P & D ENVIRONMENTAL
A Division of Paul H. King, Inc.
4020 Panama Court
Oakland, CA 94611
(510) 658-6916

June 13, 2000
Report 0221.R2

Mr. Wilson Chiu
Ms. Meranda Chang
441 Ralston Street
San Francisco, CA 94132

SUBJECT: OXYGEN RELEASING COMPOUND INJECTION REPORT
Former Cottage Bakery
2497-2507 Grove Way
Castro Valley, California

Dear Mr. Chiu and Ms. Chang:

P&D Environmental, a division of Paul H. King, Inc. (P&D), is pleased to present this report documenting the drilling of 33 soil borings at the subject site, and the injection of Oxygen Releasing Compound (ORC) into those borings. This work was performed on May 31, June 1, and June 2, 2000, in accordance with P&D's Oxygen Releasing Compound Injection Work Plan (Work Plan 0221.W3, dated May 1, 2000). The boring density and proposed concentrations for application of the ORC are in accordance with recommendations set forth by the ORC manufacturer for effective use of ORC. A Site Location Map (Figure 1) and a Site Plan Detail (Figure 2) showing the boring locations are attached with this report.

All work was performed under the direct supervision of an appropriately registered professional. This report is prepared in accordance with guidelines set forth in the document "Tri-Regional Board Staff Recommendations for Preliminary Evaluation and Investigation of Underground Tank Sites" dated August 10, 1990 and "Appendix A - Workplan for Initial Subsurface Investigation" dated August 20, 1991.

BACKGROUND

Based upon site history summaries prepared by others, it is P&D's understanding that from 1955 to 1985, the subject site was occupied by Cottage Bakery. Records indicate that one 10,000 gallon capacity underground storage tank (UST) was installed at the site in 1955. The property was acquired by Cliff Sherwood and subsequently subdivided. Records show that the UST was removed in 1986. Eventually, the western portion of the property was purchased by Tony Marquez, and the eastern portion of the property was purchased by Mr. Wilson Chiu and Ms. Meranda Chang. Review of maps for the site indicate that the UST and dispenser were located in the immediate vicinity of the new property line, with the UST located on the western portion and the dispenser located on the eastern portion.

In December 1999 and February 2000, P&D performed a subsurface investigation consisting of 14 GeoProbe borings in a grid pattern centered around the former UST system at the subject site. The results of this investigation are presented in P&D's Report 0221.R1, "Subsurface Investigation Report," dated February 29, 2000. The field work documented in this report was recommended in the Subsurface Investigation Report, and was based on several conversations with Mr. Scott Seery of the Alameda County Department of Environmental Health (ACDEH).

The results of the investigation showed that elevated concentrations of petroleum hydrocarbons were encountered in soil and groundwater in boring B6, and that the extent of petroleum hydrocarbons was defined by surrounding borings B2, B3, B5, B8, B9, B13, and B14. The surrounding borings were located approximately 15 to 20 feet away from boring B6. A map showing the boring locations is attached as Figure 2.

FIELD ACTIVITIES

On May 31, June 1, and June 2, 2000, P&D personnel oversaw the drilling of 33 boreholes at the subject site, designated as borings I1 through I33. Each boring was drilled to a depth of 25 feet below grade by Vironex, Inc. of San Leandro, California. Different amounts of ORC were then injected into each boring for various depth intervals. The boreholes were all drilled and ORC was injected into the borings using GeoProbe push technology. A total of 1,410 pounds of ORC was injected into the borings. Following ORC injection, the boreholes were backfilled with neat cement grout by Vironex. The locations of borings I1 through I33 are shown in the attached Site Plan Detail, Figure 2.

Prior to performing the field work, a permit was obtained from the Alameda County Department of Public Works (ACDPW), notification was provided to the Alameda County Department of Environmental Health (ACDEH) of the scheduled field date, Underground Safety Alert was notified for buried utility location, and a site health and safety plan was prepared.

Soil Boring and ORC Injection

Borings I1 through I33 were divided into two groups: Area A (borings I1 through I16), where the highest petroleum hydrocarbon (PHC) concentrations were encountered and most of the ORC was injected; and Area B (borings I17 through I33), where lower to undetectable PHC concentrations were encountered and a smaller amount of ORC was injected.

Various amounts of ORC were injected into the borings between the depths of 20 and 25 feet below grade (and in borings I1 through I16 between 16 and 20 feet below grade as well). The ORC was injected using a GeoProbe slurry pump and either a water sampler with an expendable tip or a perforated pipe with an expendable tip.

