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**RISK-BASED CORRECTIVE ACTION REPORT**  
**FORMER ABOVEGROUND**  
**MINERAL OIL STORAGE TANK AREA**  
**EMERYVILLE MATERIALS FACILITY**  
**EMERYVILLE, CALIFORNIA**

*Handwritten notes:*  
banned  
1 yr & 30 days/yr ≈ 8 ppm PCB  
25 yrs & 1 day/yr ≈ 106 ppm PCB  
10B ppm PCB (0-2/49)  
\* For many Remedial Alternatives included, I don't have full data understand to certain depths, limited excavation <sup>in soil</sup> technical construction all PCB areas. <sup>of</sup> come using AT/ACL

Prepared for  
Pacific Gas and Electric Company  
March 7, 1997

*Handwritten notes:*  
Acceptable H<sub>2</sub>S at site during investigation removed  
\* soil excavated will be disposed off-site  
\* make should be approved by county.

Prepared by  
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Project 20143-014.004

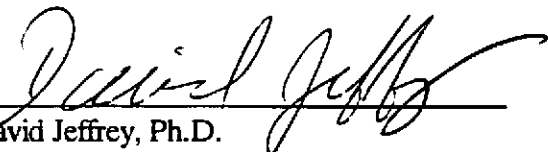
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ENVIRONMENTAL PROTECTION

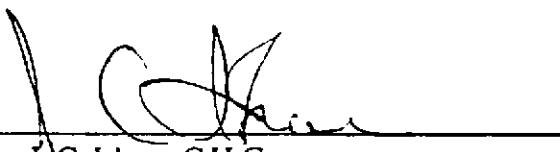
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\* dead restrictions  
9/9/11  
out of site  
10/1/11

**Risk-Based Correction Action Report  
Former Aboveground Transformer Oil Storage Tank Area  
Emeryville Materials Facility  
Emeryville, California**

The material and data in this report were prepared under the supervision and direction of the undersigned.

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## EXECUTIVE SUMMARY

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A tiered risk-based corrective action (RBCA) evaluation, consistent with recent guidelines from the American Society for Testing and Materials (ASTM), was performed for Pacific Gas and Electric Company's Emeryville Material Facility located in Emeryville, California. Several former aboveground storage tanks (ASTs) located at the facility had been used to store mineral oil. Investigation of site soils and groundwater previously performed by PG&E showed the presence of polychlorinated biphenyl compounds (PCBs), benzene, ethylbenzene, toluene, and xylenes (BTEX), and total extractable petroleum hydrocarbons (TEPH) in both soil and groundwater media. The site of the former ASTs is presently inactive and completely covered over with an impermeable plastic membrane, and is in an area zoned exclusively for industrial use.

The purpose of the report is to evaluate if detected concentrations exceed exposure levels considered acceptable to regulatory agencies. This evaluation assesses both current and relevant potential future site conditions. The results of the evaluation provide a basis for assessing if remediation of impacted soil and groundwater may be required, and possible remedial scenarios for reducing chemicals of potential concern to levels considered acceptable to regulatory agencies.

A Tier 1 evaluation was performed, in which the maximum detected chemical concentrations were compared with conservative risk-based screening levels (RBSLs); USEPA Region IX Preliminary Remediation Goals (PRGs) were used as screening values. The Tier 1 evaluation indicated that only one chemical, PCBs, exceeded screening values for both soil and shallow groundwater media. For TEPH, no PRG is available. However, it is likely that TEPH detected in site media is directly due to the use of mineral oil at the site. Mineral oil is used as a dielectric fluid in electric transformers. Mineral oil is a highly refined product from the petroleum industry, resulting from the careful removal of "active" hydrocarbon components, such as polynuclear aromatic hydrocarbons (PAHs). What is left following these purification steps is a non-reactive toxicologically inert oil.

Although the maximum detected concentration of PCBs in groundwater was found to exceed the Tier 1 RBSL, the shallow aquifer at and near the site is considered to be a State "containment zone", in recognition of the heavy industrial use which historically characterizes the general area. Therefore, the shallow aquifer is not used as a water supply source, consistent with the results of a comprehensive well survey performed by EMCON in support of the RBCA evaluation. Because groundwater PRGs are based on

exposure pathways involving the direct use of groundwater (e.g., ingestion), and the only other possible exposure at the site via groundwater is from subsurface volatilization, which is unlikely for PCBs given their poor volatility, chemicals detected in groundwater are not expected to lead to unacceptable exposures for receptors at or near the site.

Because the maximum detected concentration of PCBs in soil exceeded Tier 1 RBSLs, a Tier 2 evaluation was performed. In Tier 2, site-specific target levels (SSTLs) were developed for PCBs in soil for three receptor types: construction worker, utility line worker, and a future industrial worker. Resulting SSTL values were compared with mean detected PCB soil concentrations, assuming various potential future remediation (excavation) scenarios to remove elevated concentrations of PCBs at the site. The results of this evaluation provide three options for future site usage and recommended remedial action to address PCBs in soil:

1. Maintain existing impermeable lining: The site may be left as is, with the restriction that future industrial configuration of the site following any development activities must include a site cap (e.g., concrete or asphalt). Under these conditions, intrusive site activities which have relatively short total duration are not expected to lead to significant exposures to PCBs in the soil at depths down to ten feet below ground surface (bgs). This should also ensure that exposures for any future industrial workers located at the site will be well below levels of concern.
2. Limited soil excavation: The site need not be capped if future construction activities are restricted to certain portions of the site, and soil containing PCBs detected in areas of elevated concentrations is excavated and removed prior to or during site construction/development. Care must be taken to limit redistribution of soil in other areas of the site where PCBs are present in excess of 1 mg/kg. That is, PCBs detected at elevated concentrations at depth should be left undisturbed so that future industrial exposures to soil contaminants in the top two feet following site development will not result in elevated exposures to PCBs.
3. Extensive soil excavation: The site need not be capped, and construction activities need not be restricted, as long as soils from three sampling locations where PCBs have been detected at elevated concentrations are excavated and removed from the site prior to or during construction/ development.

## 1 INTRODUCTION

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This report presents the risk-based corrective action (RBCA) evaluation prepared for the Pacific Gas and Electric Company (PG&E) former aboveground storage tank area of the Emeryville Materials Facility located at 4525 Hollis Street, Emeryville, California (Figure 1-1). This evaluation addresses the magnitude and impacts to human health and groundwater quality posed by chemicals detected in soil and groundwater at the site. This report includes the results of the Tier 1 and Tier 2 evaluations.

The purpose of the report is to evaluate if detected concentrations exceed exposure levels considered acceptable to regulatory agencies. This evaluation assesses both current and relevant potential future site conditions. The results of the evaluation provide a basis for assessing if remediation of impacted soil and groundwater may be required, and possible remedial scenarios for reducing chemicals of potential concern to levels considered acceptable to regulatory agencies.

The lead regulatory agency for the site is Alameda County Department of Environmental Health; however, PG&E is self-directed and under no order to perform this evaluation.

In general, the tiered approach recommended by the American Society for Testing and Materials (ASTM) is designed as a step-wise process to evaluate potential exposures and associated risks to humans posed by chemical releases at a site. This evaluation was prepared in accordance with the guidelines contained in the *Standard Guide for Risk-Based Corrective Action Applied at Petroleum Release Sites* (ASTM, 1995). The evaluation used exposure and risk equations consistent with ASTM (1995) and the U.S. Environmental Protection Agency (USEPA) Risk Assessment Guidance for Superfund (USEPA, 1989). Tier 1 screening values were compiled from USEPA Region IX Preliminary Remediation Goals (PRGs; USEPA, 1996). Tier 2 values were developed using exposure assumptions recommended by California (1994a) and ASTM (1995). Details of the computations used to develop Tier 2 values are provided in Appendix A.

The steps that comprise the tiered RBCA approach are summarized in Figure 1-2 and followed in this report. Tier 1 and Tier 2 look-up tables are provided in the main text; all other values and supporting documentation related to estimating exposures and risks are presented in Appendix A. Supporting chemical data are provided in Appendix B.

## 2 SITE BACKGROUND AND CLASSIFICATION

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The site is a former aboveground storage facility located within an active repair facility in a commercial and industrial part of Emeryville, California (Figure 2-1). Figure 2-1 also shows the approximate location of the former oil transfer pump and the former aboveground transformer oil storage tanks (ASTs), which were removed in late 1993. The site of the former ASTs is completely covered with an impermeable plastic liner. Although chemicals have been detected in site media, no documented release events are known. The former AST area is inactive and lined. Groundwater at the site is not considered potable because the aquifer is located in a recognized non-attainment ("containment") zone (Arigoya, 1997).

Site investigation activities were conducted by PG&E (1994a,b, 1996) and EMCON (1996) from October 1993 through October 1996 to characterize the presence and magnitude of chemicals associated with the former ASTs at the Emeryville Materials Facility. Site activities have included surface and subsurface soil sampling and installation and sampling of groundwater wells. Soil sampling and groundwater well locations are shown on Figure 2-1.

