AND
WELL COMPLETION DIAGRAM
W-16-D & W-16-I

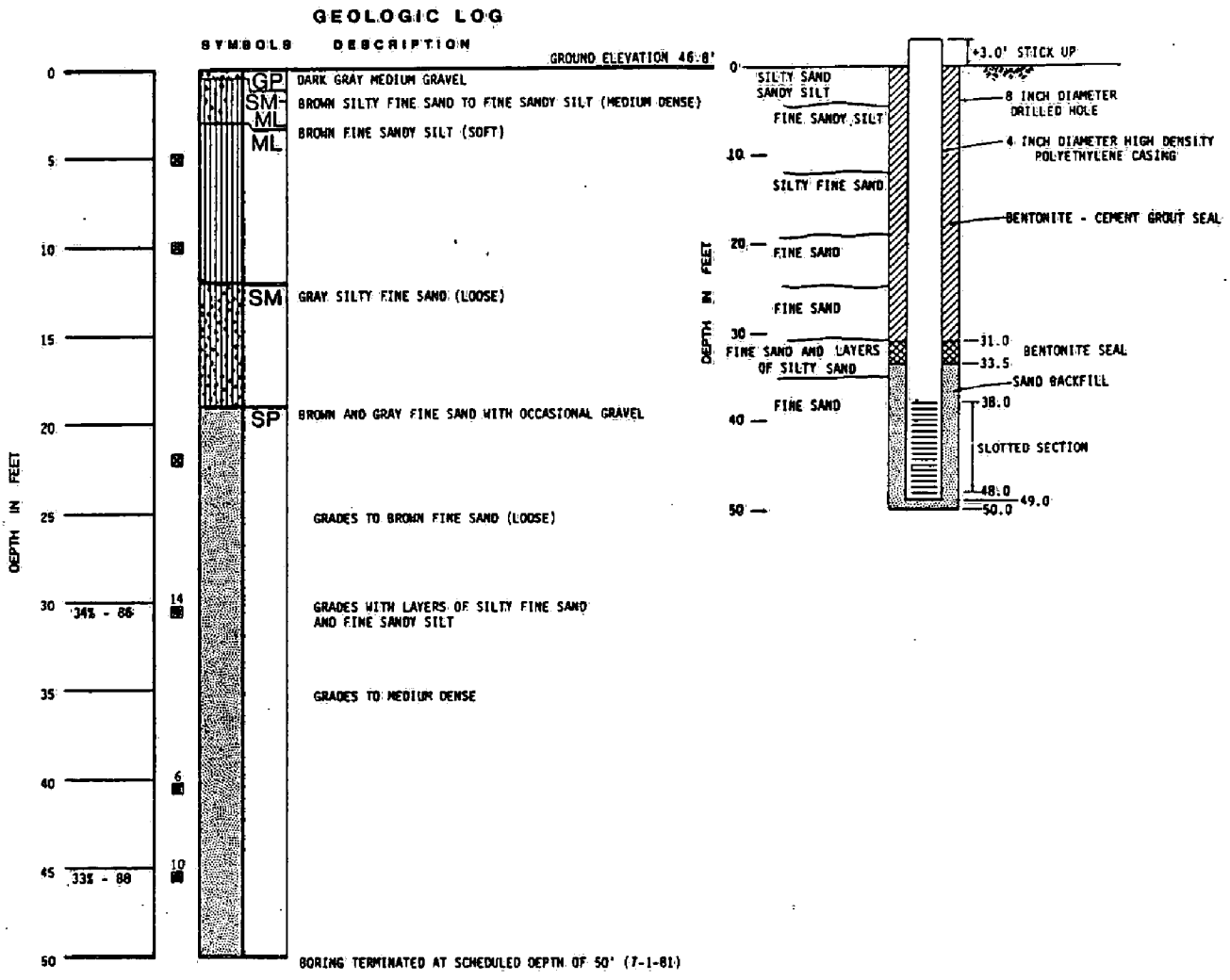
Dames & Moore

FIGURE D1-33

SCOEPA00015747

BORING RPW-1-D

WELL RPW-1-D



LOG OF BORING
AND
WELL COMPLETION DIAGRAM
RPW-1-D

NOTE:

DISCUSSION IN THE TEXT OF THIS REPORT IS NECESSARY FOR A PROPER UNDERSTANDING OF SUBSURFACE CONDITIONS REVEALED BY THE BORINGS.

DAMES & MOORE

FIGURE D1-34

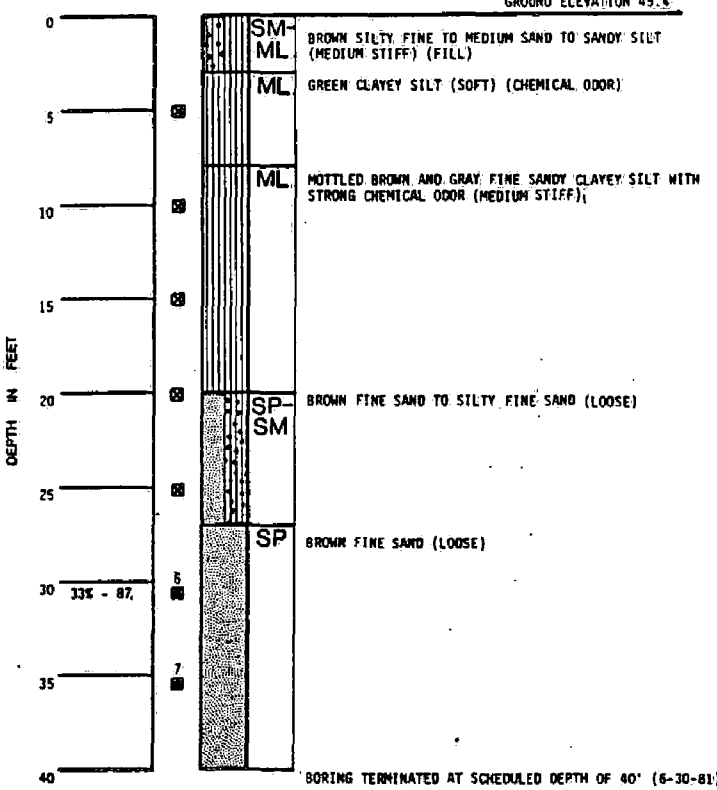
PREPARED BY MDS DATE 9/16/81
CHECKED BY DHG DATE

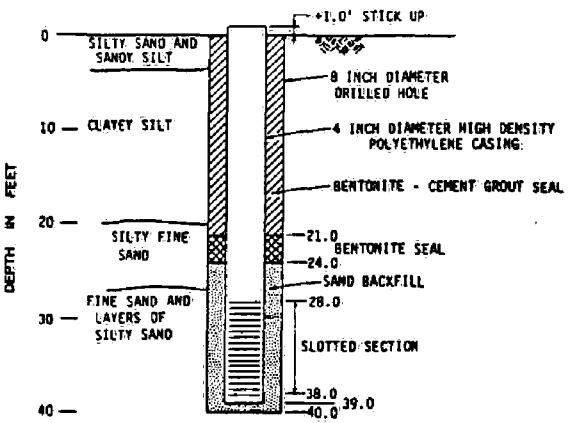
SCOEPA00015748

BORING RPW-2-D

WELL RPW-2-D

GEOLOGIC LOG





LOG OF BORING
AND
WELL COMPLETION DIAGRAM
RPW-2-D

NOTE:

DISCUSSION IN THE TEXT OF THIS REPORT IS NECESSARY FOR A PROPER UNDERSTANDING OF SUBSURFACE CONDITIONS REVEALED BY THE BORINGS.

DAMES & MOORE

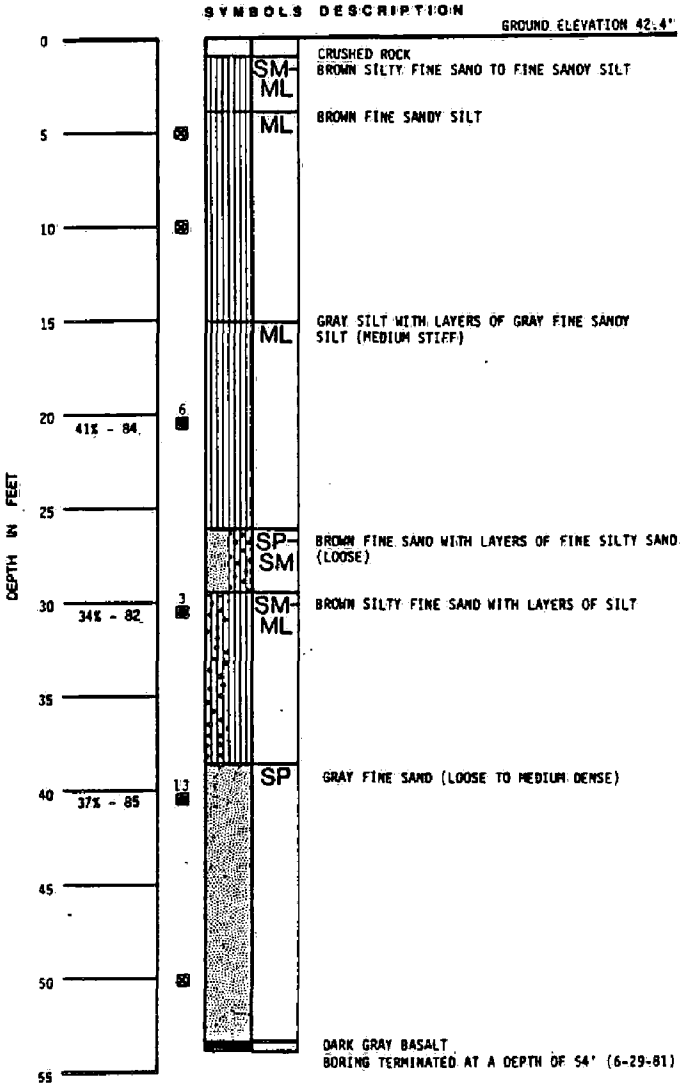
FIGURE D1-35

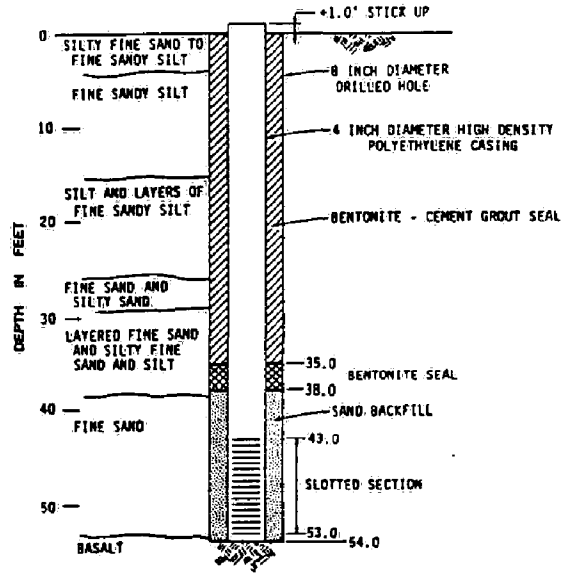
PREPARED BY: MDS 9-17-81 DATE
CHECKED BY: DTH DATE

SCOEPA00015749

BORING RPW-3-D

WELL RPW-3-D





LOG OF BORING
AND
WELL COMPLETION DIAGRAM
RPW-3-D

NOTE:

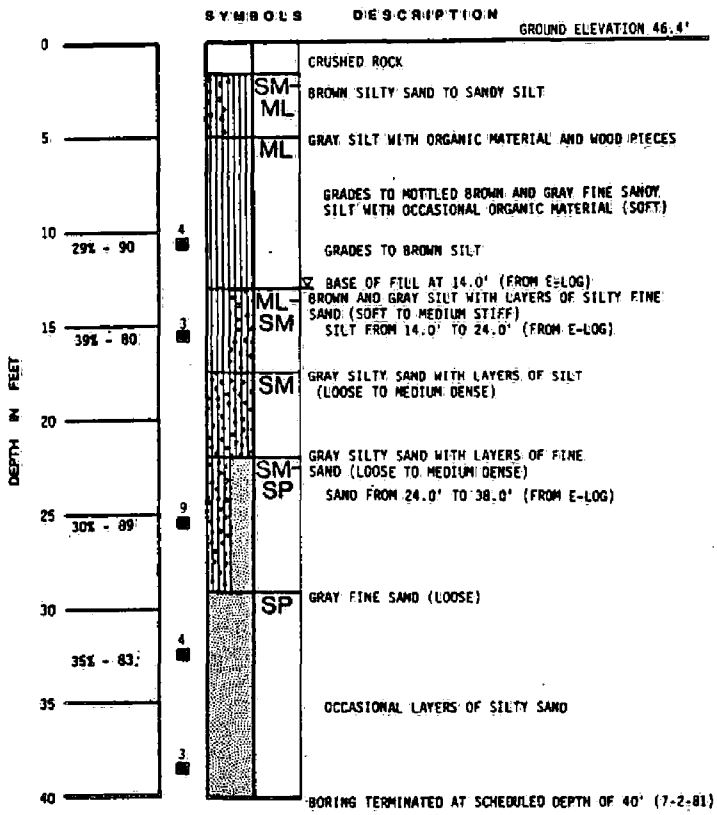
DISCUSSION IN THE TEXT OF THIS REPORT IS NECESSARY FOR A PROPER UNDERSTANDING OF SUBSURFACE CONDITIONS REVEALED BY THE BORINGS.

DAMES & MOORE

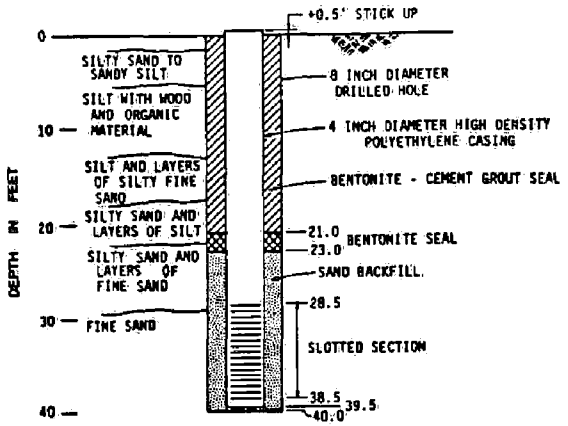
FIGURE D1-36

BY MDS DATE 3-18-81
CHECKED BY DJH DATE

BORING RPW-4-D



WELL RPW-4-D



LOG OF BORING
AND
WELL COMPLETION DIAGRAM
RPW-4-D

NOTE:

DISCUSSION IN THE TEXT OF THIS REPORT IS NECESSARY FOR A PROPER UNDERSTANDING OF SUBSURFACE CONDITIONS REVEALED BY THE BORINGS.

DAMES & MOORE

FIGURE D1-37

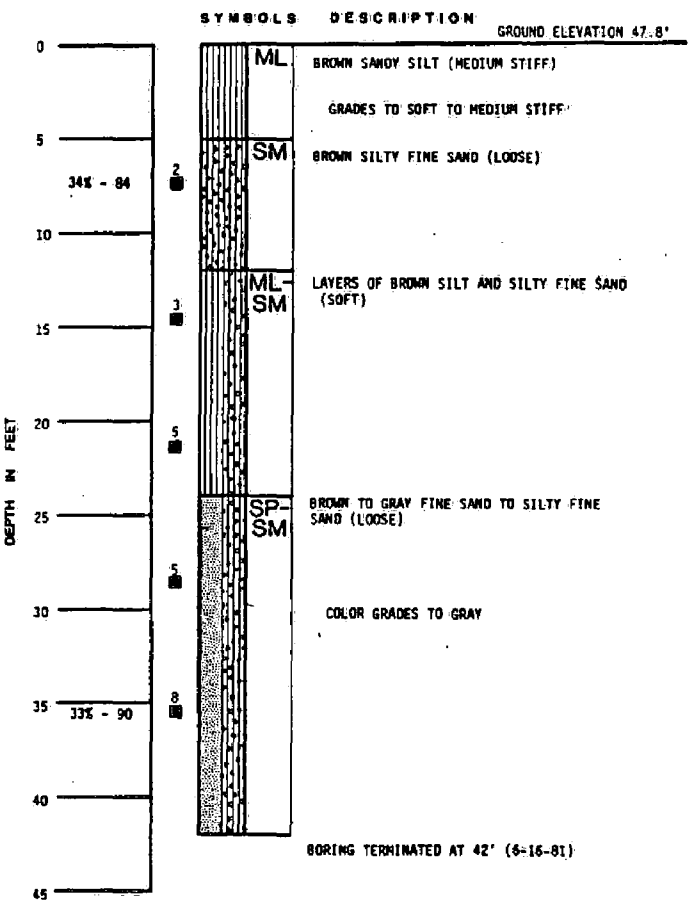
BY MDS DATE 2-18-81
CHECKED BY DTK DATE

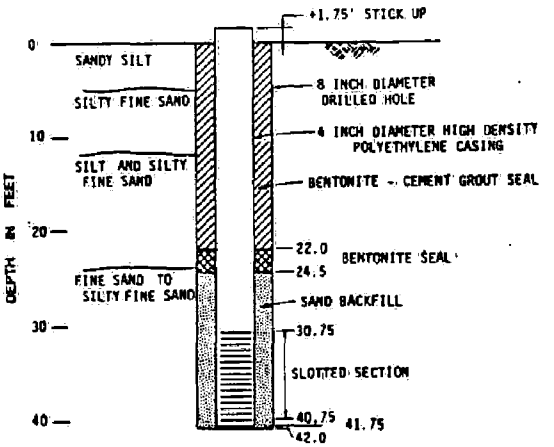
SCOEPA00015751

BORING RPW-5-D

WELL RPW-5-D

GEOLOGIC LOG





LOG OF BORING
AND
WELL COMPLETION DIAGRAM
RPW-5-D

NOTE:

DISCUSSION IN THE TEXT OF THIS REPORT IS NECESSARY FOR A PROPER UNDERSTANDING OF SUBSURFACE CONDITIONS REVEALED BY THE BORINGS.

DAMES & MOORE

FIGURE D1-38

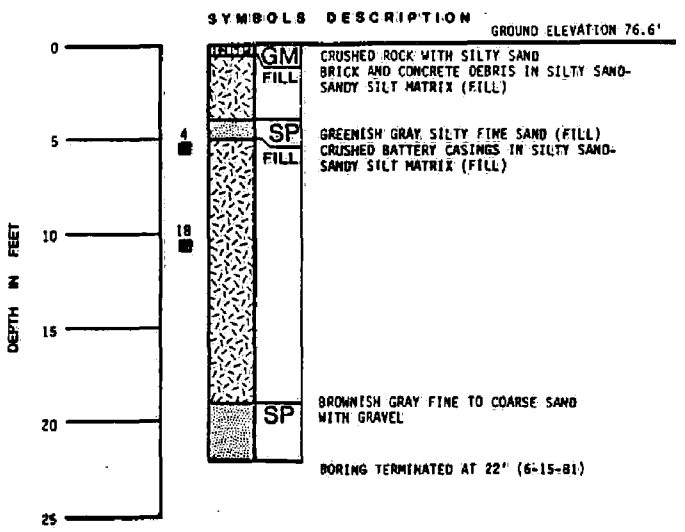
PREPARED BY MDJ DATE 9/4/81
CHECKED BY DJK DATE

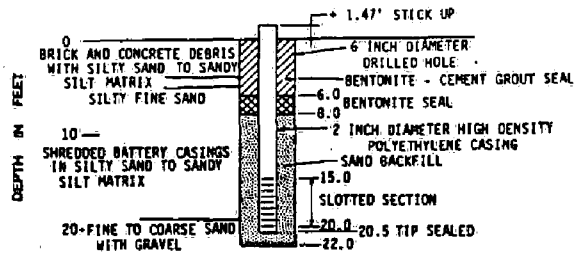
SCOEPA00015752

BORING PP-6

WELL PP-6

GEOLOGIC LOG





BY MDS DATE 6-18-81
CHECKED BY DSF DATE

LOG OF BORING
AND
WELL COMPLETION DIAGRAM
PP-6

NOTE:

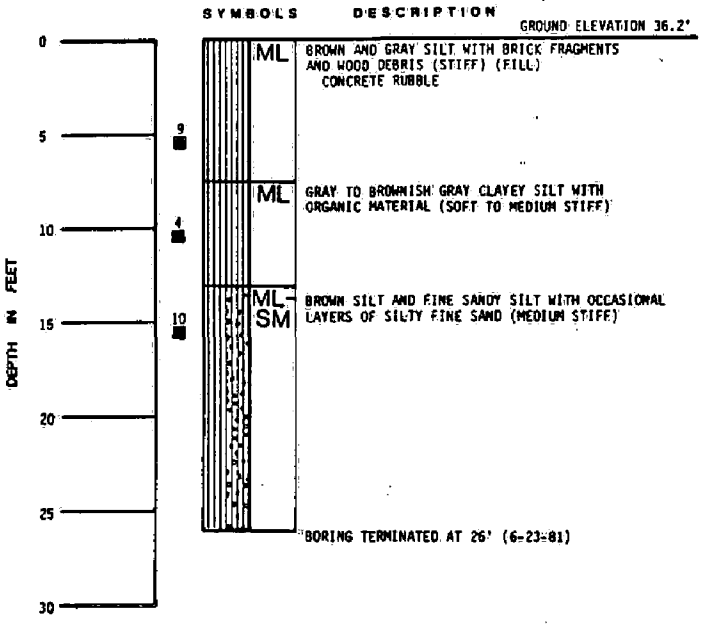
DISCUSSION IN THE TEXT OF THIS REPORT IS NECESSARY FOR A PROPER UNDERSTANDING OF SUBSURFACE CONDITIONS REVEALED BY THE BORINGS.

DAMES & MOORE

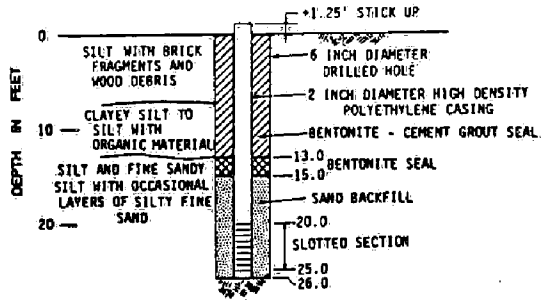
FIGURE D1-39

SCOEPA00015753

BORING PP-8



WELL PP-8



LOG OF BORING
AND
WELL COMPLETION DIAGRAM
PP-8

NOTE:

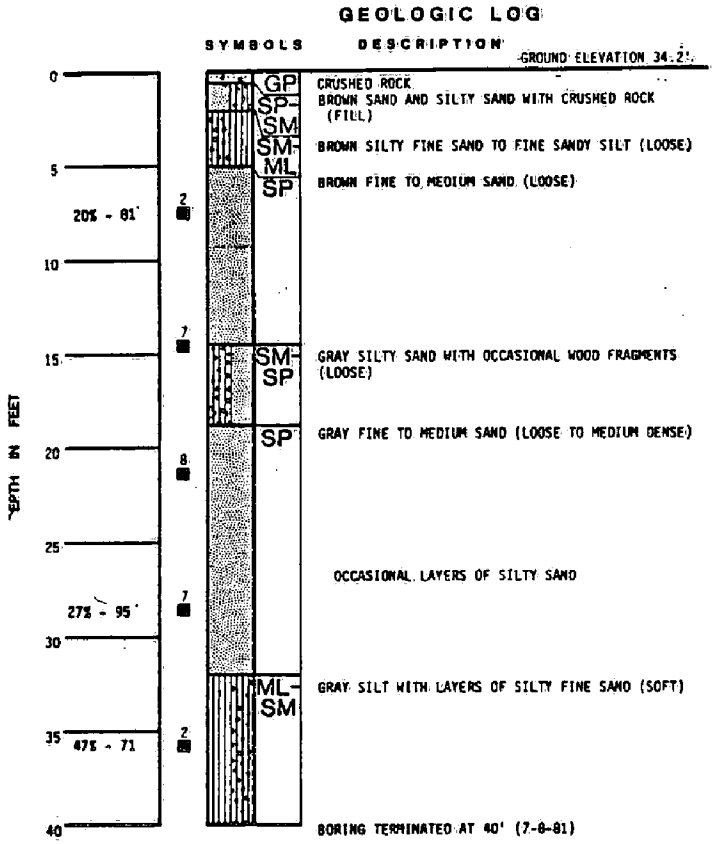
DISCUSSION IN THE TEXT OF THIS REPORT IS NECESSARY FOR A PROPER UNDERSTANDING OF SUBSURFACE CONDITIONS REVEALED BY THE BORINGS.

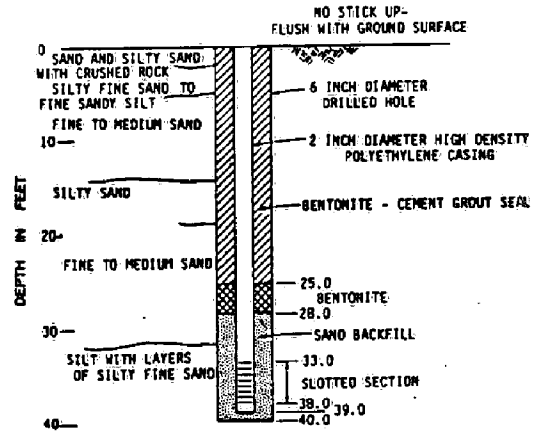
DAMES & MOORE

FIGURE D1-40

BORING PP-11

WELL PP-11





LOG OF BORING
AND
WELL COMPLETION DIAGRAM
PP-11

NOTE:

DISCUSSION IN THE TEXT OF THIS REPORT IS NECESSARY FOR A PROPER UNDERSTANDING OF SUBSURFACE CONDITIONS REVEALED BY THE BORINGS.

DAMES & MOORE

FIGURE D1-41

SCOEPA00015755

Appendix D2

APPENDIX D2

GEOPHYSICAL LOGS

APPENDIX D2

GEOPHYSICAL LOGS

INTRODUCTION

Appendix D2 includes geophysical logs for 18 wells within the study area. In some cases, more than one type of geophysical log is shown for an individual well.

Geophysical well logs can be interpreted to determine both qualitative and quantitative information on formation and ground-water properties. In ground-water studies, geophysical well logs are generally used in a qualitative sense for identification of lithology, borehole conditions, and for stratigraphic correlation. Geophysical well logs are interpreted by comparing several log signatures from a given borehole. Interpretation of geophysical well logs is non-unique due to the ambiguous nature of the log signatures and therefore an understanding of each sensing technique and supplemental information on the hydrogeologic environment (i.e., lithology and water quality) is required.

Radiation logs (natural gamma, neutron-neutron, gamma-gamma) utilize elementary particles (neutrons or gamma photons) which have the ability to penetrate matter. The natural gamma log is a passive radation log, while the neutron-neutron and gamma-gamma logs are induced radiation logs. The following is a brief description of the operation principles and interpretation guidelines of radiation logs used in this study.

Natural Gamma (Nat-γ): Measures the amount of natural gamma radiation emitted by the materials being investigated. Its chief use is in the identification of lithology, and is effective in open, cased, liquid or air-filled boreholes. The usual gamma-emitting radioisotopes found in rocks include potassium 40 and the daughter produces of the decay series of uranium and thorium. Clays tend to concentrate heavy radionuclides by ion-exchange processes and therefore, clays and clay-rich materials generally have a high level of gamma activity.

SCOEPA00015758

In most environments, the natural gamma log records a positive response (high count rate) to clay content. By contrast, the natural gamma log shows a low response (low count rate) to clean quartz sands.

Neutron-Neutron (n-n): Considered to be the most reliable moisture indicator of the radiation logs. A source emits neutrons into the borehole environment. The neutrons interact with the surrounding deposits and are degraded in energy. The degradational effects are then measured with an appropriate detector. Hydrogen atoms are highly effective in reducing the energy of the neutrons and therefore, low count rates are indicative of increase water content above the water table and increased porosity below the water table.

Gamma-Gamma ($\gamma - \gamma$): Measures the intensity of gamma radiation that is back scattered from a gamma source. Emitted gamma photons are degraded in proportion to the number of electrons in the surrounding deposits. The degrational effects are measured with an appropriate detector. Since electron density is proportional to bulk density, the gamma-gamma log is indicative of the density of the surrounding deposits. Most commercial gamma-gamma logs are plotted with the count rates reversed, so that decreases in density (increased count rate) will plot toward the left and can readily be associated with indications of increased porosity from the neutron logs (decreased count rate). The gamma-gamma logs for this study are plotted in this reversed count rate manner.

SCOEPA00015759

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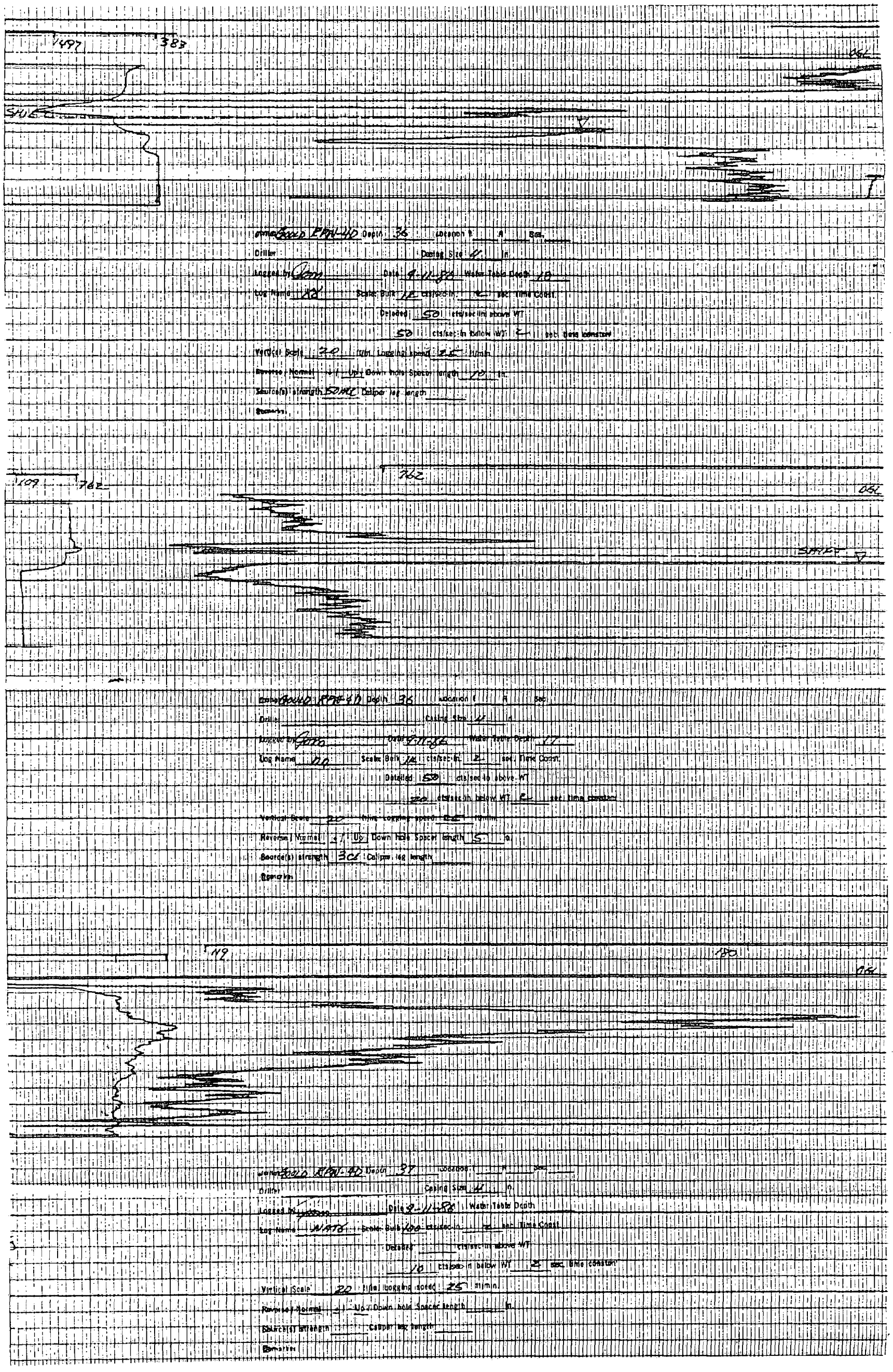


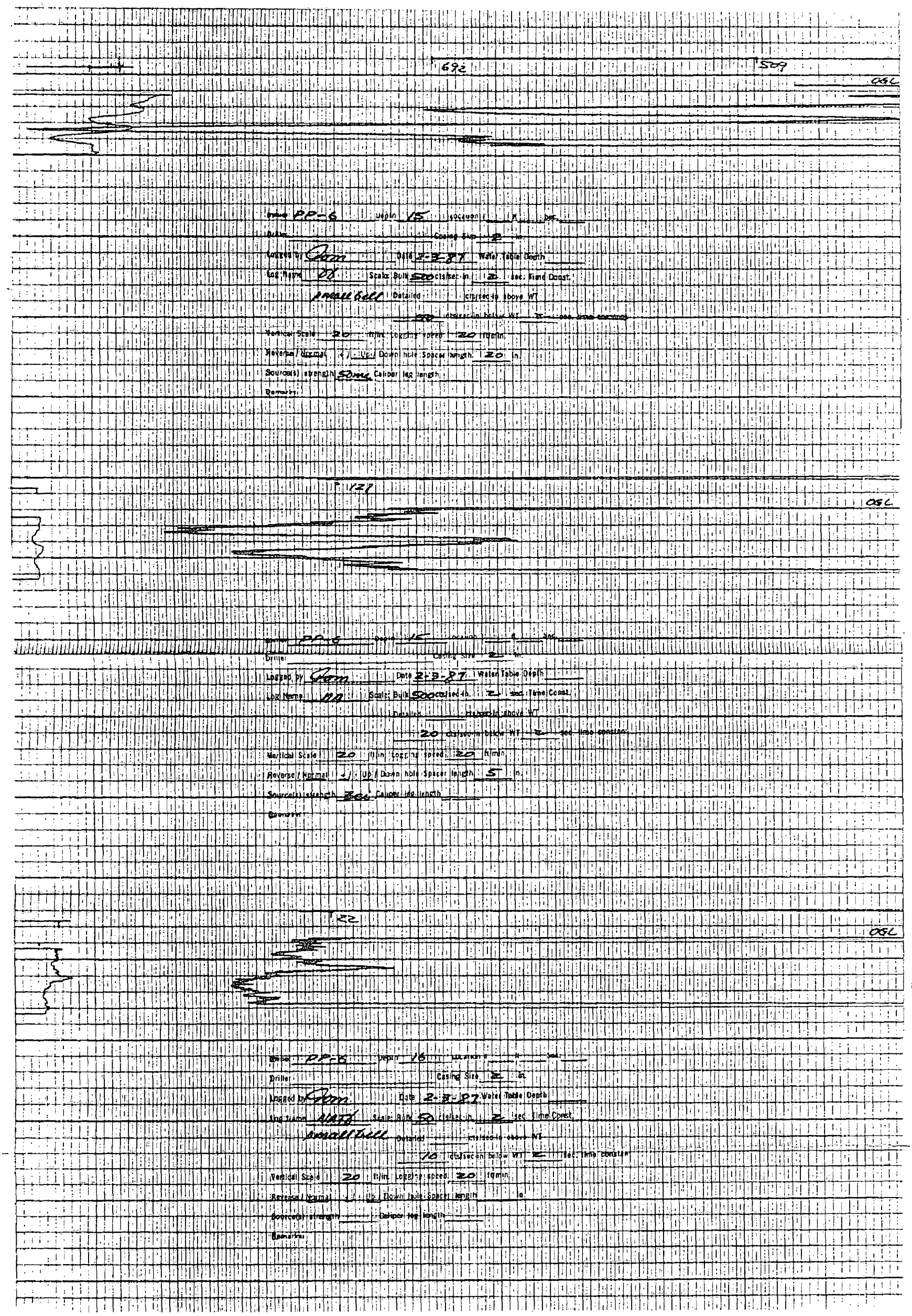
RPW-4D
Dames & Moore

FIG. D2-1

SCOEPA00015760

Drawn by Date Designed by Date QA/QC by Date App. by Date Rev By Date 1. 2. 3. 4. 5. 6. 7.

Job No. 11831-034



PP-6

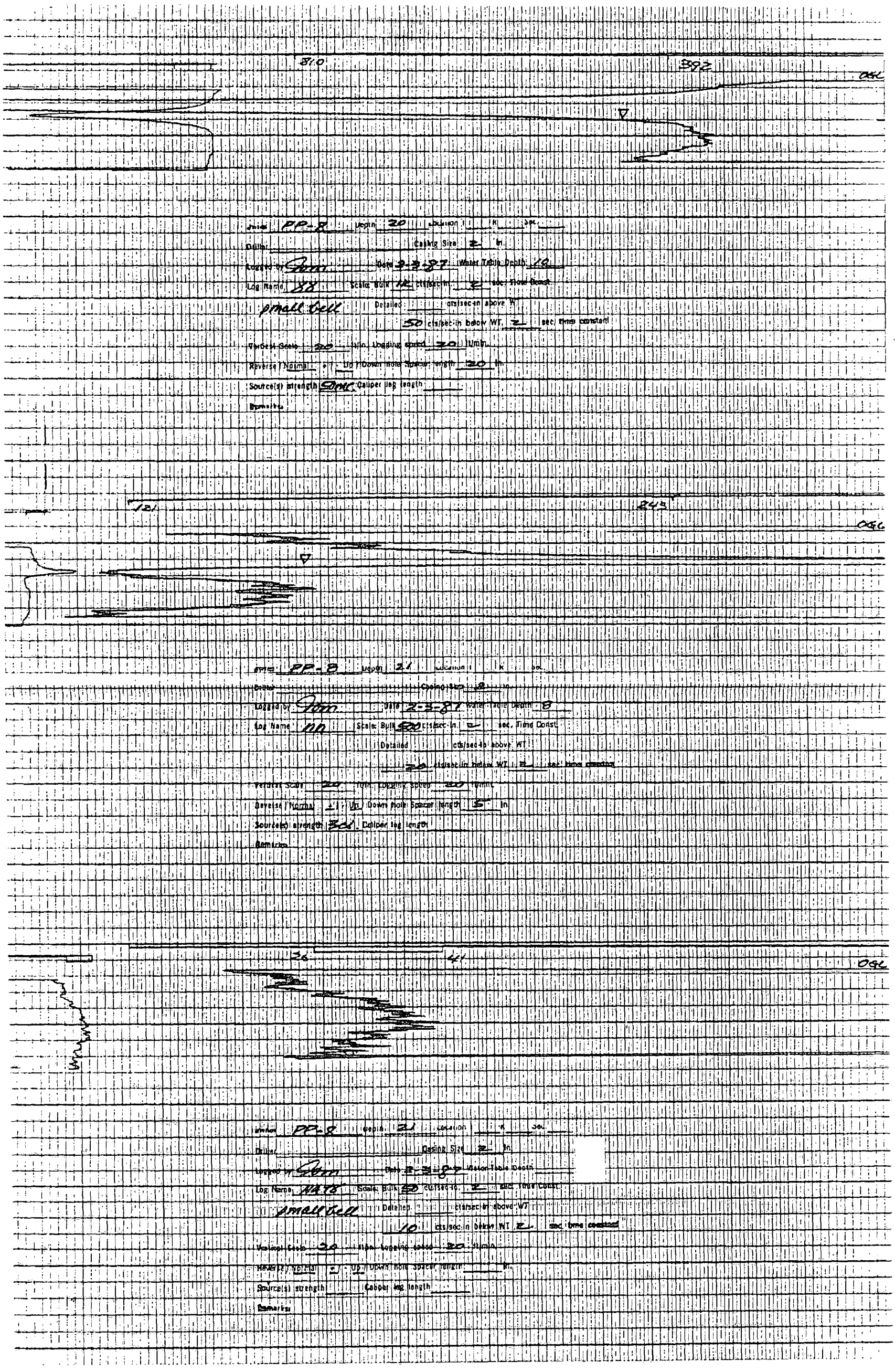
Dames & Moore

FIG. D2-2

SCOEPA00015761

Drawn by Date Designed by Date QA/QC by Date App. by Date Rev. By Date 1. 2. 3. 4. 5. 6. 7.

Job No. 11831-034



PP-8

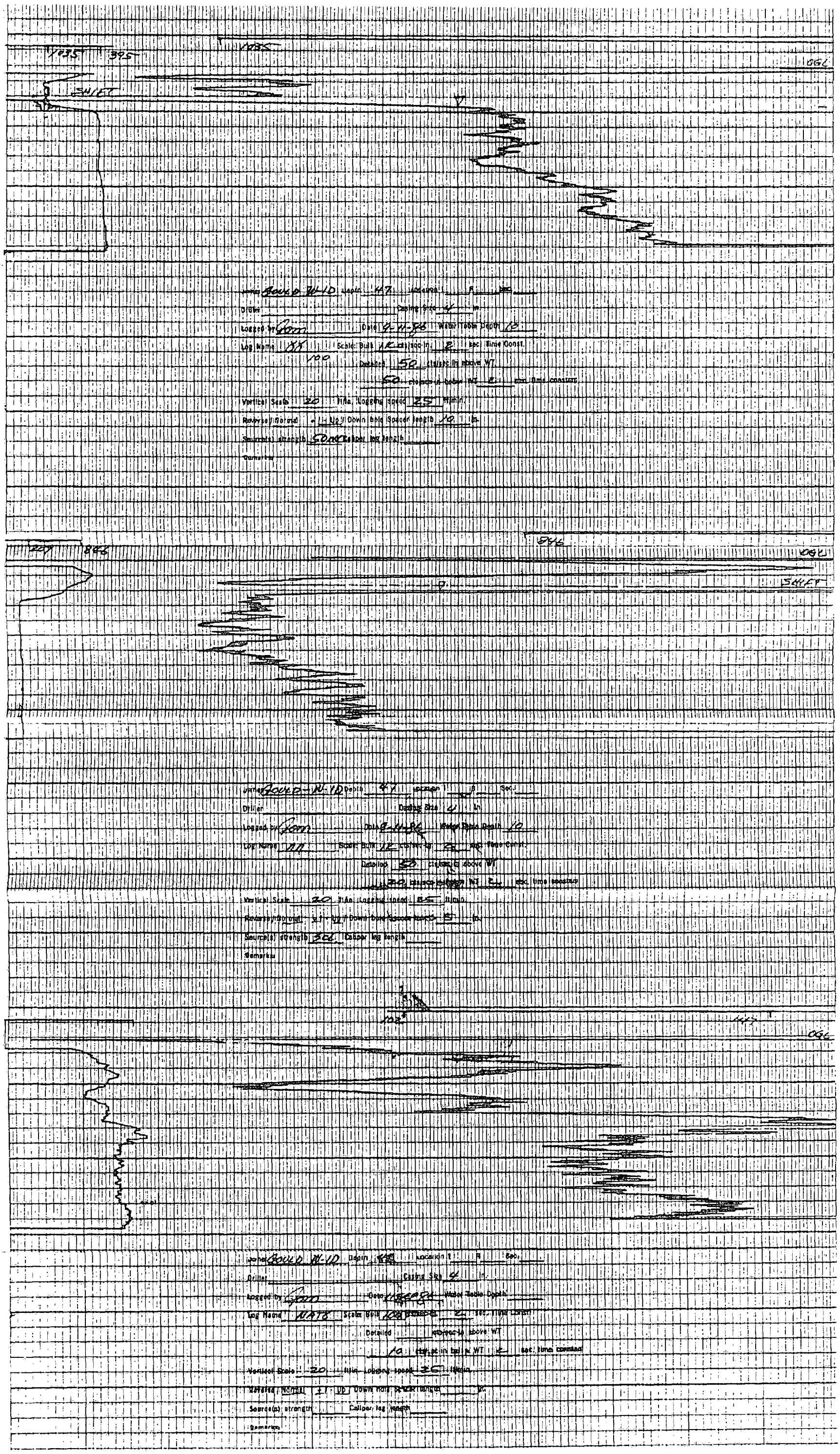
Dames & Moore

FIG. D2-3

SCOEPA00015762

Drawn by Date Designed by Date QA/QC by Date App. by Date Rev. By 1. 2. 3. 4. 5. 6. 7.

Job No. 11831-034

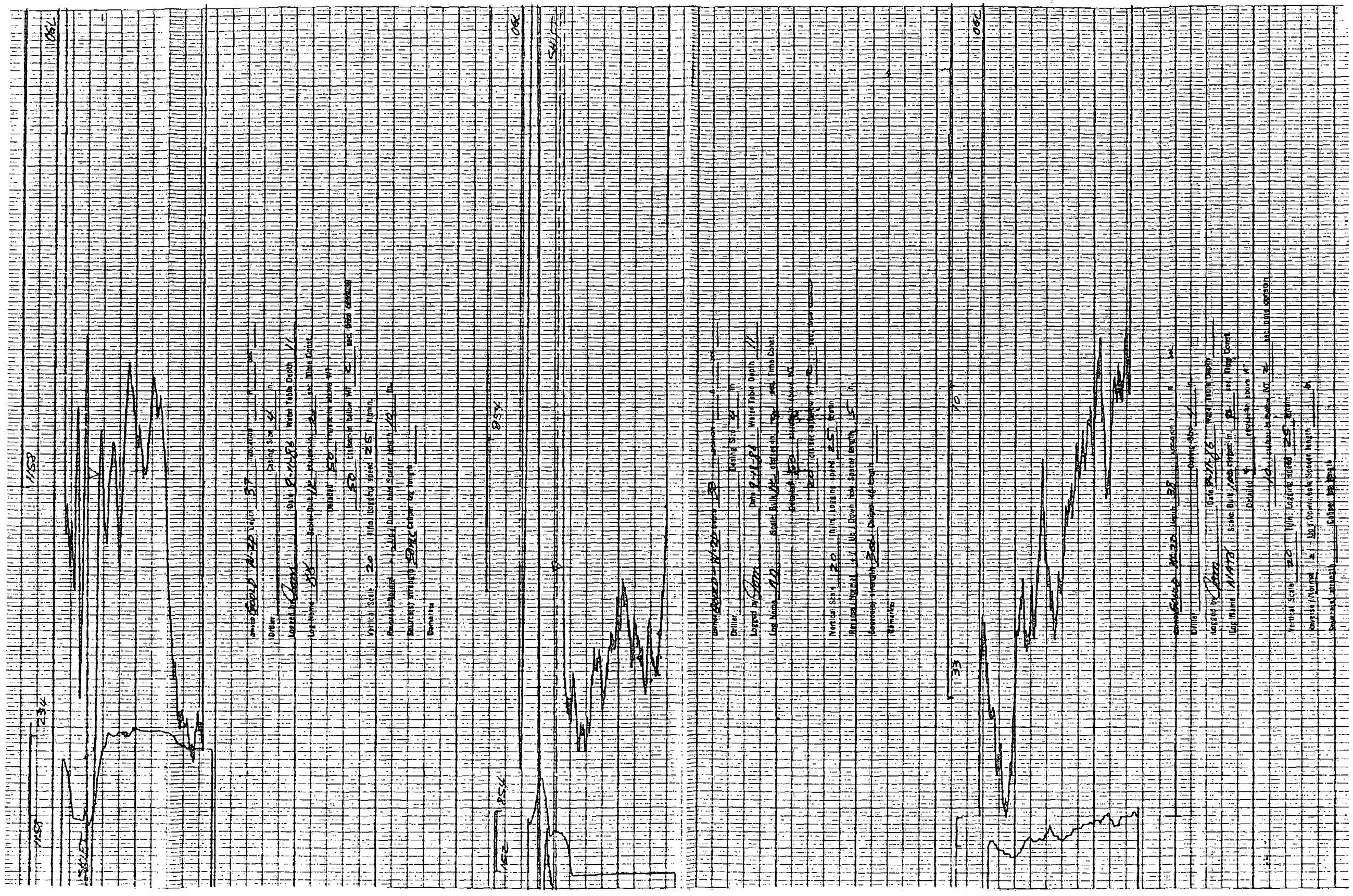


W-1D

Dames & Moore

FIG. D2-4

SCOEPA00015763



Drawn by Date Designed by Date QA/QC by Date App. by Date

W-2D

Dames & Moore

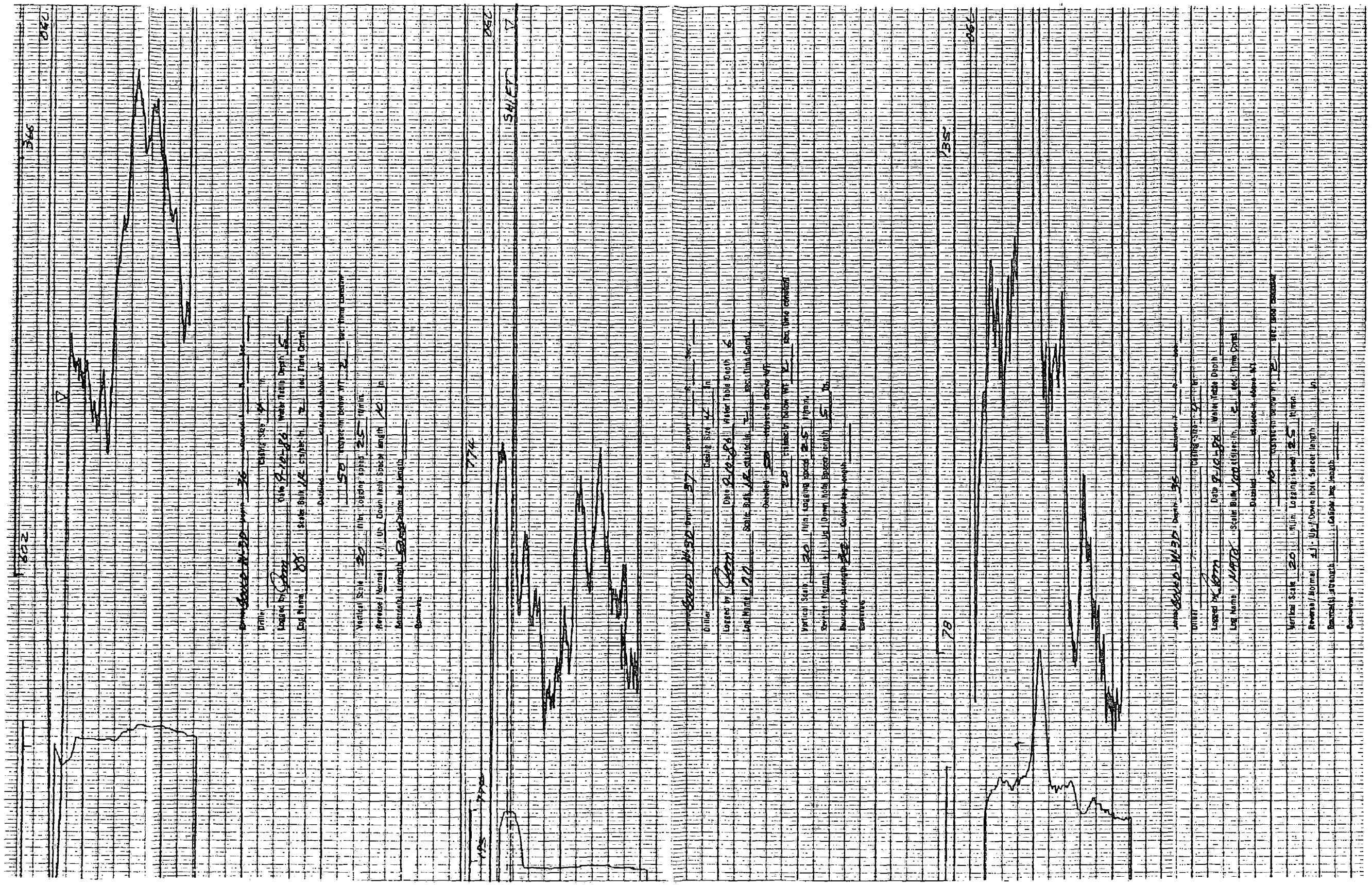
Job No. 11831-034

FIG. D2-5

SCOEPA00015764

Drawn by Date Designed by Date QA/QC by Date Date App. by Date

By 1. 2. 3. 4. 5. 6. 7.



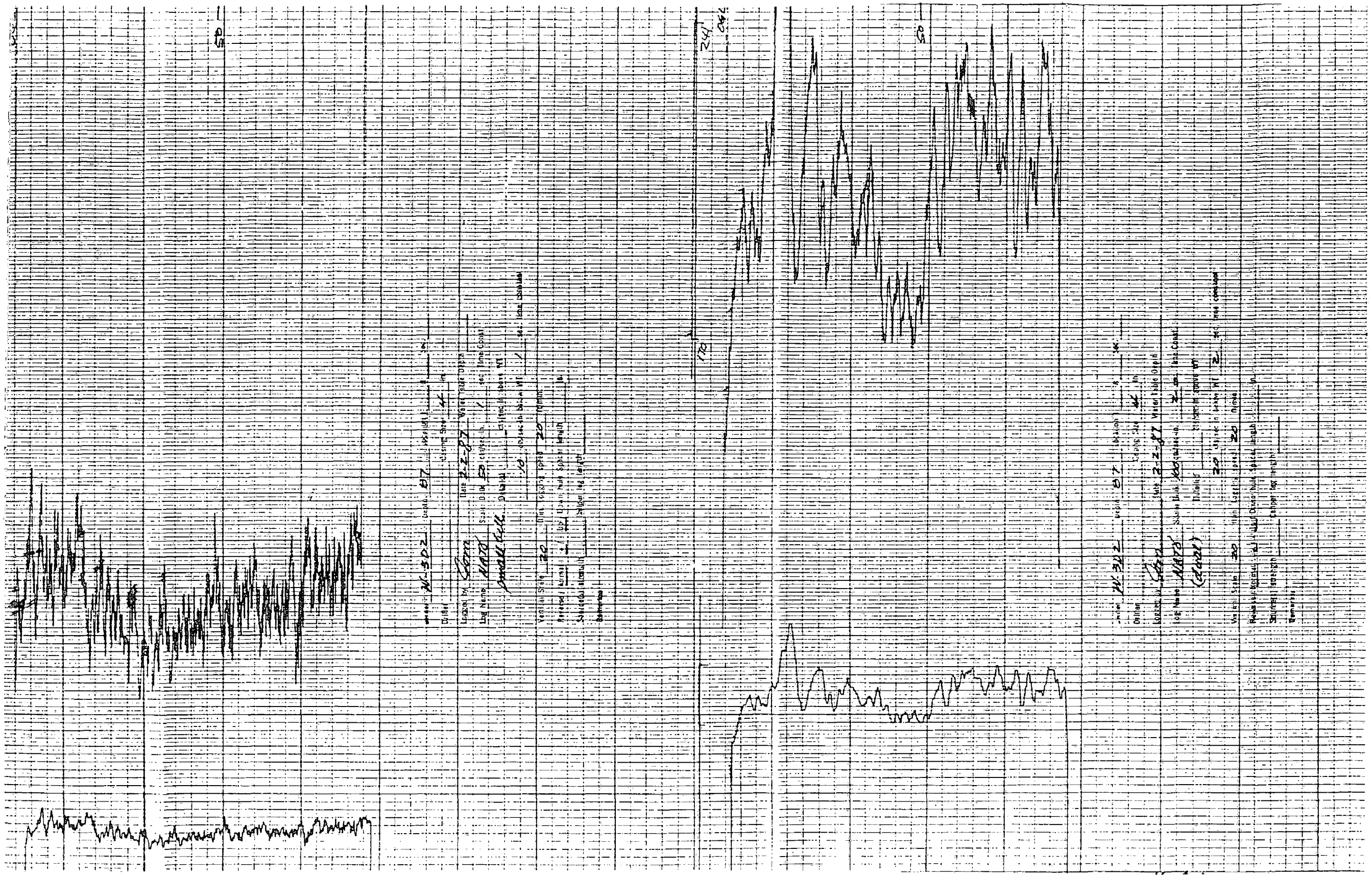
W-3D

Dames & Moore

Job No. 11831-034

FIG. D2-6

SCOEPA00015765



W-3D2

Dames & Moore

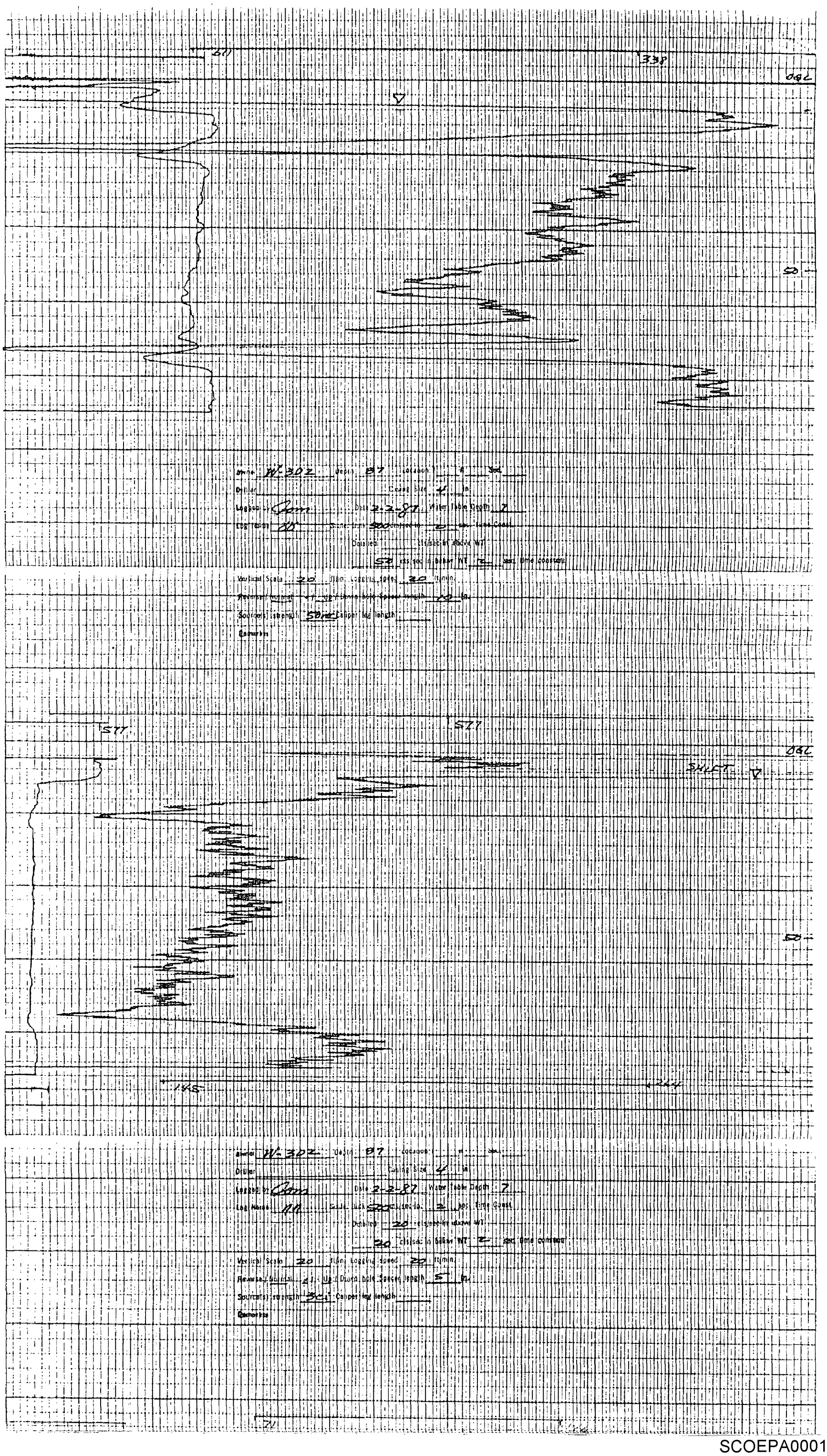
FIG. D2-7

SCOEPA00015766

SCOEPA00015767

Drawn by Date Designed by Date QA/QC by Date App. by Date

Rev. By Date 1. 2. 3. 4. 5. 6. 7.



SCOEPA00015768

Drawn by Date Designed by Date QA/QC by Date App. by Date

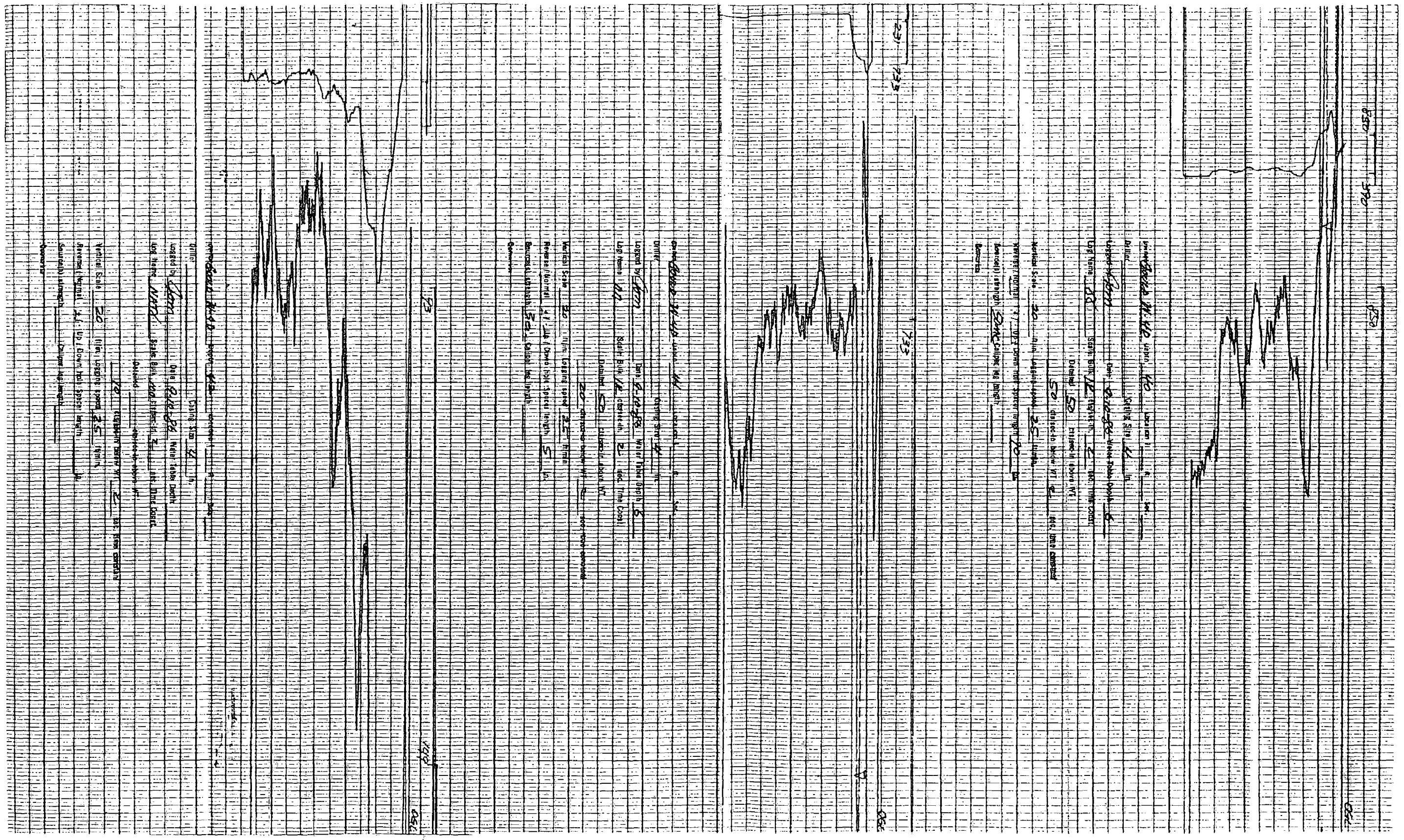
Rev By 1. 2. 3. 4. 5. 6. 7.
Date

Job No. 11831-034

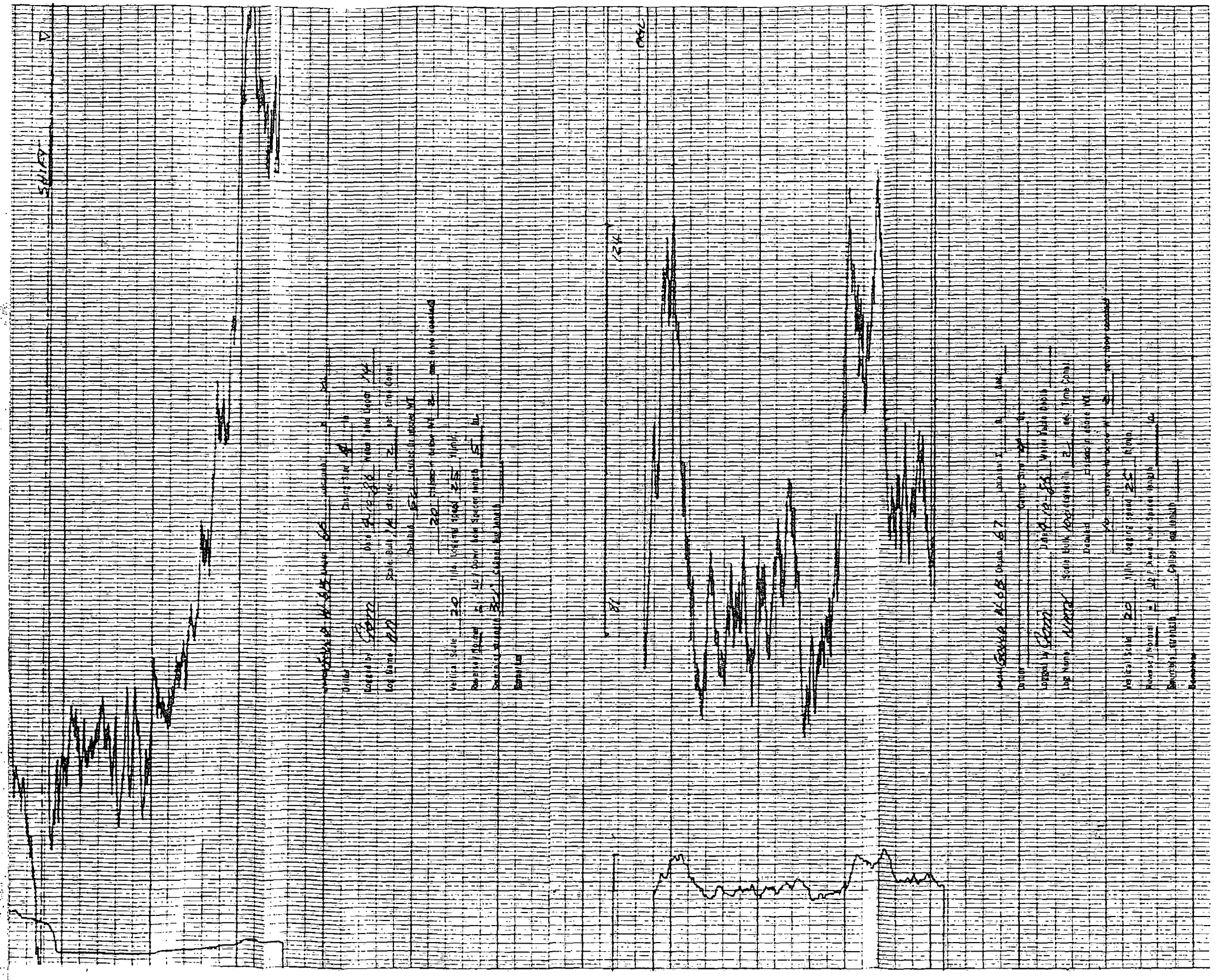
FIG. D2-8

W-4D

Dames & Moore



SCOEPA00015769



W-6B

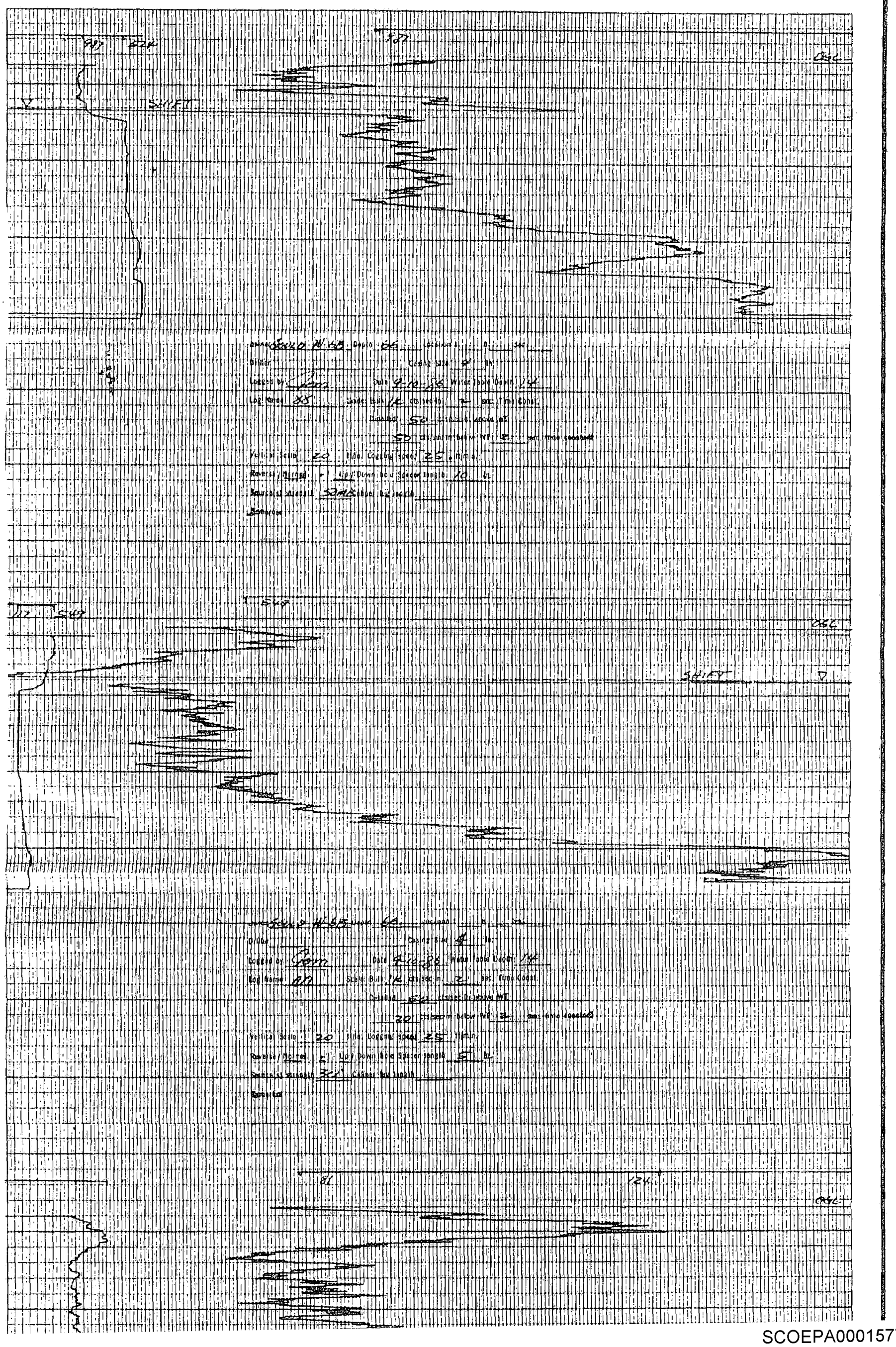
Dames & Moore

FIG. D2-9

SCOEPA00015770

Drawn by Date Designed by Date QA/QC by Date App. by Date Rev By Date 1. 2. 3. 4. 5. 6. 7.

Job No. 11831-034

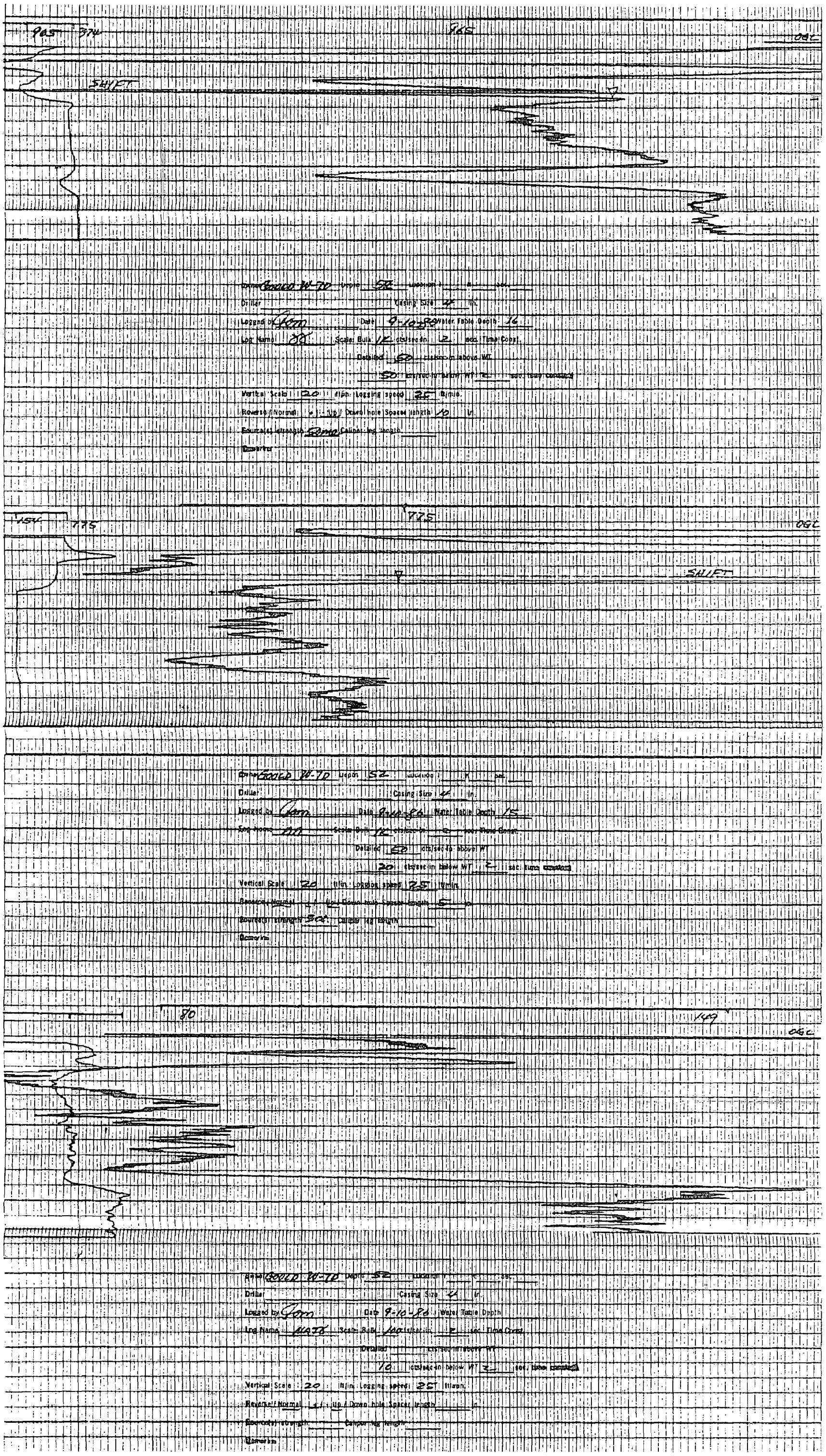


SCOEPA00015771

Drawn by Date Designed by Date QA/QC by Date App. by Date

Rev By 1. 2. 3. 4. 5. 6. 7.
Date

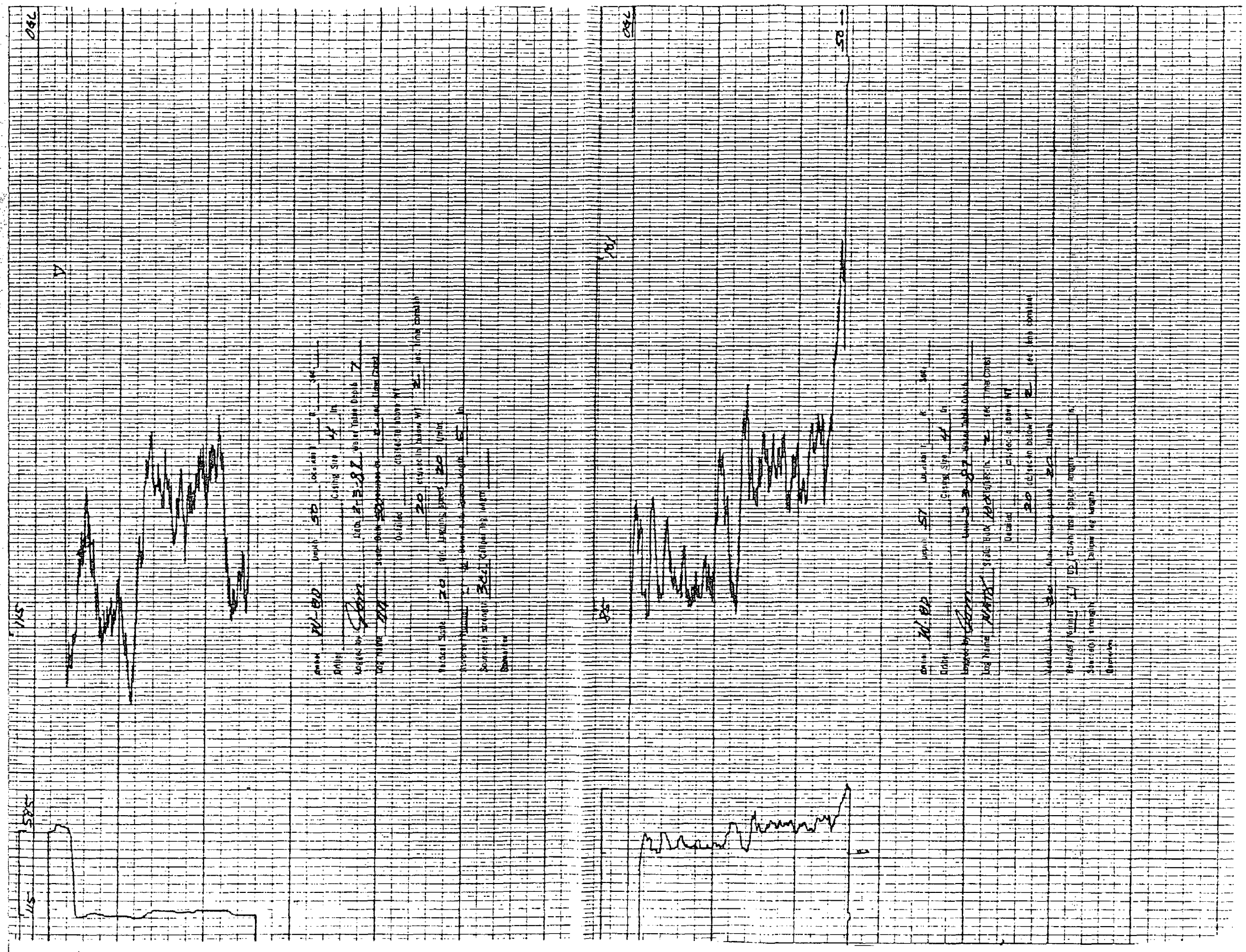
Job No. 11831-034



W-7D
Dames & Moore

FIG. D2-10

SCOEPA00015772



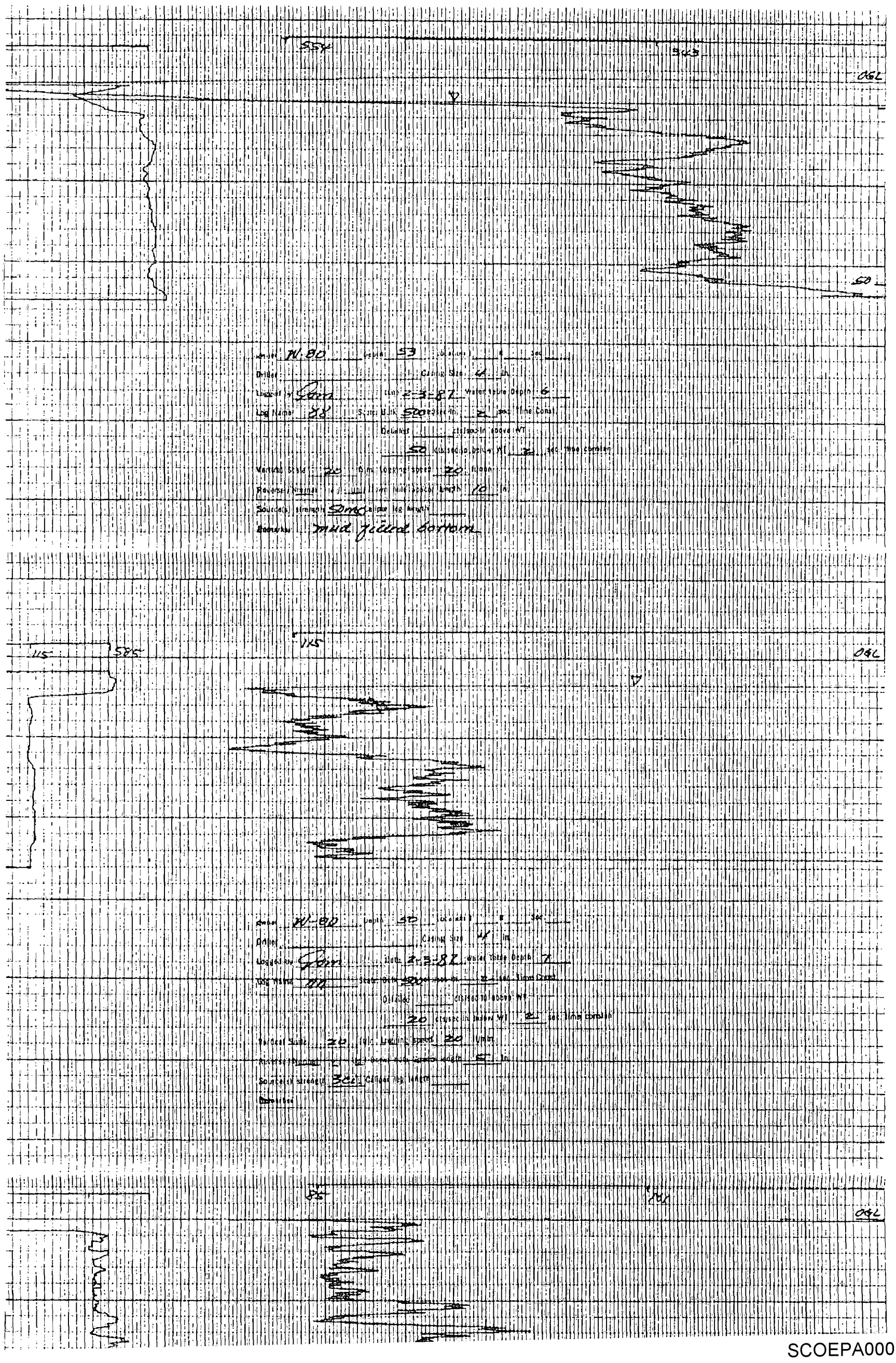
W-8D

Dames & Moore

SCOEPA00015773

Drawn by Date Designed by Date QA/QC by Date App. by Date Rev. By Date 1. 2. 3. 4. 5. 6. 7.

Job No. 11831-034



SCOEPA00015774

Drawn by Date Designed by Date QA/QC by Date App. by Date Rev By 1. 2. 3. 4. 5. 6. 7. Date

Job No. 11831-034

668

348

Boring W-8D Depth 447 Location N E Sec.

Driller Casing Size 4 in.

Logged by Date 9-10-86 Water Table Depth 9

Log Name 88 Scale: Bulk 10 cts/sec-in 2 sec. Time Const.

Detailed cts/sec-in above WT

50 cts/sec-in below WT 2 sec. time constant

Vertical Scale 20 ft/in. Logging speed 25 ft/min.

Reverse / Normal +/- Up / Down hole Spacer length 10 in.

Source(s) strength Caliper log length

Remarks

656

446

SHIFT 7

Boring W-8D Depth 447 Location N E Sec.

Driller Casing Size 4 in.

Logged by Date 9-10-86 Water Table Depth 9

Log Name 88 Scale: Bulk 10 cts/sec-in 2 sec. Time Const.

Detailed 50 cts/sec-in above WT

20 cts/sec-in below WT 2 sec. time constant

Vertical Scale 20 ft/in. Logging speed 25 ft/min.

Reverse / Normal + / - Up / Down hole Spacer length 5 in.

Source(s) strength Caliper log length

Remarks

88

1960

Boring W-8D Depth 447 Location N E Sec.

Driller Casing Size 4 in.

Logged by Date 9-10-86 Water Table Depth

Log Name 1447A Scale: Bulk 100 cts/sec-in sec. Time Const.

Detailed cts/sec-in above WT

10 cts/sec-in below WT 2 sec. time constant

Vertical Scale 20 ft/in. Logging speed 25 ft/min.

Reverse / Normal +/- Up / Down hole Spacer length in.

Source(s) strength Caliper log length

Remarks

W-8D
Dames & Moore

FIG. D2-12

SCOEPA00015775

Drawn by Date Designed by Date QA/QC by Date App. by Date Rev By Date 1. 2. 3. 4. 5. 6. 7.

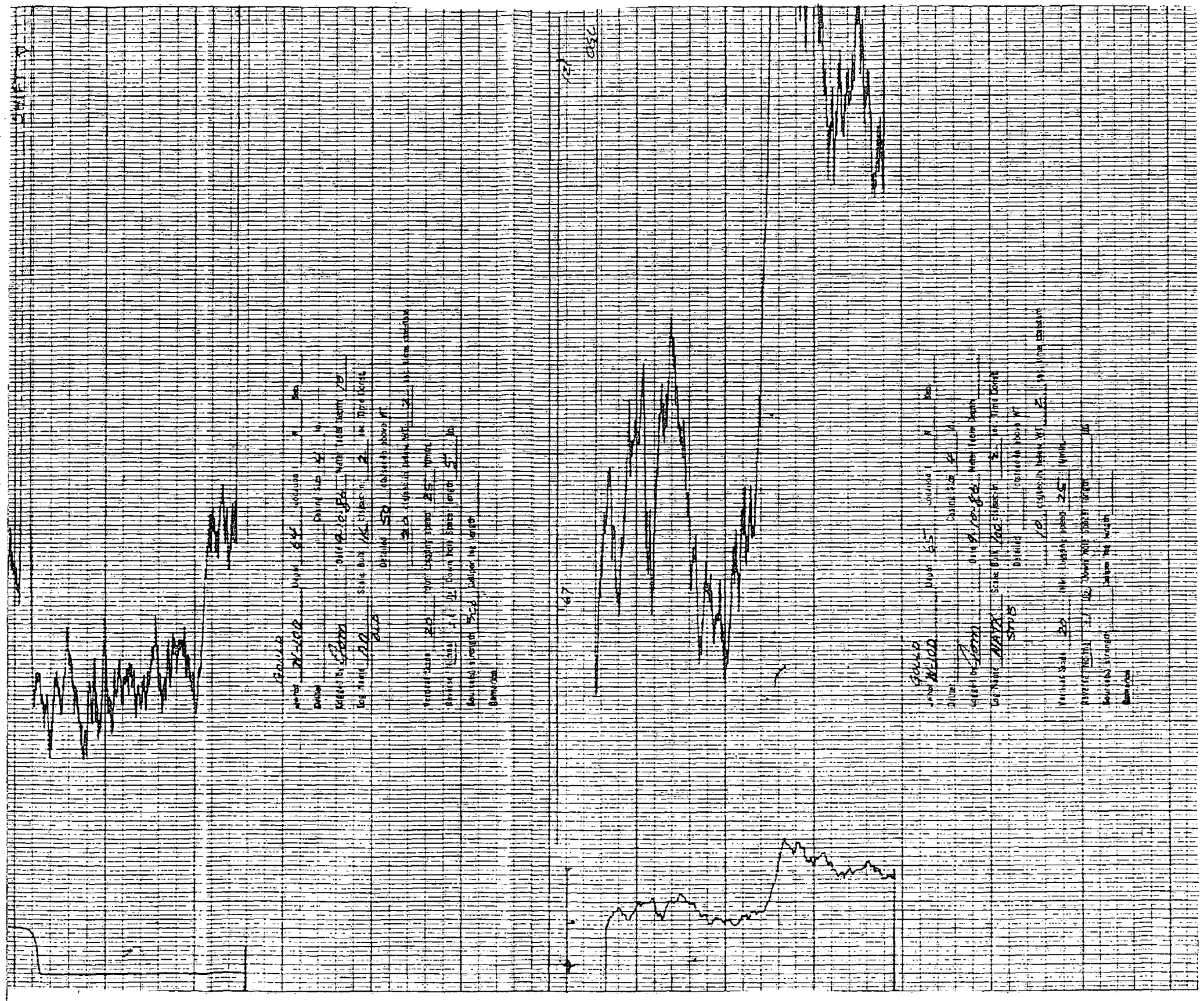
Job No. 11831-034

W-9D

Dames & Moore

FIG. D2-13

SCOEPA00015776



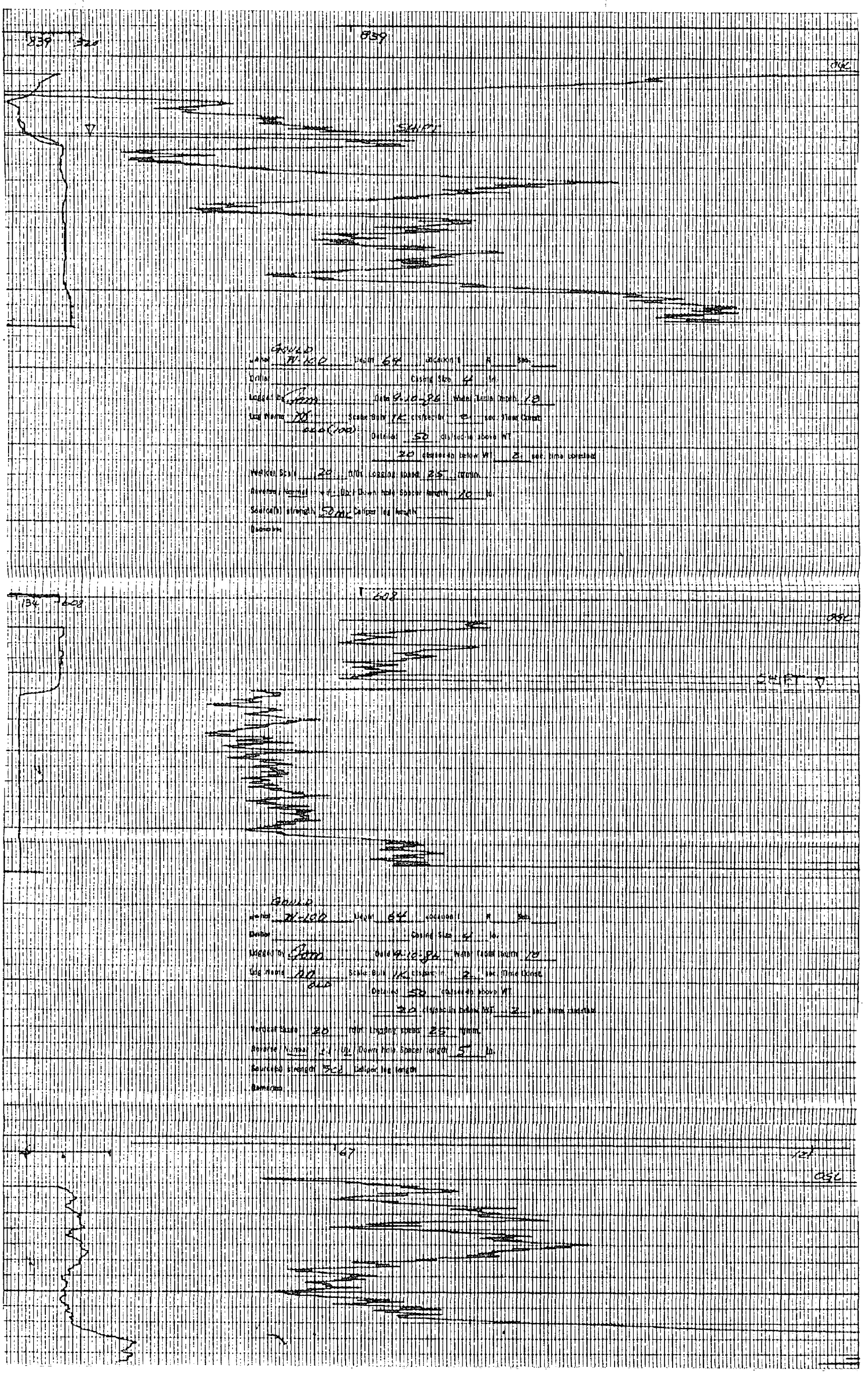
W-10D
Dames & Moore

FIG. D2-14

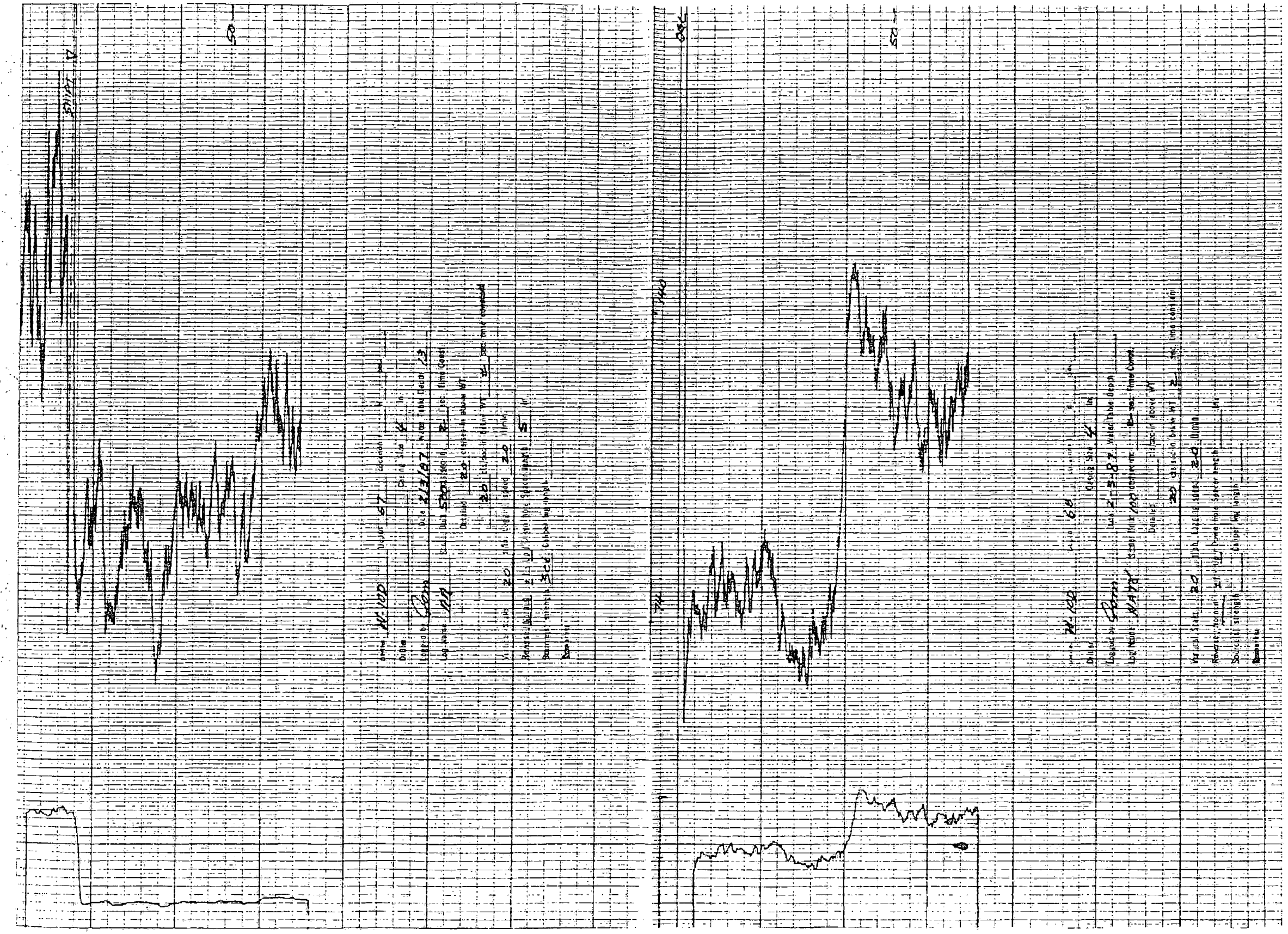
SCOEPA00015777

Drawn by Date Designed by Date QA/QC by Date App. by Date Rev. By Date 1. 2. 3. 4. 5. 6. 7.

Job No. 11831-034



SCOEPA00015778



W-10D

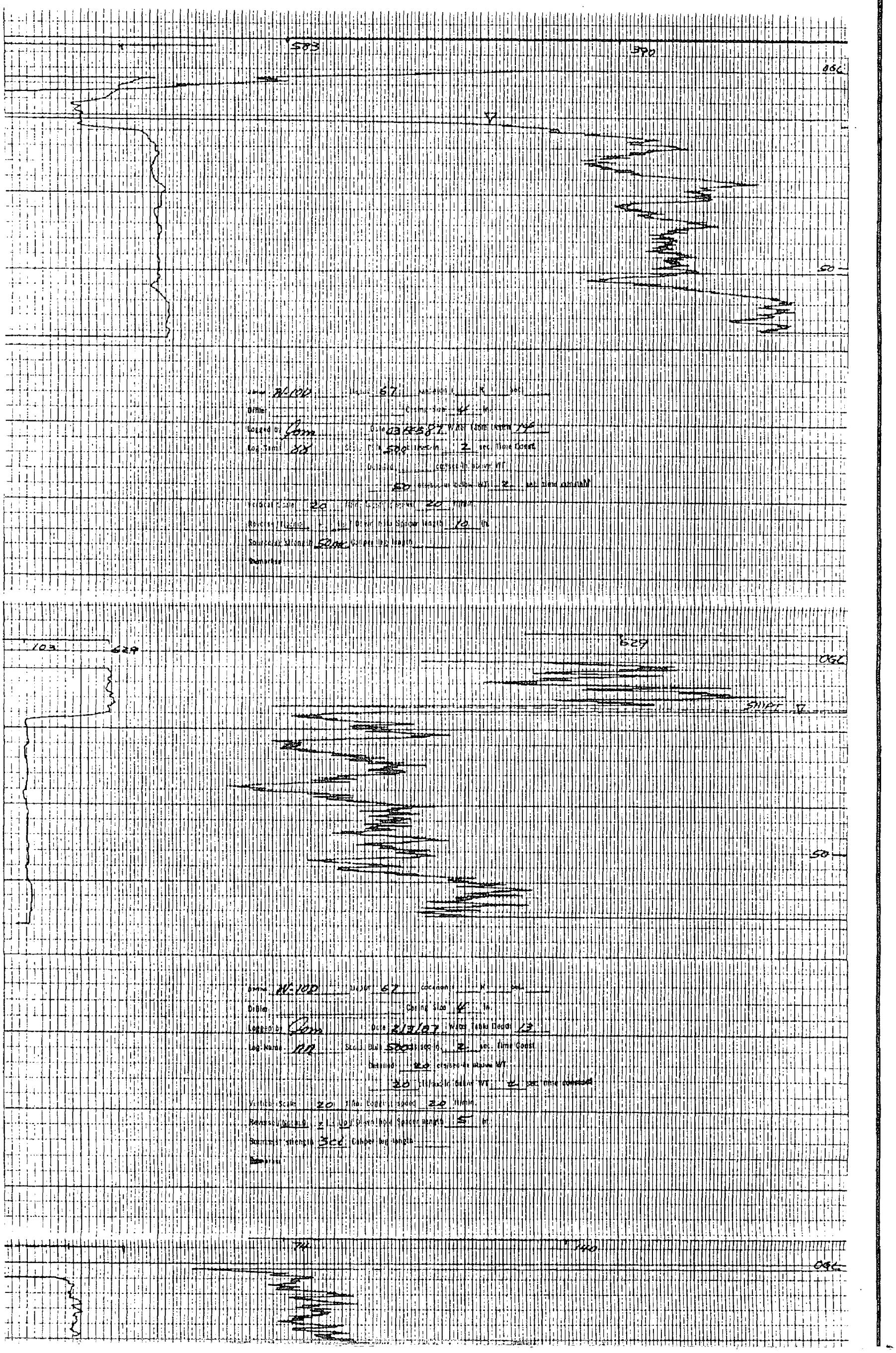
Dames & Moore

FIG. D2-15

SCOEPA00015779

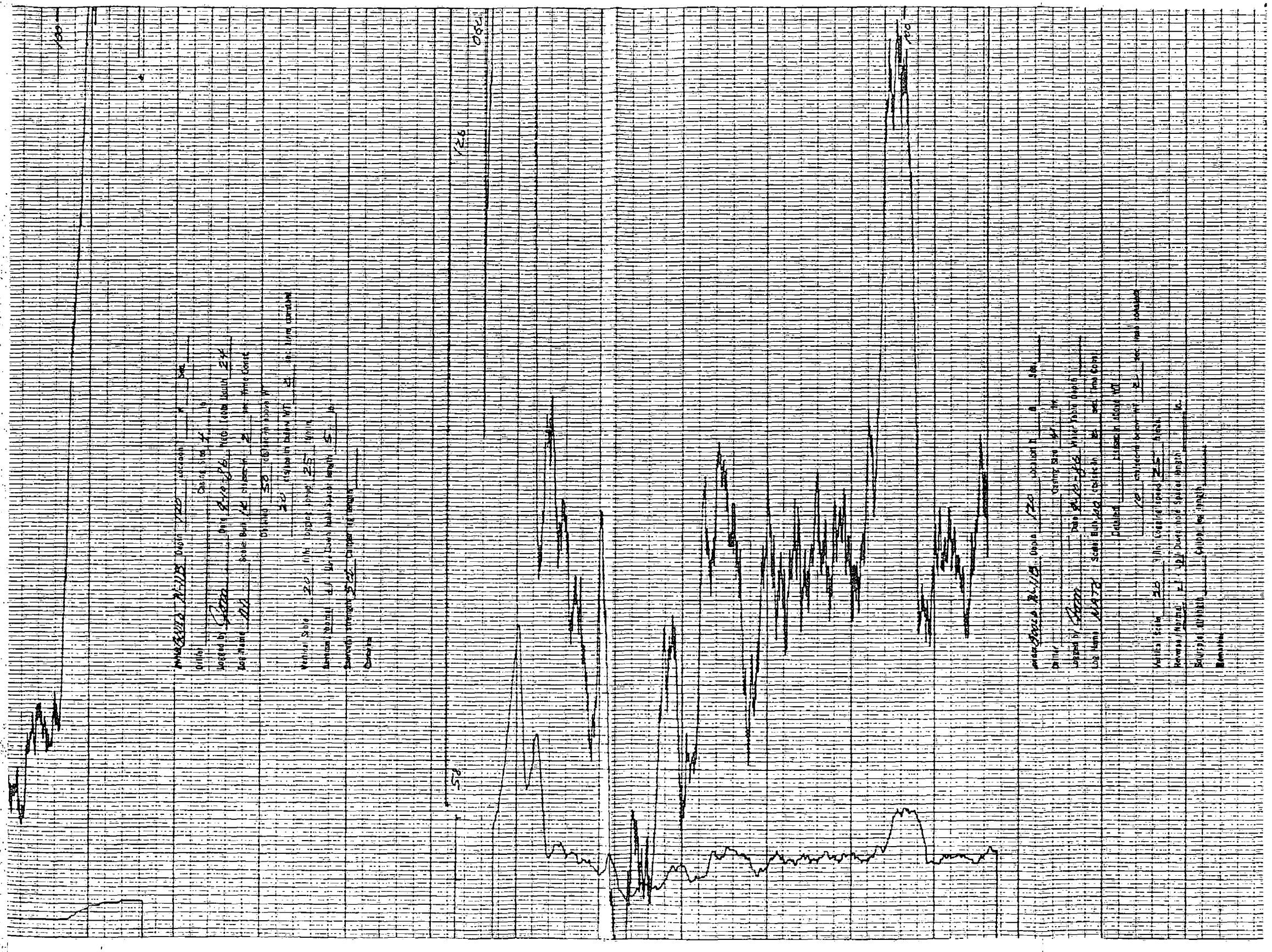
Drawn by Date Designed by Date QA/QC by Date App. by Date Rev. By Date 1. 2. 3. 4. 5. 6. 7.

Job No. 11831-034



SCOEPA00015780

SCOEPA00015781



W-11B
Dames & Moore

FIG. D2-16

Drawn by Date Designed by Date QA/QC by Date App. by Date Rev By 1. 2. 3. 4. 5. 6. 7. Date

Job No. 11831-034

1060' 517 1160' 1160

SHIFT

Driller: Grad # 115 Helper: 119 Location

Offset Casing Size: 4½ in.

Logged by: Glenn Date: 9-10-96 Water table depth: 24'

Log Name: HX Scale: Hori. 1" = 5 ft/sec/in Vert. 1" = 2 sec. filter Const.

Doubled: 50 ft/sec/in Offset WT 2 sec. time constant

50 ft/sec Offset HT

Vertical Scale: 20' Hole logging speed: 25' ft/min

Measure / Annual -1 Log / Down hole Spacer length 10 ft.

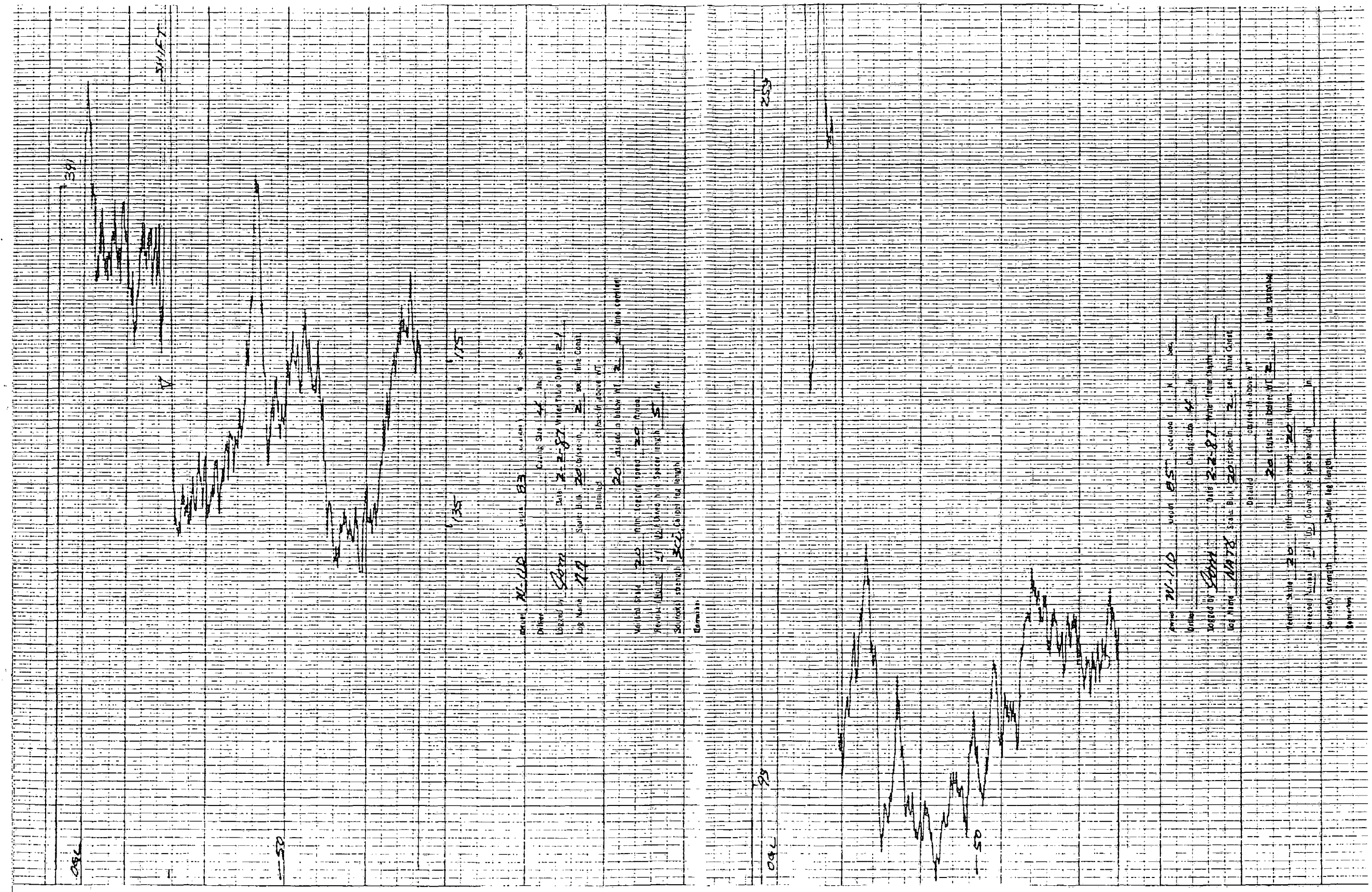
Source(s) strength: 50 mg Copper leg length

Remarks

119 523 523 650

SHIFT

SCOEPA00015782



W-11D

Dames & Moore

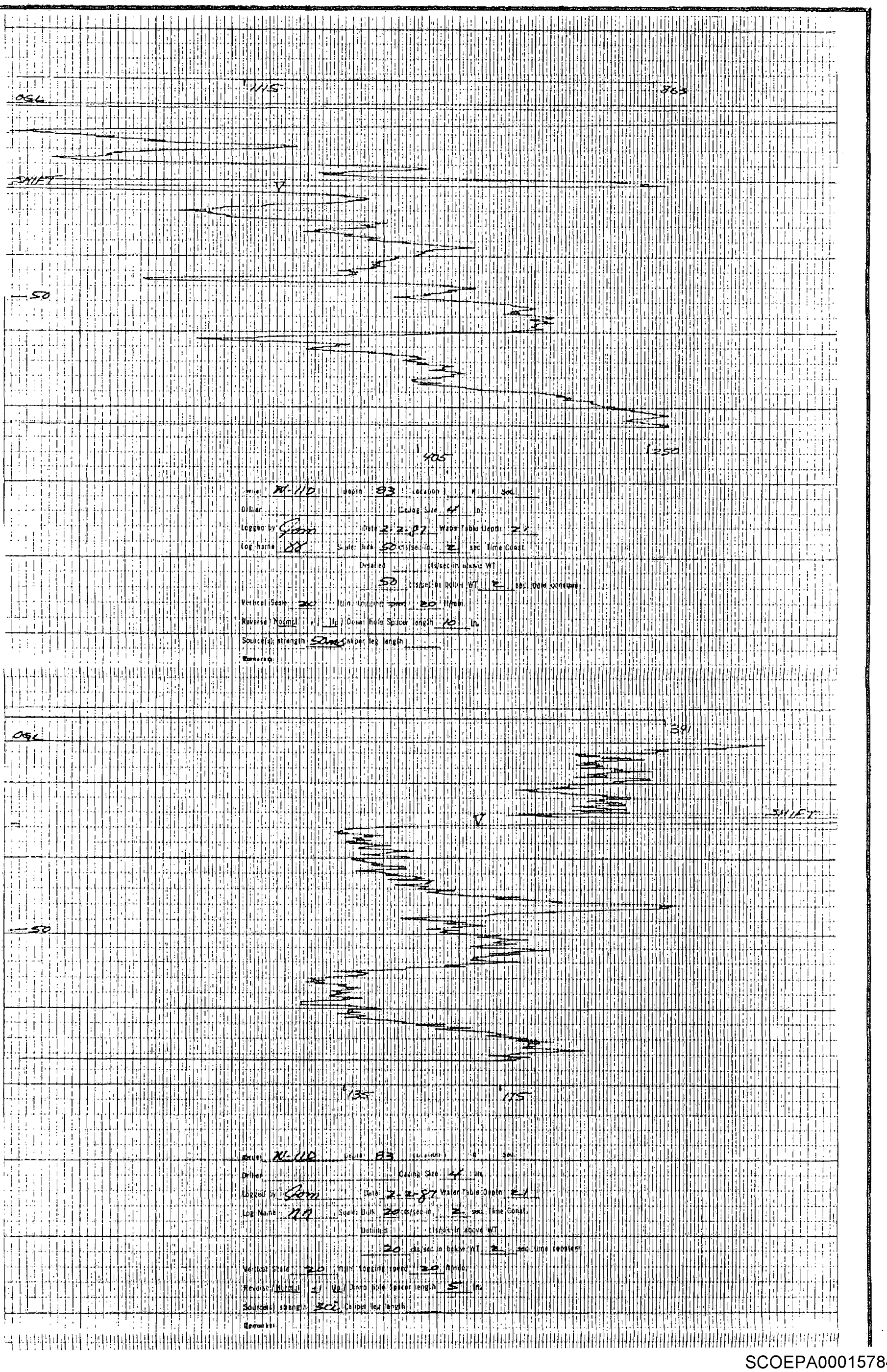
FIG. D2-17

SCOEPA00015783

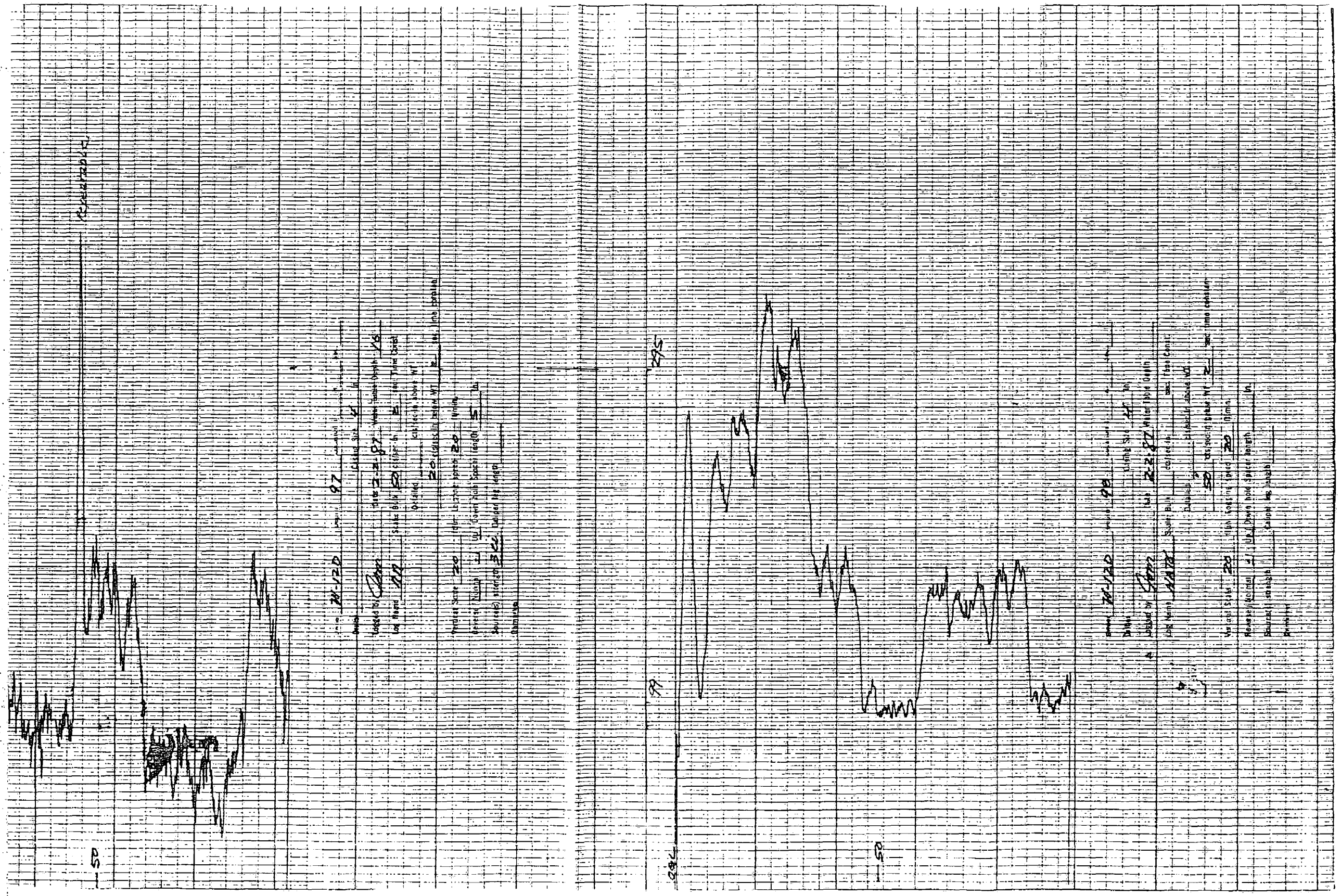
Drawn by Date Designed by Date QA/QC by Date App. by Date

Rev. By Date 1. 2. 3. 4. 5. 6. 7.

Job No. 11831-034



SCOEPA00015784



W-12D

Dames & Moore

FIG. D2-18

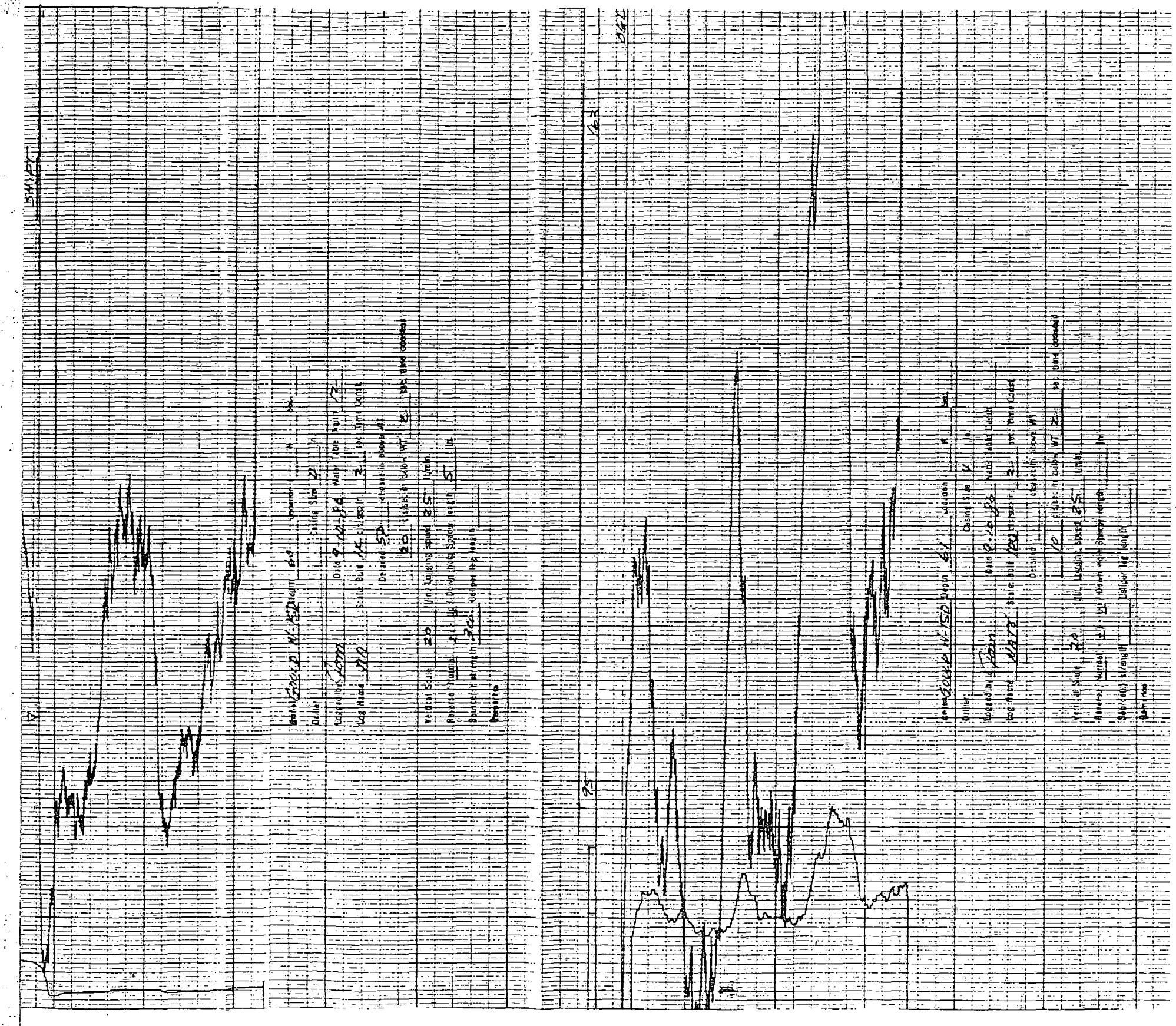
SCOEPA00015785

Drawn by Date Designed by Date QA/QC by Date App. by Date

Rev. By Date 1. 2. 3. 4. 5. 6. 7.

Job No. 11831-034

SCOEPA00015786



W-15D

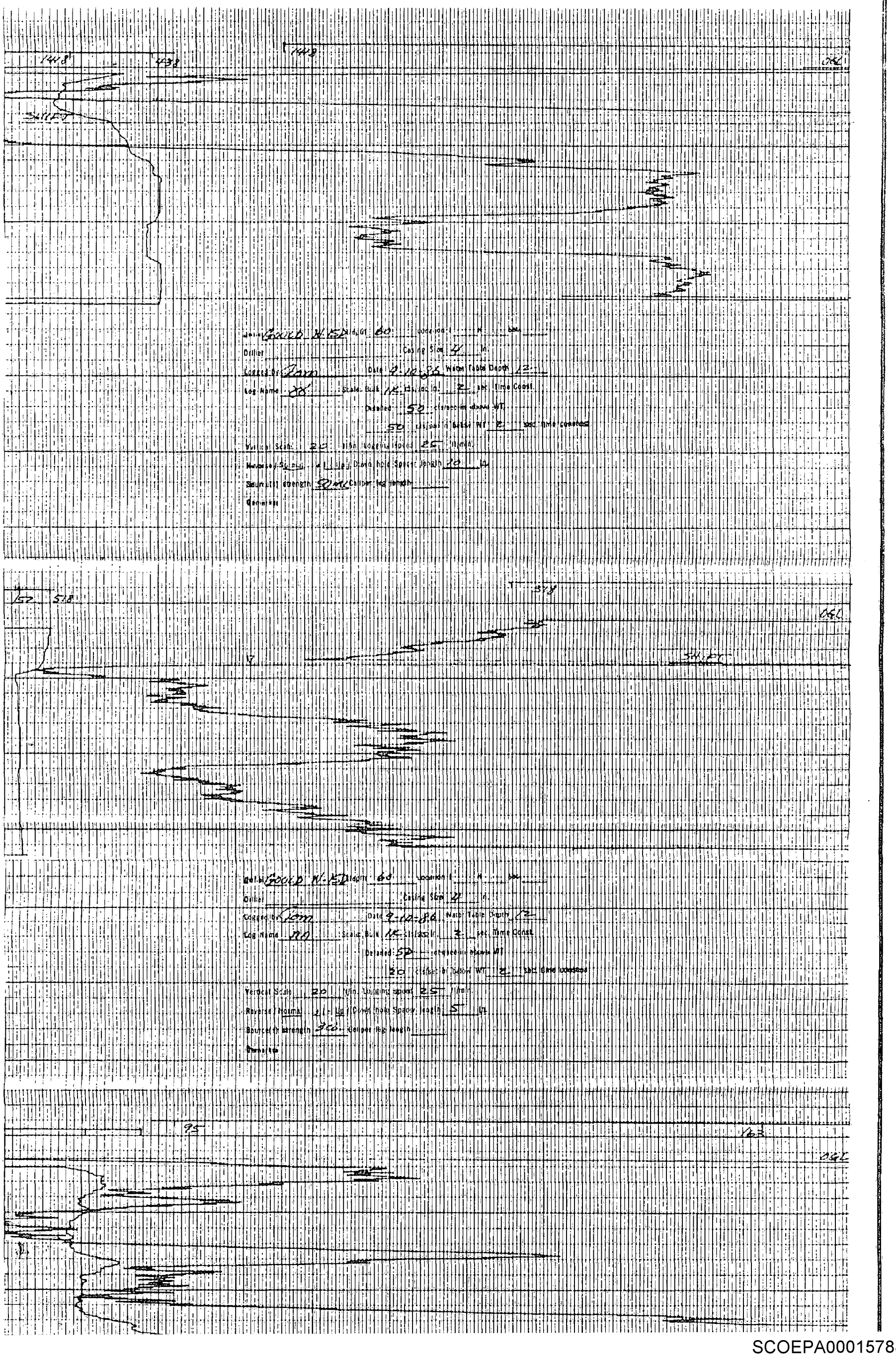
Dames & Moore

FIG. D2-19

SCOEPA00015787

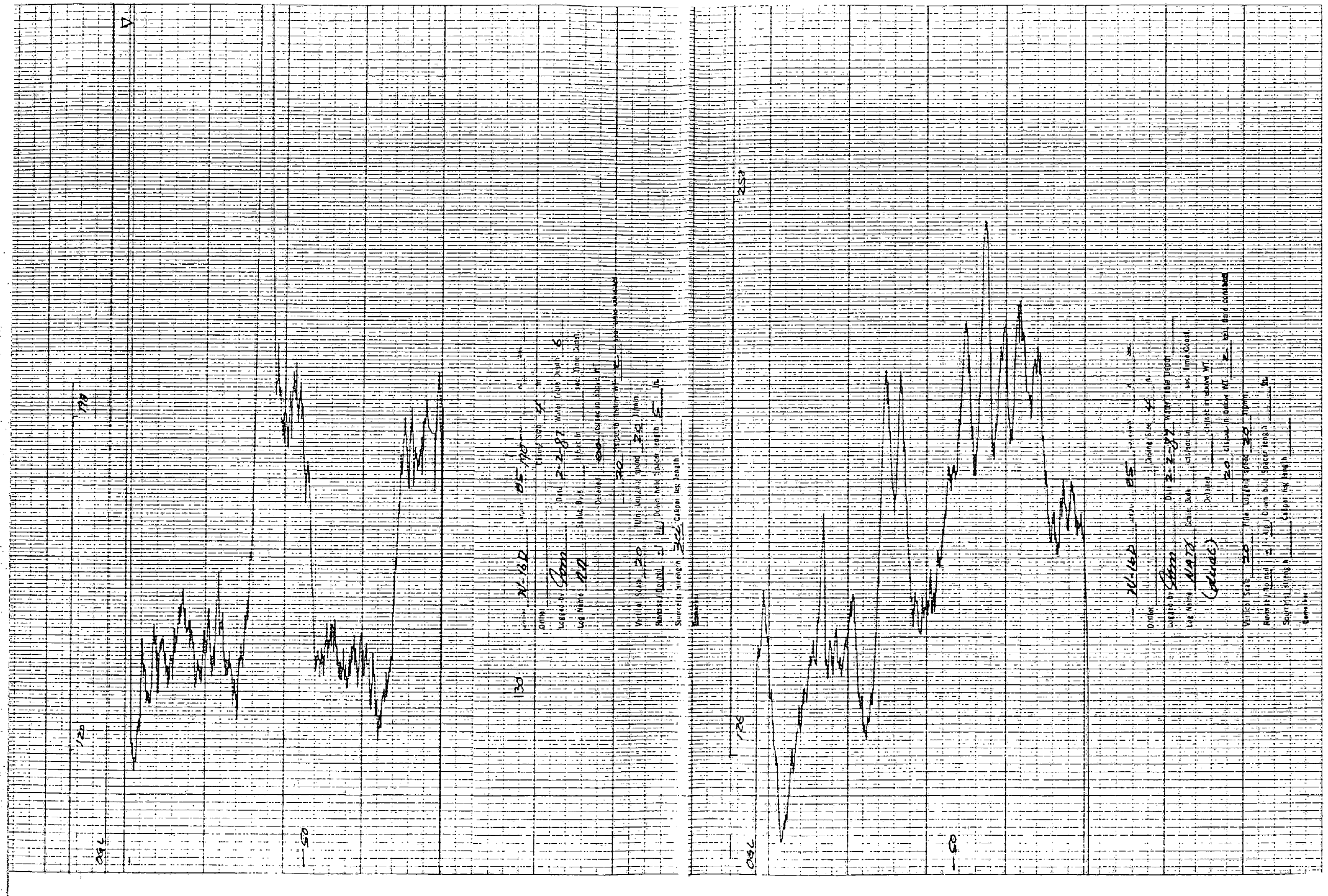
Drawn by Date Designed by Date QA/QC by Date App. by Date Rev. By Date 1. 2. 3. 4. 5. 6. 7.