No measurement was made of the depth to groundwater at the site during drilling activity. It is important to note that boreholes I23, I27, and I30 were all drilled on the western property, which is approximately one foot in elevation lower than the adjacent property to the east, where the remaining boreholes were drilled. This has the effect of making any depth below grade in those holes one foot lower than in the borings on the eastern property. The boring and injection locations are shown on Figure 2. Exact amounts of ORC injected and the depth range of those injections are tabulated in Tables 1 (Area A) and 2 (Area B).

On May 31, 2000, P&D personnel oversaw the boring of boreholes I1 through I3, I5 through I8, I13, I14, and I16. Except for borings I7 and I14, each boring was advanced to 25 feet below grade, where a total of between 59 and 64 pounds of ORC were injected in the interval from 20 to 25 feet below grade. After injecting between 20 to 25 feet, a total of 10 to 11 pounds of ORC was then injected in the interval between 16 and 20 feet below grade.

On June 1, 2000, P&D personnel oversaw the boring of boreholes I4, I9, I11, I12, I22, I24, I25, I28, I29, and I31 through I33. Refusal was encountered at a depth of approximately two feet below the ground surface in borings I9 and I11. As a result of the obstruction encountered in these boreholes, I9 and I11 were moved approximately 2 feet from their original locations. Borings I4, I9, I11, and I12 were advanced to 25 feet below grade, where between 60 and 64 pounds of ORC were injected over the interval of 20 and 25 feet below grade, and then 10 to 11 pounds of ORC were injected between 16 and 20 feet below grade. Additionally, borings I22, I24, I25, I28, I29, and I31 through I33 were advanced to 25 feet below grade and between 10 and 12 pounds of ORC was injected into each boring between 20 and 25 feet below grade.

While injecting ORC into borings I7 and I14 on May 31, ORC was observed to overflow from nearby borings. Injection was stopped, a notation was made of how much ORC had been injected (32 and 21 pounds, respectively) and the remaining ORC was scheduled to be injected at a later time.

On June 1, an attempt was made to complete ORC injection in borings I7 and I14. After placing the Geoprobe back into borehole I7, ORC immediately overflowed from borehole I7 as soon as ORC was injected into the borehole. After the fluid level in the borehole had dropped to several feet below the ground surface, the hole was filled and sealed using neat cement grout. The remaining ORC was injected in a nearby borehole as described below. On June 1, boring I14 was also re-entered, where 40 pounds of ORC was injected between 20 and 22.5 feet below grade and 10 pounds of ORC was injected between 16 and 20 feet below grade.

On June 2, 2000, P&D personnel oversaw the drilling of borings I7A (the replacement for boring I7), I10, I15, I17 through I21, I23, I26, I27, and I30. Several borings were moved slightly from their proposed locations to avoid subsurface obstructions: boring I10 was moved approximately 2 feet to avoid the obstruction observed in I9 and I11; boring I18 was moved approximately 9 inches to avoid a subsurface footing; boring I19 was moved approximately 18 inches to avoid subsurface grout from a prior investigation; and boring I23 was moved approximately 18 inches to avoid a storm drain line. Borings I10 and I15 were advanced to 25 feet below grade, where 64 pounds of ORC were injected over the interval of 20 and 25 feet below grade, and 11 pounds of ORC were injected between 16 and 20 feet below grade. Borings I17 through I21, I23, I26, I27, and I30 were all advanced to 25 feet below grade where between 10 and 17.5 pounds of ORC was injected into each boring between 20 and 25 feet below grade.

Additionally, boring I7A (the replacement boring for boring I7, which was approximately 6 inches from I7) was advanced to a total depth of 22.5 feet below grade, where 34 pounds of ORC was injected between 20 and 22.5 feet below grade and 11 pounds of ORC was injected between 16 and 20 feet below grade. This injection completed the ORC application for boring I7.

GEOLOGY AND HYDROGEOLOGY

Based on review of regional geologic maps from U.S. Geological Survey Professional Paper 943, "Flatland Deposits - Their Geology and Engineering Properties and Their Importance to Comprehensive Planning," by E.J. Helley and K.R. Lajoie, 1979 the subject site is underlain by Late Pleistocene alluvium (Qpa). The alluvium is described as typically consisting of weakly consolidated slightly weathered poorly sorted irregularly interbedded clay, silt, sand and gravel and is considered to overlie bedrock on the alluvial plain marginal to San Francisco Bay. A creek is located immediately to the southwest of the site.

