Weiss Associates Environmental and Geologic Services

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January 30, 1995

#3737

Rec'd 1/31/95 BChan

Mr. Barney Chan
Alameda County Health Care Services
Department of Environmental Health
1131 Harbor Bay Pkwy, 2nd Floor
Alameda, CA, 94502-6577

RE: Shell Service Station
WIC # 204-5508-5801
630 High Street, Oakland, California
WA Job # 81-0602-20

Dear Mr. Chan:

On behalf of Shell Oil Company (Shell), Weiss Associates (WA) has performed a RBCA screening evaluation for the Shell service station located at 630 High Street, Oakland, California. As you requested in your November 3, 1994 letter to Mr. Dan Kirk of Shell, WA has performed this evaluation following the Tier 1 procedures outlined in *Risk-Based Corrective Action Applied at Petroleum Release Sites* (RBCA) guidelines [1].

The Tier 1 RBCA framework is a decision making process whereby site contaminant levels, as determined during an initial site assessment, are compared to conservatively-derived risk-based screening level (RBSL) targets for contaminants in each environmental media. In the RBCA process, in Tier 1 - *Site Classification and Non-Site-Specific-Screening Level Corrective Action Goals* - sites are classified by the urgency of need for initial corrective action, and then site-specific contaminant concentrations are compared to target RBSLs. The ASTM guidance provides example RBSL look-up tables intended as a guide for state and local enforcement agencies; the RBSLs in the look-up tables are not intended to be viewed as stand-alone cleanup standards. Site-specific contaminant concentrations below the RBSLs by definition represent human health risks less than the target level, and human health risk may reasonably be assumed to be insignificant below these target risk levels. If the RBSLs are exceeded, the RBCA process provides several alternatives for subsequent action. These options include application of Tier I RBSLs at an alternative point of compliance, development of site-specific Tier 2 target levels (SSTLs), provision of institutional or engineering mechanisms to limit or reduce exposures, or remediation to Tier 1 RBSLs. A Tier 3 evaluation process is also included for site-specific analysis at large or

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[1] ASTM ES 38-94. *Emergency Standard Guide for Risk-Based Corrective Action applied at Petroleum Release Sites.* American Society for Testing and Materials, Philadelphia PA, 1994.

complex sites involving more sophisticated fate and transport issues or extensive data acquisition and analysis, as examples.

Following the Tier 1 framework, this letter includes a brief discussion of the results of the site investigation activities, identification of the contaminants of concern, an analysis of possible exposure routes, and identification of complete exposure pathways for this site. The worst-case contaminant exposure concentration is then determined for each exposure route, and these site-specific exposures are compared to the appropriate RBSL.

The objective of this assessment is to conduct a Tier 1 analysis following the RBCA framework to address the potential risk to human heath associated with the known petroleum hydrocarbons present in the subsurface. Potential impact to ground water quality and environmental risk will be considered in greater detail in a subsequent submittal to the Alameda County Department of Environmental Health (ACDEH) office planned for the first quarter of 1995. This assessment is therefore not intended to address potential impacts on ground water quality except as they relate to possible human health risk.

STEP 1 - INITIAL SITE ASSESSMENT

Source Characterization: Initial site assessment work as defined by the RBCA framework is the collection and assembly of data required to complete a RBCA Tier 1 analysis. Extensive site characterization has been completed at this site and investigative data has been provided to the ACDEH in the following reports: *Blaine Tech Services, 1989, Sampling Report 89026-C-1, 7 pp.; Blaine Tech Services, 1989, Sampling Report 89034-C-1, 8 pp.; Converse Environmental West, 1989a, Report of Activities, Shell Oil Company Facility 630 High Street, Oakland, California, 7 pp.; Converse Environmental West, 1989b, Shell Oil Company - Quarterly Report, 630 High Street, Oakland, California, 7 pp.; Converse Environmental West, 1989c, Shell Oil Company - Quarterly Report, 630 High Street, Oakland, California, 12 pp.* A brief summary of the site investigation activities performed at this site is presented below.