Job No. 11831-034



SCOEPA00015788

SCOEPA00015789



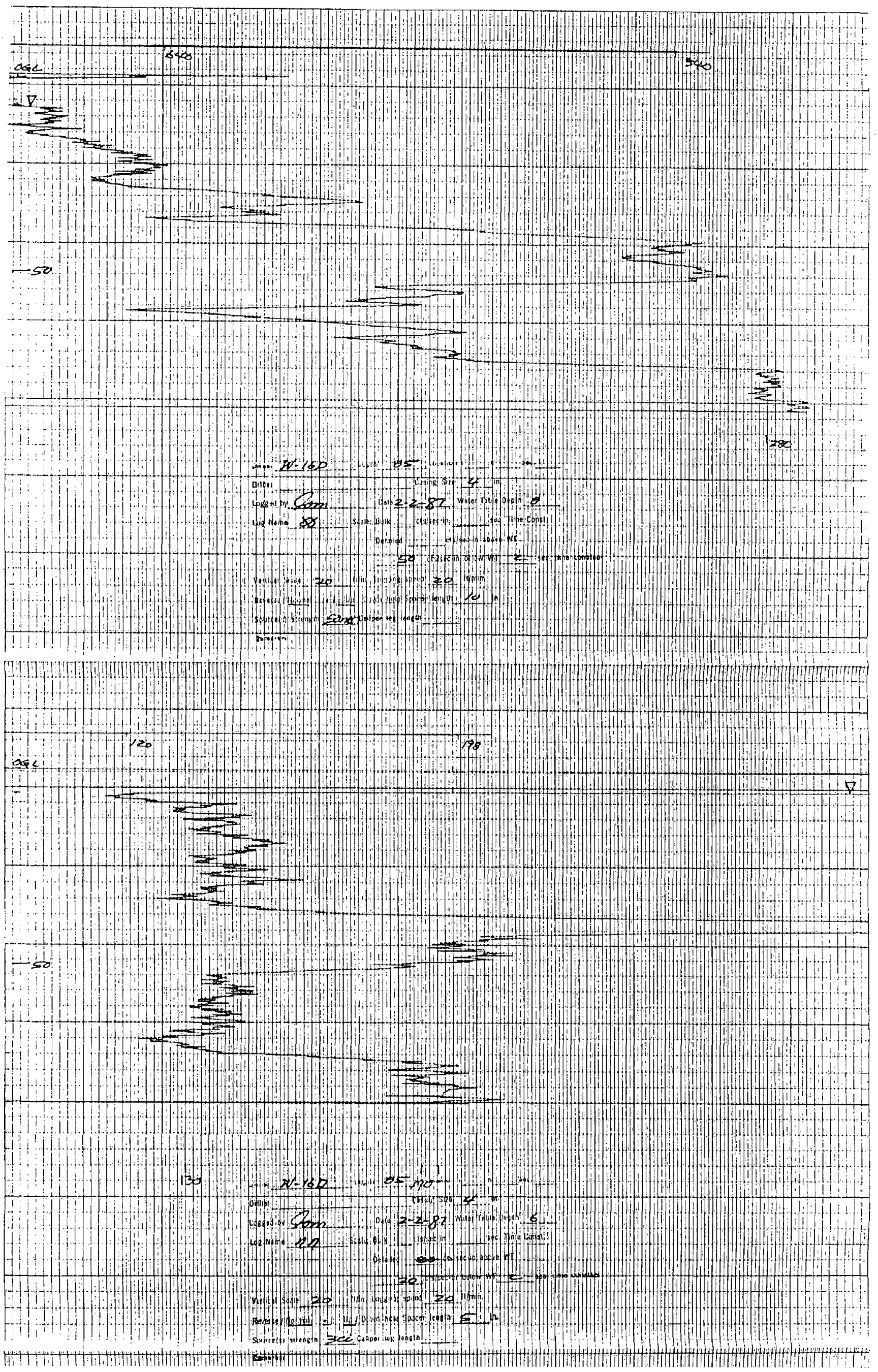
W-16D

Dames & Moore

FIG. D2-20

Drawn by Date Designed by Date QA/QC by Date App. by Date Rev. By Date 1. 2. 3. 4. 5. 6. 7.

Job No. 11831-034



SCOEPA00015790

Appendix D3

APPENDIX D3

WATER LEVEL DATA

INTRODUCTION

APPENDIX D3, WATER LEVEL DATA

Appendix D3 is divided into five parts:

D3.1 Precipitation and River Stage Data
D3.2 Monitoring Well Data
D3.3 Monitoring Well Hydrographs
D3.4 Continuous Stevens Recorder Data
D3.5 Barometric Pressure Charts

Precipitation (as recorded at the Portland International Airport) is tabulated in Appendix D3.1, along with the Willamette River stage data (as recorded at the Morrison Street bridge in downtown Portland). The river gauge datum is 1.55 ft above mean sea level. The City of Portland datum, which is the same as the study area datum, is 1.375 ft below mean sea level.

Data obtained as the result of careful water level measurements in wells throughout the study area are tabulated in Appendix D3.2 by date, beginning 8-21-86 and ending 3-10-87. Water levels were recorded manually with the use of an electronic water level indicator. The instrument was decontaminated after each water level measurement. The water levels as tabulated are referenced to the City of Portland Datum. The letter designations (S, I, D, and B) refer to the aquifer being monitored, i.e. S indicates shallow (fill) aquifer, I and D indicate intermediate and deep (alluvial) aquifer, and B indicates the basalt aquifer.

Computer print-out, single and cluster well hydrograph responses to precipitation are presented in Appendix D3.3. In addition, fluctuations in water levels for the two Doane Lake remnants and the Willamette River with relation to area precipitation are also included.

Hydrographs from continuous Stevens recorders that were installed on wells W-11B and W-11S are presented in Appendix D3.4. In addition, daily precipitation and average river elevations, which cover the same

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period of well data, are also presented at the same time scale as the Stevens recorder data.

Barometric pressure charts are presented in Appendix D3.5.

SCOEPA00015794

Appendix D3.1

SCOEPA00015795

APPENDIX D3.1

PRECIPITATION AND RIVER STAGE DATA

PORTLAND RAINFALL DATA
06-Dec-86 GOULD/NL; 11831-034/005

RIVER STAGE DATA
30-Mar-87

Gauge datum = 1.55 FT. MSL
ELEVATION = PORTLAND DATUM
1.375 FT. BELOW M

DATE	PRECIPITATION PIA DAILY	PRECIPITATION sum 5 prev days	PRECIPITATION PIA CUMULATIVE	Pd	RIVER STAGE DATA -- gauge readings DAILY MAX	RIVER STAGE DATA -- gauge readings DAILY MIN	MORRISON ST. BR. River elevation DAILY MAX	MORRISON ST. BR. River elevation DAILY MIN	MODE max+ min/2
01-Aug-86	0.00		0.00		4.80	2.00	7.73	4.93	6.33
02-Aug-86	0.00		0.00		5.20	1.90	8.13	4.83	6.48
03-Aug-86	0.00		0.00		5.40	2.50	8.33	5.43	6.88
04-Aug-86	0.00		0.00		5.70	2.50	8.63	5.43	7.03
05-Aug-86	0.00	0.00	0.00		5.60	2.40	8.53	5.33	6.93
06-Aug-86	0.00	0.00	0.00		5.50	1.90	8.43	4.83	6.63
07-Aug-86	0.00	0.00	0.00		5.60	2.10	8.53	5.03	6.78
08-Aug-86	0.00	0.00	0.00		5.70	2.30	8.63	5.23	6.93
09-Aug-86	0.00	0.00	0.00		5.80	2.40	8.73	5.33	7.03
10-Aug-86	0.00	0.00	0.00		5.70	2.40	8.63	5.33	6.98
11-Aug-86	0.01	0.01	0.01		5.80	2.50	8.73	5.43	7.08
12-Aug-86	0.00	0.01	0.01		5.60	2.40	8.53	5.33	6.93
13-Aug-86	0.00	0.01	0.01		5.80	2.30	8.73	5.23	6.98
14-Aug-86	0.00	0.01	0.01		5.90	2.70	8.83	5.63	7.23
15-Aug-86	0.00	0.01	0.01		5.80	2.70	8.73	5.63	7.18
16-Aug-86	0.00	0.00	0.01		5.80	2.30	8.73	5.23	6.98
17-Aug-86	0.00	0.00	0.01		5.90	2.20	8.83	5.13	6.98
18-Aug-86	0.00	0.00	0.01		5.70	1.90	8.63	4.83	6.73
19-Aug-86	0.00	0.00	0.01		6.20	2.10	9.13	5.03	7.08
20-Aug-86	0.00	0.00	0.01		6.10	2.50	9.03	5.43	7.23
21-Aug-86	0.00	0.00	0.01		6.20	2.50	9.13	5.43	7.28
22-Aug-86	0.00	0.00	0.01		6.10	2.50	9.03	5.43	7.23
23-Aug-86	0.00	0.00	0.01		5.80	2.40	8.73	5.33	7.03
24-Aug-86	0.00	0.00	0.01		5.70	2.30	8.63	5.23	6.93
25-Aug-86	0.00	0.00	0.01		4.40	1.50	7.33	4.43	5.88
26-Aug-86	0.00	0.00	0.01		4.50	1.10	7.43	4.03	5.73
27-Aug-86	0.00	0.00	0.01		4.90	1.20	7.83	4.13	5.98
28-Aug-86	0.00	0.00	0.01		4.50	1.70	7.43	4.63	6.03
29-Aug-86	0.00	0.00	0.01		4.20	1.40	7.13	4.33	5.73
30-Aug-86	0.09	0.09	0.10		3.80	1.10	6.73	4.03	5.38
31-Aug-86	0.00	0.09	0.10						
01-Sep-86	0.00	0.09	0.10						
02-Sep-86	0.00	0.09	0.10						
03-Sep-86	0.00	0.09	0.10		4.60	0.60	7.52	3.53	5.52
04-Sep-86	0.00	0.00	0.10		5.20	1.30	8.13	4.23	6.18
05-Sep-86	0.00	0.00	0.10		5.60	2.20	8.53	5.13	6.83
06-Sep-86	0.00	0.00	0.10		5.60	2.40	8.53	5.33	6.93
07-Sep-86	0.00	0.00	0.10		5.60	2.20	8.53	5.13	6.83
08-Sep-86	0.10	0.10	0.20		5.90	2.60	8.83	5.53	7.18
09-Sep-86	0.25	0.35	0.45		5.90	2.40	8.83	5.33	7.08
10-Sep-86	0.01	0.36	0.46		5.50	2.30	8.43	5.23	6.83
11-Sep-86	0.00	0.36	0.46		5.00	1.90	7.93	4.83	6.38
12-Sep-86	0.00	0.36	0.46		4.60	1.40	7.52	4.33	5.93
13-Sep-86	0.00	0.26	0.46		4.60	1.20	7.52	4.13	5.83
14-Sep-86	0.00	0.01	0.46		4.60	1.20	7.52	4.13	5.83
15-Sep-86	0.07	0.07	0.53		5.00	1.10	7.93	4.03	5.98
16-Sep-86	0.03	0.10	0.56		5.30	1.40	8.23	4.33	6.28
17-Sep-86	0.62	0.72	1.18		5.90	1.80	8.83	4.73	6.78

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NL/GOULD - HYDROGEOLOGY DATA

PORTLAND RAINFALL DATA
06-Dec-86 GOULD/NL; 11831-034/005

RIVER STAGE DATA
30-Mar-87

Gauge datum = 1.55 FT. MSL
ELEVATION = PORTLAND DATUM
1.375 FT. BELOW M

DATE	PRECIPITATION PIA DAILY	PRECIPITATION sum 5 prev days	PRECIPITATION PIA CUMULATIVE	Pd	RIVER STAGE DATA -- gauge readings DAILY MAX	RIVER STAGE DATA -- gauge readings DAILY MIN	MORRISON ST. BR. River elevation DAILY MAX	MORRISON ST. BR. River elevation DAILY MIN	MODE max+ min/2
18-Sep-86	0.03	0.75	1.21		5.70	2.50	8.63	5.43	7.03
19-Sep-86	0.00	0.75	1.21		5.40	2.20	8.33	5.13	6.73
20-Sep-86	0.25	0.93	1.46		5.60	2.00	8.53	4.93	6.73
21-Sep-86	0.00	0.90	1.46		5.50	2.10	8.43	5.03	6.73
22-Sep-86	0.00	0.28	1.46		5.00	1.70	7.93	4.63	6.28
23-Sep-86	0.86	1.11	2.32		5.00	1.60	7.93	4.53	6.23
24-Sep-86	0.11	1.22	2.43		5.50	1.80	8.43	4.73	6.58
25-Sep-86	1.48	2.45	3.91		5.50	2.20	8.43	5.13	6.78
26-Sep-86	0.03	2.48	3.94		5.00	2.40	7.93	5.33	6.63
27-Sep-86	0.06	2.54	4.00		4.10	2.50	7.02	5.43	6.23
28-Sep-86	0.00	1.68	4.00		3.60	1.90	6.53	4.83	5.68
29-Sep-86	0.35	1.92	4.35		4.30	0.80	7.23	3.73	5.48
30-Sep-86	0.05	0.49	4.40		4.30	0.80	7.23	3.73	5.48
01-Oct-86	0.00	0.46	4.40	0.05	4.80	1.60	7.73	4.53	6.13
02-Oct-86	0.00	0.40	4.40	0.01	4.90	2.00	7.83	4.93	6.38
03-Oct-86	0.00	0.40	4.40	0.00	5.10	1.90	8.03	4.83	6.43
04-Oct-86	0.00	0.05	4.40	0.00	5.40	2.30	8.33	5.23	6.78
05-Oct-86	0.00	0.00	4.40	0.00	5.10	1.60	8.03	4.53	6.28
06-Oct-86	0.00	0.00	4.40	0.00	4.90	1.60	7.83	4.53	6.18
07-Oct-86	0.00	0.00	4.40	0.00	5.40	1.60	8.33	4.53	6.43
08-Oct-86	0.00	0.00	4.40	0.00	6.20	2.30	9.13	5.23	7.18
09-Oct-86	0.00	0.00	4.40	0.00	6.00	1.70	8.93	4.63	6.78
10-Oct-86	0.00	0.00	4.40	0.00	5.20	2.30	8.13	5.23	6.68
11-Oct-86	0.00	0.00	4.40	0.00	4.40	2.00	7.33	4.93	6.13
12-Oct-86	0.00	0.00	4.40	0.00	3.80	1.50	6.73	4.43	5.58
13-Oct-86	0.00	0.00	4.40	0.00	4.30	0.60	7.23	3.53	5.38
14-Oct-86	0.00	0.00	4.40	0.00	4.30	0.80	7.23	3.73	5.48
15-Oct-86	0.00	0.00	4.40	0.00	4.90	1.50	7.83	4.43	6.13
16-Oct-86	0.00	0.00	4.40	0.00	5.20	2.20	8.13	5.13	6.63
17-Oct-86	0.04	0.04	4.44	0.00	5.50	2.40	8.43	5.33	6.88
18-Oct-86	0.00	0.04	4.44	0.01	5.70	2.40	8.63	5.33	6.98
19-Oct-86	0.00	0.04	4.44	0.01	5.40	2.00	8.33	4.93	6.63
20-Oct-86	0.00	0.04	4.44	0.00	4.20	1.50	7.13	4.43	5.78
21-Oct-86	0.00	0.04	4.44	0.00	5.50	2.20	8.43	5.13	6.78
22-Oct-86	0.00	0.00	4.44	0.00	5.30	2.50	8.23	5.43	6.83
23-Oct-86	0.00	0.00	4.44	0.00	4.90	1.30	7.83	4.23	6.03
24-Oct-86	0.05	0.05	4.49	0.00	4.30	1.00	7.23	3.93	5.58
25-Oct-86	0.73	0.78	5.22	0.01	3.90	1.10	6.83	4.03	5.43
26-Oct-86	0.38	1.16	5.60	0.49	3.20	1.10	6.13	4.03	5.08
27-Oct-86	0.02	1.18	5.62	0.45	3.20	1.90	6.13	4.83	5.48
28-Oct-86	0.00	1.18	5.62	0.14	3.70	1.30	6.63	4.23	5.43
29-Oct-86	0.50	1.63	6.12	0.00	3.70	1.20	6.63	4.13	5.38
30-Oct-86	0.27	1.17	6.39	0.13	4.70	1.30	7.63	4.23	5.93
31-Oct-86	0.00	0.79	6.39	0.61	5.60	2.30	8.53	5.23	6.88
01-Nov-86	0.00	0.77	6.39	0.03	6.00	2.90	8.93	5.83	7.38
02-Nov-86	0.00	0.77	6.39	0.00	6.10	3.10	9.03	6.03	7.53
03-Nov-86	0.00	0.27	6.39	0.00	5.90	2.60	8.83	5.53	7.18
04-Nov-86	0.00	0.00	6.39	0.00	6.10	2.60	9.03	5.53	7.28

SCOEPA00015798

NL/GOULD - HYDROGEOLOGY DATA

PORTLAND RAINFALL DATA
06-Dec-86 GOULD/NL; 11831-034/005

RIVER STAGE DATA
30-Mar-87

Gauge datum = 1.55 FT. MSL
ELEVATION = PORTLAND DATUM
1.375 FT. BELOW M

DATE	PRECIPITATION PIA DAILY	PRECIPITATION sum 5 prev days	PRECIPITATION PIA CUMULATIVE	PRECIPITATION Pd	RIVER STAGE DATA -- gauge readings DAILY MAX	RIVER STAGE DATA -- gauge readings DAILY MIN	MORRISON ST. BR. River elevation DAILY MAX	MORRISON ST. BR. River elevation DAILY MIN	MODE max+ min/2
05-Nov-86	0.00	0.00	6.39	0.00	6.10	2.50	9.03	5.43	7.23
06-Nov-86	0.27	0.27	6.66	0.00	6.10	2.80	9.03	5.73	7.38
07-Nov-86	0.29	0.56	6.95	0.02	6.00	3.00	8.93	5.93	7.43
08-Nov-86	0.03	0.59	6.98	0.17	5.20	2.40	8.13	5.33	6.73
09-Nov-86	0.21	0.80	7.19	0.02	4.00	2.00	6.93	4.93	5.93
10-Nov-86	0.00	0.80	7.19	0.33	3.80	1.70	6.73	4.63	5.68
11-Nov-86	0.00	0.53	7.19	0.01	4.10	2.20	7.02	5.13	6.08
12-Nov-86	0.00	0.24	7.19	0.01	4.60	2.60	7.52	5.53	6.53
13-Nov-86	0.12	0.33	7.31	0.00	4.60	2.30	7.52	5.23	6.38
14-Nov-86	0.05	0.17	7.36	0.02	5.20	2.10	8.13	5.03	6.58
15-Nov-86	0.00	0.17	7.36	0.09	5.90	2.70	8.83	5.63	7.23
16-Nov-86	0.42	0.59	7.78	0.00	5.70	2.50	8.63	5.43	7.03
17-Nov-86	0.00	0.59	7.78	0.19	5.90	2.60	8.83	5.53	7.18
18-Nov-86	0.45	0.92	8.23	0.24	6.20	3.80	9.13	6.73	7.93
19-Nov-86	0.04	0.91	8.27	0.92	7.30	4.70	10.23	7.63	8.93
20-Nov-86	0.76	1.67	9.03	0.13	6.40	4.40	9.33	7.33	8.33
21-Nov-86	0.29	1.54	9.32	0.83	6.50	5.00	9.43	7.93	8.68
22-Nov-86	0.20	1.74	9.52	0.14	6.00	5.10	8.93	8.03	8.48
23-Nov-86	0.33	1.62	9.85	0.34	6.60	5.50	9.53	8.43	8.98
24-Nov-86	0.80	2.38	10.65	0.27	7.30	5.50	10.23	8.43	9.33
25-Nov-86	0.13	1.75	10.78	0.96	8.30	7.20	11.23	10.13	10.68
26-Nov-86	0.47	1.93	11.25	0.00	8.20	7.70	11.13	10.63	10.88
27-Nov-86	0.86	2.59	12.11	0.38	8.10	6.90	11.03	9.83	10.43
28-Nov-86	0.54	2.80	12.65	0.61	8.30	6.80	11.23	9.73	10.48
29-Nov-86	0.00	2.00	12.65	0.98	9.30	8.10	12.23	11.03	11.63
30-Nov-86	0.00	1.87	12.65	0.00	9.10	7.70	12.03	10.63	11.33
01-Dec-86	0.02	1.42	12.67	0.00	8.50	7.20	11.43	10.13	10.78
02-Dec-86	0.00	0.56	12.67	0.02	8.90	7.30	11.83	10.23	11.03
03-Dec-86	0.00	0.02	12.67	0.00	8.90	7.30	11.83	10.23	11.03
04-Dec-86	0.06	0.08	12.73	0.00	8.40	6.80	11.33	9.73	10.53
05-Dec-86	0.32	0.40	13.05	0.00	8.10	6.40	11.03	9.33	10.18
06-Dec-86	0.00	0.38	13.05		7.30	5.10	10.23	8.03	9.13
07-Dec-86	0.00	0.38	13.05		6.00	4.20	8.93	7.13	8.03
08-Dec-86	0.00	0.38	13.05		5.40	3.40	8.33	6.33	7.33
09-Dec-86	0.00	0.32	13.05		5.10	3.40	8.03	6.33	7.18
10-Dec-86	0.00	0.00	13.05		5.50	3.90	8.43	6.83	7.63
11-Dec-86	0.28	0.28	13.33		5.40	3.80	8.33	6.73	7.53
12-Dec-86	0.00	0.28	13.33		5.50	3.70	8.43	6.63	7.53
13-Dec-86	0.92	1.20	14.25		6.00	3.60	8.93	6.53	7.73
14-Dec-86	0.08	1.28	14.33		6.30	3.80	9.23	6.73	7.98
15-Dec-86	0.00	1.28	14.33		6.70	4.50	9.63	7.43	8.53
16-Dec-86	0.00	1.00	14.33		7.00	5.20	9.93	8.13	9.03
17-Dec-86	0.00	1.00	14.33		6.20	4.20	9.13	7.13	8.13
18-Dec-86	0.08	0.16	14.41		5.80	4.00	8.73	6.93	7.83
19-Dec-86	0.01	0.09	14.42		6.10	4.20	9.03	7.13	8.08
20-Dec-86	0.00	0.09	14.42		5.80	3.30	8.73	6.23	7.48
21-Dec-86	0.01	0.10	14.43		5.00	2.30	7.93	5.23	6.58
22-Dec-86	0.34	0.44	14.77		4.90	2.70	7.83	5.63	6.73

SCOEPA00015799

NL/GOULD - HYDROGEOLOGY DATA

PORTLAND RAINFALL DATA
06-Dec-86 GOULD/NL; 11831-034/005

RIVER STAGE DATA
30-Mar-87

Gauge datum = 1.55 FT. MSL
ELEVATION = PORTLAND DATUM
1.375 FT. BELOW M

DATE	PRECIPITATION PIA DAILY	sum 5 prev days	PIA CUMULATIVE	Pd	RIVER STAGE DATA -- gauge readings DAILY MAX	DAILY MIN	MORRISON ST. BR. River elevation DAILY MAX	DAILY MIN	MODE max+ min/2
23-Dec-86	0.00	0.36	14.77		5.30	3.00	8.23	5.93	7.08
24-Dec-86	0.16	0.51	14.93		5.10	2.90	8.03	5.83	6.93
25-Dec-86	0.61	1.12	15.54		5.50	2.80	8.43	5.73	7.08
26-Dec-86	0.02	1.13	15.56		5.00	2.80	7.93	5.73	6.83
27-Dec-86	0.00	0.79	15.56		5.90	3.10	8.83	6.03	7.43
28-Dec-86	0.80	1.59	16.36		6.20	3.30	9.13	6.23	7.68
29-Dec-86	0.48	1.91	16.84		6.50	3.60	9.43	6.53	7.98
30-Dec-86	0.00	1.30	16.84		8.00	4.20	10.93	7.13	9.03
31-Dec-86	0.11	1.39	16.95		7.80	5.50	10.73	8.43	9.58
01-Jan-87	0.88	2.27	17.83		8.00	5.50	10.93	8.43	9.68
02-Jan-87	0.23	1.70	18.06		8.70	6.00	11.63	8.93	10.28
03-Jan-87	0.36	1.58	18.42		8.00	6.00	10.93	8.93	9.93
04-Jan-87	0.02	1.60	18.44		7.90	6.00	10.83	8.93	9.88
05-Jan-87	0.00	1.49	18.44		7.30	5.80	10.23	8.73	9.48
06-Jan-87	0.00	0.61	18.44		7.00	5.60	9.93	8.53	9.23
07-Jan-87	0.00	0.38	18.44		6.70	5.40	9.63	8.33	8.98
08-Jan-87	0.00	0.02	18.44		6.70	5.40	9.63	8.33	8.98
09-Jan-87	0.00	0.00	18.44		6.70	5.70	9.63	8.63	9.13
10-Jan-87	0.00	0.00	18.44		6.30	5.20	9.23	8.13	8.68
11-Jan-87	0.64	0.64	19.08		5.80	4.20	8.73	7.13	7.93
12-Jan-87	0.07	0.71	19.15		6.10	4.20	9.03	7.13	8.08
13-Jan-87	0.07	0.78	19.22		6.70	4.80	9.63	7.73	8.68
14-Jan-87	0.00	0.78	19.22		6.50	4.90	9.43	7.83	8.63
15-Jan-87	0.00	0.78	19.22		6.70	4.90	9.63	7.83	8.73
16-Jan-87	0.00	0.14	19.22		6.50	5.10	9.43	8.03	8.73
17-Jan-87	0.01	0.08	19.23		6.60	4.80	9.53	7.73	8.63
18-Jan-87	0.00	0.01	19.23		5.90	4.30	8.83	7.23	8.03
19-Jan-87	0.00	0.01	19.23		5.50	3.90	8.43	6.83	7.63
20-Jan-87	0.00	0.01	19.23		5.30	4.00	8.23	6.93	7.58
21-Jan-87	0.00	0.01	19.23		5.30	4.00	8.23	6.93	7.58
22-Jan-87	0.00	0.00	19.23		5.30	3.60	8.23	6.53	7.38
23-Jan-87	0.23	0.23	19.46		5.30	3.60	8.23	6.53	7.38
24-Jan-87	0.40	0.63	19.86		5.80	4.00	8.73	6.93	7.83
25-Jan-87	0.17	0.80	20.03		7.00	4.00	9.93	6.93	8.43
26-Jan-87	0.21	1.01	20.24		6.60	4.20	9.53	7.13	8.33
27-Jan-87	0.11	1.12	20.35		7.20	4.90	10.13	7.83	8.98
28-Jan-87	0.49	1.38	20.84		8.40	6.50	11.33	9.43	10.38
29-Jan-87	0.12	1.10	20.96		8.80	7.00	11.73	9.93	10.83
30-Jan-87	0.07	1.00	21.03		9.00	7.30	11.93	10.23	11.08
31-Jan-87	1.38	2.17	22.41		8.90	6.90	11.83	9.83	10.83
01-Feb-87	1.27	3.33	23.68		9.00	6.90	11.93	9.83	10.88

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Appendix D3.2

SCOEPA00015801

APPENDIX D3.2

MONITORING WELL DATA

NL/GOULD WATER LEVEL DATA

WELL DESIGNATION	S I D B	EAST COORD	NORTH COORD	ELEV REF. POINT	21-Aug-86 ELEV	04-Sep-86 ELEV	05-Sep-86 ELEV	08-Sep-86 ELEV	09-Sep-86 ELEV	11-Sep-86 ELEV	10-Sep-86 ELEV	22-Sep-86 ELEV	23-Sep-86 ELEV	25-Sep-86 ELEV	02-Oct-86 ELEV	09-Oct-86 ELEV	15-Oct-86 ELEV	16-Oct-86 ELEV	23-Oct-86 ELEV	30-Oct-86 ELEV	06-Nov-86 ELEV
clusters	x																				
P-1	S	10265.18	8677.83	30.11	26.25	27.94		27.84		27.88	27.77	27.69	27.77	27.86	28.22	28.21		28.04	27.92	28.10	28.15
W-1D	D	10271.18	8687.22	30.17	26.60	25.69		25.64		25.64	25.66	25.56	25.74	25.90	26.09	25.94		25.77	25.66	25.96	25.89
P-2	S	10340.72	9100.16	35.05		27.72		27.62		27.67	27.75		27.76	27.87	28.26	28.10		27.94	27.80	28.15	28.07
W-2D	D	10347.44	9108.79	35.79		22.07		22.13		22.05	22.24		22.02	22.19	22.24	22.20		22.09	22.09	22.17	22.82
P-3	S	10438.84	9480.69	34.50		26.50		26.51		26.51	26.50		26.48	26.63	26.90	26.79	26.68		26.52	26.80	26.84
W-3D	I	10432.28	9471.16	33.79		25.39		25.21		25.22	25.09		25.20	25.37	25.48	25.37	25.27		25.16	25.30	25.31
W-3D2	D	10441.90	9472.39	32.58																	
P-4	S	10674.60	9200.07	32.76		26.16		26.07		26.09	25.91		26.10	26.19	26.55	26.34	26.22		26.04	26.36	26.21
W-4D	I	10662.49	9200.45	32.77		23.51		23.59	23.47	23.64	23.50		23.45		23.61	23.67	23.51		23.48	23.53	23.48
W-6S	I	9779.08	8731.65	39.55	24.28		24.48	24.42		24.46	24.45		24.49	24.59	24.76	24.67	24.55		24.41	24.63	24.67
W-6D	D	9774.10	8723.30	39.19	24.48		24.52	24.49		24.58	24.69		24.55	24.65	24.89	24.83	24.72		24.57	24.55	24.87
W-6B	B	9768.95	8732.10	39.96	22.88		23.02	23.02		22.99	25.26		23.12	23.13	23.26	23.18	23.09		23.00	23.11	23.23
W-7S	S	10086.90	9141.58	38.11	27.54	27.70		27.68		27.64	27.51		27.66	27.86	28.25	28.08	27.94		27.78	28.15	28.06
W-7D	D	10098.16	9143.51	38.41	20.26	20.48		20.46		20.42	20.71		20.76	20.86	20.88	20.85	20.81		20.83	20.89	21.03
W-11S	S	9968.24	9957.58	41.00	25.98		25.40		25.32	25.85	25.90		25.29	25.23	24.97	24.86	24.84		24.74	24.66	24.71
W-11I	I	9967.40	9967.91	40.32	12.85		12.85		12.87	12.78	12.82		12.82	12.87	12.67	12.76	12.60		12.75	12.64	13.05
W-11D	D	9967.40	9967.51	40.40	12.52				12.60	12.54	12.60		12.58	12.67	12.48	12.49	12.46		12.56	12.46	12.93
W-11B	B	9964.60	9977.10	41.85		13.09			13.08	12.91	13.15		12.97	13.07			13.01				
W-12S	S	10083.6	9544.3	41.44																	
W-12I	I	10089.8	9552.6	41.67																	
W-12D	D	10089.8	9552.6	41.66																	
W-15S	S	10675.26	8664.52	43.01	28.42	28.55		28.46		28.50	28.31		28.40	28.68	29.06	28.95	28.76	28.74	28.59	28.90	28.90
W-15I	I	10683.33	8656.59	43.46	28.28	28.46		28.36		28.40	28.36		28.36	28.54	28.95	28.80	28.67		28.50	28.74	28.78
W-15D	D	10683.38	8656.59	43.48	27.28	27.38		27.39		27.38	27.38		27.37	27.47	28.01	27.76	27.62		27.44	27.66	27.77
W-16S	S	10995.7	8868.7	35.56																	
W-16I	I	11001.7	8869.8	35.91																	
W-16D	D	11001.7	8863.8	35.96																	
singles	y																				
RPW-1D	D	10383.21	7699.49	48.65																	
RPW-2D	D	10494.85	7787.18	47.96																	
RPW-3D	D	10623.16	7923.11	44.80																	
RPW-4D	D	10108.33	8435.04	48.28		28.37			28.10	28.16	28.08		28.05	28.28	28.57	28.41	28.21		27.97	28.35	28.40
RPW-5D	D	9790.39	8383.47	49.80																	
PP-6	S	9935.65	9004.87	38.50			27.69		27.60	27.67	27.69		27.69	27.88	28.27	28.11	27.97		27.79	28.17	27.96
PP-8	I	9603.24	9017.91	38.15		22.85		22.80		22.81	22.85		23.95	22.90	23.08	23.00	22.91		22.80	22.94	23.05
W-8D	D	9583.03	9314.94	37.20	23.61	24.31		24.36		24.01	19.96		23.74	23.99	24.10	24.09	24.08		24.04	24.08	24.12
W-9D	I	9625.28	9658.29	35.91	24.20	23.62			23.63	23.67	23.93		23.92	23.99	24.04	23.97	24.01		24.01	24.04	23.97
W-10D	I	9918.90	10368.15	32.06	11.70	11.54		11.76		11.63	12.05		11.51	11.67	11.46	11.58	11.51		11.52	11.48	11.97
PP-11	I	10187.65	9931.21	34.20																	
STAFF GAUGE	E	10395.00	9450	26.68												28.18	28.04		27.87	28.26	28.15
STAFF GAUGE	W	9525.00	9730	23.93												25.13	25.06		25.02	25.32	25.29

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NL/GOULD-NATE

TABLE D3.2-1
SHEET 2 OF 3

WELL DESIGNATION	N I D B	13-Nov-86 ELEV	21-Nov-86 ELEV	24-Nov-86 ELEV	01-Dec-86 ELEV	08-Dec-86 ELEV	09-Dec-86 ELEV	16-Dec-86 ELEV	29-Dec-86 ELEV	30-Dec-86 ELEV	08-Jan-87 ELEV	13-Jan-87 ELEV	14-Jan-87 ELEV	22-Jan-87 ELEV	30-Jan-87 ELEV	03-Feb-87 ELEV	12-Feb-87 ELEV	13-Feb-87 ELEV	19-Feb-87 ELEV	23-Feb-87 ELEV	23-Feb-87 ELEV (popper)
clusters	x																				
P-1	S	28.11	28.36	28.69	29.76	30.04		30.05	30.51		31.01	31.01		30.89	31.24	31.86	31.27		30.94	31.08	31.08
M-1D	D	25.99	26.61	27.15	27.78	27.64		27.58	28.25		28.55	28.76		28.67	29.20	30.10	29.20		29.09	29.19	29.20
P-2	S	28.01	28.73	29.08	30.11		30.00	30.08		30.68	30.85	30.85		30.59	30.85	30.96	30.63		30.65	30.62	30.63
M-2D	D	22.27	22.75	23.12	23.77		23.65	23.99		24.39	24.85	25.44		24.97	25.30	25.94	25.57		25.44	25.65	25.63
P-3	S	26.72	27.35	27.85	28.17	28.03		28.30		28.61	28.92	29.21		28.89	29.44	29.21	28.82		28.91	28.87	28.87
M-3D	I	25.81	25.86	26.25	26.97	26.74		26.86		27.30	27.64	28.41		27.64	28.09	29.19	27.95		27.99	28.09	28.09
M-3D2	D					22.36		22.44		22.49	23.13	28.03		23.24	23.80	23.16	23.91		23.80	23.97	23.97
P-4	S	26.29	26.76	27.48	27.98	27.83		27.73		30.00	30.11	30.21		29.24	30.22	30.68	29.87		29.98	29.85	29.86
M-4D	I	23.56	23.83	24.09	24.51	24.82		24.77		25.05	25.53	25.67		25.77	26.27	26.81	26.42		26.25	23.68	23.67
M-6S	S	24.70	25.22	25.71	26.46	26.23		26.21	26.89		27.46	27.58		27.60	28.30	28.90	28.32		28.49	28.50	28.52
M-6D	D	24.90	25.48	25.98	26.64	26.42		26.12	26.75		27.31	27.34		27.50	28.11	29.46	28.08		28.21	28.33	
M-6B	B	23.31	23.69	24.19	24.84	24.66		24.76	25.18		25.71	25.75		25.94	26.46	27.53	26.65		26.66	26.76	26.76
M-7S	S	27.98	28.72	29.43	30.08		29.96	30.05	30.74		30.84	30.81		30.57	30.81	30.89	30.54		30.65	30.64	30.65
M-7D	D	20.63	20.89	21.37	22.00		21.88	22.02	22.14		22.76	22.75		22.96	23.48	24.23		23.90	23.69	23.86	23.87
M-11S	S		25.11	25.77	31.27	30.93		30.49		31.58	32.11	31.80		32.06	32.67	33.71	32.65		32.39	32.36	
M-11I	I	12.83	13.66	14.24	15.03	14.42		14.65		14.56	15.18	15.05		15.02	16.01	17.29	15.70		15.75	15.52	15.54
M-11D	D	12.63	13.55	14.16	14.80	14.22		13.25	13.64		14.46	14.51		14.90	16.01	17.32	15.79		15.71	15.44	15.48
M-11B	B	13.15	14.05	14.64	15.35	14.72		14.85		14.94	15.54	15.40		15.30	16.34	17.62	16.08		16.06	15.82	
M-12S	S												30.24	30.20	30.47	31.11	30.31	30.31	30.20	30.34	
M-12I	I												18.84	16.55	21.51	21.78	22.04	22.07	21.80	22.00	
M-12D	D												21.42	21.37	22.07	22.84	22.09	22.84	22.08	22.10	
M-15S	S	28.84	29.46	30.09	30.71	30.72		30.82	31.47		31.66	31.78		31.45	30.63	32.28	31.66		31.75	31.67	
M-15I	I	28.71	29.15	29.59	30.51	30.56		30.61	31.05		31.46	31.49		31.32	31.65	32.10	31.62		31.50	31.55	
M-15D	D	27.77	28.53	28.92	29.28	29.40		29.21	29.98		30.12	30.32		30.14	30.73	31.29	30.67	30.63	30.73	30.72	
M-16S	S										28.11	28.26		28.24	28.79	29.33		28.80	28.85	28.86	
M-16I	I										25.67	25.71		25.90	26.22	26.59		26.60	25.16	26.51	
M-16D	D										25.83	25.87		25.87	26.09	26.94		26.57	26.41	26.47	
singles	y																				
RPW-1D	D					30.08		35.20	36.56		36.59	37.97		36.75	37.96	38.85		37.66	37.96	37.95	
RPW-2D	D					34.97		35.21	36.86		36.82	37.62		36.51	37.99	39.22		37.50	37.87	37.63	
RPW-3D	D					33.22		33.45	34.83		34.44		35.39	33.44	35.50	36.51		35.86	35.49	35.54	
RPW-4D	D	28.41	29.08	29.60	30.60		29.82	29.96		30.68	31.12	31.18		31.39	31.72	32.65	31.74		31.89	31.90	
RPW-5D	D						30.01	30.04	31.07		31.51		32.20	31.68	32.00	34.71		32.61	32.89	32.78	32.80
PP-6	S	27.99	28.61	29.37	29.96		29.98	29.94	30.64		30.73	30.85		30.45	30.70	30.93	30.56		30.53	30.52	30.53
PP-6	I	23.16	23.36	23.76	24.52		24.42	24.52	24.79		25.41	26.15		25.76	26.12	27.00	26.48		26.81	26.64	26.63
M-8D	D	24.15	24.34	24.67	25.18		25.45	24.88	25.77		26.43	26.47		26.61	27.00	27.20		25.18	26.92	27.21	27.20
M-9D	I	24.16	24.30	24.73	25.97		26.07	25.83	26.36		27.12	27.02		27.16	27.55	27.96	26.59		26.78	26.86	
M-10D	I	11.77	12.64	13.33	14.03	13.26		13.49		13.53	14.09	13.91		13.71	14.94	16.36	14.63		14.64	14.33	14.38
PP-11	I	20.20	20.14	20.56	21.20	21.29		20.97		21.12	21.69	21.72		22.06	22.23	23.10	22.94		22.47	22.78	22.78
STAFF GAUGE	E	28.10	28.33	29.49	30.08	30.08		30.08		30.63	30.93	30.98		30.65	30.89	30.98	30.68		30.73	30.58	
STAFF GAUGE	W	25.29	25.83	26.16	26.80	26.85		25.94		26.48	26.20	26.55		26.23	26.59	26.91		26.53	26.59	26.53	

SCOEPA00015804

NL/GOULD MATE

WELL DESIGNATION	S I D B	03-Mar-87 ELEV	10-Mar-87 ELEV
clusters	x		
P-1	S	31.08	31.25
M-1D	D	29.22	29.59
P-2	S	30.98	30.84
M-2D	D	25.19	25.35
P-3	S	29.60	29.80
M-3D	I	28.24	28.41
M-3D2	D	24.03	24.07
P-4	S	30.32	30.32
M-4D	I	26.54	26.61
M-6S	I	28.43	29.05
M-6D	D	28.37	28.88
M-6B	B	26.71	27.09
M-7S	S	30.92	30.82
M-7D	D	24.02	24.18
M-11S	S	32.03	32.79
M-11I	I	15.69	15.65
M-11D	D	15.71	15.59
M-11B	B	16.04	16.02
M-12S	S	30.11	30.59
M-12I	I	22.06	22.08
M-12D	D	22.13	22.15
M-15S	S	32.06	31.94
M-15I	I	31.71	31.77
M-15D	D	31.00	31.05
M-16S	S	29.11	29.25
M-16I	I	26.55	26.66
M-16D	D	26.59	26.63
singles	y		
RPW-1D	D	30.25	30.78
RPW-2D	D	30.59	30.68
RPW-3D	D	36.15	36.12
RPW-4D	D	31.94	32.43
RPW-5D	D	32.92	33.69
PP-6	S	30.84	30.72
PP-8	I	26.35	26.87
M-8D	D	26.20	27.26
M-9D	I	26.74	27.19
M-10D	I	14.81	14.35
PP-11	I	22.48	22.91
STAFF GAUGE	E	30.98	30.88
STAFF GAUGE	W	26.84	26.83

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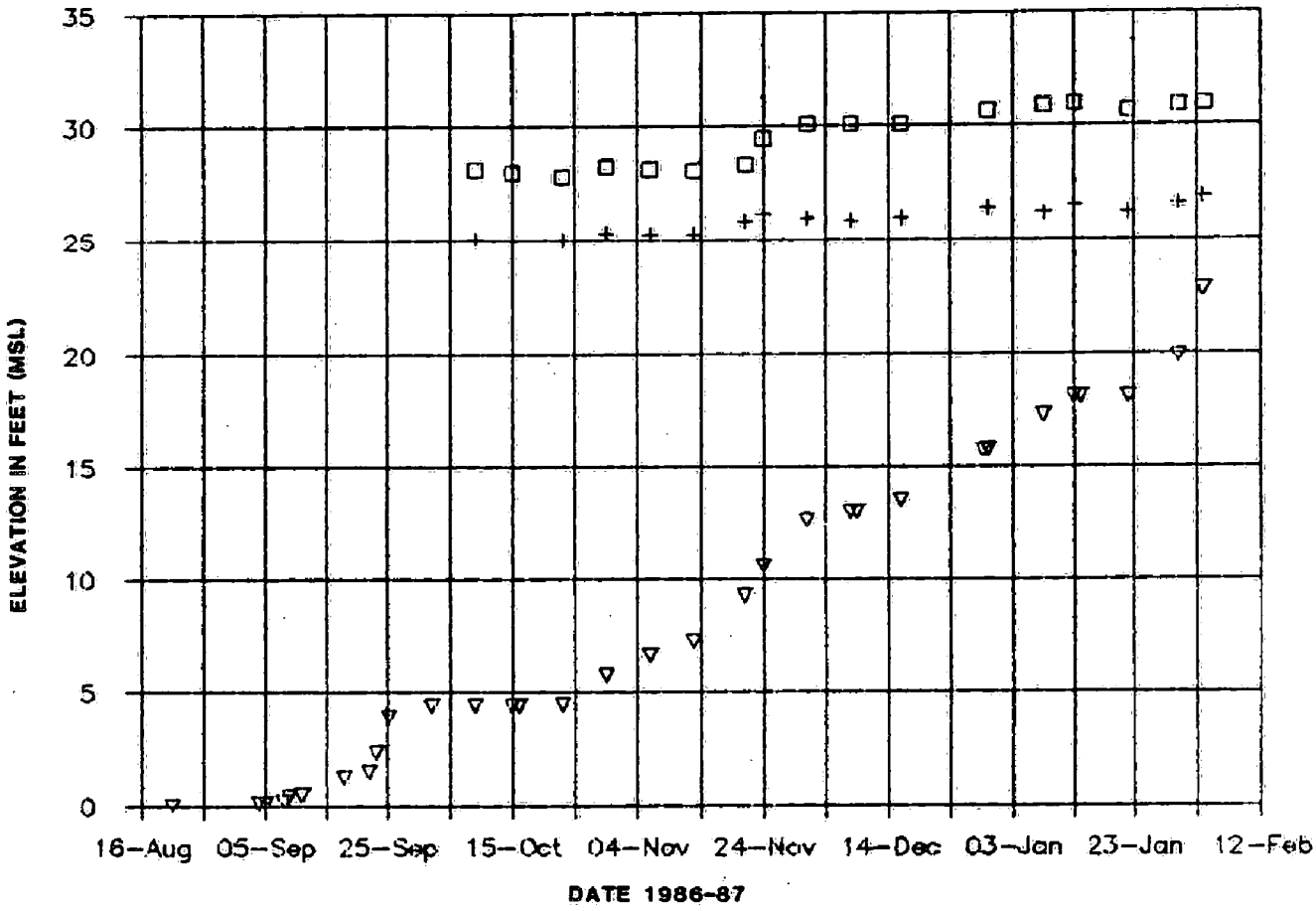
SCOEPA00015806

APPENDIX D3.3

MONITORING WELL HYDROGRAPHS

DOANE LAKE REMNANTS: WATER LEVELS



□ EAST LAKE REMNANT

\+ WEST LAKE REMNANT

▽ RAINFALL (INCHES)

11831-034

NL IND, INC./GOULD, INC.
REMEDIAL INVESTIGATION

DOANE LAKE
REMNANT WATER LEVELS

FIG. D3.3-1 DAMES AND & MOORE

SCOEPA00015808

FIG. D3.3-2A RIVER STAGE AND PRECITATION : 1 AUGUST 1986 TO FEBRUARY 1987

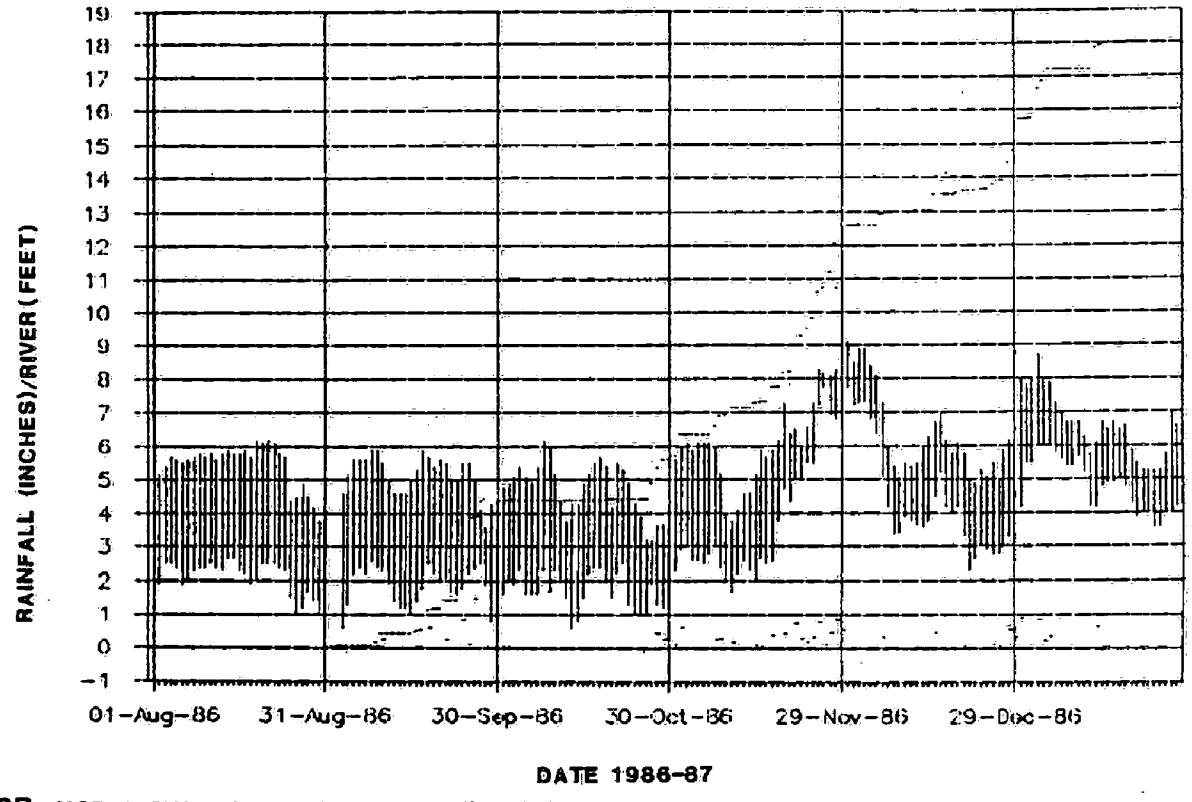
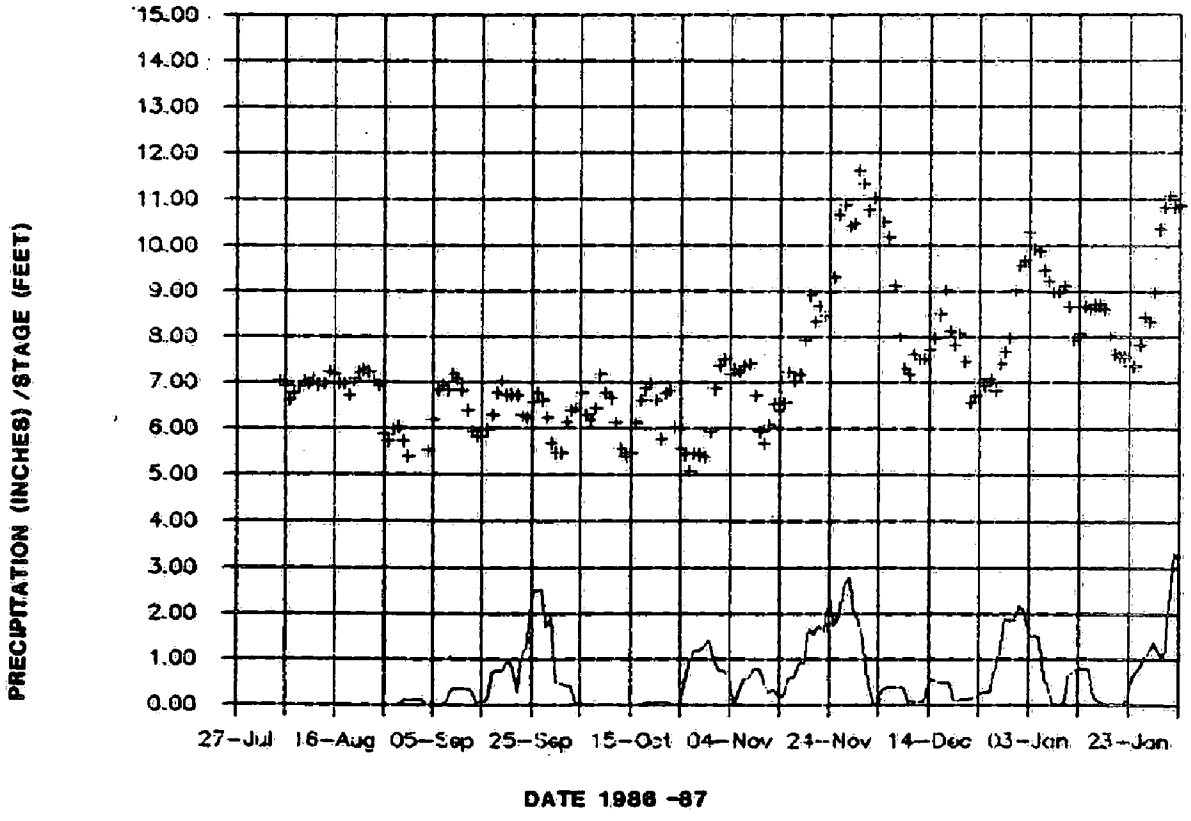


FIG. D3.3.-2B MODAL RIVER STAGE VS. 5-DAY PRECIPITATION



NL IND, INC./GOULD, INC. REMEDIAL INVESTIGATION	
RIVER STAGE AND PRECIPITATION MODAL RIVER STAGE VS. 5-DAY PRECIPITATION	
FIG. D3.3-2	DAMES & MOORE

11831-034

SCOEPA00015809

FIG. D3.3-3A CLUSTER WELLS AT W-1

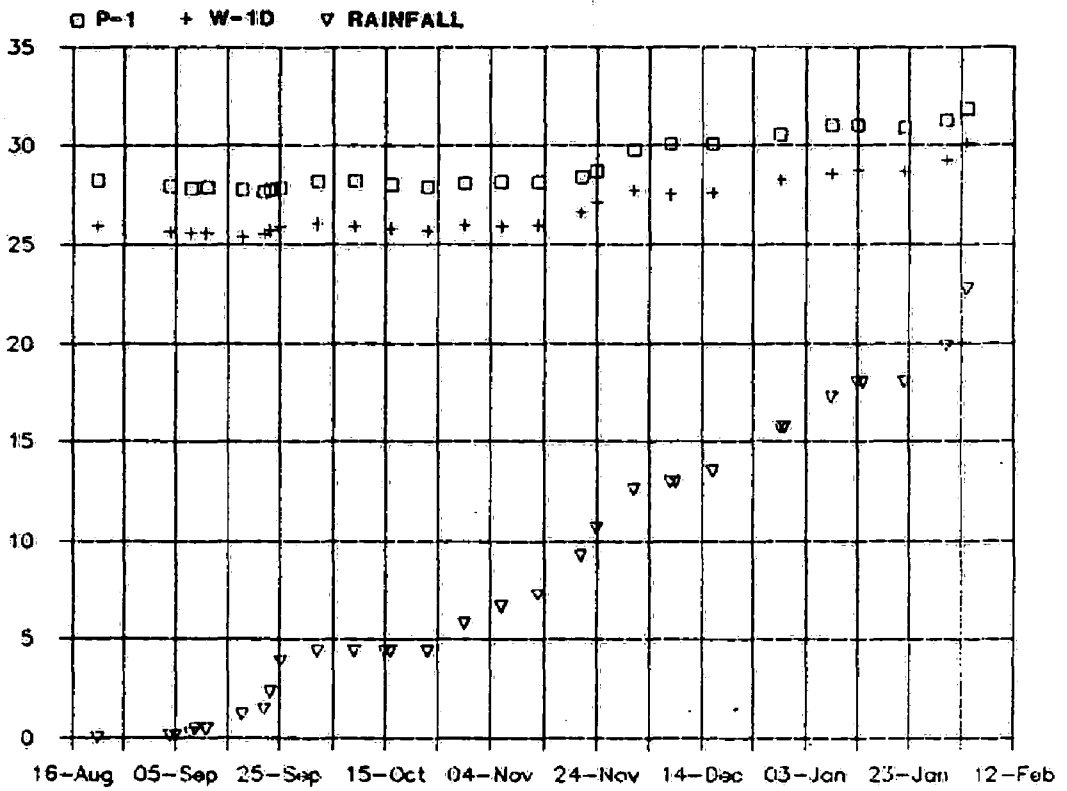
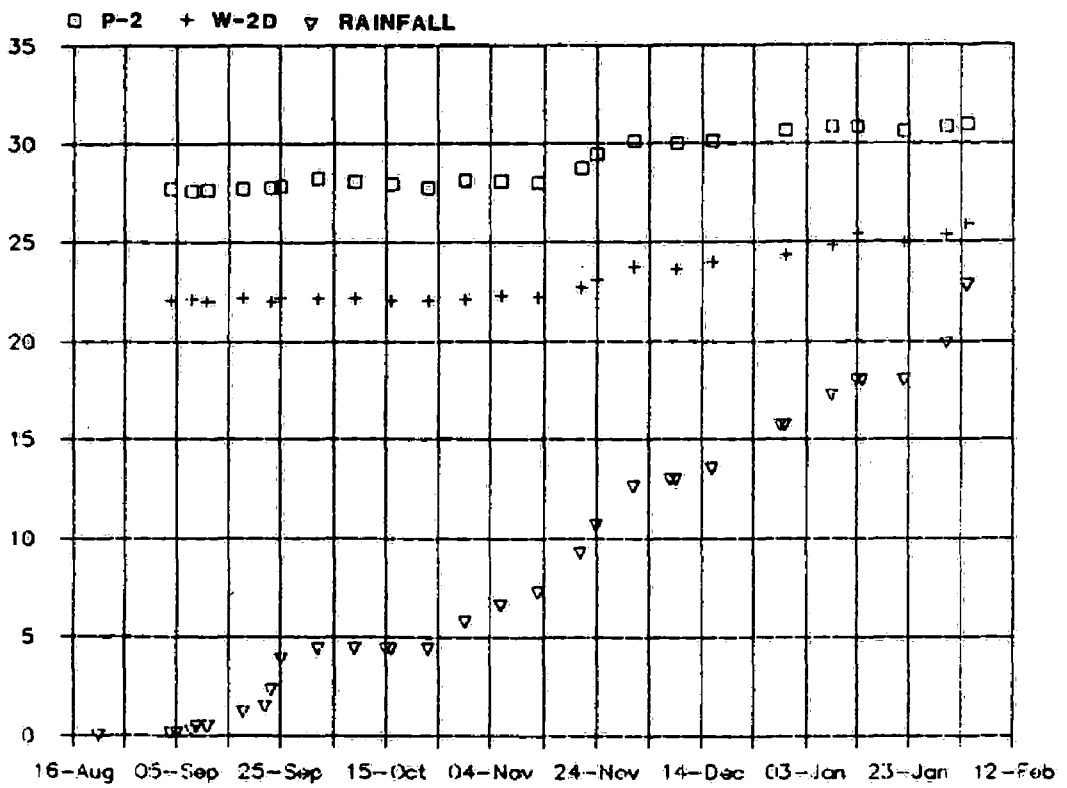


FIG. D3.3-3B CLUSTER WELLS AT W-2



ELEVATION (FEET) / CUMULATIVE RAINFALL (INCHES)

DATE 1986-87

NL IND, INC./GOULD, INC. REMEDIAL INVESTIGATION
CLUSTER WELL HYDROGRAPHS, WELLS W-1 AND W-2
FIG. D3.3-3 DAMES & MOORE

11831-034

SCOEPA00015810

FIG. D3.3-4A CLUSTER WELLS AT W-3

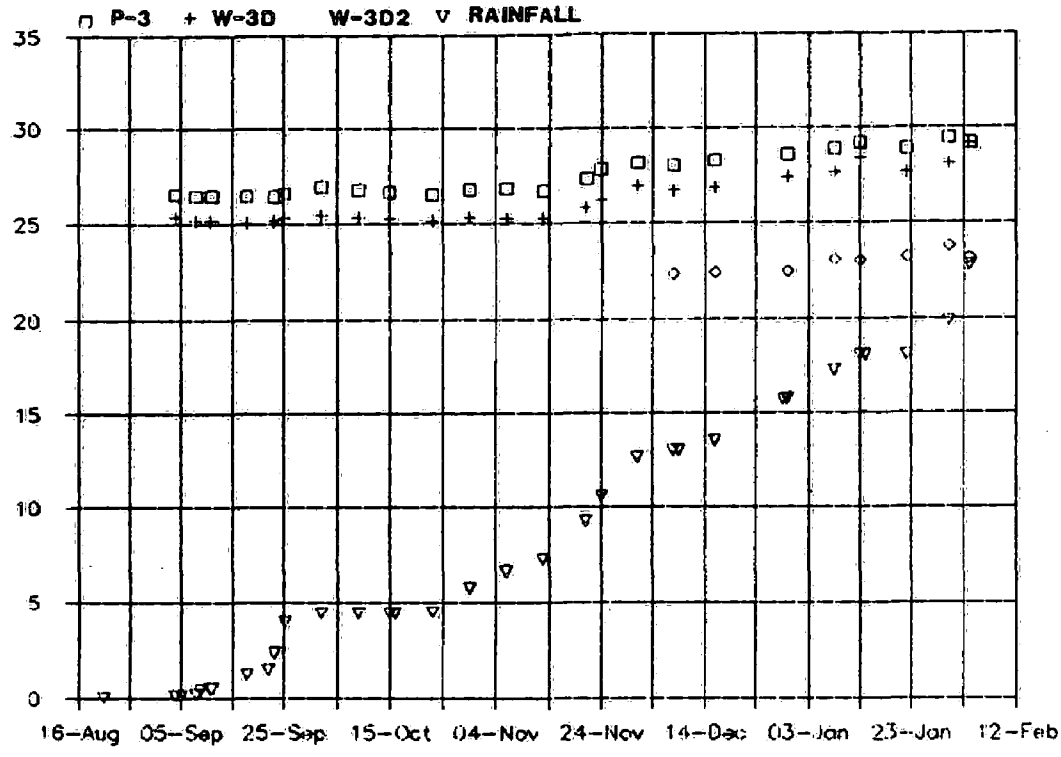
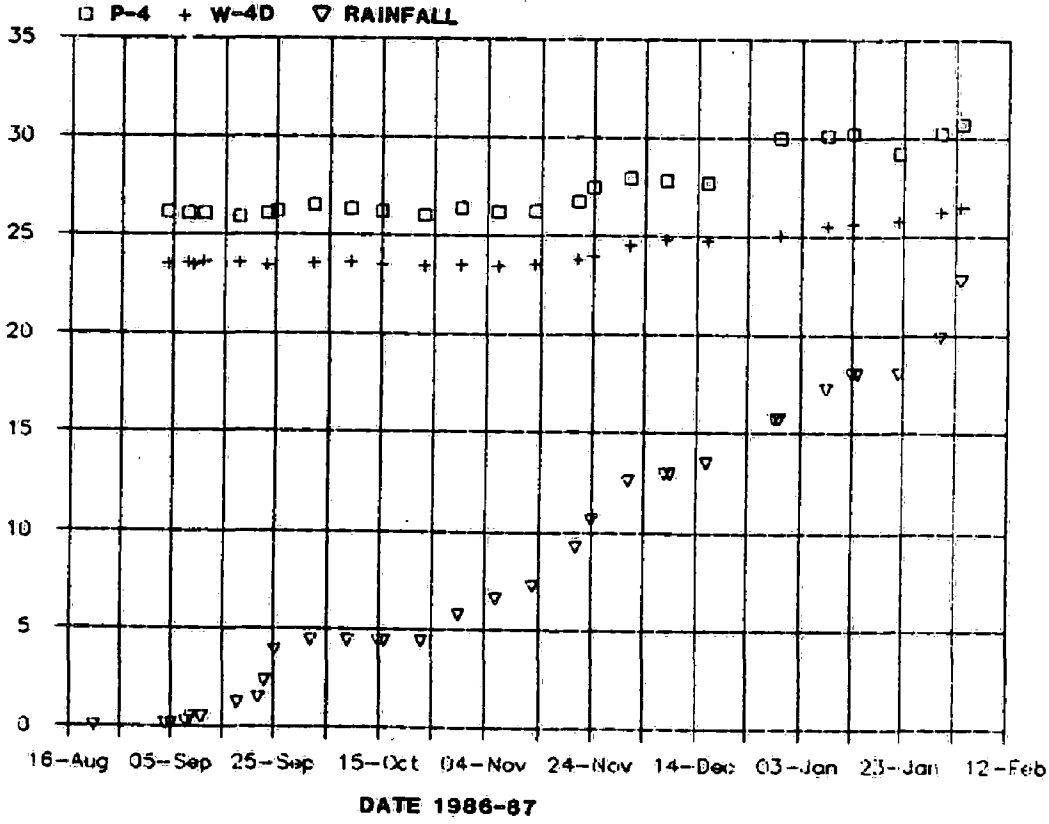


FIG. D3.3-4B CLUSTER WELLS AT W-4



ELEVATION (FEET) / CUMULATIVE RAINFALL (INCHES)

NL IND, INC./GOULD, INC. REMEDIAL INVESTIGATION	
CLUSTER WELL HYDROGRAPHS, WELLS W-3 AND W-4	
FIG. D3.3-4	DAMES & MOORE

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SCOEPA00015811

FIG. D3.3-5A CLUSTER WELLS AT W-6

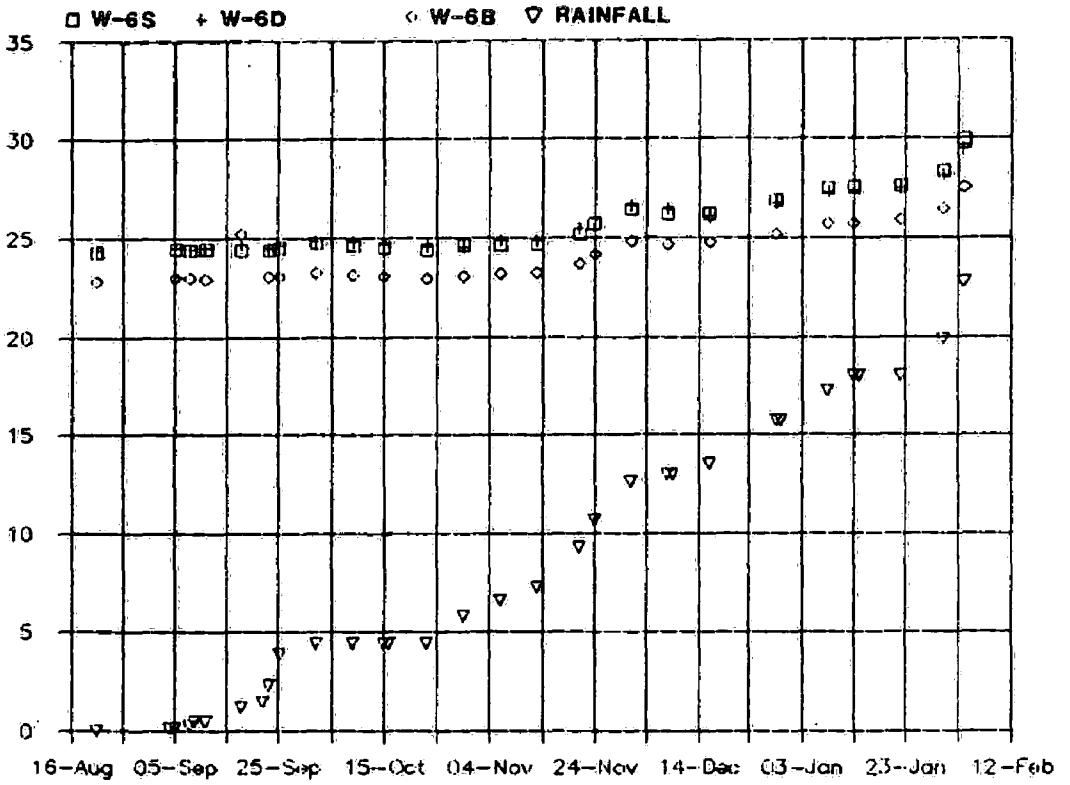
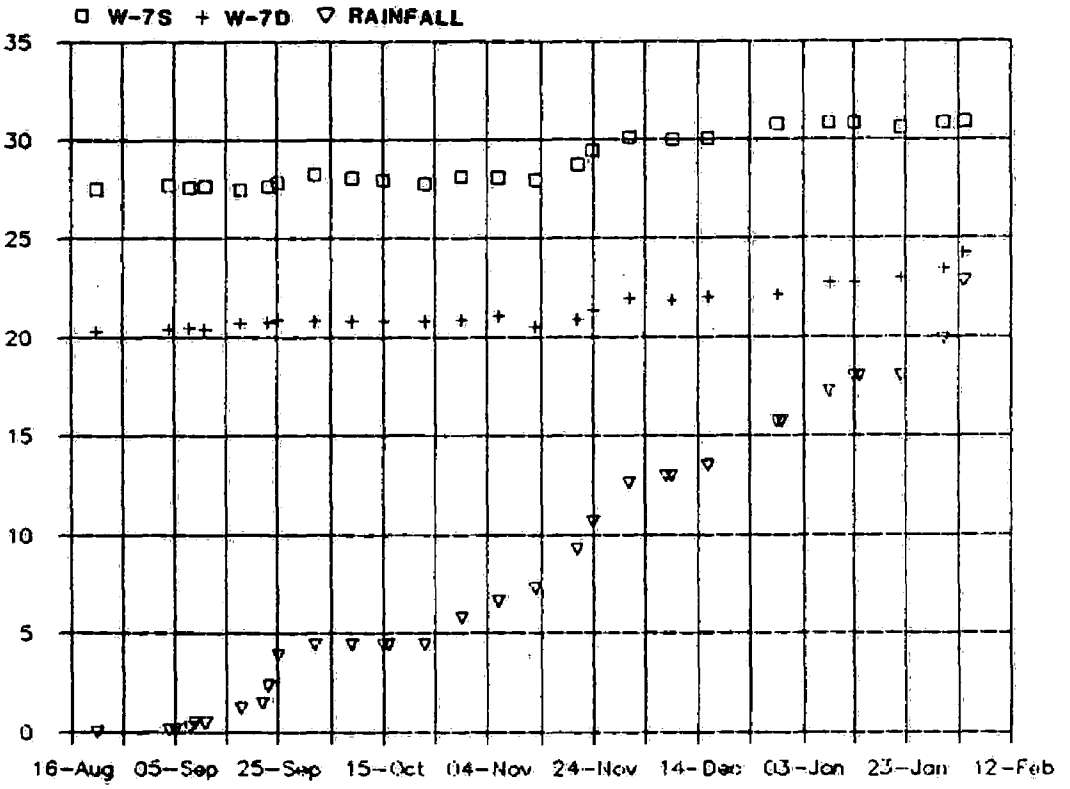


FIG. D3.3-5B CLUSTER WELLS AT W-7



ELEVATION (FEET) / CUMULATIVE RAINFALL (INCHES)

DATE 1986-87

NL IND, INC./GOULD, INC. REMEDIAL INVESTIGATION	
CLUSTER WELL HYDROGRAPHS, WELLS W-6 AND W-7	
FIG. D3.3-5	DAMES & MOORE

11831-034

SCOEPA00015812

FIG. D3.3-6A CLUSTER WELLS AT W-11

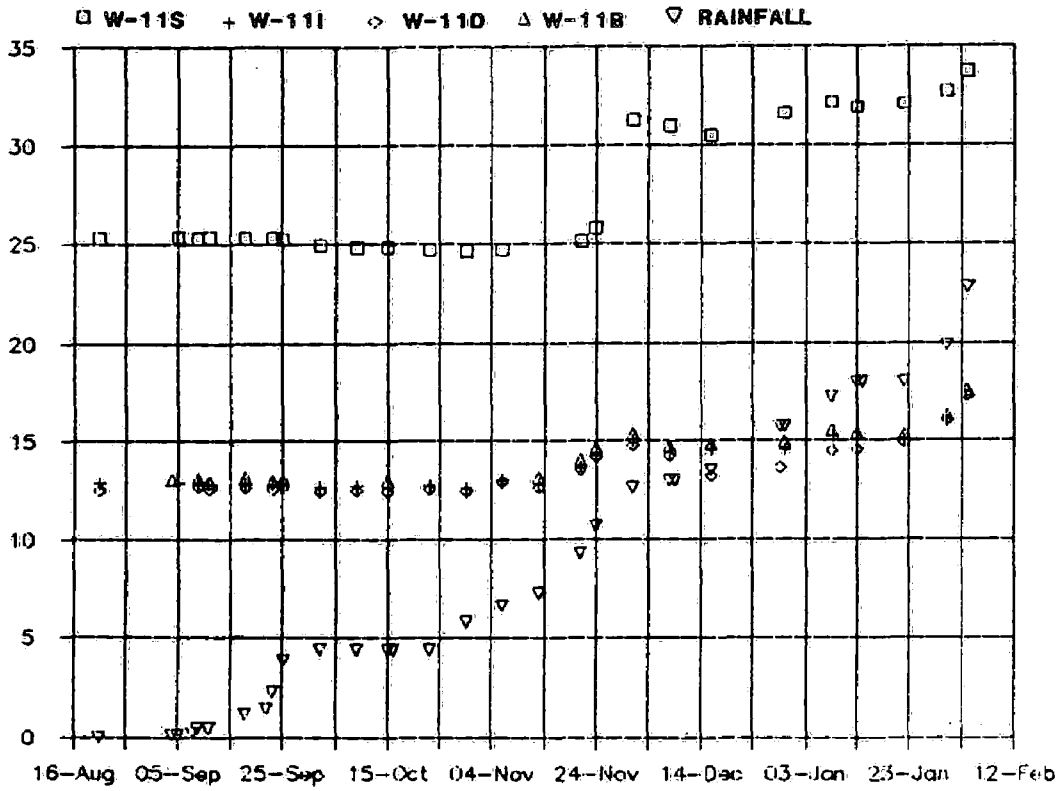
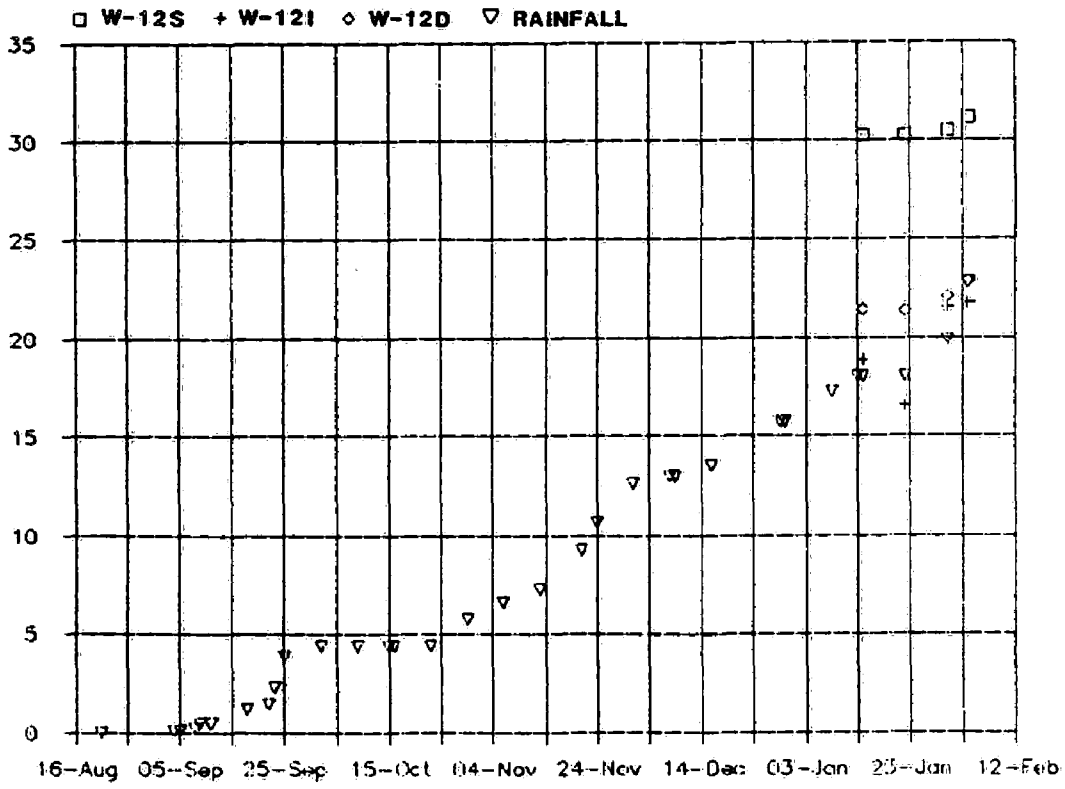


FIG. D3.3-6B CLUSTER WELLS AT W-12



ELEVATION (FEET) / CUMULATIVE RAINFALL(INCHES)

DATE 1986-87

NL IND, INC./GOULD, INC. REMEDIAL INVESTIGATION
CLUSTER WELL HYDROGRAPHS, WELLS W-11 AND W-12
FIG. D3.3-6 DAMES & MOORE

11831-034

SCOEPA00015813

FIG. D3.3-7A CLUSTER WELLS AT W-15

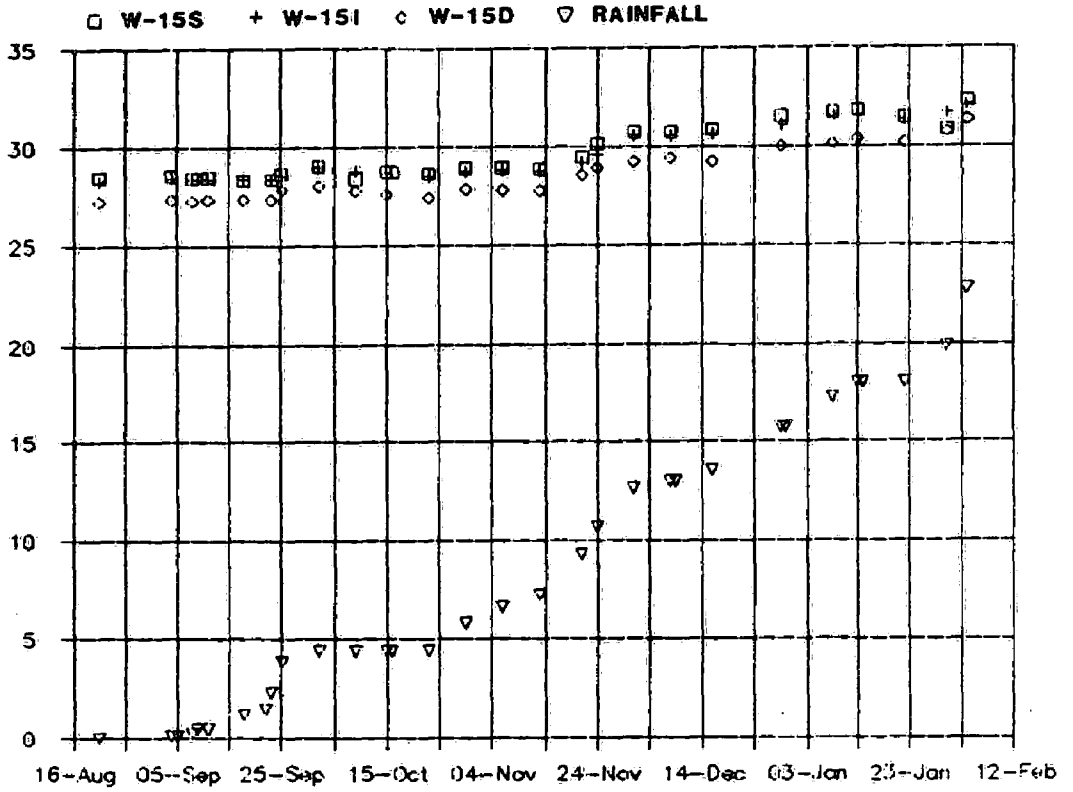
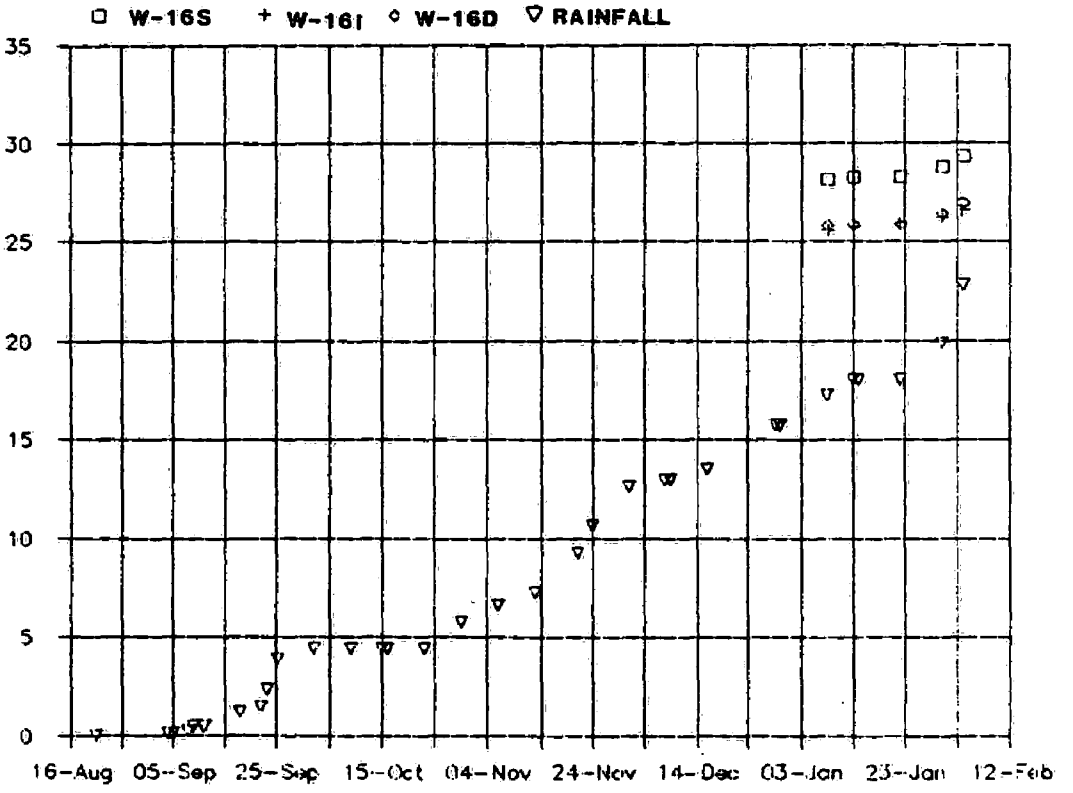


FIG. D2.3-7B CLUSTER WELLS AT W-16



ELEVATION (FEET) / CUMULATIVE RAINFALL (INCHES)

DATE 1986-87

NL IND, INC./GOULD, INC. REMEDIAL INVESTIGATION	
CLUSTER WELL HYDROGRAPHS, WELLS W-15 AND W-16	
FIG. D3.3-7	DAMES & MOORE

11831-034

SCOEPA00015814

FIG. D3.3-8A RPW WELLS

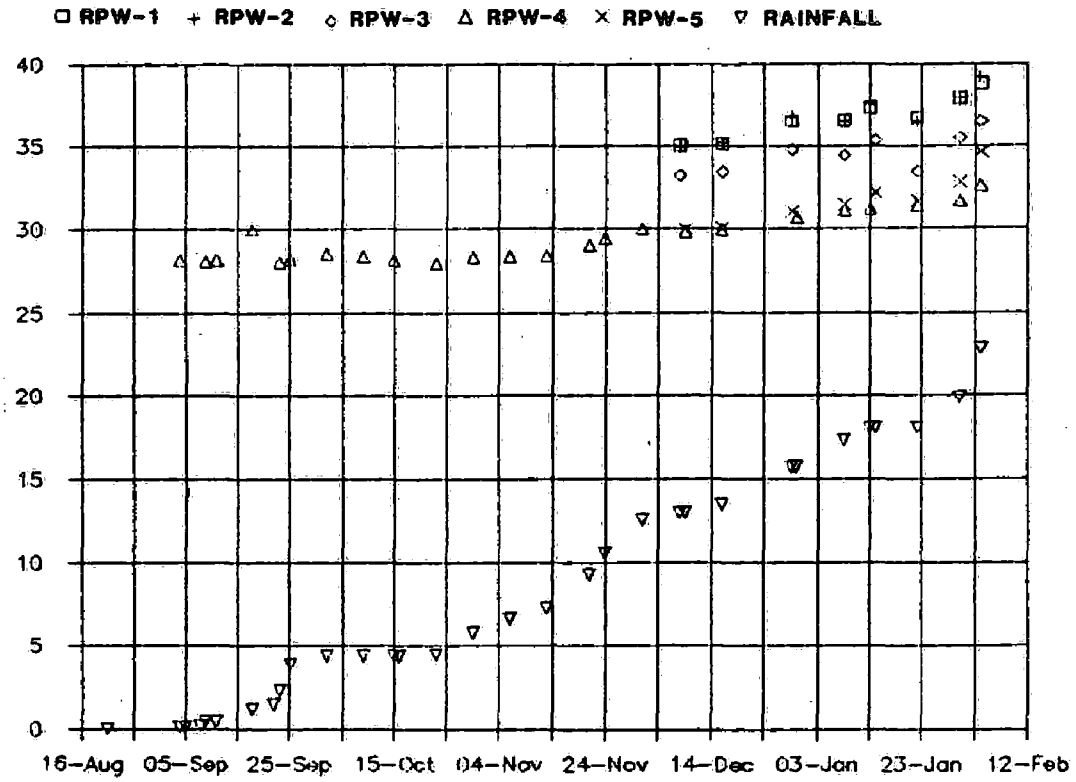
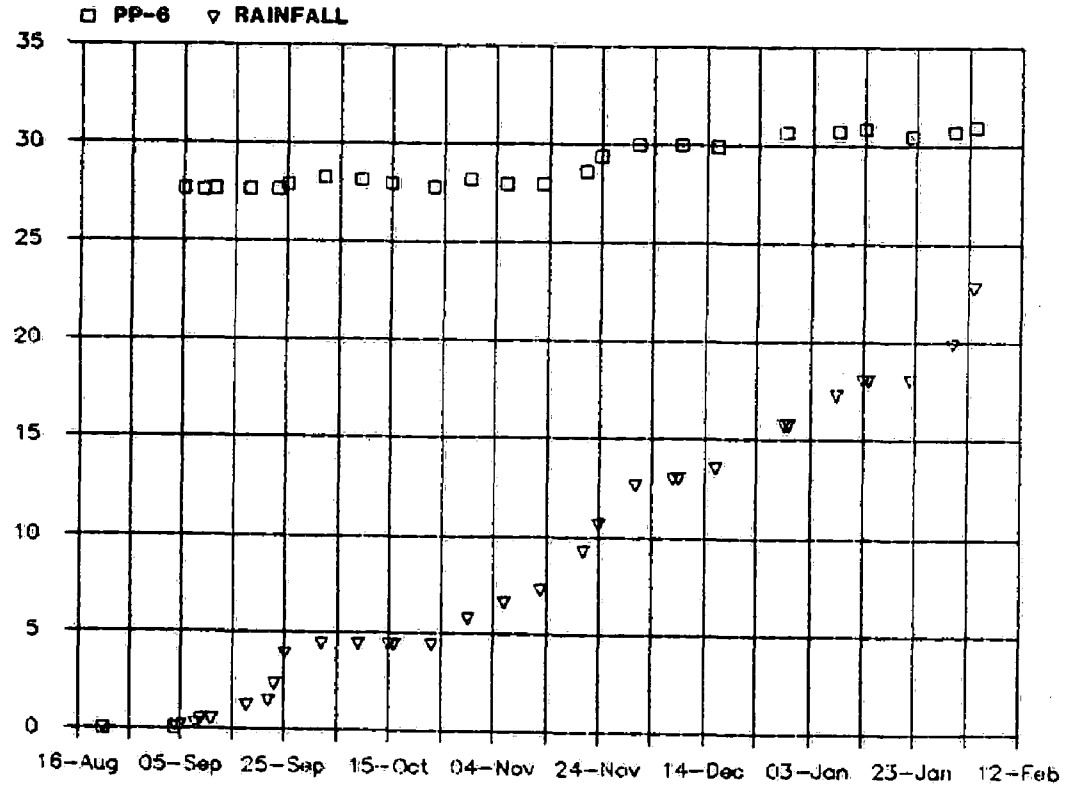


FIG. D3.3-8B SHALLOW PIEZOMETERS



ELEVATION (FEET) / CUMULATIVE RAINFALL (INCHES)

DATE 1986-87

NL IND, INC./GOULD, INC. REMEDIAL INVESTIGATION
RHONE-POULENC SINGLE WELL HYDROGRAPHS
FIG. D3.3-8 DAMES & MOORE

11831-034

SCOEPA00015815

FIG. D3.3-9A INTERMEDIATE SINGLE WELLS

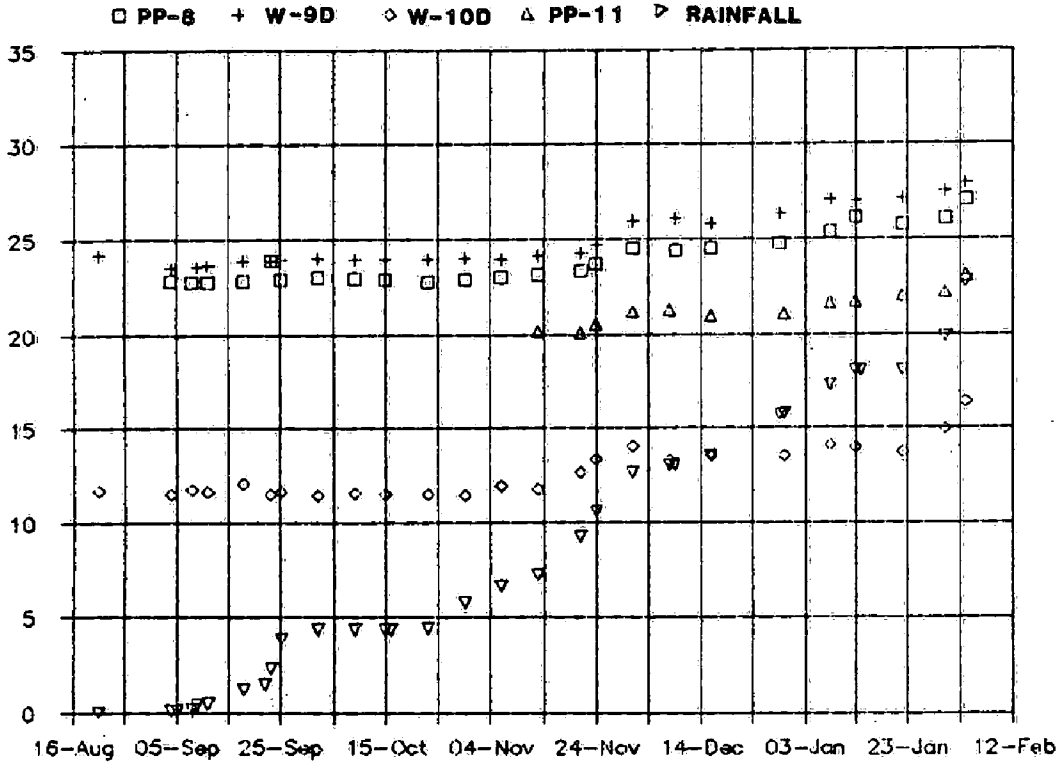
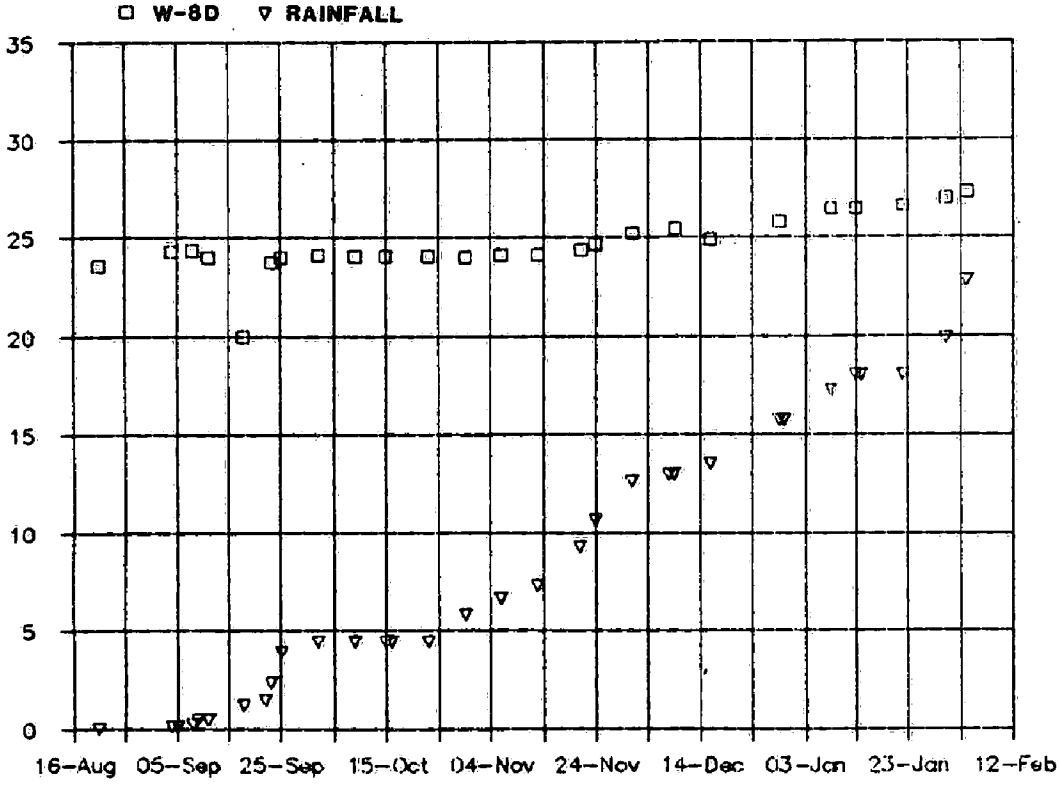


FIG. D3.3-9B DEEP SINGLE WELLS



ELEVATION (FEET) / CUMULATIVE RAINFALL (INCHES)

DATE 1986-87

NL IND, INC./GOULD, INC. REMEDIAL INVESTIGATION	
SINGLE WELL HYDROGRAPHS	
FIG. D3.3-9	DAMES & MOORE

11831-034

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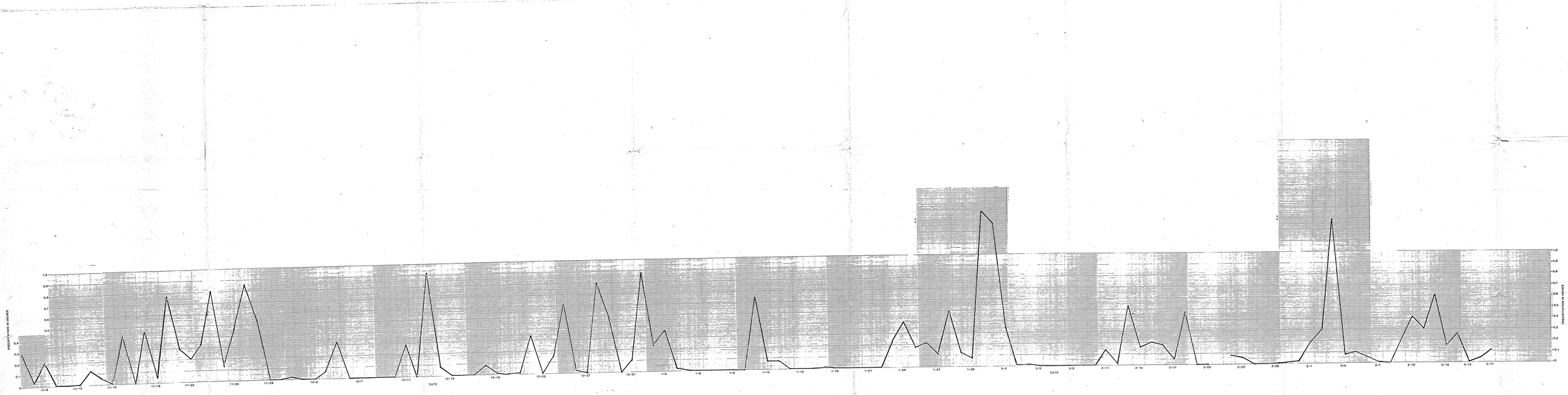
SCOEPA00015817

APPENDIX D3.4

CONTINUOUS STEVENS RECORDER DATA



NL/GOULD

DAILY PRECIPITATION (INCHES)
NOV. 7, 1986 TO MAR. 17, 1987

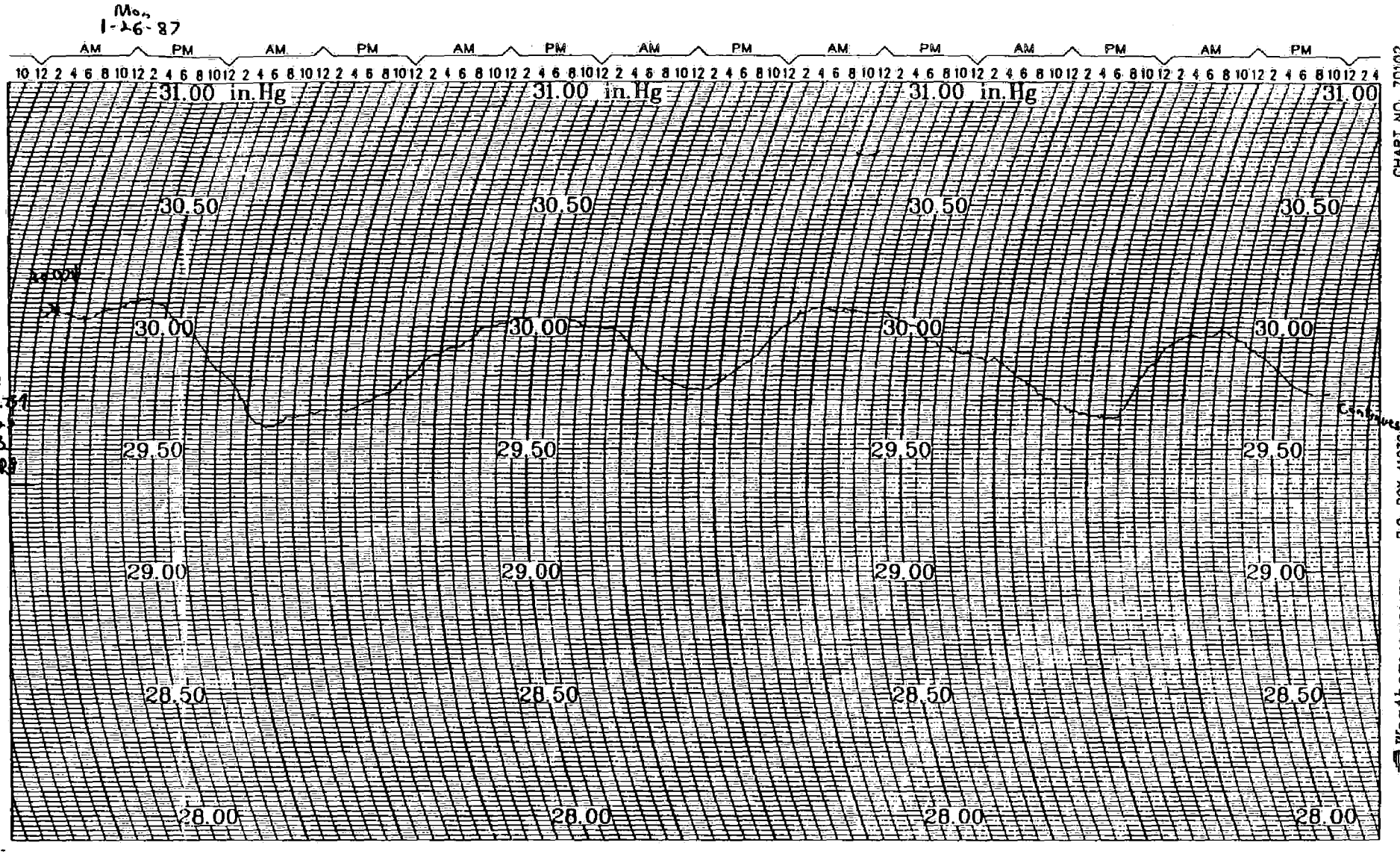
FIGURE 03.4-1 DAMES & MOORE

SCOEPA00015810

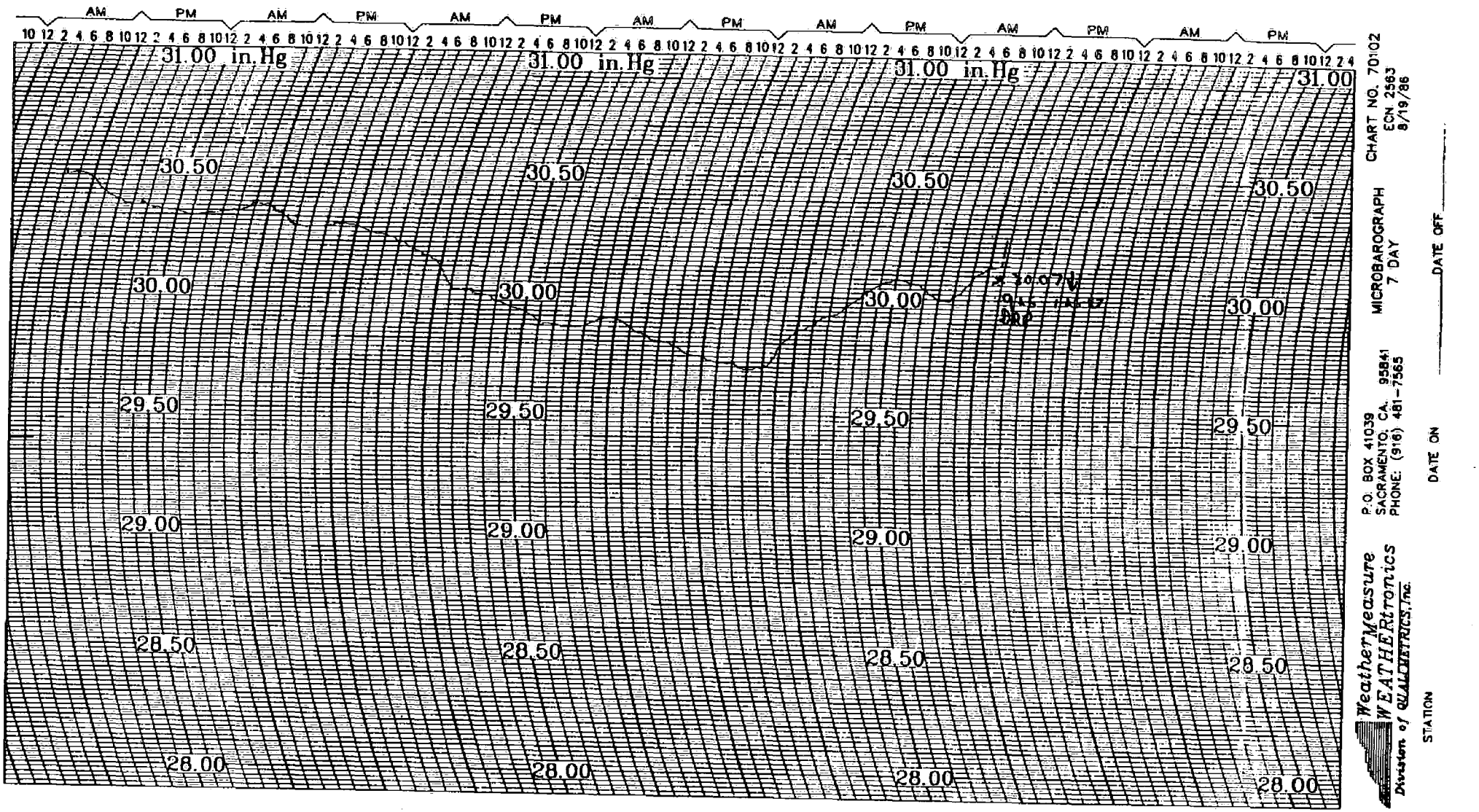
SCOEPA00015820

APPENDIX D3.5

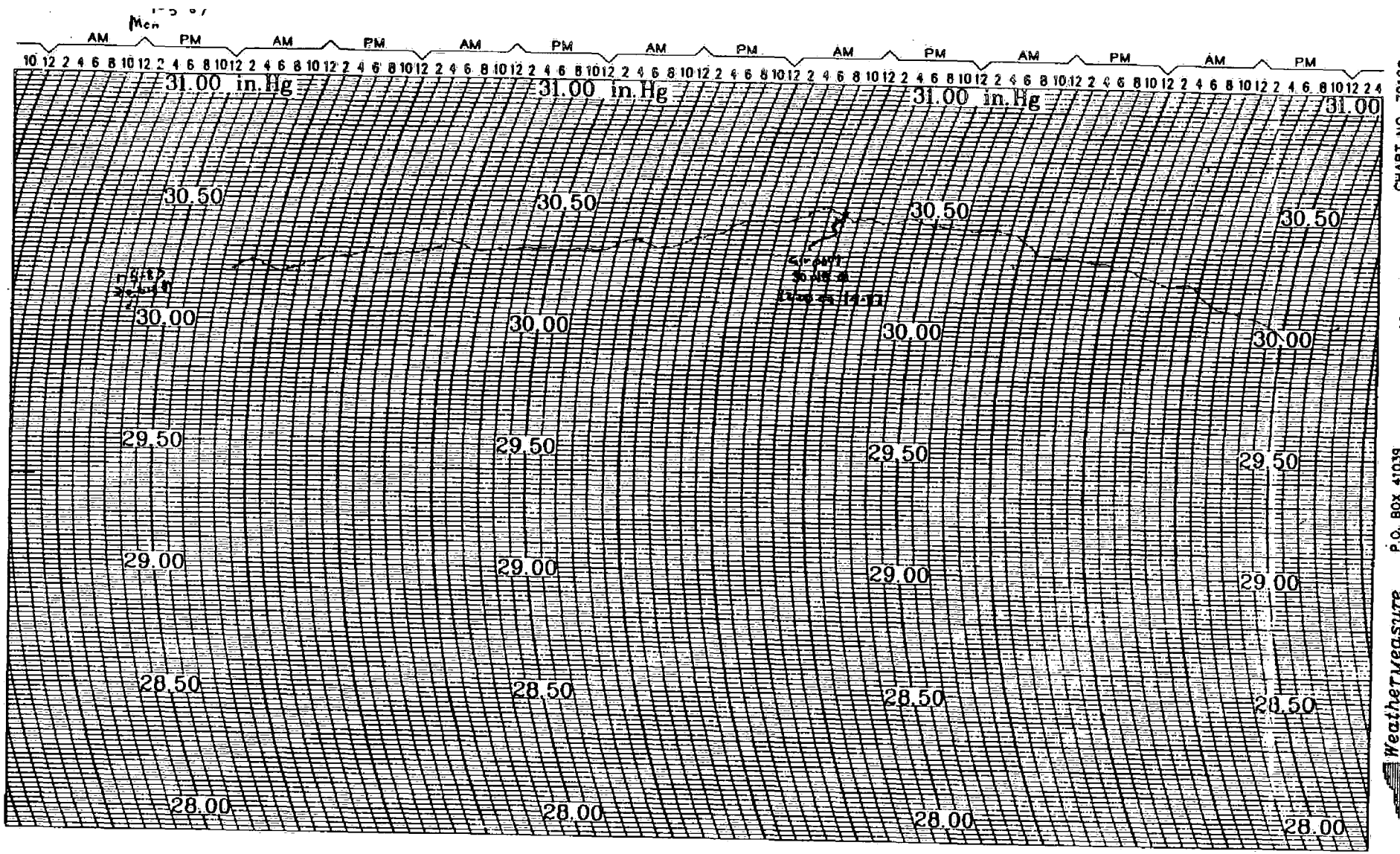
BAROMETRIC PRESSURE CHARTS



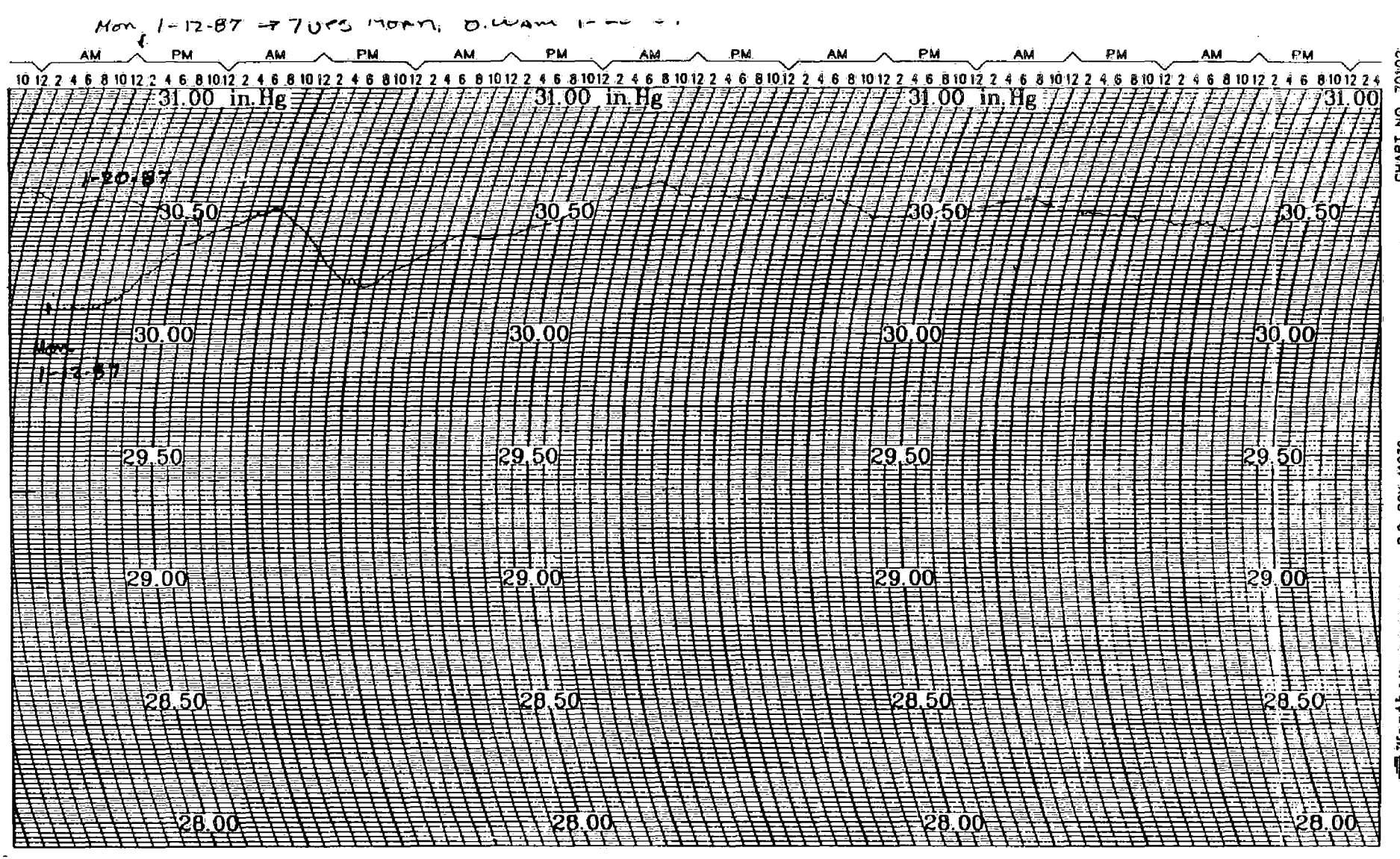
SCOEPA00015822



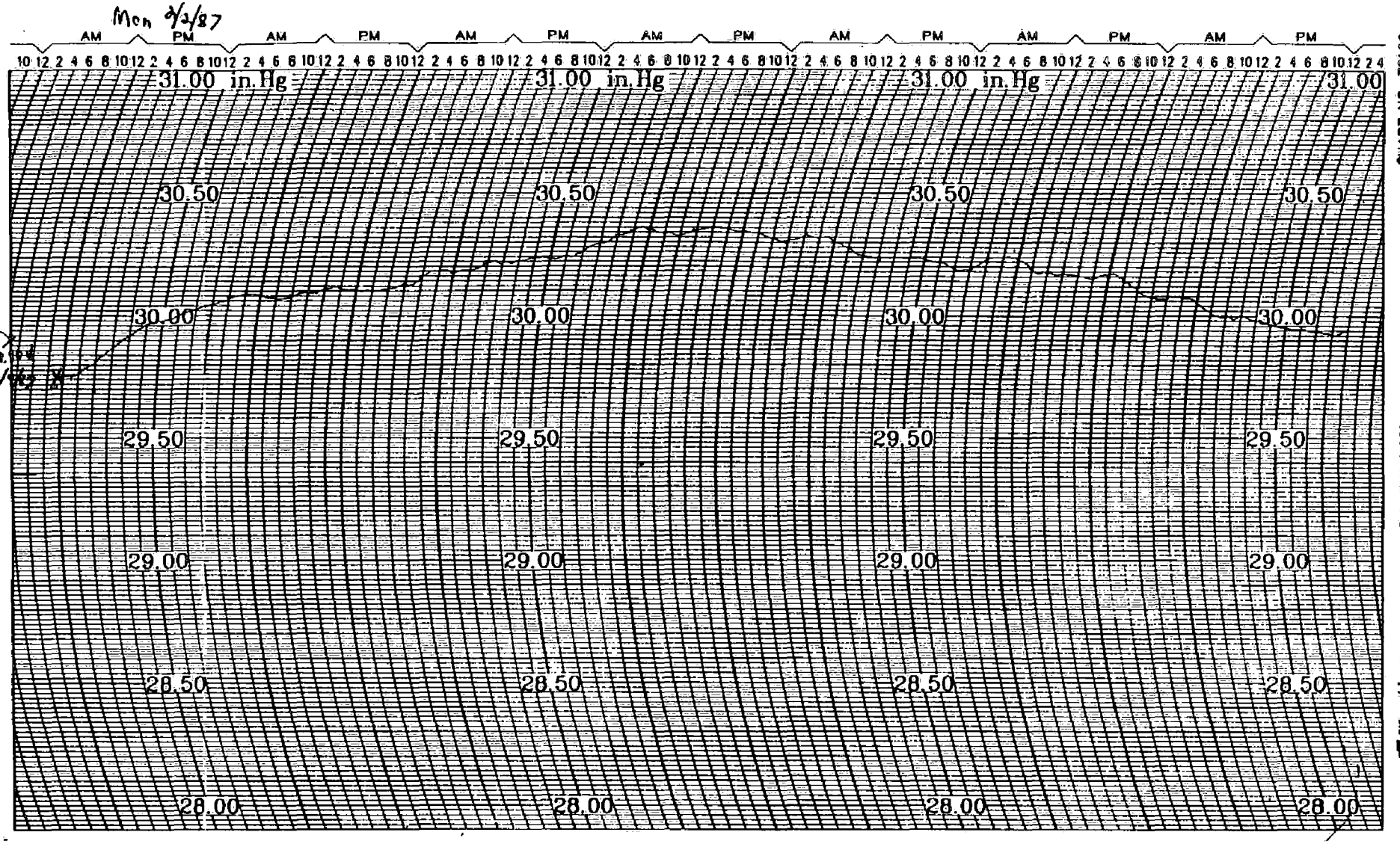
SCOEPA00015823



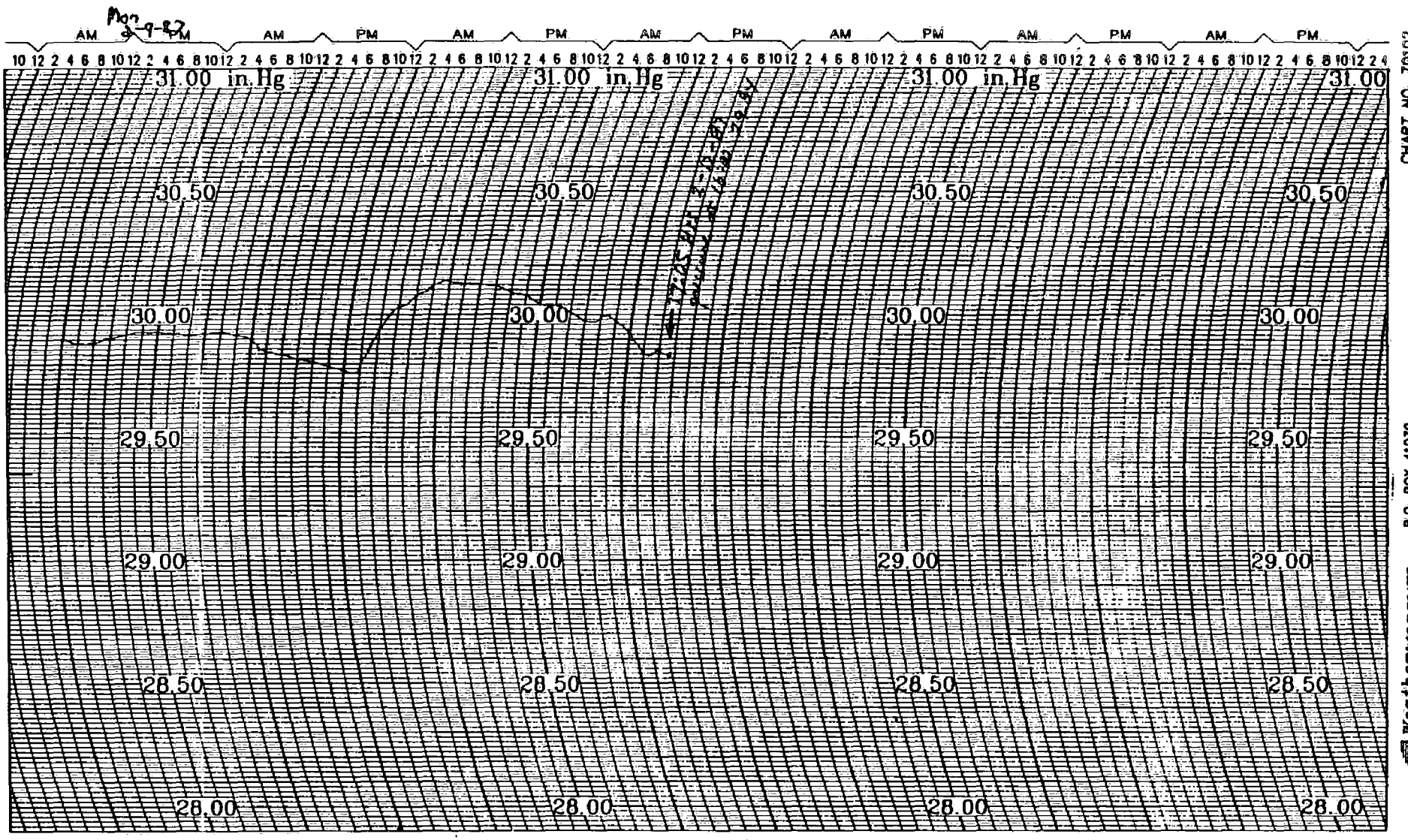
SCOEPA00015824



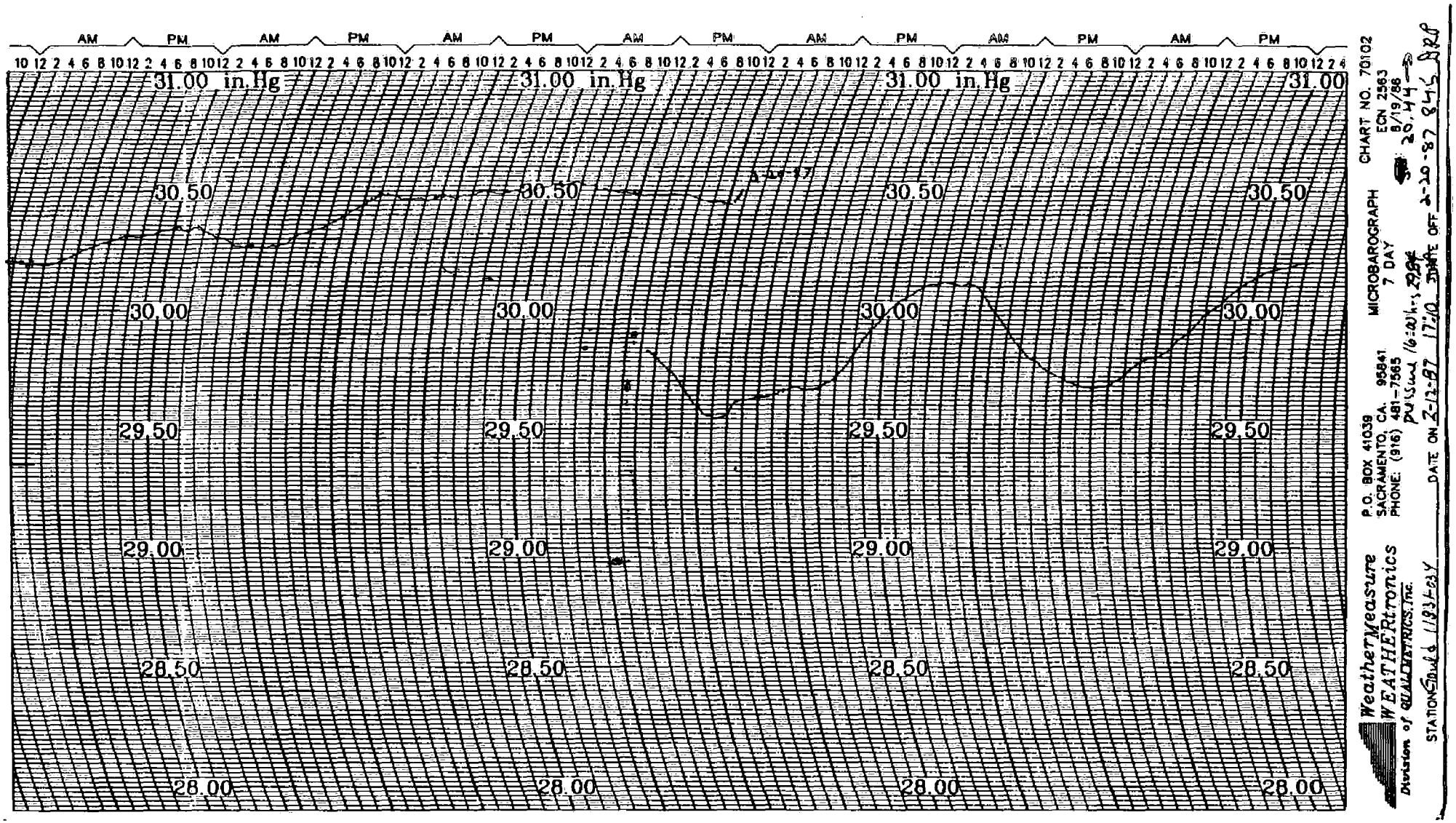
SCOEPA00015825



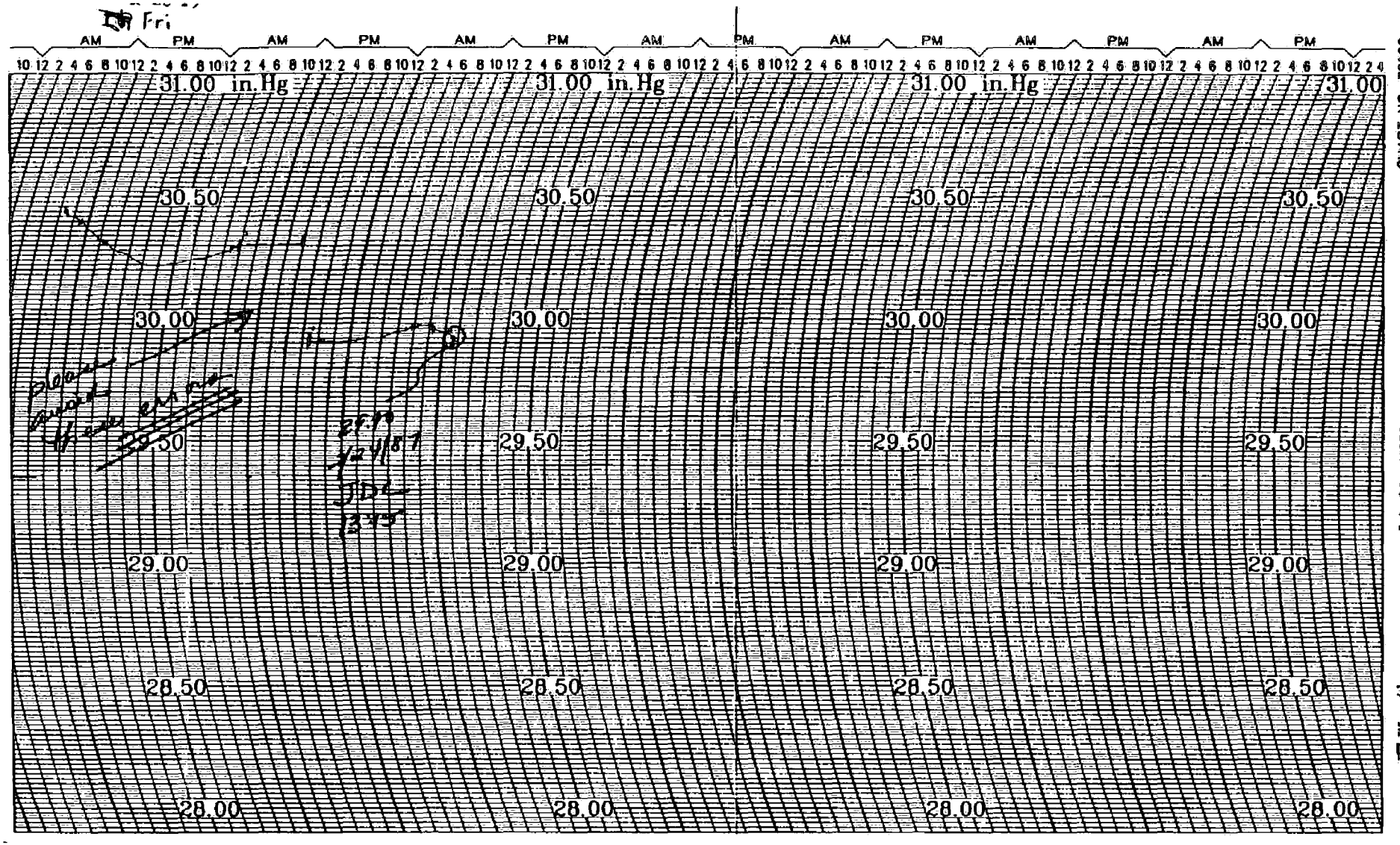
SCOEPA00015826



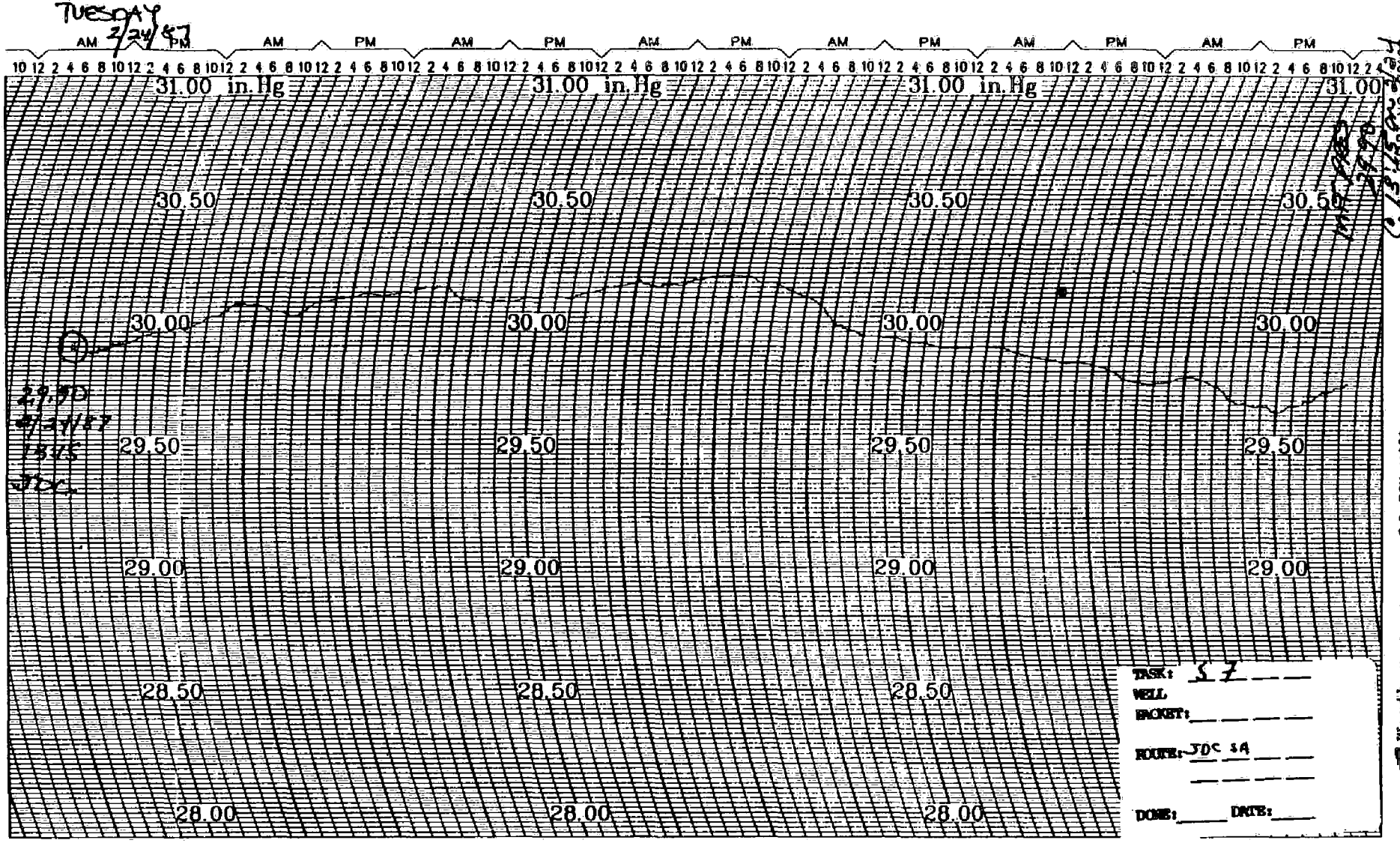
SCOEPA00015827



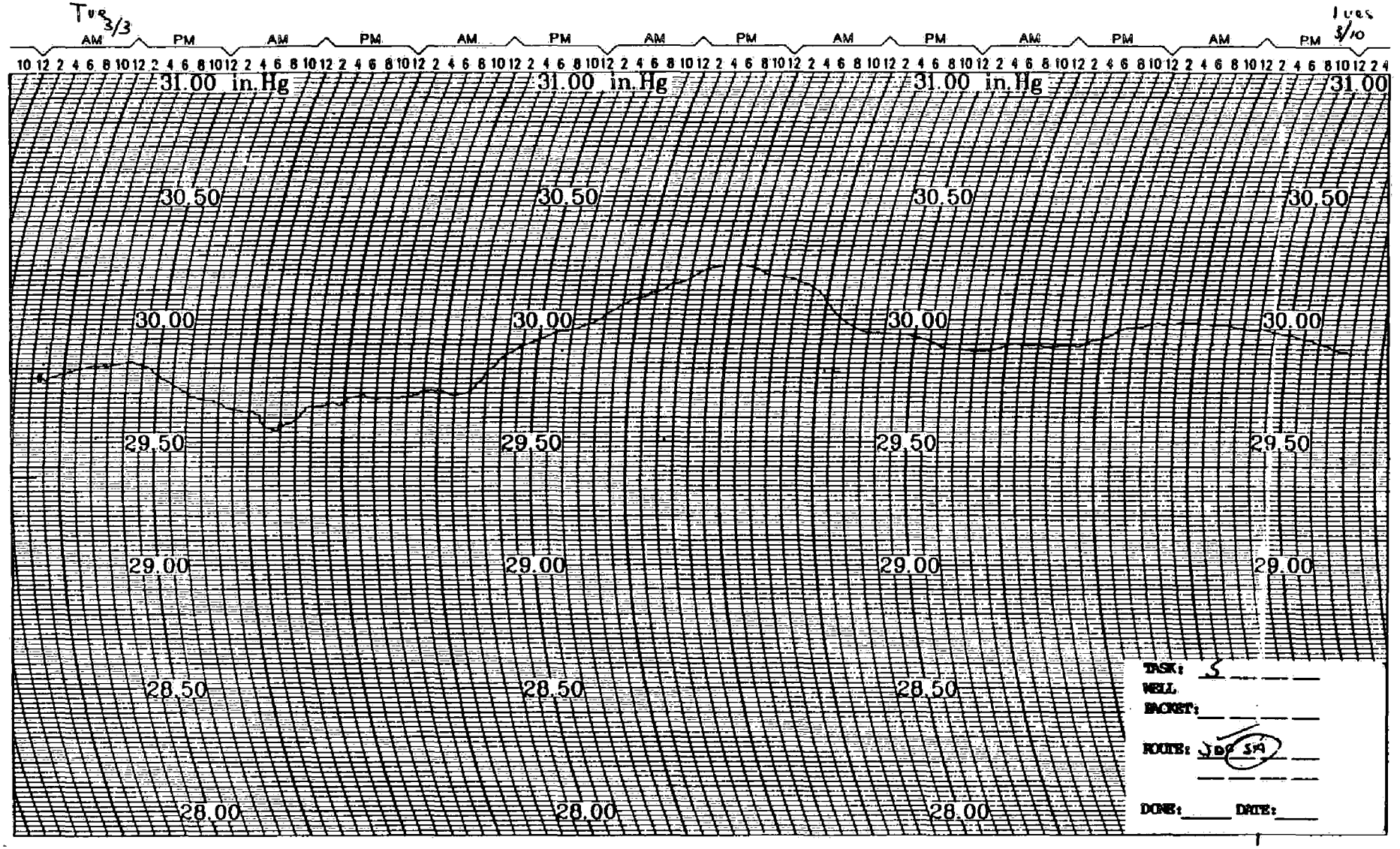
SCOEPA00015828



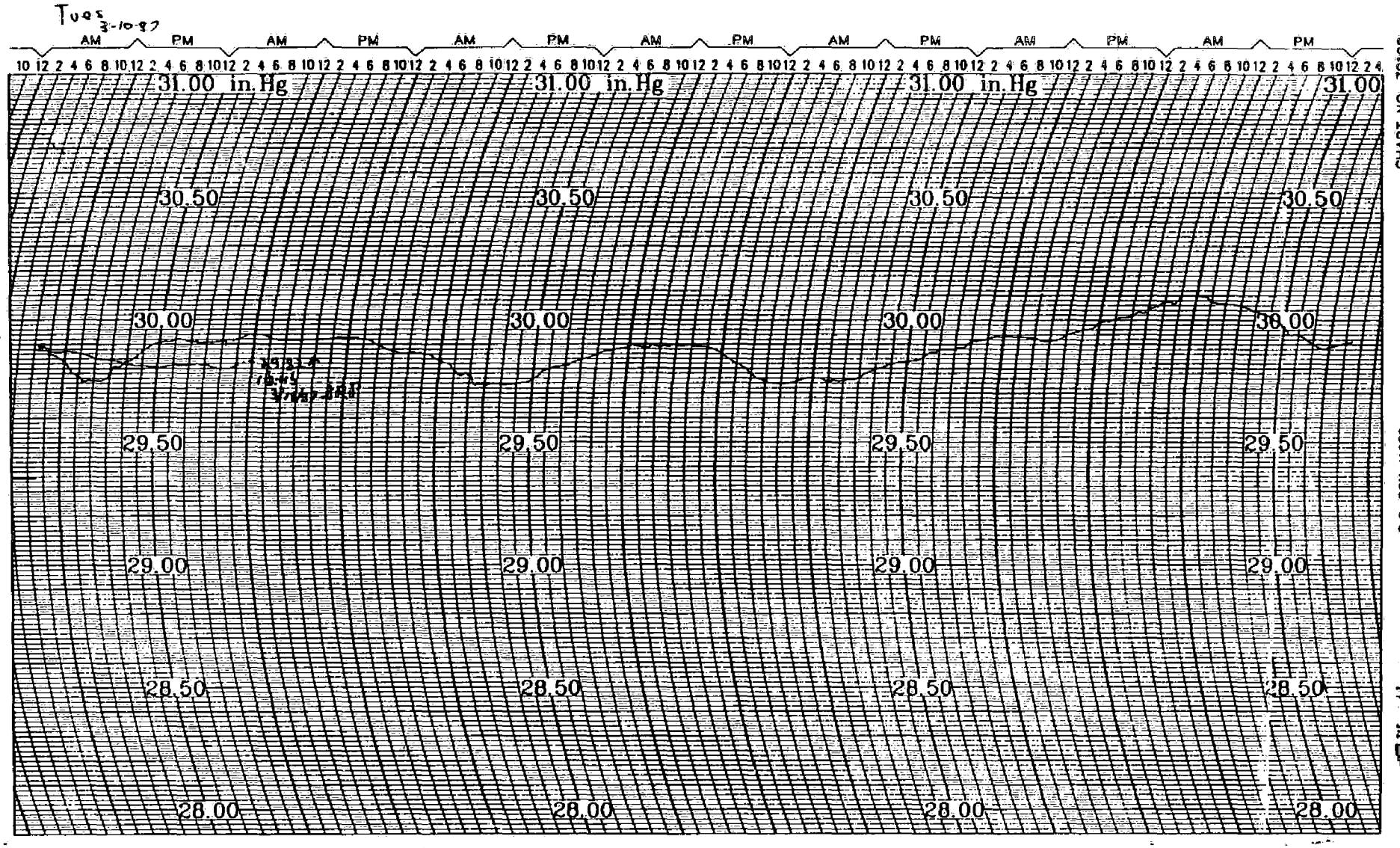
SCOEPA00015829



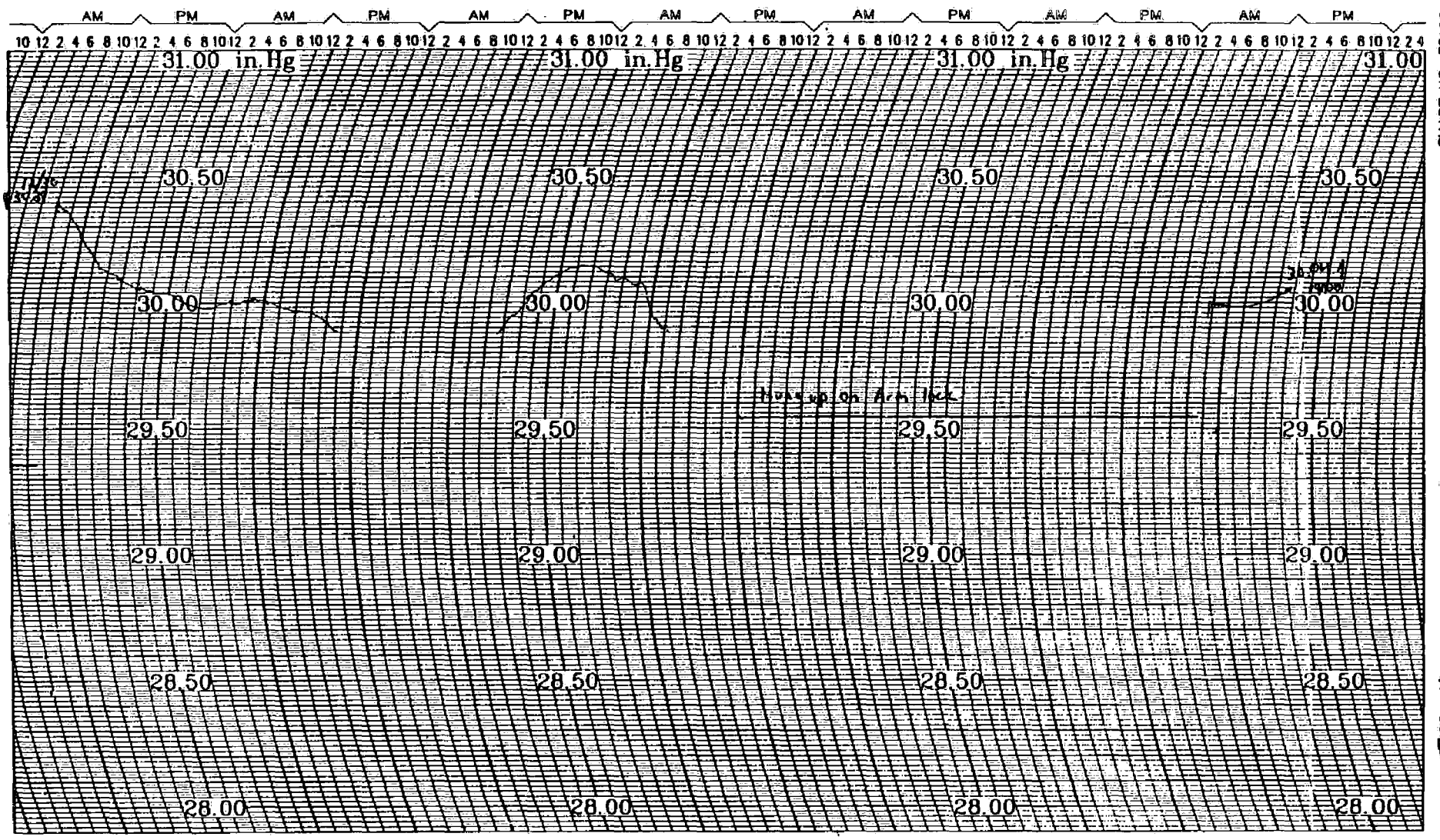
SCOEPA00015830



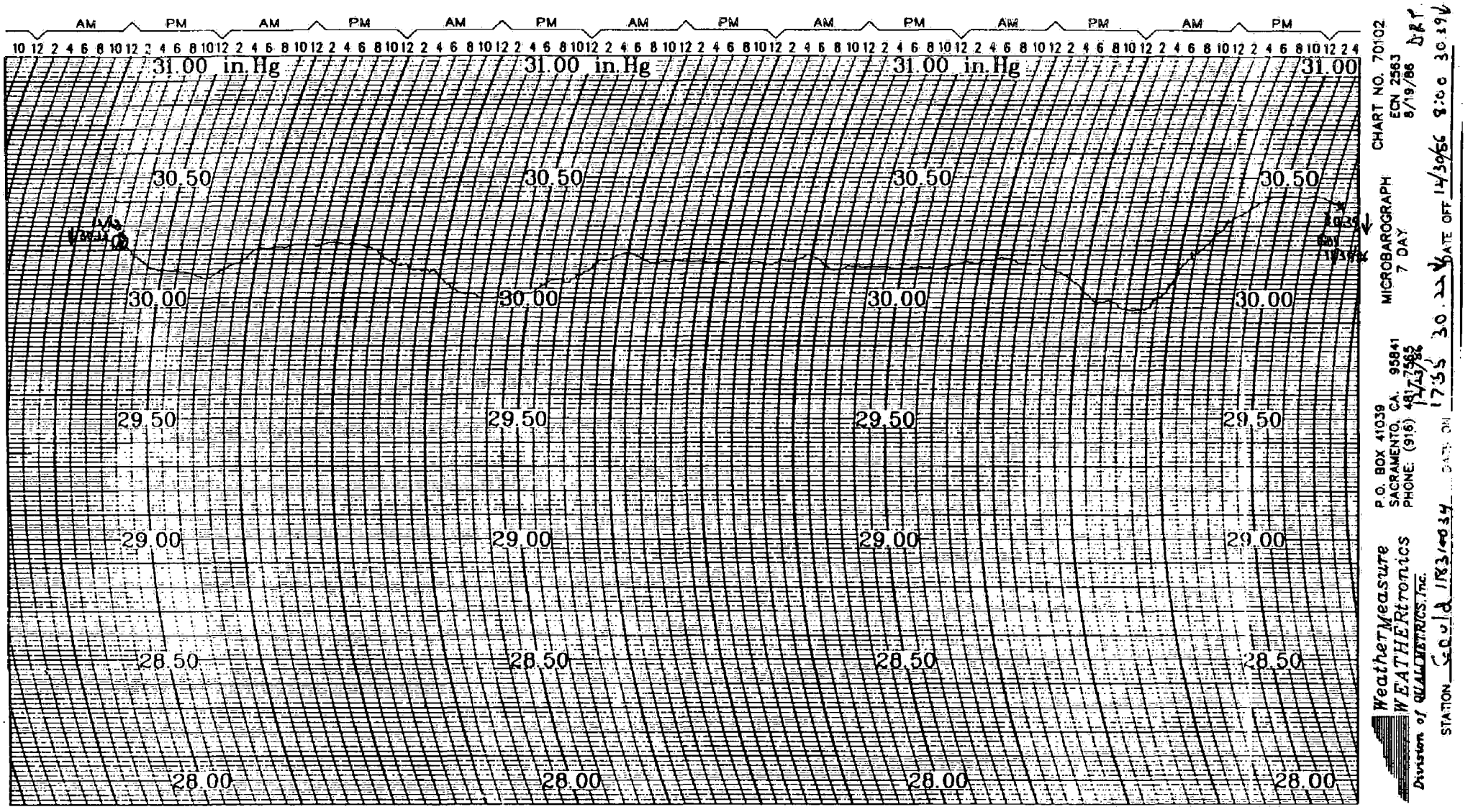
SCOEPA00015831



SCOEPA00015832



SCOEPA00015833



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Appendix D4

APPENDIX D4

TEST PIT LOGS

INTRODUCTION

APPENDIX D4, TEST PIT LOGS

Logs of test pits are presented in Appendix D4. Test pits 1 through 10 (Figures D4-2 through D4-11) were excavated on the Rhone-Poulenc property adjacent to NL/Gould (see Figure 3.2-3). They were excavated for the purpose of determining the extent, thickness, and volume of buried battery casing fragments.