Results of site investigation activities from 1993 to 1996 indicate that soil was impacted by total extractable petroleum hydrocarbons (TEPH) at depths of 1.5 to 15 feet below grade. Other constituents detected in soil include benzene, ethylbenzene, toluene, and xylenes (BTEX) and polychlorinated biphenyls (PCBs). Maximum detected concentrations are shown on Table 3-1. The maximum concentrations were detected in 1993-1994. Because these data were analyzed several years ago, and because petroleum-derived chemicals (i.e., TEPH and BTEX) tend to undergo natural degradation (LLNL, 1995; Howard et al., 1991), the current levels of these types of soil contaminants are probably much less than these maximum historic values. Degradation of PCBs, however, is a much slower process; current levels of PCBs in soil may be similar to those obtained in 1993-1994. Complete results of soil sampling are presented on Table B-1.

Chemicals have also been detected in groundwater beneath the site. The depth to groundwater at the site ranges from 11.5 to 14.5 feet below grade. BTEX and PCBs were detected only in the first sample collected from well ESE-1 in March 1994 at a depth of 15 feet below grade. Results of the most recent groundwater sampling (October 7, 1996) indicate that only TEPH is currently present in groundwater in two of the four wells tested (wells ESE-1 and ESE-2). Historical and current maximum concentrations for the



detected chemicals are shown on Table 3-2. Complete results of groundwater sampling are presented on Table B-3.

The site classification steps of the RBCA process are primarily intended to identify those sites that may present an imminent threat to human health. Such sites generally involve unconfined releases to the surface where human exposure to the free product is likely. No surface releases have occurred at the subject site which have not been immediately contained. Therefore, this site was not classified as presenting an imminent threat to human health under current conditions, and is appropriate for the ASTM RBCA process (Figure 1-2), where a comparison of site-measured soil and groundwater data with conservative, non-site-specific, health-based screening levels is conducted. This comparison represents a Tier 1 evaluation, which is discussed in the following section.

## 3 TIER ONE EVALUATION

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Three steps comprise a Tier 1 evaluation:

- Identify the nature and extent of chemical impacts
- Identify complete and possibly significant exposure pathways and receptors
- Compare Tier 1 screening levels with maximum site concentrations.

The first of these steps was presented in the previous section. The other two steps are presented below.

### 3.1 Exposure Pathways and Receptors

This step identifies potentially complete and significant pathways by which relevant human receptors may contact site-related chemicals. The USEPA (1989) describes exposure pathways in terms of four components:

- A source and mechanism of chemical release (e.g., UST leak releasing TPH)
- A retention or transport medium (e.g., volatilization of chemicals from groundwater through air pore spaces in soil to ambient air)
- A point of potential contact by a receptor with a contaminated medium (e.g., ingestion of groundwater if potable)
- An exposure route at the exposure point (e.g., inhalation)

All four components need to be present for a pathway to be considered complete. On the basis of existing soil and groundwater chemical and physical data and information of the site and surrounding land use, the following exposure pathways are considered to be potentially complete:

1. Inhalation of chemicals volatilizing from subsurface soil
2. Inhalation of chemicals volatilizing from groundwater

3. Inhalation of chemicals carried by soil dusts
4. Incidental ingestion of chemicals in soil
5. Dermal contact with chemicals in soil

Three types of worker receptors are considered in this assessment: (1) construction workers, (2) utility line workers, and (3) industrial workers. The site is currently zoned for commercial purposes, is surrounded by commercial areas, and land use is expected to remain commercial in the future. Therefore, no residential receptors are evaluated. All potential chemical exposures are assumed to occur in the future; no exposure pathways are currently complete because the former AST site is currently both inactive and covered. In the future, construction and utility worker receptors are assumed to come into contact with site soils as deep as 10 feet below grade, consistent with California (1994a) guidance. For future on-site industrial workers, it is assumed that portions of the site will be unpaved and direct contact with surficial soils (down to 2 feet below grade) is possible.

Groundwater at the site is not considered potable because the aquifer is located in a recognized non-attainment ("containment") zone (Arigoya, 1997). Additionally, a survey of existing wells located within 1/2 mile of the site indicates no industrial or residential supply wells are present (Table 3-3). Therefore, potential exposure pathways involving direct use of groundwater were not considered complete.

As recommended by Cal-EPA for commercial sites, acceptable risk-based soil and groundwater screening values were based on a target excess cancer risk of  $1 \times 10^{-5}$  (i.e., 1 in 100,000). All noncarcinogens were screened based on an acceptable hazard quotient of 1.

### **3.2 Comparison of Site Data with Screening Levels**

Tier 1 risk-based screening levels (RBSLs) were compiled from the USEPA Region IX table of Preliminary Remediation Goals (PRGs; USEPA, 1996a). PRGs are available for exposure by resident or commercial receptors to chemicals in soil, and domestic use of groundwater by residents. For soil PRGs, potential pathways include incidental ingestion, dermal contact, and inhalation of dusts (for nonvolatile chemicals) or vapors (for volatile chemicals). For groundwater PRGs, potential pathways include ingestion, dermal contact, and inhalation during domestic use. Where applicable, Cal-EPA modified PRGs were used rather than USEPA Region 9 values in accordance with USEPA (1996a). Intake assumptions used to estimate exposures via the complete pathways listed above are provided in USEPA (1996a).

Comparison of the complete pathways identified at this site (see Section 3.2) with the pathways upon which the PRGs are based, indicate that the PRGs can be considered highly conservative RBSLs for the following reasons:

- No direct contact with groundwater is expected to occur at the site but is included in the groundwater PRG;
- Groundwater PRGs assume daily residential exposure; commercial exposures are expected to be lower than residential exposures due to differences in intake assumptions;
- Groundwater PRGs include volatilization of VOCs from domestic use of groundwater, which generally leads to higher exposures than volatilization from subsurface groundwater (see pathway #2 Section 3.1);
- The algorithms used to estimate PRGs for soil and groundwater assume a constant chemical source and no degradation over time; residual sources will be depleted over time through volatilization and other mechanisms.

Soil and groundwater PRGs for the detected chemicals are provided on Tables 3-1 and 3-2, respectively. Comparison of maximum site soil concentrations with soil PRGs indicates that only PCBs exceed the commercial-based PRG. Maximum detected concentrations for all other chemicals were significantly less than commercial-based PRGs.

Comparison of both historical and most recent maximum groundwater concentrations with groundwater PRGs indicate that only historical levels of PCBs exceed the PRG. For all detected chemicals in groundwater except for benzene, historical maximum detected concentrations are significantly less than EPA PRGs. Additionally, no chemicals, including benzene, were detected above analytical detection limits in the most recent round of sampling (October 7, 1996), except for TEPH.

As Tables 3-1 and 3-2 show, there are no available PRGs for TEPH. The TEPH at the site is likely due to the use and storage of mineral oil. Mineral oil is a highly refined product produced by the petroleum industry as a complex mixture comprised mostly of relatively high-boiling-point hydrocarbons, and is prepared by stripping away all "active" components, which include alkenes and aromatic compounds. This refining process leaves a product which is essentially chemically (and toxicologically) inert, as any polynuclear aromatic hydrocarbons (PAHs) which might be present before refining, and which represent the majority of toxic constituents in the unrefined mixture, are removed with the other active compounds. Therefore, the TEPH detected at the site in soil and groundwater likely poses no significant health hazards for potentially exposed receptors.

Consistent with the ASTM RBCA approach, these results indicate that a more site-specific assessment is necessary to evaluate possible exposures to PCBs in soil. This more site-

## 4 TIER TWO EVALUATION

In Section 3.2, all potentially complete exposure pathways for chemicals detected at the site were identified and listed. This set of five pathways was first compared with the pathways used to develop the Tier 1 RBSLs used in this evaluation. As discussed in Section 3.3, it is important that screening criteria used as Tier 1 RBSLs be based on all potentially complete pathways. However, at the Tier 2 stage, consistent with the RBCA approach (ASTM, 1995), only those complete exposure pathways likely to lead to significant exposure need be quantified.

The groundwater volatilization pathway was eliminated in Tier 1. Volatilization from soil requires chemicals which have low soil sorption potential and relatively high vapor pressures. Because PCBs as a chemical group are generally considered to sorb strongly to soils and have low vapor pressures, the soil volatilization exposure pathway does not represent a significant exposure pathway and is not evaluated in Tier 2. USEPA (1996b) has characterized PCBs as a chemical group with low volatilization potential in general. Dust generation at the site is also not expected to lead to significant exposures because most of the soil at the site found to contain PCBs is derived from fill which consists of large fragments of broken glass and brick, and other non-fill soils are relatively moist (see soil boring logs in PG&E, 1996).

