ANDREA BEATTY RIDDER
Director

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY
Mail Stop PV-11 • Olympia, Washington 98504-8711 • (206) 459-6000

FILE COPY
AIR ☐
WATER ☐
HAZ. WASTE ☐

AUG 19 1985

CERTIFIED MAIL

Columbia Marine Lines
6305 N.W. Lower River Road
Vancouver, WA 98660

Gentlemen:

Enclosed is Order No. DE 85-591. All correspondence relating to this document should be directed to the enforcement officer. If you have any questions concerning the content of the document, please call Tim Nord, Olympia, telephone (206) 459-6030.

A form entitled "Acknowledgment of Service" is also enclosed. Please sign this form and return it to this office.

This order is issued under the provisions of RCW 90.48.120. Any person feeling aggrieved by this order may obtain review thereof by application, within 30 days of receipt of this order, to the Pollution Control Hearings Board, Mail Stop PY-21, Olympia, WA 98504, with a copy to the Director, Department of Ecology, Mail Stop PV-11, Olympia, WA 98504, pursuant to the provisions of Chapter 43.21B RCW and the rules and regulations adopted thereunder.

Sincerely,

Philip E. Miller
Enforcement Officer

PM:jv

Enclosures

DEPARTMENT OF ECOLOGY

IN THE MATTER OF THE COMPLIANCE BY)
COLUMBIA MARINE LINES)
with Chapter 90.48 RCW and the)
Rules and Regulations of the)
Department of Ecology)

ORDER
No. DE 85-591

To: Columbia Marine Lines
6305 N.W. Lower River Road
Vancouver, WA 98660

RCW 90.48.020 defines underground waters as waters of the state. RCW 90.48.080 provides that it shall be unlawful for any person to throw, drain, run, or otherwise discharge into any of the waters of this state, or to cause, permit or suffer to be thrown, run, drained, allowed to seep or otherwise discharge into such waters any organic or inorganic matter that shall cause or tend to cause pollution of such waters according to the determination of the Director.

Columbia Marine Lines operates a barge cleaning operation approximately three miles west of Vancouver, Washington on ALCOA property. From 1964 until 1983 Columbia Marine Lines utilized two excavated pits for disposal of barge slops and maintenance activities. These pits are currently identified as the west and east disposal pit.

By a letter dated April 3, 1984, Columbia Marine Lines notified the Department of Ecology of the disposal activities. This notification and subsequent geohydrological investigations at the disposal site have documented significant soil and ground water contamination resulting from barge slop disposal. Recent ground water monitoring data indicates that the ground water contains significant concentrations of hydrocarbon species. This constitutes violation of 90.48.080 RCW.

In view of the foregoing and in accordance with RCW 90.48.120(2):

IT IS ORDERED THAT Columbia Marine Lines shall, upon receipt of this Order, take appropriate action in accordance with the following instructions:

1) Within 10 days of receipt of this Order, install and have operational the hydrocarbon recovery program as outlined in the April 9, 1985 Phase 2 report. If this program, as designed, is unable to remove sufficient hydrocarbons so that less than 5 ppm total hydrocarbon is contained in the pumped water going to the recharge trench, CML shall install an oil/water separator between said recovery well and recharge trench to achieve this level. Adequate monitoring of discharge water shall be done to ensure this concentration of hydrocarbons is achieved.

2) By December 1, 1985, submit a report which defines the vertical and horizontal extent of ground water contamination resulting from barge slop disposal in the east and west disposal pits. This report shall address adjacent surface waters and adjacent land use areas. It shall contain, at a minimum, the following information:

a. Cross-sections which include the screened interval and water elevation of all wells used in section development.

b. Documentation of the impacts on ground water flow velocity and gradients from ALCOA's process ponds underlying the disposal pits and, the impacts this has on the hydrocarbon recovery operation.

c. The results of the in-situ well testing which document the areal and vertical hydraulic conductivity of the hydrostratigraphic units at the disposal site. Testing methods shall be referenced.

d. The results of water quality data from all new wells and existing wells which have been sampled on the same approximate date (±1 day). The initial sampling of all wells shall include those parameters identified as present in Tables 1 and 2 of Mr. Patrick H. Wicks April 1985 report titled "Report on Evaluation of Soil and Ground Water Quality at Columbia Marine Lines, Vancouver, Washington."

e. An analysis of the data gathered in d., above, which determines the selection of future sampling parameters and the frequency of sampling considering individual contaminant solubilities, migration pathways, geologic properties of the site, hydrologic properties, climatic variations, and the hydrocarbon recovery program.

f. The sampling and analysis program proposed in e., above, shall include well sampling methodologies, water elevation measurement methods, and analytical methods.

g. The results of bi-weekly water level measurements conducted from receipt of this Order.

