

This Technical report is
not acceptable to this office.
We do not believe in the results presented in this
report. A new work plan has to be submitted to this
office, that will include additional Groundwater monitoring
wells. The lateral extent of TPH contamination has to
be clearly established.

Ravi
1/29/1993

INVESTIGATION TO IDENTIFY HYDROCARBONS
IN GROUND WATER
IN THE VICINITY OF THE
MONTGOMERY WARD AUTO SERVICE CENTER,
DUBLIN, CALIFORNIA

11/92

Prepared for
Montgomery Ward & Co., Incorporated

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HCI Project No. 584

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1.0 INTRODUCTION

Hydrologic Consultants, Inc. (HCI) has been retained by Montgomery Ward & Co., Incorporated to conduct a soil-vapor survey in the vicinity of the Montgomery Ward Auto Service Center at 7575 Dublin Boulevard, Dublin, CA. This report presents the results of two phases of work that were performed at the site, the first from August 31 through September 2, 1992, and the second on November 10, 1992.

1.1 BACKGROUND

In November of 1988, failure of a 10,000-gallon underground storage tank resulted in the release of gasoline to soils and ground water at the Montgomery Ward Auto Service Center. Remedial activities were subsequently performed at the site, first by A. D. Selditch and Associates, Inc., and later by Environmental Audit, Inc. These activities included excavation and removal of contaminated soils and installation of a ground-water extraction well and treatment system.

1.2 PURPOSE AND SCOPE OF WORK

The objective of the work performed by HCI was to identify the lateral occurrence of hydrocarbons within the shallow ground water in the vicinity of the Montgomery Ward Auto Service Center. The site and adjacent properties are shown on Figure 1.

HCI's original workplan proposed to use soil-vapor sampling as an indirect indicator of ground-water contamination at the site. HCI performed an initial soil-gas survey at the site in May, 1992. However, this methodology proved unsuccessful due to conditions at the site. The low permeability of the clay soils apparently

inhibited the transport of hydrocarbon vapors from the water table into the unsaturated zone, resulting in little or no detection of hydrocarbons in areas suspected to have concentrations of hydrocarbons in the ground water.

Based on the results of the initial field work, a modified sampling methodology was developed in order to complete the scope of work. Section 2.0 describes the methodology that was used to identify hydrocarbons in the ground water at the site.

2.0 METHOD OF INVESTIGATION

The methodology used to identify hydrocarbons in ground water at the site consisted of these steps:

- Punch a small-diameter boring to a depth below the water table,
- Obtain a small volume of soil from this depth,
- Place the soil sample in a VOA vial, add a known volume of distilled water,
- Extract a gas sample from the headspace within the vial, and
- Analyze the gas sample for hydrocarbons using a portable gas chromatograph.

The following sections describe these procedures in greater detail.

2.1 SELECTION OF SAMPLE LOCATIONS

Sample locations were selected within the area shown on Figure 1 according to the following strategy. Starting at the location of the former underground storage tanks, samples were collected along several lines away from the tanks until either a zero detection was obtained, or the boundary of the sampling area was reached. During the first phase of work in August/September 1992, 12 soil samples were collected. As indicated on Figure 2, these samples were taken in lines to the east and west in a direction parallel to Dublin Boulevard, to the north in a direction perpendicular to Dublin Boulevard, and along a diagonal to the northeast. During the second phase of work in November 1992, four additional samples were obtained from the median divider on Dublin Boulevard.

Selection of sample locations was restricted by several factors. The numerous underground utilities at the site imposed limitations on sample locations. In addition, access difficulties due to traffic and business activities also constrained sample locations.