Because of these considerations, only direct contact with site soils (i.e., ingestion and dermal contact) is quantitatively evaluated in Tier 2, where site-specific target levels (SSTLs) are developed based on these potentially complete and significant pathways. Exposures via these pathways were estimated in this Tier using the intake assumptions and equations provided in Appendix A. The equations used to develop SSTLs allow for site-specific information to be used in the analysis, including exposure frequency and exposure duration.

The following site-specific information was incorporated into developing SSTLs for PCBs in Tier 2:

- Construction workers were assumed to be exposed for a total duration of 30 days (over one year)
- Utility workers were assumed to be exposed for a total duration of 25 days (over 25 years)

See Appendix A for a complete presentation of the equations and assumptions used for the Tier 2 evaluation.

The results of the Tier 2 evaluation are presented on Table 4-1. The intermittent nature of the utility worker exposure, and the short-term exposure for the construction worker, are the main factors leading to the relatively high SSTLs computed for these receptors in comparison to Tier 1 values. Under Tier 2, the SSTL results for the three receptor types are compared with arithmetic mean PCB concentrations calculated using subsets of the data (see Table B-2), in addition to the maximum detected concentrations, which were used at the more conservative Tier 1 stage. Because no residential exposures are expected under the site conditions described in this evaluation, future industrial receptors are expected to potentially contact all areas of the site. Therefore, arithmetic mean concentrations representing site-wide conditions are appropriate for use in Tier 2. Subsets of the full data are used to show the effect of removing elevated PCB concentrations at certain locations, and the effect of chemical redistribution during site development activities. That is, PCBs detected at elevated concentrations at depth may have to be left undisturbed so that future industrial exposures to soil contaminants in the top two feet following site development will not lead to elevated risks. Four such comparisons were made, which correspond to the four scenarios listed in Table 4-1, as follows:

1. As Table 4-1 (and B-2) shows, the site, as it currently exists, is acceptable for the construction and utility worker receptors. The mean PCB concentration in soils from 0 to 10 feet bgs is only 30 mg/kg, and the SSTLs computed for these two receptors are 88 and 106 mg/kg, respectively (Table 4-1).
2. To evaluate the potential for future industrial use of the site as it presently exists, an arithmetic mean concentration was computed for all PCB soil data between 0 and 2 feet bgs to provide an exposure concentration for this receptor if the plastic cover were removed. The result of this calculation, 28 mg/kg (Table 4-1 and B-2), exceeds the SSTL for the industrial worker (1.3 mg/kg). Because there is no current industrial use of the former AST area, and this area is completely covered, this "exceedance" does not represent a likely exposure scenario. However, this scenario indicates that PCB concentrations in this depth interval would exceed an SSTL if no remediation or capping is performed for the site and the plastic liner is removed.
3. To evaluate possible remediation options, it was assumed that soils containing elevated levels of PCBs at two locations, B1 and B16 (Figure 2-1), would be excavated down to depths of 7.5 and 4.5 feet bgs, respectively, and removed from the site prior to or during construction activities for industrial site development. Construction activities following excavation were conservatively assumed to result in the redistribution of remaining PCBs at the site, so maximum concentrations at each location could end up at shallower depths.

This assumption is used by California (1994a) in evaluating future use scenarios. For instance, at location B9, PCBs found at 93 mg/kg at 6-7.5 feet bgs may end up in the top 2 feet of soil following construction activities. Industrial workers located at the site in the future may then come into contact with PCBs at these concentrations. Table B-2 shows these computations in detail. A mean concentration of 12 mg/kg is obtained for PCBs not removed from the site under this scenario. This mean detected concentration exceeds the SSTL for the industrial worker, which means that more extensive removal of site soils, or certain site restrictions, or a combination of the two, would be necessary in order for the site to be in a condition suitable for future industrial use under the assumptions used herein.

4. To allow for possible soil redistribution, the arithmetic mean soil concentration between 0 and 2 feet bgs was recalculated assuming that soils at three locations, B1, B2, and B16, down to depths of 9, 6.5, and 9 feet bgs, respectively, would be excavated and removed from the site prior to or during construction activities. Additionally, construction activity at the site would be restricted so that soils at B4, B9, and B14 would be left undisturbed (to avoid redistribution). This may be feasible, since these three soil borings are all located relatively close to one another in the northwest corner of the site. Applying these conditions leads to a mean PCB soil concentration of 0.8 mg/kg for the 0 to 2 feet bgs interval. This mean concentration is below the SSTL for the industrial worker (1.3 mg/kg). Alternatively, construction may be unrestricted and take place at B4, B9, and B14, as long as all PCB-containing soils at these three locations are either removed from the site in the course of construction activity or are placed beneath a building or pavement.

The SSTLs used in this assessment, while more reflective of actual site conditions than the RBCLs used in Tier 1, are still conservative for several reasons. Uncertainties are inherent in the risk assessment process, and conservative assumptions are used so that exposures will likely be overestimated. Some of the important conservative assumptions used in this assessment include the following:

- A constant source of chemical was assumed to be present in both soil and groundwater over the entire exposure period.
- Toxicity values used to reflect cancer potency are based on protecting the most sensitive individual and include uncertainty factors up to 1,000. Recent data indicate that the slope factor of  $7.7 \text{ (mg/kg-day)}^{-1}$  used by USEPA and Cal-EPA may overestimate the actual potency of Aroclor 1260 by a factor of 50 (USEPA, 1996b).

## 5 SUMMARY AND CONCLUSIONS

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Chemicals were detected in soil and groundwater at the site associated with past releases of TPH and PCBs from ASTs at the site. Interim cleanup activities have been conducted at the site, including tank and transformer oil transfer pump removal. A RBCA analysis consistent with the ASTM RBCA guidelines was conducted on residual concentrations of chemicals in soil and groundwater to assess possible impacts to humans, and the need for (and extent of) remediation at the site.

The RBCA analysis included Tier 1 and Tier 2 evaluations. The receptors evaluated at the site included construction, utility line, and commercial workers. The pathways evaluated under Tier 1 included inhalation of chemical dusts from site soils, dermal contact with soil, and ingestion of soil and groundwater. Under Tier 2, only direct contact with site soils was evaluated. The results of this evaluation indicate that site remediation may be warranted to protect future on-site industrial workers following development of the former AST area. Three options for future site usage and remedial action are consistent with these results:

### Maintain Existing Impermeable Lining:

1. The site may be left as is, with the restriction that future industrial configuration of the site following any development activities must include a site cap (e.g., concrete or asphalt). Under these conditions, intrusive site activities which have relatively short total duration are not expected to lead to significant exposures to PCBs in the soil at depths down to ten feet bgs. This should also ensure that exposures for any future industrial workers located at the site will be well below levels of concern.

### Limited Soil Excavation:

2. The site need not be capped if construction activities are restricted to certain portions of the site, and soil containing PCBs detected in these areas are excavated and removed prior to or during site construction/development. Those remaining areas of the site not developed must be left undisturbed.



Extensive Soil Excavation/Relocation:

3. The site need not be capped, and construction activities need not be restricted, as long as soils from the elevated PCB locations are either excavated and removed from the site prior to or during construction/development or are placed beneath buildings or roadways.

## LIMITATIONS

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The services described in this report were performed consistent with generally accepted professional consulting principles and practices. No other warranty, express or implied, is made. These services were performed consistent with our agreement with our client. This report is solely for the use and information of our client unless otherwise noted. Any reliance on this report by a third party is at such party's sole risk.

Opinions and recommendations contained in this report apply to conditions existing when services were performed and are intended only for the client, purposes, locations, time frames, and project parameters indicated. We are not responsible for the impacts of any changes in environmental standards, practices, or regulations subsequent to performance of services. We do not warrant the accuracy of information supplied by others, nor the use of segregated portions of this report.

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Table 3-1

**Tier 1 Lookup Table for Soil<sup>1</sup>**  
**Risk Based Corrective Action Report**  
**Pacific Gas & Electric Company**  
**Former Aboveground Transformer Oil Storage Tank Area**  
**Emeryville Materials Facility**  
**Emeryville, California**

Chemical	Maximum detected soil conc. (mg/kg) <sup>2</sup>	Tier 1 Lookup value/EPA Region IX PRG <sup>3</sup> (mg/kg)
Benzene <sup>4</sup>	0.01	4.1
Ethylbenzene	0.003	230
PCBs <sup>5</sup>	<b>385</b>	3.4
TEPH <sup>6</sup>	16,000	NA
Toluene	0.029	880
Xylenes	0.025	320

NA = not available

mg/kg = milligrams per kilogram

Concentrations in bold are greater than Tier 1 Lookup Values

<sup>1</sup> Based on ASTM, 1995.

<sup>2</sup> See Table B-1 for complete soil data.

<sup>3</sup> Industrial Preliminary Remediation Goals from USEPA, 1996a.

<sup>4</sup> Adjusted for California cancer slope factor of 0.1 (mg/kg-day)<sup>-1</sup> (California, 1994b) and California commercial target risk of 1 x 10<sup>-3</sup>.

