General Services Administration

Preliminary Report on Tank Removal, Site Investigation, Additional Investigation & Tank Closure Plans

Prepared by Tim K. Smith (TKS Consulting, Ltd.)

May, 1994

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SUMMARY OF INVESTIGATION One 4,000-gallon gas/diesel UST and one 5,000-gallon gas UST.

Tank removals were implemented on one underground waste oil tank and one underground gasoline fuel tank. In addition, closure in place of two 10,000 gallon weathered diesel heating fuel tanks was begun.

The heating fuel tanks were to have been closed by pumping out the remaining contents of product and sludge, steam cleaning the tanks and backfilling them with cement slurry. This proved impractical due to interfering sand, rock and clay in the tanks.

Prior to tank removals, 6 soil borings, 3 of which were converted to monitor wells, were constructed to collect contaminant, geologic, and hydrologic data prior to tank excavation.

Soil sampling during the boring and tank removal process indicated the areas of tanks #1 and the area of tanks #3 and #4 have associated contamination primarily contained below the water table.

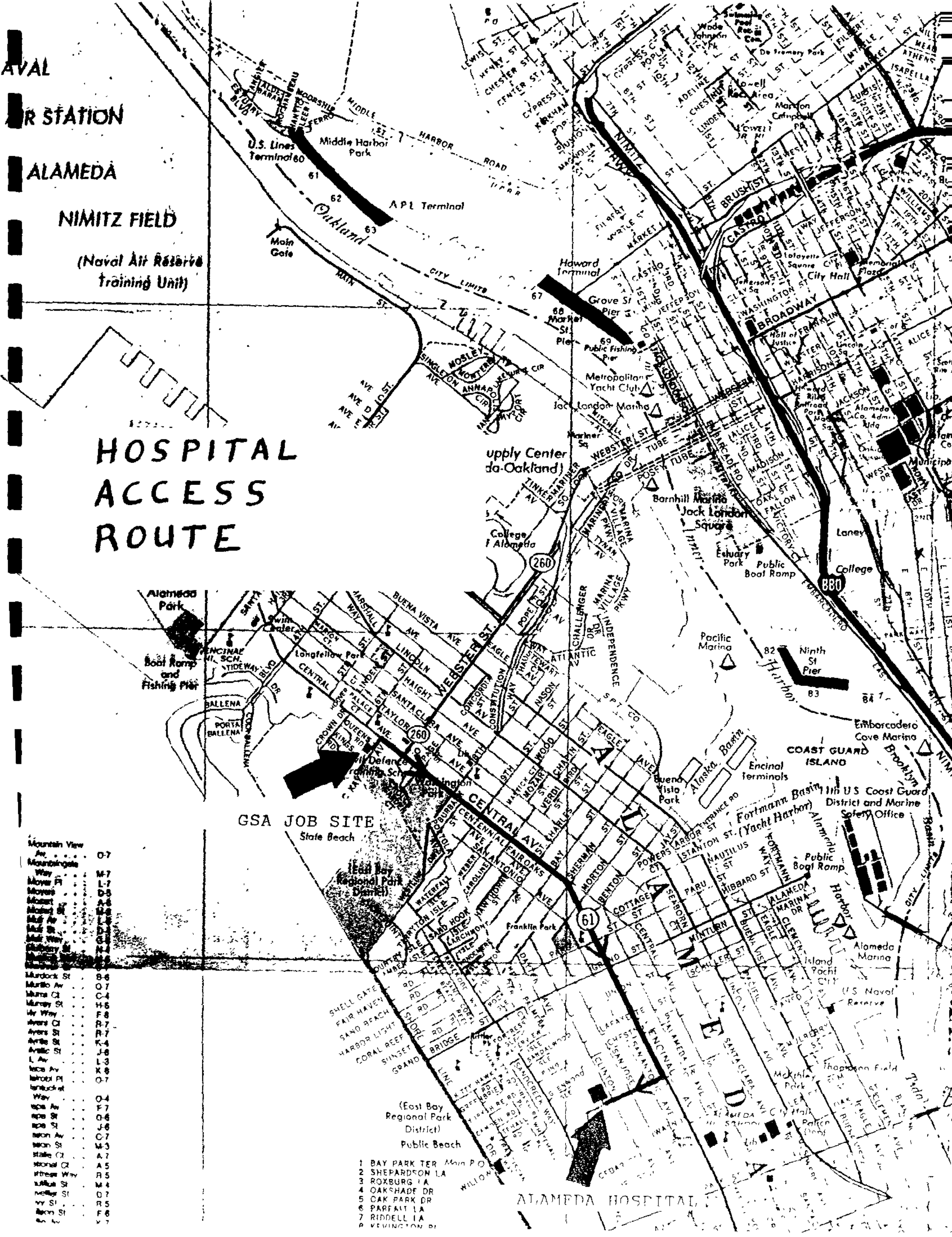
Additional work is recommended in the form of a proposed work plan.

SITE LOCATION, OWNERSHIP AND CONTACT

Site Location: Alameda Federal Center, 620 Central Avenue, Alameda, California

Site Owner: General Services Administration, Design & Construction Division - 525 Market Street, 31st Floor, San Francisco, CA 94105
For information call: Beverly Chin, Tel: (415) 744-5665

Site Contact: T&T EARTH SERVICES:
Tim K. Smith - P.O. Box 1618, Sutter Creek, CA 95685
Telephone: (209)267-0903 or
Thomas H. Hunt, III - P.O. Box 1121, Jackson, CA 95642
Telephone: (209)223-2811



NAVAL
AIR STATION
ALAMEDA
NIMITZ FIELD
(Naval Air Reserve Training Unit)
HOSPITAL
ACCESS
ROUTE
GSA JOB SITE
ALAMEDA HOSPITAL

INVESTIGATORS QUALIFICATIONS

The project is being subcontracted from Serrano & Cone, Inc., general engineering contractors, by T & T EARTH SERVICES, a partnership between Hunt Drilling Co., Inc. and TKS Consulting Ltd. Hunt Drilling operates as a Class A General Engineering Contractor with Haz Mat Certificate and C-57 Water Well License # 563592. TKS Consulting operates with Tim K. Smith, Reg. Geologist #4013 and Registered Environmental Assessor #00291. Hunt has operated in California for 14 years and TKS has operated in California for 8½ years.

SITE MAPS

Included in the work completed is a location map showing the site in relationship to The City of Alameda and a site location map including the soil borings, monitor wells and tank locations.

PREVIOUS INVESTIGATIONS

Sixteen previous geotechnical borings were completed by Trans Pacific Geotechnical Consultants. Field screening showed hydrocarbon vapors and detectable hydrocarbon odor in the borings in the vicinity of tank #3. There were thought to be three underground tanks on site, two diesel and one gasoline.

SITE TOPOGRAPHY, GEOLOGY AND HYDROLOGY

GEOLOGY: The area is underlain by loose sands with abundant shell material to about 12 feet. This is probably both fill and native material. Underlying the sand is silty sand and clay units with lower permeability than the overlying sands. These are probably native soils.

TOPOGRAPHY: The area is a relatively flat tidal plane and falls off slowly to San Francisco Bay some 500 to 1000 feet to the southwest.

REGIONAL HYDROLOGY: According to the geotechnical borings completed and included in the appendices, the ground-water was 4 to 5½ below surface. The shallow surface units appear to have high permeability and therefore significant water flows are suspected. Tidal activity may affect groundwater in this area. The recent drilling confirmed onsite groundwater at about 5 feet in all borings and highly permeable flowing sands below the water table.

TANK AND PIPING LAYOUT

The tank layout is shown on the site location map. The investigation showed four tanks on the site. The details of these are as shown on Table 1.

CURRENT SITE AND TANK STATUS

Tanks 1 and 2 were removed on 1/27/94.

(1,000-gallon gas/diesel) Tank # 1 was in poor condition and apparently had been breached by a corrosion beneath the water table which was at approximately 5 feet below surface. Moderate hydrocarbon staining was noticed at the water soil interface near the fill end (east). A report of unauthorized discharge was made by Tim Smith.

5,000-gallon gas UST → Tank # 2 was in moderate to poor condition and appeared to have holes which had opened up on removal by the iron crust peeling off in weakened areas. No hydrocarbon odor or obvious staining was observed at the water soil interface.

TABLE 1 - TANK SUMMARY

Tank #	Construction	Size gallons	Piping	Tank condition on removal	Contents
1	steel	1000	steel removed	poor w/holes	waste oil had been gas
2	steel	6150	steel removed	mod-poor w/crust covering holes	no-lead gas
3	steel	10,000	steel removed to utility ? trench	extremely poor (not removed)	bunker "C" /diesel
4	steel	10,000	steel removed to utility ? trench	extremely poor (not removed)	bunker "C" /diesel

Number 1 and 2 tanks, tanks' products, and the tanks' rinsate were manifested and shipped to Erickson, Inc., 255 Parr Blvd., Richmond, Ca., 94801.

Upon excavating the reported location of tank # 3, which was thought to be a 550 gallon diesel tank, a 10,000 gallon steel tank was found. This tank was essentially full of extremely heavy black hydrocarbon, water and greasy, sandy sediment on the bottom.

As the tank contents were unrecognizable, the tank was initially treated as a leaking waste oil tank. Further characterization of the contents showed only weathered #3 diesel or bunker "C" fuel and little else.

Upon further excavation in the area, an additional 10,000 gallon tank in similar condition and with similar contents to Tank #3 was found. This tank is called Tank #4.

Due to a nearby structural retaining wall, both #3 and #4 were to be pumped out and backfilled with cement slurry.

These tanks had been decommissioned around 1950. The tanks had been partially filled with sand and some other apparently inert material and covered, leaving the fill spouts open. Upon initial investigation (opening caps at both ends of tank #3 and the east end of tank #4), it appeared that the heavy hydrocarbon and sand might be pumped out by standard methods (Erickson Inc. and Petroleum Refineries Corporation). Upon attempting to remove contents with a commercial steam cleaner and large vacuum truck, it was discovered that the tanks also contained scattered rock up to 3 inches in diameter. This rock apparently entered via the fill holes which were left uncapped.

In tank # 4, the west end contains a semi-indurated clay like material about 12 inches thick capping the hydrocarbon rich sand and water. This "clay cap" does not persist to the east end of the tank where initial examination was made.

The result is that the rocks plug the vacuum hose and the hardened clay can not be pumped. (pumping for 5 hours resulted in removing about 2000 gallons of fluid sludge and sand from the two tanks). At this rate it would take approximately 50 hours to pump the tanks even if we could pump the solids.

As a result of this, the decision was made to terminate pumping after five hours when the most easily pumped liquids and sand slurry had been removed.

It now remains necessary to design some method to remove the contaminated sand, clay and rock from the tanks so they may be filled with inert material for closure or to remove the contamination from these fill materials.

It is felt that given the condition of the tanks and their size, if they are opened up on the top to access the contaminant they would be likely to collapse.

The removed tank product was manifested and shipped to Petroleum Refinery Corporation.

PRE-TANK REMOVAL SAMPLING PROCEDURES AND EQUIPMENT

In order to characterize and estimate groundwater flows for possible tank pit dewatering operations, a temporary monitoring well was constructed at each tank site. Contamination in the soil was evident at the water table associated with the tank sites #1 and #3, 4.

At tank #1, 2 soil borings were completed and 1 (boring #1) was converted to a monitor well (MW-1). Boring #2 was in the tank pit within 18 inches of the tank.

At tank 2, there were 3 borings (boring 3, 4 & 5). Boring #5 was converted to a monitoring well (MW-2) for ground-water quality work. Boring #3 was within 12 inches of the west end of tank 2 and boring 4 was within 18 inches of the east end of tank 2.

- During tank removals, bottom of tank pit #1 was at ~ 6 to 7' bgs. Bottom of tank pit #2 was at ~ 10 to 11' bgs.

TABLE 2
PRE-TANK REMOVAL BORINGS

BORING	DEPTH IN FT.	SAMPLE LOCATIONS FT.	TANK TESTED	BORING STATUS
SB-1	15.5	5, 10.5, 14.5	1	MW-1
SB-2	9	8.5	1	GROUT FILLED
SB-3	11.5	10.5	2	GROUT FILLED
SB-4	11.5	5, 10.5	2	GROUT FILLED
SB-5	11.5	5, 10.5	2	MW-2, DAMAGED BY SITE ACTIVITY
SB-6	15.5	5, 10.5, 14	3	MW-3

The soil borings were completed by Hunt Drilling Co. with an 8 inch hollow stem auger drill (Ingersoll Rand A 200).

Upon completion of the borings, they were either grouted with neat-cement slurry or converted to monitoring wells. Soil boring spoils were contained on site in DOT drums until properly disposed of with the tank pit spoils.

GEOLOGY OF THE BORINGS

Borings 1 through 5 were within 60 feet of each other and surrounded tank 2 on the north, east and west and tank 1 on the south and east.

The material encountered in these borings was very uniform. It consisted of medium grained (.25-.5mm) clean sand to 5 feet with a transitional zone from unsaturated to saturated sand from 4.5 to 5.5 feet in depth. At the water table in borings 1 and 2, near tank 1, hydrocarbon odor and stain was noticed at 5 feet. FID readings were in excess of 100 ppm in hole 1. Below the water table the sand went to a clean, fine (.1-.25mm) green/grey sand with local areas of marine shell fragments. Heaving sand was common and reduced the depth of MW-1. ← tank 1

No holes encountered clayey zones or aquitards of consequence. The uniform character of the borings leads me to believe that the material is not fill, or if so, the fill is extremely uniform in this area.

Boring #6 was converted to a monitoring well (MW-3) near tanks 3 and 4. The geology of this boring showed a section differing substantially from those drilled near tanks 1 and 2.

This hole contained brown clayey gravel from surface to 3.5 feet, a clayey zone from 3.5 to 5 feet, saturation at 5' and heavy hydrocarbon contamination from 5 to 6 feet in a slimy clayey gravel. This unit continued to 11 feet. A moderately clean, olive grey sand similar to that near tanks 1 and 2 was encountered from 11 to 15.5 feet.

MONITOR WELL CONSTRUCTION

The wells were constructed with 2" Schedule 40 PVC pipe with flush joint threads. The interval from approximately 10 feet below water table to 4 feet below surface was screened with .020 inch factory slotted pipe. Filter pack was installed through the hollow stem from the bottom of the hole to two feet above the screened interval. The filter pack used was a #3 Lonestar sand.

Approximately six inches of bentonite chips were applied above the filter pack and wetted with potable water.

The remainder of the hole was filled with a bentonite, neat cement grout. A traffic rated, water tight, bolt down monitor well designated monument was installed over a water tight, locking top plug.

After at least forty eight hours of setting, the wells were developed by use of a surge block and bailer.

The wells were then purged of three to five well volumes, until the water cleared and the temperature and Ph was stabilized. The purge water was contained on site in DOT 55 gallon drums until proper disposal is determined. The purge water was contained on site in DOT drums until properly disposed of with the tank rinsate.

HYDROLOGY

Ground water flows appear to be substantial. This is evidenced by flowing sand and moderate to rapid recharge of wells during development activities.

Groundwater gradient was not determined. It is suspected that the area is subject to tidal influence. However, a 24 hour monitoring of wells 1,2 and 3 showed a fluctuation of less than .1 foot max to min. This paradox is not yet understood.

SAMPLE HANDLING AND ANALYSIS

The soil samples were taken with a 1½ inch split spoon sampler lined with three six-inch brass sleeves, driven ahead of the auger by a standard 140 pound drop weight.

Dependent upon the position of the sample in relationship to the water level, either the middle or bottom sleeve was taken for analysis. The sleeve just below the saturation line was sampled. The adjacent brass tube was checked for vapors with a FID-OVA, placed in a plastic bag and sealed for geologic logging purposes.

The sample tubes for analysis were capped with aluminum foil under plastic end caps, taped, labeled and put on blue ice for shipment to the lab at 4°C under chain of custody.

The soil samples were run for TPH-g and BTEX combined (Cal luft, detection limit 1.0 ppm/btex-8020, detection limit .005 ppm), and TPH-d (mod. 8015-D, detection limit 1.0 Ppm). In addition samples at the waste oil tanks #1 and #3 were analyzed for oil and grease by method 413.2, pcb's by method 8080, semi volatile by 8270, halogenated volatile organics by 8010, and metals by 6010.

Water samples were taken at monitoring well MW-1 after development. After examination for free product with a clear PVC bailer, the well was purged of three well volumes with a bailer and sampled by a clean disposable PVC bailer.

MW-2 was damaged before it could be sampled and MW-3 had sticky globs of free product in it and was therefor not sampled.

Water samples were stored and shipped with zero head space at 4° C to the lab under chain of custody. They were analyzed for TPH-G/BTEX (CAL LUFT, D. L. 50.0 PPB/BTEX-8020, D.L. .5 PPB), TPH-D (mod. 8015, D.L. 50 PPB) and halogenated volatile organics by method 8010.

QUALITY CONTROL

All equipment was steam cleaned after each boring. The split spoon samplers were washed with TSP, double rinsed with distilled water between each sampling and loaded with clean brass sleeves after they were machine washed with TSP. All rinsate was containerized in DOT 55 gallon drums for appropriate disposal.

The lab to be used was CALIFORNIA LABORATORY SERVICES in Sacramento. They are a California certified lab #1233. As such, there were method blanks and surrogates run and reported on all sample procedures per CAL LAB's Quality Assurance Program.

Tim Smith, registered Geologist #4013 and R.E.A. #00291, served as on-site quality control officer.

TANK REMOVAL

On January 27, 1994 both #1 and #2 tanks were removed with a large excavator.

Removal was completed after inerting and purging of the tanks reduced the oxygen level to 3.5% in tank 1 and 3.5% in tank 2 with LEL in tank 1 at 0% and 7% in tank 2.

The removals went smoothly and the tanks were examined upon their removal.

Tank #1 had contained gasoline as evidenced by abandoned product lines running from the tank to beneath the fuel pump.

At some point in time it had been converted to a waste oil tank with direct filling through the fill riser pipe.

When removed, tank 1 had numerous holes along the bottom of the east (fill) end and along the high-water/ soil interface line (see photos). Stained soil at the water interface line and around the fill spout was evident. Hydrocarbon odor was moderate.

Tank 2 had holes in several location that were exposed after iron encrustations were removed from the tank skin. It is felt that the tank had not been completely breached prior to removal (see photos). No significant staining or odor was notices in the tank pit away from a small amount encountered at surface around the fill spout.

The tanks were loaded on a flat bed and manifested to Erickson Inc. in Richmond, California.

Samples were taken in the tank pit bottoms after tank removal as directed by ACEHS-HAZ MAT staff. Samples taken through the borings prior to tank removal were located and approved as adequate representations of the character of the contamination on site.

SPOILS STORAGE AND DISPOSAL

Three classes of tank pit spoils were segregated into lots during tank removal.

Lot 2: These were the highly contaminated soils from near the fill spout and adjacent to tank #1. These were characterized and disposed of under manifest at Forward Landfill at Patterson, California due to samples containing in excess of 1000 ppm hydrocarbon as motor oil. There was approximately 15 yards of this material.

Lot 1: These spoils were the materials taken off of the top of tank 1 above the water line and away from the fill spout and the material taken from beside and just above tank #2. The pit and spoils pile samples of this material showed hydrocarbon levels acceptable for disposal at BFI at Vasco Road in Livermore. Approximately 45 yards of this material was manifested and disposed of at this facility.

Lot 3: This was about 20 yards of clean surface material which had covered tank #2. It was characterized and shipped to Tri City Landfill. No manifest was required for this material. Included is the approved profile for disposal and truckers record of transport.

Otl & (Not acceptable analyses)

TABLE 3 - SOIL BORING SAMPLE RESULTS

SAMPLE NUMBER	BORING/ PIT	TYPE/FT DEEP	TPH-G MG/KG	B/T/E/X UG/KG	TPH-D MG/KG	413.2 MG/KG	8080 PCB MG/KG	8270 MG/KG	6010 MG/KG CD/CR/NI /PB/ZN	8010 UG/KG
B1-5 mw-1	B1/MW-1	TUBE/ 5	ND	ND	1.3	ND	ND	ND	ND/10/9/ ND/21	ND
B1-10.5	B1/MW-1	TUBE/ 10.5	ND	ND	12.0	100.0	ND	ND	ND/33/32 /8.7/58	ND
B1-14.5	B1/MW-1	TUBE/ 14.5	ND	ND	1.1	ND	ND	ND	ND/36/32 /ND/38	ND
B2-8.5	B2	TUBE/ 8.5	. 1.5	ND/20/ 11/75	57.0	120.0	ND	ND Flouranthene	ND/15/11 /ND/14	(TCE)7
B3-10.5	B3	TUBE/ 10.5	ND	ND	NR	NR	NR	12/26(A) Pyrene	NR	NR
B4-5	B4	TUBE/ 5	ND	ND	NR	NR	NR	NR	NR	NR
B4-10.5	B4	TUBE/ 10.5	ND	ND	NR	NR	NR	NR	NR	NR
mw-2 B5-5	B5	TUBE/ 5	ND	ND	NR	NR	NR	NR	NR	NR
B5-10.5	B5	TUBE/ 10.5	ND	ND	NR	NR	NR	NR	NR	NR
B6-5 mw-3	B6	TUBE/ 5	ND	ND	. 5100	. 19000	ND	ND	ND/14/ 8.5/ND/ 85	ND
B6-10.5	B6	TUBE/ 10.5	ND	ND	17	30	ND	18/35(A)	ND/25/21 /17/80	ND
B6-14	B6	TUBE/14	ND	ND	18	15	ND	ND	ND/29/28 /ND/22	ND
	MISC.	SAMPLES								
TOP SLUDGE	TANK 3	GRAB	ND	ND	~~49000~~ 490,000	600000	ND	ND	ND	NR
BOTTOM SED.	TANK 3	GRAB	ND	ND	4000	12000	ND	ND	ND metals	ND/22/33 /10/47
SED. TANK 4	TANK 4	GRAB	ND	ND/ND/ 12/64	220		NP	NR	NR	ND/17/21 /ND/15
GSA PL SPILL	TANK 4	GRAB	11000	11000/ 75000/ 51000/ 250000	170000	NP	NR	NP	NR	NR

SPOILS SAMPLES

SAMPLE NUMBER/ TANK	SPOILS PILE/ APPROX. VOL.	TYPE	TPH-G MG/KG	B/T/E/X UG/KG	TPH-D MG/KG	413.2 MG/KG	8080 PCB MG/KG	8270 MG/KG	6010 MG/KG 17 METALS	8010 UG/KG
GSA SP-1-1 TANK 1	1/ 67 CU.YD.	6 PT. COMP	2.5	ND/5.3/ 9.7/15	D=ND MO=23	NR	NR	NR	NO TITLE 22 STLC	NR
GSA SP-1-2 TANK 1	1/ 67 CU.YD.	6 PT. COMP	36	ND/77/ 240/ 1600	D=ND MO=390	NR	NR	NR	NO TITLE 22 STLC	NR
GSA SP-2-1 TANK 1	2/ 14.5 CU.YD.	6 PT. COMP	ND	ND	D=ND MO=3200	NR	NR	NR	NO TITLE 22 STLC	NR
GSA SP-3-1 TANK 2	3/ 19.5 CU.YD.	6 PT. COMP	ND	ND	D=ND MO=30	NR	NR	NR	NO TITLE 22 STLC	NR

TANK REMOVAL SAMPLES

SAMPLE NUMBER/ TANK	LOCATION	TYPE	TPH-G MG/KG	B/T/E/X UG/KG	TPH-D MG/KG	413.2 MG/KG	8080 PCB MG/KG	8270 MG/KG	6010 MG/KG 17 METALS	8010 UG/KG
GSAT1-W7/ TANK 1	TANK PIT WEST END BOTTOM AT 7 FT.	TUBE GRAB	ND	ND	D=ND MO=2.9	NR	NR	NR	NR	ND
GSAT2-M11 TANK 2	TANK PIT BOTTOM CENTER 11 FT.	TUBE GRAB	ND	ND	D=ND MO=5.1	NR	NR	NR	NR	NR
GSA PL-1	TANK 2 PRODUCT LINE	TUBE GRAB	ND	ND	D=ND MO=3.1	NR	NR	NR	NR	NR

D= DIESEL ND= NON DETECT NR= NOT RUN
MO= MOTOR OIL

TABLE 4
GROUND WATER SAMPLE TABLE

WELL #	SAMPLE #	SAMPLE DATE	TPH-G uG/KG	TPH-D uG/KG	B/T/E/X uG/KG	8010 uG/KG
MW-1	1G	1/28/94	ND		.6/ND/ .4/ND	
MW-1	1D	1/28/94		ND		
MW-1	1HV	1/28/94				1,2-DCE=1.5 ~~1,1,2,2-~~ ~~TTCA~~=1.0 = PCE TCE=3.0
MW-3	NOT RUN	1/28/94		FREE PRODUCT BLACK OIL		

CONCLUSIONS OF INVESTIGATION

It was discovered that there are two areas of contaminated soil and ground water on the site.

The first is the area of tank #1. This appears to be weak contamination consisting of motor oil, weathered gasoline and some type of halogenated solvent which was probably disposed of in the waste oil tank. The contamination appears to be vertically confined to the material below the water table in the vicinity of tank 1 and 2. The lateral extent of this contamination has not been outlined but the level of contamination suggests a small area of contamination is likely.