2.2 SOIL SAMPLING PROCEDURES

The primary equipment used to obtain soil samples from below the water table consisted of:

- Drive pipe with expendable point
- Drive rod
- Sampling tube
- Electric jackhammer
- Manual jack

The equipment was used to obtain soil samples as follows:

1. An electric masonry drill with a 1-inch bit was used to drill through the asphalt at the surface and begin the borehole.
2. The borehole was continued using 3-ft lengths of 1-inch O.D. carbon steel pipe that were coupled and advanced using a 30-lb electric jackhammer. The initial length of pipe was fitted with an expendable drive point.
3. Once the pipe was driven to a depth below the water table, four-foot sections of 7/16-inch O.D. steel rod were coupled together and lowered into the pipe. The expendable drive point was then driven clear of the pipe bottom by hammering upon the steel rod.
4. The steel rod was retracted from the borehole, and a 3/8-inch O.D. steel sampling tube of 9 inches length was fitted to the bottom of the rod. The rod was then inserted through the pipe and driven an additional 10 inches into the bottom of the borehole, forcing soil up into the sampling tube.

5. The steel rod was retracted again, and the sample tube was removed. The soil was extruded from the sample tube into a VOA vial using a steel push rod.
6. Soil samples were immediately labeled with the project number, date, sample number, and time collected, and were then bagged in resealable polyethylene bags. The samples were packed in ice and shipped overnight in an insulated cooler to HCI's Lakewood, Colorado office for analysis.
7. A manual jack was used to retract the drive pipe from the borehole. Following removal of the pipe, the borehole was backfilled using granular bentonite. Asphalt sealer was used to seal the borehole at land surface.

All downhole equipment was decontaminated between boreholes to reduce the possibility of cross-contamination. Decontamination consisted of scrubbing the drive pipe, drive rod, and sampling tube with an Alconox-water solution, and rinsing with clean tap water.

2.3 PROCEDURES FOR CHEMICAL ANALYSIS

Soil samples collected during this investigation were packed in ice and shipped overnight to HCI's Lakewood, Colorado office where they were analyzed by a Senior Staff Geochemist. The August/September 1992 samples were analyzed using a Photovac 10S50/10S70 Portable Gas Chromatograph. This instrument uses a photo-ionization detector (PID) to determine concentrations of volatile organic compounds in waters and soils. The soil analyses were conducted through a water extraction process. A simple headspace method, similar to USEPA Method 3810, was employed. The headspace method identifies the presence of free and dissolved products in the extract, and is best suited as a screening method.

To perform the analysis, a known volume of distilled water was added to the known mass of soil in the vial. The method assumes that chemical equilibrium is achieved between the compounds in the

water and in the gas phase above the solution. A known volume of this gas phase was then injected into the chromatograph. The various organic compounds were separated in the column of the chromatograph and then each compound passed through the PID where a peak area signal, proportional to the concentration in the gas, was generated. This peak area was compared to the peak area of a standard. Linear relationships between the concentrations in the standard and in the unknown were assumed. At the low concentrations typically encountered in environmental samples, these relationships are usually valid. Blanks including one trip blank were also analyzed as part of the analytical protocol.

The primary standards used in the analysis were benzene, toluene, ethyl benzene, and xylenes. Standards for these aromatic compounds were obtained from a chemical supplier, diluted to appropriate concentrations, and mixed to provide a working standard for comparison to the unknowns. The nominal detection limit for the method was 5 ppb. Total hydrocarbon concentrations were calculated based on the average aromatic standards response.

Analysis of the November 1992 samples was conducted following a purge and trap/gas chromatograph (GC) method. A sentograph GC with Tenax preconcentrator was used. A one-point calibration curve was used in the analysis. The calibration was conducted by making up a solution that contains 100 ug/l of benzene, toluene, ethylbenzene, m-xylene, p-xylene, and o-xylene and using it as a standard solution. The source (lot number) of this standard was the same as the one used for the previous analyses. Each soil sample was mixed with 25 ml of D.I. water and then shaken for two minutes before the analysis. Blanks were once again analyzed as part of the analytical protocol.

3.0 FINDINGS

A total of 16 soil samples were obtained at the site (see Figure 2 for sample locations). All samples except one (B1) were collected from depths of at least 15 feet below land surface. At the time of the investigation, the water level at the site was approximately 13 feet below land surface, as measured from a site monitoring well. Sample B1, located within the former tank area, was collected from a depth of approximately 13 feet below land surface because a hard barrier was encountered at that depth.

