SECOR
International Incorporated

April 27, 1999

Mr. Paul E. Skyllingstad
Department of Ecology
Industrial Section
P.O. Box 47706
Olympia, Washington 98504-7706

RE: Limited Subsurface Investigation Workplan
Former Columbia Marine Lines Facility, Vancouver, Washington
SECOR Job No.: F0319-001-01

Dear Mr. Skyllingstad:

SECOR International Incorporated is pleased to present the enclosed *Limited Subsurface Investigation Workplan* dated April 27, 1999, as referred to in the Stephen Wilson's (Crowley Marine Services, Inc.) cover letter dated April 19, 1999. We would appreciate a timely review of this workplan; installation of the geoprobe temporary well points is tentatively scheduled for Thursday, May 6, 1999 and Friday, May 7, 1999. Once data from the geoprobe investigation is available (approximately two to three weeks), SECOR anticipates installation of the monitoring well. The accelerated schedule for installation of the geoprobe points and the monitoring well is necessary so we can finalize the remediation system by this summer.

If you have any questions or require additional information, please don't hesitate to contact Stephen Wilson of Crowley Marine Services, Inc. at (206) 443-8042 or myself at (503) 691-2030.

Sincerely,
SECOR International Incorporated

Brent W. Brelje, P.E.
Principal Engineer

BWB:cmw
Enclosure

7730 S.W. Mohawk Street, P.O. Box 1508, Tualatin, OR 97062-1508 (503) 691-2030 (503) 692-7074 Fax www.secor.com

SECOR
International Incorporated

LIMITED SUBSURFACE INVESTIGATION WORK PLAN

Former Columbia Marine Services Facility
6305 Lower River Road
Vancouver, Washington

SECOR PN: F0319-001-01

Submitted by
SECOR International Incorporated
for

Crowley Marine Services
2401 Fourth Avenue
Post Office Box 2287
Seattle, Washington 98121

April 27, 1999

Prepared by:

Katy Westsund

Catherine M. Westersund
Associate Engineer

Reviewed by:

Brent Brelje /TDF

Brent W. Brelje, P.E.
Principal Engineer

7730 S.W. Mohawk Street, P.O. Box 1508, Tualatin, OR 97062-1508 (503) 691-2030 (503) 692-7074 Fax www.secor.com

TABLE OF CONTENTS

1.0 INTRODUCTION 1

2.0 SCOPE OF WORK 1
2.1 PROPOSED LOCATION OF GEOPROBE POINTS 1
2.2 DRILLING PROCEDURES 2
2.3 SOIL SAMPLE COLLECTION 2
2.4 TEMPORARY WELL POINT CONSTRUCTION, GROUNDWATER SAMPLING AND SITE SURVEY 2
2.5 MONITORING WELL INSTALLATION AND SURVEY 3
2.6 WELL DEVELOPMENT AND GROUNDWATER SAMPLING 3
2.7 WASTE CHARACTERIZATION AND DISPOSAL 3

3.0 PROJECT SCHEDULE 4

LIST OF FIGURES

FIGURE 1 SITE LOCATION MAP
FIGURE 2 PROPOSED BORING/TEMPORARY WELL POINT LOCATIONS

1.0 INTRODUCTION

This document presents a work plan for installation of nine geoprobe soil borings and groundwater sample collection at the former Columbia Marine Lines Facility located at 6305 Lower River Road in Vancouver, Washington (Figure 1). This work is being conducted to provide data that will be used to update the existing remedial system design to include remediation of separate phase hydrocarbon (SPH) product present in the site subsurface. This geoprobe investigation will better characterize site stratigraphy and the extent of SPH and dissolved hydrocarbon constituents and will allow SECOR to tailor the remedial system to the existing site conditions.

Site activities will include the following:

- Modification of the existing Health and Safety Plan (HASP) for the site to address proposed field activities.
- The installation of nine geoprobe temporary well points.
- Field survey of each geoprobe point to allow calculation of the elevation of the water table surface.
- The analysis of soil and groundwater samples collected during the installation activities for evidence of SPH and dissolved hydrocarbon constituents.
- Possible installation of one monitoring well with subsequent groundwater sample analysis based on the results of the geoprobe investigation.
- Site survey to locate the newly-installed monitoring well.
- Preparation of a Data Summary Report documenting the results of the investigation.

