

# MEMORANDUM

Project No.: 020034-04

June 11, 2003

To: Brian Thomas, FTMW, LLC

cc: Mr. Nnamdi Madakor, Ecology Toxics Cleanup Program, HQ

From: Doug Hillman, LHG, and Dan Matthews, LHG

Re: **Revised Groundwater Compliance Monitoring Plan/TCP ID #NW0486  
Former Flohr Metals Property, Seattle, Washington**

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This memorandum describes the revised groundwater compliance monitoring program for the former Flohr Metals property (currently Kvichak Marine) located at 469 NW Bowdoin Place in Seattle, Washington. This monitoring plan was prepared in accordance with the Voluntary Cleanup Program Closure Report prepared by Aspect Consulting (June 6, 2002) and the subsequent Ecology opinion letter (July 19, 2002) and additionally incorporates comments from the Corps of Engineers in letters dated November 26, 2002 and April 7, 2003. In response to Corps comments, the revised plan provides for an additional interior monitoring point and additional natural attenuation parameter monitoring. The goal of the groundwater monitoring program is to verify effectiveness of the completed remedial action and to ensure that groundwater leaving the site is protective of human health and the environment.

This compliance monitoring plan contains the following elements:

- Restatement of remedial action objectives and points of compliance;
- Revised Groundwater monitoring program;
- Sod cover inspection and maintenance program; and
- Contingency remedial action plan.

Attached to this plan, Figure 1 depicts the site location and Figure 2 shows exploration locations with the planned compliance monitoring wells highlighted.

## Remedial Action Objective and Point of Compliance

The remedial action objective is to ensure that groundwater quality discharging to the Lake Washington Ship Canal meets criteria protective of surface water conditions. Groundwater cleanup levels established for protection of surface water quality are as follows for the groundwater contaminants of concern:

- Tetrachloroethene (PCE)—4.15 µg/L;
- Trichloroethene (TCE)—55.6 µg/L;
- 1,1-Dichloroethene (1,1-DCE)—1.93 µg/L; and
- Vinyl chloride (VC)—3.7 µg/L.

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The conditional point of compliance is established at piezometers P-1A/B and P-2A/B. During the initial five-year review, Ecology will evaluate monitoring data from informational well HC-4 (discussed below) to assess the need for contingency remedial action (discussed in the final section of this letter).

## **Groundwater Monitoring Program**

Routine groundwater monitoring will be conducted to ensure long-term effectiveness of the remedial action and to document compliance with cleanup levels at the conditional point of compliance. Monitoring will consist of the following:

### ***Conditional Points of Compliance***

- Sampling at the conditional point of compliance (P-1A/B, P-2A/B), at the toe of the groundwater plume (HC-4), within the former source area (HC-1), and in a well point (IP-7) located approximately at the mid-point of the groundwater flow path from the former source area to the Ship Canal;

### ***Proposed Suite of Analytes***

- Testing water samples for chlorinated solvents using EPA method 8260 as well as sulfate, nitrate, and dissolved organic carbon (DOC);
- Measuring dissolved oxygen (DO) and (field filtered) dissolved iron concentrations as well as oxidation-reduction potential (ORP), temperature, pH, and conductivity during sampling;

### ***Monitoring Duration and Conditions to Terminate Monitoring***

- The sampling program described above will be conducted on a quarterly basis for one year to evaluate the baseline conditions of the post-remediation biogeochemical conditions and compliance with groundwater cleanup levels. Groundwater samples will be collected annually in the second, third, and fifth years for analysis for chlorinated solvents using EPA method 8260 only;
- Measuring groundwater elevations at each monitoring location in addition to a minimum of three additional wells to assess groundwater elevation and flow direction; and
- The duration of groundwater monitoring activities shall begin upon the issuance of the NFA determination for the site and shall continue, unless four quarterly consecutive monitoring events indicate that the analytes of concern mentioned above are below MTCA Method B cleanup levels for surface water. In this event, the FTMW may request that the monitoring wells be decommissioned. The deed restriction shall remain as part of the deed on the property as long as contaminated soils above the standards are present at the site.

### ***Reporting Format***

Annual groundwater monitoring reports will be prepared and submitted to Ecology at the end of each sampling year. If groundwater concentrations increase substantially at one or more wells during a sampling event, these data will be reported to Ecology within 30 days.