The second area is the area surrounding tanks 3 and 4. This contamination appears to consist of heavy hydrocarbons of the bunker "C" type or weathered #3 diesel fuel which was used for firing the old heating plant on site. This characterization agrees with the analysis completed of the product from within the tanks.

This heavy hydrocarbon appears to be concentrated at the top of the water table but is also encountered in low levels to at least 14 feet in the MW 3 boring. These tanks have apparently been leaking oil for some time due to the tarry consistency of the product found in the boring. Neither the vertical nor lateral extent of this contamination has been outlined.

The condition of tanks #3 and #4 and the character of the flowing sand below the water table validate closure in place for the proper procedure to close these tanks.

RECOMMENDATIONS

The following are recommendations made to address the remaining problems present on the project site. In conjunction with this Report of Investigation a proposed work plan is herein submitted to cover;

(1) decontamination of tanks #3 and 4 and,

(2) ground water gradient determination and,

(3) outlining contamination surrounding tank #1 and tanks #3 and 4. How about tank #2?

TANK 3 AND 4 DECONTAMINATION

In order to be able to close the site around tanks 3 and 4 the remaining fluids and solids in the tanks should be remediated to an acceptable level in order to eliminate further discharge to the ground water.

It appears that the most effective way to do this will be by bioremediation of the tank contents in place. Included in appendix 4 is a case study of Bio-Converters remediation product along with MSDS sheets on the Product and the nutrient additive. This product is new on the market and we (TKS Consulting/ T & T Earth Services) have completed one independent pilot study on diesel range contaminant hydrocarbons with impressive results. Bio-Converters have completed numerous tests and have obtained closures on heavy and light hydrocarbon remediations.

Treatment of the tanks in place will, in addition to solving the tank cleanup problem, serve as a pilot study for possible remedial treatment of the surrounding contaminated soil and groundwater.

Tank innoculation

The tanks will be inoculated with approximately 1000 gallons of microbe-nutrient mix. This treatment mix will be injected by pressurized pumping to the bottom of the tank sludge and by direct application to the surface of the tank contents. The remaining void in the tank will be filled to the outside water table level with potable water.

Process conditions and events

The process in the tank will progress in layman's terms as described by Mr. Jerry Finney of Bio-Converters, the product developer.

"Utilizing the existing tanks, we will add approximately 1,000 gallons of water containing the microbes and enzymes and nitrogen phosphorus potassium (fertilizer). There must be a few inches of freeboard maintained.

After innoculation with our product, let stand at 14 days and take samples for turbidity and check for free product and for nitrates and ammoniacal nitrogen. The cloudy water and any free product should be pumped out and placed in an above-ground tank to finish breaking down the TPH. This material can then be hauled to a sewer plant or beneficial use. The above ground tank [product conversion] should be completed in approximately 7 days. The underground tank will need to be filled and emptied every 7 days and nutrients added at that time. A considerable amount of material should be removed in 30 days."

Tank and process maintenance (TKS)

In order to expedite the process and maintain the proper nutrient content in the tank, the mixed lighter fractionated hydrocarbons, tank water and nutrient will be pumped off every 7 days and collected in Baker Tank(s).
The nutrient level will then be increased in the tank to expedite the degradation of the remaining hydrocarbon.

Planning to discharge?

The water mix collected in the Baker Tank will continue to biodegrade in the Tank and should reach acceptable discharge levels or be reusable as liquid fertilizer within 1 to 2 weeks after final liquid transfer. It is expected that less than 20,000 gallons of liquid will be recovered.

Verification sampling

Samples will be collected of both tanks' bottom sludge and fluids by compositing samples from both ends of the tanks prior to the innoculation. Subsequent to the innoculation, replicate sampling will be conducted at approximately 10 day intervals starting at 14 days after the innoculation.

Sample analysis

The samples collected will be analyzed for TRPH by method 418.1 and BTEX to cover the range of hydrocarbons detected in the original tank product characterization.

Interim reporting

Within 14 days of the receipt of the third post-innoculation sampling, an interim progress report will be submitted to The ACEHS-HAZ MAT Division.

Where required, additional innoculation may be completed in a similar fashion to the original innoculation.

Cleanup Level

It is proposed to clean up the tank contents to less than 100 mg/kg in the tank solids and 50 mg/l in the tank fluids. The liquid stored in the Baker Tank is expected to go to less than 1 ppm TRPH.

The tanks will then be completely filled with cement grout and the liquid residue disposed of appropriately.

GROUNDWATER GRADIENT DETERMINATION

Well layout

The contamination in the tank 1 and 2 area is approximately 520 feet from tanks 3 and 4.
The separation distance and the high potential for ground water channeling in and around fill areas on the site will require separate ground water gradient determination for each tank area.

It is proposed to complete two additional monitoring wells at each tank site. The construction of these well will be necessary to plan for additional site investigation to determine the quantity and distribution of contaminant at both tank areas.

Well construction, development and sampling

The additional wells will be constructed, developed and sampled at 5 foot intervals as described under previous pertinent sections of the investigation portion of this report. The proposed wells will be located as shown on the detailed site location map.

Well surveying

The wells will be surveyed to within .1 foot of horizontal separation and .01 foot of vertical elevation. The depth to the water table will be measured to within .01 foot. The groundwater depth measurement will be made at approximately the mid point of rising and falling tides to determine tidal effects on the gradient.

ADDITIONAL SOIL BORINGS

Tank #3 and #4 testing

Additional soil borings will be required to accommodate the regulations for in place tank closure on tanks #3 and #4.

A soil boring will be completed on both tanks to check contaminant at the tank bottom elevation. The tanks are underlain by concrete ballast slabs that will prevent boring to two feet below tank bottom centers. To accommodate the requirements soil borings will be located directly adjacent to the tanks and sampled at the tank bottom level which is at 14.1 feet. The samples will be taken at 13.5 to 14 feet.

In addition the tank 3,4 area will be within a larger area of groundwater/soil investigation and remedial action.

These samples will be analyzed for constituents found in the tank product characterization (Bunker "C" fuel oil). The most appropriate analysis for this will be EPA ~~method 418.1~~ 5520 and BTEX by EPA method 8020.

These borings will be completed under the procedural and operational protocol of the past borings as summarized in the investigation portion of this report.

Additional contamination investigation

Based on determination of ground water flow directions at both contamination areas, a soil boring program should be initiated to outline the area of contamination surrounding both the tank 1 and the tank 3,4 area.

← when will this phase be done

This work should consist of soil borings and hydropunch sampling to outline the areas of contamination. The work would be expedited by a portable field lab on site to give immediate direction to the sample location selection.

The borings completed to date show the heaviest contamination at the water soil interface at about 5 to 6 feet below surface.

This floating/interface zone should be sampled by a split spoon driven ahead of the auger.

The focus should be on the floating/interface zone first making the assumption that the ground water associated with this area is going to be contaminated to some level. After defining the limits of floating/interface zone contamination, select areas within this zone should be checked to depth with a hydropunch to set a vertical contamination baseline for groundwater investigation outside the area of the floating/interface zone contamination.

Additional hydropunch samples would be taken to an appropriate depth outside the area of shallow interface zone contamination to field screen for water contamination.

Should these samples show contamination, stepout hydropunch water sampling should continue until the lateral and vertical limits of the deeper ground water contamination are found. In this manner both the interface/floating contaminant zone and the ground water plume can be defined without taking numerous redundant samples of water in the obviously contaminated area.

After determining the outer limits of the ground water contamination, monitoring well(s) should be constructed in down gradient direction(s) from the plume to serve as proper ground water sampling sites.

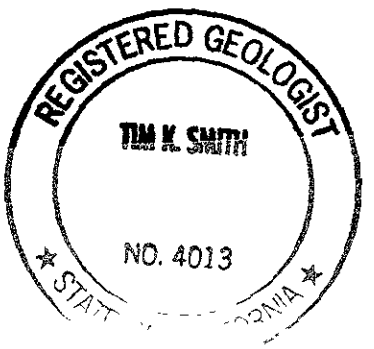
The exact number and location of borings and wells to be planned will depend upon the determination of the groundwater gradient and results of ongoing boring sample results. It is felt that from 15 to 30 sample borings would be required for tank 3,4 area and 8 to 15 for tank 1 area.

INVESTIGATION REPORTING

TKS Consulting will complete a report of investigation upon completion of the proposed field investigation and within 30 days of receipt of chemical analysis from the laboratory. The report will include documentation of samples taken, chain of custody sheets, sample results, sample locations, boring and well logs, well construction diagrams, plan maps, cross-sections and recommendations for further work, if necessary.

Three copies of the report will be furnished to the Alameda County Health Care and Services, Department of Environmental Health and Hazardous Materials Division.

In addition, the Zone 7 Water Agency Drilling Permit Application will have been submitted prior to commencement of work.



Respectfully,

Tim K. Smith
Registered Cal. Geologist #4013
R. E. A. #00291
April 29, 1994

HEALTH AND SAFETY PLAN - ALAMEDA FEDERAL CENTER:
620 CENTRAL AVENUE, ALAMEDA, CA

A COPY OF THIS PLAN IS TO BE POSTED CONSPICUOUSLY AT THE PROJECT WORK SITE AND AT THE AVAILABLE TELEPHONES

Tom Hunt will be on site safety officer. (40 hour OSHA trained with supervising credential, contracting engineer and C-57 licensed). He will be responsible for safe operation of equipment, monitoring of the site for toxic vapors, conducting tailgate H & S meetings on a daily basis, site security and appointment of a qualified site safety officer in his absence.

Daily meetings will consist of operational safety conditions, explanation of specific hazards to be aware of and individual job safety overviews with comments/questions from crew on specific hazards.

All hazardous materials will be in highly diluted concentrations in water or sorbed to soils and in gas phase. The NIOSH Guide to Chemical Hazards will be kept on site as a guide to the listed compounds for TWA, IDLH and LEL levels. Any free product which might be found at the water table will be evaluated as outlined in the LUFT Manual. On site operations will be halted when Organic Vapor Analyzer total exceeds 1000 ppm in any confined area.

Organic vapor cartridges used in half or full face respirators will be used if open air total organic vapor levels exceed 5 ppm for any continuous length of time in excess of one minute. Half face respirators will be used in combination with eye goggles.

Florescent streamers will be attached to poles 10 feet above site elevation on adjacent fence.

Material on site consists of diesel and gasoline motor fuel and it's components. (See table)

Site compounds known to cause cancer or reproductive abnormalities are highlighted on the table.

No overhead utility service exists in the area of the work site. U.S.A. Digs will mark any and all underground services.

A Century 128-GC Organic Vapor Analyzer will be continuously operated on site and will be calibrated 3 times daily to zero air and 95 ppm methane gas.

Level D OSHA protection will be worn at the site.

A first aid kit will be on hand in all vehicles and a map showing the nearest hospital will be provided to all workers.

Mobile telephones will be continuously available at the site and all personnel will be instructed in their use.

Decontamination will consist of disassembling the drilling tools and steam cleaning of all tool parts. This will be completed after drilling of each new boring. Decontamination of sample collection devices will be done after each sample is collected. All sample collection devices will be washed in Tri Sodium Phosphate and double rinsed in clean water. All personal protective equipment will be disposed of or decontaminated at the end of each day. All personnel will be required to wash before eating or drinking on site.

There will be no confined space entry on the job.

The site is completely surrounded with a locked chain link fence at night and the backfilled tank pit is surrounded with another chain link fence for personal safety of workers and visitors.

EMERGENCY

FIRE: ALAMEDA FIRE STATION #2.....
DIAL (510) 748-4508) ---------- OR ---------- 911

AMBULANCE: DIAL (510) 748-4508) ------ OR ---------- 911

POLICE: DIAL (510) 748-4508) --------- OR ---------- 911

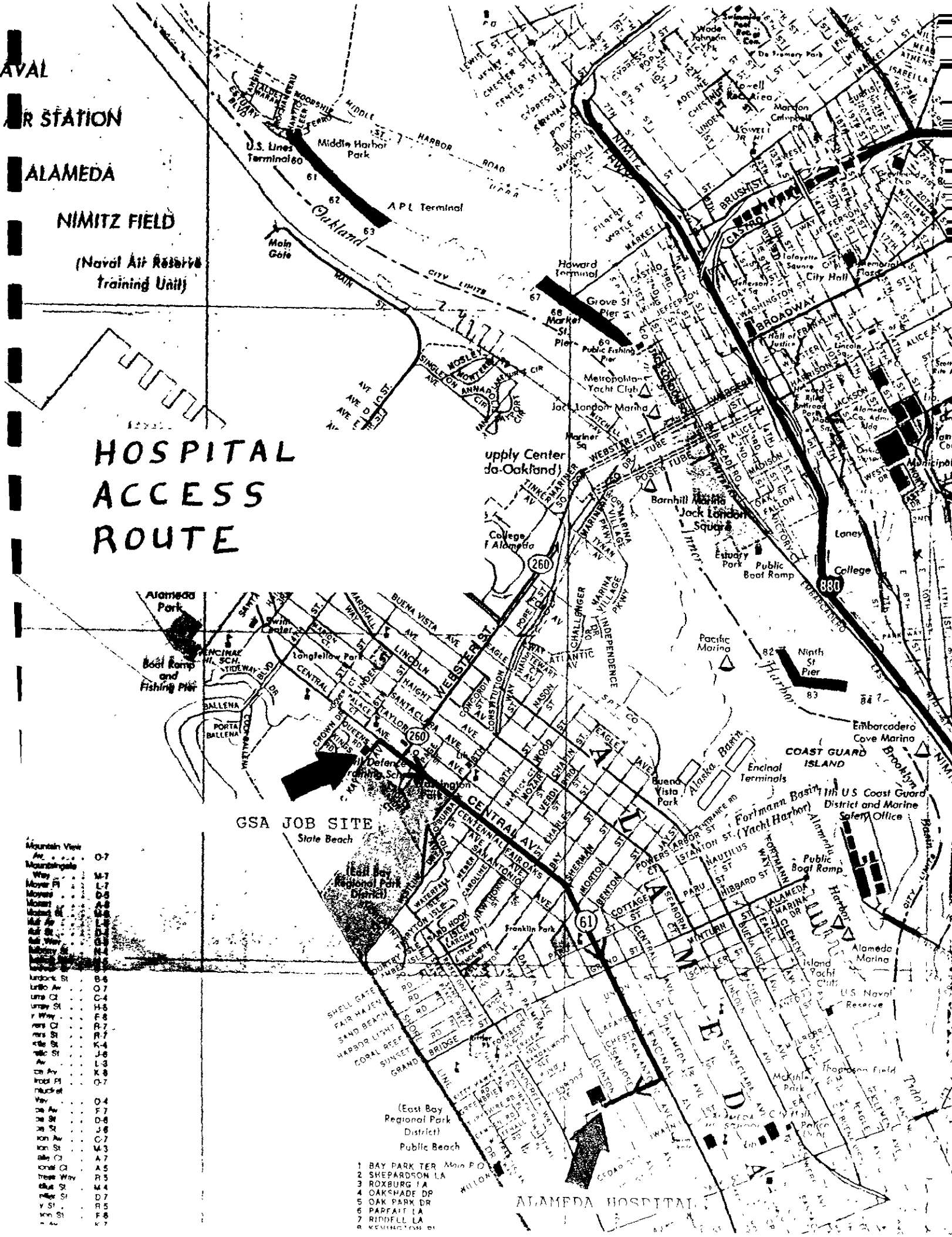
YOUR ADDRESS IS 620 CENTRAL AVENUE, ALAMEDA, CALIFORNIA

ALAMEDA HOSPITAL-EMERGENCY--2070 CLINTON ROAD: (510) 522-3700

To get to Alameda Hospital, go as follows:

1. Out main gate
2. Left to 1st stop on Central
3. Right on Central
4. Continue Central to Encinal, 8 blocks
5. Central merges to Encinal, Right diagonal at Sherman
6. Encinal to Willow, 8 blocks
7. Right turn on Willow
8. Right on Willow, 3-1/2 blocks to Alameda Hospital, Emergency Entrance off Willow just past Clinton cross street

I THE UNDERSIGNED HAVE COMPLETED THE OSHA HAZ MAT 40 HOUR SAFETY TRAINING AND AM ENROLLED IN A MEDICAL SURVEILLANCE PER 29 CFR 1910.120


AVAL
R STATION
ALAMEDA
NIMITZ FIELD
(Naval Air Reserve Training Unit)
HOSPITAL ACCESS ROUTE
GSA JOB SITE
Alameda Hospital
Oakland
Alameda
Middle Harbor Park
U.S. Lines Terminal 60
APL Terminal
Main Gate
Howard Terminal
Grove St Pier
Market St Pier
Public Fishing Pier
Metropolitan Yacht Club
Jack London Marina
Jack London Square
Barnhill Marina
Estuary Park
Public Boat Ramp
College of Alameda
Alameda Park
Boat Ramp and Fishing Pier
Pacific Marina
Ninth St Pier
Embarcadero Cove Marina
COAST GUARD ISLAND
Encinal Terminals
Alaska Basin
Buena Vista Park
Fortmann Basin (Yacht Harbor)
11th U.S. Coast Guard District and Marine Safety Office
Alameda Marina
Island Yacht Club
U.S. Naval Reserve
Franklin Park
(East Bay Regional Park District) Public Beach
State Beach
(East Bay Regional Park District)
Supply Center (Oakland)
Webster St
Central Ave
Nimitz Fwy
880
260
61
1 BAY PARK TER
2 SHEPARDSON LA
3 ROXBURG LA
4 OAKSHADE DR
5 OAK PARK DR
6 PARFAIT LA
7 RIDDELL LA

CHEMICAL COMPOSITION OF GASOLINE

C = KNOWN CARCINOGEN, R = KNOWN TO CAUSE REPRODUCTIVE TOXICITY

COMPOUND	# OF CARBONS	CONCENTRATION (WEIGHT %) (a)
Straight Chain Alkanes		
Propane	3	0.01 - 0.14
n-Butane	4	3.93 - 4.70
n-Pentane	5	5.75 - 10.92
n-Hexane (d)	6	0.24 - 3.50
n-Heptane	7	0.31 - 1.96
n-Octane	8	0.36 - 1.43
n-Nonane	9	0.07 - 0.83
n-Decane	10	0.04 - 0.50
n-Undecane	11	0.05 - 0.22
n-Dodecane	12	0.04 - 0.09
BRANCHED ALKANES		
Isobutane	4	0.12 - 0.37
2,2-Dimethylbutane	6	0.17 -0.84
2,3-Dimethylbutane	6	0.59 - 1.55
2,2,3-Trimethylbutane	7	0.01 - 0.04
Neopentane	5	0.02 - 0.05
Isopentane	5	6.07 - 10.17
2-methylpentane	6	2.92 - 3.85
3-Methylpentane	6	2.4 (Vol)
2,4-Dimethylpentane	7	0.23 - 1.71
2,3-Dimethylpentane	7	0.32 -4.17
3,3-Dimethylpentane	7	0.02 - 0.03
2,2,3-trimethylpentane	8	0.09 - 0.23
2,2,4-Trimethylpentane	8	0.32 - 4.58
2,3,3-Trimethylpentane	8	0.05 - 2.28
2,3,4-Trimethylpentane	8	0.11 - 2.80
2,4-Dimethyl-3-ethylpentane	9	0.03 - 0.07
2-Methylhexane	7	0.36 - 1.48
3-Methylhexane	7	0.30 - 1.77
2,4-Dimethylhexane	8	0.34 - 0.82
2,5-Dimethylhexane	8	0.24 - 0.52
3,4-Dimethylhexane	8	0.16 - 0.37
3-Ethylhexane	8	0.01
2-methyl-3-ethylhexane	9	0.04 - 0.13
2,2,4-Trimethylhexane	9	0.11 - 0.18
2,2,5-Trimethylhexane	9	0.17 - 5.89
2,3,3-Trimethylhexane	9	0.05 - 0.12
2,3,5-Trimethylhexane	9	0.05 - 1.09
2,4,4-Trimethylhexane	9	0.02 - 0.16

C = KNOWN CARCINOGEN, R = KNOWN TO CAUSE REPRODUCTIVE TOXICITY

COMPOUND	# OF CARBONS	CONCENTRATION (WEIGHT %) (a)
2-Methylheptane	8	0.48 - 1.05
3-Methylheptane	8	0.63 - 1.54
4-Methylheptane	8	0.22 - 0.52
2,2-Dimethylheptane	9	0.01 - 0.08
2,3-Dimethylheptane	9	0.13 - 0.51
2,6-Dimethylheptane	9	0.07 - 0.23
3,3-Dimethylheptane	9	0.01 - 0.08
3,4-Dimethylheptane	9	0.07 - 0.33
2,2,4-Trimethylheptane	10	0.12 - 1.70
3,3,5-Trimethylheptane	10	0.02 - 0.06
3-Ethylheptane	10	0.02 - 0.16
2-Methyloctane	9	0.14 - 0.62
3-Methyloctane	9	0.34 - 0.85
4-Methyloctane	9	0.11 - 0.55
2,6-Dimethyloctane	10	0.06 - 0.26
2-Methylnonane	10	0.06 - 0.41
3-Methylnonane	10	0.06 - 0.32
4-Methylnonane	10	0.04 - 0.26
Cycloalkanes		
Cyclopentane	5	0.19 -0.58
Methlcyclopentane	6	Not Quantified
1-Methyl-cic-2-Ethylcyclopentane	8	0.06 - 0.11
1-Methyl-trans-3-ethylcyclopentane	8	0.06 - 0.12
1-cic-2-dimethylcyclopentane	7	0.07 - 0.13
1-Trans-2-dimethylcyclopentane	7	0.06 - 0.20
1,1,2-Trimethylcyclopentane	8	0.06 - 0.11
1-Trans-2-cic-3-trimethylcyclopentane	8	0.01 - 0.25
1-Trans-2-cic-4-trimethylcyclopentane	8	0.03 0.16
Ethylcyclopentane	7	0.14 - 0.21
n-Propylcyclopentane	8	0.01 - 0.02
Isopropylcyclopentane	8	0.01 - 0.02
1-Trans-3-dimethylcyclohexane	8	0.05 - 0.12
Ethylcyclohexane	8	0.17 - 0.42

C = KNOWN CARCINOGEN, R = KNOWN TO CAUSE REPRODUCTIVE TOXICITY

COMPOUND	# OF CARBONS	CONCENTRATION (WEIGHT %) (a)
Straight Chain Alkenes		
cis-2-butane	4	0.13 - 0.17
trans-2-butane	4	0.16 - 0.20
Pentane-1	5	0.33 - 0.45
cis-2-pentane	5	0.43 - 0.67
trans-2-pentane	5	0.52 - 0.90
cis-2-hexene	6	0.15 - 0.24
trans-2-hexene	6	0.18 - 0.36
cis-3-hexene	6	0.11 - 0.13
trans-3-hexene	6	0.12 - 0.15
cis-3-heptene	7	0.14 - 0.17
trans-2-heptene	7	0.06 - 0.10
Branched Alkenes		
2-Methyl-1-butene	5	0.22 - 0.66
3-Methyl-1-butene	5	0.08 - 0.12
4-Methyl-2-butene	5	0.96 - 1.28
2,3-Dimethyl-1-butene	6	0.08 - 0.10
2-Methyl-1-pentene	6	0.20 - 0.22
2,3-Dimethyl-1-pentene	7	0.01 - 0.02
2,4-Dimethyl-1-pentene	7	0.02 - 0.03
4,4-Dimethyl-1-pentene	7	0.06 (Vol)
2-Methyl-2-pentene	6	0.27 - 0.32
3-Methyl-cis-2-pentene	6	0.35 - 0.45
3-Methyl-trans-2-pentene	6	0.32 - 0.44
4-Methyl-cis-2-pentene	6	0.04 - 0.05
4-Methyl-trans-2-pentene	6	0.08 - 0.30
4,4-Dimethyl-cis-2-pentene	7	0.02
4,4-Dimethyl-trans-2-pentene	7	Not quantified
3-Ethyl-2-pentene	7	0.03 - 0.04
Cycloalkenes		
Cyclopentene	5	0.12 - 0.18
3-Methylcyclopentene	6	0.03 - 0.08
Cyclohexene	6	0.03

C = KNOWN CARCINOGEN, R = KNOWN TO CAUSE REPRODUCTIVE TOXICITY

COMPOUND	# OF CARBONS	CONCENTRATION (WEIGHT %) (a)	
Alkyl Benzenes			
Benzene (d)	6	0.12 - 3.50	C
Toluene (d)	7	2.73 - 21.80	R
o-Xylene (d)	8	0.68 - 2.86	
m-Xylene (d)	8	1.77 - 3.87	
p-Xylene (d)	8	0.77 - 1.58	
1-Methyl-4-ethylbenzene	9	0.18 - 1.00	C
1-Methyl-2-ethylbenzene	9	0.19 - 0.56	C
1-Methyl-3-ethylbenzene	9	0.31 - 2.86	C
1-Methyl-2-n-propylbenzene	10	0.01 - 0.17	C
1-Methyl-3-n-propylbenzene	10	0.08 - 0.56	C
1-Methyl-3-isopropylbenzene	10	0.01 - 0.12	C
1-Methyl-3-t-butylbenzene	11	0.03 - 0.11	C
1 Methyl-4-t-butylbenzene	11	0.04 - 0.13	C
1,2-Dimethyl-3-ethylbenzene	10	0.02 - 0.19	C
1,2-Dimethyl-4-ethylbenzene	10	0.50 - 0.73	C
1,3-Dimethyl-2-ethylbenzene	10	0.21 - 0.59	C
1,3-Dimethyl-4-ethylbenzene	10	0.03 - 0.44	C
1,3-Dimethyl-5-ethylbenzene	10	0.11 - 0.42	C
1,3-Dimethyl-5-t-butylbenzene	12	0.02 - 0.16	C
1,4-Dimethyl-2-ethylbenzene	10	0.05 - 0.36	C
1,2,3-Trimethylbenzene	9	0.21 - 0.48	C
1,2,4-Trimethylbenzene	9	0.66 - 3.30	C
1,3,5-Trimethylbenzene	9	0.13 - 1.15	C
1,2,3,4-Tetramethylbenzene	10	0.02 - 0.19	C
1,2,3,5-Tetramethylbenzene	10	0.14 - 1.06	C
1,2,4,5-Tetramethylbenzene	10	0.05 - 0.67	C
Ethylbenzene (d)	8	0.36 - 2.86	C