2.0 SCOPE OF WORK

2.1 PROPOSED LOCATION OF GEOPROBE POINTS

The proposed locations of the nine geoprobe temporary well points are shown on Figure 2. The investigation will address subsurface conditions in the vicinity of wells MW-7, MW-8, and MW-19, the area south of well MW-19 toward the Columbia River, the area east of wells MW-6 and MW-8, and the area north of well MW-16. The available data indicate the possible presence of a linear depression on top of flood plain deposits (and beneath the hydraulic fill deposits) in the vicinity of wells MW-19, MW-17, and MW-13. The depression may represent a former drainage or channel feeding into the Columbia River. This may be a pathway for migration of SPH and/or dissolved constituents to the Columbia River. The available boring logs do not clearly indicate whether the noted wells intercept the depression.

SECOR proposes advancing four geoprobe borings to better identify the potential presence of such a feature; two geoprobe borings in the vicinity of the former West Pit (west of well MW-7) to assess whether additional SPH is present; one geoprobe boring east of wells MW-6 and MW-8, and two borings north of well MW-16 to evaluate whether dissolved constituents are migrating beyond the perimeter monitoring well locations.

2.2 DRILLING PROCEDURES

The proposed boring locations (see Figure 2) will be clearly marked and cleared of subsurface obstructions by a private utility locating service. The locations will also be cleared through Underground Service Alert (USA) at least 48 hours prior to drilling. SECOR will modify the existing Health and Safety Plan (HASP) for the site to address the proposed field activities. Upon approval of this work plan by the Washington Department of Ecology (Ecology), SECOR will initiate field activities.

SECOR will contract with a Washington-licensed well driller for installation of geoprobe temporary well points. The geoprobe points will be installed with a CME850 Track Rig. The well driller will secure Washington Start Cards for all nine geoprobe temporary well points. SECOR estimates that a total of three days of field work will be required to install nine geoprobe temporary well points, collect groundwater samples, and abandon the nine points.

Drill cuttings will be contained in Department of Transportation (DOT)-approved 55-gallon drums. Disposal of the drill cuttings and soil washed off the drilling equipment during decontamination will be based on the results of the soil analysis. Decontamination water will be contained by a washing station and immediately pumped into 55-gallon DOT-approved drums. Any soil or drill cuttings or wash water generated during the installation of the temporary well points will be drummed and disposed of in conjunction with the monitoring well drill cuttings and well development and purge water.

2.3 SOIL SAMPLE COLLECTION

At each sample location, well points will be advanced through the dredge sand to the contact with the underlying, confining silts, each to a total depth of approximately 25 feet below ground surface (bgs). After reaching a depth of ten feet below ground surface, soil samples will be collected continuously to characterize site stratigraphy. Field screening methods (observation of staining and odor, as well as, volatile organic compound (VOC) measurements using a photoionization detector or PID) will be used to select one soil sample near, but above the groundwater surface from each boring for laboratory analysis. Additional soil samples, from the vadose zone may also be submitted for analysis, based upon field observations.

Soil samples will be submitted to a Washington-certified laboratory for identification of total petroleum hydrocarbon (TPH) as gasoline (TPHg), as diesel (TPHd), and oil (TPHo), and benzene, toluene, ethylbenzene, and total xylenes (BTEX) constituents by NWTPH-G and NWTPH-Dx. A soil sample collected from the boring yielding the most elevated PID reading and/or most obvious odors or staining will also be submitted to the laboratory for analytical speciation, in accordance with Washington Department of Ecology Interim TPH Policy Methods.

