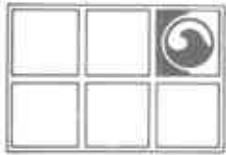


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GROUNDWATER TECHNOLOGY®

Groundwater Technology, Inc.

15010 W. 106th Street, Lenexa, KS 66215 USA
Tel: (913) 599-0262 Fax: (913) 599-1043

September 8, 1995

Mr. Thomas Peacock
Alameda County Health Care Services Agency
80 Swan Way, Room 200
Oakland, CA 94621

STD 1082

Subject: Remedial Action Plan/Work Plan
Sears Store 1058
2633 Telegraph Avenue
Oakland, California

Dear Mr. Peacock:

The following is the conceptual remedial action plan/work plan for addressing hydrocarbon-impacted soil and groundwater at Sears Store 1058. The facility is located at 2633 Telegraph Avenue in Oakland California. The site was a Sears automotive repair facility until closure in January 1993. The facility is currently owned by Mr. Alex Han and is occupied by a night club.

SITE BACKGROUND

During ownership of the property by Sears, several underground storage tank (UST) systems were in operation at the site. Six motor oil tanks were present northeast of the automotive repair building, two gasoline USTs were located in the northwest portion of the property and one used-oil tank was present between the gasoline USTs and the building (figure 1). Gasoline dispenser pumps were located due west of the gasoline USTs. The UST systems have been removed from the site.

A series of subsurface investigations have been conducted at the Sears facility to define the lateral and vertical extent of petroleum impacts to soil and groundwater resulting from the UST systems. The investigations have consisted of installing eight monitoring wells, four soil boreholes, and an off-site soil probe investigation consisting of three probe point locations.

The geology beneath the site as defined by the investigations consists of interbedded clay, silt, and sand. The upper 10 feet of the site consists predominantly of silty to sandy clay. The soils increase in grain size with depth, grading to a silty, clayey sand at 12 to 15 feet. This sand grades to a gravelly sand approximately 20 to 25 feet below ground surface (bgs).

Groundwater was encountered beneath the site between 10 and 12 feet bgs, predominantly in the upper sand unit. Groundwater flow is to the south-southeast and the water table gradient is relatively steep at

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0.02. A review of historical groundwater elevations shows that seasonal groundwater fluctuations of nearly 2 feet have occurred.

DISTRIBUTION OF PETROLEUM HYDROCARBONS

Petroleum hydrocarbons have been detected in the subsurface in three primary phases: adsorbed in the soils, dissolved in the groundwater, and liquid-phase hydrocarbons (LPH) floating on the groundwater. The distribution of the hydrocarbons in these phases are discussed below.

Adsorbed-Phase Hydrocarbons

Adsorbed-phase hydrocarbons have been detected in monitoring wells MW-2, MW-3, MW-4, and in soil boring B-2. Adsorbed-phase hydrocarbons were also detected in the closure samples collected from the used-oil tank basin. Table 1 presents a summary of the soil sample analytical results. The lateral extent of adsorbed-phase hydrocarbons extends from the used oil and gasoline tank basins south to boring B-2. Boring B-2 located adjacent to the south wall of the building contained total petroleum hydrocarbons (TPH) as gasoline at 130 parts per million (ppm), and lower concentrations of benzene, toluene, ethylbenzene, and total xylenes (BTEX). This boring suggests that migration of hydrocarbons is occurring along the building foundation. This is further supported by the absent, or low concentrations of hydrocarbons in boring B-1 (1.7 ppm TPH as gasoline) or B-3 (below detection limits) which are located several feet from the building foundation. The lateral extent of adsorbed-phase hydrocarbons south of boring B-2 are defined by soil probe point SB-5.

The hydrocarbons detected in the monitoring wells and soil borings are a mixture of gasoline and used oil, with used oil making up the greater percentage. The adsorbed-phase hydrocarbons are present both in the unsaturated and saturated zones but are primarily detected at the groundwater interface.

Dissolved-Phase Hydrocarbons

Dissolved-phase hydrocarbons have been detected in several of the monitoring wells at the site. Table 2 presents a summary of the historical groundwater sample results. The dissolved-phase plume is defined to the south by soil probe point SB-5, to the southwest by MW-7 and SB-6, to the east by MW-1, and to the north by MW-5. The dissolved-phase plume consists mostly of total petroleum hydrocarbons in the range of gasoline and motor oil (assumed to be used oil). Benzene, toluene, ethylbenzene, and total xylene (BTEX) concentrations are within the maximum contaminant levels (MCLs) established by the California Department of Health Services.

The highest dissolved-phase concentrations are present immediately downgradient of the used oil and the gasoline tank basins in monitoring wells MW-2, MW-3, and MW-4. Dissolved-phase hydrocarbons

detected in MW-8 are primarily in the gasoline range, indicating that the plume in the area is not commingled with the used oil plume.