C = KNOWN CARCINOGEN, R = KNOWN TO CAUSE REPRODUCTIVE TOXICITY

COMPOUND	# OF CARBONS	CONCENTRATION (WEIGHT %) (a)	
1,2-Diethylbenzene	10	0.57	C
1,3-Diethylbenzene	10	0.05 - 0.38	C
n-Propylbenzene	9	0.08 - 0.72	C
Isopropylbenzene	9	<0.01 - 0.23	C
n-Butylbenzene	10	0.04 - 0.44	C
Isobutylbenzene	10	0.01 - 0.08	C
sec-Butylbenzene	10	0.01 - 0.13	C
t-Butylbenzene	10	0.12	C
n-Pentylbenzene	11	0.01 - 0.14	C
Isopentylbenzene	11	0.07 - 0.17	C
Indan	9	0.25 - 0.34	
1-Methylindan	10	0.04 - 0.17	
2-Methylindan	10	0.02 - 0.10	
4-Methylindan	10	0.01 - 0.16	
5-Methylindan	10	0.09 - 0.30	
Tetralin	10	0.01 - 0.14	

<u>Polynuclear Aromatic Hydrocarbons</u>

Naphthalene (d)	10	0.09 - 0.49	
Pyrene	16	Not quantified	
Benz (a) anthracene	18	Not quantified	C
Benz (a) pyrene	20	0.19 - 2.8 mg/kg	C
Benzo (e) pyrene	20	not quantified	C
Benzo (g,h,i) perylene	21	Not quantified	C

C = KNOWN CARCINOGEN, R = KNOWN TO CAUSE REPRODUCTIVE TOXICITY

COMPOUND	# OF CARBONS	CONCENTRATION (WEIGHT %) (a)	
Elements			
Bromine		80 -345 ug/g	
Cadmium		0.01 -0.07 ug/g	C
Chlorine		80 - 300 ug/g	
Lead (b)		530 -1120 ug/g	R
Sodium		<0.6 - 1.4 ug/g	
Sulfur (c)		0.10 - 0.15 (ASTM)	
Vanadium		<0.02 - 0.001 ug/g	
Additives			
Ethylene dibromide (d)		0.7 - 177.2 ppm	C
Ethylene dichloride (d)		150 - 300 ppm	C
Tetramethyl lead			
Tetraethyl lead			

NOTE: similar compounds related to diesel fuel should be expected on the site in relative amounts differing from the gasoline related compounds.

a. Conversion from other units assumed 0.75 specific gravity.

b. ASTM specification, maximum, unleaded gasoline, 0.013 g/l maximum, conventional grade gasoline, 1.1 g/l. Title 13, CAC, Section 2253.2, Maximum, leaded gasoline other than leaded high octane gasoline, 0.8 g/gallon maximum, leaded high octane gasoline, 1.0 g/gallon. Federal standards, January 1, 1986, maximum, 0.1 g/gallon.

c. ASTM maximum, unleaded gasoline, 0.10 weight percent. Conventional grade gasoline, 0.15 weight percent, Title 13, CAC, Section 2252, maximum 300 ppm by weight.

d. Compounds for which AALs are being developed.

CHEMICAL COMPOSITION OF DIESEL FUEL

C = KNOWN CARCINOGEN, R = KNOWN TO CAUSE REPRODUCTIVE TOXICITY

COMPOUND	# OF CARBONS	CONCENTRATION (WEIGHT %) (a)
Straight Chain Alkanes		
n-Nonane	9	- 0.1
n-Decane	10	0.5 - 2
n-Undecane	11	0.98 - 9
n-Dodecane	12	0.96 - 11
n-Tridecane	13	1.1 - 10
n-Tetradecane	14	1.1 - 9
n-Pentadecane	15	1.0 - 7
n-Hexadecane	16	1.2 - 6
n-Heptadecane	17	1.2 - 6
n-Octadecane	18	0.82 - 5
n-Nonadecane	19	0.53 - 4
n-Eicosane	20	0.23 - 3
n-Heneicosane	21	1
n-Docosane	22	0.2
Branched Alkanes		
2-Methylheptadecane	18	
2,6,10,14-Tetramethyl-pentadecane	19	
2,6,10,14-Tetramethyl-pentadecane	20	
Alkyl Benzenes		
Benzene	6	 C
Toluene	7	 C
o-Xylene	8	
m-Xylene	8	
2-Ethyltoluene	9	
3-Ethyltoluene	9	
4-Ethyltoluene	9	
Isopropylbenzene	9	
1,2,3-Trimethylbenzene	9	
1,2,4-Trimethylbenzene	9	
1,3,5-Trimethylbenzene	9	
1,2,3,5-Trimethylbenzene	10	
1,2,4,5-Trimethylbenzene	10	
Pentamethylbenzene	11	
Biphenyl	12	

C = KNOWN CARCINOGEN, R = KNOWN TO CAUSE REPRODUCTIVE TOXICITY

COMPOUND	# OF CARBONS	CONCENTRATION (WEIGHT %) (a)
Polynuclear Aromatic Hydrocarbons		
Naphthalene(d)	10	0.13
Methylnaphthalene	11	0.57 - 0.91
2,3,5-Trimethylnaphtalene	13	
Fluorene	13	
Phenanthrene	14	
Anthracene	14	
Pyrene	16	
Benz(a)pyrene	20	..... 0.07 ug/kg C
Benzo(b)flouranthene	20	C
Benzo(g,h,i)perylene	21	
Elements		
Barium		0.008 - 0.7 ug/g
Cadmium		0.001 - 0.07 ug/g C
Calcium		0.1 ug/ml
Chromium		0.01 - 0.7 ug/g C
Cobalt		0.007 - 0.1 ug/g
Copper		0.01 - 0.3 ug/g
Lead		
ug/ml.....C/R		0.1
Molybdenum		<0.001 - 0.07 ug/g
Nickel.....		
ug/g.....C/R		0.007 - 0.1
Selenium.....		0.001 - 0.03.....C
Vanadium		0.0007- 0.003 ug/g
Zinc		0.01 - 3 ug/g

NOTES

a. Conversion from other units for gasoline assumed 0.75 specific gravity.

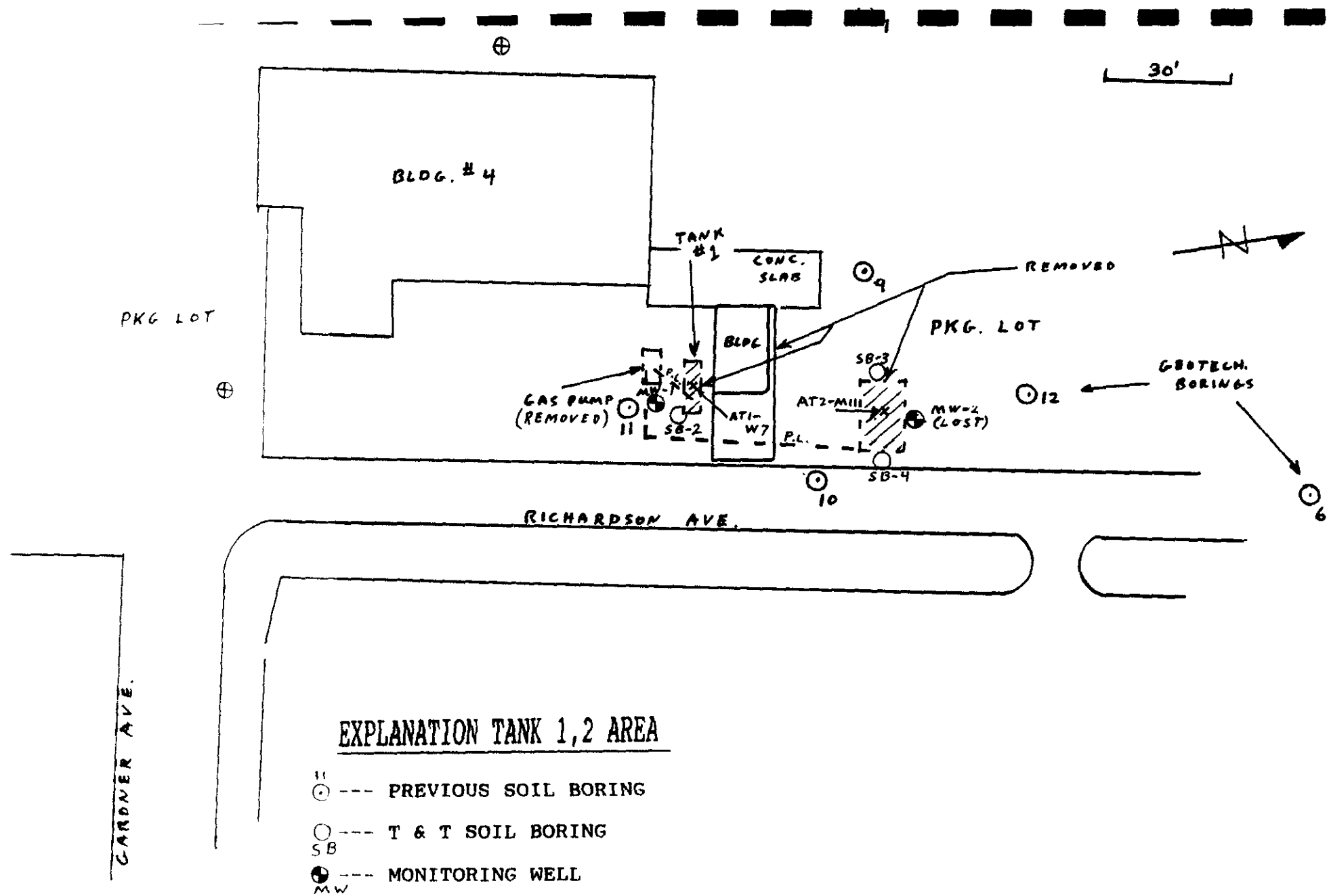
b. ASTM specification, maximum, unleaded gasoline, 0.013 g/l maximum, conventional grade gasoline, 1.1 g/l. Title 13, CAC, Section 2253.2, Maximum, leaded gasoline other than leaded high octane gasoline, 0.8 g/gallon maximum, leaded high octane gasoline, 1.0 g/gallon. Federal standards, January 1, 1986, maximum, 0.1 g/gallon.

c. ASTM maximum, unleaded gasoline, 0.10 weight percent. Conventional grade gasoline, 0.15 weight percent, Title 13, CAC, Section 2252, maximum 300 ppm by weight.

d. Compounds for which AALs have been or are being developed.

APPENDIX A

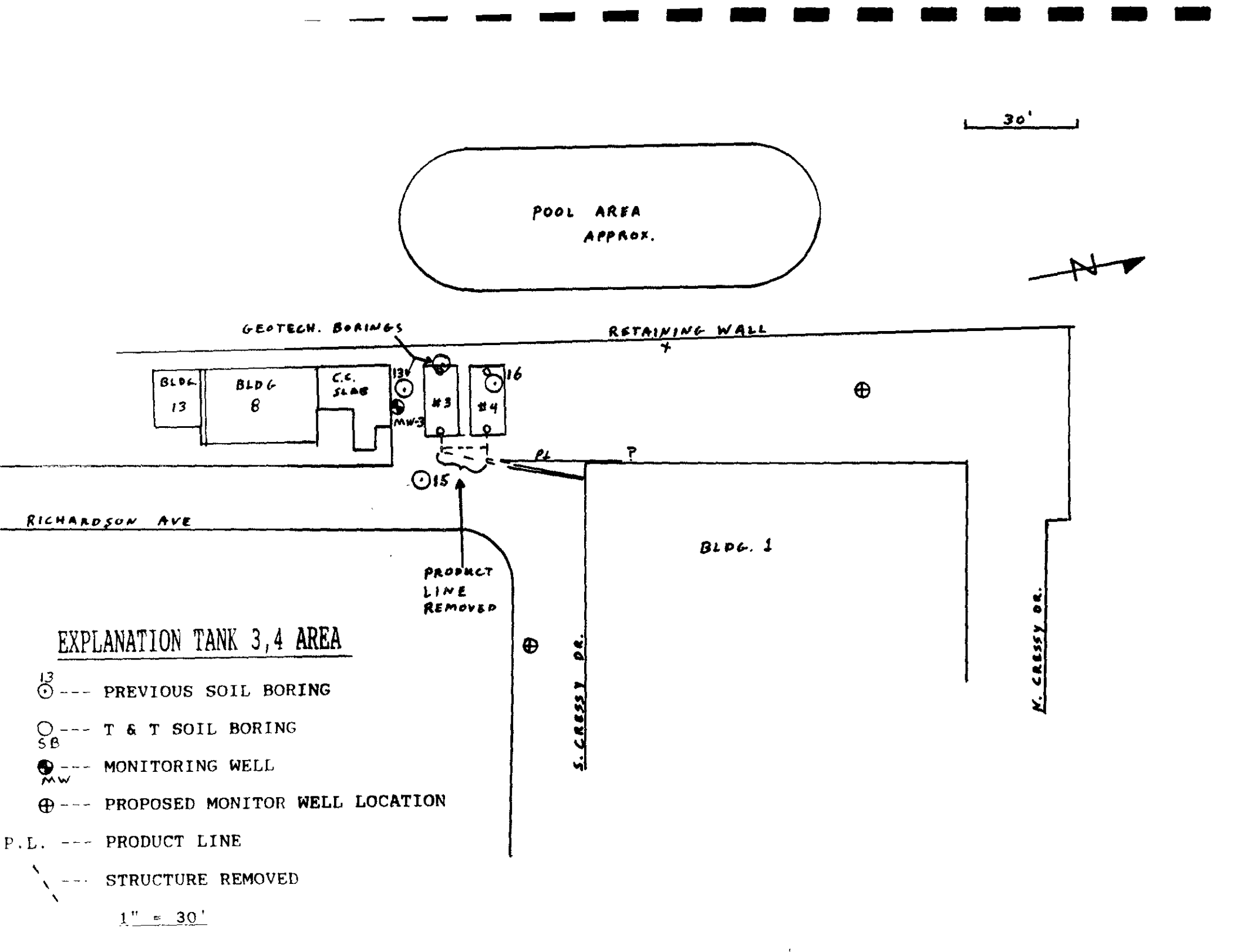
Site Maps



EXPLANATION TANK 1,2 AREA

- ⊙ --- PREVIOUS SOIL BORING
- ○ SB --- T & T SOIL BORING
- ◕ MW --- MONITORING WELL
- ⊕ --- PROPOSED MONITOR WELL LOCATION
- P.L. --- PRODUCT LINE
- \ --- STRUCTURE REMOVED

1" = 30'


30'
POOL AREA
APPROX.
GEOTECH. BORINGS
RETAINING WALL
BLDG 13
BLDG 8
C.C. SLAB
13
MW-3
#3
#4
16
P.L.
P
15
RICHARDSON AVE
PRODUCT LINE REMOVED
BLDG. 1
S. CRESSY DR.
N. CRESSY DR.
EXPLANATION TANK 3,4 AREA
13 --- PREVIOUS SOIL BORING
SB --- T & T SOIL BORING
MW --- MONITORING WELL
--- PROPOSED MONITOR WELL LOCATION
P.L. --- PRODUCT LINE
--- STRUCTURE REMOVED
1" = 30'

APPENDIX B

Boring Logs

DATE STARTED: 1/6/94

DATE COMPLETED: 1/6/94

DRILLING EQUIPMENT: IR A-700

DRILLING CONTRACTOR: Hunt

LOGGED BY: T. Smith

TOTAL DEPTH: 15.5

BORING DIAMETER: 8"

SURFACE CONDITIONS: A/C Pavement

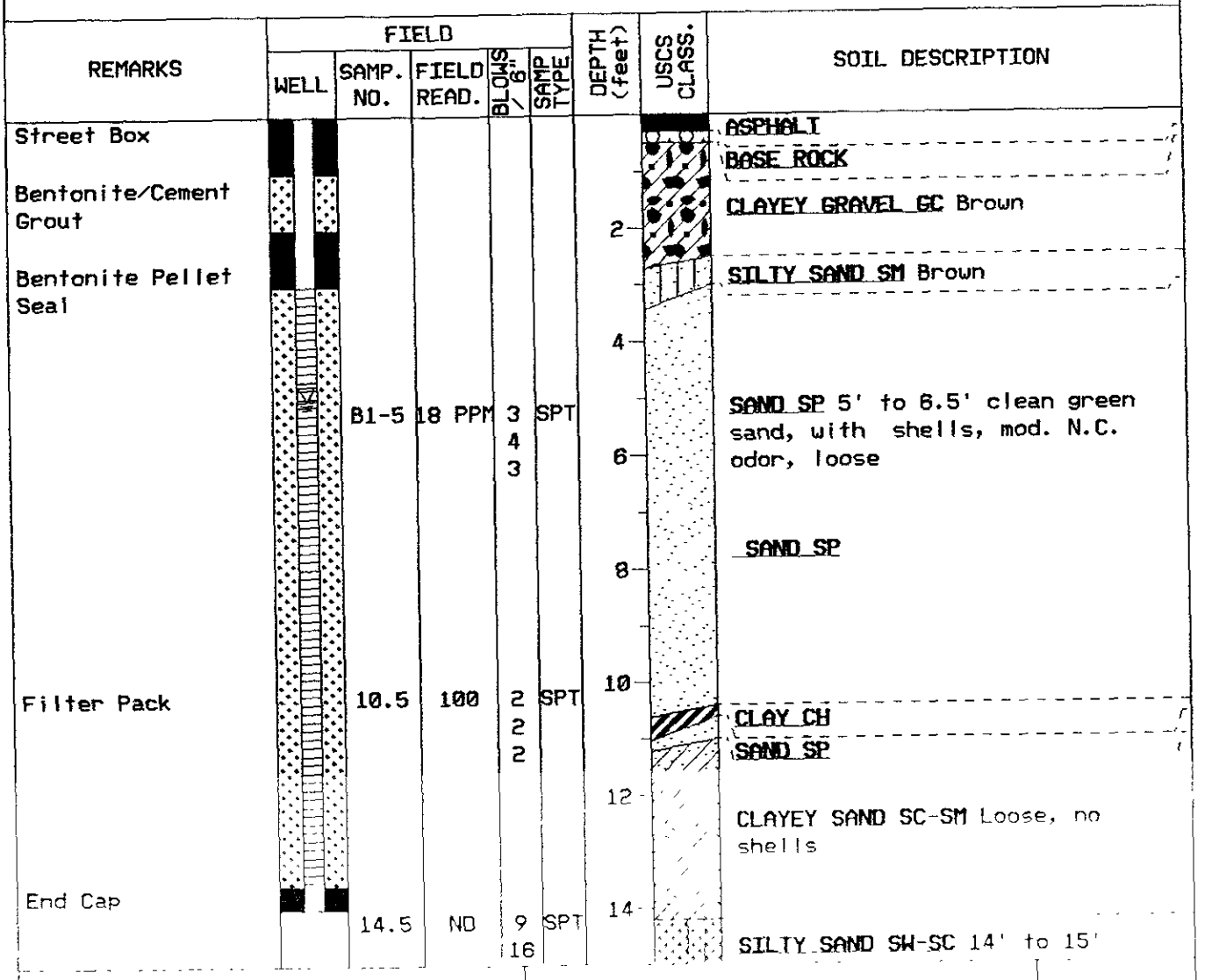
SURFACE ELEVATION:

COORDINATES:

GROUNDWATER CONDITIONS: Heavy

CASING DEPTH: 13' 7"

FILTER PACK: #3 Sand SLOT SIZE: .020"



TKS

TKS Consulting, Ltd.

PROJECT NO.

GSA

ALAMEDA

LOG OF MW-1 / B1

Fig. 1

Sheet 1 of 2

REMARKS	FIELD					DEPTH (feet)	USCS CLASS.	SOIL DESCRIPTION
	WELL	SAMP. NO.	FIELD READ.	BLOWS/6"	SAMP TYPE			
				3				silty sand, fine, mod. light
						16		SILTY SAND SW-SC 15' TO 15.5' loose, fine sand .M=SW-SC T=2 A=10
								SAND SW-SM Loose fine sand
						18		Bottom of MW-1 at 14'
						20		
						22		
						24		
						26		
						28		
						30		
						32		
						34		
						36		
						38		

TKS

TKS Consulting, Ltd.

PROJECT NO.

GSA

ALAMEDA

LOG OF MW-1 / B1

Fig. 2

Sheet 2 of 2

DATE STARTED: 1/6/94

DATE COMPLETED: 1/6/94

DRILLING EQUIPMENT: IR A-200

DRILLING CONTRACTOR: Hunt Drilling

LOGGED BY: Tim Smith

TOTAL DEPTH: 9.5

BORING DIAMETER: 8"

SURFACE CONDITIONS:

SURFACE ELEVATION:

COORDINATES:

GROUNDWATER CONDITIONS:

CASING DEPTH:

FILTER PACK: SLOT SIZE:

REMARKS	FIELD					DEPTH (feet)	USCS CLASS.	SOIL DESCRIPTION
	WELL	SAMP. NO.	FIELD READ.	BLOWS/6"	SAMP TYPE			
								ASPHALT
								CLAYEY GRAVEL GC
						2		SANDY GRAVEL GPS
								SAND SM Hydrocarbon odor
Boring Grouted with Neat Cement	▽					4		
						6		SAND SP Hydrocarbon odor
		B2-8.5	90 PPM	2 3 1	SPT	8		SAND SW Fine, gray green, with shells, loose
						10		Bottom of Boring at 9.5'
						12		
						14		

TKS

TKS Consulting, Ltd.

PROJECT NO.

GSA
ALAMEDA

LOG OF B-2

Fig. 1

Sheet 1 of 1

DATE STARTED: 1/6/94

DATE COMPLETED: 1/6/94

DRILLING EQUIPMENT: IR A-200

DRILLING CONTRACTOR: Hunt Drilling

LOGGED BY: Tim Smith

TOTAL DEPTH: 11.5

BORING DIAMETER: 8"

SURFACE CONDITIONS:

SURFACE ELEVATION:

COORDINATES:

GROUNDWATER CONDITIONS:

CASING DEPTH:

FILTER PACK: SLOT SIZE:

REMARKS	FIELD					DEPTH (feet)	USCS CLASS.	SOIL DESCRIPTION
	WELL	SAMP. NO.	FIELD READ.	BLOWS / 6"	SAMP TYPE			
								ASPHALT
								CLAYEY GRAVEL GC
						2		SAND SP-SM Med. sand
						4		
Boring Grouted with Neat Cement	▽	B3-5'	ND	1 1	SPT			Gray sand starts at 5', no odor
						6		
						8		SAND SP Loose sand, ND in core tube
			5 PPM	2 4 1	SPT	10		SILTY SAND SM
								SAND with CLAY SW-SM
						12		Bottom of B-3 at 10', sample to 11.5'
						14		

TKS

TKS Consulting, Ltd.

PROJECT NO.

GSA

ALAMEDA

LOG OF B-3

Fig. 2

Sheet 1 of 1

DATE STARTED: 1/6/94

DATE COMPLETED: 1/6/94

DRILLING EQUIPMENT: IR A-200

DRILLING CONTRACTOR: Hunt Drilling

LOGGED BY: Tim Smith

TOTAL DEPTH: 11.5

BORING DIAMETER: 8"

SURFACE CONDITIONS:

SURFACE ELEVATION:

COORDINATES:

GROUNDWATER CONDITIONS:

CASING DEPTH:

FILTER PACK: SLOT SIZE:

REMARKS	FIELD					DEPTH (feet)	USCS CLASS.	SOIL DESCRIPTION
	WELL	SAMP. NO.	FIELD READ.	BLOWS/6"	SAMP TYPE			
								ASPHALT
								CLAYEY GRAVEL GC
								SAND SP
						2		
						4		SAND with SILT SP-SM
Boring Grouted with Neat Cement	▽	B4-5'	ND	1 2	SPT	6		
						8		SAND with SILT SW-SM
			90 PPM			10		CLAY
								CLAYEY SAND SC
						12		
						14		

TKS

TKS Consulting, Ltd.

PROJECT NO.