<sup>5</sup> Polychlorinated biphenyls; only aroclor-1260 was detected. Adjusted for California commercial target risk of 1 x 10<sup>-3</sup>.

<sup>6</sup> Total extractable petroleum hydrocarbons.

Table 3-2

**Tier 1 Lookup Table for Groundwater <sup>1</sup>**  
**Risk Based Corrective Action Report**  
**Pacific Gas & Electric Company**  
**Former Above Ground Transformer Oil Storage Tank Area**  
**Emeryville Materials Facility**  
**Emeryville, California**

Chemical	Historic maximum detected conc. (ug/L) <sup>2</sup>	Maximum detected conc. most recent sampling (ug/L)	Tier 1 Lookup value/EPA Region IX PRG <sup>3</sup> (ug/L)
Benzene <sup>4</sup>	0.8	ND	1.13
Ethylbenzene	ND	ND	1.300
PCBs <sup>5</sup>	1.3	ND	0.087
TEPH <sup>6</sup>	500	150	NA
Toluene	1.5	ND	720
Xylenes	2.7	ND	1.400

NA = not available  
ug/L = micrograms per liter

**Concentrations in bold are greater than Tier 1 Lookup Values**

<sup>1</sup> Based on ASTM, 1995.

<sup>2</sup> See Table B-3 for complete soil data.

<sup>3</sup> Tapwater Preliminary Remediation Goals from USEPA, 1996a.

<sup>4</sup> Adjusted for California cancer slope factor of 0.1 (mg/kg-day)<sup>-1</sup> (California, 1994b) and California commercial target risk of 1 x 10<sup>-5</sup>.

<sup>5</sup> Polychlorinated biphenyls; only aroclor-1260 was detected. Adjusted for California commercial target risk of 1 x 10<sup>-5</sup>.

<sup>6</sup> Total extractable petroleum hydrocarbons.

Table 3-3  
**Results of Well Survey <sup>1</sup>**  
**Risk Based Corrective Action Report**  
**Pacific Gas and Electric Company**  
**Former Aboveground Transformer Oil Storage Tank Area**  
**Emeryville Materials Facility**  
**Emeryville, California**

State Well Number	Well use	Owner	Date	Depth to Water	Total Depth
1S/4W15A1	Test Well	Myers Container Corporation	10/30/90	13.82	25.0
1S/4W15A2	Test Well	Myers Container Corporation	10/30/90	11.15	15.0
1S/4W15A3	Test Well	Myers Container Corporation	10/31/90	3.62	16.0
1S/4W15A4	Test Well	Myers Container Corporation	10/30/90	—	—
1S/4W15E1	Monitoring	Charles Gensler	06/08/88	11.0	26.5
1S/4W15D1	Test Well	MRCP Realty Properties	01/03/90	13.25	22.0
1S/4W15D2	Test Well	MRCP Realty Properties	01/03/90	15.0	21.5
1S/4W15E1	Monitoring	Benefit Capital Corporation	07/27/87	12.27	30.0
1S/4W15E2	Monitoring	Emeryville Redevelopment	12/28/89	6.5	21.5
1S/4W15E3	Monitoring	Emeryville Redevelopment	12/28/89	5.5	16.5
1S/4W15E4	Monitoring	Emeryville Redevelopment	12/28/89	5.5	21.5
1S/4W15E5	Monitoring	P.O. Partners	09/28/89	12.23	32.7
1S/4W15E6	Monitoring	P.O. Partners	11/14/89	8.84	22.0
1S/4W15E7	Monitoring	P.O. Partners	11/15/89	8.74	19.0
1S/4W15E8	Monitoring	P.O. Partners	11/16/89	7.79	21.5
1S/4W15E9	Monitoring	The Martin Company	03/30/87	5.5	14.0
1S/4W15E10	Monitoring	The Martin Company	04/01/87	2.5	12.5
1S/4W15E12	Monitoring	P.O. Partners	03/29/90	7.5	19.0
1S/4W15E13	Extraction	P.O. Partners	03/28/90	12.0	30.0
1S/4W15E14	Monitoring	Christie Ave. Partners - JS	04/06/90	5.11	20.0
1S/4W15E15	Monitoring	Christie Ave. Partners - JS	04/05/90	4.08	23.0
1S/4W15E16	Monitoring	Christie Ave. Partners - JS	04/05/90	5.21	20.0
1S/4W15E17	Monitoring	Christie Ave. Partners - JS	04/06/90	7.5	20.0
1S/4W15E18	Monitoring	Christie Ave. Partners - JS	04/04/96	1.51	19.0
1S/4W15E19	Monitoring	Christie Ave. Partners - JS	06/06/90	4.75	20.0
1S/4W15F1	Monitoring	Wareham Development	11/05/87	4.23	25.0
1S/4W15F2	Monitoring	Wareham Development	11/05/87	6.39	25.0
1S/4W15F4	Monitoring	The Martin Company	03/31/87	6.5	11.5
1S/4W15F5	Monitoring	The Martin Company	04/06/87	6.0	13.0
1S/4W15F6	Monitoring	The Martin Company	04/02/87	5.0	13.5
1S/4W15F7	Monitoring	The Martin Company	04/01/87	5.5	13.5
1S/4W15F8	Monitoring	The Martin Company	04/02/87	5.5	13.0
1S/4W15K1	Monitoring	Bonta Collins	02/08/89	4.85	20.5
1S/4W15L2	Monitoring	The Martin Company	04/03/87	5.0	13.0
1S/4W15L3	Monitoring	United States Postal Service	01/30/92	7.5	18.5
1S/4W15N1	Monitoring	Shell Oil Corporation	11/08/89	9.0	20.5
1S/4W15N2	Monitoring	Shell Oil Corporation	11/08/89	9.25	25.5
1S/4W15N3	Monitoring	Shell Oil Corporation	11/08/89	9.0	29.0
1S/4W15N4	Monitoring	Frontier West	06/27/90	6.6	—
1S/4W15P1	Monitoring	Art Sepulveda	09/06/89	6.0	14.0
1S/4W15P2	Monitoring	Art Sepulveda	09/06/89	6.0	14.0
1S/4W15P3	Monitoring	Art Sepulveda	09/06/89	6.0	15.0
1S/4W15Q1	Monitoring	Cetus Corporation	12/23/86	12.45	32.0
1S/4W15F3	Monitoring	HFH Limited	11/03/88	8.0	15.5

<sup>1</sup> Data compiled from California State Water Resources Control Board (SWRCB).  
— = Not Recorded

Table 4-1

**Tier 2 Results for Soil<sup>1</sup>**  
**Risk Based Corrective Action Report**  
**Pacific Gas and Electric Company**  
**Former Aboveground**  
**Transformer Oil Storage Tank Area**  
**Emeryville Materials Facility**  
**Emeryville, California**

Receptor	SSTL <sup>2</sup>	Maximum detected PCB soil concentration	Mean detected PCB soil concentration			
			FULL DATA SITE UNDISTURBED 0-10'/ND = 0.5DL <sup>3</sup>	FULL DATA SITE UNDISTURBED 0-2'/ND = 0.5DL <sup>3</sup>	LIMITED EXCAVATION REDISTRIBUTION 0-2'/ND = 0.5DL <sup>3</sup>	RESTRICTED CONSTRUCTION NO REDISTRIBUTION 0-2' ND = 0.5DL <sup>3</sup>
Construction worker	88	385	30	NA	NA	NA
Utility worker	106	385	30	NA	NA	NA
Industrial worker	<b>1.3</b>	385	NA	<b>28<sup>4</sup></b>	<b>12<sup>5</sup></b>	<b>0.8<sup>6</sup></b>

NA = not applicable  
DL = detection limit

**Bold values exceed Tier 2 Site Specific Threshold Levels**

<sup>1</sup>All SSTL results and detected concentrations in milligrams per kilogram. See Tables B-1 and B-2 for soil data.

<sup>2</sup>Site Specific Threshold Level.