Liquid-Phase Hydrocarbons

Measurable thicknesses of liquid-phase hydrocarbons (LPH) have only been detected in monitoring well MW-3. LPH was first detected in this well on September 16, 1993, at a thickness of 0.04 feet. Thicknesses of LPH have ranged from 0.01 feet to 0.22 feet with the exception of the period of February 1994 through May 1994, when LPH was not present.

REMEDATION APPROACH

Groundwater Technology has conducted an initial screening of remedial technologies applicable to the geology/hydrogeology and contaminant types beneath the site. Technologies considered in the screening process are presented in table 3.

Because the hydrocarbons detected beneath the site are a mixture of used oil and gasoline and the contaminants occur in both the unsaturated and saturated zone, a combination of remedial technologies are required to effectively address the plume. The remedial approach for this site is anticipated to consist of:

- bioremediation of the used oil in the saturated and unsaturated zones
- soil vapor extraction to remove volatile hydrocarbons and to provide oxygen to the unsaturated zone for bioremediation
- groundwater pumping and LPH recovery for control of the dissolved-phase plume and for removal of LPH in monitoring well MW-3

These technologies and how they are to be applied are discussed in further detail below.

Bioremediation

Bioremediation will be accomplished at this site through the enhancement of natural microbial organisms present in both the unsaturated and saturated zones. The bioremediation approach will require the addition of nutrients and an appropriate electron acceptor. The electron acceptor will be oxygen (aerobic) in the unsaturated zone and possibly nitrate or sulfate (anaerobic) in the saturated zone. A biotreatability test will be required to determine the nutrient requirements for effective bioremediation.

The bioremediation process will work in conjunction with the groundwater pumping system. A review of the soil analytical results shows that the majority of the adsorbed-phase hydrocarbons are present at the groundwater interface and within the first few feet of the saturated zone. Groundwater pumping will lower the water table below the zone of adsorbed-phase impact, exposing the soils to the effects of the vapor extraction system. Periodically, nutrients will be added to the monitoring wells located within the area of impact and groundwater pumping will be stopped to allow the water table to recover. This will allow smearing of the nutrients in the impacted soil zone and should also result in increased dissolved oxygen in the saturated zone. Pumping will then be re-initiated and the groundwater lowered to the optimum level. This nutrient addition approach should alleviate the need for a costly nutrient dispersal system (horizontal piping installed above the zone of impact) and will allow for dispersal of the nutrients in both the saturated and unsaturated zones.

Dissolved-hydrocarbons may be reduced through source reduction and limited aerobic bioremediation which will occur in the saturated zone. Groundwater Technology is also having excellent results with denitrification of petroleum hydrocarbons through the batch addition of ammonia nitrate to groundwater. The bio-treatability study will be designed to evaluate denitrifying bioremediation in addition to aerobic.

Currently, it is anticipated that the raising and lowering (pulsing) of the groundwater will result in sufficient dissolved oxygen concentrations in the saturated zone to support aerobic bioremediation. However, if dissolved concentrations are not decreasing as anticipated, and denitrification is shown to be effective on the motor oil constituents, addition of nitrate to the groundwater should be considered.

Soil Vapor Extraction

Soil vapor extraction will serve two purposes at the site, volatilization of gasoline range hydrocarbons and providing increased oxygen in the unsaturated zone to facilitate aerobic bioremediation. The soil types at the site indicate an effective radius of influence can be estimated in the range of 35 to 45 feet. Based on this assumption, MW-2 could be used as a vapor extraction point and would be augmented by the installation of 3 additional vapor extraction wells. The area influenced by the vapor extraction wells will include the area downgradient of the gasoline and used-oil tank basins and along the building foundation. Figure 1 illustrates the approximate locations of the vapor extraction points.

The vapor extraction points will be manifolded to a vacuum blower located in an equipment compound. Blower size and the required number of wells would be determined following a vapor extraction test.

Groundwater Pumping and LPH Recovery

Groundwater pumping will be initiated at the site to lower the water table, to enhance aerobic biodegradation of hydrocarbons, to control the dissolved-phase plume, and to enhance recovery of LPH in the vicinity of MW-3. The number of recovery wells required to control the dissolved-phase plume will

be determined from a pump test that will be conducted at the site. Currently, it is anticipated that a recovery well will be installed at the location of MW-3 (see figure 1). The well existing at this location is too small to be used for this purpose. Pumping is anticipated to be accomplished through the use of a top loading pneumatic, total fluid pump, that will recover both LPH and groundwater.

The pumped fluids will be piped to an oil-water separator where the LPH will be separated and piped to a recovery tank and the groundwater will be pumped to a low-profile air stripper. Treated groundwater will be discharged to the public owned treatment works (POTW) or to the storm sewer system under permit.

