R. William Rudolph, Jr., PE
Thomas E. Cundey, PE
Jeriann N. Alexander, PE

October 18,1994
SCI 820.001

Ms. Susan Hugo
Alameda County Health Care Services Agency
Division of Hazardous Materials
Department of Environmental Health
1131 Harbor Bay Parkway
Alameda, California 94501

Work Plan and
Revised Request for "No Further Action"
Alternative Compliance Points Monitoring Program
6707 Bay Street
MIBK Tank Area
Emeryville, California

Dear Ms. Hugo:

Subsurface Consultants, Inc. (SCI) is submitting this revised Work Plan leading to a request for your concurrence with a "no further action" regulation of the previous MIBK underground tank area under an "alternative compliance points" approach. This letter supersedes our previous letter dated September 21, 1994 which transmitted a final copy of our "Supplemental MIBK Contamination Assessment" report for the referenced site. Extensive investigation and remediation have been conducted within the previous tank area. A summary of site activities including 5 years of groundwater monitoring results are presented in the September 21, 1994 report. We have modified the Work Plan to gain agency approval, as stated by Messers Ravi Aralananthan and Sumadhu Arigala with the Regional Water Quality Control Board (RWQCB), as well as yourself representing the Alameda County Health Care Services Agency (ACHCSA) during our meeting on September 23, 1994.

In preparing this request, we have reviewed a draft internal memorandum prepared by the San Francisco Bay Regional Water Quality Control Board (RWQCB), regarding non-attainment of groundwater cleanup levels. This memorandum was dated February 17, 1994, and was prepared by Mr. Steven Ritchie, the RWQCB's executive officer. We understand that the memo contains the RWQCB's most recent guidelines regarding alternative compliance points.

Review of the RWQCB document indicates that areas of non-attainment of groundwater cleanup goals can be approved for sites where (1) dissolved groundwater cleanup is not technically or economically feasible or warranted and/or (2) sites for which the approved cleanup program has not resulted in compliance with water quality objectives. Sites of either type must also satisfy the four following criteria:

1. **Limited Migration Potential Exists**

   The responsible party must demonstrate that no significant pollution migration will occur due to hydrogeologic or chemical characteristics of the site.

2. **Source Removal Has Occurred**

   Adequate source removal and/or isolation has been undertaken to limit future migration of chemicals and groundwater.

3. **Use of Best Available Technologies Has Been Evaluated and/or Attempted**

   The responsible party must show that best available technologies are either not technically or economically feasible or have been implemented to their practical extent.

4. **Non-Attainment Area Management Plan Has Been Accepted**

   An acceptable plan must be submitted which addresses containing and managing the remaining risks posed by residual groundwater pollution.

RWQCB Evaluation Criteria

In the case of the MIBK tank area, remedial efforts have resulted in significant source removal but have not reduced contaminant concentrations to non-detectable levels. However, further dissolved groundwater cleanup is not technically or economically feasible or warranted since the plume (1) is very small, (2) poses little environmental or health risk, and (3) is either migrating very slowly at most, or is stable given the hydrogeologic conditions at the site. As a result it appears that the site is

appropriate for consideration under an "alternative compliance points" approach. Information demonstrating that the four RWQCB evaluation criteria are applicable are presented below.

1. Limited Migration Potential

a. Low Permeability Geologic Materials

Subsurface investigation at the site indicates that low permeability geologic materials exist throughout the impacted area. Test borings indicate that the area is underlain by Bay Mud. Bay Mud is characterized as a low permeability, highly plastic silty clay. The Bay Mud is overlain by heterogeneous fill. Slug tests performed in four monitoring wells completed in the fill indicated hydrologic conductivities on the order of 4.6 to 7.5 X 10^{-5} cm/sec. This data indicates that the fill also has a relatively low permeability. Hence, we conclude that migration rates at the site are very slow.