3) By December 1, 1985, submit a plan for approval which describes the additional measures that will be taken for ongoing site cleaning. This plan shall include an estimate of how long it will take for the clean-up of soil and water contamination.

Any person who fails to comply with any provision of this Order shall be liable for a penalty of up to ten thousand dollars for each day of continuing noncompliance.

DATED at Olympia, Washington AUG 19 1985

Marc A. Horton
Assistant Director
Department of Ecology
State of Washington

Ind Sect.

ACCEPTANCE OF SERVICE

CLERK'S STAMP

IN THE POLLUTION CONTROL HEARINGS BOARD
STATE OF WASHINGTON

PUGET SOUND TUG AND BARGE CO. dba COLUMBIA MARINE LINES, Appellant,	)	PCHB No. 85-180
v.	)	STIPULATION AND ORDER
STATE OF WASHINGTON, DEPARTMENT OF ECOLOGY, Respondent.	)	

COME NOW Columbia Marine Lines, appellant, by and through its attorney, Dorene M. Haney, and the State of Washington Department of Ecology, respondent, by and through its attorney, Allen T. Miller, Jr., Assistant Attorney General, and hereby stipulate and agree as follows:

1. Columbia Marine Lines and the State of Washington Department of Ecology (Department) desire to compromise and settle the matters raised in this appeal regarding Order No. DE 85-591.

2. Columbia Marine Lines withdraws its appeal concerning paragraph 1 of Order DE 85-591 since it has completed that requirement to the satisfaction of the Department. The parties understand and agree that the hydrocarbon limit is 10 ppm as a daily average and 15 ppm as a daily maximum. The parties further understand and

KENNETH O. EIKENBERRY, ATTORNEY GENERAL
Allen T. Miller, Jr.
Assistant Attorney General

Temple of Justice
Olympia, Wa. 98504
(206) 459-6157
Telephone

agree that adequate monitoring of the discharge water means once per week.

3. Columbia Marine Lines agrees to accomplish paragraphs 2 and 3 of Order No. DE 85-591 according to the work plan proposed by Columbia Marine Lines through their consultants, Kennedy/Jenks Engineers, dated January 6, 1986. A copy of the work plan is attached to this stipulation as Appendix A.

4. The parties understand and agree that the work plan is slightly modified at Page 6, Task 3 under work effort. Sentence 4 shall read "the boring will be completed as a groundwater monitor well in the first water bearing unit below a depth of 30 feet."

5. Columbia Marine Lines agrees to submit the work plan report to the Department for review no later than May 15, 1986. Remedial action alternatives selected for the site shall be reviewed by Columbia Marine Lines and the Department. The parties agree that conceptual remedial action design criteria for the selected alternative must be approved by the Department prior to implementation by Columbia Marine Lines.

6. The parties agree that the Board should enter an order dismissing this appeal.

DATED this 13th day of January, 1986.

Presented By:

ALLEN T. MILLER, JR.
Assistant Attorney General

Attorney for Respondent

Approved By:

Dorene M. Haney

Attorney for Appellant

ORDER

The Pollution Control Hearings Board hereby orders PCHB No. 85-180 dismissed.

DATED this 5th day of ~~January~~ February, 1986.

2/3/86

LARRY FAULK
Chairman

GAYLE ROTHROCK
Vice Chairman

WICK DUFFORD
Lawyer Member

CERTIFICATION OF MAILING

I, Phyllis R. Weaver, certify that I mailed, postage prepaid, copies of the foregoing document on the 5th day of February, 1986, to each of the following-named parties at the last known post office addresses, with the proper postage affixed to the respective envelopes:

Allen T. Miller, Jr.
Assistant Attorney General
Department of Ecology
Mail Stop: PV-11
Olympia, WA 98504

Dorene M. Haney, Attorney
Derby, Cook, Quinby & Tweedt
333 Market Street, Suite 2800
San Francisco, CA 94105