Matte test pits 1 through 18 (Figures D4-12 through D4-17) were excavated on the NL/Gould property to investigate the extent, thickness, and volume of buried matte (see Figure 3.2-4).

Soil types shown on the logs of test pits are classified in accordance with the Unified Soil Classification System which is included as Figure D4-1.

SCOEPA00015837

MAJOR DIVISIONS			GRAPHIC SYMBOL	LETTER SYMBOL	TYPICAL DESCRIPTIONS
COARSE GRAINED SOILS — MORE THAN 50% OF MATERIAL IS LARGER THAN NO. 200 SIEVE SIZE	GRAVEL AND GRAVELLY SOILS — MORE THAN 50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE	CLEAN GRAVELS (LITTLE OR NO FINES)		GW	WELL-GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES
				GP	POORLY-GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES
		GRAVELS WITH FINES (APPRECIABLE AMOUNT OF FINES)		GM	SILTY GRAVELS, GRAVEL-SAND-SILT MIXTURES
				GC	CLAYEY GRAVELS, GRAVEL-SAND-CLAY MIXTURES
	SAND AND SANDY SOILS — MORE THAN 50% OF COARSE FRACTION PASSING NO. 4 SIEVE	CLEAN SAND (LITTLE OR NO FINES)		SW	WELL-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
				SP	POORLY-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
		SANDS WITH FINES (APPRECIABLE AMOUNT OF FINES)		SM	SILTY SANDS, SAND-SILT MIXTURES
				SC	CLAYEY SANDS, SAND-CLAY MIXTURES
FINE GRAINED SOILS — MORE THAN 50% OF MATERIAL IS SMALLER THAN NO. 200 SIEVE SIZE	SILTS AND CLAYS	LIQUID LIMIT LESS THAN 50		ML	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY
				CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
				OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
	SILTS AND CLAYS	LIQUID LIMIT GREATER THAN 50		MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SAND OR SILTY SOILS
				CH	INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS
				OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
HIGHLY ORGANIC SOILS				PT	PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS

NOTE: DUAL SYMBOLS ARE USED TO INDICATE BORDERLINE SOIL CLASSIFICATIONS

NL IND, INC./GOULD, INC.
REMEDIAL INVESTIGATION

UNIFIED SOIL CLASSIFICATION SYSTEM

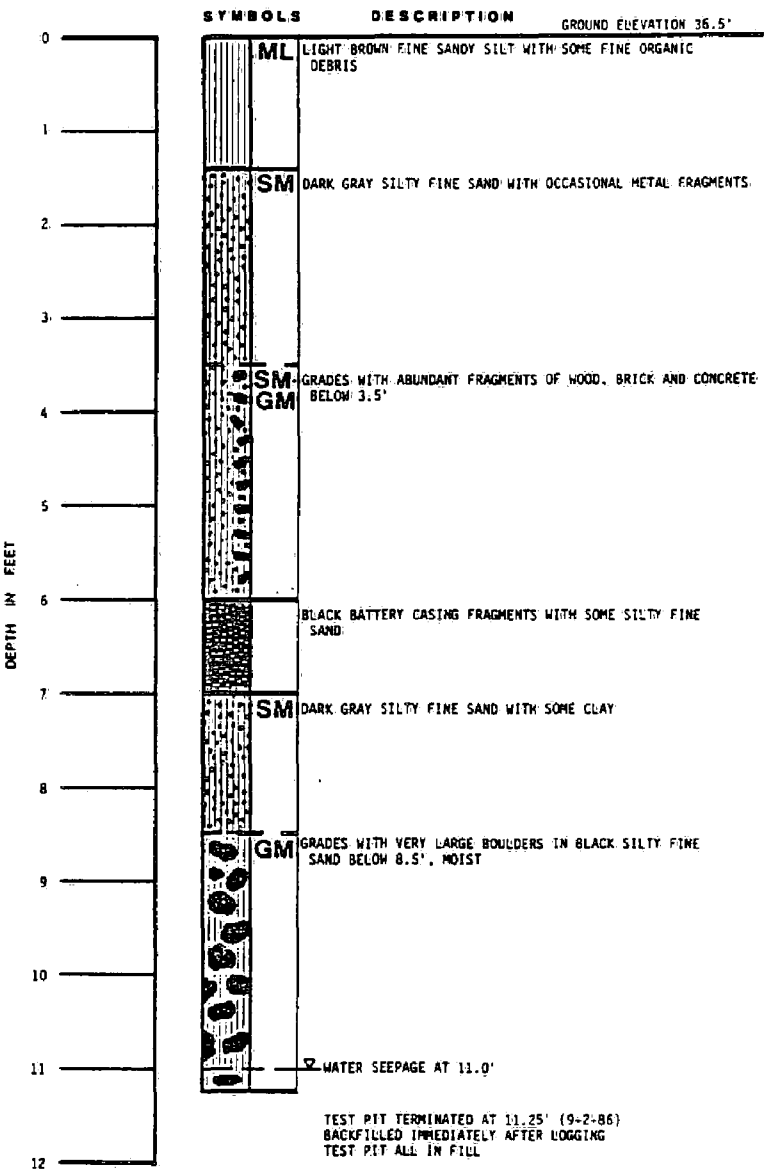
FIG. D4-1 DAMES & MOORE

11831-034

SCOEPA00015838

TEST PIT 1

GEOLOGIC LOG



NOTE: DISCUSSION IN THE TEXT OF THIS REPORT IS NECESSARY FOR A PROPER UNDERSTANDING OF SUB-SURFACE CONDITIONS REVEALED BY THE TEST PITS.

LOG OF TEST PIT 1

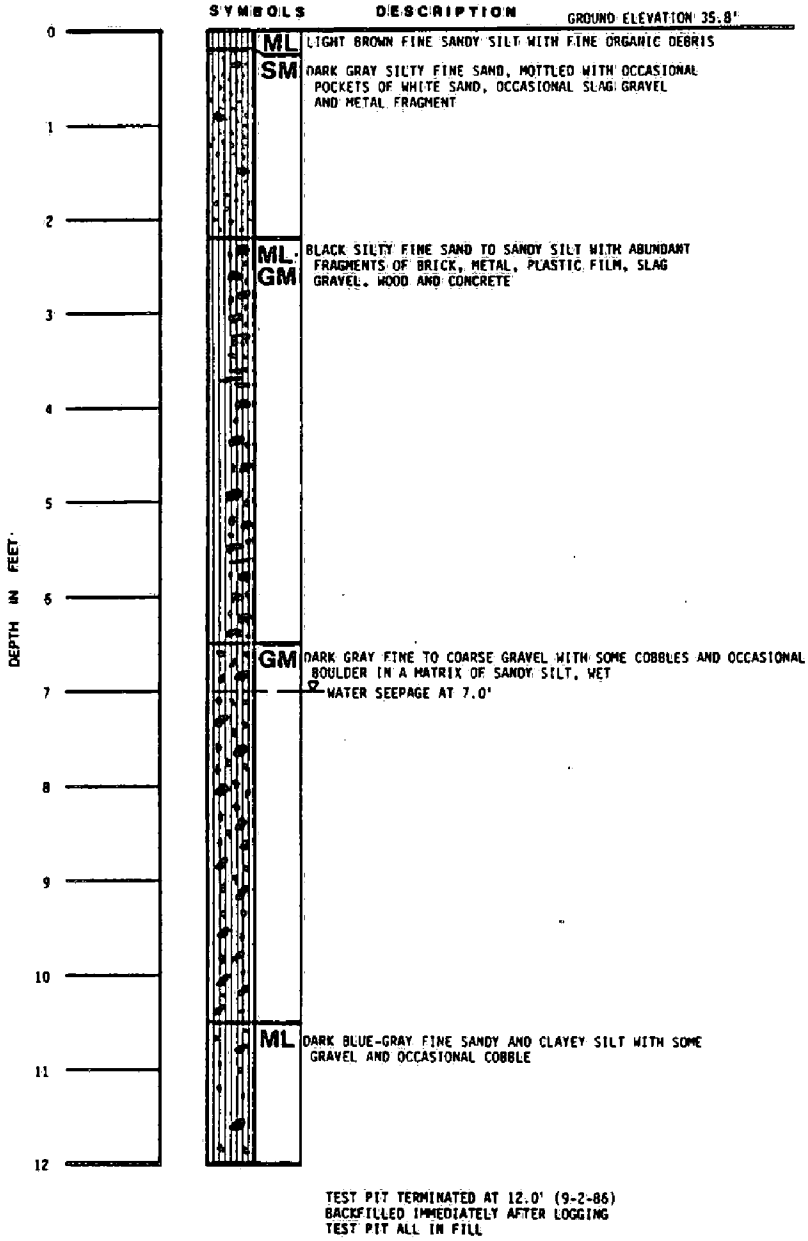
Dames & Moore

FIGURE D4-2

SCOEPA00015839

TEST PIT 2

GEOLOGIC LOG



TEST PIT TERMINATED AT 12.0' (9-2-86)
BACKFILLED IMMEDIATELY AFTER LOGGING
TEST PIT ALL IN FILL

NOTE: DISCUSSION IN THE TEXT OF THIS REPORT IS NECESSARY FOR A PROPER UNDERSTANDING OF SUB-SURFACE CONDITIONS REVEALED BY THE TEST PITS.

LOG OF TEST PIT 2

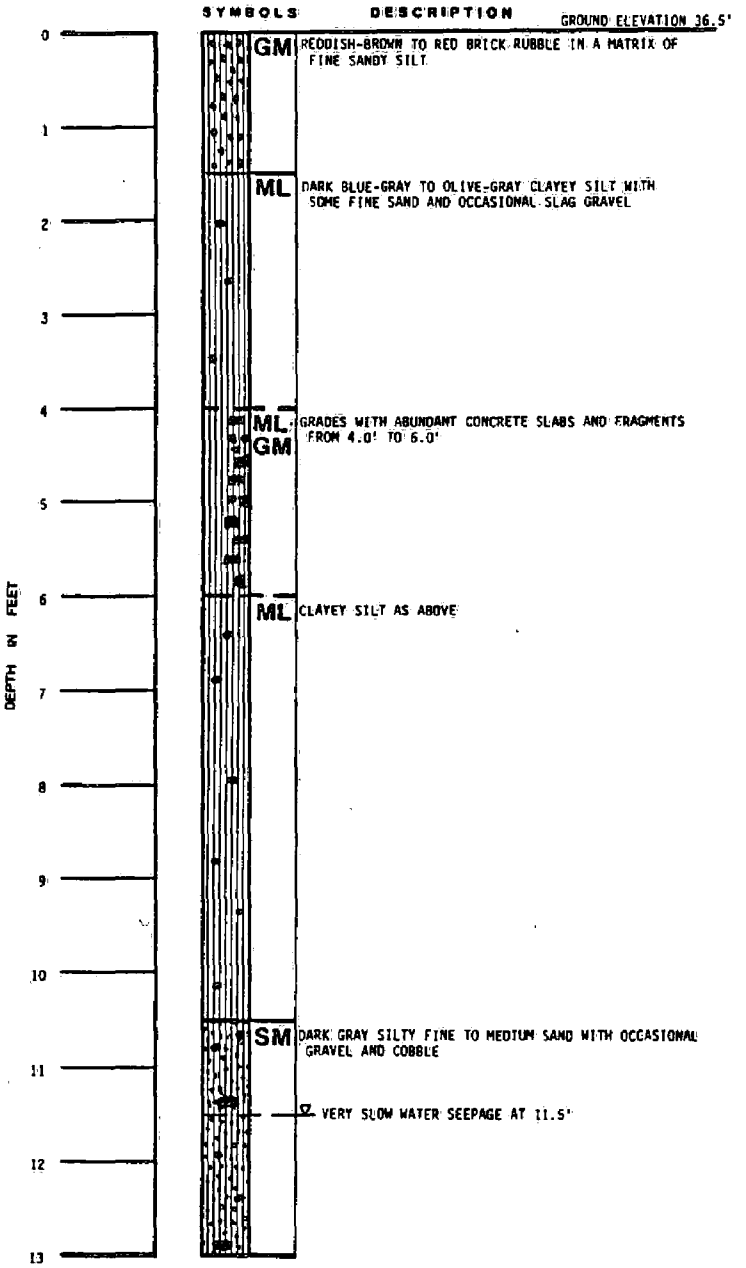
Dames & Moore

FIGURE D4-3

SCOEPA00015840

TEST PIT 3

GEOLOGIC LOG



TEST PIT TERMINATED AT 13.0' (9-2-86)
BACKFILLED IMMEDIATELY AFTER LOGGING
TEST PIT ALL IN FILL

NOTE: DISCUSSION IN THE TEXT OF THIS REPORT IS NECESSARY FOR A PROPER UNDERSTANDING OF SUB-SURFACE CONDITIONS REVEALED BY THE TEST PITS.

LOG OF TEST PIT 3

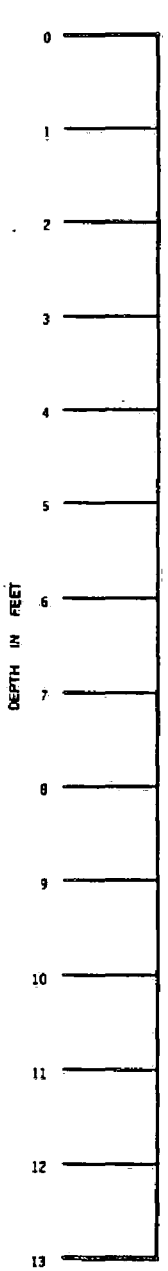
Dames & Moore

FIGURE D4-4

SCOEPA00015841

TEST PIT 4

GEOLOGIC LOG



SYMBOLS	DESCRIPTION
GM	LIGHT TAN FINE TO COARSE GRAVEL, OCCASIONAL COBBLES AND NUMEROUS BRICK FRAGMENTS IN A MATRIX OF SANDY SILT
ML	BLUE-GRAY CLAYEY TO FINE SANDY SILT WITH SOME GRAVEL
CL	BLUE-GRAY TO OLIVE-GRAY SILTY CLAY WITH SOME FINE SAND AND OCCASIONAL LARGE FRAGMENT OF CONCRETE
CL ML	LIGHT GRAY TO BLACK INTERLAMINATED SILTY CLAY AND CLAYEY SILT, MICACEOUS, NEEDLE SHAPED SMALL WHITE CRYSTALS BETWEEN LAMINATIONS
ML	DARK GRAY SANDY SILT WITH SOME CLAY
	GRADES TO BLACK BELOW 7.0', OCCASIONAL BATTERY CASING FRAGMENT
	BLACK BATTERY CASING FRAGMENTS LITTLE TO NO SOIL MATRIX, LOOSE, HIGHLY PERMEABLE
	RAPID WATER SEEPAGE AT 9.7'
	TEST PIT WALLS CAVING

GROUND ELEVATION 36.8'

TEST PIT TERMINATED AT 13.0' (9-2-86)
BACKFILLED IMMEDIATELY AFTER LOGGING
TEST PIT ALL IN FILL

NOTE: DISCUSSION IN THE TEXT OF THIS REPORT IS NECESSARY FOR A PROPER UNDERSTANDING OF SUB-SURFACE CONDITIONS REVEALED BY THE TEST PITS.

LOG OF TEST PIT 4

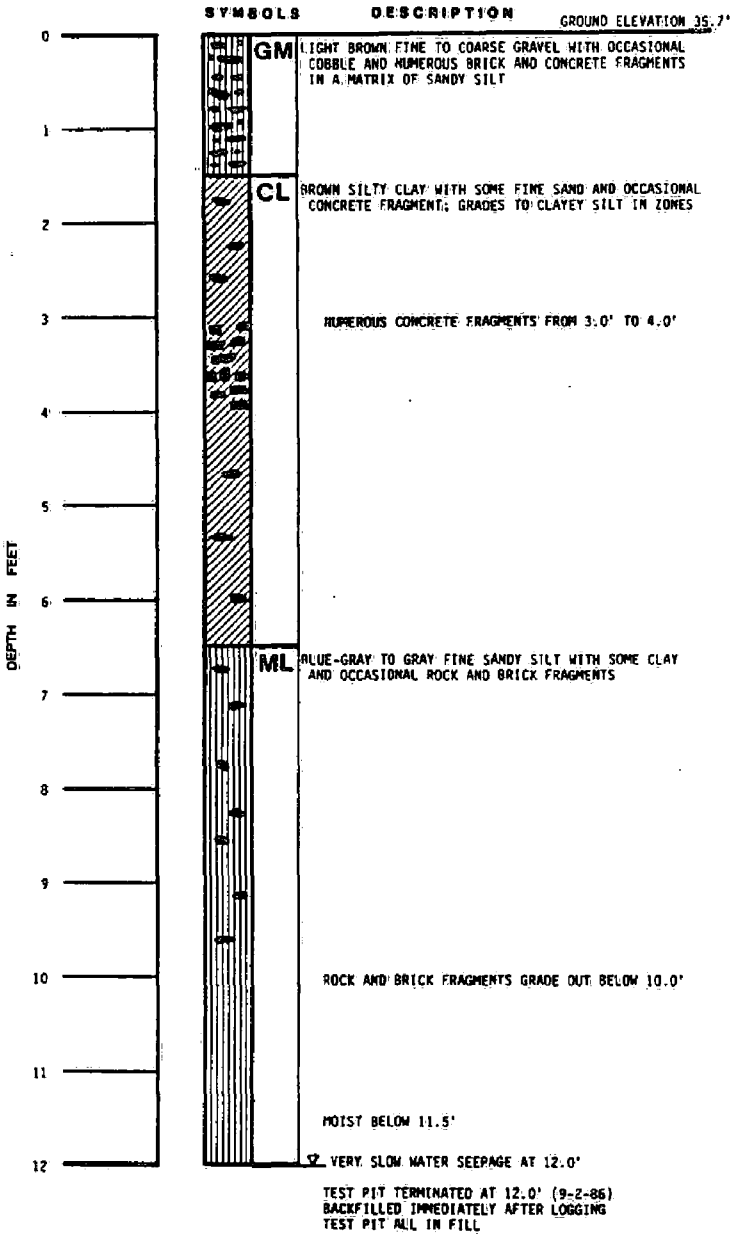
Dames & Moore

FIGURE D4-5

SCOEPA00015842

TEST PIT 5

GEOLOGIC LOG



NOTE: DISCUSSION IN THE TEXT OF THIS REPORT IS NECESSARY FOR A PROPER UNDERSTANDING OF SUB-SURFACE CONDITIONS REVEALED BY THE TEST PITS.

LOG OF TEST PIT 5

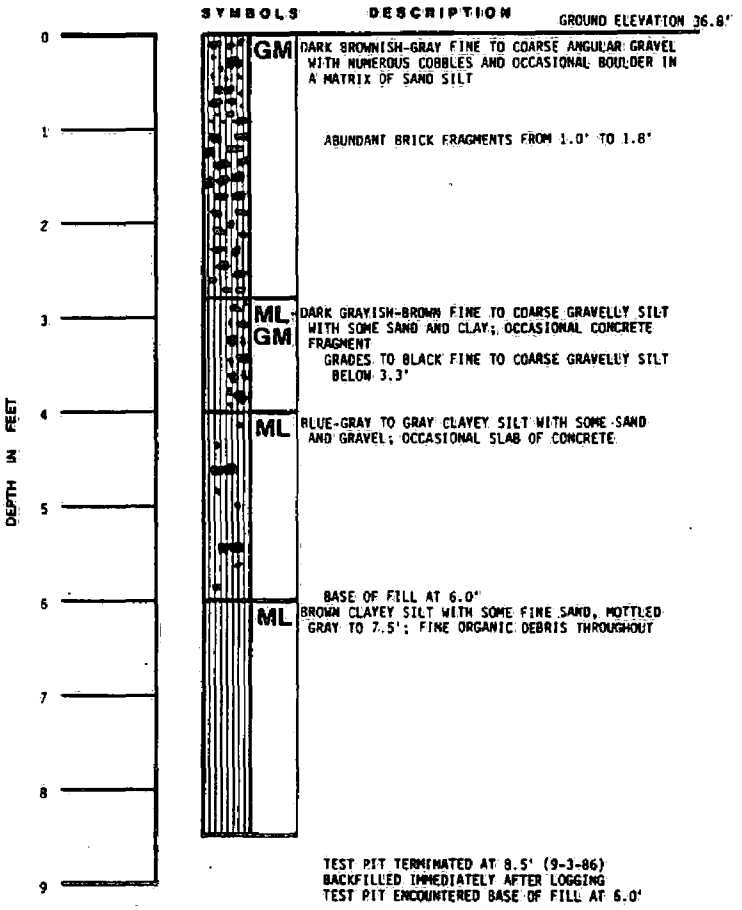
Dames & Moore

FIGURE D4-6

SCOEPA00015843

TEST PIT 6

GEOLOGIC LOG



NOTE: DISCUSSION IN THE TEXT OF THIS REPORT IS NECESSARY FOR A PROPER UNDERSTANDING OF SUB-SURFACE CONDITIONS REVEALED BY THE TEST PITS.

LOG OF TEST PIT 6

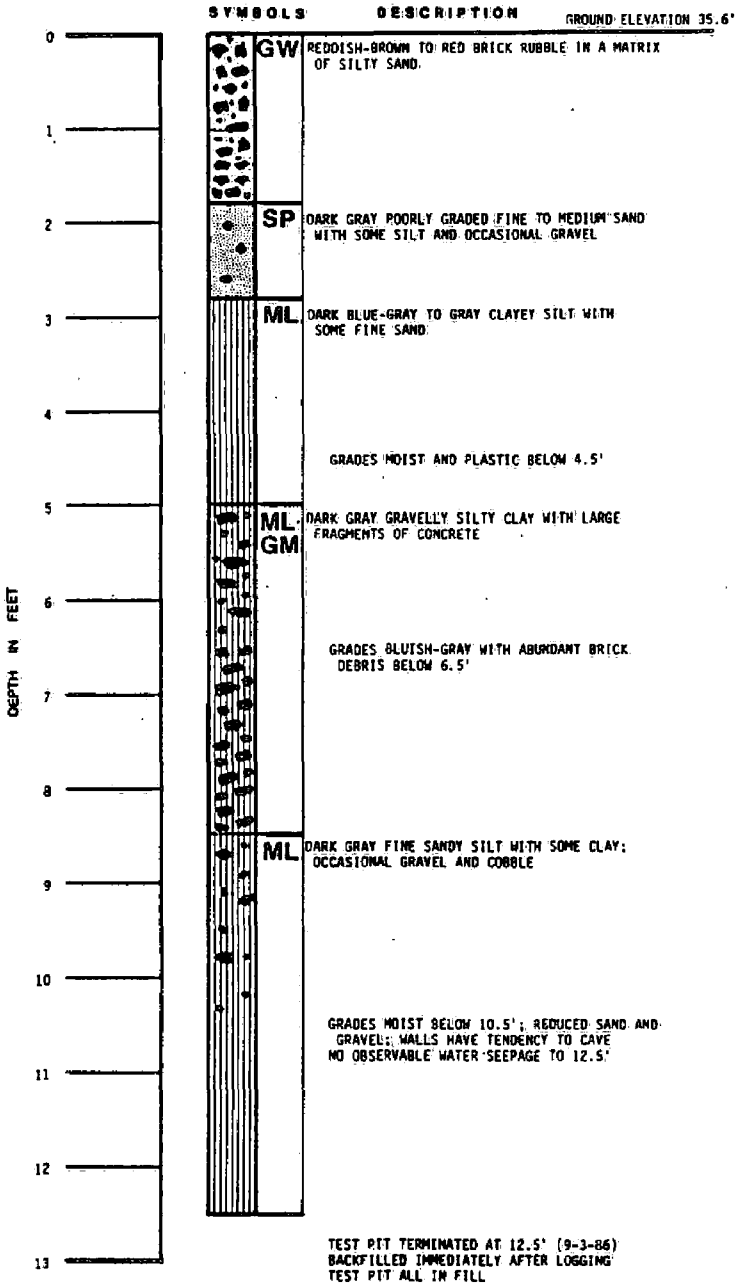
Dames & Moore

FIGURE D4-7

SCOEPA00015844

TEST PIT 7

GEOLOGIC LOG



NOTE: DISCUSSION IN THE TEXT OF THIS REPORT IS NECESSARY FOR A PROPER UNDERSTANDING OF SUB-SURFACE CONDITIONS REVEALED BY THE TEST PITS.

LOG OF TEST PIT 7

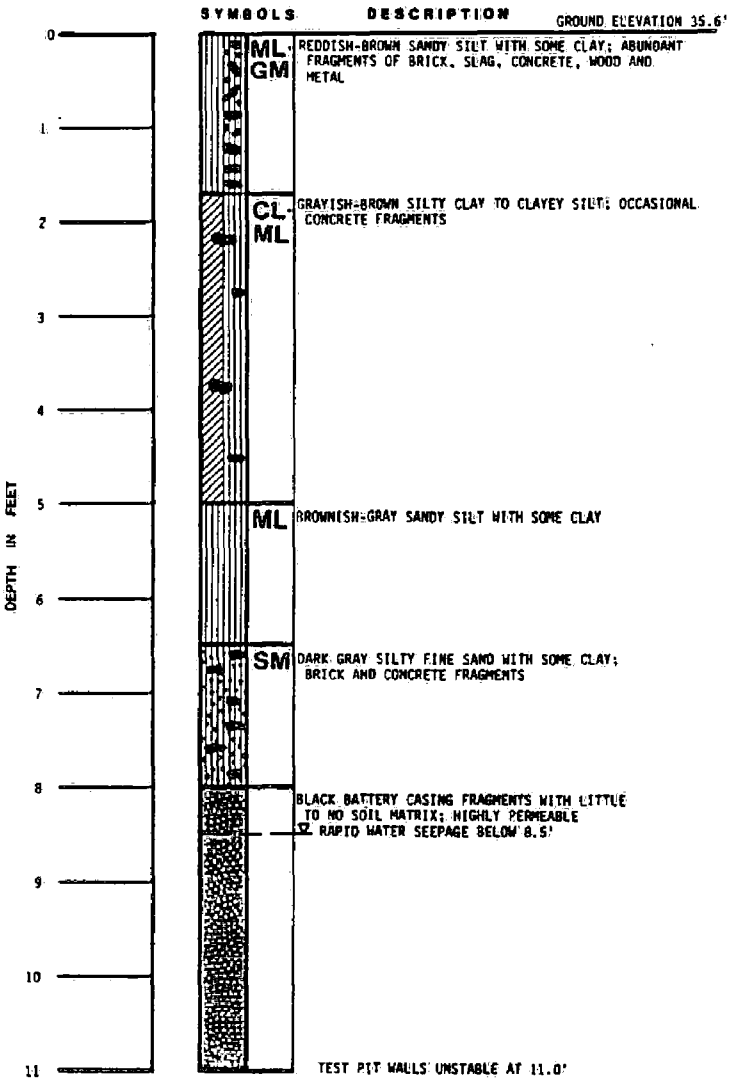
Dames & Moore

FIGURE D4-8

SCOEPA00015845

TEST PIT 8

GEOLOGIC LOG



NOTE: DISCUSSION IN THE TEXT OF THIS REPORT IS NECESSARY FOR A PROPER UNDERSTANDING OF SUB-SURFACE CONDITIONS REVEALED BY THE TEST PITS.

LOG OF TEST PIT 8

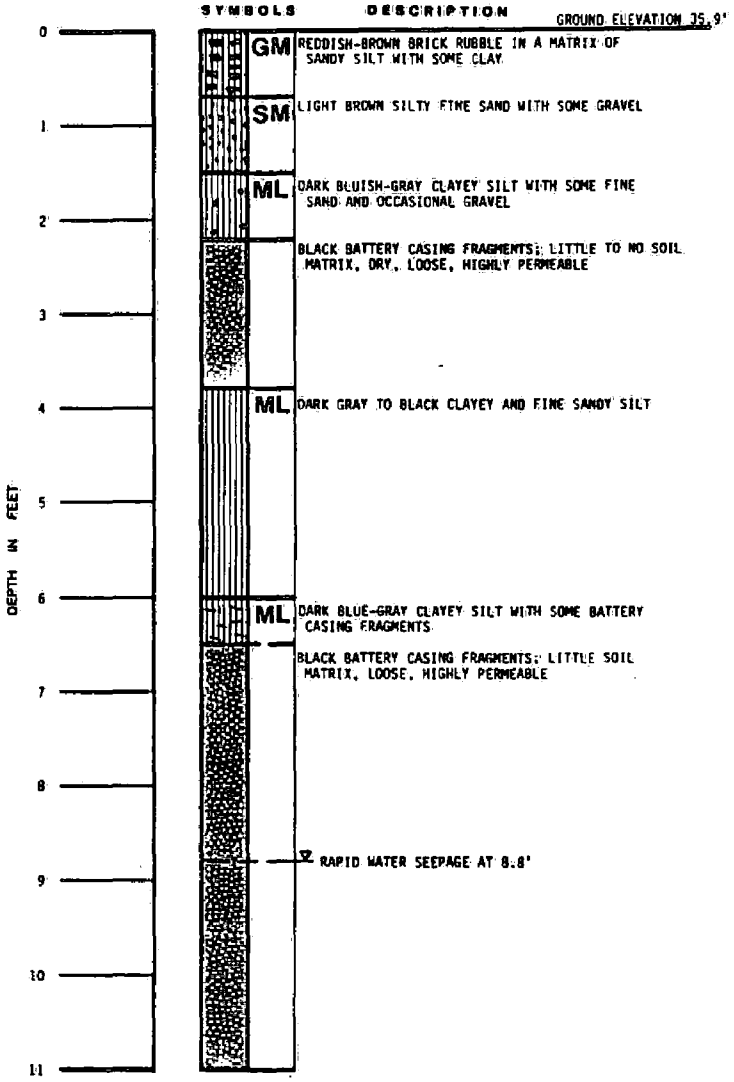
Dames & Moore

FIGURE D4-9

SCOEPA00015846

TEST PIT 9

GEOLOGIC LOG



TEST PIT TERMINATED AT 11.0' (9-3-86)
BACKFILLED IMMEDIATELY AFTER LOGGING
TEST PIT ALL IN FILL

NOTE: DISCUSSION IN THE TEXT OF THIS REPORT IS NECESSARY FOR A PROPER UNDERSTANDING OF SUB-SURFACE CONDITIONS REVEALED BY THE TEST PITS.

LOG OF TEST PIT 9

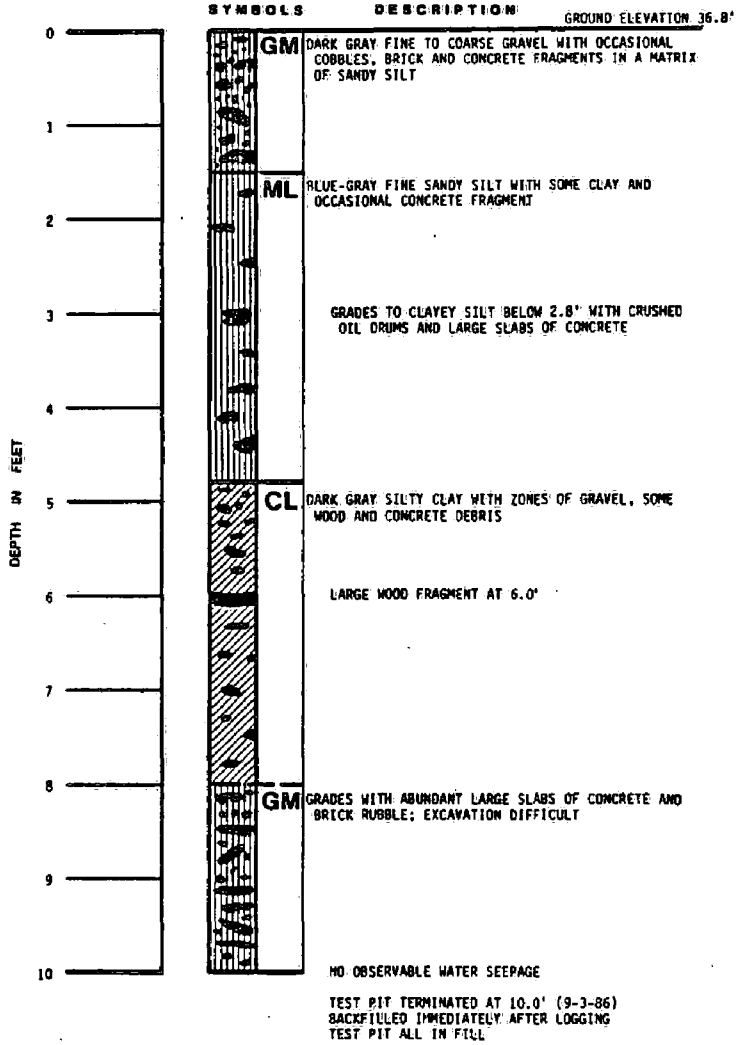
Dames & Moore

FIGURE D4-10

SCOEPA00015847

TEST PIT 10

GEOLOGIC LOG



NOTE: DISCUSSION IN THE TEXT OF THIS REPORT IS NECESSARY FOR A PROPER UNDERSTANDING OF SUB-SURFACE CONDITIONS REVEALED BY THE TEST PITS.

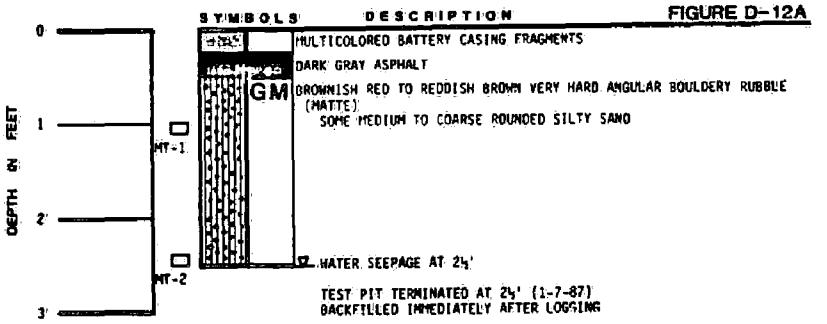
LOG OF TEST PIT 10

Dames & Moore

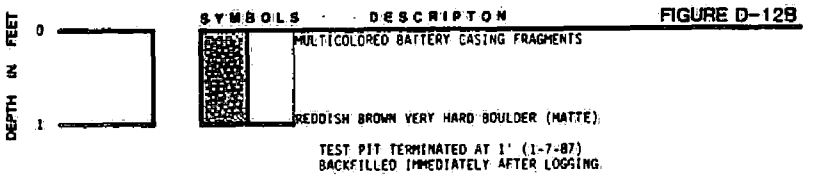
FIGURE D4-11

SCOEPA00015848

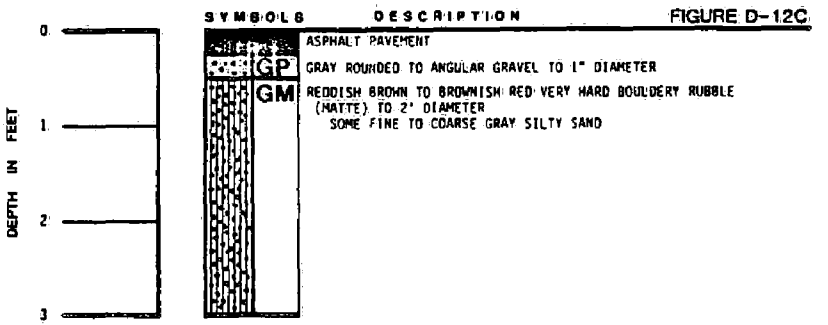
MATTE TEST PIT 1
GEOLOGIC LOG



MATTE TEST PIT 2
GEOLOGIC LOG



MATTE TEST PIT 3
GEOLOGIC LOG



KEY:

DISTURBED SAMPLE
MT-1

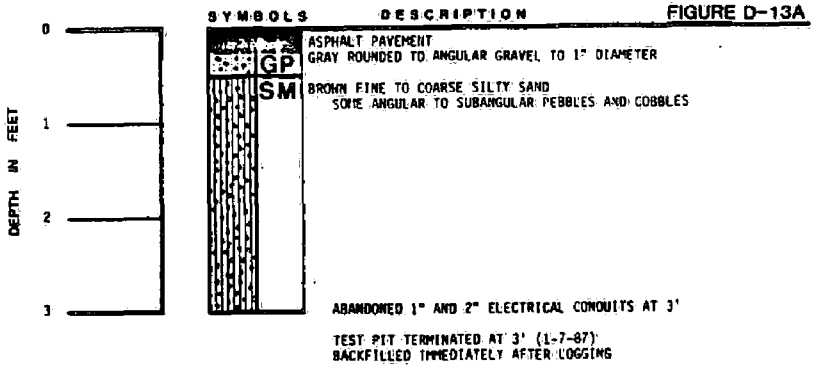
LOG OF MATTE TEST PIT 1, 2 & 3

Dames & Moore

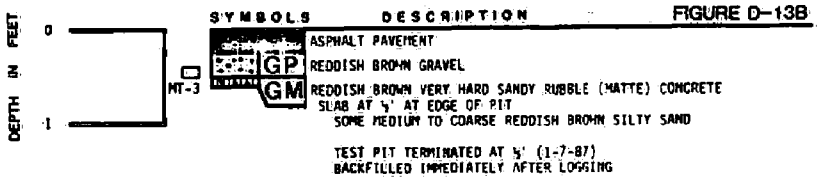
FIGURE D4-12

SCOEPA00015849

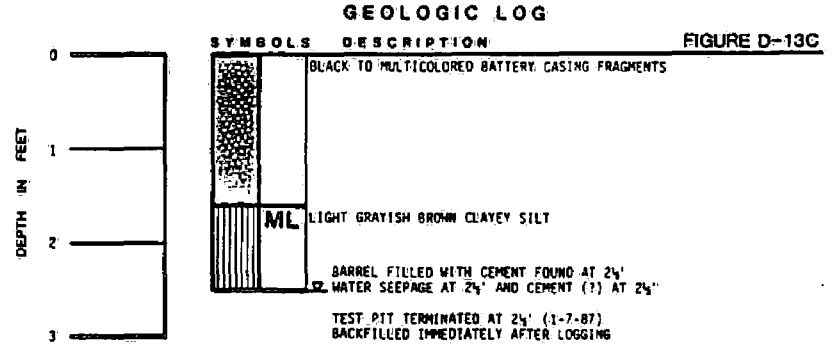
MATTE TEST PIT 4
GEOLOGIC LOG



MATTE TEST PIT 5
GEOLOGIC LOG



MATTE TEST PIT 6
GEOLOGIC LOG



KEY:

MT-3 DISTURBED SAMPLE

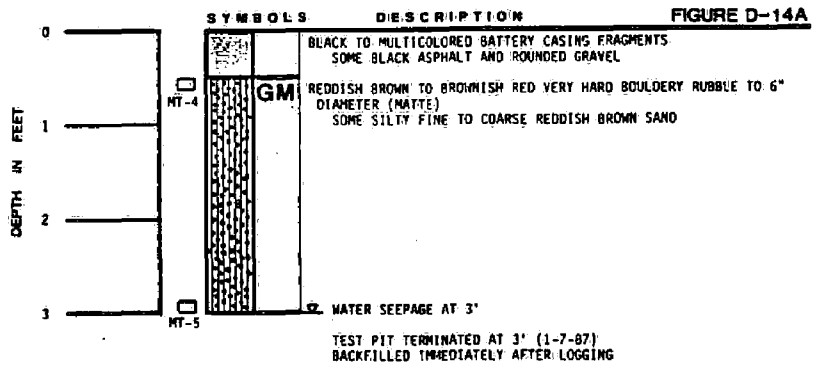
LOG OF MATTE TEST PIT 4, 5 & 6

Dames & Moore

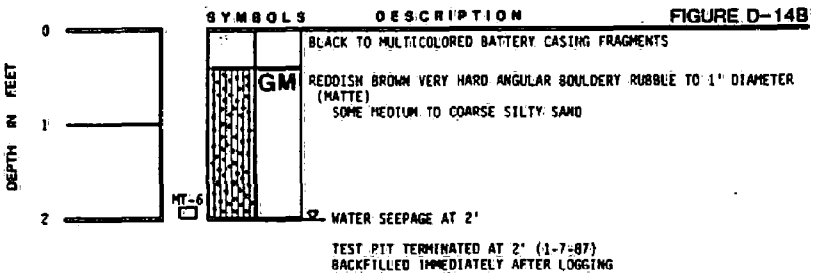
FIGURE D4-13

SCOEPA00015850

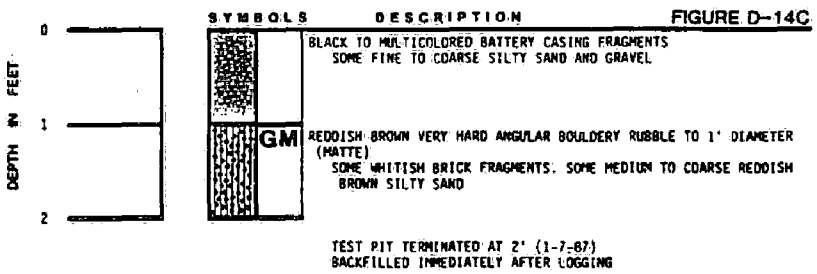
MATTE TEST PIT 7
GEOLOGIC LOG



MATTE TEST PIT 8
GEOLOGIC LOG



MATTE TEST PIT 9
GEOLOGIC LOG



KEY:

MT-4 DISTURBED SAMPLE

LOG OF MATTE TEST PIT 7, 8 & 9

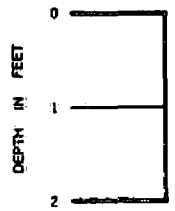
Dames & Moore

FIGURE D4-14

SCOEPA00015851

MATTE TEST PIT 10
GEOLOGIC LOG

FIGURE D-15A

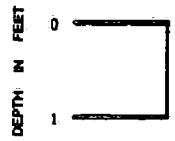


SYMBOLS	DESCRIPTION
GM	MULTICOLORED BATTERY CASING FRAGMENTS SOME FINE TO COARSE SILTY SAND AND GRAVEL REDDISH BROWN VERY HARD ANGULAR BOULDERY RUBBLE TO 1' DIAMETER (MATTE) SOME MEDIUM TO COARSE SILTY SAND

TEST PIT TERMINATED AT 1½' (1-7-87)
BACKFILLED IMMEDIATELY AFTER LOGGING

MATTE TEST PIT 11
GEOLOGIC LOG

FIGURE D-15B

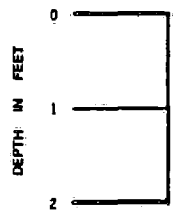


SYMBOLS	DESCRIPTION
	MULTICOLORED BATTERY CASING FRAGMENTS SOME FINE TO COARSE SAND
▽	WATER SEEPAGE AT 1'

TEST PIT TERMINATED AT 1' (1-7-87)
BACKFILLED IMMEDIATELY AFTER LOGGING

MATTE TEST PIT 12
GEOLOIC LOG

FIGURE D-15C



SYMBOLS	DESCRIPTION
	BLACK TO MULTICOLORED BATTERY CASING FRAGMENTS SOME FINE TO COARSE SAND
GM	REDDISH BROWN VERY HARD BOULDERY RUBBLE TO 1' DIAMETER.

TEST PIT TERMINATED AT 1.2' (1-7-87)
BACKFILLED IMMEDIATELY AFTER LOGGING

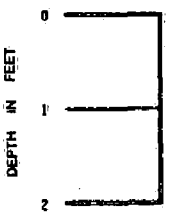
LOG OF MATTE TEST PIT 10, 11 & 12

Dames & Moore

FIGURE D4-15

SCOEPA00015852

MATTE TEST PIT 13
GEOLOGIC LOG



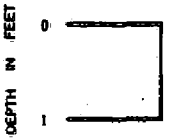
SYMBOLS | DESCRIPTION | FIGURE D-16A

BLACK TO MULTICOLORED BATTERY CASING FRAGMENTS

▽ WATER SEEPAGE AT 1½'

TEST PIT TERMINATED AT 1½' (1-7-87)
BACKFILLED IMMEDIATELY AFTER LOGGING

MATTE TEST PIT 14
GEOLOGIC LOG

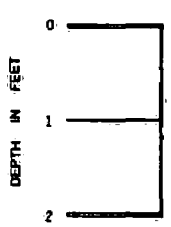


SYMBOLS | DESCRIPTION | FIGURE D-16B

GM — BLACK TO MULTICOLORED BATTERY CASING FRAGMENTS
REDDISH BROWN VERY HARD ANGULAR BOULDERY RUBBLE (MATTE)
SOME MEDIUM TO COARSE SILTY SAND, SOME WHITISH BRICK FRAGMENTS

TEST PIT TERMINATED AT 1' (1-7-87)
BACKFILLED IMMEDIATELY AFTER LOGGING

MATTE TEST PIT 15
GEOLOGIC LOG



SYMBOLS | DESCRIPTION | FIGURE D-16C

BLACK TO MULTICOLORED BATTERY CASING FRAGMENTS
SOME FINE TO COARSE SAND

▽ WATER SEEPAGE AT 1½'

TEST PIT TERMINATED AT 1½' (1-7-87)
BACKFILLED IMMEDIATELY AFTER LOGGING

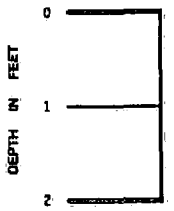
LOG OF MATTE TEST PIT 13, 14 & 15

Dames & Moore

FIGURE D4-16

SCOEPA00015853

MATTE TEST PIT 16
GEOLOGIC LOG

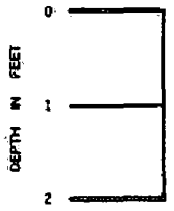


SYMBOLS | DESCRIPTION | FIGURE D-17A

BLACK TO MULTICOLORED BATTERY CASING FRAGMENTS
SOME FINE TO COARSE SAND

TEST PIT TERMINATED AT 1½' (1-7-87)
BACKFILLED IMMEDIATELY AFTER LOGGING

MATTE TEST PIT 17
GEOLOGIC LOG



SYMBOLS | DESCRIPTION | FIGURE D-17B

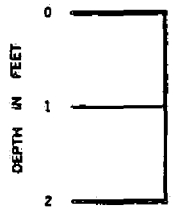
BLACK TO MULTICOLORED BATTERY CASING FRAGMENTS
SOME FINE TO COARSE SAND

GM — REDDISH BROWN VERY HARD ANGULAR BOULDERY RUBBLE (MATTE)
SOME MEDIUM TO COARSE SILTY SAND

▽ WATER SEEPAGE AT 2'

TEST PIT TERMINATED AT 2' (1-7-87)
BACKFILLED IMMEDIATELY AFTER LOGGING

MATTE TEST PIT 18
GEOLOGIC LOG



SYMBOLS | DESCRIPTION | FIGURE D-17C

BLACK TO MULTICOLORED BATTERY CASING FRAGMENTS

GM — REDDISH BROWN VERY HARD ANGULAR BOULDERY RUBBLE (MATTE)
SOME MEDIUM TO COARSE SILTY SAND

▽ WATER SEEPAGE AT 2'

TEST PIT TERMINATED AT 2' (1-7-87)
BACKFILLED IMMEDIATELY AFTER LOGGING

LOG OF MATTE TEST PIT 16, 17 &18

Dames & Moore

FIGURE D4-17

SCOEPA00015854

Appendix D5

APPENDIX D5

PHYSICAL PROPERTY TEST RESULTS

INTRODUCTION

APPENDIX D5, PHYSICAL PROPERTY TEST RESULTS

Appendix D5 contains the results of physical property analyses as performed by Pacific Testing Laboratory and included in their reports 2094 and 3061. Samples on which tests were performed are:

Surface Soils, Fill

Loc. 3	S-18-D	S-28-D
S-47	S-19-D	S-31-D
Loc-5	S-22-D	S-33-D
Loc-6	S-24-D	S-36-D
Loc-12	S-25-D	S-51-D
S-15-D	S-26-D	B-6-16.5-D

Alluvium (also see Table 4.2-2 in Section 4.0 of this Report)

B-5-23.0-D	W-12-D-15	W-12-D-34	W-16-D-10a
B-6-23.5-D	W-12-D-19	W-15-D	W-16-D-11
B-8-33.5-D	W-12-D-22	W-15-D-20.4-D	W-16-D-16a
B-10-30.1-D	W-12-D-23	W-15-D-25.2-D	W-16-D-16
B-10-60-D	W-12-D-24	W-16-D-4a	W-16-D-20a
W-12-D-10	W-12-D-27	W-16-D-4	W-16-D-20
W-12-D-11	W-12-D-29	W-16-D-7a	W-16-S-1
W-12-D-14	W-12-D-32	W-16-D-7	W-16-S-3

Sediment

D-1	D-6
D-2	D-7
D-3	D-8
D-4	D-9
D-5	

Testing included partical size (ASTM D422), Moisture and Density (ASTM D2216), Atterberg Limits (ASTM D423 and D424), and Permeability (ASTM D2434, 1974). The various ASTM procedures are included as

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references in Section 9.0 of the report. Laboratory permeabilities are vertical permeabilities by nature of the sample being tested and the test procedure. The various technical terms, such as plastic and liquid limits, plasticity index, and hydrometer are defined in the report glossary, Section 10.0. Permeability results are given in terms of an exponent (E). For instance, 3.7 E-6 is the same as 3.7 x 105-64 cm/sec. Conversions from cm/sec. to feet/year are presented in Tables 4.2-2 and 4.2-7 in Section 4.0 of this report.

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REFERENCES FOR PHYSICAL PROPERTY TEST RESULTS

American Society for Testing and Materials, 1981. Annual Book of ASTM Standards, Part 19, ASTM D422-63 (Reapproved 1972), page 113.

American Society for Testing and Materials, 1981. Annual Book of ASTM Standards, Part 19, ASTM D423-66 (Reapproved 1972), page 124.

American Society for Testing and Materials, 1981. Annual Book of ASTM Standards, Part 19, ASTM D424-59 (Reapproved 1971), page 128.

American Society for Testing and Materials, 1981. Annual Book of ASTM Standards, Part 19, ASTM D2216-80, page 342.

American Society for Testing and Materials, 1981. Annual Book of ASTM Standards, Part 19, ASTM D2434-68 (Reapproved 1974), page 368.

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LAB REPORT 2094

REPORT NUMBER LR 2594
PREVIOUS RPT. NO.

PACIFIC TESTING LABORATORIES

DAMES & MOORE SEATTLE MAR 04

ENGINEERING CONSULTATION
(TRUCTION SUPERVISION
M RIAL TESTING

EXECUTIVE OFFICES
3220-17TH AVENUE WEST P.O. CALL BOX 19125 (206) 282-0466
SEATTLE, WASHINGTON 98119

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SOIL MECHANICS

HSB 9:30 AM

Mr. Harlan Barow
MAILING ADDRESS Dames and Moore
155 NE 100th St.
Seattle, WA 98125

REPORTED BY M.E. Dodson DATE 2/20/87
PERMIT NUMBER X CERTIFICATE NUMBER 8604-7135
ARCHITECT X
ENGINEER X
CONTRACTOR X

PROJECT Dames and Moore Job No. 11831-034
LOCATION PTL PURCH. ORD. NUMBER Gould #111256

As requested, and agreed, Pacific Testing Laboratories has completed the following physical characterization tests on each client supplied soil sample.

Sample Identification	Particle Size	Moisture/Density	Atterberg Limits	Permeability
S-15-D (0-6")	yes	yes	yes	yes
S-18-D (0-6")	yes	yes	yes	yes
S-19-D (0-6")	yes	yes	yes	yes
-22-D (0-6")	yes	yes	yes	yes
S-24-D (0-6")	yes	yes	yes	yes
S-25-D (0-6")	yes	yes	yes	yes
S-26-D (0-6")	yes	yes	yes	yes
S-28-D (0-6")	yes	yes	yes	yes
S-31-D (0-8")	yes	yes	yes	yes
S-33-D (0-8")	yes	yes	yes	yes
S-36-D (0-8")	yes	yes	yes	yes
S-51-D (0-6")	yes	yes	yes	yes
B-5-23.0-D	yes	yes	yes	yes
B-6-16.5-D	yes	yes	yes	yes

Certified Report by Pacific Testing Laboratories Michael E Dodson DATE 2/27/87

Copies to:

SCOEPA00015861

Sample Identification	Particle Size	Moisture/ Density	Atterberg Limits	Permeability
B-6-23.5-D	yes	yes	yes	yes
B-8-33.5-D	yes	yes	yes	yes
B-10-30.1-D	yes	yes	yes	yes
B-10-60-D	yes	yes	yes	yes
W-15-D-20.4-D	yes	yes	yes	yes
W-15-D-25.2-D	yes	yes	yes	yes
D-1-D	yes	no	no	no
D-2-D	yes	no	no	no
D-3-D	yes	no	no	no
D-4-D	yes	no	no	no
D-5-D	yes	no	no	no
D-6-D	yes	no	no	no
D-7-D	yes	no	no	no
D-8-D	yes	no	no	no
D-9-D	yes	no	no	no

Sample identification matches the identification found on the actual jar samples. See Pacific Testing Laboratoires response to the original Chain of Custody Records for a full explanation of sample identification.

The test method used for each physical characterization test are listed below.

Test Type	Test Method.
Particle Size	ASTM D422 (including hydrometer)
Moisture/Density	ASTM D2216
Atterberg Limits	ASTM D423 and ASTM D424
Permeability	ASTM D422

RESULTS:

Results of as received water content and dry weight bulk density testing are presented for each sample below.

Sample Identification	Water Content %(g/g)	Dry Weight Bulk Density (g/cm^3)
S-15-D	15.44	1.82
S-18-D	17.63	1.72
S-19-D	13.50	1.50
S-22-D	23.11	1.49

SCOEPA00015862

Sample Identification	Water Content %(g/g)	Dry Weight Bulk Density (g/cm^3)
S-24-D	5.48	1.13
S-25-D	8.88	1.50
S-26-D	6.16	1.72
S-28-D	8.60	1.52
S-31-D	5.80	1.24
S-33-D	8.87	1.38
S-36-D	10.77	1.54
S-51-D	16.28	1.75
B-5-23.0-D	48.28	1.34
B-6-16.5-D	29.71	1.46
B-6-23.5-D	47.98	1.09
B-8-33.5-D	48.24	1.10
B-10-30.1-D	30.67	1.40
B-10-60-D	34.40	1.36
W-15-D-20.4-D	20.06	1.62
W-15-D-25.2-D	30.99	1.37

Results of Atterberg and constant head permeability testing are presented for each tested sample.

Sample Identification	Plastic Limit	Liquid Limit	Plasticity Index	Permeability (cm/s.)
S-15-D	N.P.	N.P.	N.P.	3.7 E-6
S-18-D	21.07	27.50	6.43	3.2 E-8
S-19-D	25.53	31.16	5.36	5.1 E-2
S-22-D	23.31	31.15	7.84	2.7 E-4
S-24-D	N.P.	N.P.	N.P.	6.0 E-2
S-25-D	N.P.	N.P.	N.P.	1.2 E-2
S-26-D	20.24	23.73	3.47	3.1 E-2
S-28-D	N.P.	N.P.	N.P.	2.8 E-3
S-31-D	20.30	24.00	3.70	2.1 E-5
S-33-D	17.90	22.65	4.75	1.5 E-2
S-36-D	22.30	27.38	5.08	3.5 E-5
S-51-D	N.P.	N.P.	N.P.	9.5 E-2
B-5-23.0-D	N.P.	N.P.	N.P.	1.7 E-4
B-6-16.5-D	N.P.	N.P.	N.P.	1.4 E-4
B-6-23.5-D	28.95	31.23	2.28	3.5 E-5
B-8-33.5-D	28.25	37.22	8.97	1.1 E-7

SCOEPA00015863

Sample Identification	Plastic Limit	Liquid Limit	Plasticity Index	Permeability (cm/s.)
B-10-30.1-D	N.P.	N.P.	N.P.	8.7 E-3
B-10-60-D	N.P.	N.P.	N.P.	1.6 E-2
W-15-D-20.4-D	N.P.	N.P.	N.P.	1.1 E-2
W-15-D-25.2-D	N.P.	N.P.	N.P.	8.0 E-3

N.P. = Nonplastic as defined by ASTM D424.

Results of particle size analysis are presented in the following tables and graphs.

End of text.

SCOEPA00015864

CLIENT SAMPLE# SIEVE #	S-15-D MESH (microns)	% OF SAMPLE PASSING
1.0 in.	1.0 in	100.00
3/4 in.	3/4 in.	97.98
3/8 in.	3/8 in	84.08
#4	4750	76.13
#5	4000	74.68
#8	2360	70.63
#10	2000	69.54
#10	2000	69.54
#20	833	66.18
#35	500	61.91
#60	250	41.41
#140	106	23.47
#200	75	20.68
#270	53	17.46
HYDROMETER	68.78	18.54
HYDROMETER	49.29	15.89
HYDROMETER	28.89	12.86
HYDROMETER	16.03	9.84
HYDROMETER	9.11	7.82
HYDROMETER	6.58	6.30
HYDROMETER	5.33	5.80
HYDROMETER	4.60	6.05
HYDROMETER	1.34	4.16

SCOEPA00015865

CLIENT SAMPLE#	S-18-D		% OF SAMPLE
SIEVE #	MESH (microns)		PASSING
1.0 in.	1.0 in		100.00
3/4 in.	3/4 in.		100.00
3/8 in.	3/8 in		82.79
#4	4750		74.09
#5	4000		72.29
#8	2360		67.37
#10	2000		65.82
#10	2000		65.82
#20	833		59.79
#35	500		54.02
#60	250		45.21
#140	106		40.54
#200	75		38.78
#270	53		36.19
HYDROMETER		63.22	39.22
HYDROMETER		46.05	33.37
HYDROMETER		27.40	27.08
HYDROMETER		15.41	21.08
HYDROMETER		9.03	16.25
HYDROMETER		6.40	14.49
HYDROMETER		5.23	12.44
HYDROMETER		4.52	11.42
HYDROMETER		1.32	8.34

SCOEPA00015866

CLIENT SAMPLE #	SIEVE #	MESH (microns)	% OF SAMPLE PASSING
S-19-D	1.0 in.	1.0 in	100.00
	3/4 in.	3/4 in.	97.34
	3/8 in.	3/8 in	79.63
	#4	4750	63.62
	#5	4000	60.07
	#8	2360	57.09
	#10	2000	10.29
	#10	2000	10.29
	#20	833	8.31
	#35	500	7.25
	#60	250	6.28
	#140	106	5.44
	#200	75	5.12
	#270	53	4.72
	HYDROMETER	64.46	4.34
	HYDROMETER	46.22	3.94
	HYDROMETER	27.28	3.22
	HYDROMETER	14.59	2.47
	HYDROMETER	8.95	2.02
	HYDROMETER	6.38	1.63
	HYDROMETER	5.23	1.51
	HYDROMETER	5.09	1.43
	HYDROMETER	1.36	1.00

SCOEPA00015867

CLIENT SAMPLE#	S-22-D		% OF SAMPLE
SIEVE #	MESH (microns)		PASSING
1.0 in.	1.0 in		100.00
3/4 in.	3/4 in.		92.40
3/8 in.	3/8 in		87.70
#4	4750		84.79
#5	4000		83.97
#8	2360		81.65
#10	2000		80.75
#10	2000		80.75
#20	833		78.13
#35	500		76.64
#60	250		74.54
#140	106		69.55
#200	75		66.14
#270	53		61.88
HYDROMETER		60.13	56.55
HYDROMETER		43.21	52.96
HYDROMETER		25.63	46.68
HYDROMETER		14.44	37.16
HYDROMETER		8.58	29.62
HYDROMETER		6.18	24.59
HYDROMETER		5.07	21.72
HYDROMETER		4.42	21.36
HYDROMETER		1.32	14.72

SCOEPA00015868

CLIENT SAMPLE#	S-24-D		% OF SAMPLE
SIEVE #	MESH (microns)		PASSING
1.0 in.	1.0 in		100.00
3/4 in.	3/4 in.		97.67
3/8 in.	3/8 in		92.05
#4	4750		80.98
#5	4000		78.77
#8	2360		72.64
#10	2000		70.63
#10	2000		70.63
#20	833		62.25
#35	500		50.96
#60	250		34.64
#140	106		26.45
#200	75		24.27
#270	53		22.03
HYDROMETER		65.36	24.19
HYDROMETER		47.15	20.43
HYDROMETER		27.67	17.30
HYDROMETER		15.38	14.04
HYDROMETER		8.98	11.66
HYDROMETER		6.40	10.03
HYDROMETER		5.25	8.65
HYDROMETER		4.55	7.90
HYDROMETER		1.37	4.76

SCOEPA00015869

CLIENT SAMPLE#	S-25-D		% OF SAMPLE
SIEVE #	MESH (microns)		PASSING
1.0 in.	1.0 in		100.00
3/4 in.	3/4 in.		98.04
3/8 in.	3/8 in.		85.73
#4	4750		71.94
#5	4000		69.22
#8	2360		61.34
#10	2000		58.87
#10	2000		58.87
#20	833		53.93
#35	500		47.11
#60	250		34.44
#140	106		27.51
#200	75		25.37
#270	53		23.11
HYDROMETER		66.17	28.76
HYDROMETER		47.37	25.98
HYDROMETER		27.74	23.06
HYDROMETER		15.45	19.48
HYDROMETER		9.04	16.57
HYDROMETER		6.27	14.58
HYDROMETER		5.28	13.92
HYDROMETER		4.59	12.86
HYDROMETER		1.39	11.80

SCOEPA00015870

CLIENT SAMPLE #	SIEVE #	MESH (microns)	% OF SAMPLE PASSING
S-26-D	1.0 in.	1.0 in	100.00
	3/4 in.	3/4 in.	97.45
	3/8 in.	3/8 in	84.29
	#4	4750	71.38
	#5	4000	67.52
	#8	2360	57.42
	#10	2000	54.38
	#10	2000	54.38
	#20	833	44.29
	#35	500	39.24
	#60	250	33.25
	#140	106	27.17
	#200	75	25.09
	#270	53	22.97
	HYDROMETER	64.24	22.40
	HYDROMETER	46.31	19.55
	HYDROMETER	27.28	16.49
	HYDROMETER	14.63	12.22
	HYDROMETER	8.98	9.47
	HYDROMETER	6.41	8.04
	HYDROMETER	5.26	6.72
	HYDROMETER	4.57	6.11
	HYDROMETER	1.36	4.17

SCOEPA00015871

CLIENT SAMPLE#	S-28-D		% OF SAMPLE
SIEVE #	MESH (microns)		PASSING
1.0 in.	1.0 in		100.00
3/4 in.	3/4 in.		100.00
3/8 in.	3/8 in		92.21
#4	4750		82.61
#5	4000		79.56
#8	2360		68.76
#10	2000		65.35
#10	2000		65.35
#20	833		58.09
#35	500		50.16
#60	250		38.52
#140	106		30.03
#200	75		27.18
#270	53		24.28
HYDROMETER		64.01	26.74
HYDROMETER		46.44	22.34
HYDROMETER		27.58	17.23
HYDROMETER		15.40	13.55
HYDROMETER		8.89	9.86
HYDROMETER		6.39	8.08
HYDROMETER		5.20	7.13
HYDROMETER		4.59	6.42
HYDROMETER		1.34	4.04

SCOEPA00015872

CLIENT SAMPLE #	S-31-D		% OF SAMPLE
SIEVE #	MESH (microns)		PASSING
1.0 in.	1.0 in		100.00
3/4 in.	3/4 in.		100.00
3/8 in.	3/8 in		100.00
#4	4750		98.66
#5	4000		98.49
#8	2360		97.81
#10	2000		97.40
#10	2000		97.40
#20	833		94.92
#35	500		93.65
#60	250		89.14
#140	106		79.73
#200	75		75.40
#270	53		64.57
HYDROMETER		60.26	63.72
HYDROMETER		44.55	51.40
HYDROMETER		25.20	33.98
HYDROMETER		15.29	25.70
HYDROMETER		8.94	21.24
HYDROMETER		6.26	19.12
HYDROMETER		5.21	18.69
HYDROMETER		4.52	18.05
HYDROMETER		1.36	14.44

SCOEPA00015873

CLIENT SAMPLE #	S-33-D		% OF SAMPLE
SIEVE #	MESH (microns)		PASSING
1.0 in.	1.0 in		100.00
3/4 in.	3/4 in.		100.00
3/8 in.	3/8 in		98.91
#4	4750		97.36
#5	4000		96.89
#8	2360		94.56
#10	2000		92.81
#10	2000		92.81
#20	833		91.60
#35	500		90.37
#60	250		84.63
#140	106		70.88
#200	75		66.67
#270	53		58.53
HYDROMETER		61.13	53.12
HYDROMETER		44.63	46.48
HYDROMETER		27.19	34.36
HYDROMETER		15.28	26.23
HYDROMETER		8.97	21.58
HYDROMETER		6.28	19.26
HYDROMETER		5.09	17.76
HYDROMETER		4.44	17.43
HYDROMETER		1.30	14.77

SCOEPA00015874

CLIENT SAMPLE#	S-36-D		% OF SAMPLE
SIEVE #	MESH (microns)		PASSING
1.0 in.	1.0 in		100.00
3/4 in.	3/4 in.		100.00
3/8 in.	3/8 in		100.00
#4	4750		99.93
#5	4000		99.87
#8	2360		99.30
#10	2000		98.81
#10	2000		98.81
#20	833		98.31
#25	500		97.78
#60	250		96.79
#140	106		95.20
#200	75		92.42
#270	53		81.61
HYDROMETER		58.75	75.33
HYDROMETER		42.93	66.52
HYDROMETER		26.41	47.80
HYDROMETER		15.04	34.14
HYDROMETER		8.80	27.53
HYDROMETER		6.29	24.23
HYDROMETER		5.16	22.03
HYDROMETER		4.50	19.16
HYDROMETER		1.35	17.84

SCOEPA00015875

CLIENT SAMPLE#	S-51-D		% OF SAMPLE
SIEVE #	MESH (microns)		PASSING
1.0 in.	1.0 in		100.00
3/4 in.	3/4 in.		100.00
3/8 in.	3/8 in		84.22
#4	4750		75.26
#5	4000		73.69
#8	2360		69.15
#10	2000		67.79
#10	2000		67.79
#20	833		60.61
#35	500		56.55
#60	250		38.64
#140	106		21.05
#200	75		18.42
#270	53		16.70
HYDROMETER		70.54	15.94
HYDROMETER		50.40	13.41
HYDROMETER		29.25	11.77
HYDROMETER		16.13	8.94
HYDROMETER		9.32	7.45
HYDROMETER		6.56	6.11
HYDROMETER		5.35	5.36
HYDROMETER		4.64	5.66
HYDROMETER		1.35	4.02

SCOEPA00015876

CLIENT SAMPLE #	B-5-23.0-D		% OF SAMPLE
SIEVE #	MESH (microns)		PASSING
1.0 in.	1.0 in		100.00
3/4 in.	3/4 in.		100.00
3/8 in.	3/8 in		100.00
#4	4750		99.89
#5	4000		99.87
#8	2360		99.68
#10	2000		99.59
#10	2000		99.59
#20	833		97.05
#35	500		91.79
#60	250		39.26
#140	106		13.47
#200	75		10.99
#270	53		10.09
HYDROMETER		71.33	9.46
HYDROMETER		50.81	7.00
HYDROMETER		27.27	5.68
HYDROMETER		16.18	4.73
HYDROMETER		9.37	3.78
HYDROMETER		6.64	2.34
HYDROMETER		5.42	2.84
HYDROMETER		4.70	2.46
HYDROMETER		1.38	2.46

SCOEPA00015877

CLIENT SAMPLE#	B-6-16.5-D	% OF SAMPLE
SIEVE #	MESH (microns)	PASSING
1.0 in.	1.0 in	100.00
3/4 in.	3/4 in.	100.00
3/8 in.	3/8 in	97.25
#4	4750	97.20
#5	4000	97.10
#8	2360	96.88
#10	2000	96.82
#10	2000	96.82
#20	833	96.64
#35	500	93.75
#60	250	47.35
#140	106	18.53
#200	75	14.89
#270	53	12.89
HYDROMETER	69.68	15.70
HYDROMETER	49.94	11.90
HYDROMETER	29.17	8.59
HYDROMETER	16.09	6.61
HYDROMETER	9.31	4.96
HYDROMETER	6.51	3.80
HYDROMETER	5.39	4.13
HYDROMETER	4.67	3.64
HYDROMETER	1.36	2.15

SCOEPA00015878

CLIENT SAMPLE#	B-6-23.5-D		% OF SAMPLE
SIEVE #	MESH (microns)		PASSING
1.0 in.	1.0 in		100.00
3/4 in.	3/4 in.		100.00
3/8 in.	3/8 in		100.00
#4	4750		99.89
#5	4000		99.89
#6	2360		99.79
#10	2000		99.79
#10	2000		99.79
#20	833		99.71
#35	500		99.42
#60	250		97.07
#140	106		94.77
#200	75		91.99
#270	53		84.05
HYDROMETER		56.77	76.11
HYDROMETER		41.57	67.88
HYDROMETER		25.94	47.31
HYDROMETER		15.25	25.71
HYDROMETER		9.09	15.02
HYDROMETER		6.50	10.90
HYDROMETER		5.32	8.85
HYDROMETER		4.64	7.61
HYDROMETER		1.37	4.53

SCOEPA00015879

CLIENT SAMPLE#	B-8-33.5-D	% OF SAMPLE
SIEVE #	MESH (microns)	PASSING
1.0 in.	1.0 in	100.00
3/4 in.	3/4 in.	100.00
3/8 in.	3/8 in	100.00
#4	4750	99.61
#5	4000	99.61
#8	2360	99.43
#10	2000	99.17
#10	2000	99.17
#20	833	98.84
#35	500	98.61
#60	250	96.58
#140	106	72.83
#200	75	66.45
#270	53	63.71
HYDROMETER	61.22	62.46
HYDROMETER	44.12	56.88
HYDROMETER	25.94	51.30
HYDROMETER	14.46	45.73
HYDROMETER	7.62	32.34
HYDROMETER	6.08	27.44
HYDROMETER	5.12	23.42
HYDROMETER	4.48	21.41
HYDROMETER	1.34	11.60

SCOEPA00015880

CLIENT SAMPLE#	B-10-30.1-D	% OF SAMPLE
SIEVE #	MESH (microns)	PASSING
1.0 in.	1.0 in	100.00
3/4 in.	3/4 in.	100.00
3/8 in.	3/8 in	100.00
#4	4750	99.62
#5	4000	99.54
#8	2360	98.92
#10	2000	98.61
#10	2000	98.61
#20	833	95.92
#35	500	93.26
#60	250	45.68
#140	106	14.05
#200	75	11.29
#270	53	10.44
HYDROMETER	72.38	8.95
HYDROMETER	51.47	6.66
HYDROMETER	29.81	5.28
HYDROMETER	16.33	5.28
HYDROMETER	9.37	4.59
HYDROMETER	6.65	2.98
HYDROMETER	5.44	2.30
HYDROMETER	4.71	2.07
HYDROMETER	1.38	3.44

SCOEPA00015881

CLIENT SAMPLE#	B-10-60-D		% OF SAMPLE
SIEVE #	MESH (microns)		PASSING
1.0 in.	1.0 in		100.00
3/4 in.	3/4 in.		100.00
3/8 in.	3/8 in		100.00
#4	4750		100.00
#5	4000		99.98
#8	2360		99.94
#10	2000		99.90
#10	2000		99.90
#20	833		99.55
#35	500		93.74
#60	250		47.33
#140	106		22.06
#200	75		17.96
#270	53		15.76
HYDROMETER		70.47	14.57
HYDROMETER		50.24	11.89
HYDROMETER		29.20	9.59
HYDROMETER		16.10	7.28
HYDROMETER		9.31	6.71
HYDROMETER		6.62	4.22
HYDROMETER		5.40	4.98
HYDROMETER		4.69	3.45
HYDROMETER		1.35	3.45

SCOEPA00015882

CLIENT SAMPLE#	W-15-D-20.4		% OF SAMPLE
SIEVE #	MESH (microns)		PASSING
1.0 in.	1.0 in		100.00
3/4 in.	3/4 in.		100.00
3/8 in.	3/8 in		95.82
#4	4750		88.27
#5	4000		86.92
#8	2360		82.42
#10	2000		81.45
#10	2000		81.45
#20	833		75.90
#35	500		68.47
#60	250		26.39
#140	106		12.85
#200	75		10.90
#270	53		9.80
HYDROMETER		70.30	11.63
HYDROMETER		50.21	9.16
HYDROMETER		29.15	6.98
HYDROMETER		16.07	5.38
HYDROMETER		9.32	4.36
HYDROMETER		6.60	3.63
HYDROMETER		5.32	3.34
HYDROMETER		4.69	2.91
HYDROMETER		1.41	1.89

SCOEPA00015883

CLIENT SAMPLE#	M-15-0-25.5		% OF SAMPLE
SIEVE #	MESH (microns)		PASSING
1.0 in.	1.0 in		100.00
3/4 in.	3/4 in.		100.0
3/8 in.	3/8 in		100.0
#4	475		95.91
#5	400		95.91
#6	2360		99.86
#10	2000		99.85
#10	2000		99.85
#20	833		99.75
#35	500		93.42
#60	250		22.91
#140	106		7.02
#200	75		6.23
#270	53		6.20
HYDROMETER		72.72	4.94
HYDROMETER		51.73	2.22
HYDROMETER		29.87	2.22
HYDROMETER		16.36	2.22
HYDROMETER		9.42	2.22
HYDROMETER		6.66	2.22
HYDROMETER		5.30	2.22
HYDROMETER		4.71	2.22
HYDROMETER		1.41	2.22

SCOEPA00015884

CLIENT SAMPLE#	D-1-D		% OF SAMPLE
SIEVE #	MESH (microns)		PASSING
1.0 in.	1.0 in.		100.00
3/4 in.	3/4 in.		100.00
3/8 in.	3/8 in		97.11
#4	4750		94.86
#5	4000		94.38
#8	2360		92.95
#10	2000		92.46
#10	2000		92.46
#20	833		91.07
#35	500		88.19
#60	250		69.39
#140	106		45.76
#200	75		39.14
#270	53		33.54
HYDROMETER		67.28	47.30
HYDROMETER		48.31	41.06
HYDROMETER		28.41	33.85
HYDROMETER		15.79	28.09
HYDROMETER		9.21	23.05
HYDROMETER		6.55	20.65
HYDROMETER		5.37	18.73
HYDROMETER		4.66	18.25
HYDROMETER		1.40	17.77

SCOEPA00015885

CLIENT SAMPLE#	D-2-D		% OF SAMPLE
SIEVE #	MESH (microns)		PASSING
1.0 in.	1.0 in		100.00
3/4 in.	3/4 in.		100.00
3/8 in.	3/8 in		100.00
#4	4750		100.00
#5	4000		100.00
#8	2360		100.00
#10	2000		100.00
#10	2000		100.00
#20	833		96.77
#35	500		88.39
#60	250		78.52
#140	106		72.22
#200	75		70.40
#270	53		68.59
HYDROMETER		61.44	74.84
HYDROMETER		44.35	67.75
HYDROMETER		26.04	61.71
HYDROMETER		14.77	48.56
HYDROMETER		8.85	33.61
HYDROMETER		6.35	27.31
HYDROMETER		5.20	23.90
HYDROMETER		4.49	21.53
HYDROMETER		1.34	12.08

SCOEPA00015886

CLIENT SAMPLE# SIEVE #	D-3-D MESH (microns)	% OF SAMPLE PASSING
1.0 in.	1.0 in	100.00
3/4 in.	3/4 in.	98.16
3/8 in.	3/8 in	95.24
#4	4750	93.73
#5	4000	93.34
#8	2360	92.47
#10	2000	92.22
#10	2000	92.22
#20	833	91.56
#35	500	85.97
#60	250	48.55
#140	106	24.30
#200	75	19.51
#270	53	16.25
HYDROMETER	70.01	17.24
HYDROMETER	49.98	14.21
HYDROMETER	29.07	11.74
HYDROMETER	16.08	8.52
HYDROMETER	9.32	6.63
HYDROMETER	6.63	4.74
HYDROMETER	5.42	4.55
HYDROMETER	4.70	3.98
HYDROMETER	1.41	2.08

SCOEPA00015887

CLIENT SAMPLE#	D-4-D	% OF SAMPLE
SIEVE #	MESH (microns)	PASSING
1.0 in.	1.0 in	100.00
3/4 in.	3/4 in.	100.00
3/8 in.	3/8 in	100.00
#4	4750	100.00
#5	4000	100.00
#8	2360	100.00
#10	2000	100.00
#10	2000	100.00
#20	833	96.47
#35	500	94.15
#60	250	91.76
#140	106	86.56
#200	75	82.76
#270	53	77.09
HYDROMETER	63.78	69.12
HYDROMETER	45.68	63.82
HYDROMETER	26.96	54.41
HYDROMETER	15.08	45.00
HYDROMETER	8.89	35.29
HYDROMETER	6.38	27.94
HYDROMETER	5.23	24.41
HYDROMETER	4.55	21.47
HYDROMETER	1.34	11.18

SCOEPA00015888

CLIENT SAMPLE# SIEVE #	D-5-D MESH (microns)		% OF SAMPLE PASSING
1.0 in.	1.0 in		100.00
3/4 in.	3/4 in.		100.00
3/8 in.	3/8 in		100.00
#4	4750		100.00
#5	4000		100.00
#8	2360		100.00
#10	2000		100.00
#10	2000		99.76
#20	833		99.49
#35	500		98.40
#60	250		97.09
#140	106		93.95
#200	75		92.55
#270	53		90.77
HYDROMETER		58.50	44.86
HYDROMETER		42.07	42.26
HYDROMETER		24.71	39.53
HYDROMETER		14.09	32.77
HYDROMETER		8.41	26.65
HYDROMETER		6.08	22.36
HYDROMETER		5.01	19.76
HYDROMETER		4.37	17.94
HYDROMETER		1.32	8.97

SCOEPA00015889

CLIENT SAMPLE#	D-6-D		% OF SAMPLE
SIEVE #	MESH (microns)		PASSING
1.0 in.	1.0 in		100.00
3/4 in.	3/4 in.		100.00
3/8 in.	3/8 in		99.84
#4	4750		99.64
#5	4000		99.60
#8	2360		99.21
#10	2000		99.01
#10	2000		99.01
#20	833		98.17
#35	500		96.05
#60	250		64.05
#140	106		21.41
#200	75		15.69
#270	53		13.81
HYDROMETER		70.53	17.37
HYDROMETER		50.47	13.71
HYDROMETER		29.31	11.89
HYDROMETER		15.93	9.69
HYDROMETER		9.12	7.31
HYDROMETER		6.58	6.03
HYDROMETER		5.37	5.30
HYDROMETER		4.66	4.57
HYDROMETER		1.38	3.11

SCOEPA00015890

CLIENT SAMPLE#	D-7-D		% OF SAMPLE
SIEVE #	MESH (microns)		PASSING
1.0 in.	1.0 in		100.00
3/4 in.	3/4 in.		100.00
3/8 in.	3/8 in		100.00
#4	4750		99.15
#5	4000		98.73
#8	2360		97.19
#10	2000		96.64
#10	2000		96.64
#20	833		94.71
#35	500		82.01
#60	250		37.35
#140	106		20.03
#200	75		16.43
#270	53		14.00
HYDROMETER		70.64	14.56
HYDROMETER		50.39	11.68
HYDROMETER		29.21	10.34
HYDROMETER		16.12	8.24
HYDROMETER		9.34	6.70
HYDROMETER		6.63	4.98
HYDROMETER		5.34	4.98
HYDROMETER		4.68	5.17
HYDROMETER		1.40	3.26

SCOEPA00015891

CLIENT SAMPLE# SIEVE #	D-S-D MESH (microns)		% OF SAMPLE PASSING
1.0 in.	1.0 in.		100.00
3/4 in.	3/4 in.		100.00
3/8 in.	3/8 in		93.77
#4	4750		85.92
#5	4000		83.86
#8	2360		78.22
#10	2000		76.56
#10	2000		76.56
#20	833		71.08
#35	500		56.40
#60	250		21.91
#140	106		7.88
#200	75		6.09
#270	53		5.44
HYDROMETER		72.17	6.07
HYDROMETER		51.32	4.56
HYDROMETER		29.66	4.10
HYDROMETER		16.32	3.19
HYDROMETER		9.42	2.89
HYDROMETER		6.66	2.73
HYDROMETER		5.44	2.58
HYDROMETER		4.71	2.43
HYDROMETER		1.41	1.21

SCOEPA00015892

CLIENT SAMPLE# SIEVE #	D-9-D MESH (microns)	% OF SAMPLE PASSING
1.0 in.	1.0 in	100.00
3/4 in.	3/4 in.	100.00
3/8 in.	3/8 in	100.00
#4	4750	100.00
#5	4000	100.00
#8	2360	100.00
#10	2000	100.00
#10	2000	100.00
#20	833	98.83
#35	500	97.19
#60	250	95.24
#140	106	89.84
#200	75	87.04
#270	53	83.52
HYDROMETER	60.23	73.74
HYDROMETER	43.10	70.17
HYDROMETER	25.37	64.22
HYDROMETER	14.28	55.42
HYDROMETER	8.52	44.24
HYDROMETER	6.15	36.87
HYDROMETER	5.06	31.87
HYDROMETER	4.42	29.50
HYDROMETER	1.33	14.27

SCOEPA00015893

LAB REPORT 3061

REPORT NUMBER LR
PREVIOUS RPT. NO. 3061

PACIFIC TESTING LABORATORIES

EN SERING CONSULTATION
CC RUCTION SUPERVISION
MATERIAL TESTING

EXECUTIVE OFFICES
3220-17TH AVENUE WEST P.O. CALL BOX 19125 (206) 282-0666
SEATTLE, WASHINGTON 98119

RADIOGRAPHIC INSPECTION
GEOLOGICAL SURVEYS
SOIL TEST BORINGS
SOIL MECHANICS

Mr. Harlan Borow
MAILING ADDRESS DAMES AND MOORE
155 NE 100th St.
Seattle, Washington 98125

REPORTED BY M.E. Dodson DATE 3/16/87
PERMIT NUMBER X CERTIFICATE NUMBER 8604-7135
ARCHITECT X
ENGINEER X
CONTRACTOR X

PROJECT Dames and Moore Job# 11831-034
LOCATION PTL PURCH. ORD. NUMBER Gould #111256

At your request, Pacific Testing Laboratories has completed the following physical characterization tests on each soil sample from Dames and Moore job# 11831-034.

Sample Identification	Particle Size	Moisture/Density	Atterberg Limits	Permeability
Loc. 3 S-1 (3"-9") ring	YES	YES	YES	YES
S-47 (3"-9") ring	YES	YES	YES	YES
Loc. 5 -1 (6"-9") ring	YES	YES	YES	YES
Loc. 6 -1 (6"-9") ring	YES	YES	YES	YES
Loc. 12 -1 (3"-9") ring	YES	YES	YES	YES
W-15-D (17.1'-17.6')ring	YES	YES	YES	YES
W-12-D-10 (35') ring	NO	YES	NO	YES
W-12-D-11 (35') jar	YES	NO	YES	NO
W-12-D-14 (47') ring	NO	YES	NO	YES
W-12-D-15 (47') jar	YES	NO	YES	NO
W-12-D-19 (65') ring	NO	YES	NO	YES
W-12-D-22 (65') jar	YES	NO	YES	NO
W-12-D-23 (65') ring	NO	YES	NO	YES
W-12-D-24 (65') jar	YES	NO	YES	NO
W-12-D-27 (80') ring	NO	YES	NO	YES

Certified Report by Pacific Testing Laboratories Michael E Dodson DATE 3-16-87

Copies to:

SCOEPA00015895

Sample Identification		Particle Size	Moisture/ Density	Atterberg Limits	Permeability
W-12-D-29 (80')	jar	YES	NO	YES	NO
W-12-D-32 (95')	ring	NO	YES	NO	YES
W-12-D-34 (95')	jar	YES	NO	YES	NO
W-16-D-4a (10')	ring	NO	YES	NO	YES
W-16-D-4 (10')	jar	YES	NO	YES	NO
W-16-D-7a (20')	ring	NO	YES	NO	YES
W-16-D-7 (20')	jar	YES	NO	YES	NO
W-16-D-10a (30')	ring	NO	YES	NO	YES
W-16-D-11	jar	YES	NO	YES	NO
W-16-D-16a (50')	ring	NO	YES	NO	YES
W-16-D-16 (50')	jar	YES	NO	YES	NO
W-16-D-20a (65')	ring	NO	YES	NO	YES
W-16-D-20 (65')	jar	YES	NO	YES	NO
W-16-S-3 (5.0')	ring	NO	YES	NO	YES
W-16-S-1 (5.0')	jar	YES	NO	YES	NO

METHODS: Test methods used are listed below.

Test Type	Test Method
Particle Size	ASTM D422 (including hydometer)
Moisture/Density	ASTM D2216
Atterberg Limits	ASTM D423 and ASTM D424
Permeability	ASTM D422

RESULTS:

Results of as received water content and dry weight bulk density testing are presented for each sample below.

Sample Identification	Water Content %(g/g)	Dry Weight Bulk Density (g/cm^3)
Loc. 3 S-1	8.47	1.47
S-47	6.91	1.43
Loc. 5-1	8.49	1.43
Loc. 6-1	6.92	1.45
Loc. 12-1	10.15	1.25
W-15-D	28.86	1.38
W-12-D-10	43.98	1.23
W-12-D-14	49.32	1.17
W-12-D-19	43.99	1.24
W-12-D-23	50.39	1.14

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Sam	le Identification	Water content %(g/g)	Dry Weight Bulk Density (g/cm^3)
W-1	-D-27	39.31	1.30
W-1	-D-32	39.86	1.27
W-1	-D-4a	28.76	1.51
W-1	-D-7a	21.10	1.47
W-1	-D-10a	68.91	0.94
W-1	-D-16a	36.95	1.36
W-1	-D-20a	33.74	1.42
W-1	-S-3	98.58	0.78

lesults of Atterberg and Constant Head Permeability testing are pre nted below for each sample tested.

Sam	e Identification	Plastic Limit	Liquid Limit	Plasticity Index	Permeability (cm/s.)
Loc	3 S-1	N.P.	N.P.	N.P.	1. E-2
S-4		N.P.	N.P.	N.P.	2.7 E-3
Loc	5-1	N.P.	N.P.	N.P.	2.4 E-4
Loc	6-1	N.P.	N.P.	N.P.	1.9 E-3
Loc	12-1	N.P.	N.P.	N.P.	2.0 E-2
W-1	-D	N.P.	N.P.	N.P.	1.9 E-3
W-1	-D-10	----	----	----	6.1 E-5
W-1	-D-11	N.P.	N.P.	N.P.	-------
W-1	-D-14	----	----	----	6.6 E-8
W-1	-D-15	30.27	41.59	11.32	-------
W-1	-D-19	----	----	----	5.2 E-7
W-1	-D-22	34.98	40.12	5.14	-------
W-1	-D-23	----	----	----	2.9 E-6
W-1	-D-24	37.41	40.68	3.27	-------
W-1	-D-27	----	----	----	3.9 E-6
W-1	-D-29	29.72	31.79	2.07	-------
W-1	-D-32	----	----	----	2.6 E-6
W-1	-D-34	31.31	33.84	2.53	-------
W-1	-D-4a	----	----	----	2.3 E-5
W-1	-D-4	N.P.	N.P.	N.P.	-------

I.P. = Nonplastic as defined by ASTM D424

---) = Not Analyzed.

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Sample Identification	Plastic Limit	Liquid Limit	Plasticity Index	Permeability (cm/s.)
W-16-D-7a	----	----	----	4.8 E-4
W-16-D-7	N.P.	N.P.	N.P.	-------
W-16-D-10a	----	----	----	2.7 E-6
W-16-D-11	36.81	44.58	7.77	-------
W-16-D-16a	----	----	----	7.8 E-7
W-16-D-16	26.97	31.17	4.20	-------
W-16-D-20a	----	----	----	2.3 E-5
W-16-D-20	25.30	26.54	1.24	-------
W-16-S-3	----	----	----	6.7 E-6
W-16-S-1	74.31	90.29	15.98	-------

N.P. = Nonplastic as defined by ASTM D424.

(---) = Not Analyzed.

Results of Particle Size Analysis are presented in the following tables and graphs.

END OF TEXT.

SCOEPA00015898

PTL Dames and Moore Job# 11831-034 PTL Report# 3061/Cert# 8604-7135

CLIENT SAMPLE #	LOC. 3 SAMPLE 1		% OF SAMPLE
SIEVE #	MESH (microns)		PASSING
1.0 in.	1.0 in		84.75
3/4 in.	3/4 in.		84.75
3/8 in.	3/8 in		82.41
#4	4750		80.22
#5	4000		79.83
#8	2360		78.35
#10	2000		77.99
#10	2000		77.99
#20	833		76.73
#35	500		69.83
#60	250		24.84
#140	105		14.58
#200	75		13.12
#270	53		12.03
HYDROMETER		71.13	10.22
HYDROMETER		50.58	8.52
HYDROMETER		29.27	7.84
HYDROMETER		16.13	5.96
HYDROMETER		9.19	5.11
HYDROMETER		6.63	4.09
HYDROMETER		5.36	3.41
HYDROMETER		4.68	3.24
HYDROMETER		1.28	2.56

SCOEPA00015899

PTL Dames and Moore Job# 11831-034 PTL Report# 3061/Cert# 8604-7135

CLIENT SAMPLE #	SAMPLE 47		% OF SAMPLE
SIEVE #	MESH (microns)		PASSING
1.0 in.	1.0 in		100.00
3/4 in.	3/4 in.		100.00
3/8 in.	3/8 in		96.27
#4	4750		93.61
#5	4000		93.16
#8	2360		92.00
#10	2000		91.67
#18	2000		91.67
#20	833		89.78
#35	500		80.66
#60	250		24.49
#140	105		12.77
#200	75		11.60
#270	53		11.07
HYDROMETER		71.45	10.03
HYDROMETER		50.81	8.17
HYDROMETER		29.39	7.43
HYDROMETER		16.13	6.50
HYDROMETER		8.64	5.57
HYDROMETER		6.35	4.64
HYDROMETER		5.16	3.71
HYDROMETER		4.69	3.71
HYDROMETER		1.28	2.79

SCOEPA00015900

PTL Dames and Moore Job# 11831-034 PTL Report# 3061/Cert# 8604-7135

CLIENT SAMPLE # SIEVE #	LOC. 5 SAMPLE 1 MESH (microns)		% OF SAMPLE PASSING
1.0 in.	1.0 in		76.15
3/4 in.	3/4 in.		76.15
3/8 in.	3/8 in		75.83
#4	4750		73.68
#5	4000		73.36
#8	2360		72.42
#10	2000		72.14
#10	2000		72.14
#20	833		70.20
#35	500		62.19
#60	250		28.27
#140	106		18.54
#200	75		9.50
#270	53		8.89
HYDROMETER		70.76	9.26
HYDROMETER		50.32	7.92
HYDROMETER		29.19	6.84
HYDROMETER		16.82	6.04
HYDROMETER		9.31	4.43
HYDROMETER		6.49	4.16
HYDROMETER		5.24	3.49
HYDROMETER		4.51	2.95
HYDROMETER		1.28	2.01

SCOEPA00015901

PTL Dames and Moore Job# 11831-034 PTL Report# 3061/Cert# 8604-7135

CLIENT SAMPLE #	SIEVE #	MESH (microns)	% OF SAMPLE PASSING
LOC.6 SAMPLE 1	1.0 in.	1.0 in	100.00
	3/4 in.	3/4 in.	100.00
	3/8 in.	3/8 in	98.27
	#4	4750	93.46
	#5	4000	92.67
	#8	2360	90.44
	#10	2000	89.86
	#10	2000	89.86
	#20	833	88.63
	#35	500	79.40
	#60	250	24.37
	#140	106	10.55
	#200	75	9.47
	#270	53	9.12
	HYDROMETER	71.33	10.64
	HYDROMETER	50.75	8.65
	HYDROMETER	29.34	7.21
	HYDROMETER	16.13	5.41
	HYDROMETER	9.34	4.51
	HYDROMETER	6.62	3.61
	HYDROMETER	5.41	3.61
	HYDROMETER	4.62	2.88
	HYDROMETER	1.35	3.25

SCOEPA00015902

PTL Dames and Moore Job# 11831-034 PTL Report# 3061/Cert# 8604-7135

CLIENT SAMPLE #	SIEVE #	MESH (microns)	% OF SAMPLE PASSING
LOC.12 SAMPLE 1	1.0 in.	1.0 in	100.00
	3/4 in.	3/4 in.	91.91
	3/8 in.	3/8 in	91.91
	#4	4750	90.98
	#5	4000	90.98
	#8	2360	90.59
	#10	2000	90.43
	#10	2000	90.43
	#20	833	89.79
	#35	500	82.76
	#60	250	30.42
	#140	106	12.83
	#200	75	11.03
	#270	53	10.27
	HYDROMETER	71.33	11.12
	HYDROMETER	50.81	8.23
	HYDROMETER	29.44	6.89
	HYDROMETER	16.18	5.56
	HYDROMETER	9.35	5.11
	HYDROMETER	6.62	4.45
	HYDROMETER	5.30	3.56
	HYDROMETER	4.70	3.34
	HYDROMETER	1.36	3.11

SCOEPA00015903

PTL Dames and Moore Job# 11831-034 PTL Report# 3061/Cert# 8604-7135

CLIENT SAMPLE #	W-15-D		% OF SAMPLE
SIEVE #	MESH (microns)		PASSING
1.0 in.	1.0 in		100.00
3/4 in.	3/4 in.		100.00
3/8 in.	3/8 in		100.00
#4	4750		100.00
#5	4000		100.00
#8	2360		99.93
#10	2000		99.91
#10	2000		99.91
#20	833		99.17
#35	500		91.51
#60	250		22.35
#140	106		5.21
#200	75		4.47
#270	53		4.02
HYDROMETER		72.38	4.45
HYDROMETER		51.27	3.90
HYDROMETER		29.63	3.52
HYDROMETER		16.23	3.52
HYDROMETER		9.30	3.15
HYDROMETER		6.62	2.41
HYDROMETER		5.37	2.41
HYDROMETER		4.71	2.04
HYDROMETER		1.36	2.04

SCOEPA00015904

PTL Dames and Moore Job# 11831-034 PTL Report# 3061/Cert# 8604-7135

CLIENT SAMPLE #	W-120-11	% OF SAMPLE
SIEVE #	MESH (microns)	PASSING
1.0 in.	1.0 in	100.00
3/4 in.	3/4 in.	100.00
3/8 in.	3/8 in	100.00
#4	4750	100.00
#5	4000	100.00
#8	2360	100.00
#10	2000	100.00
#18	2000	100.00
#20	833	99.90
#35	500	99.67
#60	250	99.06
#140	106	74.90
#200	75	60.02
#270	53	50.10
HYDROMETER	62.63	52.25
HYDROMETER	45.49	44.67
HYDROMETER	26.92	36.48
HYDROMETER	15.09	28.89
HYDROMETER	8.75	22.13
HYDROMETER	6.17	19.26
HYDROMETER	5.21	17.62
HYDROMETER	4.51	16.60
HYDROMETER	1.33	11.07

SCOEPA00015905

PTL Dames and Mocre Job# 11831-034 PTL Report# 3061/Cert# 8604-7135

CLIENT SAMPLE #	W-120-15	% OF SAMPLE
SIEVE #	MESH (microns)	PASSING
1.0 in.	1.0 in	100.00
3/4 in.	3/4 in.	100.00
3/8 in.	3/8 in	100.00
#4	4750	100.00
#5	4000	100.00
#8	2360	100.00
#10	2000	100.00
#16	2000	100.00
#20	833	100.00
#35	500	99.98
#60	250	99.92
#140	106	98.66
#200	75	96.57
#270	53	91.11
HYDROMETER	53.60	88.86
HYDROMETER	39.41	80.60
HYDROMETER	24.14	66.54
HYDROMETER	14.16	48.56
HYDROMETER	8.54	35.75
HYDROMETER	6.17	28.72
HYDROMETER	5.10	25.42
HYDROMETER	4.43	23.97
HYDROMETER	1.31	15.29

SCOEPA00015906

PTL Dames and Moore Job# 11831-034 PTL Report# 3061/Cert# 8604-7135

CLIENT SAMPLE #	W-120-22	% OF SAMPLE
SIEVE #	MESH (microns)	PASSING
1.0 in.	1.0 in	100.00
3/4 in.	3/4 in.	100.00
3/8 in.	3/8 in	100.00
#4	4750	100.00
#5	4000	100.00
#8	2360	100.00
#10	2000	100.00
#10	2000	100.00
#20	833	99.98
#35	500	99.92
#60	250	99.75
#140	106	99.34
#200	75	98.72
#270	53	95.91
HYDROMETER	54.41	86.65
HYDROMETER	39.59	80.46
HYDROMETER	24.20	67.05
HYDROMETER	14.38	44.98
HYDROMETER	8.74	29.38
HYDROMETER	6.32	20.84
HYDROMETER	5.17	18.57
HYDROMETER	4.58	17.12
HYDROMETER	1.33	10.32

SCOEPA00015907

PTL Dames and Moore Job# 11831-034 PTL Report# 3061/Cert# 8604-7135

CLIENT SAMPLE #	W-12-D-24	% OF SAMPLE
SIEVE #	MESH (microns)	PASSING
1.0 in.	1.0 in	100.00
3/4 in.	3/4 in.	100.00
3/8 in.	3/8 in	100.00
#4	4750	100.00
#5	4000	100.00
#8	2360	100.00
#10	2000	100.00
#10	2000	100.00
#20	833	100.00
#35	500	99.96
#60	250	99.83
#140	106	99.54
#200	75	99.05
#270	53	96.10
HYDROMETER	53.39	91.29
HYDROMETER	38.90	85.06
HYDROMETER	23.90	69.71
HYDROMETER	14.25	46.68
HYDROMETER	8.72	29.25
HYDROMETER	6.31	21.37
HYDROMETER	5.20	18.05
HYDROMETER	4.53	16.39
HYDROMETER	1.33	10.17

SCOEPA00015908

PTL Dames and Moore Job# 11831-034 PTL Report# 3061/Cert# 8604-7135

CLIENT SAMPLE #	W-120-29	% OF SAMPLE
SIEVE #	MESH (microns)	PASSING
1.0 in.	1.0 in	100.00
3/4 in.	3/4 in.	100.00
3/8 in.	3/8 in	100.00
#4	4750	100.00
#5	4000	100.00
#8	2360	100.00
#10	2000	100.00
#18	1000	100.00
#20	833	99.87
#35	500	99.79
#60	250	99.52
#140	106	98.31
#200	75	94.65
#270	53	79.64
HYDROMETER	58.64	77.26
HYDROMETER	44.83	62.64
HYDROMETER	27.78	37.59
HYDROMETER	16.85	19.84
HYDROMETER	9.47	12.11
HYDROMETER	6.67	11.69
HYDROMETER	5.46	9.61
HYDROMETER	4.72	9.40
HYDROMETER	1.39	7.31

SCOEPA00015909

PTL Dames and Moore Job# 11831-034 PTL Report# 3061/Cert# 8604-7135

CLIENT SAMPLE #	W-12D-34	% OF SAMPLE
SIEVE #	MESH (microns)	PASSING
1.0 in.	1.0 in	100.00
3/4 in.	3/4 in.	100.00
3/8 in.	3/8 in	100.00
#4	4750	100.00
#5	4000	100.00
#8	2360	100.00
#10	2000	100.00
#10	2000	100.00
#20	833	99.90
#35	500	99.74
#60	250	99.65
#140	106	96.55
#200	75	92.78
#270	53	81.36
HYDROMETER	57.83	71.99
HYDROMETER	42.09	62.13
HYDROMETER	26.22	42.41
HYDROMETER	15.21	25.44
HYDROMETER	8.93	17.55
HYDROMETER	6.42	14.99
HYDROMETER	5.26	12.82
HYDROMETER	4.57	12.43
HYDROMETER	1.33	8.68

SCOEPA00015910

PTL Dames and Moore Job#-11831-034 PTL Report# 3061/Cert# 8604-7135

CLIENT SAMPLE #	W-160-4		% OF SAMPLE
SIEVE #	MESH (microns)		PASSING
1.0 in.	1.0 in		100.00
3/4 in.	3/4 in.		100.00
3/8 in.	3/8 in		100.00
#4	4750		100.00
#5	4000		100.00
#8	2360		100.00
#10	2000		100.00
#10	2000		100.00
#20	833		99.51
#35	500		98.66
#60	250		60.91
#140	106		23.63
#200	75		16.84
#270	53		12.00
HYDROMETER		72.73	15.69
HYDROMETER		52.13	11.34
HYDROMETER		30.37	7.75
HYDROMETER		16.73	4.91
HYDROMETER		9.65	4.91
HYDROMETER		6.81	3.97
HYDROMETER		5.49	3.78
HYDROMETER		4.77	3.21
HYDROMETER		1.40	3.21

SCOEPA00015911

CLIENT SAMPLE #	W-160-7		% OF SAMPLE
SIEVE #	MESH (microns)		PASSING
1.0 in.	1.0 in		100.00
3/4 in.	3/4 in.		100.00
3/8 in.	3/8 in		100.00
#4	4750		100.00
#5	4000		100.00
#8	2360		100.00
#10	2000		100.00
#16	2000		100.00
#20	833		99.78
#35	500		93.30
#60	250		34.34
#140	106		15.83
#200	75		13.13
#270	53		12.12
HYDROMETER		73.16	11.62
HYDROMETER		51.94	10.36
HYDROMETER		30.86	9.29
HYDROMETER		16.56	7.51
HYDROMETER		9.61	5.72
HYDROMETER		6.64	4.47
HYDROMETER		5.47	5.18
HYDROMETER		4.73	4.82
HYDROMETER		1.40	3.04

SCOEPA00015912

PTL Dames and Moore Job# 11831-034 PTL Report# 3061/Cert# 8604-7135

CLIENT SAMPLE #	W-160-11		% OF SAMPLE
SIEVE #	MESH (microns)		PASSING
1.0 in.	1.0 in		100.00
3/4 in.	3/4 in.		100.00
3/8 in.	3/8 in		100.00
#4	4750		99.90
#5	4000		99.90
#8	2360		99.84
#10	2000		99.83
#10	2000		99.83
#20	833		98.92
#35	500		96.25
#60	250		86.54
#140	106		77.75
#200	75		71.76
#270	53		64.74
HYDROMETER		62.02	61.12
HYDROMETER		44.55	56.24
HYDROMETER		26.45	47.17
HYDROMETER		14.88	37.88
HYDROMETER		8.79	29.51
HYDROMETER		6.26	23.93
HYDROMETER		5.19	21.84
HYDROMETER		4.52	19.29
HYDROMETER		1.33	18.22

SCOEPA00015913

PTL Dames and Moore Job# 11831-034 PTL Report# 3061/Cert# 8604-7135

CLIENT SAMPLE #	W-16D-16		% OF SAMPLE
SIEVE #	MESH (microns)		PASSING
1.0 in.	1.0 in		100.00
3/4 in.	3/4 in.		100.00
3/8 in.	3/8 in		100.00
#4	4750		100.00
#5	4000		100.00
#8	2360		100.00
#10	2000		100.00
#18	2000		100.00
#20	833		99.90
#35	500		99.73
#60	250		99.59
#140	106		97.58
#200	75		88.36
#270	53		69.41
HYDROMETER		58.04	70.83
HYDROMETER		43.12	58.51
HYDROMETER		26.59	40.83
HYDROMETER		15.11	28.54
HYDROMETER		8.89	22.58
HYDROMETER		6.27	19.09
HYDROMETER		5.11	17.66
HYDROMETER		4.52	16.63
HYDROMETER		1.33	11.29

SCOEPA00015914

PTL Dames and Moore Job# 11831-034 PTL Report# 3061/Cert# 8604-7135

CLIENT SAMPLE #	W-16D-20		% OF SAMPLE
SIEVE #	MESH (microns)		PASSING
1.0 in.	1.0 in		100.00
3/4 in.	3/4 in.		100.00
3/8 in.	3/8 in		100.00
#4	4750		100.00
#5	4000		100.00
#8	2360		100.00
#10	2000		100.00
#18	2000		100.00
#20	833		99.96
#35	500		99.92
#60	250		99.82
#140	105		99.10
#200	75		94.54
#270	53		79.29
HYDROMETER		58.64	74.57
HYDROMETER		43.68	62.57
HYDROMETER		26.73	46.78
HYDROMETER		15.46	31.19
HYDROMETER		9.18	21.99
HYDROMETER		6.56	16.99
HYDROMETER		5.36	14.59
HYDROMETER		4.56	12.99
HYDROMETER		1.38	6.60

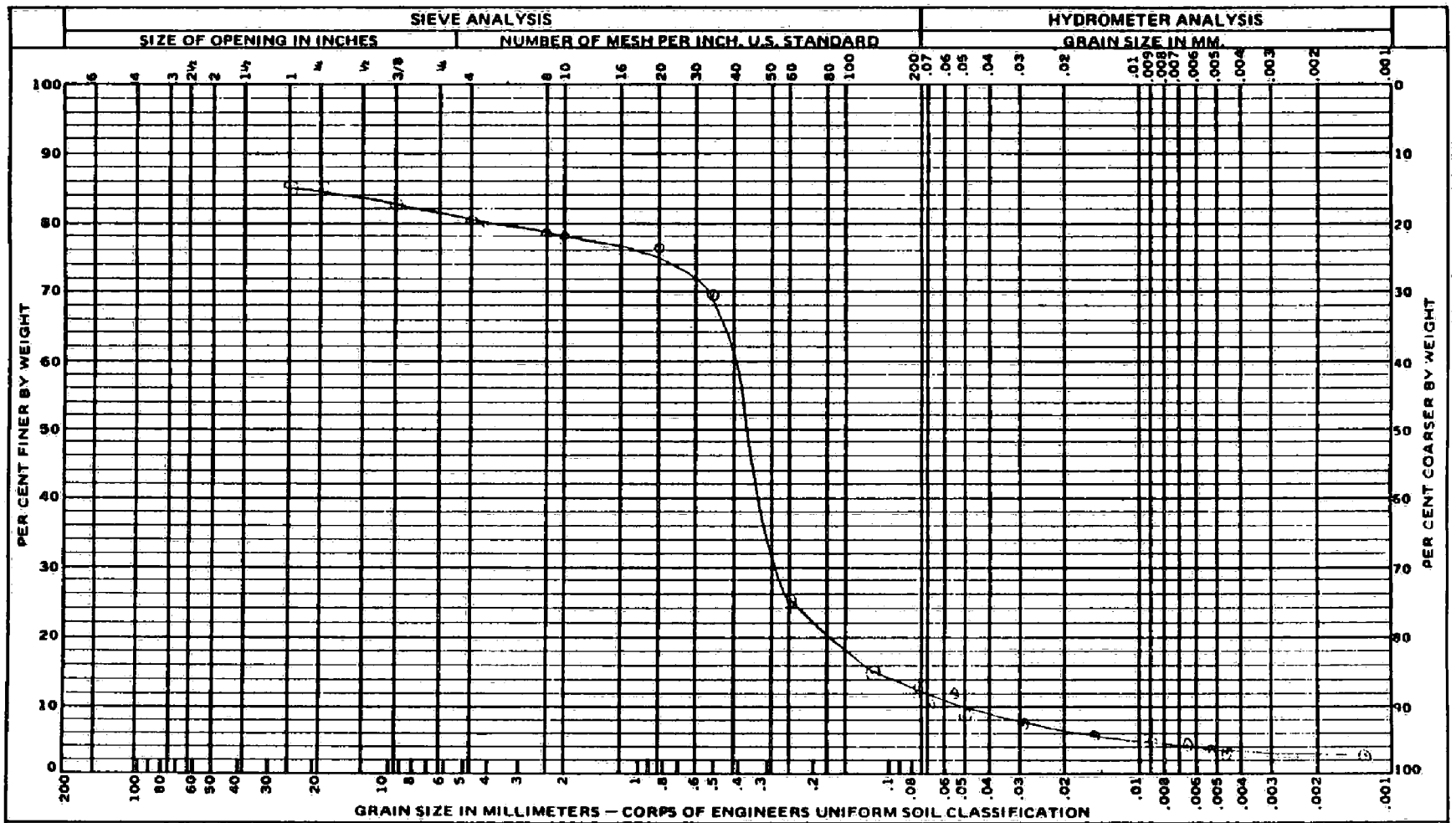
SCOEPA00015915

CLIENT SAMPLE #	W-16-S-1		% OF SAMPLE
SIEVE #	MESH (microns)		PASSING
1.0 in.	1.0 in		87.11
3/4 in.	3/4 in.		77.89
3/8 in.	3/8 in		71.84
#4	4750		66.44
#5	4000		65.56
#8	2360		63.89
#10	2000		63.50
#10	2000		63.50
#20	833		61.83
#35	500		59.83
#60	250		56.41
#140	106		53.48
#200	75		52.47
#270	53		51.54
HYDROMETER		64.18	51.39
HYDROMETER		45.38	51.39
HYDROMETER		26.18	51.39
HYDROMETER		14.40	50.40
HYDROMETER		8.46	44.47
HYDROMETER		6.07	38.74
HYDROMETER		5.13	27.67
HYDROMETER		4.62	13.83
HYDROMETER		1.42	8.20

SCOEPA00015916

PACIFIC TESTING LABORATORIES

Report No. A LR-30(Page 23.
Transmittal No.
Date of Test
Specification 8604-7135



SAMPLE NO.	DEPTH	ELEVATION	MATERIAL DESCRIPTION		LL	PI
LOC. 3 S-1						

PROJECT Dames and Moore
No. 11831-034

Plotted:
Checked:

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SCOEPA00015917

PACIFIC TESTING LABORATORIES

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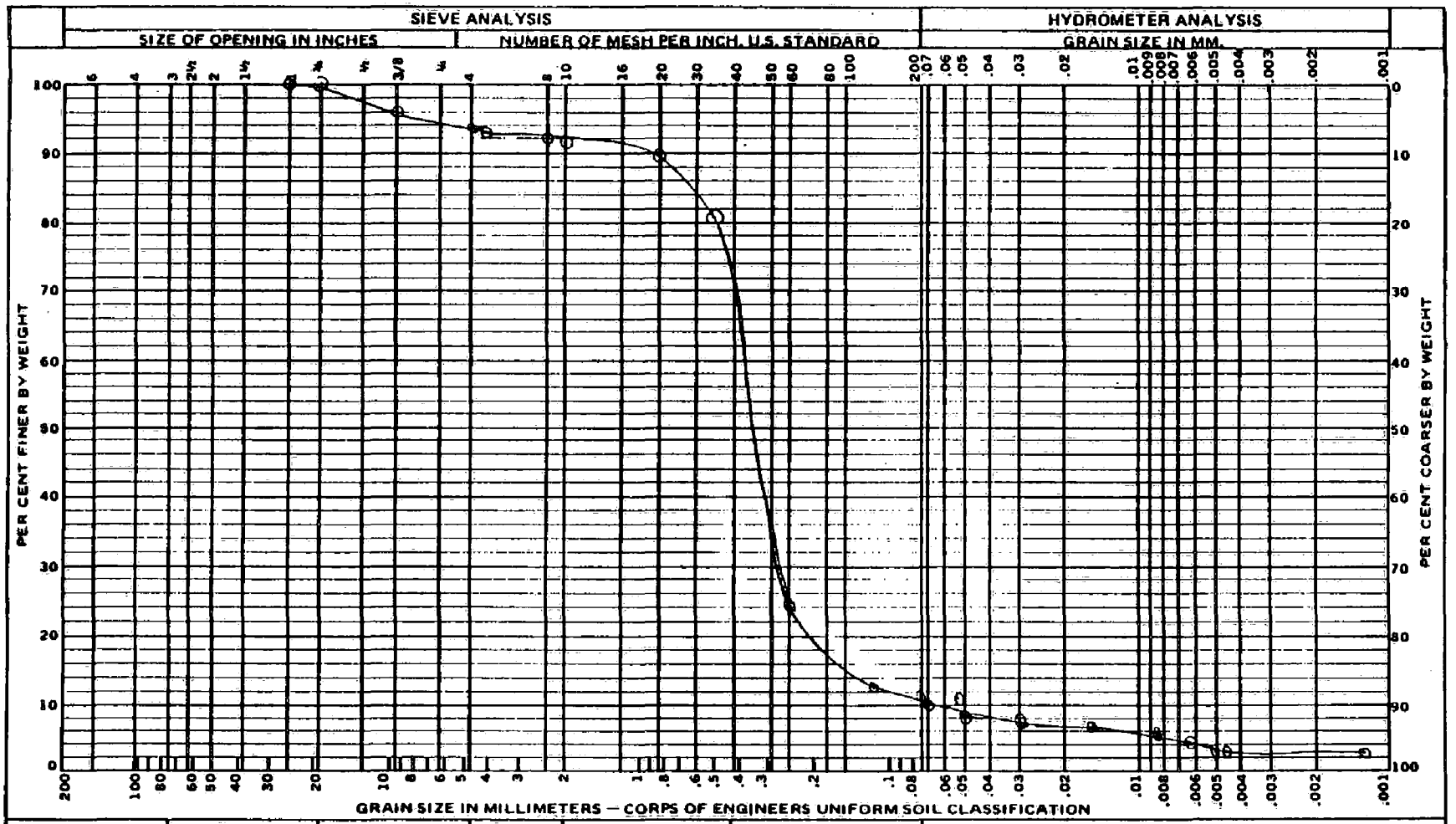
Transmittal No.
Date of Test
Specification 8604-7135



SAMPLE NO.	DEPTH	ELEVATION	MATERIAL DESCRIPTION		LL	PI
S-47						

PROJECT Dames and Moore
No. 11831-034

Plotted:
Checked:

3/16/87
(Date of Report)

