C0124

PORT OF OAKLAND

January 3, 2002

JAN 08 2002

Mr. Richard Hiett
Associate Water Resources Control Engineer
Regional Water Quality Control Board
San Francisco Bay Region
1515 Clay Street, Suite 1400
Oakland, CA 94612

RE: Port of Oakland Supplemental Environmental Project
Ecological Risk Associated with Petroleum Hydrocarbons
Former Seabreeze Yacht Harbor, Clinton Basin, Oakland

Dear Mr. Hiett:

On October 8, 2001 the Port of Oakland submitted to your office the report entitled "Former Seabreeze Yacht Harbor Wetland Enhancement Project, Oakland, Alameda County, California." Following review of the report, Regional Water Quality Control Board ("Regional Board") staff expressed concerns in a conference call with Port staff on December 18, 2001 about the presence of petroleum hydrocarbons in the soil. The Regional Board staff posited that these contaminants might be exposed to Bay water upon the creation of the tidal channel proposed as part of the wetland enhancement project. At your request, we have asked the Port's consultant, Baseline Environmental, to further evaluate the potential risk posed by the petroleum hydrocarbons present at the site. Baseline's letter report is enclosed for your review. Baseline concludes that the petroleum hydrocarbons in the sediment exposed by the proposed tidal channel would not pose a risk to ecological receptors because they are below the calculated Sediment Quality Criterion using conservative assumptions. In addition, groundwater monitoring at the site has consistently demonstrated that the petroleum hydrocarbons in the soil are not soluble.

The Port looks forward to Regional Board staff approval of the Supplemental Environmental Project at the former Seabreeze Yacht Harbor following review of Baseline's analysis. To assist and expedite approval of the project, I have prepared and enclose for use if you see fit a draft letter. If you have any questions, please do not hesitate to contact me at (510) 627-1360.

Sincerely,

Jeffrey R. Jones, MS, MPH
Environmental Compliance Supervisor

Encl: Letter Report dated December 21, 2001, re: Ecological Risk Associated with Petroleum Hydrocarbons, Habitat Enhancement Project, Former Seabreeze Yacht Center, Oakland

cc: Keith Lichten, Regional Board
Anne Henny, Port
Jon Amdur, Port
Andy Jahn, Port
Christy Herron, Port
Douglas Herman, Port
Barney Chan, ACHCSA
Maxine Spellman, Coastal Conservancy

BASELINE
ENVIRONMENTAL CONSULTING

21 December 2001
S917.1-C1

Mr. Jeff Jones
Port of Oakland
EH&SC
530 Water Street
Oakland, CA 94607

Subject: Ecological Risk Associated with Petroleum Hydrocarbons, Habitat Enhancement Project, Former Seabreeze Yacht Center

Dear Mr. Jones:

This letter addresses concerns expressed by Regional Water Control Board (RWQCB) staff regarding the presence of petroleum hydrocarbons in the soil that would be exposed to Bay water upon the creation of the tidal channel proposed, as part of the Habitat Enhancement Project.

BASELINE prepared a report titled, *Investigation of Soil Quality for Habitat Enhancement Project, Former Seabreeze Yacht Center, Oakland, California*, dated September 2001, which presented sampling results for soils that would be excavated to create the tidal channel and also for soils beneath the bottom of the future channel. Petroleum hydrocarbon concentrations in composite samples, made up of soils within the top three feet of soil beneath the bottom of the future channel, were found to range between less than the laboratory reporting limit up to 2,060 mg/kg (dry-weight) of total petroleum hydrocarbons (TPH) as Bunker C. Staff from the RWQCB requested the Port to evaluate whether these concentrations pose a risk to ecological receptors in the Inner Harbor.