Our research indicates that MIBK is highly bio-degradable. Biological testing conducted on soil and groundwater samples from within sandy portions of the fill indicates bacteria, nutrient and oxygen concentrations are conducive to continued in-situ biodegradation. To the extent that limited migration could occur as contamination slowly moves from the clayey soils into the more sandy fill, the contaminants are degraded, contributing to the rapid attenuation of the plume. This serves as a containment mechanism, further limiting migration which, in any event, is minimal due to the low permeability of the fill.

This limited migration potential has been demonstrated through 5 years of groundwater monitoring results from MW-1. MW-1 is situated directly downgradient and within 35 feet of the source. Monitoring of this well has consistently shown non-detectable results, confirming limited migration potential.

b. Horizontal Migration Pathways

As discussed in Section 1a, slug tests performed in the heterogeneous fill indicate that the fill permeability is low and does not vary significantly. We conclude that migration pathways associated with variations in the fill material are not likely to significantly promote contaminant migration at the site.

As shown on Plate 2 of the report, a number of underground utilities exist in the impacted area. Field measurements indicate that the utilities do not extend below the groundwater level and hence, do not represent potential migration routes through the site. The monitoring results also confirm the lack of significant horizontal migration pathways.

c. **Vertical Conduits**

As discussed in Section 1a, the site is underlain by Bay Mud which has a relatively low permeability. For this reason, vertical migration downward is unlikely. Review of historical records indicates that the site was reclaimed from the Bay beginning in about 1947, and was used as a landfill. As a result, the presence of old wells, which could represent potential vertical conduits to deeper aquifers, is extremely unlikely.

Considering all the factors discussed above we conclude that the plume is very limited and the potential for future migration is extremely low. This has been demonstrated by thorough site characterization and the results of 5 years of groundwater monitoring.

2. **Source Removal**

Removal of highly contaminated soil in the vadose zone and capillary fringe was accomplished by the operation of a soil vapor extraction system (SVES) at the site. Concentrations of MIBK in soil following tank removal but prior to remediation ranged up to 5,000 mg/kg. Following operation of the SVES system MIBK concentrations were not found above detection limits (10 ug/kg) in the tank pit area. These results confirm that significant source removal has been achieved. However MIBK still exist in clayey landfill soils and groundwater downgradient of the previous tank area.

An analytical vapor diffusion calculation, based on Fick's Law and a surface box mixing model was conducted by Mr. Russel Juncal of Mill Creek Associates. The calculation was conducted to evaluate potential human exposures associated with the contamination which will remain in place. A copy of the calculation is attached. The calculation indicates that potential for exposure is many orders of magnitude below published exposure standards for MIBK. Hence, we conclude that the risk of human exposure to MIBK vapors is negligible.

3. Technical Feasibility of Best Available Technologies

Soil vapor extraction system (SVES) and conventional groundwater pump and treat technologies were implemented at the site. The SVES system was successful in remediating the contaminated soil within and near the tank pit. We conclude that the SVES system has removed contaminants to the most practical extent possible. The soil contamination which remains downgradient of the tank pit is bound within low permeability clays, well below the current groundwater level. As a result, SVES is not a feasible technology to remediate the remaining soil contamination.

Because of the limited permeability of the soils underlying the site, the previous groundwater extraction system was only capable of operating at a very low flow capacity, (i.e., less than 0.2 gpm). In addition to the low flow rate, bacteriological conditions resulted in biological fouling of the extraction/treatment systems. Given these hydrogeologic constraints, which are inherent to the site, we conclude that additional groundwater extraction is not feasible nor economical.
In our opinion, there are no cost effective alternatives.

4. Non-Attainment Area Management Plan

The following plan outlines steps which will be undertaken to contain and manage any remaining risks posed by residual groundwater contamination.

1. Current/Anticipated Land and Water Use

The site is currently occupied by one- and two-story structures which are surrounded by asphalt/paved parking lots and landscaped areas. The structures are used for warehouses, light industrial manufacturing and offices. The site is zoned C/O (commercial and office) which does not allow residential use. There are no foreseeable changes in use.

As previously discussed, the site is in a landfill area which was reclaimed from the San Francisco Bay. The shallow groundwater beneath the site has no current beneficial uses. Future beneficial use is unlikely given (1) the occurrence of background levels of groundwater contamination throughout the entire Emeryville landfill area, and (2) the relatively low potential yield of the underlying geologic formation.