The subsurface materials encountered in the boreholes drilled during prior subsurface investigations at the site (December 9 and 10, 1999, and February 14, 2000, described in P&D's Report 0221.R1) consisted primarily of light brown, orange-brown, gray-brown, brown, or dark brown sandy or clayey silt, silt, sand, silty or clayey sand, clay, and silty or sandy clay. A predominantly clayey sand or sandy layer was encountered between the depths of approximately 22 to 25 feet. Soil moisture varied from dry to saturated, and soil density varied from loose to dense.

In prior subsurface investigations (as mentioned above), groundwater was encountered in boreholes B1, B2, B4, B5, B7, B8, B10, and B11 at a depth of approximately 19 feet below grade, in boreholes B3, B6, B9, and B12 at a depth of approximately 20 feet below grade, and in boreholes B13 and B14 at depths of approximately 20 and 22 feet below grade, respectively. The groundwater flow direction at the subject site is not known, but is suspected to be toward the creek to the southwest of the site.

A detailed discussion of the geology of the area impacted by petroleum hydrocarbons is presented in P&D's Oxygen Releasing Compound Injection Work Plan (Work Plan 0221.W3, dated May 1, 2000).

DISCUSSION AND RECOMMENDATIONS

ORC was injected in a total of 33 boreholes to remediate petroleum hydrocarbons detected in soil and groundwater at the subject site. The extent of petroleum hydrocarbons had been defined during previous investigations. The area affected by petroleum hydrocarbons was divided into two areas identified as Areas A and B. Petroleum hydrocarbon concentrations and the associated injection boring density and ORC concentrations were higher for Area A. In addition, ORC was injected in the unsaturated zone in addition to the saturated zone in Area A.

The rationale for the ORC concentrations and boring density, and a discussion of the geology of the impacted area are presented in P&D's Oxygen Releasing Compound Injection Work Plan (Work Plan 0221.W3, dated May 1, 2000). Based on the successful injection of the ORC at the designated locations, P&D recommends that no further action be performed and that case closure be requested.

DISTRIBUTION

Copies of this report should be distributed to Mr. Scott Seery at the ACDEH, and to Mr. Chuck Headlee at the San Francisco Regional Water Quality Control Board. Copies of the report should be accompanied by a transmittal letter signed by one or both of the owners of the subject site.

LIMITATIONS

This report was prepared solely for the use of Mr. Wilson Chiu and Ms. Meranda Chang. The content and conclusions provided by P&D in this assessment are based on information collected during our investigation, which may include, but not be limited to, visual site inspections; interviews with site owner, regulatory agencies and other pertinent individuals; review of available public documents; subsurface exploration and our professional judgement based on said information at the time of preparation of this document. Any subsurface sample results and observations presented herein are considered to be representative of the area of investigation; however, geological conditions may vary between borings and may not necessarily apply to the general site as a whole. If future subsurface or other conditions are revealed which vary from these findings, the newly-revealed conditions must be evaluated and may invalidate the findings of this report.

This report is issued with the understanding that it is the responsibility of the owner, or his representative, to ensure that the information contained herein is brought to the attention of the appropriate regulatory agencies, where required by law. Additionally, it is the sole responsibility of the owner to properly dispose of any hazardous materials or hazardous wastes left onsite, in accordance with existing laws and regulations.

This report has been prepared in accordance with generally accepted practices using standards of care and diligence normally practiced by recognized consulting firms performing services of a similar nature. P&D is not responsible for the accuracy or completeness of information provided by other individuals or entities which is used in this report. This report presents our professional judgement based upon data and findings identified in this report and interpretation of such data based upon our experience and background, and no warranty, either express or implied, is made. The conclusions presented are

based upon the current regulatory climate and may require revision if future regulatory changes occur.

Should you have any questions, please do not hesitate to contact us at (510) 658-6916.

Sincerely,

P&D Environmental

Greg Brown
Project Scientist

Paul H. King
California Registered Geologist
Registration No. : 5901
Expires: 12/31/01

cc: Mr. Scott Seery, Alameda County Department of Environmental Health
Mr. Chuck Headlee, San Francisco Bay Regional Water Quality Control Board
Mr. Kent Woodell, KTW Properties, Inc.