Elaine A. Orfanos David
Corporate Counsel
Puget Sound Tug & Barge Co.
P. O. Box 2287
Seattle, WA 98111

Phillip Miller
Department of Ecology
Mail Stop: PV-11
Olympia, WA 98504

Phyllis R. Weaver

PHYLLIS R. WEAVER, Clerk of the
POLLUTION CONTROL HEARINGS BOARD

6 January 1986

WORK PLAN
COLUMBIA MARINE LINES
VANCOUVER, WA

This work plan was prepared by Kennedy/Jenks/Chilton for use by Columbia Marine Lines and its representatives and the Washington Department of Ecology in support of the investigation and cleanup of chemical compounds in soil and groundwater at the Columbia Marine Lines site in Vancouver, Washington. The scope of the work plan was based on a review of available site data provided to Kennedy/Jenks/Chilton on 10 December 1985. This data includes GeoEngineers Phase I investigation report dated 28 November 1983, GeoEngineers Phase II investigation report dated 9 April 1985, and GeoEngineers construction monitoring report dated 12 September 1985. In addition, a data compilation report dated April 1985 and prepared by Mr. Patrick H. Wicks was also reviewed. Our data interpretations are based on a preliminary review and assume that the data in all of these reports are correct as reported. Some of the raw laboratory reports and other raw information used to prepare these reports were not available to Kennedy/Jenks/Chilton. Therefore, in preparing our work plan, we assume that data was compiled and presented accurately.

GENERAL OBSERVATIONS FROM DATA REVIEW - BASIS OF WORK PLAN

Priority Pollutant Compounds:

- Chemical compounds in soil and groundwater at the site appear to be associated with hydrocarbon fuel oil with the exception of cyanide, phthalates, and pesticides. The source of all identified contaminants has not been determined and several possible sources exist in the area.

- Strictly based on reported concentrations and not having performed dangerous waste criteria testing, it does not appear that materials at the site other than floating hydrocarbons would be classified as dangerous wastes according to Washington State regulations.

- Most metals concentrations are at or near background levels for soils, except for a few locations of limited extent. Zinc is the only metal found at significant concentrations at several locations on the site. Leachable metals concentrations, as measured by the EP toxicity test, were not detected.

- Concentrations of cyanide have been found in the subsurface soil; however, cyanide in groundwater is many times lower, with most sampling locations showing cyanide at or near detection limits. This indicates that cyanide in soil may be associated in metal

APPENDIX A

complexes, which are generally immobile and sparingly soluble in groundwater. In addition, the total cyanide laboratory test method has interferences that can provide a false increase in readings due to the presence of sulfides or organic compounds in the sample. Future analyses for cyanide should be examined for these interfering compounds prior to cyanide analyses, since they are generally present in fuel oil.

- Phenolic compounds have been detected, but most have not been specifically identified. In addition, priority pollutant phenolics do not appear to be present at concentrations that would adversely affect human health and the environment. Complex or unstable phenolic compounds which are not priority pollutants may be present from past wood products operations at the site (i.e., decomposition of wood material). However, the total phenols test employed during previous site investigations is not always accurate and many interferences such as sulfur compounds and oils in fuel oil could provide inaccurately high readings.

- Phthalates have been identifed at the site during past investigations. However, phthalates are common in the environment due to their widespread use in PVC and as plasticizers. Phtahaltes have been detected in soil, groundwater and tissues in areas remote from industrial sites. In addition, phthalates were detected in several laboratory blank samples. Therefore, phthalates may be present as a result of the monitoring wells constructed of PVC at the site or may have been a sample contaminant.

- Polycyclic aromatic hydrocarbons (PAH) were detected at the site but available data suggest low concentrations with a limited extent in the soil. Napthalene is the only PAH that has been detected in groundwater but are below concentrations that would adversely affect human health and the environment.

- Pesticides were detected in the soil at two locations in very low concentrations. Groundwater at these locations does not show concentrations of pesticides, therefore pesticides are likely sorbed to soil particles and thus are immobile.

- Volatile organics were detected in soil and groundwater at numerous locations at the site. Of the volatile organics detected, benzene compounds may be present because they are commonly present in fuel oil. However, the consistent detection of methylene chloride in the majority of samples and sample blanks suggest sample bottle or laboratory contamination. (Methylene chloride is used in the laboratory for bottle washing and in extraction procedures. Therefore, methylene chloride detected at the site is probably due to sample bottle or laboratory contamination.)