GSA
ALAMEDA

LOG OF B-4

Fig. 3

Sheet 1 of 1

DATE STARTED: 1/6/94

DATE COMPLETED: 1/6/94

DRILLING EQUIPMENT: IR A-200

DRILLING CONTRACTOR: Hunt Drilling

LOGGED BY: Tim Smith

TOTAL DEPTH: 14.0

BORING DIAMETER: 8"

SURFACE CONDITIONS: A/C Pavement

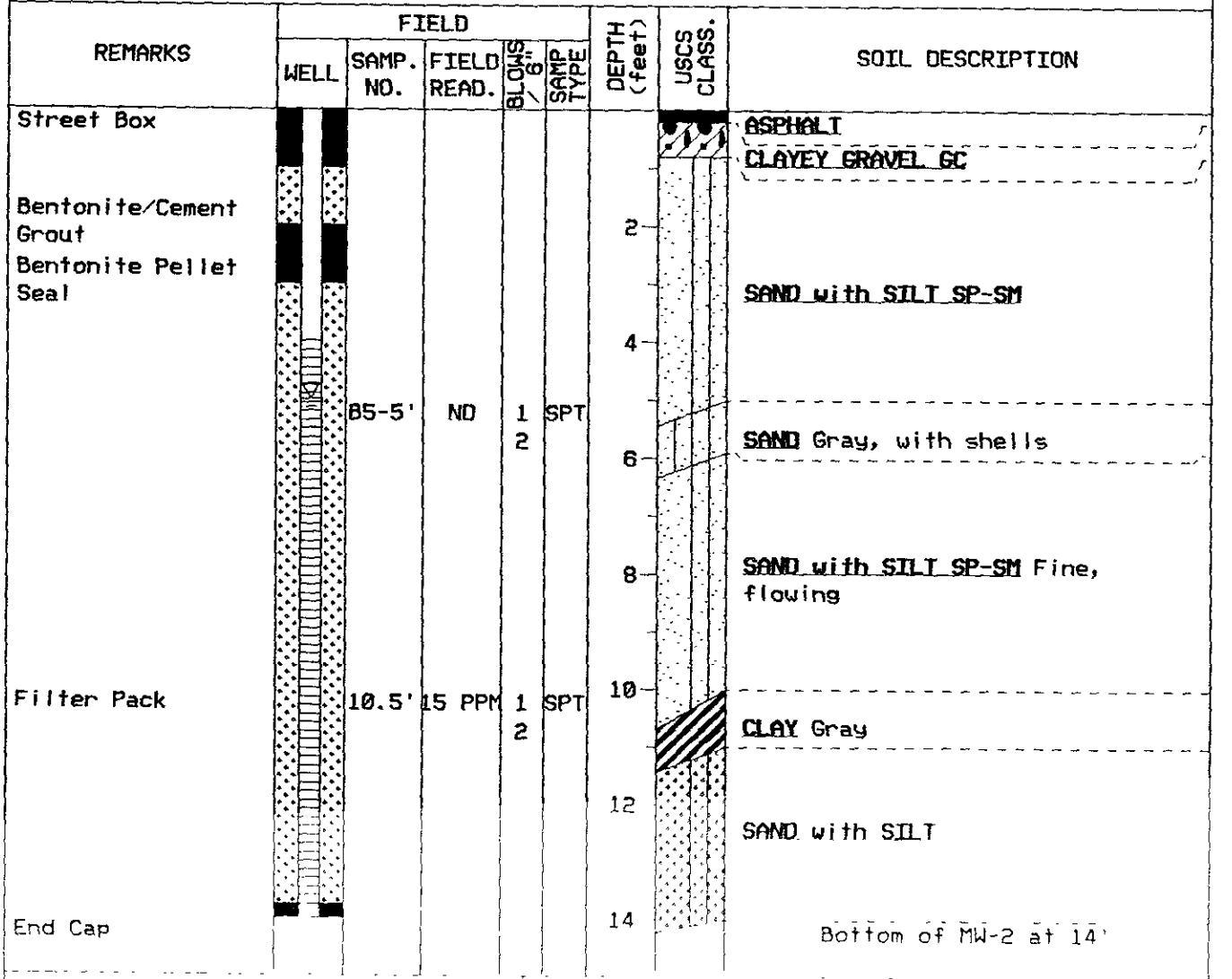
SURFACE ELEVATION:

COORDINATES:

GROUNDWATER CONDITIONS: Heavy

CASING DEPTH: 13' 4"

FILTER PACK: #3 Sand SLOT SIZE: .020"



TKS

TKS Consulting, Ltd.

PROJECT NO.

GSA

ALAMEDA

LOG OF MW-2 / B5

Fig. 1

Sheet 1 of 1

DATE STARTED: 1/7/94

DATE COMPLETED: 1/7/94

DRILLING EQUIPMENT: IR A-200

DRILLING CONTRACTOR: Hunt Drilling

LOGGED BY: Tim Smith

TOTAL DEPTH: 15.5

BORING DIAMETER: 8"

SURFACE CONDITIONS: A/C Pavement

SURFACE ELEVATION:

COORDINATES:

GROUNDWATER CONDITIONS: Heavy

CASING DEPTH: 13' 6"

FILTER PACK: #3 Sand SLOT SIZE: .020"

REMARKS	FIELD WELL	FIELD SAMP. NO.	FIELD FIELD READ.	FIELD BLOWS/6"	FIELD SAMP TYPE	DEPTH (feet)	USCS CLASS.	SOIL DESCRIPTION
Street Box Bentonite/Cement Grout Bentonite Pellet Seal						0		ASPHALT
						2		CLAYEY GRAVEL GC
						4		CLAY CL-ML Brown
		B6-5'	28 PPM	2 1 2	SPT			
						6		
						8		CLAYEY GRAVEL GC Gray, with oil pockets, black, mod. odor, OVA 6 ppm in auger, some shells
Filter Pack				2 3 4		10		
						12		SILTY SAND SM Brown, poorly sorted
End Cap		14.5'	ND	4 3	SPT	14		Heaving Sand on Bottom Bottom of MW-3 at 14'

TKS

TKS Consulting, Ltd.

PROJECT NO.

GSA
ALAMEDA

LOG OF MW-3 / B6

Fig. 2

Sheet 1 of 2

REMARKS	FIELD					DEPTH (feet)	USCS CLASS.	SOIL DESCRIPTION
	WELL	SAMP. NO.	FIELD READ.	BLOWS/6"	SAMP TYPE			
				3		16		
						18		
						20		
						22		
						24		
						26		
						28		
						30		
						32		
						34		
						36		
						38		

TKS

TKS Consulting, Ltd.

PROJECT NO.

GSA
ALAMEDA

LOG OF MW-3 / B6

Fig. 3

Sheet 2 of 2

APPENDIX C

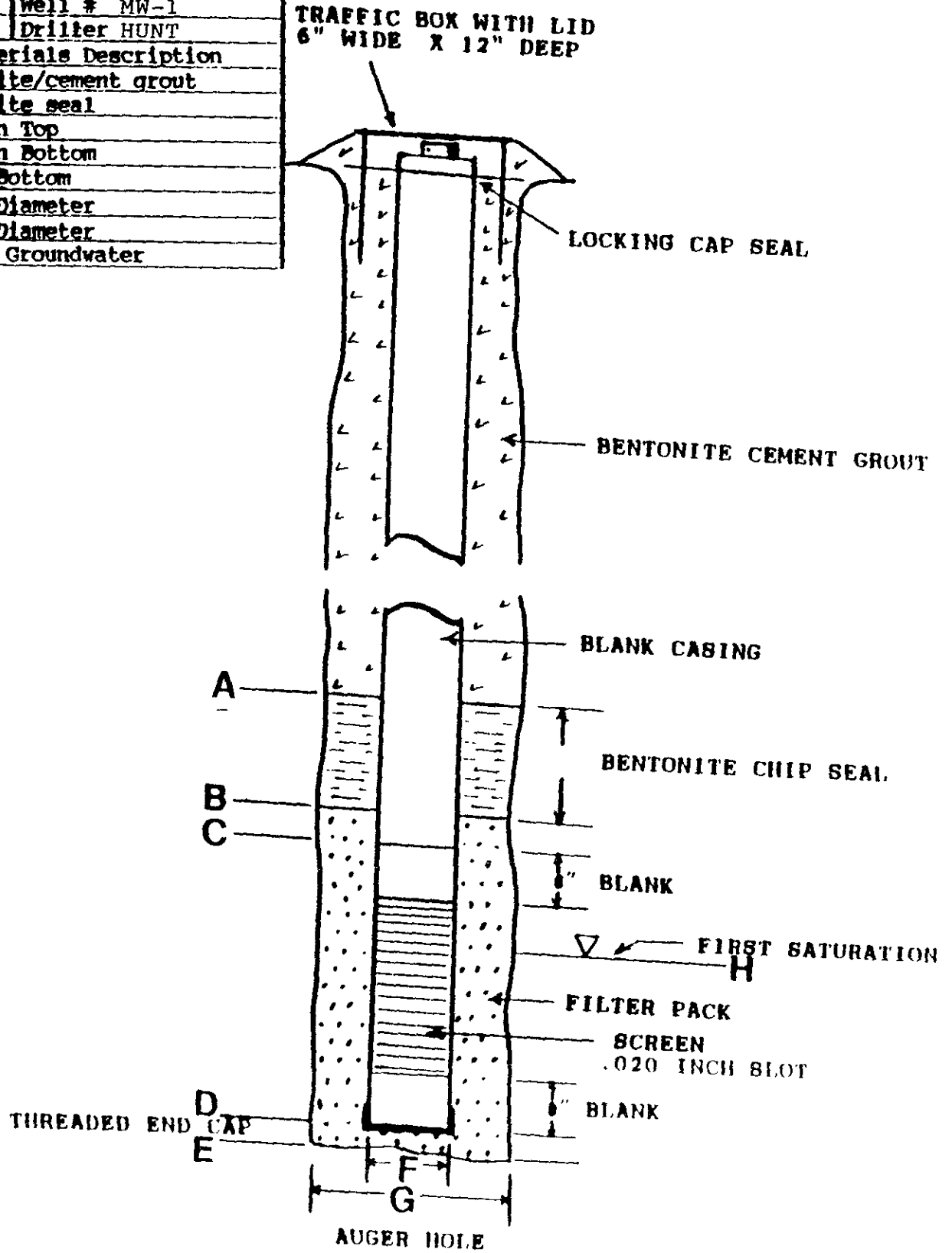
Well Diagrams

****** TKS CONSULTING ******

MONITOR WELL DIAGRAM

Pit: GSA	Well # MW-1
Date 1-6-94	Driller HUNT

Code	Dep/Width	Materials Description
A	2'	Bentonite/cement grout
B	3'	Bentonite seal
C	4'	Screen Top
D	13'7"	Screen Bottom
E	14'	Hole Bottom
F	2"	Well Diameter
G	8"	Hole Diameter
H	5'	First Groundwater



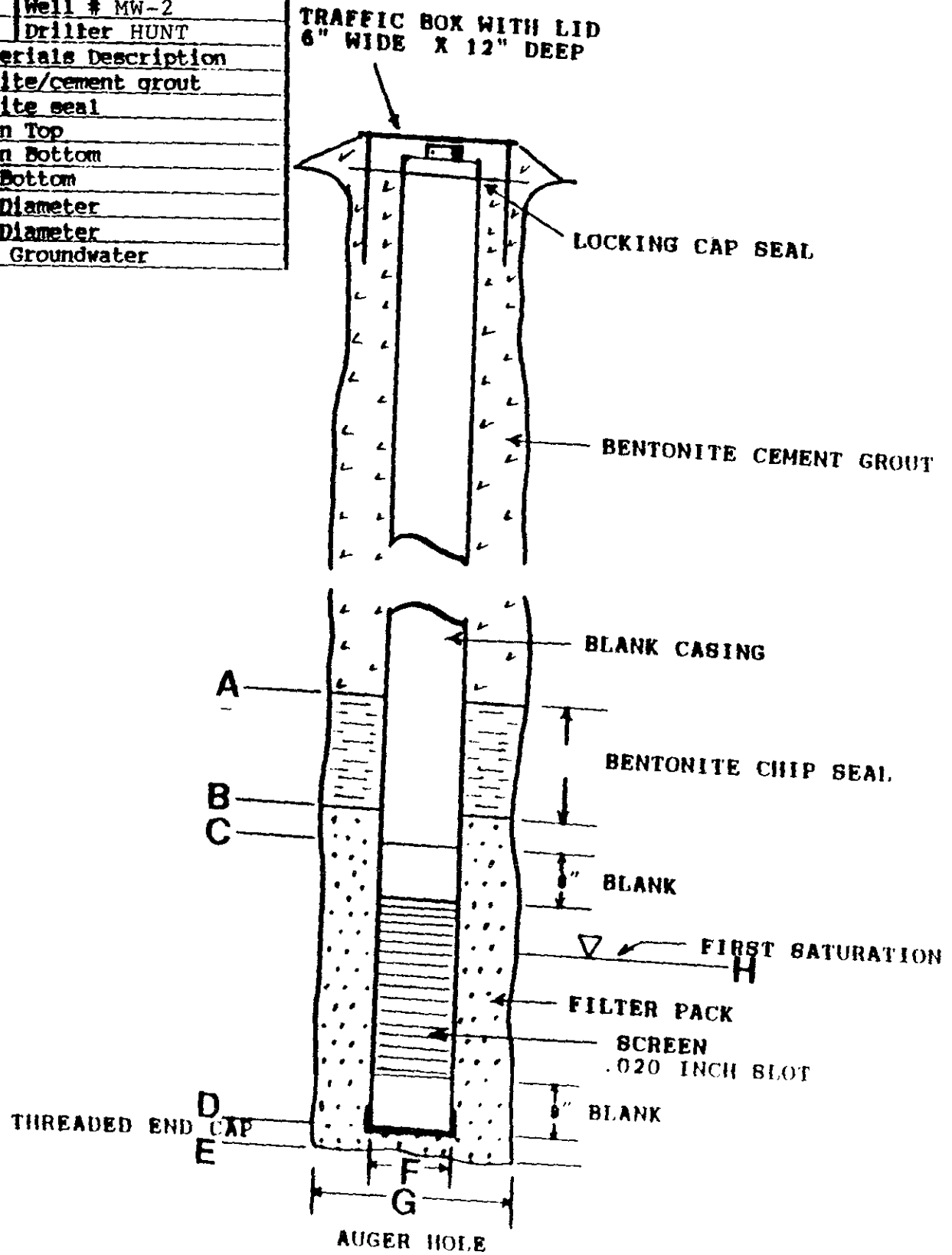
NO SCALE

****** TKS CONSULTING ******

MONITOR WELL DIAGRAM

Pit: GSA	Well # MW-2
Date 1-6-94	Driller HUNT

Code	Dep/Wdth	Materials Description
A	@ 2'	Bentonite/cement grout
B	3'	Bentonite seal
C	4'	Screen Top
D	13'8"	Screen Bottom
E	14'	Hole Bottom
F	2"	Well Diameter
G	8"	Hole Diameter
H	5'	First Groundwater



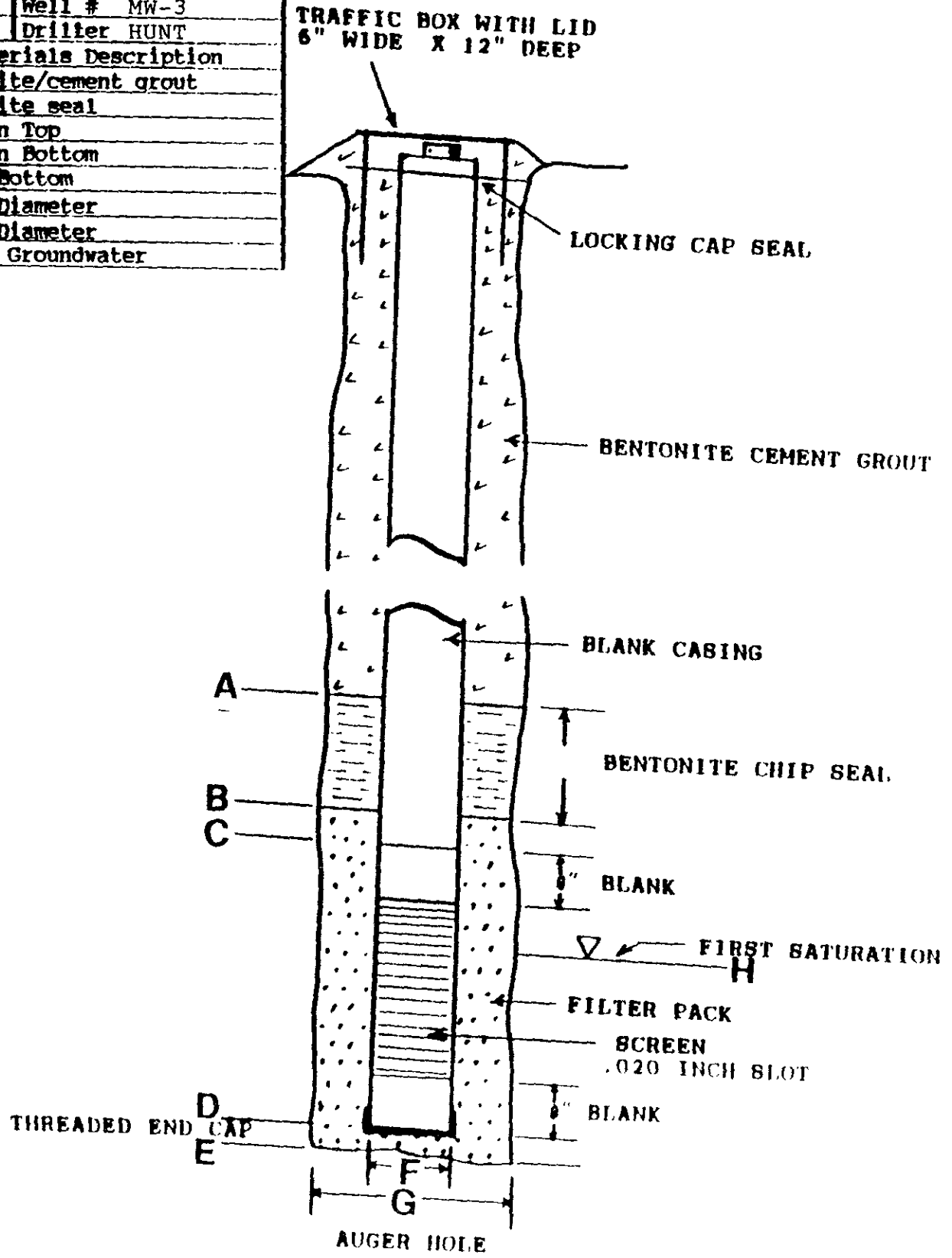
NO SCALE

****** TKS CONSULTING ******

MONITOR WELL DIAGRAM

Pit: GSA	Well # MW-3
Date 1-7-94	Driller HUNT

Code	Dep/Width	Materials Description
A	1'9"	Bentonite/cement grout
B	2'3"	Bentonite seal
C	3'1"	Screen Top
D	13'1"	Screen Bottom
E	14'	Hole Bottom
F	2"	Well Diameter
G	8"	Hole Diameter
H	5'4"	First Groundwater



NO SCALE

APPENDIX D

Manifests

FORWARD INC.

NON-HAZARDOUS WASTE MANIFEST
WASTE TREATMENT AND DISPOSAL FACILITY

JOB ACCEPTANCE NO. LMM-0817

TO BE COMPLETED BY THE GENERATOR

GENERATOR
General Services Administration

MAILING ADDRESS
525 Market Street, 31st Floor

CITY/STATE/ZIP
San Francisco, CA 94105

PHONE
(415) 744-5665

CONTACT PERSON
Beverly Chin

SIGNATURE OF AUTHORIZED AGENT / TITLE | DATE
* Beverly Chin Asst Mgr | 04/26/94

REQUIRED PERSONAL PROTECTIVE EQUIPMENT
☐ GLOVES ☐ GOGGLES ☐ RESPIRATOR ☐ HARD HAT
☐ TY-VEK ☐ OTHER

SPECIAL HANDLING PROCEDURES:

60 - $70.-

WASTE TYPE

☐ TREATMENT SOIL
☒ DISPOSAL SOIL
☐ CONSTRUCTION SOIL
☐ SLUDGE
☐ NON-FRIABLE ASBESTOS
☐ WOOD
☐ ASH
☐ OTHER

GENERATING FACILITY
General Services Administration
620 Central Ave
Alameda, Ca.

RECEIVING FACILITY

FORWARD INC. LANDFILL
9999 SOUTH AUSTIN ROAD
MANTECA, CALIFORNIA 95336
(209) 982-4298 PHONE
(209) 982-1009 FAX

TRANSPORTER (HAULER MUST COMPLETE)

TRANSPORTER
Mohan M Hotey

ADDRESS
1201 F Hwy 25

CITY/STATE/ZIP
Hollister CA 95023

PHONE 636-1034 [illegible]

SIGNATURE OF AUTHORIZED AGENT OR DRIVER | DATE
* Mohan Singh | 4/26/94

NOTES:
16 yards

TRUCK NUMBER
17-14

☐ END DUMP ☐ BOTTOM DUMP ☐ TRANSFER
☐ ROLL-OFF(S) ☐ FLAT BED ☐ VAN ☐ DRUMS

FACILITY REQUIREMENTS

FORWARD INC. LANDFILL

Forward shall have no obligation to accept the waste if weather or other conditions impair the safe and effective disposal of the waste or if the waste impairs the safe and effective operation of the Landfill. Forward shall use reasonable efforts to promptly notify Disposer of its inability to accept the waste for any reason. If Forward's refusal to accept the waste is based on weather or other site conditions, Forward shall notify the Disposer when site conditions are expected to change such that Forward will be able to accept the waste

REMARKS

FACILITY TICKET NUMBER

SIGNATURE OF AUTHORIZED AGENT | DATE
* C. Cardoza | 4-27-94

CUBIC YARDS
16 yds

DISPOSAL METHOD: (TO BE COMPLETED BY FORWARD)

	DISPOSE	BIO	AERATE	STOCKPILE	OTHER
☑ SOIL					
☐ SLUDGE					
☐ NON-FRIABLE ASBESTOS					
☐ WOOD					
☐ ASH					
☐ OTHER					

SCHEDULING MUST BE MADE PRIOR TO 4:00 P.M THE DAY PRIOR TO EXPECTED ARRIVAL • ANY UNSCHEDULED LOADS ARE SUBJECT TO REFUSAL UPON ARRIVAL. ONGOING DAILY DELIVERIES MUST BE SCHEDULED WITH THE LANDFILL THE DAY BEFORE.
TO SCHEDULE CALL (209) 982-4298

MANIFEST # 22801

GENERATOR COPY

FORWARD INC.

NON-HAZARDOUS WASTE MANIFEST
WASTE TREATMENT AND DISPOSAL FACILITY

JOB ACCEPTANCE NO. CMM-0817

TO BE COMPLETED BY THE GENERATOR

GENERATOR
General Services ADministration
ADDRESS
525 Market Street, 31st Floor
CITY/STATE/ZIP
San Francisco, CA 94105
PHONE
(415) 744-5665
CONTACT PERSON
Beverly Chin
AUTHORIZED AGENT / TITLE — DATE
* Asst. Mgr. 04/26/94

REQUIRED PERSONAL PROTECTIVE EQUIPMENT
☐ GLOVES ☐ GOGGLES ☐ RESPIRATOR ☐ HARD HAT
☐ TY-VEK ☐ OTHER

SPECIAL HANDLING PROCEDURES:

WASTE TYPE

☐ TREATMENT SOIL
☒ DISPOSAL SOIL
☐ CONSTRUCTION SOIL
☐ SLUDGE
☐ NON-FRIABLE ASBESTOS
☐ WOOD
☐ ASH
☐ OTHER

RECEIVING FACILITY

FORWARD INC. LANDFILL
9999 SOUTH AUSTIN ROAD
MANTECA, CALIFORNIA 95336
(209) 982-4298 PHONE
(209) 982-1009 FAX

TRANSPORTER (HAULER MUST COMPLETE)

General Services Administration
629 Central Ave
Alameda, CA
BROSK / John Hedtog
ADDRESS 2267 E Hwy 46
CITY/STATE/ZIP Wasco Hill 93280 CA
PHONE (805) 386-1234
SIGNATURE OF AUTHORIZED AGENT OR DRIVER — DATE
* Dale Krebs 4-26-94

NOTES:
6 yds

TRUCK NUMBER
H8

END DUMP ☐ BOTTOM DUMP ☐ TRANSFER ☒
ROLL-OFF(S) ☐ FLAT-BED ☐ VAN ☐ DRUMS ☐

FACILITY REQUIREMENTS

FORWARD INC. LANDFILL

Forward shall have no obligation to accept the waste if weather or other conditions impair the safe and effective disposal of the waste or if the waste impairs the safe and effective operation of the Landfill. Forward shall use reasonable efforts to promptly notify Disposer of its inability to accept the waste for any reason. If Forward's refusal to accept the waste is based on weather or other site conditions, Forward shall notify the Disposer when site conditions are expected to change such that Forward will be able to accept the waste

REMARKS

FACILITY TICKET NUMBER

SIGNATURE OF AUTHORIZED AGENT — DATE
* [signature] 4/27/94

CUBIC YARDS
6 yds

DISPOSAL METHOD: (TO BE COMPLETED BY FORWARD)

	DISPOSE	BIO	AERATE	STOCKPILE	OTHER
☐ SOIL					
☐ SLUDGE					
☐ NON-FRIABLE ASBESTOS					
☐ WOOD					
☐ ASH					
☐ OTHER					

SCHEDULING MUST BE MADE PRIOR TO 4:00 P.M. THE DAY PRIOR TO EXPECTED ARRIVAL • ANY UNSCHEDULED LOADS ARE SUBJECT TO REFUSAL UPON ARRIVAL. ONGOING DAILY DELIVERIES MUST BE SCHEDULED WITH THE LANDFILL THE DAY BEFORE.
FOR SCHEDULE CALL (209) 982-4298

MANIFEST # 22802

GENERATOR COPY

e of California—Environmental Protection Agency
Approved OMB No. 2050-0039 (Expires 9-30-94)
print or type. *Form designed for use on elite (12-pitch) typewriter.*

See Instructions on back of page 6.