Attachments: Tables 1 and 2
Site Location Map (Figure 1)
Site Plan Detail (Figure 2)

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TABLE 1
SUMMARY OF OXYGEN RELEASING COMPOUND (ORC) INJECTION DATA
Borings I1 through I16 (Area A)
(ORC Injected May 31, 2000 and June 1 and 2, 2000)

Injection Point	Total ORC Injected (pounds)	Injection Interval (feet below grade)
I1	11	16 to 20
	64	20 to 25
I2	11	16 to 20
	64	20 to 25
I3	11	16 to 20
	64	20 to 25
I4	10	16 to 20
	60	20 to 25
I5	11	16 to 20
	64	20 to 25
I6	11	16 to 20
	64	20 to 25
I7	32	22.5 to 25
I7A	11	16 to 20
	34	20 to 22.5
I8	11	16 to 20
	64	20 to 25
I9	11	16 to 20
	64	20 to 25
I10	11	16 to 20
	64	20 to 25
I11	11	16 to 20
	64	20 to 25
I12	11	16 to 20
	64	20 to 25
I13	10	16 to 20
	63	20 to 25
I14	10	16 to 20
	61	20 to 25
I15	11	16 to 20
	64	20 to 25
I16	10	16 to 20
	59	20 to 25

TABLE 2
SUMMARY OF OXYGEN RELEASING COMPOUND (ORC) INJECTION DATA
Borings I17 through I33 (Area B)
(ORC Injected May 31, 2000 and June 1 and 2, 2000)

Injection Point	Total ORC Injected (pounds)	Injection Interval (feet below grade)
1I7	17.5	20 to 25
I18	17.5	20 to 25
I19	17.5	20 to 25
I20	17.5	20 to 25
I21	17.5	20 to 25
I22	10	20 to 25
I23	10	20 to 25
I24	10	20 to 25
I25	10	20 to 25
I26	17.5	20 to 25
I27	10	20 to 25
I28	12	20 to 25
I29	10	20 to 25
I30	12	20 to 25
I31	12	20 to 25
I32	12	20 to 25
I33	12	20 to 25

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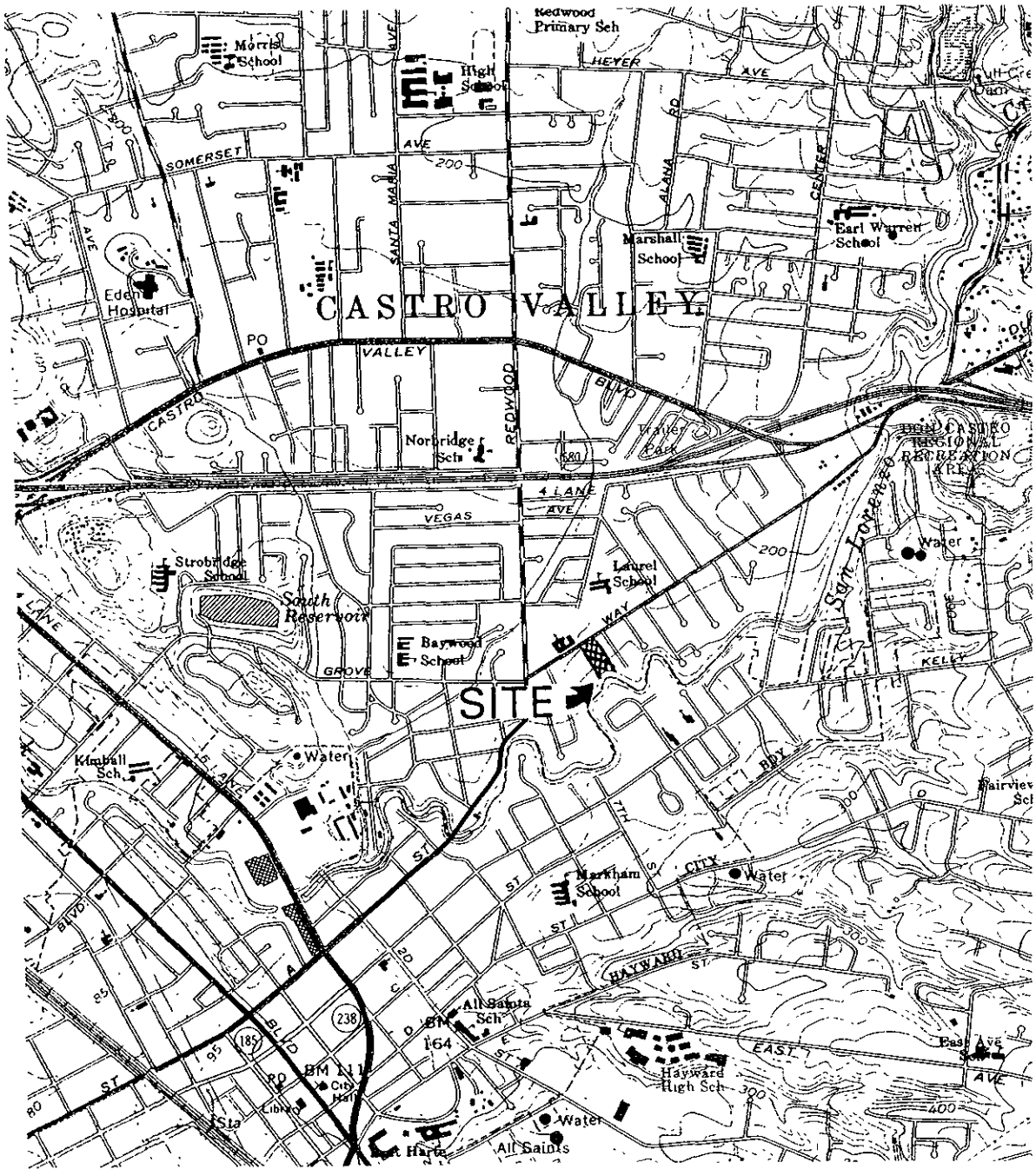