Table 1 shows the analytical results for the 16 soil samples. Concentrations for individual constituents and for Total Hydrocarbons are reported in ug/kg (or ppb), and represent the mass of compound in the soil sample normalized by the mass of the soil sample.

The results show that the highest concentration of Total Hydrocarbons (37,000 ug/kg) was found at B1, located in the former tank area, with diminishing concentrations generally occurring along the sampling lines outward from the former tank area. Specific findings progressing away from the former tank area indicate that:

- In an easterly direction parallel to Dublin Boulevard, the concentration of Total Hydrocarbons decreases by approximately one order of magnitude from B1 (37,000 ug/kg) to B2 (2,700 ug/kg) to B3 (230 ug/kg) to B4 (14 ug/kg). The levels of hydrocarbons at B4 are very low and approaching the detection limit. An additional sample, B10, located approximately 20 ft west of B4, showed no hydrocarbons. This indicates that the eastern extent of the hydrocarbon plume is bracketed in the vicinity of B4.
- In a westerly direction parallel to Dublin Boulevard, low levels of Total Hydrocarbons (39 ug/kg) were detected at B8, while no volatile hydrocarbons were detected at B12. This

brackets the western extent of the hydrocarbon plume in the vicinity of B8.

- In a northerly direction perpendicular to Dublin Boulevard, low levels of Total Hydrocarbons (60 ug/kg) were detected at B9, and a nondetect was obtained at B11. This brackets the northern extent of the hydrocarbon plume in the vicinity of B9.
- In a northeasterly direction, very low levels of Total Hydrocarbons (10 ug/kg) were detected at B6, and nothing was detected at B7. The northeasterly extent of the hydrocarbon plume is therefore bracketed in the vicinity of B6.
- In a southerly direction, the four samples taken in the median divider in Dublin Boulevard contained no hydrocarbons. Therefore, the hydrocarbon plume does not cross Dublin Boulevard.

This subsurface investigation has delineated the lateral extent of the hydrocarbons in ground water originating from the former tank area of the Montgomery Ward Auto Service Center. The hydrocarbon plume is primarily limited to the Montgomery Ward property.

Based on the findings of this investigation, no hydrocarbons have migrated within ground water across Dublin Boulevard to the Enea property (see Figure 1).