The actual system components will be determined from the pump test.

WORK PLAN

The following work plan presents the scope of work necessary to complete the lateral definition of dissolved-phase hydrocarbons and remedial system design.

Additional Assessment

In the *Off-Site Soil Assessment Report* dated March 27, 1995, Groundwater Technology recommended the installation of monitoring wells at the locations of soil probe point SB-5 and SB-6. The soil probe points defined the lateral extent of petroleum hydrocarbons. However, the points were only temporary wells. Monitoring wells installed in these locations would facilitate long-term sampling required to monitor the performance of the remediation system. The wells will be constructed of 2-inch-diameter polyvinyl chloride (PVC) casing and screen to a total depth of 20 feet, fitted with locking caps and a lock, and protected with flush-mounted road boxes. The elevation and location of the wells will be surveyed and tied into the existing elevation survey.

Because soil samples have been collected from these locations during the off-site investigation, soil samples for laboratory analysis will not be collected. Soil samples, however, will be collected at 5-foot intervals and logged by a geologist. - any samples suspected of containing PH should be analyzed

Groundwater samples will be collected from the wells approximately one week after development and submitted for laboratory analysis of BTEX and TPH as gasoline by EPA Method 8020/8015 and for TPH as motor oil by EPA Methods 3510/8015.

A sample of the LPH in monitoring well MW-3 will be submitted to a California-certified laboratory to determine if the product is predominantly motor oil or gasoline. The LPH will be analyzed by EPA Method 8015 with gas chromatography with flame-ionization detection (GC/FID).

In addition to the wells proposed above, Groundwater Technology recommends the installation of one recovery well adjacent to monitoring well MW-3. This recovery well will be used during the pump test described later in this work plan and as part of the remediation system. The well will be constructed to a depth of 23 feet (above the gravelly sand unit) with 4-inch-diameter PVC casing and continuous slot screen.

Biotreatability Test

The applicability of using bioremediation depends upon site-specific microbial, chemical, and physical factors. Groundwater Technology's Remediation Technology Laboratory (RTL) will perform a laboratory treatability study to evaluate the overall feasibility of using bioremediation at the site. The study will examine the chemical, physical, and microbial properties of the soil and evaluate the rate and extent of treatment achievable under aerobic and denitrifying conditions.

Soil and groundwater samples will be collected according to standard sampling protocols and packed in ice and shipped to RTL in Concord, California. A total of 2.5 kilograms of soil (eight 8-ounce jars) and 5 liters of groundwater will be shipped under chain-of-custody record to the laboratory.

A soil composite and a groundwater composite will be generated by blending the soil and groundwater samples. The composites will then be characterized for a series of chemical, physical, and microbiological parameters. The data collected during the initial characterization will be used to determine optimum conditions for effective implementation of the bioremediation process.

Following the initial characterization, an aerobic and anaerobic biodegradation study will be conducted to assess the feasibility of bioremediation. The aerobic study will be performed on soil and groundwater in the slurry-phase. The aerobic biodegradation evaluation will be performed under three experimental conditions: 1) nitrified, 2) non-nitrified, and 3) poisoned. Each system will consist of a series of sealed reactors containing a slurry mixture of the site soil and groundwater. In addition, the nitrified systems will contain nitrogen and phosphorus nutrients and the poisoned systems will contain a chemical poison to minimize biological activity. The reactor contents will be continuously shaken and incubated at room temperature for 30 to 45 days.

The anaerobic study will be performed on the groundwater alone, under denitrifying conditions. Two experimental systems will be evaluated for denitrification feasibility: 1) anaerobic nitrified conditions and 2) anaerobic poisoned conditions. Each system will consist of a series of sealed reactors, each containing portions of the groundwater composite and amendments. To promote denitrification, the anaerobic reactors will be filled completely with the site groundwater composite. The small amount of dissolved oxygen in the water will be consumed rapidly, resulting in anoxic conditions. Nitrate and phosphorus will be added to the nitrified systems and a chemical poison will be added to the poisoned

systems. The reactors will be inverted and incubated on a reciprocating shaker at room temperature for 60 to 90 days.

Reactors from the aerobic slurry test systems will be analyzed for BTEX and TPH by GC/FID at 5 time points over the course of the study. The anaerobic systems will be analyzed for BTEX by gas chromatography with photoionization detection (GC/PID) and TPH by GC/FID at 5 time points over the course of the study. BTEX-utilizing bacteria will be enumerated in each system at the beginning and end of each study. The treatability time period will be determined based on the initial soil and groundwater characterization and from the preliminary degradation data.