- *1989 Soil Excavation:* In January and February 1989, Armer/Norman and Associates excavated soil in the vicinity of former product dispenser pump islands, fuel lines and underground storage tanks associated with a service station previously located on the eastern portion of the site. Confirmation soil samples collected in the excavations by Blaine Tech Services (BTS) of San Jose, California, indicated that most of the hydrocarbon impacted soil was excavated from the site. Additional soil excavation was performed after these samples were collected, and it appears that the remaining hydrocarbon-impacted soil was over-excavated. A detailed description of soil sampling activities is presented in the BTS sampling reports cited above.

- *1989 Monitoring Well and Boring Installation:* In 1989, Converse Environmental West of San Francisco, California (Converse) drilled ten monitoring wells (MW-1 through MW-10) and four soil borings (SB-1 through SB-4) at the site. Selected soil samples collected from these borings were analyzed for total petroleum hydrocarbons reported as gasoline (TPH-G), total petroleum hydrocarbons reported as diesel (TPH-D), total

petroleum hydrocarbons reported as motor oil (TPH-MO), total oil and grease (TOG), total lead, benzene, toluene and xylene. Benzene was detected only in samples collected from SB-2, MW-1 and MW-4, at concentrations ranging from 0.042 ppm to 0.046 ppm. Monitoring well locations are shown in Figure 2 and a summary of the soil boring analytic data for all analytes is presented in Table 1. Boring logs and a detailed description of well installation activities are presented in the Converse reports cited above.

- In 1993, WA attempted to install an additional downgradient well to further delineate the plume. However, due to the presence of Railway lines, Caltrans property and underground utilities, no appropriate location was identified

- *Ground Water Sampling:* Quarterly ground water monitoring has been conducted since 1989. Since 1990 benzene has been detected at concentrations exceeding 100 parts per billion (ppb) only in ground water from the eastern area of the site in samples from wells MW-1, MW-3, MW-4. Table 2 presents a summary of ground water analytical results collected since 1990, for all analytes.

Potential for Exposure and Degradation of Beneficial Uses. No sensitive receptors (open bodies of water, drinking water wells, schools or hospitals) are located on or within 1,000 ft of the site. Onsite workers are identified as the most likely potentially exposed population. The site is an active service station with a car wash. A cashier's building with a footprint of approximately 600 square ft is located in the eastern area of the site. The site is paved and no construction or excavation activities are currently planned. The site is expected to remain in commercial use in the foreseeable future. Although ground water in this area is designated as a potential resource, the site is located in an industrial area, and it is unlikely that the shallow ground water underlying this site will ever be used.

Extent of Migration: No potential points of exposure or concern have been identified at this site. The only known conduit through which ground water can come into contact with receptors at the surface is through the ground water monitoring wells. These wells are locked, and are not accessible to the public.

Summary of Site Characterization Results: As discussed under Source Characterization, above, extensive site investigation has been performed at the site. Soil and ground water analytic results are summarized in Tables 1 and 2. The results of these investigations indicate that the maximum concentration of benzene detected in soil is 0.046 ppm in MW-4. Benzene concentrations in ground water have not exceeded 200 ppb since 1992.

Contaminants of concern identified for this analysis are those VOCs detected in the site characterization: benzene, toluene, ethylbenzene and xylene (BTEX). BTEX compounds are typically used in risk-based assessments as "indicator compounds" for evaluation of total petroleum hydrocarbons (TPH). Benzene is the key contaminant of concern for this assessment because of its carcinogenicity. TPH itself is not identified as a contaminant of concern for this analysis because the toxicological parameters required to evaluate human health risk are not available for TPH as a

fuel mixture. ASTM recommends evaluation of petroleum releases using the indicator compound approach, based on the assumption that "a significant fraction of the potential impact from all [TPH] chemicals is due to the indicator compounds" (ASTM ES 38-94). EPA takes a similar approach.