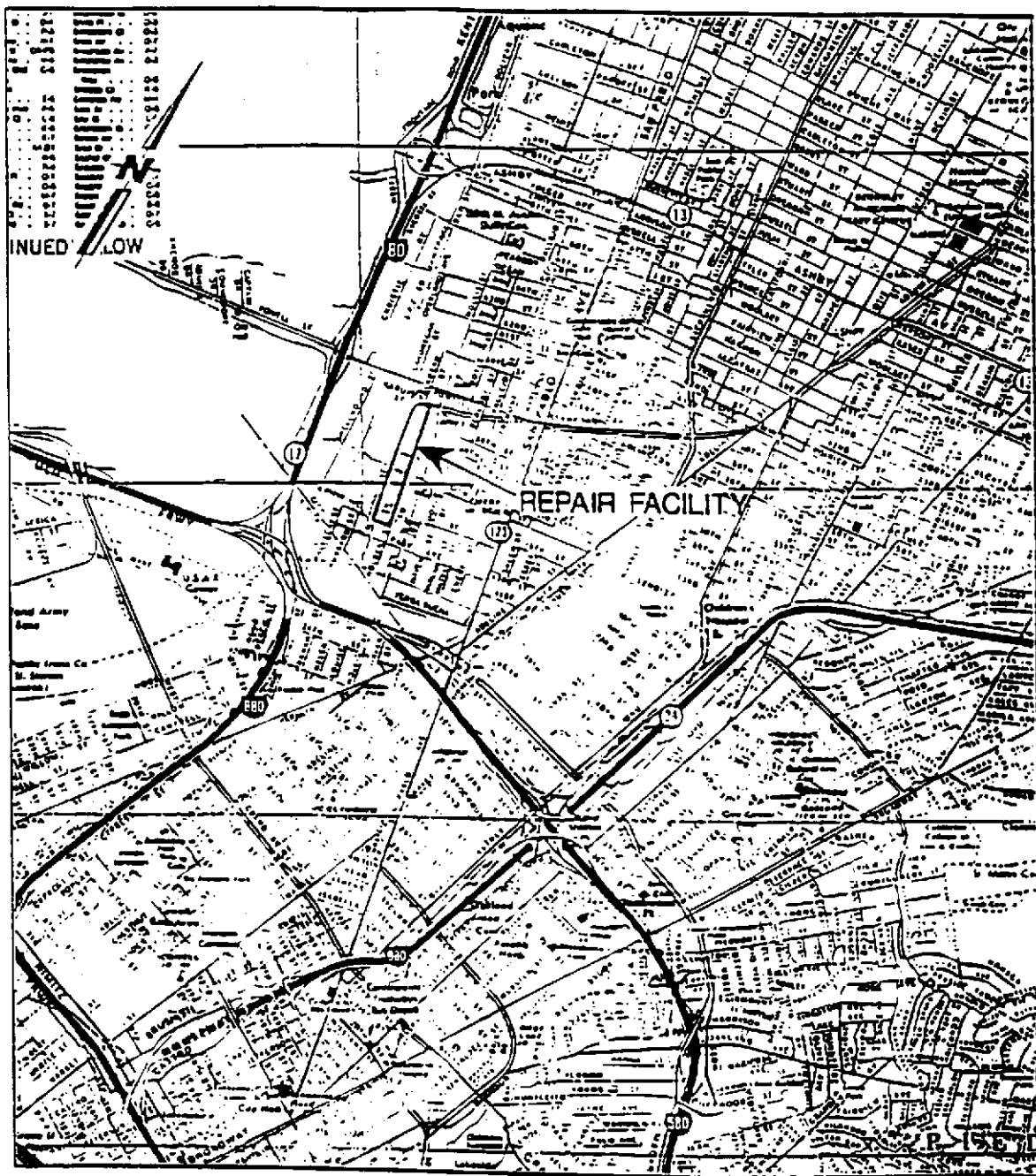
<sup>3</sup>See Table B-2 for explanation.

<sup>4</sup>Assumes plastic cover is removed from the site and soil is not disturbed.

<sup>5</sup>Assumes redistribution of soil down to 10 feet bgs and excavation at soil locations B1 and B16.

<sup>6</sup>Assumes no soil redistribution and excavation at soil locations B1, B2, and B16.





02-05-97

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PACIFIC GAS AND ELECTRIC COMPANY  
 EMERYVILLE MATERIALS FACILITY  
 EMERYVILLE, CALIFORNIA

**SITE LOCATION MAP**

FIGURE

**1-1**

PROJECT NO.

0143-014.04

02-05-97

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**STEP 1**

**STEP 2**

**STEP 3**

**STEP 4**

**STEP 5**

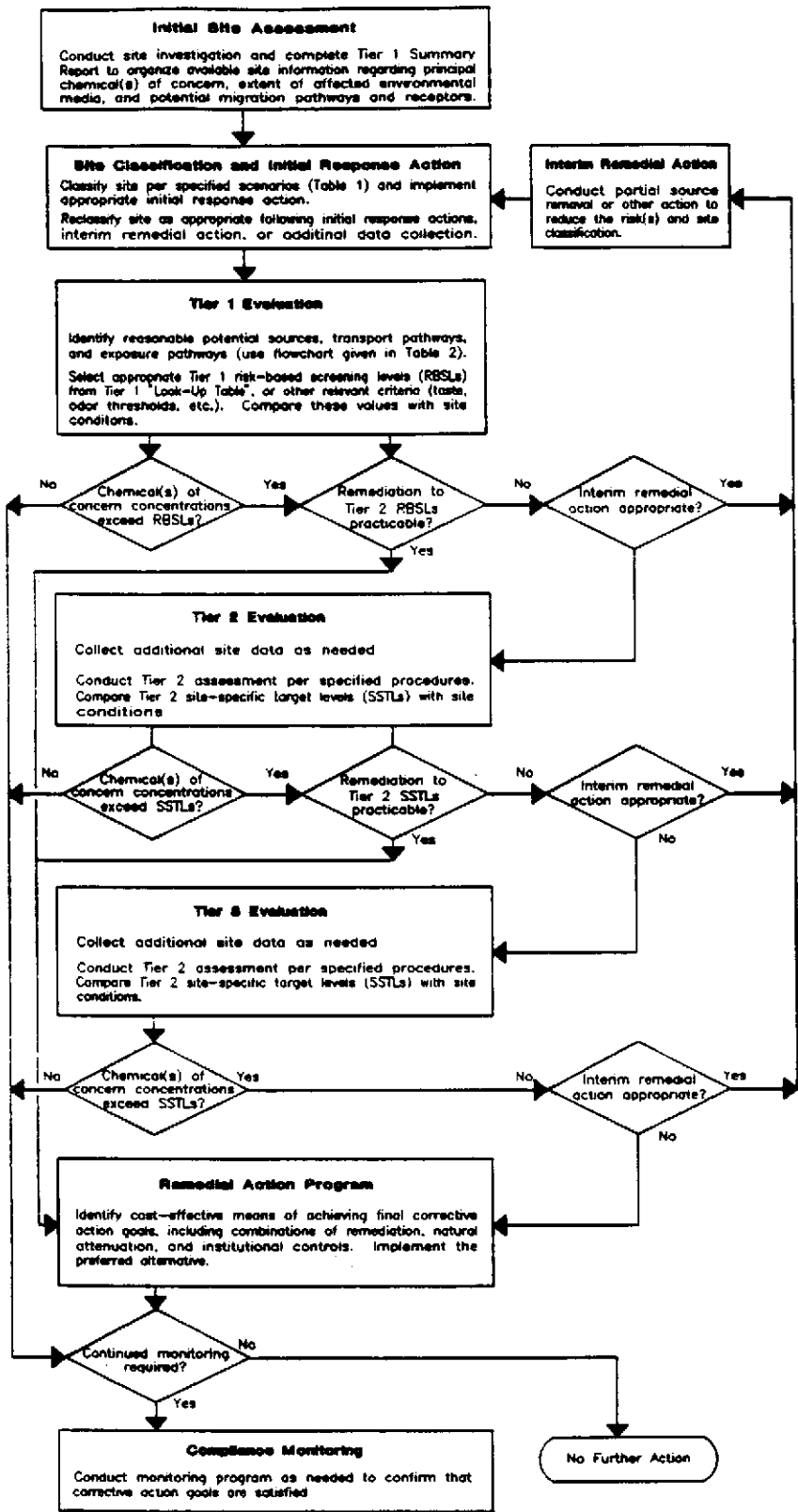
**STEP 6**

**STEP 7**

**STEP 8**

**STEP 9**

**STEP 10**



PACIFIC GAS AND ELECTRIC COMPANY  
 EMERYVILLE MATERIALS FACILITY  
 EMERYVILLE, CALIFORNIA  
 RISK-BASED CORRECTIVE  
 ACTION REPORT  
 PROCESS FLOWCHART

FIGURE  
**1-2**  
 PROJECT NO.  
 0143-014.04

Chiron Corporation

This area under construction in July 1996

53rd Street

ESE 3

ESE 4

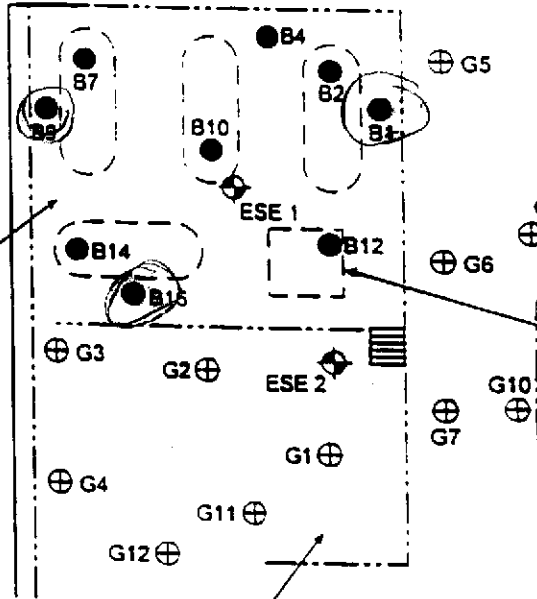
North Entrance Driveway

Chiron Corporation

Former Tank Farm

Former Oil Transfer Pump

Concrete Pad



LEGEND

⊕ 1996 geoprobe boring location

⊕ 1994 monitoring well

● 1993 ESP boring location

○ Approximate location of the former above-ground transformer oil storage tanks

--- Fence

02-05-97

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PACIFIC GAS AND ELECTRIC COMPANY  
EMERYVILLE MATERIALS FACILITY  
EMERYVILLE, CALIFORNIA

SITE MAP

FIGURE

2-1

PROJECT NO.