To support the potential implementation of an *in situ* bioremediation system, a nutrient adsorption test will be performed on the soil composite. Successful application of an *in situ* bioremediation system relies on getting adequate nutrients to the areas of contamination to support the biodegradation. This test will be designed to evaluate the capacity of the site soils to retain inorganic nutrients using several portions of soil composite in a standard nutrient solution. The nutrient solution will contain potassium tri-polyphosphate and ammonium nitrate. The mixtures will be shaken for 24 hours to facilitate nutrient contact with the soil and allow for any mass transfer to occur. The slurries will then be filtered, and the supernatant analyzed for changes in nutrient concentration. The nutrients analyzed in this procedure will be ammonia-nitrogen and total phosphate using colorimetric test kits by Hach Company for quantification. The results will be reported as milligrams of nutrient adsorbed per kilogram of soil.

Soil Vapor Extraction Test

A soil vapor extraction test will be conducted on monitoring well MW-2 to determine the effective radius of influence of a vapor extraction point, flow parameters, and anticipated hydrocarbon emissions. The test will be run for approximately 8 hours. During that time period the blower will be operated at various vacuum pressures to determine the optimum operating parameters. Vacuum will be monitored at surrounding monitoring wells to determine the radius of influence under each operating pressure. Air velocity, hydrocarbon concentrations, and CO₂ levels will be monitored at the blower effluent.

The data from this test will be evaluated using Vent ROI. This software predicts the effective radius of influence of the vent point and estimated remediation time to meet closure goals.

Groundwater Pump Test

A 12-hour pump test will be conducted in the recovery well installed adjacent to monitoring well MW-3. The pump test will consist of two primary phases: a step test to determine well yield, and a 12-hour constant flow test.

The step test will be conducted by pumping the well at predetermined flow rates until draw down at that flow rate has stabilized. The well will be allowed to recharge and the test will be repeated at a new flow rate. This test will determine the flow rate at which the well will be pumped during the 12-hour pump test. This test is anticipated to take approximately 8 hours to complete.

The pump test will be run for approximately 12 hours. Depth to water readings will be obtained from the surrounding monitoring wells at predetermined time intervals to monitor the effect that pumping has on the aquifer.

The pump test data will be evaluated using various computer software. This data will determine if a single pumping well will be sufficient to capture the LPH plume, and also the size and type of the water treatment system.

Schedule

Attached is a schedule (Attachment 3) for completion of this work plan. The data obtained from these activities will be used to develop remedial end points, a remedial system design that will meet these goals, and a plan for monitoring the remedial progress during operation of the remediation system.

Should you have any comments or questions concerning this RAP/Work Plan, please contact Mr. Mike Wray at (510) 671-2387 or me at (303) 799-4241.

Sincerely,

Groundwater Technology, Inc.


Chris Higgins

Remediation Technical Specialist


Michael J. Wray

Zone Project Manager

c: Ms. Bernadine G. Palka, P.E., Sears Merchandise Group
Mr. David Daniels, Groundwater Technology, Inc.

TABLE 1
ANALYTICAL RESULTS OF SOIL SAMPLES
 (All results expressed in mg/kg unless otherwise noted)

Sears Store 1058
 2633 Telegraph Avenue, Oakland, California

Well ID	Date Sampled	Depth	B	T	E	X	TPH-G	TPH-D	VOCs	TPH	TRPH	Metals				
												Pb	Cd	Cr	Ni	Zn
B1	12/13/93	10'	<0.005	<0.005	<0.005	<0.015	<1.0	--	--	--	<5	--	--	--	--	--
	12/13/93	15'	<0.005	0.01	<0.005	<0.015	1.7	--	--	--	<5	--	--	--	--	--
	12/13/93	20'	<0.005	<0.005	<0.005	<0.015	<1.0	--	--	--	<5	--	--	--	--	--
B2	12/13/93	10'	<0.005	<0.005	<0.005	<0.015	<1.0	--	--	--	<5	--	--	--	--	--
	12/13/93	15'	0.14	0.44	3.5	8.1	130	--	--	--	92	--	--	--	--	--
	12/13/93	20'	<0.005	<0.005	<0.005	<0.015	<1.0	--	--	--	<5	--	--	--	--	--
B3	12/13/93	10'	<0.005	<0.005	<0.005	<0.015	<1.0	--	--	--	<5	--	--	--	--	--
	12/13/93	20'	<0.005	<0.005	<0.005	<0.015	<1.0	--	--	--	<5	--	--	--	--	--
	12/13/93	22'	<0.005	<0.005	<0.005	<0.015	<1.0	--	--	--	<5	--	--	--	--	--
B4	12/13/93	10'	<0.005	<0.005	<0.005	<0.015	<1.0	--	--	--	<5	--	--	--	--	--
	12/13/93	20'	<0.005	<0.005	<0.005	<0.015	<1.0	--	--	--	<5	--	--	--	--	--
MW1	--	5.5'	N	N	N	N	N	N	--	N	--	--	--	--	--	--
	--	11'	N	N	N	N	N	N	--	N	--	--	--	--	--	--
	--	12'	N	N	N	N	N	N	--	25	--	--	--	--	--	--
	--	21'	N	N	N	N	N	N	--	5	--	--	--	--	--	--
MW2	--	6'	N	N	N	N	N	N	N	8	--	6.8	--	--	--	--
	--	11'	N	N	0.035	.22	11	N	N	3,400	--	9.9	--	--	--	--
	--	12'	N	N	N	0.09	9	N	N	560	--	8.1	--	--	--	--
	--	15.5'	N	N	N	0.027	5	N	N	--	--	7.5	--	--	--	--