Department of Toxic Substances Control
Sacramento, California

UNIFORM HAZARDOUS WASTE MANIFEST

1. Generator's US EPA ID No. CA1147000017 60 | Manifest Document No. | 2. Page 1 of 1 | Information in the shaded areas is not required by Federal law.

3. Generator's Name and Mailing Address
General Services Administration Field Office
620 Central Avenue, Alameda, CA 94501
#927 43418

4. Generator's Phone (510) 273-7492

5. Transporter 1 Company Name: Erickson, Inc.
6. US EPA ID Number: CAD009466392

7. Transporter 2 Company Name:
8. US EPA ID Number:

9. Designated Facility Name and Site Address
Gibson Oil/Pilot Petroleum
475 Sea Port Blvd.
Redwood City, Ca. 94063
10. US EPA ID Number: CAD043260702

11. US DOT Description (including Proper Shipping Name, Hazard Class, and ID Number)	12. Containers No.	12. Containers Type	13. Total Quantity	14. Unit Wt/Vol
a. RQ Hazardous Waste Liquids NOS (Benzene) 9 NA 3082, PG III D018 ERG # 31	001	TT	2/010	G
b.				
c.				
d.				

GENERATOR

15. Special Handling Instructions and Additional Information
Gibson Oil Waste Stream Profile # 10001 ERG 31
24 Hr. Contact Carolyn Cooly 24 Hr. Phone# 510-
PO# E-10033T
OE# 83765

16. **GENERATOR'S CERTIFICATION:** I hereby declare that the contents of the consignment are fully and accurately described above by proper shipping name and are classified, packed, marked, and labeled, and are in all respects in proper condition for transport by highway according to applicable federal, state and international laws.

If I am a large quantity generator, I certify that I have a program in place to reduce the volume and toxicity of waste generated to the degree I have determined to be economically practicable and that I have selected the practicable method of treatment, storage, or disposal currently available to me which minimizes the present and future threat to human health and the environment; OR, if I am a small quantity generator, I have made a good faith effort to minimize my waste generation and select the best waste management method that is available to me and that I can afford.

Printed/Typed Name	Signature	Month	Day	Year
TIMOTHY D WHITE	Timothy D White	01	05	94

TRANSPORTER

17. Transporter 1 Acknowledgement of Receipt of Materials

Printed/Typed Name	Signature	Month	Day	Year
STAN WILES	Stan Wiles	01	05	94

18. Transporter 2 Acknowledgement of Receipt of Materials

Printed/Typed Name	Signature	Month	Day	Year

19. Discrepancy Indication Space

20. Facility Owner or Operator Certification of receipt of hazardous materials covered by this manifest except as noted in Item 19

Printed/Typed Name	Signature	Month	Day	Year

DO NOT WRITE BELOW THIS LINE

10224 5-92
001 22

State of California—Health and Welfare Agency
Form Approved OMB No. 2050—0039 (Expires 9-30-91)
Please print or type. *Form designed for use on elite (12-pitch typewriter).*

See Instructions on Back of Page 6 and Front of Page 7

Department of Health Services
Toxic Substances Control Division
Sacramento, California

UNIFORM HAZARDOUS WASTE MANIFEST

1. Generator's US EPA ID No.	Manifest Document No.	2. Page 1 of	Information in the shaded areas is not required by Federal law.
CA1470005769		1	

3. Generator's Name and Mailing Address
G.S.A.
620 CENTRAL AVE. 94501
Generator's Phone (CA.) 7772

A. State Manifest Document Number: 90796703
B. State Generator's ID:

5. Transporter 1 Company Name — 6. US EPA ID Number
C. State Transporter's ID:
D. Transporter's Phone: 400 308

7. Transporter 2 Company Name — 8. US EPA ID Number
E. State Transporter's ID: (510)233-7393
F. Transporter's Phone:

9. Designated Facility Name and Site Address — 10. US EPA ID Number
Erickson, Inc.
255 Parr Blvd.
Richmond, Ca. 94801 — CAD009466392
G. State Facility's ID:
H. Facility's Phone: (510) 235-1393

11. US DOT Description (Including Proper Shipping Name, Hazard Class, and ID Number)	12. Containers No.	Type	13. Total Quantity	14. Unit Wt/Vol.	I. Waste No.
a. Waste Empty Storage Tank	002	TF	2000	P	State 512 / EPA/Other
b. NON-RCRA Hazardous Waste Solid.					State NONE / EPA/Other
c.					State / EPA/Other
d.					State / EPA/Other

J. Additional Descriptions for Materials Listed Above
Qty. 2 Empty Storage Tank (s) #1977, 1973
, . Tank (s) have been inerted with 15 lbs. Dry Ice per 1000 Gal. Capacity.

K. Handling Codes for Wastes Listed Above
a. b. c. d.

15. Special Handling Instructions and Additional Information
Keep away from sources of ignition. Always wear hardhats when working around U.S.T.'s 24 Hr. Contact Name TIMOTHY WHITE & Phone (510) 547-7716

16.
GENERATOR'S CERTIFICATION: I hereby declare that the contents of this consignment are fully and accurately described above by proper shipping name and are classified, packed, marked, and labeled, and are in all respects in proper condition for transport by highway according to applicable international and national government regulations.

If I am a large quantity generator, I certify that I have a program in place to reduce the volume and toxicity of waste generated to the degree I have determined to be economically practicable and that I have selected the practicable method of treatment, storage, or disposal currently available to me which minimizes the present and future threat to human health and the environment; OR, if I am a small quantity generator, I have made a good faith effort to minimize my waste generation and select the best waste management method that is available to me and that I can afford.

Printed/Typed Name	Signature	Month	Day	Year
		10	29	89

TRANSPORTER

17. Transporter 1 Acknowledgement of Receipt of Materials

Printed/Typed Name	Signature	Month	Day	Year
		10	29	89

18. Transporter 2 Acknowledgement of Receipt of Materials

Printed Typed Name	Signature	Month	Day	Year

FACILITY

19 Discrepancy Indication Space

20 Facility Owner or Operator Certification of receipt of hazardous materials covered by this manifest except as noted in item 19

Printed Typed Name	Signature	Month	Day	Year

8022 A
8700—22
6-89) Previous editions are obsolete

Do Not Write Below This Line

GENERATOR SENDS THIS COPY TO DOHS WITHIN 30 DAYS
P.O. Box 400 Sacramento CA 95812-0400

GENERATOR — IN CASE OF AN EMERGENCY OR SPILL, CALL THE NATIONAL RESPONSE CENTER 1-800-424-8802; WITHIN CALIFORNIA CALL 1-800-852-7550

State of California—Environmental Protection Agency
Form Approved OMB No. 2050-0039 (Expires 9-30-94)
Please print or type. *Form designed for use on elite (12-pitch) typewriter.*

See Instructions on back of page 6.

Department of Toxic Substances Control
Sacramento, California

UNIFORM HAZARDOUS WASTE MANIFEST

1. Generator's US EPA ID No. CAL4210006740 Manifest Document No. 93132333
2. Page 1 of 1
Information in the shaded areas is not required by Federal law.

3. Generator's Name and Mailing Address
GSA FIELD OFFICE
620 CENTRAL AVE ALAMEDA CA 94501

4. Generator's Phone (510) 273-3492

5. Transporter 1 Company Name
Erickson, Inc.

6. US EPA ID Number
CAD009466392

7. Transporter 2 Company Name

8. US EPA ID Number

9. Designated Facility Name and Site Address
Gibson Oil/Pilot Petroleum
475 Sea Port Blvd.
Redwood City, Ca. 94063

10. US EPA ID Number
CAD043260702

11. US DOT Description (including Proper Shipping Name, Hazard Class, and ID Number)	12. Containers No.	12. Containers Type	13. Total Quantity	14. Unit Wt/Vol
a. RQ Hazardous Waste Liquids NOS (Benzene) 9 NA 3082, PG III D018 ERG # 31	001	TT	1737	G
b.				
c.				
d.				

15. Special Handling Instructions and Additional Information
Gibson Oil Waste Stream Profile # ERG 31 OE# 83994
24 Hr. Contact JIM PERSINGER 24 Hr. Phone# 510-273-3492 PO# E-130HTT

16. **GENERATOR'S CERTIFICATION:** I hereby declare that the contents of the consignment are fully and accurately described above by proper shipping name and are classified, packed, marked, and labeled, and are in all respects in proper condition for transport by highway according to applicable federal, state and international laws.

If I am a large quantity generator, I certify that I have a program in place to reduce the volume and toxicity of waste generated to the degree I have determined to be economically practicable and that I have selected the practicable method of treatment, storage, or disposal currently available to me which minimizes the present and future threat to human health and the environment; OR, if I am a small quantity generator, I have made a good faith effort to minimize my waste generation and select the best waste management method that is available to me and that I can afford.

Printed/Typed Name	Signature	Month	Day	Year
TIMOTHY D WHITE		01	27	94

TRANSPORTER

17. Transporter 1 Acknowledgement of Receipt of Materials

Printed/Typed Name	Signature	Month	Day	Year
JERRY L HULSEY		01	27	94

18. Transporter 2 Acknowledgement of Receipt of Materials

Printed/Typed Name	Signature	Month	Day	Year

FACILITY

19. Discrepancy Indication Space

20. Facility Owner or Operator Certification of receipt of hazardous materials covered by this manifest except as noted in Item 19

Printed/Typed Name	Signature	Month	Day	Year

DO NOT WRITE BELOW THIS LINE.

IN CASE OF EMERGENCY OR SPILL, CALL THE NATIONAL RESPONSE CENTER 1-800-424-8802; WITHIN CALIFORNIA, CALL 1-800-852-7550

DTSC 8022A (7/92)
EPA 8700—22

Blue To: GENERATOR SENDS THIS COPY TO DTSC WITHIN 30 DAYS
P O Box 400, Sacramento, CA 95812-0400

State of California—Environmental Protection Agency
Form Approved OMB No: 2050-0039 (Expires 9-30-94)
Please print or type. Form designed for use on elite (12-pitch) typewriter.

See Instructions on back of page 6.

Department of Toxic Substances Control
Sacramento, California

UNIFORM HAZARDOUS WASTE MANIFEST

1. Generator's US EPA ID No.	Manifest Document No.	2. Page 1 of	Information in the shaded areas is not required by Federal law
CA1A7000027601	013174	1	

GENERATOR

3. Generator's Name and Mailing Address
GENERAL SERVICES ADMINISTRATION FIELD OFFICE
620 CENTRAL AVE, ALAMEDA, CA. 94501

4. Generator's Phone (510) 273-7492

A. State Manifest Document Number: 3018191

B. State Generator's ID:

C. State Transporter's ID:

D. Transporter's Phone: (209) 892-8670

E. State Transporter's ID:

F. Transporter's Phone:

G. State Facility's ID: CAD0831166728

H. Facility's Phone: (209) 892-8672

5. Transporter 1 Company Name: PETROLEUM RECYCLING CORP.
6. US EPA ID Number: CAT080011059

7. Transporter 2 Company Name:
8. US EPA ID Number:

9. Designated Facility Name and Site Address
PETROLEUM RECYCLING CORP.
13331 N. HIGHWAY 33
PATTERSON, CA. 95363
10. US EPA ID Number: CAD083116728

11. US DOT Description (including Proper Shipping Name, Hazard Class, and ID Number)	12. Containers No.	12. Containers Type	13. Total Quantity	14. Unit Wt/Vol	I. Waste Number
a. NON RCRA HAZARDOUS WASTE LIQUID (OIL, WATER)	001	TT	00112	G	State 223
b.					EPA/Other
c.					State
d.					EPA/Other
					State
					EPA/Other
					State
					EPA/Other

J. Additional Descriptions for Materials Listed Above

K. Handling Codes for Wastes Listed Above
a. b.
c. d.

15. Special Handling Instructions and Additional Information

24 HOUR EMERGENCY CONTACT: PRC/ENVIROPUR (800) 274-4444
24 HOUR EMERGENCY RESPONSE: CHEM TEL INC. (800) 255-3924
WEAR APPROPRIATE PROTECTIVE CLOTHING AND RESPIRATOR

16. GENERATOR'S CERTIFICATION: I hereby declare that the contents of the consignment are fully and accurately described above by proper shipping name and are classified, packed, marked, and labeled, and are in all respects in proper condition for transport by highway according to applicable federal, state and international laws

If I am a large quantity generator, I certify that I have a program in place to reduce the volume and toxicity of waste generated to the degree I have determined to be economically practicable and that I have selected the practicable method of treatment, storage, or disposal currently available to me which minimizes the present and future threat to human health and the environment; OR, if I am a small quantity generator, I have made a good faith effort to minimize my waste generation and select the best waste management method that is available to me and that I can afford.

Printed/Typed Name: AS AGENT FOR [illegible] | Signature: [signature] | Month: 01 | Day: 21 | Year: 91

TRANSPORTER

17. Transporter 1 Acknowledgement of Receipt of Materials
Printed/Typed Name: [illegible] | Signature: [signature] | Month: [illegible] | Day: [illegible] | Year: [illegible]

18. Transporter 2 Acknowledgement of Receipt of Materials
Printed/Typed Name: | Signature: | Month: | Day: | Year:

FACILITY

19. Discrepancy Indication Space

20. Facility Owner or Operator Certification of receipt of hazardous materials covered by this manifest except as noted in Item 19
Printed/Typed Name: | Signature: | Month: | Day: | Year:

DO NOT WRITE BELOW THIS LINE

IF EMERGENCY SPILL, CALL THE NATIONAL RESPONSE CENTER 1-800-424-8802; WITHIN CALIFORNIA, CALL 1-800-852-7550

SF 8022A (7-92)

HAZARDOUS SPECIAL WASTE & ASBESTOS MANIFEST

Complete Sections I, II, III and IV. — No. 481382

Complete only Sections I, II and III.

Generating Location: Alameda Federal Center
Address: 620 Central Ave
Alameda, Ca.

Phone No.:

Owner's Phone No.:

Containers	TYPE
	DM - METAL DRUM DP - PLASTIC DRUM B - BAG BA - 6 MIL. PLASTIC BAG or WRAP T - TRUCK O - OTHER

UNITS
P - POUNDS Y - YARDS M³ - CUBIC METERS Y³ - CUBIC YARDS O - OTHER

Shipment Date

TRANSPORTER I

Print/Type

Shipment Date

TRANSPORTER II

Print/Type

Shipment Date

Phone No.:

Acknowledgement of Receipt of Materials.

Shipment Date

Phone No.: 510-447-0491

Receipt Date

Operator's* Phone No.:

OPERATOR'S CERTIFICATION: I hereby declare that the contents of this consignment are fully and accurately described above by proper shipping name and are classified, packed, marked and labeled/placarded and are in all respects in proper condition for transport by highway according to applicable international and government regulations.

Print/Type

Operator's* Signature

Date

g. ☐ Friable, ☐ Non-friable, ☐ Both _____ % friable _____ % nonfriable

* Operator refers to the company which owns, leases, operates, controls, or supervises the facility being demolished or renovated or the demolition or renovation operation or both

RETURN TO OPERATOR

260-720B 5/93

GENERATOR'S WASTE PROFILE SHEET

PLEASE PRINT IN INK OR TYPE

APR 5 1994

Waste Profile Sheet Code

WMNA 050115

This form is to be used to comply with the requirements of a waste agreement.

INSTRUCTIONS FOR COMPLETING THIS FORM ARE ATTACHED

(Shaded Areas For Contractor Use Only) Decision Expiration Date: 6/1/94

Contractor Sales Rep#: Service Agr. Renewal Date: / /

A. WASTE GENERATOR INFORMATION

1. Generator Name: General Services Administration 2. SIC Code: N/A
3. Facility Address (site of waste generation): 620 Central Avenue
4. Generator City, State/Province: Alameda, California 5. Zip/Postal Code: 94501
6. Generator USEPA/Federal ID #: CAL 470000760 7. State/Province ID #: N/A
8. Technical Contact: Beverly Chin 9. Phone: (415) 744-5665

B. WASTE STREAM INFORMATION (See Instructions)

1. Name of Waste: UST Cover Material (Sand)
2. Process Generating Waste: Fuel Storage Tank Cover, Sand
3. Annual Amount/Units: 4. Type A ☒ Type B ☐
5. Special Handling Instructions/Supplemental Information: Approximately 20 cubic yards of sandy soil
6. Incidental Waste Types and Amounts:

C. TRANSPORTATION INFORMATION

1. Method of Shipment: ☐ Bulk Liquid ☐ Bulk Sludge ☒ Bulk Solid ☐ Drum/Box ☐ Other
2. Supplemental Shipping Information:
3. Is this a DOT hazardous material? ☒ No ☐ Yes (If yes, complete 4, 5 & 6) 4. Hazard Class/ID #:
5. Reportable Quantity/Units (lb/kg): 6. Shipping Name:

D. TECHNICAL MANAGER DECISION (Check One) ☒ APPROVED ☐ DISAPPROVED ☐ Check if additional information is attached

If Disapproved, Explain:

If Approved, Continue.

1. Management Method(s): Approved for use as cover
2. Precautions, Conditions, or Limitations on Approval: None
3. For Type A Wastes, Laboratory Analysis of a Representative Sample Was: ☐ Waived ☐ Attached
   If waived, explain why:
4. List transportation facility that is approved to transport this waste: Date:

Tech. Mgr. Signature: Name (Print): Bruce Wilbur Date: 4-28-94

E. MANAGEMENT FACILITY INFORMATION / DECISION

1. Proposed Management Facility:
2. Proposed Intermediate Transfer Facility: 3. Transporter:
4. Management Facility Gen. Mgr. Decision (Check One) ☒ APPROVED ☐ DISAPPROVED

If Disapproved, Explain:
If Approved, List
Precautions, Conditions, or Limitations on Approval:

General Mgr. Signature: Name (Print): Mike Toscotti Date: 4/25/94

Turn Page and Complete Side 2 (If Type B Special Waste, only complete Part J of Side 2)

GENERATOR'S WASTE PROFILE SHEET

PLEASE PRINT IN INK OR TYPE

F. PHYSICAL CHARACTERISTICS OF WASTE (See instructions)

1. Color	2. Does the waste have a strong incidental odor?	3. Physical State @ 70°F/21°C:	4. Layers	5. Specific Gravity	6. Free Liquids:
	☒ No ☐ Yes; if so, describe:	☐ Solid ☒ Semi-Solid ☐ Liquid ☐ Powder ☐ Other:	☐ Multi-layered ☐ Bi-layered ☐ Single Phased	Range: 1.5 - 1.7	☐ Yes ☒ No Volume:

7. pH: ☐ ≤2 ☐ > 2-4 ☐ 4-7 ☒ 7 ☐ 7-10 ☐ 10- ≤12.5 ☐ ≥12.5 ☐ Range ☐ NA

8. Flash Point: ☒ None ☐ <140°F/60°C ☐ 140 - 199°F/60 - 93°C ☐ ≥200°F/93°C ☐ Closed Cup ☐ Open Cup

G. CHEMICAL COMPOSITION

	RANGE (MIN-MAX)	
1. _____	____ - ____	%
_____	____ - ____	%
_____	____ - ____	%
_____	____ - ____	%
_____	____ - ____	%
_____	____ - ____	%
_____	____ - ____	%
_____	____ - ____	%
_____	____ - ____	%
Total:	____	%

2. Does the waste contain any of the following? (provide concentration if known):

	NO	or	LESS THAN	or	ACTUAL
PCBs	☒		☐ < 50 ppm		_____ ppm
Cyanides	☒		☐ < 30 ppm		_____ ppm
Sulfides	☒		☐ < 500 ppm		_____ ppm

Please note: Unless analytical results are attached, the chemical composition identification should include, at a minimum, Arsenic, Barium, Cadmium, Chromium, Lead, Mercury, Selenium, Silver, Pesticides, Herbicides, and any other TCLP constituents that may be present in the waste. The total composition must be greater than or equal to 100%. (.0001% = 1 ppm or 1 mg/l)

3. Indicate method used to determine composition (if provided): ☐ TCLP ☐ Total ☐ Other: _____

H. SAMPLING SOURCE (e.g., Drum, Lagoon, Pit, Pond, Tank, Vat) COVERED PILE + PIT

I. REPRESENTATIVE SAMPLE CERTIFICATION

1. Print Sampler's Name: TIM K SMITH 2. Sample Date: 11/6/94 + 1/27/94
3. Sampler's Title: GEOLOGIST
4. Sampler's Employer (if other than Generator): TRS CONSULTING

The sampler's signature certifies that any sample submitted is representative of the waste described above pursuant to 40 CFR 261.20(c) or equivalent rules.

5. Sampler's Signature _____

J. GENERATOR CERTIFICATION

By signing this profile sheet, the Generator certifies:

1. This waste is not a "Hazardous Waste" as defined by USEPA or Canadian Federal regulation and/or the state/province.
2. This waste does not contain regulated radioactive materials or regulated concentrations of PCB's (Polychlorinated Biphenyls).
3. The unshaded portions of this sheet and the attachments contain true and accurate descriptions of the waste material. All relevant information regarding known or suspected hazards in the possession of the Generator has been disclosed.
4. The Generator has read and understands the Contractor's Definition of Special Waste included in Part B.5 of the attached instructions for. All types and amounts of special wastes provided in incidental amounts have been identified in section B.6 of this form.
5. The analytical data presented herein or attached hereto were derived from testing a representative sample taken in accordance with 40 CFR 261.20(c) or equivalent rules.
6. If any changes occur in the character of the waste, the Generator shall notify the Contractor prior to providing the waste to the Contractor.
7. Signature X _____ 8. Title Contracting Officer
9. Name (Type or Print) Beverly Chin 10. Date 9/30/94

NON-HAZARDOUS SPECIAL WASTE & ASBESTOS MANIFEST

(H3)

If waste is asbestos waste, complete Sections I, II, III and IV.
If waste is NOT asbestos waste, complete only Sections I, II and III.

No. 481381

Section I

a. Generator Name: General Services Administration b. Generating Location: Alameda Federal Center facility

c. Address: 525 Market Street, 31st Floor d. Address: 620 Central Ave.

$ (415) 744-5665 San Francisco, CA 94105 Alamida, CA

e. Phone No.: f. Phone No.:

If owner of the generating facility differs from the generator, provide:

g. Owner's Name: h. Owner's Phone No.:

i. BFI WASTE CODE: CA405 042949 22750 Containers

j. Description of Waste: Soil k. Quantity: 18 Units: Y No.: TYPE: T

TYPE
DM - METAL DRUM
DP - PLASTIC DRUM
B - BAG
BA - 6 MIL. PLASTIC BAG or WRAP
T - TRUCK
O - OTHER

UNITS
P - POUNDS
Y - YARDS
M³ - CUBIC METERS
Y³ - CUBIC YARDS
O - OTHER *

GENERATOR'S CERTIFICATION: I hereby certify that the above named material is not a hazardous waste as defined by 40 CFR Part 261 or any applicable state law, has been properly described, classified and packaged, and is in proper condition for transportation according to applicable regulations; AND, if the waste is a treatment residue of a previously restricted hazardous waste subject to the Land Disposal Restrictions, I certify and warrant that the waste has been treated in accordance with the requirements of 40 CFR Part 268 and is no longer a hazardous waste as defined by 40 CFR Part 261.

Kathryn Casey — Generator Authorized Agent Name; Signature; Shipment Date 04/26/94

Section II

TRANSPORTER I	TRANSPORTER II
a. Name: John Hertzig	h. Name:
b. Address: 967 E. Hwy 246 Mike Hall CA.	i. Address:
c. Driver Name/Title: Dave Lopez (Driver) PRINT/TYPE	j. Driver Name/Title: PRINT/TYPE
d. Phone No.: 209-726-7234 e. Truck No.: HS 1194	k. Phone No.: l. Truck No.:
f. Vehicle License No./State: 2W495 / 1443565 CA	m. Vehicle License No./State:
Acknowledgement of Receipt of Materials.	Acknowledgement of Receipt of Materials.
g. Driver Signature; Shipment Date	n. Driver Signature; Shipment Date

Section III

a. Site Name: Vasco Rd Sanitary Land Fill c. Phone No.:

b. Physical Address: 4001 N. Vasco Rd. Livermore, Ca. d. Mailing Address:

e. Discrepancy Indication Space:

I hereby certify that the above named material has been accepted and to the best of my knowledge the foregoing is true and accurate.

f. Name of Authorized Agent; Signature; Receipt Date 4/26/94

Section IV

a. Operator's* Name: b. Operator's* Phone No.:

c. Operator's* Address:

d. Special Handling Instructions and additional information:

OPERATOR'S CERTIFICATION: I hereby declare that the contents of this consignment are fully and accurately described above by proper shipping name and are classified, packed, marked, and labeled, and are in all respects in proper condition for transport by highway according to applicable international and government regulations.

e Operator's* Name & Title. Print/Type; Operator's* Signature; Date

f Name and Address of Responsible Agency:

g ☐ Friable, ☐ Non-friable, ☐ Both ____ % friable ____ % nonfriable

* Operator refers to the company which owns, leases, operates, controls, or supervises the facility being demolished or renovated, or the demolition or renovation operation or both

RETURN TO OPERATOR

260-7208 5/93

NON-HAZARDOUS SPECIAL WASTE & ASBESTOS MANIFEST

(H 17)

If waste is asbestos waste, complete Sections I, II, III and IV.
If waste is NOT asbestos waste, complete only Sections I, II and III.