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SCOEPA00015918

PACIFIC TESTING LABORATORIES

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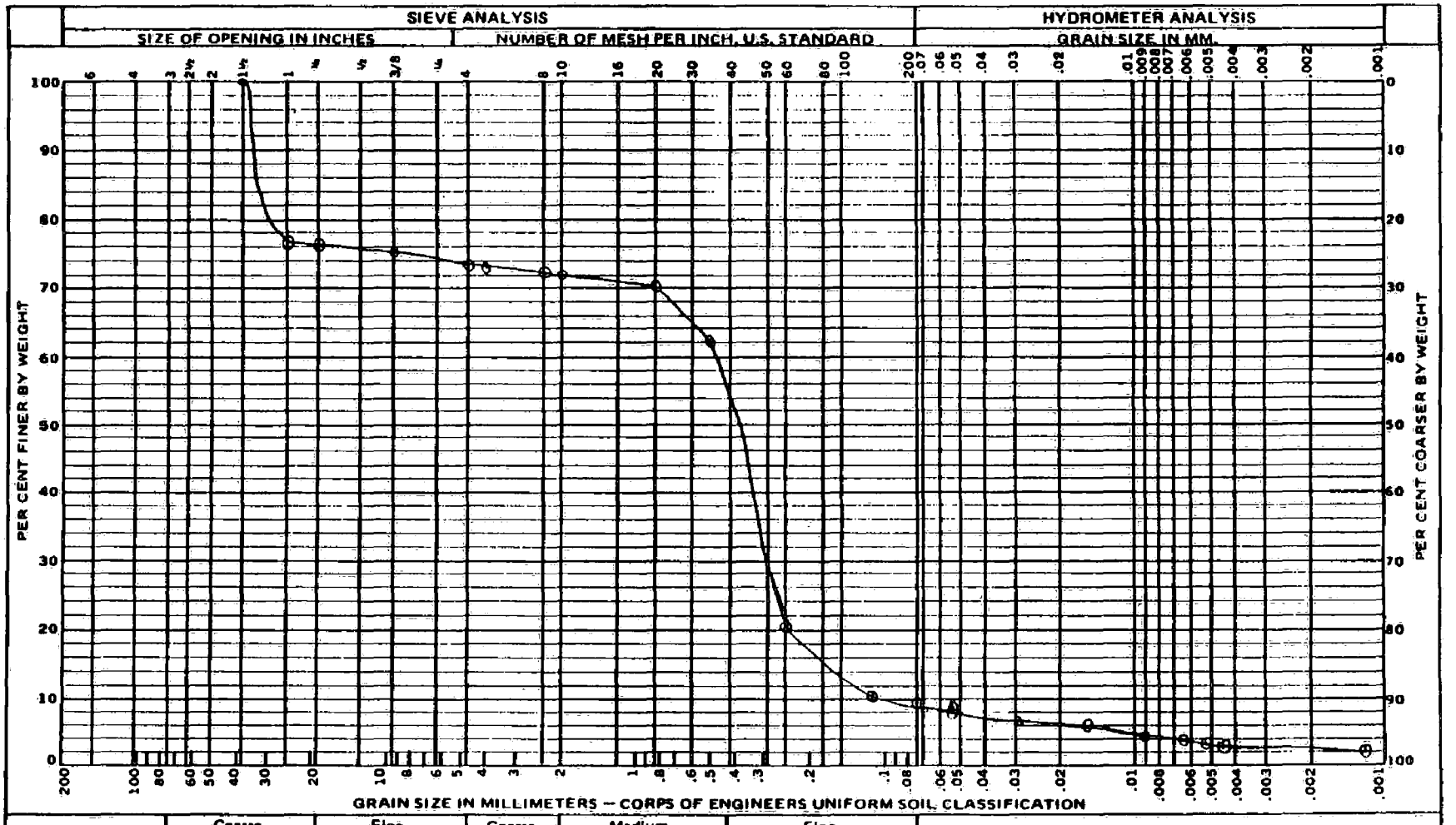
Transmittal No. _____
Date of Test _____
Specification 8604-7135



SAMPLE NO.	DEPTH	ELEVATION	MATERIAL DESCRIPTION		LL	PI
Lot 5 - 2						

PROJECT Dames and Moore
No. 11831-034

Plotted:
Checked:

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SCOEPA00015919

PACIFIC TESTING LABORATORIES

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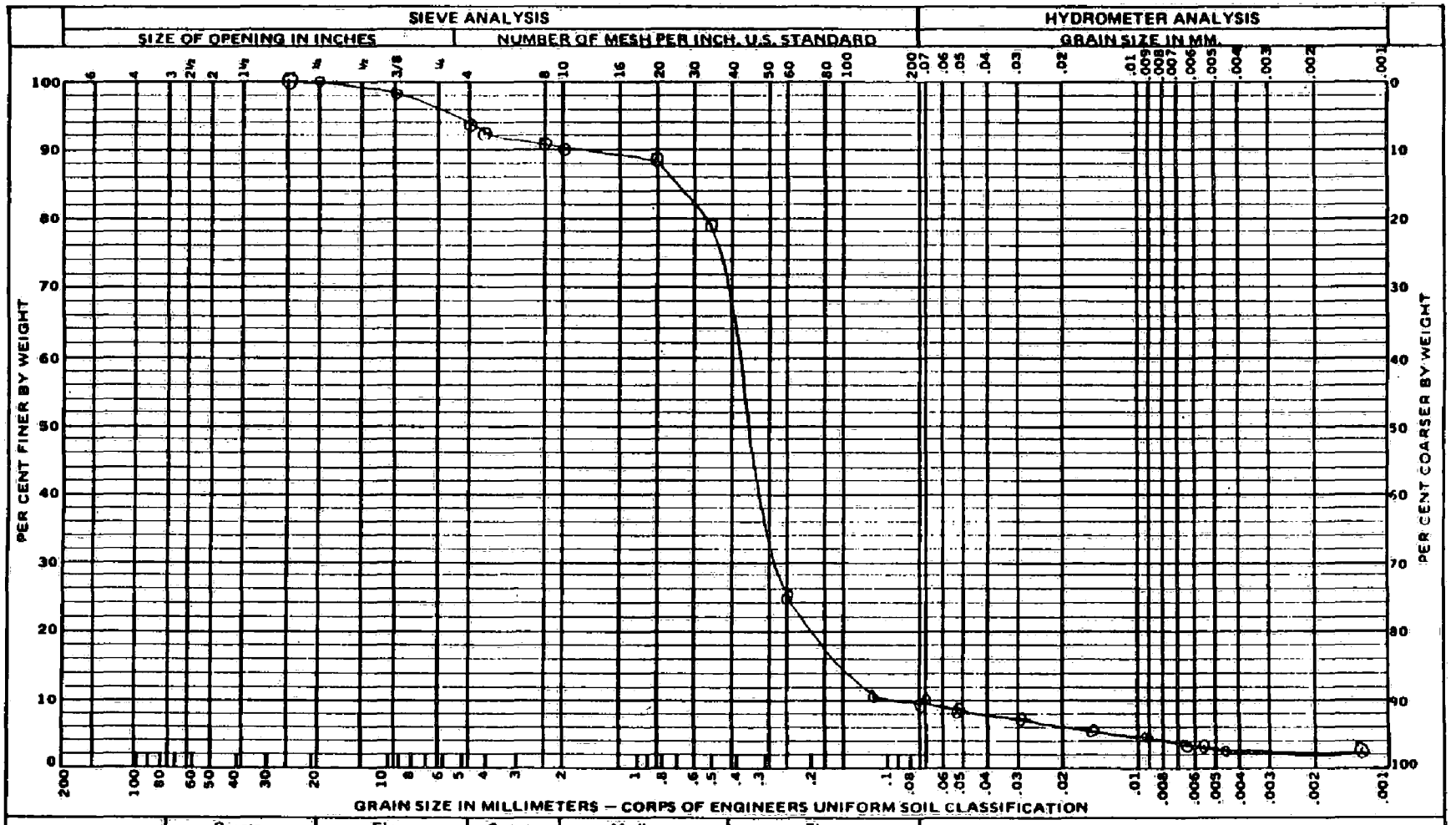
Transmittal No.
Date of Test
Specification 8604-7135



SAMPLE NO.	DEPTH	ELEVATION	MATERIAL DESCRIPTION		LL	PI
Loc. 6-1						

PROJECT Dames and Moore
No. 11831-034

Plotted:
Checked:

3/16/87
(Date of Report)

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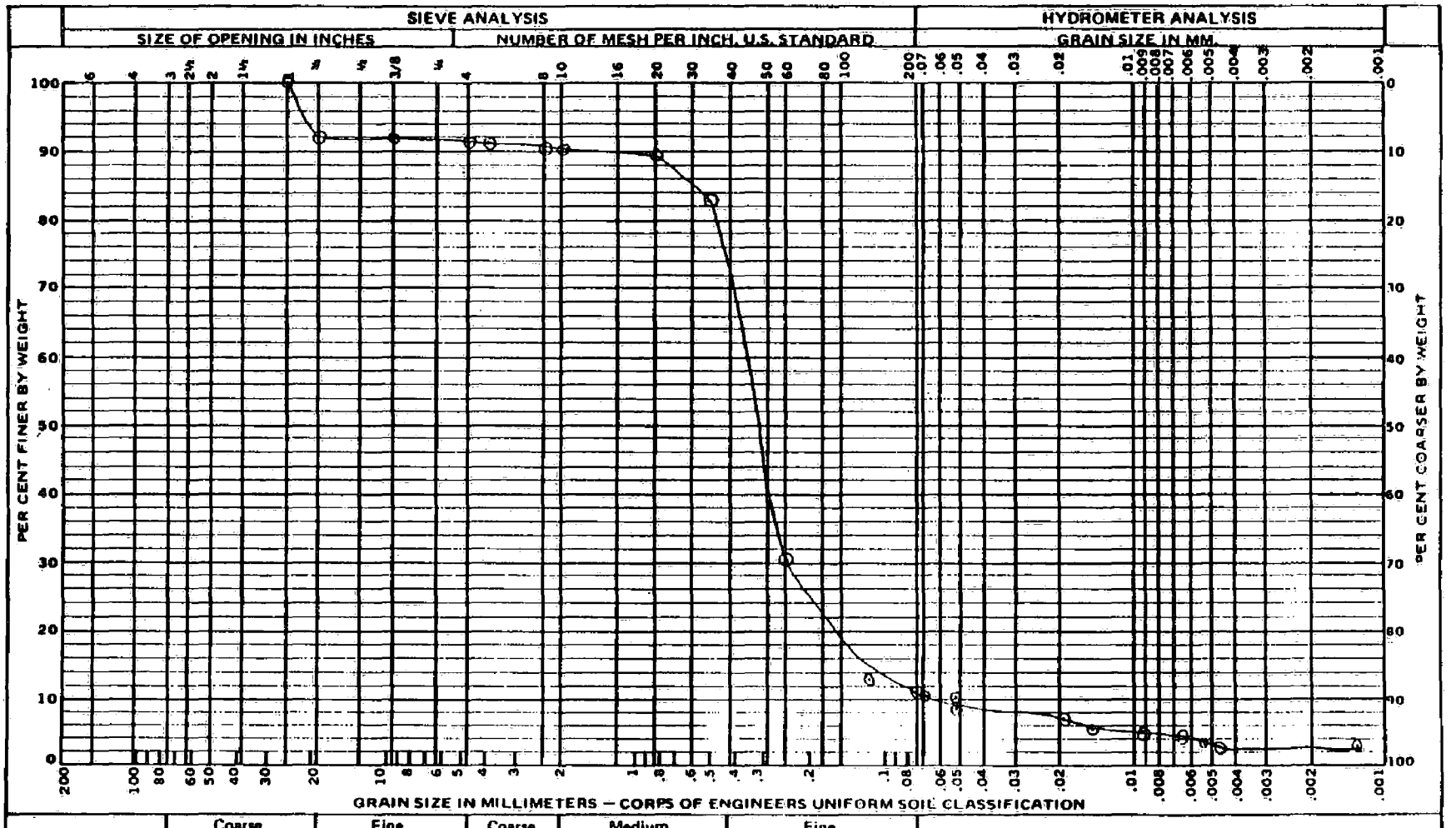
SCOEPA00015920

PACIFIC TESTING LABORATORIES

Transmittal No. _____
Date of Test _____
Specification 8604-7135



SAMPLE NO.	DEPTH	ELEVATION	MATERIAL DESCRIPTION		LL	PI
Loc. 12-1						

PROJECT Dames and Moore
No. 11831-034

Plotted:
Checked:

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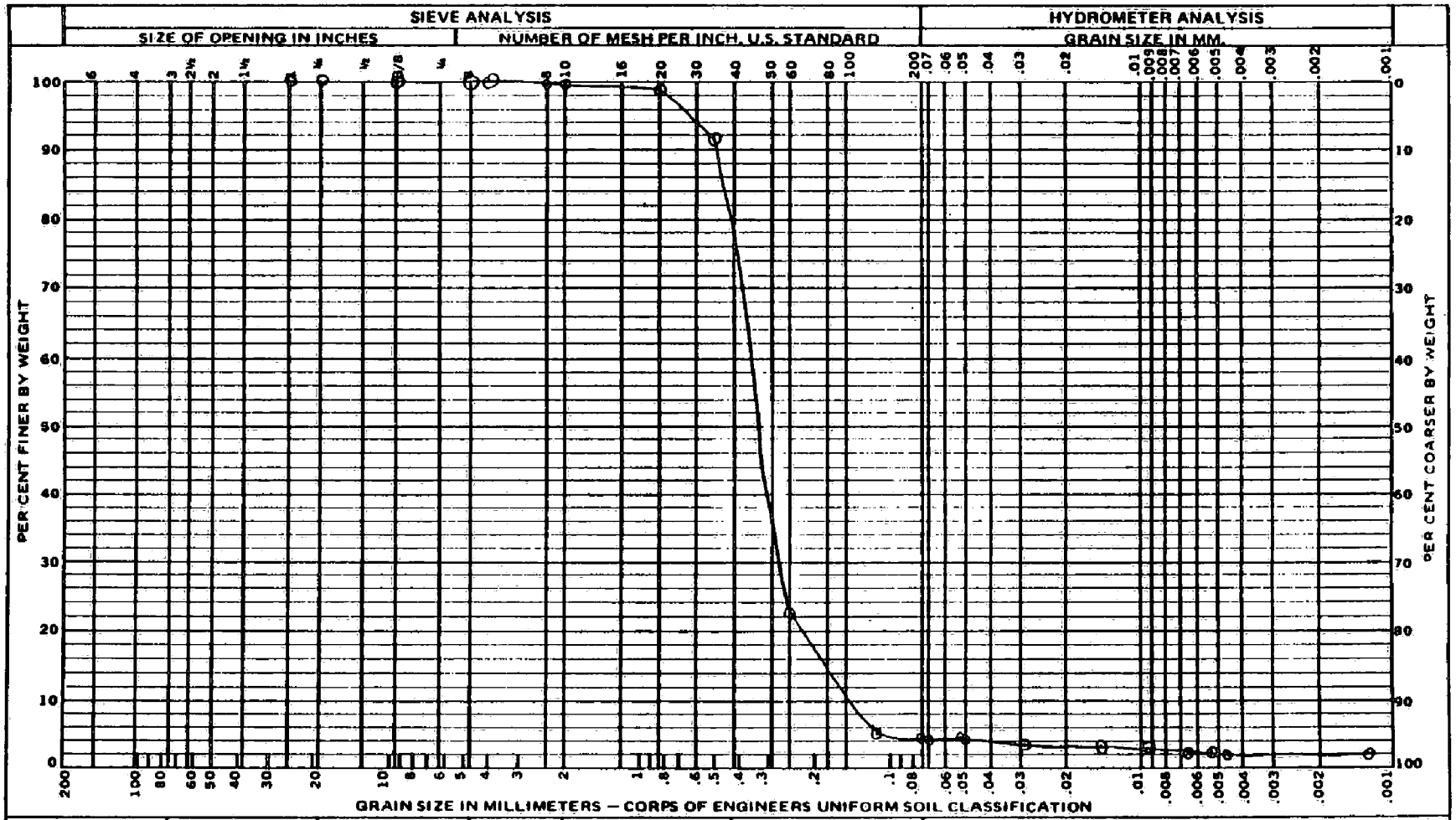
SCOEPA00015921

PACIFIC TESTING LABORATORIES

Report No. A LR-30[illegible] Page 28
Transmittal No. ____
Date of Test ____
Specification 8604-7135



SAMPLE NO.	DEPTH	ELEVATION	MATERIAL DESCRIPTION		LL	PI
W-15-D						

Plotted:
Checked:

PROJECT Dames and Moore
No. 11831-034

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SCOEPA00015922

PACIFIC TESTING LABORATORIES

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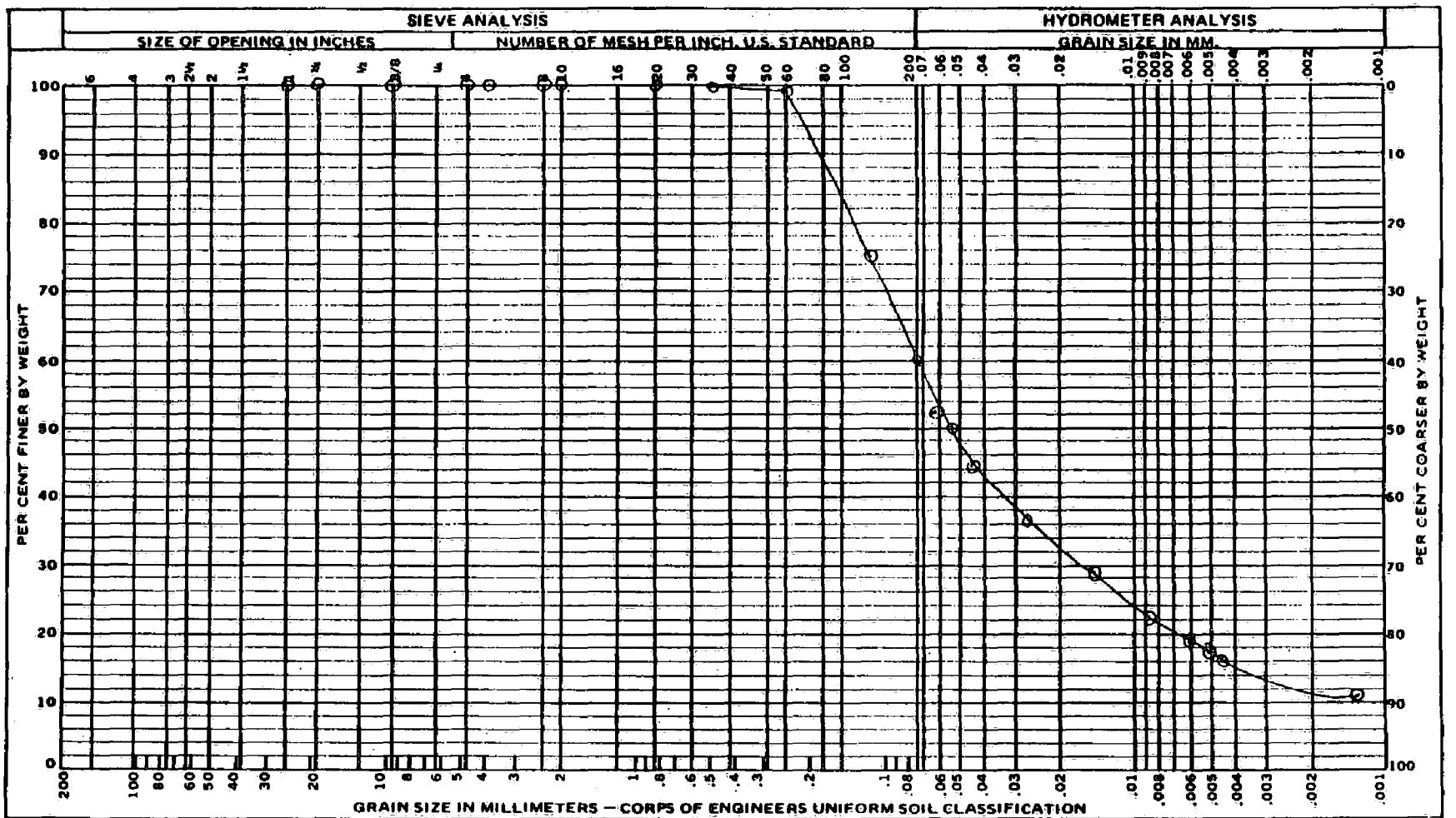
Transmittal No.
Date of Test
Specification 8604-7135



SAMPLE NO.	DEPTH	ELEVATION	MATERIAL DESCRIPTION		LL	PI
W-120-11						

PROJECT Dames and Moore
No. 11831-034

Plotted:
Checked:

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SCOEPA00015923

PACIFIC TESTING LABORATORIES

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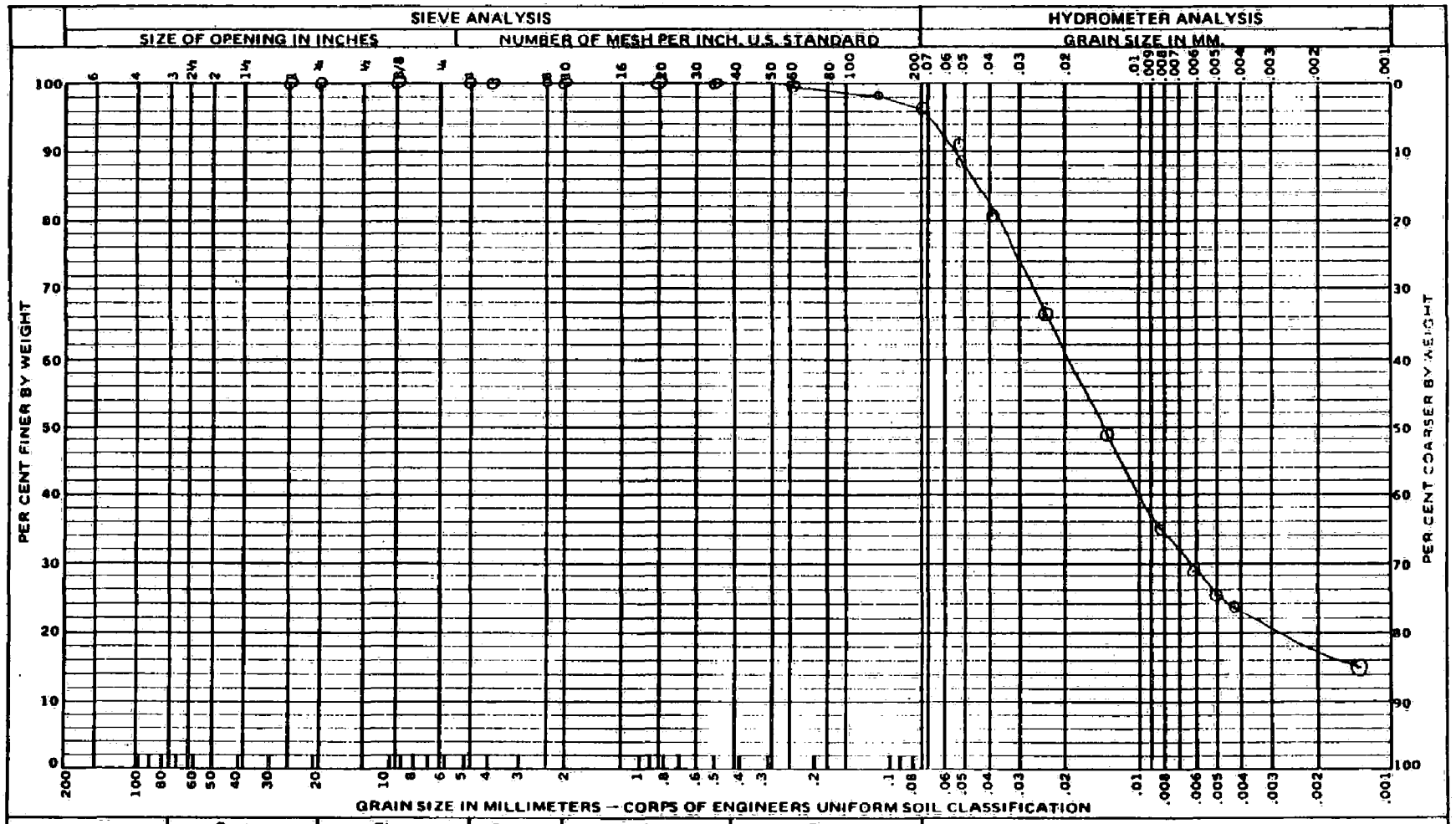
Transmittal No.
Date of Test
Specification 8604-7135



SAMPLE NO.	DEPTH	ELEVATION	MATERIAL DESCRIPTION		LL	PI
W-12D-15						

PROJECT Dames and Moore
No. 11831-034

Plotted:
Checked:

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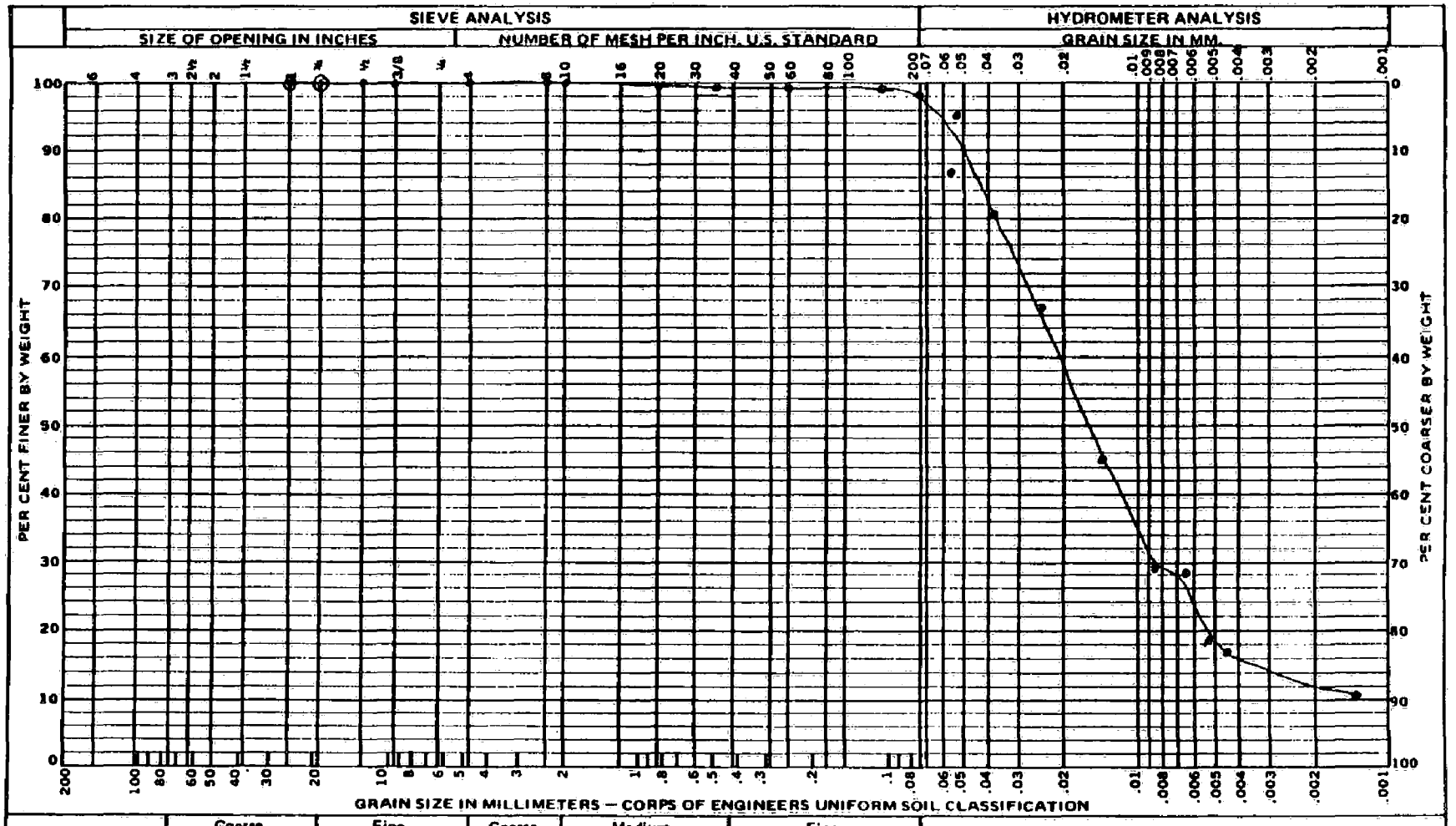
SCOEPA00015924

PACIFIC TESTING LABORATORIES

Report No. A LR-3067 Page 31
Transmittal No.
Date of Test
Specification 8604-7135



SAMPLE NO.	DEPTH	ELEVATION	MATERIAL DESCRIPTION		LL	PI
W-12-D-22						

PROJECT Dames and Moore
No. 11831-034

Plotted:
Checked:

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(Date of Report)

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SCOEPA00015925

PACIFIC TESTING LABORATORIES

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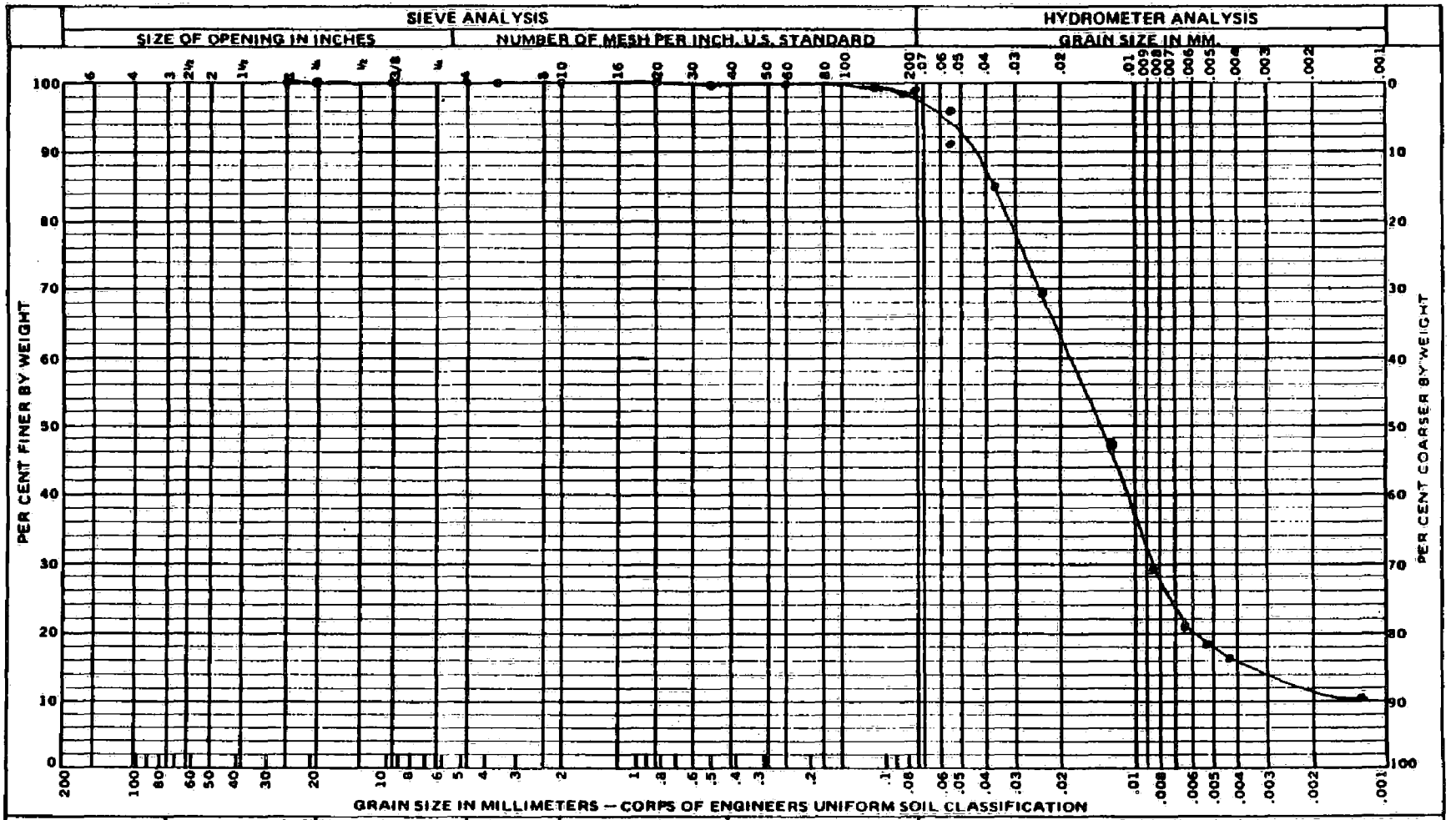
Transmittal No.
Date of Test
Specification 8604-7135



SAMPLE NO.	DEPTH	ELEVATION	MATERIAL DESCRIPTION		LL	PI
W-12-D-24						

PROJECT Dames and Moore
No. 11831-034

Plotted:
Checked:

3/16/87
(Date of Report)

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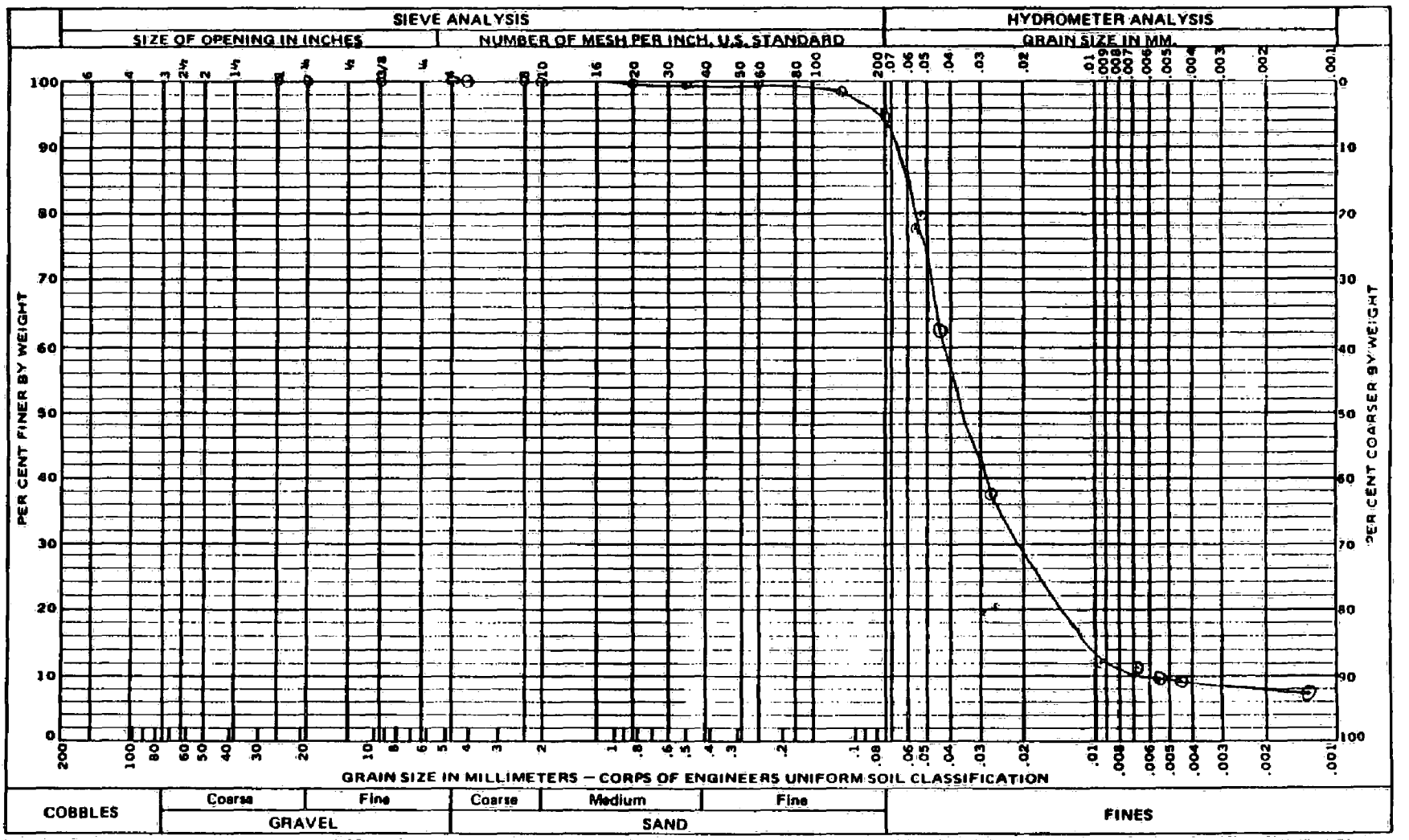
SCOEPA00015926

PACIFIC TESTING LABORATORIES

Report No. A LR-30 Page 33
Transmittal No.
Date of Test
Specification 8604-7135



SAMPLE NO.	DEPTH	ELEVATION	MATERIAL DESCRIPTION		LL	PI

PROJECT Dames and Moore
No. 11831-034

W-120-29

Plotted:
Checked:

3/16/87
(Date of Report)

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SCOEPA00015927

PACIFIC TESTING LABORATORIES

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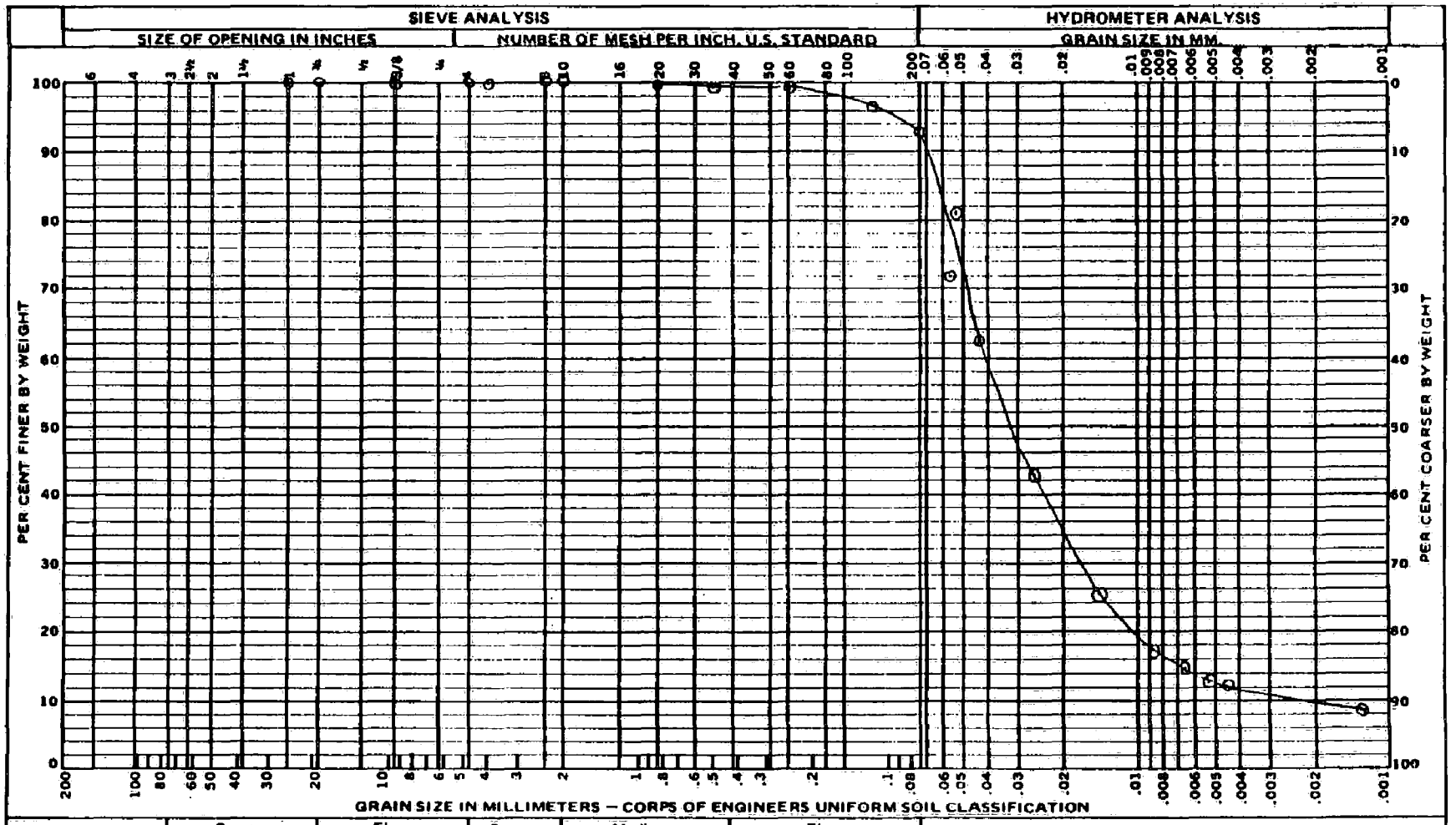
Transmittal No.
Date of Test
Specification 8604-7135



SAMPLE NO.	DEPTH	ELEVATION	MATERIAL DESCRIPTION		LL	PI
W-120-34						

PROJECT Dames and Moore
No. 11831-034

Plotted:
Checked:

3/16/87
(Date of Report)

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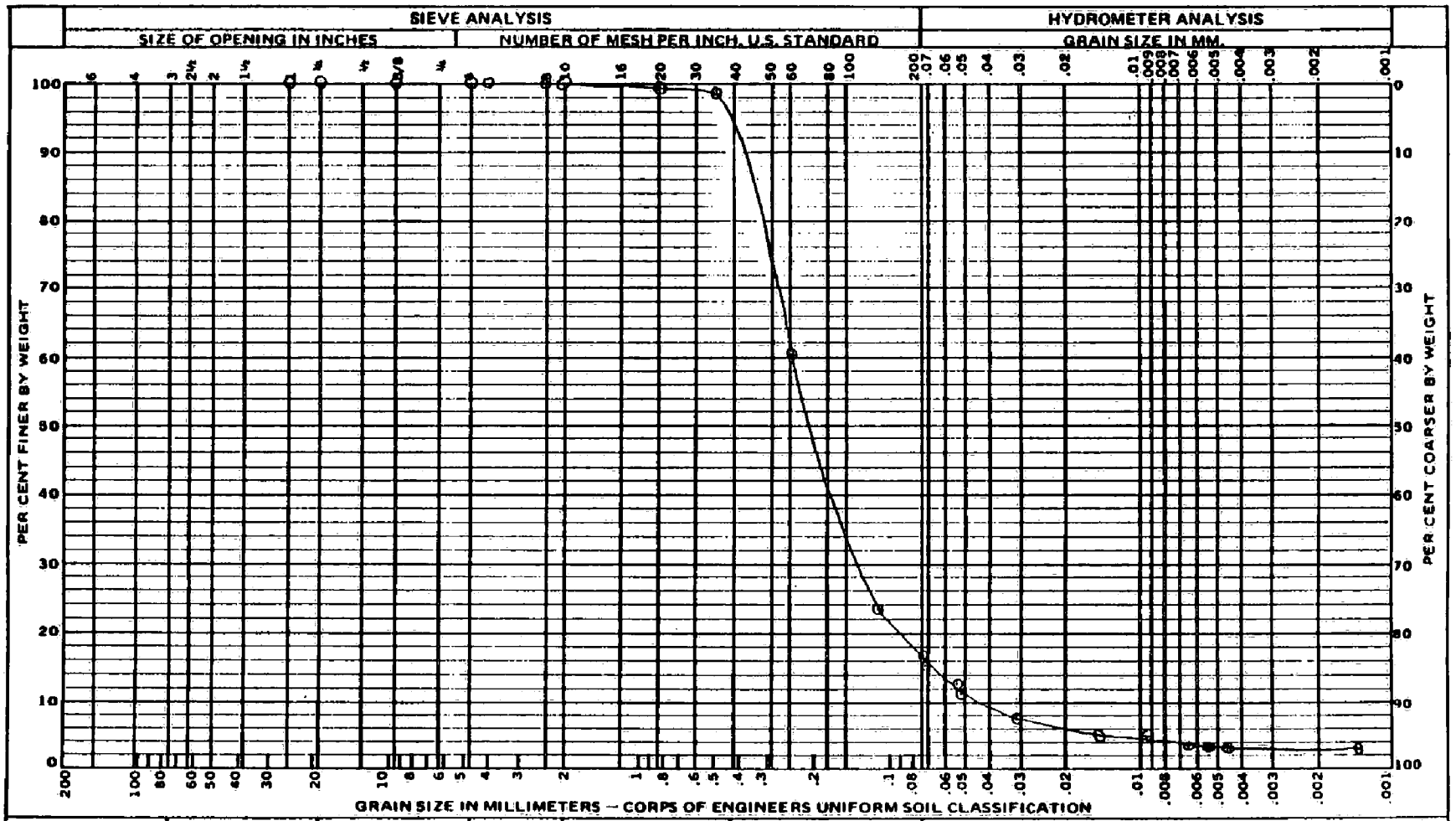
SCOEPA00015928

PACIFIC TESTING LABORATORIES

Report No. A LR-30[illegible] Page 35
Transmittal No. _____
Date of Test _____
Specification 8604-7135



SAMPLE NO.	DEPTH	ELEVATION	MATERIAL DESCRIPTION		LL	PI
W-160-4						

Plotted: _____
Checked: _____

PROJECT Dames and Moore
No. 11831-034

3/16/87
(Date of Report)

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PACIFIC TESTING LABORATORIES

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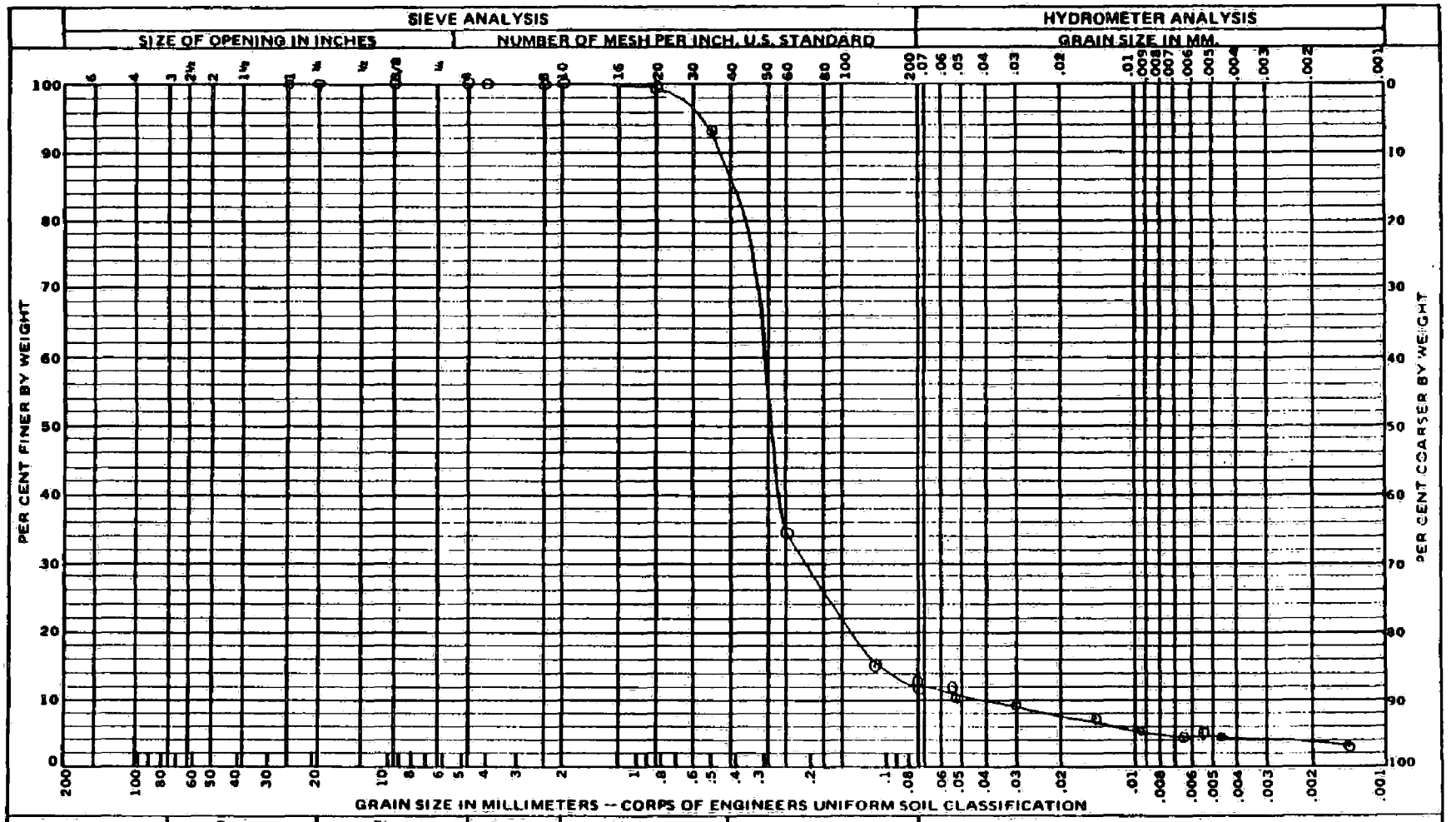
Transmittal No.
Date of Test
Specification 8604-7135



SAMPLE NO.	DEPTH	ELEVATION	MATERIAL DESCRIPTION		LL	PI
W-160-7						

PROJECT Dames and Moore
No. 11831-034

Plotted:
Checked:

3/16/87
(Date of Report)

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SCOEPA00015930

PACIFIC TESTING LABORATORIES

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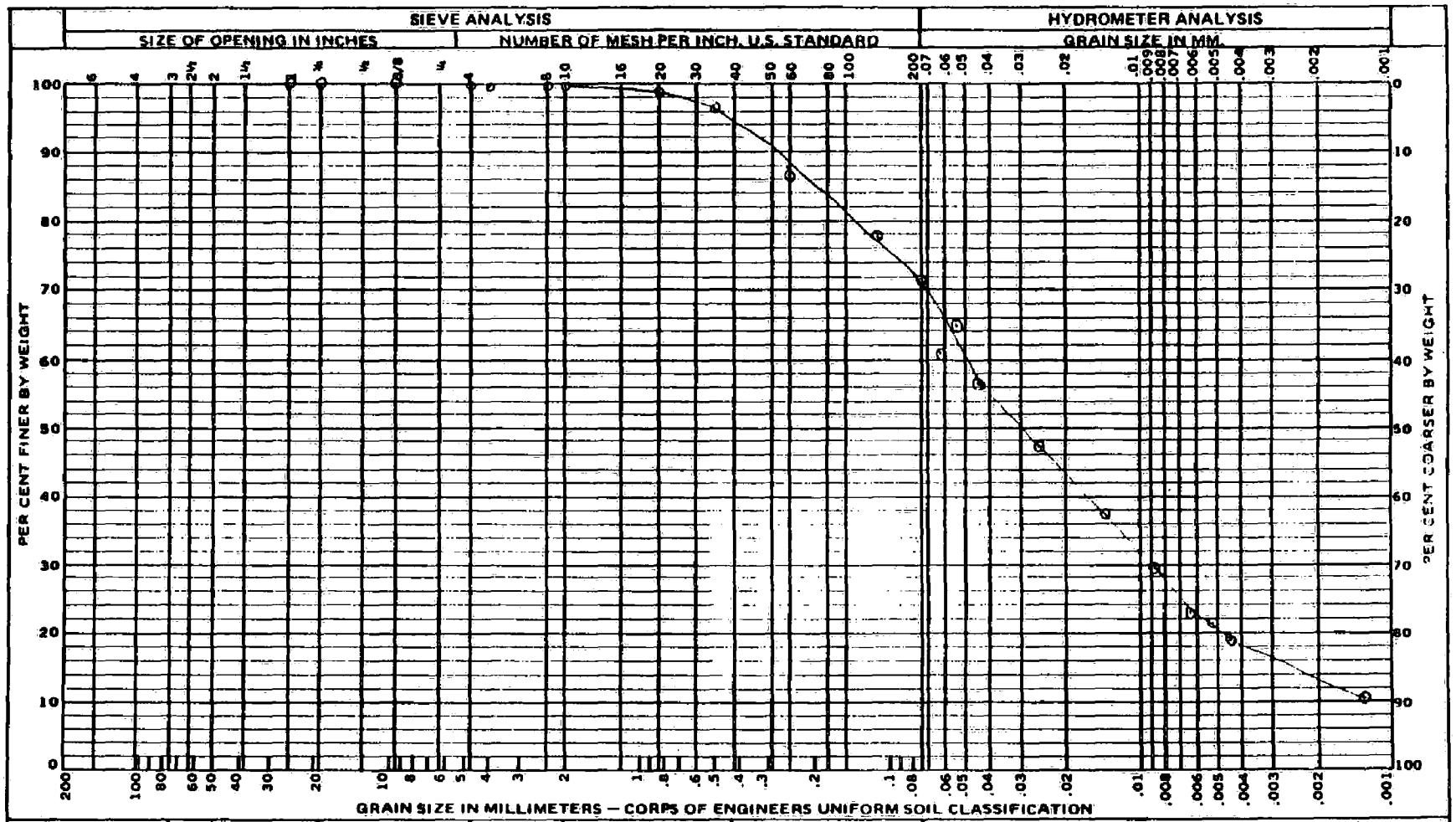
Transmittal No.
Date of Test
Specification 8604-7135



SAMPLE NO.	DEPTH	ELEVATION	MATERIAL DESCRIPTION		LL	PI
W-16D-11						

Plotted:
Checked:

PROJECT Dames and Moore
No. 11831-034

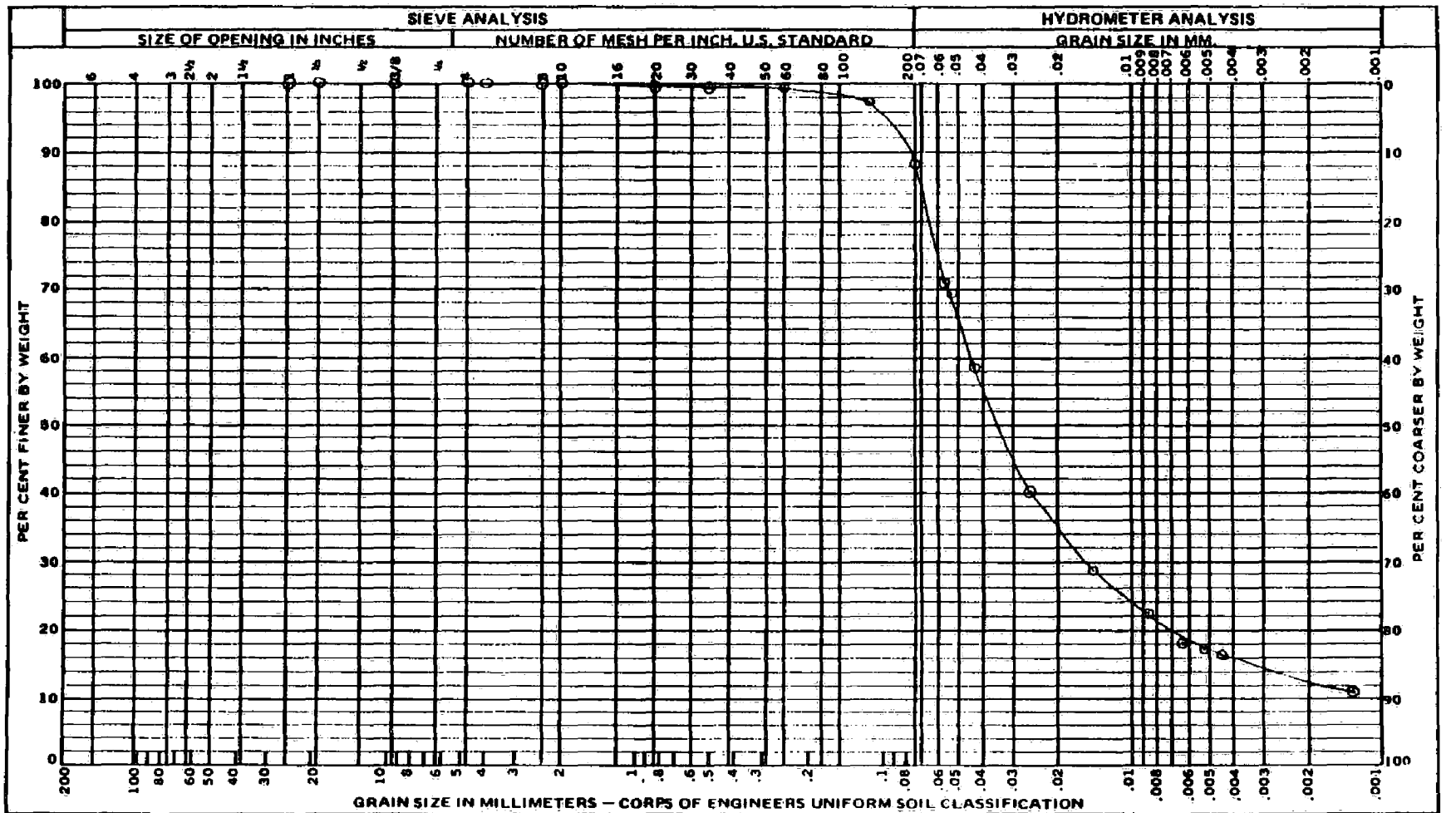
3/16/87
(Date of Report)

No. 125 9-2-75 Rev. 1

SCOEPA00015931

PACIFIC TESTING LABORATORIES

Report No. A LR-30[illegible] Page 38
Transmittal No.
Date of Test
Specification 8604-7135



SAMPLE NO.	DEPTH	ELEVATION	MATERIAL DESCRIPTION		LL	PI
W-160-16						

PROJECT Dames and Moore
No. 11831-034

Plotted:
Checked:

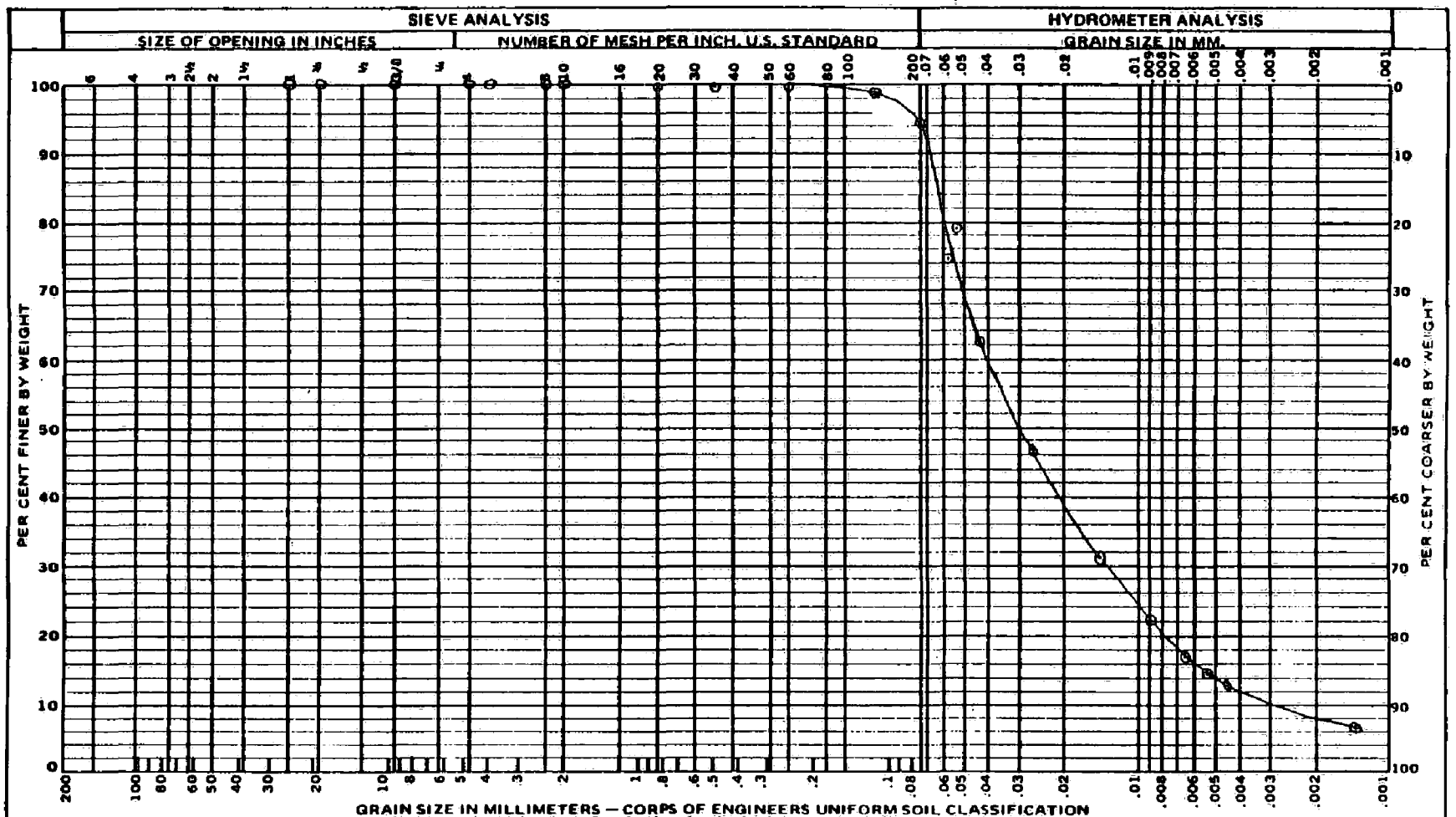
3/16/87
(Date of Report)

No. 125 9-2-75 Rev. 1

SCOEPA00015932

PACIFIC TESTING LABORATORIES

Report No. A LR-30 Page 39
Transmittal No.
Date of Test
Specification 8604-7135



SAMPLE NO.	DEPTH	ELEVATION	MATERIAL DESCRIPTION		LL	PI
W-16D-20						

PROJECT Dames and Moore
No. 11831-034

Plotted:
Checked:

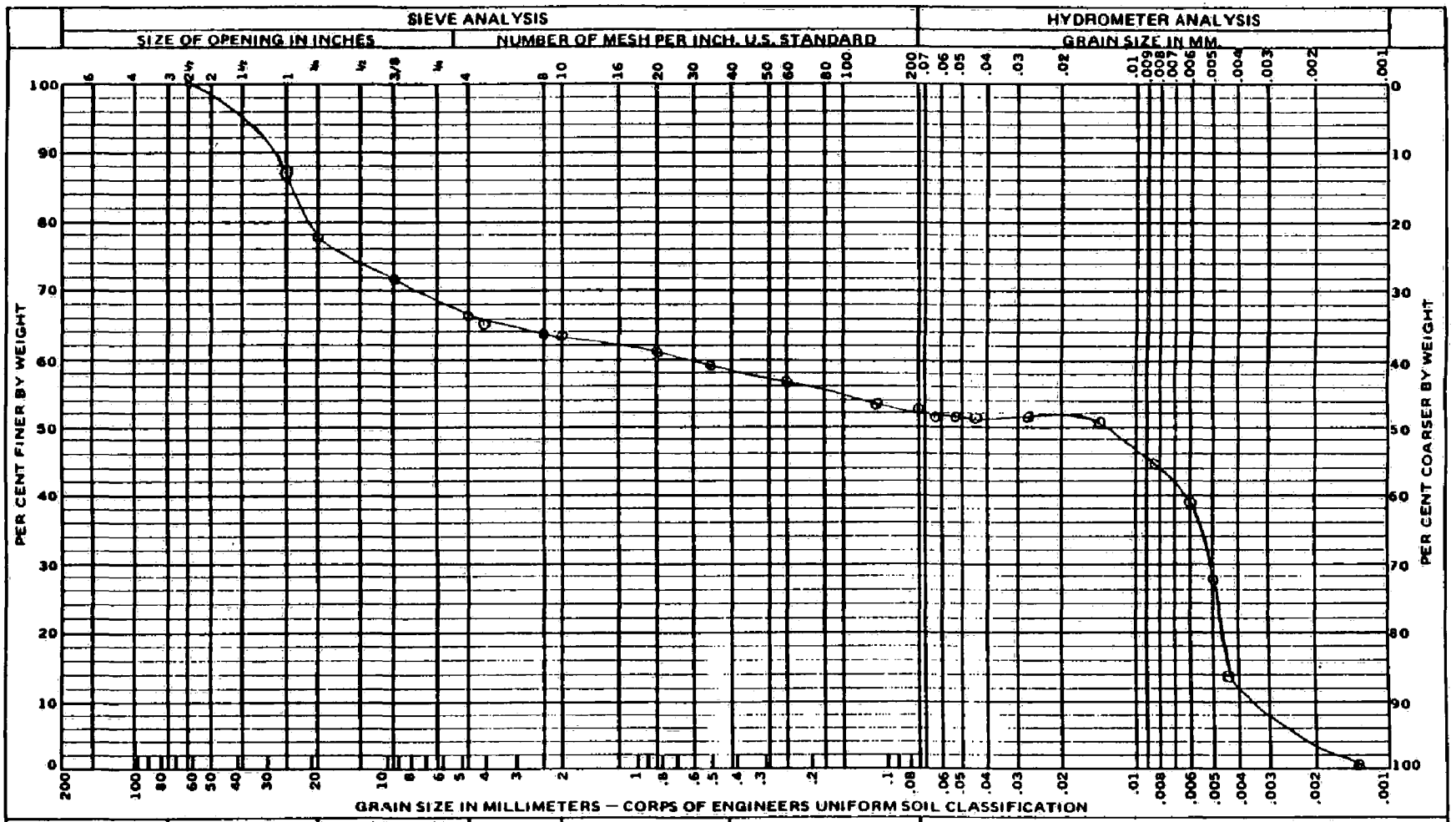
3/16/87
(Date of Report)

No. 125 8-2-75 Rev. 1

SCOEPA00015933

PACIFIC TESTING LABORATORIES

Report No. A LR-3061 Page 40
Transmittal No.
Date of Test
Specification 8604-7135



SAMPLE NO.	DEPTH	ELEVATION	MATERIAL DESCRIPTION		LL	PI
W-16-S-1						

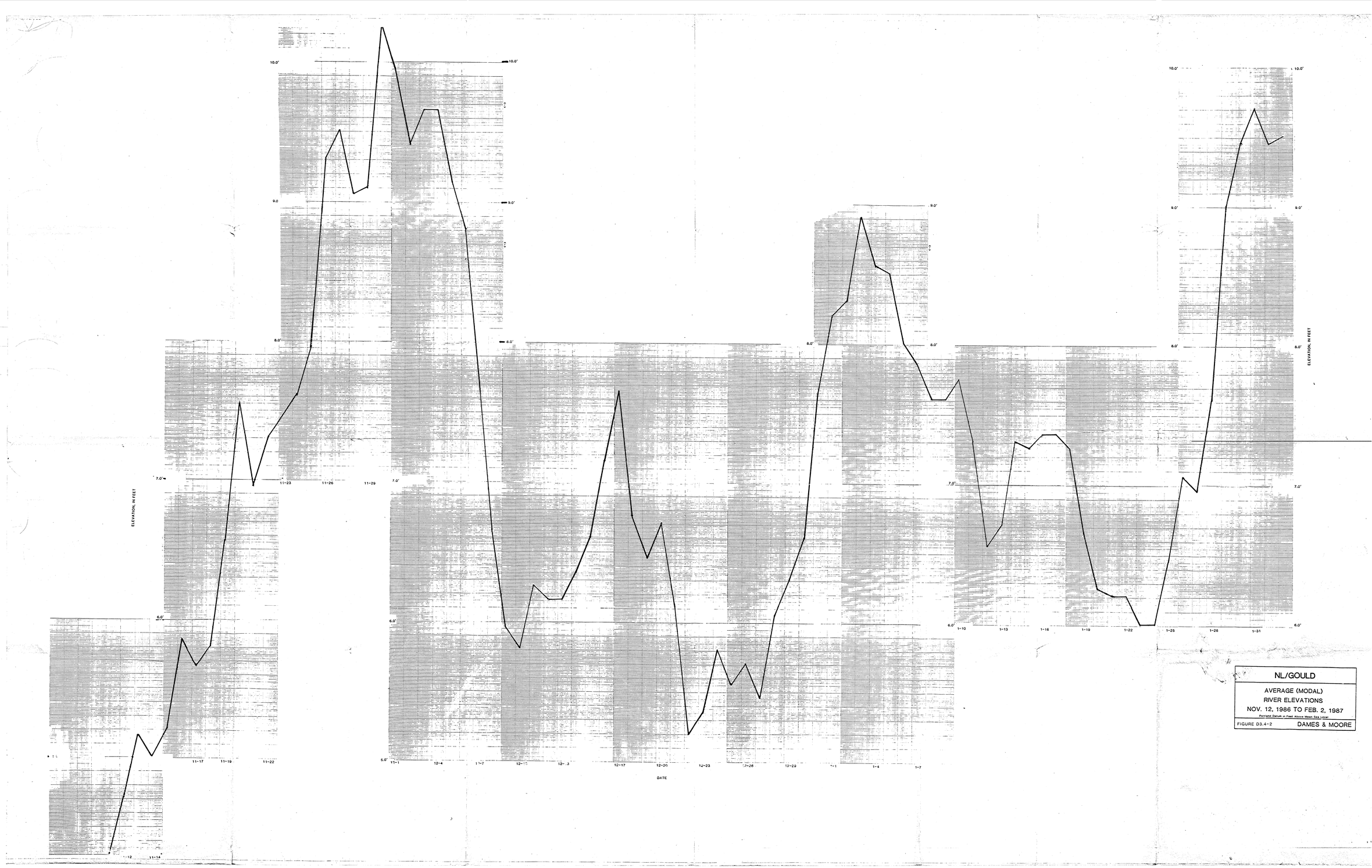
PROJECT Dames and Moore
No. 11831-034

Plotted:
Checked:

3/16/87
(Date of Report)

No. 125 9-2-75 Rev. 1

SCOEPA00015934



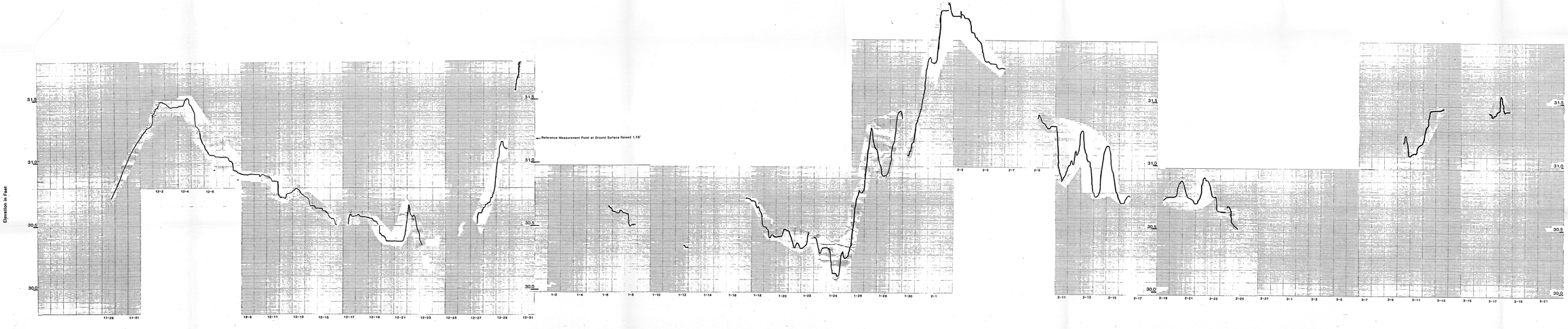
NL/GOULD

AVERAGE (MODAL)
RIVER ELEVATIONS
NOV. 12, 1986 TO FEB. 2, 1987

Portland Datum in Feet Above Mean Sea Level

FIGURE D3.4-2 DAMES & MOORE

SCOEPA00015935



NL/GOULD

HYDROGRAPH W-11S

NOV. 29, 1986 TO MAR. 21, 1987

Footnote: Hydrograph plots have been darkened for presentation purposes.

FIGURE D3.4-3 DAMES & MOORE

Portland datum in feet above mean sea level.

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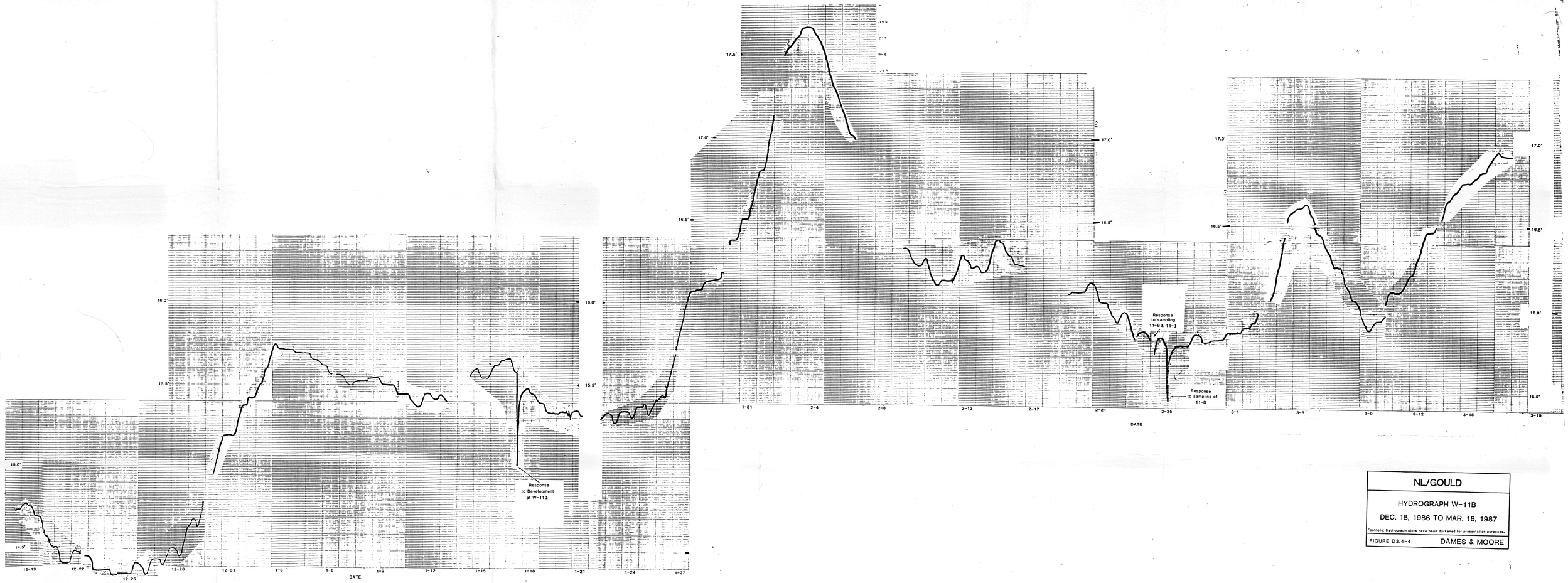

NL/GOULD

HYDROGRAPH W-11B

DEC. 18, 1986 TO MAR. 18, 1987

Footnote: Hydrograph plots have been darkened for presentation purposes.

FIGURE D3.4-4 DAMES & MOORE

SCOEPA00015937

MILLER, ANDERSON, NASH, YERKE & WIENER
ATTORNEYS AND COUNSELORS AT LAW
[illegible] S.W. FIFTH AVENUE
PORTLAND, OREGON 97204

Dr. [illegible]
Keith Boersma
Don Daly

"Olympic"

June 5, 1979

COPY

Lieutenant Commander S. E. Burgess
Captain of the Port
United States Coast Guard
6767 North Basin Avenue
Portland, Oregon 97217

RECEIVED
JUN 07 1979
WACKER FLD

Dear Lieutenant Commander Burgess:

We are attorneys for Wacker Siltronic Corporation. We have been asked to respond to your letter of May 24, 1979, regarding a reported oil spill on our client's property on May 18, 1979.

A subsequent investigation by our client indicates that a portion of its property was previously owned by a predecessor to Northwest Natural Gas Company. There were tar ponds on the property to receive the residue from the property owner's nearby gas plant. Surface water flowing off the hillside into the river carried substantial amounts of the tar into the river where it sank. This material has a specific density between 1.2 to 1.3.

We understand that the United States Coast Guard investigated this situation approximately 20 years ago.

It appears that there was not a discharge of oil from our client's property on May 18, 1979. The material which appeared on the surface of the water was part of the tar which was already in the river and was disturbed by our client's excavating operations.

Very truly yours,

HARVEY C. BARRAGAR

cc Dr. Hans Herrmann
Mr. Reiner Koschorreck

STATE OF OREGON

DEPARTMENT OF ENVIRONMENTAL QUALITY

In the Matter of:	)	DEQ NO. ECSR-NWR-89-13
	)	
ESCO Corporation;	)	ORDER ON CONSENT
Gould, Inc.;	)	
NL Industries, Inc.;	)	
Northwest Natural Gas Company;	)	
Pacific Northern Oil Company;	)	
Pennwalt Corporation;	)	
Rhone-Poulenc AG Company; and	)	
Schnitzer Investment Corp.,	)	
	)	
Respondents.	)	
	)	

Pursuant to ORS 466.570(4), the Director, Oregon Department of Environmental Quality (DEQ), issues this Order on Consent ("Consent Order") to ESCO Corporation; Gould, Inc.; NL Industries, Inc.; Northwest Natural Gas Company; Pacific Northern Oil Company; Pennwalt Corporation; Rhone-Poulenc AG Company; and Schnitzer Investment Corp. (collectively, Respondents). This Consent Order contains the following provisions:

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1. Purpose.

The mutual objective of DEQ and Respondents is to implement the Scope of Work ("SOW"), attached to and incorporated by reference into this Consent Order, as Attachment A. This investigation outlined in the SOW is necessary to evaluate the hydrogeological conditions in the Doane Lake Study Area ("Study Area") and the interrelationships between remediation, if any, of groundwater at the Gould, Inc. Superfund site and hydrogeological conditions underlying Respondents' sites in the Study Area.

2. Stipulations.

Respondents and DEQ consent and agree:

(A) To issuance of this Consent Order;

(B) To perform and comply with all provisions of this Consent Order;

(C) To not challenge DEQ's jurisdiction to issue and enforce this Consent Order;

(D) To waive any right Respondents might have to seek judicial or administrative review of this Consent Order prior to commencement of action by DEQ to enforce any of the provisions hereof.

(E) That this Consent Order shall not be admissible in any administrative or judicial action except an action to enforce any of its

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terms.

(F) That Respondents' rights and duties under this Consent Order shall not be subject to any rules adopted under ORS 466.553 subsequent to issuance of this Consent Order.

(G) To not litigate, in any proceeding brought by DEQ to enforce this Consent Order or to assess penalties for noncompliance with this Consent Order, any issue other than Respondents' compliance with this Consent Order;

(H) To not assert, in any proceeding brought by DEQ to enforce this Consent Order or to assess penalties for noncompliance with this Consent Order, that performance of an interim remedial action or removal measure under this Consent Order by Respondents discharges Respondents' duty to fully perform all remaining provisions of this Consent Order.

3. Findings of Fact.

DEQ makes the following findings without admission of any such facts by Respondents:

A. Respondents are Oregon Corporations or are foreign corporations that are now doing business in the State of Oregon, or are foreign corporations that formerly did business in the State of Oregon so as to render them subject to the jurisdiction of the courts of this state.

B. ESCO Corporation owns and operated a site at 6900 N. W. Front Avenue, Portland, Oregon.

Gould, Inc. owns and operated a site at 5909 N. W. 61st Street, Portland, Oregon.

NL Industries, Inc. owned and operated a site at 5909 N. W. 61st Street, Portland, Oregon.

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Northwest Natural Gas Company owns and operated a site at 7900 N. W. St. Helens Road, Portland, Oregon.

Pacific Northern Oil Company operates a site at 7900 N. W. St. Helens Road, Portland, Oregon.

Pennwalt Corporation owns and operates a site at 6400 N. W. Front Avenue, Portland, Oregon.

Rhone-Poulenc AG Company owns and operates a site at 6200 N. W. St. Helens Road, Portland, Oregon.

Schnitzer Investment Corporation owns and operated a site at 6501 N. W. Front Avenue, Portland, Oregon.

Attachment B, attached to and incorporated by reference into this Consent Order, is a site diagram indicating the relative location of the sites of each of the Respondents.

C. The DEQ finds that there has been a release or a threat of release into the environment of hazardous substances at the Study Area.

D. In addition to the parties who are signatories to this Agreement, DEQ has notified the following entities that they may be liable parties pursuant to ORS 466.567 for conduct of activities addressed in this Order on Consent:

Wacker-Siltronic Corporation
Liquid Air Corporation
Koppers Industries, Inc.

These entities have declined or have not responded to requests by DEQ that they participate in this Order on Consent. DEQ reserves all legal rights and remedies with respect to these nonsettling entities and this Order on Consent shall not relieve any of them from any liability they may have under applicable state, federal, or common law.

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4. Conclusions of Law and Determinations.

Based on the above Findings of Fact DEQ determines, without admission of any such determinations by Respondents and without waiver of Respondents' rights to challenge such finding of fact or determinations in any proceedings other than one brought by DEQ to enforce the provisions of this Consent Order that:

A. Each Respondent is a "person" under ORS 466.540(13).

B. Each Respondent's property is a "site" under OAR 340-122-020.

C. The presence of hazardous substances in the ground water in the Doane Lake Area constitutes a "release" or threat of "release" into the environment under ORS 466.540(14).

D. The activities required by this Consent Order are necessary to protect public health, safety, welfare and the environment.

Based on the above Stipulations, Findings of Fact, and Conclusions of Law and Determinations, DEQ ORDERS:

5. Work to be Performed.

A. Scope of Work.

Within 60 days of issuance of this Consent Order, Respondents shall submit for DEQ review and comment, a Work Plan to implement the Scope of Work (SOW), Attachment A. Respondents shall commence implementation of the Work Plan within 30 days of approval of the Work Plan by DEQ.

B. Reports.

Respondents shall submit reports that document all activities completed under the Work Plan and shall be submitted in accordance with the schedule in the Work Plan.

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C. Monthly Status Reports.

Respondents shall submit monthly status reports to DEQ outlining activities conducted during the past month and activities planned for the upcoming month, and including a summary of data results received during the previous month.

6. Public Participation.

Upon issuance of this Consent Order, DEQ will provide public notice of this Consent Order through, at least but not limited to, a press release to local paper(s) of general circulation describing the activities to be performed by Respondents under this Consent Order; provided, however, Respondents shall have received a draft of the press release or other communication prepared for distribution to the public at least five (5) working days before issuance of the release, and DEQ will consider in good faith any comments by Respondents on any release prior to issuance. Copies of the Consent Order will be made available to the public.

7. General Provisions.

A. Respondents' Access.

Each Respondent shall be responsible for obtaining in a timely fashion access to such Respondent's site and other property in its possession and control as is necessary to carry out the requirements of this Consent Order. This Consent Order does not convey any rights of access to Respondents. With respect to any other premises where work is reasonably necessary to carry out the requirements of this Consent Order, which premises is not under the ownership or control of Respondents or any one of them, DEQ shall use its best efforts to obtain access to such premises so as to enable Respondents to fully perform the requirements of this Consent Order.

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B. DEQ Access and Oversight.

(1) Upon reasonable prior notice and during normal business hours each Respondent shall allow DEQ to enter and move freely about portions of such Respondent's property only as necessary for, and only as related directly to, this Consent Order, which may include to the extent related directly to the work under this Consent Order: (a) observing Respondents' progress in implementing this Consent Order; (b) conducting such tests and taking such samples as DEQ deems necessary; (c) verifying data submitted to DEQ by Respondents; (d) using camera, sound recording, or other recording equipment. To accommodate Respondents' proprietary concerns the DEQ will allow Respondents' personnel to operate the camera, sound or other recording devices so long as the DEQ is satisfied that the manner and content of the photographs and recordings are accurate and provide all information appropriately sought by the DEQ. Respondents shall permit DEQ to inspect and copy all records, files, photographs, documents, and data relating to work under this Consent Order, except that Respondents shall not be required to permit DEQ inspection or copying of items subject to attorney-client and attorney work product privileges.

(2) DEQ employees, agents, or contractors, when on any Respondent's premises, shall abide by all reasonable and customary safety procedures and protocols established by the Respondent and shall use their best efforts to avoid disruption of a Respondent's normal business or production activities.

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C. **Project Coordinators.** All reports, notices, and other communications required under or relating to this Consent Order shall be directed to:

DEQ Project Coordinator:	**Respondents' Steering Committee Chairperson:**
Sandra Anderson	Claudia K. Powers
Environmental Cleanup Division	Lindsay, Hart, Neil and Weigler
Department of Environmental Quality	Suite 1800
811 Southwest Sixth Avenue	222 S. W. Columbia
Portland, Oregon 97204	Portland, Oregon 97201-6618
(503) 229-6744	(503) 226-1191
FAX: (503) 229-6124	FAX: (503) 226-0079

D. **Notice and Samples.**

Respondents shall make every reasonable attempt to notify DEQ of any excavation, drilling, or sampling to be conducted under this Consent Order at least five (5) working days prior to such activity but in no event less than twenty-four (24) hours prior to such activity unless otherwise agreed or in an emergency situation. Upon DEQ's oral request, confirmed in writing as soon as practicable, Respondents shall provide DEQ with a split or duplicate of any sample taken pursuant to this Consent Order. In the event DEQ conducts any sampling or analysis in connection with this Consent Order, DEQ shall notify Respondents of any excavation, drilling, or sampling at least five (5) working days prior to such activity but in no event less than twenty-four (24) hours prior to such activity. Upon Respondents' oral request, DEQ shall provide Respondents with a split or duplicate of any samples taken in connection with this Consent Order and promptly shall provide Respondents with copies of all analytical data for such samples.

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E. Quality Assurance.

Respondents shall conduct all sampling, sample transports, and sample analysis in accordance with the Quality Assurance/Quality Control ("QA/QC") provisions submitted to DEQ pursuant to the Work Plan. Respondents shall ensure that each laboratory used by Respondents for analysis performs such analyses in accordance with such provisions. In the event DEQ conducts any sampling or analysis in connection with this Consent Order, DEQ shall conduct such sampling, sample transport, and sample analysis in accordance with Quality Assurance/Quality Control guidance established and published by DEQ or the United States Environmental Protection Agency and shall provide Respondents with documentation demonstrating compliance with such guidance.

F. Records.

(1) Submission upon request.

In addition to those reports and documents specifically required under this Consent Order, Respondents shall provide to DEQ within ten (10) days of DEQ's written request copies of QA/QC memoranda and audits, data which have undergone QA/QC review, final plans, reports, directions to contractors, field logs, laboratory analytical reports, and any other documents that relate directly to the work under this Consent Order except to the extent that any such other documents are subject to any attorney-client or attorney work product privileges.

(2) Preservation.

Each Respondent shall preserve all records and documents in the possession or control of Respondent or its respective employees, agents, or contractors that relate directly to activities under this Consent Order for at least five (5) years after the last certification of completion under Section 8

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of this Consent Order. Except as exempted under subsection (1) of this Section F and upon DEQ's request, a Respondent shall provide copies of such records to DEQ.

(3) Confidentiality.

Any Respondent may assert a claim of confidentiality regarding any documents, records or information submitted to or compiled by DEQ pursuant to this Consent Order. DEQ shall treat documents, records and information for which a claim of confidentiality has been made in accordance with ORS 192.410 through 192.505. If a Respondent does not make a claim of confidentiality at the time the documents, records or information are submitted to or copied by DEQ, the documents, records or information may be made available to the public without notice to the Respondent.

G. Other Applicable Laws.

All actions under this Consent Order shall be performed in accordance with all applicable federal, state, and local laws and regulations; provided, in accordance with ORS 466.573, any on-site activities hereunder may be exempted from any applicable requirements of ORS 466.005 through 466.350 and ORS Chapters 459 and 468.

H. Reimbursement of DEQ Oversight Costs.

Until completion of work to be performed under this Consent Order, DEQ shall accrue costs incurred after issuance of this Order by DEQ or the State of Oregon in connection with any activities related to oversight of this Order.

Oversight costs to be accrued shall include both direct and indirect costs. Direct costs include direct labor costs, site specific expenses, DEQ contractor or legal costs, and any other costs related to DEQ oversight of this

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Order. The indirect cost rate shall be the rate charged by DEQ on federal agreements. That rate will vary as the rate charged on federal agreements varies.

DEQ reserves the right to seek reimbursement of any costs incurred by the state in connection with oversight activities related to this Consent Order from any person(s) who may be liable for such costs under ORS 466.567 or other applicable law. Nothing contained herein shall be a finding or an admission that Respondents are so liable.

I. Force Majeure.

(1) If any event occurs that is beyond Respondents' reasonable control and that causes or might cause, in whole or in part, a delay or deviation in performance of the requirements of this Consent Order, Respondents shall promptly notify DEQ's Project Coordinator orally of the cause of the delay or deviation and its anticipated duration, the measures that have been or will be taken to prevent or minimize the delay or deviation, and the timetable by which Respondents propose to carry out such measures. Respondents shall confirm in writing this information within five (5) working days of the oral notification.

(2) If Respondents demonstrate to DEQ that the delay or deviation has been or will be caused, in whole or in part, by circumstances beyond the control and despite the due diligence of Respondents, DEQ shall extend times for performance of related activities under this Consent Order as appropriate. Circumstances or events beyond Respondents' control include but are not limited to acts of God, strikes or work stoppages, fire, explosion, riot, sabotage, war, or DEQ's inability to gain access to any property pursuant to section 7(A) of this Consent Order. Increased cost of performance, or changed business or

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economic circumstances, shall be presumed not to be circumstances beyond Respondents' control.

J. DEQ Approvals.

(1) Where DEQ review and approval is required for any plan or activity under the Work Plan under this Consent Order, Respondents shall not proceed with the plan or activity until DEQ written approval is received. DEQ approval shall not be unreasonably withheld. DEQ shall make every good faith attempt to respond to the plan or activity submittal within thirty (30) days of receipt of the submittal with either an approval or disapproval. If limited resources or other agency priorities prevent DEQ from responding within thirty (30) days, DEQ shall notify Respondents. Such approval shall not be required for activities undertaken individually by a Respondent on its property and not as implementation of the Work Plan under this Consent Order. Any delay in granting or denying approval shall correspondingly extend the time for completion by Respondents of that activity and each successive related activity.

(2) In the event of disagreement between Respondents and DEQ regarding review and approval of a plan or activity, or regarding interpretation of data, Respondents and DEQ shall provide each other their respective positions in writing regarding the disputed matter and shall make a good faith effort to resolve any disagreement including face-to-face meetings. In the event DEQ and Respondents cannot resolve the disagreement by this method, DEQ and Respondents may upon mutual agreement select a mutually acceptable, qualified, and neutral fact-finder. A party that declines to agree to a neutral fact-finder shall provide the other party a written statement of the reasons for declining to submit the disputed issue to a fact-finder. The

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DEQ's act of declining submittal of a disputed matter to a neutral fact-finder shall not be considered a final agency action for purposes of judicial review. The fees and expenses of the fact-finder shall be borne equally by DEQ and Respondents and DEQ's costs so incurred shall not be subject to reimbursement as an oversight cost.

(3) Within twenty (20) working days after selection of the fact-finder, DEQ and Respondents shall jointly provide the fact-finder an agreed-upon statement of the precise nature of the dispute and a copy of the procedures to be followed by the fact-finder as set forth in this subsection. Within the same twenty (20) day period, DEQ and Respondents shall provide the fact-finder (with copies to each other) their respective positions regarding the dispute and the rationale, information, and documents supporting such position.

(4) Within thirty (30) days of the parties' submittals, or within other such time period as agreed to by the parties and the fact-finder, the fact-finder shall provide DEQ and Respondents a written advisory report setting forth the fact-finder's determination regarding the dispute. DEQ shall consider the advisory report in making a final decision regarding the disputed matter. The advisory report shall not be binding on DEQ; provided, the advisory report shall be admissible in any action commenced by DEQ to enforce this Consent Order or to assess penalties regarding the disputed matter.

(5) Invocation of this dispute resolution procedure shall extend the time for completion by Respondents of the activity subject to dispute and each successive related activity. Any final decision by DEQ regarding a disputed matter shall be provided to Respondents in writing and shall be an

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enforceable part of this Consent Order.

K. Stipulated Penalties.

Upon any unexcused violation by Respondents of any provision of this Consent Order, and upon Respondents' receipt from DEQ of written notice of violation, Respondents shall, if the violation continues after ten (10) days from receipt of such notice, pay the stipulated penalties set forth in the following schedule:

(1) Five hundred dollars ($500.00) for the first week of violation or delay and one thousand dollars ($1,000.00) per day of violation or delay thereafter, for:

(a) failure to submit a revised final work plan in accordance with the schedule in Attachment A of this Consent Order; (b) failure to complete the work in accordance with the schedule in the approved work plan; or

(c) failure to submit a revised final report in accordance with the schedule in Attachment A of this Consent Order;

(2) Five hundred dollars ($500.00) for the first week of violation or delay and one thousand dollars ($1,000.00) per day of violation or delay thereafter, for:

(a) failure to submit a draft Work Plan in accordance with the Schedule in Attachment A of this Consent Order;

(b) failure to commence the work in accordance with the schedule in the approved Work Plan; or

(c) failure to submit draft report in accordance with the schedule in the approved Work Plan.

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SCOEPA00015952

(3) A Respondent shall pay the sum of two thousand five hundred dollars ($2,500.00) for failure to provide access to its property pursuant to Section 7.B.

(4) Notwithstanding Subsections (1) and (2) of this Section 7(K), stipulated penalties for violations of these subsections, if any, shall not be payable until completion of the work under this Order; provided however, if Respondents complete all work in accordance with final dates of completion in accordance with schedules set out in the Work Plan as amended from time to time, all penalties will be excused.

Respondents shall pay, within thirty (30) days of receipt of a written notice of violation from DEQ, the amount of such stipulated penalty by check made payable to the State of Oregon.

L. Enforcement of Consent Order and Reservation of Rights.

(1) In addition to stipulated penalties provided under Section 7.K., DEQ reserves the right to seek injunctive relief or such other equitable relief other than administrative penalties as may be necessary to enforce the provisions of this Consent Order and/or to protect public health, safety, welfare, and the environment. From the effective date of this Consent Order, for as long as the terms herein and any modifications thereto are complied with, DEQ agrees not to sue or take any administrative action against the Respondents, or any of them, their agents, assigns, and successors for the work required under this Consent Order. Nothing herein shall be deemed to grant any rights to persons or entities not a party to the Consent Order, and DEQ and Respondents reserve all rights against such persons or entities;

(2) Respondents do not admit any liability, violation of law, or factual or legal finding, conclusion, or determination made by DEQ under this

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Consent Order.

(3) Nothing in this Consent Order shall prevent Respondents from exercising any rights of contribution or indemnification Respondents might have against any person regarding activities under this Consent Order.

M. Disclaimer of Liability.

Notwithstanding any approvals which may be granted by DEQ, the State shall not be liable by virtue of this Consent Order for any injuries or damages to persons or property resulting from any acts or omissions of the Respondents, their officers, employees, agents, receivers, trustees, successors, assigns, contractors, subcontractors, or any other person acting on their behalf, in carrying out any activities pursuant to this Consent Order. Neither Respondents, nor any of them, shall be liable by virtue of this Consent Order for any injuries or damages to persons or property resulting from any acts or omissions of DEQ, its employees, agents, contractors or subcontractors or any other person acting in DEQ's behalf, in carrying out any activities pursuant to this Consent Order. This disclaimer shall not abrogate any claims which the parties might otherwise have under common law or statute.

N. Other Claims.

Nothing in this Consent Order shall constitute or be construed as a release from any claim, cause of action, or demand in law or equity against any person, firm, partnership, corporation, or other entity not a signatory to this Consent Order for any liability it may have arising out of or in any way relating to the generation, treatment, storage, handling, transportation, release or disposal of any hazardous substance, hazardous waste, solid waste, pollutant, or contamination present on, at, beneath, near, or migrating from, taken to, or taken from any site identified in Section 3. above.

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O. Non-Admission.

Respondents do not admit any of the Findings of Fact, Conclusions of Law and Determinations herein, and reserve any and all rights and defenses which they may have, individually and jointly, regarding liability or responsibility in any subsequent proceedings concerning the Doane Lake Area or any other site.

P. Parties Bound.

This Consent Order shall be binding on the parties, and their respective successors, agents, and assigns. No change in ownership or corporate or partnership status shall in any way alter a Respondent's obligations under this Consent Order unless otherwise approved by DEQ and the other Respondents in writing, which approval shall not be unreasonably withheld. Each Respondent shall also be under an affirmative duty for the duration of this Consent Order to notify and provide a copy of this Consent Order to any prospective successor, purchaser, lessee or assignee of its site.

Q. Modification.

DEQ and Respondents may modify this Consent Order by mutual written agreement.

8. Notice and Certification of Completion.

Upon completion of the work to be performed pursuant to Section 5 of this Consent Order, Respondents shall submit to DEQ a written notice of completion and request for certification of completion in accordance with ORS 466.577(10), which certification shall not be unreasonably withheld. This Consent Order shall be deemed satisfied and terminated upon such certification.

SCOEPA00015955

9. **Signatures.**

STIPULATED, AGREED, and APPROVED for issuance:

Respondents

ESCO CORPORATION

By: _____ Date: _____
(Name)

_____
(Title)

GOULD, INC.

By: _____ Date: _____
(Name)

_____
(Title)

NL INDUSTRIES, INC.

By: _____ Date: _____
(Name)

_____
(Title)

NORTHWEST NATURAL GAS COMPANY

By: _____ Date: _____
(Name)

_____
(Title)

SCOEPA00015956

9. **Signatures**.

STIPULATED, AGREED, and APPROVED for issuance:

Respondents

ESCO CORPORATION

By: _____ Date: 12/15/89
(Name)

President-Proprietary Products Group
(Title)

GOULD, INC.

By: _____ Date: _____
(Name)

_____
(Title)

NL INDUSTRIES, INC.

By: _____ Date: _____
(Name)

_____
(Title)

NORTHWEST NATURAL GAS COMPANY

By: _____ Date: _____
(Name)

_____
(Title)

SCOEPA00015957

9. **Signatures**.

STIPULATED, AGREED, and APPROVED for issuance:

Respondents

ESCO CORPORATION

By: _____ Date: _____
(Name)

_____
(Title)

GOULD, INC.

By: Michael C. Very Date: 12/18/89
(Name)

VP- GENERAL COUNSEL
(Title) + SECRETARY

NL INDUSTRIES, INC.

By: _____ Date: _____
(Name)

_____
(Title)

NORTHWEST NATURAL GAS COMPANY

By: _____ Date: _____
(Name)

_____
(Title)

SCOEPA00015958

9. Signatures.

STIPULATED, AGREED, and APPROVED for issuance:

Respondents

ESCO CORPORATION

By: _____ Date: _____
(Name)

_____
(Title)

GOULD, INC.

By: _____ Date: _____
(Name)

_____
(Title)

NL INDUSTRIES, INC.

By: Janet D Smith Date: 12/14/89
(Name)

Associate General Counsel
(Title)

NORTHWEST NATURAL GAS COMPANY

By: _____ Date: _____
(Name)

_____
(Title)

SCOEPA00015959

9. Signatures.

STIPULATED, AGREED, and APPROVED for issuance:

Respondents

ESCO CORPORATION

By: _____ Date: _____
(Name)

_____
(Title)

GOULD, INC.

By: _____ Date: _____
(Name)

_____
(Title)

NL INDUSTRIES, INC.

By: _____ Date: _____
(Name)

_____
(Title)

NORTHWEST NATURAL GAS COMPANY

By: Bruce R. LeBarron Date: 19 Dec 89
(Name)

SR VICE PRESIDENT
(Title)

SCOEPA00015960

PACIFIC NORTHERN OIL COMPANY

By: David A. Waldschmidt Date: 12-14-89
(Name)

Gen. Counsel
(Title)

PENNWALT CORPORATION

By: _____ Date: _____
(Name)

_____
(Title)

RHONE-POULENC AG COMPANY

By: _____ Date: _____
(Name)

_____
(Title)

SCHNITZER INVESTMENT CORP.

By: _____ Date: _____
(Name)

_____
(Title)

STIPULATED, AGREED, and so ORDERED:

State of Oregon
Department of Environmental Quality

By: Fred Hansen Date: JAN 10 1990
Fred Hansen
Director

SCOEPA00015961

PACIFIC NORTHERN OIL COMPANY

By: _____ Date: _____
(Name)

_____
(Title)

PENNWALT CORPORATION

By: Edward L Locke Date: 12-13-89
(Name)

Plant Manager
(Title)

RHONE-POULENC AG COMPANY

By: _____ Date: _____
(Name)

_____
(Title)

SCHNITZER INVESTMENT CORP.

By: _____ Date: _____
(Name)

_____
(Title)

STIPULATED, AGREED, and so ORDERED:

State of Oregon
Department of Environmental Quality

By: Fred Hansen Date: JAN 10 1990
Fred Hansen
Director

SCOEPA00015962

PACIFIC NORTHERN OIL COMPANY

By: _____ Date: _____
(Name)

_____
(Title)

PENNWALT CORPORATION

By: _____ Date: _____
(Name)

_____
(Title)

J.C.

RHONE-POULENC AG COMPANY

By: N. C. Roberts Date: 12/18/89
(Name)

Vice-President & General Manager, Operations
(Title)

SCHNITZER INVESTMENT CORP.

By: _____ Date: _____
(Name)

_____
(Title)

STIPULATED, AGREED, and so ORDERED:

State of Oregon
Department of Environmental Quality

By: Fred Hansen Date: JAN 10 1990
Fred Hansen
Director

SCOEPA00015963

PACIFIC NORTHERN OIL COMPANY

By: _____ Date: _____
(Name)

_____
(Title)

PENNWALT CORPORATION

By: _____ Date: _____
(Name)

_____
(Title)

RHONE-POULENC AG COMPANY

By: _____ Date: _____
(Name)

_____
(Title)

SCHNITZER INVESTMENT CORP.

By: _____ Date: 12-13-89
(Name)
Vice Pres.
(Title)

STIPULATED, AGREED, and so ORDERED:

State of Oregon
Department of Environmental Quality

By: _____ Date: JAN 10 1990
Fred Hansen
Director

SCOEPA00015964

SCOPE OF WORK

The following scope of work is designed to address hydrogeologic data gaps identified in Geraghty & Miller, Inc.'s report entitled "Phase I Hydrogeological Investigation: Assessment of Existing Conditions", dated November 1, 1989 (the Report); the Oregon Department of Environmental Quality's (ODEQ's) comments in response to the Report as set out in Ms. Sandra Anderson's November 9, 1989 letter to the Doane Lake Industrial Group and Geraghty & Miller; the U.S. Environmental Protection Agency's (EPA's) comments in response to the Report as set out in Mr. David Tetta's November 8, 1989 letter to Ms. Sandra Anderson; Geraghty & Miller and the Doane Lake Industrial Group's comments in response to ODEQ and EPA as set out in Geraghty & Miller's November 17, 1989 and December 1, 1989 letters to Ms. Sandra Anderson; and ODEQ's oral comments presented during the course of meetings held to discuss the Report. The objectives of the proposed hydrogeological investigation in the Doane Lake Area are to determine hydrologic conditions in the vicinity of the Gould Superfund site, determine the zone of influence of potential remedial activities, and determine the impact that ground-water quality in the Doane Lake Area could have on potential Gould site remedies.

Work Plan Preparation

A detailed work plan describing the activities outlined below under Field Activities and Reporting Activities will be submitted to the Oregon Department of Environmental Quality (ODEQ) for approval, within sixty (60) days of issuance of the Order on Consent. The work plan will be prepared in accordance with guidelines established in "Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA", EPA/540/G-87/004 (OSWER Directive 9355.3-01), 1988, and OAR 340-122-080. The work plan will include: a brief summary of conclusions from Geraghty & Miller's report of existing conditions; a detailed account of proposed investigative activities to include drilling methods, monitoring well construction details, well development, sampling procedures, and pumping test procedures; a schedule for all proposed activities and submittals; and a description of qualifications of personnel to be involved in the project. Appendices to the work plan will include a Sampling and Analysis Plan and Health and Safety Plan.

All sampling and analytical procedures will be established prior to initiating the investigation in a sampling and analysis plan (SAP). The purpose of the SAP is to establish routine procedures for collecting and analyzing data to ensure that data obtained during the investigation are reliable. The SAP will be composed of a field sampling plan (FSP) and a quality assurance program plan (QAPP), and will include a discussion of collection methods, quality control procedures, sample containers, chain-of-custody procedures, analytical methods, and detection level goals. The SAP will be prepared in accordance with the following guidance documents: " Data Quality Objectives for Remedial Response Activities", EPA/540/G-87/004f (OSWER Directive 9355.0-7B), March, 1987; "Test Methods for Evaluating Solid Waste", SW-846; "A Compendium of Superfund Field Operations Methods", EPA/540/P-87/001 (OSWER Directive 9355.0-14), December, 1987; and

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"Guidelines and Specifications for Preparing Quality Assurance Program Plans", QAMS-004/80, 1980.

A site specific health and safety plan will be prepared for review by all field personnel prior to conducting any on-site field work. The plan will describe known hazards in the area and recommend the level of protective clothing and equipment to be used by field technicians. Equipment and personal decontamination procedures will be described in the health and safety plan as well. Local medical, fire and enforcement agency numbers and addresses will be included for quick referral during an emergency situation.

Field Activities

The following field activities will be performed in order to obtain data which are necessary to meet the objectives of the proposed investigation.

- Install eleven new monitoring wells in the Doane Lake Area. Three of the new wells will be installed down gradient from the Gould site near the Willamette River and will be completed as shallow, intermediate and deep wells (W-19 S, I and D). Another triple completion well nest (W-18 S, I and D) will be installed up gradient of the Rhône-Poulenc property near NW St Helens Road. Four intermediate wells will be installed in the Doane Lake Area. Two of the wells will serve as pumping wells and be located near monitoring well sites W-7 (GM-1 I) and W-2 (GM-2 I). Of the remaining two intermediate wells one (W-17 I) will be installed on the southwest side of the American Steel property and the other (MW-3 I) will be installed near MW-3 S on the Wacker property. One deep well (W-7 D) will be installed near W-7. All of the wells will be installed in compliance with ODEQ's "Guidelines for Monitoring Well Design, Installation, Testing, Decommissioning and Record Keeping". Refer to Figure 1 for proposed well locations.

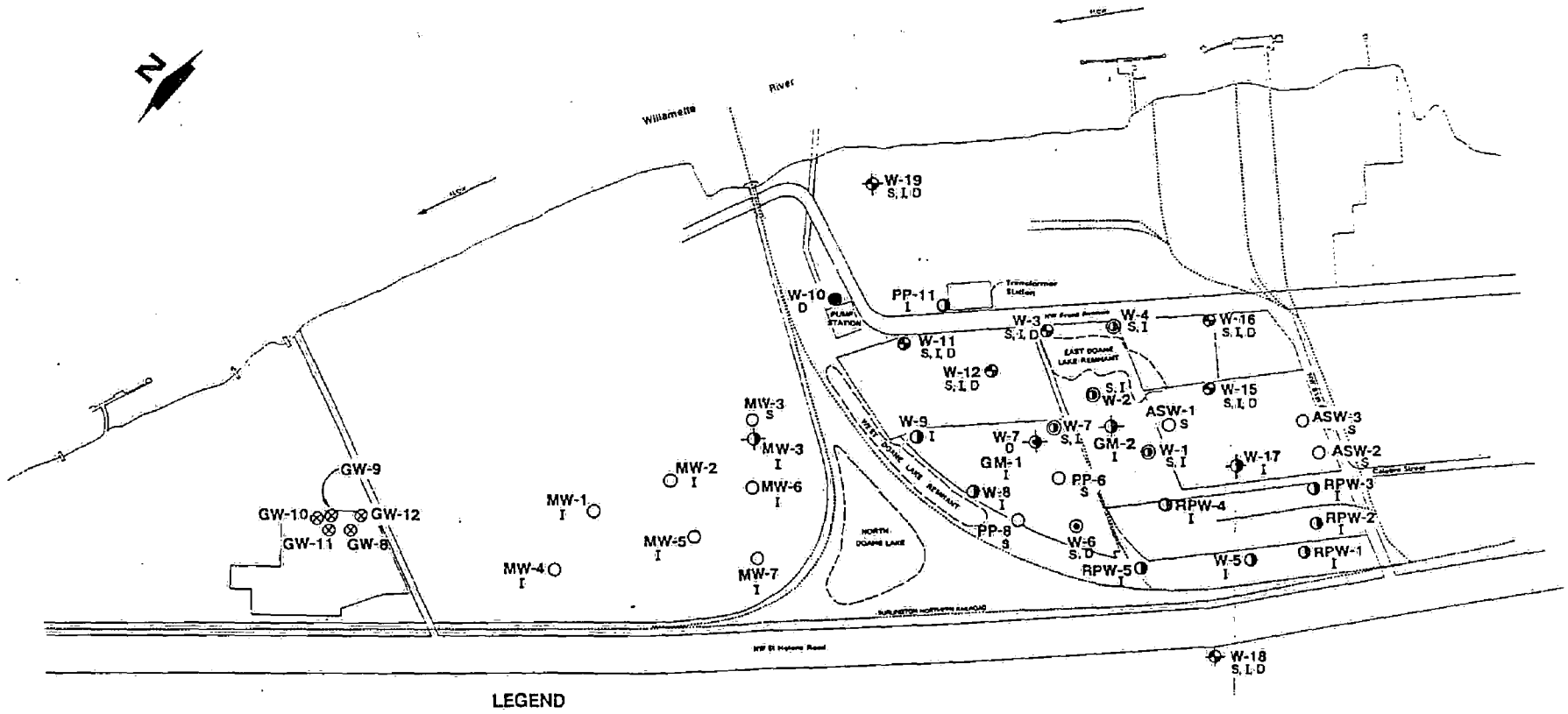
- Resurvey all new and existing monitoring well tops in the Doane Lake Area to tie the well network into a common datum.

- Collect water-level measurements from all of the monitoring wells and surface water bodies in the Study Area on a monthly basis for six months.

- Collect continuous ground-water level data in two of the wells in the south Doane Lake Area by installing continuous water-level recorders. The recorders will remain in place for one month.

- Conduct slug tests in the newly installed wells, to integrate hydraulic data from the new wells with the existing data base.

SCOEPA00015966



LEGEND

- Shallow Well
- Intermediate Well
- Deep Well
- Nested Well (Shallow/Intermediate)
- Nested Well (Shallow/Deep)
- Nested Well (Shallow/Intermediate/Deep)
- Nested Well (Intermediate/Deep)
- Groundwater Recovery Well
- Proposed Well Location

0 300 600 900
Approximate Scale in Feet

Note: S, I and D following well designations indicate shallow, intermediate and deep screened horizons.

GERAGHTY & MILLER, INC.
Environmental Services

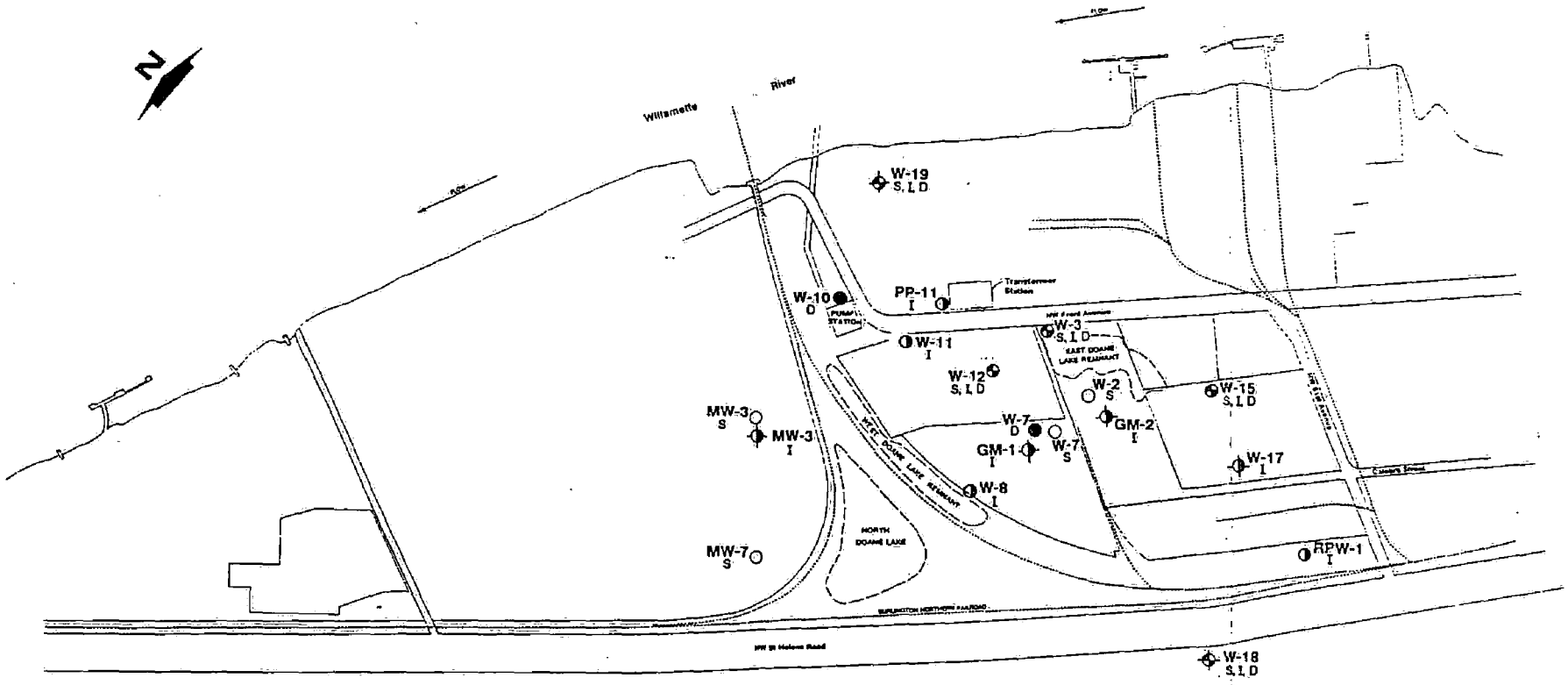
PROPOSED MONITORING WELL LOCATION MAP

Doane Lake Area
Portland, Oregon

FIGURE 1

DRAWN	APPROVED	DATE	PROJECT NUMBER
SAC		Nov. 1989	WA06301

SCOEPA00015967



LEGEND

- ○ Shallow Well
- ◑ Intermediate Well
- ● Deep Well
- ⊕ Nested Well (Shallow/Intermediate/Deep)
- ⊹ Proposed Well Location

0 300 600 900

Approximate Scale in Feet

Note: S, I and D following designations indicate shallow, intermediate and deep screened horizons.

GERAGHTY & MILLER, INC. Environmental Services

PROPOSED GROUND-WATER SAMPLING LOCATIONS

Doane Lake Area
Portland, Oregon

FIGURE 2

DRAWN	APPROVED	DATE	PROJECT NUMBER
SAC	dar	Nov. 1989	WA06301

SCOEPA00015968

- Conduct two constant rate pumping tests in newly installed intermediate alluvial horizon wells. Ground-water samples will be collected from these wells before, during and after the pumping test to assess the water quality.

- Collect one round of ground-water samples from a select number of wells in the Study Area to be analyzed for full scale priority pollutants. The analyses will target the 126 compounds and 24 analytes included on EPA's target compound list (TCL) and target analyte list (TAL). The TCL and TAL include volatile and semivolatile compounds, pesticides, PCB's, metals, and cyanide. All analyses will be conducted following contract laboratory program (CLP) procedures by a government approved CLP laboratory. Refer to Tables 1 and 2 for a listing of the chemical constituents to be tested for, as well as CLP contracted detection limits. Sulfate will also be analyzed for following EPA approved method 9038. Field measurements of pH, temperature and conductivity will be made and recorded at the time of sampling. Shallow wells to be sampled are W-2 S, W-3 S, W-7 S, W-12 S, W-15 S, MW-3 S, MW-7 S, W-18 S, and W-19 S. Intermediate wells to be sampled are RPW-1 I, W-3 I, W-8 I, W-11 I, W-12 I, W-15 I, PP-11 I, W-17 I, W-18 I, W-19 I, MW-3 I, GM-1 I and GM-2 I. The deep wells to be sampled are W-3 D, W-7 D, W-10 D, W-12 D, W-15 D, W-18 D and W-19 D. The location of wells to be sampled may be varied slightly by Geraghty & Miller based upon its proposed hydraulic analysis. Refer to Figure 2 for location of wells to be sampled. Standard quality control procedures will be followed to ensure data quality. Field duplicate blanks and equipment blanks will be collected and analyzed for every twenty ground-water samples collected. Trip blanks will be provided for each cooler containing samples to be delivered to the laboratory.

- Collect one surface-water sample from each of the East, West and North Doane Lake remnants. The surface-water samples will be analyzed for the same chemical constituents as the ground-water samples following the same analytical procedures. Field measurements of pH, temperature and conductivity will be recorded at the time of sampling.

Reporting Activities

Monthly reports will be submitted to ODEQ, which summarize investigation activities during the previous month. It is anticipated that, after approval of a work plan, the field activities described in the previous section and all associated reporting can be completed in approximately eight to ten months.

After field activities are completed, data will be compiled and analyzed. All of the field and laboratory data obtained during the investigation, as well as a description of data collection procedures, will be included in a final ground-water investigation report. The

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report will include figures illustrating soil stratigraphy, well construction details, the distribution of significant chemical constituents, and potentiometric maps of ground-water elevations measured in the shallow, intermediate, deep and basalt wells. A discussion of conclusions derived from evaluation of all of the data will also be provided in the report.

SCOEPA00015970

TABLE 1
USEPA INORGANIC TARGET ANALYTE LIST (TAL)

Analyte	Detection Limit*	Analyte	Detection Limit*
Aluminum	200	Antimony	60
Arsenic	10	Barium	200
Beryllium	5	Cadmium	5
Calcium	5000	Chromium	10
Cobalt	50	Copper	25
Iron	100	Lead	3
Magnesium	5000	Manganese	15
Mercury	0.2	Nickel	40
Potassium	5000	Selenium	5
Silver	10	Sodium	5000
Thallium	10	Vanadium	50
Zinc	20	Cyanide	10

* Detection limits are listed in parts per billion (ug/L).

All analyses shall be preformed in accordance with methods described in USEPA Contract Laboratory Program's "Statement of Work for Inorganic Analysis Multi-Media Multi-Concentration", dated August 1988.

SCOEPA00015971

TABLE 2
USEPA ORGANIC TARGET COMPOUND LIST (TCL)

VOLATILES

Compound	Detection Limit*	Compound	Detection Limit*
Chloromethane	10	Bromomethane	10
Vinyl Chloride	10	Chloroethane	10
Methylene Chloride	5	Acetone	10
Carbon Disulfide	5	1,1-Dichloroethene	5
1,1-Dichloroethane	5	1,2-Dichloroethene (Total)	5
Chloroform	5	1,2-Dichloroethane	5
2-Butanone	10	1,1,1-Trichloroethane	5
Carbon Tetrachloride	5	Vinyl Acetate	10
Bromodichloromethane	5	1,2-Dichloropropane	5
cis-1,3-Dichloropropene	5	Trichloroethene	5
Dibromochloromethane	5	1,1,2-Trichloroethane	5
Benzene	5	trans-1,3-Dichlorpropene	5
Bromoform	5	4-Methyl-2-pentanone	10
2-Hexanone	10	Tetrachloroethene	5
Toluene	5	1,1,2,2-Tetrachloroethane	5
Chlorobenzene	5	Ethyl Benzene	5
Styrene	5	Xylenes (Total)	5

SEMIVOLATILES

Compound	Detection Limit*	Compound	Detection Limit*
Phenol	10	bis(2-Chloroethyl) ether	10
2-Chlorophenol	10	1,3-Dichlorobenzene	10
1,4-Dichlorobenzene	10	Benzyl alcohol	10
1,2-Dichlorobenzene	10	2-Methylphenol	10
bis(2-Chloroisopropyl)ether	10	4-Methylphenol	10
N-Nitroso-di-n-dipropylamine	10	Hexachloroethane	10
Nitrobenzene	10	Isophorone	10
2-Nitrophenol	10	2,4-Dimethylphenol	10
Benzoic acid	50	bis(2-Chloroethoxy) methane	10

SCOEPA00015972

TABLE 2 (cont'd)
USEPA ORGANIC TARGET COMPOUND LIST (TCL)

SEMIVOLATILES (cont'd)

Compound	Detection Limit*	Compound	Detection Limit*
2,4-Dichlorophenol	10	1,2,4-Trichlorobenzene	10
Naphthalene	10	4-Chloroaniline	10
Hexachlorobutadiene	10	4-Chloro-3-methylphenol (para-chloro-meta-cresol)	10
2-Methylnaphthalene	10	Hexachlorocyclopentadiene	10
2,4,6-Trichlorophenol	10	2,4,5-Trichlorophenol	50
2-Chloronaphthalene	10	2-Nitroaniline	50
Dimethylphthalate	10	Acenaphthylene	10
2,6-Dinitrotoluene	10	3-Nitroaniline	50
Acenaphthene	10	2,4-Dinitrophenol	50
4-Nitrophenol	50	Dibenzofuran	10
2,4-Dinitrotoluene	10	Diethylphthalate	10
4-Chlorophenyl-phenyl ether	10	Fluorene	10
4-Nitroaniline	50	4,6-Dinitro-2-methylphenol	50
N-Nitrosodiphenylamine	10	4-Bromophenyl-phenylether	10
Hexachlorobenzene	10	Pentachlorophenol	50
Phenanthrene	10	Anthracene	10
Di-n-butylphthalate	10	Fluoranthene	10
Pyrene	10	Butylbenzylphthalate	10
3,3'-Dichlorobenzidine	20	Benzo(a)anthracene	10
Chrysene	10	bis(2-Ethylhexyl)phthalate	10
Di-n-octylphthalate	10	Benzo(b)fluoranthene	10
Benzo(k)fluoranthene	10	Benzo(a)pyrene	10
Indeno(1,2,3-cd)pyrene	10	Dibenz(a,h)anthracene	10
Benzo(g,h,i)perylene	10		

SCOEPA00015973

TABLE 2 (cont'd)
USEPA ORGANIC TARGET COMPOUND LIST (TCL)

PESTICIDES/PCBS

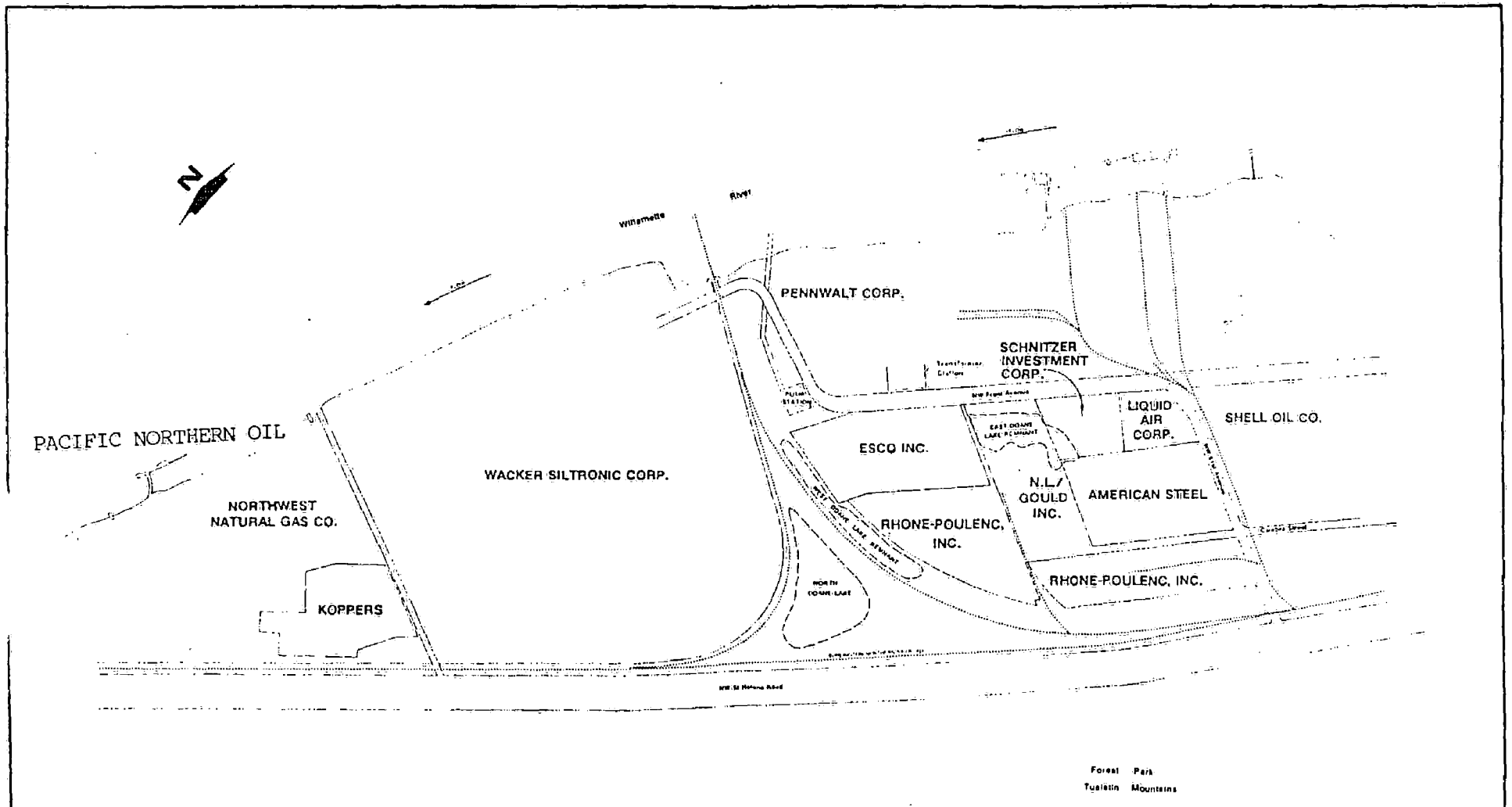
Compound	Detection Limit*	Compound	Detection Limit*
alpha-BHC	0.05	beta-BHC	0.05
delta-BHC	0.05	gamma-BHC (Lindane)	0.05
Heptachlor	0.05	Aldrin	0.05
Heptachlor epoxide	0.05	Endrosulfan I	0.05
Dieldrin	0.10	4,4'-DDE	0.10
Endrin	0.10	Endosulfan II	0.10
4,4'-DDD	0.10	Endosulfan sulfate	0.10
4,4'-DDT	0.10	Methoxychlor	0.5
Endrin ketone	0.10	alpha-Chlordane	0.5
gamma-Chlordane	0.5	Toxaphene	1.0
Aroclor-1016	0.5	Aroclor-1221	0.5
Aroclor-1232	0.5	Aroclor-1242	0.5
Aroclor-1248	0.5	Aroclor-1254	1.0
Aroclor-1260	1.0		

* Detection limits are listed in parts per billion (ug/L).

All analyses shall be preformed in accordance with methods described in USEPA Contract Laboratory Program's "Statement of Work for Organic Analysis Multi-Media Multi-Concentration", dated February 1988.

SCOEPA00015974

ATTACHMENT B
ORDER ON CONSENT
DEQ NO. ECSR-NWR-89-13



GERAGHTY & MILLER, INC.
Environmental Services

SITE PLAN
Doane Lake Area
Portland, Oregon

DRAWN	APPROVED	DATE	PROJECT NUMBER
SAC		Oct. 1989	WA06301

FIGURE 2

SCOEPA00015975

1/23/..

GOULD, INCORPORATED
SUPERFUND SITE
POTENTIALLY RESPONSIBLE PARTIES

1. GOULD, INC.
Michael Veysey
Assistant General Counsel
35129 Curtis Blvd.
Eastlake, Ohio 44095-4001

2. NL INDUSTRIES, INC.
Janet Smith
Associate General Counsel
445 Park Avenue
New York, New York 10022

3. GLOBE UNION
Thomas J. Courtney, Battery Group Counsel
5757 North Green Bay Avenue
P.O. Box 591
Milwaukee, Wisconsin 53201

4. GENERAL BATTERY CORPORATION
Jeffrey A. Leed, Director of Waste Management
P.O. Box 1262
Reading, Pennsylvania 19603

5. NASSAU RECYCLE CORPORATION
286 Richmond Valley Road
Staten Island, New York 10307
AT&T
Allen Schlesinger
131 Morristown Road
Basking Ridge, NJ 07920

6. ESB, INC.
P.O. Box 8109
Philadelphia, Pennsylvania 19101

7. GNB, Incorporated
Gus Hipp
P.O. Box 64100
St. Paul, Minnesota 55164

SCOEPA00015976

8. DELCO-REMY DIVISION
Mark Hester, Attorney
General Motors Corporation
P.O. Box 2439
2401 Columbus Avenue
Anderson, Indiana 46018

9. WAGSTAFF BATTERY MANUFACTURING COMPANY
Bruce E. Hindman
2129 N. Williams Avenue
P.O. Box 12273
Portland, Oregon 97212

10. OMARK INDUSTRIES
Lucy B. Mullins
P.O. Box 856
2299 Snake River Avenue
Lewiston, Idaho 83501

11. COLUMBIA ENERGY CORPORATION
Douglas D. Lindahl, President
4915 S.E. 17th Avenue
Portland, Oregon 97202

12. WESTERN ELECTRIC COMPANY
Present Name: AT&T TECHNOLOGIES
Ed Kahler
1090 Duane Avenue
Sunnyvale, California 94086

13. BATTERY PLATE MANUFACTURING COMPANY
2217 North Chico
South El Monte, California 91733

14. JOSEPH SIMONS & SONS
Charles R. Blumenfeld
2202 E. River Street
Tacoma, Washington 98421

15. SERVICE BATTERY
P.O. Box 2191
210 W. 16th Street
Vancouver, Washington 98660

16. SEATTLE IRON & METAL COMPANY
David M. Sidell, President
2955 11th Avenue, S.W.
Seattle, Washington 98134

17. GLEN'S METAL SUPPLY
Glen Reeder
P.O. Box 302
Pasco, Washington 99301

18. MAXWELL MANUFACTURING
P.O. Box 649
Vancouver, Washington 98660

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 10
1200 SIXTH AVENUE
SEATTLE, WASHINGTON

RECORD OF DECISION, DECISION SUMMARY AND RESPONSIVENESS SUMMARY

FOR

INTERIM REMEDIAL ACTION
SOILS UNIT
GOULD SITE
PORTLAND, OREGON
MARCH, 1988

SCOEPA00015979

RECORD OF DECISION
REMEDIAL ALTERNATIVE SELECTION
INTERIM REMEDIAL ACTION
SOILS UNIT
GOULD SITE
PORTLAND, OREGON

SCOEPA00015980

RECORD OF DECISION

REMEDIAL ALTERNATIVE SELECTION

Site

Gould site - Portland, Oregon.

Purpose

This decision document presents the selected interim remedial action for the site, developed in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA), and consistent with (where not precluded by SARA) the National Contingency Plan (NCP, 40 CFR Part 300). The State of Oregon Department of Environmental Quality concurs with the selected remedy.