TABLE 1
ANALYTICAL RESULTS OF SOIL SAMPLES
 (All results expressed in mg/kg unless otherwise noted)

Sears Store 1058
 2633 Telegraph Avenue, Oakland, California

Well ID	Date Sampled	Depth	B	T	E	X	TPH-G	TPH-D	VOCs	TPH	TRPH	Metals				
												Pb	Cd	Cr	Ni	Zn
MW3	--	11'	N	N	N	N	N	N	N	2,200	--	8.9	--	--	--	--
	--	12'	N	N	N	0.24	22	N	N	1,900	--	9.0	--	--	--	--
	--	15'	N	N	N	0.87	46	N	N	86	--	4.8	--	--	--	--
	--	25'	N	N	N	N	N	N	N	--	--	6.3	--	--	--	--
MW4	--	5.5'	N	N	N	N	N	N	N	--	--	7.5	--	--	--	--
	--	10.5'	N	N	N	0.33	41	N	N	1,600	--	12	--	--	--	--
	--	12'	N	N	N	0.15	26	N	N	1,100	--	8.2	--	--	--	--
	--	20.5'	N	N	N	N	N	N	N	12	--	6.8	--	--	--	--
MW5	--	11'	N	N	N	N	N	N	N	5	--	3.7	6.4	31	46	56
	--	15.5'	N	N	N	N	N	N	N	N	--	4.4	4.3	36	35	34
MW6	12/14/93	21.5'	<0.005	<0.005	<0.005	<0.015	<1	--	--	--	NA	<5	--	--	--	--
MW7	12/14/93	16.5'	<0.005	<0.005	<0.005	<0.015	<1	--	--	--	NA	<5	--	--	--	--
MW8	12/14/93	6.5'	<0.005	<0.005	<0.005	<0.015	<1	--	--	--	NA	40	--	--	--	--
	12/14/93	16.5'	<0.005	<0.005	<0.005	<0.015	<1	--	--	--	NA	<5	--	--	--	--

* Refer to Table 3 for compounds detected
 N Nondetectable (detection limits for each compound are listed in laboratory reports, Appendix B)
 -- Not analyzed
 BTEX Benzene, toluene, ethylbenzene, and total xylenes (EPA Method 8020)
 TPH-G Total Petroleum hydrocarbons as gasoline (Modified EPA Method 8015)
 TPH-D Total Petroleum hydrocarbons as diesel fuel (Modified EPA Methods 3550/8015)
 VOCs Volatile organic compounds (EPA Method 8010)
 TPH Total petroleum hydrocarbons by Infrared Spectrometry (Modified EPA Method 3550/EPA Method 418.1 (SM 5520 FC))

Pb Lead (EPA Method 7421)
 Cd Cadmium (EPA Method 6010)
 Cr Chromium (EPA Method 6010)
 Ni Nickel (EPA Method 6010)
 Zn Zinc (EPA Method 6010)
 mg/kg Milligrams per kilogram (parts per million)

TABLE 2
SUMMARY OF HISTORICAL GROUNDWATER SAMPLE ANALYSES
 (All results expressed in parts per billion unless otherwise noted)