No. 481379

tion I: [illegible] GENERATOR (Generator completes all of Section I)

a. Generator Name: General Services Administration
b. Generating Location: Alameda Federal Center facility
c. Address: 525 Market Stree, 31st Floor
d. Address: 620 Central Avenue
San Francisco, CA 94105
Alameda, Ca.
e. Phone No.: (415) 744-5665
f. Phone No.:

mer of the generating facility differs from the generator, provide:

g. Owner's Name:
h. Owner's Phone No.:

FI WASTE CODE: C A | 4 0 5 | 0 4 2 2 9 4 | 2 2 7 5 0

Containers: i. Quantity: 17 | Units: Y | No.: | TYPE: T

Description of Waste: Soil

TYPE
DM - METAL DRUM
DP - PLASTIC DRUM
B - BAG
BA - 6 MIL. PLASTIC BAG or WRAP
T - TRUCK
O - OTHER

UNITS
P - POUNDS
Y - YARDS
M³ - CUBIC METERS
Y³ - CUBIC YARDS
O - OTHER

ENERATOR'S CERTIFICATION: I hereby certify that the above named material is not a hazardous waste as defined by 40 CFR Part 261 any applicable state law, has been properly described, classified and packaged, and is in proper condition for transportation according to pplicable regulations; AND, if the waste is a treatment residue of a previously restricted hazardous waste subject to the Land Disposal estrictions, I certify and warrant that the waste has been treated in accordance with the requirements of 40 CFR Part 268 and is no longer hazardous waste as defined by 40 CFR Part 261.

Carolyn Powery — Signature — Shipment Date

enerator Authorized Agent Name

tion II: [illegible] TRANSPORTER (Generator complete a-k; Transporter 1 complete k-q; Transporter 2 complete r-x)

TRANSPORTER I	TRANSPORTER II
a. Name: John W. Hasting	h. Name:
b. Address: 9267 E Hwy 26	i. Address:
c. Driver Name/Title: Dan Sapolu (PRINT/TYPE)	j. Driver Name/Title: (PRINT/TYPE)
d. Phone No.: 736-4028 e. Truck No.: H-14	k. Phone No.: l. Truck No.:
f. Vehicle License No./State: 3600649 CA	m. Vehicle License No./State:
g. Acknowledgement of Receipt of Materials.	Acknowledgement of Receipt of Materials.
Dan Sapolu — Driver Signature — 4/26/94 Shipment Date	n. Driver Signature — Shipment Date

tion III: [illegible] DESTINATION (Generator complete o-q, [illegible] site complete r-t)

o. Site Name: Vasco Rd. Sanitary Landfill
p. Phone No.: 510-447-0491
q. Physical Address: Vasco Rd.
Livermore, Ca.
r. Mailing Address:

s. Discrepancy Indication Space:

hereby certify that the above named material has been accepted and to the best of my knowledge the foregoing is true and accurate.

Name of Authorized Agent — Signature — 4/26/94 Receipt Date

tion IV: ASBESTOS (Generator complete a-d, if a Operator* completes e)

Operator's* Name:
b. Operator's* Phone No.:
Operator's* Address:
Special Handling Instructions and additional information:

ERATOR'S CERTIFICATION: I hereby declare that the contents of this consignment are fully and accurately described above by proper shipping name and are classified, ked, marked, and labeled, and are in all respects in proper condition for transport by highway according to applicable international and government regulations

Operator's* Name & Title: (Print/Type) — Operator's* Signature — Date

Name and Address of Responsible Agency:

☐ Friable; ☐ Non-friable; ☐ Both, [illegible] % friable _____ % nonfriable

Operator refers to the company which owns, leases, operates, controls, or supervises the facility being demolished or renovated, or the demolition or renovation operation or both

RETURN TO OPERATOR

260-720B 5/93

APPENDIX E

Sample Analysis
PLEASE SEE SEPARATE BINDER

APPENDIX F

Bio-Converters, Inc.
Case Studies & MSDS Sheets

Bio Converters, Inc.

Corporate Offices: 2201 Broadway, Suite 803, Oakland, CA 94612

Reply to:

☐ Southern California Office, 77-705 Seminole, Indian Wells, CA 92210 • (619) 360-5251 • FAX (619) 345-0213

☐ Northern California Office, 309 Pine Street, Jackson, CA 95642 • (209) 267-0858 • FAX (209) 267-9224

☐ Nevada-Bio Converters of Nevada, Inc., 1800 Copperton Road, Camino, CA 95709 • (916) 644-8590

May 3, 1994

TKS Consulting and Contract Geologic Services
P.O. Box 1618
Sutter Creek, CA 95685
Attn: Tim Smith

Dear Mr. Smith:

Per your request, I have enclosed the following documents of case studies where Bio Converters, Inc. has remediated and is currently working on crude oil and long chain hydrocarbon projects. Also enclosed is a brief summary of the conversion process and documents of the production of beneficial organic matter, as by products.

Case Studies:

Two documents from sites at Amoco Oil Company in Farmington, New Mexico. Both of the sites were treated in-situ by our flood technique.

United Engine & Machine Co.- Demonstrates the reduction of mineral oils, cutting oils and hydraulic oils. We are currently remediating nine barrels of the same material.

San Diego Depart. of Health Services- It should be noted that the soil contaminated with motor oil had been run through the thermal desorption rotary kiln prior to our treatment.

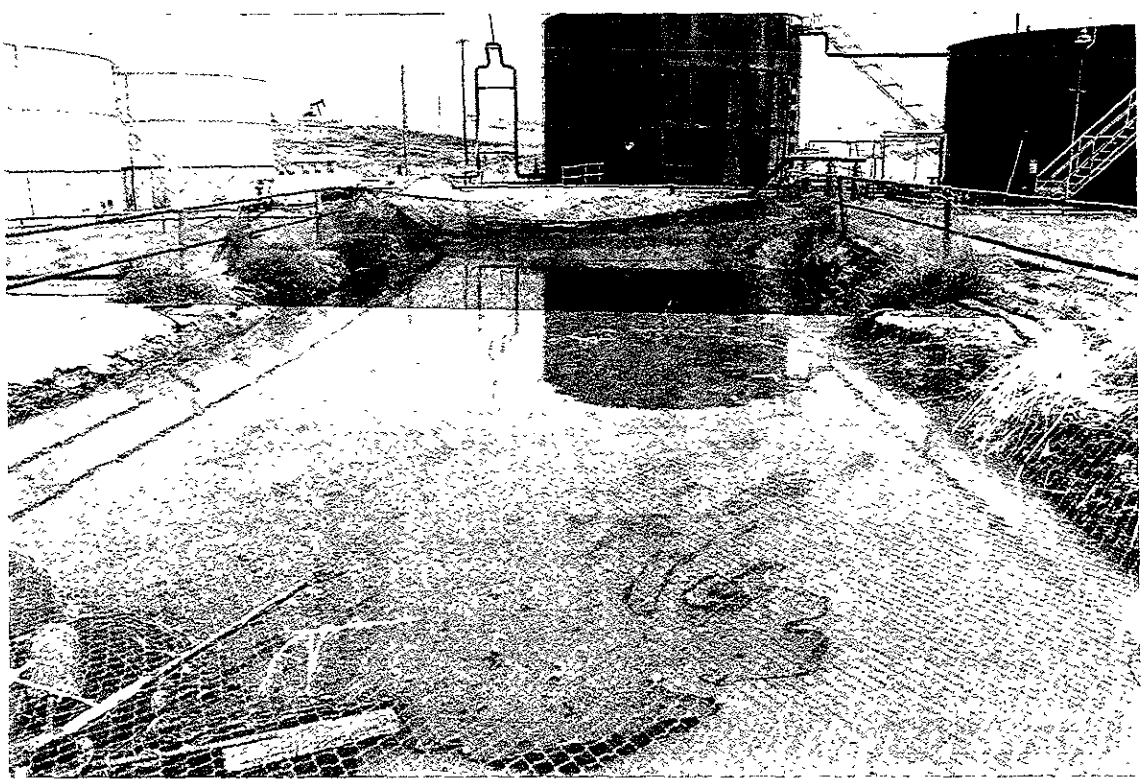
Remediation Contractors, Inc.- This document contains information pertaining to an in-situ and ex-situ bio-treatability study for hydraulic oil impacted soil and groundwater.

Oxy Petroleum- The case study on this project is being prepared at this time. However, this is a 35' x 75' crude oil sump pit. The contaminant that we are successfully remediating is a API 12 gravity asphaltic crude oil. The treatment involved our in situ flood application of our proprietary product. Baseline tph was 100,000 ppm. BCI believes this site has been successfully remediated to a depth of 10 feet in 8 months. We are currently working through the false-positives associated with

OXY U.S.A SUMP

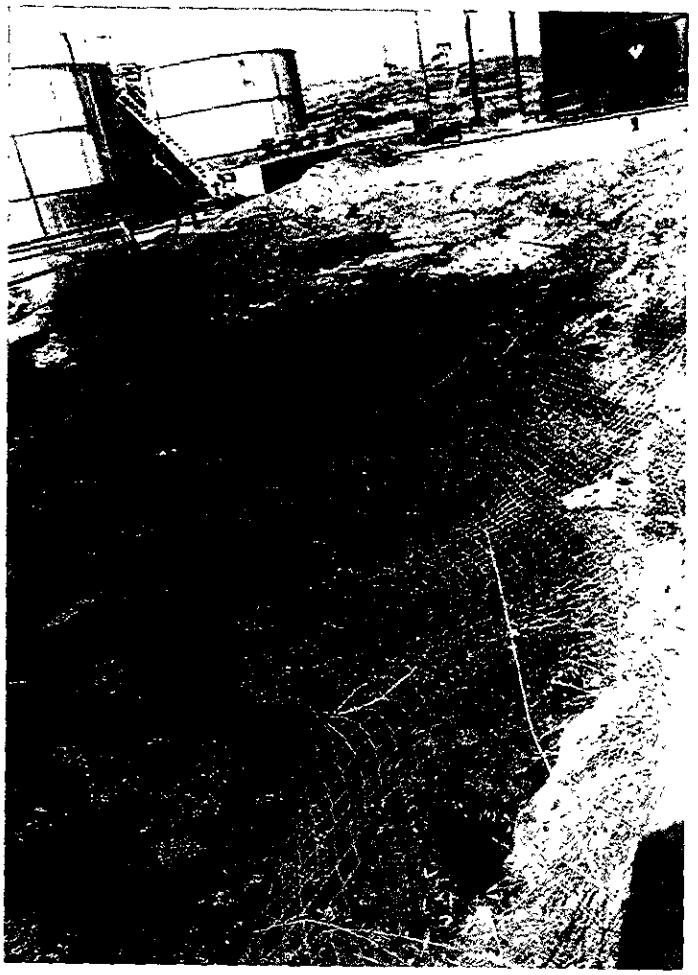
PRE TREATMENT

TREATMENT

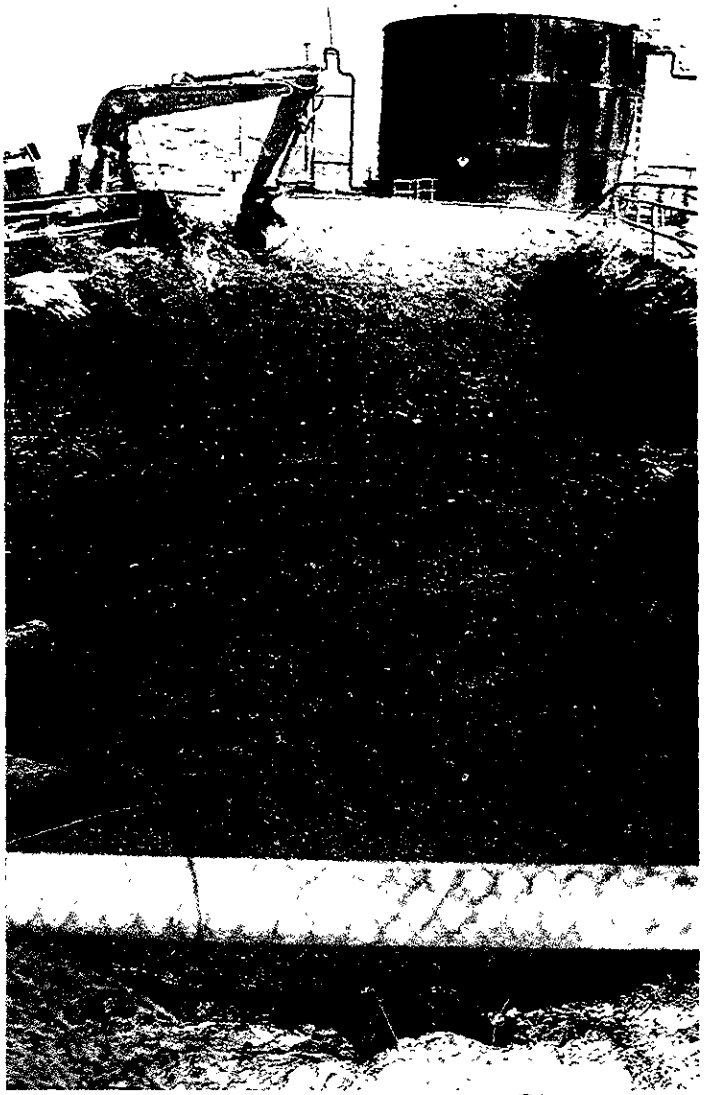


DURING CONVERSION

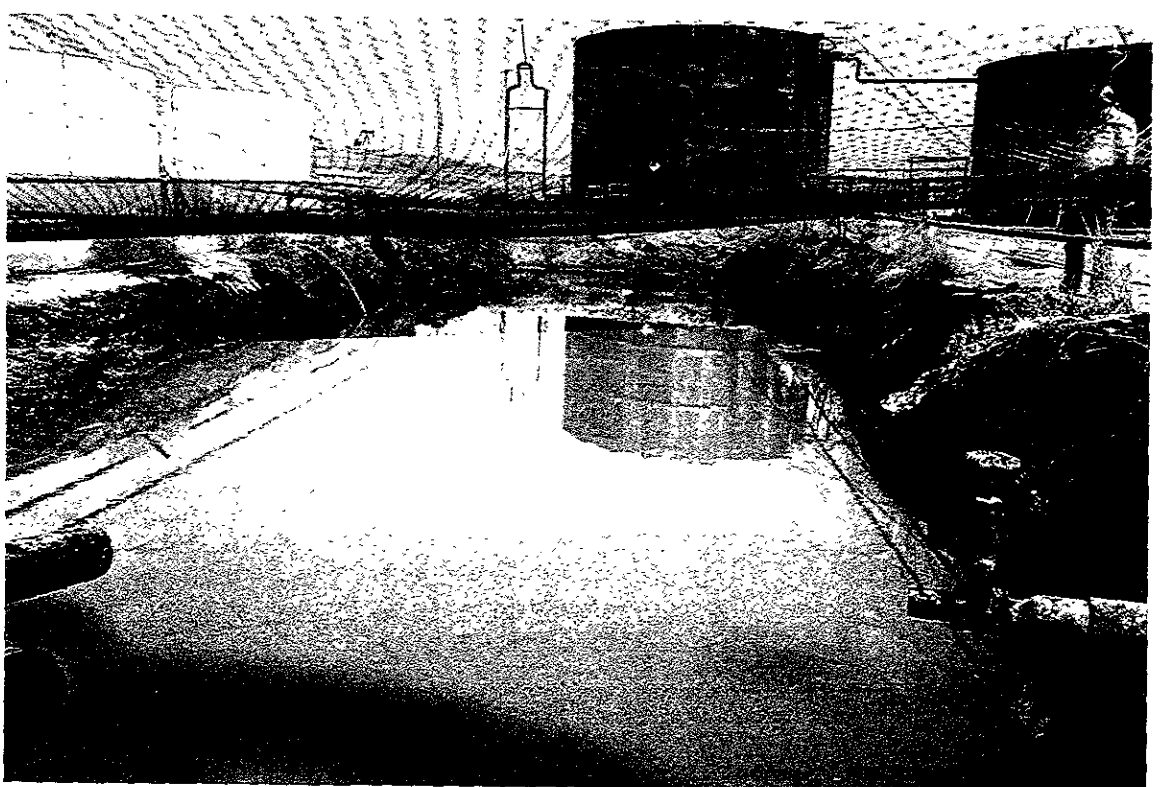
OXY USA SUMP



ALGAL BLOOM ON POND BOTTOM AFTER DRAINING



POST TREATMENT EXAMINATION (NO METHANE, OR H_2S)



SECOND APPLICATION (RE TREATMENT

bioremediation of long carbon chained asphaltic compounds in the 100 plus carbon range. Present analytical methods are resulting in tph levels of 3000 ppm. Friedman and Bruya, Inc., environmental chemists of Seattle, Washington are presently identifying the compounds to show that they are no longer petroleum hydrocarbons.(see photo)

Conversion Process:

The process involves an extra cellular cleaving and re-fixation process, producing redox reactions. This involves the reduction process of fixing hydrogen ions and an oxidation process by fixing oxygen ions to the beginning substrate, thus creating esthers, alcohols, amino acids, fatty acids, carbonyls, and carboxylic acids. These compounds are non-toxic organics found in everyday plant matter, vitamins, food supplements, etc.

In addition to redox reactions on beginning substrates such as heavy fuel oils and crudes, the BCI process will entail a certain amount of hydrocracking. This is accomplished by the enzymes simply cleaving the long chain hydrocarbon, thus creating more of a shorter chain hydrocarbon. Depending on the length that is cleaved, a certain portion will solublize then be converted to organic acids, while a portion will rise to the surface of the water faster than the rate of conversion. Eventually this newly formed free product will continue this process of cleaving, solublizing and converting. This solublization process is documented in the BC Laboratories report containing a series of 8240's and 8270's over an extended period, demonstrating that no toxic daughter products are produced. Also included is a fish bio assay of the converted product.

To expidite the process on this site, BCI recommends that the free product and organically enriched water be extracted at various intervals, and allowed to complete the conversion process in a secondary reactor. This will allow for a more efficient and timely process of the conversion.

Due to the exorbitant amount of beneficial organic matter created, it will be necessary to conduct a sodium hydroxide clean up step in the 418.1 analysis method. This will neutralize the organics which commonly will show up on an IR thus revealing true TPH values. It has been found that the 413.2 analysis is not condusive to the BCI conversion process, as this method is designed to see fats, alcohols, acids, etc. which are the common by-products produced.

The enclosed is documentation identifying typical by-products produced, such as alanine, valine, and leucine seen in the Irvine Analytical Laboratories report (an EPA

lab). Also included are the findings of Inter-Mountain Laboratories, and Friedman and Bruya, Inc. environmental chemists report on organic matter.

I hope this information will be adequate in obtaining the approvals that may be necessary. If you have any questions, please don't hesitate to call.

Sincerely,

Jay Martinovich
Bio Converters, Inc.

Technical Data

Our in situ and ex situ process is facilitative (aerobic and anaerobic), achieving 15 foot penetrations without having to till or disturb the soil whatsoever. We do not have to induce oxygen or electron acceptors. The soil is treated and undisturbed, leaving no chance of aromatic or the release of VOC's.

Analysis results for Treatment ASJ-5 (graph follows)

Elliot G-1, an Oil company production pit. Heavy crude at 96,300 (9.6%) ppm TPH that dropped to 535 ppm TPH in just 16 days. Our goal of TPH under 100 ppm was accomplished in about two weeks. Also noteworthy is the fact that benzene went from 151,725 ppb to non-detect during the same period. All this was done without excavation preventing benzene from being vented to the air as is the case with some of the other methods.

ELLIOT ANNIE L G1

Section 12 T-29 R-9
Foreman: Bainard Duke
Pumper: Mike Hodges

Envirotech Assessment:
Pit No: TC019 Pit Use. Sep/Pro
Date: 8/24/92 Ground Water Encountered: 0
Soil Type. SM/ML/SP
Pit Type UNL

EPA METHOD 8020 (PPB)
5060 PURGE & TRAP 3810 HEAD SPACE

Sample No.	OVM	BTEX	Benzene	(PPM) BTEX	Benzene
T1-2	4564	36,320	80	10,800	275.6	32.9
T1-7	4.1				
COMP				9,600	

Sample Taken 10-26-92 Envirotech 1' depth

TPH: 96,300 PPM
BTX: 234,650 PPB
Benzene: 850 PPB

Envirotech 5' depth

TPH: 39,900 PPM
BTX: 1,245 PPB
Benzene: 151,725 PPB

Envirotech assessment taken. Treated site in situ with liquid only. No physical disturbances except for assessment holes.

Sample Taken 11-12-92 Jerry in situ

TPH: 535 PPM

Sample Taken 11-18-92 JWF-9 4' depth

TPH: 363 PPM
BTX: 7,230 PPB
Benzene: ND

(continued)

Test result, continued:

11-23-92

Site excavated by B&E. Closure samples taken by Envirotech. Site was backfilled.

Sample Taken 11-30-92 JWF-24 before final liquid, 1' depth

TPH: 1,490 PPM
BTX: 13,240 PPB
Benzene: ND

Sample Taken 12-2-92 JWF-41 1' depth

TPH: 72 PPM
BTX: 36,200 PPB
Benzene: ND

12-8-92

Per Buddy Shaw, re-excavated pit on December 11, 1992. Will be checking for hot spots in the soil.

12-11-92

At 10.00 AM, met with Envirotech and B&E on site Opened pit, taking samples every three feet. Buddy Shaw checked on the work when were at a depth of approximately 9 feet.

Sample Taken JWF-56 6" depth OVM - 800 +

TPH: 444 PPM
BTX: 25 PPB
Benzene: ND

JWF-57 9' depth OVM - ND

TPH: ND
BTX: ND
Benzene: ND

JWF-58 12' depth OVM- 409

TPH: 58 PPM
BTX: 7430 PPB
Benzene: ND

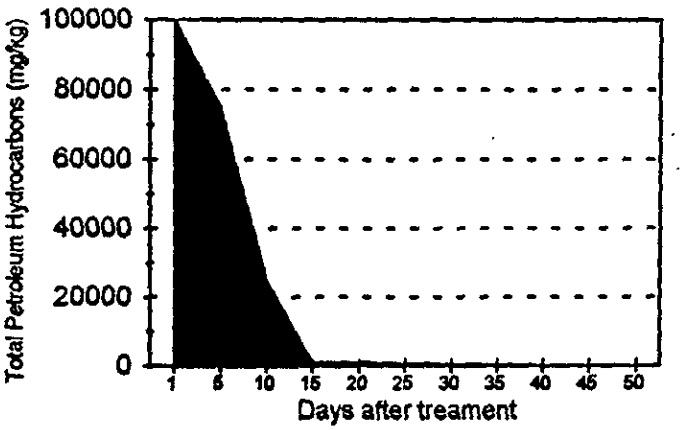
JWF-59 15' depth OVM-No Detect

TPH: ND
BTX: 48 PPB
Benzene: ND

Left the pit open for further inspection

(continued on page 4)

Example - In Situ Treatment ASJ-5



*** Seen above is an example of an effective in situ treatment. In addition to the TPH reduction, Benzene levels dropped from 151,725 ppb to non-detect during the same period.**

In the following pages we offer documented results of only a fraction of our achievements. Due to the length of the laboratory reports, we have listed these in our own, chart, format. Hard copy verification from the laboratories will be provided upon request.

Crouch Mesa, a major oil company production pit, started at 98%, (980,000 ppm) with a one foot heavy paraffin wax layer on top. This was treated in situ without disturbing any soil, and brought down to 1.8% in 75 days, decreasing to "non-detect", when the pumper recontaminated the sump. Also note the low BTEX levels showing that this was a heavy crude.

EPA Method 418.1 / Intermountain Laboratories, Farmington, New Mexico

date sampled 2/15/93 date analyzed 2/17/93

Sample ID	LAB ID	concentration	detection limit (mg/kg)
130	1,861	980,000 ppm	77,000

VOLATILE AROMATIC HYDROCARBONS

Target Analyte	Concentration (mg/kg)	Detection limit (mg/kg)
Benzene	27	2
Toluene	169	2
Ethylbenze	14	2
m,p-Xylenes	93	4
o-Xylene	18	4

date sampled 4/5/93 date analyzed 4/13/93

Sampled	LAB ID	concentration (mg/kg)	detection limit (mg/kg)
158	2,376	111,000	9,700

VOLATILE AROMATIC HYDROCARBONS

Target Analyte	Concentration (mg/kg)	detection limit (mg/kg)
Benzene	26	2
Toluene	119	2
Ethylbenzene	38	2
m,p-Xylenes	380	4
o-Xylene	124	4

(continued on page 6)

date sampled 4/30/93 date analyzed 5 /3 /93

Sample ID	LAB ID	concentration (mg/kg)	detection limit (mg/kg)
162 -JF	2,467	15,800	1,300

VOLATILE AROMATIC HYDROCARBONS

Target Analyte	Concentration (mg/kg)	Detection Limit (mg/kg)
Benzene	1.05	0.9
Toluene	12.1	0.9
Ethylbenzene	9.78	0.9
m,p-Xylenes	50.9	1.8
o-Xylene	31	1.8

*Note rise in BTEX then a drop. This is a natural occurrence in bio-conversion process.