0143-014.04

**APPENDIX A**  
**SITE-SPECIFIC TARGET LEVEL COMPUTATIONS**

Table A-1

**Tier 2 SSTL Intake Assumptions  
Risk Based Corrective Action Report  
Pacific Gas and Electric Company  
Former Aboveground  
Transformer Oil Storage Tank Area  
Emeryville Materials Facility  
Emeryville, California**

Intake assumption      Symbol      Value      Source

Construction Worker

Exposure Duration (years)	ED1	1 ✓	site specific
Exposure Duration (days/yr)	ED2	30 ✓	site specific
Ingestion Rate (mg/day)	IR	480 ✓	USEPA, 1991
Oral Absorption Factor	OAF	1 ✓	ASTM, 1995
Dermal Surface Area (cm <sup>2</sup> /day)	DSA	5300 ✓	default, 50th percentile skin surface area comprising head, hands, legs, arms, and feet (USEPA, 1990)
Soil Adherence Factor (mg/cm <sup>2</sup> )	SAF	0.5 ✓	ASTM, 1995
Dermal Absorption Factor	DAF	0.15 ✓	California, 1994a (for PCBs)
Body Weight (kg)	BW	70 ✓	ASTM, 1995
Averaging Time for Carcinogens (days)	ATc	25550 ✓	365 days x 70 years

Utility Line Worker

Exposure Duration (years)	ED1	25 ✓	site specific
Exposure Duration (days/yr)	ED2	1 ✓	site specific
Ingestion Rate (mg/day)	IR	480 ✓	USEPA, 1991
Oral Absorption Factor	OAF	1 ✓	ASTM, 1995
Dermal Surface Area (cm <sup>2</sup> /day)	DSA	5300 ✓	default, 50th percentile skin surface area comprising head, hands, legs, arms, and feet (USEPA, 1990)
Soil Adherence Factor (mg/cm <sup>2</sup> )	SAF	0.5 ✓	ASTM, 1995
Dermal Absorption Factor	DAF	0.15 ✓	California, 1994a (for PCBs)
Body Weight (kg)	BW	70 ✓	ASTM, 1995
Averaging Time for Carcinogens (days)	ATc	25550 ✓	365 days x 70 years

Industrial Worker

Exposure Duration (years)	ED1	25 ✓	ASTM, 1995
Exposure Duration (days/yr)	ED2	250 ✓	ASTM, 1995
Ingestion Rate (mg/day)	IR	50 ✓	ASTM, 1995
Oral Absorption Factor	OAF	1 ✓	ASTM, 1995
Dermal Surface Area (cm <sup>2</sup> /day)	DSA	3160 ✓	ASTM, 1995
Soil Adherence Factor (mg/cm <sup>2</sup> )	SAF	0.5 ✓	ASTM, 1995
Dermal Absorption Factor	DAF	0.15 ✓	California, 1994a (for PCBs)
Body Weight (kg)	BW	70 ✓	ASTM, 1995
Averaging Time for Carcinogens (days)	ATc	25550 ✓	365 days x 70 years

Table A-2

**Tier 2 SSTL Computations**  
**Risk Based Corrective Action Report**  
**Pacific Gas and Electric Company**  
**Former Aboveground**  
**Transformer Oil Storage Tank Area**  
**Emeryville Materials Facility**  
**Emeryville, California**

	Construction worker	Utility line worker	Industrial worker
SSTLc Computation	Aroclor-1260	Aroclor-1260	Aroclor-1260
Chemical specific SSTLc (mg/kg)	88	106	1.3
= assumed target risk	1.00E-05	1.00E-05	1.00E-05
= oral slope factor (kg-da/mg)	7.7	7.7	7.7

SSTL Concentration for carcinogens (SSTLc) estimated based on the following equation and assumptions stated above:

$$SSTLc = \frac{TR \times BW \times ATn}{ED1 \times ED2 \times ((IR \times OAP \times UCF \times OSF) + (DSA \times SAF \times DAF \times UCF \times OSF))}$$

Notes:

OSF = Oral slope factor

UCF =  $1 \times 10^4$  kg/mg Unit Conversion Factor

Toxicity values obtained from California, 1994b

**APPENDIX B**

**SITE DATA**

**Table B-1**  
**Analytical Soil Data<sup>1</sup>**  
**Risk Based Corrective Action Report**  
**Former Above Ground Transformer Oil Storage Tank Area**  
**Emeryville Materials Facility**  
**Emeryville, California**

Sample Designation	Sampling Date	Sample Depth (feet)	Polychlorinated					
			Biphenyls <sup>2</sup> (mg/Kg)	TEPH <sup>3</sup> (mg/kg)	Benzene (ug/kg)	Toluene (ug/kg)	Ethylbenzene (ug/kg)	Xylenes (ug/kg)
B1	10/06/93	0-1.5	38	NA <sup>4</sup>	NA	NA	NA	NA
B1	10/06/93	1.5-3.0	<1	NA	NA	NA	NA	NA
B1	10/06/93	3.0-4.5	385	NA	NA	NA	NA	NA
B1	10/06/93	4.5-6.0	350	NA	NA	NA	NA	NA
B1	10/06/93	6.0-7.5	295	NA	NA	NA	NA	NA
B1	10/06/93	7.5-9.0	2	NA	NA	NA	NA	NA
B2	10/06/93	1.0-2.0	4	NA	NA	NA	NA	NA
B2	10/06/93	2.0-3.0	<1	NA	NA	NA	NA	NA
B2	10/06/93	4.0-6.0	<1	NA	NA	NA	NA	NA
B2	10/06/93	6.0-6.5	19	NA	NA	NA	NA	NA
B4	10/06/93	0-1.5	<1	NA	NA	NA	NA	NA
B4	10/06/93	1.5-3.0	<1	NA	NA	NA	NA	NA
B4	10/06/93	3.0-4.5	<1	NA	NA	NA	NA	NA
B4	10/06/93	4.5-6.0	<1	NA	NA	NA	NA	NA
B4	10/06/93	6.0-7.5	11	NA	NA	NA	NA	NA
B4	10/06/93	7.5-9.0	8	NA	NA	NA	NA	NA
B7	10/06/93	1.5-3.0	<1	1,950	NA	NA	NA	NA
B7	10/06/93	4.5-6.0	<1	640	NA	NA	NA	NA
B7	10/06/93	7.5-9.0	<1	7,700	NA	NA	NA	NA
B9	10/06/93	0-1.5	2	NA	NA	NA	NA	NA
B9	10/06/93	1.5-3.0	1	NA	NA	NA	NA	NA
B9	10/06/93	3.0-4.5	2	NA	NA	NA	NA	NA



**Table B-1**  
**Analytical Soil Data<sup>1</sup>**  
**Risk Based Corrective Action Report**  
**Former Above Ground Transformer Oil Storage Tank Area**  
**Emeryville Materials Facility**  
**Emeryville, California**

Sample Designation	Sampling Date	Sample Depth (feet)	Polychlorinated					
			Biphenyls <sup>2</sup> (mg/Kg)	TEPH <sup>3</sup> (mg/kg)	Benzene (ug/kg)	Toluene (ug/kg)	Ethylbenzene (ug/kg)	Xylenes (ug/kg)
B9	10/06/93	4.5-6.0	4	NA	NA	NA	NA	NA
B9	10/06/93	6.0-7.5	93	NA	NA	NA	NA	NA
B9	10/06/93	7.5-9.0	13	NA	NA	NA	NA	NA
B10	10/06/93	1.5-3.0	<1	5,200	NA	NA	NA	NA
B10	10/06/93	4.5-6.0	<1	10,000	NA	NA	NA	NA
B10	10/06/93	7.5-9.0	<1	1,600	NA	NA	NA	NA
B12	10/06/93	1.5-3.0	<1	11,000	NA	NA	NA	NA
B12	10/06/93	4.5-6.0	<1	8,400	NA	NA	NA	NA
B12	10/06/93	7.5-9.0	<1	16,000	NA	NA	NA	NA
B14	10/06/93	2.5-3.0	<1	NA	NA	NA	NA	NA
B14	10/06/93	3.0-4.5	5	NA	NA	NA	NA	NA
B14	10/06/93	4.5-6.0	15	NA	NA	NA	NA	NA
B14	10/06/93	6.0-7.5	12	NA	NA	NA	NA	NA
B14	10/06/93	7.5-9.0	16	NA	NA	NA	NA	NA
B16	10/06/93	0-1.5	185	NA	NA	NA	NA	NA
B16	10/06/93	1.5-3.0	10	NA	NA	NA	NA	NA
B16	10/06/93	3.0-4.5	32	NA	NA	NA	NA	NA
B16	10/06/93	4.5-6.0	0.5	NA	NA	NA	NA	NA
B16	10/06/93	6.0-7.5	18	NA	NA	NA	NA	NA
B16	10/06/93	7.5-9.0	9	NA	NA	NA	NA	NA