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The following groundwater monitoring information will be summarized in the reports:

- Current and past groundwater depths and elevations relative to a site datum, summarized in a table;
- A figure showing groundwater elevation contours and groundwater flow direction;
- A table summarizing current and previous groundwater analytical results, with a discussion of those analyte concentrations that exceed MTCA Method B cleanup levels;
- A graphical figure showing previous groundwater analytical results versus the MTCA Method B cleanup levels for trend analysis;
- A section with a table summarizing current and previous biological activities, trends and biological attenuation or lack of per the EPA Protocol for Evaluating Natural Attenuation of Chlorinated Solvents in Groundwater, EPA/600/R-98/128;
- A summary of groundwater sampling procedures and operation and maintenance of the sod and monitoring wells; and
- All data shall be summarized in tables and with graphs for the five-year review report to Ecology

### Operation and Maintenance

#### *Sod Cover Inspection*

The sod cap covering arsenic-contaminated surface soil will be inspected twice a year to confirm integrity of the cap. Inspection events will be performed in October (at the end of the dry season) and in April (at the end of the wet season). Areas of the cap showing significant distress that will potentially expose underlying soils will be resodded or covered with a liner, gravel, decking, or other appropriate material. Routine cap inspection and maintenance will continue until the Waterfront Area is redeveloped and the contaminated soil is removed. If such an event occurs, prior notice will be made to Ecology and a follow-up report documenting the supplemental remedial action will be submitted.

#### *Monitoring Wells*

Monitoring wells and all sampling points must be clearly marked and maintained to ensure the integrity of sampling results. Any damaged compliance monitoring wells or points must be replaced upon Ecology's approval of the newly proposed locations. Monitoring wells and points at the site must not be decommissioned without Ecology's written approval.

### Contingency Remedial Action

Current groundwater monitoring trends and natural attenuation modeling indicate that chlorinated solvent concentrations should continue decreasing at the site. If, however, increasing concentrations are confirmed at well HC-4, IP-7 and/or the Ship Canal piezometers (P-1A/B or P-2A/B) during post-closure confirmation monitoring, suggesting renewed plume movement, Ecology shall make a contingency determination to ensure continued protection of human health and the environment and FTMW shall prepare and submit a contingency plan to Ecology for approval within 30 days of Ecology's determination.. Seasonal variation in chlorinated solvent concentrations in Site

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groundwater will likely be identified during quarterly monitoring. To identify statistically significant concentration trends, Site monitoring data will be evaluated in accordance with Ecology guidance using the MTCASat spreadsheet analysis tool. For this analysis, total chlorinated solvent concentrations and concentrations of individual constituents from at least four successive sampling events will be evaluated. The Contingency remedial action depending on the nature of the problem may consist of injecting 440 gallons of hydrogen peroxide into existing injection points located near the area of potential concern. Groundwater monitoring will be conducted at wells HC-1, IP-7, HC-4, HC-5, and HC-6 one month after injection. If constituent concentrations in groundwater at HC-4, HC-5, and HC-6 are below screening levels, confirmation monitoring will be resumed. If concentrations still exceed, more injection points may be added and another injection round will be performed or other remedial alternative determined by Ecology to be appropriate for the continued protection of human health and the environment.

### Health and Safety

The FTMW shall prepare a Health and Safety Plan for use in implementing this remedial action, compliance monitoring, or contingency response action plan.