Sears Store 1058
 2633 Telegraph Avenue, Oakland, California

Well ID	Date Sampled	Benzene	Toluene	Ethyl-benzene	Total Xylenes	TPH as Gasoline	TPH as Motor Oil	TPH (mg/L)	Dissolved Metals
MW-1	12/30/92	1	1	2	2	--	--	1	--
	03/24/93	0.4	1	0.3	10	--	--	1	--
	06/21/93	<0.3	1	2	6	--	**<100	--	--
	09/16/93	<0.3	0.7	<0.3	7	--	**<100	--	--
	12/01/93	0.4	1	2	7	--	--	--	--
	12/30/93	--	--	--	--	--	--	<100	--
	03/09/94	<0.3	<0.3	1	4.2	--	--	<100	--
	06/30/94	0.6	0.7	2.4	15	--	--	<100	--
	09/27/94	0.9	0.5	1.4	10	--	--	*<250	--
	12/01/94	0.4	0.4	<0.3	6.6	--	--	*<250	--
03/08/95	<0.3	0.6	<0.3	2.7	--	--	*<250	--	
MW-2	12/30/92	0.7	<0.3	<0.3	3	190	--	1	*ND
	03/24/93	0.6	<0.3	<0.3	2	120	--	<1	*ND
	06/21/93	0.3	<0.3	<0.3	0.7	82	**<100	--	*ND
	09/16/93	<0.3	<0.3	<0.3	<0.5	28	**<100	--	*ND
	12/01/93	<0.3	<0.3	<0.3	1	68	--	--	*ND
	12/30/93	--	--	--	--	--	310	--	--
	03/09/94	<0.3	<0.3	<0.3	<0.5	47	<100	--	ND
	06/30/94	<0.3	<0.3	<0.3	<0.5	<10	100	--	ND
	09/27/94	<0.3	<0.3	<0.3	<0.5	<10	*<250	--	*15
	12/01/94	<0.3	<0.3	<0.3	<0.5	54	*1,300	--	*6
03/08/95	<0.3	<0.3	<0.3	<0.5	<10	3,000	--	ND	
MW-3	12/30/92	11	0.9	<0.3	2	910	--	20	*ND
	03/24/93	28	0.7	1	8	3,300	--	28	**15
	06/21/93	21	5	2	19	**2,600	32,000	26	*d5
	09/16/93	†	†	†	†	†	†	†	†
	12/01/93	†	†	†	†	†	†	†	†
	03/09/94	2	1.4	4.5	13	2,000	**5,700	**63	*ND
	06/30/94	†	†	†	†	†	†	†	†
	09/27/94	†	†	†	†	†	†	†	†
	12/01/94	†	†	†	†	†	†	†	†
	03/08/95	†	†	†	†	†	†	†	†
MW-4	12/30/92	2	<0.3	1	<0.5	1,200	--	<1	*ND
	03/24/93	<0.3	<0.3	<0.3	<0.5	750	--	2	**7
	06/21/93	<0.3	2	<0.3	0.5	660	19,000	--	*ND
	09/16/93	0.3	<0.3	2	3	410	2,500	--	*ND
	12/01/93	<0.3	<0.3	<0.3	<0.5	150	390	--	*ND
	03/09/94	0.7	0.8	2	3.6	1,500	780	--	*ND
	06/30/94	<0.3	1.7	0.5	1.0	450	130	--	ND
	09/27/94	0.5	<0.3	<0.3	<0.5	110	1,100	--	ND
	12/01/94	0.6	0.5	0.3	0.8	290	580	--	*<5
	03/08/95	<0.3	<0.3	<0.3	<0.5	360	1,000	--	*<5

TABLE 2
SUMMARY OF HISTORICAL GROUNDWATER SAMPLE ANALYSES
 (All results expressed in parts per billion unless otherwise noted)

Sears Store 1058
 2633 Telegraph Avenue, Oakland, California

Well ID	Date Sampled	Benzene	Toluene	Ethyl-benzene	Total Xylenes	TPH as Gasoline	TPH as Motor Oil	TPH (mg/L)	Dissolved Metals
MW-5	12/30/92	<0.3	<0.3	<0.3	<0.5	37	--	<1	^b 5
	03/24/93	<0.3	<0.3	<0.3	0.5	19	--	2	^{**} 341
	06/21/93	<0.3	<0.3	<0.3	<0.5	<10	<100	--	^c ND
	09/16/93	0.3	<0.3	<0.3	1	<10	<100	--	^c ND
	12/01/93	<0.3	<0.3	<0.3	1	17	--	--	^c ND
	12/30/93	--	--	--	--	--	<100	--	--
	03/09/94	<0.3	<0.3	<0.3	<0.5	22	<100	--	^c ND
	06/30/94	<0.3	<0.3	<0.3	<0.5	<10	<100	--	ND
	09/27/94	0.5	0.4	<0.3	<0.5	<10	560	--	ND
	12/01/94	<0.3	<0.3	<0.3	<0.5	<10	<250	--	ND
03/08/95	<0.3	<0.3	<0.3	<0.5	<10	<250	--	ND	
MW-6	12/27/93	<0.3	<0.3	<0.3	<0.5	<10	<100	<1	^a 70
	03/09/94	<0.3	<0.3	<0.3	<0.5	15	<100	--	^c ND
	06/30/94	<0.3	<0.3	<0.3	<0.5	<10	<100	--	ND
	09/27/94	<0.3	<0.3	<0.3	<0.5	<10	<250	--	^d 8
	12/01/94	<0.3	<0.3	<0.3	<0.5	<10	<250	--	^e 32
	03/08/95	<0.3	<0.3	<0.3	<0.5	<10	<250	--	ND
MW-7	12/27/93	<0.3	<0.3	1	2	140	<100	<1	^a 40
	03/09/94	<0.3	<1.0	1.5	4.1	620	<100	--	^c ND
	06/30/94	<0.3	<0.3	<0.3	<0.5	33	<100	--	ND
	09/27/94	<0.3	<0.3	0.4	0.7	52	*<250	--	ND
	12/01/94	<0.3	<0.3	<0.3	1.1	<10	*<250	--	^e 28
	03/08/95	<0.3	<0.3	<0.3	<0.5	<10	*<250	--	ND
MW-8	12/27/93	0.4	4	0.4	1	390	<100	<1	^a 18
	03/09/94	0.6	0.8	0.5	1.5	420	<100	--	^c ND
	06/30/94	0.9	<0.3	<0.3	1.1	250	<100	--	ND
	09/27/94	<0.3	<0.3	<0.3	<0.5	210	*<250	--	^d 9
	12/01/94	5.4	<0.3	0.7	1.3	230	*<250	--	^c ND
	03/08/95	<0.3	<0.3	<0.3	<0.5	230	*<250	--	ND