Non-Priority Pollutants

- Acetone was found in the majority of field and blank samples. Acetone is widely used in the laboratory for bottle washing. Therefore, it is suspected that acetone detected at the site may be due to sample bottle contamination.

- Most of the other identified non-priority pollutants are constituents found in fuel oils; however, many were found in blank samples. Therefore, the true existence of these compounds at the site cannot be confirmed but remain suspect.

Site Characteristics

Based on GeoEngineers reports, the site appears to be underlain by a shallow perched groundwater. From available information, this groundwater is not used for drinking or agricultural purposes, and it is influenced by precipitation and surface water infiltration. The shallow groundwater appears to have an average net flow toward the Columbia River in a southwesterly direction. According to the GeoEngineers report, the gradient of the shallow groundwater table is semi-radially away from the pit disposal areas. In addition, the report indicates that some groundwater may seep to the surface in the pond areas north of the site (this area is used by livestock for grazing). While this may be true, it also appears that surface water runoff from areas not associated with the Columbia Marine Lines site may contribute to water in these ponds. During a visit to the site on 10 December 1985, by Kennedy/Jenks/Chilton personnel, significant overflow from a livestock watering trough was observed. This flowing system appeared to be consistent and a stream system was evident which flowed from the watering trough toward the pond area. Therefore, the total groundwater contribution to the pond area north of the site cannot be determined.

According to the GeoEngineers reports, a relatively impermeable layer of silt and silty sand underlie the shallow perched groundwater beneath the site. This silt and silty sand layer is present at a depth of 7 to 15 feet below grade. It appears the contaminants of concern at the site would not be subject to significant vertical migration due to this silt and silty sand layer. Complex insoluble metals and cyanide compounds tend to be immobile and would not be expected to migrate in groundwater. In addition, organic compounds associated with fuel oils tend to sorb to organic silty soils and become less mobile. All known drinking and agricultural wells in the area lie below this silt and silty sand layer and are completed within the Troutdale Formation which is located at a depth of 80-100 feet below the silt and silty sand material. This information indicates that the majority of contaminants at the site would be retarded from migration to the Troutdale Formation by the relatively impermeable silt and silty sand layer. Assuming the existence of this silt material to a significant depth above the Troutdale Formation, chemicals of concern may not be subject to migration into the usable water in the area.

DATA NEEDS AND WORK PLAN

Based on Kennedy/Jenks/Chilton's review of available data, several types of information are needed in order to perform an assessment of the site's environmental and health issues. Floating hydrocarbons have been detected in MW-7 and MW-8; however, the extent of chemical compounds in groundwater have not been defined west of this area. Therefore, a shallow groundwater monitor well should be installed west of the west pit, between Alcoa's process water ponds and MW-13.

Elevated levels of chemicals have been detected in MW-2 and MW-5; however, the presence of compounds in groundwater directly north of this area has not been determined. Therefore, a shallow groundwater monitor well should be installed north-northwest of MW-5. Likewise, elevated levels of chemicals have been detected in MW-6 and the extent of these compounds southeast of this well has not been defined. Therefore, a shallow groundwater monitor well should be installed southeast of MW-6.

Additional information regarding groundwater flow direction need to be obtained to better define groundwater movement and yearly fluctuations. Therefore, measurement of groundwater elevation in the new wells and all existing wells should provide a more defined estimate of shallow groundwater flow in the vicinity of the site.

During previous investigations, several chemical compounds were consistently detected in both field samples and sample blanks. The actual presence of these compounds at the site needs to be determined. Therefore, groundwater from one monitor well should be resampled and analyzed for the same parameters as detected during previous investigations.

The extent, quality, and relative hydraulic conductivity of the various subsurface formations need to be assessed in order to estimate the vertical extent of contamination and possible future migration potential for chemical compounds identified at the site. Subsurface soil samples from the silt and silty sand layer should be collected and analyzed to assess if chemical compounds have migrated vertically below the shallow groundwater table. These samples should be collected during the installation of one of the new shallow monitor wells and during the installation of the deep boring described below.