Basis for Decision

The decision is based upon the administrative record for the site. This record includes, but is not limited to, the following documents:

- Final Remedial Investigation Report for the Gould site, Portland, Oregon (November 1987)
- Final Feasibility Study Report for the Gould Site, Final Report (February 1988).
- Decision Summary of Remedial Alternative Selection (attached)
- Responsiveness Summary (attached as Appendix B)
- A complete list of documents contained in the Administrative Record is included as Appendix C

Description

This record of decision addresses the soils unit at the Gould site. By doing so the remedy focuses on removing the principal source of lead contamination to the environment. The remedy also includes further study to determine whether additional remedial measures are required for groundwater and surface water at the site.

SCOEPA00015981

This remedial action is designed to:

- remove lead from the battery casings through recycling;
- reduce the mobility of lead in the contaminated soil, sediment and matte at the site through fixation;
- continue monitoring of surface water and groundwater at the site while additional study of contamination in these areas is done; and
- monitor ambient air around the site to ensure that remedial actions are carried out in a manner that is protective of public health.

The extent to which lead and other components of the battery casings can be recycled will depend on the results of design work under this remedy. The results of the design studies will be used to determine the recyclability of the battery casings and the protective measures to be employed during remediation. A phased approach, described in the selected remedy, will be employed in the design work.

It is EPA's intent in selecting this remedy to treat all of the battery casings at the site and at the same time minimize the amount of material that must be sent to a RCRA landfill. Should the results of the design phase show that these goals are not compatible, an additional public comment period will be established and this Record of Decision may be modified. At such time, EPA would present for comment additional options for dealing with the treated materials.

Treatment and removal of casings and treatment of soils will remove lead and eliminate potential for exposure due to direct contact and ingestion. Immobilization of lead in soils, sediment and matte will reduce migration of lead as a potential source of further contamination to groundwater and surface water at the site.

Institutional controls will be implemented, during and after remediation. The purpose of these controls will be to assure that the remedial action will protect public health and the environment during its execution, and to ensure a similar level of protection after the remedial actions have been implemented and prior to a final decision at this site.

Declaration

Consistent with CERCLA, as amended by SARA, and the NCP, it is determined that the selected remedy as described above is protective of human health and the environment, attains Federal and State requirements which are applicable or relevant and appropriate, and is cost-effective. This remedy satisfies the preference expressed in SARA for treatment that reduces toxicity, mobility, and volume. Finally, it is determined that this remedy utilizes permanent solutions and alternative treatment technologies to the maximum extent practicable.

3-31-90

Date

Regional Administrator
Environmental Protection Agency
EPA - Region 10

SCOEPA00015983

DECISION SUMMARY
REMEDIAL ALTERNATIVE SELECTION
INTERIM REMEDIAL ACTION
SOILS UNIT
GOULD SITE
PORTLAND, OREGON

SCOEPA00015984

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APPENDICES

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Note: Sources for Figures are Remedial Investigation and Feasibility Study Reports.

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I. SITE DESCRIPTION AND BACKGROUND

Site Location and Description

The Gould site is located in the Doane Lake area of Portland between N.W. St. Helens Road and N.W. Front Avenue, about 1.3 miles southeast of St. John's Bridge. The Gould site includes the property presently owned by Gould, along with areas outside the property boundary where battery casings and other residues from operations on the Gould site were placed. Because of the potential for dispersion of contaminants in water, the site also includes the 1963 boundaries of Doane Lake. As shown on Figure 1 (General Vicinity Map), the Willamette River lies about 1,000 feet to the northeast and flows northwest, parallel to Front Avenue. The area is heavily industrialized. The Gould site is only a portion of the 60-acre study area, shown on Figure 2 (Study Area Location Map).

The study area is roughly bounded on the southwest by N.W. St. Helens Road, on the northeast by N.W. Front Avenue, on the southeast by 61st Street, and on the west and northwest by the Burlington Northern railroad right-of-way. Industrial properties adjacent to the Gould site that lie wholly or partly within the study area include American Steel Industries, Inc.; ESCO Corporation; Rhone-Poulenc Inc.; Northwest Equipment Rentals, Inc. (leased from Rhone-Poulenc); Schnitzer Investment Corporation, and Liquid Air Corporation (leased from Schnitzer).

Available aerial photographs taken since 1936, and topographic mapping as early as 1884, indicate that the study area now occupied by Gould property and adjacent industries was formed by gradual and intermittent man made filling of a fairly large body of shallow water known as Doane Lake.

On the current Gould site, a secondary lead smelting facility was completed and went into operation in 1949 under the ownership of Morris P. Kirk and Sons (Kirk & Sons), a subsidiary of NL Industries, Inc. Facility operations consisted of lead-acid battery recycling, lead smelting and refining, zinc alloying and casting, cable sweating (removal of lead sheathing from copper cable), and (after 1965) lead oxide production. NL Industries, Inc. purchased the property from the subsidiary in 1971. The property was sold by NL Industries to Gould, Inc. in January 1979. In October of the same year, Gould stopped receiving lead-acid batteries, but continued to process a substantial existing stockpile of batteries. In January 1980, lead refining operations were discontinued. Battery breaking operations ceased on April 1, 1981, lead oxide production ceased in May 1981, and the facility closed entirely in August 1981. By the summer of 1982, most of the structures, facilities, and equipment had been removed.

In 1981 EPA and DEQ began investigating the site, and the site was placed on the Superfund National Priorities list in 1983. In 1985 NL Industries and Gould Inc. signed an Order on Consent with EPA under which NL and Gould conducted a Remedial Investigation (RI) and Feasibility Study (FS) at the site. The final RI report was submitted to EPA in November 1987 and the final FS report was submitted in February 1988.

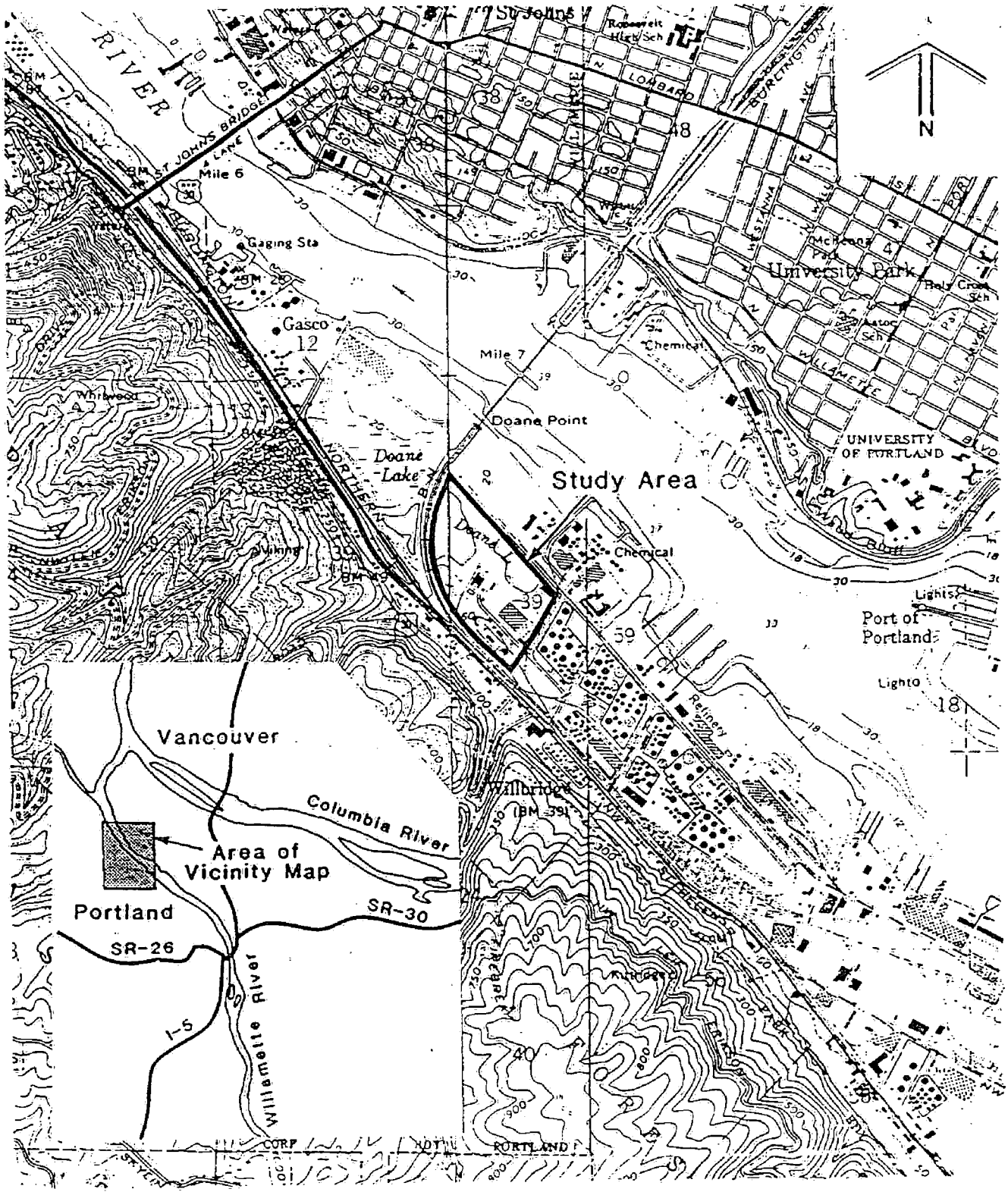

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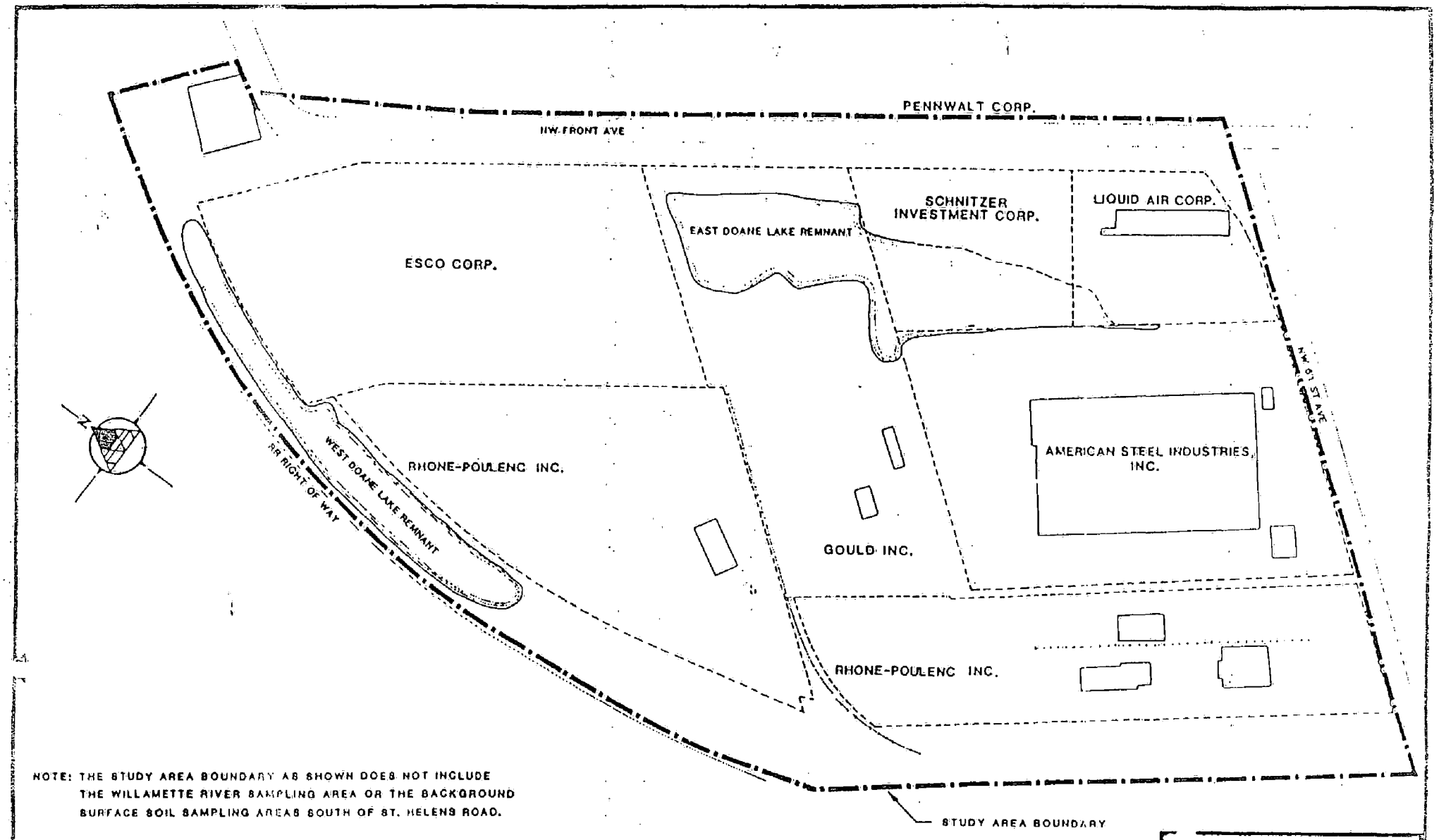
Figure 1

General Vicinity Map



NOTE: THE STUDY AREA BOUNDARY AS SHOWN DOES NOT INCLUDE THE WILLAMETTE RIVER SAMPLING AREA OR THE BACKGROUND SURFACE SOIL SAMPLING AREAS SOUTH OF ST. HELENS ROAD.

Reference:
From a topographic survey map dated May 18, 1988, by D.E. Marx & Associates, Gresham, Ore., for Damas & Moore

0 100 400 FEET
SCALE 1" 200'

Figure 2

Study Area Location Map

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Site Features

In general, the Gould site is located in an area which is less densely populated than surrounding areas to the northeast and southeast. The site is located in census tract 43, a large tract which parallels the Willamette River for approximately 7 miles. A few widely scattered private residences and rental units are located in a narrow zone between N.W. St. Helens Road and Forest Park, south and west of the study area. The 1985 census data for all of Census Track 43 shows a total of 425 dwelling units, 380 of which are single family homes. The site is located about 13 miles from the city center of downtown Portland, with a population of over 400,000.

The existing land use in the study area and vicinity is primarily industrial, and generally follows the City of Portland zoning code designations. No significant changes in the area's existing land use patterns are presently planned.

Airflow is usually northwesterly in the Portland area in spring and summer, and southeasterly in fall and winter. The winter season is marked by relatively mild temperatures, cloudy skies and rain with southeasterly surface winds predominating. Summer produces mild temperatures, northwesterly winds and little precipitation. Wind direction at the Gould site is strongly influenced by the topographic features of the hillside southwest of the site. Resulting wind directions tend to be northwest-southeast along the Willamette River. Precipitation in the Portland area is mostly rain. Average rainfall is 37.39 inches. Monthly averages vary from 0.46 inches in July to 6.41 inches in December.

The Gould site is located on the left bank floodplain of the Willamette River, approximately 7 miles upstream from the confluence of the Willamette River and the Columbia River. The floodplain of the Willamette River occupies the lowest portions of the Willamette Valley, which is a broad downwarp between the Cascade and Coast Ranges of northwest Oregon and southwest Washington. In addition to man-made fill, the site is underlain by a few to several tens of feet of alluvial deposits, which in turn overlie the lava flows of the Columbia River Basalt. The site is situated on the northeast flank of the Portland Hills anticline, where the anticline dips beneath the young sediments that fill the Portland Basin. Groundwater flow is generally in a northerly direction.

The Gould site occupies a flat area between the Willamette River on the east and the forested slopes of the Tualatin Mountains to the west. The site is mostly paved with asphalt and is basically devoid of natural vegetation. The vegetation that exists is mostly brush, small trees, and blackberries along the property fenceline.

Occurrence of animals at the site is low, since the habitat necessary to support on-site fauna is limited. Common animal species that have been seen on-site include ground squirrels that are resident on the pond, and bird species that feed in the brushy, weedy areas around the site perimeter. Some cattails grow in East Doane Lake.

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It is doubtful that any fish reside in either West or East Doane Lake since natural water sources and discharges are limited. Also, high levels of contamination have resulted in water quality levels that will not support higher aquatic life forms. Some amphibians have been noted in and around the lake. Numerous fish species reside in or migrate through the lower reach of the Willamette River in the vicinity of the site.

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II. ENFORCEMENT SUMMARY

On the current Gould site, a secondary lead smelting facility was completed and went into operation in 1949 under the ownership of Morris P. Kirk and Sons (Kirk & Sons), a subsidiary of NL Industries, Inc. Facility operations consisted of lead-acid battery recycling, lead smelting and refining, zinc alloying and casting, cable sweating (removal of lead sheathing from copper cable), and (after 1965) lead oxide production.

Available records for the period between February 1960 and January 1970 indicate that Kirk & Sons received 14 complaints and/or violations regarding emissions from the facility. A January 29, 1970 report by the Columbia-Willamette Air Pollution Authority expressed concern over levels of lead in the vicinity of Morris P. Kirk, and the potential threat to health caused by continued plant operations.

NL Industries, Inc. purchased the property from the subsidiary in 1971. Three violations for excessive emissions were recorded in 1972. Lead was detected in Doane Lake in 1973, and NL Industries was cited for improper wastewater discharge into the lake. On July 30, 1973, NL Industries curtailed all smelting operations, but the lead oxide still, cable sweater, and refining kettles continued to operate. Available records indicate that the facility operated in compliance with DEQ guidelines during 1974 through 1976.

The property was sold by NL Industries to Gould, Inc. in January 1979. In October of the same year, Gould stopped receiving lead-acid batteries, but continued to process a substantial existing stockpile of batteries. In January 1980, lead refining operations were discontinued. Battery breaking operations ceased on April 1, 1981, lead oxide production ceased in May 1981, and the facility closed entirely in August 1981. By the summer of 1982, most of the structures, facilities, and equipment had been removed.

In 1981 EPA and DEQ began investigations of the site. The site was placed on the Superfund National Priorities List in 1983. In 1985 an order on consent was signed with NL and Gould which involved the performance of an RI/FS at the site.

More recently, Special Notice Letters have been sent to NL and Gould under the authority of Section 122 of CERCLA. Information requests under Section 104(e) have also been sent to industries in the vicinity of the site requesting information on hazardous contaminants and contamination at those facilities. The information received from these companies will be used in designing the additional groundwater and surface water studies described in the selected remedy.

A historical sequence of enforcement related events is presented in Table 1.

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TABLE 1

ENFORCEMENT HISTORY

July 1966	The Air Quality Control (AQC) Division observed heavy emissions of yellow dust for 10 minutes around the Kirk & Sons facility.
Dec. 1966	The AQC observed the baghouse stack emitting an opacity reading of 2 to 3 on the Ringleman scale.
1967	The AQC and the Portland Regional Air Pollution Authority reported six opacity violations from the smelter.
Dec. 1968	The Columbia-Willamette Air Pollution Authority reported a 30-minute violation from the lead sweat furnace stack.
March 1969	The Columbia-Willamette Air Pollution Authority noted a 15-minute violation from the baghouse exhaust stack.
Nov. 1969	Kirk & Sons corrected baghouse emissions from melting kettle and blast furnace.
Jan. 1970	The Columbia-Willamette Air Pollution Authority calculated lead emissions from the Kirk & Sons facility and concluded: "It is apparent that levels of lead in the vicinity of Morris P. Kirk can cause a definite threat to health and should not be allowed to continue."
March-June 1970	The Columbia-Willamette Air Pollution Authority observed two opacity violations.
1971	NL Industries purchased the property from their subsidiary, Morris P. Kirk & Sons. Also, this same year battery manufactures began using plastic for casings.
March 16, 1972	The Columbia-Willamette Air Pollution Authority observed two opacity violations.
March 1973	The DEQ sampled NL facility discharge into Doane Lake; test results indicated 9.5 and 10.3 ppm lead. NL Industries cited for wastewater discharge to Doane Lake.
April 1973	The Columbia-Willamette Air Pollution Authority requested that NL Industries provide a compliance schedule to control emissions from the blast furnace before issuing a new Air Contaminant Discharge Permit. Monitoring and reporting provisions were also a requirement.
July 1973	NL Industries curtailed all smelting operating and remodeled the Portland facility to function as a transfer point to ship and receive goods from Los Angeles. The lead oxide still, cable sweater, and refining kettles continued to operate.

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Oct. 1976	Violations for wastewater discharge by NL Industries were corrected.
Aug. 15, 1978	East Doane Lake sampled by DEQ; test results indicated 0.1 and 0.3 ppm lead.
Jan. 1979	Gould Inc. purchased the facility from NL Industries.
Nov. 8, 1979	Preliminary modeling analysis by DEQ suggested Gould may be violating the new ambient lead standard for the lead trailer loading operation.
March 5, 1981	DEQ issued notice to Gould of discharge violations and creating offensive conditions.
April 1981	DEQ obtained two yard-cleaning samples; EP leachate test results indicated 280 and 4,200 ppm lead.
July 1981	DEQ sent notice to Gould of intent to assess civil penalties.
Aug. 1981	Gould facility ceased all operations.
Oct. 30, 1981	DEQ requested that Gould undertake a comprehensive cleanup program.
July 22, 1982	DEQ decided no cleanup of the Gould site was warranted by the groundwater data received to date.
Sept. 24, 1982	DEQ requested that Gould submit a schedule for removing the battery cases from the site and for sampling soil and pond sediments on the site.
Oct. 26, 1982	Gould responded to DEQ request, indicating that they would level and cover the battery casings.
Dec. 1982	DEQ rejected Gould's plan for covering the battery casings.
Feb. 1983	Gould Inc. submitted a letter to EPA objecting to EPA's Hazard Ranking System (HRS) score for the site (see Appendix D). The score had been used by EPA to propose inclusion of the site on the NPL. In particular, the Gould letter objected to the methods used to determine airborne contaminant hazards at the site.
Aug. 1985	Gould Inc. and NL Industries signed Section 106, Administration Order on Consent for the Remedial Investigation/ Feasibility Study (RI/FS) of the facility.
April 1986	Work Plan for RI/FS by Dames & Moore was approved and site investigations began.
Nov. 1987	Final RI report submitted to EPA and DEQ.
Feb., 1988	Final FS report submitted to EPA and DEQ.

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III. COMMUNITY RELATIONS SUMMARY

In 1983, Oregon congressional representative Les AuCoin corresponded with DEQ about the site, and DEQ held a meeting with city, county, and state agency officials to present information about environmental concerns in the area and to solicit comments. Representative AuCoin specifically requested that DEQ assure him that site cleanup would completely remove potential contaminants.

A Community Relations plan was prepared for this site in 1985 based on research and interviews with interested community members and officials. The Community Relations Plan identified several issues of concern to the affected community and local officials, including:

1. Groundwater Pollution. People were concerned about ground- water contamination in the area and how it might affect future growth of the area.

   EPA responsed to this concern by including extensive groundwater testing in the RI.

2. Airborne Lead. Several agency officials indicated that high levels of lead emissions were a primary concern and that high levels of airborne lead could adversely affect the health of nearby workers. Exposure to lead at the approximately 10 houses in the hills above the site was thought unlikely, but necessary to investigate.

   EPA has included air monitoring in the RI.

3. Effects on Workers' Health. Individuals were concerned about exposure through incidental ingestion of ground water obtained for industrial use and exposure to airborne lead.

   EPA has included exposure scenarios for workers in the risk assessment for the site.

4. Cleanup Schedule. Staff from Representative AuCoin's office and a representative from the Oregon State Public Interest Research Group expressed dissatisfaction that cleanup measures had not been implemented earlier.

   EPA has attempted to evaluate the site and make a remedial decision in an expeditious manner. By focusing on the soils unit, a decision will be made now.

5. Future Development of the Doane Lake Area. The media and local officials expressed concern about how the current pollution would affect or restrict future uses of the land.

   Future use restrictions are expected to be minimized by removing or treating as much of the lead at the site as possible.

6. Disposal of Dredged Materials from the River. A representative from the Port of Portland indicated the Port's concern about disposing of dredged materials from the Willamette River that might be found to contain contaminants from the site.

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The RI included an evaluation of sediment around the outfall from East Doane Lake.

7. Environmental Investigation of Doane Lake Area. A representative from the Association of Oregon Industries and representatives of elected officials indicated concern that DEQ's environmental investigation in the Doane Lake area could decrease future industrial development and jobs in the community.

   No reports of decreased industrial development as a result of these investigations has been received by EPA.

8. Disposal of Battery Casings. An aide to Representative AuCoin's office expressed dissatisfaction that battery casings had not been removed from the site. Representatives from the Portland Department of Public Works cautioned that any plan to dispose of waste materials at St. John's Landfill would be unpopular.

   EPA intends to recycle as much of the battery casing components as is feasible.

Throughout the course of the RI/FS, additional updates were provided to the public during the investigation and reporting phases. A proposed plan and notice of public hearing was published in the Oregonian on February 8, 1988. The public comment period for the site was from February 8 through March 18. Two public meetings were held to discuss the results of these studies and EPA's proposed plan: the first on February 18, 1988 and the second on March 10, 1988. At both meetings, there was clear community support for thorough cleanup of the site and contaminated groundwater. The results of these meetings will be discussed further in the Responsiveness Summary (Appendix B).

IV. NATURE AND EXTENT OF PROBLEM

Contaminants Evaluated

During the scoping of the RI/FS, the emphasis at this site was on metals contamination from the battery recycling operations. Of primary importance was the presence of lead in each of the media. Although groundwater in this area also has organic chemical contamination, that contamination was not evaluated in these studies. As part of the selected remedy, additional work is proposed for the groundwater which will take into account organic chemical contamination. The purpose of this additional work will be to determine what, if any, remediation actions are required for the surface water and groundwater at the site.

Contaminated media at the Gould site that were investigated include battery casings, matte, surface soils, subsurface soils, lake sediments, surface water, and groundwater.

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Extent of Contamination

Battery Casings and Matte. The lead smelter on the Gould property operated between 1949 and 1973. During this period, a daily production of approximately 35 to 40 tons of lead has been reported. An average of 1,500 batteries were processed daily. As a result of these production records and the RI investigation, a total of 86,900 tons of battery casings and 6,570,000 gallons of acid were estimated to be disposed of at the site.

In addition to acid and battery casings, a third waste product called matte was produced by the smelting operation. Matte disposal is estimated at 11,800 tons. This material was reportedly used as fill only on the Gould site, just to the northeast of the facility.

Much of the battery casing fragments produced during this period (1949-1973) were disposed off site on the Rhone-Poulenc property. The quantity of battery casing materials disposed was calculated using test pits and a fill thickness contour map. Table 2 summarizes the locations and estimated quantities of battery casings. Figure 3 shows the locations of the battery casings and matte within the study area.

TABLE 2

BATTERY CASINGS QUANTITIES AND LOCATIONS

Gould Property	(1949-1973)	41,300 cu yds	44,500 tons
	(post-1973)	11,100 cu yds	12,000 tons
	Surface Piles	1,700 cu yds	1,600 tons
Rhone-Poulenc Property		26,700 cu yds	28,200 tons
	Totals	80,800 cu yds	86,900 tons

The batteries consist of hard rubber, ebonite, plastic casings, metallic lead, and lead oxides. Lead concentrations (mostly lead oxide) ranged from 7,600 mg/kg (0.76 percent) to 190,000 mg/kg (19 percent). All of the battery casing samples had EP Toxicity results for lead above the regulatory limit (EP Toxicity limit = 5.0 mg/l). These values ranged from 21 mg/l to 220 mg/l. There was no apparent correlation between total lead concentration and EP Toxicity leachate lead concentration. The EP Toxicity results for arsenic, chromium, and cadmium were below detection limits.

About 2% of the total volume of battery casings is located in surface piles on the Gould property, the remaining 98% is part of the fill on the Gould and Rhone-Poulenc properties. These subsurface casings are in direct contact with groundwater underneath the site. The characteristics of the surface piles of casings differ from the subsurface piles. The surface piles contain a higher percentage of plastic and metallic lead relative to subsurface casings on the Gould property or from the Rhone-Poulenc property, which contain a higher percentage of rock and slag. The metallic lead, plastic, ebonite and lead oxide components of these casings are potentially recyclable. The estimated fractions of the various components in the surface and subsurface casings are shown in Table 3.

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TABLE 3

ESTIMATED BATTERY COMPONENT QUANTITIES

Rhone-Poulenc & Gould Subsurface	In-Situ Density lbs/cu. ft.	In-Situ Volume cu. yds.	Tons	Per Cent (weight)
Ebonite	68.00	69,008	63,349	74.3
Plastic	46.56	4,070	2,558	3.0
Metallic Lead	297.46	117	469	0.6
Lead Oxide/Mud	238.37	2,703	8,700	10.2
Rock/Slag	105.56	1,938	2,762	3.2
Other	74.28	1,264	1,268	1.5
Moisture	62.30	0	6,113	7.2
Subtotal	79.80	79,100	85,218	
Gould Surface				
Ebonite	65.81	899	799	50.0
Plastic	45.06	595	362	22.5
Metallic Lead	287.88	6	24	1.5
Lead Oxide/Mud	230.69	52	161	10.0
Rock/Slag	102.16	148	204	12.7
Other	71.89	0	0	0
Moisture	62.30	0	59	3.7
Subtotal	70.07	1,700	1,609	
Total	79.60	80,800	86,827	

The matte materials consist of metallic sulfide chunks primarily containing iron and lead. Lead concentrations in the matte samples ranged from 6.4 percent to 11 percent. All of the samples had EP Toxicity results for lead above the regulatory limit of 5.0 mg/l. Low concentrations of arsenic and cadmium were detected in the EP Toxicity leachates. These concentrations were within the regulatory limits (5.0 mg/l and 1.0 mg/l, respectively).

Surface Soils, Subsurface Soils, and Sediments

In addition to battery casings and matte, large quantities of soil at the site are contaminated with lead and can serve as secondary sources for lead transport. The quantities of surface soil, subsurface soil, and sediment considered to be secondary sources were estimated by using total lead and EP Toxicity data.

Figure 4 shows the areas of surface soil that were identified as secondary source areas using the above total lead criteria. The quantity of surface soil on the Gould property considered a secondary source is approximately 2,400 cu yds. The quantity on the Rhone-Poulenc property is approximately 970 cu yds. These quantities are based on a 3,000 ppm lead level in soils. Criteria for surface soils in the selected remedy are based on a lower lead level and as a result actual volumes determined in design may be higher than these estimates.

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The volumes of subsurface soils estimated to be secondary sources are as follows:

1. One foot of soil below the entire area of the battery casing/matte excavations. This would amount to 4,300 cu yds from the area on Rhone-Poulenc property and 5,000 cu yds from the area on the Gould property; and,

2. One foot of soil from the sides of the excavations. Assuming average excavation depths of 20-feet on the Rhone-Poulenc property and 25-feet on the Gould property, and an excavation side-slope ratio of 2:1, this would amount to approximately 2,170 cu yds from the Rhone-Poulenc property and 2,180 cu yds from the Gould property.

Sediment samples collected from East Doane Lake contained total lead concentrations ranging from 160 mg/kg (parts per million) to 12,000 mg/kg. The estimated quantity of secondary source material in East Doane Lake is 5,500 cubic yards. West Doane Lake sediments are not considered secondary sources.

Sediments collected in the Willamette River during August 1986 and February 1987 had generally low metals concentrations. Total lead concentrations ranged from 26 to 56 mg/kg. Other metals concentrations included total arsenic at 5.7 to 6.2 mg/kg, total chromium at 9 to 26 mg/kg, and total zinc at 72 to 82 mg/kg. Cadmium and hexavalent chromium concentrations were near or below the detection limits. Like the West Doane Lake sediments, Willamette River sediments are not considered secondary sources. The total quantity of soil considered secondary source material is summarized in Table 4.

TABLE 4

ESTIMATED SECONDARY SOURCE VOLUMES

TYPE AND LOCATION			QUANTITY (cu yds)
Surface Soil			
Gould property		2,400	
Rhone-Poulenc property		970	
Surface Soil Total		3,370	3,370
Subsurface Soil			
Gould property	5,000		
Bottom Sides	2,180		
Sub-total	7,180		
Rhone-Poulenc property	4,300		
Bottom Sides	2,170		
Sub-total	6,470		
Subsurface Soil Total	13,650		13,650
Sediment			
East Doane Lake	5,500	5,500	
Secondary Source Total			22,520

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Surface Water. Surface water in the study area consists of two remnants of Doane Lake. The two remnants are referred to as East Doane Lake and West Doane Lake (see Figure 2).

Direct precipitation and precipitation runoff from surrounding properties are the only sources of surface water to the lake remnants. Groundwater recharge also contributes water to the remnants. Their surface elevation rises and falls seasonally with rainfall and presumable groundwater recharge. However, there is no simple relationship apparent between precipitation and lake level.

East Doane Lake discharges via a drain pipe to the north beneath N.W. Front Street; the discharge enters the Willamette River approximately 200 feet east of the railroad bridge. There is no known surface discharge from the West Doane Lake remnant.

Surface water in East Doane Lake exceeds the lead drinking water standard of 0.05 mg/l. Surface water concentrations were as high as 0.28 mg/l. Levels in West Doane Lake were below the standard.

Ground Water. The site hydrostratigraphy includes unconsolidated fill and alluvial deposits overlying basalt flows. The fill consists largely of sands and gravels, silts, and an abundance of slag, bricks, metal parts, and battery casings. The alluvial deposits consist predominantlY of clays, silts and sands with the silt content generally increasing with depth. The basalt flow beneath the fill and alluvial deposits is thought to be fractured and weathered. Ground water occurs in the fractured and weathered portions of the basalts.

The fill and alluvial deposits form an interconnected, heterogeneous, and anisotropic aquifer. The fill and alluvial water-bearing zones are believed to be generally unconfined; however, due to the layering, heterogeneity, and anisotropy there may be locally confined conditions within the aquifers.

Four water-bearing units are identified beneath the site. These units are the fill, the upper alluvial, the lower alluvial, and the basalt water-bearing units. In the upper aquifers there is a significant component of downward flow, although flow at the basalt-alluvial interface appears to be from the basalt to the alluvial aquifer.

Groundwater Contaminant Delineation. Figures 5,6 and 7 show the extent of lead contamination in the fill and alluvial aquifers. The contours show where dissolved lead concentrations exceed the MCL of 0.05 mg/l as well as the MCLG of 0.02 mg/l. The sulfate plume that has resulted from disposal of battery acid is also shown.

The relationship between dissolved metals, sulfate concentrations and pH is similar in both the fill and alluvial aquifers. Both show elevated dissolved metals and sulfate levels in association with lower pH values.

In the upper alluvium, the lead plume has migrated at least as far north as well 10D, shown in Figure 6. Increased dissolved metal concentrations appear to be the result of the lower pH which increases the solubility of metals, thus carrying high levels of lead as the "plume" migrates. Total lead migration from the site is estimated to be from 0.3 to 0.6 lb/yr.

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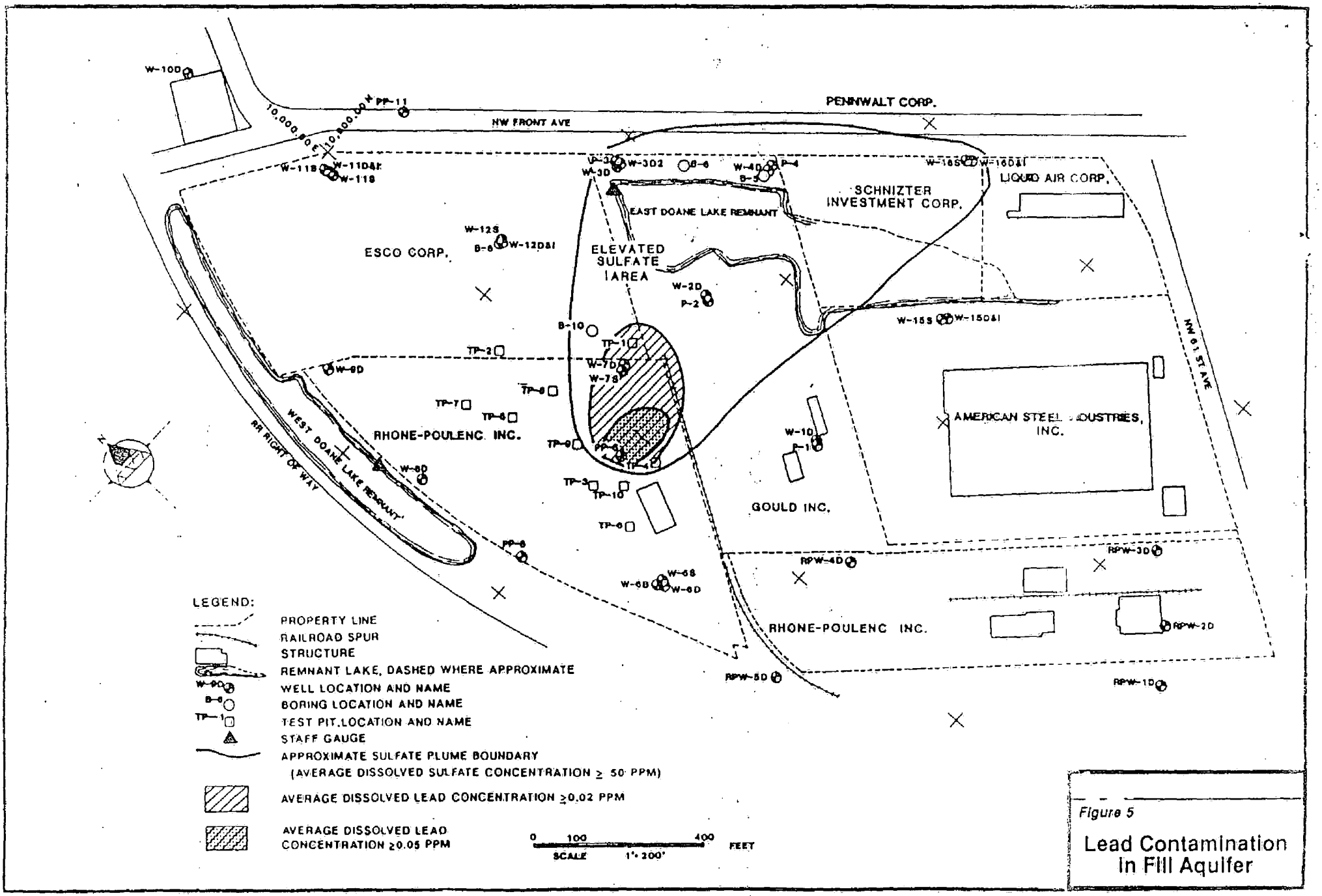

Figure 5

Lead Contamination In Fill Aquifer

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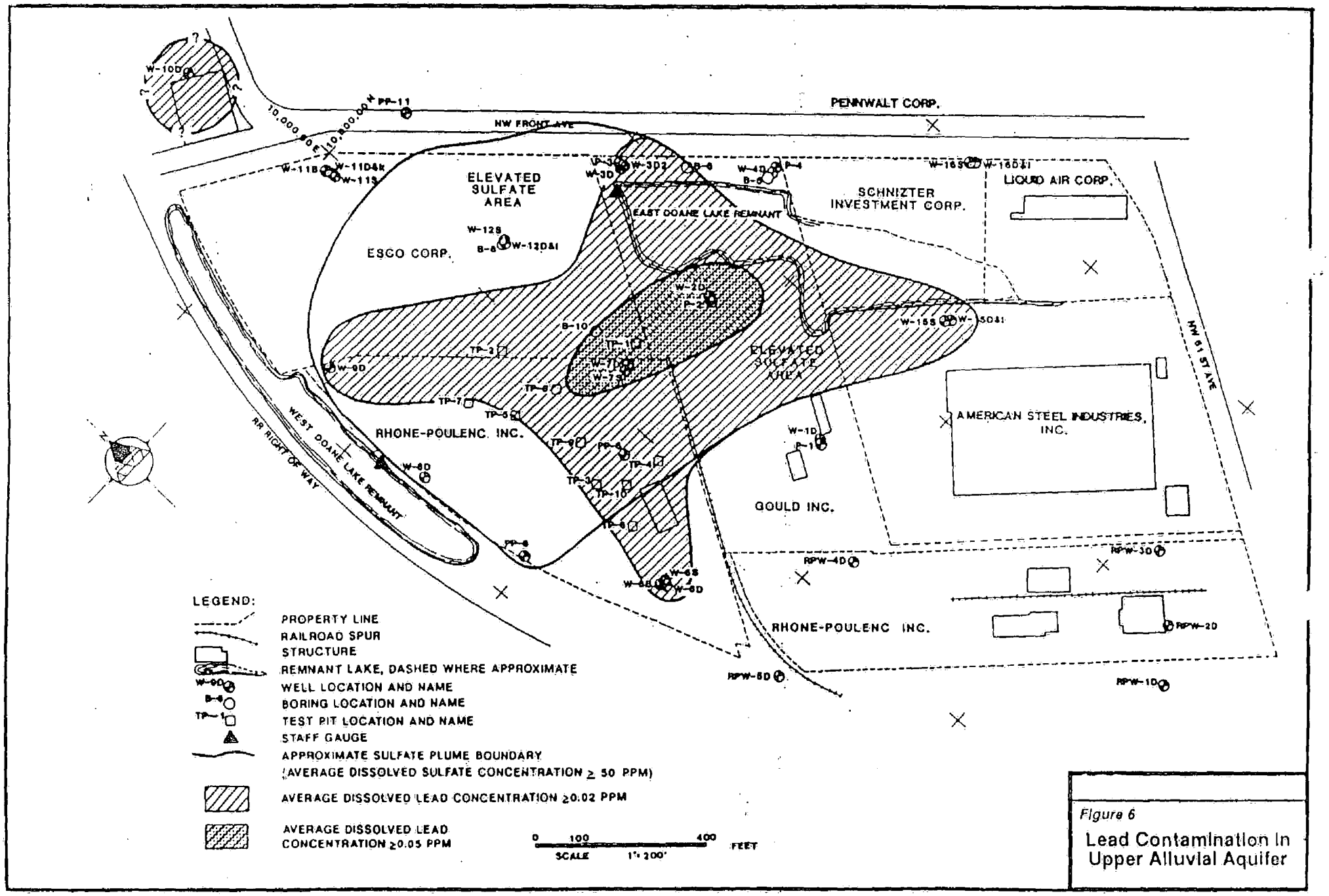

Figure 6

Lead Contamination In Upper Alluvial Aquifer

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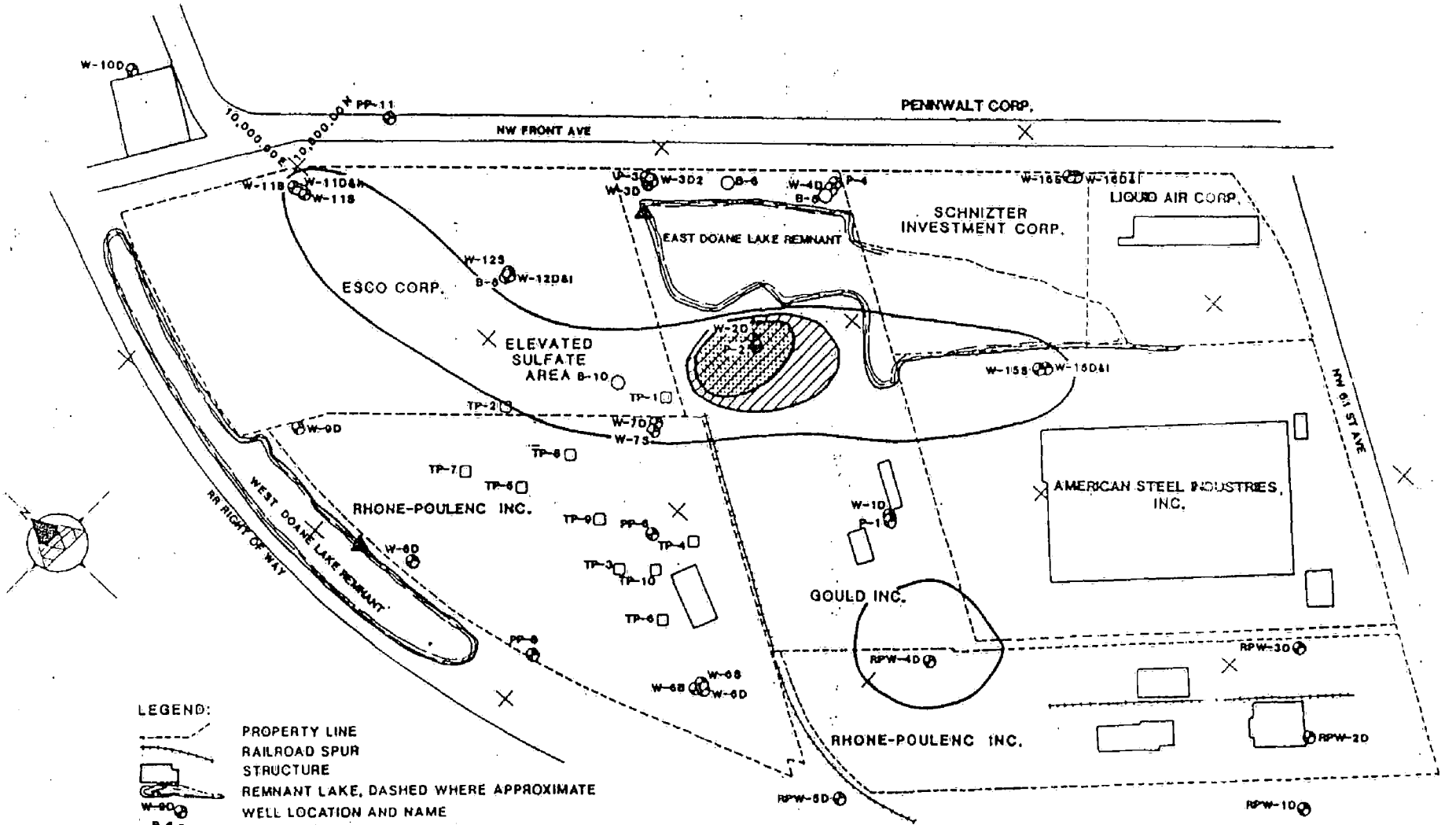

Figure 7

Lead Contamination In Lower Alluvial Aquifer

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Treatability Studies on Casings and Contaminated Soils

As part of the Feasibility Study, several engineering studies were performed to determine whether the SARA preference for treatment could be met. A bench-scale soil stabilization study was performed by Weston Services, Inc. Weston used several different reagents to determine the applicability of the soil stabilization technique to site soils and lake sediments. The results showed that admixtures of Portland cement, cement kiln dust, and lime kiln dust with the soil and sediment at specific increments improved the consistency and structural stability of the soils and sediments, and also reduced the leachability of the contaminated materials to levels generally below hazardous waste designation levels.

Three battery casing separation tests were performed on site materials. One test was performed on equipment manufactured by MA Industries, Inc. and the other two on equipment manufactured by Poly-Cycle Industries, Inc. To conduct each test, representative material was excavated from the site and shipped to locations where equipment manufactured by the two companies is in use. In the case of MA Industries, the test was run on equipment operated by Ace Battery Company of Indianapolis, Indiana. The tests of Poly-Cycle equipment were run at the Poly-Cycle plant in Jacksonville, Texas. The studies show that much of the battery casing material is potentially recyclable, however, additional design work will be required to modify the pilot facilities used in the treatability studies to actual conditions at the site. Reasonable physical separation of the plastic and ebonite components with some equipment modifications appears to be possible, although the degree of metallic lead contamination of ebonite may be high even after separation; additional design work will be required to modify the process to treat the ebonite stream in order for it to pass the EP Toxicity test.

During the evaluation of alternatives, similar tests were run independently by researchers working on materials from the United Scrap Lead Superfund site near Troy, Ohio. Researchers there performed bench-scale tests using various solutions and mechanical cleaning steps to determine the amenability of lead to be removed from the ebonite material. The results of this test are generally favorable indicating that the ebonite stream can be cleaned. However, the researchers have concluded that more work is required before the bench-scale results could be applied to any field-scale unit. This is a typical requirement for any bench scale testing.

Contaminant Transport and Need for Additional Study

Two types of lead sources exist at the Gould site. The major source includes debris remaining from earlier lead recovery operations, including battery casings and parts and the smelter matte. Secondary sources which may be significant include surface, sediment, and subsurface soils near the industrial sources. These materials may act as a source for lead in ground water, surface water or air after the primary (industrial) sources have been removed or stabilized.

Groundwater Transport. The most important chemical change encountered in the groundwater system on (and near) the site is pH change. At the primary sources, the pH is generally quite low (pH <5) because of the sulfuric acid from the scrapped batteries. As pH increases, the solubility of lead in water decreases, accompanied by the precipitation of lead oxides and hydroxides.

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The amount of lead that can be dissolved in ground water is a function of temperature, pH, other dissolved species present, amount of available lead and contact time. Assuming temperatures to be constant, all these factors are significant with regard to lead solubility in ground water in the study area. Based on these factors, an estimated migration rate of 0.3 to 0.6 lb/yr was derived during the RI.

Airborne Transport. The potential for airborne contamination comes from the surface piles of casings and contaminated surface soils at the facility. During the RI, the highest daily ambient lead values observed were 5.20 ug/m^3. This is above the NAAQS of 1.5 ug/m^3. The highest monthly average airborne lead concentrations observed were 1.56 ug/m^3 and 0.94 ug/m^3. The highest quarterly average airborne lead concentration was 0.56 ug/m^3. These results indicate that dry weather and disturbance of site materials may cause airborne transport of lead containing materials.

Need for Additional Study The exact nature of lead migration has not yet been well characterized. For that reason, additional investigations of the groundwater and surface water unit at this site are recommended in the selected remedy. The proposed additional work will involve expanding the area for groundwater and surface water monitoring and including organic chemical contamination in the evaluation of groundwater quality.

Endangerment Assessment

Human Health Effects. An endangerment assessment was performed to evaluate the potential for human health and environmental exposure risks associated with the no-action alternative as well as the remedial action alternatives. The primary contaminants included in the assessment are lead, along with arsenic cadmium, chromium and zinc. Arsenic is treated as a carcinogen for both inhalation and ingestion routes, while cadmium is treated as a carcinogen for only the inhalation route. As part of the endangerment assessment, a screening analysis for these other contaminants was performed based on the values found at the site and the relative toxicity of these compounds compared to lead. As a result of this screening, risks from lead exposure were found to dominate risks from exposure to the other chemicals. Lead was selected as the indicator compound for assessing risk and evaluating the various remedial alternatives.

Three potential critical pathways were identified, including airborne exposure from on-site fugitive dust sources, incidental oral ingestion of contaminants, and dermal contact as well as incidental ingestion of lead from surface water in East Doane Lake. No exposure from drinking water was included. Groundwater contamination will be evaluated further in the additional work proposed under the selected remedy.

Inorganic lead may be absorbed by inhalation or by ingestion. Absorption by either route contributes in an additive fashion to the total body burden. Among adults, inhalation is the more efficient of the two mechanisms. The fraction of inhaled lead absorbed from the respiratory tract is approximately 40 percent, while the fraction of ingested lead absorbed from the gastrointestinal tract is approximately 10 percent. These rates may be higher in children and are of particular relevance in assessing exposures in this sensitive subpopulation.

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Lead is highly persistent in the environment and is bioaccumulative. When lead is first absorbed, it enters the bloodstream and is dispersed unevenly in the body among blood, soft tissue, and bone. Approximately 90 percent of the lead in blood is bound to the red blood cells. The overall half-life of lead in blood has been calculated to be 36 $\pm$ 5 days. Lead is excreted from the blood into the urine. Lead in soft tissue has a calculated mean half-life slightly less than that in the blood and is excreted by alimentary tract secretions, hair, sweat, and nails. Most lead absorbed into the human body is deposited in the bone. Lead in the bone is calculated to have a half-life of approximately 10,000 days (27 years).

The toxicology of lead has been extensively reviewed. Alterations in the hematopoetic (blood forming) and central nervous systems are the primary toxic effects caused by exposures to lead. Cognitive and behavioral deficits are the focus of much current research on relatively low levels of lead exposure.

The Centers for Disease Control (CDC) has determined that a blood lead level in children of 25 ug/dl or above indicates excessive lead absorption and constitutes grounds for medical intervention. That determination is based on the occurrence of enzymatic abnormalities in the red blood cells at blood lead levels above 25 ug/dl and by the finding of neurologic dysfunction in children at blood lead levels between 35 and 50 ug/dl. Further, the CDC defines childhood lead poisoning at a blood lead level of 25 ug/dl in association with an erythrocyte protoporphyrin (EP) level of 35 ug/dl or above (CDC 1985). In its draft toxicological profile for lead, CDC has also cautioned that concentrations greater than 500-1000 ppm could lead to elevated blood lead levels in children inhaling or swallowing dirt. Recent findings of cognitive deficits associated with lower blood lead concentrations may result in a review of the adequacy of the existing CDC threshold level. EPA has issued a revised maximum contaminant level goal (MCLG) of 20 ug/liter lead. The current MCL of 50 ug/liter is used to derive an acceptable intake chronic (AIC) risk criterion for ingestion of lead.

Based on discussions with EPA and following the noncarcinogenic risk evaluation procedures of the Superfund Public Health Evaluation Manual, Acceptable Intake: Chronic (AIC) values were used to assess the significance for human health of potential inhalation and ingestion exposures to lead calculated for the Gould Inc. site. AIC criteria are designed to represent an intake for a contaminant that would be acceptable on a long-term continuing basis without producing adverse health effects. Separate AIC values for inhalation and ingestion exposures are derived by EPA from the National Ambient Air Quality Standard (NAAQS) for lead (1.5 ug/m^3 quarterly) and the drinking water standard for lead (0.05 mg/l), respectively. Each AIC is calculated as the environmental criterion concentration times contact rate divided by adult body weight. Assuming 20 m^3/day of air breathed, 2 liters/day of water ingested, and an adult body weight (bw) of 70 kg, the derived AIC values are 0.0004 mg/kg-bw/day for inhalation and 0.0014 mg/kg-bw/day for ingestion. For each calculated exposure dose (in mg/kg-bw/day) in this endangerment assessment, risk is represented by a hazard index (HI) number equal to the calculated dose divided by the appropriate AIC value. Thus, a hazard index greater than 1.00 represents a calculated dose greater than the AIC criterion value, given the exposure model assumptions and the environmental concentrations used in the model.

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Figure 8 provides a visual summary of the results of the exposure calculations for the No-Action Alternative. Inhalation and ingestion exposures for each scenarios are scaled appropriately in comparison to AIC values. As Figure 8 shows, the high dose cases for ingestion of soils indicate extremely high intakes of lead. These intakes result from calculations assuming contact with the lead oxide--almost pure lead--in the battery casing waste piles. Even if more realistic assumptions than continuous daily contact with the waste piles are made, the results of any contact with and ingestion of contaminants from the battery casing piles would be significant in comparison to either baseline exposures or ingestion AIC values. The high dose ingestion calculations are not considered to be a basis for evaluation of potential health impacts from the site (they are excessively conservative); however, they clearly demonstrate the potential significance of any contact with the existing source materials on site.

For on-site workers (adults only), total lead intake increases to about 2.5 times baseline intake, with inhalation exposures increasing by a greater percentage than ingestion exposures but still accounting for less than 10 percent of total exposures. Both inhalation and ingestion mean dose exposures are lower than AICs. Off-site residential total lead intake increases only marginally for adults or children (about 14 percent). Only inhalation exposures are included in this scenario, with the ambient air lead concentration assumed to be constant at 0.33 ug/m^3, or 22 percent of the NAAQS value of 1.5 ug/m^3. In the on-site residential base case scenario, adult lead intake increases almost fivefold and children's lead intakes by a factor of more than 11. Both inhalation and ingestion exposures are substantially increased in all age intervals; all hazard indices for children and adults are greater than 1.00, with a maximum of 11.2 for inhalation and 34.2 for ingestion among children's age intervals.

Environmental effects. It is doubtful that any fish reside in either East or West Doane Lake. During field sampling activities, numerous aquatic insects and frogs were observed in the West Doane Lake. None were observed during concurrent sampling in the East Doane Lake, although mallards are reported to be resident there. Numerous fish species reside in or migrate through the lower reach of the Willamette River in the vicinity of the site. These include migrant Chinook and Coho salmon, and Steelhead and American shad. Resident species include largemouth and smallmouth bass, crappie, bluegill, walleye, northern squawfish, catfish, mountain whitefish, carp, sucker, peamouth, and chiselmouth (Oregon Department of Fish & Wildlife 1972, 1986).

The Willamette River in the site reach flows through a highly industrialized area that receives a variety of point- and non-point source pollutants. Dissolved lead values upstream of the area of the discharges from the Gould site have exceeded the chronic aquatic life standard of 1.3 ug/l in some 45 percent of the samples from the past decade (USGS 1975 - 1984 data). Total recoverable lead values have been still higher. Levels of lead have trended downward with no values greater than 2 ug/l in the last three years of this period.

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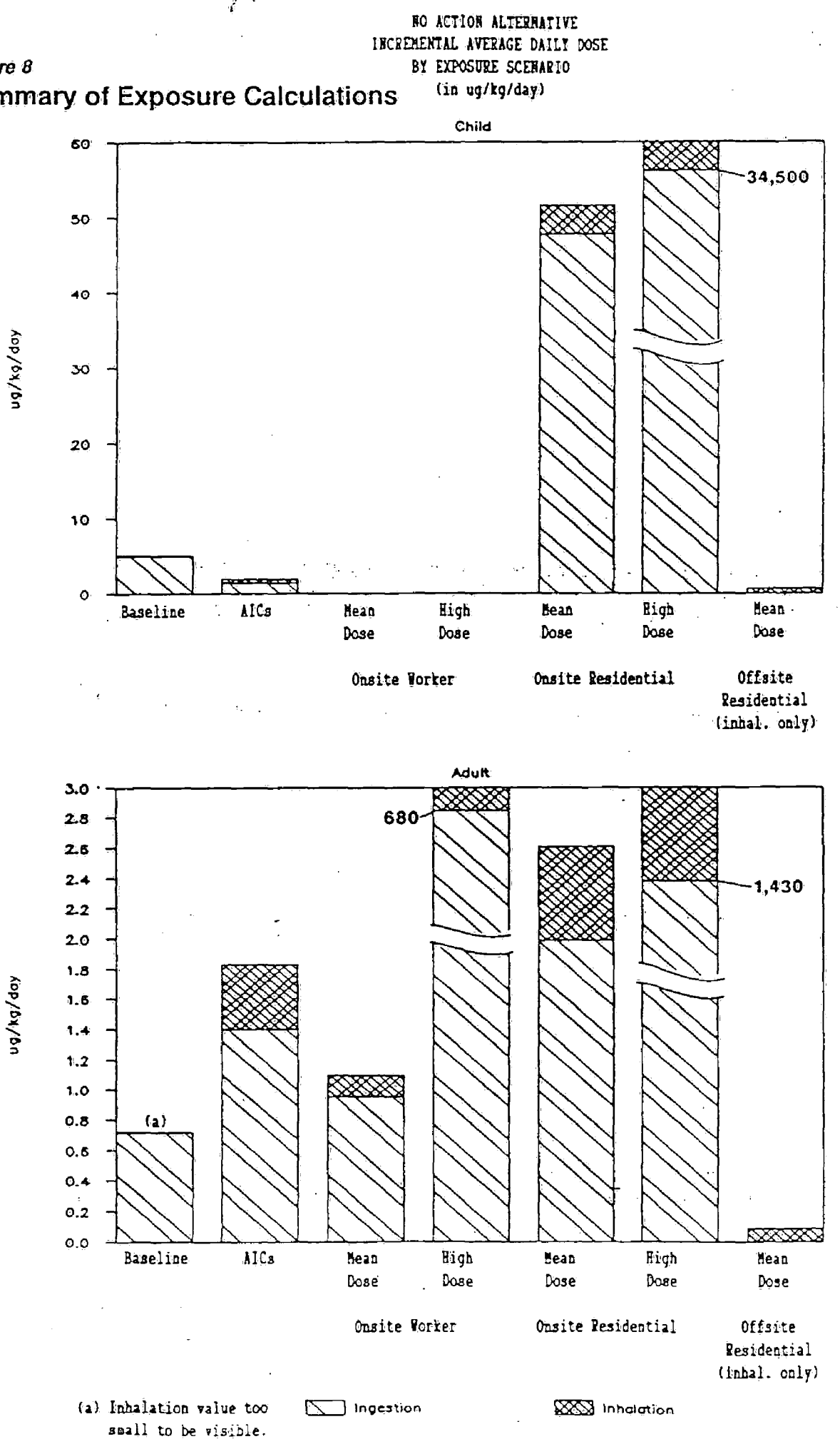
Figure 8

Summary of Exposure Calculations



Estimates of the quantity of surface water overflow from the East Doane remnant indicate a maximum value of 7,800,000 gallons per year. Using a range of discharge values, dilution calculations were made to estimate the distance downstream of the outfall at which the concentration in a plume within the Willamette River will reach background levels. Using the above estimates, the plume where lead values measurably exceed background could be several thousand feet long and up to 100 feet wide.

Few recent data are available on fish populations in the vicinity of the Gould discharges; however it is likely that these populations reflect the stresses of the existing habitat. Of primary economic and recreational concern are effects on anadromous (migratory) salmonids. Both juveniles and adults migrate past the site on their way to and from upstream spawning areas. Because of the shallowness of the beach adjacent to the discharges, adults would not be expected to move through concentrated areas of the plume and should suffer little impact from their limited exposures. Thus, it is likely that a significant percentage of outmigrating juvenile salmonids will pass through the plume. Expected residency in the plume would be on the order of minutes if actively migrating or hours if passively drifting down current. Exposures of this duration may cause some minor stress to respiration and metabolism but would not be expected to result in significant numbers of deaths unless a fish were somehow trapped for an extended period in a region with very high concentrations. The EPA criterion for short-term exposure (1 hour) is 0.034 mg/l.

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V. ALTERNATIVES EVALUATION

Summary of Alternatives and Evaluation Criteria

This section summarizes the detailed evaluation of the final candidate remedial action alternatives. First, alternatives are subject to a screening for compliance with the protectiveness and ARAR criteria. An additional screening of cost effectiveness is then done to ensure the the selected remedy is a cost effective one. Those that pass the screening are then evaluated against all nine criteria and an alternative is selected that best addresses the combination of criteria. This alternative is considered to represent treatment to the maximum extent practicable.

The Final Candidate Alternatives, identified briefly, are:

Alternative 1 - No-Action Alternative (presented to provide a baseline for evaluating the other alternatives).

Alternative 2A - Removal and Disposal of Surface Piles of Battery Casings; Lime Application to Contaminated Soils.

Alternative 2B - Removal and Disposal of Surface Piles of Battery Casings; Capping of Contaminated Surface Soils; Regrading of the Site and Isolation of East Doane Lake.

Alternative 2C - Excavation and Separation of Surface Piles of Battery Casings, and Subsequent Off-Site Management of Casings; Lime Treatment; Capping of Contaminated Surface Soils; Treatment of Surface Water; and Regrading and Revegetation of the Site.

Alternative 8A - Removal and Disposal of Surface Piles of Battery Casings and Sediments of East Doane Lake; Capping of Contaminated Surface Soils; Treatment of Surface Water; and Regrading and Revegetation of the Site.

Alternative 8B - Excavation and Separation of Surface Piles of Battery Casing Components, and Subsequent Off-Site Management of Casings; Capping of Contaminated Surface Soils; Treatment of Surface Water; and Regrading and Revegetation of the Site.

Alternative 10A - Excavation and Separation of all Battery Casings, and Subsequent Recycle of Some Casing Components; On-Site Incineration of Non-recyclable Components; Fixation or Stabilization of Surface Soils, Subsurface Soils, Sediments, and Matte; Treatment of Surface Water.

Alternative 10B - Excavation and Separation of all Battery Casings, and Subsequent Recycle of Some Casing Components; Incineration of Non-recyclable Battery Casing Components; Lime Treatment and On-Site Placement of Sediments; Treatment of Surface Water.

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Alternative 10C - Excavation and Separation of all Battery Casings, and Subsequent Recycle of Some Casing Components; Off-Site Disposal of Non-recyclable Components that Fail EP Toxicity; Fixation or Stabilization of Surface Soils, Subsurface Soils, Sediments, and Matte; Additional Study of Groundwater and Surfacewater Quality.

Alternative 21 - Excavation of Battery Casing Components and Permanent Disposal in an On-Site RCRA Landfill; Fixation or Stabilization of Surface Soils, Subsurface Soils, Sediments, and Matte; Treatment of Surface Water.

Alternative 25 - Permanent Disposal in an On-Site RCRA Landfill of all Site Contaminated Materials, including Battery Casing Components, Surface Soils, Subsurface Soils, Sediments, and Matte; Treatment of Surface Water.

Evaluation Criteria

Nine factors will be considered in evaluating the Final Candidate Alternatives:

- Long-term effectiveness and permanence;
- Reduction in toxicity, mobility or volume;
- Short-term effectiveness;
- Implementability;
- Cost;
- Overall protection of human health and the environment;
- Compliance with applicable or relevant and appropriate requirements (ARARs) that are shown in Appendix A;
- State acceptance; and
- Community acceptance.

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The process begins by applying the protectiveness and ARAR factors to each of the candidate alternatives. Alternatives that do not satisfy these requirements will be screened out. Then a cost effectiveness screening is done to ensure that each of the alternatives would be a cost effective solution to the problems at the site. Finally, for the remaining alternatives which have passed these screening steps, all of the factors are weighed in determining the best overall solution to be applied at this site.

Screening of Alternatives

Alternatives 1, 2A, 2B, 8A, and 8B

These alternatives fail the protectiveness and ARAR screens for the following reasons:

- The alternatives rely heavily on institutional controls and monitoring for the protection of public health and the environment.
- Uncontrolled wastes would be left in place on site.
- Extensive continued migration of site contaminants into the groundwater aquifers will occur.
- The alternatives fail to meet ARARs.

Alternative 2C

Although Alternative 2C has many of the same disadvantages of the above alternatives, it involves some treatment of the remaining contaminated material at the site and is therefore considered more protective than the above alternatives. The alternative fails the EP Tox ARAR, and a waiver in this instance would be required. Since alternative 2C is the preferred alternative in the FS report submitted by NL and Gould, it will be carried through the evaluation process.

Alternatives 10A & 10B

These two alternatives pass the protectiveness and ARARs screens. However, the alternatives each involve incineration of the ebonite casings. Due to expected opposition from the community and the State of Oregon, these two remedies are also being screened out at this point.

Alternative 10C

This alternative passes the protectiveness/ARAR screening and will be evaluated in more detail.

Alternatives 21 & 25

These alternatives pass the protectiveness/ARAR screening. They are in fact quite similar alternatives, with the one difference being that in Alternative 21 the soils and sediment are treated before being placed in the RCRA landfill. Since alternative 21 appears to go further in satisfying the preference in the law for treatment to the maximum extent practicable, and since it is later shown to be cost effective, only 21 will be evaluated in detail.

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Screening for Cost Effectiveness

The alternatives which pass the initial screening screen are 2C, 10C, and 21. These are then evaluated to determine if any one fails to provide for a solution that is cost effective. The evaluation for these is shown in Table 5.

TABLE 5
SUMMARY OF COST EFFECTIVENESS SCREENING

	Alternatives Evaluated		
Factor	2C	10C	21
Cost	$4,923,481	$20,565,184	$15,661,848
Effectiveness	Moderate	High	Moderate
Reduction in Toxicity, Mobility or Volume	Low	High	Moderate

The costs for Alternative 10C are extremely difficult to estimate. The above costs have been prepared by the Dames & Moore for NL and Gould and are considered worst case costs assuming little of the material is recyclable. In particular, costs for disposal of non-recyclable battery components such as ebonite in a RCRA landfill are estimated at over $2,500,000 per year for five years. These costs also do not allow for any credit from the sale of recyclable components. Design costs for this project are estimated at only $226,000. EPA views these detailed cost estimates as providing a strong justification for increasing the amount of effort devoted to designing a process that minimizes the amount of material that requires disposal in a RCRA landfill.

Based on the analysis above, all of the above alternatives are considered to be cost effective ones. Each appears to provide an increase in effectiveness and reduction in toxicity, mobility or volume (both criteria evaluated together) that is commensurate with the increased cost. The basis for the ratings in this table is included in the detailed analysis that follows for these three alternatives.

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Alternative 2C Evaluation

Alternative 2C comprises removal of the surface piles of battery casing fragments, followed by off-site component separation and recycle of some components, off-site disposal of others; lime treatment of the exposed surface soils and battery casing material, followed by low-permeability capping and revegetation; lime treatment of the East Doane Lake surface water; site grading; and a long-term monitoring program.

Short-Term Effectiveness. Under this alternative, most of the fill material would be left in place. During remediation, remedial action worker safety issues similar to those for minor earthmoving projects will arise. Hazards associated with site contaminants will be controlled by appropriate respiratory protection, proper safety attire and the application of dust suppression techniques. Therefore, the short-term risks for workers on-site would be negligible.

During remediation, lead concentrations in air emissions at the fenceline of the property will be monitored to detect any exceedences of the NAAQS for lead. Proper dust suppression techniques should minimize the likelihood of this event.

The surface piles carry the greatest potential for environmental risk because of their availability. Battery casing components contained in the surface piles will be transported to an off-site recycler for separation of components. After separation, some components will be recycled, while others may have to be disposed of in a landfill. Risks associated with transport of hazardous wastes from the site to the recycler, and hazardous waste transport from the recycler to a RCRA landfill, will be mitigated by transporting the wastes in accordance with 40 CFR 263 and State of Oregon requirements for hazardous waste transportation.

Alternative 2C could be executed in approximately one year, including planning, review, contracting and implementation.

The disadvantages of this alternative in terms of short term effectiveness are that significant quantities of hazardous materials remain at the site and there is potential exposure to these substances if the institutional controls proposed in this alternative are not effective. Secondly, the lime treatment proposed in this alternative has not been fully evaluated during the FS and therefore its effectiveness at this site is not well known.

Long-Term Effectiveness. Removal of the surface piles is expected to substantially reduce the potential for entrainment of dust from the site by wind, and to reduce the potential for human contact with site contaminants. Pumping and lime treatment of the site surface water may reduce the concentrations of dissolved contaminants by raising the pH of the water. Site grading will reduce the amount of runoff in East Doane Lake, and eliminate the transport of surface water off site. The application of lime to the surface areas where soil is exposed or where casings are exposed or buried may reduce the concentration of dissolved contaminants in surface runoff by raising the local pH. However, the effectiveness of this treatment technique at the Gould site has not been fully evaluated.

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Subsequent capping will partially isolate the remaining contaminants, thereby reducing their availability for off-site transport by surface water, air and direct contaminant ingestion with soils. However, the location of the site in a 100 year floodplain, the problems with implementing institutional controls, particularly on the Rhone Poulenc and ESCO properties, and the fact that only 2% by volume of the contaminated casings will be removed make the long term effectiveness of this alternative questionable.

Reduction in Toxicity, Mobility, or Volume. Alternative 2C reduces the volume and toxicity of the site contaminants contained in surface piles, which are about 2% of the total battery casings. The mobility of contaminants in soil and subsurface casings may be reduced by increasing the pH of the soil system through lime treatment. Lime treatment may not be effective in preventing mobilization from groundwater moving underneath the site. Periodic reapplication of lime may be required to ensure the effectiveness of the treatment. Subsurface contaminants are not reduced in volume or toxicity.

Implementability. Equipment for separating the battery casing fill at the site is available. However, the separation equipment tested during the FS was designed to work on whole batteries, not on the mix of materials found at the Gould site. In particular, plastic and ebonite streams analyzed after processing through available separation equipment contained sufficient residual lead to fail the EP Tox test. Further, lead oxide is combined with much dirt in the separation process, which will serve to reduce the recyclability of this fraction. Alternative 2C would be accomplished using modified conventional machinery at an off-site facility.

Alternative 2C involves the removal and treatment of the surface piles of battery casings, surface soil treatment with lime, and surface water treatment by pH adjustment and filtration. Recovered battery casing components will be sent to other facilities for recycling or disposal. Those facilities receiving battery casing components will be required to meet RCRA Treatment, Storage or Disposal facility requirements for processing of hazardous wastes, as required by the EPA Off-Site Policy. Applicable DOT, EPA and State of Oregon regulations for the transport of hazardous materials will also have to be followed.

Any facility interested in accepting the lead compounds for the purposes of recovering the lead would have to be permitted as a TSD facility under RCRA. Recovered battery casing materials which cannot be recycled and which fail EP Tox will be disposed of in a RCRA landfill. Nonrecyclable materials which pass EP Tox may be disposed of in a sanitary landfill.

Cost. The costs associated with this alternative are divided into two categories. The first is capital cost which includes direct costs such as transportation, separation and disposal costs associated with the surface casings; surface water treatment costs; lime addition to soil; site grading; and installation costs associated with monitoring. Also included

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in capital cost are indirect costs such as permitting, engineering and design, start-up, and contingency. The second category of cost is operating and maintenance costs including site monitoring and reporting. Operating costs are discounted to present worth for comparison of alternatives.

	Capital Cost	O&M @ 12% Present Worth	Total Cost
Alternative 2C	$3,133,760	$1,789,722	$4,923,481

Compliance with ARARs. Contaminant-specific, location specific and action specific ARARs that apply to the Gould site are contained in Appendix A. All contaminant-specific, location-specific and action-specific ARARs will be met by Alternative 2C, except for the EP Toxicity requirement for lead in soils and battery casing materials. This alternative also allows a continual source of lead to impact the groundwater under the site, which already exceeds the MCL of 0.05 mg/l and is considered a Class II aquifer.

Overall Protection of Human Health and the Environment. Surficial contamination on site is reduced under Alternative 2C by removal of the surface battery casings piles and by paving/capping areas of highest residual soil contamination, with lime applied before paving/capping to further reduce the potential mobility of residual lead in subsurface soils. These measures will provide controls for general inhalation exposures and direct contact ingestion exposures in these areas of the site, barring physical disturbance of the pavement/cap. East Doane Lake surface waters will also be treated under Alternative 2C.

Assuming that the cap is not disturbed, on-site residential exposures by inhalation and ingestion result in hazard indices less than 1.00 for all age groups. On-site worker and off-site residential populations have even lower hazard indices for all exposure pathways evaluated. On-site and off-site air lead concentrations are in compliance with the NAAQS ARAR value. However, these values are based on the effectiveness of the cap and the institutional controls that would be required on the Gould, Rhone-Poulenc, and the ESCO properties. There is considerable uncertainty as to whether Rhone-Poulenc or ESCO would allow these types of institutional measures on their property. Should the cap become disturbed, substantially higher exposures for ingestion might result.

Short-term, off-site worker inhalation exposures from fugitive dusts generated during Alternative 2C remedial activities are determined to be non-significant, with a hazard index of 0.19. Maximum short-term (quarterly) air lead concentrations off site are projected to be in compliance with the NAAQS ARAR value.

Community Acceptance. Several letters were included in the record of public comment which clearly indicate that this alternative is not acceptable to portions of the community. For example, the Northwest District Association, which covers an area representing 12,000 residents, stated that it considers this alternative to be "totally unacceptable". Other groups that have expressed opposition to Alternative 2C include: Willamette Heights Neighbors Concerned About Noise and Chemical Pollution, Northwest Environmental Advocates, and OSPIRG. These responses are included in Appendix B.

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State Acceptance. The State of Oregon Department of Environmental Quality (DEQ) has carefully reviewed this alternative and finds it unacceptable.

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Alternative 10C Evaluation

Alternative 10C comprises excavation of all of the battery casing fragments and matte from the Gould property and adjacent properties, followed by on-site separation of the battery casing fragments. Separation is followed by recycling of those components (or portions of components) that can be recycled; off-site disposal for non-recyclable components that fail the EP Toxicity test, and on-site disposal of non-hazardous components. It is EPA's intent under this alternative to minimize the amount of material that would require disposal in a RCRA landfill. Treatment studies performed during design will be used to define what portions of the battery casings are recyclable.

Additional processes under Alternative 10C include excavation, fixation/stabilization and on-site disposal of contaminated soil, sediment and matte; soil capping of treated areas and revegetation; isolation of East Doane Lake by site regrading; and a monitoring program to determine changes im groundwater contamination over time. Under Alternative 10C, additional study will be performed on surface and groundwater in this area. The proposed study will help determine whether action needs to be taken to deal with the contamination underneath the site, and how that action should be coordinated with other cleanup efforts by nearby industries that are currently going on. The study will also address organic contamination as well as lead contamination. The study would begin later this year.

Short-Term Effectiveness. Beneficial effects of removing and successfully separating battery casings and fixing/stabilizing soils, sediments and matte will be immediate on completion. The groundwater and surface water monitoring program for Alternative 10C will be conducted as long as site contaminants remain unremediated.

During remediation, worker safety issues similar to those for moderate earthmoving projects will arise. For on-site workers, personnel protective equipment, including respiratory protection, will mitigate the safety concerns. However several activities will be conducted simultaneously in a relatively small area, leading to some concern over worker safety due to the intensive nature of site activity. As part of the remedial action, a comprehensive health and safety plan will be developed before field work begins.

During remediation, lead concentrations in air emissions at the fenceline of the property will be monitored to detect any exceedences of the NAAQS for lead. Proper dust suppression techniques should minimize the likelihood of this events. Most of the material to be remediated is currently saturated in groundwater, which will also help prevent fugitive emissions.

The completion of remedial activities under Alternative 10C may take up to 6 years after remedial design is complete. Site conditions that may delay execution of the alternative include logistical difficulties associated with dredging of the lake sediments. Requirements related to stabilization of the lake shoreline during deployment of dredging equipment may also serve to extend the time required for dredging. The estimate is based on a variety of factors that include the size of the facility and other items that will be evaluated during the design phase. It is the agency's intent to minimize the time that is required for remediation under this alternative.

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Long-Term Effectiveness. Removal and successful separation of the battery casing fragments would substantially reduce sources of pollution at the site. Without the battery casings, levels of pollution in all media will decrease. Removal and disposal of contaminated sediments without treatment of the site surface water will raise the concentration of dissolved and suspended contaminants for a period of time.

Under this alternative, health and environmental hazards posed by the site are intensively addressed by treatment. Potential hazards posed by the site fill are addressed by treatment of the battery casing fragments. The treatment undertaken by this alternative addresses essentially all of the contaminated material and related risks. Risks remaining after remediation is completed are posed mainly by unremediated surface soils, ground water and surface water in the study area. The groundwater and surface water risks will be addressed in the additional study that is proposed under this alternative. Should the cap become disturbed, additional inhalation and ingestion risks might result. However, because of the intensive treatment employed in this alternative, these risks are considered to be less than those presnented in either Alternative 2C or 21.

The technology to be used in this alternative has been demonstrated in other situations and appears to be feasible based on the studies that have been done at this site, since the tests clearly showed that the materials can be separated. Design modifications of the separation process will be accomplished during the engineering studies that will occur as part of the remedial design phase.

Reduction in Toxicity, Mobility, or Volume. In the Nature and Extent of Problem section, the estimated quantities of metallic lead, plastic, lead oxide, ebonite, and other material are calculated. An estimate of the quantity of metallic lead is shown as 0.6 percent of all primary source materials, plastic is estimated at 3.0 percent of primary source materials, lead oxide/dirt/mud at 10.2 percent, and ebonite at 74.3 percent. Contacts made during the conduct of the FS indicate that the metallic lead would likely be completely recyclable, the plastic would be recyclable at some locations, depending on lead content, and lead oxide would likely be accepted by some smelters. The largest component of source material, ebonite, may or may not be recyclable depending on the extent to which it can be treated. Using these assumptions, it is estimated that approximately 25% of the lead in the casings can be recycled.

The potential for long-term mobility of site contaminants is decreased with Alternative 10C, by both removal of lead in the casings through recycling and by treatment of contaminated soils and sediment to reduce the mobility of lead.

Implementability. During the conduct of the FS, several efforts at component separation and cleaning of the battery casing material were attempted by the PRPs. A review of the efforts of others who attempted separation and recycle was also conducted. These attempts can be generally characterized as demonstrating that separation of battery casings is feasible at low feed rates.

Plastic and ebonite streams after processing may contain enough interstitial lead to fail the EP Tox test. All such materials that can not be recycled would need to be landfilled in a RCRA facility.

Soil stabilization is a proven technology and was shown to be effective in a bench-scale test during the FS. Pilot testing of the technology under actual site conditions will be required during remedial design to determine the correct ratios of materials and to determine whether the technique can be effective under actual site conditions.

SCOEPA00016019

Sediment dredging may contribute to the difficulty of subsequent treatment of East Doane Lake surface water, though some sedimentation of the suspended materials should occur prior to any future surface water remediation. Excavation of the fill on the Gould and off-site properties must also include a consideration of the power lines along the northwest edge of the Gould property, which may need to be relocated because of remediation.

Alternative 10C involves the excavation and separation of all battery casings, followed by recycle or RCRA disposal of specific battery casing constituents. Those recycle facilities receiving the lead oxide and soil component will have to meet RCRA TSD requirements for processing of hazardous wastes, as required by the EPA Off-Site Policy. Applicable DOT, EPA and State of Oregon regulations for the transport of hazardous materials will also have to be followed. No permit will be required for any of the wholly on-site portions of the alternative. During remediation, separation and treatment facilities will be erected, operated and demolished, and excavation equipment will be operated. These activities may require local construction permits.

Recovered battery casing materials which can not be recycled will be disposed of in a landfill. Components which fail the EP Toxicity test will have to be placed in a landfill that meets the RCRA requirements of 40 CFR Part 264. It is EPA's intent to minimize this portion of the separation plant output stream.

Cost. The costs associated with this alternative are divided into two categories. The first is capital cost, which includes direct costs such as erection of process equipment, excavation, separation and disposal costs associated with the surface and subsurface casings; sediment dredging costs, soil stabilization costs; site grading; and installation costs associated with monitoring. Also included in capital cost are indirect costs such as permitting, engineering and design, start-up, and contingency. The second category of cost is operating and maintenance costs that occur throughout the multi-year remedial effort, such as excavation, separation, and disposal costs beyond year one. Operating and maintenance costs are discounted to present worth for comparison of alternatives.

Capital Cost	O&M @ 12% Present Worth	Total Cost
$3,491,603	$17,073,581	$20,565,184

The costs for this alternative are extremely difficult to estimate. The above costs have been prepared by the Dames & Moore for NL and Gould and are considered worst case costs assuming little of the material is recyclable. In particular, costs for disposal of non-recyclable battery components such as ebonite in a RCRA landfill are estimated at over $2,500,000 per year for five years. These costs also do not allow for any credit from the sale of recyclable components. Design costs for this project are estimated at only $226,000. EPA views these detailed cost estimates as providing a strong justification for increasing the amount of effort devoted to designing a process that minimizes the amount of material that requires disposal im a RCRA landfill.

SCOEPA00016020

Compliance with ARARs. Contaminant-specific, location specific and action specific ARARs that apply to the Gould site are contained in Appendix A. All contaminant specific, location-specific and action specific ARARs will be met by Alternative 10C. During remediation, lead concentrations in air emissions at the fenceline of the property could exceed the NAAQS for lead. If continued excedences occur, remedial operations will be shut down and appropriate modifications to the operations will be made. Activities may also be adjusted based on meteorological conditions. All materials handling will be performed as a wet process where feasible. A site specific health and safety plan will be developed to ensure the safety of remedial action workers. Much of the material to be remediated is currently saturated in groundwater, which will also help prevent fugitive emissions.

Overall Protection of Human Health and the Environment. Surficial contamination on site is reduced under Alternative 10C by on-site treatment of all battery casings (piles and buried), with off- site disposal at a RCRA landfill of materials failing EP Toxicity tests and stabilization/on-site disposal of remaining residual materials (soil, sediment, matte), and pavement/capping of all disposal areas. These measures will provide long-term, effective controls for general inhalation exposures and direct contact ingestion exposures in these areas of the site. Stabilization of residual wastes will provide an additional component of protection and further prevent contaminant migration to groundwater.

Community Acceptance. In the public record there are several letters indicating support for this alternative. Groups that have expressed support for Alternative 10C include: Food Front Cooperative Grocery, Willamette Heights Neighbors Concerned About Noise and Chemical Pollution, Northwest Environmental Advocates, and OSPIRG. These responses are included in Appendix B.

State Acceptance. DEQ fully endorses this alternative and supports EPA's conclusion that Alternative 10C meets the statutory requirements for a remedy contained in CERCLA and Oregon Senate Bill 122.

SCOEPA00016021

Alternative 21 Evaluation

Under Alternative 21, all of the fill material on the Gould and off-site properties above 3000 ppm will be excavated for treatment (soil, sediments) or on-site disposal (battery casings). Contaminated soil, sediment, and matte would be treated by fixation/stabilization, then backfilled into the site excavation. Excavated battery casing materials would be disposed of in an on-site RCRA landfill. The alternative also includes pH adjustment and filtration of the East Doane Lake remnant, site grading, low-permeability surface capping, and a long-term monitoring program.

Short-Term Effectiveness. Under this alternative, the recovered battery casing fill would be stored on an adjacent property while the landfill is constructed. During remediation, worker safety issues similar to those for moderate earthmoving projects will arise. For on-site workers, safety attire will mitigate some safety concerns, however several activities will be conducted simultaneously in a relatively small area, leading to some concern over worker safety due to the intensive nature of site activity. As part of the remedial action, a comprehensive health and safety plan will be developed before field work begins.

During remediation, lead concentrations in air emissions at the fenceline of the property will be monitored to detect any exceedences of the NAAQS for lead. Proper dust suppression techniques should minimize the likelihood of this events. Most of the material to be remediated is currently saturated in groundwater, which will also help prevent fugitive emissions.

Remediation under Alternative 21 might be completed in about four years, including planning, review, contracting and construction.

Long-Term Effectiveness. The intent of this alternative is to fully mitigate potential health and environmental effects of site contaminants by completely isolating the contaminants from the environment. Enclosure of the battery casing fill in a RCRA landfill will prevent the migration of contaminants in water and air, and will limit their availability for direct ingestion. Fixation/stabilization treatment of soil, sediment and matte will also prevent contaminant migration and will decrease the mobility of these materials. Site regrading and blocking of the overflow from the East Doane Lake remnant will reduce the accumulation of runoff in the lake remnant, and decrease the movement of contaminated surface water off site. With appropriate institutional controls, the health and environmental hazards posed by the site fill are mitigated.

The removal and on-site disposal of the battery casing fill will require long term maintenance and monitoring. Frequent inspection of the cap will be required to ascertain that an impermeable barrier is maintained between the contaminants and the environment. Site monitoring equipment will require continued maintenance, as well. As a result, the effectiveness of leaving all of the contaminated battery casings untreated on-site is questionable, given concerns about the long term maintenance requirements of caps, the location of the site in a floodplain, and the effectiveness of institutional controls at this site.

SCOEPA00016022

Soil stabilization is a proven technology and was shown to be effective in a bench-scale test during the FS. Pilot testing of the technology under actual site conditions will be required during remedial design to determine the correct ratios of materials and to determine whether the technique can be effective under actual site conditions.

Reduction in Toxicity, Mobility, or Volume. On-site disposal of untreated battery casings cannot be considered a treatment that permanently or significantly reduces the toxicity or volume of hazardous substances. The mobility of contaminated soils is reduced by treatment.

Implementability. Soil stabilization is a proven technology and was shown to be effective in a bench-scale test during the FS. Pilot testing of the technology under actual site conditions will be required during remedial design to determine the correct ratios of materials and to determine whether the technique can be effective under actual site conditions.

Sediment dredging will contribute to the difficulty of subsequent treatment of East Doane Lake surface water. Excavation of the fill on the Gould and off-site properties must also include a consideration of the power lines along the northwest edge of the Gould property, which may need to be relocated because of remediation. Power supply to industrial facilities may be interrupted as a result.

Alternative 21 would be accomplished using conventional machinery and techniques. Surface capping is a proven technology, and is considered reliable. However, failure of a surface cap could require additional remediation, consisting of replacement of the cap.

During construction, monitoring systems will be installed, site drainage systems will be emplaced, and buildings will be demolished. Construction permits will be required for any off-site portion (i.e., drainage) of these activities.

During construction of the landfill, excavated wastes would have to be placed on an adjacent property. Temporary storage of excavated material must comply with 40 CFR 265.253 and 265.254. Off-site storage might also require special arrangements with state and local agencies and authorities, and special agreements with neighboring property holders.

The materials and equipment needed to implement Alternative 21 include a dredge for the sediments, common excavation equipment, a plastic geomembrane for the landfill, water treatment equipment, monitoring equipment, and a source of lime and other reagents for fixation/stabilization. All of these materials are readily available.

SCOEPA00016023

Cost. The costs associated with this alternative are divided into two categories. The first is capital cost, which includes direct costs such as excavation and landfill construction costs; sediment dredging costs, surface water treatment costs; soil fixation/stabilization costs; site grading; and installation costs asso- ciated with monitoring. Also included in capital cost are indirect costs such as permitting, engineering and design, start-up, and contingency costs. The second category of cost is operating and maintenance costs that occur throughout the multi-year remedial effort, such as excavation, placement and monitoring costs beyond year one. Operating and maintenance costs are discounted to present worth for comparison of alternatives.

	Capital Cost	O&M @ 12% Present Worth	Total Cost
Alternative 21	$9,678,453	$5,983,396	$15,661,848

Compliance with ARARs. Contaminant-specific, location specific and action specific ARARs that apply to the Gould site are contained in Appendix A. Several action specific ARARs are particular to Alternative 21. These are indicated below:

- Landfill: must comply with 40 CFR 264 standards for a hazardous waste landfill.
- Capping: must comply with 40 CFR 264 Subpart G standards for a cover over hazardous waste at closure.
- Closure with waste in place: must comply with 40 CFR 264 Subpart G standards for closure performance and post-closure care and monitoring.
- Excavation: hazardous wastes excavated and replaced on-site must be replaced in a waste management unit that complies with RCRA requirements.

All contaminant-specific, and location-specific ARARs can be met by Alternative 21. During remediation, lead concentrations in air emissions at the fenceline of the property could exceed the NAAQS for lead. However, proper design of the materials handling process and proper dust suppression techniques should minimize the likelihood of these events. Much of the material to be remediated is currently saturated in groundwater, which will also help prevent fugitive emissions.

Action- specific ARARs for Alternative 21 can be met, with details to be worked out during remedial design.

Overall Protection of Human Health and the Environment. Surficial contamination on site is reduced under Alternative 21 by on-site treatment of all contaminated soils, with stabilization/on-site disposal in a constructed landfill of these materials and battery casing components. These measures will provide long-term, effective controls for general inhalation exposures and direct contact ingestion exposures in these areas of the site, barring physical disturbance of the RCRA landfill. Stabilization of residual wastes will provide an additional component of protection if the RCRA landfill is disturbed.

SCOEPA00016024

The long-term exposures and risks after completion of Alternative 21 remediation activities are determined to be acceptable. On-site residential exposures by inhalation and ingestion result in hazard indices less than 1.00 for all age groups. Should the landfill cap become disturbed, however, these exposures could increase.

Community Acceptance. During the public comment period, most of the comments were addressed to either Alternative 2C or 10C rather than Alternative 21. However, many of the comments expressed a desire for a "complete clean-up" of the site. To the extent that Alternative 21 fails to remove lead from the battery casings, community concerns about this alternative are assumed.

State Acceptance. DEQ's position regarding this Alternative is that the agency is opposed to any alternative that will increase the number of RCRA landfills in the State of Oregon. Since there is another cost effective alternative for this site, Alternative 21 is deemed unacceptable.

SCOEPA00016025

VI SELECTED REMEDIAL ALTERNATIVE

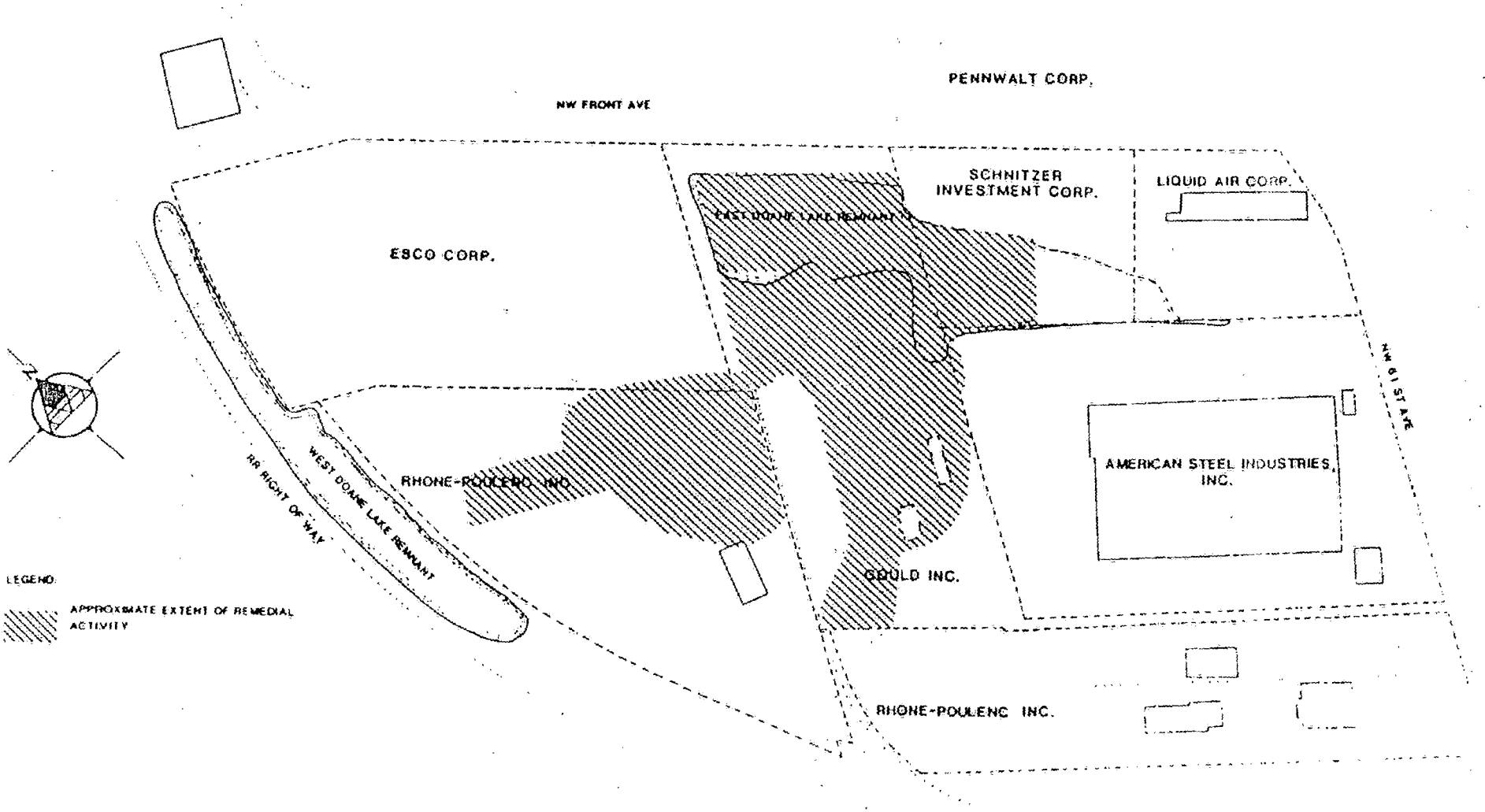
Description of Selected Remedy

The selected remedy for the soils unit at the Gould site is based on Alternative 10C. The selected remedy comprises:

- Excavation of all of the battery casing fragments and matte from the Gould property and adjacent properties where casings have been identified;
- A phased design program to determine the amount of material that can be recycled and to minimize the amount of material that must be RCRA landfilled.
- Separation of the battery casing fragments;
- Recycling of those components (or portions of components) that can be recycled, off-site disposal for non-recyclable components that fail the EP Toxicity test, and on-site disposal of non-hazardous, non-recyclable components;
- Excavation, fixation/stabilization and on-site disposal of the remaining contaminated soil, sediment, and matte;
- Soil capping and revegetation;
- Isolation of surface water runoff to East Doane Lake by site regrading; and
- A monitoring program to determine changes in groundwater contamination over time and to ensure that remediation does not adversely impact air quality.

Under Alternative 10C, additional study will be performed on surface and groundwater in this area. The proposed study will help determine whether action needs to be taken to deal with the contamination underneath the site, and how that action should be coordinated with other cleanup efforts by nearby industries that are currently going on. The study will also address organic contamination as well as lead contamination. The study should begin later this year and will be accomplished under a strict schedule.

SCOEPA00016026



Reference:
From a topographic survey map dated May 18, 1986, by D.E. Marx & Associates, Gresham, Ore., for Dames & Moore

Figure 9

Estimated Areas to be Remediated under Selecte Remedy

SCOEPA00016027

Surface soils that have a total lead content above 1,000 ppm, and sub-surface soils, matte, and the East Doane Lake sediments that fail EP Toxicity standards; will be removed and treated with a fixation additive to bind the lead in the soils matrix. The stabilized product from the soils process will be backfilled, graded, and recompacted on site. Topsoil and a vegetative cover will be placed over the backfill to prevent weathering of stabilized soil and subsequent remobilization of the metal components. Battery casings which are recyclable will be excavated and treated to separate the component materials such that they can be recycled. Output streams from the separation facility that are not recyclable, and that fail the test of EP Toxicity for lead are required under RCRA regulations to be disposed of in a RCRA landfill.

EPA intends to devote extensive design effort to developing a process that will minimize the amount of material that will require disposal in a RCRA landfill. If based on the results of the design phase, it appears that the goals of treating all of the battery casings and minimizing the amount of material requiring RCRA disposal are not compatible, an additional public comment period will be established, and the Record of Decision may be amended. At such time, EPA would present to the public other options for dealing with the treated materials.

Those output streams that cannot be recycled but pass the test of EP Toxicity, will be disposed of on site, and covered with topsoil.

SCOEPA00016028

The outfall of East Doane Lake will be blocked such that water that fails the Oregon Water Quality Standard for lead will not be discharged to the Willamette River. The processes and unit operations under the selected remedy are described below. The areal extent of remediation under the selected remedy is depicted in Figure 9.

Battery casings will be excavated and then delivered to a stockpile located adjacent to the battery casing treatment plant. The contaminated soils, sediments and matte will be removed and stockpiled adjacent to a soils treatment facility. The estimated in-situ casing and contaminated soil quantities are as shown in the following table.

	Volume (cu yd)	Mass (tons)
Surface Soils	3,370	4,300
Sub-surface Soils	13,650	17,500
Sediments	5,500	7,520
Matte	6,000	12,000
Battery Casings	80,800	86,820

The contaminated soils will be transferred to a stockpile formed adjacent to the soils treatment facility. Soils which will not be treated but were removed for ease of access and slope stability will be stockpiled and later used as backfill. This volume is estimated to be 17,800 cu. yd.

The treated soils will be back hauled to the excavation, then graded and compacted in lifts suitable for the soil type. The site will be graded to have swales and slopes to provide soil stability, drainage, and prevent run-on from adjacent areas. Top soil will be imported to provide a four-inch soil cap with a vegetative cover to prevent weathering and subsequent airborne migration.

In addition to the earthmoving required on the Gould site, the northeast section of the American Steel Industries parking lot, which drains to the lake, will require modification to reroute drainage from that facility.

To prevent excess airborne migration during surface and subsurface excavation of material, dust control by watering and other measures will be practiced as required. In addition to watering, these activities could include reduced vehicle speeds; reduced drop heights; and special enclosures and controls for conveyors. Additional design modifications may also be required to ensure that fugitive emissions are kept to a minimum. Site boundaries will be monitored to determine if air emissions of lead exceed the NAAQS. If continued excedences occur, remedial operations will be shut down and appropriate modifications to the operations will be made. Activities may also be adjusted based on meteorological conditions. A site specific health and safety plan will be developed to ensure the safety of remedial action workers.

SCOEPA00016029

The excavation of subsurface battery casings and subsequent treatment will result in an extension of East Doane Lake in the Gould property, in the Rhone-Poulenc property, and on the ESCO property. To prevent erosion, the excavation will be graveled at the shoreline and coarse gravel will be spread and graded above and below the waterline.

A treatment facility will be constructed at the site to treat contaminated surface soils, subsurface soils, sediment and matte. A typical process for treating soils consists of a comminution system to reduce the materials to a relatively uniform size, and then pugmilling with an additive to bind the metals in the soils matrix.

In the pugmilling section, the process commences at the feed hopper. Stockpiling, retrieval, material handling, and circulating loads in the crushing circuit provide a uniform blend of feed material to the pugmill. In the pugmill the feed is joined with binder additive and a predetermined amount of water, then fed to the pugmill as a water based slurry. In the pugmill the additive is driven into the soils. The additive comprise of a cement-like fixative (cement, pozzolan, lime, clays); a reducing agent, and various proprietary chemicals. The actual additive composition and its ratio will be determined by pilot testing during the design phase. The pugmill discharges the stabilized soil to a belt conveyer which transports it to a stockpile from where it will be retrieved by loader for backfilling.

A treatment facility will also be constructed at the site to treat the contaminated battery casings and produce potentially recyclable products or a reduction in material to be subsequently disposed. The process includes a comminution system to reduce the materials to a size at which they can be separated. This is followed by a series of hydroclassifiers which separate the various products in water by the differential specific gravities. Separation is performed as a function of material specific gravity and detention time in each classifier. The quantities, specific gravities, and loose bulk densities of each of the casing components are estimated to be the following:

Component	Specific Gravity	Bulk Density (lbs/cu.ft.)	Volume (cu. yd.)	Mass (tons)
Ebonite	1.40	61.21	77,642	64,148
Plastics	0.94	41.90	5,162	2,920
Met. Lead	11.34	267.73	136	493
Oxide/Mud	5.65	214.54	3,059	8,860
Rock/Slag	2.20	95.01	2,313	2,966
Other	1.50	67.00	1,405	1,268
Moisture	1.00	62.30	0	6,175
Average/Total	2.15	71.68	89,717	86,827

SCOEPA00016030

The actual volume of casings to be treated will be determined after additional design work to further define the locations of battery casings underneath the site and determine the characteristics of the subsurface casings/soil matrix that can be recycled.

It is also assumed that both the soils treatment and battery recycling plants will operate concurrently.

The separated materials from the battery separation facility will be ebonite, plastic, metallic lead, and a combined stream of lead oxide/mud. Based on the results of pilot studies it is assumed that all of the metallic lead, half of the plastic, and 25 percent of the lead oxide/mud will be potentially recyclable. Any of the ebonite, plastic, lead oxide/mud streams that fail EP Toxicity will be sent to an off-site RCRA landfill. Materials that pass EP Toxicity but which can not be recycled may be left on site. These amounts will depend on the the results of the separation step.

Rock/debris and other similar materials separated from the recycling plant feed stream will be sent to the fixation plant and treated with the soil for backfilling.

The end product of soil stabilization treatment will be tested for the appropriate physical and chemical characteristics. The design of the testing procedures will be developed after the pilot testing and selection of the particular stabilization technique. The testing program would determine treated and untreated soil properties such as porosity, permeability, wet and dry densities, particle size distribution, bulk properties, and durability. Chemical leach testing of stabilized soil, including EP Toxicity tests, will be done to predict its chemical stability.

Design Studies

A major feature of this selected remedy is the design work that will be required before the remedy can be implemented. As discussed earlier, EPA intends to devote extensive design effort to developing a process that will minimize the amount of material that will require disposal in a RCRA landfill. The design work will consist of a phased series of studies to:

- Define recyclability criteria for the subsurface casings that will be used to determine the volumes of subsurface casings that can be recycled.

- Determine the process requirements to separate the casing components in a manner that minimizes fugitive emissions. Depending on the results of initial evaluations under this step, large quantities of surface casing material may be transported to an off-site facility for recycling and equipment modification studies.

- Determine the modifications required to adapt existing separation technology to conditions at the Gould site.

- Determine the process requirements for treating contaminated soils, sediment and matte.

SCOEPA00016031

Additional Study

Under the selected remedy, additional study will be performed on surface and groundwater in this area. At present, EPA believes that the information currently available on the surface and groundwater at the site is insufficient to make a decision on remediation of those areas. The proposed study will help determine whether action needs to be taken to deal with the contamination underneath the site, and how that action should be coordinated with other cleanup efforts by nearby industries that are currently going on. The study will also address organic contamination as well as lead contamination. The study would begin later this year. EPA has notified several companies in the Doane Lake area that they may be responsible for this contamination and will be working with them to do the study.

Monitoring

The monitoring program will consist of airborne monitoring during the construction and operation period as required to ensure that the selected remedy is protective of public health and the safety of remedial action workers; and long term groundwater/surface-water monitoring. The groundwater and surface water monitoring results will be used as needed to determine whether any addition remedial measures are required for these areas.

Institutional Controls

The institutional controls that would be available to prevent contact with contaminated ground or surface water during and after remediation include site access restrictions, restrictive covenants, deed restrictions, property transfer restrictions, conveyance of subsurface rights to a third party, and private third-party agreements. A choice of the correct combination of controls to apply to the remedy during remediation will be made during remedial design. Additional post remediation controls will be determined after remediation.

Performance Standards

Soil Stabilization and Capping - Surface soils with a total lead concentration above 1,000 ppm; and subsurface soils, sediment, and matte which fail EP Toxicity standards will be treated as described above. Laboratory experiments will be performed to ensure that the stabilization process effectively immobilizes the contaminants. Stabilization will be deemed effective if the following tests are met:

1) The leachate generated during the EP Toxicity test does not contain contaminants in excess of the levels required to pass the test.

2) The stabilized material passes standard engineering strength tests to be determined in the design phase.

SCOEPA00016032

The cap shall be designed and maintained to provide protection against surface exposure of humams or animal or plant life to the stabilized soil contaminants, and protect this material from weathering. A four inch soil cover will be placed over the stabilized material and revegetated.

The stabilized material cap must also meet the following design requirements of 40 CFR 264.310.a: 1) function with minimum maintenance; 2) promote drainage; and 3) accommodate settling and subsidence so that the cap's integrity is maintained.

Battery Casings Separation. All battery casings material that fails EP Toxicity standards and passes recyclability criteria developed during the design studies will be processed in the separation facility.

Output feed streams from the separation facility must meet the following criteria:

1) Lead and lead oxide streams must meet the requirements of RCRA regarding recyclability.

2) Ebonite and plastic streams must pass EP Toxicity requirements.

Output streams which do not pass these criteria will require transportation to a RCRA landfill that meets the requirements of 40 CFR 264, and EPA's off-site policy.

Statutory Determinations

As discussed in the detailed evaluation of alternatives, the selected remedy is protective of human health and the environment. Surficial contamination on site is reduced under Alternative 1OC by on-site treatment of all recyclable battery casings (with volumes to be determined during design); with off- site disposal at a RCRA landfill of materials failing EP Toxicity tests and stabilization/on-site disposal of remaining residual materials; and pavement/capping of all disposal areas. These measures will provide long-term, effective controls for general inhalation exposures and direct contact ingestion exposures in these areas of the site. Stabilization of residual wastes will provide an additional component of protection and help prevent further long term contamination of the groundwater underneath the site from these wastes.

The selected remedy also attains ARARs for the soils unit considered in this ROD. These ARARs are specified in Appendix A. All contaminated casings and soils will be treated to ensure compliance with the EP Toxicity standard of 5 mg/l.

In comparison with the other alternatives which pass the Protectiveness/ARAR screening, the selected remedy provides a level of effectiveness and reduction in toxicity, mobility or volume that is commensurate with its cost; it is therefore cost effective. Since the remedy is considered to be the optimal choice when all nine evaluation criteria are used, it is also considered to represent treatment to the maximum extent practicable for the soils unit at this site. The selected remedy, in treating all the contaminated casings and soils, also satisfies the preference in CERCLA for treatment as a principle element.

SCOEPA00016033

APPENDIX A
APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS

APPENDIX A
APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS
LAWS AND REGULATIONS TO BE CONSIDERED

A. FEDERAL LAWS AND REGULATIONS THAT ARE ARARs FOR THE GOULD SITE

° Resource Conservation and Recovery Act (RCRA) (42 USC 6901), Subtitle C:

EP Toxicity Standards for lead, cadmium, chromium, zinc.

Landfills: must comply with 40 CFR 264 standards for a hazardous waste landfill.

Capping: must comply with 40 CFR 264 Subpart G standards for a cover over hazardous waste at closure.

Closure with waste in place; must comply with 40 CFR 264 Subpart G standards for closure performance and post-closure care and monitoring.

° Clean Air Act (CAA) (72 USC 7401):

National Ambient Air Quality Standards for lead.
Ambient Air Quality Standard 1.5 ug/m3 lead

arithmetic average concentration of all samples collected during any one calendar quarter period.

° OSHA 29CFR 1910:

Regulations governing worker safety at hazardous waste sites.

Other Action Specific ARARs

The following ARARS will be used for any wastewater discharges from remedial actions at the Gould site.

° Safe Drinking Water Act (SWDW) (42 USC 300):
Drinking Water Standards (40 CFR 141), including maximum contaminant levels (MCLs).

° Clean Water Act (CWA) (33 USC 1251):
National Pollutant Discharge Elimination System (40 CFR 122)
Water Quality Criteria (EPA440/5-86-001).

SCOEPA00016035

B. OREGON STATE LAWS AND REGULATIONS THAT ARE ARARs FOR THE GOULD SITE

Chemical Specific ARARs

Regulation	Standard
OAR 437.100.010	No employee exposure to inorganic arsenic at concentrations greater than 10 ug/m3 of air averaged over any 8 hour period.
OAR 340-31.055	Ambient Air Quality Standard of1.5 ug/m3 lead. Arithmetic average concentration of all samples collected during any one calendar quarter period.
OAR 340.20.225	Air/ Significant Emission Rate of 0.6 ton/year lead
OAR 437.111.010	No employee exposure at lead concentrations greater than 50 ug./m3 of air averaged over an 8-hour period.
OAR 340-45	Regulations Pertaining to NPDES and WPCF Permits

Suspended Particulate Matter

OAR 340-31.015

Annual Geometric Mean	60 ug/m3
24 hour concentration for more than 15 % of samples in one calendar month.	100 ug/m3
24 hour concentration not more than once per year.	150 ug/m3

Fine Particulates/ PM10

Annual Arithmetic Average	50 ug/m3
24 hour average concentration, not exceeded more than average of one day per year.	150 ug/m3

SCOEPA00016036

Action Specific ARARs

Hazardous Waste

OAR 340.100-002

(Federal Regulations Incorporated by Reference)

Capping

surface impoundments - 40 CFR 264.228

waste piles - 40 CFR 264.258(b)

landfills - 40 CFR 264.310(a)

Closure with waste in place

stabilization - 40 CFR 264.228 (a)(2) and 40 CFR 264.258(b)

install final cover - 40 CFR 264.310

30 year post closure care - 40 CFR 264.310

Operation and Maintenance - 40 CFR 264.310

Surface Water Control - 40 CFR 264.251(c),(d)
264.273(c),(d)
264.221(c)

Waste Pile - 40 CFR 264.251

Regulation	Standard
OAR 340-101	Identification and Listing of Hazardous Waste - will determine which wastes at the site are considered hazardous
OAR 340-102	Standards Applicable to Generators of Hazardous Waste - will determine which wastes at the site are considered hazardous.
OAR 340-104	Standards for Owners and Operators of Hazardous Waste Treatment, Storage and Disposal Facilities - establishes closure and post closure care of surface impoundments and waste piles.
OAR 340-108	Oil and Hazardous Material Spills and Releases -regulates emergency spill reporting and cleanup standards.
ORS 466-005 to ORS 466-995	Hazardous Waste and Hazardous Materials - Covers hazardous waste disposal and treatment, monitoring requirements.

OAR 340-130	Notice of Environmental Hazards - pertains to institutional controls at the site

Solid Waste

Regulation	Standard
OAR 340-61	Solid Waste Management - covers storage, disposal and treatment of solid waste.
ORS 459-005 to 459-355	Solid Waste Control - same as above.

Air Quality

Depending on the type of action designed, the regulations described below may contain specific requirements in addition to the chemical specific air pollution regulations cited earlier.

Regulation	Standard
OAR 340-20	Air Pollution Control - details contained in regulations cited below.
OAR 340-20-001	Highest and Best Practicable Treatment and Control Required
OAR 340-20-040	Methods
OAR 340-20-240	Requirements for Sources in Nonattainment Areas
OAR 340-20-225	Significant Emission Rate
OAR 340-20-245	Requirements for Sources in Attainment or Unclassified Areas (Prevention of Significant Deterioration)
OAR 340-21	General Emission Standards for Particulate Matter
OAR 340-31	Ambient Air Quality Standards

Oregon Occupational Safety and Health Code

Regulation	Standard
OAR 437-40	General Provisions
OAR 437-50	Personal Protective Equipment
OAR 437-83	Construction
OAR 437-100	Inorganic Arsenic
OAR 437-111	Lead
OAR 437.114	Air Contaminants
OAR 437.129	Protective Equipment. Apparel. and Respirators
OAR 437.136	General Occupational Health Regulations

Transportation of Hazardous Materials

OAR 860.66.055 to 860.66.072

Oregon Land Use Goals:

OAR 660.15.000(6)
Goal 6. Air, Water and Land Resources Quality - Establishes that discharges shall not exceed the carrying capacity of air water or land and shall not violate applicable Federal or State environmental quality statutes and regulations.

OAR 660.15.000(7)
Goal 7. Areas Subject to Natural Disasters and Hazards - Establishes that floodplain areas should be evaluated as to the degree of hazard present.

C. FEDERAL LAWS AND REGULATIONS TO BE CONSIDERED

° Safe Drinking Water Act (SWDW) (42 USC 300):
Drinking Water Standards (40 CFR 141), including maximum contaminant levels (MCLs).

° Clean Water Act (CWA) (33 USC 1251):
National Pollutant Discharge Elimination System (40 CFR 122)
Water Quality Criteria (EPA440/5-86-001).

D. STATE OF OREGON LAWS AND REGULATIONS TO BE CONSIDERED

Chemical Specific Regulations

OAR 333.61.030	0.05 mg/l Drinking Water Standard for chromium 0.05 mg/l Drinking Water Standard for lead 5 mg/l Drinking Water Standard for zinc 0.01 mg/l Drinking Water Standard for cadmium 0.05 mg/l Drinking Water Standard for arsenic
OAR 340-41-445	0.05 mg/l Lead Standard for Protection of Human Health from Water and Fish Ingestion 0.01 mg/l Chromium Standard for Protection of Human Health from Water and Fish Ingestion 0.05 mg/l Arsenic Standard for protection of Human Health from Water and Fish ingestion

Water Quality Regulations

OAR 340-41-001 to 340-41-029	State Wide Water Quality Management Plan - regulates groundwater quality.
OAR 340-41-442 to 470	Willamette Basin - establishes beneficial uses to be protected and water quality criteria not to be exceeded.

APPENDIX B
RESPONSIVENESS SUMMARY

RESPONSIVENESS SUMMARY

NL/GOULD, INC.

PORTLAND, OREGON

This community relations responsiveness summary is divided into the following sections:

PAGE

Section A: Overview. 2

This section discusses the EPA selected alternative for corrective action and public reaction to this alternative.

Section B: Background on Community Involvement and Concerns. 3

This provides a brief history of community interest and concerns raised during remedial planning and investigation activities at the NL/Gould, Inc., site

Section C: Summary of Comments Received During the Public Comment Period and EPA's Responses to the Comments.

Both written and oral comments are categorized. EPA's responses to these comments are also provided.

Section D: Remaining Concerns.

This section describes remaining community concerns that EPA should take into consideration in conducting the remedial design and remedial action at the NL/Gould, Inc., site.

OVERVIEW

At the time of the public comment period (2/18-3/18/88), EPA identified a preferred cleanup alternative for the NL/Gould site. EPA's preferred alternative involved removing the battery casings on and beneath the site and treating them for proper disposal of lead, plastic, and other materials; treating the lead contaminated soil and sediments with a chemical additive to bind the lead to the soil and keep the contamination on site; and additional studies of groundwater pollution in the Doane Lake area to decide if additional cleanup is necessary. The preferred alternative is described further in the detailed evaluation.

This Responsiveness Summary describes concerns which the community has expressed regarding the problems at the site and the preferred cleanup alternative. EPA's response to these comments are also provided.

After reviewing all the comments received during the public comment period, EPA has determined that residents of the local communities, local environmental groups, and the Oregon Department of Environmental Quality strongly support EPA's proposed alternative. Indeed, some residents and groups would go farther.

The potentially responsible parties, NL Industries and Gould, Inc., do not support EPA's preferred alternative. Instead, they recommend Alternative 2C, which is discussed in the detailed evaluation.

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BACKGROUND ON COMMUNITY INVOLVEMENT AND CONCERNS

From 1981 until 1985 when EPA assumed the enforcement lead for the site, Oregon Department of Environmental Quality (DEQ) conducted community relations activities as part of its regulatory efforts at the site.

In 1982, DEQ announced proposed listing of the NL/Gould site for the National Priorities List. There was little public response to the proposed listing. From December 1982 to September 1983, the site received moderate media publicity. General public interest in the site appeared to be low despite the intermittent media coverage.

In 1983, Oregon Congressional Representative Les AuCoin corresponded with DEQ about the site, and DEQ held a meeting with city, county, and state agency officials to present information about environmental concerns in the area and to solicit comments. Representative AuCoin specifically requested that DEQ assure him that site cleanup would completely remove potential contaminants.

EPA prepared a Community Relations Plan for this site in 1985, based on research and interviews with interested community members and officials. The issues of concern to the affected community and local officials included:

1. Groundwater Pollution. People were concerned about ground- water contamination in the area and how it might affect future growth of the area.

   EPA responded to this concern by including extensive groundwater testing in the RI.

2. Airborne Lead. Several agency officials indicated that high levels of lead emissions were a primary concern and that high levels of airborne lead could adversely affect the health of nearby workers. Exposure to lead at the approximately 10 houses in the hills above the site was thought unlikely, but necessary to investigate.

   EPA has included air monitoring in the RI.

3. Effects on Workers' Health. Individuals were concerned about exposure through incidental ingestion of ground water obtained for industrial use and exposure to airborne lead.

   EPA has included exposure scenarios for workers in the risk assessment for the site.

4. Cleanup Schedule. Staff from Representative AuCoin's office and a representative from the Oregon State Public Interest Research Group expressed dissatisfaction that cleanup measures had not been implemented earlier.

   EPA has attempted to evaluate the site and make a remedial decision in an expeditious manner. By focusing on the soils unit, a decision will be made now.

5. Future Development of the Doane Lake Area. The media and local officials expressed concern about how the current pollution would affect or restrict future uses of the land.

Future use restrictions are expected to be minimized by removing or treating as much of the lead at the site as possible.

6. Disposal of Dredged Materials from the River. A representative from the Port of Portland indicated the Port's concern about disposing of dredged materials from the Willamette River that might be found to contain contaminants from the site.

The RI included an evaluation of sediment around the outfall from East Doane Lake.

7. Environmental Investigation of Doane Lake Area. A representative from the Association of Oregon Industries and representatives of elected officials indicated concern that DEQ's environmental investigation in the Doane Lake area could decrease future industrial development and jobs in the community.

No reports of decreased industrial development as a result of these investigations has been received by EPA.

8. Disposal of Battery Casings. An aide to Representative AuCoin's office expressed dissatisfaction that battery casings had not been removed from the site. Representatives from the Portland Department of Public Works cautioned that any plan to dispose of waste materials at St. John's Landfill would be unpopular.

EPA intends to recycle as much of the battery casing components as is feasible.

During the investigation and reporting phases of the RI/FS, fact sheets were produced and mailed out to the community and the press to keep them informed of progress at the site. EPA and DEQ also consulted by phone with several prominent community members about issues of concern shortly before review and evaluation of the RI/FS produced by the contractor.

Two public meetings were held to discuss the results of these studies and EPA's proposed plan: the first on February 18th and the second on March 10th. The results of these meetings and comments received are discussed in the next section.

SECTION C

SUMMARY OF COMMENTS RECEIVED DURING THE PUBLIC COMMENT PERIOD

The comment period was held from February 16, 1988, to March 18, 1988, and included two public meetings. Comments and questions raised during the NL/Gould public comment period on the draft FS and the proposed plan are summarized briefly below. Comments are grouped and categorized by subject. Detailed comment letters from the PRPs are summarized, along with the Agency's response at the end of this section.

Approximately 50 people attended each of the two public meetings. Each meeting consisted of about 45 minutes of presentations followed by question and answer and public comment opportunities. The audience questioned EPA, the potentially responsible parties, and their consultant, Dames and Moore, about the site, the studies, the alternatives, and the Superfund process. At the first meeting, citizens requested a second public meeting and additional explanation by EPA of the preferred alternative as well as other alternatives. This resulted in the second meeting. For that meeting, the PRPs requested an opportunity to make a presentation. Dames and Moore were given about 20 minutes at the second meeting to present their results and evaluation of the remedial alternatives. Transcripts of both meetings are available in the Administrative Record.

After reviewing all the comments received during the public comment period, EPA has determined that residents of the local communities, local environmental groups, and the Oregon Department of Environmental Quality strongly support EPA's proposed plan.

Preference for Remedial Alternative

A total of 21 comments were received supporting EPA's proposed alternative and recommending the long range cleanup of the site. In addition to their support, the following more detailed comments were made:

1. The Northwest District Association's Health and Environment Committee prefer Alternative 10C. However, they recommended that the selected remedy be expanded to clean up all pollutants in the groundwater and provide continuous groundwater and air monitoring to ensure that contaminants do not migrate into the environment.

   EPA Response: The intent of the selected remedy is to insure that all health and environmental hazards posed by sediments, soils, and casings at the site are addressed by

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treatment. Monitoring and control of air emissions will be a priority during remedial design, and groundwater issues will be resolved at the conclusion of the groundwater studies planned for later this year (see Section D).

2. The Oregon Department of Environment Quality recommends Alternative 10C. DEQ does not feel that Alternative 2C will be satisfactory to the state. If 2C is implemented, there is a high probability that the site would be revisited under the state's new Superfund authority.

EPA Response: These and other concerns about Alternative 2C contributed to EPA's choice of the selected remedy described in Section VI of the ROD.

3. The Oregon State Public Interest Research Group (OSPRIG) preferred a complete cleanup of the site. Of the alternatives described in the FS, they preferred and recommended implementation of Alternative 10C. OSPRIG raised questions about how thorough the site characterization was and supported additional, more comprehensive, groundwater studies. Concerns were expressed with any solution leaving hazardous materials on site, since the site is within the 100 year floodplain of the Willamette River. OSPRIG also expressed concern about site access and casual exposure to the hazards at the site, and that there are no signs warning of the presence of hazardous waste at the site. OSPRIG also recommended setting up a working task group made up of citizens, local officials, and academics.

EPA Response: The selected remedy will address the contaminated soils, sediments, battery casings, and other solids. The current information available on the surface and groundwater at and around the site is insufficient to make a decision on how to clean up those areas at this time. EPA will propose additional remedial measures for ground and surface water, if necessary, after further studies are complete next year (see section D).

The company has been asked to take measures to restrict access and to warn of the presence of hazardous materials.

Working task groups consisting of citizens, local officials, etc., have worked in some communities and may be set up for the Gould site if there is enough interest.

4. Several other citizens expressed support for the preferred alternative and added their opinion that the community would only accept solutions that fully addressed toxicity and mobility of both surface and subsurface contaminants.

EPA Response: The selected remedy is intended to reduce the mobility, toxicity and volume of contaminants to the maximum extent practicable.

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5. The PRPs and their representative recommended Alternative 2C.

EPA Response: Alternative 2C would not meet the Superfund mandate to reduce toxicity, mobility, and volume to the extent practicable as well as the selected remedy. This recommendation and other concerns are addressed in more detail in letters from NL Industries and Gould. A summary of the concerns raised in those letters as well as EPA's detailed responses to those concerns are included at the end of this section.

Technical Concerns/Questions Regarding Remedial Alternatives

1. Resident expressed concern about reliance on institutional controls for the site.

EPA Response EPA does not believe that institutional controls alone will be protective if the contaminated material remains on site untreated. However, institutional controls may be necessary in addition to the selected remedy to ensure protection of public health.

2. Citizen asked what lead standard will EPA use at this site, the current standard or a new standard if one is proposed/promulgated before remedial action starts at the site.

EPA Response: The selected remedy is based on the current lead standard (500 parts per billion). EPA will consider changing to any new standards if they are more protective of human health or the environment.

3. Citizen asked whether the selected remedy would result in creation of a hazardous waste landfill by fixing the lead in the soil.

EPA Response: The proposed plan would not involve creating a RCRA (hazardous waste) landfill. The contaminated materials would be treated in such a way that they would no longer have the properties that would make them a hazardous waste.

4. Citizen asked whether there would be any sodium hydroxide problems with the preferred alternative.

EPA Response: There should not be any sodium hydroxide problem. A treatment facility on the site would be constructed to treat the 20,000 yards of contaminated soils. Then the clean material would be covered with some imported top soil and capped with new growth vegetation.

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5. Citizen asked whether the technology needed to recycle lead out of the casings is currently available.

   EPA Response: Pilot tests have shown that recycling is possible. Additional design work will be done to apply the technology to the Gould site.

6. Citizen asked how long monitoring would continue.

   EPA Response: Under Superfund law, monitoring may continue for an extended period of time. Under the new law, EPA is required to re-evaluate the site once every five years to determine if additional clean up is necessary.

7. Citizen asked whether Alternative 10C will involve draining the lake and dredging all the sediments.

   EPA Response: Alternative 10C will involve dredging the sediments out of the lake, not draining the lake.

8. Citizen asked whether draining the lake to reach contaminated bottom sediments would be easier than dredging sediments and then treating them.

   EPA Response: No, because the lake basically represents the surface of the groundwater at the site. If the lake was drained, it would re-fill.

9. Citizen asked what current technology is available to remove sediments in the lake.

   EPA Response: Options would include a variety of dredging systems. This is one of the items that will be dealt with in the design of the selected remedy.

10. Citizen asked about the history of filling Doane Lake and how much of it has been filled with battery casings and when was the last time it was routinely done.

    EPA Response: Based on dated aerial photos taken throughout the years, significant areas of the lake have been filled. The other remaining fill is just a variety of different types of material. NL Industries says the last time casing were used as fill was 1972.

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11. Citizen asked whether the aquifer has been examined for lead and whether it has ever been examined in times of overflow to see how much lead is going into the river.

EPA Response: River impacts have been estimated based on discharges from the overflow storm drain for East Doane Lake.

12. Citizen asked about whether there was sufficient site characterization.

EPA Response: EPA feels the site characterization was sufficient to make a decision about soils, sediments, and battery casings. There still is contaminated groundwater at the site and we do not feel that the situation there has been adequately addressed. Additional groundwater studies are being planned.

13. Citizen asked about the future use of the property.

EPA Response: The future use of the property will depend on the success of the remedial action. It is likely that some institutional controls or restriction on use of the property will be part of the final remedy; however, the full extent of those controls will not be determined until later.

Costs/Funding

1. Citizen requested information on costs and who would pay for the cleanup.

EPA Response: Since the PRPs are conducting the RI/FS, EPA will first negotiate with the PRPs to arrange to have them pay for the cleanup as well as for any costs incurred by EPA during the cleanup.

If negotiations with the PRPs fail monies could come from the federal trust fund set up for Superfund.

2. Citizens asked several questions about the basis of the price estimates for the alternatives.

EPA Response: Cost estimates are based on Superfund program guidance and general cost estimation guides. The basis for these specific cost estimates is given in Appendix C of the FS report.

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Public Participation

1. Citizens at the first public meeting expressed a concern that they had not had enough time or information to fully comment on the issues. As a result, they requested a second public meeting and additional explanation by EPA of the preferred alternative and Alternative 2C.

   EPA Response: The first public meeting was held at the Northwest Service Center, Thursday, February 18, 1988, to explain the results of the investigations and to discuss the recommended remedial alternatives. In response to requests from the citizens, EPA provided additional materials written in less-technical language explaining the alternatives and scheduled a second meeting. A second public meeting was held on March 10, 1988.

2. The PRPs requested an opportunity to speak at the second public meeting and describe in their own words their reasons for preferring Alternative 2C (Additional concerns raised by the PRPs are summarized and responded to at the end of this section).

   EPA Response: At the second meeting, EPA allowed Dames & Moore (the consulting firm which performed the RI/FS) to make a brief presentation describing the relative merits of various alternatives. At both meetings, citizens were invited to address questions directly to the PRPs and their consultants as well as to the Agency. (At the first meeting, the PRPs and consultants were given the same opportunity as all others in attendance to make comments on the record.)

Health Issues

1. Citizens expressed concern regarding long term health effects of exposure to contaminants at the site.

   EPA Response: Lead and the other contaminants at the site are known to cause developmental problems in children who are exposed, as well as renal problems. Under the No Action Alternative, the Endangerment Assessment prepared for NL and Gould showed exposures above health based levels. The selected remedy would reduce the risk of exposure to below these levels.

2. Citizen asked whether women, particularly those of child-bearing age, were more sensitive to renal problems and other potential adverse health affects, and whether that was taken into account in the studies.

   EPA Response: Based on the Endangerment Assessment, children are seem as the most sensitive group in terms of lead impacts.

3. Concern regarding reproductively-aged persons working and living close to the site and about renal toxicity.

   EPA Response: In the Endangerment Assessment, altered testicular function and renal dysfunction were among the reported effects of elevated blood lead levels.

4. Citizens and neighboring businesses have raised concerns about the health and safety of nearby workers during and after any remedial action.

   EPA Response: EPA has expressed its intent to implement the selected remedy in a manner that is fully protective of public health, based on the National Ambient Air Quality Standard for lead. Specific measures will be part of the remedial design which will be presented for public comment before implementation.