For purposes of this screening assessment, we have assumed that compounds are present in site soils at the worst case (highest) levels found in the 1989 soil samples as reported by Converse. For characterization of ground water, we have made the conservative assumption that the maximum contaminant concentration detected in the past two years is present in ground water beneath all of the exposed surface of the site. Table 3 shows the values used in this Tier 1 analysis for each contaminant of concern.

STEP 2 - SITE CLASSIFICATION AND INITIAL RESPONSE ACTION

Site Classification: The RBCA framework includes initial classification of the site into one of four main categories, each related to a set of possible appropriate initial response actions. The ASTM guidance provides examples of possible site classifications and the criteria on which they are based (Table 3 - *Site Classification Scenarios and Potential Initial Response Actions*, page 7 of ASTM ES 38-94). Based on review of the information provided by the initial site characterization and the examples in the RBCA guidance, Site Classification 3 is most appropriate for the site at this time. This classification has been selected based on evidence of impacted ground water, although no known water supply wells are located downgradient of the site. For the purposes of this assessment we will make the conservative assumption that such supply wells may exist, based on the designation of the water bearing zone as a possible ground water supply source by the Regional Water Quality Control Board.

Initial Response Action: Based on a Site Classification of 3, the RBCA guidance identifies ground water monitoring and assessment of the potential impact on beneficial uses as appropriate response actions. The initial response to the hydrocarbon release at this site has already been completed based on guidance from the ACDEH, in the form of a comprehensive site investigation which included long-term monitoring of ground water conditions. Ground water monitoring is continuing at this time. Based on the results of these investigations it appears that the site is a potential candidate for the proposed Non-Attainment Zone (NAZ) policy. At this time, Shell is preparing a NAZ analysis to assess the potential impacts of the onsite contamination, with the intention of demonstrating that the site can be re-classified as RBCA Class 4 - No Demonstrable Long-Term Threat - as the next step in the process. This RBCA analysis will assist in determining whether designation as a NAZ would present any significant human health risk.

STEP 3 - COMPARISON OF SITE CONDITIONS WITH TIER 1 RBSLs

Identification of Complete Exposure Pathways: Figure 3 provides the exposure pathway analysis for the selected exposure scenario for this site, and is taken directly from the RBCA *Figure 2: Exposure Scenario Evaluation Flowchart*. The following pathways have been identified as complete: indoor inhalation of volatile compounds diffused from soil and/or ground water, outdoor inhalation of volatile compounds diffused from soil and/or ground water, and ingestion of ground water.

Exposure Characterization-Selection of Scenarios: The exposure scenario selected for evaluation at this site is commercial/industrial exposure for both current and future land use. The site is currently an operating service station, and is expected to remain so in the foreseeable future. The identified worst-case receptor is an onsite worker who is assumed to be exposed over a standard working lifetime for 8 hours per day. Exposures to other potential receptors (customers, for instance) onsite have not been considered here, because exposures can reasonably be expected to be lower. Other onsite receptors would be transient, i.e. they would only be present onsite for a limited time, and/or would not be present every day. Similarly, offsite receptors are not evaluated, as exposure concentrations at offsite locations can reasonably be assumed to be lower than those for an onsite receptor.

Exposure Characterization- Selection of Appropriate RBSLs: RBSLs corresponding to a target carcinogenic human health risk of one in one hundred thousand ($1E^{-5}$) or a target chronic hazard quotient of 1.0, for non-carcinogenic compounds, have been selected as appropriate for this analysis. Selection of a $1E^{-5}$ target risk level at this site is consistent with local policies for acceptable risks at commercial sites, and within the acceptable risk range of $1E^{-4}$ to $1E^{-6}$ specified in the National Contingency Plan. Moreover, the commercial receptors of concern for this analysis are Shell employees, all of whom have received OSHA 29 CFR 1910.120 hazardous waste worker training and are familiar with the risks of petroleum hydrocarbons and appropriate precautionary measures. Table 3 shows the Tier 1 RBSLs for contaminants of concern in soil and groundwater for the exposure pathways/receptor scenarios identified above as of concern for this site. The RBSLs in air were not selected as appropriate, based on lack of direct air measurements at the site for comparison. For information purposes only, the RBSLs for direct soil contact are also shown, although the site currently has no complete pathway for soil contact.

need to monitor indoor air?