We evaluated potential ecological risk posed by the petroleum hydrocarbons by two methods. The first method was to compare actual groundwater monitoring data from the Seabreeze site to regulatory thresholds for TPH. The second method was to calculate a Sediment Quality Criterion for TPH based on a surface water criterion. If the groundwater quality underlying the site inland of the proposed channel were less than the regulatory threshold, and the petroleum hydrocarbon concentrations in soil underlying the future channel were less than the calculated Sediment Quality Criterion, the conclusion would be that the petroleum hydrocarbons do not pose a risk to ecological receptors. Details on these methods are presented below.

GROUNDWATER QUALITY

Groundwater monitoring at the former Seabreeze Yacht Center has been conducted for over five years. Currently, four wells are monitored on an annual basis. Groundwater samples from these wells over the last five years were quantified as TPH as diesel, as bunker C, and/or as motor oil (with silica gel cleanup). A summary of these results and a figure showing the well locations are provided in Attachment 1. The maximum TPH as diesel concentration reported for these samples was 0.29 mg/L and most of the samples were reported as "ND" (i.e., less than the laboratory reporting limit of about 0.05 mg/L).[1] These low concentrations of TPH in the groundwater indicate that the petroleum hydrocarbons at the site are either not soluble and/or strongly adsorb to the soils.

The RWQCB has established a saltwater quality criterion for TPH residual fuel of 0.64 mg/L in the 1999 Waste Discharge Requirements issued to the San Francisco International Airport. The groundwater quality underlying the former Seabreeze site, without taking into account attenuation via groundwater transport and dilution upon discharge to the Inner Harbor, are well below this surface water criterion.

SEDIMENT QUALITY CRITERION

The U.S. EPA has developed a method for calculating Ecotox Thresholds for ecological risk screening. For sediments, the approach uses the following equation for calculating Sediment Quality Criteria:

$$\textit{Sediment Quality Criterion} = (K_{oc}) \times (f_{oc}) \times \textit{surface water criterion}$$

where:
K_{oc} = organic carbon partition coefficient (L/kg)
f_{oc} = organic carbon fraction (unitless)
surface water criterion = 0.64 (mg/L) [as described in previous section]

Petroleum hydrocarbons at the site are associated with a historic former power plant that used Bunker C as fuel, which is a residual heavy petroleum fraction. Gas chromatograms from soil samples collected across the site indicate that the soils contain heavy hydrocarbons that extend through the motor oil range (e.g., beyond C_{35}-range aliphatics). The Massachusetts Department of Environmental Protection (MADEP) has published K_{oc} factors for different aliphatic fractions of petroleum hydrocarbons. The MADEP K_{oc} factors for aliphatics are as follows:

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[1] Samples from the last five sampling events were not quantified for TPH as bunker C or motor oil because earlier results using these standards were reported as "ND."

Aliphatics	K_{oc} (L/kg)
C_5 to C_8	2,265
C_9 to C_{12}	150,000
C_9 to C_{18}	680,000

A more appropriate description of the carbon range for the type of petroleum hydrocarbons at the site would be C_{10} to C_{50}. Extrapolating from the K_{oc} factors published by the MADEP, the K_{oc} appropriate for the site would be significantly greater than 680,000 L/kg. MADEP guidance indicates that C_{19} to C_{36} aliphatics are considered immobile.

The fraction organic carbon is dependent on the type of soil present. Both the U.S. EPA Ecotox Threshold and ASTM RBCA methodologies use a default value of 0.01 (one percent) for all soils. The TPH data presented in BASELINE's report for the Habitat Enhancement Project were for composite samples consisting primarily of individual Bay mud samples. Bay muds are usually a silty clay, which typically has a higher fraction of organic carbon than 0.01. The Oakland Risk-Based Corrective Action: Technical Background Document, 17 May 1999 (Oakland RBCA) cites a value of 0.02 for organic carbon fraction in silty clays.

For the former Seabreeze Yacht Center, the closest applicable published values for K_{oc} and f_{oc} appear to be 680,000 L/kg and 0.01, respectively. Even these values are likely to be overly conservative. Using these values and the equation above, the Sediment Quality Criterion for TPH (residual fuel) would be 4,352 mg/kg. The maximum TPH as bunker C value for the composite samples collected beneath the bottom of the future tidal channel was 2,060 mg/kg (dry-weight basis).[2] ✓ this

Since there were high TPH bunker are than 1400 ppm.