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Comments/Concerns Raised by Neighboring Businesses

1. Since ESCO corporation boundary is immediately adjacent to the NL/Gould, Inc. site, ESCO objects to any requirements which might be imposed upon ESCO or its property in connection with proposed EPA cleanup recommendations concerning the remedial work at the Superfund site.

   EPA Response: Noted.

2. Pennwalt Corporation wished to make a correction to the FS report. Pennwalt has never manufactured or even handled sodium arsenite or any other substances containing arsenic. The plant is not a hazardous waste generator and does not customarily ship wastes to Arlington. The report also infers that brine purification residue is a hazardous by-product. The residue consists of calcium carbonate and magnesium hydroxide and has a pH of 10 to 11. This material is not hazardous waste.

   EPA Response: Noted.

3. Richard Bach, attorney representing the Northwest National Gas Company, and James Benedict, attorney representing Rhone-Poulenc, Inc. both commented that it was their understanding that actions and records to date regarding the NL/Gould site would not be part of the Administrative Record for the planned groundwater study.

   EPA Response: An Administrative Record for the Record of Decision for the groundwater/surface water unit at this site will be developed. That Administrative Record will contain those documents necessary to support appropriate remedial actions.

4. The attorney for Rhone-Poulenc, Inc. raised concerns about access to the Rhone-Poulenc property during RD/RA and about possible institutional controls which might affect company property, and stated while the issues were not resolved, the company is willing to discuss those issues.

   EPA Response: EPA considers this additional reasons to question the effectiveness of institutional controls as a means of protecting public health at this site.

Comments from Potentially Responsible Parties

Concerns raised in the comment letter from NL Industries, dated March 15, 1988, are detailed and responded to below:

1) The site presents little if any threat to public health or the environment.

EPA Response: The Endangerment Assessment prepared by the PRP's does in fact show that under the No-Action Alternative AICs are exceeded for some of the exposure scenarios.

2) The site would not qualify today for inclusion on the NPL.

EPA Response: This statement is untimely and moot. Since the site is on the NPL, EPA is required by law to conduct a RI/FS study and take appropriate remedial action consistent with CERCLA. The ROD and Selected Remedy reflect the agency's attempt to do that. Based on the Endangerment Assessment prepared by Dames & Moore for NL and Gould, EPA has determined that the No-Action Alternative poses unacceptable health risks, and therefore remedial action is required at this site.

3) As indicated in the FS, only Alternative 2C is rated as "high" across-the board.

EPA Response: As indicated in the Detailed Evaluation of Alternatives section of the Record of Decision, EPA's evaluation of the Alternatives differs from NL's.

4) Alternative 10C will result in recycling 3 per cent of material.

EPA Response: Using information from the FS, Alternative 10C is estimated to recycle over 1,000 tons of lead, or about 25% of the total lead in the battery casings.

5) Implementation of Alternative 10C involves substantial air emissions.

EPA Response: EPA has reviewed Attachment 2 of NL's letter. Several assumptions and approaches used in the report lead to conservative emission estimates and correspondingly high estimated ambient lead concentrations. Namely:

* Some of the emission factors taken from AP-42 include general emission factors that are used to represent a variety of processes, including blasting. As a result, these factors are considered conservative.

* A variety of controls are available that will provide dust suppression in excess of that assumed by NL. These include biodegradable oil based dust suppressants, controls on vehicle speeds, controls on drop heights, and coverings over specific fugitive emission points. In particular, emissions from conveyors, which are responsible for most of the estimated fugitive emissions from remediation, are particularly well suited to fugitive dust controls.

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* The modeling performed in the report was done without the use of on-site or local metorological data, despite the fact that data were available for use in the model. Instead, worst case assumptions were used to genrerate a one-hour average, which was later adjusted to a quarterly average. This is an inappropriate use of the ISC model and leads to overly conservative concentration estimates. Other assumptions in the modeling which lead to conservative estimates include: simulation of sources as area sources rather than volume sources; and the close proximity of receptors to assumed area source boundaries, which the user's manaul for the ISC model indicates will generate higher estimated concentrations.

In conclusion, EPA's opinion is that NL's emission rates are conservative and that the emissions from Alternative 10C can be controlled to such an extent that the operations should comply with the lead NAAQS. It is EPA's intent to comply with this standard in implementing Alternative 10C.

7) Alternative 10C relies on unproven technology.

EPA Response: The battery recycling equipment used in the pilot studies was conventional machinery. During the pilot studies that equipment was able to recycle the material from the Gould site. EPA recognized that there were some materials handling problems associated with those tests and that those problems will require additional design work before a facility is constructed at the Gould site. However, it is EPA's opinion that the basic technology for implementing 10C is proven.

8) EPA and DEQ have failed to follow basic administrative and environmental law principles in selecting their preferred alternative.

EPA Response: EPA and DEQ, after reading the draft FS, expressed support for an alternative that represented a variation of an alterantive presented in the draft FS. It was requested that this alternative be further developed so that EPA and DEQ could evalutate it in more detail. During subsequent meetings in January, NL and Gould provided EPA and DEQ with sufficient additional information that the agencies were further able to evaluate this alternative and prepare a proposed plan for the public. This information was provided to EPA prior to the delivery of the final FS report.

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9) EPA and DEQ ignored the recommendations of the report prepared by Environmental Standards regarding risks from remedial actions.

EPA Response: EPA evaluated the report along with the FS. As the record of decision shows, EPA's evalaution of the Alternatives differs from that contained in FS report. EPA's evaluation differs from Environmental Standards on this particular issue in that EPA has expressed its intent to implement 10C in a manner that is fully protective of public health. During design estimates will be made of fugitive emissions from the designed facilities and if it appears that estimated fugitive emissions result in exceedences of the NAAQS for lead, design modifications may be required. In addition, during remediation, if violations are noted, activities will be halted or curtailed. By doing this EPA expects to minimize off site deposition of lead such that the spread of contamination from the site on to adjacent properties should not occur. By "spread of contamination" EPA means a statistically significant increase above background levels.

10) Alternative 10C is not cost effective and results in costs of $11,000 per ton of recyclables.

EPA Response: The $11,000 per ton figure appears to based on the total cost for entire remedy; the cost for the recycling portion alone appears to be far less than this. For example, the detailed costs for this alternative include estimated costs of over $2,500,000 per year to dispose of the material at a hazardous waste landfill. EPA has stated that it intends to minimize the amount of material that requires RCRA disposal. Also, in the screening of alternatives section of the Record of Decision, EPA states that the higher costs of Alternative 10C are commensurate with the higher long term effectiveness and greater reduction in volume of lead in the waste stream achieved by this remedy.

11) Institutional controls can be used effectively, those controls are as much a part of 10C as they are of 2C, and they are widely accepted by EPA.

EPA Response: Although institutional controls are mentioned in both 10C and 2C, the controls differ in the extent to which they are part of a complete remedial package. In 10C controls will be used in areas where contamination has been treated to the maximum extent practicable, while in 2C they are not. In addition, EPA questions the effectiveness of institutional controls, particularly on portions of the site that are not owned by Gould (see comment #4 on page 12).

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12) Has EPA/DEQ considered the impacts of utilizing some 80,000 yards of landfill space.

EPA Response: EPA and DEQ have considered the impacts of disposing of 80,000 yards of material in a RCRA landfill and consider them to be an undesirable requirement associated with implementing the selected remedy. EPA intends to devote extensive design effort to developing a process that will minimize the amount of material that will require disposal in a RCRA landfill. If based on the results of the design phase, it appears that the goals of treating all of the battery casings and minimizing the amount of material requiring RCRA disposal are not compatible, an additional public comment period will be established, and the Record of Decision may be modified. At such time, EPA would present to the public other options which are equally or more protective of public health that allow this material to remain on site.

13) The discrepancies between EPA's decision at this site and EPA's decision at the Newport Dump site were noted.

EPA Response: In each case it appears that EPA evaluated the site in accordance with the requirements of CERCLA. Using the same approach at different sites can result in different decisions, depending on the specific alternatives available for remediation, the specific health and environmental threats, and the laws and regulation that are considered ARARs.

14) EPA modified Alternative 10C in presenting it to the public.

EPA Response: EPA described additional work that was being done on cleaning ebonite to point out that additional steps that were possible aside from the washing steps include in the pilot studies. It is EPA's intent to design a treatment plant that is generally consistent with the processes presented in the FS by NL and Gould.

15) Inconsistencies were noted in the Supplement to the Draft Feasibility Study of Cleanup Alternatives for the NL/Gould Superfund Site.

EPA Response: The one inconsistency that has not been addressed earlier in this response involves differences between the evaluation of the protectiveness of the cap under Alternatives 2C and 10C. Although the cap under 2C is thicker, the overall protectiveness of a cap in this situation is not considered as high because of the higher levels of contamination that will exist under the cap in Alternative 2C.

Concerns raised in the comment letter from Gould, Inc., dated March 18, 1988, are detailed and responded to below:

1) Alternative 10C is so dangerous to human health and welfare and to the environment that it subjects EPA to massive third-party liability for personal injury and property damage.

EPA Response: As stated elsewhere in this Record of Decision, EPA intends to implement 10C in a manner that is protective of public health and complies with ARARs, including the NAAQS lead standard. Given EPA's intent regarding the implementation of 10C, it is not anticipated that the agency will have to rely on any shield provided by the Federal Tort Claims Act or liability limitations provided for within CERCLA as amended.

2) EPA's proposal to select Alternative 10C is not supported by the record, is inconsistent with statutory and regulatory criteria, and will be overturned by judicial review.

EPA Response: EPA believes that the selected remedy is consistent with statutory and regulatory criteria. The standard for judicial review is the arbitrary and capricious standard. EPA's selection must be upheld unless the objecting party can demonstrate on the Administrative Record that the remedy is arbitrary and capricious and an abuse of discretion or otherwise not in accordance with the law. The agency believes that its decisionmaking process as demonstrated by this Administrative Record is both deliberate and contemplative of all considerations.

3) Gould feels that for EPA to select Alternative 10C would be arbitrary, capricious, unlawful, and an abuse of decretion that will violate all applicable criteria for remedy selection.

EPA Response: See response above.

4) Gould feels it would be arbitrary, capricious, unlawful, and an abuse of discretion to select an alternative not supported by the ROD

EPA Response: See response to #2.

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5) Gould feels EPA cannot properly take public acceptance into account where it has misrepresented the record to the public.

EPA Response: The public hearings were recorded and PRP's were given sufficient opportunity to present their alternative. The agency has presented both its views and the views of the PRPs to the public during the comment period, and has complied with all requirements for public notice and comment as established by CERCLA as amended.

6) Gould feels it was unlawful for EPA to add the Portland site to the National Priorities List ("NPL")

EPA Response This statement is untimely and moot. Since the site is on the NPL, EPA is required by law to conduct a RI/FS study and take appropriate remedial action consistent with CERCLA. The ROD and Selected Remedy reflect the agency's attempt to do that.

7) If Alternative 10C is selected and implemented, EPA and the PRPs will potentially be subject to massive and costly litigation.

EPA Response: This concern as raised by Gould refers to either litigation brought by the PRP's against the agency or third party liability actions brought by other parties. As to third party liability actions, as stated elsewhere in this Record of Decision, EPA intends to implement 10C in manner that is protective of public health and complies with ARARs, including the NAAQS lead standard. Given EPA's intent regarding the implementation of 10C, it is not anticipated that the agency will have to rely on any shield provided by the Federal Tort Claims Act or liability limitations provided for within CERCLA as amended. As to PRP generated litigation, EPA considers the risk of such litigation to be endemic to the CERCLA process, especially in such instances where EPA's proposed remedy differs from that of the PRP's. Such litigative risk should not bear weight in arriving at an appropriate remedy under CERCLA as amended.

SECTION D

REMAINING CONCERNS

This section describes issues and concerns that EPA has not been able to address to date or must continue to address during RD/RA.

- How contaminated is local groundwater and what will be done about it?

  EPA Response: EPA was unable to fully address this since additional investigation is required to fully characterize local groundwater and the impacts of surrounding industries and to evaluate feasible remedies. Additional studies of a wider area are in the planning stages and results are expected by Spring or Summer of 1989.

- Citizen asked what water quality standards the remedy would have to achieve, and if we did not know, how could EPA select a cleanup alternative.

  EPA Response: EPA has decided to select a remedy for soils, sediments, and casings, but to defer the groundwater remedy until we have additional information. Cleanup and monitoring levels for ground and surface water will be determined at that time.

- Who will pay for the remedy?

  EPA Response: EPA was unable to address this since negotiations with the PRPs remain unresolved.

Citizens rasied the following concerns and questions regarding details of the design of the proposed plan/selected remedy which will have to be responded to in the remedial design process:

- How will EPA take into account BPA power lines across adjacent properties which must provide uninterrupted electrical service?

- If lead is binding to the soil, is there a saturation point and how long will it be before the lead/soils reach the saturation point and start leaching out and contaminating groundwater?

- During cleanup, will the soils at the edge of the Gould property would be disturbed?

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- What precautions will be taken to control dust and airborne lead emissions when materials are excavated and/or transported from the site? (Some related issues were addressed in answer to the PRPs concerns)

- Is there a risk that air emissions from the site could be electrically conducted and cause a risk to/from the neighboring power lines?

- Has EPA examined the existence or lack thereof of biomethylation of lead and arsenic and does the selected remedy prevent any further biomethylation.

EPA Response: **EPA will address all the above issues during remedial design.**

Citizens also requested the following:

- That EPA keep the public, including workers in the area, informed in a timely manner of the results of engineering studies, pilot tests, and other aspects of remedial design of the selected remedy. EPA will prepare and distribute fact sheets periodically and as appropriate.

  EPA Response: EPA will provide an opportunity for public comment, including a meeting, to discuss the remedial design before it is approved or completed by EPA.

- That EPA continue with the groundwater studies being planned and report back to the community.

  EPA Response: The studies will be done and EPA will provide a public comment period and meeting when results are available.

- That EPA carefully monitor and control air emissions during remediation to minimize airborne lead emissions.

  EPA Response: EPA will specify and if necessary conduct airborne emissions monitoring and control measures during RD/RA.

APPENDIX C
ADMINISTRATIVE RECORD

INDEX TO ADMINISTRATIVE RECORD FOR GOULD

Doc. No.	File	Type/Description	Date	Pages	Author/Organization	Addressee/Organization
00000001.	Pre Superfund	Letter re revised proposal for ground water monitoring program; well diagram, schedule of charges	12/24/81	9	K. C. Robbins, Dames & Moore	J.G. Papp, Gould
00000002.	Pre Superfund	Factual report Ground Water Monitoring Program, Portland plant site, Portland, Oregon	3/29/82	33	Dames & Moore on behalf of Gould, Inc.	
00000003.	Pre Superfund	Sampling report re air sampling survey at Gould site; attached sample analysis	9/13/82	9	Paul Boys, EPA	___
00000004.	Pre Superfund	Letter with attached lab analyses re ground water analyses at Gould site	11/9/82	4	Andrew Larson, Gould, Inc.	Charles R. Clinton, Oregon DEQ
00000005.	Pre Superfund	Lab analysis re Oregon Rivers Project Sample #35402, 35404, 35405, 35407, 35409, 35413, 35415, 35417, 35419, 35421, 35423, 35430	1/21/83	16	EPA Lab	___
00000006.	Pre Superfund	Maps, notes re water right applications in Gould-Rhone Poulenc area; well record and street diagram re Gould site	4/13/83	6	___	___
00000007.	Site evaluation report	Potential hazardous waste site tentative disposition; inventory--possible sources of hazardous waste; map and a diagram of Doane Lake area; potential hazardous waste site identification and preliminary assessment re Gould site	8/15/79	9	EPA	___
00000008.	Site evaluation report	Potential hazardous waste site log re Gould site	11/29/79	1	J. W. Fey, EPA	___
00000009.	Site evaluation report	Potential hazardous waste site--final strategy determination re Gould site	3/29/80	1	Robert Stamnes, EPA	___
00000010.	Site evaluation report	Potential hazardous waste site--site inspection report and diagram of air monitoring stations re Gould site	8/26/82	10	Paul Boyes, EPA	___

Doc.	Title	Type/Description	Date	Pages	Author/Organization	Addressee/Organization
00000011.	Site evaluation report	Report re visit to Gould site	2/6/85	4	—	—
00000012.	Site evaluation report	Potential hazardous waste site--site identification; attached letter from Army Corps of Engineers to EPA re identification of hazardous waste disposal sites	9/2/86	2	Homer W. Westcott, Army Corps of Engineers	—
00000013.	Site evaluation report	Description of Gould site and proposed work with attached site map	—	4	—	—
00000014.	NPL proposal/comments on proposal	Excerpt from Federal Register, Vol. Vol. 7, No. 251, re EPA, 40CFR Part 300, amendment to National Oil and Hazardous Substance Contingency Plan; The National Priorities List	12/30/82	9	—	—
00000015.	NPL proposal/comments on proposal	Excerpt from Federal Register, Vol. 48, No. 175, re EPA, 40CFR Part 300, Amendment to National Oil and Hazardous Substance Contingency Plan; National Priorities List	9/8/83	18	—	—
00000016.	Permits	EPA--Notification of Hazardous Waste Activity re Gould site	8/12/80	2	Frank E. Moore	—
00000017.	Permits	EPA--General information form, consolidated Permits Program re Gould site	11/13/80	7	Croft L. Smith, Gould, Inc.	—
00000018.	Permits	EPA--Notification of Hazardous Site re Gould site	6/3/81	1	M. E. Elmore, Gould, Inc.	—
00000019.	Permits	Letter re request by Gould, Inc., to withdraw TSD permit application for Gould site; EPA-General Information, Consolidated Permits program	8/17/81	10	David C. Ross, Gould, Inc.	Linda Dawson, EPA
00000020.	Remedial Action Master Plan	Final, Remedial Action Master Plan, Gould, Inc., Portland, Oregon	11/4/83	87	CH_2M Hill	—

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Doc. No.	File	Type/Description	Date	Pages	Author/Organization	Addressee/Organization
00000021.	Administrative Order	Administrative Order on Consent re RI/FS by Gould. EPA docket #1085-85-08-106	8/28/85	27		NL Industries, EPA, Gould, Inc.
00000022.	Sampling plans/protocol/QA&QC plans	Memo re Doanes Lake district of Portland - aquifer test	10/26/84	3	Bill Robertson/Bart Bartholomew, State of Oregon	Ernie Schmidt, State of Oregon
00000023.	Sampling plans/protocol/QA&QC plans	Letter re comments on draft Technical Resource document entitled "Solid Waste Leaching Procedure"	12/2/85	2	William K. Weddendorf, NL Industries, Inc.	Patricia Storm, EPA
00000024.	Sampling plans/protocol/QA&QC plans	Quality Assurance Plan re Gould site	4/18/86	2	—	—
00000025.	Sampling plans/protocol/QA&QC plans	Appendix C--Quality Assurance Project Plan re Gould site	9/16/86	5	—	—
00000026.	Sampling plans/protocol/QA&QC plans	Memo re water sampling and analysis methods for NL/Gould	10/27/86	1	Harlan Borow, Dames & Moore	Mark Anderson, Dames & Moore
00000027.	Sampling plans/protocol/QA&QC plans	Letter re agreement with respect to sampling and monitoring; agreement and diagram of Gould site	1/16/87	5	Mark C. Rutzick, Preston, Thorgrimson, Ellis & Holman	Patricia Cirone-Storm, EPA
00000028.	Sampling plans/protocol/QA&QC plans	Letter re change in ground water sampling procedures at NL/Gould site	2/18/87	1	Mark Anderson, Dames & Moore	Patricia C. Storm, EPA
00000029.	Sampling plans/protocol/QA&QC plans	Letter re repurge wells and Ph values at Gould site	2/25/87	1	John D. Cooper, Dames & Moore	Patricia C. Storm, EPA
00000030.	Community relations/public participation	Letter and attached copy of preliminary community relations assessment for Gould site	11/23/83	9	Nancy Jerrick, CH2MHill	Phil Millam, EPA
00000031.	Community relations/public participation	Memo re keeping Linton Community Center advised of cleanup progress at Gould site	5/23/85	1	J. A. Gillaspie, Oregon DEQ	Pat Storm, EPA
00000032.	Community relations/public participation	Community relations--work plan memo for the Gould, Inc., site	7/25/85	6	Camp Dresser & McKee, Inc.	EPA

Doc. No.	Title	Type/Description	Date	Pages	Author/Organization	Addressee/Organization
00000033.	Community relations/public participation	Fact sheet and diagram showing locations of monitoring wells and sampling points	8/13/85	4	___	___
00000034.	Community relations/public participation	Final Community Relations Plan, Gould, Inc., site, Portland, Oregon	12/85	26	Camp Dresser & McKee, Inc.	EPA
00000035.	Community relations/public participation	Gould site update and map of vicinity	1986	1	___	___
00000036.	Community relations/public participation	Statement of work, Community Relations Plan	___	3	___	___
00000148.	Community relations/public participation	Transcript of public hearing, Portland, OR	2/18/88	108	----	----
00000149.	Community relations/public participation	Transcript of public hearing, Portland, OR	3/10/88	63	----	----
00000037.	Newspaper clippings	"Toxic wastes to delay Wacker expansion," with attached diagram of Doane Lake area	6/15/85	2	Steve Jenning, The Oregonian	___
00000038.	Newspaper clippings	"Portland industrial site is unofficial toxic dump"	6/25/85	1	The Journal-American (Bellevue)	___
00000039.	Newspaper clippings	"Portland's toxic armpit"	8/8/85	6	Garrett Romaine, Willamette Week	___
00000040.	Newspaper clippings	"Gould property to undergo extensive examination" and "Superfund blasted as Superfailure"	9/10/85	1	Spencer Heinz, The Oregonian	___
00000041.	Newspaper clippings	"Superfund forges on amid identity crisis, criticisms"	9/29/85	3	Spencer Heinz, The Oregonian	___
00000042.	Newspaper clippings	EPA news release re start of investigation at Gould site	4/14/86	1	EPA	___
00000043.	Newspaper clippings	"Procedures for cleanup underway"	4/17/86	1	The Oregonian	___

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Doc. No.	File	Type/Description	Date	Pages	Author/Organization	Addressee/Organization
00000044.	Newspaper clippings	"Packwood charged with stalling on Superfund" and "Superfund a must"	9/27/86 & 9/29/86	1	The Oregonian	—
00000045.	Newspaper clippings	"Positive toxic-waste tests delay Wacker expansion in Portland"	—	1	—	—
00000046.	Workplan and modification	Gould, Inc., site--Remedial Investigation and Feasibility Study Workplan	3/31/86	372	Dames & Moore	EPA
00000125.	Workplans/modifications	Letter and attachments re RI/FS Workplan modifications	6/25/86	5	Anne M. Topker, Mark W. Anderson,	Patricia C. Storm, EPA
00000126.	Workplans/modifications	Letter and attachments re RI/FS Workplan modifications	8/22/86	3	Mark W. Anderson, Dames & Moore	Patricia C. Storm, EPA
00000132.	Work plans/modifications	North Doane's Lake Site Characterization Work Plan	6/87	95	Camp, Dresser & McKee, Inc. Dames & Moore	EPA
00000047.	Remedial investigation/draft reports--Folder 1	Remedial Investigation, NL/Gould site, Portland, Oregon--draft report, Vol. 1, text	6/1/87	272	Dames & Moore	EPA
00000048.	Remedial investigation/draft reports--Folder 1	Remedial Investigation, NL/Gould site, Portland, Oregon--draft report, Vol. 2, Appendices	6/1/87	352	Dames & Moore	EPA
00000049.	Remedial investigation/draft reports--Folder 2	Preliminary remedial technologies report, Gould, site Remedial Investigation and Feasibility Study	6/7/86	16	Dames & Moore on behalf of NL Industries and Gould, Inc.	
00000050.	Remedial investigation/draft reports--Folder 2	Hydrogeological data report--interim evaluation, NL/Gould RI/FS, Portland, Oregon; attached Plates 1A, 1B, 1C	2/27/87	104	Dames & Moore on behalf of NL Industries and Gould, Inc.	
00000051.	Remedial investigation/draft reports--Folder 2	Letter re comments on hydrogeological report prepared by Dames & Moore for Gould site	4/27/87	2	Patricia C. Storm, EPA	James E. Tracewski, NL Industries, Inc.
00000133.	Remedial Investigation/Final Reports, Folder 1	Remedial Investigation Final Report, Vol. 1, text and figures	11/16/87	290	Dames & Moore	EPA

Doc. No.	File	Type/Description	Date	Pages	Author/Organization	Addressee/Organization
00000134.	Remedial Investigation/Final Reports, Folder 2	Remedial Investigation Final Report, Vol. 2, text and figures	11/16/87	313	Dames & Moore	EPA
00000139.	Remedial Investigation/ Draft Reports - Folder #2	Cover letter regarding attached Draft Response to Comments on Hydrogeologic Issues RI Report.	9/24/87	93	Dames & Moore	David Tetta, EPA Bill Renfroe, Oregon DEQ
00000052.	Correspondence/RI/FS	Letter re EPA request to Army Corps of Engineers to act as on-site representative during RI/FS at Gould site; attached Scope of Work for technical assistance	8/28/85	3	Patricia C. Storm, EPA	Costas Zogas, Army Corps of Engineers
00000053.	Correspondence/RI/FS	Memo with attached letter, interagency agreement and workplan for agreement between EPA and Army Corps of Engineers re oversight of RI/FS at Gould site	10/4/85	6	Patricia C. Storm, EPA	Curt Lambert, EPA
00000054.	Correspondence/RI/FS	Letter re RI/FS activities at Gould site	11/14/85	2	Michael C. Veysey, Gould, Inc.	Patricia C. Storm, EPA
00000055.	Correspondence/RI/FS	Letter re issues raised at Nov. 13, 1985, meeting and RI/FS activities at Gould site	11/20/85	2	Patricia C. Storm, EPA	Michael Veysey, Gould, Inc.
00000056.	Correspondence/RI/FS	Letter and draft Response Measures Program for Surface Debris at Gould site	1/14/86	20	William K. Weddendorf, NL Industries, Inc.	Patricia Cirone-Storm, EPA
00000057.	Correspondence/RI/FS	Letter re status of surface debris at Gould site	6/9/86	2	F. R. Baser, NL Industries, Inc.	Patricia Cirone-Storm, EPA
00000058.	Correspondence/RI/FS	Letter re July 29, 1987, meeting and comments on draft Remedial Investigation Report and Feasibility Study Report	7/31/87	2	David Tetta, EPA	James E. Tracewski, NL Industries, Inc.
00000059.	Meetings: RI/FS	Schedule and agenda for Gould site briefing	8/19/85	3	—	—
00000060.	Meetings: RI/FS	Letter and proposed agenda for briefing on environmental issues by EPA	9/12/85	2	Don Larsen, EPA	Ann Warner, Office of Senator Mark O. Hatfield

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Doc. No.	File	Type/Description	Date	Pages	Author/Organization	Addressee/Organization
00000061.	Meetings: RI/FS	Notes re coordination meeting for Gould site and attached list of site contacts	11/9/85	3	Kathryn Carlson, Army Corps of Engineers	—
00000062.	Meetings: RI/FS	Memo re meeting between EPA and Oregon DEQ re hazardous cleanup at Doane Lake	5/20/86	3	Patricia C. Storm, EPA	Addressees, EPA, DEQ
00000063.	General correspondence	Letter re cleanup of Doane Lake district	1/3/86	2	Michael J. Downs, Oregon, DEQ	Chuck Findley, EPA
00000064.	General correspondence	Letter re removal of debris from Gould site by local smelter	1/21/86	1	Patricia C. Storm, EPA	Michael Veysey, Gould, Inc.
00000065.	General correspondence	Letter, handwritten notes and receipts re removal of surface debris from Gould site by local smelter	2/4/86	4	Michael C. Veysey, Gould, Inc.	Patricia C. Storm, EPA
00000066.	General correspondence	Letter re calculation of volume of rubber and crushed battery casings at Gould site	3/17/86	2	Kent W. Cox & Assocs., Inc.	James A. Gibbs, Gould, Inc.
00000067.	General correspondence	Letter re removal of surface debris from Gould site	3/21/86	2	William K. Heddendorf, NL Industries, Inc.	Patricia Cirone-Storm, EPA
00000068.	General correspondence	Letter and workplan re drum disposal/ battery casing transportation	6/10/87	6	Mark D. Schultheis, Dames & Moore	Patricia Storm, EPA, and Tom Miller, Oregon DEQ
00000069.	Feasibility study/draft report	Feasibility study, Phase B report	6/5/87	61	Dames & Moore	EPA
00000137.	Feasibility Study/Draft Reports, Binder #1	Feasibility Study, Volume 1, Text	11/19/87	310	Dames & Moore	EPA
00000138.	Feasibility Study/Draft Reports, Binder #2	Feasibility Study, Volume 2, Appendices	11/19/87	318	Dames & Moore	EPA

		Type/Description	Date	Pages	Author/Organization	Addressee/Organization
00000140.	Feasibility Study/Final Report	Feasibility Study Final Report, Vol. 1, Text	2/88	545	Dames & Moore	N.L. Industries Gould, Inc. Dave Tetta, EPA Bill Renfroe, DEQ
00000141.	Feasibility Study/Final Report	Feasibility Study Final Report, Vol. 2, Appendices	2/88	447	Dames & Moore	N.L. Industries Gould, Inc. Dave Tetta, EPA William Renfroe, DEQ
00000142.	Feasibility Study/Draft Reports/ Supplement	EPA summary and comments on Draft Feasibility Study	2/88	36	EPA	
00000147.	Feasibility Study/Final Report/EPA Comments	EPA comments on Final Feasibility Study	3/16/88	2	Dave Tetta, EPA	Jim Tracewski, NL Industries
00000070.	Treatability study	Letter and report re preliminary treatability study on lead contaminated soil	7/27/87	44	Todd K. Walles and James H. Dougherty, Weston Services, Inc.	Jim Tracewski, NL Industries, Inc.
00000071.	Treatability study	Lab report on 19 samples of various materials (Lab. No. 4793)	8/14/87	9	Barbara Gleason, Laucks Testing Labs, Inc.	Mark Schultheis, Dames & Moore
00000072.	Treatability study	Letter re request for permission to send 33-cubic-yard sample to Polycycle Industries, Inc.	8/21/87	1	David Tetta, EPA	James E. Tracewski, NL Industries, Inc.
00000073.	Treatability study	Draft work plan re collection and transportation of battery casing material from Gould site to Polycycle Industries	9/4/87	2	—	—
00000074.	Treatability study	Draft materials re initial screening of preliminary alternatives, final remedial alternatives and general response action categories and associated remedial technologies; attached chart	—	6	—	—
00000075.	Comments on RI/FS	Letter re Bonneville Power Administration's concerns about activities at Gould site and draft FS report	7/17/87	3	Judith L. Woodward, BPA	Dave Tetta, EPA
00000076.	Comments on RI/FS	Memo re comments on air monitoring portions of draft RI report prepared by Dames & Moore	7/23/87	3	John W. Schweiss, EPA	David Tetta, EPA

Doc. No.	File	Type/Description	Date	Pages	Author/Organization	Addressee/Organization
00000077.	Comments on RI/FS	Review comments on final RI	7/27/87	5	Kevin Dyer, Army Corps of Engineers	—
00000078.	Comments on RI/FS	Memo re review of quality assurance for RI at Gould site	7/27/87	1	Roy R. Jones, EPA	Dave Tetta, EPA
00000079.	Comments on RI/FS	Memo re review of NL/Gould RI	7/28/87	2	Rene Fuentes, EPA	Dave Tetta, EPA
00000145.	Comments on RI/FS	Memo re comments on endangerment assessment/Feasibility Study	1/15/87	4	Kenneth Kauffman Oregon DEQ	William Renfroe Oregon DEQ
00000146.	Comments on RI/FS	Letter re NOAA's comments on RI/FS as concerns freshwater environment	1/11/87	3	Lew Consiglieri, NOAA	Dave Tetta, EPA
00000080.	Document deleted as it is a duplicate of Document 58					
00000081.	Chain of custody	Chain of custody record re Job No. 11831-034	4/16/86	1	John Cooper, Dames & Moore	—
00000082.	Chain of custody	EPA Region 10 Laboratory--analyses required (metals); and field sample data and a Chain of Custody sheet. Lab #86160895.	4/16/86	3	John Cooper, Dames & Moore and Kevin E. Dyer	Pat Storm, EPA
00000083.	Chain of custody	EPA Region 10 Laboratory--analyses required (metals); field sample data and a chain of custody sheet. Lab #86384550-86384558.	9/18/86	4	Kevin Dyer, John Cooper, Pat Storm	Pat Storm, EPA
00000084.	Chain of custody	EPA Region 10 Laboratory--Analyses required: metals/oxygen demand, solids and nutrients/priority pollutants, organics; field sample data and chain of custody sheet. Lab #86510040-86510043.	2/27/86	6	Nancy Addison and Kevin Dyer, EPA	
00000085.	Chain of custody	EPA Region 10 Laboratory--Analysis required: metals; field sample data and chain of custody sheet. Lab #870300220-87030022.	1/12/87	4	Kevin Dyer, EPA	—

Doc. No.	Title	Type/Description	Date	Pages	Author	Addressee/Organization
00000086.	Lab reports/raw data	Memo and lab reports re Willamette River monitoring results from near Rhone-Poulenc/Gould properties. Lab #850848.	2/11/86	35	J. A. Gillaspie, Oregon DEQ	Mike Gearheard, EPA
00000087.	Lab reports/raw data	EPA Region 10 lab report re sample #86160895	7/2/86	1	EPA Region 10 Lab	---
00000088.	Lab reports/raw data	EPA Region 10 lab report re sample #86160895	7/24/86	1	EPA Region 10 Lab	
00000089.	Lab reports/raw data	Results of analysis of NL/Gould subsurface soils, groundwater and surface water	8/86-1/87	7	---	
00000090.	Lab reports/raw data	EPA Region 10 lab report re sample #86384-550 through 86384-558 (test well)	11/4/86	9	EPA Region 10 Lab	---
00000091.	Lab reports/raw data	Revised subsurface soils table	1/20/87	2	Mark Anderson, Dames & Moore	Patricia C. Storm, EPA
00000092.	Lab reports/raw data	Letter and attached table re corrections to Round 1 chemical analysis result tables for NL/Gould project	1/30/87	2	Mark W. Anderson, Dames & Moore	Patricia C. Storm, EPA
00000093.	Lab reports/raw data	EPA Region 10 lab report re sample #86-51-0040 through 86510043 (test well)	2/3/87	4	EPA Region 10 Lab	---
00000094.	Lab reports/raw data	EPA Region 10 lab report re sample #87-03-0020-22 through 87-03-0020-22 (Lake/Reservoir)	2/24/87	3	EPA Region 10 Lab	---
00000095.	Lab reports/raw data	EPA Region 10 lab report re sample #87-03-0020-22 through 87-03-0020-22	3/12/87	3	EPA Region 10 Lab	---
00000096.	Lab reports/raw data	Drum inventory re Gould site	4/6/87	11	---	---
00000097.	Lab reports/raw data	EPA Region 10 lab report re sample #87-094550-50 through 87-094550-54	4/15/87	5	EPA Region 10 Lab	---

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Doc. No.	File	Type/Description	Date	Pages	Author/Organization	Addressee/Organization
00000098.	Lab reports/raw data	Laucks Testing Laboratories lab report on water samples (lab #3932)	5/27/87	4	J. M. Owens, Laucks Testing Laboratories	Harlan Borow, Dames & Moore
00000099.	Lab reports/raw data	Remedial Investigation, NL/Gould site, Portland, Oregon, laboratory data supplement--Vol. 1	6/1/87	572	Dames & Moore on behalf of NL Industries, Inc., and Gould, Inc.	
00000100.	Lab reports/raw data	Remedial Investigation, NL/Gould site, Portland, Oregon, laboratory data supplement--Vol 2.	6/1/87	570	Dames & Moore on behalf of NL Industries, Inc., and Gould, Inc.	
00000127.	Lab reports/raw data	Sample/Project Analysis Results for sample numbers 87094550 through 87094554	2/26/87	5	EPA Lab, Region 10	
00000128.	Lab reports/raw data	Sample analysis results for sample number 86160895	4/16/86	1	EPA Lab, Region 10	
00000129.	Lab reports/raw data	Sample analysis results for sample numbers 86384550 through 86384558	9/18/86	9	EPA Lab, Region 10	
00000130.	Lab reports/raw data	Sample analysis results for sample numbers 86510040 through 86510043	12/17/86	4	EPA Lab, Region 10	
00000131.	Lab reports/raw data	Sample analysis results for sample numbers 87030020 through 87030022	1/12/87	3	EPA Lab, Region 10	
00000135.	Lab Reports/Raw Data	Remedial Investigation, Laboratory Data Supplement, Vol. 1, laboratory and QA/QC data	11/16/87	553	Dames & Moore	EPA
00000136.	Lab Reports/Raw Data	Remedial Investigation, Laboratory Data Supplement, Vol. 2, laboratory and QA/QC data	11/16/87	522	Dames & Moore	EPA
00000101.	Maps and photos	Photo analysis of Doane Lake hazardous waste burial site, Portland, Oregon	6/80	32	Office of Research and Development, EPA	---
00000102.	Maps and photos	Gould, Inc., site vicinity map	1/20/81	1	Dames & Moore	---

	Title	Type/Description	Date	Pages		
00000103.	Maps and photos	Willamette River fish runs and dredging conditions. Map located at EPA Regional file.	8/84	1	—	—
00000104.	Maps and photos	Handwritten notes and photographs re visit to Gould site on 1/13/86. Photos located at EPA Regional file.	1/13/86	7	Kevin Dyer	Pat Storm, EPA
00000105.	Maps and photos	Aerial photos of Gould site. Photos located at EPA Regional file.	2/7/86	6	—	
00000106.	Maps and photos	Diagrams of sampling and monitoring locations at Gould site	6/25/86	3	Dames & Moore	—
00000107.	Maps and photos	Letter of transmittal and map re potential areas for drum disposal at Gould site	6/8/87	2	John D. Cooper, Dames & Moore	Pat Storm, EPA
00000108.	Maps and photos	Topographic survey of Gould/NL site, Portland, Oregon. Map located at EPA Regional file.	1/27/87	3	Dale E. Marx, Dames & Moore	
00000109.	Maps and photos	Diagram of location of monitoring wells (?). Diagram located at EPA Regional file.	—	1	—	—
00000110.	Maps and photos	Study areas, Port of Portland	—	1	—	—
00000111.	Maps and photos	Map showing location of drum disposal areas at Gould site	—	1	Dames & Moore	—
00000112.	Maps and photos	Untitled map of Gould site. Map located at EPA Regional file	—	1	—	
00000113.	Maps and photos	Preliminary hydrology investigation, boring-well locations. Map located at EPA Regional file.	—	1	—	—
00000114.	Maps and photos	Aerial photo of Gould site. Photo located at EPA Regional file.	—	1	—	—

Doc. No.	File	Type/Description	Date	Pages	Author/Organization	Addressee/Organization
00000115.	Other documents	Oregon ambient water quality toxics data summary--1979 to 1983	---	88	---	---
00000116.	Other documents	Memo re recommendation for sites in Region 10 where toxicants may be suspected in fish and shellfish; summary of sites and type of analyses; bioaccumulation site selection criteria form	5/6/86	5	David A. Terpening, EPA	Program Staff, EPA
00000143.	Other documents	Toxicological Profile for Lead, Draft	2/88	202	Technical Resources, Inc.	
00000117.	Technical guidances and references	Guidances for Administrative Record--Gould site	---	2	David Tetta, EPA	---
00000119.	Adjacent sites	Letter and ground water sample testing results for Rhone-Poulenc; letter re sampling procedures and analysis of water monitoring wells for Rhone-Poulenc	8/15/84	11	R. L. Ferguson, Rhone-Poulenc, Inc.	Charles Clinton, Oregon DEQ
00000120.	Adjacent sites	Memo re Gould site and attached copy of report: Tier 2 dioxin screening, Rhone-Poulenc chemical plant, Portland, Oregon, TDD R10-8405-09 (1/85)	3/15/85	15	Janet Gillaspie, Oregon DEQ	Agencies interested in Doane Lake District
00000121.	Adjacent sites	Memo with attached copy of a preliminary report, soil investigation for proposed Polysilicon plan, Wacker Siltronic Corporation, Portland, Oregon (6/85)	8/5/85	38	J. A. Gillaspie, Oregon DEQ	Staff interested in Doane Lake, Oregon DEQ
00000122.	Adjacent sites	Memo and attached report re results of groundwater analyses recently submitted to DEQ by Wacker Siltronic Corp.	10/23/85	10	Chip Humphrey, EPA	Patricia C. Storm, EPA
00000123.	Adjacent sites	Results of ground water analyses by Wacker Filtronic Corp.	10/23/85	7	---	---
00000124.	Adjacent sites	Monitoring well locations on proposed Polysilicon sites (Wacker Filtronic Corp.)	10/23/85	1	---	---

Doc. No.	Title	Type/Description	Date	Pages	Author/Organization	Addressee/Organization
00000144.	ARAR	Applicable or relevant & appropriate requirement determinations for for feasibility study	3/7/88	9	Fred Hansen, DEQ	Robie Russell, EPA

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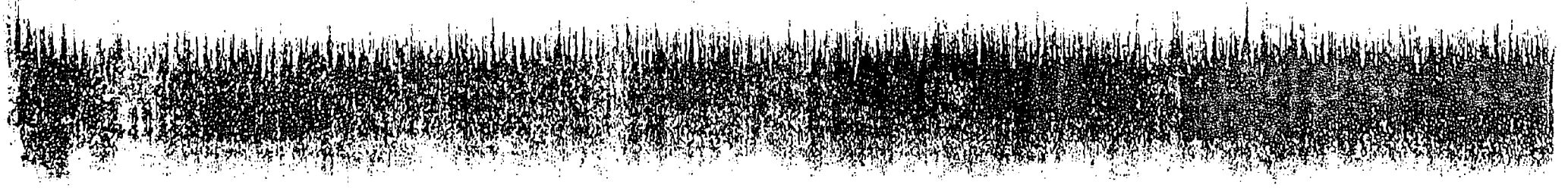
Doc. No.	File	Type/Description	Date	Pages	Author/Organization	Addressee/Organization

DOCUMENTS DELETED FROM ADMINISTRATIVE RECORD, GOULD SITE

Doc. #	Title/Description	Reason removed
00000080.	Letter re meeting on July 29, 1987, and RI/FS activities dated July 31, 1987, from D. Tetta, E	Duplicate of document #00000058
00000118.	Final Report, Field Investigation Oregon. FIT Project (sampling of ground water monitoring wells and piezometers owned by Rhone Poulenc Chemical Company to verify offsite migration of pollutants toward Doane Lake)	For internal use only



old index

#	File	Type/Description	Date	# Pages	Author/Organization	Addressee/Organization
000137.	Feasibility Study/Draft Reports, Binder #1	Feasibility Study, Volume 1, Text	11/19/87	310	Dames & Moore	EPA
000138.	Feasibility Study/Draft Reports, Binder #2	Feasibility Study, Volume 2, Appendices	11/19/87	318	Dames & Moore	EPA
000139.	Remedial Investigation/ Draft Reports - Folder #2	Cover letter regarding attached Draft Response to Comments on Hydrogeologic Issues RI Report.	9/24/87	93	Dames & Moore	David Tetta, EPA Bill Renfroe, Oregon DEQ
000140.	Feasibility Study/Final Report	Feasibility Study Final Report, Vol. 1, Text	2/88	545	Dames & Moore	N.L. Industries Gould, Inc. Dave Tetta, EPA Bill Renfroe, DEQ
000141.	Feasibility Study/Final Report	Feasibility Study Final Report, Vol. 2, Appendices	2/88	447	Dames & Moore	N.L. Industries Gould, Inc. Dave Tetta, EPA William Renfroe, DEQ
added documents						
0000142.	Feasibility Study/Draft Reports/ Supplement p. 6 [follows 000069 (00000137 - 00000142, 00000147)]	EPA summary and comments on Draft Feasibility Study	2/88	36	EPA	
0000143.	Other documents p.13 , follows 00000116	Toxicological Profile for Lead, Draft	2/88	202	Technical Resources, Inc.	
0000144.	ARAR - last document follows 00000124	Applicable or relevant & appropriate requirement determinations for for feasibility study	3/7/88	9	Fred Hansen, DEQ	Robie Russell, EPA
0000145.	Comments on RI/FS p. 9, follows 00000079	Memo re comments on endangerment assessment/Feasibility Study	1/15/87	4	Kenneth Kauffman Oregon DEQ	William Renfroe Oregon DEQ
0000146.	Comments on RI/FS "	Letter re NOAA's comments on RI/FS as concerns freshwater environment	1/11/87	3	Lew Consiglieri, NOAA	Dave Tetta, EPA
0000147.	Correspondence p. 8 follows # 00000142	EPA comments on Final Feasibility Study	3/16/88	2	Dave Tetta, EPA	Jim Tracewski, NL Industries
0000148.	Public participation p3, follows 00000036	Transcript of public hearing, Portland, OR	2/18/88	108	----	----
0000149.	Public participation "	Transcript of public hearing, Portland, OR	3/10/88	63	----	----

APPENDIX D
STATE LETTER OF CONCURRENCE

NEIL GOLDSCHMIDT
GOVERNOR

Department of Environmental Quality

811 SW SIXTH AVENUE, PORTLAND, OREGON 97204-1334 PHONE (503) 229-5696

MAR 29 1988
OFFICE OF
REGIONAL ADMINISTRATOR

March 28, 1988

Robie Russell
Regional Administrator
Environmental Protection Agency
1200 Sixth Avenue
Seattle, WA 98101

Re: Gould Proposed Plan Certification

Robie
Dear Mr. Russell:

The Oregon Department of Environmental Quality (DEQ) has carefully reviewed the EPA proposed plan for the soils unit as described in the draft final record of decision (ROD). The Department concurs with EPA's selected remedy based on alternative 10C as satisfying the statutory requirements for a remedy as required by the State of Oregon. It has been determined that the proposed remedial action complies with the applicable or relevant and appropriate requirements (ARARs) as identified to you in the Department's letter of March 7, 1988.

The alternative based on 10C maximizes the use of recycling technologies in providing a permanent solution to the contamination problem at the Gould site. This concept is in keeping with the intent of Oregon's "superfund" legislation.

Department staff are available to provide you additional information, if necessary. The appropriate DEQ contact is William Renfroe, (503) 229-6900.

Sincerely,

Fred Hansen
Director

WTR:f
ZF3002
cc: Mike Downs, HSW
Kurt Burkholder, AG
Dick Nichols, WQ
Ron Householder, AQ
Tom Bispham, AQ
Chuck Findley, EPA
Dave Tetta, EPA
Mike Gearheard, EPA 000
William Renfroe, HSW

SCOEPA00016081

APPENDIX D
STATE LETTER OF CONCURRENCE

NEIL GOLDSCHMIDT
GOVERNOR

Department of Environmental Quality

811 SW SIXTH AVENUE, PORTLAND, OREGON 97204-1334 PHONE (503) 229-5696

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OFFICE OF
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Fred Hansen
Director

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Ron Householder, AQ
Tom Bispham, AQ
Chuck Findley, EPA
Dave Tetta, EPA
Mike Gearheard, EPA 000
William Renfroe, HSW

EQ-1

SCOEPA00016083

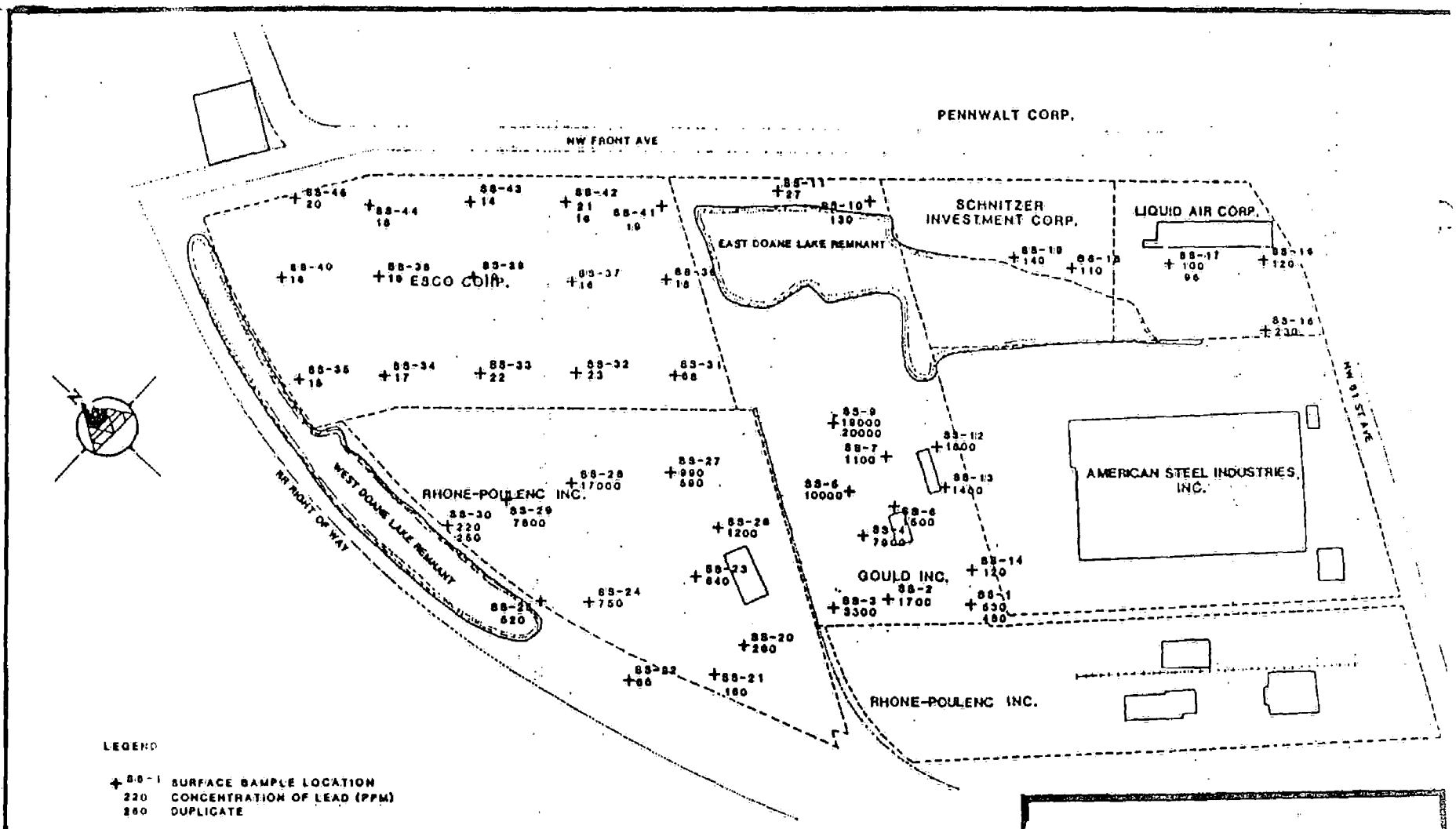


Figure 4

Lead Contamination in Surface Soils

SCOEPA00016084

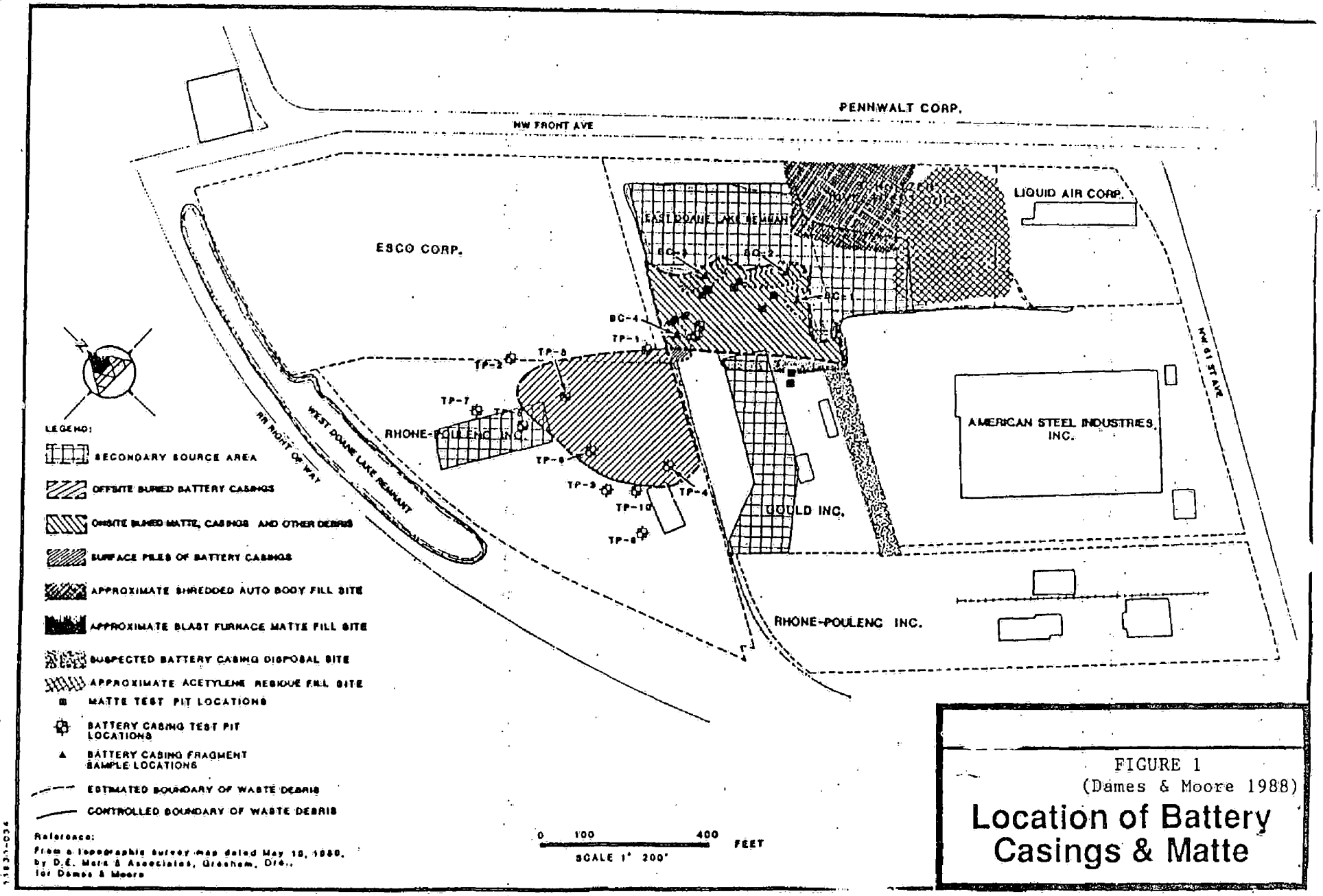


FIGURE 1
(Dames & Moore 1988)

Location of Battery Casings & Matte

SCOEPA00016085

Wacker Siltronic Corporation
P.O. Box 83180
Portland, OR 97283-0180
Phone (503) 243-2020
FAX (503) 226-0052

February 11, 1992

Fred Hansen, Director
Oregon Department of Environmental Quality
Att'n: Site Assessment Section
Environmental Cleanup Division
811 SW 6th Avenue, 9th Floor
Portland, OR 97204

Re: DEQ Proposal to List Wacker Siltronic Corporation Property on Confirmed Release List and Inventory (SDDB ID #183)

Dear Mr. Hansen:

On November 21, 1991 Wacker Siltronic Corporation (Wacker) received your letter of November 15, 1991 notifying it that the Department of Environmental Quality (DEQ) proposes to list Wacker's plant site in Portland on DEQ's "Confirmed Release List" and on its "Inventory" under Oregon's Environmental Cleanup Law (ORS 465.200 et seq.) Your letter stated that Wacker had 45 days from receipt of the notice to provide comments and that an extension of up to 45 additional days could be given for appropriate reason. Wacker applied for and was given an extension of an additional 45 days. This letter provides Wacker's comments on DEQ's proposed listings of Wacker's Portland plant site.

Enclosed with the notice letter was a "Facility Report" which the letter states "identifies the hazardous contamination at this property as well as other information we plan to include on the lists". The letter also says that 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." The report referenced in the caption is "CH2M Hill Findings Report, 12/1/90", a Groundwater and Soil Gas Investigation Report prepared for Wacker to assess the possibility that the Olympic pipeline crossing the Wacker property in a utilities corridor is the source of some hydrocarbons found in the soil along portions of the corridor. The CH2M Hill report was provided to DEQ by Wacker pursuant to its continued cooperation with the DEQ.

Wacker's comments on the proposed listings are as follows:

a. The Facilities Report lists Wacker Siltronic Corporation as "Current Legal Owner" of the plant site, which is correct, but it also lists Wacker-Chemie Gmbh as "Current Owner", which is incorrect. Wacker Siltronic Corporation, an American

corporation, is the owner of the plant site in every respect, and is its operator as well. Wacker-Chemie Gmbh, a German company, is the parent corporation of Wacker Siltronic, but it does not own the plant site, nor any interest in it. All reference to Wacker-Chemie Gmbh should be removed from the Facility Report and should not appear in any DEQ listing about the site.

b. The Facility Report lists Northwest Natural Gas as "Prior Owner/Operator". Northwest Natural Gas was indeed a former owner and operator of the site, but it is not the only former owner or operator. Wacker Siltronic Corporation acquired the property from the Portland Development Commission, which acquired the site from its prior owners and prepared it for use by Wacker. Wacker will be pleased to provide the DEQ any information it has on the chain of title of the property. In addition, available information concerning soil and groundwater contamination at the site indicates that the contamination came from other nearby properties or was caused to be there by other third parties. Wacker is confident that DEQ has the information referred to but would, of course, provide any information available to it which D.E.Q. may not have.

c. The Facility Report lists a number of substances said to have been released at the site, and it appears that all are hazardous substances under Oregon law, except perhaps the TPH if the TPH is not liquid at a temperature of 60° F and a pressure of 14.7 psi absolute. DEQ's information on this subject appears to be from the CH2M Hill report provided to DEQ by Wacker and cited in the caption of DEQ's letter and from certain other reports as well. This information appears to justify inclusion of the site on DEQ's "Confirmed Release List".

d. As stated above, the DEQ notice letter says that the site assessment report referenced in the caption (the CH2M Hill report) "provides the basis for the determination that further investigation or cleanup is needed at the site", and hence provides the basis for listing the site on DEQ's Inventory. There is, however, a great deal more information about the site already known to DEQ, including other information provided by Wacker, information developed by U.S. EPA and by responsible parties in connection with the NL/Gould Superfund site, and information developed by a group of owners of property in the NL/Gould and Doane Lake area pursuant to a consent order with DEQ. On the basis of all available information, it is reasonable to conclude that no further investigation is needed and no remedial action is needed at Wacker's site, and that the property should not be listed on DEQ's inventory.

DEQ has noted on the Facility Report that any contamination at the site is under the surface and that the groundwater under the site is not used. Indeed, any contamination in the soil is many feet under the surface, and appears to be immobile in the subsurface environment. Neither soil nor groundwater contamination at the site poses any threat to any local drinking water.

e. DEQ's notice letter states that "Listing your property does not necessarily mean that you are responsible for the contamination, investigation, or cleanup." In the case of the Wacker property, it is clear from the facts that Wacker has no legal liability for investigation costs, cleanup costs, natural resource damages or other related costs which may arise out of the presence of contamination in the soil or groundwater of its Portland plant site.

The crux of the matter is that Wacker purchased the property from the City of Portland as part of a Portland urban renewal and job development effort in which the Portland Development Commission assembled the property and prepared it for sale to and use by Wacker. Wacker was encouraged to buy the property and build its plant there by Governor Straub of Oregon, Mayor Goldschmidt of Portland, officials of the Port of Portland, the Portland Chamber of Commerce, and many others. Wacker purchased the property long after most of the contamination had come to be in the soil or groundwater. The contamination was buried deep in the site and was not at all evident. Wacker made all appropriate inquiries prior to the purchase but neither knew nor reasonably should have known of any contamination in the site. Some of the hazardous substances which may have come to the site before its purchase and all of the hazardous substances of concern coming to the site after the purchase came by migration from other property not owned by Wacker (including from the Olympic pipeline). All the hazardous substances of concern in the site came there by virtue of acts or omissions of third parties not connected in any way with Wacker.

For all these reasons, under both Oregon and federal law, Wacker is not responsible for any investigation, cleanup, natural resource damage or other similar costs arising from the contamination at the site.

Very truly yours,

WACKER SILTRONIC CORPORATION

John Pittman
Director of Engineering
cc: Marvin Durning
Rudy Staudigl
Jim Ellis
Tom McCue

SCOEPA00016088

Wacker Siltronic Corporation
P.O. Box 83180
Portland, OR 97283-0180
Phone (503) 243-2020
TDD (503) 241-7519

December 15, 1995 SER52:TM

Ms. Laurie J. McCulloch
Manager, Underground Storage Tank Section
Department of Environmental Quality
Northwest Region
2020 SW Fourth Ave., Suite 400
Portland, Oregon 97201-4987

RE: Wacker Siltronic Corporation Petroleum Contaminated Soil Closure Report

Dear Ms. McCulloch:

Attached is the closure report required under condition 18 of the Solid Waste Letter of Authorization and Permit No.: PCSLA-NWR-95-004. This permit was issued for the onsite treatment of petroleum contaminated soils discovered during construction activities associated with facility expansion at Wacker Siltronic.

Your assistance during this process was greatly appreciated. Should you have any questions regarding this report or activities conducted during the treatment operation, please contact me, Tom McCue, at 241-7532.

Sincerely,

WACKER SILTRONIC CORPORATION

Thomas C. McCue

Thomas C. McCue
Environmental Manager

cc: John Pittman
Richard Rose-DEQ

SCOEPA00016089

PETROLEUM CONTAMINATED SOILS

CLOSURE REPORT

Prepared for

Wacker Siltronic Corporation

by

Deaver Environmental Group, Inc.

December 14, 1995

SCOEPA00016090

PETROLEUM CONTAMINATED SOILS
CLOSURE REPORT

The following data is provided to comply with condition 18 of the Petroleum Contaminated Soil Treatment Permit (#PCSLA-NWR-95-004) issued to Wacker Siltronic Corporation by DEQ on April 17, 1995 and amended on May 12, 1995.

Disposal Documents

1) St. John's Landfill - Property Owner Statement of Final Soil Disposition (includes reuse of all treated soils as clean cover material)

2) Permit #2306 with Sanifill Northwest - Hillsboro Landfill (includes contaminated soils from scraping the treatment area, and soils excavated from hot spots, hay bales, and plastic sheeting)

3) Oregon Hydrocarbon, Inc. - Soil Data and Certification Sheet (includes contaminated soils from treatment area identified during field screening)

4) Spencer Invoice for disposal of leachate removed from excavated areas prior to starting excavation work each morning. Leachate was processed through an oil/water separator. The oil was sent to Spencer for recycle and the water went to the Wacker wastewater treatment system and discharged under the Industrial Pretreatment Permit.

Description of Work Related to Closure

All treated soils processed through the MSRU (Mobile Soil Remediation Unit) met the permitted constituent levels and were sent to St. John's Landfill for use as clean cover material.

After treatment activities had ceased, the following closure activities occurred in the contaminated soil staging and treatment areas.

SCOEPA00016091

1) Prior to removing the MSRU, soils in the treatment and staging areas were scraped to a level of six inches and areas directly underneath the equipment were hand excavated. The soils were collected and treated in the MSRU and sent to St. John's Landfill for use as clean cover material.

2) The MSRU was removed from the site.

3) Areas with visible contamination (dark spots in the soil) where the treatment equipment had been located were scraped again, and the soils sent off-site to Oregon Hydrocarbon, Inc. for treatment by thermal desorption. The area where the treatment equipment had been located was sampled (Sample #'s 95-576 - 95-579) using both composite and grab sample methods. All samples exceeded the 100 mg/kg for TPH, however, none of the samples exceeded the 40 mg/kg standard for TPH-G.

4) The entire treatment area including the area where the treatment equipment had been located and the area where the contaminated soil had been staged prior to treatment was scraped to a depth of one foot.

5) Seventeen (17) soil samples were collected on a grid pattern from the treatment area and analyzed per methods TPH-G and TPH-418.1M. Three areas with levels of TPH exceeding 100 mg/kg were further excavated to a depth of three feet (Sample #'s 95-580 thru 95-596).

6) The soil scraped from the above areas was then sampled for Benzene (Sample #95-597). Based on the analytical results, the soil was sent to Hillsboro Landfill under Permit #2306.

7) The six locations where hydrocarbons had been detected in the previous sampling, and locations immediately around them, were then resampled (13 sample points) and analyzed per methods TPH-D and TPH-418.1M (Sample #'s 95-598 thru 95-610). Analytical results for all sample locations were below the maximum allowable contaminant level of 100 mg/kg for

waste oil, heating oil and heavy oil contaminated soil (by DEQ Method TPH-418.1) established by the Permit. No analysis was done for TPH-G based on results from 20 earlier samples indicating that gasoline levels were below 40 mg/kg (Sample #'s 95-576 thru 596).

All conditions of the Solid Waste Letter of Authorization have been met and the area used for staging and treatment of the contaminated soils has been covered with gravel and is currently being used for temporary parking to support construction activities on the site.

Attachments:

1) St. John's Landfill - Property Owner Statement of Final Soil Disposition
2) Sanifill Northwest - Hillsboro Landfill Permit #2306
3) Oregon Hydrocarbon, Inc. - Soil Data and Certification Sheet
4) Spencer Invoice
5) Wacker site map showing location of treatment area
6) Sample #'s 95-576 thru 95-579 and map
7) Sample #'s 95-580 thru 95-596 and map
8) Sample # 95-597
9) Sample #'s 95-598 thru 95-610 and map

ATTACHMENT 1

PROPERTY OWNER STATEMENT

FINAL SOIL DISPOSITION

FACILITY INFORMATION

(UST cleanup project where soils originated)

DEQ File Number assigned to site: 080-0962537737

Facility Name: Wacker Siltronic

Facility Address: 7200 N.W. Front Ave
Portland, Oregon 97210

FINAL DISPOSITION SITE INFORMATION

(Property where treated soils will be placed once treatment is complete)

Site Address: 9363 N. Columbia Blvd.
Portland OR 97203

Tax Lot No.(s): Sec 36, T.2N R.1W, WM County: Multnomah

Approximate size of property:

Acres: 250 or Sq. Ft.: _____ or Dimensions: _____

Property Owner Name: Metro

Mail Address: 600 NE Grand Ave
Portland, OR 97232

Phone Number: (503) 797-1652

THE PROPERTY OWNER WHERE THE TREATED SOILS WILL BE DEPOSITED MUST SIGN AND DATE THE FOLLOWING STATEMENT:

As the owner of the property listed above which will receive the treated soil from the UST cleanup project also listed above once treatment is complete, I agree to ensure that the soils will be placed on my property such that they are 1) above seasonal high groundwater levels, 2) not located near wetlands or surface water, 3) not located within a 100 year floodplain, and 4) will be placed out of human contact or possible exposure. I also understand that I may be jointly responsible and liable for any future problems arising from this soil disposition activity.

Signature: Paul Davis, Program Supp. Date: 18 Apr 95

This signed statement must be included with the Soil Treatment Plan.

DEPARTMENT OF ENVIRONMENTAL QUALITY - April, 1993

WACKER - PROCESS TEL:503-241-7599 Apr 18 95 13:45 No.004 P.03

SCOEPA00016095

ATTACHMENT 2

JUL 21 '94 09:58 FROM WACKER SILTRONIC LANDFILL TO 2417599 P.03

Permit No: 2306

Approval Expiration: 9/12/95

APPROVED

SANIFILL NORTHWEST

Northern Wasco County Landfill, Hillsboro Landfill, Riverbend Landfill

Generator's Special Waste Profile Sheet

IMPORTANT: This form must be completed by a Representative of the Waste Generator. The information on this form must be typed or legibly printed in ink and signed by an Authorized Agent of the Generator. Completed form bearing original signature must be provided PRIOR TO DISPOSAL.

1.0 Generator Information

1.1 Generator Name: Wacker Siltronic — 1.5 Generator's EPA ID No: ORD 096 253 737

1.2 Site of Waste Generation: Wacker Siltronic
Facility Address: 2300 NW East Avenue — 1.6 Facility Phone:
City: Portland State: OR Zip: 97210 (503) 243-2020

1.3 Technical Contact: Sandra Archer/Chip Bloomer — 1.7 Technical Contact Phone:
Title: Environmental Engineer (503) 243-2020

1.4 General Site Activity: Manufacture Silicon Wafers

2.0 Waste Description

2.1 General Waste Description: Thermally Desorbed Soil

2.2 Process Generating Waste: Excavation

2.3 Is this Waste "Hazardous Waste" as defined by Federal, State or Local Regulations: ____ Yes X No

2.4 Has this waste ever been "handled" or "Disposed" of as hazardous: ____ Yes X No
____ Material ____ Waste ____ Disposed of via a "uniform hazardous waste manifest".
If yes, explain: ____

2.4 Waste Generation Rate: 250 Tons ____ Cubic Yards ____ Other: ____
Per: ____ Day X Week ____ Year ____ Other ____ One Time Disposal? ____ Yes ____ No.

2.6 Waste will be transported in: ____ Roll Off Boxes ____ Drums (Type/Size): ____
X Dump Trucks ____ Other: ____

3.0 Waste Properties at Room Temperature

3.1 Physical State:
X Solid ____ Semi Solid
____ Powder ____ Liquid
____ Combination ____ Other: ____

3.2 Odor: X None ____ Mild ____ Strong

3.3 pH Range: 6.0 to 8.0

3.4 Color(s): Black

3.5 Percent Solid: 99 %

3.6 Flash Point F: X None ____ <140° F
____ 140° - 199° F ____ >200° F

RETURN APPLICATION TO:
Hillsboro Landfill, Inc.
3205 SE Minter Bridge Rd.
Hillsboro, Oregon 97123
PH: 503-640-9427
FAX: 503-648-2490

TOTAL P.03

SCOEPA00016097

SANIFILL NORTHWEST

Special Waste Permit Management Decision

APPROVED

Special Waste Permit No.: Z306

Permit Expiration Date: 9/12/95

Generators' Name: Wacker Siltronic

Address of Waste Generation: 7200 NW Front Ave.

City: Portland State: OR

General Waste Description: clean up soil, petroleum contaminated

Landfill Action: Disposal of the above described special waste is:

Approved ✓ Disapproved ____ for disposal at Hillsboro Landfill

at the disposal rate of $ 57.86 per Ton $ ____ Per trip min/charge

Waste Acceptance Mgr. Signature: Ellen L. Ries Date: 6/12/95 ELR

Precautions, Conditions, or Limitations on Approval: ____

If disapproved, reason for denial of permit ____

Credit/Billing Information

Accept ____ Reject ____ By: ____

Comments: ____

Landfill Account No. WAC001

ATTACHMENT 3

Portland, Oregon Soil Recycling Facility	OREGON HYDROCARBON INC. (a TPS Technologies Inc. company) SOIL DATA AND CERTIFICATION SHEET	Date: 1-23-95

Generator and/or Client:	Consultant/Engineering Firm:
Waker Sultronics 700 N.W. Front Portland, Ore. 97209	Spencer, Inc 914 S. Molalla Ave Oregon City, Ore. 97045

Testing Laboratory (include contact person and phone #):	Sampling procedures and location (attach add'l sheets and map)
North Creek Analytical Howard Holmes (503) 241-7599	SEE grid Composite Samples from Boxes

Site History (list address, describe contamination type, contamination source, how contamination was stored, past activities at site - Attach additional sheet if necessary)	Estimated Qty (Tons):
Pipe line spills / Riverfill non-Hazardous Soil	30-200 TONS State Classification: non-Haz.

Please check appropriate box below and attach all required analytical reports, including test methodologies used. Unless otherwise noted, composite samples should be collected with the following frequency: One (1) sample for 250 tons or less; two (2) samples for 500 tons or less and one (1) additional sample for each 500 additional tons.

☐ I/We certify that the soil referenced herein is contaminated solely by virgin petroleum products from leaking underground storage tank(s).

Attach analysis for the following:
1. Total Petroleum Hydrocarbons ID test (Method TPH-HCID)
2. If Method TPH-HCID shows gasoline is present, perform a Total Petroleum Hydrocarbons test for gasoline (Method TPH-G or EPA Method 8020)
3. If Method TPH-HCID shows that diesel, heating oil, and/or Bunker C are present, perform Total Petroleum Hydrocarbons tests for fuel oils (EPA Method 418.1 Modified)
4. If Method TPH-HCID shows that both gasoline and diesel or heating oils are present, then both types of TPH test must be performed.

☒ I/We certify that some or all of the contaminants in the soil referenced herein is waste oil, or some other non-virgin petroleum product or virgin petroleum from something other than a leaking underground storage tank.

Attach analysis for the following:
1. Total Petroleum Hydrocarbons ID test (Method TPH-HCID)
2. If Method TPH-HCID shows gasoline is present, perform a Total Petroleum Hydrocarbons test for gasoline (Method TPH-G or EPA Method 8020)**
3. If Method TPH-HCID shows that diesel, heating oil, and/or Bunker C are present, perform Total Petroleum Hydrocarbons tests for fuel oils (EPA Method 418.1 Modified)
4. If Method TPH-HCID shows that both gasoline and diesel or heating oils are present, then both types of TPH test must be performed.
5. Halogenated Volatile Organic compounds (EPA Method 8240)
6. PCB's and Halogenated Pesticides (EPA Method 8080)
7. TCLP (EPA Method 1311) metals concentration for a) through h):
   a) arsenic c) cadmium e) lead g) selenium
   b) barium d) chromium f) mercury h) silver

** If elevated benzene levels are detected, an additional TCLP benzene test may be required in an above-ground spill or leak situation.

No soils referenced herein may be delivered until the foregoing certificate is received and approved by OHI, and OHI issues manifests and assigns a delivery date. If any soils delivered to OHI are found to be "hazardous waste" pursuant to federal or state regulations, Client shall be solely responsible for their removal. If Client fails to so remove such soils, OHI, acting as Client's agent, may arrange for such removal at Client's expense.

This is a complete and accurate description of the soil referenced herein; no deliberate or willful omissions have been made and all known or suspected hazards have been disclosed herein. I/We further hereby certify that the soil is not "hazardous" as defined by U.S. Department of Transportation (DOT), U.S. Environmental Protection Agency (EPA), State or local regulations.
All required analysis reports are attached.

Generator's Authorized Signatory: X Chip Bl[illegible] Date: X 1/25/95

Print Name: X Chip Bloom Title: X Engr.

Engineer/Environmental Firm Authorized Signatory: Christina Lemper Date: 1-23-95

Print Name: Christina Lemaera Title: [illegible]

JAN 24 '95 03:48PM SPENCER ENVIRO. P.2

SCOEPA00016100

OREGON HYDROCARBON INC.

est No.: 09-01066 Time In 10:26 Time Out 10:40 Date 01-27-95

mer Name: SPENCER/WAKER
7200 NW FRONT AVE
PORTLAND, OR

Gross: 59760 lb INB
Tare : 31980 lb
Net : 27780 lb

Load No.: 003
ansporter: SPENCER
ver's Name: KIRK MORGAN
action No.: 008138

Net Tons : 13.89

PORTLAND, OR

AVG. PPM Levels

Designated Facility Name and Site Address
TPS/OREGON HYDROCARBON
9333 NORTH HARBORGATE STREET
PORTLAND, OR 97203

Facility's Phone No.: (503) 735-9525
GLENNA MULLAN
(503) 240-1712

Facility Permit Number

Transporter Name and Mailing Address

Transporter's Phone No.

Transporter's USEPA ID No.

Person to Contact

Transporter's DOT No.

Customer Account Number with TPS

Soil Description & Type	Moisture Content	Contaminated by:	Approx. Qty.	Description of Drilling Mud	Gross Weight	Tare Weight	Net Weight
Sand ☐ Organic ☐ Clay ☐ Other ☐	0-10% ☐ 10-20% ☐ 20%-over ☐	Gas ☐ Diesel ☐ Other ☐			59760	31980	27780
Sand ☐ Organic ☐ Clay ☐ Other ☐	0-10% ☐ 10-20% ☐ 20%-over ☐	Gas ☐ Diesel ☐ Other ☐				13.89	

List any exception to items listed above:

Generator's and/or consultant's certification: I/We certify that the soil referenced herein is taken entirely from those soils described in the Soil Data Sheet completed and certified by me/us for the Generation Site shown above and nothing has been added or done to such soil that would alter it in any way.

Print or Type Name: Generator ☐ Consultant ☐ | Signature and date: | Month | Day | Year

Transporter's certification: I/We acknowledge receipt of the soil described above and certify that such soil is being delivered in exactly the same condition as when received. I/We further certify that this soil is being directly transported from the Generation Site to the Designated Facility without off-loading, adding to, subtracting from or in any way delaying delivery to such site.

Print or Type Name: Kirk Morgan | Signature and date: | Month 1 | Day 27 | Year 95

Discrepancies:

Recycling Facility certifies the receipt of the soil covered by this manifest except as noted above:

Print or Type Name: Glenna Mullan | Signature and date: Glenna Mullan 1-27-95

TRANSPORTER'S COPY

JAN 31 '95 02:06PM SPENCER ENVIRO. P.2

SCOEPA00016101

R2 166 BACK to BAKER

Soil Recycling | Manifest

OREGON HYDROCARBON INC.

ifest No.: 09-01066 Time In 12:09 Time Out 12:24 Date 01-27-95

omer Name: SPENCER/WAKER
7200 NW FRONT AVE
PORTLAND, OR

Gross: 56140 lb INB
Tare : 31880 lb
Net : 24260 lb
Net Tons : 12.13

Load No.: 004
ransporter: SPENCER
ver's Name: KIRK MORGAN
action No.: 008139

Generator and/or Consultant

Destination: TPS/OREGON HYDROCARBON 9333 NORTH HARBORGATE STREET PORTLAND, OR 97203	Facility: 503 Person: GLENNA MULLAN FAX: (503) 240-1712	
Transporter Name and Mailing Address:	Transporter's Phone #:—	Transporter's US EPA ID No.:
	Person to Contact:	Transporter's DOT No.:
	FAX #:	Customer Account Number with TPS:

Description of Soil	Moisture Content	Contaminated by	Approx. Dry	Description of Delivery	Gross Weight	Tare Weight	Net Weight
Sand ☐ Organic ☐ Clay ☐ Other ☐	0-10% ☐ 10-20% ☐ 20%-over ☐	Gas ☐ Diesel ☐ Other ☐			56140	31880	24260
Sand ☐ Organic ☐ Clay ☐ Other ☐	0-10% ☐ 10-20% ☐ 20%-over ☐	Gas ☐ Diesel ☐ Other ☐				12.13	

List any exception to items listed above:

Generator's and/or consultant's certification: I/We certify that the soil referenced herein is taken entirely from those soils described in the Soil Data Sheet completed and certified by me/us for the Generation Site shown above and nothing has been added or done to such soil that would alter it in any way.

Print or Type Name: Generator ☐ Consultant ☐ Signature and date: Month Day Year

Transporter

Transporter's certification: I/We acknowledge receipt of the soil described above and certify that such soil is being delivered in exactly the same condition as when received. I/We further certify that this soil is being directly transported from the Generation Site to the Designated Facility without off-loading, adding to, subtracting from or in any way delaying delivery to such site.

Print or Type Name: Kirk Morgan Signature and date: Month Day Year 27 95

Facility

Discrepancies:

Recycling Facility certifies the receipt of the soil covered by this manifest except as noted above:

Print or Type Name: Glenna Mullan Signature and date: Glenna Mullan 1-27-95

Please print or type. TRANSPORTER'S COPY

JAN 31 '95 02:07PM SPENCER ENVIRO P.3

SCOEPA00016102

P-2 134 TO BAKER

OREGON HYDROCARBON INC.

No.: 09-01066 Time In 14:49 Time Out 15:07 Date 01-27-95

Name: SPENCER/WAKER
7200 NW FRONT AVE
PORTLAND, OR

Gross: 57840 lb INB
Tare : 32620 lb
==========
Net : 25220 lb

d No.: 005
orter: SPENCER
Name: KIRK MORGAN
n No.: 008145

Net Tons : 12.61

RTLAND, OR

SYOREGON HYDROCARBON 33 NORTH HARBORGATE STREET RTLAND, OR 97203	(503) 735-9525 GLENNA MULLAN (503) 240-1712	Facility Permit Numbers
ter Name and Mailing Address:	Transporter's Phone #:	Transporter's US EPA ID No.:
	Person to Contact	Transporter's DOT No.:
	FAX #:	Customer Account Number with TPS:

ription of Soil	Moisture Content	Contaminated by:	Approx. Qty	Description of Delivery	Gross Weight	Tare Weight	Net Weight
Organic ☐ Other ☐	0-10% ☐ 10-20% ☐ 20%-over ☐	Gas ☐ Diesel ☐ Other ☐			57840	32620	25220
Organic ☐ Other ☐	0-10% ☐ 10-20% ☐ 20%-over ☐	Gas ☐ Diesel ☐ Other ☐				12.61	

xception to items listed above:

er's and/or consultant's certification: I/We certify that the soil referenced herein is taken entirely from those soils described in the Soil eet completed and certified by me/us for the Generation Site shown above and nothing has been added or done to such soil that would n any way.

ype Name:	Generator ☐	Consultant ☐	Signature and date:	Month	Day	Year

rter's certification: I/We acknowledge receipt of the soil described above and certify that such soil is being delivered in exactly the same n as when received. I/We further certify that this soil is being directly transported from the Generation Site to the Designated Facility off-loading, adding to, subtracting from or in any way delaying delivery to such site.

ype Name:	Signature and date:	Month	Day	Year
Kirk Morgan	[signature]	1	27	95

ocies:

acility certifies the receipt of the soil covered by this manifest except as noted above:

ype Name:	Signature and date:
Glenna Mullan	Glenna Mullan 1-27-95

r type: TRANSPORTER'S COPY

JAN 31 '95 02:08PM SPENCER ENVIRO

SCOEPA00016103

TPS Technologies Soil Recycling
Non-Hazardous Soils

Manifest #

Facility #:	Given by TPS:	Load #
09	01066	001

OREGON HYDROCARBON INC.

est No.: 09-01066 Time In 08:26 Time Out 08:37 Date 01-27-95

mer Name: SPENCER/WAKER
7200 NW FRONT AVE
PORTLAND, OR

Gross: 50580 lb INB
Tare : 32760 lb
Net : 17820 lb
Net Tons : 8.91

Load No.: 001
ansporter: SPENCER
r's Name: KIRK MORGAN
tion No.: 008135

Generator and/or Consultant

Designated Facility Name:
TPS/OREGON HYDRO...
9333 NORTH HARBORGATE STREET
PORTLAND, OR 97203
(503) 240-1714

Transporter Name and Mailing Address | Transporter's Phone # | Transporter's US EPA ID No.
Transporter's DOT No.
Customer Account Number with TPS:

Description of Soil	Moisture Content	Contaminated by	Approx. Qty	Description of Delivery	Gross Weight	Tare Weight	Net Weight
Sand ☐ Organic ☐ Clay ☐ Other ☐	0-10% ☐ 10-20% ☐ 20%-over ☐	Gas ☐ Diesel ☐ Other ☐			50580	32760	17820
Sand ☐ Organic ☐ Clay ☐ Other ☐	0-10% ☐ 10-20% ☐ 20%-over ☐	Gas ☐ Diesel ☐ Other ☐				8.91	

st any exception to items listed above:

erator's and/or consultant's certification: I/We certify that the soil referenced herein is taken entirely from those soils described in the Soil Sheet completed and certified by me/us for the Generation Site shown above and nothing has been added or done to such soil that would t in any way.

Type Name: Generator ☐ Consultant ☐ | Signature and date: | Month | Day | Year

Transporter

Transporter's certification: I/We acknowledge receipt of the soil described above and certify that such soil is being delivered in exactly the same condition as when received. I/We further certify that this soil is being directly transported from the Generation Site to the Designated Facility without loading, adding to, subtracting from or in any way delaying delivery to such site.

Print or Type Name: X Kirk Morgan | Signature and date: X [signature] | Month 1 | Day 27 | Year 95

Discrepancies

Recycling Facility

Recycling Facility certifies the receipt of the soil covered by this manifest except as noted above:

Print or Type Name: Glenna Mullan | Signature and date: [signature] 1-27-95

Please print or type.

TRANSPORTER'S COPY

JAN 31 '95 02:09PM SPENCER ENVIRO

SCOEPA00016104

OREGON HYDROCARBON INC.

nifest No.: 09-01066 Time In 08:33 Time Out 08:51 Date 01-27-95

stomer Name: SPENCER/WAKER
7200 NW FRONT AVE
PORTLAND, OR

Gross: 64020 lb INB
Tare : 33860 lb
Net : 30160 lb

Load No.: 002
Transporter: SPENCER
Driver's Name: JOHN LARSON
ansaction No.: 008137

Net Tons : 15.08

3 2 3 5 Loads 5 Boxes Total 62.62 62.62 Tons

PORTLAND, OR

FAX #: A.V.C. Owed

Generator and/or Consultant

Generator's Name and Mailing Address: OREGON HYDROCARBON
9333 NORTH HARBORGATE STREET
PORTLAND, OR 97203

Generator's Phone #: (503) 730-9525
Person to Contact: GLENNA MULLAN
FAX #: (503) 240-1712

Facility Permit Number: 37

Transporter Name and Mailing Address:

Transporter's Phone #:
Person to Contact:
FAX #:

Transporter's US EPA ID No.:
Transporter's DOT No.:
Customer Account Number with TPS:

Basic Description of Soil(s)	Moisture Content	Contaminated By	Approval Code	Additional Description for Waste	Quantity	Unit Weight	Net Weight
Sand ☐ Organic ☐ Clay ☐ Other ☐	0 - 10% ☐ 10 - 20% ☐ 20% - over ☐	Gas ☐ Diesel ☐ Other ☐			64/60	3386	30160
Sand ☐ Organic ☐ Clay ☐ Other ☐	0 - 10% ☐ 10 - 20% ☐ 20% - over ☐	Gas ☐ Diesel ☐ Other ☐				15.08	

List any exception to items listed above:

Generator's and/or consultant's certification: I/We certify that the soil referenced herein is taken entirely from those soils described in the Soil Data Sheet completed and certified by me/us for the Generation Site shown above and nothing has been added or done to such soil that would alter it in any way.

Print or Type Name: Generator ☐ Consultant ☐ Signature and date: Month Day Year

Transporter

Transporter's certification: I/We acknowledge receipt of the soil described above and certify that such soil is being delivered in exactly the same condition as when received. I/We further certify that this soil is being directly transported from the Generation Site to the Designated Facility without off-loading, adding to, subtracting from or in any way delaying delivery to such site.

Print or Type Name: X John Larsson Signature and date: X John Larsson Month 01 Day 27 Year 95

Discrepancies:

Recycling Facility

Recycling Facility certifies the receipt of the soil covered by this manifest except as noted above:

Print or Type Name: Glenna Mullan Signature and date: Glenna Mullan 1-27-95

Please print or type

TRANSPORTER'S COPY

JAN 31 '95 02:10PM SPENCER ENVIRO. P.6

SCOEPA00016105

ATTACHMENT 4

(503) 655-0896

Spencer, Inc.

FAX: (503) 657-3395

PO BOX 5207
OREGON CITY, OREGON 97045-8207

INVOICE #
3140

* * I N V O I C E * *

Mar 22 95

ILL TO:
WACKER SULTRONIC
7200 NW FRONT
PORTLAND, OR

97209

LOCATION:
WACKER SULTRONIC
7200 NW FRONT
PORTLAND, OR

97209

JST #		PO #	BILLING	TERMS 1.5% 10DAYS	DUE DATE	ORDER #
56145	KS	42106	Mar 24 95	NET 30 DAYS	Apr/23/95	3707

SAMPLE STEAM WASH BAY OIL/WATER SEPARATOR AND THEN PUMP IT OUT AS

008-0SRV-0055-0SUR	SERVICE CALL CHARGE (INDU	1.00	125.00EA	125.00
006-0NLQ-SE3 -0SUR	NON-HAZ LIQUID DISPOSAL (	661.00	0.50GA	330.50
007-LAB -NET -0000	VOLATILES/PURGEABLES (624	1.00	200.00EA	200.00
007-LAB -NET -0002	TCLP 8-LAB ANALYSIS (	1.00	200.00EA	200.00

RDERED BY: LYNN ERICKSON @243-2020 EXT 157

0.00
0.00
0.00

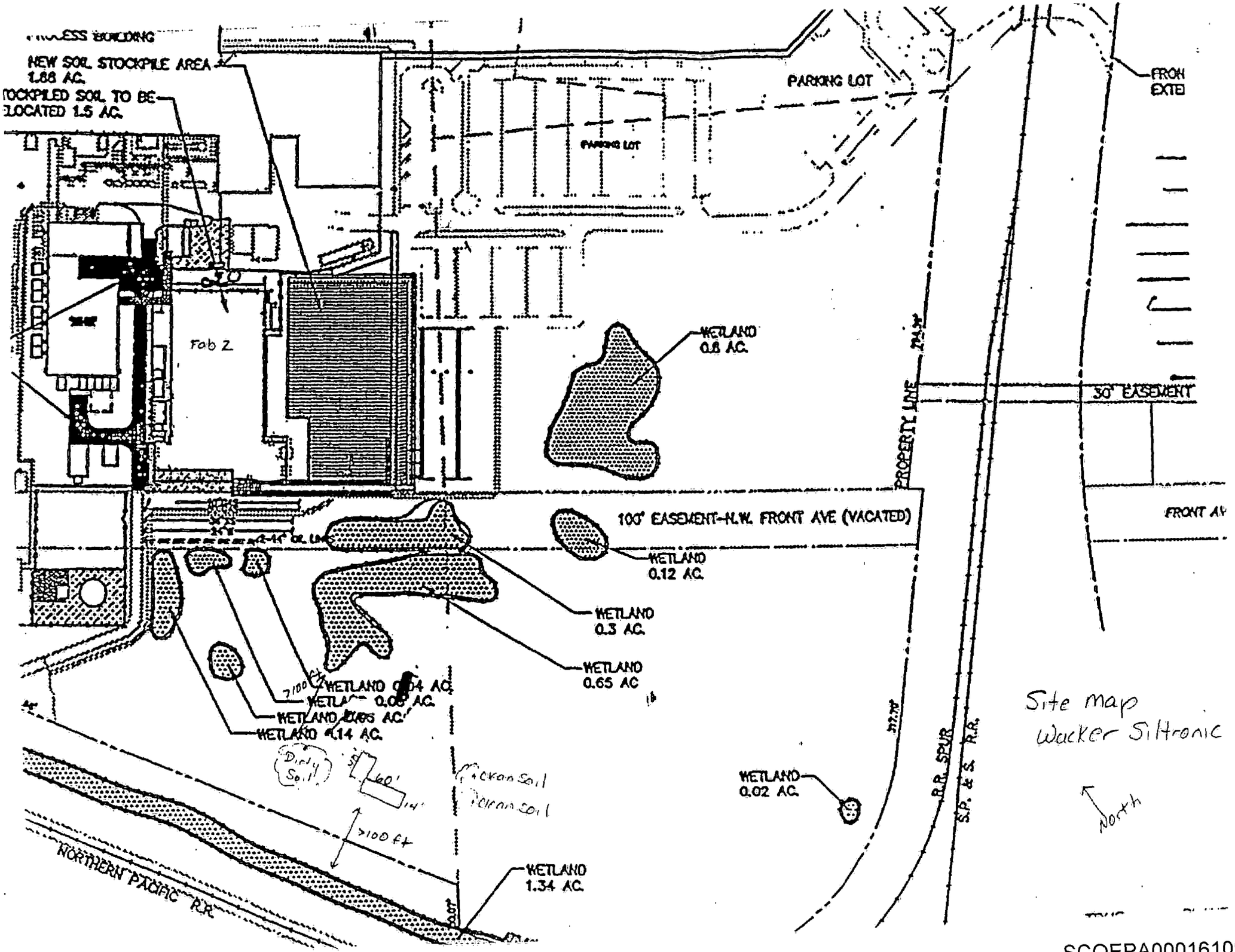
855.50

NANCIAL CHARGE of 1½% per month may be applied to any Past Due amount. Past . Accounts may be placed on C.O.D. without notification. If outside collection action is essary purchaser shall pay all costs of collection including reasonable attorney fees.

PAY THIS AMOUNT →

SCOEPA00016107

ATTACHMENT 5



SCOEPA00016109

ATTACHMENT 6

NORTH CREEK ANALYTICAL

18939 120th Avenue N.E., Suite 101 • Bothell, WA 98011-9508 (206) 481-9200 • FAX 485-2992
East 11115 Montgomery, Suite B • Spokane, WA 99206-4776 (509) 924-9200 • FAX 924-9290
9405 S.W. Nimbus Avenue • Beaverton, OR 97008-7132 (503) 643-9200 • FAX 644-2202

RECEIVED JUN 30 1995

TPH-G per Oregon DEQ (C6-C10)

Results In mg/kg (ppm)

Client: Wacker Siltronic Corporation
Project: FAB-2

NCA Project #: P506332
Matrix: soil
Sampled: 06/23/95
Received: 06/23/95

Client ID	Lab ID	Analyte	Results	MRL	Date Prepared	Date Analyzed
95-576-Composite	P506332-1	Gasoline/Related	6.9	2.0	06/26/95	06/26/95
95-577-grab	P506332-2	Gasoline/Related	7.2	2.0	06/26/95	06/26/95
95-578-grab	P506332-3	Gasoline/Related	ND	2.0	06/26/95	06/26/95
95-579-grab	P506332-4	Gasoline/Related	ND	2.0	06/26/95	06/26/95

MRL Method Reporting Level
ND None Detected at or above the method reporting level
* See Comment Section at end of report

SCOEPA00016111

NORTH CREEK ANALYTICAL

18939 120th Avenue N.E., Suite 101 • Bothell, WA 98011-9508 (206) 481-9200 • FAX 485-2992
East 11115 Montgomery, Suite B • Spokane, WA 99206-4776 (509) 924-9200 • FAX 924-9290
9405 S.W. Nimbus Avenue • Beaverton, OR 97008-7132 (503) 643-9200 • FAX 644-2202

RECEIVED JUN 3 0 1995

TPH-D per Oregon DEQ (C10-C28)
Results In mg/kg (ppm)

Client: Wacker Siltronic Corporation
Project: FAB-2

NCA Project #: P506332
Matrix: soil
Sampled: 06/23/95
Received: 06/23/95

Client ID	Lab ID	Analyte	Results	MRL	Date Prepared	Date Analyzed
95-576-Composite	P506332-1	Diesel/Related	1,200	25	06/26/95	06/27/95
95-577-grab	P506332-2	Diesel/Related	350 *1	25	06/26/95	06/27/95
95-578-grab	P506332-3	Diesel/Related	100	25	06/26/95	06/27/95
95-579-grab	P506332-4	Diesel/Related	300	25	06/26/95	06/27/95

MRL Method Reporting Level
ND None Detected at or above the method reporting level
* See Comment Section at end of report

SCOEPA00016112

NORTH CREEK ANALYTICAL
18939 120th Avenue N.E., Suite 101 • Bothell, WA 98011-9508 (206) 481-9200 • FAX 485-2992
East 11115 Montgomery, Suite B • Spokane, WA 99206-4776 (509) 924-9200 • FAX 924-9290
9405 S.W. Nimbus Avenue • Beaverton, OR 97008-7132 (503) 643-9200 • FAX 644-2202

RECEIVED JUN 3 0 1995

TPH-418.1M per Oregon DEQ
Results in mg/kg (ppm)

Client: Wacker Siltronic Corporation
Project: FAB-2

NCA Project #: P506332
Matrix: soil
Sampled: 06/23/95
Received: 06/23/95

Client ID	Lab ID	Analyte	Results	MRL	Date Prepared	Date Analyzed
95-576-Composite	P506332-1	TPH	290	100	06/26/95	06/27/95
95-577-grab	P506332-2	TPH	950	500	06/26/95	06/27/95
95-578-grab	P506332-3	TPH	180	100	06/26/95	06/27/95
95-579-grab	P506332-4	TPH	670	100	06/26/95	06/27/95

MRL Method Reporting Level
ND None Detected at or above the method reporting level
* See Comment Section at end of report

SCOEPA00016113

NORTH CREEK ANALYTICAL
18939 120th Avenue N.E., Suite 101 • Bothell, WA 98011-9508 (206) 481-9200 • FAX 485-2992
East 11115 Montgomery, Suite B • Spokane, WA 99206-4776 (509) 924-9200 • FAX 924-9290
9405 S.W. Nimbus Avenue • Beaverton, OR 97008-7132 (503) 643-9200 • FAX 644-2202

RECEIVED JUN 3 0 1995

TCLP VOC's per EPA 8240

Results In mg/kg (ppm)

Client:	Wacker Siltronic Corporation	**NCA Project #:**	P506332
Project:	FAB-2	**Matrix:**	soil
		Sampled:	06/23/95
		Received:	06/23/95

Client ID	Lab ID	Analyte	Results	MRL	Date Prepared	Date Analyzed
95-576-Composite	P506332-1	Benzene	ND	0.010	06/26/95	06/26/95
		Carbon Tetrachloride	ND	0.010		
		Chlorobenzene	ND	0.010		
		Chloroform	ND	0.010		
		1,4-Dichlorobenzene	ND	0.010		
		1,2-Dichloroethane	ND	0.010		
		1,1-Dichloroethene	ND	0.010		
		Methyl Ethyl Ketone	ND	0.13		
		Tetrachloroethene	ND	0.010		
		Trichloroethene	ND	0.010		
		Vinyl Chloride	ND	0.025		
95-577-grab	P506332-2	Benzene	ND	0.010	06/26/95	06/26/95
		Carbon Tetrachloride	ND	0.010		
		Chlorobenzene	ND	0.010		
		Chloroform	ND	0.010		
		1,4-Dichlorobenzene	ND	0.010		
		1,2-Dichloroethane	ND	0.010		
		1,1-Dichloroethene	ND	0.010		
		Methyl Ethyl Ketone	ND	0.13		
		Tetrachloroethene	ND	0.010		
		Trichloroethene	ND	0.010		
		Vinyl Chloride	ND	0.025		
95-578-grab	P506332-3	Benzene	ND	0.010	06/26/95	06/26/95
		Carbon Tetrachloride	ND	0.010		
		Chlorobenzene	ND	0.010		
		Chloroform	ND	0.010		
		1,4-Dichlorobenzene	ND	0.010		
		1,2-Dichloroethane	ND	0.010		
		1,1-Dichloroethene	ND	0.010		
		Methyl Ethyl Ketone	ND	0.13		
		Tetrachloroethene	ND	0.010		
		Trichloroethene	ND	0.010		
		Vinyl Chloride	ND	0.025		

MRL Method Reporting Level
ND None Detected at or above the method reporting level
* See Comment Section at end of report

SCOEPA00016114

CREEK ANALYTICAL
18939 120th Avenue N.E., Suite 101 • Bothell, WA 98011-9508 (206) 481-9200 • FAX 485-2992
East 11115 Montgomery, Suite B • Spokane, WA 99206-4776 (509) 924-9200 • FAX 924-9290
9405 S.W. Nimbus Avenue • Beaverton, OR 97008-7132 (503) 643-9200 • FAX 644-2202

RECEIVED JUN 3 0 1995

TCLP VOC's per EPA 8240
Results In mg/kg (ppm)

Client: Wacker Siltronic Corporation
Project: FAB-2

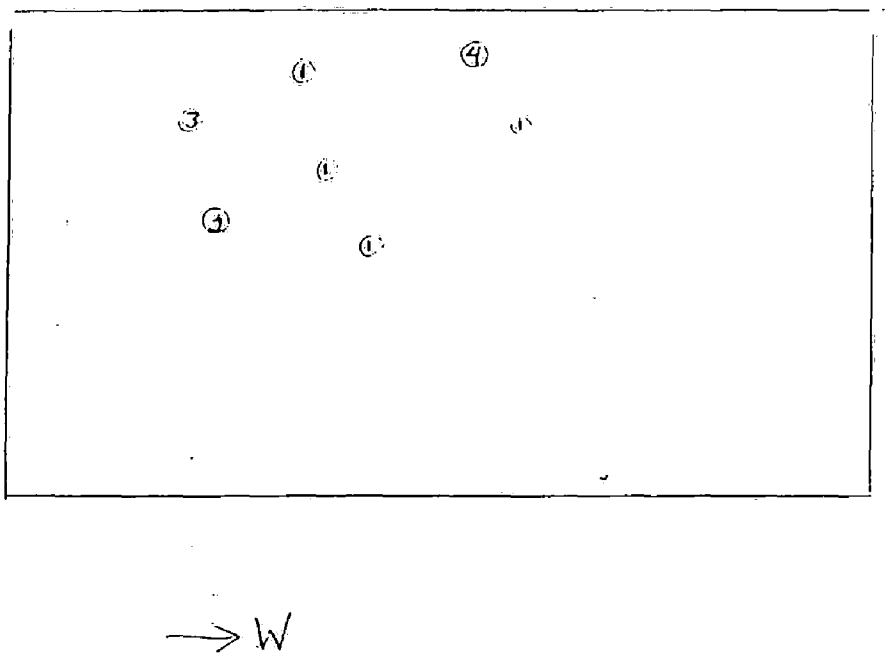
NCA Project #: P506332
Matrix: soil
Sampled: 06/23/95
Received: 06/23/95

Client ID	Lab ID	Analyte	Results	MRL	Date Prepared	Date Analyzed
95-579-grab	P506332-4	Benzene	ND	0.010	06/26/95	06/26/95
		Carbon Tetrachloride	ND	0.010		
		Chlorobenzene	ND	0.010		
		Chloroform	ND	0.010		
		1,4-Dichlorobenzene	ND	0.010		
		1,2-Dichloroethane	ND	0.010		
		1,1-Dichloroethene	ND	0.010		
		Methyl Ethyl Ketone	ND	0.13		
		Tetrachloroethene	ND	0.010		
		Trichloroethene	ND	0.010		
		Vinyl Chloride	ND	0.025		

MRL Method Reporting Level
ND None Detected at or above the method reporting level
* See Comment Section at end of report

SCOEPA00016115

Soil Sample index: after Pemco model off site
June 23, 1995 - sample 95-576, 577, 578, 579



①: Composite sample site of 400mls from each site #95-576

②: grab sample #95-577

③: grab sample #95-578

④: grab sample #95-579

ATTACHMENT 7

NORTH CREEK ANALYTICAL
18939 120th Avenue N.E., Suite 101 • Bothell, WA 98011-9508 (206) 481-9200 • FAX 485-2992
East 11115 Montgomery, Suite B • Spokane, WA 99206-4776 (509) 924-9200 • FAX 924-9290
9405 S.W. Nimbus Avenue • Beaverton, OR 97008-7132 (503) 643-9200 • FAX 644-2202

TPH-G per Oregon DEQ (C6-C10)
Results In mg/kg (ppm)

Client: Wacker Siltronic Corporation
Project: FAB-2

NCA Project #: P506392
Matrix: soil
Sampled: 06/29/95
Received: 06/30/95

Client ID	Lab ID	Analyte	Results	MRL	Date Prepared	Date Analyzed
95-580	P506392-1	Gasoline/Related	ND	2.0	06/30/95	06/30/95
95-581	P506392-2	Gasoline/Related	ND	2.0	07/03/95	07/03/95
95-582	P506392-3	Gasoline/Related	ND	2.0	06/30/95	06/30/95
95-583	P506392-4	Gasoline/Related	ND	2.0	06/30/95	06/30/95
95-584	P506392-5	Gasoline/Related	ND	2.0	06/30/95	06/30/95
95-585	P506392-6	Gasoline/Related	ND	2.0	06/30/95	06/30/95
95-586	P506392-7	Gasoline/Related	2.8	2.0	06/30/95	06/30/95
95-587	P506392-8	Gasoline/Related	6.9	2.0	06/30/95	06/30/95
95-588	P506392-9	Gasoline/Related	ND	2.0	06/30/95	06/30/95
95-589	P506392-10	Gasoline/Related	ND	2.0	06/30/95	06/30/95
95-590	P506392-11	Gasoline/Related	ND	2.0	06/30/95	06/30/95
95-591	P506392-12	Gasoline/Related	ND	2.0	06/30/95	06/30/95
95-592	P506392-13	Gasoline/Related	ND	2.0	06/30/95	06/30/95
95-593	P506392-14	Gasoline/Related	ND	2.0	06/30/95	06/30/95
95-594	P506392-15	Gasoline/Related	ND	2.0	06/30/95	06/30/95
95-595	P506392-16	Gasoline/Related	ND	2.0	06/30/95	06/30/95
95-596	P506392-17	Gasoline/Related	ND	2.0	06/30/95	06/30/95

MRL Method Reporting Level
ND None Detected at or above the method reporting level
* See Comment Section at end of report

SCOEPA00016118

NORTH CREEK ANALYTICAL
18939 120th Avenue N.E., Suite 101 • Bothell, WA 98011-9508 (206) 481-9200 • FAX 485-2992
East 11115 Montgomery, Suite B • Spokane, WA 99206-4776 (509) 924-9200 • FAX 924-9290
9405 S.W. Nimbus Avenue • Beaverton, OR 97008-7132 (503) 643-9200 • FAX 644-2202

TPH-418.1M per Oregon DEQ
Results In mg/kg (ppm)

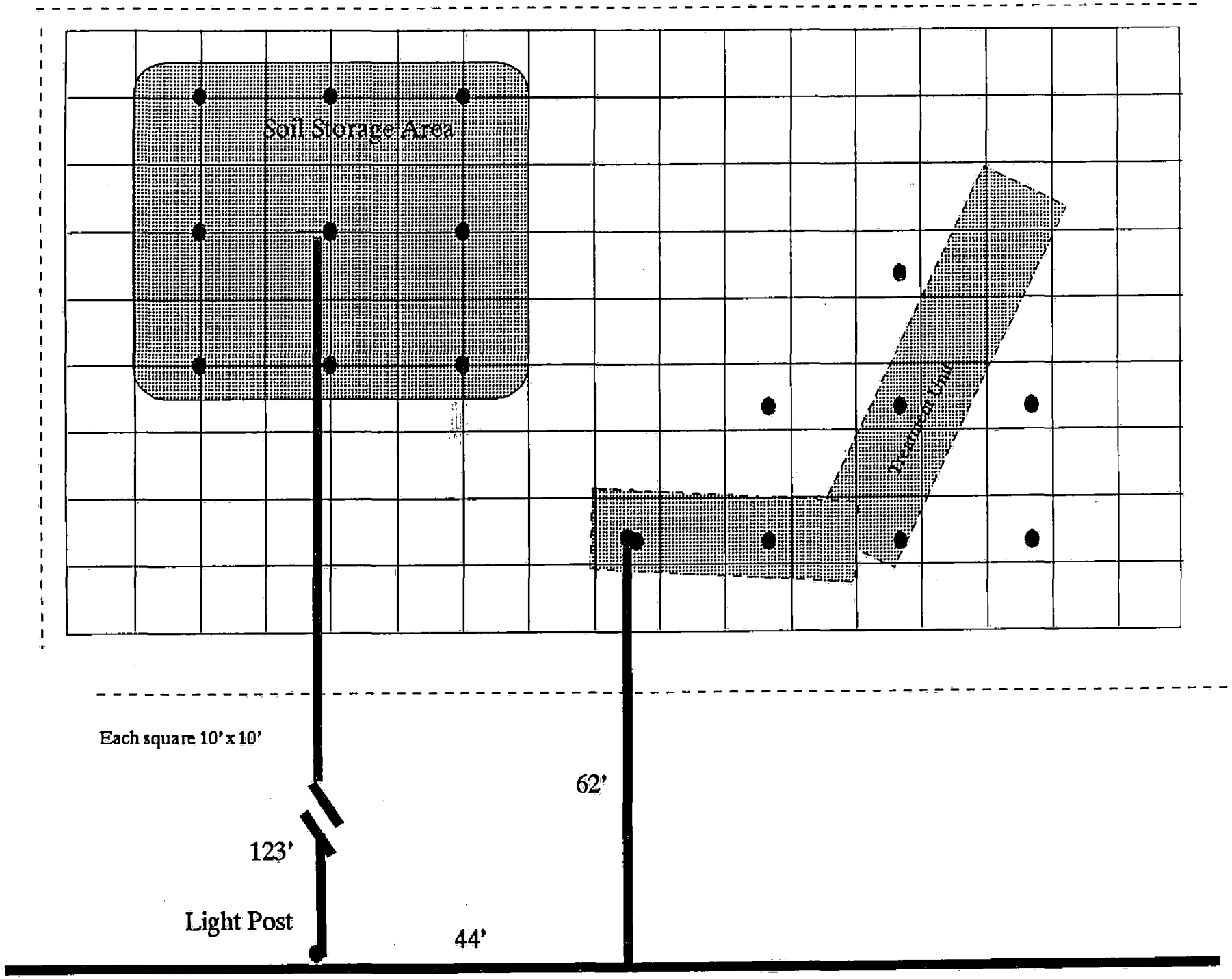
Client: Wacker Siltronic Corporation
Project: FAB-2

NCA Project #: P506392
Matrix: soil
Sampled: 06/29/95
Received: 06/30/95

Client ID	Lab ID	Analyte	Results	MRL	Date Prepared	Date Analyzed
95-580	P506392-1	TPH	ND	20	06/30/95	07/05/95
95-581	P506392-2	TPH	360	20	06/30/95	07/05/95
95-582	P506392-3	TPH	43	20	06/30/95	07/05/95
95-583	P506392-4	TPH	ND	20	06/30/95	07/05/95
95-584	P506392-5	TPH	ND	20	06/30/95	07/05/95
95-585	P506392-6	TPH	ND	20	06/30/95	07/05/95
95-586	P506392-7	TPH	140	20	06/30/95	07/05/95
95-587	P506392-8	TPH	430	20	06/30/95	07/05/95
95-588	P506392-9	TPH	ND	20	06/30/95	07/05/95
95-589	P506392-10	TPH	ND	20	06/30/95	07/05/95
95-590	P506392-11	TPH	ND	20	06/30/95	07/05/95
95-591	P506392-12	TPH	22	20	06/30/95	07/05/95
95-592	P506392-13	TPH	ND	20	06/30/95	07/05/95
95-593	P506392-14	TPH	ND	20	06/30/95	07/05/95
95-594	P506392-15	TPH	29	20	06/30/95	07/05/95
95-595	P506392-16	TPH	ND	20	06/30/95	07/05/95
95-596	P506392-17	TPH	ND	20	06/30/95	07/05/95

MRL Method Reporting Level
ND None Detected at or above the method reporting level
* See Comment Section at end of report

SCOEPA00016119


Soil Storage Area
Property Line
Each square 10' x 10'
62'
123'
Light Post
44'

ATTACHMENT 8

CREEK ANALYTICAL
18939 120th Avenue N.E., Suite 101 • Bothell, WA 98011-9508 (206) 481-9200 • FAX 485-2992
East 11115 Montgomery, Suite B • Spokane, WA 99206-4776 (509) 924-9200 • FAX 924-9290
9405 S.W. Nimbus Avenue • Beaverton, OR 97008-7132 (503) 643-9200 • FAX 644-2202

BTEX per EPA 8020
Results In ug/kg (ppb)

Client: Wacker Siltronic Corporation
Project: FAB-2

NCA Project #: P507082
Matrix: soil
Sampled: 07/10/95
Received: 07/10/95

Client ID	Lab ID	Analyte	Results	MRL	Date Prepared	Date Analyzed
95-597	P507082-1	Benzene	55	13	07/11/95	07/11/95

MRL Method Reporting Level
ND None Detected at or above the method reporting level
* See Comment Section at end of report

SCOEPA00016122

ATTACHMENT 9

NORTH CREEK ANALYTICAL
18939 120th Avenue N.E., Suite 101 • Bothell, WA 98011-9508 (206) 481-9200 • FAX 485-2992
East 11115 Montgomery, Suite B • Spokane, WA 99206-4776 (509) 924-9200 • FAX 924-9290
9405 S.W. Nimbus Avenue • Beaverton, OR 97008-7132 (503) 643-9200 • FAX 644-2202

TPH-D per Oregon DEQ (C10-C28)
Results in mg/kg (ppm)

Client: Wacker Siltronic Corporation
Project: FAB-2

NCA Project #: P507126
Matrix: soil
Sampled: 07/12/95
Received: 07/12/95

Client ID	Lab ID	Analyte	Results	MRL	Date Prepared	Date Analyzed
95-598	P507126-1	Diesel/Related	38	25	07/13/95	07/14/95
95-599	P507126-2	Diesel/Related	ND	25	07/13/95	07/14/95
95-600	P507126-3	Diesel/Related	29	25	07/13/95	07/14/95
95-601	P507126-4	Diesel/Related	52	25	07/13/95	07/14/95
95-602	P507126-5	Diesel/Related	28	25	07/13/95	07/14/95
95-603	P507126-6	Diesel/Related	47	25	07/13/95	07/13/95
95-604	P507126-7	Diesel/Related	120	25	07/13/95	07/13/95
95-605	P507126-8	Diesel/Related	39	25	07/13/95	07/13/95
95-606	P507126-9	Diesel/Related	ND	25	07/13/95	07/14/95
95-607	P507126-10	Diesel/Related	ND	25	07/13/95	07/14/95
95-608	P507126-11	Diesel/Related	ND	25	07/13/95	07/14/95
95-609	P507126-12	Diesel/Related	ND	25	07/13/95	07/14/95
95-610	P507126-13	Diesel/Related	ND	25	07/13/95	07/13/95

MRL Method Reporting Level
ND None Detected at or above the method reporting level
* See Comment Section at end of report

SCOEPA00016124

NORTH CREEK ANALYTICAL

18939 120th Avenue N.E., Suite 101 • Bothell, WA 98011-9508 (206) 481-9200 • FAX 485-2992
East 11115 Montgomery, Suite B • Spokane, WA 99206-4776 (509) 924-9200 • FAX 924-9290
9405 S.W. Nimbus Avenue • Beaverton, OR 97008-7132 (503) 643-9200 • FAX 644-2202

TPH-418.1M per Oregon DEQ
Results in mg/kg (ppm)

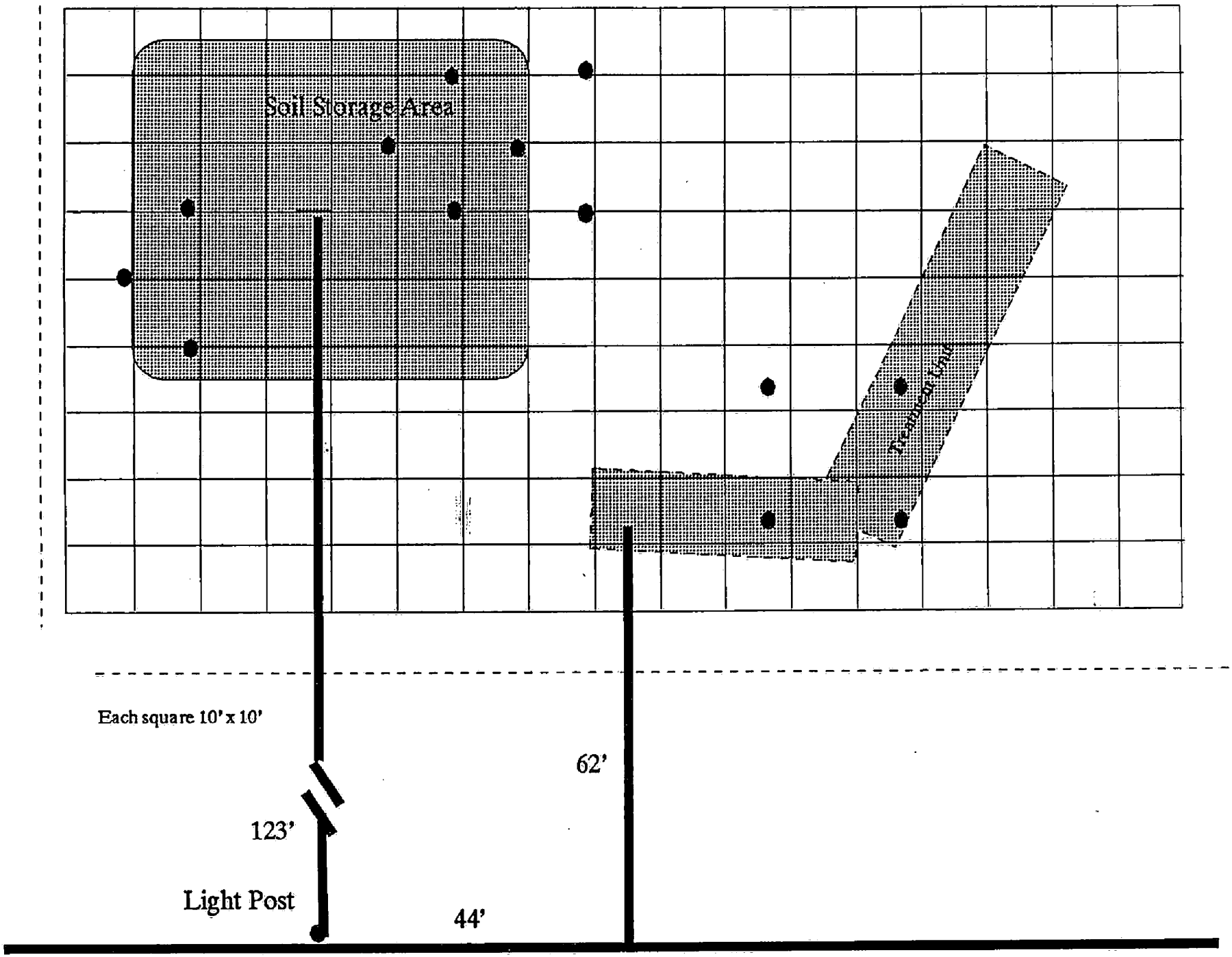
Client: Wacker Siltronic Corporation
Project: FAB-2

NCA Project #: P507126
Matrix: soil
Sampled: 07/12/95
Received: 07/12/95

Client ID	Lab ID	Analyte	Results	MRL	Date Prepared	Date Analyzed
95-598	P507126-1	TPH	47	20	07/13/95	07/13/95
95-599	P507126-2	TPH	ND	20	07/13/95	07/13/95
95-600	P507126-3	TPH	41	20	07/13/95	07/13/95
95-601	P507126-4	TPH	23	20	07/13/95	07/13/95
95-602	P507126-5	TPH	28	20	07/13/95	07/13/95
95-603	P507126-6	TPH	40	20	07/13/95	07/13/95
95-604	P507126-7	TPH	53	20	07/13/95	07/13/95
95-605	P507126-8	TPH	28	20	07/13/95	07/13/95
95-606	P507126-9	TPH	ND	20	07/13/95	07/13/95
95-607	P507126-10	TPH	ND	20	07/13/95	07/13/95
95-608	P507126-11	TPH	ND	20	07/13/95	07/13/95
95-609	P507126-12	TPH	ND	20	07/13/95	07/13/95
95-610	P507126-13	TPH	ND	20	07/13/95	07/13/95

MRL Method Reporting Level
ND None Detected at or above the method reporting level
* See Comment Section at end of report

SCOEPA00016125


Soil Storage Area
Each square 10' x 10'
62'
123'
Light Post
44'

Oregon

DEPARTMENT OF
ENVIRONMENTAL
QUALITY

NORTHWEST REGION

FAX COVER LETTER

DATE: 8/10/95 TIME: 3:50

COVER PAGE PLUS 2 PAGES

TO: Tom McCue

FAX NUMBER: 241-7599 PHONE: 241-7532

FROM: Sandy Steele

FAX: (503)229-6899 PHONE: (503) 229-5530

MESSAGE: Say hi to Jim Ellis for me — Thanks,

Sandy

If all pages are not received, please notify sender.

2020 SW Fourth Avenue
Suite 400
Portland, OR 97201-4987
(503) 229-5263 Voice/TDD

DEQ-1

DEQ SITE ASSESSMENT SECTION - STRATEGY RECOMMENDATION

Site Name: Northwest Natural Gas Co.

Site CERCLIS Number: 027734359

DEQ ECSI Number: 84

Site Address: 7540 NW St. Helens Road
Portland, OR 97210

Recommendation By: Kevin Dana, Environmental Specialist,
Site Assessment Section

Approved By: Heather Schijf, HS Coordinator,
Site Assessment Section

Date: June 7, 1993

Background:

There is conflicting information as to when operations began on-site. Apparently, Portland Gas and Coke Company purchased the site in the 1880's, and by 1913 had constructed a gasification plant. Portland Gas operated the plant until 1956, when it was transferred to Northwest Natural Gas Company. During this time, waste products from the gasification operations were deposited on-site. Until 1925, all waste products were discharged directly to the Willamette River. After 1925, tars were separated from the wastewater in settling ponds. A total of 30,000 cubic yards of coal tar accumulated in the ponds on the southern end of the property, near the shores of Doane Lake. 41,000 cubic yards of spent oxide were piled on the northern end of the property. Northwest Natural Gas razed most of the facilities in the late 1960's and built a liquified natural gas plant in their place. Five large above ground storage tanks were leased to Pacific Northern Oil Co. and used for oil storage, receiving, and distribution activities.

In 1965, the Koppers Company leased an eight acre portion of the site from Northwest Natural Gas and built a coal tar distillation plant. The distillation process produced oil, which was stored in an on-site tank farm. Waste streams of creosote and pitch were cooled and solidified in storage tanks, then apparently dumped into an on-site disposal pit. It is not precisely known how wastewater was disposed of. The plant operated until 1973, when it was shut down due to a lack of raw materials.

About this time, Northwest Natural Gas was sprucing up its property in preparation for building a substitute natural gas plant. (The plant was never constructed). Most of the spent oxide was hauled

to the Scappoose landfill. The rest was mixed with overburden and used to cover the coal tar pits to a depth of about ten feet. (Part of Doane Lake was apparently also filled in). Northwest Natural Gas then sold this portion of the site to Wacker Siltronic Corporation, which built a plant on at least part of the fill. (See ECSI #183 for more information on the Wacker Siltronic site).

The Koppers plant reopened in 1974, producing experimental batches of "electrode pitch". About 1975, Koppers installed a rainwater collection and treatment system around the tank farm to comply with a permit condition. (Apparently, the company had an NPDES permit for its surface water runoff, since the water was funnelled into a ditch). The "treatment" system simply consisted of an oil/water separator. Koppers also began to discharge its industrial wastewaters to the sewers under permit. Since about 1977, the facility is believed to have only been used for the bulk transfer of creosote oil and coal tar pitch.

In 1982, DEQ sampled five groundwater monitoring wells that ringed Koppers' waste disposal site. The wells were sampled for phenols. One sample had 24 mg/l; the other four samples were all under 1 mg/l. DEQ performed more extensive groundwater sampling in 1984. The sampling found naphthalene (48 mg/l), acenaphthene (45 mg/l), fluorene (65 mg/l), phenanthrene (240 mg/l), anthracene (330 mg/l), fluoranthene (110 mg/l), pyrene (88 mg/l), lead (236 mg/l), and ethylbenzene (380 mg/l), all of which are well above SOCLEAN's groundwater standards. DEQ also sampled the sediment in a containment basin, and found similar contaminants (only benzo(a)pyrene (120 ppm) was at levels that violated SOCLEAN). It is unclear exactly where the containment basin is located.

Camp Dresser & McKee, Inc. performed a "site characterization" in 1987, which incorporated the results of DEQ's sampling. (A copy of Camp Dresser's report was not in the file; however, a 1988 summary of the information by Tetra Tech was available). Also in 1987, Ecology and Environment (E&E) performed a Preliminary Assessment (PA) on the Koppers portion of the site for EPA. E&E recommended no further action under the federal Superfund, because the contamination was unlikely to affect human health. Because DEQ planned to conduct a study of area groundwater, EPA agreed to defer to state authority.

In 1990, DEQ signed a consent decree with the property owners in the Doane Lake area to study the area's groundwater contamination. The seven month study ended with a recommendation that the sites in the Doane Lake area be remediated separately. (See ECSI #36 for more information on the Doane Lake study).

Recommendation/Action:

The Site Assessment Section has reviewed file information relating to this site. Contamination at the site is extensive but does not pose an imminent threat to human health. The coal tars are buried under ten feet of fill, and groundwater in the area is not used for

SCOEPA00016129

drinking. However, the contamination is apparently migrating, and may pose a threat to the environment. In May 1992, the Army Corps of Engineers found polynuclear aromatic hydrocarbons (PAHs) in the 5-20 ppm range in core samples in Willamette River sediments adjacent to the site. Site Assessment recommends that further sampling be performed to determine the extent of the soil and groundwater contamination. The Wacker Siltronic property should be included in this investigation. Because the known levels of groundwater contamination are so high, Site Assessment recommends that the sampling be given a high priority. Site Assessment also recommends that the site owner enter the Voluntary Cleanup Program. Finally, the site should be placed on the Confirmed Release List and the Inventory.

Referrals Within or Outside DEQ:

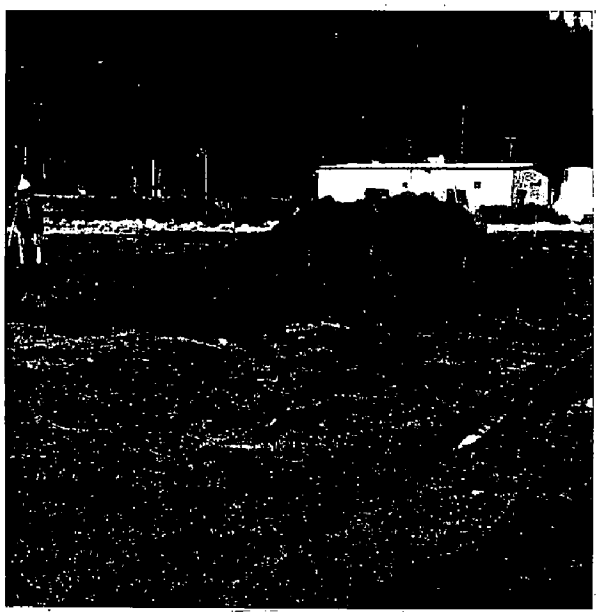
This site has not been referred to another division of DEQ or an outside regulatory agency. The Site Response Section was consulted regarding the disposition of this site.

Other:

This site is currently listed in DEQ's ECSI database under three filenames: Northwest Natural Gas Co. (ECSI #84); Koppers Company, Inc. - Portland (ECSI #62); and Pacific Northern Oil Co. (ECSI #396). The files will be combined under the filename Northwest Natural Gas Co. and updated with information contained in this decision document. The updated information will reflect Site Assessment's decision for further action at the site.

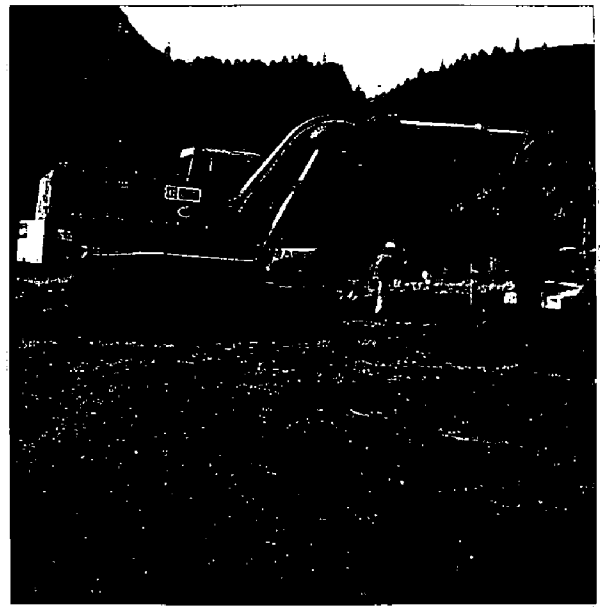
SCOEPA00016130

Copies from Photo Records Binder
For
1991 Olympic Pipeline Excavation
Diesel and Gas Pipe Replacement on Easement of Property



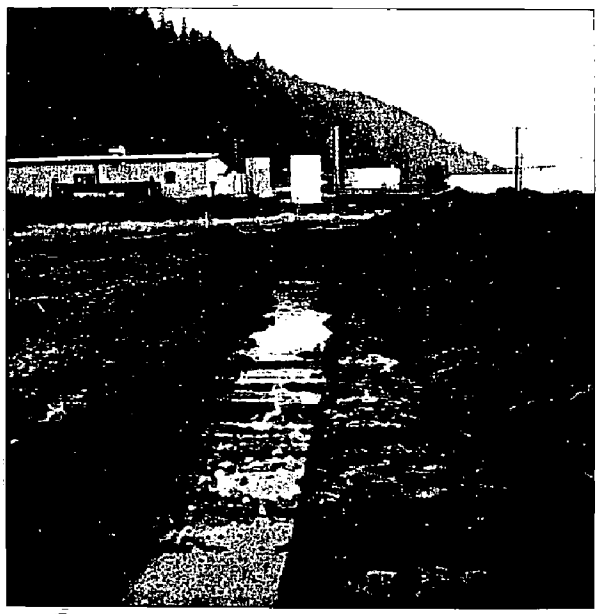
#1

3-11-91



#2

3-11-91

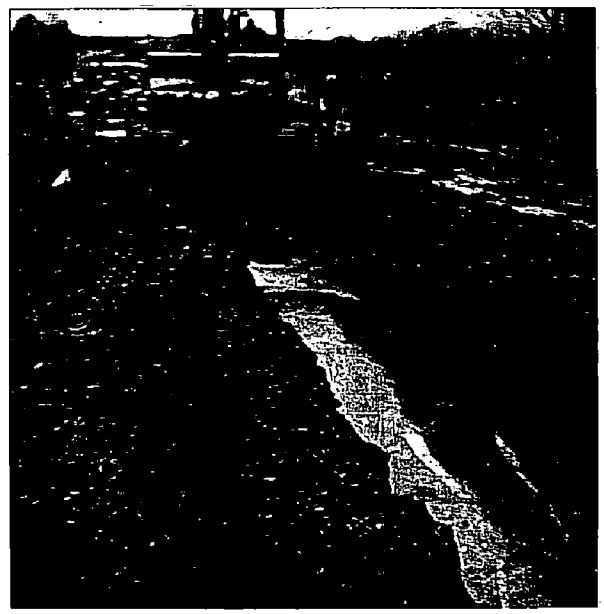


#3

3-11-91

West ↑

over



#4

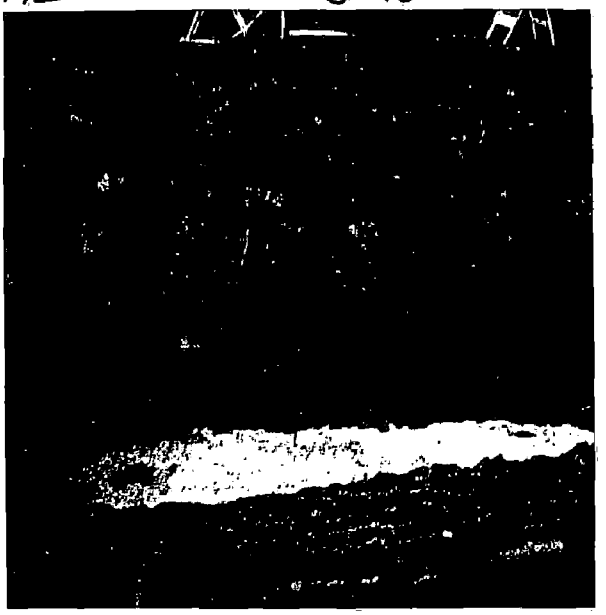
3-11-91

Pipes were welded and then x-rayed
Lines were offset 7½ feet South
of the old Pipe Line

1991 OLYMPIC PIPELINE EXCAVATION

Diesel and gas pipe replacement on easement of property.