UNITED ENGINE & MACHINE CO.
INCORPORATED

4909 Goni Road
Carson City, NV 89706

SILV-O-LITE
Better Pistons Since 1928

BURLOW
(702) 882-7790

Jerry Stacy

MARCH 1, 1994

JERRY CONNERS
N.D.E.P.
333 W. NYE LN.
CARSON CITY, NV. 89710
Phone: 687-5872, ext. 3019

Mr. Conners

This letter is to inform you of our operations, procedures, chemicals used, lab analysis, and plans for remediation as related to an accumulated sludge from our Waste Water Treatment operation. It should be noted that the remediation of this sludge is a pilot project and will be a one time only venture.

United Engine & Machine Co. is a corporation that produces aluminum pistons for automotive engines. The basic processes involved in producing aluminum pistons are as follows:

> Pistons are cast, in permanent molds in our foundry from, ready to use, aluminum ingot which we purchase. Piston castings are trimmed of gates and risers and then heat treated prior to machining. The machining process involves turning, grooving, boring, drilling, and honing. After machining, pistons are washed, balanced, packaged and stored in our warehouse.

The sludge that we plan to remediate was the result of a waste water treatment operation that is no longer in process. We called the equipment for this operation a "Separator" and attached is a procedure for the "Separator operation". We have 3 drums of sludge from this operation that was unable to go to the landfill due to a high TPH (270,000 ppm). While looking for alternatives for disposal of this sludge Ken Arnold sent Jerry Stacy of Bio-Converters to see me. Mr. Stacy believed that the sludge could be effectively treated to reduce the high TPH. He was given a sample of the sludge to perform his own tests, the result was a TPH of 160 ppm and he assured me that he would be able to lower the TPH even further. Mr. Stacy's plan for treatment of the 3 drums of sludge is as follows:

> Start with 1/3 drum of sludge, add nutrients (Nitrogen, Potassium, Potash) and their "Microbial Consortium" to fill the drum. After 6 weeks the solution will be tested for TPH and any other parameter considered necessary. Once satisfactory results are achieved, disposal will be considered. The end quantity of product will be about 500 gallons of solution that will essentially be considered a liquid fertilizer.

This project will be used as guide for any future remediation projects that may be faced with a similar problem and as an alternative solution to landfill.

Enclosures:

1. Material Safety Data Sheets for products used in the "Separator" and constituents of the waste water.

2. Lab Analysis.

3. Procedure for the "Separator Operation".

CURTIS L. EVENSON
ENVIRONMENTAL COORDINATOR

STATE OF NEVADA
BOB MILLER
Governor

J. R. HODGSON
Administrator

Administration:
(702) 687-4670
Fax 687-5856

Air Quality
Mining Regulation and Reclamation
Water Quality Planning
Water Pollution Control

PETER G. MORROS
Director

Fax (702) 885-0868
TDD 687-4678

Waste Management
Corrective Actions
Federal Facilities

DEPARTMENT OF CONSERVATION AND NATURAL RESOURCES
DIVISION OF ENVIRONMENTAL PROTECTION
Capitol Complex
333 W. Nye Lane
Carson City, Nevada 89710

March 15, 1994

Curtis L. Evenson
Environmental Coordinator
United Engine & Machine Co.
4909 Goni Road
Carson City, NV 89706

SUBJECT: Pilot Test Evaluation

Dear Mr. Evenson:

The Nevada Division of Environmental Protection (NDEP) has received and evaluated the results of the pilot demonstration which indicates that the generated sludge has been properly characterized and bioremediated to levels which require no further action by this office. However, local government and other interested agencies should be contacted regarding such issues as disposal and on site soil utilization.

Should you have any questions or if I can be of any assistance, please do not hesitate to contact me at (702) 687-4670, extension 3019 (FAX 702-885-0868). All future correspondence regarding this subject should be addressed to the undersigned.

Sincerely yours,

Jerry L. Conners
Environmental Management Specialist
Bureau of Corrective Actions

JLC:kmf

cc: See attached list

Alpha Analytical, Inc.
255 Glendale Avenue, Suite 21
Sparks, Nevada 89431
(702) 355-1044
FAX: 702-355-0406
1-800-283-1183

Boise, Idaho
(208) 336-4445

2810 W. Charleston, Suite G67
Las Vegas, Nevada 89102
(702) 386-6747

ANALYTICAL REPORT

High Desert Laboratories
P O Box 6535
Reno, NV 89513

Job#:
Phone: 359-0330
Attn: Bill Sharp

Sampled: 09/02/93 Received: 09/03/93 Analyzed: 09/15/93

Matrix: [X] Soil [ ] Water [ ] Waste

Analysis Requested: TPH - Total Petroleum Hydrocarbons-Extractable Quantitated As Diesel

Methodology: TPH - Modified 8015/DHS LUFT Manual

Results:

Client ID/ Lab ID	Parameter	Concentration mg/Kg	Detection Limit mg/Kg
Separator Sludge #7702 /BIL090393-01	TPH *	270,000	18,000

* - TPH components are in the range of light oil.

Approved By: Roger L. Scholl Date: 9/16/93
Roger L. Scholl, Ph.D.
Laboratory Director

Alpha Analytical, Inc.
255 Glendale Avenue, Suite 21
Sparks, Nevada 89431
(702) 355-1044
FAX: 702-355-0406
1-800-283-1183

Boise, Idaho
(208) 336-4145

2810 W. Charleston, Suite G67
Las Vegas, Nevada 89102
(702) 386-6747

ANALYTICAL REPORT

High Desert Laboratories
P O Box 6535
Reno, NV 89513

Job#: United Engine
Phone: 359-0330
Attn: Bill Sharp

Sampled: 10/13/93 Received: 10/19/93 Analyzed: 10/27/93

Matrix: [ ] Soil [X] Water [ ] Waste

Analysis Requested: TPH - Total Petroleum Hydrocarbons-Extractable Quantitated As Diesel

Methodology: TPH - Modified 8015/DHS LUFT Manual

Results:

Client ID/ Lab ID	Parameter	Concentration mg/L	Detection Limit mg/L
Seperator Sludge after BIO Conversion /BIL101993-01	TPH *	160	1

* - TPH components are in the range of diesel, light oil and motor oil.

Note: Hydrocarbons outside the range of diesel may have varying recoveries.

Approved by: Roger L. Scholl Date: 10/28/93
Roger L. Scholl, Ph.D.
Laboratory Director

County of San Diego

ROBERT K. ROSS, M. D.
DIRECTOR

DEPARTMENT OF HEALTH SERVICES
ENVIRONMENTAL HEALTH SERVICES

OFFICE OF THE DEPUTY DIRECTOR
P. O. BOX 85261
SAN DIEGO, CA 92186-5261
(619) 338-2222
Fax #: 338-2174

SITE ASSESSMENT AND MITIGATION DIVISION
P.O. BOX 85261
SAN DIEGO, CA 92186-5261
(619) 338-2222

January 25, 1994

Mr. Marty Martinovich
Bio Convertors, Inc.
77705 Seminole
Indian Wells, CA 92210

Dear Mr. Martinovich:

RE: REPORT OF BIOREMEDIATION PILOT TEST
SAN DIEGO, CALIFORNIA

Background

On September 22, 1993, I attended a presentation given by Mr. Jerry Finney and you of Bio Convertors, Inc. (BCI) at Woodward-Clyde Consultant's office in San Diego, California. BCI described their ex-situ bioremediation technology which involves application of a mixture of cultured natural soil bacteria and enzymes, liquid fertilizer, and surfactant to stockpiles of petroleum hydrocarbon contaminated soil. They asserted that following application of their liquid mixture, the petroleum hydrocarbon contaminated stockpile could be covered and the contaminants would biodegrade to low levels without any further maintenance (e.g. tilling).

Pilot Test

A pilot test of BCI's bioremediation technology was conducted at the Shewey Environmental Remediation Facility (low temperature thermal desorption rotary kiln) in San Diego, California. Approximately 50 cubic yards of soil contaminated with motor oil was used for the pilot test. This soil had been run through the rotary kiln, however, it still contained an average total petroleum hydrocarbon (TPH) concentration of 554 mg/kg (EPA 418.1). The cleanup level established for this soil was 100 mg/kg TPH.

On November 10, 1993, four baseline samples were collected from this 50 cubic yards of motor oil contaminated soil. The soil

samples were collected by Shewey Environmental staff and delivered to Del Mar Analytical (a California DTSC certified laboratory) for analysis. The results of the analyses were 310, 240, 860, and 350 mg/kg TPH by EPA 418.1 (average of 440 mg/kg TPH). Following the collection of the baseline soil samples, Bio Convertors, Inc. applied their liquid mixture (described above) to the contaminated soil stockpile. The stockpile was then covered with 10-mil plastic sheeting (the stockpile was also underlain with 10-mil plastic sheeting).

On December 13, 1993, six soil samples were collected from the 50 cubic yard stockpile by Shewey Environmental staff and delivered to Del Mar Analytical for analysis. The results of the analyses were 53, 5, 34, 27, 38, and 17 mg/kg TPH by EPA 418.1. On December 14, 1993, one additional soil sample was collected from the bottom of the stockpile to determine if contaminants had been leached by the surfactant. This sample had 28 mg/kg TPH by EPA 418.1.

Conclusions

Based on the laboratory analytical results of soil samples, the 50 cubic yards of soil contaminated with motor oil was bioremediated from starting TPH concentrations averaging 440 mg/kg to TPH concentrations below 100 mg/kg in 33 days.

If you have any questions on this pilot test, please contact me at (619) 338-2246.

Sincerely,

JOHN A. MENATTI, Supervising Hazardous Materials Specialist
Environmental Health Services
Site Assessment and Mitigation Division

JAM:jm

cc: Mr. Jerry Finney, Bio Convertors, Inc.
Mr. Charlie Shewey, Shewey Environmental

RCI REMEDIATION CONTRACTORS INC.
4229 NORTHGATE BOULEVARD, SUITE 3, SACRAMENTO, CALIFORNIA 95834
TELEPHONE (916) 925-4794 • FAX (916) 925-5973 • LICENSE NO. 648556

No. C109-01
January 12, 1994

Ms. Susan Erikson
Sacramento County
Environmental Management Department
8475 Jackson Road, Suite 230
Sacramento, California 95826

Subject: **In-Situ and Ex-Situ Bio-Remediation and Bio-Treatability Study for Hydraulic Oil Contaminated Soil and Groundwater, 2500 Venture Oaks Way, Sacramento, California**

Dear Ms. Erikson:

Remediation Contractors Inc. (RCI), is pleased to present this report on bio-remediation study for the above referenced site.

This report has been prepared in general accordance with the Work Plan, dated November 24, 1993. This report contains information pertaining to the in-situ and ex-situ bio-remediation and bio-treatability study for hydraulic oil contamination of soil and groundwater at the above referenced site.

If you have any questions regarding the information contained in this remedial action plan please call RCI at your convenience.

REGISTERED PROFESSIONAL ENGINEER
JOHN F. HICKS
№ C31759
Exp. 12-31-95
CIVIL
STATE OF CALIFORNIA

Very truly yours,

REMEDIATION CONTRACTORS INC.

John F. Hicks, P.E., R.E.A.
President

cc: Mr. D. Cole, Evergreen Tustin Ventures, Sacramento, California
Ms. S. Johnson, California Regional Water Quality Control Board-Central Valley, Sacramento, California

Enclosures
C109LTR.RPT

IN-SITU AND EX-SITU BIO-REMEDIATION AND BIO-TREATABILITY STUDY FOR HYDRAULIC OIL CONTAMINATED SOIL AND GROUNDWATER

at
2500 Venture Oaks Way
Sacramento, California

1.0 INTRODUCTION

Remediation Contractors Inc. (RCI) was retained by Evergreen Tustin Ventures, on July 27, 1993, to perform an assessment and remediation of the hydraulic oil contaminated soil and groundwater at 2500 Venture Oaks Way, Sacramento, California. In-Situ and ex-situ bio-remediation and bio-treatability study was carried out in conjunction with excavation to satisfy the regulatory agency for the site closure.

1.1 Purpose and Objectives

The primary goals of the bio-remediation and bio-treatability study are to:

1. Lower the hydraulic oil concentrations in soil prior to disposal in a landfill also reduce the hydraulic oil concentrations in areas where excavation may not be possible (eg. directly under building footings);

2. Lower the hydraulic oil concentrations in groundwater;

3. Simulate a test that will demonstrate the suitability of bio-treatability in a closed environment;

3. Address the concerns of the California Regional Water Quality Control Board, Central Valley Region (TRESS) and the Sacramento County Environmental Management Department (SCEMD).

1.2 Scope of Work

RCI performed the following tasks during this bio-remediation and bio-treatability study:

1. Installed a network of PVC piping into the sidewalls of the existing excavation for the injection of oil-consuming bacteria;

2. Introduced an oil consuming bacteria solution into the PVC piping network and monitored the level of the liquid in the pipes;

3. Introduced the bio-solution to the contaminated soil in one of the on-site bins used for storing the excavated soil;

4. Collected and analyzed soil samples from the bin, before, during and after bio-remediation, approximately a 2 week interval;

5. Obtained an undisturbed core sample of contaminated soil from the sidewall by driving a PVC tube and soil samples were collected and analyzed.

6. Simulated a closed system in-situ bio-remediation using the PVC tube containing undisturbed core sample of contaminated soil;

7. Sampled and analyzed bio-triose soil from the closed test cell;

8. Prepared a report on bio-remediation activities.

2.0 SITE CHARACTERISTICS AND BACKGROUND

The project site location, summary of past studies, geology and hydrogeology have been presented in previous reports.

The excavation of the elevator pit started on November 4, 1993. The clean soils above the groundwater table were placed into bins supplied by and disposed of by Commercial Industrial Waste of Sacramento, California. Contaminated soils were stockpiled and stored on two steel bins (Bins #1 and #2) which were lined with plastic and covered with a sliding steel lid. Approximately, 15 cubic yards of contaminated soil was bio-triose by introducing oil consuming bacteria solution into Bin #1 on November 24 and December 2, 1993. The excavated pit was filled with concrete on November 29, 1993. On December 2, 1993, approximately, 400 gallons of bacterial solutions were introduced into the subsurface through the network of PVC piping installed during the excavation.

3.0 SAMPLING PROCEDURES

An undisturbed core sample was obtained to simulate an in-situ bio-remediation treatability study. Also, soil samples were obtained from the stockpiled excavated soil in the steel bin during and prior to bio-remediation. Groundwater grab samples were obtained for visual inspection and analyses from the Monitoring Wells, MW-2 and MW-3.

3.1 Soil Sampling for Treatability Study

On November 16, 1993, an undisturbed sample for the treatability study was obtained from the excavation sidewall where the highest concentration was noted. The sampling was done by introducing a 2-inch diameter PVC blank into the sidewall and which was driven into the soil by a sledge hammer. After reaching 12 inches horizontally, a hydraulic bottle jack (12 Ton) was used for further penetration. Penetration ceased after reaching 16 inches horizontally. A pry-bar was used to free the casing with the undisturbed sample. Two soil samples (E12-6A IN and E12 6A OUT) were obtained for analysis from each end of the casing.

4.1 Analysis of Soil Samples

Fifteen soil samples were collected for chemical analysis from the stockpiled soil in the Bin #1. Five additional soil samples were collected from the test cell. All soil samples were analyzed for total recoverable petroleum hydrocarbon (TRPH) using EPA Method 418.1. The results of the soil sample analysis are presented in Table 1. The official laboratory reports and chain of custody documents are included in Appendix A.

4.2 Analysis of Groundwater Samples

Both groundwater grab samples were analyzed for TPH-diesel and TPH-oil using EPA method modified 8015. The test cell water sample was analyzed for TRPH using EPA method 418.1. Groundwater samples were analyzed at Excelchem Environmental Labs. Results of the groundwater analysis are summarized in Table 2. The official laboratory reports and chain of custody documents are included in Appendix A.

5.0 DISCUSSION OF RESULTS

A description of the results of the treatability study, ex-situ bio-remediation and present groundwater condition based on the results of the sampling and laboratory analyses is presented below.

5.1 Treatability Study

From the review of the analytical results it is apparent that the TRPH concentrations from 100 ppm became non-detect after 27 days of bacterial treatment.

5.2 Ex-Situ Bio-Remediation

Analytical results of ex-situ bio-remediation do not prove that the bio-remediation was effective in reducing the TRPH concentrations. This may be due to inhomogeneity in TRPH concentrations in compact dense clay and difficulty in obtaining similar and consistent soil sample in three different sampling events.

5.3 Groundwater Analysis

Analytical results of groundwater grab samples from Monitoring Wells MW-2 and MW-3 were below detection limit for TPH-d and TPH-o. Groundwater grab samples from both wells were clear, free of sheen and without any odor. From these observations, it is apparent that the in-situ bio-remediation may be effective in groundwater.

BC LABORATORIES, INC.

August 26, 1993

To: Jerry Finney
Re: Project 386-GW-AB-6/17

A sample was recieved by our lab from Bio-Converters Inc. on 6/18/93. An initial TPH was run the result was 6100 mg/L. The sample was originally treated with bugs, soap, and nutrient on the 20th of June. As the bugs decomposed the heavy oil skim the TPH value took an initial drop to 2600 mg/L then began to rise. It is believed that the bugs decomposition of the heavy oil skim solubilized the skim which raised the result as high as 14,000 mg/L. Upon the addition of more bugs and nutrient to attack the solubilized hydrocarbons the TPH value has dropped to 3700 mg/L in approximately 5 days from its high of 14,000 mg/L.

Thank-you

Stuart Buttram

4100 Adus Ct · Bakersfield, CA 93308 · (805) 327-4911 · FAX (805) 327-1918

BC LABORATORIES, INC.

November 22, 1993

Bio-Converters, Inc.
77705 Ceminole
Indian Wells, CA 92210
Attn: Marty Martinovich

Re: Occidental Petroleum Sump Project

The hydrocarbons in the samples taken on November 11, 1993 visibly appear to be lighter than the previous samples. The sump bottoms are now very easily penetrated with a hand auger device versus the asphalt texture it had in the beginning. There is a great visible difference in the sumps compared to prior sampling.

Thank you,

Michael R. Graham

Approved By:

MRG/sr

4100 Atlas Ct · Bakersfield, CA 93308 · (805) 327-4911 · FAX (805) 327-1918

BC LABORATORIES, INC.

August 30, 1993

TO: Marty Martinovich
Bio-Converters, Inc.

RE: Project #336-GW-C-6/17

Introduction

On June 18, 1993 a sample was received from Bio-Converters Inc., a bio-remediation company. This sample was to be an experiment to prove that their bio-remedial process works to everyone's satisfaction. The sample was treated and let rest for approximately one week intervals at which time 418.1 analyses were performed.

Procedures

The sample was received in a quart mason jar. A subsample was taken and analyzed by 418.1. The sample was transferred to a 2 L erlenmeyer flask and treated with 41.5 g of nutrient, 21.0 g of [redacted]/bugs, and 4 oz. of Dawn dishwashing detergent to disperse oil. All of these components were added on July 1, 1993. After treatment all analyses performed were 418.1 modified. After three analyses by 418.1M, it was determined that the oil skim was going down but the bugs did not have adequate nutrient or free water to work. More nutrient and water and bugs were added on August 11, 1993. Two Tbsp. nutrient were added, two Tbsp. bugs were added, and the sample volume was doubled to 2 L with DI Water. This seemed to speed up the degradation process, as the free float really began to subside.

Summary of Analysis Results

Project: (386-GC-C-6/17) Lab # 5902-2, Received 06/18/93.

Lab #	Test	Results	Units	Run Date	Sampling
5902-2	418.1	6100	mg/L	06/24/93	Original
6974-1	418.1M	2600	mg/L	07/12/93	1
7515-1	418.1M	5300	mg/L	08/05/93	2
7835-1	418.1M	14,000	mg/L	08/11/93	3
8664-1	418.1M	3700	mg/L	08/26/93	4

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Conclusion:

After the initial treatment the TPH value dropped to 2600 mg/L then rose to a high of 14,000 mg/L through a period of about 4 weeks. This is possibly due to the heavy oil skim that was present in the sample when received. Visually during this time the oil skim went down. But the TPH value steadily rose. This was probably caused by the bacteria breaking down the heavy oil and making this more soluble, thus the higher TPH readings. On 08/11/93 more additions of nutrient, bugs and water was made and one week was let pass in order to see the results of our addition. The TPH value dropped from 14,000 mg/L to 3700 mg/L in one week. Thus the bio-remedial process seems to be working but slower than expected. It is the suggestion of this lab that in future tests/projects that much less soap be added to samples, especially when light fractions of hydrocarbons are present, i.e., gas, diesel, naphtha, etc. This would greatly reduce the interferences with analyses results and lower detection limits due to these interferences.

Along with the TPH analyses, an initial and final 8240 and 8270 were run in order to identify any harmful spinoffs that may have been formed during the bio-degradation process. As you can see by the following data, no harmful spinoffs were formed.

LAB No.	8240 µg/l	DATE ANALYZED	PQL
5902-2	None Detected	06/28/93	3000
	8270 µg/l		
5902-2	None Detected	06/28/93	4000
10285-1ADD'N	8240 µg/l		
Ethyl Benzene	200	10/06/93	50
Toluene	1200	10/06/93	50
Trichlorofluoro-methane (Freon)	400	10/06/93	50
Xylenes	700	10/06/93	50
	8270 µg/l		
10285-1ADD'N	None Detected	10/07/93	100

As you can see some aromatics were detected in the final 8240. This is because the PQL could be lowered as the TPH concentration dropped. The Freon is a lab contaminant also found in the blank.

Sincerely,

Stuart Buttram

Stuart Buttram
Organic Supervisor

4100 Atlas Ct · Bakersfield, CA 93308 · (805) 327-4911 · FAX (805) 327-1918

BC LABORATORIES, INC.

September 24, 1993

TO: Marty Martinovich
Bio-Converters, Inc.

RE: Project #14475 Southern Distributors Corp.

Introduction

On July 15, 1993 a sample was received from Bio-Converters Inc., a bio-remediation company. The sample was to be an experiment to prove that their bio-remedial process works satisfactorily. The sample was initially analyzed for BTEX, TPH-Gas, TPH-Diesel, 8240 and 8270. These analyses were performed to get starting point values on which to base judgements. The sample was then treated and let stand for 1-2 week intervals at which time BTEX-TPH-Gas analyses were performed to judge the progress of degradation.

Procedures

The sample was received in one gallon jugs. A subsample was taken and analyzed by the aforementioned analyses. One gallon of the sample was then transferred to a 1 gallon amber glass bottle and treated. To the samples 75 g of nutrient, 65.5 g of [redacted], and 4 oz. of soap were added. The sample was mixed vigorously and put into a cool dark cupboard. BTEX-TPH-Gas analyses were performed at this time and at 1-2 week intervals. On July 25, 1993 is was deemed necessary to add more compost to the sample, 42 g were added. On September 17, 1993 it was deemed necessary to split the sample and add more DI water as a media for the bacteria to survive. The following table illustrated the degradation process.

4100 Atlas Ct · Bakersfield, CA 93308 · (805) 327-4911 · FAX (805) 327-1918

SUMMARY OF ANALYSIS RESULTS						
LAB #	$TEST_1$	$TEST_2$	$RESULTS_1$	$RESULTS_2$	UNITS	RUN DATE
7000-1	TPH-Gas	TPH-D	30,000	5,000	µg/L	07/19/93
7514-1	TPH-Gas	TPH-D	50,000	450,000	µg/L	07/29/93
7837-1	TPH-Gas	---	23,000	---	µg/L	08/11/93
9286-1	TPH-Gas	---	13,000	---	µg/L	09/03/93
	TPH-Gas	---	9,000	---	µg/L	09/22/93

Conclusion:

After the initial treatment of the sample the TPH value rose slightly from 30,000 µg/L to 50,000 µg/L. By week four the analyses results dropped slowly but steadily to a value of 9,000 µg/L by week 10. From the data compiled it can be concluded that the bio-degradation process is working, but slowly. It is believed that the confined space and limited amount of growth media are hampering the degradation process. Basically the bacteria seem to be drowning in their own waste. In the field, or on a much larger scale this would not happen due to a virtually inexhaustible supply of space to occupy.

Sincerely,

Stuart Buttram

Stuart Buttram
Organic Supervisor

4100 Atlas Ct. · Bakersfield, CA 93308 · (805) 327-4911 · FAX (805) 327-1918

BC LABORATORIES, INC.

October 1, 1993

Bio-Converters
2201 Broadway, Suite 803
Oakland, CA 94612
Attn: Marty Martinovich

Re: Project # 14475

Dear Marty,

On July 14, 1993 a sample was received from Bio-Converters, Inc.. This sample was run by EPA Method 8240 and 8270 to find baseline values for contaminants present upon receipt of the sample. The sample was then treated by their procedure to bio-remediate any petroleum contaminants in the sample. The original TPH value was 30,000 µg/l two months later the TPH value was down to 13,000 µg/l.