2. Compliance Monitoring Program

a. Notification to Current and Future Owners, Lessees or Renters

The current property owner is fully aware of the MIBK contamination. He was apprised of its existence in the course of his purchase of the subject property, and the remediation has proceeded during his occupancy of the site. Pursuant to California Health and Safety Code § 25359.7, he must give written notice of the contamination to any subsequent "buyer, lessee or renter", prior to a proposed "sale, lease or rental".

Additionally a special notice will be filed with the office of the Alameda County Recorder regarding the presence of soil and groundwater contamination beneath the site setting forth the constraints on excavation, changed use, etc., required by the ACHCSA and RWQCB, as stated in our September 23, 1994 meeting. A copy of the proposed notice, which has been approved by the present site owner, John Nady, is attached. Mr. Nady is prepared to sign and record this notice, subject to confirmation that the ACHCSA and RWQCB have approved this work plan.

b. Groundwater Monitoring

It is our opinion that the 5 years of groundwater monitoring results from MW-1 provide a record of compliance with water quality objectives which is consistent with the proposed alternative compliance points approach. The results represent a wide range of seasonal water level variations and consistently show no impact. The site characterization and monitoring results adequately demonstrate the lack of significant migration potential at the site. For these reasons we did not propose ongoing groundwater monitoring. However, based on our September 23, 1994 meeting, we understand that in order to accept this work plan the ACHCSA and the RWQCB will require 2 additional quarterly, followed by 2 semi annual groundwater monitoring events. Accordingly, additional groundwater monitoring events will be conducted at the site on or about the following dates: November 1994, February 1995, August 1994, and January 1996.

1995

During each of these events, monitoring wells MW-1, MW-8, MW-9 and MW-10 will be sampled. Groundwater from each well will be analytically tested using the following test procedures:

Volatile Organic Chemicals (VOC) EPA 8240. BTEX MEK MIBK
Total Extractable Hydrocarbons (TEH) EPA 8015 modified.

MW-3 include in program if concentrations increased

Total Volatile Hydrocarbons (TVH) EPA 8015 modified.

During each monitoring event groundwater level measurements will be obtained from the wells and the local groundwater gradient will be evaluated.

Groundwater monitoring will be terminated following the January 1996 event, provided that EPA 8240 compounds are not detected in MW-1 and contaminant concentrations in MW-9 and MW-10 either decrease or remain relatively stable throughout the future monitoring events. At that time we understand that the site will be deemed by the ACHCSA and RWQCB to require "no further action".

Once concurrence has been obtained from the RWQCB and ACHCSA, the monitoring wells will be abandoned in accordance with Alameda County Flood Control and Conservation District (Zone 7) guidelines.

We appreciate your cooperation in this matter and look forward to your prompt review and comment.

Yours very truly,

Subsurface Consultants, Inc.

R. William Rudolph
Geotechnical Engineer 741 (expires 12/31/96)

RWR:sld

Atttachments: Vapor Diffusion Calculations
Notice
Exhibit A

cc: Sumaden Arigular ✓
RWQCB

Brian Berger
Pettit & Martin

James McClay
MRCP Realty

Russel Juncol
Mill Creek Associates

John Nady
Nady Systems

Attachment 1
Vapor Diffusion Calculations

In order to estimate potential risks to on-site workers from the residual MIBK contamination in groundwater, a vapor diffusion model based on Fick's Law was utilized. The vapor flux of MIBK calculated by the model is then assumed to mix homogeneously within a 'box' of atmosphere above the contaminated groundwater. In order to introduce extreme conservatism into the exposure calculations it was assumed that essentially no wind blows at the site. The calculated MIBK vapor concentration in the atmosphere 'box' (dimensions 2 feet x 2 feet x 6 feet) can be compared to published exposure standards to assess health risks, as shown below.