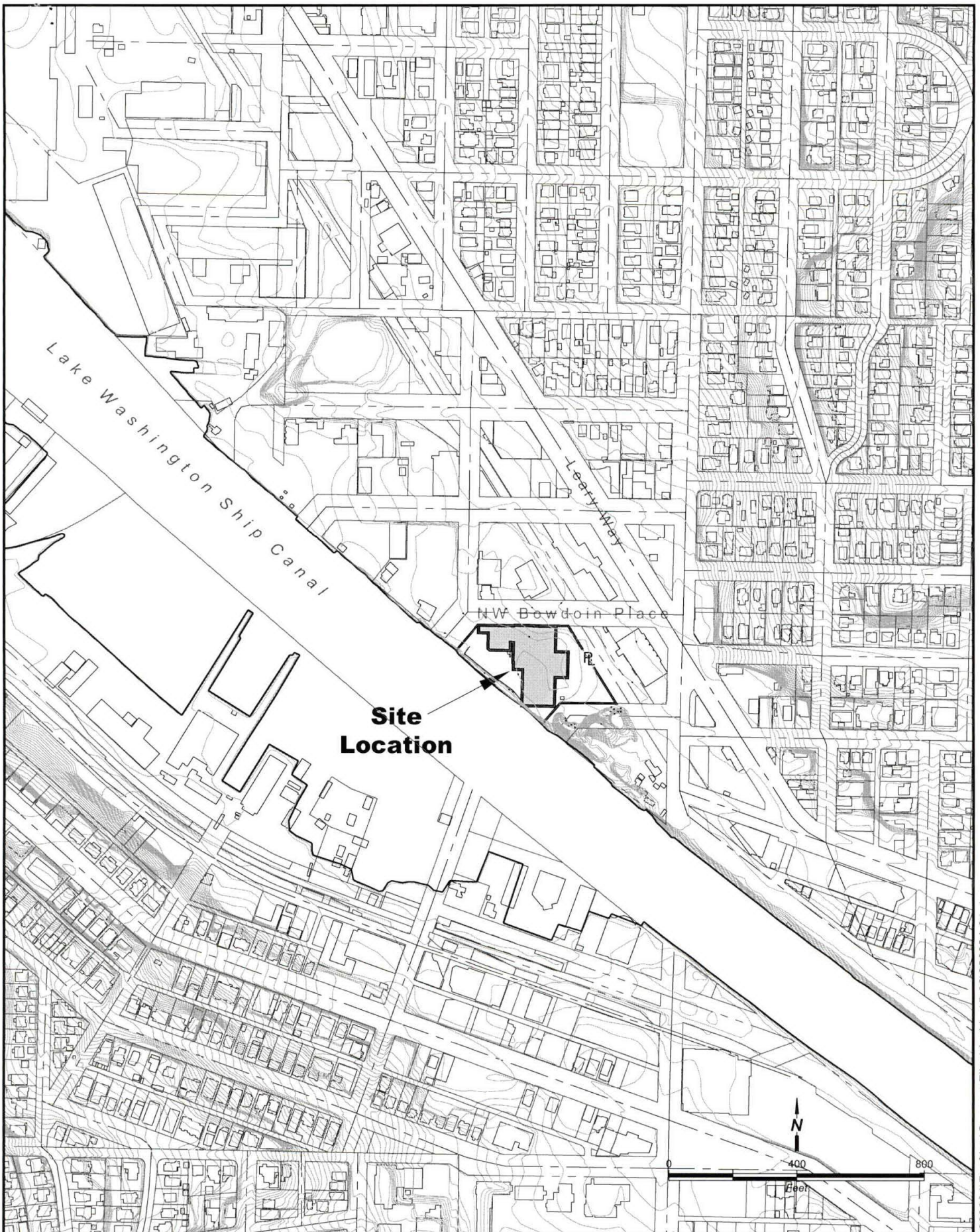
#### Attachments:

Figure 1—Site Vicinity Map

Figure 2—Exploration Plan and Compliance Monitoring Well Location Map

V:\020034 Kvichak Marine\GW Monitoring Plan Flohr Metals (Ecology comments).doc





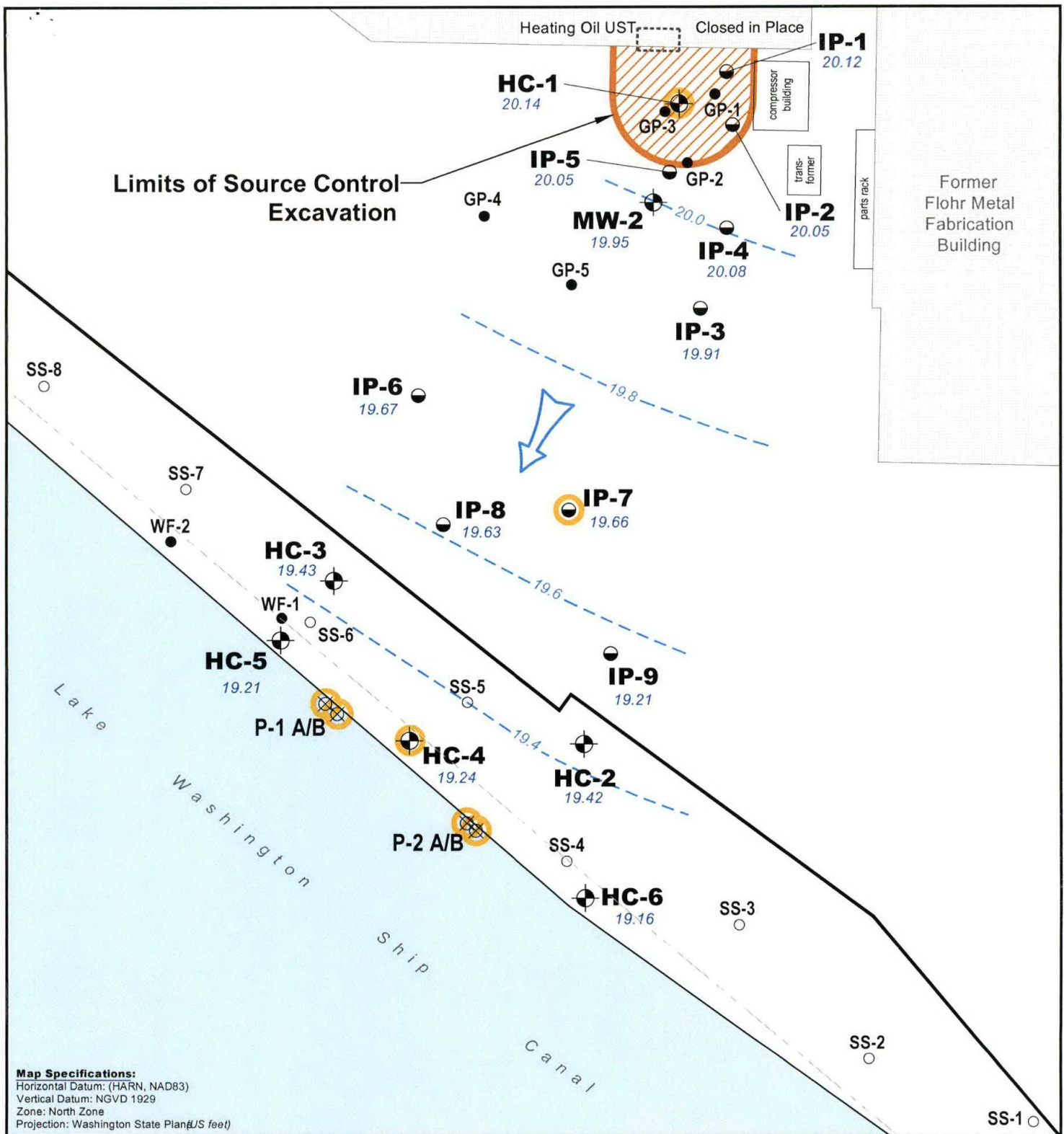
179 Madrone Lane North  
Bainbridge Island, WA 98110  
Tel: (206) 780-9370  
Fax: (206) 780-9438

## Site Vicinity Map

Kvichak Marine  
Seattle, Washington

DATE:	5/22/02	PROJECT NO.	
DESIGNED BY:	DLH		<b>020034</b>
DRAWN BY:	JJR	FIGURE NO.	
REVISED BY:	SDM		<b>1</b>





## Legend



Compliance Monitoring Program Sampling Location



Monitoring Well



Injection Point



Piezometer



Probe Sample



Surface Soil Sample



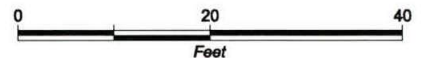
Ground Water Contour (measured 4/3/2002)

19.16

Ground Water Elevation (in feet)



Ground Water Flow Direction



179 Madrone Lane North 811 First Avenue #480  
Bainbridge Island, WA 98110 Seattle, WA 98104  
(206) 780-9370 (206)-328-7443

## Exploration Plan and Compliance Monitoring Location Map

Kvichak Marine  
Seattle, Washington

DATE: April 2003  
DESIGNED BY: DLH  
DRAWN BY: JJR  
REVISED BY: SDM

PROJECT NO.  
**020034**  
FIGURE NO.  
**2**