CONCLUSION

Groundwater monitoring at the site has consistently demonstrated that the petroleum hydrocarbons present in the soil are not soluble. TPH concentrations measured over the last five years have been below the saltwater criterion established by the RWQCB of 0.64 mg/L (for residual fuel). In addition, the TPH concentrations identified in the soils beneath the bottom of the future tidal channel are below the Sediment Quality Criterion calculated using conservative assumptions. Both these approaches demonstrate that the petroleum hydrocarbons in the sediment exposed by the proposed tidal channel do not pose a risk to ecological receptors.

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[2]This sample contained 1,400 mg/kg TPH as bunker C on a wet-weight basis, based on 32 percent moisture.

→ $\times \frac{1}{(.68)} = 2060$

We believe that this evaluation should address the concerns expressed by the RWQCB staff regarding the petroleum hydrocarbons as they relate to the Habitat Enhancement Project. Please contact us at your convenience if you have any questions or need additional information.

Sincerely,

Yane Nordhav
Principal
Reg. Geologist No. 4009

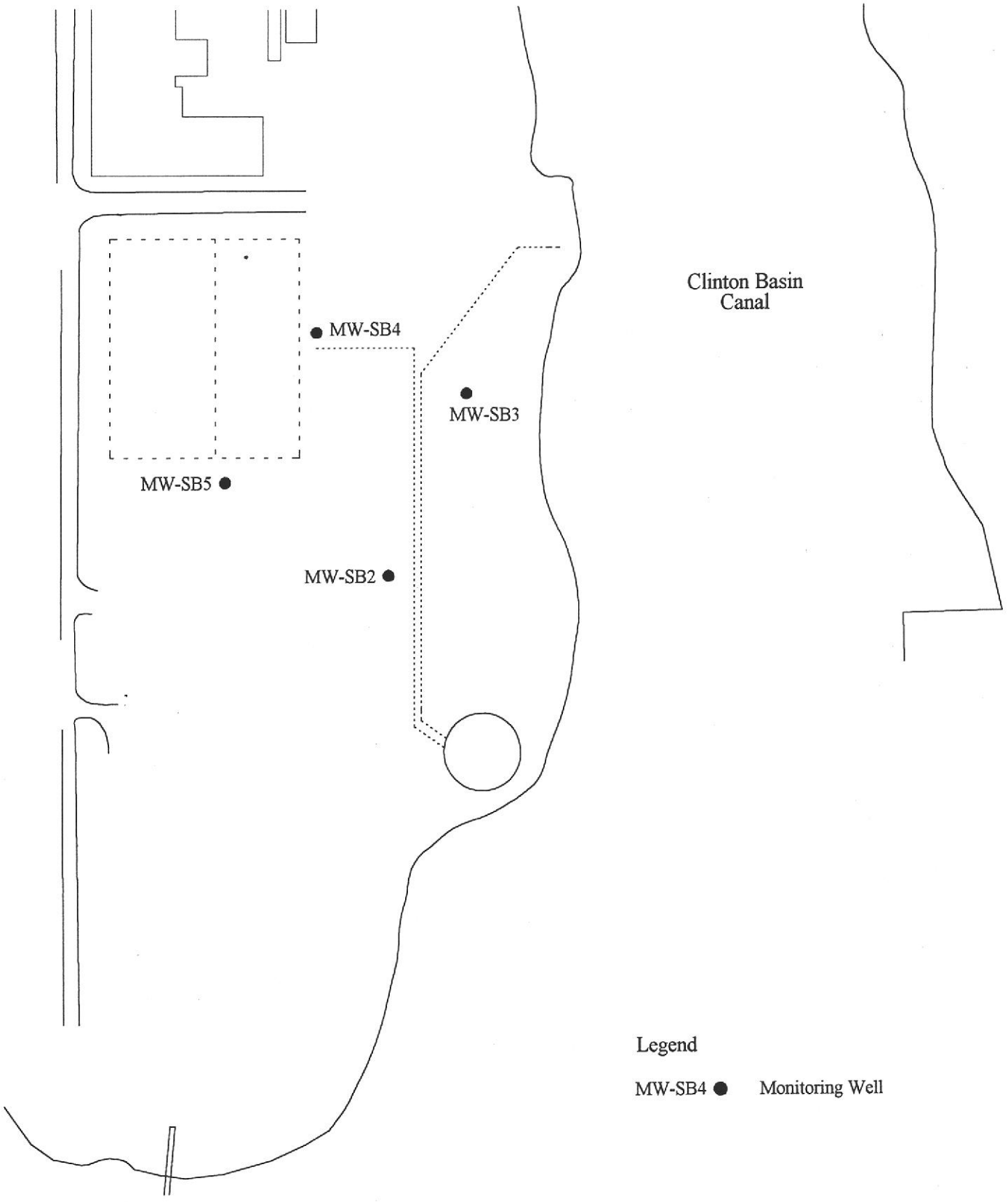
Lydia Huang
P.E. No. 43995

YN:LH:km
Attachment

ATTACHMENT 1

GROUNDWATER MONITORING DATA

MONITORING WELL LOCATIONS



Seabreeze Yacht Center
Sixth Avenue
Oakland, California

D:\Graphics\98381\TPH-HabitatEhh.vcd 12/18/01

ATTACHMENT 1: **Groundwater Monitoring Data, Seabreeze Yacht Center, Oakland, California,** (mg/L)

Sample ID	Sample Date	Total Extractable Hydrocarbons[1]		
		as Diesel	as Bunker C	as Motor Oil