2.4 TEMPORARY WELL POINT CONSTRUCTION, GROUNDWATER SAMPLING AND SITE SURVEY

A 3/4-inch diameter PVC well casing and screen will be installed subsequent to boring advancement, followed by measurement of groundwater levels and collection of groundwater samples. The presence of SPH in temporary well points will be assessed by pumping or bailing the well and examining for SPH. Water surface elevations will be sounded and groundwater samples collected for all points that do not contain SPH. If SPH is present, SECOR will collect a sample of SPH for possible chemical analysis. Each geoprobe well point will be surveyed with respect to mean sea level (msl) or existing surveyed well head elevation to allow calculation of water elevations. SECOR will measure depth to bottom, depth to water, and SPH thickness, if present, at

each point from the surveyed reference point prior to abandoning each geoprobe point. The driller will abandon the temporary well points in accordance with Washington regulations.

2.5 MONITORING WELL INSTALLATION AND SURVEY

Based on the results of the geoprobe investigation, one additional monitoring well may be installed. The proposed location and construction details of the new well will be confirmed with Ecology prior to the installation. It is anticipated that the well will be installed using hollow stem auger drilling techniques. Four inch diameter, schedule 40 PVC well casing with 0.01-inch slotted well screen will be used to intercept the hydraulic fill water-bearing horizon with 15 feet of well screen and 10 feet of casing.

Prior to installation, the well location would be cleared of potential subsurface obstructions using a private utility locating service and USA. The boring would be advanced to total depth and soil samples would be collected at 5-foot intervals using a split spoon sampler lined with clean brass tubes. Each sample for possible chemical analysis would be covered at each end with Teflon sheeting, capped with plastic end caps, labeled, and preserved pending transport to the analytical laboratory under chain of custody protocol.

A Washington-certified land surveyor would locate the newly-installed well with respect to msl, existing reference datum, and existing wells (for correlation purposes) to allow calculation of groundwater elevation within the well. The surveyor will also locate the newly-installed well with respect to the Columbia River and for the purposes of establishing property lines to the east and west of the site. A new site plan will be generated showing the wells and the surveyed property boundaries.

2.6 WELL DEVELOPMENT AND GROUNDWATER SAMPLING

The well will be developed by a combination of pumping, bailing, and/or surging, until the removed water is relatively sediment free and after removing 8 to 10 well casing volumes of water. SECOR would then measure the depth to water and well bottom and collect water samples using a dedicated bailer. SECOR field personnel would measure the temperature, pH, and conductivity of the removed water prior to and during sample collection. SECOR will not develop, purge, or sample those wells exhibiting measurable SPH thickness.

The sample will be submitted to a Washington state-certified analytical laboratory for analysis of TPHg, TPHd, TPHo, and BTEX constituents. For the purposes of this work plan, SECOR has also assumed chemical analysis of one soil sample selected based upon field screening results for the same suite of analytes.