On September 27, 1993, a final EPA Method 8240 and 8270 were run in order to evaluate whether any harmful compounds were being formed by the bio-remedial process. As you can see by the following data no harmful spin-offs were formed.

Lab No.		8240 µg/l	Date Analyzed
7000-1	Benzene	1200	7-20-93
	Toluene	5100	
	Ethyl Benzene	970	
	Xylene	6700	
	All Other Compounds None Detected		

Lab No.		8270 µg/l	Date Analyzed
7000-1	Benzoic Acid	11	7-26-93
	Bis(2-ethylhexyl)phthalate	25	
	2-methylnapthalene	57	
	Naphthalene	230	
	2,4-Dimethylphenol	21	
	2-methylphenol	92	
	4-methylphenol	33	
	All Other Compounds None Detected		

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BC LABORATORIES, INC.

Lab No.		8240 µg/l	Date Analyzed
9911-1	Benzene	320	9-27-93
	Toluene	1800	
	Ethyl Benzene	ND	
	Xylene	2600	
	All Other Compounds None Detected		

Lab No.		8270 µg/l	Date Analyzed
9911-1	All Compounds None Detected		9-28-93

If I may be any further assistance, please do not hesitate to call me at (805)327-4911 ext. 240.

Thank you,

Stuart G. Buttram

Organics Supervisor

G:\WP51\SR\BCNVR2.MM

4100 Atlas Ct. · Bakersfield, CA 93308 · (805) 327-4911 · FAX (805) 327-1918

LABORATORY REPORT

Aquatic Testing Laboratories

"dedicated to providing quality aquatic toxicity testing"

2810 Bunsen Ave., Unit A
Ventura, CA 93003
(805) 650-0546 FAX (805) 650-0756

CA DOHS ELAP Cert. No.: 1775

Date: October 6, 1993

Client: Bio-Converters, Inc.
77705 Seminole Ave.
Indian Wells, CA 92210
Attn: Marty Martinovich

Laboratory No.: A-93100105-001

Sample I.D.: 7000-1

Date Received: 10/01/93

Sample Control:

The samples were received by ATL in a chilled state, with the chain of custody record attached.

Sample Analysis:

The following analyses were performed on your sample:
CCR Title 22 - Fathead Minnow Hazardous Waste Screen Bioassay.

Attached are the test data generated from the analysis of your sample.

Result Summary:

ATL Lab No.	Sample ID.	Results
A-93100105-001	7000-1	LC50 > 750 mg/l

Quality Control: Reviewed and approved by:

Joseph A. LeMay, Laboratory Director

Thank you for your business!

FATHEAD MINNOW HAZARDOUS WASTE SCREEN BIOASSAY

Lab No.: A93100105-001

Client/ID: BCL 7000-1
Bio-Converters

TEST SUMMARY

Species: Pimephales promelas.
Fish length (mm): av: 32; min: 28; max: 36.
Fish weight (gm): av: .42; min: .26; max: .63.
Test Protocol: Calif. F&G/DOHS 1988.
Test type: Static.
Test chamber volume 10 l.
Mixing method: Sonication/mechanical shaking.
Acclimation/dilution water: Reconstituted soft water (hardness 40-48 mg/l $CaCO_3$).
Aeration: Single bubble through narrow-bore tube.

Source: Thomas fish.
Date fish received: 9-15-93.
Regulations: CCR Title 22.
Endpoints: LC50 at 96 hrs.
Temperature: 20 +/- 2°C.
Number of replicates: 2.
Number of fish per chamber: 10.
QA/QC Batch No.: QA-93922.

TEST DATA

	INITIAL			24 Hr				48 Hr				72 Hr				96 Hr			
DATE/TIME	10-2-93 1138			10-3-93 1130				10-4-93 1041				10-5-93 1113				10-6-93 1147			
ANALYST:																			
	°C	DO	pH	°C	DO	pH	#D	°C	DO	pH	#D	°C	DO	pH	#D	°C	DO	pH	#D
CONT A	20.4	6.8	7.6	20.3	6.2	7.7	0	20.2	6.7	7.5	0	20.1	6.6	7.5	0	20.0	7.8	7.7	0
CONT B	20.2	7.4	7.6	20.1	7.3	7.7	0	20.0	7.0	7.5	0	20.0	6.4	7.5	0	19.8	7.4	7.7	0
400 A	20.2	8.0	7.9	20.2	6.0	7.6	0	19.9	4.6	7.2	0	20.0	5.9	7.4	0	19.7	7.2	7.8	0
400 B	19.9	8.2	8.0	19.9	6.0	7.6	0	19.7	5.4	7.3	0	19.8	6.7	7.5	0	19.4	7.6	7.8	0
750 A	19.7	8.1	8.0	19.7	6.0	7.7	0	19.5	5.5	7.3	0	19.6	7.8	7.5	0	19.3	6.8	7.7	0
750 B	19.5	8.2	8.0	19.5	6.0	7.7	0	19.4	6.1	7.3	0	19.4	6.6	7.5	0	19.2	7.8	7.7	0

Comments:
"A" replicates were mixed by sonication.
"B" replicates were mixed by mechanical aggitation on a shaker table

ADDITIONAL WATER CHEMISTRIES

	CONTROL	
	Alk.	Hard
0 hr	31	43
96hr	33	49

	HIGH CONC.	
	Alk.	Hard
0 hr	32	44
96hr	31	40

RESULTS

Total Number Dead		
CONTROL	0	/20
400 mg/l	0	/20
750 mg/l	0	/20

X	LC50 >750 mg/l (<40% dead in 750 mg/l conc.)
	400 <LC50< 750 (≥40% dead in 750 & ≤60% in 400) *** Definitive Test Required ***
	LC50 <400 mg/l (>60% dead in 400 mg/l conc.)

Irvine Analytical Laboratory, Inc.
Chemical Analysis and Professional Consulting
15375 Barranca Parkway
Building I, Suite 112
Irvine, California 92718
(714) 727-3484
FAX (714) 727-3584
TELEX (714) 727-3684

REPORT OF LABORATORY ANALYSIS

January 29, 1992

Dr. Bruce Dale, Ph.D.
Texas A & M University
Engineering Bio Science
T.M. Box 183
College Station, TX 77843

Sample Description: Soil
1 & 2 Amino
Lot No.: 7572 & 7573
IAL Lab No.: 5833 & 5835
P.O. No.: ----------
Date Received: 1/3/92

Subject: Determination of Free and Hydrolyzed Amino Acid in Soil - 1 Amino (Sample # 7572) & Soil - 2 Amino (Sample # 7573).

Method: Pico-Tag, Water, MA

Column: Pico-Tag Column

Mobile Phase:

Eluent A: 940 ml phosphate buffer (pH 6.4) / 60 ml acetonitrile, 200 ml EDTA (1mg/1ml).

Eluent B: 600 ml acetonitrile in 400 ml water, 200 ml EDTA (1mg/1ml).

Mode: Gradient Program

Temperature: 46°C

Wavelength: 280 nm

Sample Preparation:

A) Free Amino Acid

About 5 gm of each sample was dissolved in 50 ml 0.1 N HCl and sonicated for 30 minutes. 30 ml of the solution was taken for derivatization using PITC (phenylisothiocyanate). Results for Free Amino Acid are as follows:

	Alanine
Sample # 7572, Soil - 1 Amino	0.185 mcg/g
Sample # 7573, Soil - 2 Amino	0.425 mcg/g

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REPORT OF LABORATORY ANALYSIS

B) Hydrolyzed Amino Acid

About 5 gm of sample was dissolved in 50 ml 6 N HCl and sonicated for 30 minutes. It was then transferred to a special vial, loaded with Nitrogen gas and kept in oven at 120°C for 24 hours. Using the same method of analysis as the Free Amino Acid analysis, the yield was:

Sample # 7572, Soil 1-Amino:

Alanine	2.40 mcg/g
Valine	0.11 mcg/g
Leucine	0.14 mcg/1g

Sample # 7573, Soil 2-Amino:

Alanine	2.93 mcg/g
Valine	0.10 mcg/g
Leucine	0.12 mcg/g

Respectfully submitted,

A. Kazeminy

Assad Kazeminy, Ph.D.
Laboratory Director

Inter-Mountain Laboratories, Inc.

1701 Phillips Circle
Gillette, Wyoming 82718

April 29, 1994

Marty Martinovich
BIO-CONVERTERS, INC.
77705 Seminole
Indian Wells, CA 92210

Dear Marty:

Enclosed are the reports for the samples submitted for analysis form the Ahrens site. As per our discussions these sample were analyzed by three different methods. They were first analyzed by a straight 418.1 and values of 311 and 1225 mg/Kg were found for AB-3 composite and AB-4 respectively. The samples were then analyzed using a modified 418.1 in which the samples are treated with acid followed by treatment with base and then extracted with freon and analyzed as in 418.1. The results of this analysis was 31 and 740 mg/Kg for AB-3 composite and AB-4 respectively. The freon extracts were then injected onto a gas chromatograph to determine the amount of hydrocarbon present which was in the diesel range and lighter. The results of this showed that in the straight 418.1 extracts compounds were present which resemble linoleic and palmitic acid very similiar to what we had seen in the earlier samples from the site which was contaminated with olive oil. The GC analysis of the freon extracts from the modified 418.1 gave very similiar results to those obtained on the IR for the sample from AB-3 composite but gave significantly lower results for the sample from AB-4. This indicates that AB-3 does not appear to have hydrocarbons heavier than the diesel range, but that AB-4 may.

Please feel free to give me a call if you have any questions or if I can help you further this matter.

Sincerely yours,

Harry Howell
Laboratory Director

FRIEDMAN & BRUYA, INC.
ENVIRONMENTAL CHEMISTS

Andrew John Friedman
James E. Bruya, Ph.D.
(206) 285-8282

3012 16th Avenue West
Seattle, WA 98119
FAX: (206) 283-5044

April 12, 1994

Marty Martinovich, President
Bio-Converters, Inc.
77705 Seminole
Indian Wells, CA 92210

Dear Mr. Martinovich:

Enclosed are the results from the testing of material submitted on April 5, 1994 from Project OXY.

The three tests performed on samples 3111-1 (3-point C-)and 3111-1 (Dried @ 105°C) indicate that these samples contain large amounts of organic matter relative to any petroleum hydrocarbons. The EPA method 418.1 (total petroleum hydrocarbons) is not always selective for petroleum hydrocarbons. Cleanup of the 418.1 extract with a silica gel column is supposed to remove non-petroleum hydrocarbons, but in reality non-polar and moderately polar organic matter will pass through the column.

The TLC tests are excellent methods to distinguish classes of compounds. Most petroleum-based products contain saturated hydrocarbons which show up as a band of material on top of the hexane region. I failed to see any saturated hydrocarbons in your samples. It is possible, however, that low levels of saturated hydrocarbons may be present. The matrix spikes for the TLC quantification for saturated hydrocarbons came out at 0%, indicating that the saturated hydrocarbons may have absorbed onto the matrix. Nevertheless, the classes of compounds seen in the TLC characterizations leads me to believe that your samples as composed primarily of large amounts of organic matter.

We appreciate this opportunity to be of service to you and hope you will call if you should have any questions.

Sincerely,

Beth Plotkin
Chemist

BP/dp

Enclosures

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: April 12, 1994
Date Received: April 5, 1994
Project: OXY
Date Samples Extracted: April 6, 1994

RESULTS FROM THE ANALYSIS OF THE SOIL SAMPLES FOR CONTAMINANT CHARACTERIZATION BY THIN LAYER CHROMATOGRAPHY

Sample ID	TLC Characterization
3111-1 (3-Point C-)	The thin layer chromatographic trace showed the presence of non-polar, moderately polar and highly polar organic compounds, such as those found in organic matter. This characterization is based on the presence of compounds that glowed blue under short and long wave UV light in the hexane region. These compounds are non-polar conjugated molecules. Compounds that glow yellow under long wave UV were seen from the origin to the top of the methylene chloride region. These compounds are moderately to highly polar and may be of high molecular weight. Visible material was streaked from the origin to the top of the methylene chloride region and represents a complex mixture of compounds. Saturated hydrocarbons were not seen in this analysis.
3111-1 (Dried @ 105°C)	The thin layer chromatographic trace showed the presence of non-polar, moderately polar and highly polar organic compounds, such as those found in organic matter. This characterization is based on the presence of compounds that glowed blue under short and long wave UV light in the hexane region. These compounds are non-polar conjugated molecules. Compounds that glow yellow under long wave UV were seen from the origin to the top of the methylene chloride region. These compounds are moderately to highly polar and may be of high molecular weight. Visible material was streaked from the origin to the top of the methylene chloride region and represents a complex mixture of compounds. Saturated hydrocarbons were not seen in this analysis.

Suite 200
San Diego, CA 92110
619-225-1883
Fax 619-225-7830

PRC

March 17, 1994

Mr. John Martin
U.S. Environmental Protection Agency
Risk Reduction Engineering Laboratory
26 West Martin Luther King
Cincinnati, Ohio 45268

Subject: **Bio Converters, Inc., Innovative Biological/Enzymatic Process for Rapidly Degrading Contaminants in Soil and Groundwater**

Dear Mr. Martin:

On March 1, 1994, I met with Jerry Finney and Marty Martinovich of Bio Converters, Inc. (BCI) to discuss their proprietary biological/enzymatic process for degrading contaminants in soil and groundwater. This meeting was scheduled, on my own time, at the behest of Andy Harrison, the Installation Restoration Manager at Naval Air Station North Island (NASNI) in San Diego, California. Mr. Harrison also serves as NASNI's Naval Environmental Leadership Program (NELP) coordinator; NELP is the Navy equivalent of EPA's Superfund Innovative Technology Evaluation (SITE) Program. Through Mr. Harrison, two joint SITE/NELP demonstrations are currently planned for NASNI this year: Terra-Kleen and Zenon. Mr. Harrison is also very interested in demonstrating the BCI technology and requested I meet with BCI and solicit SITE Program interest in participating in the demonstration.

BCI has developed a microbe/nutrient solution which has been cultured under somewhat extreme conditions. BCI claims that the cultured microbes, when introduced to a contaminated matrix, cause an enzymatic degradation of contaminants which reduces toxic hydrocarbons to proteins, fatty acids, and carboxylic acids which are subsequently consumed by indigenous bacteria and plant life. The metabolic "digestion" of the hydrocarbon results in end products of carbon dioxide, water, and, in the case of chlorinated organic compounds, chlorine salts. BCI claims that the process requires moisture levels greater than 20 percent, adequate oxygen levels (water can serve as an oxygen source for the process), and various nutrients to stimulate the microbial activity.

BCI utilizes a unique microbe culturing process which involves conditioning at temperatures of up to 200 degrees Fahrenheit for short periods of time, an increase to a pH of 12 for a 24-hour period, and a rapid drop in pH to approximately 7. This process results in a highly resilient microbe which can endure extreme environmental conditions and high contaminant levels. BCI also claims that the culturing process produces a highly energetic microbe which can degrade contaminants more rapidly than typical biodegradation processes.

While BCI's claims and culturing process appear somewhat extreme and their product literature is somewhat confusing, they have provided case study data which appear to substantiate the effectiveness of the technology in rapidly degrading petroleum hydrocarbons. Additionally, BCI has conducted benchscale tests which indicate that the technology may also be effective for treating soils contaminated with chlorinated organic compounds. Several regulatory agencies have provided oversight on BCI remediation projects.

I have attached a summary of BCI's conversion process and information on several case studies. If you would like more information on the technology, contact Marty Martinovich of BCI at (619) 399-5655. You may also contact Mr. Harrison, NASNI's NELP coordinator, at (619) 545-1125. Additionally, if I can be of assistance in this matter, please call me at (619) 225-1883.

Sincerely,

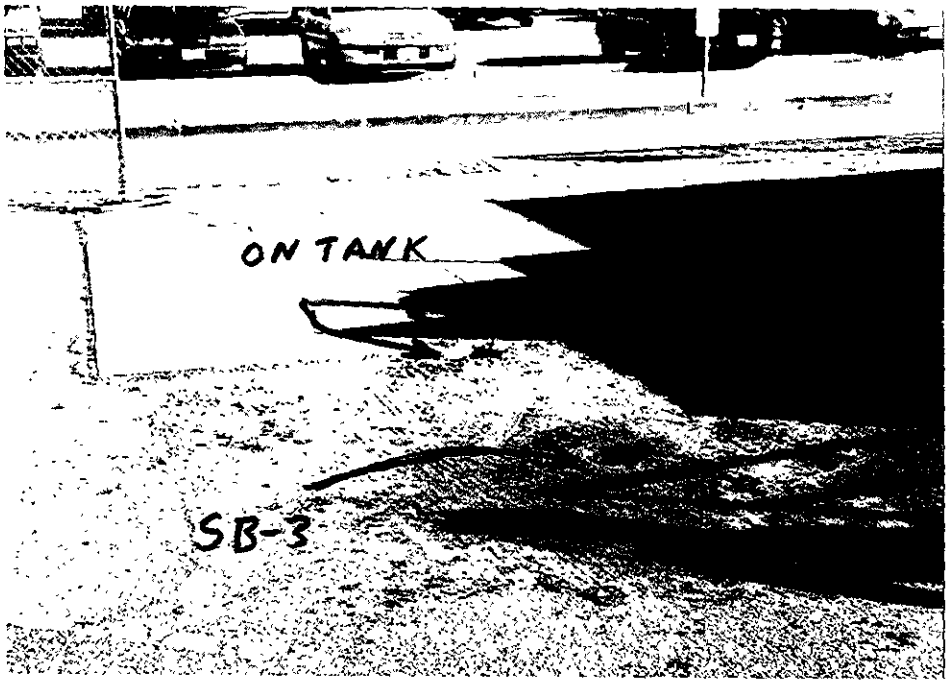
Roger Argus
Technical Project Manager

cc: Rob Foster, PRC
Annette Gatchett, EPA
Andy Harrison, NASNI
Marty Martinovich, BCI
Mark Meckes, EPA
Steve Safferman, EPA

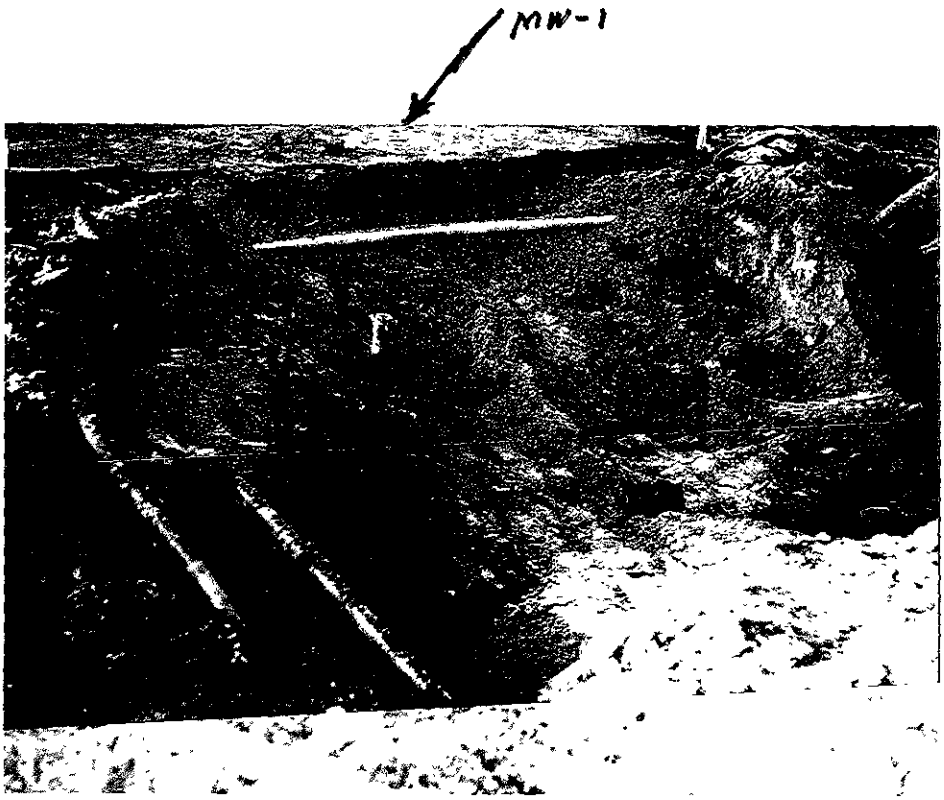
APPENDIX G

Site Photos

GSA
ALAMEDA



SOIL BORING #3
WEST END TANK #2



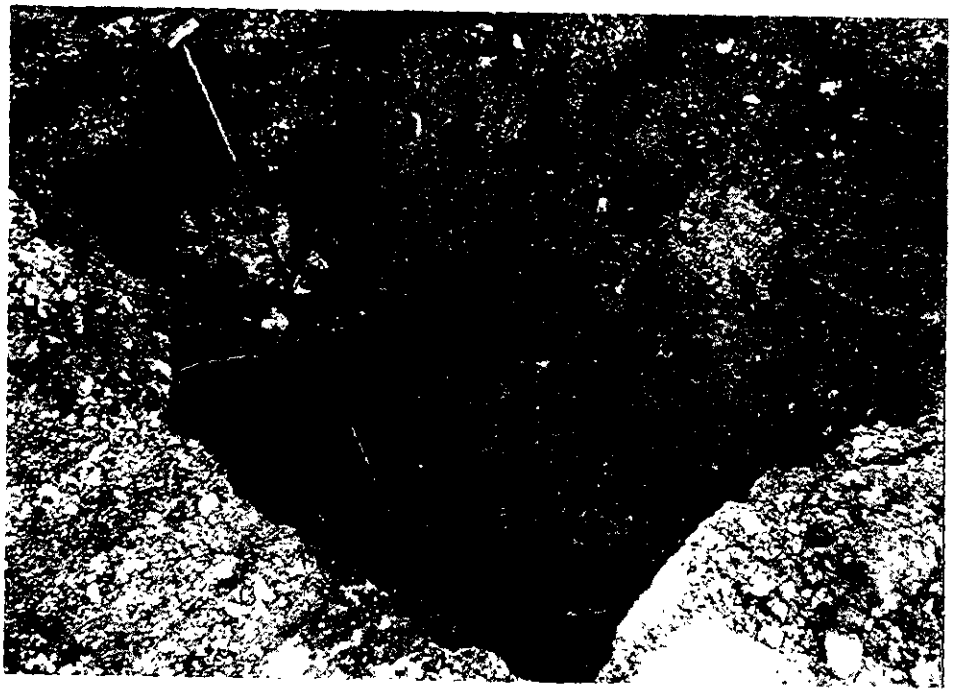
TANK #1 : SHOWING FILL SPOUT OLD PRODUCT LINES & PRODUCT LINES TO TANK #2 & EARTH CONTAMINATION @ FILL.
MW-1 @ TOP ON SOUTH SIDE

GSA
ALAMEDA

TANK #1 (SMALL)
TANK #2 (LARGE)

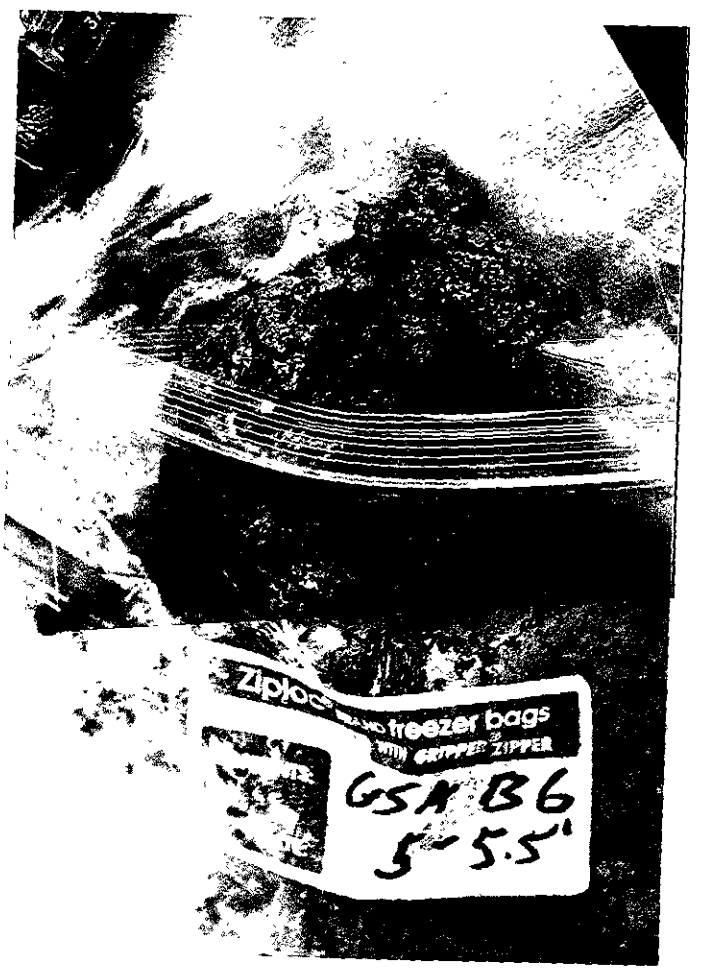
TANK #1 WITH HOLES OF BOTTOM SHOWING

GSA
ALAMEDA



TANK #3
WEST END PLUG

TANK #3 VALVE BOX



OIL AT SOIL/WATER
INTERFACE BG/MW-3