Exposure Characterization - Site-Specific Exposure Estimates: Table 3 also shows the site-specific, worst-case concentrations of each contaminant of concern in soil and ground water. As discussed earlier, the concentrations in soil represent the maximum detected in any onsite soil boring, and the ground water concentrations represent the maximum detected in any monitoring wells since 1992.

Comparison to RBSLs: Table 3 shows a comparison between the selected RBSL for each pathway/scenario of concern and the site-specific characterization results. The table also shows, for informational purposes, the worst-case contaminant concentrations detected in subsurface soils at the site as compared to the RBSL for commercial/industrial surficial soils exposure pathway.

Examination of Table 3 indicates that existing onsite levels of petroleum hydrocarbon compounds of concern are below the target Tier 1 RBSLs for all exposure pathways, with the exception of direct ingestion of benzene in ground water. Worst-case site concentrations are also below the RBSL for direct soil contact exposure. Based on this comparison, remaining contamination in site soils does not pose a significant risk to human health, and toluene, ethylbenzene, and xylene levels in ground water are also acceptable from a human health risk perspective. The worst-case benzene concentration in site ground water is 0.190 ppm (mg/l) versus the target Tier 1 RBSL of 0.0987 ppm, indicating the need for further evaluation of benzene contamination in ground water. However, the average depth to ground water at the site is approximately 10 ft, and the existing monitoring wells are the only known exposure route. The probability of ground water ingestion actually occurring is therefore very low.

STEP 4 - EVALUATION OF TIER 1 RESULTS

WA concludes that the analysis completed here using the ASTM E 38-94 Risk-Based Corrective Action Tier 1 methodology indicates that an initial response action of long term ground water monitoring is the most appropriate at this time. Shell is currently continuing to monitor ground water quality at the site under the oversight of the LOP. The residual hydrocarbons present in the soil and ground water at this site do not represent a significant risk to human health. While the worst-case concentration of benzene in the ground water exceeds the Tier 1 RBSL, based on the discussion above no complete exposure pathway, and thus no significant risk, exists. Also, as discussed in earlier submittals[2], the hydrocarbons present in ground water at this site are limited to the immediate site vicinity and appear to be degrading through natural processes including bioattenuation and biodegradation.

Shell intends to submit a request for establishment of a NAZ, which will include an assessment of beneficial uses of ground water and an evaluation of natural attenuation or hydraulic control. This response will include an evaluation of the risk of ground water ingestion, and a discussion of engineering controls or other measures which may be taken, if necessary, to ensure that ingestion of impacted ground water does not occur. The appropriate point of compliance for evaluation of ground water quality will be identified as part of the NAZ evaluation process, and therefore cannot be identified here for use in a Tier 2 evaluation of ground water. Based on these conclusions, we recommend that no site-specific risk assessment be required at this time, and that Tier upgrade for further analysis is not required. The initial response action selected is consistent with the RBCA guidance and expected consideration of the site under the Board's NAZ policy.

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[2] Weiss Associates, April 17, 1994 letter to Barney Chan of the Alameda County Department of Environmental Health.

We hope that this study addresses your concerns. Please contact Alison Watts or Carolyn Atwood at (510) 450-6000 with any questions or concerns.