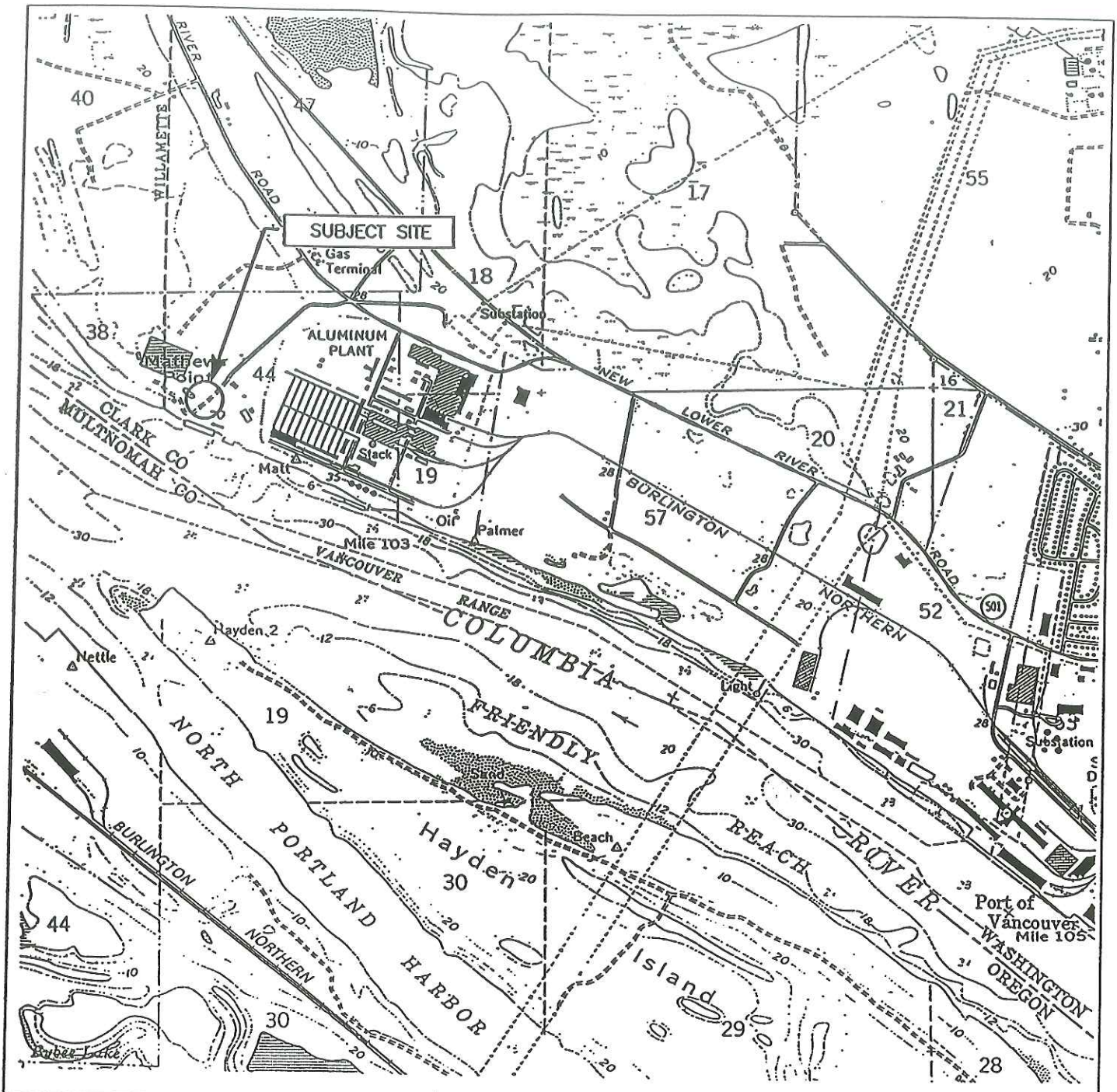
2.7 WASTE CHARACTERIZATION AND DISPOSAL

All soil and water generated during drilling and decontamination of equipment will be contained in DOT-approved 55-gallon drums. Purge water and soil will be transported to an appropriate facility of Crowley Marine Services choosing.

3.0 PROJECT SCHEDULE

SECOR anticipates that field activities can be initiated in early May. It is expected that data from the geoprobe investigation will be available within three weeks after the completion of the work and, if required, the monitoring well will be installed within two weeks after the data have been made available (late May, early June). The Data Summary Report will be submitted by late June 1999, and SECOR will initiate remedial system modifications.

FIGURES



QUADRANGLE LOCATION

North

0 1/2 1

SCALE (MILES)

REFERENCE: USGS 7.5 MINUTE QUADRANGLE; VANCOUVER, WASHINGTON.