**Table B-1**  
**Analytical Soil Data<sup>1</sup>**  
**Risk Based Corrective Action Report**  
**Former Above Ground Transformer Oil Storage Tank Area**  
**Emeryville Materials Facility**  
**Emeryville, California**

Sample Designation	Sampling Date	Sample Depth (feet)	Polychlorinated					
			Biphenyls <sup>2</sup> (mg/Kg)	TEPH <sup>3</sup> (mg/kg)	Benzene (ug/kg)	Toluene (ug/kg)	Ethylbenzene (ug/kg)	Xylenes (ug/kg)
ESE-1	03/22/94	5	<1	270	6	29	<3	21
ESE-1	03/22/94	10	<1	1,800	10	29	3	25
ESE-1	03/22/94	16	<1	<5	<3	<3	<3	<3
ESE-1	03/22/94	19	<1	<5	<3	<3	<3	<3
ESE-2	03/22/94	5	<1	8	<3	<3	<3	<3
ESE-2	03/22/94	9	<1	2,100	9	28	3	21
ESE-2	03/22/94	10	<1	<5	<3	<3	<3	<3
ESE-2	03/22/94	15	<1	1,900	<3	<3	<3	<3
ESE-3	03/22/94	5	<1	<5	<3	<3	<3	<3
ESE-3	03/22/94	10	<1	<5	<3	<3	<3	<3
ESE-3	03/22/94	13	<1	<5	<3	<3	<3	<3
ESE-3	03/22/94	19	<1	<5	<3	<3	<3	<3
ESE-4	03/22/94	5	<1	<5	<3	<3	<3	<3
ESE-4	03/22/94	10	<1	<5	<3	<3	<3	<3
ESE-4	03/22/94	15	<1	<5	<3	<3	<3	<3
ESE-4	03/22/94	20	<1	<5	<3	<3	<3	<3
G-1	07/25/96	11.5-12	<0.1	1,200	<5	<5	<5	<5
G-2	07/25/96	14-14.5	<0.1	<10	<5	<5	<5	<5
G-3	07/25/96	14-14.5	<0.1	<10	<5	<5	<5	<5

**Table B-1**  
**Analytical Soil Data<sup>1</sup>**  
**Risk Based Corrective Action Report**  
**Former Above Ground Transformer Oil Storage Tank Area**  
**Emeryville Materials Facility**  
**Emeryville, California**

Sample Designation	Sampling Date	Sample Depth (feet)	Polychlorinated					
			Biphenyls <sup>2</sup> (mg/Kg)	TEPH <sup>3</sup> (mg/kg)	Benzene (ug/kg)	Toluene (ug/kg)	Ethylbenzene (ug/kg)	Xylenes (ug/kg)
G-4	07/25/96	14-14.5	<0.1	<10	<5	<5	<5	<5
G-5	07/25/96	11-11.5	<0.1	<10	<5	<5	<5	<5
G-6	07/25/96	11.5-12	0.26	13,000	<5	<5	<5	<5
G-7	07/25/96	13-13.5	<0.1	1,400	<5	<5	<5	<5
G-8	07/25/96	11-11.5	<0.1	1,100	<5	<5	<5	<5
G-9	07/25/96	11.5-12	0.13	3,100	<5	<5	<5	<5
G-10	07/25/96	11.5-12	<0.1	2,200	<5	<5	<5	<5
G-11	07/25/96	11.5-12	<0.1	<10	<5	<5	<5	<5
G-12	07/25/96	13-13.5	<0.1	2,400	<5	<5	<5	<5

**Bold entries indicate maximum detected concentrations used in Tier 1 evaluation**

mg/kg = milligrams per kilogram.  
ug/kg = micrograms per kilogram.

<sup>1</sup> Data from PGE; 1994a,b,1996.  
<sup>2</sup> Includes analysis for aroclor 1016, 1221, 1232, 1242, 1248, 1254, and 1260; only 1260 was detected.  
<sup>3</sup> TEPH = total extractable petroleum hydrocarbons.  
NA = not analyzed.

QC: SQC JA 11/8/96

**Table B-2**  
**Analytical Soil Data Statistics<sup>1</sup>**  
**Risk Based Corrective Action Report**  
**Former Above Ground Transformer Oil Storage Tank Area**  
**Emeryville Materials Facility**  
**Emeryville, California**

Sample Designation	Sampling Date	Sample Depth (feet)	Polychlorinated Biphenyls <sup>2</sup> (mg/Kg)	FULL DATA	FULL DATA	LIMITED EXCAVATION	RESTRICTED CONSTRUCTION
				UNDISTURBED	UNDISTURBED	REDISTRIBUTION	NO REDISTRIBUTION
				0-10/ND = 0.5DL <sup>3</sup>	0-2/ND = 0.5DL <sup>4</sup>	0-2/ND = 0.5DL <sup>5</sup>	0-2/ND = 0.5DL <sup>4</sup>
B1	10/06/93	0-1.5	38	38	38	2	
B1	10/06/93	1.5-3.0	<1	0.5			
B1	10/06/93	3.0-4.5	385	385			
B1	10/06/93	4.5-6.0	350	350			
B1	10/06/93	6.0-7.5	295	295			
B1	10/06/93	7.5-9.0	2	2			
B2	10/06/93	1.0-2.0	4	4	4	19	
B2	10/06/93	2.0-3.0	<1	0.5			
B2	10/06/93	4.0-6.0	<1	0.5			
B2	10/06/93	6.0-6.5	19	19			
B4	10/06/93	0-1.5	<1	0.5	0.5	8	0.5
B4	10/06/93	1.5-3.0	<1	0.5			
B4	10/06/93	3.0-4.5	<1	0.5			
B4	10/06/93	4.5-6.0	11	11			
B4	10/06/93	6.0-7.5	11	11			
B4	10/06/93	7.5-9.0	8	8			
B7	10/06/93	1.5-3.0	<1	0.5	0.5	0.5	0.5
B7	10/06/93	4.5-6.0	<1	0.5			
B7	10/06/93	7.5-9.0	<1	0.5			
B9	10/06/93	0-1.5	2	2	2	93	2
B9	10/06/93	1.5-3.0	1	1			
B9	10/06/93	3.0-4.5	2	2			

**Table B-2**  
**Analytical Soil Data Statistics<sup>1</sup>**  
**Risk Based Corrective Action Report**  
**Former Above Ground Transformer Oil Storage Tank Area**  
**Emeryville Materials Facility**  
**Emeryville, California**

Sample Designation	Sampling Date	Sample Depth (feet)	Polychlorinated Biphenyls <sup>2</sup> (mg/Kg)	FULL DATA	FULL DATA	LIMITED EXCAVATION	RESTRICTED CONSTRUCTION
				UNDISTURBED	UNDISTURBED	REDISTRIBUTION	NO REDISTRIBUTION
				0-10/ND = 0.5DL <sup>3</sup>	0-2/ND = 0.5DL <sup>4</sup>	0-2/ND = 0.5DL <sup>5</sup>	0-2/ND = 0.5DL <sup>6</sup>
B9	10/06/93	1.5-4.0	4	4			
B9	10/06/93	6.0-7.5	93	93			
B9	10/06/93	7.5-9.0	13	13			
B10	10/06/93	1.5-3.0	<1	0.5	0.5	0.5	0.5
B10	10/06/93	4.5-6.0	<1	0.5			
B10	10/06/93	7.5-9.0	<1	0.5			
B12	10/06/93	1.5-3.0	<1	0.5	0.5	0.5	0.5
B12	10/06/93	4.5-6.0	<1	0.5			
B12	10/06/93	7.5-9.0	<1	0.5			
B14	10/06/93	2.5-3.0	<1	0.5		16	
B14	10/06/93	3.0-4.5	5	5			
B14	10/06/93	4.5-6.0	15	15			
B14	10/06/93	6.0-7.5	12	12			
B14	10/06/93	7.5-9.0	16	16			
B16	10/06/93	0-1.5	185	185	185	18	
B16	10/06/93	1.5-3.0	10	10			
B16	10/06/93	3.0-4.5	32	32			
B16	10/06/93	4.5-6.0	0.5	0.5			
B16	10/06/93	6.0-7.5	18	18			
B16	10/06/93	7.5-9.0	9	9			