One deep boring should be installed and completed as a groundwater monitor well in the Troutdale Formation. This deep boring and monitor well will provide information to 1) assess the extent of the silt and silty sand layer, 2) determine if other types of formations are present beneath the site, 3) estimate the depth to the Troutdale Formation, and 4) assess the quality of the groundwater within the Troutdale Formation.

In addition, during installation of the deep boring, slug tests should be performed to estimate the hydraulic conductivity of the various subsurface formations. This information will be critical in assessing

groundwater flow and contaminant migration potential which in turn will provide information on what biota, if any, are at risk from the chemicals identified at the site.

To obtain the data needs described above, the following work plan has been developed:

Phase I - Additional Site Characterization and Risk Assessment

Task 1 - Install and Sample Shallow Groundwater Monitor Wells.

Work Effort: Soil borings will be drilled at the following locations (shown on Figure 1):

1) West of the west pit to a depth of approximately 30 feet.
2) South-southeast of MW-6, beneath paved area, to a depth of approximately 20 feet.
3) North-northwest of MW-5, to a depth of approximately 20 feet.

Soil samples will be collected at five foot intervals within the borings to the surface of the shallow groundwater table. Samples will be held for possible future analyses. Each boring will be completed as a groundwater monitor well with elevations of the casings established by survey and water table elevations measured. Wells will be developed and sampled for chemical analyses.

One groundwater sample from each well will be analyzed for the following parameters:

- pH, temperature, and conductivity
- Volatile Organics (EPA Method 624)
- Polynuclear Aromatic Hydrocarbons (EPA Method 610)
- Dissolved Zinc (EPA Method 289)
- Total Cyanide (EPA Method 335)
- Total Organic Carbon (EPA Method 415)

In addition, one soil sample will be collected from the silt and silty sand soil layer at the base of the boring west of the west pit. This sample will be analyzed for the parameters described above (except for temperature and conductivity).

Rationale: Installation and sampling of these wells should assist in defining the extent of contamination as well as confirm if identified contaminants have migrated since the last sampling effort. Chemical analyses of the silty soil will assess if contaminants have migrated in the silty soil.

Task 2 - Resample One Existing Monitor Well.

Work Effort: Groundwater at MW-2 will be resampled for chemical analyses. This sample will be analyzed for the following parameters:

- pH, temperature, and conductivity
- Volatile Organics (EPA Method 624)
- Acid/Base/Neutral Organics (EPA Method 625)
- Dissolved Zinc (EPA Method 289)
- Total Cyanide (EPA Method 335)
- Total Phenols (EPA Method 420)
- Total Organic Carbon (EPA Method 415)

Rationale: MW-2 has shown several chemicals in past sampling, including compounds suspected to be laboratory contaminants. MW-2 will be sampled to confirm the existence of chemical compounds and to assess if several chemicals found in previous sampling events were the result of laboratory contamination, as is currently suspected.

Task 3 - Install and Sample Deep Groundwater Monitor Well.

Work Effort: One deep soil boring will be drilled into the Troutdale Formation west of MW-4 and due north of MW-7 (shown on Figure 1). Soil samples will be collected at ten-foot intervals to the base of the boring. Samples will be held for possible future analyses. The boring will be completed as a groundwater monitor well in the Troutdale Formation, with elevation of the casing established by survey and water table elevations measured. The well will be developed and sampled for chemical analyses. In addition, the initial soil sample collected within the silt and silty sand soil layer (approximately ten feet below the base of the shallow water table) will be analyzed.

The one soil and groundwater sample will be analyzed for the following parameters:

- pH, temperature, and conductivity (groundwater only)
- Volatile Organics (EPA Method 624)
- Polynuclear Aromatic Hydrocarbons (EPA Method 610)
- Dissolved Zinc (EPA Method 289)
- Total Cyanide (EPA Method 335)
- Total Phenols (EPA Method 420)
- Total Organic Carbon (EPA Method 415)

Rationale: Sampling and analyses of the silty soil should assess if contaminants have migrated vertically below the shallow groundwater table. This well will also provide information on the thickness of the "aquitard;" the silt and silty sand layer that would retard migration of chemical compounds. In addition, any other formations (such as a clay layer) will be indicated. Furthermore, an assessment could be made about the depth and quality of the Troutdale formation near the site.

Task 4 - Perform Hydraulic Conductivity Testing.