#13 3-18-91



Shows side of trench by WWTP

N ↑

#14 3-18-91

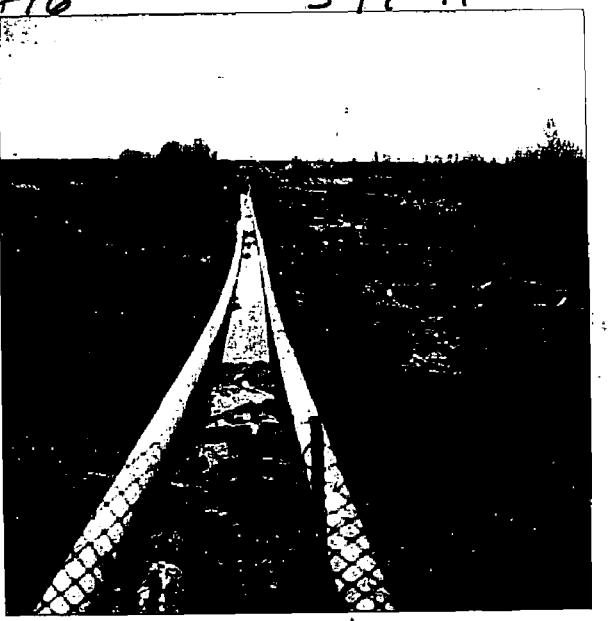
Old Pipe capped + Presser tested to 1100 psi ? Pipe goes back in front of WWTP — ✓ OK

#15 3-19-91

Putting in new Pipe to the old

W ↑

#16 3-19-91



New Pipe rolled into Ditch

E ↑

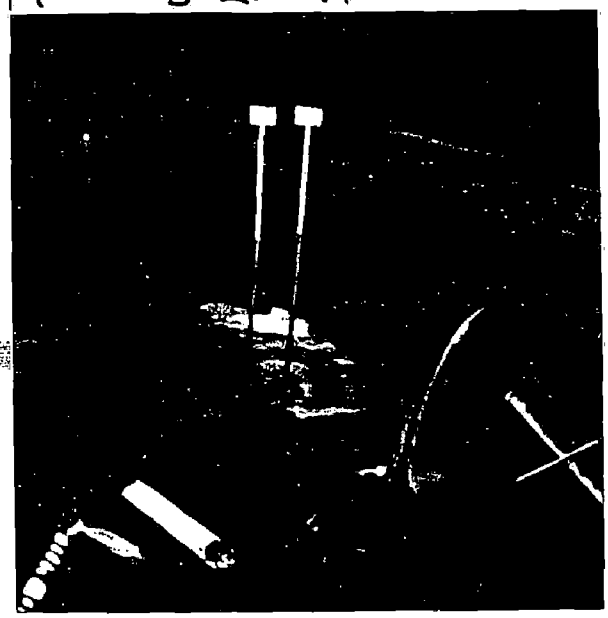
#17 3-19-91

Pipe being Droped Down to meet old Pipe E ↖

#18 3-22-91

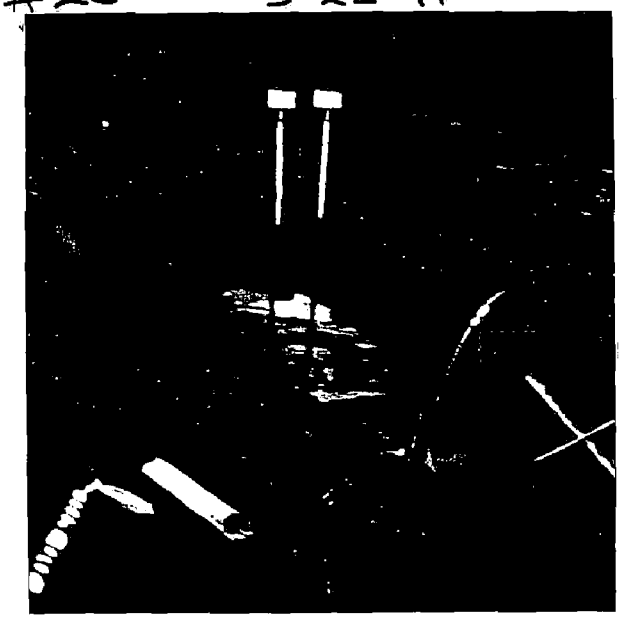
New Lines meet old Line by WWTP E
About 10 to 12 feet Deep ↑

#19 3-22-91



About 20" Pipe Put under Rail Road tracks white Line CAPed W ↑

#20 3-22-91



WACKER

FACSIMILE TRANSMITTAL SHEET

WACKER SILTRONIC CORPORATION
P.O. Box 83180
Portland, Oregon 97283-0180

7200 N.W. Front Avenue
Portland, Oregon 97210

PHONE: (503) 243-2020
FAX: (503) 226-0052
TELEX: 4970339

DATE: 3/15/91

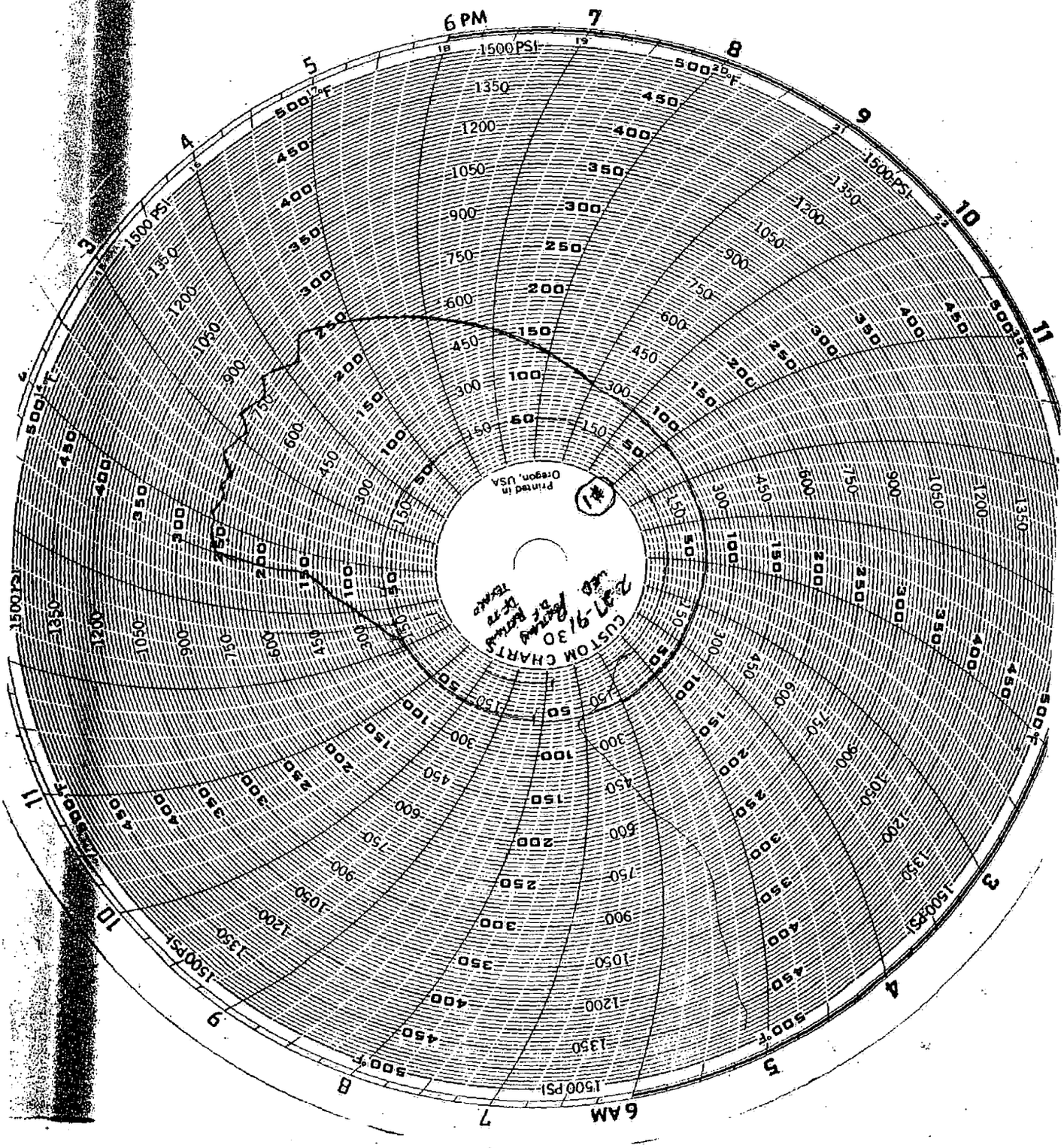
FAX NO.: 1149|91

NUMBER OF PAGES (INCLUDING THIS PAGE) 2

TO: CH2M-HILL
MARK WHITSON FAX: 295-4446

FROM: JOHN PITTMAN

MESSAGE/SPECIAL INSTRUCTIONS:


6 PM
7
8
9
10
11
6 AM
5
4
3
1500 PSI
500°F
CUSTOM CHART
Printed in Oregon, USA

Wacker Siltronic Corporation

WACKER

TO: FILE

FROM: John Pittman

SUBJECT: POTENTIAL LEAK OF OLYMPIC PIPELINE LOCATED IN THE EASEMENT ACCESS ON WACKER SILTRONIC PROPERTY

DATE: October 17, 1990

In June of 1990, two geotechnical bore holes were made on the plant site where the manufacturing expansion building is proposed to be located. Conclusive with the geotechnical data, was environmental data to determine any levels of potentially contaminated material below the surface. The environmental samples were analyzed and a report issued in July showing that there were BETX constituents in both of the borings.

The southern hole had double digit PPM levels of these constituents, while the northern hole had single digit readings. There is a one-hundred foot easement that runs across the property site from east to west which is located approximately 125 feet south of the southern-most bore hole. The difference in these levels of BETX constituents provided suspicion that there could possibly be a leak in the Olympic Pipeline which runs through the easement. This pipeline carries petroleum products which are distributed in the State of Oregon.

The consulting firm of CH2M Hill was contacted to do further investigation on both sides of our easement to determine the possibilities of a leak from the pipeline. Groundwater samples were conducted in 26 locations transecting the easement. The samples were set-up on a 75 foot grid with eight samples being taken on either side of the easement as close as possible.

The preliminary results were discussed with CH2M Hill on Monday, October 15. The highest reading for total petroleum hydrocarbons was next to the easement with a reading of 89 PPM. Because of coal tars that have been dispersed on this property many years ago by previous owners, a lot of discussion has been involved with the levels of these readings. Are these a result of the coal tar derivatives or is there actual fresh petroleum product in these locations? Marvin Durning, our environmental lawyer in Seattle was contacted on Tuesday, October 16 to determine if there was any reporting responsibilities for this information that was presented from the survey. Under CERCLA, a release of a reportable quantity of a hazardous substance from a facility, which includes pipelines, must be reported through the emergency release number, which is an 800 number in Washington, D.C.. The reportable quantities, which include a mixture for benzene is 10 pounds, for ethyl benzine, toluene and xylene, is 1000 pounds. A couple of unanswered

questions is what constitutes and verifies a release and how to determine the quantity of the material that may be hazardous.

I proceeded to call the emergency response number in Washington D.C.. I talked with a Mark Brantley who wanted to know if I was interested in reporting a spill. I told him the situation at our plant site and he indicated that maybe I should call the EPA superfund hotline to determine if this was indeed a reportable spill. I tried this number all afternoon and it was continuously busy.

Meanwhile, a Frank Hopf, Manager of the Olympic Pipeline gave me a call. His number is (206) 235-7738. He asked if I would share the information on the pipeline situation which I did. He indicated that they had problems on this line and that it is only used for delivery approximately 10% of the time. They were very interested in seeing the results of the groundwater samples and we agreed to meet on Thursday, October 18 at 11:30 to review this information and their next step.

The hours of the hotline number are from 8:30 to 7:30 pm, Eastern Standard Time. I continued calling throughout the afternoon up until 7:30 EST at which time I re-called the emergency response/release number and talked to Mark Brantley once again. I gave him all the information that he requested for filling out the form, such as our address, and preferenced the report that it was a suspected leak based on data gathered and not a

confirmed release of the pipeline on our easement. He filled out the report and gave us a report number of 44020.

At approximately 4:50 that afternoon, I called Mike Downs at DEQ to indicate the situation that we had found here. He did not seem overly concerned with the levels that we detected but would check with their underground tank people to see how they felt about these numbers and if they were significant.

A Jimmy Prince, also of Olympic Pipeline, called as well. He works for Frank Hopf and indicated that he would send out a person from the pipeline that evening. The time was now 5:00. By the time I got off the phone with Prince, a Al White was in the lobby to determine what the location of the suspected release was. I accompanied Al White to the area on the plant site to show him where the samples were taken and they made provisions to have a company come in and start excavation that night.

I returned to the plant at approximately 9:30 on Wednesday evening to check on the progress but the contractor had left because it was raining very hard. After contacting Olympic Pipeline's local number, I was told that the crew would start again at 7:30 on Thursday morning the 18th.

Mid-morning of Thursday, October 18th, a Bill Mulkey, an Olympic Pipeline claims agent, contacted me and was also interested in the findings and requested access to the site from the back gate for bringing in more heavy equipment. All people associated with the Olympic Pipeline that I have been in contact with have been extremely friendly and cooperative in trying to resolve this situation.

On Thursday morning, 10/18, Mike Downs called again concerning yesterday's discussion. He had an opportunity to talk with the underground tank people and their impression is that the levels of benzene constituents in the water would indicate that it probably is a gasoline leak. He was asked to be kept informed of the activities out here which I agreed to do.

On Friday, October 19, at approximately 10:00, Bill Mulkey called and left a phone message indicating that the excavation they had done to uncover the pipelines was clean. I went out to the site at approximately 10:30 to observe the situation. When I arrived at the excavation, the pipes were no longer exposed because of the sloughing of the walls of the hole that covered the pipes.

The pipes were exposed during the evening and they observed no gasoline smell or leaks at that point so they pressurized the pipelines to 250 PSI. The normal working pressure when pumping product is between 50 and 70 PSI. Their conclusion was that there was

not a leak because of these two items; the exposure of the pipelines indicating no leak and the pressurization of the pipeline holding for eight hours.

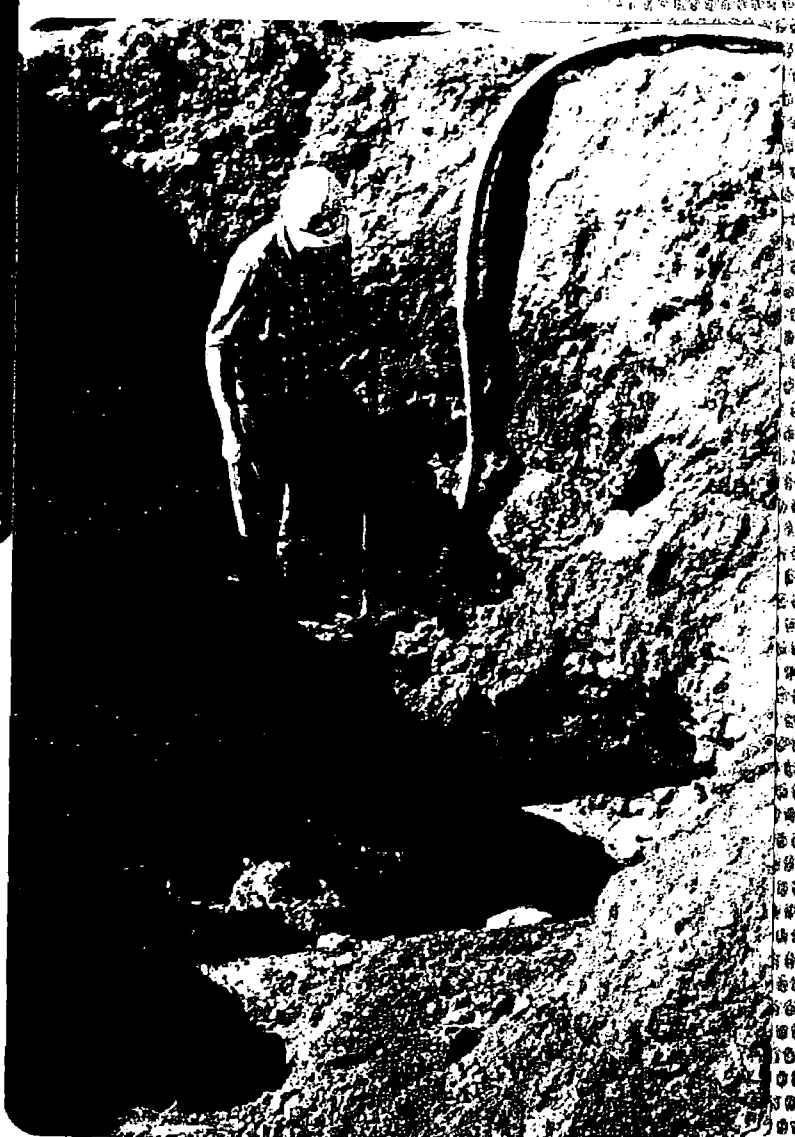
DEQ was asked to come out to the site and also the consultant from IDC, Dave Watson. The only thing that DEQ asked for was a follow-up report on what had happened and the resulting conclusions.

In November time frame, Olympic pipeline will pressurize this section of line to 600 to 700 PSI. This additional pressure will substantiate if there is a leak or not. Bill Mulkey and myself decided with the evidence found to date that the excavation would be back-filled and that further testing would be done by their consultants to compare with the data that was found by CH2M Hill. Olympic Pipeline's consultants will do a similar investigation with probing to the groundwater level and extracting water for analysis. This should be completed by the end of the year. At that time, additional decisions will be made.

JLP:jt

Copies from Photo Records Binder #12
For
March, 1979 Site Oil Contamination

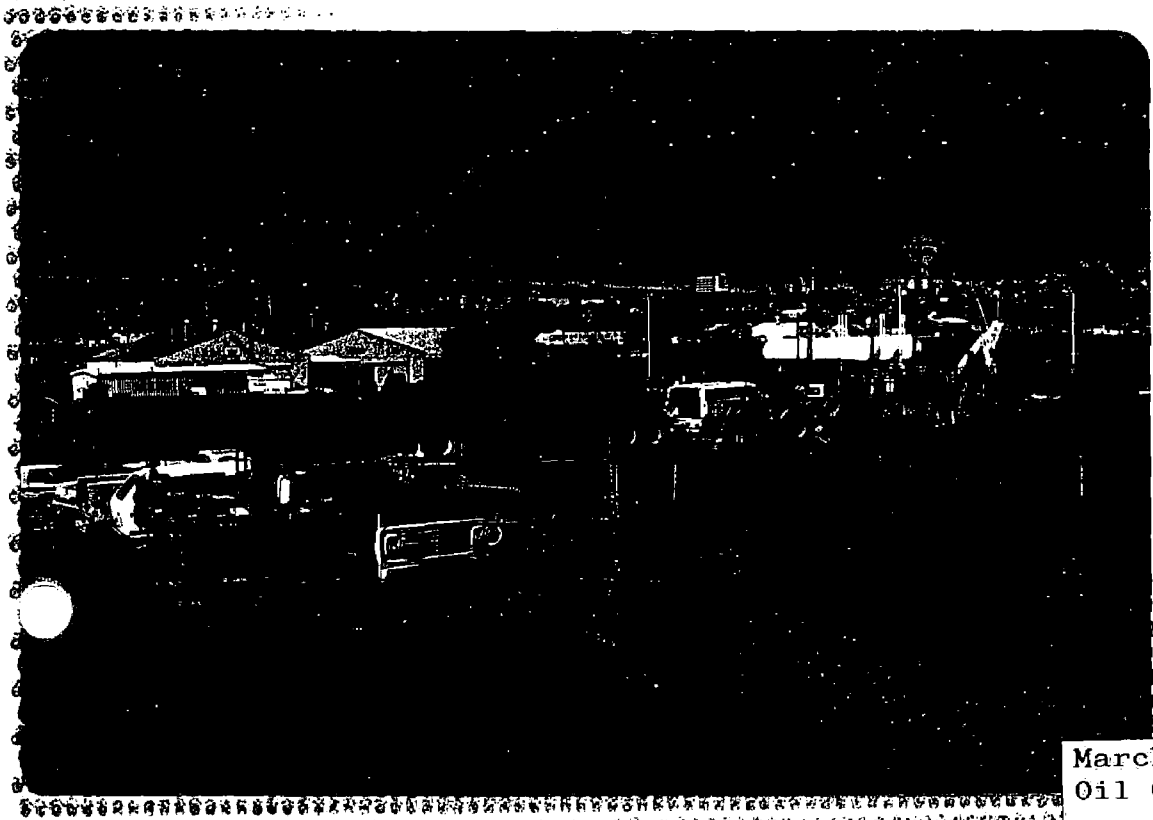
March 22, 1979
Oil Contamination Problem



March 22, 1979
Oil Contamination Problem

SCOEPA00016142

March 22, 1979
Oil Contamination Problem



March 22, 1979
Oil Contamination Problem

March 19, 1979
Aerial Photo of
Oil Problem & WWT Parea

March 19, 1979
Aerial Photo of
Oil Problem & WWT Parea

March 23, 1979
Olympic Pipeline

March 23, 1979
Olympic Pipeline

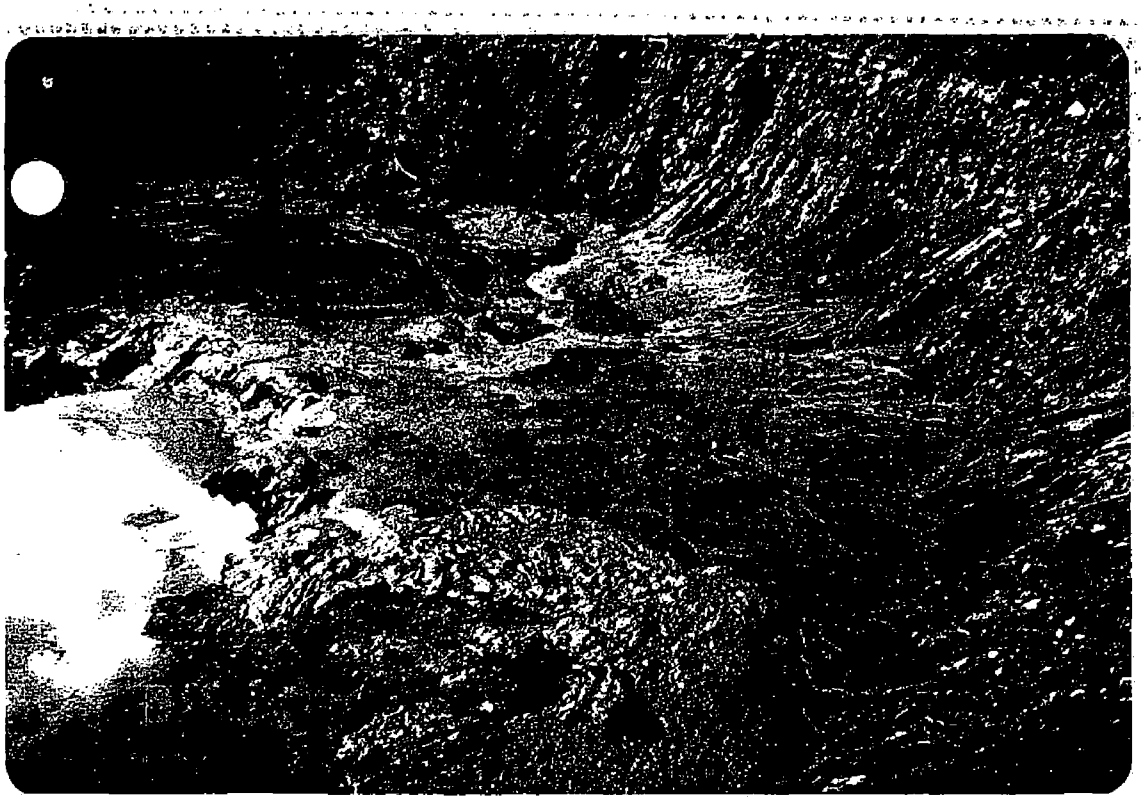
March 23, 1979
Olympic Pipeline

March 23, 1979
Olympic Pipeline

SCOEPA00016145

April 9, 1979
Olympic Pipeline
Fine Replacement

April 9, 1979
Excavated debris from
Olympic Pipelines



April 9, 1979
Clarifier Re-excavation

April 9, 1979
Clarifier re-excavation

SCOEPA00016147

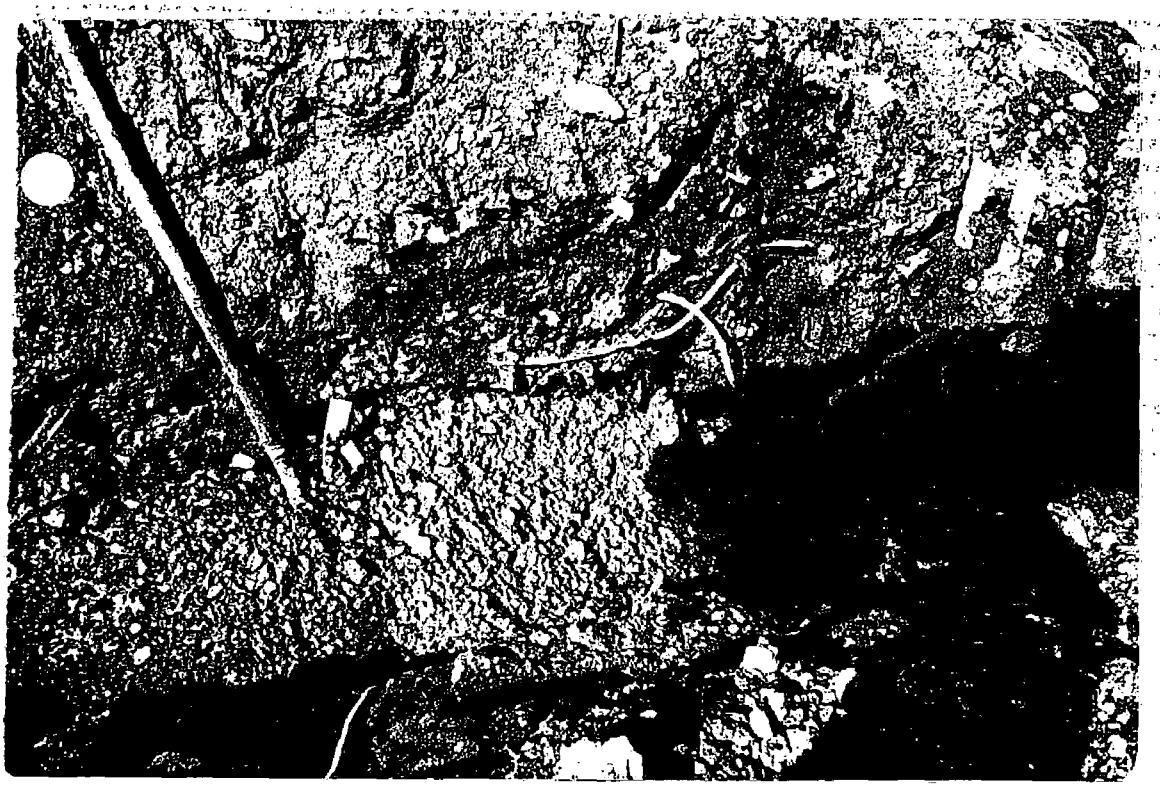
April 9, 1979
Settling pond for
Olympic Pipeline

April 9, 1979
Settling pond for
Olympic Pipeline

April 9, 1979
Clarifier Re-excavation

April 9, 1979
Oil in Clarifier Re-excavation

SCOEPA00016149



April 9, 1979
Oil in Clarifier Re-excavation

April 9, 1979
Clarifier Re-excavation

Beazer Materials and Services, Inc.
A Member of THE BEAZER GROUP
Law Department
436 Seventh Avenue, Pittsburgh, PA 15219
Phone: 412-227-2430 Fax: 412-227-2042

WQ
Daviere EH
Sent Transfer form

Beazer

RECEIVED
JUN 13 1989
Water Quality Division
Dept. of Environmental Quality

Jill M. Blundon
General Counsel
Thomas Burgunder
Thomas F. Reid
George Carroll
Mary Dombrowski Wright
Billie Schrecker Nolan
William F. Giarla
Babette Magee
James B. Springfield
Real Estate Manager

June 2, 1989

Fred Hansen
Director
Department of Environmental
Quality
811 SW Sixth Ave.
Portland, OR 97204-1390

Jay F. Young
NL Industries, Inc.
P. O. Box 1090
Hightstown, NJ 08520

RE: Doane Lake

Gentlemen:

Please be advised that as a result of the December 28, 1988 sale of the former Koppers Company, Inc. (now known as Beazer Materials and Services, Inc. ("BM&S")) tar terminal located in Portland, Oregon ("plant") to Koppers Industries, Inc. ("KII"), BM&S has assumed liability, if any, arising out of environmental contamination at the plant, if any, occurring before December 28, 1988. Accordingly, with respect to the Doane Lake site, if any liability is determined to arise from activities at the plant before December 28, 1988, that liability will be BM&S', not KII's. As you know, BM&S continues to take the position that no such liability exists.

Therefore, all future communications with respect to the Doane Lake site should be directed to Billie Nolan, Beazer Materials and Services, Inc., 1400 Koppers Building, Pittsburgh, PA 15219 and not to the plant or to anyone else at KII.

State of Oregon
DEPARTMENT OF ENVIRONMENTAL QUALITY
RECEIVED
JUN 09 1989
OFFICE OF THE DIRECTOR

Writer's Direct Dial Number 412/227-2414

Thank you for your assistance in this regard.

Very truly yours,

Jill M. Blundon
Vice President and
General Counsel

cc: J. Batchelder
L. Flaherty
J. Oxford - KII Portland

SCOEPA00016152

To: File

From: Petra Mattes

Date: July 31, 1998

RE: July 29, 1998 Riverbank incident

WSC Personnel involved: Kirk Benson, Alan Heiman, Petra Mattes, Tom McCue, Dennis Netsch, Nobel Powel, Jerry Schaeffer, Cathryn Young

At 9:30 AM, Wednesday July 29, 1998 Tom McCue and myself were notified that there was a "spill" during the riverbank repair project.

Advanced American Diving, the contractor for the riverbank repair, was dredging silt from the Willamette River to be backfilled into the rock material. Apparently, a deposit of oily material was disturbed, resulting in visible sheen and oil, of an unknown quantity, on the river. Booms were immediately put into place to contain the sheen, and pads used to absorb the oil. Booms and pads were bagged and added to drop box #1 for future disposal.

Oily soil/silt were put on the riverbank. This material is being loaded into 8 lined drop boxes with covers for further analysis, characterization and disposal. See attached spreadsheet of analysis.

I contacted DEQ EMD (OARS) at 9:40 to report the incident. I talked with Betty, who gave us a case number of 98-17-92. Betty then referred the case to Mike Greenburg (229-5153, pager #237-5242). Mike is with the DEQ spill section.

At 3:00 PM I confirmed with Mike Greenburg that he does not expect a submitted report. Mike stated that DEQ currently does not consider this event a "spill", but rather the discovery of an existing problem. He has referred the case to the site assessment, cleanup division. Mike also confirmed that the Fire Marshal or local emergency response community does not need to be notified.

DEQ contacted the Coast Guard. John Murphy of the Coast Guard called me, and then came to the site with two other men from the Guard. They inspected the cleanup, and said the situation was under control, and did not have any further suggestions. The Coast Guard is not requiring a follow up report.

At 11:30 I contact EPA NRC (800-424-8802) and spoke with Ms. Reddy to inform her of the occurrence. The case number is 448107. Ms. Reddy verified that the EPA does not require a follow up report.

It has been decided that dredging will be discontinued to avoid any further disturbances. All backfill material will be hauled in.

Corrective / Follow up Actions:

1. Update Contingency Plan
2. Create "cards" with contacts and phone numbers to notify

AGREEMENT

The Oregon Department of Environmental Quality has entered into an Order on Consent (DEQ No. ECSR-NWR-89-13, dated 1/10/90) pursuant to ORS § 465.260 (the "Order").

The undersigned desires to enter the property of Wacker Siltronic Corporation situated at 7200 N.W. Front Avenue, Portland, Oregon (the "property") pursuant to the Order.

In consideration of the Consent for Access to Property executed by Wacker Siltronic Corporation ("Wacker"), the undesigned agrees:

1/ that it enters Wacker's property at its own risk and releases Wacker from any and all claims arising directly or indirectly out of its entry and its activities on Wacker's property;

2/ that at the completion of its work pursuant to the Order, it will restore Wacker's property as nearly as possible to its condition prior to its entry;

3/ that it will indemnify, hold harmless, and defend Wacker from and against all claims, losses, damages, liability, and costs (including, but not limited to, costs of defense) arising out of or in any way connected with the presence, discharge, release, or escape of contaminants of any kind to the extent caused by or contributed to by its activities on Wacker's property;

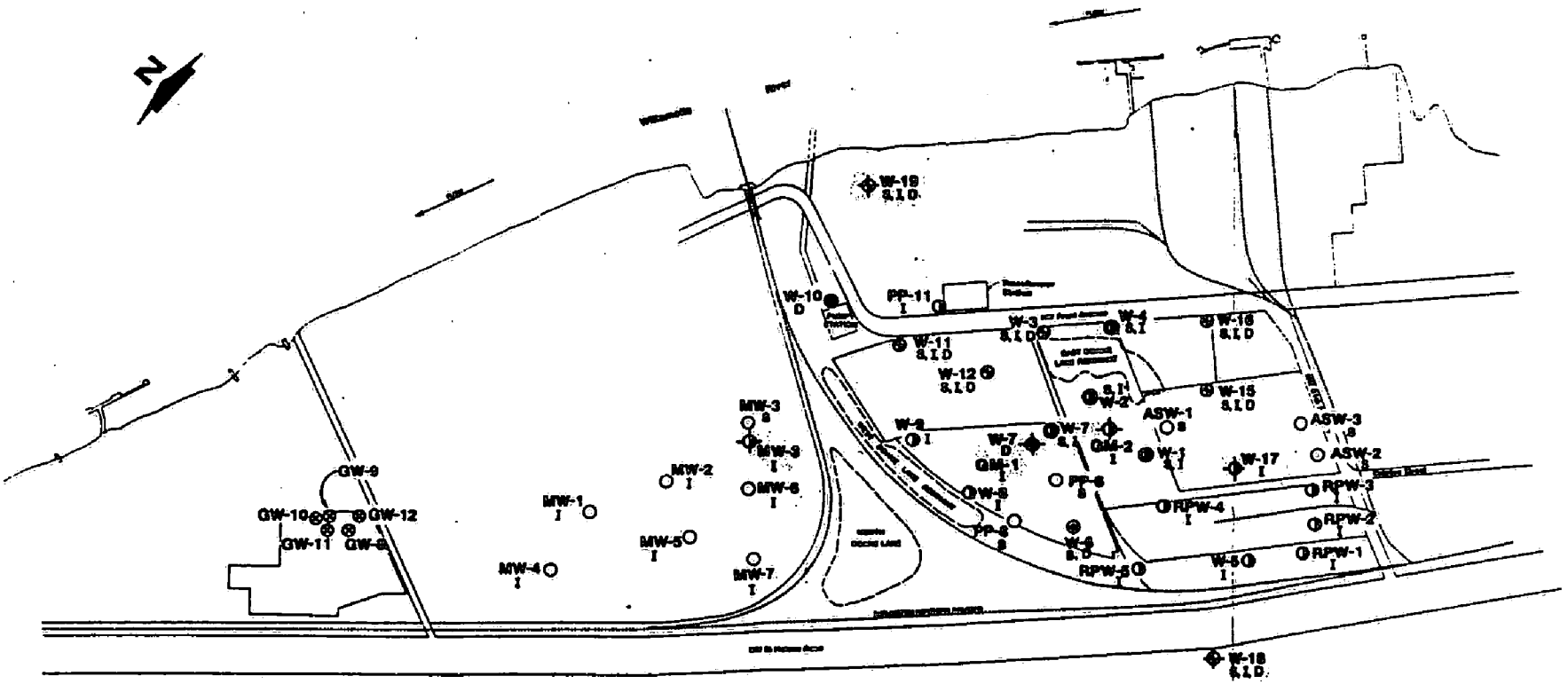
4/ that it will reimburse Wacker for any cost of attorney fees related to the successful enforcement of this Agreement.

Done this 21st day of June, 1990.

GERAGHTY & MILLER, INC.
Edward R. Rothshild
Vice President/Midwest Region

By _____

SCOEPA00016154



LEGEND

- Shallow Well
- Intermediate Well
- Deep Well
- Nested Well (Shallow/Intermediate)
- Nested Well (Shallow/Deep)
- Nested Well (Shallow/Intermediate/Deep)
- Nested Well (Intermediate/Deep)
- Groundwater Recovery Well
- Proposed Well Location

0 300 600 900
Approximate Scale in Feet

Note: S, I and D following well designations indicate shallow, intermediate and deep screened horizons.

GERAGHTY & MILLER, INC.
Environmental Services

PROPOSED MONITORING WELL LOCATION MAP
Doane Lake Area
Portland, Oregon

DRAWN	APPROVED	DATE	PROJECT NUMBER
SAC		Nov. 1988	WA06301

FIGURE 1

SCOEPA00016155

CONSENT FOR ACCESS TO PROPERTY
FOR WORK PURSUANT TO ORDER ON CONSENT

Name: Wacker Siltronic Corporation

Address of Property: 7200 N.W. Front Avenue
Portland, Oregon

The Oregon Department of Environmental Quality has entered into an Order on Consent (No. _____, dated _____) pursuant to ORS 465.260, with the following parties:

_____

_____

_____

_____ (Firms signing the Order on Consent)

_____

_____

_____

_____

for the purposes set out in the Oregon Department of Environmental Quality letter to Wacker Siltronic Corporation (Wacker Siltronic) dated May 2, 1990, a copy of which is Attachment A hereto.

Wacker Siltronic gives its consent and permission to the extent of whatever possessory interest it may have in the property and premises described above (the "property"), and appurtenances thereto, to officers, employees, agents, and authorized representatives of the above-listed parties to the Order on Consent

SCOEPA00016156

and to their contractors acting pursuant to the order by the Oregon Department of Environmental Quality (DEQ) to enter its property for the limited purpose of installing groundwater monitoring wells, sampling existing wells, measuring water elevations, evaluating wells and/or sampling from wells.

Such entry shall be during working hours and after reasonable advance notice and subject to such reasonable conditions as may be required to protect Wacker Siltronic's property or proprietary interests and minimize disruption of Wacker Siltronic's activities at the property.

Such entry shall also be conditioned on each of the abovenamed parties' agreement to the terms of this Consent for Access to Property indicated by its signature at the end hereof and conditioned on the agreement of each of its officers, employees, agent, authorized representatives, contractors, or contractor's employees entering wacker's property, by signature at the end hereof.

Each such signer agrees

(1) that it enters Wacker's property at its own risk, and releases Wacker Siltronic from any and all claims arising directly or indirectly out of its entry and its activities on Wacker's property;

(2) that at the completion of its work pursuant to the Order on Consent, it will restore Wacker Siltronic's property as nearly as possible to its condition prior to its entry;

SCOEPA00016157

(3) that it will hold harmless, and defend Wacker Siltronic from and against all claims, losses, damages, liability and costs (including, but not limited to, costs of defense) arising out of or in any way connected with the presence, discharge, release, or escape of contaminants of any kind caused by or contributed to by its activities on Wacker Siltronic's property.

This Consent to Access to Property is given by Wacker Siltronic voluntarily, with knowledge of its right to refuse and without threats or promises of any kind (except promises expressed herein). Wacker Siltronic understands that by consenting to access, it neither incurs any liability nor waives any rights.

DONE this _____ day of _____, 1990.

WACKER SILTRONIC CORPORATION

By_____
Its_____

AGREED:

(In case of company/corporation)

_____

By_____ DATE_____
Its_____

(In case of individual)

_____ DATE_____

SCOEPA00016158

Department of Environmental Quality

811 SW SIXTH AVENUE, PORTLAND, OREGON 97204-1390 PHONE (503) 229-5696

ATTACHMENT A

May 2, 1990

CERTIFIED MAIL NO. P-722-249-805
RETURN RECEIPT REQUESTED

Mr. James M. DiSorbo, President
Wacker Siltronic Corporation
P. O. Box 83180
Portland, OR 97210

Dear Mr. DiSorbo:

Pursuant to an Order on Consent (copy attached), a preliminary investigation to determine the nature and extent of groundwater contamination in the Doane Lake industrial area is being conducted by certain private parties who have facilities located in the area.

To carry out the investigation as required, access to your property at 7200 N. W. Front Avenue, Portland, Oregon may be required for the purpose of installing monitoring wells, sampling existing monitoring wells, measuring water elevations, evaluating wells and/or sampling from wells.

The Department of Environmental Quality is arranging for access to private properties pursuant to its authority -- ORS 465.250(2) and ORS 465.260 -- in the area so that the investigation may proceed expeditiously.

A "Consent for Access to Property" form is enclosed for your review and signature.

Please review and sign the form and return it to me by May 28, 1990.

If you have any questions regarding the form or the investigation, please do not hesitate to call Ms. Sheree Stewart at (503) 229-5413.

Thank you very much for your cooperation in facilitating this important investigation.

Sincerely,

Sandra Anderson

Sandra Anderson, Project Manager
Site Response Section
Environmental Cleanup Division

SA:m
SITE\SM2981
Enclosures
cc: Claudia Powers, Lindsay, Hart, Neil & Weigler
Larry Edelman, DOJ
Tom Miller, SRS, DEQ
Sheree Stewart, SRS, DEQ

DEQ-1

SCOEPA00016159

STATE OF OREGON
DEPARTMENT OF ENVIRONMENTAL QUALITY
811 SW SIXTH AVENUE
PORTLAND, OR 97204
FAX No. (503) 229-6124

Facsimile Cover Sheet

TO: John Pittman

OFFICE/PHONE: 226-0052

DATE: 5/21/90

FROM: (Contact person in case of transmission problems) Sheree Stewart, DEQ, 229-5413

OFFICE/PHONE:

NUMBER OF PAGES INCLUDING THIS COVER SHEET: (NOTE: Number all pages consecutively including this cover sheet.) 4

COMMENTS: According to our records, the letter was received on 5/17/90 via CERTIFIED MAIL.

SCOEPA00016160

NEIL GOLDSCHMIDT
GOVERNOR

Department of Environmental Quality

811 SW SIXTH AVENUE, PORTLAND, OREGON 97204-1390 PHONE (503) 229-5696

May 2, 1990

CERTIFIED MAIL NO. P-722-249-805
RETURN RECEIPT REQUESTED

Mr. James H. DiSorbo, President
Wacker Siltronic Corporation
P. O. Box 83180
Portland, OR 97210

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If you have any questions regarding the form or the investigation, please do not hesitate to call Ms. Sheree Stewart at (503) 229-5413.

Thank you very much for your cooperation in facilitating this important investigation.

Sincerely,

Sandra Anderson

Sandra Anderson, Project Manager
Site Response Section
Environmental Cleanup Division

SA:m
SITE\SM2981
Enclosures
cc: Claudia Powers, Lindsay, Hart, Neil & Weigler
Larry Edelman, DOJ
Tom Miller, SRS, DEQ
Sheree Stewart, SRS, DEQ

CONSENT FOR ACCESS TO PROPERTY

Name: Wacker Siltronic Corporation

Address of Property: 7200 N. W. Front Avenue
Portland, Oregon

I hereby give my consent and permission to the extent of whatever possessory interest I may have in the property and premises described above (the "property"), and appurtenances thereto, to officers, employees, agents, authorized representatives, and the persons and their contractors acting pursuant to Order by the Oregon Department of Environmental Quality (DEQ) to enter my property for the limited purpose of installing groundwater monitoring wells, sampling existing wells, measuring water elevations, evaluating wells and/or sampling from wells.

Such entry shall be during working hours and after reasonable advance notice and subject to such reasonable conditions as may be required to protect my or my company's property or proprietary interests and minimize disruption of activities, if any, at the property.

I recognize that these actions are undertaken pursuant to an Order on Consent under ORS 465.260.

SCOEPA00016162

This written permission is given by me voluntarily with knowledge of my right to refuse and without threats or promises of any kind. I understand that by consenting to access, I neither incur any liability nor waive any rights not otherwise provided for under applicable law.

By: _____
Name

_____
Title

_____
Date

SCOEPA00016163

RECEIVED
JIM DISORBO
MAY 17 1990
WACKER SILTRONIC CORP.

NEIL GOLDSCHMIDT
GOVERNOR

Department of Environmental Quality

811 SW SIXTH AVENUE, PORTLAND, OREGON 97204-1390 PHONE (503) 229-5696

May 2, 1990

CERTIFIED MAIL NO. P-722-249-805
RETURN RECEIPT REQUESTED

Mr. James H. DiSorbo, President
Wacker Siltronic Corporation
P. O. Box 83180
Portland, OR 97210

Dear Mr. DiSorbo:

Pursuant to an Order on Consent (copy attached), a preliminary investigation to determine the nature and extent of groundwater contamination in the Doane Lake industrial area is being conducted by certain private parties who have facilities located in the area.

To carry out the investigation as required, access to your property at 7200 N. W. Front Avenue, Portland, Oregon may be required for the purpose of installing monitoring wells, sampling existing monitoring wells, measuring water elevations, evaluating wells and/or sampling from wells.

The Department of Environmental Quality is arranging for access to private properties pursuant to its authority -- ORS 465.250(2) and ORS 465.260 -- in the area so that the investigation may proceed expeditiously.

A "Consent for Access to Property" form is enclosed for your review and signature.

Please review and sign the form and return it to me by May 28, 1990.

If you have any questions regarding the form or the investigation, please do not hesitate to call Ms. Sheree Stewart at (503) 229-5413.

Thank you very much for your cooperation in facilitating this important investigation.

Sincerely,

Sandra Anderson

Sandra Anderson, Project Manager
Site Response Section
Environmental Cleanup Division

SA:m
SITE\SM2981
Enclosures
cc: Claudia Powers, Lindsay, Hart, Neil & Weigler
Larry Edelman, DOJ
Tom Miller, SRS, DEQ
Sheree Stewart, SRS, DEQ

DEQ-1

CONSENT FOR ACCESS TO PROPERTY

Name: Wacker Siltronic Corporation

Address of Property: 7200 N. W. Front Avenue

Portland, Oregon

We ~~I~~ hereby give ~~my~~ our consent and permission to the extent of whatever possessory interest ~~I may~~ we have in the property and premises described above (the "property"), and appurtenances thereto, to officers, employees, agents, authorized representatives, and the persons and their contractors acting pursuant to Order by the Oregon Department of Environmental Quality (DEQ) to enter ~~my~~ our property for the limited purpose of installing groundwater monitoring wells, sampling existing wells, measuring water elevations, evaluating wells and/or sampling from wells, at locations which do not interfere with our use of the property.

Such entry shall be during working hours and after reasonable advance notice and subject to such reasonable conditions as may be required to protect ~~my~~ us or ~~my~~ our company's property or proprietary interests and minimize disruption of activities, if any, at the property.

We ~~I~~ recognize that these actions are undertaken pursuant to an Order on Consent under ORS 465.260.

SCOEPA00016165

This written permission is given by ~~me~~ us voluntarily with knowledge of ~~my~~ our right to refuse and without threats or promises of any kind. ~~I~~ We understand that by consenting to access, ~~I~~ we neither incur any liability nor waive any rights not otherwise provided for under applicable law.

WACKER SILTRONIC CORPORATION

By: James H. DiSorbo
Name

President and Chief Executive Officer
Title

May 31, 1990
Date

SCOEPA00016166

ATOCHEM

ROUTING MEMO
123A (Rev. 8/90)

TO

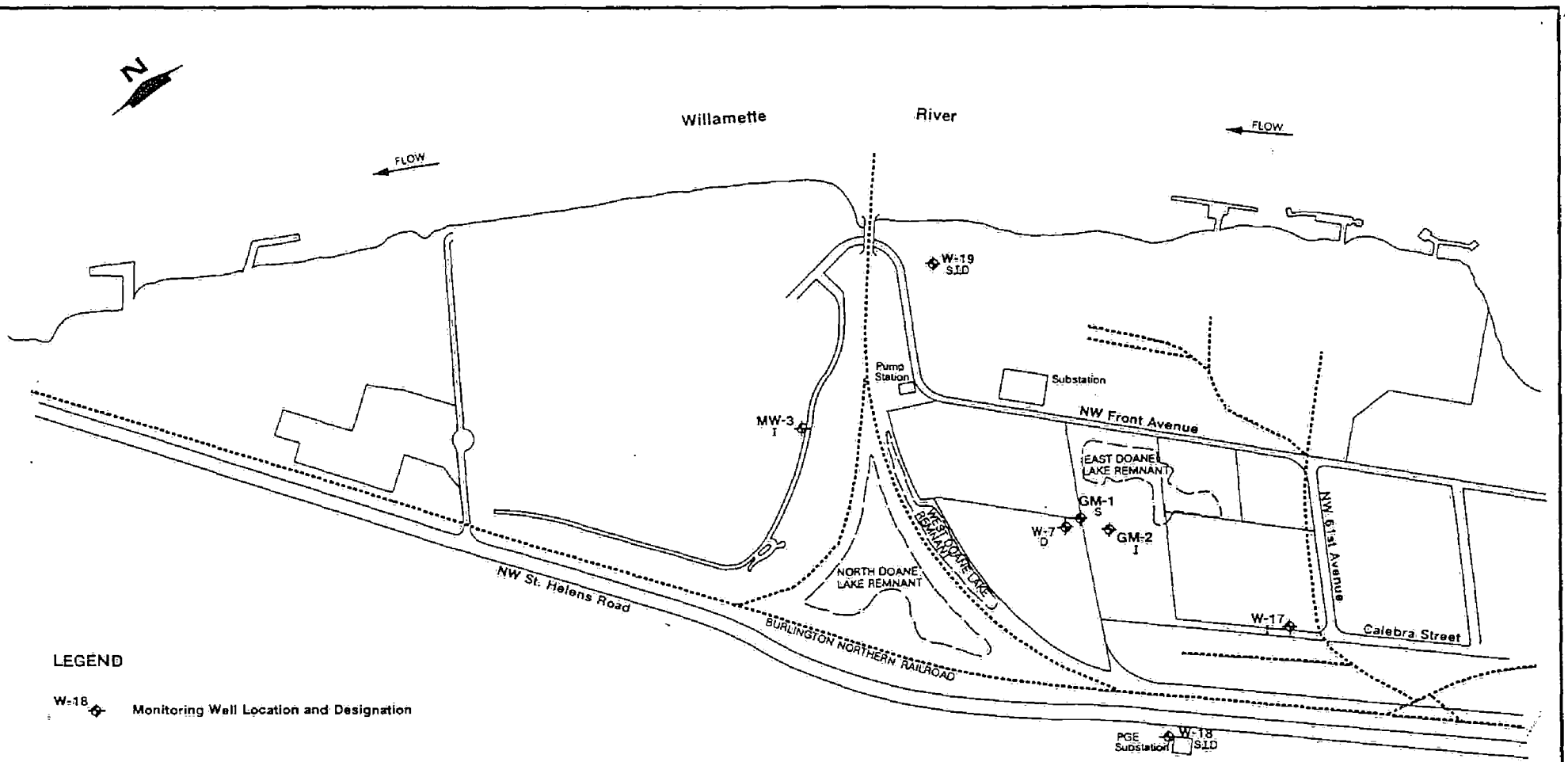
NAME JOHN PITTMAN
LOCATION

- ☐ Please handle
- ☐ Initial and return
- ☐ Return with copy of your reply
- ☐ For your information Do not return
- ☐ Initial and forward
- ☐ Return with comments
- ☐ Return with suggestions for an appropriate answer

JOHN PITTMAN
WACKER SILTRONIC CORP.
P.O. BOX 83180
PORTLAND, OR 97283-0180

RECEIVED
ENGINEERING
JUN 27 1991
John L. Pittman
Wacker Siltronic

FROM	DATE
LARRY P.	



Note: S, I, and D following well designations indicate shallow, intermediate, and deep screened horizons.

GERAGHTY & MILLER, INC.
Environmental Services

LOCATION OF GERAGHTY & MILLER WELLS

Doane Lake Area
Portland, Oregon

DRAWN BY	COMPILED BY	DATE	PROJECT NUMBER
SAC	AAR	FEB. 1991	WA103.01

FIGURE 2-2

SCOEPA00016168

TABLE 2-1. SUMMARY OF MONITORING WELL DATA
HYDROGEOLOGICAL INVESTIGATION
DOANE LAKE AREA, PORTLAND, OREGON

WELL ID	WELL LOCATION	LOGGED & INSTALLED BY	YEAR INSTALLED	TOC ELEVATION (feet)	CASING DIAMETER (inches)	TOTAL DEPTH (feet)	LENGTH OF SCREEN (feet)	SCREENED INTERVAL (feet bls)
W-16 S	SCHNITZER	DAMES & MOORE	1986	35.56	2	16.50	5.0	8.0-13.0
W-16 I	SCHNITZER	DAMES & MOORE	1986	35.91	2	53.50	10.0	40.0-50.0
W-16 D	SCHNITZER	DAMES & MOORE	1986	35.96	4	90.30	10.0	75.5-85.5
W-17 I	TRANS INDUSTRIES	GERAGHTY & MILLER	1990	41.71	4	50.00	5.0	45.0-50.0
W-18 S	PGE	GERAGHTY & MILLER	1990	53.87	4	30.00	5.0	25.0-30.0
W-18 I	PGE	GERAGHTY & MILLER	1990	53.38	4	54.00	5.0	49.0-54.0
W-18 D	PGE	GERAGHTY & MILLER	1990	54.33	4	64.00	5.0	59.0-64.0
W-19 S	ATOCHEM	GERAGHTY & MILLER	1990	33.84	4	25.00	5.0	20.0-25.0
W-19 I	ATOCHEM	GERAGHTY & MILLER	1990	33.98	4	49.00	5.0	44.0-49.0
W-19 D	ATOCHEM	GERAGHTY & MILLER	1990	33.75	4	67.56	5.0	63.0-68.0
PP-6 S	RHONE-POULENC	DAMES & MOORE	1986	37.99	2	22.00	5.0	15.0-20.0
PP-8 S	RHONE-POULENC	DAMES & MOORE	1986	37.45	2	26.00	5.0	20.0-25.0
PP-11 I	FRONT ST	DAMES & MOORE	1986	36.28	2	40.00	5.0	33.0-38.0
MW-1 S	WACKER SILTRONIC	CH2M HILL	1985	35.18	2	27.00	15.0	7.0-22.0
MW-2 S	WACKER SILTRONIC	CH2M HILL	1985	33.67	2	27.50	14.5	7.5-22.0
MW-3 S	WACKER SILTRONIC	CH2M HILL	1985	35.11	2	32.50	15.0	12.0-27.0
MW-3 I	WACKER SILTRONIC	GERAGHTY & MILLER	1990	35.11	4	60.00	5.0	55.0-60.0
MW-4 S	WACKER SILTRONIC	CH2M HILL	1985	37.45	2	27.00	15.0	6.5-21.5
MW-5 S	WACKER SILTRONIC	CH2M HILL	1985	37.02	2	25.50	15.0	5.0-20.0
MW-6 S	WACKER SILTRONIC	CH2M HILL	1985	35.29	2	29.50	15.0	9.0-24.0
MW-7 S	WACKER SILTRONIC	CH2M HILL	1985	36.23	2	30.00	15.0	10.0-25.0
ASW-1	TRANS INDUSTRIES	ROY F. WESTON	1988	NA	2	NA	10.0	NA
ASW-2	TRANS INDUSTRIES	ROY F. WESTON	1988	NA	2	NA	10.0	NA
ASW-3	TRANS INDUSTRIES	ROY F. WESTON	1988	NA	2	NA	10.0	NA
ASW-4	TRANS INDUSTRIES	KLEINFELDER	1989	NA	2	18.00	10.0	8.0-18.0
ASW-5	TRANS INDUSTRIES	KLEINFELDER	1989	NA	2	17.00	10.0	7.0-17.0
ASW-6	TRANS INDUSTRIES	KLEINFELDER	1989	NA	2	17.00	10.0	7.0-17.0
ASW-7	TRANS INDUSTRIES	KLEINFELDER	1989	NA	2	15.00	10.0	5.0-15.0
GW-8	KOPPERS	NA	NA	NA	NA	NA	NA	NA
GW-9	KOPPERS	NA	NA	NA	NA	NA	NA	NA
GW-10	KOPPERS	NA	NA	NA	NA	NA	NA	NA
GW-11	KOPPERS	NA	NA	NA	NA	NA	NA	NA
GW-12	KOPPERS	NA	NA	NA	NA	NA	NA	NA

NA Data not available
bls Below land surface
TOC Top of casing

053DLK.01\DNLKMWS.WKQ

SCOEPA00016169

TABLE 5-3. SUMMARY OF VOLATILE COMPOUNDS DETECTED IN OCTOBER WATER SAMPLES
HYDROGEOLOGICAL INVESTIGATION
DOANE LAKE AREA, PORTLAND, OREGON

COMPOUND	WELL ID:	RPW-2 I (ug/L)	RPW-21-DL* (ug/L)	GM-2 I (ug/L)	W-3 I (ug/L)	W-3 D (ug/L)	W-7 D (ug/L)	GM-1 S (ug/L)	W-8 I (ug/L)	W-10 D (ug/L)	W-11 D (ug/L)	W-12 S (ug/L)	W-12 D (ug/L)
1,1-Dichloroethene		5 U	25 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	12 J	5 U	5 U
1,2-Dichloroethene (total)		5 U	25 U	5	5 U	5 U	2 J	5 U	5 U	5 U	44 J	5 U	5 U
Trichloroethene		5 U	25 U	12	5 U	5 U	160	5 U	5 U	5 U	31 J	5 U	5 U
Benzene		6	7 DJ	3 J	5 U	5 U	2 J	1 J	3 J	15	340	2 J	5 U
Tetrachloroethene		5 U	25 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	50 U	5 U	5 U
Toluene		4 J	8 DJ	4 J	1 J	3 J	3 J	170	1 J	3 J	23 J	1 J	4 J
Chlorobenzene		12	15 DJ	2 J	3 J	5 U	5 U	5 U	4 J	2 J	85	5 U	5 U
Ethylbenzene		150	170 D	27	5 U	1 J	4 J	1 J	5 U	5 U	660	5 U	5 U
Xylenes (total)		290 E	330 D	66	5 U	5 U	5	3 J	1 J	5 U	800	5 U	5 U

COMPOUND	WELL ID:	W-15 I (ug/L)	W-15 D (ug/L)	W-17 I (ug/L)	W-18 D (ug/L)	W-19 I (ug/L)	W-19 D (ug/L)	PP-6 S (ug/L)	MW-3 S (ug/L)	MW-3I (ug/L)	EDLR1.0 (ug/L)	NDLR1.0 (ug/L)	WDLR1.0 (ug/L)
1,1-Dichloroethene		5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
1,2-Dichloroethene (total)		5 U	5 U	5 U	5 U	1 J	4 J	5 U	5 U	5 U	5 U	5 U	5 U
Trichloroethene		5 U	5 U	5 U	5 U	4 J	10	5 U	5 U	5 U	5 U	5 U	5 U
Benzene		2 J	1 J	1 J	5 U	1 J	3 J	5 U	120	5 U	1 J	5 U	5 U
Tetrachloroethene		5 U	2 J	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
Toluene		5 U	1 J	2 J	8	2 J	2 J	1 J	1 J	3 J	3 J	1 J	1 J
Chlorobenzene		5 U	23	5 U	5 U	13	34	2 J	5 U	5 U	5 U	5 U	5 U
Ethylbenzene		5 U	5 U	2 J	5 U	5 U	5 U	5 U	18	5 U	5 U	5 U	5 U
Xylenes (total)		5 U	5 U	4 J	5 U	5 U	5 U	5 U	16	3 J	2 J	1 J	5 U

ug/L Micrograms per liter
* Sample was diluted at a ratio of 5:1 in order to bring concentration within instrument calibration range.
U Compound was not detected at the given detection limit. The sample quantitation limit was corrected for dilution where applicable.
E Compound with a concentration exceeding the calibration range of the GC/MS instrument.
D Compound identified in an analysis at a secondary dilution factor.
J Estimated value
NA Not available

053DLK.13\VOLDAT.WQ1

SCOEPA00016170

TABLE 5-6. SUMMARY OF INORGANIC ANALYTES DETECTED IN OCTOBER WATER SAMPLES
HYDROGEOLOGICAL INVESTIGATION
DOANE LAKE AREA, PORTLAND, OREGON

ANALYTE (3) / SAMPLE ID:	W-18 I (ug/L)	W-18 D (ug/L)	W-19 I (ug/L)	W-19 D (ug/L)	PP-6 S (ug/L)	MW-3 S (ug/L)	MW-3 I (ug/L)	MW-7 S (ug/L)	WDLR1.0 (ug/L)	NDLR1.0 (ug/L)	EDLR1.0 (ug/L)
Aluminum	25 U	25 U	25 U	25 U	25 U	25 U	25 U	25 U	43.7 B	25 U	25 U
Antimony	40 U	40 U	40 U	40 U	40 U	40 U	40 U	40 U	40 U	40 U	69.1
Arsenic	2.0 U	3.6 B	2.0 U	2.0 U	4.6 BJ	5.3 B	2.0 U	2.0 U	5.7 BJ	4.5 UJ	2.0 UJ
Barium	18.4 B	15.5 B	1570	263.0	49.9 B	72.8 B	96.7 B	50.9 B	25.1 B	22.7	25.1 B
Beryllium	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Cadmium	5.0 U	5.0 U	18.3	5.0 U	5.0 UJ	5.0 U	5.0 U	5.0 U	5.0 UJ	5.0 UJ	5.0 UJ
Calcium	17200	21500 U	1090000	416000	124000	56800	73400	59600	19000	17400	99500
Cobalt	10.0 U	10.0 U	21.0 B	10.0 U	10.0 U	10.0 U	10.0 U	12.1 B	10.0 U	10.0 U	10.0 U
Copper	10.5 B	5.5 B	5.0 U	5.5 B	5.0 U	5.0 U	5.0 U	5.1 B	9.2 B	5.0 U	10.1 B
Iron	25 U	25 U	25 U	72 UJ	199	25500 J	27200 J	1140 J	25 U	104 U	25 U
Lead	3.0 U	3.0 U	3.0 U	3.0 U	3.0 UJ	3.0 U	3.0 U	3.0 U	3.0 UJ	3.0 UJ	7.5 J
Magnesium	8720	13600	420000	185000	12800	20800	33100	20200	8290	4350 B	8910
Manganese	46	50	48000	104	1310	2890	1800	4650	5 U	347	37
Mercury	0.20 U	0.20 U	0.20 U	0.20 U	0.20 UJ	0.20 U	0.20 U	0.20 U	0.20 UJ	0.20 UJ	0.20 UJ
Nickel	20.0 U	20.0 U	139.0	20.0 U	20.0 U	20.0 U	20.0 U	20.0 U	20.0 U	20.0 U	20.0 U
Potassium	2370 B	2690 B	22800	9850	5000 U	3130 B	1440 B	1440 B	8160	5000 U	3040 U
Sodium	12800	19000	952000	80800	104000	10700	24800	19500	173000	36000	43000
Sulfate (mg/L)	28	19	43	57	10 U	10 U	10 U	72	75.8	13.2	282
Vanadium	10.5 B	20.9 B	10.0 U	20.3 B	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U
Zinc	31.1	28.2	235.0	149.0	8.0 U	8.0 U	47.6	25.6	8.0 U	8.0 U	8.0 U
Cyanide	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	107	10.0 U	31.4	10.0 U	10.0 U	10.0 U

(1) Field duplicate
(2) Equipment blank
(3) Metals are dissolved
ug/L Micrograms per liter
U Compound was not detected at the given detection limit
B Analyte was detected, but the concentration was less than the contract required detection limit (CRDL) provided in the current scope of work for inorganics Contract Laboratory Program (CLP).
J Estimated value

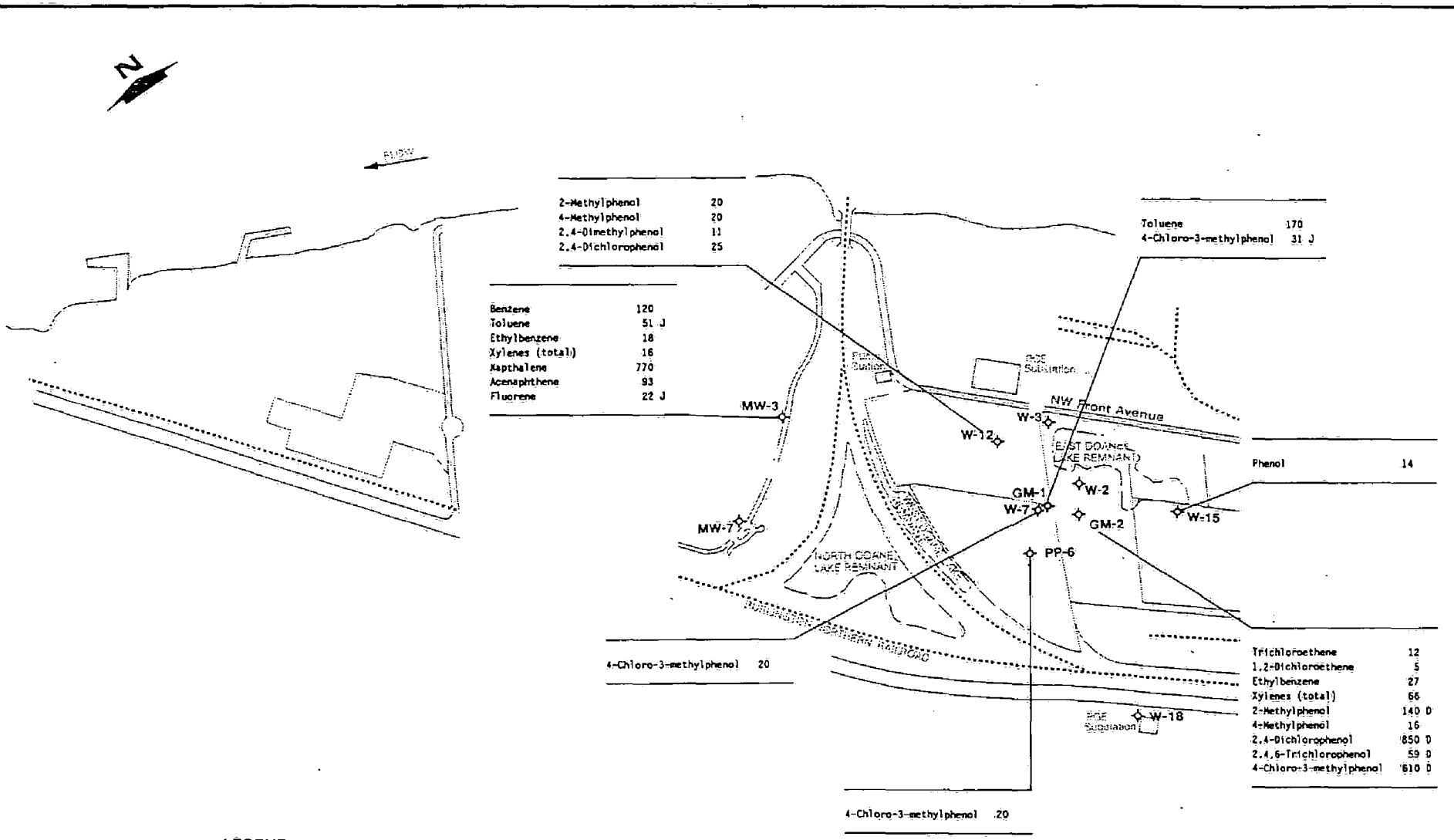
SCOEPA00016171

TABLE 5-7. SUMMARY OF EXTRACTION PROCEDURE TOXICITY ANALYSES
HYDROGEOLOGICAL INVESTIGATION
DOANE LAKE AREA, PORTLAND, OREGON

	GM-2I (1) LEACHATE CONC. (ug/L)	GM-2I DUPLICATE LEACHATE CONC. (ug/L)	W-7D (2) LEACHATE CONC. (ug/L)	GM-1S (3) LEACHATE CONC. (ug/L)	W-17I (4) LEACHATE CONC. (ug/L)	W-18S (5) LEACHATE CONC. (ug/L)	W-18I (6) LEACHATE CONC. (ug/L)	W-18D (7) LEACHATE CONC. (ug/L)	W-18D DUPLICATE LEACHATE CONC. (ug/L)	W-19S (8) LEACHATE CONC. (ug/L)	W-19S DUPLICATE LEACHATE CONC. (ug/L)	W-19I (9) LEACHATE CONC. (ug/L)	W-19D (10) LEACHATE CONC. (ug/L)	MW-3I (11) LEACHATE CONC. (ug/L)	METHOD DETECTION LIMIT (ug/L)	MAXIMUM CONCENTRATION FOR SOLID WASTE (ug/L)
PESTICIDE																
gamma-BHC (Lindane)	0.05 U	NA	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	NA	0.05 U	NA	0.05 U	0.05 U	0.055 U	0.05	400
Endrin	0.10 U	NA	0.10 U	0.10 U	0.1 U	0.10 U	0.10 U	0.10 U	NA	0.10 U	NA	0.10 U	0.10 U	0.11 U	0.10	20
Methoxychlor	0.5 U	NA	0.50 U	0.50 U	0.5 U	0.50 U	0.50 U	0.50 U	NA	0.5 U	NA	0.5 U	0.5 U	0.55 U	0.50	10000
Toxaphene	1.0 U	NA	1.00 U	1.00 U	1.0 U	1.00 U	1.00 U	1.00 U	NA	1.0 U	NA	1.0 U	1.0 U	1.1 U	1.00	500
HERBICIDE																
2,4-D	1000 U	NA	1000 U	1000 U	1000 U	1000 U	1000 U	1000 U	NA	1000 U	NA	1000 U	1000 U	1000 U	1000	10000
2,4,5-TP (Silvex)	100 U	NA	100 U	100 U	100 U	100 U	100 U	100 U	NA	100 U	NA	100 U	100 U	100 U	100	1000
METALS																
Arsenic	2.1	2.1	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0	2.0 U	2.0	2.0	2.1	2.0	5000
Barium	139	150	262 B	61.3 B	86.2 B	120 B	171 B	67.3 B	38.2 B	115 B	113 B	115 B	115 B	107	15.0	100000
Cadmium	719	728	5.1	5.0 U	5.0 U	5.0 U	5.0 U	5.2 B	5.0 U	5.0	5.0 U	5.0	5.0	5.0 U	6.0	1000
Chromium	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	10.0	5000
Lead	517	315	15100	1360	3.0 U	3.0 U	3.0 U	3.0 U	3.0 U	3.0	3.0 U	3.0	3.0	3.0	5.5	5000
Mercury	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20	200
Selenium	3.0 U	3.0 U	15.0	3.0 U	3.0 U	3.0 U	3.0 U	3.0 U	3.0 U	3.0 U	3.0 U	3.0 U	3.0 U	3.0 U	3.0	1000
Silver	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	10.0	5000

(1) Sample GM-2 I composited from DLGM2IS-1, -2, and -3.
(2) Sample W-7D was composited from DLGM1IS-1 and -2.
(3) Sample GM-1S was collected from DLGM1IS-3.
(4) Sample W-17I was composited from DLW17IS-1, -2, and -3.
(5) Sample W-18S was composited from DLW18SS-1 and -2.
(6) Sample W-18I was composited from DLW18IS-1, -2, and -3.
(7) Sample W-18D was composited from DLW18DS-1, -2, -3, and -4.
(8) Sample W-19S was composited from DLW19SS-1 and -2.
(9) Sample W-19I was composited from DLW19IS-1, -2, and -3.
(10) Sample W-19D was composited from DLW19DS-1, -2, -3, and -4.
(11) Sample MW-3I was composited from DLMW3IS-1, -2, and -3.
U Compound not detected at given detection limit.
B Compound was found in the associated blank as well as in the sample.

SCOEPA00016172



LEGEND

ppb	Parts Per Billion
J	Estimated Value
D	Sample Was Diluted

Constituents with concentrations higher than the CRDL are shown

0 500 1000

Approximate Scale in Feet

GERAGHTY & MILLER, INC.
Environmental Services

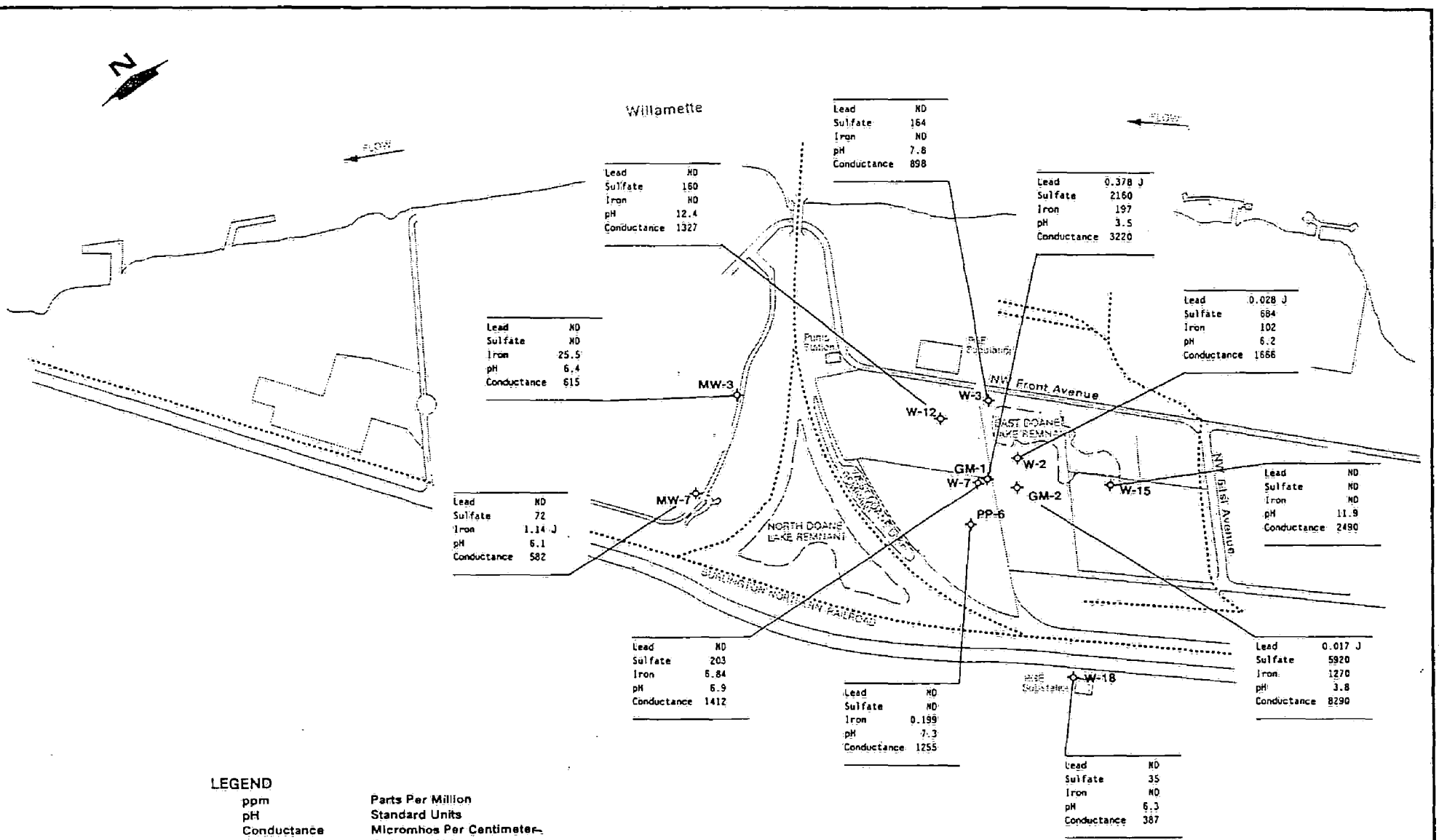
DISTRIBUTION OF ORGANIC COMPOUNDS IN THE SHALLOW HORIZON (ppb)

Doane Lake Area
Portland, Oregon

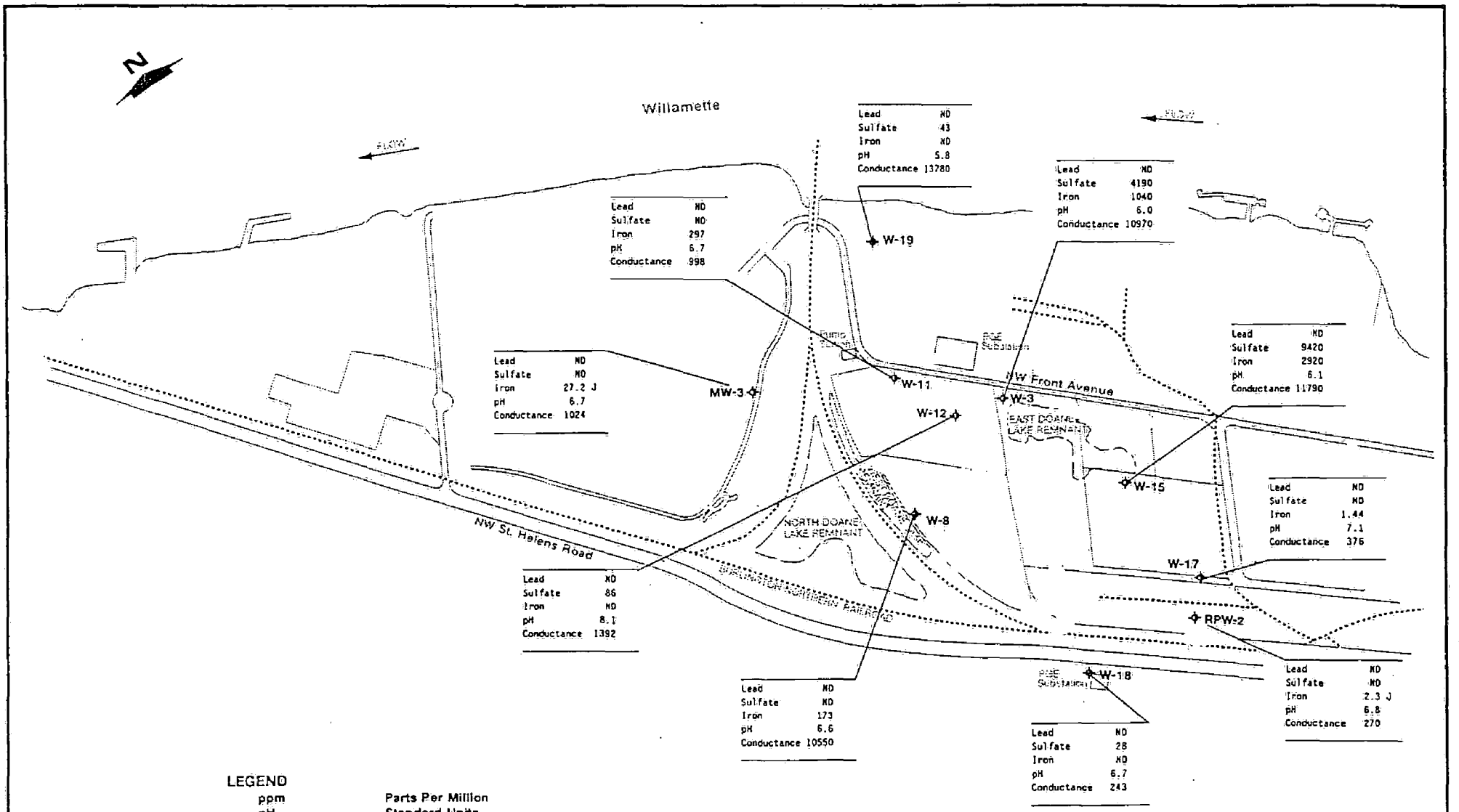
DRAWN BY	COMPILED BY	DATE	PROJECT NUMBER
SAC	PJW	FEB. 1991	WA103.01

FIGURE 5-1

SCOEPA00016173



SCOEPA00016174



LEGEND

ppm	Parts Per Million
pH	Standard Units
Conductance	Micromhos Per Centimeter
J	Estimated Value
ND	Not Detected

0 500 1000
Approximate Scale in Feet

GERAGHTY & MILLER, INC.
Environmental Services

DISTRIBUTION OF WATER QUALITY PARAMETERS IN THE INTERMEDIATE HORIZON (ppm)

Doane Lake Area
Portland, Oregon

FIGURE 5-11

DRAWN BY	COMPILED BY	DATE	PROJECT NUMBER
SAC	AAR	FEB. 1991	WA103.01

SCOEPA00016175

TABLE A-1. CONSTRUCTION SUMMARY OF NEW MONITORING WELLS
HYDROGEOLOGICAL INVESTIGATION
DOANE LAKE AREA, PORTLAND, OREGON

WELL ID	WELL LOCATION	PVC DIAMETER (inches)	TOTAL DEPTH (feet bls)	LENGTH OF SCREEN (feet)	ELEVATION OF SCREENED SECTION (feet msl)
GM-1 S	Rhone-Poulenc	4	28.68	5	10.78 to 5.78
GM-2 I	Gould	4	35.00	5	3.52 to -1.48
MW-3 I	Wacker Siltronic	4	60.00	5	-21.61 to -26.61
W-7 D	Rhone-Poulenc	4	69.72	5	-30.22 to -35.22
W-17 I	Trans Industries	4	50.00	5	-5.59 to -10.59
W-18 S	PGE	4	30.00	5	27.89 to 22.89
W-18 I	PGE	4	54.00	5	3.78 to -1.22
W-18 D	PGE	4	64.00	5	-5.87 to -10.87
W-19 S	Atochem	4	25.00	5	12.21 to 7.21
W-19 I	Atochem	4	49.00	5	-11.57 to -16.57
W-19 D	Atochem	4	67.56	5	-30.50 to -35.50

bls Below land surface
msl Mean sea level (msl + 1.375 = City of Portland datum)

053DLK.02\CONSUM.WQ1

SCOEPA00016176

TABLE A-2. SUMMARY OF WELL DEVELOPMENT VOLUMES
HYDROGEOLOGICAL INVESTIGATION
DOANE LAKE AREA, PORTLAND, OREGON

WELL ID	TOTAL WELL DEPTH (Feet)	APPROXIMATE WELL DEVELOPMENT VOLUME (Gallons)
GM-1S	28.68	50
GM-2I*	35.00	45
W-7D	69.72	90-100
W-17I	50.00	70-80
W-18S	30.00	50
W-18I	54.00	90-100
W-18D	64.00	120-150
W-19S	25.00	70-80
W-19I	49.00	90-100
W-19D	67.56	90-100
MW-3I*	60.00	50

*Bailed dry during development

053DLK.04:DEVELVOL.TBL

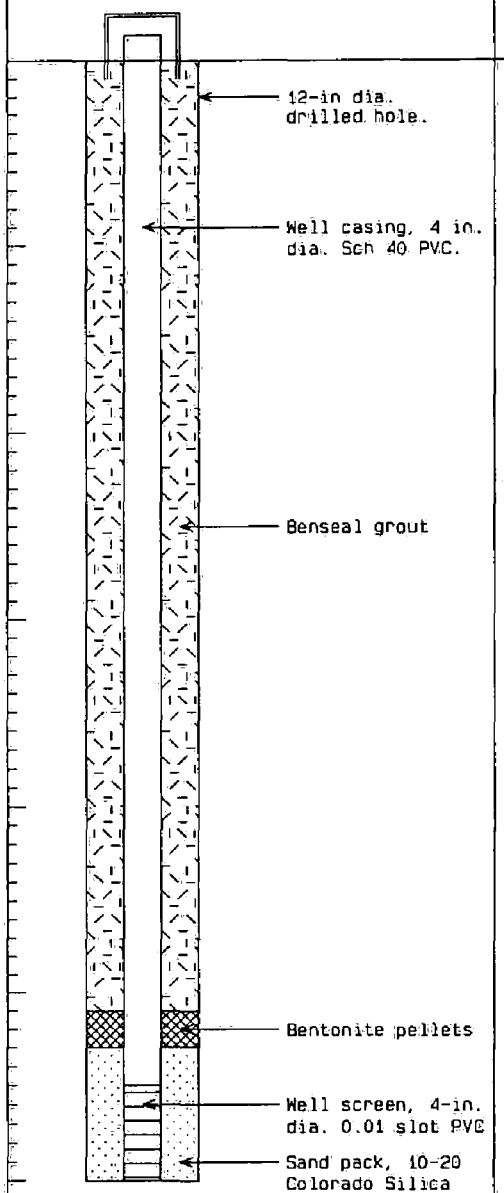
SCOEPA00016177

PROJECT NAME: DOANE LAKE HYDROGEOLOGICAL INVESTIGATION
PROJECT NO: WA103.01

LOG OF MW-3I

CLIENT NAME: INDUSTRIAL GROUP
PROJECT LOCATION: PORTLAND, OREGON
DATE STARTED: 25-JUNE-90
DATE COMPLETED: 25-JUNE-90
LOGGED BY: A. RIPLEY
CHECKED BY: A. RIPLEY

SURFACE ELEV: 33.39 feet
DATUM: MEAN SEA LEVEL
DRILL COMPANY: GEO-TECH EXPLORATIONS
DRILLER: MIKE PETERSEN
DRILL METHOD: HOLLOW STEM AUGER
SAMPLING METHOD: SPT SPLIT SPOON



DEPTH (feet)	BLOWS PER SIX IN.	MATERIALS DESCRIPTION
	6	Surface silty sand with gravel.
	5	SILTY SAND with some clay - Dark brown, moist, medium dense, medium-grained sand, some organic fragments (roots), minor clay fraction. (SM)
	8	
10	6	POORLY-GRADED SAND with silt - Brown, moist, medium dense, medium-grained sand, trace silt (<5%). (SP-SM)
	7	
	8	Water level taken 7/18/90
	3	
	4	As above - Saturated.
	4	POORLY-GRADED SAND - Brown to grey, saturated, medium dense, medium to coarse-grained sand. (SP-SM)
20	5	
	4	SANDY SILT - Dark grey, wet, stiff to very stiff, fine-grained sand, abundant organic fragments. (ML)
	11	
		Heaving sands at 25 feet, no sample taken.
		POORLY-GRADED SAND with silt - Dark grey, saturated, very loose, medium-grained sand grades to SANDY SILT in bottom 6" of sampler. (SP-SM)
30	0/6"	
	1	
	1	SANDY SILT - Grey, wet to moist, stiff, very fine-grained sand, some mica flakes and organic fragments. (ML)
	3	
	3	
	6	
40	1	SILT with clay - Dark grey, moist, soft to medium stiff, plastic clay. (MH)
	2	
	3	
	6	As above - Large wood fragment in sampler, abundant organic fragments. (MH)
	2	
	3	
50	2	SILT with clay - As above. (MH)
	3	
	2	
60	1	SILT with clay - As above. (MH)
	2	
	3	
		Borehole terminated at 61.5 feet.
70		

GERAGHTY & MILLER, INC.

FIGURE A-11

SCOEPA00016178

RECEIVED
MAR 2 3 1991
DR. R. STAUDIGL

Oregon

DEPARTMENT OF ENVIRONMENTAL QUALITY

March 20, 1991

Dr. Rudolf Staudigl
Wacker Siltronic Corporation
P.O. Box 83180
Portland, Oregon 97283-0180

Re: Portland, Oregon
Facility Expansion

Dear Dr. Staudigl:

This letter is a follow-up to your recent discussions with the Department of Environmental Quality (DEQ) concerning Wacker Siltronic Corporation's (Wacker) facility expansion plans. Wacker informed DEQ that it is necessary to expand its manufacturing facility in Portland, Oregon, to remain competitive in a growing market. DEQ understands that the proposed expansion will include the construction of parking and building facilities, and related manufacturing capacity improvements, on a portion of the Wacker property identified on the attached site diagram (Facility Expansion), and that the initial phase of the Facility Expansion will require Wacker to invest approximately $150 million.

Investigations Wacker performed at the property indicate that coal tars containing polyaromatic hydrocarbon contaminants are present at certain portions of the soils where the Facility Expansion will be constructed. Present information indicates that these substances were deposited prior to Wacker's purchase of the property, but are nevertheless "hazardous materials" as defined in ORS 465.200 and ORS 466.605. To address this soil contamination, you informed DEQ that Wacker and its consulting engineers (Industrial Design Corporation) designed the Facility Expansion to include the construction of concrete barrier covering a significant portion of the Facility Expansion to serve as a cap and drainage networks to divert runoff to the storm sewer system.

Wacker's position is that the cap and drainage networks provided by the existing facilities and the proposed Facility Expansion constitute an appropriate remedy for the underlying soils by minimizing the migration of, and preventing contact with, contaminated soils. Based on its independent evaluation

811 SW Sixth Avenue
Portland, OR 97204-1390
(503) 229-5696

SCOEPA00016179

of site conditions, it is Wacker's position that the proposed Facility Expansion, together with the existing improvements, will achieve the lowest practicable level of contamination in accordance with OAR 340-108-030 and will be protective of public health, safety, welfare and the environment.

We are not able to provide you definitive answers on your proposed Facility Expansion. DEQ has not made an independent determination of the extent or nature of contamination at the site. Although we have no reason to doubt the preliminary information developed by you and your consulting engineers, as government regulators we cannot make conclusions of issues for which we have not independently verified the facts.

Within this context, let me discuss how DEQ expects to treat this site and the proposed Facility Expansion. Based on present information, our best professional judgment would lead us to conclude that futures remedial action, if any, could be designed so as to not require dismantling the existing facilities or the Facility Expansion. Likewise, based on present information, such future remedial actions, if any, also could be designed so as to not disrupt manufacturing activities at the existing facilities or the Facility Expansion.

If a future determination is made regarding the need for additional investigations or remediation at the site, DEQ would have to follow the Oregon statutes and Environmental Quality Commission rules which delineate a process for conducting such investigations and a full opportunity for public review of and comment on conclusions regarding any proposed remedy. It is through this independent analysis and public review process that we would arrive at our final conclusions about the nature of the remediation.

In this light, Wacker's suggestion that the proposed Facility Expansion and associated drainage networks is a cap and should be acceptable as a remedy, should one be necessary, may well be right. But as I have outlined above, such a determination cannot be made by the DEQ at this time. I might add that in the past we have concluded that a cap and appropriate drainage has been an acceptable institutional control for soil contamination which is contained in buried soils and which is neither mobile nor likely to become mobile. While this may be the conclusion at the Wacker site, such a determination cannot be made until we have conducted our independent investigation and analysis, and followed our public involvement process.

Based on the limited information currently available and on the procedures outlined, I hope this letter provides Wacker with the assurances necessary that the Facility Expansion can proceed without being at risk of disruption of manufacturing or dismantlement from future remediation, should such be necessary.

Sincerely,

Fred Hansen
Director

Attachment

U.S. ENVIRONMENTAL PROTECTION AGENCY
REGION 10
1200 SIXTH AVENUE
SEATTLE, WASHINGTON 98101

REPLY TO ATTN OF: HW-113

RECEIVED
ENGINEERING
OCT 24 1988
John L. Pittman
Wacker Siltronic

John Pittman
Wacker Siltronic
P.O. Box 03180
Portland, Oregon 97203

Dear Mr. Pittman:

Re: NL/Gould Superfund Site, Portland, Oregon

On February 18, 1988, the Environmental Protection Agency (EPA) notified you that it had documented the release or threatened release of hazardous substances at the above-referenced site. The EPA also notified you that it has information indicating that you or your company may be a responsible party for the groundwater unit at the NL/Gould site. This letter is to inform you of the agreements between EPA and the Oregon Department of Environmental Quality (DEQ) on the investigation of groundwater contamination associated with the "groundwater unit" of the NL/Gould Superfund site in Portland.

At DEQ's request, EPA has agreed that the state should be the lead agency responsible for the investigations of the groundwater unit. Accordingly, it is EPA's understanding that DEQ will use state authorities and resources to arrange for a Remedial Investigation to supplement the Remedial Investigation/ Feasibility Study performed by NL and Gould, which partially evaluated the nature and extent of contamination of the groundwater unit at this site. Details of this arrangement are included in the enclosed letter from EPA to DEQ dated September 13, 1988.

As part of this agreement, DEQ intends to: identify Potentially Responsible Parties (PRPs) for the groundwater unit; provide appropriate notice, define a Scope of Work based on the Scope of Work prepared for this site by EPA's contractor (included in this letter as an enclosure); and require consenting PRPs to properly and promptly conduct the investigation under a negotiated agreement. EPA will not be signatory to a negotiated agreement between the state and PRPs for the groundwater investigation. However, EPA is willing to provide a letter indicating its intent regarding future EPA action with respect to any order that is signed by DEQ.

EPA and DEQ have agreed that if the state has not reached an acceptable agreement with the PRPs by March 31, 1989, the agencies will reevaluate options for accomplishing the investigation in a timely manner, including the use of federal funds, if available.

The results of the groundwater unit investigation will be used by DEQ and EPA to decide on the need for remedial actions for the NL/Gould groundwater unit. (The Record of Decision issued by EPA in March 1988 for the NL/Gould soils unit stated that EPA was deferring a decision on groundwater remediation to a later date).

We appreciate the cooperation you have shown in responding to our information request. If you have any questions on EPA's future role in this process, EPA's primary contact on this matter will be Alan Goodman of the Oregon Operations Office at (503) 229-5254.

Sincerely,

for George C. Hofer

Chuck Findley, Director
Hazardous Waste DIvision

Enclosures

cc: Al Goodman, Oregon Operations Office
Fred Hansen, DEQ
Bill Renfroe, DEQ

White 5183F

U.S. ENVIRONMENTAL PROTEC ON AGENCY
REGION 10
1200 SIXTH AVENUE
SEATTLE, WASHINGTON 98101

SEP 13 1988

REPLY TO
ATTN OF: HW-113

Michael J. Downs, Administrator
Environmental Cleanup Division
Department of Environmental Quality
811 S.W. Sixth Avenue
Portland, Oregon 97204

Re: NL/Gould Superfund Site, Portland, Oregon

Dear Mr. Downs:

This letter is to confirm the agreements between the U.S. Environmental Protection Agency (EPA) and the Oregon Department of Environmental Quality (DEQ), on the investigation of groundwater contamination associated with the "groundwater unit" of the NL/Gould Superfund site in Portland.

At DEQ's request, EPA is deferring for now to the State for investigating the groundwater unit. Accordingly, it is EPA's understanding that DEQ will use State authorities and resources to arrange for a Remedial Investigation to supplement the Remedial Investigation/Feasibility Study performed by NL and Gould which partially evaluated the nature and extent of contamination of the groundwater unit at this site. DEQ intends to identify Potentially Responsible Parties (PRPs) for the groundwater unit, provide appropriate notice, define a Scope of Work based on the Scope of Work prepared for this site by Tetra Tech, and require consenting PRPs to properly and promptly conduct the investigation under a negotiated agreement.

EPA will not be involved in the State's negotiations with responsible parties. However, EPA has provided the State with a Preliminary Scope of Work for the groundwater unit investigation. DEQ may require additional work beyond EPA's investigation requirements.

EPA will not be signatory to a negotiated agreement between the State and PRPs for the groundwater investigation. However, EPA is willing to participate in a meeting of the PRPs to inform them of EPA's role in the groundwater unit investigation.

EPA acknowledges that DEQ, as lead agency, will oversee the groundwater unit investigation with only State authorities, under schedules set by the State, using no federal funds, and with no EPA involvement. DEQ agrees to keep EPA informed through the Oregon Operations Office of site activities for informational purposes, to provide pertinent documents to EPA for placement in the Administrative Record, and to perform community relations activities at the site that are consistent with the Community Relations Plan currently being revised by EPA.

EPA and DEQ agree that if the State has not reached an acceptable agreement with the PRPs by March 31, 1989, the agencies will reevaluate options for accomplishing the investigation in a timely manner, including the use of federal funds, if available.

The results of the groundwater unit investigation will be used by DEQ and EPA to decide on the need for remedial actions for the NL/Gould groundwater unit. (The Record of Decision issued by EPA in March 1988 for the NL/Gould soils unit stated that EPA was deferring a decision on groundwater remediation to a later date.)

EPA's primary contact for DEQ on this matter will be Alan Goodman of the Oregon Operations Office.

We appreciate the State's desire and commitment to take the lead for conducting the NL/Gould groundwater unit investigation. We look forward to its successful and timely completion.

Sincerely,

Randall F Smith

for Charles E. Findley, Director
Hazardous Waste Division

cc: Oregon Operations Office
Fred Hansen, DEQ

SCOEPA00016185

U.S. ENVIRONMENTAL PROTECTION AGENCY
TECHNICAL ENFORCEMENT SUPPORT
AT
HAZARDOUS WASTE SITES

TES IV
CONTRACT #68-01-7351
WORK ASSIGNMENT NO. C10004

FINAL SCOPE OF WORK
HYDROGEOLOGICAL INVESTIGATION
NL/GOULD - DOANE LAKE AREA
PORTLAND, OREGON
U.S. EPA REGION X

TETRA TECH, INC.
FOR
JACOBS ENGINEERING GROUP, INC.
PROJECT NUMBER: 05-B904-00
TC-3621-66

SEPTEMBER 1988

SCOEPA00016186

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1.0 EXECUTIVE SUMMARY

The Doane Lake area is located in a heavily industrialized region north of the City of Portland, Oregon, along the Willamette River, approximately 11.2 km (7 ~~ft~~ MILES) upstream of the confluence with the Columbia River. The entire study area is approximately 180 ac, with the 120-ac northern section separated from the 60-ac southern section by a Burlington Northern Railroad right-of-way.

The northern section is bounded on the east by the Willamette River, on the west by NW St. Helens Road, on the south by the railroad, and on the north by a U.S. Corps of Engineers dredging equipment repair facility. Facilities located in the northern area are owned and/or operated by Wacker Siltronics Corporation, Northwest Natural Gas Company (NWNG), Koppers Company, Inc., and Pacific Northern Oil Company.

The southern section of the study area is bounded on the east by the Willamette River, on the west and north by the Burlington Northern Railroad right-of-way, and on the south by 61st Street. Facilities located in the southern area are owned and/or operated by Gould, Inc., American Steel Industries, Inc., ESCO Corporation, Rhône-Poulenc Inc., Northwest Equipment Rentals, Schnitzer Investments Corporation, Liquid Air Corporation, and Pennwalt Corporation.

A wide variety of wastes and products have been disposed of or spilled in the study area over several decades, including heavy metals, pesticides, solvents, creosote, acids, and caustics.

Regulatory investigations in the Doane Lake area began in approximately 1960 at the Kirk and Sons facility. Operations at this facility, located in the central area of the southern portion of the Doane Lake study area, consisted mainly of lead-acid battery recycling and smelting. Kirk and Sons received numerous complaints and violations concerning lead emissions and

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improper wastewater discharges at their facility. The site was purchased in 1971 by NL Industries, who continued lead processing activities. In 1979, the property was sold to Gould, Inc., who stopped receiving lead-acid batteries, but continued to process the existing stockpile. In August 1981, the Gould, Inc. facility closed.

Investigations conducted at the Gould, Inc. site by the U.S. Environmental Protection Agency (EPA), Oregon Department of Environmental Quality (ODEQ), and other agencies revealed widespread lead contamination. Due to the threat posed to human health and the environment by the offsite migration of lead, the Gould site was nominated for inclusion to the National Priorities List (NPL) in 1983. In 1985, Gould, Inc. signed an Administrative Order on Consent, agreeing to conduct a Remedial Investigation/Feasibility Study (RI/FS). The scope of the study includes fully characterizing the nature and extent of contamination on the site and investigating various remedial action alternatives.

In February 1988, the U.S. EPA issued notice and information request letters to Potentially Responsible Parties (PRPs), other than Gould, Inc., under provisions of Section 104 of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). Gould, Inc. was also sent a notice and information request letter at a later date. Six of the previously notified PRPs responded with information concerning the generation and disposal of hazardous wastes. The information received was evaluated for data gaps and ranked as Level A (quantitative) or Level B (qualitative), according to the reliability of the data.

On 31 March 1988, U.S. EPA developed a Record of Decision (ROD) that selected an interim remedial action for the NL/Gould site. The ROD addressed the preferred alternative for remediation of lead contamination of the soils unit at the Gould site. The remedial action selected is comprised of the following activities:

- Removing and recycling lead from battery casings

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- Reducing the mobility of lead in the contaminated soil, sediment, and matter through fixation

- Monitoring surface water and groundwater at the site while additional studies of contamination in these areas are conducted

- Monitoring ambient air around the site to ensure that remedial actions are carried out in a manner that protects public health.

Since the ROD identified the need for additional groundwater and surface water studies, the remedial action will include activities concerning these units. Information obtained from the PRP 104(e) responses, as well as results presented in the NL/Gould RI, and the North Doane Lake Site Characterization Work Plan, revealed data gaps concerning the nature and extent of groundwater and surface water contamination in the Doane Lake study area. Previous studies performed in the northern section of the Doane Lake area have concentrated on polynuclear aromatic hydrocarbon (PAH) contamination, while studies in the southern section have concerned heavy metals. A unified investigation is necessary to determine the full range of contaminants present, transport processes, and effects of various organic and inorganic contaminants on remediation efforts for lead.

To satisfy the need for further studies, U.S. EPA and ODEQ have requested that Tetra Tech, Inc., as a subcontractor to Jacobs Engineering, develop a scope of work. The purpose of this scope of work is to delineate the regulatory and technical requirements of the RI that will be conducted to characterize the nature and extent of groundwater, and surface water, and sediment contamination on and around the Doane Lake area. Information derived from the RI activities will be used to determine what effect remedial activities will have on contaminants that may be present in addition to lead, and what effect these contaminants may have on lead remediation efforts.

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2.0 SITE DESCRIPTION

The following section includes a physical description of the Doane Lake study area. The majority of the information presented here is taken from the RI report prepared by Dames & Moore (1987).

2.1 LOCATION

The Doane Lake study area consists of eight privately owned parcels located in Sections 12 and 13 of Township 1 North, Range 1 West. The approximate 180-ac site lies on the southwest bank of the Willamette River about 7 mi from the confluence with the Columbia River (Figures 1 and 2).

2.2 EXISTING PROPERTY FACILITIES AND ACTIVITIES

The study area is currently occupied by eight industries and one investment firm, three remnants of Doane Lake, and the Burlington Northern Railroad tracks, which bisect the study area.

The discussion of this area will focus on the following two subareas (Figure 3):

- Area A - Includes the NL/Gould site, Rhône-Poulenc Inc., ESCO Corporation, Schnitzer Investments Corporation, Pennwalt Corporation, Liquid Air Corporation, east and west Doane Lake remnants (Figure 2).

- Area B - Includes the Wacker Siltronic Corporation, NWNG, Koppers Company, Inc., and the north Doane Lake remnant (Figure 2).

The contaminants associated with each subarea are different. However, the migration of pollutants in groundwater follows similar patterns.

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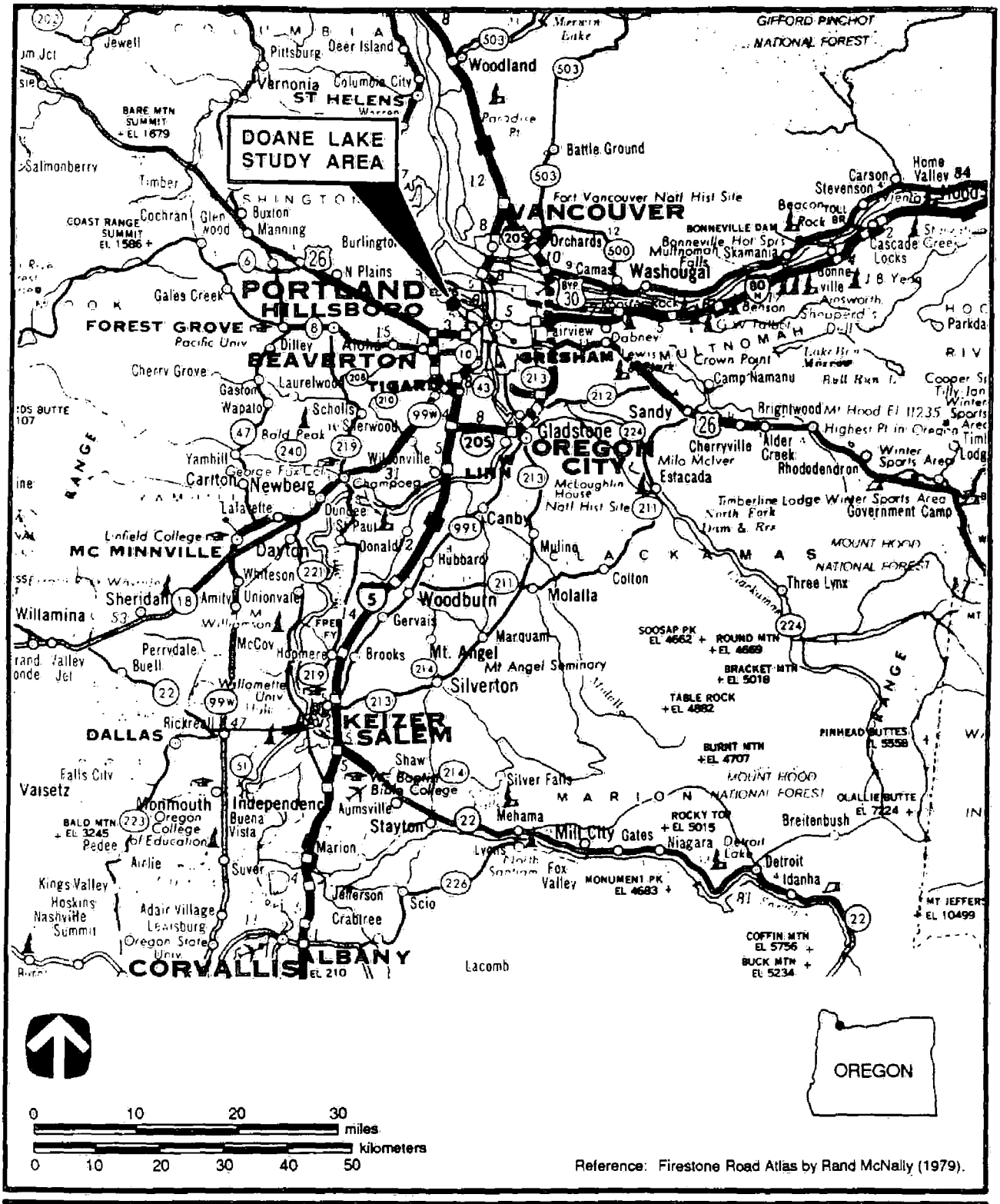

Figure 1. Area map.

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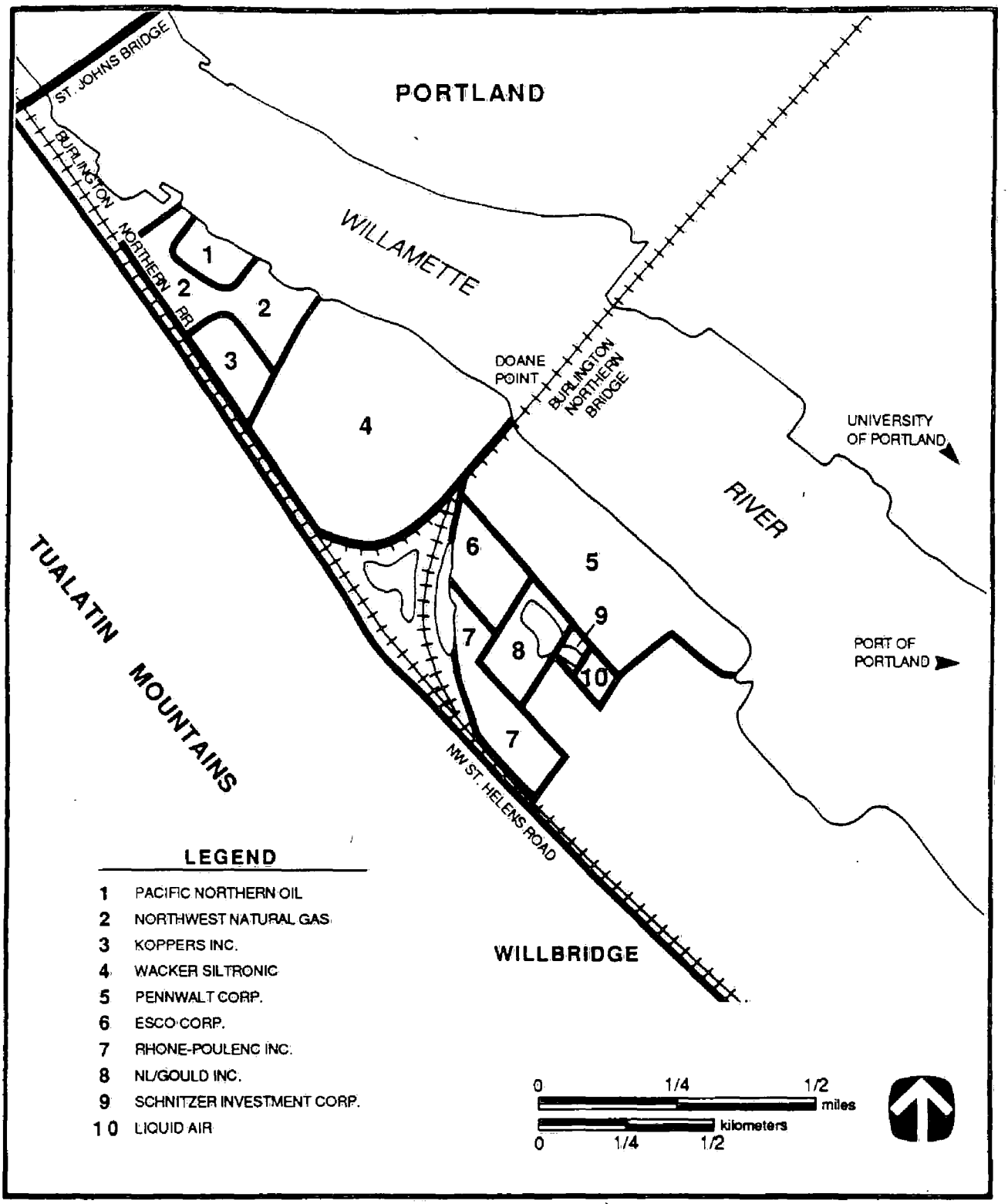

Figure 2. Site description and facility locations.

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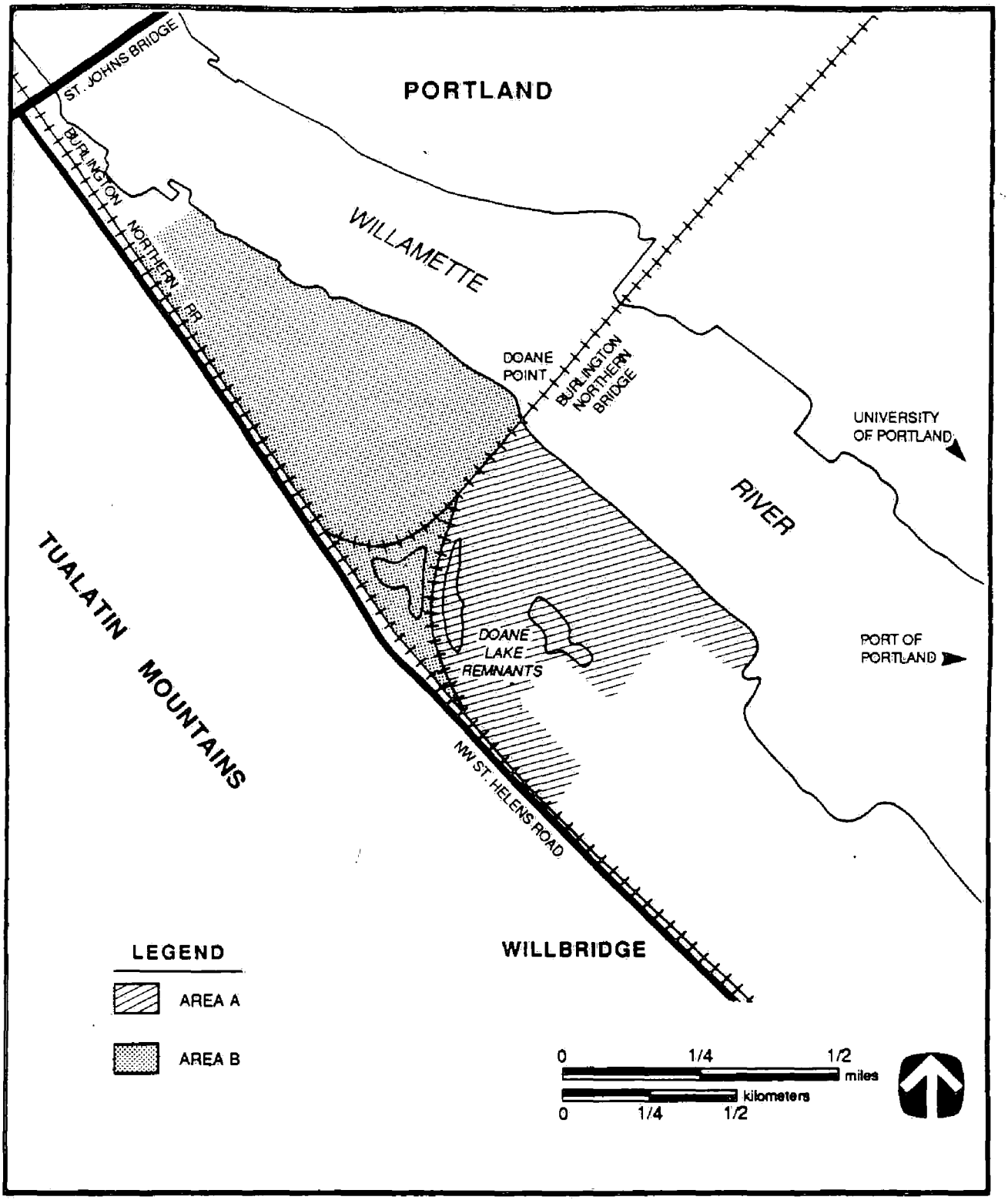

Figure 3. Description of Areas A and B.

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2.3 TOPOGRAPHY

The Doane Lake study site slopes gently from the base of the Tualatin Mountains from 15.2 m (50 ft) to approximately 3 m (10 ft) above sea level along the banks of the Willamette River. The majority of the industries are constructed on fill material, which ranges from 1.5 to 10.6 m (5 to 35 ft) in depth. The site topography consists of three remnants of the original Doane Lake, graded fill, and several settling and storage basins.

2.4 GEOLOGY

The Doane Lake study area is located in the lowest portion of the Willamette Valley. The flood plain, upon which the site is located, is flanked by the Tualatin Hills anticline to the southwest and the Willamette River to the northeast. Various types of fill underlie most of the site, which sits atop two to several tens of feet of alluvial deposits from the Holocene age that are underlain by 12-14 flows of Columbia River basalt.

The fill layer consists of imported rock from a quarry located directly southwest of NWNG, dredged sediments from the Willamette River, and dredged material from various onsite settling basins. Waste products from various operations in the study area were incorporated into the fill material. Specific fill constituents include castings sands, metal slag, scrap metal, demolition debris, silty hydraulic dredge spoils, shredded automobile interiors, shredded battery casings, matte, and carbide sludge. Fill thickness varies from 0.3 to 10.6 m (1 to 35 ft).

Prior to any fill operations, Doane Lake occupied an abandoned channel of the Willamette River. The alluvium beneath the fill layer consists of a mixture of river channel sands, over-the-bank silts and sandy silts, fluvial-lacustrine silts, clayey silts, and silty clay. Disconnected pockets and layers of volcanic ash, mudflow, sandy gravel, peat, organic silt, and woody detritus are also present. The inferred depth of the alluvium layer ranges from 11.6 to 24.4 m (38 ft to 80 ft).

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The Columbia River basalt consists of 12-14 separate flows of basalt dating back to the Miocene age. Each flow typically consists of a rubbly or vesicular top, which contains the majority of the groundwater underlain by a jointed section of basalt. The measured basalt layer thickness exceeds 152 m (500 ft). The basalt found under the Doane Lake study site consists of medium-grained crystals (1-2 mm in diameter) and a porphyritic texture. Fine-to coarse-grained basalt gravel locally overlie the basalt. The upper section of the basalt layer is thought to be fractured and jointed.

The sediments beneath the filled portions of Doane Lake consist generally of clays and silts with mixed lenses of fine-grained sands. Sediments from the existing remnants consist of black "muddy clay" with abundant organic matter, except in the area of the Schnitzer/Liquid Air property, which contains large amounts of lime. The lime forms a white to gray-muddy clay. Grain sizes in Doane Lake consists of clayey silts to fine-grained silty sand.

Sediments samples from the Willamette River, both upstream and downstream from the study area, show grain sizes of predominantly sand with small amounts of gravels and silts present.

2.5 SURFACE WATER AND GROUNDWATER HYDROLOGY

The east Doane Lake remnant receives runoff from Schnitzer/Liquid Air, ESCO, and eastern portion of Rhône-Poulenc scrap yard. Surface drainage from east Doane Lake runs into a stormwater sewer, northward under NW Front Street, and discharges into the Willamette River (Figure 4).

The west Doane Lake remnant receives runoff from the ESCO property and western portion of the Rhône-Poulenc scrap yard. Discharge/drainage processes from this remnant have not been characterized. Tidal influence on the west Doane Lake remnant has been suspected to cause percolation through the Burlington Northern Railroad berm and onto the northern portion of the Doane Lake area.

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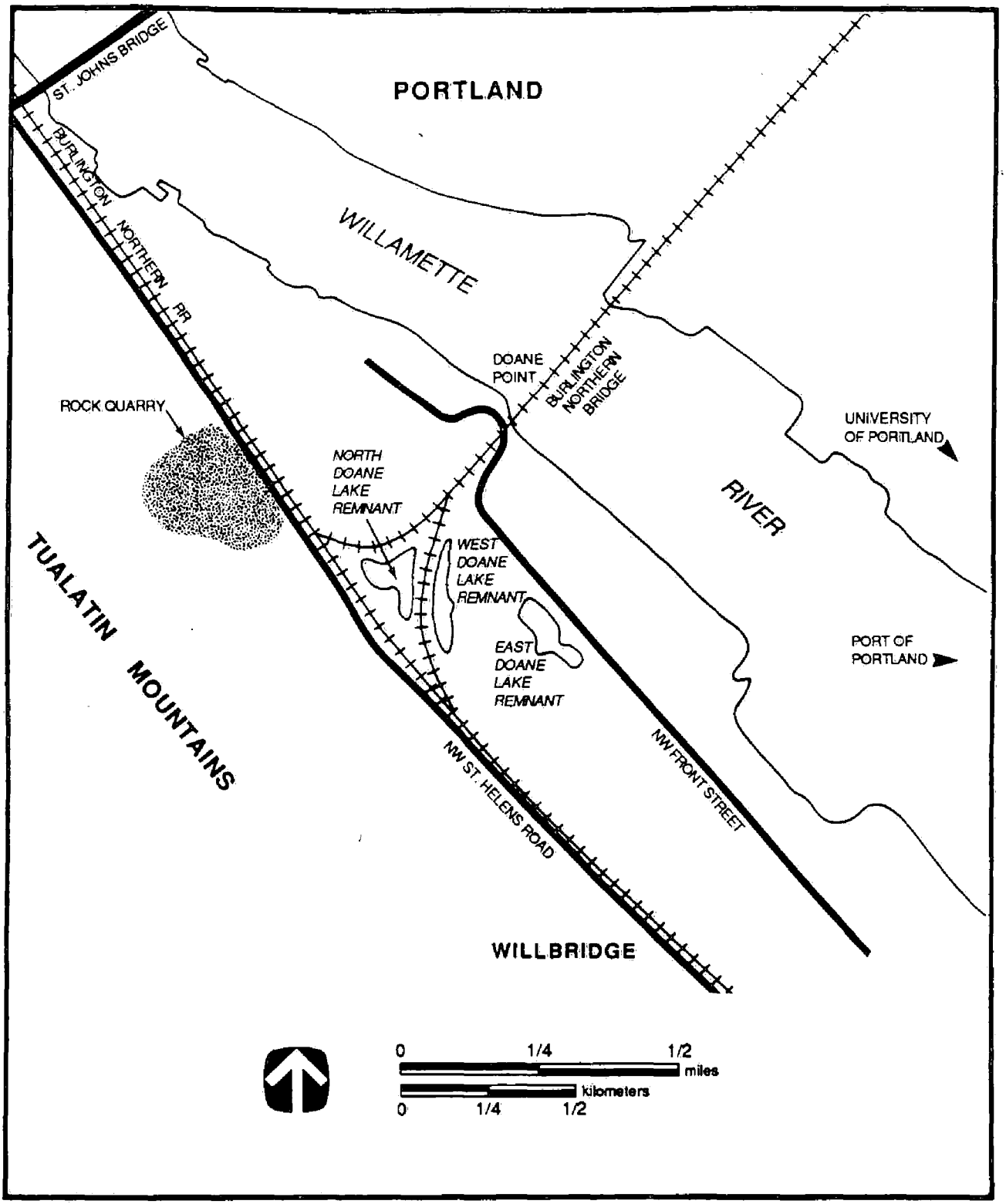

Figure 4. Doane Lake remnants and key landmarks.

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Runoff and drainage patterns for the north Doane Lake remnant within the "y" portion of the BN railroad tracks has not been characterized.

The shallow fill water-bearing unit has been shown to be hydraulically connected to the upper alluvial layer and both east and west Doane Lake remnants. The upper alluvial water-bearing unit is hydraulically connected to the lower alluvium fill aquifer, the Willamette River, and both east and west Doane Lake remnants. The distinction between lower and upper alluvial water-bearing units is somewhat arbitrary since they both comprise a single water-bearing unit. The majority of groundwater beneath the site resides in the upper weathered and fractured portions of the basalt water-bearing layer. The fractured and jointed nature of basalt allows for both horizontal and vertical movement of groundwater, including artesian vertical migration in the northern portion of the study area. Recharge of the basalt water-bearing unit occurs in the southern section of Area A. All water-bearing units appear to be interconnected. Groundwater migration through both the upper and lower alluvial water-bearing units tends to travel northward toward the Willamette River. Groundwater levels and recharge in all four water-bearing units is predominantly affected by precipitation and water levels of the Willamette River. The Willamette River level is affected by both tidal and upstream drainage volumes.

Limited data for Area B indicate that its geological composition and hydrological migration patterns are similar to those described for Area A (i.e., interconnected water-bearing units and general northwest migration of groundwater parallel and towards the Willamette River).

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3.0 EXISTING DATA

Data for the Doane Lake area have been generated from several studies. The NL/Gould RI, North Doane Lake Site Characterization Work Plan, and PRP 104(e) response letters provided the majority of the information known about the site.

3.1 KNOWN PAST DISPOSAL PRACTICES

3.1.1 Area A (Figure 5)

The NL/Gould site, a lead smelting and refining facility, generated several types of waste including sulfuric acid, shredded rubber and plastic battery casings, shredded battery tops, and blast furnace matte. Disposal practices at the NL/Gould site consisted of draining untreated sulfuric acid into east Doane Lake remnant until 1976, when the acid was neutralized and discharged into the City of Portland sewer system. The casings, tops, and electro elements were placed in storage bins. The casings were shredded and used as fill, both on and adjacent to the NL/Gould site. Electrodes were fed directly into a blast furnace. The waste from the furnace consisted of slag, matte, and speiss materials. The matte was used as fill material onsite. The slag and speiss materials were recycled back into the furnace. Automobile interiors and acetylene wastes were also used as fill. By 1963, the stockpiling of battery casing had created a large mound along the plant shoreline to the northeast. This mound was observed to have spilled over into the east Doane Lake remnant as early as 1957 (Dames & Moore 1987).

The ESCO site contains a capped landfill, which was used for the disposal of clay-bonded sands, demolition debris, and sand bonded with foundry resins containing phenolformaldehyde (Sherwood, R., 18 April 1988, personal communication). Arc furnace dust containing chromium was disposed of onsite between 1971 and 1975. Zircon sands with naturally occurring radioactivity were also landfilled onsite until 1976. By 1957, ESCO began

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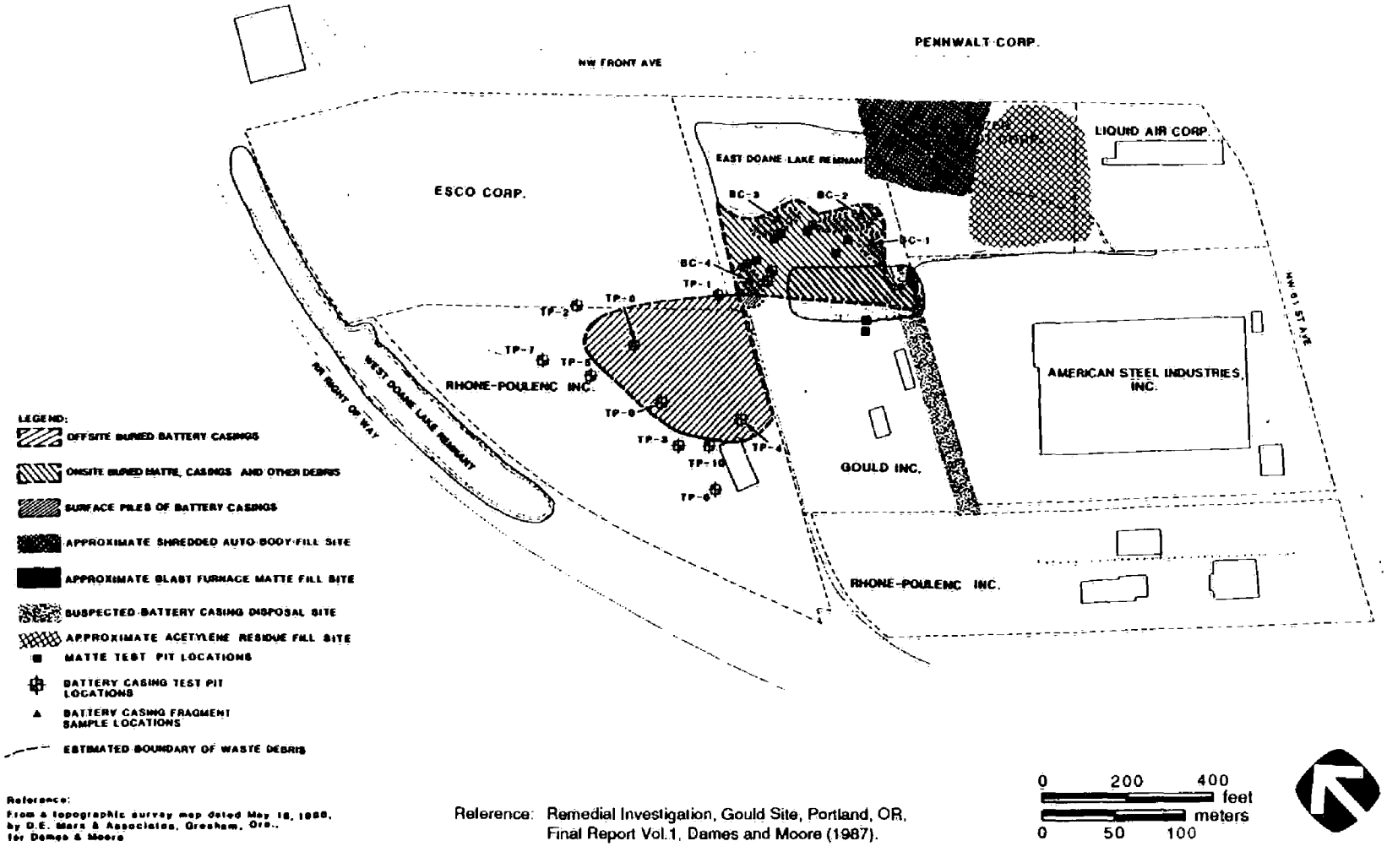

Figure 5. Disposal sites in Area A.