**Table B-2**  
**Analytical Soil Data Statistics<sup>1</sup>**  
**Risk Based Corrective Action Report**  
**Former Above Ground Transformer Oil Storage Tank Area**  
**Emeryville Materials Facility**  
**Emeryville, California**

Sample Designation	Sampling Date	Sample Depth (feet)	Polychlorinated Biphenyls <sup>2</sup> (mg/Kg)	FULL DATA	FULL DATA	LIMITED EXCAVATION	RESTRICTED CONSTRUCTION
				UNDISTURBED	UNDISTURBED	REDISTRIBUTION	NO REDISTRIBUTION
				0-10'/ND = 0.5DL <sup>3</sup>	0-2'/ND = 0.5DL <sup>4</sup>	0-2'/ND = 0.5DL <sup>5</sup>	0-2'/ND = 0.5DL <sup>6</sup>
ESE-1	03/22/94	5	<1	0.5		0.5	
ESE-1	03/22/94	10	<1	0.5			
ESE-2	03/22/94	5	<1	0.5		0.5	
ESE-2	03/22/94	9	<1	0.5			
ESE-2	03/22/94	10	<1	0.5			
ESE-3	03/22/94	5	<1	0.5		0.5	
ESE-3	03/22/94	10	<1	0.5			
ESE-4	03/22/94	5	<1	0.5		0.5	
ESE-4	03/22/94	10	<1	0.5			
			a. mean	30	<b>20</b>	12	0.8
			SSTL/c. worker <sup>7</sup>	<b>80</b>			
			SSTL/u. worker <sup>8</sup>	<b>106</b>			
			SSTL/i. worker <sup>9</sup>		<b>1.3</b>	1.3	1.3

mg/Kg = milligrams per kilogram.

' = feet below ground surface

ND = analyte not detected above detection limit (DL)

a. mean = arithmetic mean soil exposure concentration

**Bold values exceed Tier 2 Site Specific Threshold Levels**

<sup>1</sup>Data from PCB, 1993a,b, 1996

<sup>2</sup>Analysis includes aroclor 1016, 1221, 1232, 1242, 1248, 1254, and 1260; only 1260 was detected.

<sup>3</sup>All data down to 10 feet bgs is used for the calculation of the mean exposure concentration for the intrusive worker for the undisturbed site.

<sup>4</sup>All data down to 2 feet bgs is used for the calculation of the mean exposure concentration for the industrial worker at the undisturbed site.

<sup>5</sup>Mean exposure concentration for the industrial worker assuming pre-construction removal of soil at B1 down to 7.5 feet bgs

and at B16 down to 4.5 feet bgs, assuming redistribution of soil contaminants following construction.

It was assumed that redistribution at soils at ESE-1, ESE-2, ESE-3, and ESE-4 would result in "ND levels"

of contaminant at shallow depth, even though no sampling was performed at shallow depth.

<sup>6</sup>Mean exposure concentration for the industrial worker assuming removal of soil at B1 down to 9 feet bgs, B2 to 6.5 feet bgs,

and at B16 down to 2 feet bgs during construction, with addition of clean backfill at all locations up to original grade.

Assumes no construction activity at other site locations where PCBs have been detected (B4, B9, and B14).

<sup>7</sup>SSTL for the construction worker; see Table 4-1.

<sup>8</sup>SSTL for the utility worker; see Table 4-1.

<sup>9</sup>SSTL for the industrial worker; see Table 4-1.

QC: needs QC

**Table B-3<sup>1</sup>**  
**Analytical Groundwater Data (ug/L)**  
**Risk-Based Corrective Action Report**  
**Former Above Ground Transformer Oil Storage Tank Area**  
**Emeryville Materials Facility**  
**Emeryville, California**

Sample Designation	Sampling Date	Polychlorinated Biphenyls <sup>2</sup>	TEPH <sup>3</sup>	Benzene	Toluene	Ethylbenzene	Xylenes
ESE-1	03/28/94	<1	340	<0.3	<0.3	<0.3	<0.3
ESE-1	12/12/94	<0.5	80	<0.5	<0.5	<0.5	<0.5
ESE-1	03/13/95	<b>1.3</b>	<b>500<sup>4</sup></b>	<0.5	<0.5	<0.5	<0.5
ESE-1	06/15/95	<0.5	350 <sup>4</sup>	<0.5	<0.5	<0.5	<0.5
ESE-1	09/15/95	<0.5	170 <sup>4</sup>	<0.5	<0.5	<0.5	<0.5
ESE-1	12/15/95	<0.5	440 <sup>4</sup>	<0.5	<0.5	<0.5	<0.5
ESE-1	03/15/96	<0.5	277	<0.5	<0.5	<0.5	<0.5
ESE-1	06/14/96	<0.5	<500	<0.5	<0.5	<0.5	<0.5
ESE-1	10/07/96	<0.5	110 <sup>5</sup>	<0.5	<0.5	<0.5	<0.5
ESE-2	03/28/94	<1	250	<b>0.8</b>	<b>1.5</b>	<0.3	<b>2.7</b>
ESE-2	12/12/94	<0.5	<50	<0.5	<0.5	<0.5	<0.5
ESE-2	03/13/95	<0.5	120 <sup>6</sup>	<0.5	<0.5	<0.5	<0.5
ESE-2	06/15/95	<0.5	<50	<0.5	<0.5	<0.5	<0.5
ESE-2	09/15/95	<0.5	<50	<0.5	<0.5	<0.5	<0.5
ESE-2	12/15/95	<0.5	<50	<0.5	<0.5	<0.5	<0.5
ESE-2	03/15/96	<0.5	<59	<0.5	<0.5	<0.5	<0.5
ESE-2	06/14/96	<0.5	<500	<0.5	<0.5	<0.5	<0.5
ESE-2	10/07/96	<0.5	<b>150<sup>5</sup></b>	<0.5	<0.5	<0.5	<0.5
ESE-3	03/28/94	<1	<50	<0.3	<0.3	<0.3	<0.3
ESE-3	12/12/94	<0.5	<50	<0.5	<0.5	<0.5	<0.5
ESE-3	03/13/95	<0.5	<50	<0.5	<0.5	<0.5	<0.5
ESE-3	06/15/95	<0.5	<50	<0.5	<0.5	<0.5	<0.5
ESE-3	09/15/95	<0.5	<50	<0.5	<0.5	<0.5	<0.5

**Table B-3<sup>1</sup>**  
**Analytical Groundwater Data (ug/L)**  
**Risk-Based Corrective Action Report**  
**Former Above Ground Transformer Oil Storage Tank Area**  
**Emeryville Materials Facility**  
**Emeryville, California**

Sample Designation	Sampling Date	Polychlorinated Biphenyls <sup>2</sup>	TEPH <sup>3</sup>	Benzene	Toluene	Ethylbenzene	Xylenes
ESE-3	12/15/95	<0.5	<50	<0.5	<0.5	<0.5	<0.5
ESE-3	03/15/96	<0.5	<59	<0.5	<0.5	<0.5	<0.5
ESE-3	06/14/96	<0.5	<500	<0.5	<0.5	<0.5	<0.5
ESE-3	10/07/96	<0.5	<100	<0.5	<0.5	<0.5	<0.5
ESE-4	03/28/94	<1	<50	<0.3	<0.3	<0.3	<0.3
ESE-4	12/12/94	<0.5	<50	<0.5	<0.5	<0.5	<0.5
ESE-4	03/13/95	<0.5	56 <sup>6</sup>	<0.5	<0.5	<0.5	<0.5
ESE-4	06/15/95	<0.5	<50	<0.5	<0.5	<0.5	<0.5
ESE-4	09/15/95	<0.5	<50	<0.5	<0.5	<0.5	<0.5
ESE-4	12/15/95	<0.5	57 <sup>6</sup>	<0.5	<0.5	<0.5	<0.5
ESE-4	03/15/96	<0.5	<59	<0.5	<0.5	<0.5	<0.5
ESE-4	06/14/96	<0.5	<500	<0.5	<0.5	<0.5	<0.5
ESE-4	10/07/96	<0.5	<100	<0.5	<0.5	<0.5	<0.5

**Bold entries indicate maximum detected concentrations used in Tier 1 evaluation**

ug/l = micrograms per liter.

<sup>1</sup> Data from EMCON, 1996.

<sup>2</sup> Includes analysis for aroclor 1016, 1221, 1232, 1242, 1248, 1254, and 1260; only 1260 was detected.

<sup>3</sup> TEPH = total extractable petroleum hydrocarbons.

<sup>4</sup> Compounds similar to client-supplied transformer oil were found.

<sup>5</sup> Hydrocarbon reported does not match the pattern of laboratory standard for mineral oil.

<sup>6</sup> Compounds in diesel range not similar to laboratory standard for transformer oil

NA = not analyzed.

QC: SQC JA 11/8/96