Work Effort: During installation of the deep boring and monitoring well, the hydraulic conductivity of several of the subsurface formations will be tested by employing a packer "slug" test. This test will

consist of introducing clean water into a temporary borehole casing during drilling, and measuring the time required for the introduced water to enter each formation. A slug test will be performed approximately every twenty feet during drilling with at least one test in the shallow groundwater formation, two tests in the silt and silty sand layer and one test in the Troutdale formation.

Rationale: Hydraulic conductivity testing will provide an in-situ measure of the relative water permeability of the various formations beneath the site. The test will provide information to assist in evaluating the mobility of dissolved chemicals and will assess the depth of the silt and silty sand formation, which would tend to retard organic chemical and metals migration. In addition, if other formations are found during the test, the relative permeability of these would be estimated.

Task 5 - Measure Water Elevations in All Wells.

Work Effort: All existing wells at the site will be measured for water elevation on the same day.

Rationale: This effort will provide additional information concerning relative shallow groundwater flow direction and seasonal fluctuations.

Following completion of the field effort, described above, sufficient field data should be available to perform an Environmental and Health Issues Risk Assessment and assess the need for remedial action at the site.

Task 6 - Evaluated Sites' Environmental Health Issues and Risks.

The data obtained during the above tasks and previous field activities will be reviewed against a framework of regulatory and non-regulatory concerns.

Information to be analyzed in the evaluation of the site's environmental and health issues and risks include the following:

- Nature and properties of identified contaminants,
- Potential for contaminant mobility and suspected exposure pathways,
- Potential human receptors or sensitive biological areas at risk, and
- Regulatory requirements.

The majority of this information should be available from previous and current investigations, and subsequent analysis of collected samples.

Data on the properties of contaminants and available data on acceptable exposure levels will be obtained through a literature review of available published data.

Two types of potential exposure will be addressed. The first involves possible exposure to biota from residual contamination at the site after remedial actions have been performed. A second type of potential exposure is movement of identified chemicals from the site to the surrounding environment and exposure to biota in their offsite location. The transport contaminants in the soil or groundwater will be estimated using relatively simple and conservative models, such as estimating a contaminant's relative velocity based on soil adsorption coefficients.

Information concerning residual concentrations of contaminants (total and leachable fraction), contaminant volatility, the depth to and beneficial uses of groundwater beneath the site and the ability of native soils to naturally reduce mobility of any contaminants (permeability, attenuation capacity, etc.) have been identified as key data that will be analyzed to address the risks associated with the site.

The result of this risk assessment should provide information to assess if the site poses a significant threat to human health and the environment and if remedial actions are needed at the site.

Phase II - Remedial Action Evaluation (If Needed)

Task 1 - Develop and Evaluate Potential Remedial Action Alternatives.

Remedial action alternatives will be developed and evaluated for the site, if indicated by previous field investigations, additional site characterization, and evaluation of the site's environmental and health issues and risks. Initially, potential remedial technologies will be screened for applicability to the different areas of the site. Inappropriate or unfeasible technologies for specific problem areas of the site will be eliminated from further consideration.

Technologies that survive the preliminary screening process will be developed into feasible alternatives that could be implemented at the site. Alternatives relevant to specific identified problems on the site will be developed. Each feasible remedial alternative will then be subjected to a detailed evaluation in an effort to identify cost-effective alternative(s) acceptable for the site. Factors to be considered during the detailed evaluation will include cost and non-cost criteria, including technical feasibility, institutional issues, public health issues, environmental impacts, and cost criteria.

Technical feasibility analysis will address performance, reliability, constructability, safety and time constraints involved in remediating the site. Institutional issues involve compliance status of each remedial alternative with federal and state regulatory requirements and conditions for non-attainment of relevant standards. The public health analysis will involve an evaluation of the types, toxicity, and potential for release of identified chemicals at the site. The environmental assessment will address each alternative's impact on sensitive environmental areas.

Cost analysis of each feasible alternative will involve an estimation of estimated capital and O & M costs, present worth analysis, and sensitivity analysis for key design criteria or cost factors.

Following the detailed evaluation of alternatives a preferred remedial alternative will be selected for the site. This alternative will be reviewed with the Washington Department of Ecology prior to proceeding to Task 2.

Task 2 - Develop Conceptual Design Criteria.