Sincerely,
Weiss Associates

Alison Watts
Sr. Staff Geologist

Carolyn J. Atwood, REA
Senior Project Manager

Enclosures: Figures
Tables

cc: Dan Kirk, Shell Oil Company, PO Box 4023, Concord, California, 94524
Brad Boschetto, Shell Oil Company, PO Box 4848, Anaheim, California, 92803
Kevin Graves, Regional Water Quality Control Board, San Francisco Bay Region

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FIGURES

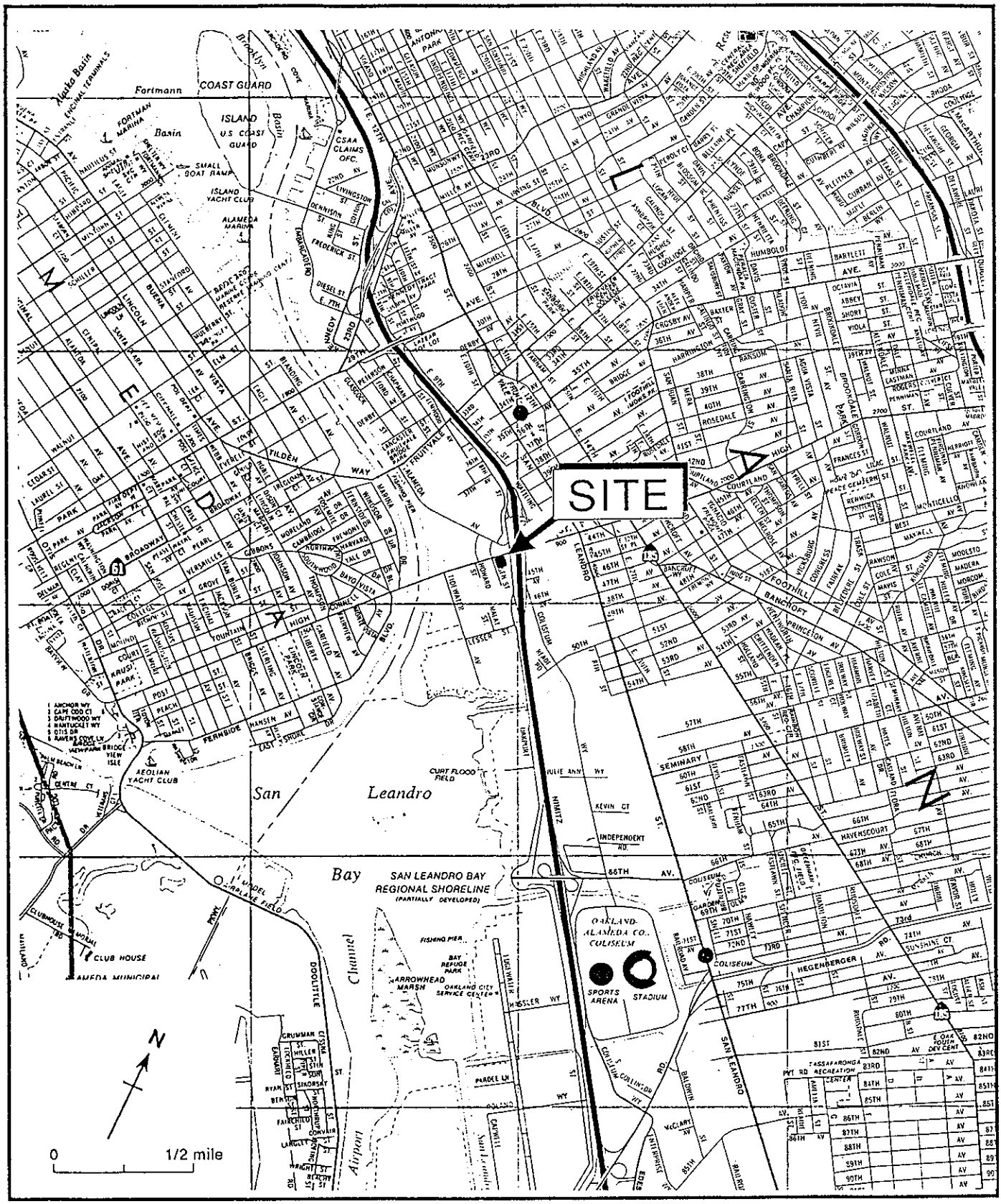

Figure 1. Site Location Map - Shell Service Station WIC #204-5508-5801, 630 High Street, Oakland, California