Assumptions:

- All contaminated soil above groundwater has been removed.
- C_w = MIBK concentration in water = 50 mg/l (SCI, 1994)
- K_h = Henry's Law constant for MIBK
  $= 1.49 \times 10^{-5}$ Atm-m^3/Mole, or
  6.09×10^{-4} (Dimensionless)
- C_{sg} = Vapor concentration in soil gas = $C_w \times K_h$ = 50 mg/l x 6.09×10^{-4} = 0.0304 mg/l
  $= 3.04 \times 10^{-5}$ mg/cm^3
- D_a = Diffusion Coefficient of MIBK in free air
  = 4300 cm^2/Day (Hern and Melancon, 1989)
- D_e = Effective Diff. Coefficient of MIBK in soil
  $= \frac{D_a \times P_a^{3.33}}{P_t^2}$ Where P_a = Air filled porosity
  P_t = Total porosity
- Total porosity assumed 40% (conservative)
- Air filled porosity assumed 40% (no moisture, conservative)

  Therefore: $D_e = 3.04.10^{-5}$ mg/$cm^3 \times P_a^{1.33}$

  $D_e = 4300$ cm^2/day $\times P_a^{1.33} = 1267$ cm^2/day
- Soil flux = $F = \frac{D_e (C_{sg})}{X}$ Where x = distance to water

  $= \frac{1267 \text{ cm}^2/\text{day} \; (3.04 \times 10^{-5} \text{ mg/cm}^3)}{244 \text{ cm}}$

  $= 1.58 \times 10^{-4}$ mg/cm^2-day

C_o = Concentration of MIBK in outside air

$= \frac{FL}{uh}$ Where F = MIBK flux from soil

L = Length of receptor 'Box' parallel to wind

u = Wind speed

H = Height of receptor 'Box'

- Receptor box is assumed to be 2 feet x 2 feet x 6 feet, approximate area of human receptor

- Wind speed assumed to be 1 cm/day = 0.

$$C_o = \frac{1.58 \times 10^{-4}\ mg/cm^2\text{-day} \times 70\ cm}{1\ cm/day \times 197\ cm}$$

$= 5.5 \times 10^{-5}\ mg/cm^3 = 0.055$ ppm MIBK

- Exposure standards for MIBK:

OSHA PEL = 100 ppm (TWA)

NIOSH REL = 50 ppm (10^{-HR} TWA)

ACGIH TLV = 50 ppm (TWA) 75 ppm (STEL)

IDLH = 3000 ppm

Conclusion

C_o (the concentration of MIBK) in outside air should be several orders of magnitude less than the exposure standards listed above.

When recorded send to:
Brian Berger
101 California Street, Suite 3500
San Francisco, California 94111

NOTICE

Re: 6707 Bay Street
Emeryville, California

NOTICE is hereby given that extensive environmental investigations have been conducted on the property commonly known as 6707 Bay Street, Emeryville, California, a legal description of which is attached as Exhibit A hereto. These investigations have included analyzing soil and groundwater for the presence of hazardous substances. The investigations indicated that a number of hazardous substances exist within soil and groundwater at the site due to (1) the fact that the site is a reclaimed portion of San Francisco Bay initially used as an uncontrolled landfill and (2) subsequent industrial use of the site which included the installation of underground storage tanks (removed in 1989) which apparently released some portion of their contents, including certain volatile organic compounds, into the surrounding soil and groundwater. Substances detected include heavy metals, volatile organic compounds, petroleum hydrocarbons and semi-volatile organic compounds. Complete summaries of the substances detected in soil and groundwater are presented in the following documents prepared by Subsurface Consultants, Inc. (SCI):

1. Summary of Environmental Investigation/Remediation, 6707 Bay Street, Emeryville, California, dated May 23, 1994.

2. Supplemental MIBK Contamination Assessment, 6707 Bay Street, Emeryville, California, SCI 820.001, dated September 21, 1994.