Following selection of the preferred remedial alternative for the site, conceptual design criteria will be prepared for the selected remedial alternative. Design criteria will include preliminary sizing and selection of major equipment items, if necessary, as well as defining the limits of soil excavation or capping, if necessary. In addition, a preliminary layout of piping, equipment, and soil excavation/capping will be prepared, if needed.

SCHEDULE FOR PHASE I WORK PLAN

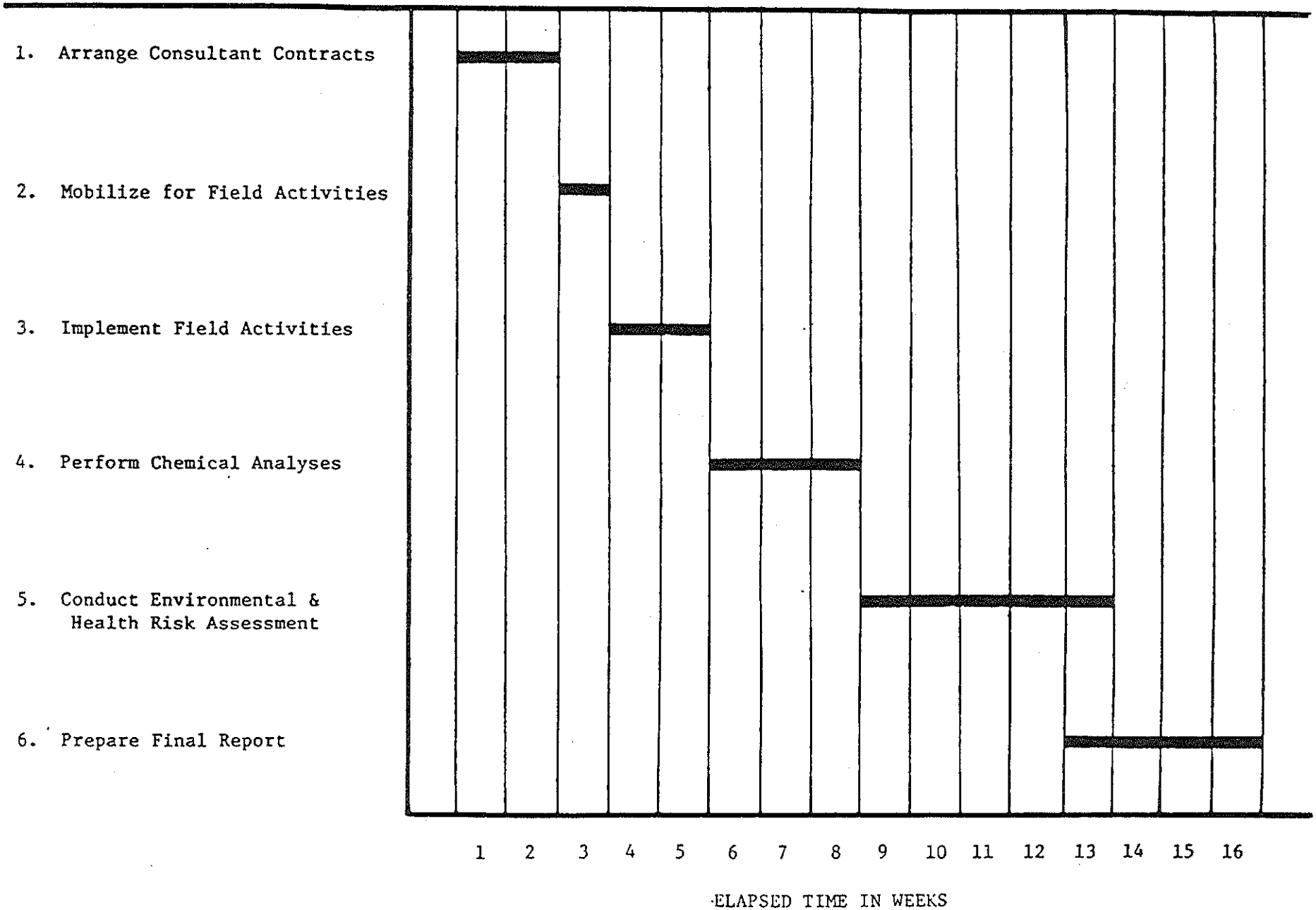
The schedule for the Phase I work plan is presented in Table 1, attached.