TABLE 1
RESULTS OF SOIL SCREENING ANALYSES

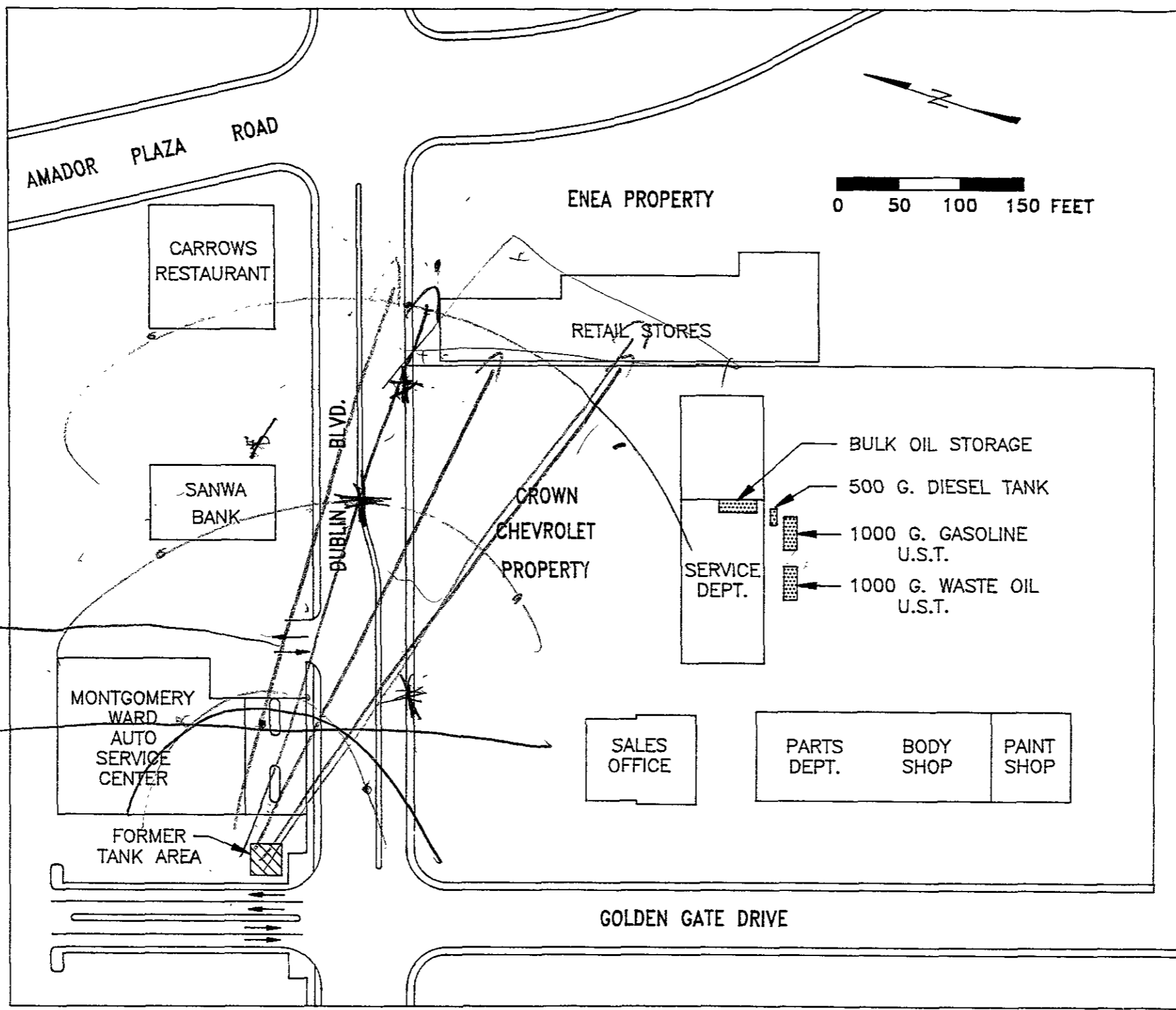
Sample No.	Date	Equivalent Soil Concentration ¹ (ppb or µg/kg)					
		Benzene	Toluene	Ethyl Benzene	o/p Xylene	m Xylene	Total Hydrocarbons ²
B1-1	8/31/92	200	4,900	1,900	3,700	5,800	37,000
B2-1	8/31/92	7	430	58	190	280	2,700
B3-1	8/31/92	22	27	ND	10	ND	230
B4-1	8/31/92	ND	9 ³	ND	ND	ND	14 ³
B5-1	8/31/92	ND	ND	ND	ND	ND	ND
B6-1	9/01/92	ND	ND	ND	ND	ND	10
B7-1	9/01/92	ND	ND	ND	ND	ND	ND
B8-1	9/01/92	ND	14	ND	ND	ND	39
B9-1	9/01/92	ND	28	ND	ND	ND	60
B10-1	9/01/92	ND	ND	ND	ND	ND	ND
B11-1	9/02/92	ND	ND	ND	ND	ND	ND
B12-1	9/02/92	ND	ND	ND	ND	ND	ND
B13-1	11/10/92	ND	ND	ND	ND	ND	ND
B14-1	11/10/92	ND	ND	ND	ND	ND	ND
B15-1	11/10/92	ND	ND	ND	ND	ND	ND
B16-1	11/10/92	ND	ND	ND	ND	ND	ND

NOTE: ND = NOT DETECTED

¹ Equivalent soil concentration is approximated as the total mass of constituent in the soil sample normalized by the mass of the soil sample.

² Total Hydrocarbons reported as aromatics.

³ Average of two analyses.