These documents are contained within the public record, and are on file at the Alameda County Health Care Services Agency Environmental Health Services Department. Because of the presence of these substances, the Alameda County Health Care Services Agency and the California Regional Water Quality Control Board for the San Francisco Bay Region have imposed the following conditions and/or restrictions on the use of the property:

1. If soil is excavated, it may be considered hazardous waste under state and federal law;

2. Groundwater from the site is not usable for domestic, irrigation or industrial purposes.

3. If future construction includes structures extending below the groundwater level (that being approximately 7 to 10 feet), groundwater generated during dewatering operations will require treatment prior to discharge;

4. An approved Health and Safety Plan will be required by the Alameda County Health Care Services Agency (ACHCSA) prior to any work requiring significant subsurface excavations; and

5. An environmental risk assessment may be required by the ACHCSA if any significant change in land use is proposed.

Dated: _____, 1994 By: _____
John Nady

State of California)
) SS.
County of San Francisco)

On this the __ day of October, 1994, before me, _____, the undersigned Notary Public, personally appeared _____, personally known to me or proved to me on the basis of satisfactory evidence to be the person whose name is subscribed to the within instrument, and acknowledged that he executed it.

WITNESS my hand and official seal.

_____

Notary's Signature

EXHIBIT A

ORDER NO. 101577

90070780

The land referred to in this report is situated in the state of California, County of ALAMEDA, and is described as follows:

CITY OF BERKELEY AND CITY OF EMERYVILLE

PARCEL 1:

COMMENCING AT A POINT ON THE WESTERN LINE OF BAY STREET, AS SAID STREET IS SHOWN ON THE MAP OF MAXWELL TRACT, FILED SEPTEMBER 19, 1872, MAP BOOK 5, PAGE 21, ALAMEDA COUNTY RECORDS, AT THE NORTHERN EXTREMITY OF THAT CERTAIN CURVE HAVING A RADIUS OF 32.00 FEET, WHICH CONNECTS THE SAID LINE OF BAY STREET WITH THE NORTHERN LINE OF 65TH STREET, AS SET FORTH IN THE DEED TO STATE OF CALIFORNIA, RECORDED DECEMBER 11, 1953, SERIES NO. AH/10838, BOOK 7203 OFFICIAL RECORDS, PAGE 513, CONTAINING 4.589 ACRES; THENCE ALONG THE SAID LINE OF BAY STREET NORTH 10° 40' 15" WEST 395.18 FEET TO THE SOUTHERN EXTREMITY OF THAT CERTAIN COURSE DESIGNATED AS "SOUTH 10° 40' 15" EAST 297.16 FEET" IN SAID DEED TO THE STATE OF CALIFORNIA; THENCE ALONG THE EXTERIOR BOUNDARY LINE OF THE SAID 4.589 ACRE PARCEL OF LAND NORTHERLY ALONG THE ARC OF A CURVE TO THE LEFT, WITH A RADIUS OF 4970.00 FEET, FROM A TANGENT WHICH BEARS NORTH 10° 40' 15" WEST A DISTANCE OF 137.99 FEET TO A POINT ON A LINE DRAWN PARALLEL WITH THE NORTHERN BOUNDARY LINE OF THAT CERTAIN PARCEL OF LAND DESIGNATED AS PARCEL 1 IN DEED OF TRUST MADE BY HENRY SHAPIRO, ET AL., TO ALAMEDA COUNTY-EAST BAY TITLE INSURANCE COMPANY, A CORPORATION, TRUSTEE, RECORDED OCTOBER 26, 1956, SERIES NO. AL/112672, BOOK 8188 OFFICIAL RECORDS, PAGE 307, DISTANT 170.00 FEET NORTHERLY THEREFROM, MEASURED AT RIGHT ANGLES THERETO, SAID LAST MENTIONED POINT BEING THE ACTUAL POINT OF BEGINNING; THENCE ALONG THE EXTERIOR BOUNDARY LINE OF THE SAID 4.589 ACRE PARCEL OF LAND THE FIVE FOLLOWING COURSES AND DISTANCES: NORTHERLY ALONG THE ARC OF SAID CURVE TO THE LEFT, WITH A RADIUS OF 4970.00 FEET, A DISTANCE OF 83.44 FEET, THENCE NORTH 13° 12' 53" WEST 184.31 FEET, THENCE NORTHERLY, NORTHWESTERLY AND WESTERLY ALONG THE ARC OF A CURVE TO THE LEFT, WITH A RADIUS OF 45.00 FEET, TANGENT TO THE SAID LAST MENTIONED COURSE, A DISTANCE OF 77.84 FEET, THENCE SOUTH 67° 40' 58" WEST 232.70 FEET, AND THENCE SOUTHWESTERLY ALONG THE ARC OF A CURVE TO THE LEFT, WITH A RADIUS OF 640.00 FEET, FROM A TANGENT WHICH BEARS SOUTH 54° 30' 18" WEST, A DISTANCE OF 267.23 FEET, TO A POINT ON SAID PARALLEL LINE SO DRAWN; THENCE ALONG THE SAID PARALLEL LINE SO DRAWN NORTH 88° 51' 33" EAST 516.63 FEET TO THE ACTUAL POINT OF BEGINNING.