Source: GTEL Environmental Laboratories

Notes: "--" indicates no datum for the cell, including "not analyzed for this constituent". Values beginning with "<" indicate the compound was not detected above the laboratory reporting limits. † indicates not sampled due to the presence of liquid-phase hydrocarbons.

mg/l = Milligrams per liter

TPH = Total petroleum hydrocarbons

ND = Non-detectable (detection limits for each metal are listed in the laboratory reports, included in attachment 4)

* = Water samples were not filtered, analytical results represent total metals present, not dissolved concentrations.

** = Uncategorized hydrocarbon compound not included in this hydrocarbon concentration.

a = Dissolved lead

b = Dissolved lead only analyte detected

c = Dissolved lead, cadmium, total chromium, nickel, and zinc.

d = Cadmium only analyte detected.

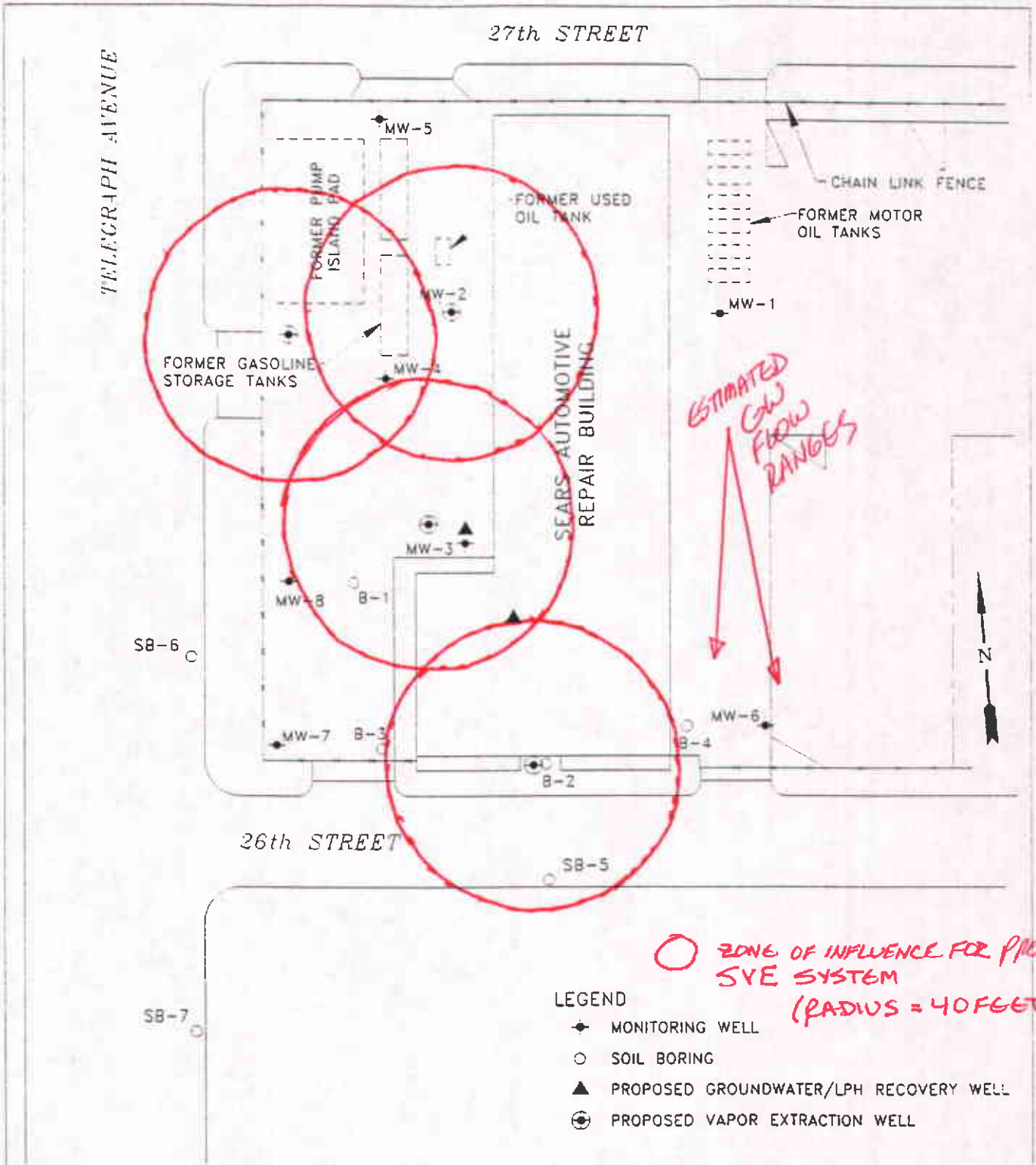
e = Hydrocarbon pattern not characteristic of motor oil.