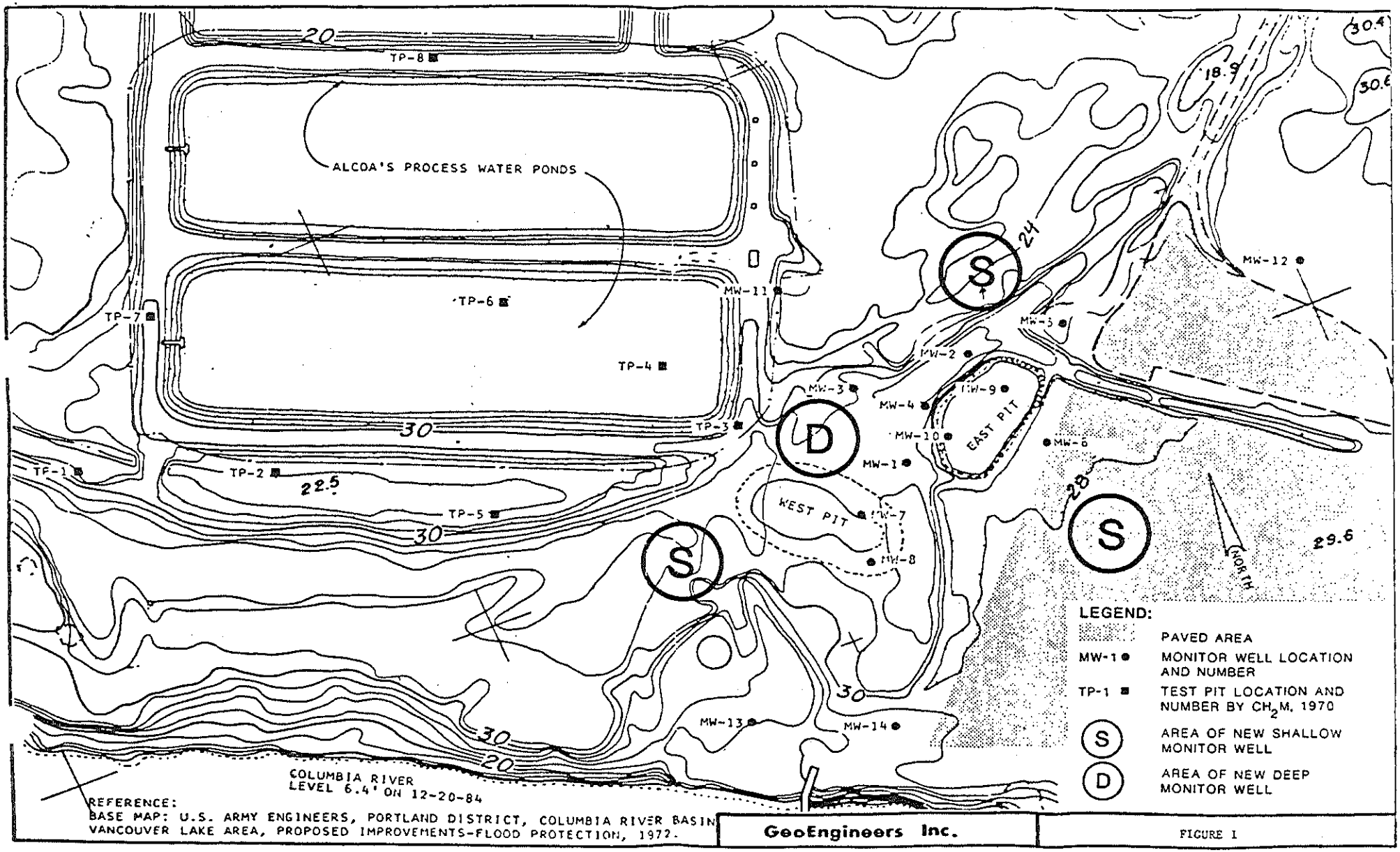
NAG:bw/106

TABLE I

Kennedy/Jenks/Chilton

SCHEDULE FOR PHASE I WORK PLAN





REFERENCE:
BASE MAP: U.S. ARMY ENGINEERS, PORTLAND DISTRICT, COLUMBIA RIVER BASIN VANCOUVER LAKE AREA, PROPOSED IMPROVEMENTS-FLOOD PROTECTION, 1972.

GeoEngineers Inc.

FIGURE 1