PARCEL 2:

A NON-EXCLUSIVE, PERPETUAL EASEMENT, APPURTENANT TO AND FOR THE USE OF THE OWNER OR OWNERS OF PARCEL 1 HEREIN DESCRIBED, AND ANY SUBSEQUENT SUBDIVISION OR SUBDIVISIONS THEREOF, WITH THE RIGHT AND PRIVILEGE TO CONSTRUCT, REPAIR, REPLACE, MAINTAIN AND USE A SEWER

EXHIBIT A

ORDER NO. 101577

90070780

"CONTINUED"

OVER, ACROSS AND UNDER A STRIP OF LAND 5.00 FEET WIDE, TOGETHER WITH THE RIGHT OF INGRESS THERETO AND EGRESS THEREFROM, FOLLOWING DESCRIBED PARCEL OF LAND:

A PORTION OF THAT CERTAIN PARCEL OF LAND DESIGNATED AS PARCEL 1 IN DEED TO SARONI PROPERTIES, INC., A CORPORATION, RECORDED DECEMBER 4, 1958, SERIES NO. AP/127666, BOOK 8865 OFFICIAL RECORDS, PAGE 301, DESCRIBED AS FOLLOWS:

BEGINNING AT THE NORTHWESTERN CORNER OF SAID PARCEL 1; THENCE ALONG THE NORTHWESTERN BOUNDARY LINE THEREOF THE TWO FOLLOWING COURSES AND DISTANCES: SOUTHWESTERLY ALONG THE ARC OF A CURVE TO THE LEFT WITH A RADIUS OF 640.00 FEET, FROM A TANGENT WHICH BEARS SOUTH 30° 34' 38" WEST, A DISTANCE OF 2.75 FEET, AND THENCE SOUTH 30° 20' WEST TANGENT TO THE SAID LAST MENTIONED ARC, 191.98 FEET TO A POINT ON THE SOUTHERN BOUNDARY LINE THEREOF; THENCE ALONG THE SAID LAST MENTIONED LINE SOUTH 88° 51' 33" EAST 5.72 FEET TO A POINT ON A LINE DRAWN PARALLEL WITH THE SAID NORTHWESTERN BOUNDARY LINE AND DISTANT 5.00 FEET SOUTHEASTERLY THEREFROM, MEASURED AT RIGHT ANGLES THERETO; THENCE ALONG THE SAID PARALLEL LINE SO DRAWN THE TWO FOLLOWING COURSES AND DISTANCES: NORTH 30° 20' EAST 189.19 FEET, AND THENCE NORTHEASTERLY ALONG THE ARC OF A CURVE TO THE RIGHT WITH RADIUS OF 635.00 FEET, TANGENT TO THE SAID LAST MENTIONED COURSE 5.04 FEET, MORE OR LESS, TO A POINT ON THE NORTHERN BOUNDARY LINE OF SAID PARCEL 1: THENCE ALONG THE SAID LAST MENTIONED LINE NORTH 88° 51' 33" WEST 5.72 FEET, MORE OR LESS, TO THE POINT OF BEGINNING.

ASSESSOR'S PARCEL NO. 049-1490-002