SECOR International Incorporated

SITE LOCATION MAP

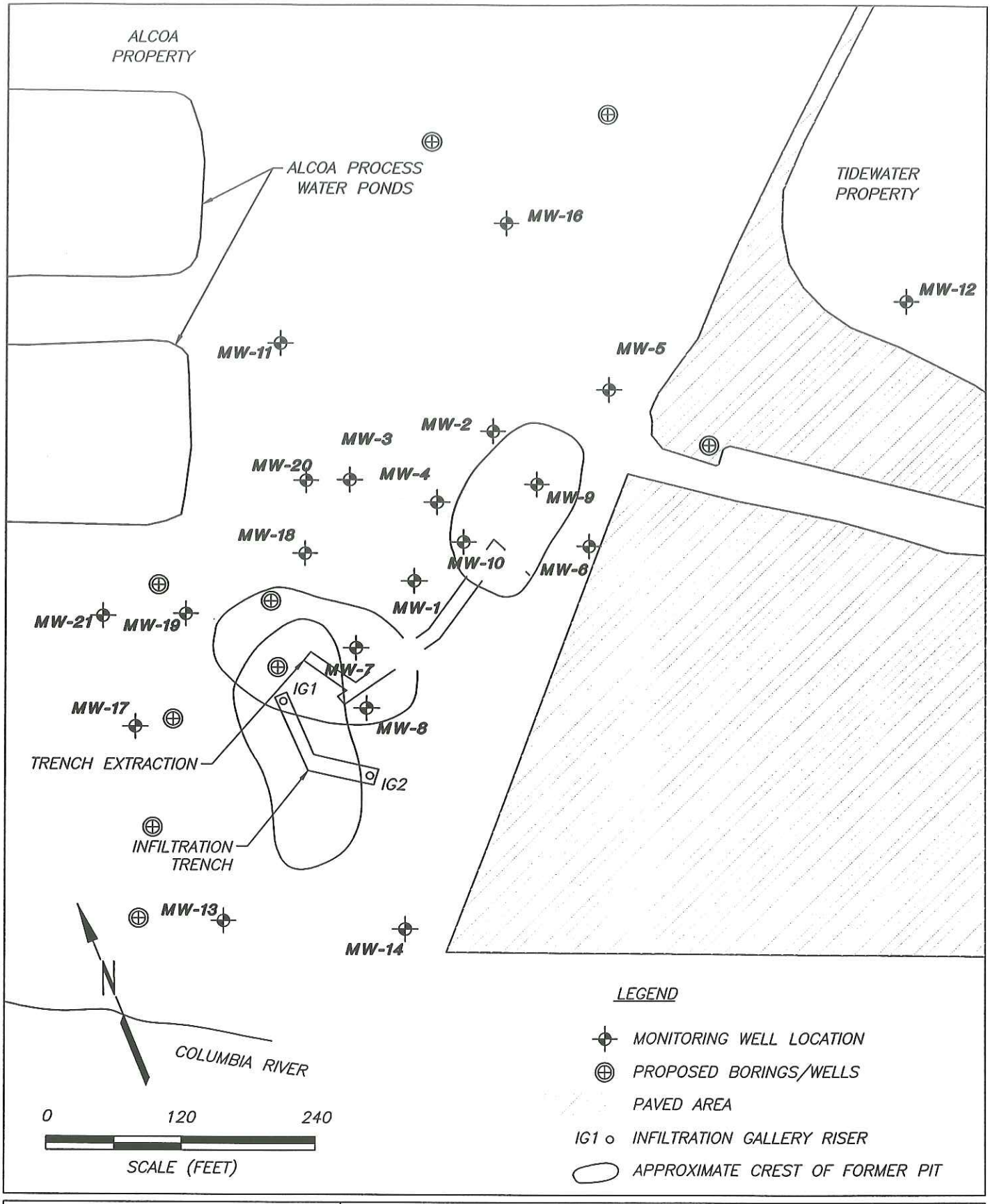
FORMER COLUMBIA MARINE LINES FACILITY

VANCOUVER, WASHINGTON

FIGURE: 1

JOB#: 00256-003-01 APPR: RSH DWN: DJM DATE: 12/2/97

DWG: CR003088



SECOR
International Incorporated

PROPOSED BORING/TEMPORARY WELL POINT LOCATIONS
FORMER COLUMBIA MARINE LINES FACILITY
6305 LOWER RIVER ROAD
VANCOUVER, WASHINGTON

FIGURE: **2**

JOB#: **00255-003-01** APPR: CMW DWN: **KSM** DATE: **3/31/99**

DWG: CRO0308P