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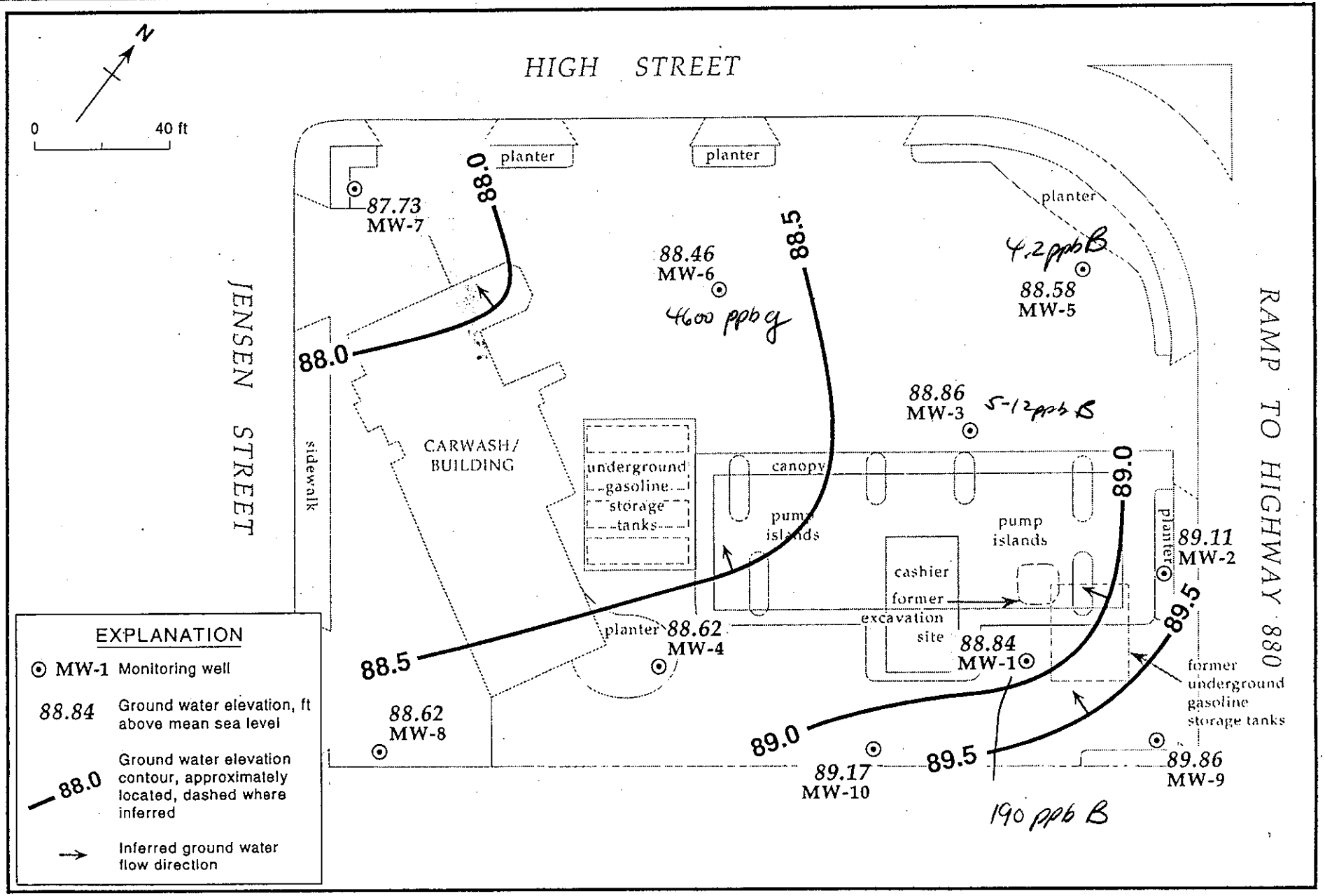

Figure 2. Monitoring Well Locations and Ground Water Elevation Contours - August 4, 1994 - Shell Service Station WIC #204-5508-5801, 630 High Street, Oakland, California

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