Base Map From:
U.S. Geological Survey
Hayward, Calif.
7.5 Minute Quadrangle
Photorevised 1980

Figure 1
SITE LOCATION MAP
Lands of Chiu and Chang
2497-2507 Grove Way
Castro Valley, California

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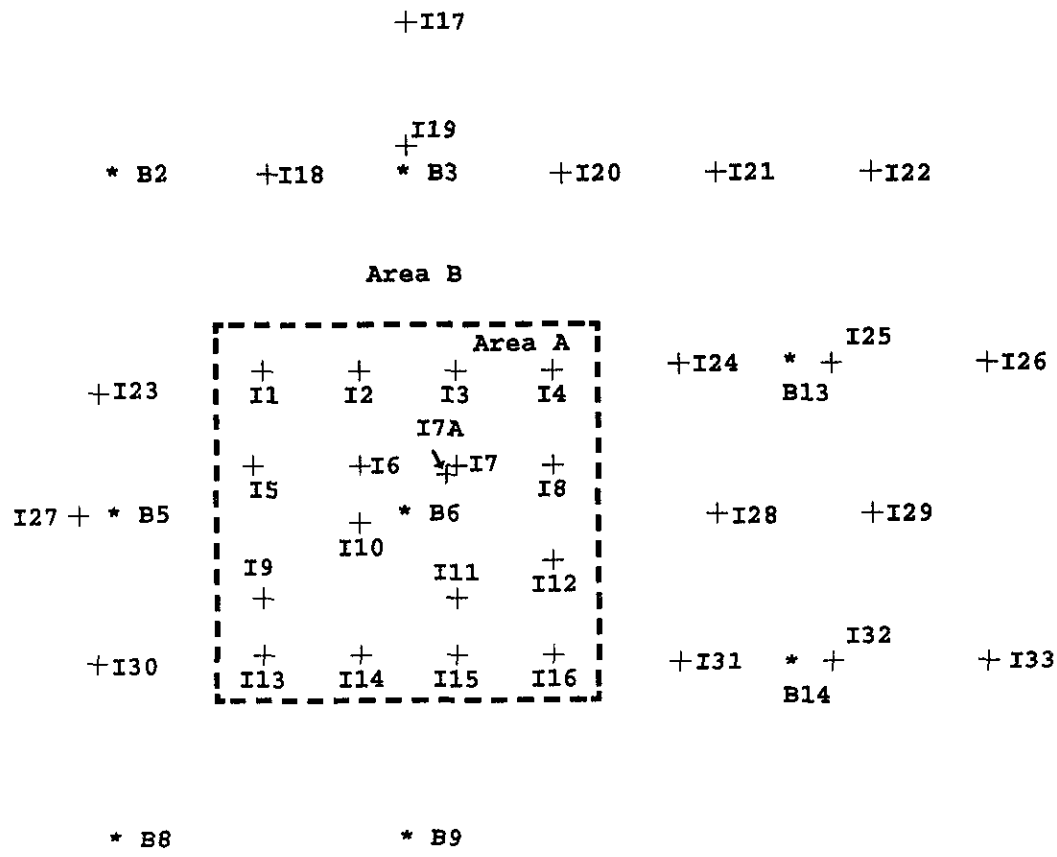

Legend
* Existing Boring Location
\+ ORC Injection Location
▬ ▬ Approximate Area Borders

Base Map From:
P&D Environmental
March 2000

0 5 10
SCALE IN FEET

North

Figure 1
SITE PLAN DETAIL
Former Cottage Bakery
2497-2507 Grove Way
Castro Valley, California