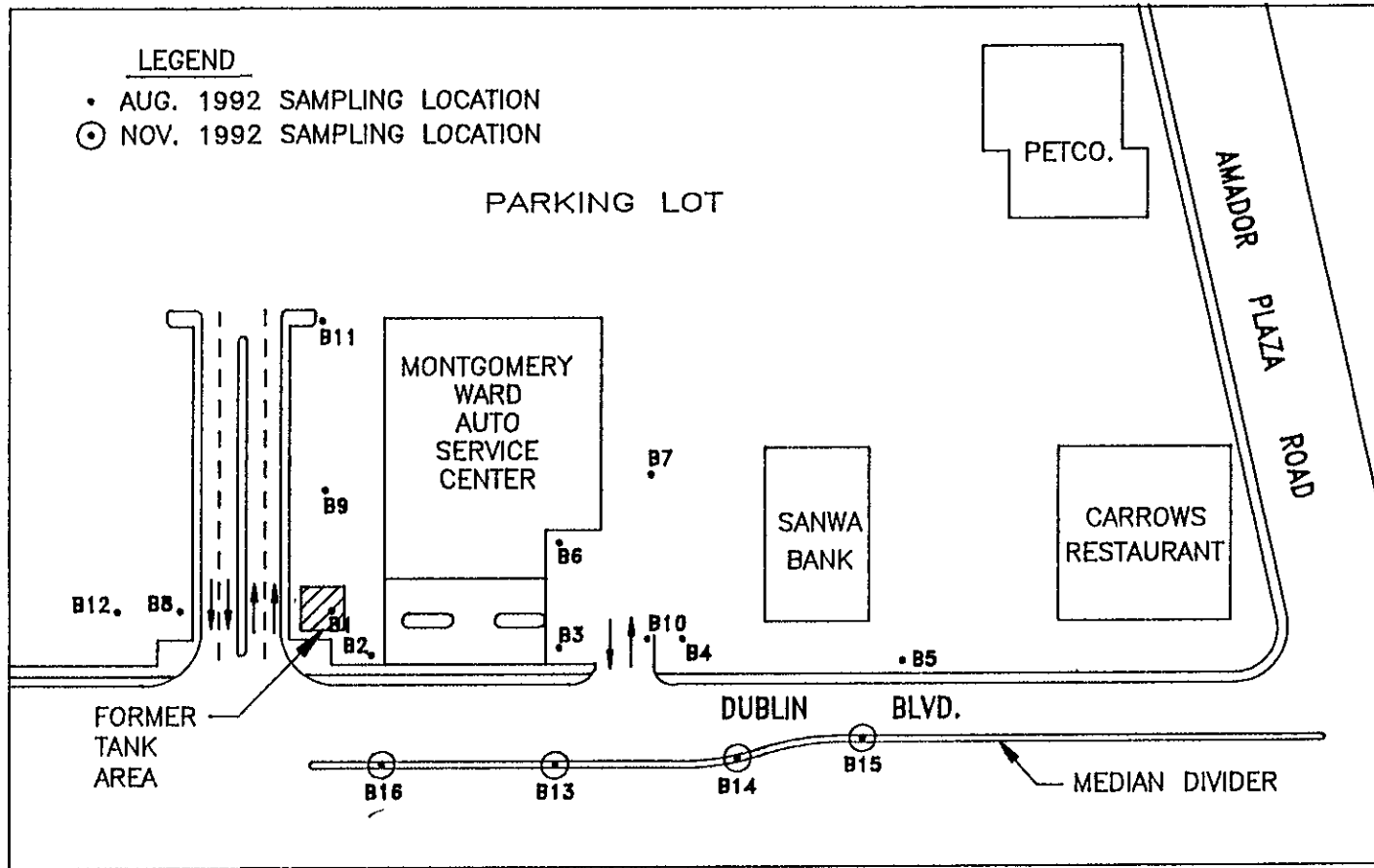


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SITE MAP OF MONTGOMERY WARD AUTO SERVICE CENTER AND VICINITY

FIGURE:
1



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LOCATION OF AUG. 1992 AND NOV. 1992 SAMPLES

FIGURE: 2