f = Uncategorized compounds included in concentration

g = Zinc only analyte detected

TABLE 3
Remediation Technology Evaluation Matrix

Remedial Technology	APPLICATION				Comments on Technology
	Adsorbed Phase	Dissolved Phase	Phase-Separated	Vapor Phase	
<i>In situ</i> Soil Vapor Extraction	YES	NO	YES	YES	Provides effective removal of separate and adsorbed volatile hydrocarbons above the water table. Increases percent oxygen in vadose zone, enhancing aerobic bioremediation, provides vapor control; will not adequately address dissolved-phase or adsorbed-phase hydrocarbons below the water table. Recommended for further consideration.
Groundwater/LPH Recovery	NO	YES	YES	NO	Provides containment and control of dissolved plume. Recommended for further consideration.
Aquifer Sparging	YES	YES	NO	NO	Provides effective removal of dissolved- and adsorbed-phase volatile hydrocarbons in saturated zone. Increases dissolved oxygen promoting <i>in situ</i> bioremediation; requires vapor control. Not recommended for further consideration due to difficulty of vapor control next to basement.
High-Vacuum Groundwater/Soil Vapor Extraction	YES	YES	YES	YES	Provides effective removal of VOCs in all phases. Primarily designed for shallow (<20 feet) low permeable, low water-yield aquifers. Not recommended for further consideration due to anticipated well yields.
<i>In situ</i> Aerobic Bioremediation	YES	YES	NO	NO	Provides effective destruction of VOCs and some semivolatiles; oxygen addition may be required, nutrient addition may be required. UIC injection permit required. Recommended for further consideration.
<i>In situ</i> Denitrifying Bioremediation	YES	YES	NO	NO	Provides effective destruction of VOCs and some semivolatiles; nitrate and nutrient addition required. UIC injection permit required. Recommended for further consideration.
No Action	NO	NO	NO	NO	Applicable to sites where there is no risk associated with contaminants. Due to the presence of LPH at the site, risk-based closure is not applicable to the site.



○ ZONE OF INFLUENCE FOR PROPOSED SVE SYSTEM (RADIUS = 40 FEET)

- LEGEND**
- ◆ MONITORING WELL
 - SOIL BORING
 - ▲ PROPOSED GROUNDWATER/LPH RECOVERY WELL
 - ⊕ PROPOSED VAPOR EXTRACTION WELL

				PROPOSED VAPOR EXTRACTION/ RECOVERY WELL LOCATIONS	
CLIENT: SEARS, ROEBUCK AND CO. SITE No. 1058		FILE: PVEWRW/SP695		PROJECT NO.: 020200094	PM
LOCATION: 2633 TELEGRAPH AVENUE OAKLAND, CALIFORNIA		REV: 1		FIGURE: 1	
		DES: MW	DET: ML	DATE: 6/16/95	

Proposed Schedule of Activities

Sears Store 1058
2633 Telegraph Avenue, Oakland, California

TASK	PROPOSED START DATE	PROPOSED COMPLETION DATE
Work Plan Approval	9-5-95	9-15-95
Monitoring Well Installation	9-18-95	9-19-95
Monitoring Well Development	9-20-95	9-20-95
Groundwater & LPH Sampling	9-27-95	9-27-95
Biotreatability Study	10-2-95	1-19-96
Soil Vapor Extraction Test	10-9-95	10-9-95
Pump Test	10-10-95	10-11-95
Summary Report with Preliminary Biotreatability Data		12-4-95

Note: The above schedule is contingent on accessibility of site access from the current property owner.