MW-SB2	03/14/97	**0.061**	<0.5	<0.25
	06/20/97	**0.15**	--	--
	01/28/98	<0.05[2]	--	--
	01/06/99	<0.048	--	--
	02/04/00[3]	--	--	--
	01/19/01	<0.05	--	--
MW-SB3	03/14/97	**0.085**[4]	<0.5	<0.25
	06/20/97	**0.15**	--	--
	01/28/98	<0.05[2]	--	--
	01/06/99	<0.049	--	--
	02/04/00	<0.05	--	--
	01/19/01	<0.05	--	--
MW-SB4	03/14/97	<0.05	<0.5	<0.25
	06/20/97	**0.11**	--	--
	01/28/98	<0.05[2]	--	--
	01/06/99	<0.049	--	--
	02/04/00	<0.05	--	--
	01/19/01	<0.05	--	--
MW-SB5	03/14/97	**0.29**	<0.5	<0.25
	06/20/97	**0.27**	--	--
	01/28/98	<0.05[2]	--	--
	01/06/99	<0.05	--	--
	02/04/00	<0.05	--	--
	01/19/01	<0.05	--	–

Notes: <x.x = analyte not identified above laboratory reporting limit of x.x.
x.x = concentrations reported at or above laboratory reporting limit.
-- = no analysis performed.

1 Analytical Method California DOHS, LUFT Manual (EPA 8015M). Samples were subjected to silica gel cleanup (EPA Method 3630) prior to analysis, unless otherwise noted.

2 The corresponding method blank sample (laboratory sample) contained 0.067 mg/L of a hydrocarbon reported to be heavier than diesel. The laboratory indicated that the method blank sample result should not affect the data quality since the collected samples did not contain diesel above the laboratory reporting limit.

3 Well could not be located at time of sampling.

4 The laboratory indicated that the chromatographic pattern of the sample matches a known laboratory contaminant. Based on telephone correspondence with Mr. Ron Chu of PACE, the laboratory contaminant may be due to contamination of the silica gel used to clean up the sample prior to analysis.