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disposing of foundry sand and slag into the east Doane Lake remnant (Dames & Moore 1987). Landfilling on the ESCO site continued to fill in the west Doane Lake remnant until 1979.

Rhône-Poulenc, an agrochemical facility, provides no specific descriptions of disposal practices onsite (Furguson, R., 13 April 1988, personal communication). The RI (Dames & Moore 1987) refers to aerial photos dating to 1963, which show Rhône-Poulenc contributing to the landfilling operations along the north boundary of their land adjacent to the ESCO site. The constituents of this fill are unknown. By 1979, all landfilling by ESCO and Rhône-Poulenc had ceased in this area.

The Schnitzer Investment/Liquid Air Corporation site (owned by Schnitzer) generated calcium hydroxide slurry (lime) and shredded automobile interiors or "fluff". The lime, produced during acetylene production, was disposed of in the east Doane Lake remnant, where it was allowed to settle and later dredged for reuse and resale. Information on the disposal of other wastes produced by Liquid Air Corporation is not currently available.

The Pennwalt Corporation primarily produces chlorine gas, and 11-12 tons of asbestos are reportedly buried on the Pennwalt site. All other hazardous substances are transported offsite as finished products or as waste to a disposal facility located in Arlington, OR (Schu, M., 12 April 1988, personal communication).

3.1.2 Area B (Figure 6)

From 1913 to 1923 Portland Gas and Coke (now NWNG) produced gas from coal, and discharged wastewaters and unusable petroleum by-products into the Willamette River. The wastewater contained unknown levels of suspended hydrocarbons, tar, and spent oxides. After 1925, this wastewater was pumped into a series of tar ponds. The water from these ponds drained into the Willamette River while the tars settled out on the bottom of the ponds. Periodic flooding of the site would flush the waste from the settling ponds. Spent oxide was stockpiled in the northwest corner of the site. Some of the spent oxide was used as fill in one of the tar settling ponds. Tar residue

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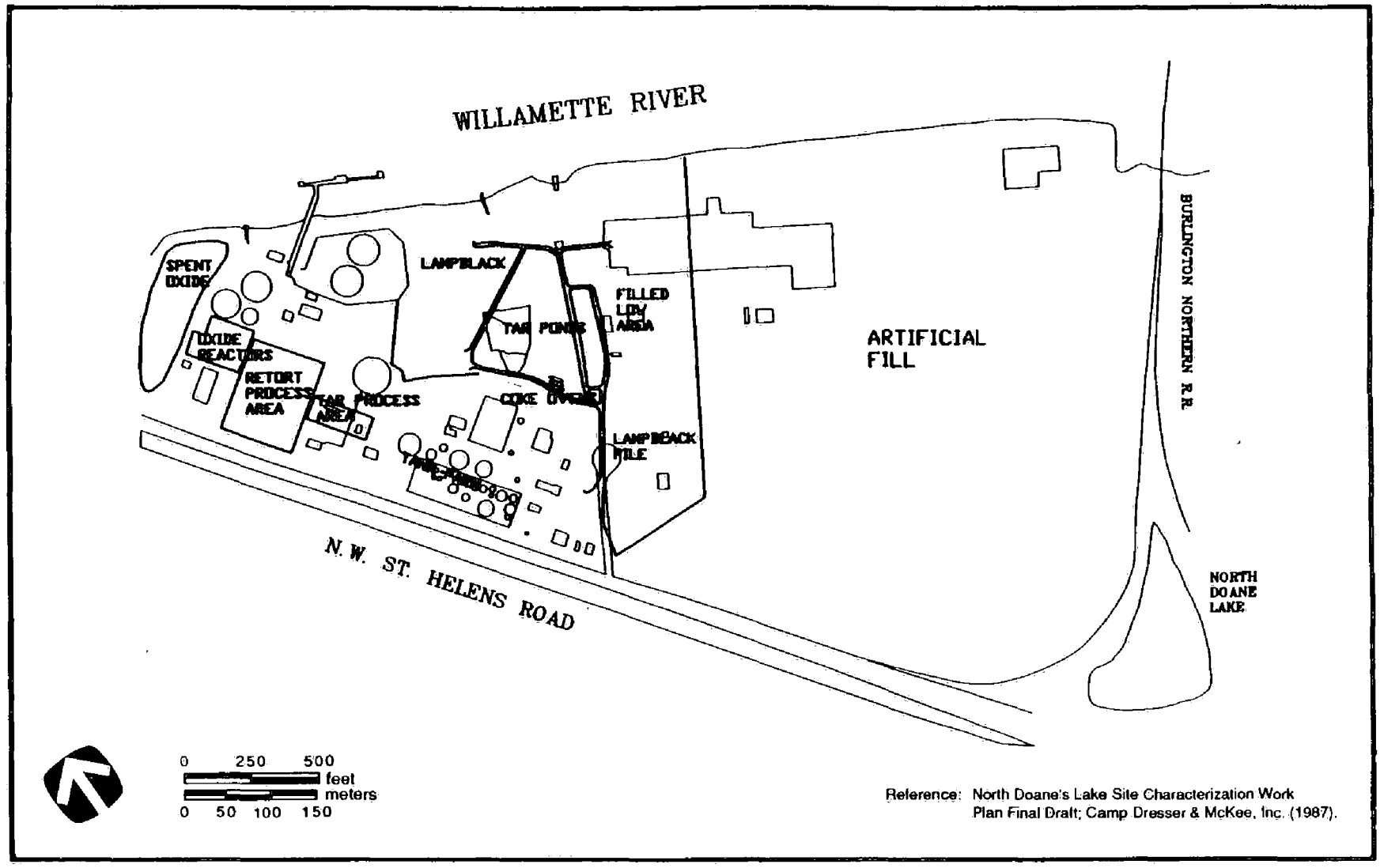

Figure 6. Disposal sites in Area B.

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was periodically dredged from the ponds and incorporated into fill material throughout the site. Some solid waste from the demolition of the GASCO plant is also evident in these ponds.

The Wacker Siltronic Corporation purchased their site in 1978 and began silicon wafer production in 1980. Most of their waste chemicals are disposed of via the onsite wastewater treatment plant that ultimately discharges treated water into the Willamette River. Permitted levels of nitric acid and nitrogen dioxide are discharged into both the water and air. Mercury is recycled onsite.

3.2 EVENTS RELATED TO SITE ASSESSMENT

A chronological log of events relating to site assessment in the Doane Lake study area is presented in Table 1. Analyses of sediments collected from the Willamette River near Doane Lake were performed as early as 1974 by the U.S. Geologic Survey (Rickert et al. 1977). Lead concentrations in river sediments collected at that time ranged from 5 to 35 mg/kg and averaged 18.6 mg/kg (Dames & Moore 1987).

In 1981, the ODEQ initiated the first of two air quality monitoring surveys in the Doane Lake study area. The first survey monitored ambient airborne lead levels around, but not on, the NL/Gould property. Results of that survey showed occasional airborne lead levels in exceedance of the State of Oregon ambient air quality standard and the federal national ambient air quality standard for lead, both of which are 1.5 ug lead/m^3 of air, expressed as an arithmetic mean over a 3-mo period. Quarterly averages in exceedance of the standards ranged from 1.6 to 4.2 ug/m^3 (Dames & Moore 1987).

The second air quality survey was conducted on NL/Gould property during August 1982 by the U.S. EPA Region X and Dames & Moore. Monitoring of ambient airborne lead levels on the NL/Gould property at that time showed elevated lead concentrations (0.26-150 ug/m^3; Dames & Moore 1987) with the highest concentration measured within a few feet of discarded battery casings.

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TABLE 1. CHRONOLOGICAL LOG OF EVENTS IN DOANE LAKE STUDY AREA

Date	Summary
1974	U.S. Geologic Survey conducts sediment pollution survey in Willamette River adjacent to Doane Lake study area.
1979/1981	ODEQ conducts surface water quality survey on west and east Doane Lake remnants.
1981	ODEQ conducts air quality survey around, but not on, NL/Gould site.
1981	Dames & Moore installs 10 groundwater and soil monitoring wells on the Rhône-Poulenc site.
1980-1982	ODEQ conducts sediment pollution survey of Willamette River adjacent to NL/Gould and downstream on east bank of river.
1981	Ecology & Environment begins two-phase study of ambient air quality in and around Rhône-Poulenc plant. Groundwater monitoring for organics and inorganics begins.
1982	U.S. EPA/Dames & Moore conduct air quality survey on the NL/Gould site.
1982	ODEQ conducts water column survey between Burlington Northern bridge and Doane Lake outfall on Willamette River.
1983	Arc furnace dust sampled on ESCO site.
1985	CH2M HILL conducts air/soil/groundwater survey of Wacker Siltronic site.
1985	Water quality survey 65 m offshore, 2-15 m depth.
1986	RI of groundwater on Schnitzer site.
1986	RI at stations up and downstream from east Doane Lake overflow outfall on Willamette River.
1986	Test pits on Rhône-Poulenc and NL/Gould sites to determine location of battery casings.
1986/1987	Surface water quality survey of east and west Doane Lake remnants and Willamette River.
1987	Test pits installed on NL/Gould site to determine location matte fill.

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Between 1980 and 1982, the ODEQ conducted a sediment pollutant survey, as well as a surface-water quality survey, on the Willamette River at locations adjacent to the study area (Dames & Moore 1987). Lead was measured at 2.8 and 3.2 mg/kg in sediments collected from the bank of the river, downstream from the Burlington Northern Railroad bridge and near the Doane Lake area, respectively. Lead concentrations in the water column samples ranged from 1.8 to 14.4 ug/L at a station near the Burlington Northern Railroad bridge and at a storm drain near the Doane Lake area, respectively (Dames & Moore 1987).

3.2.1 Area A

Between 1971 and 1975, arc furnace dust from two ESCO secondary steel foundry plants located outside the Doane Lake study area was disposed of along with other foundry yard debris, on the ESCO property adjacent to the NL/Gould site. In 1983, arc furnace dust samples were collected from one of the ESCO plants and subjected to an EP toxicity test. Results of that test indicated a total chromium concentration of 17.2 mg/L, which exceeded the EP toxicity standard for chromium of 5.0 mg/L. A similar analyses was performed on dust samples collected from the same plant and the second foundry plant in 1986. These analyses showed significantly lower total chromium concentrations (0.19 and 0.45 mg/L, respectively) than concentrations previously measured in 1983.

Five groundwater monitoring wells, two soil borings, and two battery casing test pits were installed on ESCO property by Dames & Moore in 1986 as part of the NL/Gould RI (Dames & Moore 1987). Three of the five monitoring wells are located in a cluster in the northwest corner of the ESCO property. The two remaining wells, plus one of the soil borings, are all centrally located in the southeast portion of the property. The second soil boring was installed in the southern corner of the site, while the two battery casing test pits are situated along the perimeter of the southern property line.

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In addition, an unspecified number of wells were installed on the ESCO property by the Oregon State Health Division in 1983 to monitor radiation in groundwater (Sherwood, R., 18 April 1988, personal communication). To adequately characterize the ESCO site, radionuclide data downgradient from the ESCO property is required. The approximate locations of these wells are not known at this time.

In 1986, surface water and groundwater monitoring was initiated on property owned by the Schnitzer Investment Corporation as part of the NL/Gould RI (Dames & Moore 1987). Two monitoring wells were installed along the northeastern perimeter of the Schnitzer facility during the RI. According to Mr. L. Wakefield (21 March 1988, personal communication), five wells currently exist on Schnitzer property. Water samples collected from the fill aquifer layer of the two monitoring wells installed during the RI had dissolved lead and sulfate concentrations below detection limits (<0.02 and <50 mg/L, respectively; Dames & Moore 1987). Water samples collected from the alluvial groundwater aquifer exhibited higher dissolved lead and sulfate concentrations throughout the Schnitzer site than the fill aquifer layer samples (Dames & Moore 1987).

Groundwater and sediment collected from the Rhône-Poulenc property have been investigated many times over the past 35 yr. During the summer of 1980, Rhône-Poulenc installed 14 shallow piezometers throughout their property to obtain groundwater samples and investigate groundwater levels. Subsequently, five shallow standpipes (wells) were also installed for collection and treatment of the groundwater. Eleven of the 14 piezometers are located along the perimeter of the plant area extending north from the 2,4-D dust plant/warehouse to the railroad tracks. The three remaining piezometers are all located north of the plant area. The five standpipes are located in the northerly portion of the plant area. Rhône-Poulenc periodically collected groundwater samples from the piezometers and standpipes, and analyzed the samples for chlorinated phenolic compounds, xylene, 2,4-D, 2,4-DB, and isoctyl alcohol at their onsite laboratory. The results from the periodic sampling by Rhône-Poulenc were submitted regularly to the ODEQ.

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In 1981, Dames & Moore installed ten groundwater monitoring wells at depths from 40 to 70 ft, four shallower piezometers, and six lysimeters throughout the site as part of a multi-year monitoring program conducted for Rhône-Poulenc (Dames & Moore 1983). Three of the ten monitoring wells, one piezometer, and two lysimeters were installed in the south end of the plant area near the dust plant/warehouse. A fourth well was installed just east of the 2,4-D plant near the Rhône-Poulenc property line. A fifth well and a third lysimeter were located northwest of the 2,4-D plant and west of the railroad tracks that border the facility. The remaining monitoring wells, piezometers, and lysimeters were generally installed along the north perimeter of the property. Groundwater from the wells, piezometers, and lysimeters was collected and analyzed for chemical constituents five times during the monitoring program. The first, third, fourth, and fifth sampling rounds were performed between 1981 and 1983 by Dames & Moore, while the second round of sampling was performed by Ecology & Environment in 1982 in conjunction with a separate sampling program conducted for the U.S. EPA. During their investigation, Ecology & Environment also conducted an ambient air quality survey at the Rhône-Poulenc facility (Ecology & Environment 1982).

The groundwater samples were analyzed for metals, phenols, herbicides, pesticides, and several conventional parameters by AmTest, Inc., Seattle, WA. Results from the five groundwater monitoring periods indicated that 2,4-D and trichlorophenol were present in the greatest concentrations among organic compounds detected, while lead and arsenic were present at the greatest concentrations among inorganics detected. However, the results from the chemical analyses vary significantly (sometimes by several orders of magnitude) between sampling locations, and in some cases, from one sampling period to the next. Therefore, the results from these analyses are considered as gross approximations to indicate the presence or absence of contaminants. Data from any single sampling are not considered reliable for establishing the level of contamination present.

In addition to groundwater, soil samples were collected by Dames & Moore during the installation of the wells, piezometers, and lysimeters at the Rhône-Poulenc site. The soil samples were extracted in accordance with

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the EP toxicity protocol and analyzed for heavy metals, herbicides, pesticides, chlorophenol compounds, and o-dichlorobenzene. The U.S. EPA has established allowable concentrations for contaminants in soils. The permissible concentrations are reported in the Resource Conservation and Recovery Act (RCRA) as 100 times the maximum level allowed under the U.S. EPA interim drinking water standards. The EP toxicity tests performed showed concentrations to be present in the soils just below the maximum allowable levels (Dames & Moore 1983).

During the spring of 1983, Rhône-Poulenc, in cooperation with ODEQ, conducted an extensive soil sampling and analyses investigation in the plant area, south of the dust plant/warehouse. This study included drilling 22 borings to depths of up to 3 m (10 ft). The soil samples collected were split and delivered to AmTest and to the onsite laboratory for analyses. At the request of ODEQ, some of the samples were split a second time and submitted to ODEQ for analyses.

Ten test pits on the Rhône-Poulenc and ESCO properties were excavated in 1986 as part of the RI of the Gould site to establish the lateral extent of battery casings that were historically used as fill material in the area. Test pit results verified that battery casings had been disposed of along the northwest edge of the Gould property. The approximate locations of the battery casing test pits are presented in Figure 3.2-3 of the NL/Gould RI (Dames & Moore 1987).

Seventeen similar test pits were excavated on the NL/Gould property to define the area used to dispose of matte material generated from the blast furnace operations conducted at the site. The matte test pits are all located on Gould property in an area adjacent to the west side of the east Doane Lake remnant. The matte test pits verified matte disposal locations along the northeastern edge of the Gould property. The approximate locations are presented in Figure 3.2-4 of the NL/Gould RI (Dames & Moore 1987).

In 1979, and again in 1981, the ODEQ conducted surface-water quality surveys on both the east and west Doane Lake remnants. According to Dames &

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Moore (1987), data from both surveys indicate lead contamination in the lakes.

As part of the RI (Dames & Moore 1987), a survey of the surface water from the Willamette River (at points both upstream and downstream of a storm sewer outfall that serves the east Doane Lake remnant), and the east and west Doane Lake remnants, was conducted during 1986 and 1987. The analyses indicated that dissolved lead concentrations in the Willamette River samples were within the U.S. EPA national drinking water standards as well as ODEQ water quality standards. In addition, the lead concentrations in water samples from the west remnant were generally low. However, relatively high concentrations (0.13-0.28 mg/L) of dissolved lead were measured in water samples from the east Doane Lake remnant.

The organic analyses performed on the groundwater and soil samples collected from the RP property during the investigations summarized above have been the only organic analyses performed on samples collected from sites in Area A of the Doane Lake study area to date. Therefore, analyses are required at locations throughout Area A to accurately characterize the organic compounds present in Area A of the study area.

Because there have been no surveys of groundwater collected from the basalt layer aquifer in the Doane Lake study area, new well installations should include deep wells screened in the basalt aquifer. In addition, there have been no groundwater investigations conducted on Pennwalt property to date and no investigation of the background levels in the study area. Therefore, new wells should be installed to allow for these investigations to be conducted.

3.2.2 Area B

Surface water from the north Doane Lake remnant, located immediately northwest of the west Doane Lake remnant, has not been sampled to date.

In 1985, CH2M HILL surveyed the Wacker-Siltronic site for soil, groundwater, and air contamination. As part of the survey, seven monitoring

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wells were drilled to depths necessary to penetrate the native soils nearly 20 ft below the fill layer. These monitoring wells were all located east and southeast of the onsite wastewater treatment facility and extend within several hundred feet of the railroad tracks which border the southeast portion of the Wacker site.

Several high molecular polynuclear aromatic hydrocarbons (HPAH) were detected at significantly elevated concentrations in sediments collected during installation of the wells. EP toxicity tests conducted on the sediments also show barium contamination from unidentified sources. Groundwater collected from the wells exhibited contamination by similar compounds, excluding barium (CH2M HILL 1985).

Although groundwater sampling has been conducted on Wacker property, there have been no studies to date that have focused on the extent of groundwater contribution to the Willamette River north of the Wacker facility.

3.3 SOURCES AND EXTENT OF CONTAMINATION

3.3.1 Area A

Heavy metals, particularly lead, appear to be the major contamination problem in Area A. However, the extent of organic compound contamination has not been thoroughly investigated. Organic compounds discovered in past assessments have included 2,4-D. Arsenic, zinc, and chromium have also been detected in the local groundwater system. The source of lead has been determined to be the NL/Gould facility. The direct discharge of sulfuric acid from the NL/Gould site into east Doane Lake remnant has increased the mobility of these metals by lowering the pH of the groundwater and surface water (pH <5 generally). The pH levels gradually increase away from the source. At high pH (>11), as is the condition on the Liquid Air Corporation site, lead solubility again increases in the form of hydroxy complexes (Schock and Gardels 1983). To date, no lead has been detected in the lower water-bearing units under the Liquid Air facility. Concentrations of lead

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in the fill water-bearing unit have infiltrated the Liquid Air site, according to plume maps presented in the RI (Dames & Moore 1987).

Radioactive contamination from zircon sands disposed at the ESCO facility has not been adequately characterized.

Lead contamination in the Willamette River sediments adjacent to the NL/Gould site have been documented, as well as in sediments immediately downstream and across the river on the opposite bank.

3.3.2 Area B

The contamination associated with Area B is reflective of the petroleum industries that have operated onsite for more than 65 yr. HPAHs have been detected in both groundwater and soils throughout the Wacker Siltronics and NWNG properties. The sources of most of this contamination appear to be from various petroleum-related operations conducted on the NWNG property. Tar settling ponds on NWNG properties were maintained for about 30-35 yr. Residues were periodically dredged and incorporated into fill material, which was distributed throughout the NWNG site and along the northwest section of the Wacker site. Soil and groundwater contamination by HPAH and other organic compounds has been documented on the southeast portion of the Wacker site. Barium has also been detected in the same area. Discharge of petroleum by-products and tars into the Willamette river has been documented by NWNG. However, the extent of contamination downstream has not been addressed to date.

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4.0 MIGRATION PATHWAYS AND RECEPTORS

Migration pathways and receptors have been evaluated in previous studies. However, further investigations are necessary before the pathways and receptors are fully characterized. By identifying and characterizing all of the contaminants that may be present, remedial activities may be identified and evaluated for use in the various media contaminated with lead.

4.1 GROUNDWATER

One of the primary pathways of concern throughout the study area is the migration of contaminants through the hydraulically connected water-bearing groundwater units to private and public water supplies, and the environment. Groundwater monitoring studies in Area A included samples from the upper three water-bearing units (i.e., fill, upper, and lower alluvium), but no basalt groundwater surveys have been conducted to date. Organic analyses of groundwater have been conducted on the Rhône-Poulenc Site. However, the majority of Area A adjacent to Rhône-Poulenc has not been characterized for organic contamination in the groundwater. Radioactivity surveys on the ESCO site have been conducted, however, the extent of radionuclide migration has not been adequately characterized.

Area B groundwater surveys indicate organic contamination throughout the Wacker site. Tar residues, which were incorporated into fill on both the NWNG and Wacker sites, appear to be migrating offsite. Early operations at NWNG included the addition of surfactants to the wastewaters, thereby increasing solubility and allowing for transport over greater distances via groundwater and surface water (Camp Dresser & McKee 1987). Spent oxide materials are also distributed throughout the NWNG site, but have not been investigated in groundwater.

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4.2 SURFACE WATER

Surface water exposure pathways are of concern in the Doane Lake area. These pathways include the direct ingestion of contaminated waters and the ingestion of game animals that frequent the area (i.e., birds and fish). The inaccessibility of the east and west Doane Lake remnants reduces the chances of direct ingestion and/or contact by the general public. However, the north Doane Lake remnant and the Willamette River are both uncontrolled and readily accessible to the general public.

4.3 AMBIENT AIR

Lead-contaminated airborne particulates, originating from contaminated surface soils and exposed piles of discarded battery casings, are associated with the battery recycling and secondary lead smelter operations conducted by NL/Gould (Dames & Moore 1987). The contaminated soils and exposed piles of casings allow winds to carry fine lead and lead oxide particles, which typically remain in the casings after the recycling process is complete, either offsite or to nearby locations in the study area before they settle out onto surface soil and surface water. Once the contaminated airborne particulates have been deposited, surface water and groundwater become potential migratory pathways. Because surface water and groundwater are the primary pathways of concern in the study area, ambient air should be considered a secondary, or indirect, migratory pathway. Arsenic, cadmium, chromium, and zinc associated with lead refining processes are also of concern when considering ambient air as a migratory pathway.

4.4 SOILS

Soil contamination has been verified in both Area A and Area B. As previously stated, contaminant-laden soil particles may be transported to nearby locations or even offsite by winds before being deposited onto surface soil or surface water. Once contaminated soil particles have been deposited, there is a potential for surface water and groundwater contamination.

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5.0 HYDROGEOLOGY INVESTIGATION SCOPE OF WORK

The following sections describe the purpose and level of effort required for groundwater and surface water investigations to be conducted in the Doane Lake study area.

5.1 PURPOSE

The purpose of this hydrogeological RI is to determine the nature and extent of contamination of the groundwater and surface water units associated with the Doane Lake study area. This information will be used to identify possible contaminant sources and provide information for data gaps identified during reviews of PRP 104(e) responses.

The objectives of this study are to characterize areas of contamination; identify parameters of concern in addition to lead; determine the effect other parameters have on remedial activities chosen for lead; identify pathways of migration and transport processes; and identify potential receptors and potential risks to human health and the environment.

Specific tasks to be performed during the hydrogeologic RI include the preparation of the following plans:

- RI sampling plan
- Quality assurance project plan (QAPP)
- Health and safety plan

These plans and corresponding field activities must be coordinated with, and approved by, the ODEQ and U.S. EPA prior to implementation.

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5.2 PREPARATION OF PLANS

The sampling, QAPP, and health and safety plans will be prepared based on U.S. EPA guidance documents. During the investigation it may be necessary to revise the plans and scope of work to accommodate information obtained through field activities.

5.2.1 RI Sampling and Analysis Plan

The sampling and analysis plan should fully describe the specific procedures to be used to determine the nature and extent of groundwater and surface water contamination in the Doane Lake area. Guidance for this plan can be obtained from the Compendium of Superfund Field Operations Methods, EPA/540/P-87/001a, OSWER 9355.0-14, September 1987. All sample collection and analytical procedures must also comply with requirements of the U.S. EPA Contract Laboratory Program (CLP). Guidance for these procedures can be found in the following documents: U.S. EPA Contract Laboratory Program Statement of Work for Inorganics Analysis, IFB WA87-K025, K026, K027, October 1986, Revised July 1987 and U.S. EPA Contract Laboratory Program Statement of Work for Organics Analysis, WA-87K236, K237, K238, October 1986, Revised July 1987.

The sampling and analysis plan should address the following topics:

- Appropriate sampling locations and depths
- Statistically sufficient number of samples
- Collection of all necessary ancillary data (i.e., pH, temperature, specific conductance, etc.)
- Determining which parameters to be measured
- Data quality objectives (DQOs) (guidance: Data Quality Objectives for Remedial Response Activities OSWER 9335.0-7B, March 1987)

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- Schedule of activities
- Documenting sampling activities and procedures including:
  - Collection procedures and forms
  - Field equipment used
  - Calibration of field equipment.
- Sample containers and preservatives used
- Chain-of-custody techniques including:
  - Standardized field tracking forms
  - Laboratory sample custody forms
- Sample analysis procedures
  - Sample storage procedures and storage time
  - Sample preparation methods
  - Analytical procedures
  - Laboratory calibration procedures and frequency
  - Laboratory internal quality control.

5.2.2 Quality Assurance Project Plan

The QAPP should describe methods and rationale to be used to ensure precision, accuracy, completeness, and achievement of the DQOs dictated by the intended use of the data collected. The QAPP should describe the

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policies, organization, objectives, functional activities, and specific QA/QC to be used in conducting the hydrogeologic investigation. The QAPP should include the following items:

- Title page with provisions for approval signatures
- Table of contents
- Project description
- Project organization and responsibility
- QA objectives for measurement data in terms of precision, accuracy, completeness, representativeness, and comparability
- Sampling procedures
- Sample custody
- Calibration procedures and frequency
- Analytical procedures
- Data reduction, validation, reporting
- Internal quality control checks and frequency
- Performance and system audits and frequency
- Preventive maintenance procedures and schedules
- Specific routine procedures used to assess data precision, accuracy, and completeness of specific measurement parameters

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- Corrective action
- Quality assurance reports.

5.2.3 Health and Safety Plan

The health and safety plan will establish protocols to provide a safe working environment for the investigative teams while protecting the general public. Guidance for the health and safety plans is provided by Appendix B, NIOSH/OSHA/USCG/USEPA Guidance Manual 1985 and 29 CFR Part 1910.120. The health and safety plan should include:

- Assessment of site hazards
- Listing of key personnel responsible for site safety
- Description of levels of protection to be worn
- Description of decontamination procedures
- Site emergency procedures
- Procedures for site control
- Emergency medical care procedures for injuries and toxicological problems.

5.3 SITE INVESTIGATION REQUIREMENTS

As stated previously, the ROD required that additional studies will be performed to provide a complete characterization of the nature and extent of contamination, and determine the pathways of migration for the surface water and groundwater units in the Doane Lake study area. Activities necessary to fulfill these data needs are outlined in the following sections. All of the investigative activities will be performed in accordance with the requirements of Section 5.2 above.

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5.3.1 Surface Water Investigations

Drainage and discharge patterns of the Doane Lake remnants have been studied in previous investigations. However, these studies have not fully characterized all of the discharge processes or the offsite transport mechanisms for the dissolved or soluble constituents of contaminants other than lead in the Doane Lake study area. To provide information for this characterization, a surface water characterization study will be conducted on the following units:

- Willamette River - Near-bank samples will be collected upstream of NW 61st Avenue, and downstream at intervals sufficient to determine significant inflow of contaminants. River level elevations will be collected daily to coincide with all other surface water and groundwater studies.

- East, west, and north Doane Lake remnants - Surface water samples will be collected in sufficient numbers to comply with QA/QC requirements. Transport mechanisms and processes, (i.e., drainage ditches, infiltration, and percolation) should be identified.

The locations and the rationale for the sampling locations and methods must be described. Two complete rounds of samples will be conducted to coincide with extremes of the hydrologic cycle.

5.3.1.1 Surface Water Sample Parameters--

Analyses performed on samples collected during previous field studies in the Doane Lake area have been limited in scope. In addition, the study area has received a broad range of contaminants. Therefore, analytical parameters will include full priority pollutant scans on all samples collected. Ancillary field data outlined in Section 5.2.1 (pH, temperature, etc.) should also be obtained at the time of collection.

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5.3.2 Willamette River Sediment Investigation

The National Oceanic and Atmospheric Administration (NOAA) conducted a Preliminary Natural Resource Survey in the vicinity of the Doane Lake study area. NOAA concluded that the nearshore Willamette River may provide nursery habitat for anadromous fish. The sediment samples collected by the U.S. Coast Guard and U.S. Army Corps of Engineers revealed elevated levels of some metals, pesticides and PCBs near the Doane Lake outfall. However, downgradient sediment samples were collected at stations 1 and 2 mi downstream. Additional sampling is necessary to identify the nature and extent of contaminants present in sediments in the immediate vicinity of the site, and to determine their potential threat to wildlife and human health.

Sediment samples will be collected at predetermined stations located upstream and downstream from the east Doane Lake remnant outfall. These stations will assist in identifying tidal influences on particulate dispersion rates in the Willamette River. Dye tests will be conducted to determine the exact location of the outfall. If other sources of discharges to the river are discovered during drainage pattern studies in Section 5.3.1, additional sampling points may be necessary.

Sampling stations will consist of 18 sampling points located on three transects (Figure 7), and will be established as follows:

- A transect cross-channel with stations at 10 m, 50 m, 100 m, and 250 m from the outfall
- A transect upstream from the outfall with stations at 10 m, 50 m, 100 m, 250 m, 500 m, 1,000 m, and 1,500 m
- A transect downstream from the outfall with stations at 10 m, 50 m, 100 m, 250 m, 500 m, 1,000 m, and 1,500 m.

Sediment samples will be collected from the upper 10 cm of sediment at all stations. At the 10-m downstream and three 50-m stations, sediment samples will be collected from the 10-20 cm and 20-30 cm horizons.

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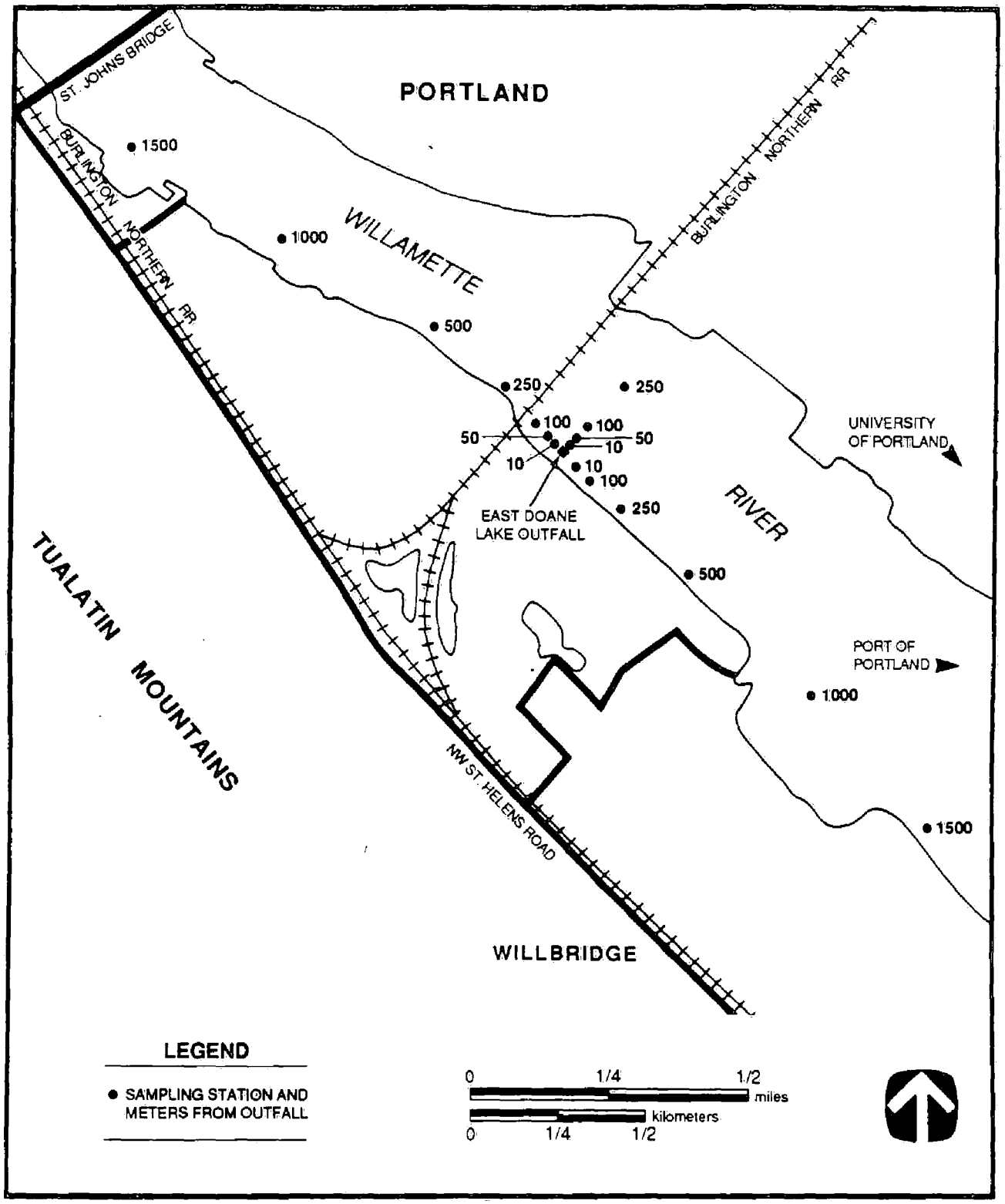

Figure 7. Williamette River sediment sampling stations.

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5.3.2.2 Sediment Sample Parameters--

Sediment samples collected from all of the stations and at all horizons will be analyzed for lead, the primary contaminant of concern for the Doane Lake study area, pesticides on the Hazardous Substance List, pH, conductivity, TOC, and grain size.

Sediment samples collected from the upper 10-cm horizons at the 10-m downstream station, all of the 50-m stations, all of the 100-m stations, and both 1,500 m stations will be analyzed for the full U.S. EPA Toxic Compound List (TCL).

Sediment bioassays will be conducted to determine the effect of contaminants on some of the common organisms used as food by anadromous fish in the Willamette River. Solid phase bioassays using Daphnia magna and Selenastrum should be conducted at sampling stations that coincide with the sediment samples to be analyzed for TCL scans (i.e., the upper 10-cm horizon at the 10-m downstream station, all of the 50-m stations, all of the 100-m stations, and both 1,500-m stations).

5.3.3 Groundwater Investigations

Groundwater appears to be the pathway with the highest potential for contaminant migration. To fully characterize groundwater conditions in the Doane Lake area, additional activities will be performed.

5.3.3.1 Additional Well Installations--

Additional wells will be installed to determine groundwater gradients, presence of contamination, and transport processes. Previous studies have described the presence of three aquifers in the Doane Lake area. Therefore, most new well installations will include well clusters, with each cluster comprised of three wells: one shallow well screened in the upper fill material, one intermediate well screened in the alluvial material, and one

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deep well screened in the basalt aquifer. New wells will be placed in the following locations (Figures 8 and 9):

- Northwest region of the northern Doane Lake study area - to evaluate the quality of groundwater in the northwest portion of the study area, where several oil spills have been recorded.

- Approximately 650 m southeast of the oil dock at the property boundary of Wacker Siltronics Corporation - to evaluate the effect of previous landfilling of coal gasification wastes on properties now owned by Wacker Siltronics Corporation.

- North of the Koppers creosote facility - to determine if creosote bottoms buried in the vicinity have affected groundwater quality.

- North of the Pennwalt Corporation facility - to determine the groundwater quality of this area, not previously characterized.

- Southeast of the American Steel facility - to serve as a background well location.

- Northeast of the Doane Lake pump station - comprised of one deep well screened in the basalt aquifer - to characterize the basalt aquifer, identified in the RI as being hydraulically downgradient and in communication with the upper aquifers.

- Background wells, located in the following areas:

  - Southwest of the Wacker Siltronics facility, composed of one well screened in alluvial material, and one well screened in the basalt aquifer

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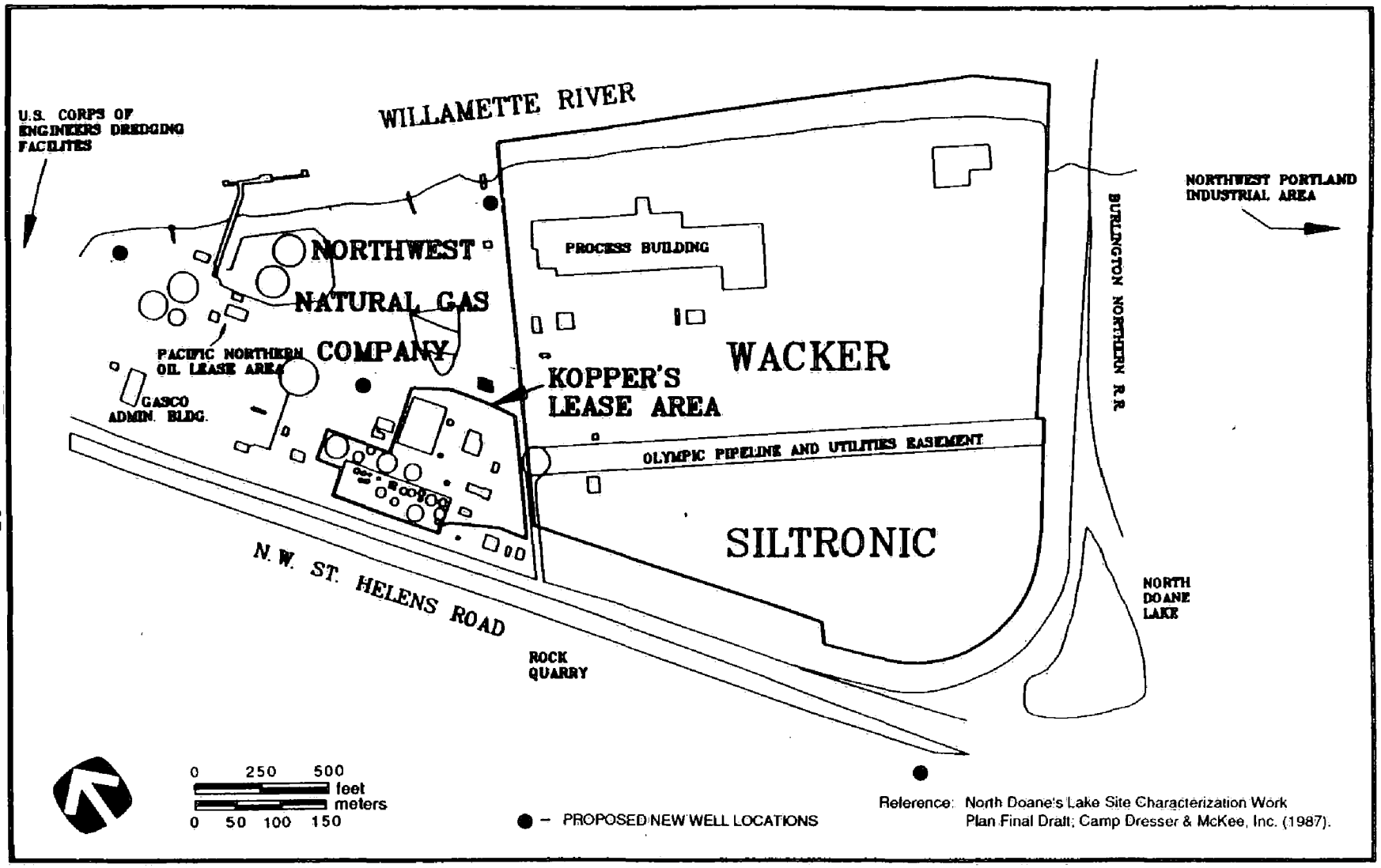

Figure 8. Proposed new well locations, North Doane Lake area.

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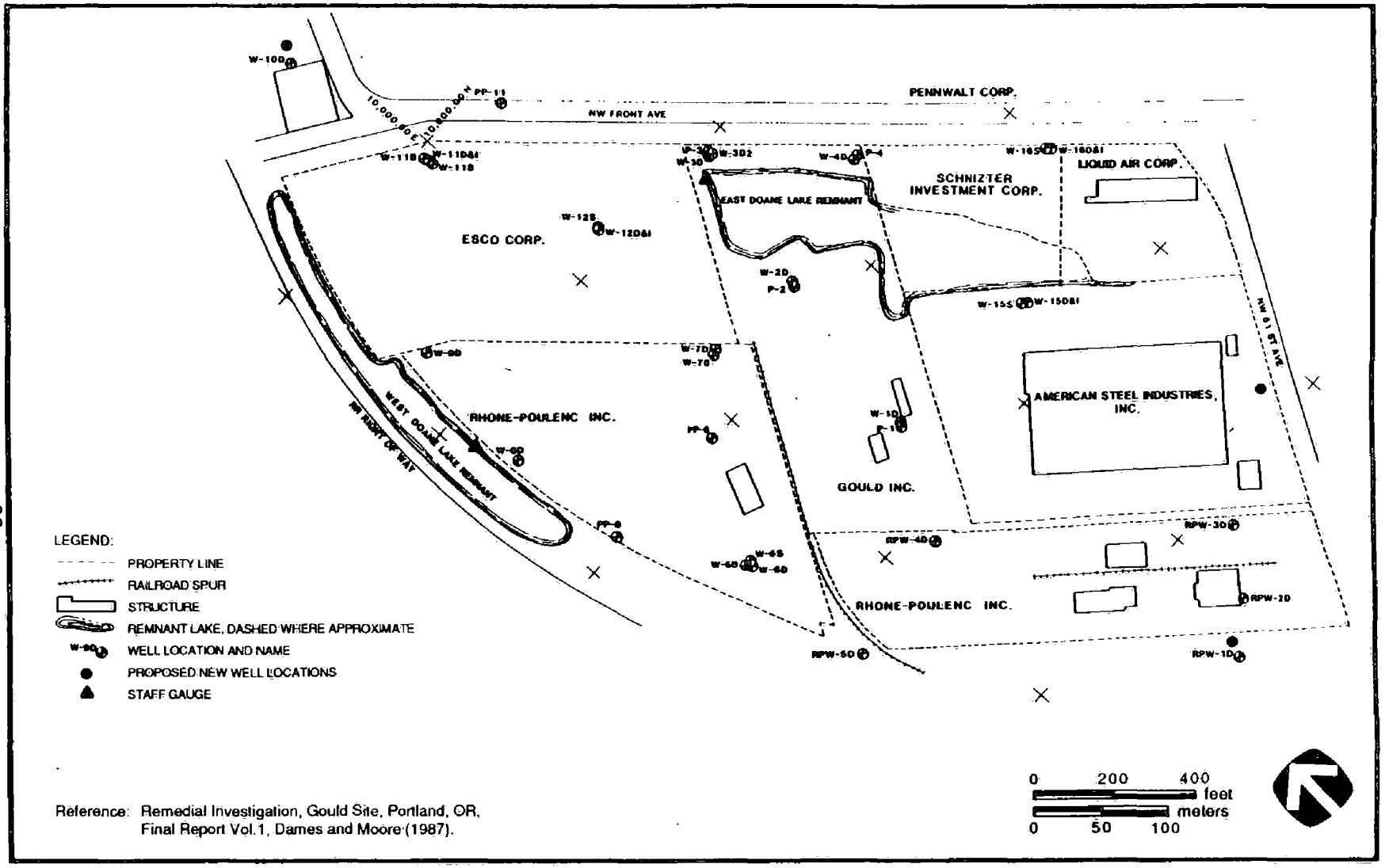

Figure 9. Proposed new well locations, South Doane Lake area.

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- South of the Rhone-Poulenc facility, near Well RPW-1D, composed of one well screened in the basalt aquifer.

The installation of additional wells may be necessary if the new and existing wells do not provide sufficient information to fully characterize the site as a whole, or sub-sites within the study area.

5.3.3.2 Groundwater Sample Parameters--

Groundwater sample analyses conducted to date have been limited in scope. To provide a more complete understanding of groundwater conditions in the Doane Lake area, an expanded investigation is required.

Samples from all new and existing wells will include field-filtered and preserved samples for all major ions to define complete groundwater composition. Analytical parameters will include: sodium, potassium, calcium, magnesium, iron, manganese, aluminum, silicon, chloride, fluoride, sulfate, carbonate, bicarbonate, cyanide, thiocyanate, nitrate, nitrite, ammonium, orthophosphate, and radium-226. Ancillary field data collected at each well will include Eh, pH, EC, and temperature measurements. These measurements are to be collected in a flow-through container.

Information concerning the nature and extent of various organic contaminants is deficient. Additional information on organic compounds will provide an understanding of the groundwater and surface water contamination that exists in the area, and potential impacts on the preferred remedial activities. Therefore, all new wells, and a significant majority of the existing wells will be sampled and analyzed for the TCL contaminants. Samples collected from all of the wells will be analyzed for both filtered and unfiltered metal constituents of the TCL. Two complete rounds of samples will be conducted to coincide with extremes of the hydrologic cycle.

Groundwater levels in all new and existing wells will be monitored to establish the hydraulic gradients in the various sections of the study area. These measurements will be collected by one sampling team using a single

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calibrated measuring tape. Transmissivity values for all newly installed wells will be determined to evaluate the contaminant transport processes. River levels will also be obtained to coincide with groundwater elevations and transmissivity tests to determine recharge effects and hydraulic connections.

5.4 REPORTS

The findings of the surface water and groundwater evaluations will be merged with existing data to provide a complete characterization of the site hydrogeology and contamination.

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6.0 REFERENCES

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February 8, 1989

Note to File:

Donald S. McClave, President/CEO for Portland Chamber, and Ron Miller, Past CEO for Northwest Natural Gas, were invited to Wacker Siltronic on January 31, 1989 to discuss Chamber of Commerce business (letter attached). During the discussions, Mr. Miller made the comment that this property (Wacker Siltronic) used to belong to Northwest Natural Gas and it was his understanding that Northwest Natural Gas used it for a dumping site.

Jim Harper

cc: John Pittman

Portland Chamber

January 31, 1989

Mr. Jim Harper
Director
Wacker Siltronic Corporation
P.O. Box 03180
Portland, OR 97203

Dear Jim:

Thanks for visiting with Ron Miller and me today regarding the Chamber. We appreciate your continued support and willingness to become involved in Chamber activities in the future.

As you requested we will bill you for annual dues of $3000 on September 1, 1989, and appreciate your commitment to consider additional increases in the future as your earnings situation and other business considerations allow.

In the meantime, please call me whenever you become aware of projects or activities in which the Chamber should be involved.

Very best wishes.

Sincerely,

Donald S. McClave
President and
Chief Executive Officer

DSM:wjc
cc: R.T.Miller
S.Russell

Portland Metropolitan Chamber of Commerce
221 N.W. Second Avenue
Portland, Oregon 97209
503 228 9411 *FAX 503 228 5126*

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IDC INDUSTRIAL DESIGN CORPORATION

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MAR 2 2 1989
John L. Pittman
Wacker Siltronic

March 21, 1989

Mr. John Pittman
Director of Engineering
Wacker Siltronic Corporation
P.O. Box 03180
Portland, OR 97203

Subject: Wacker Siltronic Corporation--NL/Gould Superfund Site and Doane Lake area

Dear Mr. Pittman:

Pursuant to your request, I am writing to provide you a summary of CH2M HILL's activities on behalf of Wacker Siltronic and its parent corporation concerning Wacker Siltronic's facility on N.W. Front Avenue in northwest Portland, and to answer questions you have asked.

I am a mechanical engineer, licensed in Oregon and a number of other jurisdictions. I have about 24-years' experience in engineering in Oregon and elsewhere, including experience in feasibility studies for and design of industrial facilities, and experience with the environmental considerations in such projects. I am currently Director of Design Services for Industrial Design Corporation, a subsidiary of CH2M HILL. For 19 years prior to 1985, I was employed by CH2M HILL.

CH2M HILL is an engineering company providing consulting engineering services, including soils analysis, environmental engineering, and industrial design. CH2M HILL was founded in 1946 in Corvallis, Oregon and grew over the years to about 4,000 employees in 40 offices spread across the United States. Industrial Design Corporation is a subsidiary of CH2M HILL, formed in 1985. Prior thereto, CH2M HILL carried out its industrial design activities under its own name.

About 1977, CH2M HILL was retained by Wacker Chemie, Wacker Siltronic Corporation's parent company, to prepare a feasibility study and cost estimate for a silicon wafer manufacturing plant at the site on N.W. Front Avenue in Portland. The feasibility study and cost estimate were

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prepared to assist Wacker in choosing between the Portland site on N.W. Front Avenue and a site in Augusta, Georgia.

After Wacker Chemie chose the Portland site in early 1978, CH2M HILL was employed by Wacker to design the facility, and thereafter to serve as Wacker's representative during the construction of the plant by Hoffman Construction Company. CH2M HILL also advised Wacker and assisted it in connection with obtaining necessary building and environmental permits for the facility.

I was CH2M HILL's project manager during 1977 and 1978 on the Wacker feasibility study and cost analysis, and for the design of the facility. I was project manager during the period when building and environmental permits were obtained. I, therefore, have personal knowledge of the information known to CH2M HILL and the studies made by CH2M HILL during 1977 and 1978 concerning the Wacker Siltronic site.

From time to time after 1978, CH2M HILL has provided engineering services to Wacker Siltronic on other tasks, including the oil spill from the Olympic Pipeline Company's pipe and the seepage of oily material from the river sediments during outfall construction in 1979; the cleanup of TCE spills in 1984; the removal of underground storage tanks in 1985; and air, soils, and water investigations in 1985 in connection with a proposed expansion of the facility by addition of a polysilicon manufacturing building on an empty portion of the site.

You have advised me that Wacker Siltronic Corporation purchased the Portland site on August 17, 1978 and asked me a number of questions about CH2M HILL's work for Wacker and the state of information about the site prior to the purchase. I have reviewed CH2M HILL records and refreshed my recollection about CH2M HILL's work for Wacker before and after that date, and will summarize my recollection below and answer the questions you have asked.

CH2M HILL did not know of and, therefore, did not advise Wacker of any hazardous substances or hazardous contamination of the site at any time prior to August 17, 1978. Moreover, prior to Wacker's purchase of the site, CH2M HILL knew nothing about the site from which it reasonably should have known of the presence of hazardous substances or hazardous contamination. Not knowing any such information itself, CH2M HILL naturally did not tell Wacker any such information.

Prior to the purchase, CH2M HILL knew, and Wacker knew, that the site was undeveloped land which had once been low-lying, marshy land along the Willamette River which had been filled by previous owners. The site was acquired by the city of

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Portland in 1978 from the then current owners, and resold shortly thereafter to Wacker Siltronic as part of an urban renewal and job creation project of the city. As part of the urban renewal project, the city agreed to make the already filled site suitable for industrial use by providing road access and sewer access, and paying for preloading the site sufficiently to provide adequate foundation strength for Wacker Siltronic's proposed facility.

Wacker inquired and was told by the city of Portland that the site was undeveloped land, not previously used for business or industrial purposes. From all of this, it seems to me that Wacker made all appropriate inquiry into the previous ownership and uses of the property consistent with good commercial or customary practice in an effort to minimize liability.

It is now known that in 1985 there were low levels of lead and organic compound (e.g., possibly pesticide) contamination in the groundwater of the site, and that there may be coal tar residues buried under the fill in some portions of the site, but none of that was known to CH2M HILL prior to the purchase. Prior to the purchase there was no commonly known or reasonably ascertainable information about any hazardous contamination in the site.

In the course of evaluating the feasibility and cost of building the proposed facility at the site, and in the course of the design of the facility, CH2M HILL did vibration and geotechnical investigations of the site to determine foundation strengths, preloading required, and the effects of vibrations (trains, rock-quarry operations, etc.) on the silicon wafer process. A total of ten test borings were made in the site in 1977 and 1978, all prior to the purchase. The tests showed that the subsurface soil profile beneath the site was quite random--an upper random fill about 25 to 30 feet thick underlain by silts and sands of the Willamette silt series. Bedrock was encountered at a depth of about 210 feet. In the upper layer, i.e., in the fill, some soil samples showed some organic material mixed in the sand or silt, but there was nothing indicating the presence of any hazardous substance or otherwise requiring any special concern.

When Wacker representatives first saw the site in about 1976, and continuing until and after the purchase on August 17, 1978, the site was fairly level, grassy, filled property with an average elevation of +34 feet mean sea level. Wacker and CH2M HILL representatives inspected the site on a number of occasions prior to the purchase. Nothing was visible which would indicate the presence or likely presence of contamination at the property.

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Prior to the purchase of the site, CH2M HILL assisted Wacker in obtaining various building and environmental permits, and no agency with whom we dealt told us of any contamination at the site, or of anything which would cause us to search or test for such contamination.

In 1979, many months after the purchase, during construction of the wastewater treatment plant for the facility, it was discovered that oil was leaking from the Olympic Oil Pipeline which crosses the site. This was repaired and cleaned up by Olympic Oil. Also during 1979, during construction of the outfall for the wastewater, an oily substance rose from the river sediment. This was reported to, contained, and cleaned up under Coast Guard supervision. These events mark CH2M HILL's first knowledge of contamination at the site, and oil was not a hazardous substance at that time.

In 1985, Wacker Siltronic contracted with CH2M HILL to conduct subsurface soil testing and groundwater sampling and analysis in an undeveloped area of the site where Wacker was considering construction of a polysilicon manufacturing plant. By that time, Wacker had been told that Portland Gas and Coke Company (predecessor of Northwest Natural Gas) had, decades before, owned a portion of the Wacker site and might have deposited coal tar residues in that part of the site. By that time the NL/Gould site south of the Wacker Siltronic property had been named a federal Superfund site. CH2M HILL's soil and groundwater sampling found the presence of lead and a mixture of substances commonly associated with petroleum products, coal tar, and pesticides in the groundwater and/or soil of the area tested. These 1985 investigations are the time at which CH2M HILL reported to Wacker evidence of the presence of substances which may be hazardous substances by the laws and regulations in effect today.

I hope this letter answers the questions you have asked. If you have any further questions, or if we can be of further assistance, please let me know.

Sincerely,

Richard S. Reid
Director of Design Services

OH16\044.wp5\4

Wacker Siltronic Corporation
P.O. Box 03180
Portland, OR 97203
7200 N.W. Front Ave.
Portland, OR 97210
Phone (503) 243-2020
FAX 503-226-0052
TWX 910-464-4777
TLX 4970339

March 24, 1989

Mr. Fred Hansen, Director
Oregon Department of Environmental Quality
811 S.W. Sixth Avenue
Portland, Oregon 97204-1334

RE: NL/Gould Site and Doane Lake Study

Dear Mr. Hansen:

On January 17, 1989 our legal counsel, Marvin Durning, Esq., wrote to you in reply to your letter of November 15, 1988, which notified us that Wacker Siltronic Corporation "has been identified by the DEQ as an owner/operator, pursuant to ORS 466.540 through 466.590, with regard to the groundwater unit associated with the Gould/NL Site" and requested that we attend a meeting to initiate discussions concerning a consent order to carry out an investigation of the groundwater unit, referred to as the Doane Lake Study. Mr. Durning's letter stated that a detailed discussion of the relevant facts and law would follow. This letter and its enclosures provide the promised detailed discussion.

As you know, Wacker Siltronic has been working with DEQ and EPA for several years concerning our property. Your letter, and the course of events it envisages, required that we clarify whether Wacker Siltronic has any legal liability under Oregon law for remedial action costs in the Doane Lake area. I asked, therefore, that a thorough review be made of the facts concerning this property and of the governing Oregon law (ORS 466.567). I am advised by Mr. Durning that Wacker Siltronic Corporation has no legal responsibility to pay any of the costs of the Doane Lake Study nor any other remedial action costs pertaining to the site. I enclose a copy of a memorandum from Mr. Durning providing a detailed discussion of the relevant facts and law, together with a copy of a letter of Harvey C. Barrager, Esq., of Miller, Nash, Wiener, Hagen & Carlsen concurring in Mr. Durning's analysis of Oregon law.

As you know, Wacker Siltronic Corporation purchased the property in question in August, 1978 after more than two years of investigations and discussions involving the highest officials of

our parent company, Governor Straub of Oregon, Mayor Goldschmidt of Portland, officials of the Port of Portland, Portland Chamber of Commerce, and many others. The purchase and construction of our plant were part of a Portland urban renewal and job development effort in which we were proud to participate. Wacker asked about all environmental requirements and was advised as to such requirements by the Department of Environmental Quality as well as by the City of Portland, U.S. Corps of Engineers, Port of Portland, and Portland Chamber of Commerce. Wacker retained CH2M Hill, experienced Oregon consulting engineers, to advise it about the site, design its plant, and assist it in obtaining all required environmental permits. The company also utilized an experienced local construction company, the Hoffman Construction Company, to build the plant.

Prior to the purchase of the site, no official, agency, consultant, or any other person told Wacker of any hazardous substances in the soil or water of the site, told it to test for such contaminants, or gave it any reason to suspect the existence of any such contaminant on this site.

The land we purchased in 1978 from the City of Portland was an almost level, grass covered site which had already been filled by prior owners. Any contaminant lay buried under many feet of fill. The site was inspected by Wacker representatives both on foot and by helicopter overflight. No contamination was visible or otherwise detectable by inspection. The City of Portland told Wacker Siltronic that the site was vacant, undeveloped land, not formerly used for any industrial purpose. The company's representatives and its engineers saw and heard nothing at all which could cause them to suspect there were hazardous contaminants of any kind in the soil or underground water of the site.

Wacker Siltronic did not learn of the presence of hazardous substances in its site until long after the purchase, and first established the presence of coal tar wastes in 1985 after it was told by Northwest Natural Gas Company (NWNGC) of coal tar wastes under the fill in part of the property, deposited there decades before by NWNGC's predecessor, the Portland Gas and Coke Company. Wacker Siltronic confirmed the presence of the coal tar wastes,

and found certain other contaminants (e.g., lead, organics) by soil and underground water tests carried out for the company by CH2M Hill. The DEQ was promptly and fully informed. None of the contaminants found was contributed to the site by Wacker Siltronic.

Since discovering the contamination on the property, Wacker Siltronic has spent about $250,000 on studies, tests, monitoring, reports, legal and other consulting costs, and staff time. Since it is clear under both federal and Oregon law that Wacker Siltronic Corporation is not legally responsible for investigation or cleanup costs, we cannot justify further expenditures of this nature. Indeed, we reserve our rights to seek reimbursement of our expenditures from the responsible parties or other sources as the law may provide.

Our company has now invested more than $95 million in our Portland plant facilities, and we now have more than 900 employees. We have worked together in a spirit of close cooperation with federal, state and local agencies, including the Department of Environmental Quality, and look forward to continuing this cooperative relationship. In this spirit we will, of course, provide access to our property to assist the work of the Doane Lake study, subject to appropriate agreements to avoid interference with the company's work, protect it against liability, protect the confidentiality of its processes, and preserve its other rights. Since Wacker Siltronic has no legal responsibility for the Doane Lake study, we will not attend further meetings concerning the proposed consent decree. We will advise EPA of our position in the near future.

The crux of the matter is that Wacker Siltronic purchased its property after coal tar deposits and possibly some lead and organic compound contamination had come to lie hidden in the property; that it made all appropriate inquiries prior to the purchase and neither knew nor reasonably should have known of any hazardous substance contamination in the site; that any hazardous substances of concern coming to the site after the purchase came by migration from other property not owned by Wacker Siltronic; and that all the hazardous substances of concern in the site came

there by virtue of acts or omissions of third parties not connected in any way with Wacker Siltronic. Simply stated, Wacker Siltronic is an innocent victim of the contamination and not in any way responsible for it.

DEQ has advised Wacker Siltronic that, among legally liable parties, it is DEQ policy to seek cleanup from "culpable" parties first, and only if this fails to achieve the necessary cleanup, to pursue property owners solely on the basis of ownership. "Culpable" parties presumably means parties responsible for contributing or exacerbating contamination of a site and Wacker Siltronic is, therefore, not a culpable party. This DEQ policy, while fair as among legally liable parties, is not controlling in our situation, for Wacker Siltronic is not legally liable at all.

In view of the facts presented in this letter and the enclosed memorandum, we request that you confirm to us by letter that Wacker Siltronic Corporation is not liable for any remedial action costs; i.e., is not a party liable under the provisions of ORS 466.567.

We appreciate DEQ's taking a leadership role in investigating the Doane Lake area, and look forward to continued cooperation in providing access to our property, with appropriate safeguards.

Sincerely yours,

WACKER SILTRONIC CORPORATION

James H. DiSorbo
President

JHD:jr

Enclosure

bcc: John Pittman, Director of Engineering
Marvin B. Durning, Esq.
Harvey Barrager, Esq.

MILLER, NASH, WIENER, HAGER & CARLSEN
ATTORNEYS AND COUNSELORS AT LAW
3500 U.S. BANCORP TOWER
111 S. W. FIFTH AVENUE
PORTLAND, OREGON 97204-3699
TELEPHONE (503) 224-5858
TELEX 364462 KINGMAR PTL
TELECOPY (503) 224-0155

SEATTLE OFFICE
6500 COLUMBIA CENTER
701 FIFTH AVENUE
SEATTLE, WASHINGTON 98104-7075
TELEPHONE (206) 622-8484
TELECOPY (206) 622-7485

March 24, 1989

Mr. Marvin B. Durning
1411 Fourth Avenue Building
Suite 1522
Seattle, Washington 98101

Mr. John L. Pittman
Wacker Siltronic Corporation
7200 N.W. Front Avenue
Portland, Oregon 97208

Subject: NL/Gould Site - Doane Lake Study

Gentlemen:

You have requested our opinion with respect to the liability of Wacker Siltronic Corporation for remedial action costs with respect to hazardous substances which have been discovered in the area of Wacker Siltronic's plant in Northwest Portland.

In rendering this opinion, we have not made any independent investigation. Except with respect to the matters set forth in our letter of January 6, 1989 to John Pittman, Director of Engineering, we have relied on the statement of facts set forth in your memorandum dated January 31, 1989 and on the facts and conclusions set forth in the letters of Hans Herrmann and Richard S. Reid which are attached to your memorandum.

On the basis of the foregoing, it is our opinion that under Chapter 466 of Oregon Revised Statutes, Wacker Siltronic Corporation is not responsible for remedial action costs with respect to hazardous substances which have been discovered in the area of its plant in Northwest Portland.

Very truly yours,

MILLER, NASH, WIENER, HAGER & CARLSEN

By Harvey C. Barragar
Harvey C. Barragar

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MAR 2 1989

NEIL GOLDSCHMIDT
GOVERNOR

Department of Environmental Quality

811 SW SIXTH AVENUE, PORTLAND, OREGON 97204-1390 PHONE (503) 229-5696

John L. Pittman
Wacker Siltronic

February 23, 1989

Mr. Marvin B. Durning
1411 Fourth Avenue Building
Suite 1522
Seattle, Washington 98101-2212

Re: Wacker Siltronic & Doane Lake Study

Dear Mr. Durning:

We have received your letter of January 17, 1989 stating that Wacker Siltronic Corporation does not intend to participate in or fund the Doane Lake Study. As you know, the study was designed by the EPA to investigate groundwater and surface water contamination in the vicinity of the former Doane Lake. The study is intended as an alternative to expanding the NL/Gould Superfund site. Wacker Siltronic was identified by EPA and DEQ as an owner/operator within the Doane Lake Study area. The boundaries of the study area were based on current understanding of hydraulic boundaries and connections, and the extent of subsurface contamination.

DEQ looks forward to receiving your memorandum discussing Wacker Siltronic's position, as referenced in your letter. After reviewing the memorandum we will provide a more detailed response.

If you have any questions or need additional information, please contact Bill Renfroe of my staff at (503) 229-6900.

Sincerely,

Fred Hansen
Director

SJM:m
SM2016
cc: John Pittman, Wacker Siltronic
Ed Woods, NWR, DEQ
Bev Thacker-Morgan, PA, DEQ
Al Goodman, EPA-000

NEIL GOLDSCHMIDT
GOVERNOR

Department of Environmental Quality

811 SW SIXTH AVENUE, PORTLAND, OREGON 97204-1390 PHONE (503) 229-5696

RECEIVED
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JAN 17 1989
John L. Pittman
Wacker Siltronic

January 12, 1989

Mr. John Pittman
Wacker Siltronix
P. O. Box 03180
Portland, Oregon 97203

Re: Doane Lake Meeting

Dear Mr. Pittman:

This letter is to remind you that a meeting has been scheduled on January 19, 1989, regarding the Doane Lake investigation. The meeting will be held at the Department of Environmental Quality's (DEQ) fourth floor conference room between 9:00 a.m. and 12:00 Noon. Our address is:

DEQ
Executive Building
811 S.W. Sixth Avenue
Portland, Oregon

If it will be necessary for someone to contact you during the meeting, please have them call Ms. Lynda Buckley at (503) 229-5733. Refreshments will be provided by DEQ.

If you have any questions or need additional information, please contact me at (503) 229-6900.

Sincerely,

William T. Renfroe, Jr.
Site Response Section
Environmental Cleanup Division

WTR:m
SM1939
cc: Dave Tetta - EPA Region
Al Goodman - EPA OOO
Larry Edelman - DOJ
Fred Hansen - OD
Mike Downs - ECD
Tom Miller - SRS
Ed Woods - NWR
Sandra Anderson - SRS
Ed Woods - NWR

Similar letters sent to:
David Simon - Liquid Air Corp.
Edmund Bolin - NW Natural Gas Co.
Dale Ghring - ESCO
David Waldschmidt - Pacific Northern Oil
John Oxford - Koppers Company, Inc.
Tom Zelenka - Schnitzer Steel
Bob Ferguson - Rhone-Poulenc
Larry Patterson - Pennwalt Chemical Corp.
Jim Gibbs - Gould, Inc.
Steve Oster - NL Industries, Inc.

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DOANE LAKE HYDROGEOLOGIC INVESTIGATION

DECEMBER 8, 1988

MEETING AGENDA

10:00	Introductions	Bill Renfroe
10:10	Opening Remarks	Tom Miller
10:20	Tettra Tech Scope of Work	Sandy Anderson
10:30	Non Negotiable Issues - Administrative Order on Consent (Consent Order) - Scope of Investigation (Minimum) - Single Point of Contact - DEQ Cost Recovery - Press Release on Signing of Order	Bill Renfroe
10:45	Draft Consent Order - Key Sections	Larry Edelman
11:30	Questions & Answers - Cost Distribution - DEQ Provision of NBARs	Open Forum
12:00	Adjourn	

The Regulatory "Players"

Tom Miller - Manager, Site Response Section (503) 229-5080

Larry Edelman - Attorney, Office of the Attorney General (503) 229-5725

Sandy Anderson - Hydrogeologist, Site Response Section
(DEQ Project Manager - after Order is signed) (503) 229-6744

Bill Renfroe - Senior Environ. Engineer, Site Response Section
(DEQ Project Manager - until Order is Signed) (503) 229-6900

NEIL GOLDSCHMIDT
GOVERNOR

Department of Environmental Quality

811 SW SIXTH AVENUE, PORTLAND, OREGON 97204-1390 PHONE (503) 229-5696

RECEIVED
ENGINEERING
NOV 28 1988
John L. Pittman
Wacker Siltronic

November 23, 1988

Mr. John Pittman
Wacker Siltronic
P. O. Box 03180
Portland, OR 97203

Re: Meeting Date Change for Consent Order
Negotiations for the Doane Lake Study

Dear Mr. Pittman:

The meeting originally scheduled for Thursday, December 1, 1988, has been rescheduled.

You or representatives of your firm are requested to attend a meeting on **Thursday, December 8, 1988**, at DEQ's offices. The meeting will begin at 10:00 a.m. and will convene in the fourth floor conference room. The intent of the meeting is to initiate discussions that will result in a signed consent order prior to the EPA imposed deadline of March 31, 1989.

If you have any questions or need additional information, please contact Bill Renfroe, Site Response Section, at (503) 229-6900.

Sincerely,

William T. Renfroe, Jr.
Site Response Section
Environmental Cleanup Division

WTR:m
SM1779
cc: Chuck Findley-EPA Region X
Al Goodman-EPA 000
Larry Edelman-DOJ
Fred Hansen-OD
Mike Downs-ECD
Tom Miller-SRS
Tom Bispham-RO

Similar letters sent to:
David Simon - Liquid Air Corp.
Edmund Bolin - NW Natural Gas Co.
Roger Sherwood - ESCO
David Waldschmidt - Pacific Northern Oil
John Oxford - Koppers Company, Inc.
John Pittman - Wacker-Siltronic
Bob Ferguson - Rhone-Poulenc
Larry Patterson - Pennwalt Chemical Corp.
Michael Veysey - Gould, Inc.
Janet D. Smith - NL Industries, Inc.

NEIL GOLDSCHMIDT
GOVERNOR

Department of Environmental Quality

811 SW SIXTH AVENUE, PORTLAND, OREGON 97204-1334 PHONE (503) 229-5696

RECEIVED
ENGINEERING
NOV 18 1988
John L. Pittman
Wacker Siltronic

November 15, 1988

Mr. John Pittman
Wacker Siltronic
P. O. Box 03180
Portland, OR 97203

Re: Request to Participate in Consent Order Negotiations for the Doane Lake Study

Dear Mr. ~~Pittman~~ John:

It has been agreed upon with EPA that the Oregon Department of Environmental Quality (DEQ) will act as the lead agency for an investigation of the groundwater unit associated with the Gould/NL site.

You are hereby notified that Wacker Siltronic has been identified by the DEQ as an owner/operator, pursuant to ORS 466.540 through 466.590, with regard to the groundwater unit associated with the Gould/NL site. The Department intends to proceed with the groundwater unit investigation, referred to as the Doane Lake Study, using the above referenced authority. At this time DEQ has decided to limit the investigation to the scope of work proposed by the EPA. A copy of this scope of work was mailed to you by EPA on or about October 21, 1988.

You or representatives of your firm are requested to attend a meeting on Thursday, December 1, 1988, at DEQ's offices. The meeting will begin at 10:00 a.m. and will convene in the fourth floor conference room. The intent of the meeting is to initiate discussions that will result in a signed consent order prior to the EPA imposed deadline of March 31, 1989.

If you have any questions or need additional information, please contact Bill Renfroe, Site Response Section, at (503) 229-6900.

Sincerely,

Fred Hansen
Director

WTR:m
SM1752
cc: Chuck Findley-EPA Region X
Al Goodman-EPA 000
Larry Edelman-DOJ
Mike Downs-ECD
Tom Miller-SRS
Tom Bispham-RO

Similar letters sent to:
David Simon - Liquid Air Corp.
Eddmond Bolin - NW Natural Gas Co.
Roger Sherwood - ESCO
David Waldschmidt - Pacific Northern Oil
John Oxford - Koppers Company, Inc.
Bob Ferguson - Rhone-Poulenc
Larry Patterson - Pennwalt Chemical Corp.
Michael Veysey - Gould, Inc.
Janet D. Smith - NL Industries, Inc.

SCOEPA00016246

MARVIN B. DURNING A PROFESSIONAL SERVICE CORPORATION LAW OFFICES
1411 FOURTH AVENUE BUILDING, SUITE 1522, SEATTLE, WASHINGTON 98101-2212 TELEPHONE (206) 223-9616 TELECOPY (206) 223-9617

GERARDO A. CARLO, OF COUNSEL
ADMITTED IN PUERTO RICO
AND DISTRICT OF COLUMBIA

MARVIN B. DURNING, OF COUNSEL
CARLO & DUBOS
SAN JUAN, PUERTO RICO

January 19, 1989

Mr. Roger Neu
Schnitzer Investment Corp.
3200 N.W. Yeon Avenue
Portland, Oregon 97210

Re: Wacker Siltronic Corporation - NL/Gould
Federal Superfund Site - Doane Lake Area

Dear Mr. Neu:

Wacker Siltronic Corporation has asked me to write to you and to the other parties interested in the NL/Gould Federal Superfund Site and Doane Lake Area in northwest Portland, Oregon to advise you of Wacker Siltronic's position concerning any remedial action costs connected with those areas.

As you know, Wacker Siltronic Corporation owns property on which its silicon wafer plant is constructed, at 7200 N.W. Front Avenue in the Doane Lake area of northwest Portland. Because of its ownership of this property, Wacker Siltronic has been involved with the U.S. Environmental Protection Agency, Region X (EPA), and the Oregon Department of Environmental Quality (DEQ) concerning a further investigation of "the groundwater unit" of the NL/Gould Federal Superfund site desired by EPA and a Doane Lake Study desired by DEQ. Recent efforts by DEQ/EPA to negotiate an Oregon Consent Order to carry out this further remedial investigation have required that Wacker Siltronic clarify its legal liability, if any, for remedial action costs associated with the NL/Gould site and Doane Lake area.

A careful review of the facts and of governing law indicates that Wacker Siltronic has no legal responsibility to pay any of the costs of the above-mentioned further remedial investigation nor any other remedial action costs pertaining to the site or area. Wacker Siltronic Corporation purchased its property in October, 1978 from the City of Portland as part of a cooperative urban renewal and job development effort. At the time of the purchase, Wacker Siltronic made appropriate inquiries and neither knew nor reasonably should have known of any contamination of hazardous substances in or on the property. Any hazardous substances coming to the property after the purchase came by migration from other property not owned by Wacker Siltronic, and all hazardous substances of concern at the property came there by acts or omissions of third parties not connected in any way with Wacker Siltronic. For all these reasons, and others, Wacker Siltronic is not a responsible party under either federal or Oregon law; rather, it is an innocent victim of the contamination.

SCOEPA00016247

MARVIN B. DURNING
A PROFESSIONAL SERVICE CORPORATION

Over the past few years, Wacker Siltronic has cooperated with EPA and DEQ and with other interested parties concerning its property, and has already made very substantial expenditures on studies, tests, monitoring, reports, staff time, legal and other consulting costs because of the contamination discovered at its property. In view of the fact that the Company has no legal liability for the contamination, it has advised DEQ (and will advise EPA) that it will not sign the proposed Consent Order and will not share in the further remedial investigation costs nor for other remedial action costs. In addition, Wacker Siltronic reserves its right to reimbursement of its expenditures (and other damages, if any) from responsible parties or other sources as the law may provide.

Although Wacker Siltronic will not be a party to the proposed Oregon Consent Order, it will continue to cooperate with EPA, DEQ, and other interested parties by providing access to its property, under appropriate safeguards, if such access is needed for the further remedial investigation.

We trust this letter makes clear Wacker Siltronic Corporation's position and that this clarification will assist you in determining your company's or your client's course of action. We are sending a letter similar to this one to the other interested parties of the NL/Gould Federal Superfund site and Doane Lake area.

Very truly yours,

Marvin B. Durning

Marvin B. Durning

MBD:bg
cc: John Pittman, Director of Engineering
Wacker Siltronic Corporation

(A7)0117.2

SCOEPA00016248

Mailing list for January 19, 1989 letter to interested parties.

SCHNITZER INVESTMENT CORPORATION

Mr. Roger Neu
Schnitzer Investment Corp.
3200 N.W. Yeon Avenue
Portland, Oregon 97210

LIQUID AIR CORPORATION

Mr. David N. Simon, Mgr.
Regulatory Affairs
Liquid Air Corporation
P.O. Box 8038
Walnut Creek, California 94576

NORTHWEST NATURAL GAS COMPANY

Mr. E. L. Bolin
Northwest Natural Gas Company
220 N.W. 2nd Avenue
Portland, OR 97209

Richard Bach, Esq.
Stoel, Rives, Boley, Jones, & Grey
Suite 2300
900 S.W. Fifth Avenue
Portland, Oregon 97204

ESCO

Mr. Roger Sherwood
ESCO
P.O. Box 10123
Portland, Oregon 97210

Joseph A. Darrel, Esq.
Thelen, Marrin, Johnson & Bridges
Two Embarcadero Center
San Francisco, California 94111

James Brown, Esq.
Bogle & Gates
222 S.W. Columbia, Suite 1400
Portland, Oregon 97201

PACIFIC NORTHERN OIL

Mr. David Waldschmidt
Pacific Northern Oil
100 West Harrison
Suite 200 North Tower
Seattle, Washington 98111

KOPPERS COMPANY, INC.

Mr. John Oxford
Koppers Company, Inc.
7540 N.W. St. Helens Road
Portland, Oregon 97229

Ms. Billie Nolan
Koppers Company, Inc.
1401 Koppers Bldg.
Pittsburgh, Pennsylvania 15219

SCOEPA00016249

RHONE-POULENC

Mr. Robert L. Ferguson
Rhone-Poulenc
P.O. Box 10224
Portland, Oregon 97210-0224

Mr. Richard F. Gitschlag
Environmental Project Manager
Rhone-Poulenc
CN5266
Princeton, New Jersey 08543

James E. Benedict, Esq.
Schwabe, Williamson & Wyatt
Suite 1600 Pac West Center
1211 S.W. Fifth Avenue
Portland, Oregon 97204

William Farran, Esq.
Environmental Counsel
Rhone-Poulenc
CN5266
Princeton, New Jersey 08543

PENWALT CHEMICAL CORPORATION

Mr. Larry Patterson
Penwalt Chemical Corp.
6400 N.W. Front Avenue
Portland, Oregon 97210

Mr. Michael Schu
Penwalt Corporation
Three Parkway
Philadelphia, Pennsylvania 19102

Claudia Powers, Esq.
Lindsey, Hart, Neil, & Weigler
Suite 1800
222 S.W. Columbia Street
Portland, Oregon 97201-6618

NL INDUSTRIES, INC.

Janet D. Smith, Esq.
Associate General Counsel
NL Industries, Inc.
445 Park Avenue, Suite 1500
New York, New York 10022

Steven Oster, Esq.
Donovan, Leisure, Newton & Irvin
Suite 1200
1850 "K" Street, N.W.
Washington, D.C. 20006

GOULD, INC.

Michael Veysey, Esq.
James Gibbs, Esq.
Assistant General Counsel
Gould Inc.
10 Gould Center
Rolling Meadows, Illinois 60008

MARVIN B. DURNING A PROFESSIONAL SERVICE CORPORATION LAW OFFICES
1411 FOURTH AVENUE BUILDING, SUITE 1522, SEATTLE, WASHINGTON 98101-2212 TELEPHONE (206) 223-9616 TELECOPY (206) 223-9617

GERARDO A. CARLO, OF COUNSEL
ADMITTED IN PUERTO RICO
AND DISTRICT OF COLUMBIA

MARVIN B. DURNING, OF COUNSEL
CARLO & DUBOS
SAN JUAN, PUERTO RICO

RECEIVED
ENGINEERING
JAN 19 1989

January 17, 1989

John L. Pittman
Wacker Siltronic

Mr. Fred Hansen, Director
Oregon Department of Environmental Quality
811 S.W. Sixth Avenue
Portland, Oregon 97204-1334

Re: NL/Gould Site and Doane Lake Study

Dear Mr. Hansen:

Wacker Siltronic Corporation has asked me to reply to your letter of November 15, 1988, stating that Wacker Siltronic Corporation "has been identified by the DEQ as an owner/operator, pursuant to ORS 466.540 through 466.590, with regard to the groundwater unit associated with the Gould/NL site" and requesting that it attend a meeting to initiate discussions concerning a consent order to carry out an investigation of the groundwater unit, referred to as the Doane Lake Study. The Wacker Siltronic property of concern in your letter is the company's silicon wafer manufacturing plant site on NW Front Avenue, in the Doane Lake area of Northwest Portland.

As you know, Wacker Siltronic has been working with DEQ and EPA for several years concerning its property. Your letter, and the course of events it envisages, required that the company clarify at this time whether it has any legal liability under Oregon law for remedial action costs in the Doane Lake area. A review of the facts concerning this property and of the governing Oregon law (ORS 466.567) indicates that Wacker Siltronic Corporation has no legal responsibility to pay any of the costs of the Doane Lake Study nor any other remedial action costs pertaining to the site. A memorandum providing a detailed discussion of the relevant facts and law is in preparation, and will be sent to you in the near future.

The second meeting with Doane Lake area property owners concerning DEQ's proposed consent order is scheduled for 9:00 a.m. on Thursday, January 19. Since Wacker Siltronic has no legal responsibility for the Doane Lake study, nor for any other remedial action costs in the area, the company will not send representatives to the January 19 meeting or further such meetings.

MARVIN B. DURNING
A PROFESSIONAL SERVICE CORPORATION

Wacker Siltronic Corporation has also asked me to express to you its appreciation for the leadership which DEQ has shown with respect to the Doane Lake area. Wacker Siltronic will cooperate, of course, with DEQ and the responsible parties by providing access to its property, under appropriate safeguards, should that be needed in the conduct of the study.

If you have any questions, please call.

Very truly yours,

Marvin B. Durning

Marvin B. Durning

MBD:bg
cc: John Pittman, Director of Engineering,
Wacker Siltronic Corporation
William T. Renfroe, Jr., DEQ, Site Response Section
Environmental Cleanup Division

(A7)0117.1

SCOEPA00016252

MARVIN B. DURNING A PROFESSIONAL SERVICE CORPORATION LAW OFFICES
1411 FOURTH AVENUE BUILDING, SUITE 1522, SEATTLE, WASHINGTON 98101-2212 TELEPHONE (206) 223-9618 TELECOPY (206) 223-9617

GERARDO A. CARLO, OF COUNSEL
ADMITTED IN PUERTO RICO
AND DISTRICT OF COLUMBIA

MARVIN B. DURNING, OF COUNSEL
CARLO & DUBOS
SAN JUAN, PUERTO RICO

DRAFT

January 17, 1989

Mr. Fred Hansen, Director
Oregon Department of Environmental Quality
811 S.W. Sixth Avenue
Portland, Oregon 97204-1334

Re: NL/Gould Site and Doane Lake Study

Dear Mr. Hansen:

Wacker Siltronic Corporation has asked me to reply to your letter of November 15, 1988, stating that Wacker Siltronic Corporation "has been identified by the DEQ as an owner/operator, pursuant to ORS 466.540 through 466.590, with regard to the groundwater unit associated with the Gould/NL site" and requesting that it attend a meeting to initiate discussions concerning a consent order to carry out an investigation of the groundwater unit, referred to as the Doane Lake Study. The Wacker Siltronic property of concern in your letter is the company's silicon wafer manufacturing plant site on NW Front Avenue, in the Doane Lake area of Northwest Portland.

As you know, Wacker Siltronic has been working with DEQ and EPA for several years concerning its property. Your letter, and the course of events it envisages, required that the company clarify at this time whether it has any legal liability under Oregon law for remedial action costs in the Doane Lake area. A review of the facts concerning this property and of the governing Oregon law (ORS 466.567) indicates that Wacker Siltronic Corporation has no legal responsibility to pay any of the costs of the Doane Lake Study nor any other remedial action costs pertaining to the site. A memorandum providing a detailed discussion of the relevant facts and law is in preparation, and will be sent to you in the near future.

The second meeting with Doane Lake area property owners concerning DEQ's proposed consent order is scheduled for 9:00 a.m. on Thursday, January 19. Since Wacker Siltronic has no legal responsibility for the Doane Lake study, nor for any other remedial action costs in the area, the company will not send representatives to the January 19 meeting or further such meetings.

MARVIN B. DURNING
A PROFESSIONAL SERVICE CORPORATION

Wacker Siltronic Corporation has also asked me to express to you its appreciation for the leadership which DEQ has shown with respect to the Doane Lake area. Wacker Siltronic will cooperate, of course, with DEQ and the responsible parties by providing access to its property, under appropriate safeguards, should that be needed in the conduct of the study.

If you have any questions, please call.

Very truly yours,

Marvin B. Durning

MBD:bg
cc: John Pittman, Director of Engineering,
Wacker Siltronic Corporation

(A7)0117.1

MARVIN B. DURNING
A PROFESSIONAL SERVICE CORPORATION

TELECOPY COVER LETTER

Telecopy Number: (206) 223-9617

To: WACKER SILTRONIC CORPORATION Telecopy Number: 1-(503) 226-0052

Please deliver the following pages to: JOHN PITTMAN, DIR. OF ENGINEERING

From: MARVIN DURNING

Total number of pages 3, including this cover page.

John - phone call -.

Client Name: WACKER SILTRONIC

Client Matter and Number: 033

Date: 1/17/89 Time: _____

We are transmitting from a Group III facsimile machine (Sharp FO620 Automatic) compatible with Group I, II, and III machines. If you are experiencing any problems receiving documents, please call us immediately at (206) 223-9616.

Telecopy operator: _____

(D1)0109.1

SCOEPA00016255

DOANE LAKE HYDROGEOLOGIC INVESTIGATION

DECEMBER 8, 1988

MEETING ATTENDEES

NAME	ORGANIZATION	TELEPHONE
SANDRA ANDERSON	DEQ	503-229-6744
Tom Miller	DEQ	503-229-5080
Harry Edelman	DEQ	503-229-5725
Bob Ferguson	Rhone-Poulenc	503 796-1202
JOHN PITTMAN	WACKER	503 241-7514
MARVIN DURNING	WACKER	206 223-9616
Claudia K. Powers	PENNWALT	503-226-1191
LARRY PATTERSON	PENNWALT	503-228-7655
Robert Johnson	Northwest Natural Gas	503-220-2403
Edmund L. Bolin	"	503-721-2440
Roger Sherwood	"	503-778-6335
DAVID SIMON	LIQUID AIR	415-977-6657
DAVID H. COUCH	ESCO - BOGLE GATES	(503) 222-1515
GARY FONTANA	ESCO - TIDEGEN, MYMRIN et al	(415) 392-6320
James C Bowling	ESCO Bogle Gates	(503) 222-1575
Claudia K. Powers	PENNWALT - LINDSAY, HART	(503) 226-1191

SCOEPA00016256

DOANE LAKE HYDROGEOLOGIC INVESTIGATION

DECEMBER 8, 1988

MEETING ATTENDEES

NAME	ORGANIZATION	TELEPHONE
Bill Renfroe	DEQ	(503) 229-6900
Jim Gibbs	Gould	(312) 640-4794
Jim Benedict	Schwabe-Rhone-Poulenc	503 222-9981
Tom Zelenka	Schnitzer	(503) 224-9900
Steve Oster	DLNR of NL	(202) 862-4735
Richard O. Bach	Stoel Rives Boley	(503) 294-9513
David Waldschmidt	Pacific Northern Oil	(206) 282-4421
Richard Fgitschlot	Rhone-Poulenc	(201)-821-3626
Bill Farran	" "	(201)-821-3533

SCOEPA00016257

Roger Neu
SCHNITZER INVESTMENT CORP.
3200 NW Yeon Avenue
Portland, OR 97210

LIQUID AIR CORP.
c/o David N. Simon, Manager
Regulatory Affairs
2121 N. California
P. O. Box 8038
Walnut Creek, CA 94576

Eddmond Bolin
NORTHWEST NATURAL GAS
220 NW Second Avenue
Portland, OR 97209

NORTHWEST NATURAL GAS
c/o Dick Bach/Mark Morford
STOEL, RIVES, BOLEY, JONES & GREY
Suite 2300
900 SW Fifth Avenue
Portland, OR 97204

Roger Sherwood
ESCO
P. O. Box 10123
Portland, OR 97210

ESCO
c/o Jim Brown
BOGLE & GATES
222 SW Columbia, Ste. 1400
Portland, OR 97201

ESCO
c/o Joseph A. Darrel
THELEN, MARRIN, JOHNSON & BRIDGES
Two Embarcadero Center
San Francisco, CA 94111

PACIFIC NORTHERN OIL
c/o David Waldschmidt
Suite 200, North Tower
100 West Harrison
Seattle, WA 98111

John Oxford
KOPPERS COMPANY, INC.
7540 NW St. Helens Road
Portland, OR 97229

KOPPERS COMPANY, INC.
c/o Billie Nolan
1401 Koppers Building
Pittsburg, PA 15219

SCOEPA00016258

John Pittman
WACKER SILTRONIC
P. O. Box 03180
Portland, OR 97203

WACKER SILTRONIC
c/o Marvin Durning
Attorney at Law
Suite 1522
1411 Fourth Avenue Building
Seattle, WA 98101-2212

Robert L. Ferguson
Plant Manager
RHONE-POULENC AG COMPANY
P. O. Box 10224
Portland, OR 97210-0224

William N. Farran
Environmental Counsel
RHONE-POULENC INC.
CN5266
Princeton, NJ 08543

Richard F. Gitschlag
Environmental Project Manager
RHONE-POULENC INC.
CN5266
Princeton, NJ 08543

Larry Patterson
PENWALT CHEMICAL CORP.
6400 NW Front Avenue
Portland, OR 97210

PENWALT CORPORATION
c/o Claudia Powers
LINDSEY, HART, NEIL & WEIGLER
Suite 1800
222 SW Columbia Street
Portland, OR 97201-6618

Michael Schu
PENWALT CORPORATION
Three Parkway
Philadelphia, PA 19102

Janet D. Smith
Associate General Counsel
NL INDUSTRIES, INC.
Suite 1500
445 Park Avenue
New York, NY 10022

Jim Gibbs
Michael Veysey
Assistant General Counsel
GOULD, INC.
10 Gould Center
Rolling Meadows, IL 60008

SCOEPA00016259

Steven Oster
DONOVAN, LEISURE, NEWTON & IRVIN
Attorneys at Law
(N/L Industries, Inc.)
Suite 1200
1850 "K" Street, NW
Washington, D.C. 20006

James E. Benedict
SCHWABE, WILLIAMSON & WYATT
Attorneys at Law
(Rhone-Poulenc Inc.)
Suite 1700, Pacwest Center
1211 SW Fifth Avenue
Portland, OR 97204

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E. L. BOLIN

MANAGER
LAND AND CLAIMS DEPARTMENT
NORTHWEST NATURAL GAS COMPANY
220 N.W. SECOND AVENUE
PORTLAND, OREGON 97209

(503) 721-2440

SCOEPA00016261

CDM

environmental engineers, scientists, planners, & management consultants

CAMP DRESSER & McKEE

Riverpoint
2300 15th Street, Suite 400
Denver, Colorado 80202
303 456-1311

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LAND AND CLAIMS

14-Nov-1988

Mr. E. L. Bolin, Manager
Land and Claims Department
Northwest Natural Gas Company
220 N.W. Second Avenue
Portland, Oregon 97209

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John L. Pittman
Wacker Siltronic

Dear Ed:

I have reviewed the document entitled " Final Scope of Work Hydrogeological Investigation NL/Gould - Doane Lake Area" by Tetra Tech, Inc., dated September 1988, as you requested in your letter of October 26, 1988. I have reviewed this work plan in light of the potential impact on NWNG, including approximate cost estimates that might be attributed to NWNG.

Work scope tasks that relate to NWNG include a portion of project plan preparation (Sampling Plan, Quality Assurance Plan, Health and Safety Plan), river sediment sampling and analysis, ground water monitoring well installation and sampling and a portion of project reporting costs. Each of these areas is discussed below.

Preparation of project plans for this project should be a relatively small effort considering the amount of background information already assembled in the area and the available existing plans. The total cost should not exceed about $8,000 - $12,000. The descriptions of plan requirements are consistent with current EPA guidance.

The river sediment sampling program includes only one station (1500 meter downgradient) that may provide information relevant to the past activities of the gas plant. This station includes analysis of a full suite of organic and metal contaminants, in addition to a sediment bioassay. Collection and chemical analysis costs could amount to $3,500. I do not have any costs available for the bioassay procedure. The utility of the sampling program is questionable considering the amount of dredging that has been conducted in the area and the length of time since active discharge from the gas plant. The specification of a bioassay in advance of examination of chemical analysis results is questionable.

Three cluster well sites with three completions at each site, plus one upgradient well are proposed. The work plan proposes an extensive program of inorganic chemical characterization, complete organic analysis, water level monitoring and hydrologic testing. The locations of these proposed wells will still leave open the question of degree of contamination resulting from the old tar pond area, since the ground water flow direction is not known in detail at present in the vicinity of the tar pond area and only one of the wells is in an area that has some potential to be downgradient of the old ponds. The necessity for basalt well completions prior to determining the degree of contamination of the lower alluvial zone is also questionable. The probable depth to the basalt contact at the two proposed locations adjacent to

the river is in excess of 120 feet and will result in relatively high drilling costs. I would recommend that as an alternative, that only one basalt well be installed at the location near the tank farm area, where bedrock is much shallower. Approximate costs for the program as outlined in the work plan including well drilling and installation, sampling and testing would range from $75,000 - $100,000.

Please call if you need more information or assistance on this matter.

Sincerely,
Camp, Dresser & McKee, Inc.

Michael J. Smith

Michael J. Smith
Project Manager

NL

January 11, 1989

Mr. Thomas Miller
Oregon, Department of Environmental Quality
Section Manager, Site Response Section
811 S.W. 6th Street
Portland, OR 97204

Re: Doane Lake Study Group, Proposed Work Plan

Dear Mr. Miller:

It is my understanding that you are about to meet with Mr. Richard Bach and other members of the Doane Lake Study Group. Given the importance of the issues to be discussed, it was our hope to attend this meeting on January 12, 1989.

Due to the distance involved and the untimeliness of this meeting, we are unable to attend. We do wish, however, to express our opinions and concerns about the Scope of Work presently being proposed by the Doane Lake Group. Please find enclosed, our letter to Mr. Richard Bach dated January 10, 1989.

In brief, we believe that the plan presently being prepared by the Doane Lake Group will reduce the aerial and qualitative value of the originally proposed Tetra Tech Work Plan and will not provide a unified approach to the Doane Lake groundwater negotiation program.

If you have any questions please feel free to call me at (609) 443-2407.

Very truly yours,

Jay F. Young

Jay F. Young
Principal Environmental Engineer

JY/wd
enclosure

cc: Richard Bach

NL Industries, Inc.
Environmental Control Department
P.O. Box 1090, Hightstown, N.J. 08520 Tel. (609) 443-2407

SCOEPA00016264

NL

January 10, 1989

Richard D. Bach, Esq.
Stoel, Rives, Boley, Jones and Grey
Suite 2300
Standard Insurance Center
900 S.W. Fifth Avenue
Portland, OR 97204

Re: Doane Lake Study Group, Proposed Work Plan

Dear Mr. Bach:

In response to your comments and proposals made at the Doane Lake Study Group meeting on January 5, 1989, we wish to provide the following comments and observations:

PROPOSED GROUNDWATER INVESTIGATION SCOPE OF WORK

In brief, the thrust of the proposed investigation (See Attachment 1) is directed toward the further analysis of the Gould site hydrological characteristics. The proposed study would evaluate the effects of groundwater pumping at the Gould site on the surrounding properties. This will be done by reevaluating the hydrogeology on, and around the Gould site.

The purpose of these activities is to identify which of the surrounding properties would be influenced hydrologically by a pumping operation at the Gould site, and which would not. The proposal would eliminate the unaffected facilities from further inclusion in remedial activities associated with the present Doane Lake groundwater cleanup. Those facilities not involved in the Doane Lake groundwater cleanup effort would presumably be left to deal with their individual site cleanup programs at some later date by agreement with the State Department of Environmental Quality.

In general, we believe that the present proposal (See Attachment 1) misconceives the goals of the project, namely, to "determine the nature and extent of releases of hazardous substances into the groundwater and associated surface waters at the Respondents' facilities."(1) It is the Oregon Department of Environmental Quality (ODEQ) goal to evaluate the impact of these releases in the Doane Lake Regional Area.

NL Industries, Inc.
Environmental Control Department
P.O. Box 1090, Hightstown, N.J. 08520 Tel. (609) 443-2407

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[illegible]
By [illegible] 1-12-89

(1) Oregon DEQ Proposed Order on Consent

As you'll recall from the statement of the Order, other respondents and their respective substances of concern are as follows:

ESCO	Low level radioactive wastes, Phenol Formaldehyde, Chromium
Koppers Co., Inc.	Creosote
Liquid Air Corp.	Calcium Hydroxide
Northwest Natural Gas Co.	Coal Tar
Pacific Northern Oil	Petroleum products, Coal Tar
Penwalt Chemical Corp.	Sodium Bichromate, Ammonia, Hydrochloric Acid
Schnitzer Investment Corp.	Calcium Hydroxide
Wacker Siltronics	Coal Tar, TCE

Clearly the Study Group's proposal fails to address the regional nature of the required investigation and makes no attempt to investigate the issues listed above. In this regard, the Study Group's present proposal lacks balance and does not carry out the ODEQ objective.

While failing to address the Scope and the issues relating to the historical contaminant releases at other respondents' locations, the proposed study narrows the focus of the investigation to include only the Gould site. It is not, however, the Gould site which is driving the need to investigate the Doane Lake area. Rather, it is the existence, and hazardous nature of other substances in the groundwater system. The need to restore the Doane Lake Region water quality is the driving force for these investigations. In short, the proposal does not correctly define the site. The site is the Doane Lake area, not the Gould property alone.

The vehicle for the proposed Scope of Work includes pumping system evaluations and hydrogeological evaluations at the Gould site. The premise, here again, is that the Gould site groundwater remedial activities will even be required. This is a presumption made by the authors, which again, implies that it is the Gould site which is driving the entire investigation. As you will recall, no determination has been made to date requiring a remedial pumping program at the Gould site. This determination is most appropriately to be made during the "unified investigation" referenced in the proposed Order. (See Attachment 2)

The following comments discuss these issues in more detail:

1. The proposed plan presumes that there will be a pumping and treatment requirement at the Gould site. At this time, there are no provisions or negotiated requirements for the hypothetical pumping systems. Undesigned, groundwater pumping scenarios would have to be developed by the consultant to anticipate the "cone of influence" type of effects. Please note that Section VI of the 3/31/88 Record of Decision (ROD) states, "The proposed study will help determine whether action needs to be taken to deal with the contamination underneath the site, and how that action should be coordinated with other cleanup efforts by nearby industries that are currently going on."

The current study being proposed precludes a determination as to <u>whether</u> actions need to be taken at the Gould site, presupposes pumping scenarios which are limited to Gould remedial actions and does not look at the qualitative contributions of other local industry to the regional groundwater problem. Local industries which may be contributing to groundwater contamination in the area could be eliminated from further study simply because they do (or might) not fall into the estimated cone of influence determined by a mathematical model. In effect, the proposed plan not only concentrates on the Gould site, but also reduces the aerial extent of the investigation.

In principle, this reduced focus of study is also not consistent with the 3/31/88 ROD which states, "The proposed additional work will involve expanding the area for groundwater and surface monitoring and including organic chemical contamination in the evaluation of groundwater quality."

2. In regard to our discussion of 1/9/89, concerning the stated purpose of both Tetra Tech study, and the proposed Order on Consent (See Attachment 2), it is my understanding that you have interpreted both documents as not requiring investigation of groundwater outside the apparent Gould area of interest.

We believe that both documents state the need for "a unified investigation...to determine the full range of contaminants present, transport processes, and effects of various organic and inorganic contaminants on remediation efforts..." (See Attachment 2). Although lead appears to be the stated issue prompting the initial study, current information certainly supports the need for a unified investigation and overall
treatment. Both documents identify other respondents and other contaminants.

It does not make sense to limit the area of investigation proposed by the (Tetra Tech) Scope of Work as your proposal suggests for three reasons: First, should, the worst case, hypothetical Gould pumping scenario turn out to affect an area including all the respondents identified, the modeling effort would not exclude anyone from the effort, hence, time and additional funds will have been wasted. Second, both documents identify the need for a unified investigation. This can only occur under the current (or similar scope) of work. Since both the ODEQ and the respondents to the proposed Order are interested in a coordinated groundwater effort, it is not sufficient to focus on one site to the potential exclusion of others. This kind of effort assumes that the work done by others at later points in time will not interfere with original efforts, i.e., with the efforts of those whose cleanup activities occurred first. Finally, since the study group has rejected the Tetra Tech study and the proposed Order on Consent, it seems inappropriate to use the specified language of either document to argue for a more focused effort. In this case the requirements of the 3/31/88 Record of Decision should prevail.

3. It is NL's opinion that the stated direction of the proposed, Scope of Work contains inherent bias which is not consistent with the Agency's Record of Decision. It is everyone's interest to ensure that the study is performed in a manner which will provide for the unified study and remediation of the area groundwater. It is clear that other non-Gould groundwater contamination exists. It is our strong recommendation that the proposed study be revisited to yield a more balanced and unified approach to the local groundwater investigation. We at NL are interested in continued participation in the Doane Lake Study Group to attain this end.

As discussed on 1/9/89, it is my understanding that you and several of the other group members plan to meet with OEDQ on 1/12/89 to determine whether your current proposal will be acceptable. I also understand that this meeting is an interim effort designed to meet your goal of having an acceptable Work Plan by 1/19/89. Please call me to advise of any further progress. I can be reached at (609) 443-2407.

Very truly yours,

Jay F. Young
Principal Environmental Engineer
NL Industries, Inc.

cc: Mr. T. Miller

ATTACHMENT 1

PROPOSAL: NL/GOULD SUPERFUND SITE

GROUNDWATER INVESTIGATION

I. PURPOSE:

Phase I: To develop and implement a Scope of Work for the hydrogeological investigation of the groundwater zone of influence at the NL/Gould Site which focuses upon issues directly affecting groundwater lead treatment and remediation.

II. OBJECTIVE:

To determine the groundwater zone of influence and to characterize the hydrogeology of this zone at the NL/Gould site in order to enable preparation of the groundwater lead remedial design for the site.

III. SCOPE OF WORK:

The hydrogeologic investigation will include the following:

1) Review and analyze the 104(e) responses and other existing data available to the DEQ, EPA and industry group members.

2) An analysis of the impacts of site hydrogeology on potential groundwater treatment technologies for the NL/Gould site.

3) Identify hydrogeological data gaps to be addressed in order to determine the zone of influence and which may affect the design of a groundwater treatment system.

4) If sufficient existing data is available, the hydrogeological study will produce a hydrogeological characterization of the NL/Gould site such that groundwater remediation may proceed.

5) If data gaps indicate that additional hydrogeological information is required, the Consultant will recommend additional activities to acquire that data. This recommendation may include one or more of the proposed wells proposed in the Tetra Tech Report.

6) Obtain hydrogeological data necessary to fill data gaps as recommended by Consultant.

7) Based upon the range of potential groundwater treatment technologies, determine the zone of influence for the NL/Gould Site groundwater cleanup and ascertain which group members fall within the zone.

IV. PHASE II:

(Alternative 1): Based on existing data, the Consultant will recommend whether groundwater quality monitoring is neccessary before or after the soil/surface water cleanup at the NL/Gould site. The Consultant will recommend what kind of groundwater monitoring should be conducted and whether it is necessary to conduct such monitoring off-site. Should off-site monitoring be necessary, the Consultant will recommend which of the wells proposed by Tetra Tech are most beneficial for the monitoring activity.

OR

(Alternative 2): Following the completion of the NL/Gould soil/surface water site remediation, the Consultant will recommend what kind of groundwater monitoring should be conducted and whether it is necessary to conduct such monitoring off-site. Should off-site monitoring be necessary, the Consultant will recommend which of the wells proposed by Tetra Tech are most beneficial for the monitoring activity.

ATTACHMENT 2

STATE OF OREGON

DEPARTMENT OF ENVIRONMENTAL QUALITY

In the Matter of:	)	DEQ No._____
	)	
ESCO;	)	
Gould, Inc.;	)	
Koppers Company, Inc.;	)	
Liquid Air Corp.;	)	
NL Industries, Inc.;	)	**DRAFT**
Northwest Natural Gas Co.;	)	
Pacific Northern Oil;	)	
Pennwalt Chemical Corp.;	)	
Rhone-Poulenc;	)	
Schnitzer Investment Corp. and;	)	
Wacker-Siltronic	)	ORDER ON CONSENT
	)	
	)	
Respondents.	)	

Pursuant to ORS 466.570(4), the Director, Oregon Department of Environmental Quality (DEQ), issues this Order on Consent (Consent Order) to ESCO; Gould, Inc.; Koppers Company, Inc.; Liquid Air Corp.; NL Industries, Inc.; Northwest Natural Gas Co.; Pacific Northern Oil Co.; Pennwalt Chemical Corp.; Rhone-Poulenc; Schnitzer Investment Corp.; and Wacker-Siltronic (Respondents). This Consent Order contains the following provisions:

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1. Purpose.

The mutual objective of DEQ and Respondents is to implement the scope of work for the Doane Lake Hydrogeologic Investigation, attached to and incorporated by reference into this Consent Order, as Attachment A. This study is necessary to determine the nature and extent of releases of hazardous substances into the groundwater and associated surface waters at the Respondents' facilities in a manner that complies with the applicable provisions of ORS 466.540 through 466.590. This unified investigation is necessary to determine the full range of contaminants present, transport processes, and effects of various organic and inorganic contaminants on remediation efforts at the NL/Gould Superfund site.

2. Stipulations.

Respondents consent and agree:

A. To issuance of this Consent Order;

B. To perform and comply with all provisions of this Consent Order;

C. To not challenge DEQ's jurisdiction to issue and enforce this Consent Order;

D. To waive any right Respondents might have, prior to commencement of action by DEQ to enforce this Consent Order, to seek judicial review, or review by the Environmental Quality Commission, of this Consent Order;

E. To not litigate, in any proceeding brought by DEQ to enforce this Consent Order or to assess penalties for noncompliance with this Consent Order, any issue other than Respondents's compliance with this Consent Order;

F. To not assert, in any proceeding brought by DEQ to enforce this Consent Order or to assess penalties for noncompliance with this Consent

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Order, that any partial performance of this Consent Order by Respondents discharges Respondents's duty to fully perform all provisions of this Consent Order; and

G. To waive any right Respondents might have under ORS 466.570(7) to seek reimbursement of costs incurred under this Consent Order.

3. Findings of Fact.

DEQ makes the following findings without admission of any such facts by Respondents:

A. Respondents are Oregon Corporations or are licensed to do business in the State of Oregon.

B. ESCO owns and operated a facility at 6900 N. Front Avenue, Portland, Oregon.

Gould, Inc. owns and operated a site at 5909 W. 61st Street, Portland, Oregon.

Koppers Company, Inc. operates a site at 7540 NW St. Helens Road in Portland, Oregon.

Liquid Air Corporation operates a site at 6501 NW Front Avenue, Portland, Oregon.

NL Industries, Inc. owned and operated a site at 5909 W. 61st Street, Portland, Oregon.

Northwest Natural Gas owns and operates a site at 7900 NW St. Helens Road, Portland, Oregon.

Pacific Northern Oil operates a site at 7900 NW St. Helens Road, Portland, Oregon.

Pennwalt Chemical Corporation owns and operates a site at 6400 NW Front Avenue, Portland, Oregon.

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Rhone-Poulenc owns and operates a site at 6200 NW St. Helens Road, Portland, Oregon.

Schnitzer Investment Corporation owns and operates a site at 6501 NW Front Avenue, Portland, Oregon.

Wacker-Siltronic Corporation owns and operates a site at 7200 NW Front Avenue, Portland, Oregon.

Attachment B, attached to and incorporated by reference into this Consent Order, is a site diagram indicating the relative size and location of the facilities of each of the Respondents.

C. A brief description of the site activities and duration of activities, including dates, is attached to and incorporated by reference into this Consent Order as Attachment C.

D. The following is a brief description of contamination, including results where such information is available, to demonstrate the release or the threat of release of hazardous substances into the environment:

Respondent	Hazardous Substance
ESCO	Low level radioactive wastes Phenol formaldehyde, chromium
Gould, Inc.	Lead
Koppers Company, Inc.	Creosote
Liquid Air Corp.	Calcium hydroxide
NL Industries, Inc.	Lead
Northwest Natural Gas Co.	Coal tar
Pacific Northern Oil	Petroleum products, coal tar
Pennwalt Chemical Corp.	Sodium bichromate, ammonia, hydrochloric acid
Rhone-Poulenc	Pesticides

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Schnitzer Investment Corp. Calcium hydroxide

Wacker-Siltronic Coal tar, TCE

4. Conclusions of Law and Determinations.

Based on the above Findings of Fact and the administrative record, DEQ determines, without admission of any such determinations by Respondents, that:

A. Respondents are a "person" under ORS 466.540(13).

B. The substances described in section 3.D. are "hazardous substances" under ORS 466.540(9).

C. The presence of hazardous substances in ground water or surface water at the facility constitutes a "release" or "threat of release" into the environment under ORS 466.540(14).

D. The activities required by this Order are necessary to protect public health, safety, welfare and the environment.

E. Respondents are a "person" liable for remedial action and natural resource damage costs under ORS 466.567(a) and (d).

Based on the above Stipulations, Findings of Fact, and Conclusions of Law and Determinations, DEQ ORDERS:

5. Work to be Performed.

A. Within 45 days of issuance of this Order, Respondents shall submit for DEQ review and comment, a draft workplan to implement the Scope of Work in Attachment A. Within 30 days of receipt of DEQ's written comments on the workplan, Respondents shall submit a final workplan which addresses DEQ comments. At a minimum, but not limited to, the workplan shall include a detailed schedule for implementation, including milestones and deliverables,

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and shall address all requirements of the Scope of Work.

B. The final hydrogeologic investigation report shall address all requirements of the Scope of Work in Attachment A, and shall include at a minimum, but not be limited to:

(1) All data collected including depth to water measurements, water table elevations, analytical data for all samples taken, QA/QC data, river elevations, and aquifer performance test data;

(2) Water table maps;

(3) Hydrogeologic cross-sections showing stratigraphy, water table, well locations and screened intervals;

(4) As built construction diagrams for monitoring wells and a written description of the well installation procedures;

(5) Calculations for hydraulic conductivity, velocity, and hydraulic gradient;

(6) A description of the method used for evaluating transmissivity of the aquifers;

(7) Drilling logs and lithologic logs for each monitoring well;

(8) A description of stratigraphy, structural geology, regional and local ground water flow patterns and directions, hydraulic conductivity, porosity, lithology, hydraulic interconnections between saturated zones, vertical gradients, a description of hydraulic influences on surface and ground water such as pumping of local wells, tidal effects, and river levels, and a discussion of surface and ground water transport mechanisms and processes.

C. Monthly Status Reports.

Respondents shall submit monthly status reports to DEQ outlining activities conducted during the past month and activities planned for the upcoming month, and including a summary of data results received during the previous month.

6. Public Participation.

Upon issuance of this Order, DEQ will provide public notice of this

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Order through, at least but not limited to, a press release to local paper(s) of general circulation describing the measures required under this Order. Copies of the Order will be made available to the public.

7. General Provisions.

A. DEQ Access and Oversight.

Respondents shall allow DEQ to enter and move freely about portions of the facility at all reasonable times for the purposes, among other things, of inspecting records relating to work under this Consent Order; observing Respondents' progress in implementing this Consent Order; conducting such tests and taking such samples as DEQ deems necessary; verifying data submitted to DEQ by Respondents; and, using camera, sound recording, or other recording equipment. Respondents shall permit DEQ to inspect and copy all records, files, photographs, documents, and data relating to work under this Consent Order, except that Respondents shall not be required to permit DEQ inspection or copying of items subject to attorney-client and attorney work product privileges.

B. Project Coordinators. To the extent possible, all reports, notices, and other communications required under or relating to this Consent Order shall be directed to:

DEQ	Respondents
Project Coordinator:	Project Coordinator:
Sandra Anderson	[]
Environmental Cleanup Division	[]
Department of	
Environmental Quality	
811 S.W. Sixth Avenue	
Portland, Oregon 97204	
(503) 229-6744	

C. Notice and Samples. Respondents shall make every reasonable

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attempt to notify DEQ of any excavation, drilling, or sampling to be conducted under this Consent Order at least five (5) working days prior to such activity but in no event less than twenty-four (24) hours prior to such activity. Upon DEQ's verbal request, Respondents shall provide DEQ with a split or duplicate of any sample taken pursuant to this Consent Order.

D. Quality Assurance. Respondents shall conduct all sampling, sample transport, and sample analysis in accordance with the Quality Assurance/Quality Control (QA/QC) provisions approved by DEQ as part of the workplan. Respondents shall ensure that each laboratory used by Respondents for analysis performs such analyses in accordance with such provisions.

E. Records.

(1) Submission upon request. In addition to those reports and documents specifically required under this Consent Order, Respondents shall provide to DEQ within ten (10) days of DEQ's written request copies of QA/QC memoranda and audits, raw data, draft and final plans, reports, task memoranda, field notes, laboratory analytical reports, and any other documents that relate in any way to the facility.

(2) Preservation. Respondents shall preserve all records and documents in possession or control of Respondents or its employees, agents, or contractors that relate in any way to activities under this Consent Order for at least ten (10) years after the last certification of completion under Section 8 of this Consent Order. Upon DEQ's request, Respondents shall provide copies of such records to DEQ.

(3) Confidentiality. Respondents may assert a claim of confidentiality regarding any documents or records submitted to or copied by

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DEQ pursuant to this Consent Order. DEQ shall treat documents and records for which a claim of confidentiality has been made in accordance with ORS 192.410 through 192.505. If Respondents do not make a claim of confidentiality at the time the documents or records are submitted to or copies by DEQ, the documents or records may be made available to the public without notice to Respondents.

F. Other Applicable Laws. All actions under this Consent Order shall be performed in accordance with all applicable federal, state, and local laws and regulations; provided, in accordance with ORS 466.573(2), the onsite portion of removal and the remedial action may be exempted from any applicable permitting requirements of ORS 466.005 through 466.350.

G. Reimbursement of DEQ Oversight Costs. DEQ will submit to Respondents a monthly statement of costs incurred after issuance of this Order by DEQ or the State of Oregon in connection with any activities related to oversight of Respondents' implementation of this Order. A sample invoice is attached to this Order. Costs shall include both direct and indirect costs. The indirect cost rate charged Respondents shall be the rate charged by DEQ on federal agreements. That rate is currently 22.6% of direct salary and other personnel expenses, and will vary as the rate charged on federal agreements varies. Within thirty (30) days of receipt of each monthly statement, Respondents shall pay the amount of such costs by check made payable to the Department of Environmental Quality.

H. Force Majeure.

(1) If any event occurs that is beyond Respondents' reasonable control and that causes or might cause a delay or deviation in performance of the requirements of this Consent Order, Respondents shall promptly notify

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DEQ's Project Coordinator verbally of the cause of the delay or deviation and its anticipated duration, the measures that have been or will be taken to prevent or minimize the delay or deviation, and the timetable by which Respondents propose to carry out such measures. Respondents shall confirm in writing this information within five (5) working days of the verbal notification.

(2) If Respondents demonstrate to DEQ's satisfaction that the delay or deviation has been or will be caused by circumstances beyond the control and despite the due diligence of Respondents, DEQ shall extend times for performance of related activities under this Consent Order as appropriate. Circumstances or events beyond Respondents' control include but are not limited to acts of God, unforeseen strikes or work stoppages, fire, explosion, riot, sabotage, or war. Increased cost of performance, or changed business or economic circumstances, shall be presumed not to be circumstances beyond Respondents' control.

I. DEQ Approvals. Where DEQ review and approval is required for any plan or activity under this Consent Order, Respondents shall not proceed with the plan or activity until DEQ approval is received. DEQ approval shall not be unreasonably withheld. Any delay in granting or denying approval shall correspondingly extend the time for completion by Respondents.

J. Enforcement of Order and Reservation of Rights.

(1) DEQ may seek any available remedy for failure by Respondents, if any, to comply with any requirement of this Consent Order;

(2) Respondents are not released from future liability, if any, resulting from the release or threatened release from the facility of a

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hazardous substance arising out of conditions unknown to DEQ at the time this Consent Order is issued;

(3) Subject to section 2.A., Respondents do not admit any liability, violation of law, or factual or legal findings, conclusions, or determinations made by DEQ under this Consent Order.

(4) Subject to section 2.G., nothing in this Consent Order shall prevent Respondents from exercising any rights of contribution or indemnification Respondents might have against any person regarding activities under this Consent Order.

K. Hold Harmless. Respondents shall save and hold harmless the State of Oregon and its commissions, agencies, officers, employees, contractors, and agents, and indemnify the foregoing, from and against any and all claims arising from acts or omissions related to this Consent Order of Respondents or its officers, employees, contractors, agents, receivers, trustees, or assigns. DEQ shall not be considered a party to any contract made by Respondents or its agents in carrying out activities under this Consent Order.

L. Parties Bound. This Consent Order shall be binding on the parties, and their respective successors, agents, and assigns. No change in ownership or corporate or partnership status relating to the plant or property shall in any way alter Respondents' obligations under this Consent Order. Respondents shall also be under an affirmative duty to notify and provide a copy of this Consent Order to any prospective successor, purchaser, lessee, assignee, or mortgage of the facility.

M. Modification. DEQ and Respondents may modify this Consent Order by mutual written agreement.

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8. Notice and Certification of Completion.

Upon completion of the provisions of the Scope of Work, Respondents shall submit to DEQ written notices of completion and requests for certification of completion in accordance with ORS 466.577(10). This Consent Order shall be deemed satisfied and terminated upon DEQ's issuance of an administrative order certifying that all investigations have been completed in accordance with this Consent Order.

9. Signatures.

STIPULATED, AGREED, and APPROVED for issuance:

Respondents

By: _____ _____
(Name) (Date)
_____ _____
(Title) (Firm)

By: _____ _____
(Name) (Date)
_____ _____
(Title) (Firm)

By: _____ _____
(Name) (Date)
_____ _____
(Title) (Firm)

By: _____ _____
(Name) (Date)
_____ _____
(Title) (Firm)

By: _____ _____

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(Name) (Date)

(Title) (Firm)

By: (Name) (Date)

(Title) (Firm)

By: (Name) (Date)

(Title) (Firm)

By: (Name) (Date)

(Title) (Firm)

By: (Name) (Date)

(Title) (Firm)

By: (Name) (Date)

(Title) (Firm)

By: (Name) (Date)

(Title) (Firm)

STIPULATED, AGREED, and so ORDERED:

State of Oregon
Department of Environmental Quality

By: _____ Date: _____
FRED HANSEN
Director

SCOEPA00016286

STOEL RIVES BOLEY
JONES & GREY
ATTORNEYS AT LAW
SUITE 2300
STANDARD INSURANCE CENTER
900 SW FIFTH AVENUE
PORTLAND, OREGON 97204-1268
Telephone (503) 224-3380
Telecopier (503) 220-2480
Cable Lawport
Telex 703455
Writer's Direct Dial Number

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JAN 18 1989
John L. Pittman
Wacker Siltronic

TELECOPY/FACSIMILE COVER LETTER

DATE: 1-18-89

TO: John Pittman

FIRM: Wacker

FAX #: ( ) 226-0052

OFFICE #: ( ) 243-2020

FROM: Richard D. Burke

CLIENT # 55570 CLIENT NAME _____

MATTER # 26 MATTER NAME _____

We are transmitting a total of 5 pages, including this page. If you do not receive all pages, please call _____ as soon as possible at one of the following numbers: (503) 294-9508 or 294-9401.

Our 24-hour automatic facsimile number is:

Canon FAX 510 (503) 220-2480

COMMENTS:

SCOEPA00016287

NL/GOULD SUPERFUND SITE
EXPANDED GROUNDWATER INVESTIGATION
Industry Group Meeting with DEQ -- January 19, 1989

AGENDA

I. THE PARTIES: In its correspondence and discussions, DEQ has identified the following parties as being involved in the proposed expanded groundwater study at and adjacent to the NL/Gould Superfund Site:

NL Industries
Gould, Inc.
ESCO
Liquid Air Corp.
Koppers Company, Inc.
Northwest Natural Gas Company
Pacific Northern Oil Company
Penwalt Chemical Corp.
Rhone-Poulenc
Schnitzer Investment Corp.
Wacker Siltronic

At this point, Liquid Air Corp. and Wacker Siltronic are claiming that they have no responsibility or liability in connection with this project and have expressly declined to participate. Koppers has declined to attend any meetings and it is assumed that they will decline to participate in the study.

NL Industries and Gould, Inc. have expressed a preference for the Tetra-Tech proposal or some variation designed better to utilize available data with respect to local hydrogeology.

The remaining companies: ESCO, Northwest Natural Gas, Penwalt, Rhone-Poulenc and Schnitzer have expressed a willingness to participate in a coordinated study to determine (a) the extent to which their properties would be affected by, and (b) the extent to which any contamination on their properties would effect, remedial actions in connection with the NL/Gould Superfund Site. These companies have indicated, however, that their participation may be conditioned upon agreement among and participation at acceptable levels by all of the parties identified by DEQ.

II. THE PROPOSAL: ESCO, Northwest Natural Gas, Rhone-Poulenc, Schnitzer and Penwalt propose a study along the lines and with the timetable set forth in Attachment No. 1. They would be prepared to enter into a consent order with DEQ to implement an agreed-upon work plan in accordance with this proposal so long as:

1) All of the DEQ-identified parties join the consent order; and

2) EPA assures the participants that it approves of this approach and will not exercise its authority to require a different study while the parties are complying with the consent order.

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1/18/89

ATTACHMENT NO. 1

PROPOSAL: NL/GOULD SUPERFUND SITE

Groundwater Investigation

I. PURPOSES:

Phase I: To develop and implement a Scope of Work for the hydrogeological investigation of the groundwater zone of influence at the NL/Gould Site which focuses upon issues directly affecting groundwater lead treatment and remediation.

II. OBJECTIVE:

To determine the groundwater zone of influence and to characterize the hydrogeology of this zone at the NL/Gould site in order to enable preparation of the groundwater lead remedial design for the site.

III. SCOPE OF WORK:

The hydrogeologic investigation will include the following:

1) Review and analyze the 104(e) responses and other existing data available to the DEQ, EPA and industry group members.

2) An analysis of the impacts of site hydrogeology on potential groundwater treatment technologies for the NL/Gould site.

3) Identify hydrogeological data gaps to be addressed in order to determine the zone of influence and which may affect the design of a groundwater treatment system.

4) If sufficient existing data is available, the hydrogeological study will produce a hydrogeological characterization of the NL/Gould site such that groundwater remediation may proceed.

5) If data gaps indicate that additional hydrogeological information is required, the Consultant will recommend additional activities to acquire that data. This recommendation may include one or more of the proposed wells proposed in the Tetra Tech report.

6) Obtain hydrogeological data necessary to fill data gaps as recommended by Consultant.

7) Based on the range of potential groundwater treatment technologies, determine the zone of influence for the NL/Gould site groundwater cleanup and ascertain which group members fall within the zone.

IV. PHASE II:

Based on existing data, the Consultant will recommend whether groundwater quality monitoring is necessary before or after the soil/surface water cleanup at the NL/Gould site. The Consultant will recommend what kind of groundwater monitoring should be conducted and whether it is necessary to conduct such monitoring off-site. Should off-site monitoring be necessary, the Consultant will recommend which of the wells proposed by Tetra Tech are most beneficial for the monitoring activity.

V. TIMETABLE:

1)	Prepare request for proposals and mail RFPs....	10 days
2)	Consultants prepare and submit proposals.....	30 days
3)	Evaluate proposals and select consultant.....	30 days
4)	Prepare work plan for submittal to DEQ.....	60 days
5)	DEQ review of work plan.....	30 days
6)	Revise and finalize work plan.....	15 days
7)	Negotiate and sign consent order.....	30 days
8)	Begin implementation of work plan.....	15 days
	TOTAL.....220 days	

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DEC 14 1988
John L. Pittman
Wacker Siltronic

STOEL RIVES BOLEY JONES & GREY

M E M O R A N D U M

December 13, 1988

TO: Doane Lake PRPs - Via Telecopier
(see attached distribution list)

FROM: Richard D. Bach

RE: NL/Gould Expanded Groundwater Study

As we had agreed, I called Tom Miller of DEQ immediately after our December 8, 1988 meeting. During that telephone call, I told Mr. Miller that the Doane Lake PRPs might be interested in performing and funding an expanded groundwater study for the Doane Lake area--but only if they could design a study that would be of some use to them in connection with any remedial actions that might be necessary on or in relation to their own properties.

I made it clear that the Doane Lake PRPs believe that the Tetra Tech work plan is significantly flawed in that (a) it appears to ignore a substantial amount of the mass of groundwater and other data available with respect to the area, and (b) it is intended to aid in the design of a remedial action for the NL/Gould Superfund site rather than to analyze the surrounding properties.

Mr. Miller's response was surprisingly agreeable. He indicated that DEQ was not irrevocably wedded to the Tetra Tech

scope of work, and that DEQ would be willing to consider our position.

I met with Mr. Miller again on Monday, December 12. At that time he indicated that he had discussed this matter with DEQ and EPA, and that they had no reason to reject our approach. DEQ would like more details of what we might have in mind, but they recognize that our position has merit.

I told Mr. Miller that we would contact him again after our scheduled conference call. I have arranged for a telephone conference call to discuss these issues at 9:00 a.m., Pacific Standard Time, on Thursday, December 15, 1988. Please stand by for that call, and if you cannot be available please call my secretary, Terri Atsch (503-294-9240), with the name and phone number of anyone you might want to sit in for you.

Richard D. Bach

RDBS#2.030:twa
Attachment

SCOEPA00016293

DOANE LAKE PRP DISTRIBUTION LIST

Roger Neu/Tom Zelenka
Schnitzer Investment Corp.
3200 NW Yeon Avenue
Portland, OR 97210

Edmund Bolin/Robert Johnson, Esq.
Northwest Natural Gas
220 NW Second Avenue
Portland, OR 97209

Roger Sherwood
ESCO
PO Box 10123
Portland, OR 97210

Gary Fontana, Esq.
Thelen, Marrin, Johnson & Bridges
Two Embarcadero Center
San Francisco, CA 94111

John Oxford
Koppers Company, Inc.
7540 NW St. Helens Road
Portland, OR 97229

Liquid Air Corp.
c/o David N. Simon, Manager
Regulatory Affairs
2121 N California
PO BOx 8038
Walnut Creek, CA 94576

Richard D. Bach, Esq.
Stoel Rives Boley Jones & Grey
Suite 2300
900 SW Fifth Avenue
Portland, OR 97204

James C. Brown, Esq.
Bogle & Gates
222 SW Columbia, Suite 1400
Portland, OR 97201

Pacific Northern Oil
c/o David Waldschmidt, Esq.
Suite 200, North Tower
100 West Harrison
Seattle, WA 98111

Koppers Company, Inc.
c/o Billie Nolan
1401 Koppers Building
Pittsburg, PA 15219

John Pittman
Wacker Siltronic
PO Box 03180
Portland, OR 97203

Robert L. Ferguson
Plant Manager
Rhone-Poulenc Ag Company
PO Box 10224
Portland, OR 97210-0224

Richard F. Gitschlag
Environmental Project Manager
Rhone-Poulenc Inc.
CN5266
Princeton, NJ 08543

Claudia Powers, Esq.
Lindsay, Hart, Neil & Weigler
Suite 1800
222 SW Columbia Street
Portland, OR 97201-6618

Janet D. Smith, Esq.
Associate General Counsel
NL Industries, Inc.
Suite 1500
445 Park Avenue
New York, NY 10022

Wacker Siltronic
c/o Marvin Durning, Esq.
Suite 1522
1411 Fourth Avenue Building
Seattle, WA 98101-2212

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William N. Farran, Esq.
Rhone-Poulenc Inc.
CN5266
Princeton, NJ 08543

Larry Patterson
Penwalt Chemical Corp.
6400 NW Front Avenue
Portland, OR 97210

Michael Schu
Penwalt Corporation
Three Parkway
Philadelphia, PA 19102

Michael Veysey, Esq.
Assistant General Counsel
Gould, Inc.
10 Gould Center
Rolling Meadows, IL 60008

Steven Oster, Esq.
Donovan, Leisure, Newton & Irvin
Suite 1200
1850 "K" Street, NW
Washington, DC 20006

James E. Benedict, Esq.
Schwabe, Williamson & Wyatt
Attorneys at Law
Suite 1700, Pacwest Center
1211 SW Fifth Avenue
Portland, OR 97204

WILLAMETTE RIVER

BRIDGE

SAMPLE

TAR PIT

ROAD

SAMPLE

LAKE

LAKE OUTLET

MAIN STREAM

SMALL STREAM

P.R.

CONDUIT UNDER ROAD

N.W. ST. HELENS ROAD

PENNSALT CORPORATION

SEEPAGE THROUGH RAILROAD FILL

DOANE LAKE

KIRK

CHIPMAN EFFLUENT STREAM

CHIPMAN CHEMICAL

P.R.

N

CHIPMAN CHEMICAL CO.

CHIPMAN AREA WATER FLOW DIRECTION

JWM 2-25-64 NOT TO SCALE

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